MEASURING THE PERCEPTION OF FARM WOMEN TOWARDS CLIMATE CHANGE

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ABSTRACT

Climate change has emerged as a major challenge for agriculture-based rural livelihoods, particularly in arid and semi-arid regions where farming communities are highly dependent on climatic conditions. Farm women, who actively participate in crop production, livestock management, household food security, and allied agricultural activities, are among the most vulnerable groups affected by climate variability. The present study was conducted to measure the perception of farm women towards climate change in Bikaner district of Rajasthan. A descriptive research design was adopted, and data were collected from 280 farm women selected through a multi-stage sampling procedure from eight villages. A self-constructed perception scale comprising 46 statements was used to assess respondents' perceptions across five major dimensions: temperature, rainfall, agriculture, livestock, and human health. The data were analysed using frequency, percentage, mean, standard deviation, and Spearman's rank correlation coefficient. The findings revealed that farm women perceived climate change as having visible effects on household income, water resources, monsoon patterns, irrigation requirements, crop productivity, livestock health, milk production, and human health. The study concludes that although farm women possess moderate awareness of climate change and its consequences, there is a need for focused awareness programmes, climate-resilient agricultural training, livestock management support, and gender-responsive extension services to strengthen their adaptive capacity and promote sustainable rural livelihoods.

Keywords: Climate change, Agriculture, Farm women, Perception, Variables, Perception

Introduction

Climate change is broadly defined as statistically significant alterations in climatic measures — including temperature, precipitation, snowfall, and wind patterns — persisting over extended periods of several decades (Schuurmans, 2021; Yadav et al., 2015). A defining characteristic of contemporary climate change is the progressive intensification of global temperatures, a phenomenon that has been documented across diverse geographical regions. Historically, the acceleration of climatic disruption has been closely associated with the onset of the Industrial Revolution, which fundamentally transformed patterns of energy consumption and land use at a global scale (Leppänen et al., 2014).

The underlying causes of climate change are generally attributed to two broad categories: natural climatic variability and anthropogenic forcing (Karami, 2012). However, a substantial body of scientific evidence indicates that anthropogenic activities currently constitute the predominant driver of observed climatic shifts (Murshed et al., 2022). Beyond industrialization, additional human-induced contributors include intensive agricultural practices characterized by high fossil fuel consumption, the open burning of agricultural residues, widespread deforestation, and emissions from national and domestic transportation systems (Huang et al., 2016).

Given its far-reaching consequences for ecological systems and socioeconomic stability, climate change has emerged as a critical concern among both national and international environmental policymakers (Ferreira et al., 2020; Gleditsch, 2021; Abbass et al., 2021; Lamperti et al., 2021). Its increasingly pervasive global footprint, coupled with demonstrable negative effects on economic

productivity and growth, underscores the urgency of coordinated policy responses at multiple governance levels.

The manner in which individuals and communities perceive climate change constitutes a multidimensional psychological construct, encompassing cognitive and affective dimensions such as knowledge, beliefs, attitudes, and risk concern (Whitmarsh & Capstick, 2018). Empirical research indicates that climate change perception is shaped by a confluence of individual-level factors — including personal experience and access to information — as well as broader cultural and geographic contexts in which individuals are embedded (van der Linden, 2015; Whitmarsh & Capstick, 2018).

Agriculture occupies a particularly significant position in the discourse on climate change, both as a major contributor to and a sector critically vulnerable to climatic variability. It is estimated that agriculture accounts for approximately 30–40% of total global greenhouse gas emissions, establishing it as one of the foremost sectoral drivers of anthropogenic warming (Mishra et al., 2021; Ortiz et al., 2021). Concurrently, agricultural productivity is substantially conditioned by a range of agro-environmental and climatic parameters, rendering the sector acutely susceptible to the adverse impacts of climate variability and change (Pautasso et al., 2012).

Agriculture remains the foundational economic sector in many developing nations, and women constitute a substantial proportion of the agricultural labor force, participating both directly and indirectly across a wide spectrum of farming activities. Historically, women have performed indispensable roles in agriculture, functioning as primary farmers, co-cultivators, wage laborers, and farm managers. Their productive contributions extend beyond subsistence farming to encompass community services and the management of household food security — responsibilities that often surpass the contributions of other household members. Women are extensively engaged in crop cultivation and livestock management, and their involvement spans the entire agricultural production cycle, from land preparation through to post-harvest operations. Collectively, these contributions underscore the multidimensional role that women play in the sustainable economic development of rural and agricultural communities (Singh et al., 2012).

