**Farmer Mental Health and Rural Stressors**

by

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Abstract

Agriculture has recently suffered from low commodity prices, natural disasters (e.g. droughts and hurricanes), and supply chain disruptions due to COVID-19. These factors influence the physical and mental health of farmers while conducting their operations, which can lead to stress and other negative health effects. The American Farm Bureau conducted a survey in 2019 which found that farm finances and economic factors were the leading drivers affecting farmers' mental well-being (American Farm Bureau, 2019).

Our approach measures the impact of financial stress on mental well-being by focusing on the farm management decisions of farmers. These decisions include navigation of finances, decisions regarding weather, and relations inside and outside of the operation. The impacts of these themes can affect personal health and economic resiliency.

This study uses a survey of extension agents and ALFA Fieldmen in Alabama. These two groups regularly interact with farmers and their impressions of what farmers are focusing on in their business provide important insights into farmer mental well-being. The analysis of the survey results is primarily qualitative with a focus on the themes that are most prominent in defining farmer stress. This work has potential to impact the farming community in ways of education and resources for dealing with physical and mental stressors of the farming occupation.

Acknowledgments

I would love to express my gratitude to my remarkable support group; my mother, Leigh Hudon, my father, John Hudon, my brother, Jack Hudon, and major professor, Dr. Mykel Taylor. Thank you for your constant support, guidance, and assistance in this impactful project.

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# Chapter 1

## Introduction

A well-known fact among the community of employed individuals in the agricultural sector is that the farming occupation is stressful (C.D.C 2021). This broad fact is recognized, although little is known about the specifics of farmer stress and their mental health state. This study is motivated by the stressful nature of the occupation of farming, and the effects of farming on mental health. This stress manifests itself into mental health issues, eventually affecting the entire outlook and lifestyle for farmers and people around them. Whether stress is brought on by unexpected changes in weather conditions, financial issues, personal problems, or the daily lifestyle, farming proves to be one of the top stressful occupations (Dudensing et al.2017) .

In order to investigate farmer mental health and rural stressors, a Qualtrics survey was created to analyze the stress level and mental health state of farmers as perceived by extension professionals. This survey was sent via email to a variety of extension professionals including County Extension Coordinators, Regional Extension Agents, State Extension Specialists, ALFA Fieldman (multi-county), and other extension professionals. These representatives of the farmers have the highest knowledge and intimate information regarding the farming community in Alabama and their feelings toward stress. They are the individuals that assist in troubleshooting and solving the problems, and some have held this position for upwards of 30 years. Extension professionals were asked to complete the 31-question survey regarding demographics, open ended response questions, and ranking questions. Although some of the questions were developed based on Rudolphi et al. (2019), this research is unique in that extension professionals are surveyed regarding their perception of the farmers on a multitude of topics. Liang et al. (2021) also used a survey instrument to obtain data on farmer mental health. Farmers themselves

are not motivated, or do not have the resources to reach out for assistance for themselves (Cole & Bondy 2019). Therefore, we strive to address this issue and understand the determinants of farmers' well-being by surveying professionals who regularly interact with farming communities across Alabama. Due to the lack of knowledge and or resources, the aim of our survey include specifics regarding farming stressors, and the willingness of extension professionals to assist in mental health promotion and awareness.

The goal of this research is to better understand what causes mental health issues for farmers and to inform extension economists on how best to approach educating farmers about financial decisions and outcomes. The analysis performed on the survey data indicated that time management and financial concerns were the top stressors according to extension professionals affecting farmers. Further analysis yields some indication that there are differences among extension professionals on which stressors are the primary drivers of mental health issues for farmers. Throughout this paper, the data from the Qualtrics survey are presented, the methodology to perform the survey and analysis results are given, and conclusions from the responses are discussed. Future research is then outlined to guide work on farmer well-being and moving in the direction of understanding more about this topic.

Through this research, it is discovered that farmers are under an immense amount of stress due to their farming operations. The top stressors are financial in nature, although stress manifests in many different forms and is prolonged by the lack of education and awareness of resources to alleviate the negative consequences of stress for farmers. First, we review the relevant literature examining this topic and study the background information. We then discuss the data and provide descriptive statistics of our study sample. After, we lay out the methods and models used to analyze the data. Finally, we study the results of our empirical investigation and

discuss the practical implication of our findings regarding farmer mental health, and actions to take for further research.

## Chapter 2

Background and Literature Review

Farming is one of the most stressful occupations and has been studied by many different researchers (Henning- smith et al. 2021; Dudensing et al.2017; Liang et al. 2021). There are many different factors that contribute to farmer mental health. The main stressors found within the literature are unfavorable weather conditions, financial struggles, lack of insurance and healthcare/coverage, access to care, social isolation, geographic location, and makeup of the land. These topics are outlined below following by a discussion of how stress manifests.

### *Weather:*

Weather variability has been shown by several studies to affect farmers' mental well-being. The variability in weather causes difficulties in planning for the care of crops and livestock, therefore initiating the cycle of anxiety, depression, and other results of such stressors. According to Wilson et al. (2019), weather leads to stress in farmers due to the "unpredictable nature" of weather and natural disasters. Most weather-based challenges that farmers experience are outside of their control (Henning-Smith et al. 2021). Climate change and natural hazards effect on individuals' quality of life and wellbeing in the Murray-Darling Basin of Australia was studied by Yazd et al. (2020). The results of their study indicate that with higher variability in the weather, mental health worsens, and suicide rates are heightened. Environments such as those studied by Yazd et al. (2020) are vulnerable to issues of drought due to their location in Australia. Results from the study reflect that farmer mental health issues are considerably high in this region of Australia, and that the suicide rates are more than double compared to the general population. In a study by Kearney et al. (2014), farmers were screened on a scale from very

stressful to not stressful. Weather, as a stressor, received the highest percentage rate at 60.2% reporting that weather was a "very stressful" event that farmers dealt with on a daily basis.

*Financial Struggles:*

According to a recent survey by the American Farm Bureau (2020) one of the top stressors for farmers are financial issues; the top 4 reasons are financial in nature, with the top two being financial issues and the future of the farm (Yazd et. al 2019). When respondents were asked how much they thought each topic affected the mental health of farmers, 60% of participants listed financial issues, while fear of losing the farm was listed by 54% of respondents, an uncertain future was listed by 51% of respondents and the state of the farm economy reported was listed by 50% of respondents (see figure 1).

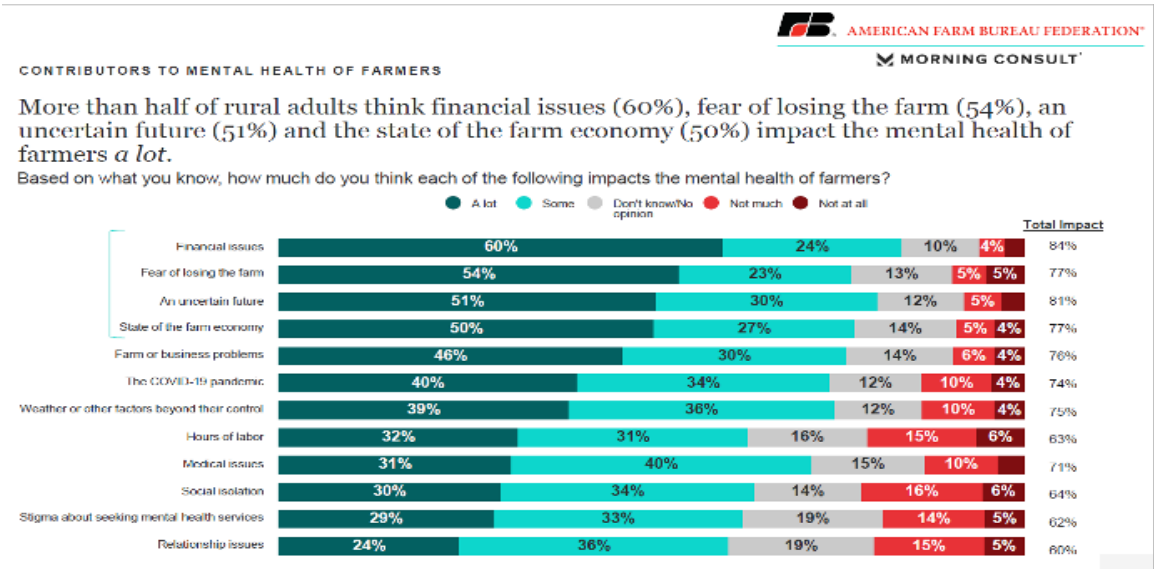


*Figure 1. American Farm Bureau Federation Summary Statisstics regarding farmer mental health*

Financial struggles are a collective concern for many farmers. Many aspects of finances are out of the farmers control including worries about debt, financial stress, tariffs and price changes (Henning-Smith et al. 2021). Some individual comments during interviews of farmers assert the claim that financial issues are the primary triggers of stress and related psychological

mental states in farming communities: “Sometimes I feel like I’m dealing to the penny. I gotta round down all of my sales. The expenses have continued to rise, and for us in our farm it’s the cost of seed, it’s the cost of land, it’s the cost of equipment, and yet what the farmer is getting back has not really risen. The price of the goods we are selling hasn’t really changed very much for a long time.” (Henning-Smith et al. 2021). Financial struggles is a popular topic in interviews and surveys. According to Kearney et al. (2014), market prices, taxes, and health care cost were the top 3 specific stressors within the topic of finances. Individuals rank this category as “very stressful” leading the category in the study to obtain the highest median percentage within the study at 21.9% (Kearney et al. 2014). The results of these articles suggest education and assistance with farmer finances in order to alleviate stress, although there is no definitive answer to the issue with fluctuating variables within the lifestyle of farming.

