

2008

# Quantifying Stressors Among Iowa Farmers

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# Quantifying Stressors Among Iowa Farmers

## **Abstract**

In order to identify events/activities that are particularly stressful for farmers/ranchers, a farm stress survey based on the proportionate scaling method was mailed to a stratified random sample of 3,000 Iowa farmers by the USDA National Agricultural Statistics Service. The participants were asked to compare 62 life events and farm activities to a marriage (assigned a baseline rating of 50), decide if it was less stressful or more stressful, and then assign a stress rating between 1 and 100. As expected, the most stressful events were the death of a spouse or child. Other high-stress events were disabling injuries, foreclosure on a mortgage, divorce, machinery breakdown during harvest, and loss of crop to weather. Mean stress ratings varied by age, marital status, and type of farming enterprise. Farmers between the ages of 40-59 and 60-79 had the most items with high stress levels. Females had more high-stress items than males. Divorced farmers had fewer high-stress items than other respondents. Farmer's whose primary focus was raising horses had more high-stress items than other farm types. Significant outcomes of this study go beyond the specific mean stress ratings of the events and activities. The results indicate that farm stressors can be quantified using the proportionate scaling method and that the impact of the stressor is based not just on the event but is also dependent on the characteristics of the farmer (e.g., age, gender, marital status, etc.).

## **Keywords**

Farmers' attitudes, Farm stress, Farm workers, Safety, Surveys

## **Disciplines**

Agriculture | Bioresource and Agricultural Engineering

## **Comments**

This article is from *Journal of Agricultural Safety and Health*, 14, no. 4 (2008): 431–439.

# Quantifying Stressors Among Iowa Farmers

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Rural America comprises about 20% of the nation's population and occupies about 80% of its area (USDA, 2003). Farming is ranked as one of the most stressful occupations, and rural communities suffer from many occurrences of depression (Kerby, 1992). A 1999 Iowa Farm and Rural Life Poll survey revealed that approximately 57% of respondents in Iowa said their personal stress levels had increased during the previous five years (Lasley, 1999). A variety of studies have identified farm stressors ranging from personal issues to aspects of the contemporary situation in agriculture including: weather, financial difficulties, global influences, injury risk, income, family interactions, health problems, grief, interest rates, market conditions, machinery breakdown, disease outbreak, government regulations, transfer of property, and the effects of rural depopulation (Rosenblatt et al., 1985; Weigel et al., 1986; Stallones et al., 1995; May, 1998).

Stress has been shown to be directly correlated to the potential for on-the-job injury (Simpson et al., 2004). Chronic stress has been linked with many illnesses and diseases, including heart disease, ulcers, hypertension, type-2 diabetes, etc. (Kiecolt-Glaser et al., 2003). Walker and Walker (1987) also found chronic stress to be associated with a high incidence of self-reported cognitive, social, and physical symptoms (e.g., loss of temper, back pain, behavioral problem, frequent illness, and marital problems). Stallones (1996)

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Submitted for review in August 2007 as manuscript number JASH 7121; approved for publication by the Journal of Agricultural Safety and Health of ASABE in April 2008.

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noted that health-related responses to stress have not been extensively addressed in farm populations. She concluded that “much work is needed in several areas to understand the role of stress in the health of farmers and farm workers” (p. 6). We echo this sentiment and state that the same is true for the role of stress on the safety of farmers and farm workers, which is the focus of this work.

In 1967, Holmes and Rahe published their study on their Social Readjustment Rating Scale (SRRS), which used a proportionate scaling methodology to quantify the level of stress associated with a variety of life events. The PERI Life Events Scale, introduced by Dohrenwend et al. (1978), addressed some of the methodological shortcomings of the initial SRRS. Research concerning stress associated with life events over several decades has demonstrated the efficacy of this methodology for a variety of populations (Rahe, 1978; Rahe et al., 1980; Shrout et al., 1989; Raphael et al., 1991; Miller and Rahe, 1997). This literature on the stress of life events attempts to produce a summative stress score for participants and highlight the link between overall stress and health-related issues. Connecting stress (and the accumulation of stress) from life events to depression and other health-related issues has been established in the literature. However, the focus of this research on stress is not health related.