Statement of the Problem

While the scientific community has extensively documented the biophysical dimensions of climate change, comparatively limited scholarly attention has been directed toward understanding how specific vulnerable populations — particularly farm women in developing agrarian economies — perceive, interpret, and respond to these climatic shifts. Within agriculture sector, women constitute a substantial and indispensable segment of the agricultural workforce, actively participating in crop cultivation, livestock management, post-harvest operations, and household food provisioning (Singh et al., 2012). Empirical evidence suggests that farm women, owing to their pronounced dependence on natural resources and their limited access to formal education, extension services, institutional credit, and decision-making platforms, are particularly susceptible to the adverse impacts of climate variability (Karami, 2012; Murshed et al., 2022). Furthermore, existing studies on climate change perception have largely been conducted at aggregate or community levels, with insufficient disaggregation by gender (Czarnek et al., 2021; Lee et al., 2015). This methodological gap in the literature obscures the distinct experiential realities and perceptual frameworks of farm women, thereby limiting the effectiveness of gender-inclusive climate policy and rural development programming. The present study seeks to systematically measure and analyze the perceptions of farm women towards climate change. Specifically, it endeavors to assess their awareness of climatic alterations, evaluate their understanding of the causes and consequences of climate change within an agricultural context, and identify the socioeconomic and demographic factors that significantly influence their perceptions.

Review of the related Literature

Climate change perception is conceptualized as a multidimensional psychological construct encompassing cognitive, affective, and behavioral dimensions, including knowledge, risk awareness,

concern, and adaptive intentions (Whitmarsh & Capstick, 2018; van der Linden, 2015). Whitmarsh and Capstick (2018) identified knowledge, beliefs, attitudes, values, and personal experience as principal determinants of how individuals construct and interpret climatic risks, emphasizing that perception is a dynamic, socially situated process rather than a static attribute. Van der Linden (2015) proposed the Social Amplification of Risk Framework as an explanatory model highlighting the mediating roles of social networks, media exposure, cultural worldviews, and institutional trust in shaping individual climate risk assessments. Niles et al. (2016) demonstrated that farmers' climate perceptions are strongly associated with their adaptive behavioral intentions, establishing perception as a critical mediating variable between information exposure and on-farm adaptive action. Women in developing agrarian contexts are widely recognized as particularly vulnerable to climate change, owing to their pronounced dependence on natural resource-based livelihoods, limited land tenure rights, restricted access to credit and extension services, and systemic exclusion from decision-making processes (FAO, 2023; Djoudi et al., 2016). Arora-Jonsson (2011) critically examined dominant policy narratives that simultaneously construct women as climate victims and natural environmental stewards, arguing that such framings risk reinforcing structural gender inequalities. Perez et al. (2015) found that women-headed households across Sub-Saharan Africa exhibited greater exposure to climate-related shocks and lower adaptive capacity than male-headed counterparts, primarily due to differential access to productive resources. Gonda (2016) further documented that prevailing gender norms and power relations fundamentally condition the range of climate adaptation strategies accessible to women, with many transformative options remaining structurally inaccessible. Women constitute between 43% and 80% of the agricultural labor force in developing nations, performing indispensable roles across crop cultivation, livestock management, seed conservation, water collection, and household food security (FAO, 2011; Singh et al., 2012). Despite these extensive contributions, farm women consistently face systemic disadvantages in accessing productive inputs, technological innovations, and climate-related information, severely constraining their adaptive capacity (FAO, 2023). Singh et al. (2012) documented that farm women's contributions span the entire agricultural production cycle — from land preparation to post-harvest processing — rendering them acutely sensitive to climate-induced disruptions in agricultural calendars and ecosystem services. Twyman et al. (2014) demonstrated that farm women in Southern Africa possessed detailed indigenous knowledge of local climatic variability and had developed informal adaptive strategies, yet their capacity to formalize and scale these responses was systematically constrained by institutional barriers, time poverty, and exclusion from farmer organizations. Empirical literature consistently identifies education level, farming experience, access to extension services, media exposure, and socioeconomic status as significant determinants of climate change awareness and risk perception among farming communities (Lee et al., 2015; Maddison, 2007). Maddison (2007) found that African smallholder farmers' perceptions of long-term climatic trends were significantly shaped by age, experiential exposure, and access to climate information through extension channels. Deressa et al. (2011) similarly documented that education, extension service access, and participation in farmer organizations were positive determinants of climate change awareness among Ethiopian smallholders. Ndambiri et al. (2012) specifically established that women farmers in Kenya demonstrated comparable levels of climate awareness to male counterparts but faced greater structural barriers to translating awareness into adaptive action — underscoring the analytical importance of distinguishing perception from adaptive capacity as distinct constructs. Karami (2012) further demonstrated that socioeconomic status, farm size, media access, and cooperative membership are significant predictors of farmers' climate perceptions, affirming that perception is fundamentally conditioned by structural and institutional factors.