*Lack of health insurance and health care/coverage:*

A large stressor for farmers is the lingering concern and risk of no healthcare coverage. A hazardous working environment for farmers is common as they deal with “chemical or biological agents, environmental conditions, stimulus, or events that trigger stress” (Brennan et al. 2021). Individuals in the farming community typically are self-employed, which results in high healthcare premiums and in some cases, no access to healthcare. “Additionally, rural Americans are more susceptible to medical conditions such as high blood pressure and obesity, have higher suicide rates, higher rates of poverty, less access to healthcare, and are less likely to have health insurance” (Wilson et al. 2019). Another struggle related is access to mental health care assistance and affording the insurance (Henning-Smith et al. 2021). Farmers used many positive and negative coping strategies such as connecting with individuals in the community and “making time for myself to get away from the farm” as well as negative coping strategies such as

substance abuse and self-isolation (Henning-Smith et al. 2021). Farmers are not motivated to access services of healthcare if they are already financially concerned, therefore, the coverage of health care by insurance companies is imperative (Henning-Smith et al. 2021). Farmers experiencing these financial difficulties and struggles are more likely to experience psychological distress (Yazd et al. 2020). Healthcare and access to insurance is a common topic between each article and between groups of farmers in a variety of areas. The most common issue with farmers and healthcare is getting farmers to come forward and actively seek resources when they are experiencing stress symptoms (Gregorie 2002). Overall, farmers are concerned with the cost of healthcare and insufficient income (Kearney et al. 2014). The lack of health insurance is a leading factor for stress among farmers and in the farming community.

*Access to care, social isolation, geographic location, and makeup of the land:*

Another topic to note related to health care is the physical difficulties in access to healthcare. Respondents reported family concerns and access to healthcare as linked stressors (Henning-Smith et al. 2021). The issues were often linked to health care issues such as difficulty accessing mental health care, difficulty affording health care insurance, mental health problems, loneliness, social isolation, and substance use (Henning-Smith et al. 2021). Social isolation is a contributing factor and can exacerbate mental health issues. “It has been found that isolation, loneliness and lack of social relationships among Australian people living in rural communities is detrimental to mental health.” (Yazd et al. 2020). Social isolation is ranked as one of the top stressors for farmers, along with financial issues, socioeconomic disadvantages, chemical exposure, and lack of health services (Yazd et al. 2020; Yazd et. al 2019). Social isolation can be the result of other stressors, or the physical stressor itself due to physical location. “Geographical

and social isolation are frequently cited as major psychosocial risk factors affecting the health of farmers" (Gregorie 2002).

Geographic location and makeup of the land surrounding the farm is another variable in mental health and stress for farmers. Causes for stress from farmers in Australia are rainfall and water allocation for dryland vs irrigated farms (Yazd et al.2020); water scarcity in geographic locations such as Australia is out of the farmers' control. The geographic location for both dryland and irrigated farms results in consternation regarding the weather and location of the farm. Location of the farm can be of high concern as there are many areas that are more prone to natural disaster. Farmers live in high stress each day knowing that there is a chance for their crop to be damaged by the next natural disaster in tornado alley, any snow storm, or any hurricane that blows through their location.

*Impacts of farmer mental health: How stress manifests*

Stress and mental health issues may manifest in many different ways depending on the individual. Some of the top responses to stress and mental health struggles include depression, suicide, alcohol and substance abuse, and anxiety (Dudensing et al. 2018). These are the reactions to stress regarding the pressures of the farming occupation. Stress causes reactions in these ways, which result in mental health struggles for many individuals in the farming community. (Gregoire 2002) mentions, "Suicide is the second most important cause of death in young farmers after accidents and is an important cause of mortality in older and retired farmers and amongst farmers' wives." Prolonged periods of stress may play a significant role in the development or progression of heart disease, depression, and anxiety and other physical issues (Kearney et. al 2014). These symptoms are crated from the manifestation of stress; Liang et. al

(2021) mention that “risk factors are well documented”, such as depression, suicide, and anxiety, but “protective measures are seldom examined”.

## Chapter 3

Methods and Models

The methods regarding the Qualtrics survey included demographic, open ended, and ranking questions (Likert scale), which were analyzed in a variety of ways. The survey with all questions and answers is given in the appendix. After receiving data, the results were summarized, and statistics are presented into a variety of tables showing count, percentage, average, and mode of different groupings of questions. The demographic questions (1-13) were measured by count and percentage to determine the number of individuals of a certain demographic participating, and what percentage of the group they held.

Question 14 was an open-ended question regarding the term “farmer stress”; to analyze this question, we looked at the output of the question. The output of question 14 was a word cloud which is created by the responses given within the question. The more repetition of words entered in the answer box, the larger in size the word becomes.

Questions 15-22 were ranking (Likert scale) questions in which individuals ranked their perception of stress level regarding each theme. For each theme, the average across the topic, and the mode answer of the topic was calculated. We used the mode responses to determine the frequency of a specific response. We used the mode due to the fact that averages typically have an equal distance between responses, and the stress scale has an undetermined distance between each response. We observed the averages across each topic to determine the “average stress score” to compare the results from the survey.

Questions 23-25 were analyzed through count and percentage in the same way as the demographic questions. The count and percentage rate of individuals’ regarding farmer type helped to lead us to a clear conclusion for each question.

Conducting a thorough investigation of the Likert scale ranking questions (15-22) allows to determine how closely correlated the themes are to one another, and whether to accept or reject the null hypothesis "means are not equal". A one tailed T test was run in order to indicate correlation, p-values, and significance; this test helped us decide to accept or reject the null hypothesis. By giving the T statistics and the P values for each theme we were able to recognize which values were statistically significant, and which values were closely correlated based on the Pearson correlation coefficient.

After determining P values and T statistics, we proceeded to run regressions on each dependent theme based on the independent variables (demographics). Figure 3 demonstrates the relationships between the variables and shows how the themes break down into different categories of stressors. The models used during regression include the independent variables: *gender, experience, experience*$^2$, as well as the entire *state*. These independent variables are referred to as "control variables." Control variables are used to determine if there are statistical differences across demographics that affect how professionals view these different stress themes.

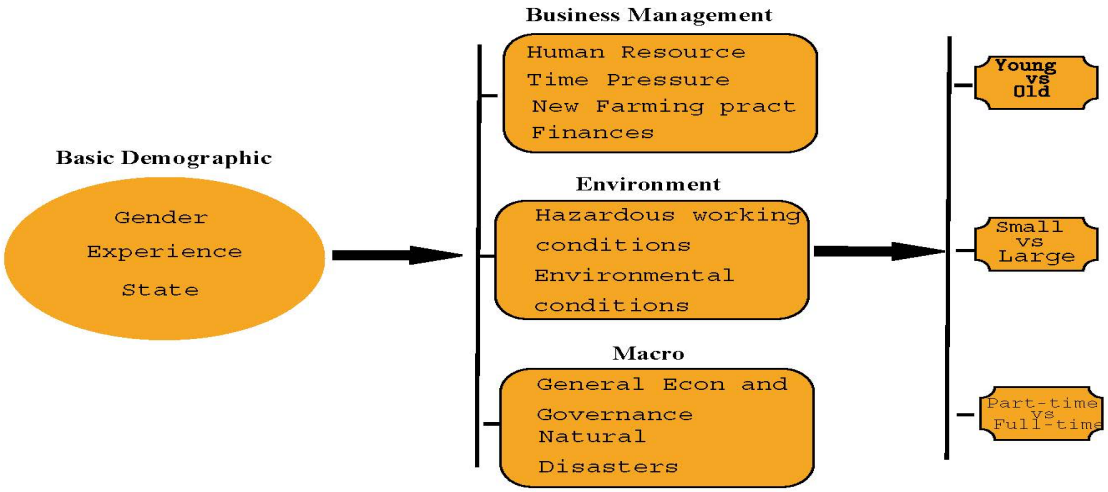


*Figure 2. Diagram of Relationships Between Stress Themes and Farmer Categories*

The quantitative analysis was conducted by using Ordinary Least Squares (OLS) regression analysis where the control variables are then regressed against each theme, Employee/Employer Relations *(HR)*, Hazardous Working Conditions *(Hazard)*, Environmental Conditions *(Environment)*, Adopting new farming practices *(New)*, Time Pressure *(Time)*, General Economics and Government *(Government)*, Personal and Business Finances *(Finance)*, Impact from Natural Disasters *(Disasters)* to generate 8 separate OLS regressions.

