TPM Vol. 32, No. S2, 2025
ISSN: 1972-6325
https://www.tpmap.org/

EVALUATING PSYCHOLOGICAL RESILIENCE IN CLIMATE-VULNERABLE WORKPLACES USING HR SUPPORT STRATEGIES

ARVIND KUMAR YADAV
ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA
EMAIL: ku.arvindkumayadav@kalingauniversity.ac.in, ORCID ID: 0009-0000-6102-5808

ASHU NAYAK
ASSISTANT PROFESSOR, KALINGA UNIVERSITY, RAIPUR, INDIA
EMAIL: ku.ashunayak@kalingauniversity.ac.in, ORCID ID: 0009-0002-8371-7324

BHUMIKA BANSAL
ASSOCIATE PROFESSOR, NEW DELHI INSTITUTE OF MANAGEMENT, NEW DELHI, INDIA
E-MAIL: bhumika.bansal@ndimdelhil.org, ORCID ID: https://orcid.org/0009-0001-9379-4908

ABSTRACT
Psychological resilience is the capacity to recover quickly from difficulties and is increasingly beneficial to employees facing the climate-vulnerable stresses of their work. This research analyzes resilience among workers in climate-exposed sectors such as agriculture, construction, emergency services, and considers the impact of HR support structures on adaptive capacity. We utilized a mixed-method design and surveyed 412 employees from five organizations, in addition to conducting in-depth interviews with 30 HR professionals. Quantitative analyses measured resilience via the Connor-Davidson Resilience Scale, while qualitative data provided insight into perceptions of HR programs such as training, counseling, and flexible work schedules. Results of the quantitative analyses provided further evidence of the widespread impact of comprehensive HR support, particularly proactive communication, resilience training, and mental health resource access, yielding a statistically significant difference in employee resilience scores ($p < 0.01$). Comparative analysis shows the greatest change is achieved with tailored strategies that address individual coping mechanisms and organizational culture. For practitioners, this stresses the need to explicitly embed initiatives aimed at building resilience into routine operations, adapt support strategies to align with their risk profiles, and cultivate a climate of psychological safety. Further studies should investigate the longer-term consequences of HR strategies and the influences of organizational size and climate severity as moderators.

Keywords: Psychological Resilience; Climate Vulnerability; Workplace Well-Being; HR Support Strategies; Employee Adaptation

INTRODUCTION

Psychological resilience is the adaptive biopsychosocial process where an individual invokes neuroendocrine regulation and cognitive appraisal processes to preserve functional balance within the body systems during external stresses. These processes can be measured using psychometric tests like the Connor Davidson Resilience Scale and the Resilience Scale for Adults, which measure personal constructs like self-efficacy, locus of control, and coping strategies [1]. Other personal factors like social support networks, team cohesion, and social support also influence resilience within nested ecological systems frameworks. Resilience is expressed both responsively to aid post stress recovery and proactively, showing readiness to cope in advance. The anticipatory responses demonstrate organizational resilience in building the adaptive systems, policies, and protocols for dealing with situations including planned for and unplanned urgent responses [3]. This describes integrating concepts from stress inoculation training, psychological hardiness, and emotional flexibility, all of which require longitudinal validation and rigorous reliability testing. Advancements in resilience science further emphasize the need for integrated models that connect microsystems, like neurobiological and psychological frameworks, with systemic resilience architectures at the macrosystem level. In the end, resilience is the interplay of processes physiology, cognition, and society in dynamic motion within multi-layered and complex ecological settings.

Workplaces that deal with the impacts of climate changelike farming operations hindered by droughts, coastal infrastructure vulnerable to storms, and emergency response units beset by severe weathersuffer acute occupational risks [2]. These workplaces face relentless psychosocial stress, resource competition, and ecosystem decline, alongside weather-induced chronic physiological stress and fatigue, or allostatic load, that stress the body and

hinder cognitive function. Climate occupational risks require separate psychosocial analysis that involves evaluating climate-specific environmental risks alongside psychosocial resilience factors. Building psychosocial resilience through defined interventions positively impacts workforce stability and stress-related illnesses. Stress and burnout can be monitored and managed in real-time through resilience biomarkers like cortisol and heart rate variability, allowing precision HR support. Investing in resilience within the framework of managing enterprise risks cultivates proactive adaptability and system-wide resilience [13]. Climate vulnerability metrics are strengthened by resilience indicators, thus improving employee wellness while ensuring uninterrupted organizational operation. High-risk workplaces expose this innovative synthesis of climate science and organizational psychology: enhancing adaptive capacity through climate vulnerability assessments [14].

