

**Self-reported work-related stress, depressive symptoms, and health and well-being among certified organic farmers: the Organic Farmer Safety, Health & Life Study (OFSHLS)**

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**Running Head Title:** Work-related stress, depressive symptoms, and health and wellbeing among certified organic farmers.

## Abstract

**Objective:** Assess work-related stress and depressive symptoms among certified organic crop producers in the U.S. Southwest. **Methods:** Cross sectional survey design with certified organic crop producers listed in the Organic Integrity Database (OID) using an electronic and paper version of the Organic Farmer Safety, Health & Life Questionnaire (OFSHLQ). Analyses included descriptive statistics and multiple linear regressions to examine predictors of depressive symptoms and overall mental health. **Results:** More than half of respondents reported moderate or high work-related stress. Depressive symptom score was low ( $M = 0.75$ ,  $SD = 0.96$ ); self-rated mental health was good ( $M = 3.8$ ,  $SD = 0.9$ ). Years of experience was negatively associated with depressive symptoms, chronic conditions, and stress; older age was positively associated with better mental health. **Conclusions:** Policies and interventions should address administrative burdens, economics, and overall well-being.

**Key words:** organic farmer; mental health; stress factors

## Learning Outcomes

After going through the article, the reader should be able to:

- Identify key sociodemographic and occupational factors that may contribute to mental health outcomes among certified organic crop producers.
- Explain the interplay of mental health stressors and protective factors unique to organic farmers.
- Discuss policy and intervention implications aimed at reducing work-related stress and supporting mental health among certified organic producers.

## Introduction

Stress is a workplace hazard, and worker well-being includes the ability for people to deal with and address normal stresses, work productively, and achieve their highest potential.<sup>1-4</sup> Research suggests that healthy and happy employees have a better quality of life, a lower risk of disease and injury, increased work productivity, and a greater likelihood of contributing to their communities compared to employees with poorer well-being.<sup>5</sup> Work and well-being are closely associated, and in the United States (U.S.), the National Academy of Medicine and the Occupational Safety and Health Administration have identified worker well-being as a nationally important health issue.<sup>6-8</sup> Worker well-being—defined as the ability to manage stress, work productively, and reach one's full potential—is essential for health, productivity, and community engagement, and has been recognized as a national priority in the U.S. Although well-being is often conceptualized broadly to include eudaimonic dimensions such as purpose, meaning, and personal growth, the present study focuses specifically on mental health outcomes, for which farmers may be especially vulnerable due to the nature of their work.

Farming is widely recognized as a high-stress occupation, and the literature has documented high risk for psychological distress and suicide among farmers. Researchers have also consistently reported overall poor mental health in this population, including elevated levels of stress, depression, anxiety, suicidal ideation, severe burnout, and other psychological disorders.<sup>9-18</sup> Studies have also identified a variety of risk factors that contribute to the poor mental health of farmers, including financial instability, workload, market variability, climate volatility, social and geographic isolation, and unpredictable government regulations among others;<sup>10,17,19-22</sup> and the climate crisis adds to the already long list of risk factors.<sup>20,23,24</sup> Both conventional and organic farmers face significant challenges. Conventional farmers often confront systemic pressures tied

to industrialized practices, including reliance on volatile commodity markets and agrochemical corporations.<sup>20</sup> However, farming is not a monolithic occupation, and the extent to which these documented mental health risks apply uniformly across different production systems, particularly organic agriculture, remains unclear. While these mental health challenges affect farmers broadly, organic producers may face a distinct combination of stressors and protective factors that warrant closer examination.

Organic agriculture, as defined by the U.S. Department of Agriculture (USDA), comprises practices that prioritize ecological balance, biodiversity, and the avoidance of synthetic inputs, from fertilizers to genetic engineering.<sup>25</sup> Since the USDA established its National Organic Program in 2002, the sector has grown exponentially, with nearly 28,500 certified organic farms operating across the U.S. as of February 2025.<sup>26</sup> Although definitive scientific evidence on a higher nutritional content and more favorable health benefits of organic compared to conventionally grown products is still missing,<sup>27,28</sup> the U.S. is increasingly reliant on organic farmers to meet growing consumer demand for “healthy food.” This is generally driven by concerns over pesticide residues, environmental sustainability, and diet-related chronic diseases. U.S. organic food sales continues to grow and increased from \$60 billion in 2021 to \$65.4 billion in 2024, with organic fruits, vegetables, and dairy products leading market growth.<sup>29,30</sup> Organic practices enhance soil health and biodiversity, fostering resilient agroecosystems capable of sustaining long-term food security,<sup>31</sup> and scientists agree that sustainable agriculture is a “most urgently needed work” in the U.S.<sup>32</sup>

In the U.S., organic farmers navigate a distinct set of challenges. Daily work often involves long, solitary hours and economic uncertainty, which can lead to loneliness and chronic stress,<sup>33</sup> and rural mental health infrastructure often fails to address cultural values central to organic farmers’

identities.<sup>34</sup> The costly and bureaucratic process of obtaining and maintaining organic certification -requiring meticulous record-keeping, annual inspections, and adherence to strict input standards- can exacerbate financial strain.<sup>35</sup> Simultaneously, organic producers contend with niche market vulnerabilities, climate-driven risks amplified by their reliance on natural pest management, and ethical tensions between idealism and economic survival. All these may cause added stress and compromise mental health.<sup>6,36</sup> Furthermore, it is unclear how the upcoming Farm Bill, which is still pending approval after Congress enacted two one-year extensions in 2023 and 2024 to cover through FY2025, will support organic farmers, including subsidies for organic crop insurance.<sup>37</sup>

#### *Health, well-being, and mental health*

Health encompasses both objective health status and overall well-being, which is understood through the "total person" concept—a holistic framework that considers the physical, mental, social, and environmental aspects of a person's life. While this framework highlights broad dimensions of well-being, the present study draws on it primarily to contextualize mental health as one component of worker health. Because work intersects with each of these dimensions, this perspective has been adopted by occupational safety and health (OSH) agencies to inform what is called "a new OSH paradigm."<sup>2,4,38,39</sup> This paradigm offers more critical insights into the health and mental health of workers, compared to the traditional approach which focused on preventing injuries and exposure. If workers are integrated into a societal context, we must accept aspects of work and life as interdependent. The total person model proposes that good health and well-being considers the interpersonal and contextual factors that determine health and overall well-being.