The *gender* control variable is in place to determine if a difference is present between men and women in their perception of farmer stress. The *Experience* and $experience^2$ control variables determine if the amount of experience possessed by an individual has on their perception of the stress level regarding each dependent variable (theme). *State* is a control variable representing the location of the individual within the state and measures the level of stress for each theme based on location.

The following shows the OLS regression for the first theme, Employee/Employer Relations (HR). Each dependent variable was regressed in the same way.

$$(1) \quad HR = \alpha 1 + \beta 1 Male + \beta 2 Experience + \beta 3\ Experience^2 + \beta 4 State$$

The second set of regressions used in this analysis and shown in equations (2) (3) and (4) include the dependent variables of *Young*, *Full-Time*, and *Small* and are estimated using a probit model. The survey question number 23 (appendix) asks, "For each type of farmer, who experiences more stress for each category?" and the respondent can pick either young farmer, older farmer, or neither. For the variable *Young*, a dummy variable is created that is equal to one if the respondent chose Young farmers more frequently than Older Farmers as being susceptible to the stress themes used in the survey. The variable *Full-Time* is also a dummy variable equal to

one if the respondent picked full-time farmer more often than part-time farmer or the "neither" response. Similarly, the variable *Small* is a dummy variable equal to one if the respondent picked the small-scale farmer as experiencing more stress for each stress theme than a large farmer. Occasionally, the respondent's answer is a tie between the two categories and those observations are dropped from the dataset, resulting in 40 observations for *Young*, 46 observations for *Full-Time*, and 43 observations for *Small*. The following models were used:

(2) Young Farmers vs Old Farmers= $\alpha 1 + \beta 1 Male + \beta 2 Experience + \beta 3\ Experience^2 + \beta 4 State + \beta 5 HR + \beta 6 Hazard + \beta 7 Environment + \beta 8 New + \beta 9 Time + \beta 10 Government + \beta 11 Finance + \beta 12 Disasters$

(3) Small Farms vs Large Farms= $\alpha 1 + \beta 1 Male + \beta 2 Experience + \beta 3\ Experience^2 + \beta 4 State + \beta 5 HR + \beta 6 Hazard + \beta 7 Environment + \beta 8 New + \beta 9 Time + \beta 10 Government + \beta 11 Finance + \beta 12 Disasters$

(4) Part Time Farm vs Full Time Farm= $\alpha 1 + \beta 1 Male + \beta 2 Experience + \beta 3\ Experience^2 + \beta 4 State + \beta 5 HR + \beta 6 Hazard + \beta 7 Environment + \beta 8 New + \beta 9 Time + \beta 10 Government + \beta 11 Finance + \beta 12 Disasters$

The stress theme variables are included in the regressions to measure if extension professionals' views of those themes in general effect how they view these particular groups of farmers (young/old, full/part-time, small/large-size). They measure the correlation between an extension professional being concerned about a particular stress theme causing more stress for

farmers in general and their concern about the stress faced by each category of farmers considered (young/old, full/part-time, small/large-size).

# Chapter 4

Data and Descriptive Statistics

*Independent Variables*

The data for this study was collected through a Qualtrics survey administered to Extension professionals and ALFA Fieldmen in January 2022. The survey questions are included in Appendix A at the end of the thesis. Table 1 and 2 show demographic information representing the independent variables in the study. The survey included a series of open ended, and ranking questions measured on a Likert scale. Questions 1-13 are demographic questions regarding participants: age, current occupation, type of producers worked with, gender, ethnicity, race, relationship status, where producers serve in the state of Alabama, and how many years the professionals have been working with their producers. Table 1 shows the results from the demographic questions; a majority of respondents (95%) were between the ages of 25-64, while 37 (67%) respondents are Male, and 18 (33%) are Female. Only one individual of "Another Hispanic, Latino, or Spanish origin" ethnicity responded to the survey, while 52 (95%) individuals of white race and 3 (5%) individuals of Black or African American race responded.

*Table 1. Demographics of survey respondent*

| Table 1 | | *Count* | *%* |
|---|---|---|---|
| *Age* | | | |
| | 18-24 | 2 | 0.03 |
| | 25-34 | 14 | 0.24 |
| | 35-44 | 14 | 0.24 |
| | 45-54 | 13 | 0.22 |
| | 55-64 | 15 | 0.25 |
| | 65+ | 1 | 0.02 |
| *Gender* | | | |
| | Male | 37 | 0.67 |
| | Female | 18 | 0.33 |
| *Ethnicity* | | | |
| | No, not Hispanic, Latino, or Spanish origin | 54 | 0.98 |
| | Another Hispanic, Latino, or Spanish origin | 1 | 0.02 |
| *Race* | | | |
| | White | 52 | 0.95 |
| | Black or African American | 3 | 0.05 |

Extension professionals and ALFA Fieldmen were chosen to partake in this survey as they are able to provide a reflection of farmers preferences and feelings regarding the practical aspect of the lifestyle of farming due to their interactions with farmers through their jobs. Extension professionals and ALFA Fieldmen are also in a position to take action regarding education and being someone to confide in for farmers. As shown in Table 2, a majority of Extension professionals have been working with their represented farmers for many years. Only 1 (2%) professional has worked with their producers for less than 1 year, 11 (21%) professionals have been working with their producers for 1-5 years, 10 (19%) professionals for 6-10 years, 8 (15%) professionals for 11-15 years, 5 (10%) professionals for 16-20 years, 7 (13%) professionals for 21-25 years, 4 (8%) professionals for 26-30 years, 5 (10%) professionals for 31-35 years, and 1 professional (2%) for more than 40 years. The extension professionals

involved in the survey include 17 (29%) County Extension Coordinators, 17 (29%) Regional Extension Agents, 10 (17%) State Extension Specialists, 9 (16%) ALFA Fieldman, 4 (7%) Other, and 1(2%) Other ACES Extension professional, for a total of 58 responses. The types of producers worked with included in the survey are 30 Row crop, 35 Fruits and Vegetables, 25 Poultry, 32 Cattle, 5 Aquaculture, 29 Forages, 5 Other and 28 Forestry. Each extension professional may represent one or multiple regions as well as types of farmers across the state of Alabama. Extension professionals responded to a question regarding the region in the state they serve; 33 responded in Northwest, 32 in Northeast, 30 in West-central, 32 in Central, 31 in East Central, 31 in Southwest, and 28 in Southeast parts of Alabama. The spread of individuals across the state indicates good representation of each region; 26 (48%) individuals served the entire state of Alabama, which is close to half of respondents.

*Table 2. Producer Demographics*

| Table 2 | Count | % |
|---|---|---|
| *Current Occupation* | | |
| County Extension Coordinator | 17 | 0.29 |
| Regional Extension Agent | 17 | 0.29 |
| Extension Specialist | 10 | 0.17 |
| ALFA Fieldman | 9 | 0.16 |
| Other | 4 | 0.07 |
| Other ACES Extension | 1 | 0.02 |
| *Type of Producers work with** | | |
| Row Crops | 30 | - |
| Fruits and Vegetables | 35 | - |
| Poultry | 25 | - |
| Cattle | 32 | - |
| Aquaculture | 5 | - |
| Forages | 29 | - |
| Other | 5 | - |
| Forestry | 28 | - |
| *Serving Entire State* | | |
| Yes | 26 | 0.48 |
| No | 28 | 0.52 |
| *Region Served** | | |
| Northwest | 33 | - |
| Northeast | 32 | - |
| West Central | 30 | - |
| Central | 32 | - |
| East Central | 31 | - |
| Southwest | 31 | - |
| Southeast | 28 | - |
| *Years working with producers* | | |
| Less than 1 | 1 | 0.02 |
| 1 - 5 years | 11 | 0.21 |
| 6-10 years | 10 | 0.19 |
| 11-15 years | 8 | 0.15 |
| 16-20 years | 5 | 0.10 |
| 21-25 years | 7 | 0.13 |
| 26-30 years | 4 | 0.08 |
| 31-35 years | 5 | 0.10 |
| More than 40 years | 1 | 0.02 |

* Extension professionals may serve more than one region or producer type.

Participants were asked what word comes to mind when they hear the word “farmer stress.” The results output for question 14 is a word cloud. This word cloud represents the words that were entered into the open-ended question box. The more repetition of the answer, the larger the word appears in the word cloud. The words entered into the open-ended question ranged in variety, although we cleaned the data into different categories that were similar. Some of the words included in the data prior to cleaning were *money, low commodity prices, high input costs, overwhelmed, overworked, underappreciated, income, daily, unknown future,* and *understandable.* The words used to categorize each of the answers prior to cleaning were *finances, weather, constant, questionable, burnout, suicide, price, and normal*. This allowed us to have a comparison of overarching themes of what came to mind when hearing the word “farmer stress”. These answers are on par with the assumption that weather, finances, and the variability of the farming occupation are the main concerns for farmers.