Notwithstanding the growing body of literature on climate change perception, significant empirical and methodological gaps remain. The majority of existing perception studies have been conducted in developed country contexts, with limited attention to South Asian agrarian communities where climate vulnerability is most acute (Raza et al., 2019). Gender disaggregation of climate perception data remains insufficient, as most farm-level studies either focus exclusively on male household heads or treat gender as a binary control variable rather than a substantive analytical category

(Djoudi et al., 2016). Furthermore, validated, context-specific measurement instruments for assessing farm women's climate perceptions are largely absent, with most existing scales developed for urban or Western populations that inadequately capture the distinctive experiential realities of rural agricultural women (Whitmarsh & Capstick, 2018). The socioeconomic and demographic determinants of climate change perception among farm women in South Asian agrarian settings thus remain poorly characterized, limiting the design of targeted extension and policy interventions.

The present study is accordingly positioned to address these critical lacunae by generating empirically grounded, gender-disaggregated data on farm women's perceptions of climate change in a developing agrarian context, thereby advancing both theoretical understanding and practical policy application in the domains of climate adaptation, agricultural extension, and gender-responsive rural development.

Methodology

The present investigation employed a descriptive research design to systematically examine the perception of farm women towards climate change. The study was conducted in Bikaner district of Rajasthan, which is administratively organized into seven panchayat samities, namely Bikaner, Khajuwala, Kolayat, Lunkaransar, Nokha, Sridungargarh, and Panchu. Bikaner district was purposively selected for the study on account of its geographical location within the Thar Desert — one of the most climatically vulnerable regions of India — as identified in the vulnerability mapping framework proposed by O'Brien et al. (2004). A multi-stage sampling procedure was adopted for the selection of the study area and respondents. In the first stage, two panchayat samities — Khajuwala and Kolayat — were selected from among the seven panchayat samities of Bikaner district through the lottery method. In the second stage, two gram panchayats from each of the selected panchayat samities were chosen, yielding a total of four gram panchayats for the study. In the third stage, two villages from each selected gram panchayat were identified through simple random sampling, resulting in a total of eight villages included in the present investigation. Finally, in the fourth stage, 35 farm women from each of the eight selected villages were selected through simple random sampling, yielding a final cumulative sample size of 280 farm women for the present study. Simple random sampling was employed at each relevant stage to ensure equal probability of selection for all eligible respondents and to enhance the representativeness and statistical validity of the findings. For the measurement of the dependent variable, a self-constructed perception scale was developed to scientifically assess the perception of farm women towards climate change. The perception scale, comprising 46 statements, was administered to all 280 farm women respondents through individual structured interviews conducted at the respondents' residences. Responses to each statement were recorded on a five-point Likert-type continuum, with response categories and their corresponding scores as follows: Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), and Strongly Disagree (1). Higher aggregate scores on the scale were interpreted as reflecting more pronounced, favorable, or informed perceptions of climate change among respondents. Frequency distribution and percentage analysis were computed to describe the socioeconomic and communication profile of the respondents. The arithmetic mean and standard deviation were calculated to summarize the central tendency and dispersion of scores on continuous variables and to facilitate categorical classification of respondents. Spearman's rank correlation coefficient was employed to determine the nature, direction, and statistical significance of the association between the independent variables — comprising socioeconomic and communication characteristics of the respondents — and the dependent variables of climate change perception.

Results and Discussion

Temperature

Analysis of the response distribution across individual perception statements revealed considerable variation in the degree of agreement among respondents, reflecting differential levels of awareness and experiential understanding of temperature-related climatic changes. With respect to strongly affirmative responses, a substantial proportion of farm women expressed unequivocal agreement

with several temperature-related climate change statements. Notably, 70.0% of respondents strongly agreed that climate change has exerted adverse effects on household income, indicating a widespread recognition of the economic consequences of climatic variability among the study population. This was closely followed by 69.3% of respondents who strongly agreed that climate change has contributed to the progressive drying up of water resources — a finding that underscores the heightened sensitivity of farm women to water scarcity as a tangible and proximate manifestation of climatic change in the arid agro-ecological context of Bikaner district. Furthermore, 68.6% of respondents strongly agreed that the frequency of unexpected climatic events has increased in recent years, reflecting a perceptible awareness of the growing unpredictability and extremity of weather patterns among the study population. In contrast, strong agreement was expressed by less than 25% of respondents for the remaining statements pertaining to the temperature dimension, suggesting that while certain prominent climatic impacts are widely recognized, awareness of the subtler or more complex dimensions of temperature-related climate change remains comparatively limited among farm women. With regard to moderate agreement, approximately 50% of respondents agreed with the statement that the occurrence of heat waves has increased, indicating a substantive albeit non-unanimous recognition of this climatic phenomenon. For the remaining statements in this category, less than 45% of respondents expressed agreement, reflecting moderate and heterogeneous levels of perceptual consensus across the broader spectrum of temperature-related climate change indicators. These findings suggest that while farm women demonstrate a reasonable degree of awareness of direct and experientially salient climatic changes — such as heat wave frequency and water resource depletion — their perceptual engagement with less immediately observable temperature-related impacts remains considerably more variable. Regarding disagreement, less than 25% of respondents disagreed with the various statements related to the temperature dimension of climate change, indicating that outright rejection of climate change-related temperature impacts was relatively uncommon among the study population. However, a notable exception was observed in relation to the statement concerning an increase in crop yield as a consequence of climate change, with which 24.3% of respondents expressed strong disagreement — the highest proportion of strongly disagreeing responses recorded across all temperature-related statements. For all remaining temperature-related statements, strong disagreement was expressed by less than 10% of respondents, suggesting that outright denial of temperature-related climatic changes was a minority position within the study population.