Holistic frameworks that integrate the multiple factors that contribute to either health or disease have also been adopted by healthcare. For instance, “whole person health” is an approach to care that investigates the biological, behavioral, social and environmental factors that contribute to health, rather than considering separate organs or biological systems.<sup>40</sup>

Although holistic models have received criticism for focusing on the “person” and individualizing structural factors, they incorporate internal feelings and perceptions that play an important role in mental health. Furthermore, once internalized, structural factors significantly contribute to health and well-being. Research shows that differences in disease rates result from multiple factors, including not only individual and interpersonal influences but also broader societal conditions such as structural racism and economic inequality, referred to as “social determinants of health” (SDOH). SDOH holistically consider circumstances in which people are born, live, and work shape individual health outcomes and overall community health and well-being, including mental health.<sup>41-43</sup>

SDOH, such as job insecurity, isolation, economic instability and limited access to resources, are common aspects of many farmers’ day-to-day life negatively impacting their health and well-being. Studies have found that the drivers of farmers’ mental health are multidimensional and go beyond the intrapersonal and interpersonal levels to include the social, financial and safety net dimensions.<sup>44</sup>

### *The Mental Health of Farmers*

Work plays a central role in daily life, with most people spending a substantial part of their waking hours on the job. While work influences health, wealth and well-being,<sup>45</sup> workers’ well-being contributes to “good” work and has been associated with productivity.<sup>46</sup> Self-reported health status, a validated predictor of morbidity and mortality,<sup>47</sup> reflects perceptions of overall

health and mental health, which are shaped by occupational, social, and environmental contexts. Among farmers, perception of well-being is particularly salient, as their work immerses them in physically demanding tasks, economic precarity, and climate-related stressors.<sup>20</sup> Generally, physical and/or mental issues contribute to inability to focus, which affects productivity and increases the risk for injuries.<sup>48-50</sup> Data show that farmers have a higher suicide rate than the general population, not only in the U.S. but in a diversity of countries across the world.<sup>3,21,51,52</sup> However, these population-level patterns may obscure important variation across farming systems and contexts. This must properly be addressed, as farmers are officially classified as essential workers and supply a basic human need.

The health and mental health disparities between conventional and organic farmers is an area that remains underexplored. A study found higher levels of subjective well-being among organic farmers compared to conventional farmers, despite shared occupational hazards;<sup>53</sup> and a United Kingdom study with organic horticulture workers found that those who worked on organic farms were happier than their counterparts.<sup>54</sup> These preliminary results warrant further research with this population, as studies have found a positive correlation between happiness and physical health but few have directly assessed negative mental health outcomes such as depression and distress.<sup>55,56</sup>

For some organic farmers, well-being may be tied to environmental stewardship and participation in sustainable food systems. Studies suggest that the act of farming organically—rooted in principles of biodiversity, soil health, and reduced chemical use—fosters a sense of accomplishment, fulfillment from environmental stewardship, community engagement, alignment with personal values, and identity as “good farmers.”<sup>6,57,58</sup> Others have explored organic farmers’ contribution to community resilience in the form of natural capital, a sense of

community pride and belonging, and historical responsibility.<sup>59</sup> Organic farming communities often emphasize environmental consciousness and reduced chemical exposure, which may foster a sense of purpose and social responsibility.

There is some evidence that this alignment with ecological ethics and civic agriculture buffers against stressors like financial strain, as farmers derive meaning from contributing to planetary and community health.<sup>60,61</sup> For example, a qualitative study in New Mexico suggested that there may be protective mental health factors unique to the organic farmer;<sup>6</sup> and organic farmers in the U.S. Midwest report greater life satisfaction when engaged in direct-to-consumer markets, which reinforce social connections and shared values.<sup>62</sup> Participation in social activities, such as farmers' markets or cooperative networks, may promote human and social capital, countering the isolation endemic to rural farm life.<sup>60,61,63,64</sup> Such social capital, a pillar of the total person framework, mitigates isolation and enhances resilience.

Yet, the interplay of well-being and mental health remains complex. While organic farmers cite fulfillment from their work, they also face elevated risks of anxiety and depression linked to unpredictable weather, certification costs, and market competition.<sup>33,35</sup> These stressors permeate multiple dimensions of health: financial insecurity erodes mental well-being, climate anxiety disrupts sleep (a physical health marker), and bureaucratic pressures strain familial relationships.<sup>36</sup> Crucially, self-reported health metrics among organic farmers may mask underlying tensions, as cultural narratives of resilience and stoicism discourage acknowledgment of vulnerability.<sup>65</sup>

This paradox underscores a critical gap in research. While there is a large body of literature exploring mental health risks in general agricultural populations, few studies explicitly examine

how stressors and protective factors interact within organic farming systems. This is particularly true for the U.S. organic farmer. The aim of the present study, the Organic Farmer Safety, Health & Life Study (OFSHLS), was to typify the certified organic crop producer and identify multilevel factors that may contribute to OSH in these farmers. It was funded by the Southwest Center for Agricultural Health, Injury Prevention and Education (SW Ag Center), a National Institute for Occupational Safety and Health (NIOSH) agricultural center. This paper presents results on self-reported mental health status and risk factors, specifically work-related stress and depressive symptoms. The study was approved by University of New Mexico Health Sciences Center Institutional Review Board. All participants were provided with an informed consent form and voluntarily consented to participate.

## **Methods**

### *Design and participants*

The study employed a cross-sectional design. Data were collected in late fall 2020 and spring 2021. Participants included certified organic crop producers/principal operators listed in the Organic Integrity Database (OID),<sup>26</sup> a USDA publicly available database of certified organic operations that includes contact information such as phone, email, website, and physical and mailing address. The farm producer may be the person who runs the farm, making day-to-day management decisions for the farm operation. She/he may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper who may grow crops, collect plants from the wild, or raise livestock.

