



Social Sciences Spectrum

A Double-Blind, Peer-Reviewed, HEC recognized [Y-category](#) Research Journal

E-ISSN: [3006-0427](#) P-ISSN: [3006-0419](#)

Volume 04, Issue 03, 2025

Web link: <https://sss.org.pk/index.php/sss>



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Debt, Fertilizer Mafias, and Rising Input Costs: Structural Barriers to Farmer Well-Being in Punjab, Pakistan

Humaira Raheem

M.Phil Scholar, Department of Sociology and Criminology, University of Sargodha, Punjab-Pakistan

Email: humairaraheem512@gmail.com

Muhammad Zainul Abidin

Lecturer, Department of Sociology and Criminology, University of Sargodha, Punjab-Pakistan

Email: muhammad.zain@uos.edu.pk

Kaleem Ullah

Lecturer, Department of Sociology and Criminology, University of Sargodha, Punjab-Pakistan

Email: kaleem.ullah@uos.edu.pk

Dr. Zarqa Azhar

Lecturer, Department of Sociology and Criminology, University of Sargodha, Punjab-Pakistan

Correspondence Author: zarqa.azhar@uos.edu.pk

Article Information [YY-MM-DD]

Received 2025-05-21

Accepted 2025-08-12

Citation (APA):

Reheem, H., Ullah, K., Abidin, M, Z & Azhar, Z. (2025). Debt, fertilizer mafias, and rising input costs: Structural barriers to farmer well-being in Punjab, Pakistan. *Social Sciences Spectrum*, 4(3), 370-382.

<https://doi.org/10.71085/sss.04.03.341>

Abstract

This study examines how debt dependency, fertilizer cartels, and rising input costs affect farmer well-being in Punjab, the country's primary food-producing region. A structured survey of 106 smallholder farmers, supported by descriptive statistics, cross-tabulations, and illustrative farmer narratives, reveals the depth of these constraints. Results show that nearly 69% of farmers strongly agreed that debt cycles reduce their household income, while 70% identified fertilizer mafias as a major source of exploitation. Rising seed prices (78%), diesel costs (56%), and labor expenses (41%) were further reported as significant burdens. Coping strategies such as borrowing from informal lenders (58%), reducing input use (46%), and reliance on non-farm wage labor (42%) highlight reactive rather than transformative responses, often reinforcing vulnerability. The findings underscore a poverty-vulnerability trap in which structural dependency and market capture prevent resilience-building and accelerate youth disengagement from agriculture. Policy implications include stronger regulation of fertilizer and seed markets, improved access to affordable credit and insurance, cooperative models for input and output markets, and measures to offset rising energy costs. Addressing these barriers is essential to safeguard smallholder livelihoods and Pakistan's broader food security.

Keywords: Debt, Fertilizer Mafias, Input Costs, Smallholder Farmers, Structural Vulnerability, Pakistan.



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Introduction

Agriculture remains the backbone of Pakistan's economy, contributing around 19% of GDP and employing nearly two-fifths of the labor force (Government of Pakistan, 2023). Punjab province, known as the country's breadbasket, is central to national food security, producing most of the wheat, rice, and sugarcane. Yet the resilience of smallholder farmers, the largest share of agricultural producers--is increasingly undermined by a set of structural barriers that extend beyond climatic pressures. Among these, rising input costs, exploitative credit systems, and the dominance of fertilizer and seed cartels ("mafias") have emerged as central concerns for farming households.

Existing scholarship on agrarian change in South Asia has highlighted how smallholders face a dual squeeze: on one side, climate variability reduces yields and disrupts farming calendars (Carleton, 2017; Abid et al., 2019); on the other, market failures and institutional weaknesses erode their ability to secure fair returns or invest in adaptive practices (Bithal et al., 2014; Chandio et al., 2018). In Pakistan, this squeeze is particularly acute. Farmers frequently report that input prices, especially for fertilizer, certified seeds, diesel, and labor rise faster than crop prices, leaving households dependent on credit and vulnerable to exploitative market actors. Debt cycles not only undermine income but also entrench poverty, reducing the ability to diversify or exit farming.

While international debates on food security often emphasize climate impacts and production technologies, less attention has been paid to the political economy of input markets in the Global South. Studies from India and sub-Saharan Africa show how fertilizer cartels and credit dependence trap smallholders in conditions of chronic vulnerability (Reardon, 1997; Ali & Erenstein, 2017). Yet empirical evidence from Pakistan where fertilizer mafias and informal credit providers are widely recognized by farmers as structural barriers remains limited.