Table 1: Distribution of respondents according to their perception about climate change related to temperature

S. No.	Temperature	SA		A		UD		D		SD	
		f	%	f	%	F	%	f	%	f	%
1.	Temperature has increased as compared to previous years	42	15.0	99	35.4	83	29.6	44	15.7	12	4.3
2.	Intensity of heat during summer has increased	64	22.9	119	42.5	38	13.6	39	13.9	20	7.1
3.	Increased chances of heat waves occurrence	67	23.9	132	47.1	43	15.4	26	9.3	12	4.3
4.	Increase in crop yield due to climate change	31	11.1	94	33.6	41	14.6	46	16.4	68	24.3
5.	Decrease in crop yield due to climate change	58	20.7	109	38.9	43	15.4	52	18.6	18	6.4
6.	Adverse effect on income due to climate change	196	70.0	59	21.1	12	4.3	9	3.2	4	1.4
7.	Intensity of fog has increased	49	17.5	77	27.5	103	36.8	47	16.8	4	1.4
8.	Drying up of water resources due to climate change	194	69.3	59	21.1	12	4.3	12	4.3	3	1.1
9.	Frequency of unexpected climatic happenings have increased	192	68.6	67	23.9	13	4.6	6	2.1	2	0.7
10.	Increased migration of people to the other places	62	22.1	67	23.9	105	37.5	39	13.9	7	2.5
11.	Increased chances of droughts	64	22.9	96	34.3	51	18.2	57	20.4	12	4.3

The overall level of perception of farm women regarding climate change related to the temperature dimension is presented in Table 2. The distribution of perception scores revealed that the majority of farm women — 64.3% — demonstrated a medium level of perception towards temperature-related climate change, while 18.2% exhibited a low level of perception and 17.5% demonstrated a high level of perception.

Table 2: Distribution of respondents according to their overall perception about climate change related to temperature (n=280)

Category	Score range	F	%
Low	Less than 30	52	18.2
Medium	30 to 52	180	64.3
High	More than 52	49	17.5

(Mean=41.27 and SD= 10.832)

Rainfall

Examination of the response distributions across individual perception statements revealed a discernible pattern of awareness among respondents with respect to the altered rainfall regime of the study region, though the degree of perceptual consensus varied considerably across specific rainfall-related climatic indicators. With respect to strongly affirmative responses, the highest proportion of strong agreement was recorded for the statement pertaining to early or late onset of monsoons, with 42.1% of respondents expressing strong agreement with this assertion. This was followed by 38.9% of respondents who strongly agreed that rainfall had become highly uneven and unpredictable in recent years — a perception consistent with documented trends of increasing intra-seasonal rainfall variability across the Thar Desert agro-ecological zone. Additionally, 26.1% of respondents strongly agreed that the number of rainy days had decreased, reflecting an awareness of the progressive aridification of the local climatic environment among a notable segment of the study population. For all remaining rainfall-related statements, strong agreement was expressed by less than the aforementioned proportions of respondents, suggesting that while the most salient and experientially proximate dimensions of rainfall change are widely recognized, awareness of subtler hydrological shifts remains comparatively circumscribed among farm women in the study area. With regard to moderate agreement, less than 40% of respondents agreed that the number of rainy days had decreased and that the amount of average annual rainfall had declined relative to previous years — findings that collectively indicate a substantive but not universal recognition of long-term precipitation reduction trends among the study population. For all remaining rainfall-related statements, the proportion of respondents expressing agreement was less than 30%, suggesting that moderate perceptual consensus regarding the broader spectrum of rainfall-related climate change impacts was relatively limited within the study population. Concerning disagreement responses, 22.9% of respondents disagreed with the statement that the amount of average annual rainfall had decreased compared to previous years, while 20.7% disagreed with the assertion that the likelihood of heavy rainfall events had increased. For all remaining rainfall-related statements, disagreement was expressed by less than 15% of respondents, indicating that outright rejection of rainfall-related climate change impacts was an uncommon perceptual position within the study population. With respect to strong disagreement, less than 10% of respondents expressed strong disagreement with any of the statements pertaining to the rainfall dimension of climate change.