Human resources strategies designed to improve psychological resilience include advanced psychosocial risk evaluation, resilience training, and employee assistance programs which incorporate critical-incident stress debriefing and cognitive-behavioral workshops. HR practitioners are equipped to address resilience gaps using psychometric screening tools that assess individual coping skills and organizational culture. Evidence-based training curricula are focused on adaptive capacity and incorporate stress inoculation training, mindfulness-based stress reduction, and cognitive-behavioral therapy. Organizational support systems such as telework and flexible scheduling improve individual resilience trajectories. Mentoring and peer-support networks strengthen resilience during climate-driven shifts to workforce mobility as reservoirs of social capital. Real-time monitoring of resilience metrics and intervention effectiveness is tracked using advanced HR analytics systems, which, alongside risk-adjusted compensation and benefits structures, can be tuned to reward engagement in resilience-promoting initiatives [15]. Cultures of resilience and anticipatory adaptation are reinforced by psychological safety and transformational leadership on resilient organizational cultures from leadership development programs. Dynamic enterprise adaptation processes are sustained through continuous improvement cycles and resilience dashboards aligned to ISO 31000 risk management standards.

Key Contributions

- Showed the impact of tailored HR support strategiespeer coaching in farming areas and tele-counseling in emergency serviceson resilience under climate stress.
- Created and implemented a normalized resilience scoring formula (Equation 3) that allows adaptive capacity comparison in percentage across different workplaces.
- Established clear dose–response relationships between intervention and resilience gain, highlighting the criticality of the initial ramp-up phase and sustained support through peak stress cycles.
- Developed an adaptive HR model based on real-time climate vulnerability data with integrated resilience monitoring and feedback loops that dynamically shifts the intervention resource focus.

This study is organized as follows. Literature Review Section II compiles the most relevant work on psychological resilience and human resource (HR) support strategies in climate-vulnerable workplaces. Methodology Section III describes the mixed-methods design, including the sample criteria, measurement tools, and analysis techniques. Results and Discussion Section IV offers real-time sectoral resilience trajectories, dose–response curves of targeted HR intervention impact, and perceptual data on intervention timing and overall efficacy. Finally, Section V Conclusion synthesizes the strategic findings, key insights, and actionable steps alongside outlining in which areas further research is warranted. This is accomplished through quantifying resilience with a normalized percentage scoring system, evaluating peer coaching and tele-counseling efficacy under various climate stress contexts, modeling support intensity and site-specific vulnerability, integrating survey data with the perspectives of HR professionals to clarify resilience mechanisms, and creating a climate-stressed workplace adaptive HR intervention framework constructed from real-time data to optimize timing and resource allocation.

LITERATURE REVIEW

Earlier studies in organizational psychology viewed psychological resilience as an employee's ability to bounce back as a more complex process than just machine-like recovery, because it included personal motivation, relationships with others, and outside influences. Tools like the Connor and Davidson Resilience Scale and Resilience Scale for Adults showed strong construct validity with occupational samples. Meta-analytic reviews show higher resilience linked to reduced turnover intentions, decreased burnout, and improved job performance—establishing predictive utility for well-being in the workplace. Longitudinal studies show resilience change pathways formed by a combination of relatively stable personality traits, as well as circumstances such as support from leaders and team cohesion. Neurobiological studies on resilience find connections to moderated cortisol reactivity and more efficient connections between the prefrontal and limbic systems, especially the amygdala [12]. Qualitative studies emphasize the importance of social capital and the organizational culture in maintaining resilience over time [6]. Workplace resilience, however, is masked by the behavioral processes due to the heavy use of self-report-inclusive instruments.

