

**EVALUATION OF FARMER PERCEPTIONS AND ADAPTIVE PRACTICES TOWARDS
CLIMATE-INDUCED LIVESTOCK HEALTH RISKS IN JHAJJAR**

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Abstract

This study evaluates farmer perceptions and adaptive practices in response to climate-induced livestock health risks. Using a mixed-methods approach, data were collected through structured questionnaires and key informant interviews with livestock farmers across Jhajjar district. The findings reveal that a majority of farmers have observed increased incidences of heat stress, disease outbreaks, and reduced productivity in their livestock, which they associate with rising temperatures and erratic rainfall patterns. Despite limited formal training, many farmers employ traditional and adaptive strategies, such as altering feeding patterns, improving shelter conditions, and adjusting grazing practices. However, knowledge gaps, financial constraints, and inadequate veterinary support hinder effective adaptation. The study underscores the urgent need for climate-resilient extension services, targeted awareness programs, and policy interventions to strengthen adaptive capacity and safeguard livestock-dependent livelihoods.

Keywords: Climate change, Livestock health, Farmer perception, Adaptive practices, Jhajjar

INTRODUCTION

Climate change is increasingly recognized as one of the most significant global challenges, with profound implications for agriculture and livestock-based livelihoods. In India, where agriculture remains the backbone of the rural economy, the adverse effects of changing climatic conditions are becoming more visible and severe. Among the numerous consequences of climate variability, its impact on livestock health is particularly critical. Livestock not only provides a crucial source of income, nutrition, and employment for rural households but also plays a vital role in sustaining agricultural systems. The state of Haryana, and more specifically the district of Jhajjar, with its strong agrarian base and considerable livestock population, presents a pertinent case for studying how farmers perceive and respond to climate-induced livestock health risks.

Jhajjar district, located in the western part of Haryana, experiences semi-arid climatic conditions characterized by high temperatures, erratic rainfall, and frequent droughts. These climatic stressors have been increasingly affecting livestock health, leading to heat stress, reduced productivity, altered disease patterns, and higher mortality rates. In response to these emerging challenges, farmers are compelled to adapt their traditional

livestock management practices. The success of such adaptation efforts largely depends on how well farmers understand the risks posed by climate change and their capacity to implement appropriate strategies. Thus, examining farmer perceptions offers vital insights into the ground realities of climate change impacts and the resilience of rural communities.

Understanding farmer perceptions is essential because it influences their decision-making and adoption of adaptive practices. Perceptions are shaped by a combination of personal experiences, socio-economic conditions, access to information, education levels, and institutional support. In Jhajjar, where the majority of the population depends on mixed farming systems, any shift in livestock health due to climatic factors can severely affect livelihoods. Farmers' awareness of changing climatic patterns—such as increased temperature, irregular monsoons, and extended dry spells—directly influences how they perceive the associated risks to animal health, including the spread of vector-borne diseases, reduced milk yield, reproductive disorders, and water scarcity.

Adaptive practices employed by farmers in Jhajjar may include changes in feeding and watering regimes, shelter modifications to reduce heat stress, use of indigenous knowledge for disease management, and greater reliance on veterinary services. However, the adoption and effectiveness of these measures vary widely across different socio-economic groups and are often constrained by limited access to financial and technical resources.

This study aims to evaluate the perceptions of farmers in Jhajjar regarding climate-induced livestock health risks and to document the adaptive practices they employ in response. By doing so, it seeks to identify knowledge gaps, assess the role of institutional support, and highlight the challenges and opportunities for building climate resilience in the livestock sector. The findings will contribute to a better understanding of the intersection between climate change, livestock health, and rural livelihoods, and will inform the design of targeted policy interventions and support systems that enhance adaptive capacity at the grassroots level.

Climate Change and Livestock

Globally, livestock systems contribute significantly to agricultural GDP and food security, providing milk, meat, manure, draught power, and employment. However, they are also increasingly under threat due to climate change. Studies indicate that rising ambient temperatures and altered rainfall regimes can negatively affect livestock productivity, reproduction, and immunity. For instance, heat stress can lead to reduced feed intake, lower milk yield, reproductive failure, and in severe cases, mortality.

India, with its vast livestock population—the largest in the world—faces compounded challenges. Livestock rearing is not just a commercial activity but a socio-economic necessity, especially among landless and

smallholder farmers. However, the increasing frequency of climate-induced events such as heatwaves, floods, droughts, and disease outbreaks is undermining livestock health and performance. Furthermore, rising temperatures can alter the geographical distribution and seasonal patterns of diseases like Foot-and-Mouth Disease (FMD), Hemorrhagic Septicemia (HS), and parasitic infestations, which have serious economic consequences for farmers.

