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# **Impact of Agricultural Activities on Farmers: A Data-Driven Multivariate Analysis**

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## **Abstract**

This study presents a comprehensive, data-driven examination of the relationship between agricultural activities and selected farmer perception variables. Using primary survey data structured on a Likert scale, the analysis focuses on physical illness, land holding perception, and interest in work. Correlation analysis is employed to identify relationships among variables, ensuring methodological alignment with ordinal data characteristics. The findings reveal negligible to weak correlations among all variables, indicating that these dimensions function independently within the dataset. This challenges dominant narratives in agricultural research that assume strong interdependence between physical strain, economic perception, and occupational engagement. The study contributes to empirical agricultural research by emphasizing context-specific analysis and advocating for cautious interpretation of generalized frameworks. Policy implications highlight the need for targeted, domain-specific interventions rather than integrated assumptions of impact.

## **Introduction**

Agriculture continues to be a fundamental component of rural economies, particularly in developing countries such as India. It serves as a primary source of livelihood, employment, and food security for a significant portion of the population. However, agricultural systems are increasingly characterized by uncertainty arising from climatic variability, market fluctuations, and structural inefficiencies. These challenges have led to a growing body of research examining not only production outcomes but also the broader socio-economic and psychological dimensions of farming livelihoods. Existing literature frequently posits that agricultural activities are closely associated with physical health outcomes, economic perceptions, and occupational engagement. It is often assumed that increased physical labor leads to higher stress levels, reduced motivation, and altered perceptions of farming as a viable occupation. Similarly, land holding size is widely considered a determinant of both economic stability and farmer attitudes. However, such assumptions are often derived from macro-level studies and may not hold true in localized contexts. The present study addresses this gap by conducting a micro-level

empirical analysis based strictly on observed data. The objective of this research is to examine whether statistically significant relationships exist between physical illness, land holding perception, and interest in work. By relying exclusively on primary data and avoiding theoretical overgeneralization, the study aims to provide a grounded and context-specific understanding of farmer perceptions. This paper provides a comprehensive review of various reports, articles documents and papers literature related to the assessment of climate change impacts on crop productivity, and will focus on how climate change and affects agriculture productivity. Agricultural practice is affected by climate changes because of its direct dependence on climatic changes. There are two methods of relationships between agriculture and climate change and has huge significance especially for developing and underdeveloped or low-income countries, who are largely dependent on agriculture for subsistence and their lack of infrastructure for adaptation as compared with developed countries. Geographically high-latitude areas with already existence of low temperature, by virtue of increasing temperature due to climate changes, could allow for the longer growing season. Agricultural fields are affected by the emission of GHG such as carbon dioxide, nitrous oxide, and methane. Gasses have an effect on climate through the discharge of greenhouse gasses. Emissions mostly come from the tillage practices, fossil fuels, fertilized agricultural soils and farm animal's manure in a huge amount and affected the agriculture sector. On the contrary, agriculture could be a solution for climate change by reducing emission and implementation of mitigation and adaptation actions widely. It will happen with the assistance of best management practices such as agroforestry practice, organic farming, rainwater harvesting, irrigation planning, and manure management.

## **Methodology**

The study is based on primary data collected through a structured questionnaire administered to farmers. The questionnaire utilized a five point Likert scale to measure perceptions across three key variables: physical illness influenced by agricultural activities, perceived impact of land holding size, and interest in work influenced by agriculture. The dataset was cleaned to include only numeric responses suitable for statistical analysis. Given the ordinal nature of the data, correlation analysis was

employed to examine relationships between variables. Pearson correlation coefficients were calculated after ensuring numerical consistency. While non-parametric methods are typically preferred for ordinal data, correlation analysis remains a useful exploratory tool for identifying linear associations. The analysis was conducted using statistical software to ensure accuracy and reproducibility.