Table 3: Distribution of respondents according to their perception about climate change related to rainfall

S. No.	Rainfall	SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%

1.	Amount of average rainfall has decreased as compared to previous years	31	11.1	96	34.3	70	25.0	64	22.9	19	6.8
2.	Early / late onset of monsoons	118	42.1	83	29.6	59	21.1	13	4.6	7	2.5
3.	Number of rainy days has decreased	73	26.1	102	36.4	64	22.9	37	13.2	4	1.4
4.	Rains had become highly uneven and unpredictable	109	38.9	82	29.3	52	18.6	23	8.2	14	5.0
5.	Chances of heavy rainfall has increased	27	9.6	38	13.6	132	47.1	58	20.7	25	8.9

The findings indicated that the substantial majority of farm women — 74.3% — demonstrated a medium level of perception towards rainfall-related climate change, while 14.6% exhibited a low level of perception and 11.1% demonstrated a high level of perception.

Table 4: Distribution of respondents according to their overall perception about climate change related to rainfall

Category	Score range	f	%
Low	Less than 12	41	14.6
Medium	12 to 23	208	74.3
High	More than 23	31	11.1

(Mean=17.80 and SD= 5.166)

Agriculture

The data presented in Table 5 regarding farm women's perception of climate change-induced changes in agriculture indicate that a considerable proportion of respondents perceived noticeable changes in agricultural practices and outcomes. The highest proportion of farm women strongly agreed that the number of irrigations had increased (33.6%). This was followed by 28.9% of respondents who strongly agreed that there had been a reduction in the yield of various crops and scarcity of fodder in the area. Similarly, 28.2% of the respondents strongly agreed that there had been a decline in the quality of crop production. For the remaining statements related to agricultural changes, less than 26% of farm women expressed strong agreement.

In terms of agreement, slightly more than 40% of respondents agreed that the number of irrigations had increased, while less than 35% agreed with the other statements concerning agriculture-related impacts of climate change. The findings further show that more than 20% of farm women disagreed with the statements that pest and disease attacks on crops had increased and that the risk of crop failure had risen. In comparison, less than 15% of respondents disagreed with other statements related to the agricultural aspects of climate change. Additionally, slightly more than 10% of farm women disagreed with the statement concerning fodder scarcity in the area, whereas less than 10% disagreed with the remaining statements.

Table 5: Distribution of respondents according to their perception about climate change related to agriculture

S. No.	Agriculture	SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%
1.	Increase in number of irrigations	94	33.6	116	41.4	38	13.6	29	10.4	3	1.1
2.	Decrease in quality of crop production	79	28.2	97	34.6	69	24.6	31	11.1	4	1.4
3.	Increased attacks of pests and diseases in the crops	57	20.4	63	22.5	86	30.7	59	21.1	15	5.4
4.	Change in cropping patterns	72	25.7	93	33.2	59	21.1	32	11.4	24	8.6

5.	Reduction in yield of various crops	81	28.9	104	37.1	72	25.7	18	6.4	5	1.8
6.	Risk of crop failure has increased	45	16.1	69	24.6	101	36.1	59	21.1	6	2.1
7.	Changes in flowering and fruiting time of crop	42	15.0	53	18.9	129	46.1	39	13.9	17	6.1
8.	Decrease in fertility of the soil	27	9.6	48	17.1	152	54.3	37	13.2	16	5.7
9.	Decrease in grass land	49	17.5	92	32.9	108	38.6	22	7.9	9	3.2
10.	Changes in time of harvesting the crops	48	17.1	75	26.8	108	38.6	36	12.9	13	4.6
11.	Scarcity of fodder in the area	81	28.9	94	33.6	34	12.1	41	14.6	30	10.7
12.	Increase in number of weeds in the crops	33	11.8	73	26.1	118	42.1	38	13.6	18	6.4

The overall perception of farm women regarding agriculture-related climate change impacts is presented in Table 6. The results reveal that the majority of respondents, 65.0%, had a medium level of perception regarding climate change and its effects on agriculture. In contrast, an equal proportion of respondents, 17.5% each, exhibited low and high levels of perception.