The primary interest here is in understanding which events or issues are stressful to farmers because, when stressed, farmers are more likely to make unsafe decisions that may result in injury. To meet this goal, this study uses a proportionate scaling methodology to measure stress associated with a variety of life events, farm work activities, and other farm issues among Iowa farmers. Using this methodology, one item or event (e.g., marriage) is selected as the module event (the event that other items will be compared to) and given a midrange value. All other items are then scored in proportion to the module event. The participant must first decide if a particular item is more stressful or less stressful than the module event. After they decide if the magnitude should be greater or smaller, they must then decide by how much and assign a magnitude value to the item.

## Methods

A survey was administered to a random sample of Iowa farmers following Dillman’s tailored design method (Dillman, 2000). The USDA National Agricultural Statistics Service (NASS) was contracted to administer the survey to a stratified random sample of Iowa farms (arrayed by county). Based on the number of Iowa Farms, NASS determined that approximately 500 responses were needed to draw representative conclusions. Since, NASS expects a 33% response rate on surveys mailed to Iowa farmers, it was determined that a sample of 1,500 Iowa farms would be selected. Following Dillman’s (2000) recommendations, a token financial incentive (\$2.00) was offered with the initial questionnaire to increase the response rate. NASS was interested in determining the impact of the incentive on return rates among Iowa farmers, so NASS agreed to double the sample size but only provide the incentive to one-half of the sample. This increased the sample to 3,000 Iowa farms.

All contacts with the sample population were done by NASS to maintain the anonymity of the sample and the respondents. The population was initially contacted with a brief pre-notice letter letting them know that a questionnaire for an important survey would be arriving in a few days and that their response would be greatly appreciated. The second contact consisted of the questionnaire, a detailed cover letter explaining why a response was important, and for half of the sample, the \$2.00 incentive. The third contact was a thank you postcard sent one week after the questionnaire mailing.

This postcard expressed appreciation for responding and encouragement to return the questionnaire if they had not already done so. The fourth contact was approximately four weeks after the initial questionnaire. This mailing, sent to current non-respondents, consisted of a replacement questionnaire and a cover letter indicating that the questionnaire had not been received and urging the recipient to complete and return the replacement questionnaire.

The final questionnaire consisted of three parts: (1) instructions; (2) 62 farm and life events, activities, and issues that were to be assigned a stress level; and (3) six demographic questions. The 62 items rated were selected based on the results and a factor analysis of a pilot study using a preliminary survey that contained 101 items. The original items were selected from previous studies using this methodology, the literature on farm stress, and our knowledge of Iowa agriculture.

## Results

From the 3,000 farm homes in the sample, 1,343 useable questionnaires were returned, for an overall response rate of 45%. This response rate, which is significantly higher than expected, is an indication of the importance of the topic of stress among Iowa farmers. Of these responses, 810 were part of the 1500 who received the incentive, for a response rate of 54% within this subgroup. The response rate for those who did not receive an incentive was 36% (533 out of 1500). While the response rate for this subgroup was significantly lower, it was still above the expected response rate.

Following the process established by previous researchers using the proportionate scaling methodology (Holmes and Rahe, 1967; Rahe, 1978; Rahe et al., 1980; Miller and Rahe, 1997), marriage was used as the module event. However, since this study was not designed to establish a current overall summary stress score for participants, participants were not given a time period for responses (e.g., “rate only the events you have experienced in the past year”) and were asked to rate all events, even ones they had not personally experienced. Because some of the items are extremely rare and may not have been experienced by the sample population, to achieve the primary goal of the study (identification of events that farmers find stressful), it was deemed necessary to have all respondents rate all items. The directions provided to the participants explaining the proportional scaling process are shown in figure 1.