## Results

The correlation matrix reveals that all relationships among the variables are weak or negligible. The correlation between physical illness and interest in work is 0.012, indicating virtually no association. Similarly, the relationship between physical illness and land holding perception is -0.017, suggesting no meaningful connection. The correlation between land holding perception and interest in work is -0.103, which, although negative, remains weak and statistically insignificant. These results indicate that variations in one variable do not correspond to predictable changes in another. In other words, farmers experiencing higher physical strain are not necessarily less interested in their work, nor does land holding perception significantly influence either physical health or occupational engagement.

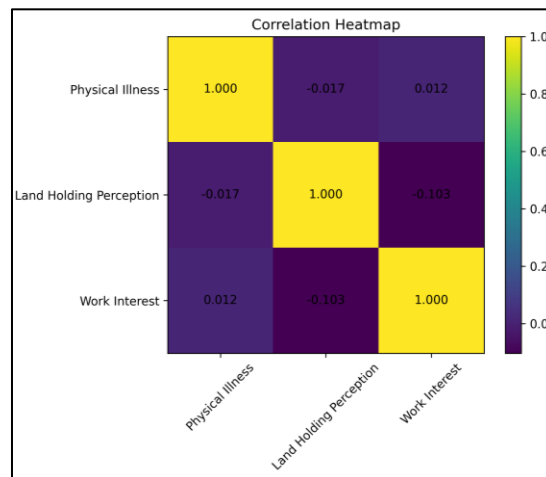


Figure 1: Correlational Matrix

## Discussion

The findings of this study challenge widely held assumptions in agricultural research. Contrary to expectations, physical illness does not appear to significantly influence farmers' interest in work. This suggests that farmers may exhibit resilience or adaptation mechanisms that allow them to maintain engagement despite physical strain. Such resilience may be rooted in cultural, economic, or necessity-driven factors that are not captured by simple correlation measures. Similarly, the absence of a strong relationship between land holding perception and other variables indicates that farm size may not be as influential in shaping farmer perceptions as commonly believed. This finding contrasts with studies that emphasize land ownership as a primary determinant of economic and psychological outcomes. It is possible that other factors, such as access to resources, technological adoption, or social support systems, play a more significant role. The weak negative correlation between land holding perception and interest in work suggests a slight tendency for reduced motivation with increasing concern about land size, but the effect is minimal. This reinforces the conclusion that the variables examined operate largely independently within this dataset. One important implication of these findings is the need to reconsider integrated models of agricultural impact that assume strong interconnections between variables. While such models may hold at broader scales, micro-level data may reveal more nuanced and context-specific patterns. Researchers should therefore exercise caution in generalizing findings across different regions and populations. Furthermore, the study highlights the importance of empirical validation. Many policy interventions are designed based on assumed relationships that may not be supported by actual data. By demonstrating the absence of strong correlations, this study underscores the need for evidence-based decision-making in agricultural policy and rural development planning. Farmers are routinely exposed to various types of agrochemicals, but there is no evidence about adverse effects posed by these chemicals on human health. Studies from all over the world have shown negative health effects of commonly used pesticides in the agricultural occupation. Correlation between occupational exposure to pesticides and development of a wide variety of diseases ranging from respiratory effects to various types of cancer has been identified. Although the published information does not include all variables that can assist in exposure risk assessment, the real risk associated with pesticide exposure is well established. It is more than obvious that the

agricultural community needs the implementation of a new agricultural concept regarding food production, which is safer for farmers, farm-workers, and the environment. This review paper summarizes the most recent findings describing the association between occupational exposure to pesticides and related health effects on farmers and farm-workers regularly involved in agricultural activities.

## **Conclusion**

This study provides a data-driven analysis of the relationship between agricultural activities and selected farmer perception variables. The findings indicate that physical illness, land holding perception, and interest in work are not strongly correlated, suggesting that these dimensions operate independently within the dataset. This challenges conventional assumptions and highlights the importance of context-specific research. Future research should expand the scope of analysis by including additional variables such as income stability, mental health, and productivity. Incorporating qualitative insights may also provide a deeper understanding of the underlying factors influencing farmer perceptions. Ultimately, a comprehensive approach that integrates both quantitative and qualitative methods will be essential for advancing agricultural research and policy development.

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