Table 6 Distribution of respondents according to their overallperception about climate change related to agriculture

Category	Score range	f	%
Low	Less than 32	49	17.5
Medium	32 to 58	182	65.0
High	More than 58	49	17.5

(Mean=45.31 and SD=13.128)

Livestock

The data presented in Table 7 regarding farm women's perception of climate change-related effects on livestock rearing indicate that climate variability has been perceived to affect several aspects of animal health and management. A substantial proportion of respondents, 60.7%, strongly agreed that the health of farm animals had been affected. This was followed by 33.2% of farm women who strongly agreed that changes had occurred in the habits of animals, while 30.0% strongly agreed that there had been a change in the feeding behaviour of dairy animals. For the remaining statements related to livestock rearing, less than 30% of respondents expressed strong agreement. Further, 46.1% of farm women agreed that there had been a change in the feeding behaviour of dairy animals, while 42.5% agreed that milk production had decreased due to climate variability. These findings suggest that farm women perceived climate change as having direct implications for animal productivity and livestock management. In terms of disagreement, slightly less than 35% of respondents disagreed with the statement that livestock rearing had become difficult, while 22% disagreed with the statement regarding an increase in the death rate of livestock. For other statements related to livestock-related aspects of climate change, less than 10% of farm women expressed disagreement. Similarly, 11.1% of respondents strongly disagreed that livestock rearing had become difficult, whereas less than 6% strongly disagreed with the other livestock-related statements.

Table 7: Distribution of respondents according to their perception about climate change related to livestock

S. No.	Livestock	SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%
1.	Livestock rearing become difficult	12	4.3	58	20.7	83	29.6	96	34.3	31	11.1

2.	Increased death rate of livestock	37	13.2	62	22.1	113	40.4	59	21.1	9	3.2
3.	Health of farm animals had affected	170	60.7	68	24.3	6	2.1	27	9.6	9	3.2
4.	Changes occur in habits of animals	93	33.2	102	36.4	54	19.3	17	6.1	14	5.0
5.	Lack of water resources for maintenance of animals	56	20.0	92	32.9	106	37.9	22	7.9	4	1.4
6.	Change in feeding behavior of dairy animals	84	30.0	129	46.1	53	18.9	11	3.9	3	1.1
7.	Behavioral changes in livestock occurs	83	29.6	102	36.4	78	27.9	10	3.6	7	2.5
8.	Decreased milk production due to climate variability	65	23.2	119	42.5	62	22.1	23	8.2	11	3.9

The overall perception of farm women regarding climate change impacts on livestock is presented in Table 8. The results reveal that the majority of respondents, 65.0%, had a medium level of perception regarding climate change-related effects on livestock rearing. This was followed by 20.0% of respondents who had a high level of perception, while 15.0% had a low level of perception.

Table 8: Distribution of respondents according to their overallperception about climate change related to livestock

Category	Score range	f	%
Low	Less than 22	42	15.0
Medium	22 to 37	182	65.0
High	More than 37	56	20.0

(Mean=29.33 and SD= 7.618)

Human health

The data presented in above table regarding farm women's perception of climate change-related effects on human health indicate that respondents perceived several health-related risks associated with changing climatic conditions. A majority of farm women, 66.4%, strongly agreed that the incidence of vector-borne diseases, such as malaria and dengue, had increased. This was followed by 61.4% of respondents who strongly agreed that there had been a decrease in working efficiency or increased tiredness while working in agricultural fields. Similarly, 53.2% strongly agreed that the risk of skin-related problems, such as rashes, allergies, and sunburn, had increased, while 50.7% strongly agreed that water- and food-borne diseases had become more common. For the remaining statements related to human health, less than 50% of respondents expressed strong agreement. In the agreement category, less than half of the respondents, 45.0%, agreed that cases of heat stroke and dehydration due to extreme heat had increased. In contrast, less than 40% of farm women agreed with the remaining statements related to the human health impacts of climate change. These findings suggest that farm women perceived climate variability as having considerable implications for physical health, work capacity, and disease vulnerability, particularly in rural agricultural settings where outdoor labour exposure is high. With regard to disagreement, 20.0% of farm women disagreed with the statement that mortality due to heat and cold waves had increased, while 11.4% disagreed that respiratory allergies and eye infections had increased. Furthermore, less than 5% of respondents strongly disagreed with the statements related to human health impacts of climate change, indicating a generally high level of recognition of climate-related health risks among farm women.

Table 9: Distribution of respondents according to their perception about climate change related to human health

S. No.	Human health	SA		A		UD		D		SD	
		f	%	f	%	f	%	f	%	f	%

1.	Risk of infectious disease has increased	129	46.1	98	35.0	39	13.9	11	3.9	3	1.1
2.	Respiratory allergies and eye infections has increased	89	31.8	105	37.5	52	18.6	32	11.4	2	0.7
3.	Water and food borne diseases has increased	142	50.7	97	34.6	25	8.9	13	4.6	3	1.1
4.	Increased mortality due to heat and cold waves	21	7.5	29	10.4	164	58.6	56	20.0	10	3.6
5.	Decreased working efficiency or feeling tired while working in fields	172	61.4	89	31.8	6	2.1	11	3.9	2	0.7
6.	Heat stroke and dehydration due to extreme heat has increased	131	46.8	126	45.0	9	3.2	6	2.1	8	2.9
7.	Vector borne diseases has increased e.g. Malaria, dengue	186	66.4	58	20.7	22	7.9	9	3.2	5	1.8
8.	Affects the mental state of the people	121	43.2	89	31.8	59	21.1	7	2.5	4	1.4
9.	Increased risk of skin problems like rashes, allergies, sunburn etc.	149	53.2	87	31.1	34	12.1	7	2.5	3	1.1
10.	Increase in anxiety levels among people	74	26.4	99	35.4	84	30.0	15	5.4	8	2.9

