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Climate Change Awareness and Community Resilience in Sindh: Mediated by Behavioral Change and Moderated by Social Capital

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Abstract
Climate change is one of the major threats of the vulnerable population in Sindh, Pakistan, which has impacted on livelihoods, social welfare, and adaptive capacity. This paper looks at how climate change awareness influences community resilience, the mediating variable of behavior change, and the moderating variable of social capital. Two hundred respondents were surveyed using a quantitative and cross-sectional survey design in rural and semi-urban communities that were vulnerable to climate risks like floods, heat waves, and water scarcity. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used in analyzing data to measure measurement and structural models. It has been shown that climate change awareness directly and indirectly improves the resilience of communities due to behavioral change. It was established that behavioral change is a powerful mediator, and adaptive actions are needed to supplement knowledge. In addition to this, the social capital moderates the behavior change and community resilience relationship positively where the importance of trust, networks, and collective action lie in enhancing adaptive capacity is highlighted. The paper highlights the importance of focusing on the new integrated interventions based on awareness campaigns, behavioral education, and community involvement to enhance the resilience outcomes. The insights can be useful in helping the policy makers, NGOs and local authorities to improve strategies in climate adaptation in high-risk regions of Sindh.

Keywords: Climate Change Awareness, Community Resilience, Behavioral Change, Social Capital, PLS-SEM, Sindh

Introduction

Climate change has become a serious issue in Pakistan and this especially affects its people in climate-prone areas like in Sindh where people experience frequent floods, heat stress and water scarcity and agricultural disturbances. The latest research notes that climate-related risks have a direct impact on agricultural productivity, food security, and well-being in communities, and resilience-building is an important development concern (Mobeen et al., 2023; Sargani et al., 2023). The situation in Punjab and Sindh also indicates that the perception and awareness of climate change are highly influential determinants of the response of individuals and communities to environmental stressors (Mobeen et al., 2025; Usman et al., 2023). The studies have also shown that infrastructure, knowledge availability, and climate information has a critical role to play in strengthening resilience technologies and adaptive capacity in the susceptible areas of Pakistan

(Khan et al., 2025; Waheed et al., 2025). Although there is increasing awareness on these issues, there are still disparities in awareness and adaptive measures that are weakening effective climate resilience at the community level.

The awareness of climate change, in itself, however, does not necessarily lead to resilience unless it leads to a behavior change with a significance. According to the previous research, the perception of risks and climate knowledge can determine adaptive behaviors, including preparedness planning, livelihood diversification, and the use of climate-smart behaviors (Usman et al., 2023; Iftikhar et al., 2025). In rural and agricultural contexts, especially, behavioral responses prove especially important as the livelihood choices are very sensitive to the variability of climate (Mobeen et al., 2023; Sargani et al., 2023). Studies conducted in southern Punjab and Sindh have found out that access to climate information services and experiential learning play a significant role in shaping adaptive behavior particularly to the marginalized groups (Iftikhar et al., 2025; Mobeen et al., 2025). These results indicate that the role of behavioral change serves as a major process in which climate change awareness leads to high resilience outcomes, but this mediating process is not well-studied on the community level in Sindh.

A growing literature is focusing on social capital as an important contextual issue that enhances communal reactions to environmental catastrophes. In rural Pakistan, social networks, trusting, and collective action have been demonstrated to boost the understanding of disasters, sharing information, and coordinated actions in disaster adaptation (Shah et al., 2024; Panahi and Moayerian, 2025). There is empirical data that shows that communities that have better social capital are more cooperation, shared learning and resilient to environmental shocks (Aldrich and Meyer, as cited in Panahi and Moayerian, 2025; Iqbal et al., 2024). Research in Pakistan also adds to the fact that social capital enhances well-being, acts as a way to address issues collectively, and increases the efficacy of adaptive behaviors (Shah et al., 2024; Narijo et al., 2024). Regardless of its significance, there is paucity of empirical research studies that focus on social capital as a moderating influence that determines the strength of the association between behavior change and community resilience especially in climate-vulnerable environment such as that found in Sindh.

Aim of the Study

This paper will focus on investigating how climate change awareness affects community resilience in Sindh, where behavioral change is the mediator and social capital is the moderator.

Research Objectives

1. To determine the climate change awareness level of the Sindh communities.
2. To check how community resilience is impacted by the awareness of climate change.
3. To examine the mediating effect of behavior change between climate change awareness and community resilience.
4. To examine how social capital moderates the relationship between change of behavior and community resilience.
5. To offer policy suggestions on how to enhance climate resilience in the community in Sindh.