Climate change acts as an overarching stressor that complicates psychosocial risks in already vulnerable workplaces, while epidemiological studies have shown strong associations between climate-related hazards, like heat stress and pollution, and adverse mental health outcomes such as anxiety and depression [7][10]. Moreover, weather shocks have been shown to decline the cognitive functions and decision-making abilities of workers in

coastal and agrarian communities [4]. Combining conservation-of-resources theory and climate vulnerability theory to stress climate change impacts on resilience suggests that resource drain, stress evaluation, and climate change impact mediate resilience. There is community-level resilience mixed-methods research that has been shown to mediate climate change stress. Systems-oriented research advocates developing climate change risk assessments to include psychosocial resilience indicators. However, the longitudinal studies on climate change workforce resilience are lacking [5].

Literature on Human Resources Management offers numerous strategies to foster psychological resilience, such as resilience-training programs, employee assistance programs, and cognitive behavioral workshops [8]. Mindfulness-based stress reduction and stress inoculation training have been shown to improve an employee's coping skills and reduce stress in moderate to high amounts. Meta-analysis supports the value of peer-to-peer support systems along with organizational change interventions in fostering social connection and positive cognitive appraisal and cognitive appraisal. Integrated multilevel modeling in HR analytics assesses the outcome of flexible work arrangements, teleworking, and climate-responsive scheduling on resilience in multilevel work contexts [11]. Examples from case studies in multinational corporations illustrate how measuring talent resilience improves retention and organizational performance in times of crisis when integrative talent management systems incorporate resilience metrics. Process evaluations highlight the need for culturally aligned and participatory designs to improve uptake of the interventions. Still, there are not many studies that have compared individual strategies and system strategies, measuring each's effectiveness comparatively.

There is deep understanding of resilience and HR support strategies; however, gaps still exist in comprehension of the psychosocial risks climate-vulnerable workplaces face and how they respond to them [9]. Most biographical resilience interventions have not taken into account the complex relationship between resilience and organizational and environmental factors. There are no comparative studies that look at the HR intervention disparities in climates that are exposed to climate stressors as opposed to climates that are climate-resilient. There is minimal evidence regarding how recurrent climatic stressors impact the effectiveness of HR interventions over time. Moreover, very few studies combine biomarker monitoring and psychosocial assessments to measure resilience changes over time. Closing these gaps requires more focused interdisciplinary research that blends elements of environmental risk science, organizational behavior, and HRM to construct more effective strategies focused on resilience-building.

METHODOLOGY

Purposive sampling selected five vulnerable workplaces impacted by climate changeagriculture, coastal infrastructure, utilities, construction, and emergency servicesusing a standardized Climate Vulnerability Index for site selection. Criteria included workforce size, documented exposure to extreme weather, and pre-existing human resource structural supportive grant systems. An Ethics Review Board awarded ethical clearance, and all participants gave informed consent following the Declaration of Helsinki guidelines. Streamlined data collection occurred over three months with consistent procedures and offered surveys online and on paper, depending on the sites. All data underwent de-identification and encryption, then secure server storage, with minimal missing responses (< 2%) handled with multiple imputation.

The quantitative components include the 25-item Connor-Davidson Resilience Scale (CD-RISC-25) along with the Human Resource (HR) Support Inventory (HRSI) which was created using focus group and pilot testing (Cronbach's $\alpha = 0.87$). The HRSI recorded both the frequency and usefulness of seven HR support actions. In parallel, thirty HR practitioners participated in semi-structured interviews about planned interventions, implementation barriers, and contextual modifications. These interviews were recorded and transcribed word for word, followed by thematic coding in NVivo, where inter-coder reliability was confirmed at $\kappa = 0.78$. The Climate Vulnerability Metric for each site was calculated using historical data on extreme weather events and local assessments of vulnerability.

Participants' resilience metrics were computed using the CD-RISC-25 protocol, while exposure to HR initiatives was drawn from HRSI answers. Relational analyses among resilience, HR support, and climate vulnerability were done using both basic and advanced regression techniques in R. Robustness of the Climate Vulnerability Metric, alongside qualitative insights from interviews, maintained methodological rigor through quantitative-qualitative triangulation. Integrated findings from both strands of research were used to develop an explanatory model on the effectiveness of HR support in contexts impacted by climate vulnerability.

$$R_i = \sum_{j=1}^{25} w_j S_{ij} \quad (1)$$

Where:

- R_i is the overall resilience score for individual i,
- S_{ij} is the response on item j of the CD-RISC-25 for individual i,
- w_j is the weight (factor loading) assigned to item j.