To be eligible for this study, participants had to be at least 18 years old and currently operate an organic crop farm in one of the five states within the study region (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas). Both email and post mail were utilized for participant

recruitment. Email invitations were sent to 291 organic operators with valid email addresses in OID, while study packets were mailed to 399 producers who either only had a physical address in OID or did not respond to the email invitation. After removing the non-delivered emails and letters, a total of 499 unduplicated organic producers were invited to participate in the study either through the online survey or the paper-and-pencil survey. Upon completing either the online or paper-pencil survey, each participant received a \$25 merchandise card from a national hardware and home improvement retailer.

#### *Data collection*

An electronic and paper version of the Organic Farmer Safety, Health & Life Questionnaire (OFSHLQ) was used for data collection. OFSHLQ is a theory-based tool developed by the research team that has shown acceptable psychometric properties<sup>4</sup> and that was previously used to collect OSH data on safety practices and injury rates with this population.<sup>66</sup> The questionnaire is designed to measure multilevel factors, including farm and work conditions, self-reported health status and illness, lifestyle, workplace psychosocial factors, work and life balance, and broader contextual influences such as policy, economy conditions, societal factors, and community connections that may impact OSH and the mental health of the organic farmer. A sociodemographic section is also included.

The online OFSHLQ was housed on REDCap (Research Electronic Data Capture), which is a secure web-based platform for creating and managing online surveys and databases. Paper survey data were manually entered into the REDCap database by trained project staff. A total of 124 participants responded to the survey, yielding a response rate of 25.1%. Of these, 15 were excluded from the analysis -one for not meeting the qualifying criteria and fourteen for missing sociodemographic data- resulting in a final dataset of 109 organic farmers for analysis.

## *Measures*

### 1. Chronic conditions

The number of chronic conditions was assessed by asking participants to select the medical conditions that they had been diagnosed with by a doctor, nurse, or other health professional. A list of twelve chronic medical conditions was provided, including heart attack, stroke, hypertension, asthma, skin cancer, any other type of cancer, chronic obstructive pulmonary disease (COPD), arthritis, depressive disorder, kidney disease, diabetes, and obesity. Participants could select multiple conditions. The total number of conditions for each participant was used in the analysis.

### 2. Work-related stress

Work-related stress was measured by asking participants to rate their stress levels related to nine indicators or potential sources (see Table 2). Responses were recorded on a four-point Likert-type scale, ranging from “Not stressed at all” to “High stress.” A total score was calculated for analysis. The internal consistency reliability (Cronbach's alpha) of the scale in the sample was 0.786, which indicates an acceptable internal consistency.

### 3. Depressive symptoms

A depressive symptoms score was calculated based on participants' responses to two items listing specific indicators (adapted from the Patient Health Questionnaire-2 (PHQ-2)).<sup>67</sup> For each item, the response options were “not at all,” “several days,” “more than half the days,” and “nearly every day,” scored as 0, 1, 2, and 3 respectively. A total score was calculated ranging from 0 to 6. Due to the skewness and nonnormality of the depressive symptoms score, this variable was log-transformed in the final linear regression analysis. Since the variable included 0

values, a constant of 1 was added to each non-missing observation prior to the log transformation.

#### 4. Mental health status

Mental health status was assessed by a single question: “Would you say that your mental health is generally...” Participants responded on a six-point scale: not sure/don’t know, poor, fair, good, very good, and excellent. Responses indicating not sure/don’t know were excluded and treated as missing data. For the subsequent analysis, mental health status was treated as a continuous variable.<sup>68</sup>

#### 5. Overall health status

Overall health status was measured by a single item: “Would you say that, in general, your overall health is...” Responses were recorded on a six-point scale: not sure/don’t know, poor, fair, good, very good, and excellent. Participants who selected not sure/don’t know were treated as missing data. Overall health status was treated as a continuous variable in the subsequent analysis.<sup>68</sup>

#### *Data analysis*

Descriptive statistics, including means, standard deviations, ranges, frequencies, and percentages were calculated for sociodemographic and work variables (i.e., age, gender identity, race/ethnicity, education level, annual household income, household size, marital status, operator type, years of experience in organic farming, and hours per week of work on the farm), health-related variables (i.e., work-related stress and number of chronic conditions) as well as the primary outcome variables (i.e., depressive symptoms score, mental health status, and overall health status). Missing data were handled using listwise deletion. These analyses were conducted using SPSS 29.0 (IBM SPSS Statistics, Armonk, NY: IBM Corp.).

Three multiple linear regression analyses were performed. The first analysis examined the extent to which sociodemographic/work factors and covariates predicted the depressive symptoms score. The second analysis assessed how sociodemographic/work factors, covariates, and depressive symptoms score predicted mental health status. The third analysis investigated how sociodemographic factors, covariates, and depressive symptom scores predicted overall health status. Multicollinearity was examined across all three regression models, with all variance inflation factors (VIFs) below 1.7, indicating multicollinearity among independent variables was not severe enough for additional treatment.

### **Results:**

As shown in Table 1, slightly more than half of the participants (52.3%) were under 55 years old. Approximately one-third (35.8%) identified as female. The majority (67.9%) were non-Hispanic white. Regarding education level, about two-thirds (65.1%) had a 4-year college degree or higher. Just over one-fifth (20.2%) reported an annual household income below \$50,000. More than half of those who responded (55.0%) lived alone or with one other person, and the majority (72.5%) were married or cohabitating. In terms of their farm-related characteristics, most participants (82.6%) were workers. Slightly over half (56.0%) had less than 10 years of experience, and about two-thirds (66.1%) worked more than 40 hours per week.

<<Table 1. Social demographic and selected work characteristics>>

The average number of chronic conditions was 1.3 (SD = 1.3), with a range from 0 - 6. The five most commonly reported chronic conditions included hypertension (29.2%), arthritis (24.5%), skin cancer (19.2%), obesity/overweight (16.0%), and asthma (15.1%). Stroke and COPD were not selected by respondents. Overall, 35.8% reported at least one chronic condition, and 34.0% had multiple chronic conditions.