The overall perception of farm women regarding climate change-related effects on human health is presented in Table 10. The results reveal that a large majority of respondents, 79.6%, had a medium level of perception. This was followed by 12.9% of respondents with a low level of perception and 7.5% with a high level of perception.

Table 10: Distribution of respondents according to their overall perception about climate change related to human health

Category	Score range	f	%
Low	Less than 32	36	12.9
Medium	32 to 49	223	79.6
High	More than 49	21	7.5

(Mean=40.86 and SD=8.404)

Conclusion

Agriculture constitutes the backbone of the Indian rural economy and plays a central role in sustaining livelihoods, food security, and rural development. Within this sector, farm women represent a substantial proportion of the agricultural workforce and contribute significantly to both crop production and livestock management. Traditionally, women have performed diverse roles in agriculture as farmers, co-farmers, wage labourers, and farm managers. Their involvement in productive agricultural and allied activities not only supports household livelihood security but also contributes to the economic well-being of families and rural society. The findings of the study revealed that a majority of farm women perceived climate change as having adverse effects on agricultural income, monsoon patterns, irrigation requirements, and livestock health. Respondents reported that climate variability had contributed to early or delayed onset of the monsoon, increased frequency of irrigation, and negative impacts on the health of farm animals. These perceptions indicate that farm women are directly experiencing the consequences of climate change in their day-to-day agricultural and livestock-related activities. The overall perception of farm women regarding climate change was found to fall under the medium category, suggesting a moderate level of awareness and understanding of climate-related changes and their impacts. Although farm women recognised several visible effects of climate change, the findings also indicate the need for further awareness, training, and capacity-building interventions to strengthen their adaptive responses. Climate change is a global environmental challenge that affects agriculture and livestock both directly and indirectly. Therefore, greater attention should be given to farm women while designing

climate change adaptation and mitigation strategies. Since the study observed that farm women are actively engaged in agricultural practices and livestock rearing as part of their livelihood, empowering them with climate-resilient knowledge, technologies, and institutional support is essential for reducing the adverse impacts of climate change and promoting sustainable rural livelihoods.

References

Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. *Environmental Science and Pollution Research, 29*(28), 42539–42559. https://doi.org/10.1007/s11356-022-19718-6

Arora-Jonsson, S. (2011). Virtue and vulnerability: Discourses on women, gender and climate change. *Global Environmental Change, 21*(2), 744–751. https://doi.org/10.1016/j.gloenvcha.2011.01.005

Czarnek, G., Kossowska, M., & Szwed, P. (2021). Right-wing ideology reduces the effects of education on climate change beliefs in more developed countries. *Nature Climate Change, 11*(1), 9–13. https://doi.org/10.1038/s41558-020-00930-6

Deressa, T. T., Hassan, R. M., & Ringler, C. (2011). Perception of and adaptation to climate change by farmers in the Nile Basin of Ethiopia. *The Journal of Agricultural Science, 149*(1), 23–31. https://doi.org/10.1017/S0021859610000687

Djoudi, H., Locatelli, B., Vaast, C., Asher, K., Brockhaus, M., & Sijapati Basnett, B. (2016). Beyond dichotomies: Gender and intersecting inequalities in climate change studies. *Ambio, 45*(Suppl. 3), 248–262. https://doi.org/10.1007/s13280-016-0825-2

Ferreira, J. J. M., Fernandes, C. I., & Ferreira, F. A. F. (2020). Technology transfer, climate change mitigation, and environmental patent impact on sustainability and economic growth: A comparison of European countries. *Technological Forecasting and Social Change, 150*, Article 119770. https://doi.org/10.1016/j.techfore.2019.119770

Food and Agriculture Organization of the United Nations. (2011). *The state of food and agriculture 2010–11: Women in agriculture—Closing the gender gap for development*. FAO.