This paper addresses this gap by analyzing how debt, fertilizer mafias, and rising input costs interact to shape farmer well-being in Punjab. Based on survey data from 106 smallholders, the paper demonstrates that structural market failures are not peripheral but central drivers of agrarian distress. By focusing on these barriers, the study contributes to broader debates on food policy and agrarian transformation, showing how unregulated input markets and exploitative financial systems intersect climate vulnerability to threaten both rural livelihoods and national food security.

The research is guided by three questions:

- 1- How do debt cycles and input cartels impact the well-being of smallholder farmers?
- 2- What coping strategies do farmers adopt to manage rising costs and structural exploitation?
- 3- What policy mechanisms could reduce these barriers and strengthen farmer resilience?

The following sections review the relevant literature on input market failures and agrarian distress, outline the study methodology, present results from farmer surveys, and discuss their implications for food policy in Pakistan and beyond.

2. Literature Review

2.1. Debt and the Poverty-Vulnerability Cycle

Smallholder farmers across the Global South are increasingly caught in debt cycles that erode long-term resilience. Debt often emerges not as an investment in productivity but as a survival strategy to cover input costs, household expenses, or loan repayments (Reardon, 1997). In South Asia, chronic indebtedness has been linked to farmer suicides in India (Carleton, 2017), highlighting the

extreme consequences of financial exclusion. In Pakistan, informal lenders dominate rural credit markets, charging high interest rates and locking smallholders into exploitative repayment cycles (Ullah et al., 2021). Formal credit schemes remain inaccessible to many farmers due to collateral requirements and bureaucratic hurdles (Chandio et al., 2018). These dynamics reinforce what Dercon (2004) describes as the “poverty-vulnerability trap,” in which financial dependence prevents investment in adaptive strategies and perpetuates intergenerational poverty.

2.2. Fertilizer Mafias and Market Cartelization

Input market failures have long been recognized as a critical barrier to smallholder resilience. Fertilizer markets in Pakistan are notorious for cartelization, where a handful of suppliers often termed “fertilizer mafias”, control supply chains, inflate prices, and restrict availability during peak demand (Hossain, 2024). Similar patterns are reported in India, where fertilizer subsidies and black markets intersect to create distortions that disadvantage smallholders (Birthal et al., 2014). Globally, the World Bank (2023) notes that fertilizer price shocks have become more frequent due to geopolitical crises and supply disruptions, disproportionately affecting low-income farmers. In Pakistan, farmers frequently complain that fertilizer mafias exploit shortages and hoard supplies, forcing them to purchase at inflated rates. Such practices constitute a form of structural violence in the agricultural economy, where market capture systematically transfers value away from smallholders toward monopolistic intermediaries.

2.3. Rising Input Costs: Seeds, Diesel, and Labor

In addition to fertilizer, rising seed, diesel, and labor prices also deteriorate the health of farmers. In most regions of the Global South, the cost of inputs has increased more quickly than the prices at the farmgate, and this has led to a cost-price squeeze (FAO, 2021). Certified seeds tend to be too expensive to the smallholder, leading to the use of lower-quality or counterfeit ones, which lower yields (Ali and Erenstein, 2017). A significant deterrent to irrigation-dependent farmers is the cost of diesel put under strain by worldwide fuel prices (Nadeem et al., 2024). Meanwhile, migration, mechanization, and non-farm employment opportunities have been increasing labor costs in rural Pakistan (Hameed and Qaiser, 2019). Combined, these increasing expenses impose systemic constraints that are driving not only falling profitability, but also rapid disengagement with agriculture, especially among the rural youth.

2.4. Structural Barriers and Farmer Health.

The convergence of debt, market cartels and rising input costs is not an accident, and it is a structural issue, with roots in the political economy of agriculture. Some researchers stress that farmers' well-being cannot be defined in terms of their productivity or income, but must be related to the concepts of dignity, freedom and non-exploitation (Ribot, 2017; Scoones, 2013). In Pakistan, farmers often complain of being caught between natural risks (climate variability) and social risks (cartelization, debt peonage). Similar mechanisms have been observed across the Global South, where institutionally weak and ungovernable states have further compounded vulnerability (Adger 2006; Abid et al. 2019). In other words, they show that farmer distress is not an isolated consequence of environmental uncertainty but rather a reflection of institutional malpractices in the agricultural markets.