This survey is to be completed by the farm operator or spouse and returned in the postage-paid business reply envelope provided. This survey is based on the concept of proportional scaling. In other words, you will be assigning a stress score between 1 (no stress) and 100 (the maximum stress possible) for each activity or event listed on pages 2 and 3 of this survey, by comparing that item to a baseline event (in this case marriage, which we will consider to be neither stressful nor stress free) that has been assigned a stress score of 50. For each event on the list, if you think it is more stressful than marriage, decide how much more and give the item a score between 51 and 100 (the maximum stress possible). If it is less stressful, decide how much less and give the event a score between 1 (no stress) and 49. If in your opinion the event provides the same stress as marriage, give it a score of 50. Write your numeric score in the box next to each event.

There are no right or wrong answers. It is important that you base your scores on your opinion of how each event is stressful to you personally. If there are events on the list that you have not personally experienced, base your score on how stressful you think that event would be for you in comparison to marriage. Please score every event and return the completed questionnaire in the enclosed postage-paid envelope.

**Figure 1. Directions provided with the questionnaire.**

**Table 1. Mean stress levels for each stressor in ranked order.**

Event/Activity	Mean Stress	
	Level	95% CI
Death of a spouse	88.8	(87.8 - 89.8)
Death of a child	87.8	(86.7 - 88.9)
Disabling injury of a family member	76.8	(75.6 - 77.9)
Disabling injury to yourself	73.7	(72.5 - 74.8)
Foreclosure on a mortgage or loan	72.7	(71.3 - 74.0)
Divorce	70.4	(68.9 - 71.9)
Machinery breakdown during harvest (combine, tractor, truck, etc.)	70.3	(69.3 - 71.2)
Loss of crop to weather (drought, flood, hail, wind, etc.)	70.1	(69.1 - 71.2)
Loss of crop to pests or disease	69.3	(68.3 - 70.2)
Severe weather conditions (drought, heat, flood, cold, etc.)	69.0	(68.1 - 69.9)
Lack of health insurance	67.7	(66.3 - 69.0)
Machinery breakdown during planting (tractor, planter, truck, etc.)	66.4	(65.4 - 67.4)
Assigning hazardous tasks to family members	66.2	(65.2 - 67.2)
Machinery costs	65.5	(64.5 - 66.5)
Providing health insurance for you and your family	64.7	(63.5 - 65.8)
Decrease in commodity prices	64.6	(63.7 - 65.6)
Increased input prices (seed, fertilizer, pesticides, etc.)	63.7	(62.8 - 64.6)
Working with a disability	63.5	(62.4 - 64.6)
Weather delays during planting or harvesting	63.3	(62.4 - 64.3)
Taking on a mortgage	63.2	(62.2 - 64.3)
Decreased physical abilities due to age or illness	62.9	(61.9 - 63.8)
Delay in getting parts to repair machinery	62.6	(61.6 - 63.7)
Need to increase farm income	61.2	(60.2 - 62.2)
Business readjustment (merger, re-organization, bankruptcy, etc.)	60.5	(59.3 - 61.8)
Death or disabling injury of a member of your rural community	60.2	(59.2 - 61.2)
Extra work required during planting or harvesting due to weather conditions	59.6	(58.7 - 60.6)
Having to file/maintain appropriate agency paper work (NRCS, FSA, county, etc.)	57.7	(56.7 - 58.8)
Loss of animals	57.6	(56.4 - 58.8)
Decrease in commodity quality or quantity	56.9	(55.9 - 57.9)
Working with dangerous chemicals	56.8	(55.7 - 58.0)
Need to learn new ways to increase farm income through diversification	56.3	(55.3 - 57.3)

Based on these directions, the stress ratings reported may be based on experience or perception. As expected, the most stressful items were the death or disabling injury of a family member. The top ten stressors were death of a spouse, death of a child, disabling injury of a family member, disabling injury to yourself, foreclosure on a mortgage or loan, divorce, machinery breakdown during harvest, loss of crop to weather, loss or crop to pests or disease, and severe weather conditions. The least stressful events included lack of adequate childcare facilities, neighbor asking assistance from you, and winning the lottery. The means and 95% confidence intervals for each stressor are show in table 1.

### Results by Age

The respondents were aggregated into five age categories: younger than 30 years of age ( $n = 50$ , 3.8%); 30 to 39 years of age ( $n = 95$ , 7.1%); 40 to 59 years of age ( $n = 705$ , 52.5%); 60 to 79 years of age ( $n = 454$  people, 33.8%); and 80 years of age and over ( $n = 39$ , 2.9%).