*Figure 3. Responses from word association regarding “farmer streess”.*

*Dependent Variables*

Ranking questions were designed to measure with a Likert scale the stress farmers are likely to feel on a variety of themes. The specific topics included in the questions were based on work by Rudolphi et al. (2019) and are Employee/Employer Relations, Hazardous Working Conditions, Environmental Conditions, Adopting New Farm Practices, Time Pressure, General Economics and Government, Personal Business and Finances, and Impact from Natural Disaster. Individuals ranked their perceptions of stress level for farmers regarding each theme using "No stress (1), Very little (2), Some (3), Quite a Bit (4), and A great deal of stress (5). For each variable, the average stress level is given along with the minimum and maximum answer for each topic within the theme.

*Table 3. Summary statistics and description of variables used in regression*

| *Variable* | *Mean* | *Standard Deviation* | *Min* | *Max* | *Observations* |
|---|---|---|---|---|---|
| *Human Resources* | 3.47 | 0.85 | 1.00 | 4.83 | 51 |
| *Hazard* | 2.65 | 0.69 | 1.29 | 4.00 | 51 |
| *Environment* | 3.46 | 0.69 | 2.00 | 5.00 | 51 |
| *New* | 2.38 | 0.59 | 1.33 | 4.00 | 51 |
| *Time* | 3.93 | 0.78 | 2.00 | 5.00 | 51 |
| *Government* | 3.32 | 0.56 | 2.14 | 4.43 | 51 |
| *Finance* | 3.90 | 0.56 | 2.82 | 5.00 | 51 |
| *Disasters* | 3.77 | 0.66 | 2.00 | 5.00 | 51 |
| *Male* | 0.67 | 0.47 | 0.00 | 1.00 | 55 |
| *State* | 0.44 | 0.50 | 0.00 | 1.00 | 59 |
| *Experience* | 15.12 | 10.59 | 1.00 | 40.00 | 52 |
| *Experience2* | 338.38 | 389.77 | 1.00 | 1600.00 | 52 |
| *Young* | 0.43 | 0.50 | 0.00 | 1.00 | 40 |
| *Full* | 0.76 | 0.43 | 0.00 | 1.00 | 46 |
| *Small* | 0.28 | 0.45 | 0.00 | 1.00 | 43 |

The dependent variables for each regression shown in equation (1) are calculated by taking the average Likert score for each theme for every respondent. The variable *Male* is a dummy variable equal to one if the respondent is a male. The variable *State* is a dummy variable equal to one if the respondent is an extension specialists with statewide responsibilities. *State* equals zero if the respondent is either a single- or multi-county extension professional. *Experience* is an integer variable that measures the number of years the extension professional has served in that role working with farmers. The variable $Experience^2$ is equal to *Experience* squared and is included in the model to account for nonlinear effects of years of experience on the dependent variable.

Table 4: Question 15 is the first of the ranking questions within the survey. The theme of "Employer/Employer relations" includes the topics of employee cost, securing or hiring qualified employees, retention of qualified employees, employee-employer conflict, employee-employee conflict, and keeping up on employee paperwork. According to the mode answer given by respondents, the most given response on stress level regarding employee cost is a 4, which reflects a quite a bit of stress. The mode answer of "quite a bit" is shown in Table 4 for employee cost, securing, or hiring qualified employees, keeping qualified employees, and keeping up on employee paperwork. The topics within the "Employee/Employer Relation" theme that experienced "some" stress with mode answers of 3 are Employee/Employer conflict and Employee/Employee conflict. In line with determining the mode for each topic within the themes, the average across questions was calculated. The "Employee/Employer Relations" theme held the highest average stress score values. The highest stress factor within the theme reported

was “keeping qualified employees” because it has the highest average score. It is closely followed by “securing or hiring qualified employees”, and “employee cost”.

*Table 4. Employee/Employer Relations Likert Summary*

| *Employee/ Employer Relations* | Average | Mode |
|---|---|---|
| Employee Cost | 3.76 | 4 |
| Securing or hiring qualified employees | 4.00 | 4 |
| Keeping Qualified Employees | 4.02 | 4 |
| Employee-Employee conflict | 2.73 | 3 |
| Employer-Employee conflict | 2.84 | 3 |
| Keeping up on employee paperwork | 3.45 | 4 |

Table 5 measures the “Hazardous Working Conditions” theme with topics regarding crop storage and handling, people around agricultural equipment, handling chemicals, operating hazardous machinery, noise levels around equipment, dust, chemical dusts, powders, and removal of safety devices. We observe a mode answer of “some” (3) and “very little” (2) stress, with lower averages from answers. This observation leads us to believe that hazardous working conditions is not as high of a stressor as other themes. Within the theme of “Hazardous Working Conditions”, we observe that the highest scoring average topic is crop storage and handling at a 2.88 level.

*Table 5. Hazardous Working Conditions Likert Summary*

| *Hazardous Working Conditions* | Average | Mode |
|---|---|---|
| Crop storage and handling | 2.88 | 3 |
| People around agricultural equipment | 2.73 | 3 |
| Handling Chemicals | 2.69 | 2 |
| Operating hazardous machinery | 2.67 | 3 |
| Noise levels around equipment | 2.43 | 2 |
| Dust, chemical dusts, powders | 2.61 | 2 |
| Removal of safety devices | 2.55 | 2 |

Table 6 regards the theme of "Environmental Conditions" with topics of too much rainfall, early/late killing frost, erosion, inadequate soil moisture levels, too little rainfall, and extreme weather. We observe mode answers of "some" (3) and "quite a bit" (4), and averages across topics reporting higher stress levels for the theme of "Environmental Conditions" as a whole. The highest reported stress level within the "Environmental Conditions" theme was 3.82, which results in a high average stress level for the topic extreme weather.

*Table 6. Environmental Conditions Likert Summary*

| *Environmental Conditions* | Average | Mode |
|---|---|---|
| Too much rainfall | 3.65 | 3 |
| Early/Late killing frost | 3.24 | 3 |
| Erosion | 2.82 | 3 |
| Inadequate soil moisture levels | 3.47 | 3 |
| Too little rainfall | 3.76 | 4 |
| Extreme weather | 3.82 | 4 |

Table 7 reports on the theme of "Adopting New Farming Practices" with topics irrigation practices, organic certifications, automation and robotic farming, vertical farming, artificial intelligence, and conservation practices. We observed mode answers of "very little" (2) and "some" (3), with lower averages of answers across topics. We conclude that "Adopting New Farming Practices" is a lower stressor than other themes, as the highest average stress score for this theme was 2.75 for the topic of irrigation practices.

*Table 7. Adopting New Farming Practices Likert Summary*

| *Adopting New Farming Practices* | Average | Mode |
|---|---|---|
| Irrigation Practices | 2.75 | 3 |
| Organic Certifications | 2.29 | 2 |
| Automation and Robotic Farming | 2.29 | 2 |
| Vertical Farming | 2.08 | 2 |
| Artificial Intelligence | 2.16 | 2 |
| Conservation Practices | 2.71 | 3 |

Table 8 surveys the theme of "Time Pressure" with topics of too much to do and too little time, not enough manpower, having to hurry through the farm work, and having too much work for one person. We observe mode answers of "some" (3), "quite a bit" (4), and "a great deal of stress" (5), as well as higher averages across topics. We conclude that "Time pressure" as a whole theme is a main stressor, specifically, the topics of too much to do and too little time, and not enough manpower with the highest averages of 4.08.

*Table 8. Time Pressure Likert Summary*

| *Time Pressure* | Average | Mode |
|---|---|---|
| Too much to do and too little time | 4.08 | 4 |
| Not enough manpower | 4.08 | 5 |
| Having to hurry through the farm work | 3.53 | 3 |
| Having too much work for one person | 4.02 | 4 |

Table 9 shows the theme of "General Economics and Government" with topics regarding government farm practices, government export policy/trade relations, the budget deficit in this country, environmental regulations, tax paperwork, succession planning, and trends in consumer demand. Through this theme, mode answers of "some" (3) are reported for each topic. Average answers across the topic help us to conclude that this theme causes some stress, although it is not the largest stressor for farmers from the perspective of extension professionals. Environmental regulations proved to hold the highest stress score average at 3.61.