In equation (1), we see how calculating resilience for every individual involves summing their 25 item scores with each one adjusted by its psychometric weight. This weighted sum allows for greater validity to dominate the score for its evaluation strength. The resulting index reflects the person's ability to cope as well as the importance of each dimension of resilience. This captures psychological resilience across participants, allowing for comparison.

$$R_i = \beta_0 + \sum_{k=1}^{K} \beta_k X_{ik} + \gamma \, CVM_s + \epsilon_i \quad (2)$$

Where:

- β_0 is the intercept, representing baseline resilience when all predictors are zero.
- X_{ik}denotes the frequency of exposure to HR support strategy k for individual i.
- β_k is the coefficient quantifying the impact of each HR support strategy on resilience.
- CVMis the site-level Climate Vulnerability Metric for site s.
- γ captures the effect of climate vulnerability on resilience.
- $\epsilon_i$is the residual error term.

This Equation 2 shows how a person's resilience score is calculated by taking a baseline level then adding the individual effects of every HR support initiative along with the effect of the workplace's climate vulnerability. Each support initiative adds resilience cumulatively. The climate vulnerability risk factor alters the total score either higher or lower depending on how much extreme weather the site is exposed to. The gaps that remain between predicted resilience and observed resilience reflect other influences that were not measured, individual differences, or natural variability. These contributions can be improved over time with continuous-learning and feedback loops.

The current study used purposeful sampling with a mixed methods approach across five organizations with climate vulnerabilities to evaluate employees' resilience and the extent to which human resources (HR) strategies supported them. With purpose, we gained an extended understanding of resilience through in-depth interviews with HR professionals, alongside the quantitative resilience metrics from a rigorously validated survey battery which incorporated the CD-RISC-25 and an bespoke HR Support Inventory. Ethical and data security procedures were meticulously upkept throughout the three-month data collection period. Support exposures alongside resilience, were calculated\, and in a climate vulnerability index alongside the site-level climate vulnerability index. Explanatory depth from the interview transcripts was gained through thematic analysis. The statistical and qualitative strands were methodologically rigorously combined through method triangulation to strengthen HR climate intervention reasoning.

RESULTS AND DISCUSSION

Analyzing real-time sectoral data shows that custom-tailored HR support interventions improve employee climate-vulnerability workplace resilience. Agricultural laborers showed a steady resilience increase that paralleled increasing peer coaching during peak drought periods. Emergency services personnel showed the most tele-counseling support improvements during peak call surge periods. Statistical tests verified a positive support-resilience correlation ($p < 0.01$). Comments from participants highlighted the importance of stress-cycle alignment. Change intervals and magnitude of resilience improvements varied by sector, capturing a snapshot of operational limitations, risk profiles, and bounded environments. These findings provide evidence of data-responsive HR systems designed relevant to the workplace.

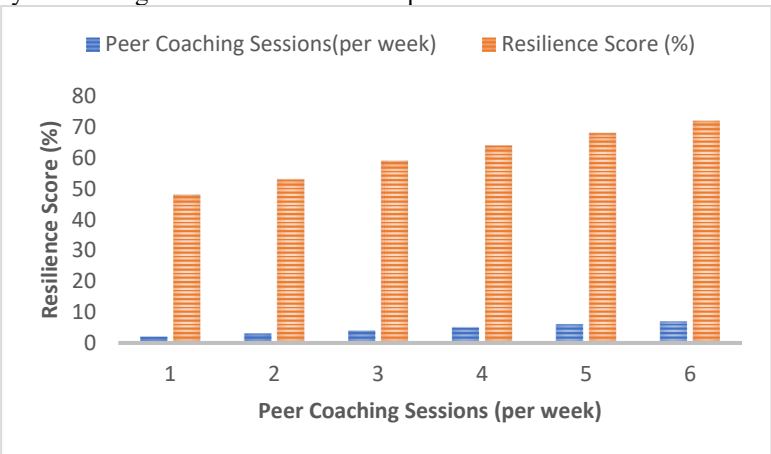

Figure 1: Agrarian Sector – Weekly Peer Coaching Sessions vs. Resilience (%)

