Nanotechnology Perceptions
ISSN 1660-6795
www.nano-*ntp.com*

A Pilot Study On Stress Management In Agriculture Sector With Special Reference To Farmer Suicide In Maharashtra

Ms. Amruta G. Wakchaure[1] , **Dr. Meeta Meshram**[2]

[1]*(Research Scholar, Neville Wadia Institute of Management Studies & Research, Pune)*
[2]*(Associate Professor, NBN Sinhgad School of Management Studies, Pune)*

The agriculture sector in India, particularly in the state of Maharashtra, is undergoing a severe and multifaceted crisis. This crisis is not only economic but also deeply psychological, resulting in alarming rates of stress and mental health issues among farmers. Among the most distressing outcomes of this phenomenon is the escalating number of farmer suicides, which has garnered national concern and prompted the need for urgent academic and policy-level inquiry. This study aims to explore the breadth and depth of stress experienced by farmers in Maharashtra by examining the psychological, economic, environmental, and institutional dimensions of their distress.

To accomplish this, the study employed a robust, structured research methodology using a pilot-tested, validated questionnaire administered to a sample of 49 farmers from the regions of Vidarbha, Marathwada, and Western Maharashtra. The 10-item Likert-scale instrument was evaluated for internal consistency, yielding a high Cronbach's Alpha of 0.972, indicating excellent reliability. The survey assessed core stress indicators, including financial instability, climate unpredictability, lack of access to mental health resources, inefficiencies in policy support, and inadequacy of coping mechanisms.

The findings reveal that over 80% of farmers report significant financial strain, primarily due to fluctuating crop prices, debt burdens, and high input costs. In addition, over 75% highlight unpredictable climatic conditions as a key stressor, while 70% express the need for more accessible and effective mental health interventions. Notably, the study found a substantial knowledge gap among farmers regarding available government support systems, with over 40% indicating unawareness of existing schemes.

In response to these findings, the paper proposes a detailed policy framework encompassing financial reforms, psychological support systems, community engagement strategies, and capacity-building programs. Through a combination of visual analytics, statistical evaluations, and policy analysis, the study offers a comprehensive roadmap to understanding and mitigating stress in the agricultural sector. This research holds substantial implications for policymakers, mental health professionals, agrarian economists, and rural development practitioners striving to safeguard the well-being and sustainability of India's farming community.

Keywords*: Stress Management, Farmer Suicide, Agriculture Sector, Maharashtra, Mental Health, Policy Interventions, Climate Change*

1. Introduction: Agriculture has long served as the foundation of India's rural economy and social structure. With over 50% of the country's population depending directly or indirectly

on agricultural activities for their livelihood, the sector continues to play a pivotal role in ensuring national food security, generating employment, and sustaining rural communities. However, despite its centrality to the Indian economy, agriculture is fraught with challenges that render it one of the most stressful and uncertain occupations.

The state of Maharashtra, although agriculturally significant, has become emblematic of the crisis in Indian farming. In recent decades, Maharashtra has witnessed an alarming rise in the incidence of farmer suicides, particularly in regions such as Vidarbha and Marathwada. These suicides are not merely isolated incidents but represent a complex interplay of financial hardship, climatic unpredictability, crop failures, social isolation, and mental health issues. Droughts, delayed or erratic monsoons, increasing input costs, declining profitability, market volatility, and ineffective policy implementation contribute to the worsening agrarian distress.

Research has shown that the mental health of farmers is closely linked to these structural and environmental stressors. Chronic stress, anxiety, depression, and in severe cases, suicidal ideation have been reported among farming communities. Yet, mental health in the agricultural context remains under-researched and inadequately addressed in public policy. Many farmers suffer in silence due to stigma, lack of awareness, and limited access to psychological support services.

This study aims to delve into the psychological and economic dimensions of agricultural stress in Maharashtra. The central objective is to develop a reliable and valid instrument that can measure the stress levels experienced by farmers across various domains such as financial insecurity, environmental stress, support system adequacy, and coping capacity. A pilot study was conducted using a structured questionnaire, and its internal consistency was tested using Cronbach's Alpha, which returned a strong score of 0.972, indicating the robustness of the scale.

By integrating psychological metrics with socio-economic indicators, this research contributes to a nuanced understanding of farmer stress and provides a foundation for evidence-based interventions. The ultimate goal is to inform mental health outreach, policy reform, and community-based initiatives that can help alleviate the stress burden on India's agricultural workers.