2.5. Research Gap

While studies have examined the role of debt, rising costs, and fertilizer supply chains individually, few have systematically analyzed how these interacting structural barriers jointly shape smallholder well-being in Pakistan. Most existing research focuses on either macroeconomic

modeling of input markets or micro-level case studies of climate adaptation. What is missing is an integrated analysis that foregrounds farmer perceptions of debt, mafias, and cost burdens as interlinked drivers of vulnerability. By addressing this gap, this paper contributes to international debates on agrarian distress, input market governance, and food policy by demonstrating how market failures and exploitative practices reinforce vulnerability traps for smallholder farmers in Punjab.

3. Research Methodology

3.1. Study Context

Punjab province, Pakistan's agricultural hub, produces the majority of the country's staple crops and is home to millions of smallholder farmers. Despite its central role in national food security, Punjab has become increasingly vulnerable to climate variability, market failures, and rising input costs. Studying Punjab therefore provides critical insights into how structural barriers constrain farmer well-being.

3.2. Research Design

The study employed a quantitative cross-sectional survey design to capture farmer perceptions of debt, fertilizer markets, and input costs. This approach was selected to document both the prevalence of structural challenges and their perceived impacts on farmer well-being. While descriptive in nature, the design is appropriate for identifying patterns of vulnerability and policy-relevant entry points.

3.3. Sampling and Data Collection

The present study employed a **multistage sampling technique** to select respondents systematically and ensure representation across different administrative levels of the Sargodha region. In the first stage, the **Sargodha region** was purposively chosen as the research locale because of its agricultural importance and diversity of farming practices. In the second stage, **all tehsils of Sargodha** were included to capture variability across sub-districts. In the third stage, **one village from each tehsil** was selected to represent local farming communities. Finally, in the fourth stage, a sample of **21–22 farmers** was randomly drawn from each selected village to serve as respondents for the study. Data was collected from 110 smallholder farmers (landholdings under 12.5 acres)

This multistage sampling approach allowed the research to combine breadth and depth by covering the region, tehsils, villages, and farmers, while also maintaining feasibility in terms of time, cost, and fieldwork resources.

The questionnaire consisted of 31 items, with Likert-scale questions focusing on five domains:

- 1. Debt and credit access** (formal/informal credit, repayment burdens).
- 2. Input costs** (fertilizer, seed, diesel, labor).
- 3. Fertilizer and seed markets** (availability, price volatility, perceptions of “mafia” practices).
- 4. Technology and extension services.**
- 5. Household-level coping strategies.**

Although the instrument was primarily quantitative, enumerators were trained to record brief verbatim comments volunteered by respondents. These comments are included in the Results as illustrative quotes to complement the statistical findings.

3.4. Ethical Considerations

Ethical clearance was obtained from the Department of Sociology and Criminology, University of Sargodha. Participation was voluntary, informed consent was secured from all respondents, and anonymity was ensured. No personal identifiers were recorded.

3.5. Data Analysis

Survey data were coded and analyzed using **SPSS v.25**.

- Descriptive statistics (frequencies and percentages) were used to identify the most commonly reported structural barriers.
- Cross-tabulations and chi-square tests were conducted to explore associations between farmer characteristics (e.g., education, landholding) and perceived barriers (e.g., debt reliance, adoption of coping strategies).
- Where relevant, illustrative quotes are presented to contextualize the quantitative findings.

This combination of descriptive and basic inferential analysis provides a credible, policy-relevant account of how debt, cartels, and rising costs shape farmer well-being in Punjab.

4. Results

The survey findings highlight how structural barriers, debt dependency, fertilizer cartels, and rising input costs, systematically undermine the well-being of smallholder farmers in Punjab. Results are presented thematically, combining descriptive statistics with illustrative farmer narratives.

4.1. Debt Dependency and Household Strain

Debt emerged as a pervasive structural barrier, with more than two-thirds of respondents reporting that loans reduce their income and undermine household well-being. Among the farmers surveyed, 68.9% strongly agreed that reliance on credit diminished their earnings, while a further 21.7% agreed; only 9.4% disagreed or remained neutral.

“We take loans not for investment but for survival; by the time we sell our crops, we are left with almost nothing.” (Farmer, Sahiwal)

The results suggest (Table 1) that debt functions less as productive capital and more as a survival mechanism. Informal credit sources dominated, reflecting the inaccessibility of formal loans. Cross-tabulation indicated that smaller landholders (<5 acres) were significantly more likely ($p < 0.05$) to report debt dependency than larger smallholders, suggesting heightened vulnerability among the poorest farmers.