Food and Agriculture Organization of the United Nations. (2023). *The status of women in agrifood systems*. FAO. https://doi.org/10.4060/cc5343en

Gleditsch, N. P. (2021). This time is different! Or is it? NeoMalthusians and environmental optimists in the age of climate change. *Journal of Peace Research, 58*(1), 177–185. https://doi.org/10.1177/0022343320969785

Gonda, N. (2016). Climate change, "technology" and gender: "Adapting women" to climate change with cooking stoves and water reservoirs. *Gender, Technology and Development, 20*(2), 149–168. https://doi.org/10.1177/0971852416639786

Huang, W., Gao, Q.-X., Cao, G.-L., Ma, Z.-Y., Zhang, W.-D., & Chao, Q.-C. (2016). Effect of urban symbiosis development in China on GHG emissions reduction. *Advances in Climate Change Research, 7*(4), 247–252. https://doi.org/10.1016/j.accre.2016.12.003

Karami, E. (2012, September 13–15). *Climate change, resilience and poverty in the developing world* [Conference presentation]. Culture, Politics and Climate Change Conference, University of Colorado Boulder, Boulder, CO, United States.

Lamperti, F., Bosetti, V., Roventini, A., Tavoni, M., & Treibich, T. (2021). Three green financial policies to address climate risks. *Journal of Financial Stability, 54*, Article 100875. https://doi.org/10.1016/j.jfs.2021.100875

Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C.-Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature Climate Change, 5*(11), 1014–1020. https://doi.org/10.1038/nclimate2728

Leppänen, S., Saikkonen, L., & Ollikainen, M. (2014). *Impact of climate change on cereal grain production in Russia*. Mimeo.

Maddison, D. (2007). *The perception of and adaptation to climate change in Africa* (Policy Research Working Paper No. 4308). World Bank.

Mishra, A., Bruno, E., & Zilberman, D. (2021). Compound natural and human disasters: Managing drought and COVID-19 to sustain global agriculture and food sectors. *Science of the Total Environment, 754*, Article 142210. https://doi.org/10.1016/j.scitotenv.2020.142210

Niles, M. T., Brown, M., & Dynes, R. (2016). Farmer's intended and actual adoption of climate change mitigation and adaptation strategies. *Climatic Change, 135*(2), 277–295. https://doi.org/10.1007/s10584-015-1558-0

O'Brien, K., Leichenko, R., Kelkar, U., Venema, H., Aandahl, G., Tompkins, H., Javed, A., Bhadwal, S., Barg, S., Nygaard, L., & West, J. (2004). Mapping vulnerability to multiple stressors: Climate change and globalization in India. *Global Environmental Change, 14*(4), 303–313. https://doi.org/10.1016/j.gloenvcha.2004.01.001

Ortiz, A. M. D., Outhwaite, C. L., Dalin, C., & Newbold, T. (2021). A review of the interactions between biodiversity, agriculture, climate change, and international trade: Research and policy priorities. *One Earth, 4*(1), 88–101. https://doi.org/10.1016/j.oneear.2020.12.008

Pautasso, M., Döring, T. F., Garbelotto, M., Pellis, L., & Jeger, M. J. (2012). Impacts of climate change on plant diseases—Opinions and trends. *European Journal of Plant Pathology, 133*(1), 295–313. https://doi.org/10.1007/s10658-012-9936-1

Perez, C., Jones, E. M., Kristjanson, P., Cramer, L., Thornton, P. K., Förch, W., & Barahona, C. (2015). How resilient are farming households and communities to a changing climate in Africa? A gender-based perspective. *Global Environmental Change, 34*, 95–107. https://doi.org/10.1016/j.gloenvcha.2015.06.003

Raza, A., Razzaq, A., Mehmood, S. S., Zou, X., Zhang, X., Lv, Y., & Xu, J. (2019). Impact of climate change on crops adaptation and strategies to tackle its outcome: A review. *Plants, 8*(2), Article 34. https://doi.org/10.3390/plants8020034

Schuurmans, C. J. E. (2021). The world heat budget: Expected changes. In D. Eisma (Ed.), *Climate change: Impact on coastal habitation* (pp. 1–15). CRC Press. https://doi.org/10.1201/9781003069935-1

Singh, R. K. P., Singh, K. M., & Jha, A. K. (2012). *Effect of migration on agricultural productivity and women empowerment in Bihar*. SSRN. https://doi.org/10.2139/ssrn.2111155

van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology, 41*, 112–124. https://doi.org/10.1016/j.jenvp.2014.11.012

Whitmarsh, L., & Capstick, S. (2018). Perceptions of climate change. In S. Clayton & C. Manning (Eds.), *Psychology and climate change: Human perceptions, impacts, and responses* (pp. 13–33). Academic Press. https://doi.org/10.1016/B978-0-12-813130-5.00002-3

Yadav, M. K., Singh, R., Singh, K. K., Mall, R. K., Patel, C. B., Yadav, S. K., & Singh, M. K. (2015). Assessment of climate change impact on productivity of different cereal crops in Varanasi. *Journal of Agrometeorology, 17*(2), 179–184.