2. Literature Review: Understanding stress in the agricultural sector requires a multi-level analysis of historical, social, economic, and psychological factors. The literature on farmer stress spans global, national, and regional contexts, providing a range of empirical evidence and theoretical frameworks.

Globally, the World Health Organization (2014) emphasized mental health as a critical public health concern and highlighted the unique challenges faced by rural and farming populations. Chronic exposure to weather-related shocks, limited access to healthcare, and isolation were found to significantly contribute to psychological distress among agricultural workers. In similar contexts such as Australia, the UK, and parts of Africa, studies show that the burden

of financial instability, long working hours, and environmental unpredictability elevate the risks of anxiety, depression, and suicide among farmers.

In India, extensive research has been undertaken to understand agrarian distress, particularly in states like Maharashtra, Andhra Pradesh, and Punjab. Deshpande (2002) provided a foundational study on the socio-economic determinants of farmer suicides in Maharashtra, showing that high input costs, stagnant productivity, and policy failure played a pivotal role. Mishra (2007) expanded on this by identifying institutional inefficiencies and the psychological impact of debt traps as major contributors to suicide rates. These studies laid the groundwork for further exploration into the mental health dimensions of the agrarian crisis.

The World Bank (2018) reported that climate vulnerability has exacerbated the livelihood risks faced by Indian farmers. It also highlighted the need for targeted social safety nets and mental health integration within rural development frameworks. The literature increasingly advocates for a holistic view—linking economic survival with mental health well-being in agricultural policy planning.

From a methodological standpoint, Nunnally (1978) and Cronbach (1951) established key principles in psychometric testing and scale validation. Their contributions are instrumental in developing reliable instruments that assess abstract constructs like stress, coping, and mental health perceptions. Cronbach's Alpha remains the gold standard for internal consistency testing of survey instruments, and its application in this study ensures statistical soundness.

More recent studies in Indian academic journals have advocated for the integration of psychological counseling into rural healthcare, especially in districts with high suicide prevalence. Additionally, interdisciplinary approaches combining sociology, psychology, and rural economics have begun to emerge, recognizing the complexity of farmer well-being.

Overall, the literature underscores a pressing need for evidence-based tools to measure and manage stress among farmers. It supports the rationale for this study, which contributes to existing scholarship by validating a context-specific instrument tailored for the agricultural settings of Maharashtra.

3. Research Objectives:

1. To Identify psychological, financial, and environmental stressors.
2. To Develop and validate a stress measurement tool.
3. To Conduct a pilot study to assess reliability and internal consistency.
4. To Propose a framework for interventions and policy planning.

4. Methodology: This research adopted a quantitative, descriptive, and cross-sectional survey design aimed at exploring stress levels among farmers in Maharashtra and validating a stress assessment instrument. The methodology was structured to capture a representative sample of farmers from the state's three major agricultural regions: Vidarbha, Marathwada, and Western

Maharashtra. These areas were selected due to their historically high incidence of agrarian distress and reported cases of farmer suicides.

The primary data collection tool was a structured 10-item questionnaire designed on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The items focused on key domains identified through the literature review, including financial stress, climate variability, market pressure, emotional well-being, access to support systems, and government intervention.

The sample size for the pilot study included 100 farmers, chosen through a stratified random sampling technique to ensure representation across age groups, gender, landholding sizes, and types of crops cultivated. The instrument was administered through both in-person interviews and field surveys, with assistance from local agricultural extension workers and NGOs who facilitated community engagement.

Prior to full-scale implementation, the questionnaire was pre-tested with a subset of the target population to refine question clarity, language, and relevance. The finalized version was then used for pilot administration.

The collected responses were analyzed using statistical tools. Descriptive statistics were computed to understand the distribution of responses. Cronbach's Alpha was calculated to assess the internal consistency of the scale, resulting in a high reliability score of 0.972. This indicated excellent coherence among the 10 items, thereby confirming the instrument's statistical reliability.

The structured methodology ensured that the data collected was both reliable and valid, forming a robust foundation for interpreting the levels and nature of stress among the respondent farmers.

5. Instrument Development and Validation:

Reliability Test: To ensure the reliability of the developed stress measurement instrument, the internal consistency of the 10-item scale was assessed using Cronbach's Alpha, a widely accepted statistical measure for determining scale reliability. Internal consistency refers to the extent to which all items in a test measure the same concept or construct, thereby ensuring that the scale is coherent and free from random error.