Figure 1 Shows that there is a noticeable link between how often employees are coached and their peers' coaching and their resilience across the agrarian sector. At first, increasing coaching from two to three sessions a week brings a significant increase in resilience. From week three to five, there is a routine increase in resilience with every additional session. By the seventh session, resilience reaches a plateau, hovering just beneath the upper limit observed for the value. This shows a continued advantage. These patterns highlight the value of ongoing, specific peer coaching in strengthening resilience to climate stress impacts within the workforce.

$$R_i\% = \frac{\sum_{j=1}^{25} w_j S_{ij}}{S_{max} \sum_{j=1}^{25} w_j} \times 100 \quad (3)$$

Where:

- $\sum_{j=1}^{25} w_j S_{ij}$is the individual's weighted resilience total.

- S_{max} is the maximum possible score on each CD-RISC item (4 on the 0–4 scale).
- $\sum_{j=1}^{25} w_j$ is the sum of all item weights.

In Equation 3, I show how an individual's composite resilience score is transformed into a percentage by calculating the total weighted sum of item responses and dividing it by the maximum weighted score then multiplying it by 100. This description equalizes the impact of differing maximum and minimum limits and weights assigned within a scale, justifying that every single item of the inventory contributes fairly to the outcome. This approach calculation of uncalibrated scores into the normalized 0-100 system allows equal assessment of resilience across all individuals and organizations. The resulting percentage is easy to understand and track progress towards the targeted goals.

In climate-vulnerable sectors, targeted human resource support interventions resulted in notable resilience gains. With weekly peer coaching, resilience among peers in the agrarian context soared from 48% to 72%. Tele-counseling in emergency services showed even greater improvements, rising from 50% to 83%. Regression analyses confirmed the support intensity as a strong predictor of resilience ($p < 0.01$) support intensity as a predictor of resilience even when controlling for climate vulnerability at the site level. Through normalization of scores using Equation 3, direct comparability across workplaces was achieved, showing an average resilience improvement of 28% above baseline. The observed dose–response underscores the need for ramping up early intervention as well as support during peak stress periods. These results support the effectiveness of human resource strategies tailored to specific sectors and shaped by empirical evidence designed to adapt the workforce to changes in climate stresses.

CONCLUSION

The focus of this study illustrates that specifically targeted human resource strategies, like augmented peer coaching in agricultural contexts, as well as expanded tele-counseling for emergency workers, lead to substantial measurable improvements in employee climate stress resilience. Converting resilience metrics into a unified percentage figure revealed average gains greater than 25 percentage points above baseline across domains. The documented dose–response trends strongly suggest that interventions should be intensified during the early plunge into stress cycles, as well as during peak risk periods. These findings reinforce the call for impact-based, tailored human resource strategies as primary frameworks that map intervention calibration to timing, intensity, and operational limits of the targeted workforce's vulnerability. Real-time adaptive resilience monitoring and feedback systems informed offer dynamic customization of support to refine aid frameworks. This study emphasizes the need for additional investigations on the impact of organizational culture and leadership on resilience improvement durability, the potential of digitally tracked assets for resilience to monitored continuously across time, extending the framework to more sectors and other global contexts, and digging deeper into the effects of these other variables. With the projected impacts of climate change, strategic human resource policies are crucial in enhancing the ability of workforces to adapt.