<<Figure 1. Prevalence of chronic conditions diagnosed by a doctor, nurse, or other health professional>>

The average work-related stress score was 20.2 (SD = 5.2), ranging from 11 to 36. Notably, a substantial proportion of respondents experienced moderate or high work-related stress.

Specifically, as presented in Table 2, the most commonly reported work-related stressor was concerns about the future of the farm (60.5%), followed by the amount of paperwork (59.6%) and financial issues (58.7%). Other notable stressors included farm policy and legislation (51.3%), loss of farm value (35.8%), and loss of farm tradition (33.1%). Illness or health concerns (22.0%), family problems (19.3%), and isolation (14.7%) were the three least work-related stressors reported by participants.

<<Table 2. Work-related stress>>

The reported average depressive symptoms score was 0.75 (SD = 0.96), ranging from 0 to 4.

Table 3 presents details on each measured item. A majority of respondents (68.8%) did not feel bothered by having little interest or pleasure in activities, feeling down, or hopelessness over the past two weeks. However, over one-quarter (26.6%) reported experiencing these symptoms for several days, while only 0.9% felt bothered more than half the days. Regarding sleep-related issues, approximately one-third (32.1%) experienced trouble sleeping, difficulty concentrating, low energy, or excessive sleep on several days, with a small percentage (5.5%) reporting these symptoms for more than half the days or nearly every day.

<<Table 3. Percent of respondents self-reporting depressive symptoms>>

As shown in Table 4, years of experience in organic farming ( $B = -0.230$ ,  $p = 0.028$ ) was negatively associated with the log-transformed depressive symptoms score. Specifically, organic farmers who had more than 10 years of experience exhibited a 0.230-unit reduction in the log-

transformed depressive symptoms score compared with their counterparts with less than 10 years of experience, after controlling for all other factors.

<<Table 4. Multiple linear regression analysis of sociodemographic characteristics and covariates (i.e., number of chronic conditions and work-related stress) as predictors of log-transformed depressive symptoms score>>

Conversely, both the number of chronic conditions and work-related stress ( $B = 0.111$ ,  $p = 0.008$ ;  $B = 0.024$ ,  $p = 0.020$ , respectively) were significantly positively associated with the log-transformed depressive symptoms score. More specifically, each one-unit increase in the number of chronic conditions was associated with a 0.111 unit increase in the log-transformed depression symptoms score, while a one-unit increase in work-related stress was linked to a 0.024 unit increase in the log-transformed depression symptoms score among respondents, after accounting for all other variables. The predictors together accounted for 22.6% of the variance in the log-transformed depressive symptoms score.

The average mental health status score was 3.8 ( $SD = 0.9$ ), ranging from 1 to 5. This suggests a generally good to very good self-reported mental health status. As presented in Table 5, age ( $B = 0.583$ ,  $p = 0.012$ ) was positively associated with participants' mental health status. In particular, those aged 55 or older demonstrated a 0.583-unit improvement in mental health status compared to farmers younger than 55, after adjusting for all other factors. On the other hand, the depressive symptoms score ( $B = -0.301$ ,  $p = 0.010$ ) was negatively related to participants' mental health status. This indicated that each one-unit increase in the depression symptoms score corresponded to a 0.301 unit decrease in the mental health status, with all other factors held constant. The predictors collectively explained 16.4% of the variance in the mental health status among participants.

<<Table 5. Multiple linear regression analysis of sociodemographic characteristics, covariates and frequency of experiencing depressive symptoms as predictors of mental health status>>

Participants reported an average overall health status score of 3.7 (SD = 0.8), ranging from 2 to 5. This suggests a generally good to very good health status. As presented in Table 6, the number of chronic conditions among respondents ( $B = -0.259, p < 0.001$ ) was negatively associated with their overall health status. Specifically, a one-unit increase in the number of chronic conditions was associated with a 0.259-unit decrease in overall health status, assuming all other variables remained constant. Interestingly, gender identity also showed a marginally significant association with overall health ( $B = 0.354, p = 0.061$ ). Compared to non-female respondents, female organic farmers reported a 0.354-unit higher overall health status, controlling for other variables. The predictors explained a total of 14.1% of the variance in the overall health status of organic farmers.

<<Table 6. Multiple linear regression analysis of sociodemographic characteristics, covariates, and frequency of experiencing depressive symptoms as predictors of overall health status>>

## **Discussion**

An aim of the OFSHLS was to explore multilevel factors that contribute to OSH in certified organic producers in the southwest region of the U.S. The results presented here refer to self-reported mental health status and work and life risk factors that contribute to work-related stress and depressive symptoms. These data and results address a research and literature gap on the interplay of multilevel stressors and protective factors among the U.S. organic farmer. Important is to keep in mind that the study was conducted during the recent COVID-19 pandemic, and the potential implications it had on the mental status of the participants.

The sociodemographic and farm characteristics of the sample (Table 1) have been presented and discussed in a previous publication on safety and injury, including comparing the sample to the 2017 Census of Agriculture national and regional data on this population of certified organic producers.<sup>66</sup> Overall, participants were young, male, white, educated, married, and with a medium to high annual household income. A slight majority (52%) were younger than 55 years, which is consistent with recent national data on this population. The 2022 Census of Agriculture found that 51% of the 39,500 certified or exempt organic producers were younger than 55 years. These data also confirm that organic agriculture is creating a younger generation of farmers. The average age of the U.S. farmer in 2022 was 58 years, compared to only 53 for the organic producer.<sup>69</sup>

The sample's self-reported race/ethnicity was noticeably different from national data, and only 68% of participants selected the "non-Hispanic white" answer to this question. A higher share of Hispanic farmers was an expected result. While the 2017 Census of Agriculture estimated that approximately 4% of U.S. certified organic producers were Hispanic/Latino or Spanish, this percentage was much higher in the southwest region (11%).<sup>70</sup>