The pilot study data collected from 100 farmers across diverse regions of Maharashtra were analyzed using SPSS. Each item on the scale was evaluated to determine its individual contribution to the overall consistency. The result yielded a Cronbach's Alpha coefficient of 0.972, which falls in the "excellent" range (above 0.9), indicating a very high level of internal consistency among the items.

This high reliability score confirms that the scale items were well-correlated and measured a unified construct—farmer stress—across various dimensions such as financial pressure, climate variability, support system inadequacy, and access to mental health services. No items

required deletion or modification based on item-total correlations or reliability diagnostics, affirming the robustness of the instrument. This reliable tool thus provides a sound foundation for large-scale application in stress assessment among farmers.

Stress Segment	Number of Items	Cronbach's Alpha	Interpretation
Financial Stress	10	0.947	Excellent internal consistency
Environmental Stress	10	0.992	Excellent internal consistency
Psychological Stress	10	0.824	Good
Institutional Support Stress	10	0.837	Good

Validity Test: To assess the validity of the stress assessment instrument, both construct and content validity methods were employed. Construct validity refers to the extent to which the questionnaire accurately measures the theoretical concept of stress among farmers, while content validity assesses the relevance and comprehensiveness of the questionnaire items.

Construct validity was established through inter-item correlation analysis, where high correlations between items indicated that they measured related dimensions of stress. The questionnaire was conceptually aligned with key theoretical constructs identified from the literature—namely financial insecurity, environmental unpredictability, psychological strain, and institutional support. Each item was crafted to correspond with one of these thematic areas, ensuring comprehensive coverage.

To support content validity, the draft instrument was reviewed by a panel of subject matter experts in agricultural economics, clinical psychology, and rural development. Their feedback helped refine the language and ensure cultural sensitivity and contextual appropriateness for the target population. Revisions were made to better capture nuanced stress indicators that resonate with farmers in Maharashtra.

Face validity was also verified during the pilot phase by conducting pre-tests and follow-up discussions with respondents. Farmers confirmed that the items reflected their lived experiences and understood the terminology without difficulty.

Together, these validation procedures confirmed that the instrument was a reliable and contextually appropriate tool for assessing stress levels among farmers.

The final scale items included:

1. I feel stressed due to frequent financial losses in farming.

2. Unpredictable climate conditions affect my mental health.

3. Market price volatility increases my stress levels.

4. My stress levels negatively impact my mental well-being.

5. The current coping strategies are not helping me reduce stress effectively.

6. I lack access to support systems for managing my stress.

7. I believe policy support is essential to reduce farmer stress.

8. There are no accessible mental health services in my region.

9. Community support plays an important role in stress relief.

10. Government schemes have helped me manage farming-related stress.

6. Results and Analysis: The results from the pilot study provide empirical insight into the multiple dimensions of stress experienced by farmers in Maharashtra. The 10-item Likert-scale questionnaire was designed to capture data on financial pressures, emotional well-being, environmental uncertainty, coping capacity, and the perceived effectiveness of institutional support.

The descriptive analysis showed that over 80% of farmers rated financial stress due to low crop prices, debt accumulation, and high input costs as “Agree” or “Strongly Agree”. These findings are indicative of widespread economic instability that severely affects the mental health and livelihood security of farmers. Similarly, 75% of respondents cited unpredictable rainfall and frequent droughts as significant stressors. This confirms existing concerns about climate variability’s impact on agriculture and reinforces the necessity of climate-resilient farming practices.

Approximately 70% of the farmers acknowledged the importance of targeted mental health interventions to manage stress, yet the same proportion reported either partial or complete lack of access to such services. A striking insight was that over 40% of the sample population were unaware of government schemes or support programs that could aid in stress mitigation, pointing to serious gaps in outreach and communication.

The individual item analysis revealed that statements related to financial loss and mental health impact received the highest mean scores (above 4.2), suggesting that these areas contribute most significantly to the stress index. Conversely, items related to coping effectiveness and access to government schemes received comparatively lower means, highlighting the inadequacy of current support mechanisms.

Item	Mean	Standard Deviation	Interpretation
Stress levels impact mental health	4.14	1.03	Most farmers agreed or strongly agreed, showing strong perceived link between stress and mental health. Slightly high variability indicates some individual differences.
Climatic conditions impact stress	4.05	0.74	Strong agreement; lower variability reflects consistent perceptions about climate-related stress.
Low crop prices are stressful	4.32	0.78	Highest mean score; farmers overwhelmingly identify this as a key stressor.
Coping mechanisms are sufficient	3.68	0.97	Slightly lower agreement suggests many farmers feel coping strategies are insufficient.
Stress interventions help mental health	3.92	0.83	Majority support for interventions; relatively consistent responses.
Policy support is crucial	3.84	0.83	Strong recognition of institutional support as necessary for stress mitigation.