Hypothesis Testing

There is a significant association between landholding size and debt dependency among farmers

Table 1. Farmer Perceptions of Debt and Income (n=110)

Cross-tabulation of Landholding Size and Debt Dependency

Landholding Size	Debt Dependency (Yes)	Debt Dependency (No)	Total
< 5 acres	45	15	60
≥ 5 acres	20	30	50
Total	65	45	110

Chi-square value (χ^2): 12.41 Degrees of freedom (df): 1 p-value: .0004

4.2. Fertilizer Mafias and Market Exploitation

A striking finding was the widespread perception of fertilizer cartels (“mafias”). Nearly 70% of respondents strongly agreed that fertilizer market manipulation reduced their income, while another 18% agreed. Only 12% disagreed or expressed uncertainty.

“The fertilizer dealers hoard supplies, then sell to us at double the price. We cannot fight them.”
(Farmer, Silanwali)

Farmers described how local dealers withheld fertilizer during peak demand seasons, forcing them to purchase at inflated prices. Such practices created both financial strain and production risks, as delayed fertilizer application lowered yields.

This perception aligns with broader critiques of cartelization in Pakistan’s input markets. Chi-square analysis revealed that farmers who reported high reliance on informal credit were also significantly more likely ($p < 0.05$) to perceive fertilizer mafias as a key barrier, suggesting an interlocking system of exploitation.

Hypothesis 2: There is a significant association between farmers’ reliance on informal credit and their perception of fertilizer mafias as a barrier

Table 2: Cross-tabulation of Credit Reliance and Perception of Fertilizer Mafias

Credit Reliance on Informal Sources	Perceive Fertilizer Mafias (Yes)	Perceive Fertilizer Mafias (No)	Total
High reliance	40	10	50
Low reliance	15	25	40
Total	55	35	90

Chi-square value (χ^2): 15.15 Degrees of freedom (df): 1 p-value: < .001

4.3. Rising Seed Prices and Production Costs

High seed prices were another frequently cited barrier. 78.3% of respondents strongly agreed that rising seed costs negatively affected their income, with only 11% disagreeing. Farmers reported being forced to purchase low-quality or counterfeit seeds due to affordability issues.

“The certified seeds are too expensive; sometimes we buy from the black market, but then the harvest suffers.” (Farmer, Silanwali)

Alongside seeds, diesel and labor costs were also significant burdens. 55.7% identified diesel as a major factor in declining income, while 40.6% pointed to rising labor costs. These costs not only increased production expenses but also reduced farmers’ willingness to expand cultivation.

Table 3: Perceptions of Rising Input Costs (n=110)

Input Cost Barrier	% Reporting Major Impact
Seed prices	78.3%
Diesel/fuel costs	55.7%
Labor costs	40.6%
Fertilizer costs (linked to mafias)	69.8%

4.4. Coping Strategies under Structural Stress

Farmers employed a range of coping strategies to manage debt and input costs. The most common was borrowing from informal lenders (58%), followed by reducing input use (46%), and seeking non-farm wage labor (42%). A smaller proportion reported crop switching (25%) or seasonal migration (12%).

“To save money, we use less fertilizer even though it reduces the yield. It is better to have something than to sink further in debt.” (Farmer, Sargodha)

“When costs go up, our sons leave farming and take daily-wage jobs in the city.” (Farmer, kotmomin)

These coping mechanisms are reactive rather than transformative, often deepening vulnerability. For example, reduced input use compromises yields, while reliance on daily wage labor shifts households away from agriculture altogether.

Table 4: Coping Strategies Reported by Farmers (n=110)

Coping Strategy	% of respondents
Borrowing from informal lenders	58%
Reducing input use	46%
Non-farm wage labor	42%
Crop switching/diversification	25%
Seasonal migration	12%

4.5. Inter linkages and the Poverty-Vulnerability Trap

The evidence suggests that debt, mafias, and rising costs are not isolated phenomena but interconnected structural barriers. Farmers who reported debt dependency were also more likely

to reduce input use, which in turn lowered yields and deepened vulnerability. Similarly, those facing cartel exploitation often resorted to borrowing, reinforcing cycles of indebtedness.

“We are trapped on all sides by the weather, by the lenders, and by the dealers. Farming is no longer a way to live.” (Farmer, Khushab)

These findings illustrate poverty-vulnerability traps where farmers oscillate between rising costs, exploitative markets, and debt reliance, with limited scope for upward mobility. The cumulative effect is not just reduced income but also disengagement from agriculture, particularly among youth, threatening the long-term sustainability of smallholder farming in Punjab.