In Haryana, and particularly in Jhajjar, climate anomalies have already begun manifesting in the form of increased cases of heat stress-related disorders, shifting disease calendars, and fodder scarcity. Farmers often struggle with limited veterinary access, poor infrastructure, and inadequate institutional support, making it imperative to understand how they perceive and respond to these emerging challenges.

Jhajjar District: Agro-Climatic Profile and Relevance

Jhajjar lies in the western part of Haryana, characterized by semi-arid climate conditions with hot summers and cold winters. The average annual rainfall is relatively low and erratic, which, coupled with increasing temperatures, contributes to water stress—an important determinant of livestock health. The district's economy is predominantly agrarian, with most households practicing mixed farming—growing crops and rearing livestock.

Cattle and buffalo are the most commonly reared animals in Jhajjar, with dairy farming being a key livelihood activity. In recent years, however, farmers have reported increased difficulty in managing livestock due to climatic changes. Heat stress, reduced milk productivity during summer, fodder scarcity during drought periods, and rising veterinary costs are some of the major concerns voiced by farmers. These challenges are exacerbated for small and marginal farmers who lack access to capital, information, and infrastructure necessary for climate adaptation.

This district presents a microcosm of the challenges that many other semi-arid regions of India face. Thus, a focused study in Jhajjar not only contributes to localized policy interventions but also offers insights applicable to broader regional and national frameworks.

Farmer Perceptions as a Lens for Policy

Farmer perceptions act as the cognitive filter through which climate signals are interpreted and adaptive decisions are made. These perceptions are shaped by past experiences, socio-economic status, cultural beliefs, access to information, and interaction with extension services. A farmer who perceives climate change as a real and immediate threat is more likely to engage in adaptive practices, such as adjusting feeding routines, seeking veterinary care, modifying shelter structures, or adopting improved breeds.

Conversely, farmers who attribute livestock health issues to non-climatic causes (e.g., supernatural beliefs, bad luck, or genetic weaknesses) may fail to adopt appropriate adaptive measures, thereby increasing their vulnerability. Moreover, perceptions can be inaccurate or lag behind actual climatic changes, underscoring the need for targeted awareness and capacity-building programs.

Understanding how farmers in Jhajjar perceive risks such as rising temperatures, changing disease patterns, and fodder shortages can help bridge the gap between scientific knowledge and ground-level practices. This is particularly important in light of the government's policy thrust on climate-resilient agriculture, as seen in schemes like the National Mission for Sustainable Agriculture (NMSA) and National Livestock Mission (NLM).

Adaptive Practices and Coping Mechanisms

Farmers across Jhajjar and similar districts have developed a range of coping and adaptive strategies in response to climate-induced risks. These include both traditional and modern practices. Examples of traditional strategies include adjusting animal housing for better ventilation, modifying feeding schedules to cooler parts of the day, and using locally available fodder species during drought. Modern strategies may include vaccination, deworming, artificial insemination for breed improvement, and insurance.

However, the efficacy and adoption of these strategies vary widely depending on factors such as income level, access to extension services, education, landholding size, and gender. For instance, better-off farmers may afford to invest in cooling equipment or construct pucca animal sheds, while marginal farmers may rely on rudimentary measures.

Government and NGO interventions also play a role in facilitating adaptation, though these are often hindered by weak delivery mechanisms, lack of participatory planning, and low awareness levels. Hence, understanding the diversity and effectiveness of adaptive practices from the farmer's perspective is key to designing inclusive and scalable interventions.

RESEARCH METHODOLOGY

The study was conducted in Jhajjar district of Haryana, India—an agrarian region characterized by a semi-arid climate and a significant dependence on livestock-based livelihoods. The region faces increasing climate variability, notably in the form of temperature extremes, erratic rainfall, and prolonged dry spells, all of which impact livestock health and productivity.

A descriptive and exploratory research design was adopted to investigate farmer perceptions, experiences, and adaptation strategies related to climate-induced livestock health risks. The research was both qualitative and quantitative, using a mixed-methods approach.

RESULTS AND DISCUSSION

1. Socio-economic Profile of Respondents

The socio-economic profile of respondents plays a critical role in shaping their perception and adaptive capacity. Most respondents were middle-aged male farmers with limited formal education but high dependence on livestock.