The 2022 Census of Agriculture confirmed the role of Hispanic producers both at the national and regional levels. Data show that of the approximately 2 million U.S. farms, 91% are operated by non-Hispanic white farmers, but also that Texas, New Mexico, and Oklahoma, three states included in this regional study, are among the top states with Hispanic producers.<sup>71</sup> Nationally, 112,379 producers (3% of the country's 3.4 million producers) identified as Hispanic, Latino, or Spanish origin in 2022 (NASS, 2022b). This accounts for 83,505 farms with one or more Hispanic producers operating 37 million acres, an increase of 15% from the previous census. They made up a large share of total producers in New Mexico (31%) and Texas (10%).<sup>72</sup>

A high majority of respondents, nearly 83%, classified themselves as “owner operator.” This result was expected. In the U.S., 98% of farms are small family farms, farms owned by families, and the vast majority of family farms are operated as sole proprietorships owned by a single individual or family. Similarly, most organic farms in the U.S. are small-scale, and just over 4% are large farms. Furthermore, the 2021 Certified Organic Survey found that 86% of the 436 farms in the five states within this study’s region were owned by the participant producer.<sup>73-75</sup> Worth noticing is that in some cases the principal operator/producer may be someone else working on the farm such a hired manager, business manager or a farmworker who holds primary decision-making authority and is therefore most directly affected by farm-level stressors. Regarding results on chronic conditions, important is to note that the indicator was self-reported but the question specifically referred to conditions diagnosed by a healthcare professional. Overall, respondents reported an average of slightly more than one condition, with hypertension, arthritis, skin cancer, obesity/overweight, and asthma leading the list (see Figure 1). These results are worth discussing, as studies on the health status of the agricultural workforce have reported conflicting results. There is consensus that farmers are exposed to practices and working conditions that increase their risk for negative mental, and physical health outcomes, as well as overall well-being.<sup>76</sup> However, a large regional study with pesticide applicators in the U.S. found that compared with the general population, participants had lower rates of total mortality, cardiovascular disease, diabetes, COPD, and cancer.<sup>77</sup> Other early studies found U.S. farmers and agricultural workers to be healthier and have lower morbidity and mortality rates than non-farming rural and urban populations,<sup>78,79</sup> probably due to healthier lifestyles.<sup>80</sup>

*Significant is that* 35.8% of participants reported at least one chronic condition and 34.0% had multiple chronic conditions, as these results differ from national data. The 2018 National Health Interview Survey (NHIS) found that more than half (51.8%) of U.S. adults had at least one major diagnosed chronic condition, and 27.2% had multiple chronic conditions.<sup>81</sup> These results may suggest a lower prevalence of chronic disease among participants, but the sample may be younger than that used to generate national data. How the health status of the U.S. organic farmer compares to that of the conventional farmers and the general population warrants future research. The health status of the U.S. agricultural workforce is unknown and national health data is not currently available for organic farmers, an issue that has been pointed out by researchers and documented in the literature.<sup>35,59,66,82</sup>

The study found that a substantial proportion of respondents (more than half) experienced moderate or high work-related stress, particularly caused by uncertainty about the future, paperwork, finances, and policy/legislation. Interestingly, fewer respondents were concerned with relevant issues like health, family problems, and isolation (Table 2). These may be indicators of overall well-being, and future research should further explore this potential association. On depressive symptoms, although a majority of participants (68.8%) were not troubled by certain typical symptoms like lack of interest or pleasure in life and feeling down or hopeless, more than one-fourth experienced these symptoms for several days; many (32.1%) reported issues with sleeping, concentrating, and having little energy (Table 3). Overall, depressive symptoms score was low: 0.75 on a scale from 0 to 6.

How do the mental health and depressive symptoms of this study's sample compare to those of other workers, farmworkers in general, and peer organic farmers? Comparative studies involving organic farmers are scarce. There is considerable empirical evidence that a dysfunctional work

environment contributes to depressive symptoms, and that workplace stress is a risk factor for poor mental health.<sup>83-86</sup> In the U.S., approximately 65% of workers identify work as a very significant or somewhat significant source of stress, and 83% of workers suffer from work-related stress. It has been estimated that workplace stress is responsible for 120,000 deaths each year.<sup>86-88</sup>

Regarding farmers, data show that they are at particular risk of mental health disorders, and international studies have identified stressors that are specific to farming and result in depression and suicide.<sup>9,17,20,89-91</sup> In the U.S., a recent study with Ohio farmers estimated that nearly 10% of participants likely had a major depression disorder.<sup>13</sup>

However, research and literature on the mental health of the organic farmer is more limited, particularly in the U.S. A recent literature review suggested that organic farmers have globally better psychological and physical health than conventional farmers. Other studies have yielded conflicting results.<sup>92</sup> For instance, a study with French livestock farmers concluded that those reporting organic practices scored significantly lower in anxiety and higher in positive emotions compared to conventional farmers;<sup>93</sup> another study concluded that mental symptoms were slightly more common among Finnish organic farmers compared to their conventional counterpart.<sup>94</sup> In the U.S., only small studies have explored the mental health of the organic farmer and how organic and conventional farmers compare. These studies have suggested a combination of both risk and protective factors that may be unique to the organic farmer.<sup>95</sup>

Also important is to consider contextual factors that may contribute to poor mental health outcomes, like the recent COVID-19 pandemic. A 2020 national poll sponsored by the American Farm Bureau Federation found that two in three rural farmers/farmworkers said that the COVID-19 pandemic had an impact on their mental health; and they were more likely to have

experienced feeling nervous or anxious during the pandemic compared to rural adults.<sup>96</sup>

Similarly, a cross-sectional study on the impact of COVID-19 on U.S. certified organic producers found that the pandemic had a multilevel effect on the workforce with negative economic and business consequences,<sup>97</sup> which most likely created uncertainty about the future, financial constraints, and work-related stress.