For respondents less than 30 years old, the most stressful events were death of a child and death of a spouse. These two events (both with mean stress scores greater than 80)

**Table 1 (continued). Mean stress levels for each stressor in ranked order.**

Event/Activity	Mean Stress Level	95% CI
Finding reliable help for farm work (limited labor pool for agricultural tasks)	55.0	(54.0 - 56.1)
Foreign competition in producing agricultural commodities	54.6	(53.6 - 55.7)
Encroachment of urban boundaries to farming property	54.4	(53.1 - 55.8)
Costly power outages	54.1	(52.8 - 55.3)
Transporting agricultural equipment on public roadways	53.2	(52.2 - 54.3)
Change in government commodity programs	53.2	(52.2 - 54.3)
Beginning or ceasing work off the farm	53.0	(52.0 - 54.1)
Working in a dusty or noisy environment	53.0	(51.9 - 54.1)
Legal activities from neighbor odor nuisance law suit	52.9	(51.6 - 54.2)
Sexual difficulties	52.8	(51.6 - 54.1)
Having to ask a neighbor for assistance	51.6	(50.5 - 52.7)
Vertical integration of farming	51.3	(50.2 - 52.4)
Spouse beginning or ceasing work, either on or off the farm	50.9	(49.8 - 52.0)
Marriage	50	--
Farming population shrinking	49.9	(48.8 - 51.0)
Reduction of local agricultural supporting companies	49.3	(48.3 - 50.3)
Access to timely emergency response (fire, police, medical, etc.)	48.4	(47.4 - 49.4)
Conflicts with parents about farming practices	47.9	(46.6 - 49.2)
Working with livestock	47.3	(46.3 - 48.4)
Completion of planting or harvesting	44.9	(43.7 - 46.1)
In-laws	42.2	(41.1 - 43.4)
West Nile virus	42.1	(40.9 - 43.3)
Lack of children to continue the family farm	41.6	(40.4 - 42.8)
Working in isolation	40.2	(39.1 - 41.4)
Spouse not from farm	39.8	(38.6 - 41.0)
Genetically engineered commodities	38.5	(37.4 - 39.5)
Agricultural practices of neighbor	37.8	(36.7 - 38.8)
Vacation	35.5	(34.5 - 36.5)
Lack of adequate childcare facilities	35.5	(34.4 - 36.7)
Major holidays	34.6	(33.6 - 35.7)
Neighbor asking assistance from you	32.7	(31.8 - 33.6)
Winning the lottery	29.1	(27.8 - 30.3)

were statistically significantly higher than other events, and no other event had a mean score of 70 or higher. For respondents 30 to 39 years old, the most stressful events (mean > 80) were death of a spouse and death of a child. Other high-stress events (mean > 70) for this age group included disabling injury of a family member, foreclosure on a mortgage, disabling injury to yourself, and loss of crop to weather. For respondents 40 to 59 years old, death of a child and death of a spouse were the most stressful events (mean > 80). Other high-stress events (mean > 70) for this age group included disabling injury of a family member, foreclosure on a mortgage, disabling injury to yourself, working in a dusty or noisy environment, loss of crop to weather, and machinery breakdown during harvest. For respondents 60 to 79 years old, death of a spouse and death of a child were the most stressful events, having significantly higher stress levels than others (mean > 80). Other high-stress events (mean > 70) for this age group included disabling injury of a family member, disabling injury to yourself, machinery breakdown during harvest, loss of crop to weather, foreclosure on a mortgage, and severe weather conditions. For respondents 80 years old or older, the most stressful cases were death of a spouse and

death of a child. However, among this age group, the stress levels for these two events were not significantly higher than others.

### **Results by Gender**

The majority of the respondents were male ( $n = 1089$ , 81.0%). There were 249 female respondents (18.5%) and eight respondents who did not indicate a gender.