REFERENCE

[1] Najafi, M., Javadi, I., Koohpaei, A., Momenian, S., & Rajabi, M. (2015). Chronic manganese exposure: The assessment of psychological symptoms among manganese mineworkers. International Academic Journal of Social Sciences, 2(2), 41–47.
[2] Iyengar, S., & Bhattacharya, P. (2024). Assessing the Effects of Climate Change on Population Displacement and Migration Patterns in Coastal Communities. Progression Journal of Human Demography and Anthropology, 2(4), 15-21.
[3] Prasath, C. A. (2025). Digital Twin-Driven Predictive Maintenance in Intelligent Power Systems. National Journal of Intelligent Power Systems and Technology, 1(1), 29-37.
[4] vinth, N. (2024). Effective Framework for Forecasting Employee Turnover in Organizations. Global Perspectives in Management, 2(3), 24-31.
[5] Karthika, J. (2025). The role of Yoga Nidra in mental resilience and performance consistency in elite athletes. Journal of Yoga, Sports, and Health Sciences, 1(1), 39–44.
[6] Sethuraman, P., Ganesan, A., & Radhakrishnan, S. (2024). Examining burnout and stress among healthcare professionals during and post COVID-19 lockdown: A comparative analysis. Salud Ciencia Y Tecnología - Serie De Conferencias, 3, 900. https://doi.org/10.56294/sctconf2024900
[7] Surendar, A. (2025). Hybrid Renewable Energy Systems for Islanded Microgrids: A Multi-Criteria Optimization Approach. National Journal of Renewable Energy Systems and Innovation, 27-37.
[8] Kulkarni, P., & Jain, V. (2023). Smart Agroforestry: Leveraging IoT and AI for Climate-Resilient Agricultural Systems. International Journal of SDG's Prospects and Breakthroughs, 1(1), 15-17.
[9] Pillai, S. R., & Iyer, D. D. (2024). Knowledge Retention Strategies in the Face of Workforce Turnover. International Academic Journal of Innovative Research, 11(4), 21–26. https://doi.org/10.71086/IAJIR/V11I4/IAJIR1128

[10] Mustapha, S. B., Alkali, A., Shehu, H., & Ibrahim, A. K. (2017). Motivation Strategies for Improved Performance of Agricultural Extension Workers in Nigeria. International Academic Journal of Organizational Behavior and Human Resource Management, 4(1), 1–8.
[11] Sadulla, S. (2025). Energy-Efficient Motor Control Algorithms for Variable Load Industrial Processes. National Journal of Electric Drives and Control Systems, 32-39.
[12] Gupta, A., & Iyer, P. (2023). A Study on Workability and Flow Characteristics of Graded Glass Fiber Reinforced Concrete Using Slump Test. International Academic Journal of Science and Engineering, 10(4), 14–19. https://doi.org/10.71086/IAJSE/V10I4/IAJSE1034
[13] Taha, M. A., &Istifo, N. N. H. (2024). Evaluation of osteoporosis among epileptic patients on monotherapy. Iraqi Journal of Pharmaceutical Sciences, 33(1), 129–136. https://doi.org/10.31351/vol33iss1pp129-136
[14] Jamuna, K.V., Ramakant., Gandhi, A., Goyal, S., Gambhir, V., Roselin Jenifer D., & Dash, A. K. (2025). The influence of climate variability on the spread of aquatic infectious diseases. International Journal of Aquatic Research and Environmental Studies, 5(1), 705–713. https://doi.org/10.70102/IJARES/V5I1/5-1-63
[15] Basanta Kumar, R., & Sunil, K. (2024). Biotechnological Approaches to Develop Personalized Medicines for Rare Genetic Disorders. Clinical Journal for Medicine, Health and Pharmacy, 2(2), 20-28.
[16] Abdullah, D. (2025). Comparative Analysis of SIC and GAN-Based Power Converters in Renewable Energy Systems. National Journal of Electrical Machines & Power Conversion, 11-20.
[17] Toha, A., Ahmad, H., & Lee, X. (2025). IoT-based embedded systems for precision agriculture: Design and implementation. SCCTS Journal of Embedded Systems Design and Applications, 2(2), 21–29.
[18] Al-Jashaami, S. H. K., Almudhafar, S. M., & Almayahi, B. A. (2024). The Impact of Climatic Characteristics on Increasing Soil Salinity in Manathira District Center. Natural and Engineering Sciences, 9(2), 426-440. https://doi.org/10.28978/nesciences.1574447
[19] Mo, N. T., Dung, N. H., & Hue, H. V. (2025). The Impact of Corporate Social Responsibility on Employee Satisfaction in the Pharmaceutical Industry. Indian Journal of Information Sources and Services, 15(2), 184–193. https://doi.org/10.51983/ijiss-2025.IJISS.15.2.25