This study was conducted during the COVID-19 pandemic, and although many participants reported mental health issues such as moderate or high work-related stress, the overall depressive symptoms score was low. Did participating organic farmers experience the pandemic differently than conventional farmers? Did it have an impact on the mental health results? The present study cannot categorically answer these questions, however, there is evidence that the impact of COVID-19 was varied across the food production system. For instance, pandemic data showed a significant increase in sales of organic and fresh produce in 2020 and 2021.<sup>98</sup> Perhaps, the level of stress and mental health issues related to the pandemic was somewhat mitigated by the increased business activity experienced by organic producers. Whether this was also true for the participants in this study and how this affected the results warrant further research. Considering that farmers are essential workers, it will be important to identify the subgroups of agricultural workers who are more susceptible to future global and regional challenges and risks.

Looking at potential factors associated with mental health status and depressive symptoms, the multiple regression analyses identified age and years of experience in organic farming to be protective factors, while number of chronic conditions and work-related stress were both found to increase the risk of experiencing depressive symptoms among participants (Tables 4-6).

Although cross-sectional designs cannot definitively distinguish protective effects from selection bias (healthier farmers are more persistent), survival bias (those with poor mental health quit

farming) or cohort effects, it could be that older and more experienced farmers may more easily cope with work-related stress and situations that negatively impact mental health. As may be expected, disease and stress place a burden on depression. Chronic disease may be defined as a condition that lasts at least one year and requires ongoing medical attention or limits activities of daily living or both. According to the National Institute of Mental Health, people who have a chronic disease are at a higher risk of developing depression, and people who experience depression are at higher risk of developing certain chronic diseases, including heart disease, diabetes, stroke, pain, osteoporosis, and Alzheimer's disease.<sup>99,100</sup> Finally, results on self-reported health status and mental health are encouraging. Participants perceived their mental health and overall health to be generally good to very good, even in spite of work-related stress, certain depressive symptoms, and prevalence of chronic conditions. This is significant and future studies should further explore this result and how it may influence mental health in this population. Feeling positive about one's own health is a good thing. Longitudinal studies found that men and women self-reporting fair or poor health were more likely to die than those indicating excellent health,<sup>101</sup> that higher level of subjective well-being predicted longer survival times among older adults,<sup>102</sup> and that subjective successful aging had a significant positive association with mortality.<sup>103</sup> How the organic farmers who participated in this study compared to their conventional counterparts in terms of perceived overall health is not clear because of very limited research and data. Although a United Kingdom study with conventional and organic horticulture workers found no difference,<sup>54</sup> whether organic and conventional farmers differ in self-reported overall health warrants further research.

## **Limitations**

This was a cross-sectional design and does not provide longitudinal data, both self-reported and professionally diagnosed variables may change over time. This may be particularly true for stress and mental health variables considering that data were collected during the COVID-19 pandemic. Data on variables of interest were only available for those who completed the survey, a comparative analysis of respondents and non-respondents was not possible. The sample may not represent the entire regional or US organic producer population. However, using both postal mailing and electronic approaches for recruitment and data collection may have accommodated disparate preferences and resulted in a more diverse and representative sample. Additionally, response rate was typical of survey studies and results on certain sociodemographic and work characteristics were consistent with data reported by national surveillance systems on this population. Responses were self-reported, which may reflect respondents' personal biases as well as the individual characteristics and experiences of only those who chose to participate, but self-reported questionnaires are widely used in observational studies. Finally, although the questionnaire was informed by a multilevel framework, it should not be implied that "all" determinants of mental health were captured. The goal was to go beyond traditional worksite measures; it is possible that certain relevant psychosocial factors were not measured. Future research should also focus on contextual and structural level variables.

## **Conclusion**

This study contributes to the limited research on the mental and physical health of the organic producer. The study found moderate or high work-related stress among participants, but a low overall depressive symptoms score. Similarly, participants perceived their mental health and overall health to be generally good to very good. They reported a lower-than-average prevalence

of chronic disease. These results suggest that, for this sample of organic farmers, there may be certain protective factors that contribute to better-than-expected mental and physical health. Conforming these results and identifying those potential protective factors should be the focus of future research.

More resources must be dedicated to research, interventions, and policy involving this population of essential workers. There is a need for studies examining the direct comparison between organic farmers and their conventional counterparts with regard to mental health, chronic conditions, and overall well-being. Research might also address the regional and cultural context of the southwest compared to other regions of the U.S. or also look at comparative communities internationally. Furthermore, an exploration of the longitudinal effects of being an organic farmer would be worthwhile to understand how mental health challenges arise and how farmers employ their internal and external resources to address them.

Interventions in support of the organic farmer should encourage positive coping and mental health strategies. Work-related stress and depressive symptoms seem prevalent, and prevention intervention among high-risk subgroups would make a difference. Program level interventions could include community-based initiatives to strengthen mental health supports such as peer support groups, mental health hotlines, and mutual aid. Extension services could expand their scopes to include mental health and well-being strategies that are culturally competent and trauma informed. In addition, given the significant association between chronic health conditions and depressive symptoms as well as overall health status, interventions should also address the prevention and management of chronic disease among organic farmers. Integrated approaches that combine physical and mental health services, such as screening for hypertension, arthritis, and metabolic conditions alongside mental health assessments, may be particularly beneficial.

Addressing chronic conditions may not only improve physical health outcomes but also reduce vulnerability to depressive symptoms in this population.

Policy initiatives might focus on the administrative burden of running an organic farm, the economic precarity of not having access to various government programs and subsidies, and policy uncertainty. These are mostly structural interventions that might include clarifying and simplifying the certification process through use of digital tools and reduced paperwork or providing technical assistance to farmers who do not have the time to get familiar with policies and energy to complete the certification process on their own. Economic support could be expanded using subsidies and cost sharing, offering low-interest loans, and microlending programs. Also, disaster relief and insurance programs would help keep people in organic farming, considering the numerous risks to crops with organic farming in comparison to their conventional counterparts.

It is vital to recognize organic farmers as essential workers. Initiatives that support their mental health and well-being not only improve individual outcomes but also strengthen local food systems, promote public health, and bolster environmental resilience. These efforts represent a crucial investment in both farmer well-being and the future of sustainable agriculture.