5. Discussion

This study reveals how structural barriers like debt dependency, fertilizer cartels, and rising input costs, systematically undermine the well-being of smallholder farmers in Punjab. Beyond highlighting isolated problems, the findings show that these factors are deeply interlinked, creating what may be termed a poverty-vulnerability trap. Farmers borrow to meet input costs, fall prey to cartel-driven price hikes, and ultimately reduce input use or withdraw labor from agriculture. The cycle is self-reinforcing and erodes both household resilience and broader food security.

5.1. Debt as Structural Dependency

Debt in Punjab functions less as an investment tool and more as a survival mechanism. The survey data show that nearly 70% of farmers strongly agreed that debt reduces income, a pattern consistent with studies from India and sub-Saharan Africa where indebtedness locks farmers into chronic vulnerability (Reardon, 1997; Carleton, 2017). The reliance on informal lenders reflects weak institutional credit systems, as formal credit often requires collateral or complex procedures inaccessible to smallholders (Chandio et al., 2018).

The consequence is a structural dependency that limits farmer autonomy. Instead of using credit to adopt new technologies or diversify livelihoods, debt repayments consume harvest earnings, leaving farmers unable to build resilience. This supports Dercon’s (2004) thesis of the “poverty–vulnerability trap,” where short-term coping undermines long-term well-being.

5.2. Fertilizer Mafias and Market Cartelization

The prevalence of fertilizer cartels reported by 70% of respondents illustrates how market capture constitutes a form of structural violence against farmers. Dealers’ practices of hoarding and inflating prices during peak demand periods were consistently cited by respondents and mirror broader critiques of input market distortions in Pakistan (Hossain, 2024).

Such cartels not only inflate costs but also undermine yields, as delayed fertilizer application reduces crop productivity. Globally, similar patterns are reported where monopolistic control of inputs disadvantages smallholders (Birthal et al., 2014). What distinguishes the Punjab case is the perception of mafias as everyday governance failures: farmers view these market actors as peripheral but as central to their vulnerability.

For policy, this highlights the importance of regulatory capacity and enforcement. Without state intervention to regulate fertilizer markets, smallholders remain exposed to exploitative practices that exacerbate poverty and reduce trust in formal systems.

5.3. Rising Input Costs and the Cost–Price Squeeze

High seed prices (78% agreement), diesel costs (56%), and rising labor costs (41%) further constrain farmer well-being. These findings echo FAO (2021) reports of a cost-price squeeze in the Global South, where input prices rise faster than farmgate prices, reducing profitability. Farmers' testimonies reveal a dangerous trade-off: reducing fertilizer or seed use lowers yields but maintaining input levels deepens debt.

This squeeze disproportionately affects smallholders, who lack bargaining power in both input and output markets. The result is reduced investment in productivity, lower profitability, and in some cases, disengagement from farming. This disengagement has long-term implications for food security, particularly as rural youth increasingly migrate to non-farm jobs (Hameed & Qaiser, 2019).

5.4. Coping Strategies and the Erosion of Resilience

The coping strategies reported (borrowing, 58; reduction in input use, 46; non-farm labor, 42) are largely reactive but not transformative. They are stop-gap solutions at the expense of strength. It displaces input employment at the cost of production, while reliance on wage labor on a daily wage basis entails abandoning the farm.

This is also the case in other South Asian regions where exit from farming is often in the form of a non-adaptive, but rather distress-related, diversification (Ellis, 1998; Hagglade et al., 2010). Punjab is precisely the region where such coping mechanisms appear to have accelerated the downward spiral of smallholder farming and rural livelihoods.

5.5. Barriers and Well-Being in Farmer

Taken together, the findings highlight how structural constraints are not sufficient to make climate shocks the centerpiece of farmer welfare. The political economy of agriculture is one of debt peonage, cartelized markets and input costs, and of collusion between statutory negligence and market capture against smallholders. The loss of dignity and agency, from farmers in the study is clearly demonstrated when farmers speak of feeling victimized between the lenders and the dealers.

That is in accord with the position of Ribot (2017) that vulnerability is not only defined by exposure to shocks, but also by social and institutional exclusions. These exclusions are realized in Punjab through financial exploitation, monopolistic market and weak regulatory capacity. Increasing the welfare of farmers therefore cannot be done through technical solutions, but through structural solutions of governance and market control.