*Table 9. General Economics and Government Likert Summary*

| *General Economics and Government* | Average | Mode |
|---|---|---|
| Government farm programs | 3.20 | 3 |
| Government export policy/trade relations | 3.43 | 3 |
| The budget deficit in this country | 2.94 | 3 |
| Environmental Regulations | 3.61 | 3 |
| Tax paperwork | 3.55 | 3 |
| Succession planning | 3.37 | 3 |
| Trends in consumer demand | 3.16 | 3 |

Table 10 represents the theme of "Personal and Business Finance" with topics of securing/repayment of farm loans, market prices for crops/livestock, financing their retirement, concerns over the financial future of the farm, deflated/inflated land prices, input cost, purchasing and updating equipment, financial recordkeeping, family living expenses, equipment breakdown and repairs, and cash flow. Mode answers for topics range from "some" (3), "quite a bit" (4), and "a great deal of stress" (5). Overall, we observe higher averages across topics within this theme, although the highest average is 4.39 for the topic of Input Cost. This theme was relevant during administration of the survey; fertilizer and input cost were extremely high during this period, resulting in responses representing the highest stressor reported by extension professionals for farmers.

*Table 10. Personal and Business Finances Likert Summary*

| *Personal and Business Finances* | Average | Mode |
|---|---|---|
| Securing/Repayment of farm loans | 3.71 | 3 |
| Market prices for crops/livestock | 4.12 | 4 |
| Financing their retirement | 3.84 | 4 |
| Concerns over the financial future of the farm | 4.27 | 4 |
| Deflated/Inflated land prices | 3.67 | 4 |
| Input costs | 4.39 | 5 |
| Purchasing and updating equipment | 3.73 | 4 |
| Financial recordkeeping | 3.41 | 3 |
| Family living expenses | 3.75 | 3 |
| Equipment breakdown and repairs | 4.00 | 4 |
| Cash flow | 4.02 | 4 |

Table 11 observes the theme "Natural Disasters" with topics loss of farm revenue, cost of cleanup, uncertainty about future of farming, physical cleanup process, damage to infrastructure, and crop or animal loss. Mode answers across each topic are reported as "some" (3), "quite a bit" (4) and "a great deal" (5). Averages across topics are also high, the highest being 4.31 regarding loss of farm revenue, resulting in the second highest stressor according to extension professionals for farmers in Alabama.

*Table 11. Natural Disaster Likert Summary*

| *Natural Disasters* | Average | Mode |
|---|---|---|
| Loss of farm revenue | 4.31 | 5 |
| Cost of cleanup | 3.41 | 3 |
| Uncertainty about future of farming | 3.96 | 4 |
| Physical cleanup process | 3.24 | 3 |
| Damage to infrastructure | 3.63 | 4 |
| Crop or animal loss | 4.08 | 4 |

After determining independent and dependent variables, we addressed the question of "Who experiences more stress?". For this question, we categorized farmers into 6 different types, "Younger farmers (35 or younger) and Older Farmers (65 and older)", then, "Full time vs Part time Farmers", and lastly, "Small sized farmers vs Large sized farmers". If respondents felt that one group of farmers doesn't experience more stress than the other, then they could choose neither as their answer.

Reviewing "Younger vs Older Farmers", (Table 12) measures the prior themes; we observe that Older Farmers, as a whole, have a more stressful occupation, although they have lower stress in many of the areas compared to younger farmers. Respondents believe that Younger farmers experience higher stress for: employee/employer relations, environmental conditions, time pressures, and personal and business finances. Older Farmers experience higher stress due to hazardous working conditions, adopting new farm practices, general economics and government, and impact from natural disaster. We conclude from table 12 that Older Farmers experience more stress than Younger Farmers, although the most polarizing theme that pushes Older Farmers to a higher stress level is the process of adopting new farm practices. It is believed that the difficulty to understand and perform new procedures using novel technology promotes stress in Older Farmers as they are comfortable with the older practices.

Younger farmers are reported to have a more stressful time handling personal and business finances and time pressures. Personal and Business Finances received 25 (20%) responses, and Time Pressures received 23 (20%). Older Farmers have the highest number of responses to the question asked regarding their struggle with "Adopting new farming practices." Older Farmers received 41(28%) responses for "Adopting new farming practices" followed by "General economics and government" with 28 (19%) responses. These topics are fitting with

each age group as younger farmers have not had the experience to hammer down the time pressures and deadline requirements of the occupation and have not dealt with the personal and business finances as frequently as Older Farmers. Older Farmers may experience trouble adapting to new requirements of both new farm practices and government/economic policies as they have worked their operation for many years in a consistent way and are not privy to change their ways.

*Table 12. Younger Farmers vs. Older Farmers Stress Themes*

| | Younger Farmer (35 or younger) | | Older Farmers (65 and older) | | Neither | |
|---|---|---|---|---|---|---|
| Stress Theme | Count | % | Count | % | Count | % |
| Employee/Employer relations | 19 | 0.15 | 11 | 0.08 | 20 | 0.15 |
| Hazardous working conditions | 14 | 0.11 | 15 | 0.10 | 21 | 0.16 |
| Environmental conditions | 17 | 0.14 | 10 | 0.07 | 23 | 0.18 |
| Adopting new farming practices | 6 | 0.05 | 41 | 0.28 | 3 | 0.02 |
| Time pressures | 23 | 0.19 | 15 | 0.10 | 12 | 0.09 |
| General economics and government | 8 | 0.06 | 28 | 0.19 | 14 | 0.11 |
| Personal and business finances | 25 | 0.20 | 11 | 0.08 | 14 | 0.11 |
| Impact from natural disasters | 12 | 0.10 | 14 | 0.10 | 24 | 0.18 |

Table 13 shows that full time farmers experience more stress in every theme except for time pressure. It is intuitive that part time farmers would be more stressed about the completion

of their daily duties when having other working responsibilities. The highest reported topics for part time farmers are time pressures 27 (36%) and adopting new farming practices at 13 (17%). This represents the difficulties that part time farmers face; when only farming part time it is hard to implement new farming practices as the farm cannot be first priority. Due to the fact that the farm is not first priority, time pressures weigh heavily when there is too much to do and not enough time to complete. Full time farmers are reported to largely stress about general economics and government 33 (16%) and falling slightly behind are Employee/Employer Relations 32 (15%) and Personal and business finances 32 (15%). These themes may be the highest sources of stress for full time farmers as the variation of general economics and government has full effect on their sole business. For this reason, full time farmers are reported to stress slightly less about personal and business finances, although financial concerns for a full-time farmer are constant due to the variation of the occupation. Parallel with personal and business finance, employee/employer relations are a high stressor for full time farmers as reliable work and relationships are difficult to find and keep. Full time farmers are largely more stressed as they rely on farming as their one and only profession, which affects them more than a part time farmer, as they do not have alternative income or benefits.

*Table 13. Full Time vs. Part Time Farmers Stress Themes*

| | Full time farmer | | Part time farmer | | Neither | |
|---|---|---|---|---|---|---|
| Stress Theme | Count | % | Count | % | Count | % |
| Employee/Employer relations | 32 | 0.15 | 6 | 0.08 | 12 | 0.10 |
| Hazardous working conditions | 20 | 0.10 | 8 | 0.11 | 22 | 0.19 |
| Environmental conditions | 23 | 0.11 | 5 | 0.07 | 22 | 0.19 |
| Adopting new farming practices | 24 | 0.11 | 13 | 0.17 | 13 | 0.11 |
| Time pressures | 15 | 0.07 | 27 | 0.36 | 8 | 0.07 |
| General economics and government | 33 | 0.16 | 4 | 0.05 | 13 | 0.11 |
| Personal and business finances | 32 | 0.15 | 9 | 0.12 | 9 | 0.08 |
| Impact from natural disasters | 31 | 0.15 | 3 | 0.04 | 16 | 0.14 |

In table 14, we observe the stress levels of Small Size farmers vs Large Size farmers with the same themes. We observe that for small size farmers, personal and business finances 17 (19%), and time pressures 16 (18%) are the highest ranked stressful topics. Small sized farmers may feel more stress with these topics because they are trying to make a small farm successful while working another job or possibly trying to get started in their business and borrowing large amounts of money to get started. Large size farms are reported to feel most stressed about Employee/Employer Relations 27 (16%), Time Pressures 24 (14%), and Impact from Natural Disaster 24 (14%). Large size farmers are most stressed about these topics as they may have

more acres to farm, which could increase their time commitments, need for employees, and risk exposure from natural disasters.

We can conclude that large size farmers have a much higher stress level than individuals with small sized farms. Farmers managing a large-size farming operation are assumed to have higher stress through each theme than farmers possessing a small-scale farm; this is intuitive as there is a larger operation to be run with more workers, opportunity to get hurt, more effect from the environment on a larger farm size, harsher time pressures, more money to deal with, and larger exposure to disaster.