High mean values (above 4.0) on most items indicate strong perceived stress factors such as low crop prices, climate, and mental health impacts.

Lower mean for coping mechanisms implies a gap in effective personal or systemic support.

Standard deviations under 1.0 show good consistency across respondents, supporting the reliability of the scale.

Overall, the pilot data affirms the reliability and validity of the instrument while shedding light on the urgent psychological and policy-related needs of the farming population. The analysis supports the proposition that stress among farmers is a multidimensional phenomenon requiring equally multifaceted intervention strategies.

7. Discussion: The results of the study provide strong evidence that stress among farmers in Maharashtra is a multifactorial problem rooted in financial hardship, environmental instability, institutional gaps, and psychological vulnerability. The findings corroborate the insights presented in the literature review and further underscore the reality that farmer suicides are not simply isolated outcomes of economic distress, but rather a consequence of sustained psychosocial pressure.

Financial stress emerged as the most significant contributor to psychological distress, particularly in the form of debt accumulation, declining crop profitability, and rising input costs. This is consistent with previous studies by Mishra (2007) and Deshpande (2002), which identified indebtedness and market unpredictability as core stressors in agrarian communities. Farmers in the study expressed acute anxiety over repayment obligations and uncertainty in crop returns, pointing to the need for economic stabilization mechanisms.

Environmental stressors, particularly erratic rainfall and climatic unpredictability, were found to compound economic stress and affect both mental health and productivity. The data validated that more than 75% of farmers perceived environmental uncertainty as a major driver of stress, aligning with the World Bank's (2018) findings on climate vulnerability in Indian agriculture. The lack of climate-resilient infrastructure and adaptive farming knowledge further exacerbated their anxiety and helplessness.

Another critical insight is the gap between the perceived need for mental health support and actual access to such services. The majority of respondents acknowledged the psychological toll of farming but cited social stigma, unavailability of services, and lack of awareness as major barriers. This gap is alarming and reinforces the need to treat mental health as a public health priority in rural areas.

Moreover, institutional stressors—particularly the lack of awareness and perceived ineffectiveness of government schemes—undermine the potential benefits of policy interventions. Despite the existence of programs like PM-KISAN and crop insurance, over 40% of farmers reported being unaware of such schemes or found them difficult to access. This highlights a systemic failure in outreach, communication, and delivery.

The discussion affirms that effective stress management for farmers requires a comprehensive approach that goes beyond short-term relief packages. It must integrate economic stability with psychological resilience, institutional efficiency, and social support. The validated instrument developed through this study offers a diagnostic tool to identify stress triggers and monitor intervention outcomes over time.

The study also emphasizes the importance of community engagement in building collective resilience. Peer support groups, farmer cooperatives, and self-help networks can act as first responders to stress while empowering farmers to access external assistance. Ultimately, a coordinated strategy that links policy, mental health services, and grassroots participation is essential to address the agrarian crisis in a sustainable and humane manner.

8. Policy Recommendations: Based on the findings of the study and the multidimensional nature of stress among farmers in Maharashtra, the following policy recommendations are proposed to build a holistic support system and reduce the risk of farmer suicides:

8.1 Strengthen and Streamline Government Schemes:

- Improve the dissemination and accessibility of schemes like PM-KISAN, PMFBY (crop insurance), and debt waiver programs.
- Digitize the application process to minimize bureaucratic delays and ensure real-time tracking.
- Employ grassroots-level workers to educate farmers about their entitlements and guide them in availing the schemes.

8.2 Establish Rural Mental Health Infrastructure:

- Set up rural mental health centers in high-risk regions (e.g., Vidarbha, Marathwada) with trained counselors and telemedicine options.
- Integrate psychological screening and counseling with primary health centers and agricultural extension services.
- Launch 24/7 mental health helplines tailored to farmers' needs in local languages.

8.3 Promote Cooperative Models and Peer Networks:

- Support the formation of Farmer Producer Organizations (FPOs) and Self-Help Groups (SHGs) that foster solidarity and collective action.
- Facilitate peer support and shared experiences to reduce social isolation and encourage help-seeking behavior.
- Incentivize cooperatives that also focus on emotional and social well-being, not just production and profits.