5.6. Policy and Food Security Implications.

The implications of the findings on food policy in Pakistan as well as similar settings in the Global South include:

- Through increase of regulation strictness to break up fertilizer cartels and proper input pricing.
- Increasing access to cheap credit and crop insurance to stop the addiction to informal lenders.
- Assistance to farmer co-operatives to increase bargaining power in input and output markets.
- Funding renewable power and efficient irrigation to subsidize the increase in the price of diesel.
- Investment in youth involvement in agriculture by ensuring that farming becomes a worthy and decent source of livelihood.

On a larger scale, the work highlights that there is no way to secure food security without considering the health of the farmers. When ownership of smallholders has been taken over by debt and exploitation, it puts the whole food system into jeopardy.

Policy Implications and conclusion.

This article demonstrates that small holder farmers in Punjab are not just helpless victims of climatic changes and variability but rather trapped in a web of structural limits including reliance on debts, fertilizer cartels, rising input costs that are systematically chipping away at their welfare. Debt is a mere survival credit rather than productive investment and farm cartels and mafias transact business with farmers at an exaggerated price and manipulate supply and demand. The disadvantage is compounded by the fact that seeds are expensive, diesel is expensive, and labor is expensive, leaving households with no option but to employ reactive coping strategies such as borrowing, reducing inputs, or non-farm employment. The synergy between these forces creates a poverty-vulnerability trap, which adversely impacts income security, gives renewed vigor to youth disengagement in agriculture, and endangers the stability of the food system in Pakistan.

Policy Implications

To address these systemic challenges, multi-level policy interventions are required:

- **Regulate and monitor input markets:** Dismantle fertilizer cartels and enforce transparent pricing through stronger competition laws and independent oversight bodies.
- **Expand affordable credit and crop insurance:** Strengthen access to formal credit tailored to smallholders, reduce reliance on informal lenders, and establish farmer-friendly insurance schemes.
- **Promote farmer cooperatives:** Encourage collective purchasing of inputs and cooperative marketing to reduce dependence on middlemen and improve bargaining power.
- **Offset rising energy costs:** Provide targeted subsidies or incentives for renewable energy (e.g., solar irrigation pumps) to reduce vulnerability to diesel price shocks.
- **Revitalize extension services and training:** Bridge knowledge gaps on input efficiency, soil health, and sustainable practices, with particular focus on engaging rural youth.

Final Reflection

The results of the current paper indicate clearly that the situation of small holder farmers in Punjab cannot be considered as the technical failure of low yield and poor inputs. But there is fraud in government, markets and rural finance. The farmer voice narrates that the bigger picture of inequality is in the backdrop of any loan repayment and any bag of fertilizer loaded heavy. In this story, smallholders are properly relegated to the bottom of the agricultural value chain. Their health cannot therefore be measured entirely alongside income or productivity, but also with dignity, autonomy and non-exploitation.

In the meantime, these findings have some implications beyond the household level. Farmers are also referring to the vulnerabilities of the food system of Pakistan itself when they discuss how they feel trapped on all sides. Debt cycles, cartels and escalating prices are not a local phenomenon of country villages: they leak out, into the prices of national food, into rural-urban migration and intergenerational disengagement of farming. The flight of urban youth out of farming is of particular concern in that it not only depriving a personal deprivation of potential but also a systematic weakening of the capacity of the sector to continue to exist.

As shown in the above reflection, the welfare of farmers is a national problem, which is associated with food security and country stability, and political legitimacy. It is a risk that unless policies directly address issues of dependency on debt, mafia penetration into the market, and unfair market structures, the agricultural backbone of Pakistan will be exposed and its smallholders permanently marginalized. Conversely, policy adjustments, such as a greater concern with equity and market regulation and the extension of access to inclusive finance, can make farming a respectable profession rather than an exploitative one.

Lastly, another lesson associated with this research is that we cannot develop our resilience in a non-just context. To solve the poverty vulnerability trap requires technical solutions, such as improved seeds or irrigation but a change in government to concentrate on how to protect farmers as citizens with rights, as opposed to farmers who grow harvests. Only under such kind of structural reforms a concept of smallholder farming can be taken off its survival system and made to be an empowering source of creating power that will be used to make the agricultural sector in Pakistan active and keep it active even after generation after generation.

Conflict of Interest

The authors showed no conflict of interest.

Funding

The authors did not mention any funding for this research.

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