*Table 14. Small vs. Large Size Farmers Stress Themes*

| | Small size farmers | | Large size farmers | | Neither | |
|---|---|---|---|---|---|---|
| Stress Theme | Count | % | Count | % | Count | % |
| Employee/Employer relations | 6 | 0.07 | 27 | 0.16 | 17 | 0.12 |
| Hazardous working conditions | 7 | 0.08 | 16 | 0.10 | 27 | 0.19 |
| Environmental conditions | 9 | 0.10 | 14 | 0.08 | 27 | 0.19 |
| Adopting new farming practices | 15 | 0.17 | 21 | 0.13 | 14 | 0.10 |
| Time pressures | 16 | 0.18 | 21 | 0.13 | 13 | 0.09 |
| General economics and government | 9 | 0.10 | 24 | 0.14 | 17 | 0.12 |
| Personal and business finances | 17 | 0.19 | 19 | 0.11 | 14 | 0.10 |
| Impact from natural disasters | 10 | 0.11 | 24 | 0.14 | 16 | 0.11 |

We observe questions 26 (Table 15), 27 (Table 16), and 30 (Table 17) which concern emergency resources, mental health symptoms, and extension professional's role in engaging farmers in discussions about mental health. Question 27 (Table 16) is another ranking question. Individuals are asked how familiar they are with multiple mental health resources; National Suicide Prevention Lifeline 1-800-273-TALK, Crisis Text Line 741-741, Local emergency room, 911, Alabama Crisis Farm and Ranch Stress Assistance Network Center, and AgriStress Response Network. Majority of extension professionals had "some" or "quite a bit" of knowledge about each of the resources. Question 30 (Table 17) asks extension professionals "How do you view your role engaging farmers in discussions about farmer stress?". Respondents chose between answer choices of: I am or would like to be a person they can confide in (29), I am or would like to be a person who can point them to available resources (29), It is not appropriate for me to have these conversations (3), I would like to help but need more training (30), I feel it is appropriate for agricultural professionals to be trained to recognize the signs of farmer stress (30), and other (1). Individuals were prompted to select all that apply; therefore, we have good representation for positive outlook for extension professionals wishing to be confided in, trained, and a source for resources and assistance. We observe only 3 responses for individuals that feel that it is not appropriate to discuss this topic.

*Table 15. Responses from question 26 regarding awareness of resources*

| What is your level of awareness of the following mental health resources? | Average | Mode |
|---|---|---|
| National Suicide Prevention Lifeline 1-800-273-TALK | 2.88 | 3 |
| Crisis Text Line 741-741 | 1.82 | 1 |
| Local Emergency Room | 3.43 | 3 |
| 911 | 3.82 | 5 |
| Alabama Crisis Center | 2.06 | 1 |
| AgriStress Response Network | 1.73 | 1 |
| Farm and Ranch Stress Assistance Network | 1.85 | 1 |

*Table 16. Responses from question 27 regarding referring others to resources*

| How willing are you to refer others to these mental health resources? | Average | Mode |
|---|---|---|
| National Suicide Prevention Lifeline 1-800-273-TALK | 3.41 | 3 |
| Crisis Text Line 741-741 | 3.02 | 3 |
| Local Emergency Room | 3.37 | 3 |
| 911 | 3.57 | 5 |
| Alabama Crisis Center | 3.10 | 3 |
| AgriStress Response Network | 3.08 | 3 |
| Farm and Ranch Stress Assistance Network | 3.08 | 3 |

*Table 17. Responses from question 30 on how extension professionals view their roles*

| How do you view your role discussing farmer stress? | Count | % |
|---|---|---|
| I am or would like to be a person they can confide in | 29 | 0.24 |
| I am or would like to be a person who can point them to available resources | 29 | 0.24 |
| It is not appropriate for me to have these conversations | 3 | 0.02 |
| Other | 1 | 0.01 |
| I would like to help but need more training | 30 | 0.25 |
| I feel it is appropriate for agricultural professionals too be trained to recognize the signs of farmer stress | 30 | 0.25 |

**May select more than one response.*

Overall, we observe great willingness of extension professional to participate in conversation about mental health. Extension professionals are the closest individuals to farmers themselves and would serve as great leaders in delivering information and education on stressors affecting mental health. The relationship held with their farmers allow them to be individuals to confide in for such topics.

# Chapter 5

## Results

### *Hypothesis Testing*

We conducted hypothesis testing in order to determine whether to reject, or fail to reject the null hypothesis that the means of each theme are the same. The means were calculated by averaging the Likert score for each respondent across the sub-themes given in tables 4-11.

The two themes with the largest sample means were Time and Finances. The t-test indicates that the means from these two themes are not statistically different from each other. Regarding the top scoring themes, top two are not statistically different from each other therefore time and finances are equally stressful based on the Likert scale used for these questions. The second highest mean response is for natural disaster, and the third highest is environmental conditions.

These results suggest that educational curriculum development by extension educators may need to focus on helping farmers navigate the challenges of time management and finances to reduce the occurrence of stress. Similarly, the high mean scores of Natural Disaster and Environmental Conditions may indicate a need for more education on risk management tools such as crop insurance.

*Table 18. Hypothesis testing of the mean responses to the Likert scale survey questions*

| T Statistics | *HR* | | *Hazard* | | *Environment* | | *New* | | *Time* | | *Government* | | *Finance* | | *Disaster* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Human Resources* | 1 | | | | | | | | | | | | | | |
| *Hazard* | 8.147 | *** | 1 | | | | | | | | | | | | |
| *Environment* | 0.053 | | -8.738 | *** | 1 | | | | | | | | | | |
| *New* | 10.172 | *** | 3.503 | *** | 11.945 | *** | 1 | | | | | | | | |
| *Time* | -5.079 | *** | -11.987 | *** | -3.888 | *** | -15.903 | *** | 1 | | | | | | |
| *Government* | 1.381 | * | -7.030 | *** | 1.426 | * | -12.760 | *** | 6.717 | *** | 1 | | | | |
| *Finance* | -4.792 | *** | -15.721 | *** | -5.366 | *** | -20.582 | *** | 0.298 | | -7.725 | *** | 1 | | |
| *Disaster* | -2.790 | *** | -11.684 | *** | -2.993 | *** | -14.879 | *** | 1.421 | * | -4.859 | *** | 1.793 | ** | 1 |
| Mean | 3.467 | | 2.650 | | 3.461 | | 2.379 | | 3.926 | | 3.322 | | 3.900 | | 3.771 |

*Significance level: *** 0.01 ** 0.05 * 0.1 respectively.*

*Table 19. Regression Results*

| | *Human Resources* | *Hazard* | *Environment* | *New* | *Time* | *Government* | *Finance* | *Disaster* |
|---|---|---|---|---|---|---|---|---|
| *Male* | 0.176 | -0.162 | -0.179 | -0.270 | -0.067 | 0.049 | -0.192 | -0.530 *** |
| | 0.262 | 0.215 | 0.205 | 0.18486 | 0.240 | 0.175 | 0.176 | 0.191 *** |
| *Experience* | -0.018 | -0.017 | -0.053 | 0.014 | -0.026 | 0.005 | -0.006 | 0.004 |
| | 0.043 | 0.035 | 0.033 | 0.030 | 0.039 | 0.029 | 0.029 | 0.031 |
| *Experience2* | 0.001 | 0.001 | 0.002 *** | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| | 0.001 | 0.001 | 0.001 *** | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| *State* | 0.214 | -0.291 | -0.029 | -0.04199 | 0.380 *** | 0.319 *** | -0.144 | 0.038 |
| | 0.244 | 0.200 | 0.191 | 0.172 | 0.224 *** | 0.163 *** | 0.164 | 0.178 |
| *Intercept* | 3.195 | 2.912 | 3.886 | 2.435 | 3.927 | 3.161 | 4.071 | 3.888 |
| | 0.368 | 0.302 | 0.288 | 0.260 | 0.338 | 0.246 | 0.247 | 0.269 |
| $R^2$ | 0.097 | 0.065 | 0.1459 | 0.0522 | 0.0788 | 0.079 | 0.0459 | 0.2081 |

*Significance level: ***0.01 **0.05 *0.1 respectively.*

*Regression Results*

HR regression:

The regression using *Human Resources* as the dependent variable is listed in table 19. The coefficient and standard error are given for each independent variable in the first and second row, respectively. None of the independent variables are statistically different from zero in the regression except the intercept.

Hazardous Working Conditions:

The regression using *Hazardous_Conditions* as the dependent variable is listed in table 19. With the exception of the intercept term, none of the independent variables are statistically different from zero.

Environmental Conditions:

The regression with *Environmental_Conditions* as the dependent variable is listed in table 19. In this regression, the variables for years of experience as an extension professional are statistically significant and negative at the 12% level for *Experience* and positive and statistically significant at the 4% level for $Experience^2$. This means that extension professionals with more years of experience working with farmers tend to put a lower value on the Likert score of the environmental conditions theme. The opposite sign of the squared term for experience (*Experience2*) indicates that this negative effect is reduced as the number of years of experience increases. For extension professionals with more years of experience, it is possible that they view environmental factors such as drought or too much rainfall as less of a source of stress than other themes.

Adoption of New Farming Practices:

The regression with *New_Practices* as the dependent variable is shown in table 19. With the exception of the intercept term, none of the independent variables are statistically different from zero.