Death of a child and death of spouse were the most stressful events for both male and female respondents, with mean stress scores above 80 and significantly higher than other events or activities. For male respondents, other events having high stress (mean > 70) were disabling injury of a family member, disabling injury to yourself, and foreclosure on a mortgage. Female respondents reported more high-stress events (mean > 70): disabling injury of a family member, disabling injury to yourself, foreclosure on a mortgage, lack of health insurance, loss of crop to weather, loss of crop to pests, machinery breakdown during harvest, divorce, severe weather conditions, assigning hazardous tasks to family members, and providing health insurance for you and your family.

### **Results by Marital Status**

Marital status was divided into five age categories: married ( $n = 1112$ , 83.5%); divorced ( $n = 73$ , 5.4%); never married ( $n = 64$ , 4.8%); widowed ( $n = 58$ , 4.3%); and married but separated ( $n = 9$ , 0.7%).

For married respondents, death of a spouse and death of a child were the most stressful events (mean > 80), and disabling injury of a family member, disabling injury to yourself, foreclosure on a mortgage, machinery breakdown during harvest, loss of crop to weather, and divorce were other high-stress events (mean > 70). Divorced respondents indicated that death of a child was the most stressful event, followed by divorce (both with a mean > 80). Other high-stress events (mean > 70) for divorced respondents were disabling injury of a family member, death of a spouse, disabling injury to yourself, and foreclosure on a mortgage. Death of a spouse was reported as the most stressful event for never-married respondents, although it was not significantly higher than other high-stress events (mean > 70), including death of a child, disabling injury of a family member, foreclosure on a mortgage, disabling injury to yourself, and machinery breakdown during harvest. Widows or widowers felt that death of spouse was the most stressful event, followed by death of a child. Disabling injury of a family member, decreased physical abilities, taking on a mortgage, loss of crop to pests, severe weather conditions, disabling injury to yourself, loss of crop to weather, and machinery breakdown during harvest were also highly stressful (mean > 70) for widowers and widows. Married but separated respondents considered death of a child and divorce to be the most stressful events, but the two events were not significantly more stressful than other high-stress events (mean > 70) such as death of a spouse, disabling injury of a family member, assigning hazardous tasks, disabling injury to yourself, and machinery breakdown during harvest.

### **Results by Farm Type**

Farm type was divided into five categories: grain and livestock ( $n = 638$ , 47.5%); grain ( $n = 436$ , 32.4%); livestock ( $n = 145$ , 10.8%); conservation reserve program (CRP) ( $n = 31$ , 2.3%); and horses ( $n = 10$ , 0.7%). There were 84 respondents who worked on other miscellaneous farm types or did not answer the question.

Death of a spouse and death of a child were the most stressful events among all farm type categories. For farmers who worked in both grain and livestock, other high-stress events (mean > 70) were disabling injury of a family member, disabling injury to yourself, foreclosure on a mortgage, machinery breakdown during harvest, and loss of

crop to weather. Grain farmers indicated that disabling injury of a family member, disabling injury to yourself, foreclosure on a mortgage, divorce, loss of crop to pests, machinery breakdown during harvest, and loss of crop to weather were high-stress events or activities (mean > 70). For livestock farmers, high-stress events (mean > 70) were reported to be disabling injury of a family member, disabling injury to yourself, divorce, foreclosure on a mortgage, and lack of health insurance. High-stress events or activities (mean > 70) for CRP farmers were disabling injury of a family member, disabling injury to yourself, and divorce. Farmers who focused on raising horses reported stress levels greater than 80 for divorce, lack of health insurance, foreclosure on a mortgage, and disabling injury of a family member. For this group, other high-stress events (mean > 70) included loss of animals, providing health insurance, disabling injury to yourself, machinery breakdown during harvest, costly power outages, and severe weather conditions.

## Discussion

The results of this study indicate that it is possible to quantify farm stressors using a proportionate scaling process. The magnitudes of stress associated with general life events reported by Iowa farmers are generally consistent with the values reported in the literature for general populations (Holmes and Rahe, 1967; Miller and Rahe, 1997). As expected, death of a spouse or child were reported as the most stressful events. Consistency of these life events with the literature increases the confidence in the values reported for farm activities and issues.