Table 1: Socio-Economic Characteristics of Respondents (n=150)

Variable	Category	Frequency	Percentage (%)
Age	<35 years	38	25.3
	36–50 years	66	44.0
	>50 years	46	30.7
Gender	Male	130	86.7
	Female	20	13.3
Education Level	Illiterate	52	34.7
	Primary	48	32.0
	Secondary and above	50	33.3
Landholding Size	Marginal (<1 ha)	30	20.0
	Small (1–2 ha)	52	34.7
	Medium to Large (>2 ha)	68	45.3
Major Livestock Type Kept	Cattle	90	60.0
	Buffalo	120	80.0
	Goat	50	33.3

A majority of farmers had access to buffalo and cattle, reflecting the high dairy dependency in the region. Educational attainment was relatively low, influencing knowledge-based adaptive practices.

2. Perception of Climate Change and Livestock Health Risks

Respondents were asked whether they perceived any changes in climate and their effects on livestock.

Table 2: Farmer Perception of Climate-Induced Risks

Perceived Change	Agree (%)	Disagree (%)	Not Sure (%)
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Increase in average temperature	88.7	6.0	5.3
Decrease in rainfall predictability	81.3	12.0	6.7
Increase in disease outbreaks	73.3	18.0	8.7
Heat stress affecting milk yield	77.3	14.7	8.0
Change in vector-borne disease pattern	65.3	25.3	9.4

A substantial proportion of respondents associated climate changes with direct and indirect effects on livestock health. Heat stress and milk yield reduction were dominant concerns.

3. Observed Impacts on Livestock Health and Productivity

Farmers observed several specific climate-related health impacts among livestock:

Table 3: Observed Health Impacts Due to Climate Change

Health Issue	Frequency (%)
Decreased milk production	78.0
Reproductive disorders	56.7
Increased tick/parasite load	62.0
Foot and Mouth Disease outbreaks	34.7
Mastitis incidence	48.0
High calf mortality in summer	41.3

Climate-induced heat stress contributed to a decline in milk yield, fertility issues, and increased disease prevalence. Many farmers linked increased tick load and disease transmission to changing seasonal patterns.

4. Adaptive Practices Adopted by Farmers

The study found both indigenous and modern practices used by farmers to adapt to climate stress.

Table 4: Adaptive Measures by Farmers

Adaptive Measure	Adoption Rate (%)
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Providing shade and water cooling	82.7
Use of traditional herbal medicine	36.0
Use of mineral mixture and feed supplements	50.7
Change in breeding practices (e.g., AI timing)	28.7
Vaccination and deworming awareness	67.3
Insurance for livestock	12.0
Fodder storage during non-rainy season	41.3

While basic practices like shade and water access were common, institutional adaptations like livestock insurance and structured fodder planning were lacking. Veterinary extension seemed to play a key role in awareness of disease control.

5. Barriers to Adaptation

Despite recognizing climate threats, farmers reported several constraints to effective adaptation.

Table 5: Major Constraints Faced in Adaptation

Constraint	Respondents (%)
Lack of technical knowledge	62.7
Inadequate veterinary services	58.0
Financial limitations	71.3
Poor access to weather-based advisories	46.7
Low awareness about government schemes	54.0
Inadequate availability of green fodder	39.3

The financial constraint was the leading barrier, followed closely by a lack of institutional support. Poor veterinary coverage and weather-related information gaps reduced the ability of farmers to adopt proactive measures.

Conclusion

The study on farmer perceptions and adaptive practices towards climate-induced livestock health risks in Jhajjar reveals a growing awareness among farmers regarding the impacts of changing climate patterns on animal health and productivity. Most farmers reported increased instances of heat stress, reduced milk yield, and higher disease prevalence, which they attribute to rising temperatures and erratic rainfall. While traditional

knowledge continues to inform many of their coping strategies—such as adjusting feeding schedules, modifying shelter, and increasing water availability—there is a clear need for enhanced scientific support and institutional intervention.

Despite their awareness, limited access to timely veterinary services, climate-resilient infrastructure, and financial resources hampers the ability of farmers to adopt more effective adaptation strategies. The findings underscore the importance of targeted training programs, improved veterinary outreach, and climate-informed extension services to build resilience among livestock-rearing communities. Policymakers must prioritize localized climate adaptation frameworks and integrate indigenous knowledge with scientific innovations to support sustainable livestock management. Enhancing farmer capacity through education, support systems, and infrastructure will be critical in mitigating the long-term risks posed by climate change to the livestock sector in Jhajjar and similar agro-climatic zones.

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