Time Pressures:

The regression with *Time_Pressure* as the dependent variable is listed in table 19. Other than the intercept term, only the variable *State* is statistically different from zero. This result indicates that extension professionals with state-level responsibility rate time pressure as a greater source of stress for farmers than professionals with a county-level role. Differences in perceptions of stress for farmers between the state and county-level professionals could reflect different types of interactions leading to these perceptions between the two groups.

General Economics and Government:

The regression with *Government* as the dependent variable is listed in table 19. As with the regression for the *Time_Pressure* theme, the *State* variable is the only independent variable that is statistically different from zero. As mentioned previously, this result indicates that extension professionals with state-level responsibility rate time pressure as a greater source of stress for farmers than professionals with a county-level role.

Finances:

The regression using *Finances* as the dependent variable is listed in table 19. Except for the intercept term, none of the independent variables are statistically different from zero.

Natural Disasters:

The regression with *Disasters* as the dependent variable is listed in table 19. The variable Male is statistically different from zero in this regression, with a negative coefficient. This

implies that male extension professionals put a lower rating on natural disasters as a source of stress than their female counterparts do.

*Farm Category Regressions*

Young farmers versus Older Farmers:

The dependent variable in the farm category regression is binary, necessitating the use of a Probit regression for statistical estimation. The regression with *Young* as the dependent variable is shown in the Probit Regression Results in table 20. The variable *Male* is statistically different from zero with a negative coefficient. The implies that male extension professionals are less likely to state that young farmers experience more stress than Older Farmers. Another statistically significant variables is *Human_Resources*, which has a positive coefficient. The positive coefficient means that extension professionals that rated the human resource theme as a relatively high source of stress are more likely to state that Young farmers experience more stress than Older Farmers.

*Table 20. Probit Regression Results*

| | *Young* | *Full* | *Small* |
|---|---|---|---|
| *Male* | -1.756 | 0.098 | 1.088 |
| | 0.833 | 0.560 | 1.044 |
| *State* | -1.215 | -0.918 | 3.034 |
| | 0.866 | 0.638 | 1.365 |
| *Experience* | -0.236 | -0.051 | -0.091 |
| | 0.162 | 0.096 | 0.113 |
| *Experience2* | 0.008 | 0.002 | -0.001 |
| | 0.005 | 0.003 | 0.003 |
| *Human Resources* | 1.495 | -0.068 | -0.377 |
| | 0.631 | 0.437 | 0.600 |
| *Hazard* | 0.122 | 0.200 | -0.535 |
| | 0.494 | 0.465 | 0.663 |
| *Environment* | -0.119 | 0.248 | 1.807 |
| | 0.480 | 0.425 | 0.824 |
| *New* | 0.708 | -0.820 | -1.536 |
| | 0.968 | 0.683 | 0.931 |
| *Time* | -0.715 | 0.562 | 0.543 |
| | 0.570 | 0.487 | 0.697 |
| *Government* | 0.129 | 0.690 | -2.520 |
| | 0.814 | 0.634 | 1.249 |
| *Finance* | -1.293 | -0.648 | 1.133 |
| | 1.041 | 0.790 | 1.099 |
| *Disasters* | -0.562 | 0.400 | 0.608 |
| | 0.586 | 0.527 | 0.847 |
| *Intercept* | 5.625 | -1.499 | -2.474 |

Full-time farmers versus part-time farmers:

The regression with *Full-Time* as the dependent variable is shown in table 20. None of the independent variables are statistically different from zero in this regression.

Small-sized farmers versus large-sized farmers.

The regression with *Small* as the dependent variable is shown in table 20. The variable State is statistically different from zero and has a positive coefficient. This indicates that extension professionals with state-level responsibilities are more likely to select small-sized

farmers as experiencing more stress than large-sized farmers. Among the eight stress themes included in the regression, three are statistically different from zero, including *Environment*, *New_Practices*, and *Government*. The positive sign on the coefficient for *Environment* indicates that extension professionals who rated the environmental conditions theme relatively highly are more likely to respond that small-sized farmers experience more stress than large-sized farmers. The negative sign on the coefficient for adopting new farming practices, *New_Practices*, indicates that extension professionals that gave a higher Likert scale rating to new farming practice adoption as a source of stress are more likely to select large-scale farmers as experiencing more stress than small-scale farmers. Similarly, the negative coefficient for the Government variable indicates that extension specialists who rated general economics and government as a relatively high source of stress for farmers were also more likely to select large-sized farms as experiencing more stress than small-scale farmers.

While it is difficult to discern any overarching themes from the regression results, there are some items that can be gleaned from the analysis. There are differences in viewpoints between different types of extension professionals, either male versus female or those with state versus county responsibilities. These differences may need to be incorporated into decisions on how to design educational efforts addressing mental health for farmers.

# Chapter 6

## Conclusion

Based on demographic question analysis, open ended question responses, regression results, hypothesis testing, and correlation coefficients, we can conclude that the most stressful themes for farmers based on the perception of extension professionals are as predicted; time pressures, financial issues; this is also shown in "Evaluation on Financial Stress and Performance of Beginning Farmers during the Agricultural Downturn" (Katchova & Dinterman 2018). We observe a common awareness of mental health resources. We mainly received the answer of "some" knowledge of each resource, although individuals have the most knowledge of the 911, and the local emergency room. Through these questions, responses lead us to believe extension professionals are highly interested in action that they can take to help promote mental health in farmers, and awareness of the topic.

Results of the analysis indicated that both having the time to complete tasks on the farm and dealing with financial issues of the farming business are likely to cause stress for farmers, according to extension professionals surveyed in Alabama. These themes, along with the impact of environmental conditions (such as drought or too much rain) and natural disasters, indicate that more education for farmers may assist with the impact of these stressors. For time management, it may be useful to discuss how to find more help for the farm as well as strategies for being more efficient at farm work. It is also possible that farmers who hold jobs off the farm are stretched to thin with their time and need strategies for finding assistance. When it comes to finances, it may be useful to educate farmers on recordkeeping, financial statements, and working with their banker. Education on risk management tools like crop insurance may be

helpful in avoiding some of the stress associated with environmental conditions and natural disasters.

## Solutions and strategies:

Possible solutions for combatting mental health issues within the farming occupation is education for both farmers themselves, and people within the "circle" of farming. The main source of assistance may come from education of Extension professionals; this will lend a hand to farmers who need assistance and give extension professionals an awareness of the topic and the tools to handle the situation. Education may be delivered in multiple ways, directly to the farmer or through an extension agent, but non the less, an awareness of farmer mental health is imperative while navigating the occupation and assisting the individuals within it.

Moving forward, it would be interesting to further investigate the impacts of stress on farm management decision making of individuals at different parts of the year (i.e., pre- and post-harvest). This would be similar to (Bruns et al. 2021) and (Mani et al. 2013) when studying the cognitive state of Cambodian small hold farmers and their economic performance, as well as the mindset of the farmers at different times of the year. Are individuals more likely to experience stress pre-harvest rather than post? It would also be useful to better understand if stress affects decision making or vice versa. This type of research would require both surveys of farmers and experiments in the field with farmers.

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Appendix A

1. Agricultural Professionals Viewpoints on Farmer Stress

In effort to better understand indicators of farmer stress, Auburn University asks you to please complete the following short survey. The title of this study is, "Agricultural Professionals Viewpoints on Farmer Stress."

You are invited to participate in a research study to assess indicators of farmer stress. The study is being conducted by Mykel Taylor, Adam Rabinowitz, and Caroline Hudon in the Auburn University Department of Agricultural Economics and Rural Sociology. You are invited to participate because you work with agricultural producers and are at least 18 years of age or older.

What will be involved if you participate? Your participation is completely voluntary. If you decide to participate in this research study, you will be asked to complete an online survey about indicators of farmer stress. Your total time commitment will be approximately 15 minutes.

Are there any risks or discomforts? The risks associated with participating in this study are from the regular use of the Internet on a computer, smartphone, or tablet. There is also a minimal risk that your information could be accessed by others, however our survey host (Qualtrics) uses encryption and other methods to protect your data.

Are there any benefits to yourself or others? If you participate in this study, you can expect that your responses will be combined with others to inform Cooperative Extension, healthcare providers, and agricultural stakeholders about indicators of farmer stress. Participants will not personally benefit from participating in the study.

Will you receive compensation for participating? You will not receive any compensation from Auburn University.

If you change your mind about participating, you can withdraw at any time by closing your browser window. Once you've submitted anonymous data, it cannot be withdrawn since it will be unidentifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University or the Department of Agricultural Economics and Rural Sociology.

Any data obtained in connection with this study will remain anonymous. We will protect your privacy and the data you provide by not sharing individual responses. Information collected through your participation may be combined with other answers in summary form and used in media releases, published in a professional journal, and/or presented at professional and industry meetings.