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**Table 1. Social demographic and selected work characteristics of participants**

| Geographic Location                  | N  | %    |
|--------------------------------------|----|------|
| Arkansas                             | 5  | 4.6  |
| Louisiana                            | 2  | 1.8  |
| New Mexico                           | 41 | 37.6 |
| New York                             | 2  | 1.8  |
| Oklahoma                             | 15 | 13.8 |
| Texas                                | 44 | 40.4 |
| Age                                  |    |      |
| Below 55 years old                   | 57 | 52.3 |
| 55 years old or above                | 51 | 46.8 |
| Gender Identity                      |    |      |
| Not female                           | 68 | 62.4 |
| Female                               | 39 | 35.8 |
| Race/Ethnicity                       |    |      |
| Non-Hispanic White                   | 74 | 67.9 |
| Other                                | 26 | 23.9 |
| Education Level                      |    |      |
| Less than 4-year college degree      | 36 | 33.0 |
| 4-year college degree or more        | 71 | 65.1 |
| Annual Household Income              |    |      |
| Under \$50,000                       | 22 | 20.2 |
| \$50,000 or more                     | 77 | 70.6 |
| Household Size                       |    |      |
| Lives alone or with one other person | 60 | 55.0 |
| Lives with two or more other people  | 48 | 42.2 |
| Marital Status                       |    |      |
| Not married or cohabitating          | 29 | 26.6 |

|                                        |    |      |
|----------------------------------------|----|------|
| Married or cohabitating                | 79 | 72.5 |
| Operator Type                          |    |      |
| Owner operator                         | 90 | 82.6 |
| Non-owner operator                     | 17 | 15.6 |
| Years of Experience in Organic Farming |    |      |
| Less than 10 years                     | 61 | 56.0 |
| More than 10 years                     | 46 | 42.2 |
| Hours per Week of Work on the Farm     |    |      |
| 40 or fewer hours per week             | 34 | 31.2 |
| More than 40 hours per week            | 72 | 66.1 |

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Note: Missing responses are not included, percentage for each response category does not add up to 100%.

**Table 2. Work-related stress**

| <b>Level of stress due to</b> | <b>Not stress at all<br/>% (n)</b> | <b>A little stress<br/>% (n)</b> | <b>Moderate stress<br/>% (n)</b> | <b>High stress<br/>% (n)</b> | <b>Missing<br/>% (n)</b> |
|-------------------------------|------------------------------------|----------------------------------|----------------------------------|------------------------------|--------------------------|
| Money/finances                | 11.9% (13)                         | 25.7% (28)                       | 24.8% (27)                       | 33.9% (37)                   | 3.7% (4)                 |
| The future of the farm        | 14.7% (16)                         | 21.1% (23)                       | 37.6% (41)                       | 22.9% (25)                   | 3.7% (4)                 |
| Loss of farm value            | 34.9% (38)                         | 22.9% (29)                       | 26.6% (29)                       | 9.2% (10)                    | 6.4 % (7)                |
| Loss of farm tradition        | 34.9% (38)                         | 26.6% (29)                       | 23.8% (26)                       | 9.2% (10)                    | 5.5% (6)                 |
| Farm policy and legislation   | 14.7% (16)                         | 29.4% (32)                       | 33.9% (37)                       | 17.4% (19)                   | 4.6% (5)                 |
| The amount of paperwork       | 7.3% (8)                           | 29.4% (32)                       | 33.0% (36)                       | 26.6% (29)                   | 3.7% (4)                 |
| Family problems               | 39.4% (43)                         | 36.7% (40)                       | 16.5% (18)                       | 2.8% (3)                     | 4.6% (5)                 |
| Illness or health             | 36.7% (40)                         | 35.8% (39)                       | 18.3% (20)                       | 3.7% (4)                     | 5.5% (6)                 |
| Isolation                     | 54.1% (59)                         | 24.8% (27)                       | 11.0% (12)                       | 3.7% (4)                     | 6.4% (7)                 |

**Table 3. Percent of respondents self-reporting depressive symptoms**

| <b>Over the past two weeks how often have you been bothered by</b>            | <b>Not at all<br/>% (n)</b> | <b>On several<br/>days<br/>% (n)</b> | <b>More than<br/>half the<br/>days<br/>% (n)</b> | <b>Nearly<br/>every<br/>day<br/>% (n)</b> | <b>Missing<br/>% (n)</b> |
|-------------------------------------------------------------------------------|-----------------------------|--------------------------------------|--------------------------------------------------|-------------------------------------------|--------------------------|
| Having little interest or pleasure in doing things, feeling down, or hopeless | 68.8% (75)                  | 26.6% (29)                           | 0.9% (1)                                         | 0.0% (0)                                  | 3.7% (4)                 |
| Having trouble sleeping, concentrating, have little energy or sleep too much  | 58.7% (64)                  | 32.1% (35)                           | 4.6% (5)                                         | 0.9% (1)                                  | 3.7% (4)                 |

**Table 4. Multiple linear regression analysis of sociodemographic characteristics and covariates (i.e., number of chronic conditions and work-related stress) as predictors of log-transformed depressive symptoms score**

| <b>Variable</b>                        | <b>B</b>     | <b>SE</b>   | <b>t</b>      | <b>Sig.*</b> |
|----------------------------------------|--------------|-------------|---------------|--------------|
| Age                                    | .093         | .116        | .797          | .428         |
| Gender identity                        | -.014        | .110        | -.129         | .898         |
| Race/ethnicity                         | .162         | .125        | 1.297         | .199         |
| Education level                        | .102         | .115        | .888          | .377         |
| Annual household income                | -.046        | .125        | -.369         | .713         |
| Household size                         | -.123        | .121        | -1.015        | .313         |
| Marital status                         | .088         | .131        | .669          | .505         |
| Operator type                          | -.202        | .133        | -1.516        | .134         |
| Years of experience in organic farming | <b>-.230</b> | <b>.103</b> | <b>-2.243</b> | <b>.028</b>  |
| Hours per week of work on the farm     | .009         | .116        | .075          | .941         |
| Number of chronic conditions           | <b>.111</b>  | <b>.041</b> | <b>2.715</b>  | <b>.008</b>  |
| Work-related stress                    | <b>.024</b>  | <b>.010</b> | <b>2.374</b>  | <b>.020</b>  |

Note: \*Significant at the  $p < 0.05$  level; Bolded items had  $p < 0.05$ .