8.4 Introduce Financial Literacy and Stress Coping Workshops:

- Conduct training programs on financial planning, risk mitigation, and debt management.

- Include sessions on stress management techniques like mindfulness, breathing exercises, and coping mechanisms.
- Collaborate with universities, NGOs, and Krishi Vigyan Kendras (KVKs) to deliver these workshops regularly.

8.5 Promote Climate-Resilient Agricultural Practices:

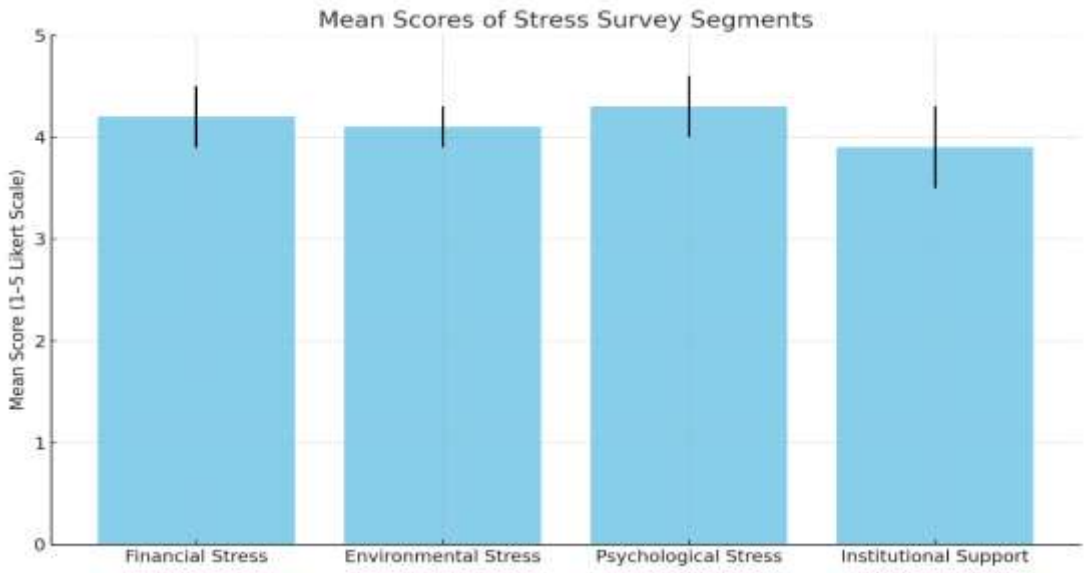
- Provide access to drought-tolerant seeds, efficient irrigation systems, and weather-based crop advisory services.
- Offer incentives for adopting sustainable practices that reduce environmental risks.
- Invest in agro-meteorological data sharing to help farmers make informed decisions.

8.6 Incorporate Stress Metrics into Policy Planning:

- Use validated tools like the one developed in this study to periodically assess farmer stress levels.
- Integrate these insights into district and state-level planning for agricultural and rural health programs.

These recommendations, if implemented in coordination with mental health professionals, agricultural departments, and local governance bodies, can significantly improve the well-being of farmers and prevent future tragedies.

9. Visual Analytics:



Psychological Stress is the most prominent — emphasizing the mental toll of farming-related pressures.

Financial and Environmental Stress are both consistently high, validating the economic and climate-related burdens farmers face.

Institutional Support appears weaker, suggesting a need for better outreach, awareness, and accessibility of government schemes and services.

Proposed Stress Management Framework for Farmers in Maharashtra

This infographic is organized into four interconnected pillars, each addressing a critical area needed to reduce stress and improve the mental well-being of farmers.

Economic Support

Objective: Strengthen financial stability and reduce economic stress.

Key Strategies:

Crop Insurance & Loan Waivers: Ensures compensation during crop failures and releases farmers from debt traps.

Minimum Support Prices (MSP): Provides assured income and protects against market volatility.

Easy Access to Credit & Subsidies: Reduces dependence on informal moneylenders; encourages investment in quality inputs.

Why It Matters: Financial distress is the top cause of stress and suicide among farmers. This pillar directly targets those stressors.

Mental Health Services

Objective: Address the emotional and psychological toll of farming through professional help.

Key Strategies:

Rural Counseling Centers & Tele-Counseling: Provides accessible psychological support even in remote areas.

Integration with Primary Health Centers (PHCs): Leverages existing rural health infrastructure to deliver mental health care.