HAVING READ THE INFORMATION ABOVE, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, PLEASE CLICK AGREE TO PARTICIPATE BELOW. YOU MAY PRINT A COPY OF THIS LETTER TO KEEP.

2. What is your age?
    a. Under 18
    b. 18-24 years old
    c. 25-34 years old
    d. 35-44 years old
    e. 45-54 years old
    f. 55-64 years old
    g. 65+ years old

3. What is your current occupation?
    a. County Extension Coordinator
    b. Regional Extension Agent
    c. Extension Specialist
    d. Other ACES Extension
    e. ALFA fieldman
    f. Other (please specify)

4. What kind of producers do you work with? (select all that apply)
    a. Row Crops
    b. Fruits and Vegetables
    c. Poultry
    d. Cattle
    e. Aquaculture
    f. Forages
    g. Forestry
    h. Other

5. What is your gender?
    a. Male
    b. Female
    c. Prefer to self describe

6. Are you of Hispanic, Latino, or Spanish origin?
    a. No, not of Hispanic, Latino, or Spanish origin
    b. Yes, Mexican, Mexican Am., Chicano
    c. Yes, Puerto Rican
    d. Yes, Cuban
    e. Yes, another Hispanic, Latino, or Spanish origin

7. What is your race? (select all that apply)
    a. White
    b. Black or African American
    c. American Indian or Alaskan Native
    d. Asian Indian
    e. Chinese
    f. Filipino
    g. Japanese
    h. Korean
    i. Vietnamese
    j. Native Hawaiian
    k. Guamanian or Chamorro
    l. Samoan
    m. Other Pacific Islander
    n. Other

8. What is your relationship status?
    a. Married, or in a domestic partnership
    b. Separated
    c. Divorced
    d. Widowed
    e. Other (please specify)

9. Do you serve producers in the entire state?
    a. Yes
    b. No

10. Do you serve only one specific county?
    a. Yes
    b. No

11. What county do you work in?
    1. Autauga County, AL
    2. Baldwin County, AL
    3. Barbour County, AL
    4. Bibb County, AL
    5. Blount County, AL
    6. Bullock County, AL
    7. Butler County, AL
    8. Calhoun County, AL
    9. Chambers County, AL
    10. Cherokee County, AL
    11. Chilton County, AL
    12. Choctaw County, AL
    13. Clarke County, AL
    14. Clay County, AL

15. Cleburne County, AL
16. Coffee County, AL
17. Colbert County, AL
18. Conecuh County, AL
19. Coosa County, AL
20. Covington County, AL
21. Crenshaw County, AL
22. Cullman County, AL
23. Dale County, AL
24. Dallas County, AL
25. DeKalb County, AL
26. Elmore County, AL
27. Escambia County, AL
28. Etowah County, AL
29. Fayette County, AL
30. Franklin County, AL
31. Geneva County, AL
32. Greene County, AL
33. Hale County, AL
34. Henry County, AL
35. Houston County, AL
36. Jackson County, AL
37. Jefferson County, AL
38. Lamar County, AL
39. Lauderdale County, AL
40. Lawrence County, AL
41. Lee County, AL
42. Limestone County, AL
43. Lowndes County, AL
44. Macon County, AL
45. Madison County, AL
46. Marengo County, AL
47. Marion County, AL
48. Marshall County, AL
49. Mobile County, AL
50. Monroe County, AL
51. Montgomery County, AL
52. Morgan County, AL
53. Perry County, AL
54. Pike County, AL
55. Pikens County, AL
56. Randolph County, AL
57. Russell County, AL
58. Shelby County, AL
59. St. Clair County, AL
60. Sumter County, AL

61. Talladega County, AL
62. Tallapoosa County, AL
63. Tuscaloosa County, AL
64. Walker County, AL
65. Washington County, AL
66. Wilcox County, AL
67. Winston County, AL

12. Which region(s) of the state do you serve? (select all that apply)
    a. 1 - Northwest
    b. 2 - Northeast
    c. 3 - West Central
    d. 4 - Central
    e. 5 - East Central
    f. 6 - Southwest
    g. 7 - Southeast

13. How many years have you been working with agricultural producers?
    a. Less than 1
    b. 1-5 years
    c. 6-10 years
    d. 11-15 years
    e. 16-20 years
    f. 21-25 years
    g. 26-30 years
    h. 31-35 years
    i. More than 40 years

14. What is the first word that comes to mind when someone says “farmer stress”?

15. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Employee/ Employer Relations
    a. Employee Cost
    b. Securing or hiring qualified employees
    c. Keeping qualified employees
    d. Employee-Employee conflict
    e. Employer-Employee conflict
    f. Keeping up on employee paperwork

16. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Hazardous Working Conditions
    a. Crop storage and handling
    b. People around agricultural equipment
    c. Handling Chemicals
    d. Operating hazardous machinery
    e. Noise levels around the equipment
    f. Dust, chemical dusts, powders
    g. Removal of safety devices

17. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Environmental Conditions
    a. Too much rainfall
    b. Early/late killing frost
    c. Erosion
    d. Inadequate soil moisture levels
    e. Too little rainfall
    f. Extreme weather

18. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Adopting New Farming Practices
    a. Irrigation Practices
    b. Organic certifications
    c. Automation and Robotic Farming
    d. Vertical Farming
    e. Artificial Intelligence
    f. Conservation Practices

19. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Time Pressure
    a. Too much to do and too little time
    b. Not enough manpower
    c. Having to hurry through the farm work
    d. Having too much work for one person

20. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? General Economics and Government
    a. Government farm programs
    b. Government export policy/trade relations
    c. The budget deficit in this country
    d. Environmental regulations
    e. Tax paperwork
    f. Succession planning
    g. Trends in consumer demand

21. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Personal Business and Finances
    a. Securing/ Repayment of farm loans
    b. Market prices for crops/livestock
    c. Financing their retirement
    d. Concerns over the financial future of the farm
    e. Deflated/Inflated land process
    f. Input costs
    g. Purchasing and updating equipment
    h. Financial recordkeeping
    i. Family living expenses
    j. Equipment breakdown and repairs
    k. Cashflow

22. Based on your interactions with farmers, what are your perceptions of the levels of stress that a farmer experiences from the following farm management issues? Natural Disasters
    a. Loss of farm revenue
    b. Cost of cleanup
    c. Uncertainty about future of farming
    d. Physical cleanup process
    e. Damage to infrastructure
    f. Crop or animal loss

23. For each type of farmer, who experiences more stress for each category?
    a. Younger Farmer (35 or younger)
    b. Older Farmers (65 and older)
    c. Neither

24. For each type of farmer, who experiences more stress for each category?
    a. Full Time Farmer
    b. Part Time Farmer
    c. Neither

25. For each type of farmer, who experiences more stress for each category?
    a. Small- Sized Farmer
    b. Large- Sized Farmer
    c. Neither

26. What is your level of awareness of the following mental health resources?
    a. National Suicide Prevention Lifeline 1-800-273-TALK
    b. Crisis Text Line 741-741
    c. Local emergency room
    d. 911
    e. Alabama Crisis Center
    f. AgriStress Response Network
    g. Farm and Ranch Stress Assistance Network

27. How willing are you to refer others to use the following mental health resources?
    a. National Suicide Prevention Lifeline 1-800-273-TALK
    b. Crisis Text Line 741-741
    c. Local emergency room
    d. 911
    e. Alabama Crisis Center
    f. AgriStress Response Network
    g. Farm and Ranch Stress Assistance Network

28. What do you consider to be common mental health symptoms that farmers experience? (select all that apply)
    a. Depression
    b. Anxiety
    c. Alcohol use problems
    d. Substance use problems
    e. Suicidal thinking
    f. Sleep problems
    g. Eating disorders
    h. Obsessive compulsive disorder
    i. Post-traumatic stress disorder
    j. Social Withdrawal
    k. Loss of interest
    l. Difficulty interacting
    m. Uncontrollable emotions
    n. Isolation
    o. Other
    p. None of the above

29. What do you consider to be the ***most*** common mental health symptom that farmers experience?
    a. Depression
    b. Anxiety
    c. Alcohol use problems
    d. Substance use problems
    e. Suicidal thinking
    f. Sleep problems
    g. Eating disorders
    h. Obsessive compulsive disorder
    i. Post-traumatic stress disorder
    j. Social Withdrawal
    k. Loss of interest
    l. Difficulty interacting
    m. Uncontrollable emotions
    n. Isolation
    o. Other
    p. None of the above

30. How do you view your role engaging farmers in discussions about farmer stress? (select all that apply)
    a. I am or would like to be a person they can confide in.
    b. I am or would like to be a person who can point them to available resources.
    c. It is not appropriate for me to have these conversations.
    d. I would like to help but need more.
    e. I feel it is appropriate for agricultural professionals to be trained to recognize the signs of farmer stress.
    f. Other

31. Is there anything else you would like to share with us about your experiences with farmer stress and mental health?