**Table 5. Multiple linear regression analysis of sociodemographic characteristics, covariates and frequency of experiencing depressive symptoms as predictors of mental health status**

| Variable                               | B            | SE          | t             | Sig.*       |
|----------------------------------------|--------------|-------------|---------------|-------------|
| Age                                    | <b>.583</b>  | <b>.228</b> | <b>2.559</b>  | <b>.012</b> |
| Gender Identity                        | .070         | .216        | .325          | .746        |
| Race/ethnicity                         | .112         | .245        | .457          | .649        |
| Education level                        | -.224        | .225        | -.991         | .325        |
| Annual Household Income                | .037         | .246        | .150          | .881        |
| Household Size                         | -.115        | .238        | -.485         | .629        |
| Marital Status                         | .351         | .257        | 1.365         | .176        |
| Operator Type                          | -.002        | .263        | -.007         | .994        |
| Years of Experience in Organic Farming | -.082        | .209        | -.392         | .696        |
| Hours per Week of Work on the Farm     | .082         | .227        | .360          | .720        |
| Number of Chronic Conditions           | -.114        | .083        | -1.369        | .175        |
| Work-related Stress                    | -.027        | .021        | -1.297        | .199        |
| Depressive symptoms score              | <b>-.301</b> | <b>.114</b> | <b>-2.629</b> | <b>.010</b> |

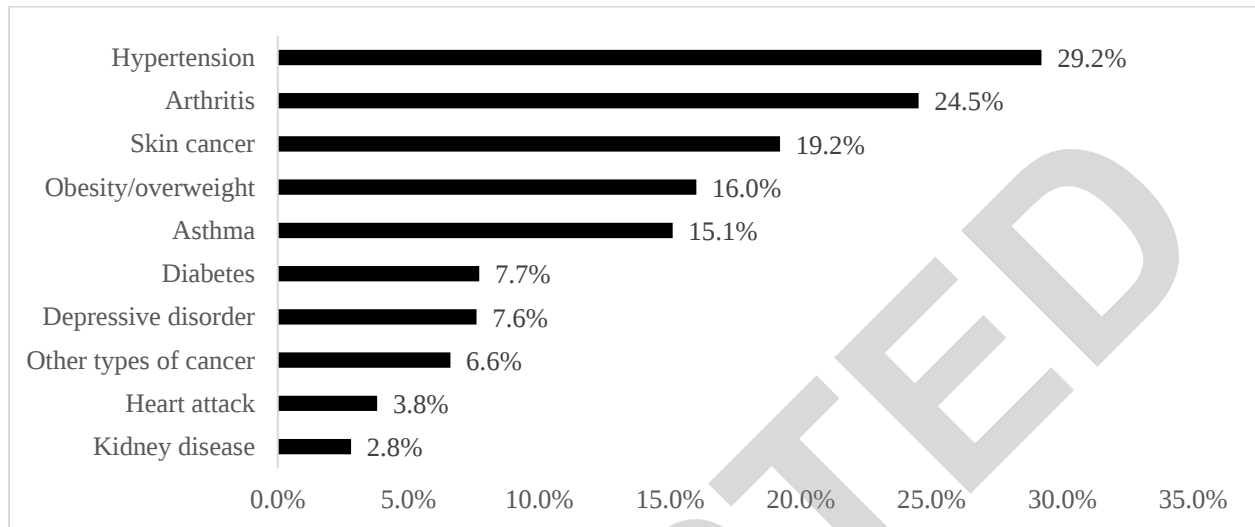
Note: \*Significant at the  $p < 0.05$  level; Bolded items had  $p < 0.05$ .

**Table 6. Multiple linear regression analysis of sociodemographic characteristics, covariates, and frequency of experiencing depressive symptoms as predictors of overall health status**

| Variable                               | B            | SE          | t             | Sig.*           |
|----------------------------------------|--------------|-------------|---------------|-----------------|
| Age                                    | .258         | .196        | 1.311         | .194            |
| Gender Identity                        | .354         | .186        | 1.904         | .061            |
| Race/ethnicity                         | -.096        | .211        | -.453         | .652            |
| Education level                        | .063         | .194        | .325          | .746            |
| Annual household income                | .102         | .212        | .484          | .630            |
| Household size                         | -.032        | .205        | -.157         | .876            |
| Marital status                         | -.082        | .221        | -.370         | .712            |
| Operator type                          | -.033        | .226        | -.147         | .883            |
| Years of experience in organic farming | -.084        | .180        | -.468         | .641            |
| Hours per week of work on the farm     | .067         | .196        | .343          | .733            |
| Number of chronic conditions           | <b>-.259</b> | <b>.072</b> | <b>-3.620</b> | <b>&lt;.001</b> |
| Work-related stress                    | -.026        | .018        | -1.436        | .155            |
| Depressive symptoms score              | .067         | .099        | .683          | .497            |

Note: \*Significant at the  $p < 0.05$  level; Bolded items had  $p < 0.05$ .

**Figure 1. Prevalence of chronic conditions diagnosed by a doctor, nurse, or other health professional**



## Graphical abstract

This study aimed to assess work-related stress and depressive symptoms among certified organic crop producers in the U.S. Southwest

Cross sectional survey of producers in the USDA's Organic Integrity Database (OID) using the Organic Farmer Safety, Health & Life Questionnaire (OFSHLQ)

### Policies and interventions should address:

administrative burdens



economics

&

overall wellbeing



Moderate to high work-related stress but low depressive symptoms with good self-rated mental health positively associated with age

### Self-reported work-related stress, depressive symptoms, and health and wellbeing among certified organic farmers: the Organic Farmer Safety, Health & Life Study (OFSHLS)

Vittoria Totaro, MA; Shixi Zhao, PhD, CHES; Francisco Soto Mas, MD, PhD, MPH; Ming Ji, PhD

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