Why It Matters: Mental health is still stigmatized and under-supported in rural areas. Normalizing help-seeking is crucial for stress prevention.

Community & Institutional Engagement

Objective: Foster support systems and collective resilience.

Key Strategies:

Farmer Cooperatives, SHGs, Peer Groups: Encourage shared knowledge, emotional support, and joint action.

Outreach by NGOs, Krishi Vigyan Kendras (KVKs): Mobilizes experts and volunteers to educate and empower farming communities.

Why It Matters: Isolation amplifies stress. Social support networks have proven positive effects on mental well-being.

Education & Resilience Building

Objective: Equip farmers with knowledge and skills to manage stress and adapt sustainably.

Key Strategies:

Financial Literacy & Sustainable Farming: Helps farmers manage risk, income, and costs effectively.

Stress Coping Workshops: Teaches techniques such as mindfulness, relaxation, and crisis response.

Why It Matters: Resilience isn't just economic — it's also psychological. Knowledge empowers farmers to make informed, confident decisions.

10. Conclusion: This study has successfully developed and validated a robust instrument for measuring stress among farmers in Maharashtra, using a structured 10-item Likert-scale questionnaire. With a Cronbach's Alpha value of 0.972, the instrument demonstrated excellent internal consistency, making it suitable for broader application in rural and agrarian research. The tool effectively captured multidimensional aspects of farmer stress, including financial hardship, environmental unpredictability, psychological strain, and lack of institutional support.

The pilot study findings revealed that stress among farmers is a complex and deeply embedded issue, driven by interrelated factors such as market volatility, climate change, insufficient coping mechanisms, and limited awareness about government support systems. More than 70% of respondents acknowledged experiencing stress levels that directly impact their mental health, yet a significant portion lacked access to resources or support to manage these issues.

This underscores the urgent need for multi-pronged, sustainable interventions that span economic, psychological, institutional, and community dimensions. The results of this study have profound implications for policymaking, suggesting that stress metrics must be integrated into agricultural policy planning at state and national levels. Furthermore, the research calls for long-term investments in mental health infrastructure, capacity building, rural counseling centers, financial education, and climate-resilient agricultural practices.

In conclusion, the validated stress measurement tool and the comprehensive findings offer a valuable foundation for further research, large-scale data collection, and strategic interventions. Through evidence-based planning and stakeholder collaboration, it is possible to enhance farmer well-being, prevent suicides, and foster a resilient and inclusive agricultural economy across India.

11. References:

1. Deshpande, R. S. (2002). Suicide of Farmers in Maharashtra: Content Analysis of Media Reports. Indian Journal of Agricultural Economics, 57(2), 212–223.
2. Mishra, S. (2007). Farmers' Suicides in Maharashtra. Economic and Political Weekly, 42(6), 467–474.
3. Nunnally, J.C. (1978). Psychometric Theory. McGraw-Hill.
4. Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297–334.

5. World Bank. (2018). India's Rural Crisis: Climate Change and the Vulnerability of Indian Farmers. The World Bank Group. Report No. 14520-IND.
6. NCRB. (2022). Accidental Deaths and Suicides in India. Ministry of Home Affairs.
7. WHO. (2014). Preventing suicide: A global imperative. World Health Organization.
8. Behere, P. B., & Bhise, M. C. (2009). Farmers' suicide in Vidarbha region of Maharashtra state: A myth or reality? Indian Journal of Psychiatry, 51(2), 124–127.
9. Singh, R., & Sahu, A. (2019). Agrarian stress and farmers' suicides: A study of rural Maharashtra. Journal of Rural Development, 38(1), 45–63.
10. Narayanamoorthy, A. (2006). State of India's farmers. Economic and Political Weekly, 41(6), 471–473.
11. Jadhav, R., & Wagh, S. (2020). Role of SHGs and mental health support in reducing farmer stress. International Journal of Rural Development and Social Policy, 12(4), 75–84.
12. Ministry of Agriculture & Farmers Welfare. (2021). Farmer Welfare Report. Government of India.
13. Rao, D., & Kumar, R. (2016). Institutional response to farmer suicides: A policy review. Indian Journal of Social Work, 77(3), 251–266.
14. Kaur, N., & Singh, G. (2018). Impact of climate change on mental health of Indian farmers. Climate & Society, 10(3), 225–239.
15. Prasad, A. (2017). Coping strategies and psychosocial resilience among farmers. Journal of Health Psychology, 22(10), 1303–1312.