Of the 62 items ranked, 44 items were considered to be more stressful than the selected module event of marriage, while 18 were considered to be less stressful than marriage (table 1). The higher stress items as reported by Iowa farmers were generally items that we expected to be significant stressors based on the literature. Iowa farmers did, however, rate some issues that are receiving significant press exposure to be low in stress (e.g., lack of adequate childcare facilities, genetically modified commodities, and West Nile virus). For example, there has been significant focus in the national media and among safety professionals about the problem of providing adequate childcare facilities for farm children. However, Iowa farmers do not consider this to be a significant issue. While female respondents ranked lack of adequate childcare facilities slightly more stressful than male respondents (39.6 compared to 34.7), the 95% confidence intervals overlapped, indicating no significant difference on this item based on gender. What this study does not reveal is why adequate childcare was not a stressor for Iowa farmers. This may indicate that the attention brought to this issue has created the desired change and adequate childcare facilities are now available, or it may be an indication that, as Iowa farmers continue to age (approximately 11% of the respondents were less than 40 years old), daycare facilities are not an issue for most of today's farmers. It should also be noted that Iowa farmers did not consider working with livestock to be particularly stressful even though livestock are a leading cause of non-fatal work-related injuries on Iowa farms (Harlan et al., 2002).

The results varied by age of respondents. The youngest (less than 30) and the oldest (80 and older) respondents reported the fewest high-stress events, while the two groups between 40 and 80 reported more high-stress events than other age groups. Many of the high-stress items were consistent between age groups. However, the 40 to 59 age group considered working in dusty and noisy environments to be highly stressful, while the respondents as a whole ranked this item near the middle. Female respondents reported

more high-stress events than males. They also consider more family-related events to be highly stressful, such as divorce or issues associated with health insurance.

Divorced respondents reported fewer high-stress events than other respondents. Since it was more personal to this group, they ranked divorce as being much more stressful and death of a spouse to be less stressful than other respondents. Since this group actually experienced a divorce, it is likely that divorce was more personal to them. Significant stressors also varied by farm type. Respondents who focused on raising horses reported more high-stress events than other respondents. Farmers who indicated that their primary farming activity was associated with the CRP program reported fewer high-stress events. This is to be expected since they are likely to be involved in fewer farming activities at this point in their career.

While not directly related to the content of the survey, the impact of the token incentive significantly increased the response rate. The National Agricultural Statistics Service expects a 33% response rate on surveys mailed to Iowa farmers. Interest in the topic of stress among Iowa farmers likely resulted in a slight increase in the response rate (36%) among the sample that just received the survey. However, among the 1500 who received the \$2.00 incentive, the response rate of 54% was over 20 percentage points higher than expected and nearly 20 percentage points higher than the sample who did not receive the incentive. For future surveys, the cost of the incentive would pay for itself by reducing the sample size needed to obtain the number of respondents needed to draw conclusions based on Iowa farmers.

## Conclusions

This study provides a snapshot profile of Iowa farmers' perceptions and beliefs regarding the magnitude of stressors from life events and farm activities, issues, and events. Based on this study, we can draw the following conclusions:

- Farm stressors can be quantified using the proportionate scaling method.
- The perceived magnitude of the stressor is based on the event and the characteristics of the farmer (e.g., age, gender, marital status, type of operation, etc.)
- Death of a spouse and death of a child were the most stressful events among all respondents and were significantly more stressful than other events.
- A token incentive provided with the initial survey (\$2 in this case) significantly increased the response rate above the expected response rate for surveys mailed to Iowa farmers.

## Recommendations for Future Research

The results of this study support the need for continued study concerning farm stressors, but also clearly indicate the need to rethink stress intervention efforts to target not only the event but also the characteristics of the farmer. While a variety of future studies may be beneficial, the most needed studies can be grouped into two basic categories:

- Expanded studies of farm stressors using the proportionate scaling method with farm populations from other regions and representing more farm types.
- Development, implementation, and evaluation of educational and public awareness interventions targeting identified high-stress events that also take into account the characteristics of the farmer to help farmers manage the stress of these events and reinforce safe behaviors during these times of excess stress.

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