Literature review

The available literature regarding climate change in Pakistan outlines the growing susceptibility of people to common environmental shocks in the typically agricultural and rural areas. The research has continuously proven that the awareness and the perception of climate change play a significant role in adaptive capacity and livelihood sustainability. Sindh and Punjab demonstrate that the more climate-aware a person can be, the more the risks can be evaluated, and the more the coping strategies can be implemented to become more resilient (Mobeen et al., 2023; Mobeen et al., 2025). The study also shows that the availability of climate information, infrastructure, and knowledge is a significant determinant of the resilience and food security outcomes at the community level (Khan et al., 2025; Waheed et al., 2025). Nevertheless, these works

frequently concentrate on sectoral consequences like agriculture or supply chains, so there is a gap in the knowledge on how awareness can be implemented into large community resilience via behavioral processes. Social and behavioral aspects of climate adaptation and resilience-building have gained more and more importance in recent studies. Climate knowledge has been found to cause behavioral responses, including livelihood diversification, preparedness planning, and technology adoption, which are mentioned as critical pathways that lead to resilience (Usman et al., 2023; Iftikhar et al., 2025). Simultaneously, the social capital has become a vital facilitator of collective actions, sharing knowledge, and disaster response within the communities at risk during climates (Shah et al., 2024; Panahi and Moayerian, 2025). There has been evidence in Pakistan indicating that robust social networks and trust enhance understanding of risks and coordinated adaptation responses (Iqbal et al., 2024; Narijo et al., 2024). Irrespective of these revelations, there exists scanty empirical studies that have simultaneously investigated the moderating role of social capital and the mediating role of behavioral change in the climate awareness-community resilience relationship, especially in the context of Sindh.

Hypothesis Development

Climate Change Awareness and Community Resilience

Climate change awareness can be defined as the knowledge of people about risks, causes, and effects of climate change on their livelihood and the environment. Previous studies in Pakistan suggest that communities with a better level of awareness show good levels of coping capacity and adaptive reactions to climate stressors (Mobeen et al., 2023; Mobeen et al., 2025). Consciousness promotes early risk identification, informed decision-making and preparedness, which are relevant elements of community resilience. Research in climate-sensitive areas also indicates that the information about climate variability and extreme events enhances the individual response and recovery ability (Khan et al., 2025; Usman et al., 2023). With this evidence the climate change awareness is likely to be directly positively related to community resilience.

H1: Climate change awareness has a significant positive effect on community resilience.

Climate Change Awareness and Behavioral Change

A behavioral change is an important response mechanism where communities and individuals adapt to climate hazards. It is implied in the literature that climate awareness is a key driver of adaptive behavior that includes preparedness planning, livelihood adaptations, and climate-smart practices (Iftikhar et al., 2025; Usman et al., 2023). Empirical studies of Pakistani residents indicate that those who have greater knowledge of climate have more chances of making changes to their behaviors in response to perceived risks (Mobeen et al., 2023; Sargani et al., 2023). Such behavioral changes are especially witnessed in rural and agricultural societies as livelihoods are very much vulnerable to changes in climatic conditions (Mobeen et al., 2025). Hence, a greater level of climate change awareness will have a positive influence in behavioral change.

H2: Climate change awareness has a significant positive effect on behavioral change.

Behavioral Change and Community Resilience

The aspect of behavioral change is a focal point in promoting the resilience of the community through the proactive adaptation and collective preparedness. It is shown that adaptive behaviors increase the capacity of a community to endure climate shocks and recover, diversifying the sources of income, preparing against disasters, and conserving resources (Sargani et al., 2023; Waheed et al., 2025). Pakistan-based studies also confirm that behavior-based adaptation enhances climate-stress livelihood stability and social well-being (Usman et al., 2023; Iftikhar et al., 2025). These findings suggest that behavioral change directly contributes to resilience by reducing vulnerability and increasing adaptive capacity at the community level.

H3: Behavioral change has a significant positive effect on community resilience.

Mediating Role of Behavioral Change

Climate awareness is important; however, its effects on resilience are usually achieved by making behavioral changes, but not by awareness. The existing literature stresses that the creation of awareness should be translated into actual behavior to achieve significant results in resilience (Mobeen et al., 2023; Mobeen et al., 2025). Pakistan has proven evidence of adaptive behaviors as an intermediate mechanism between knowledge on climate and better livelihood and resilience outcomes (Sargani et al., 2023; Usman et al., 2023). This implies that community resilience mediates behavioral change through which climate change awareness has been found to have an effect.

H4: Behavioral change mediates the relationship between climate change awareness and community resilience.

Moderating Role of Social Capital

Social capital makes adaptive behaviors successful by increasing level of trust, cooperation, and acting as one in community. The research indicates that resilient social networks enhance the knowledge of the disaster risks, sharing of information, and coordination of actions in environmental disasters (Shah et al., 2024; Panahi and Moayerian, 2025). In Pakistan, empirical data show that most communities with a high level of social capital have better well-being and community resilience outcomes (Iqbal et al., 2024; Narijo et al., 2024). This means that social capital is likely to enhance a positive behavioral change and community resilience relationship through enhancing collective interaction and support.

H5: Social capital positively moderates the relationship between behavioral change and community resilience, such that the relationship is stronger when social capital is high.

Conceptual Framework

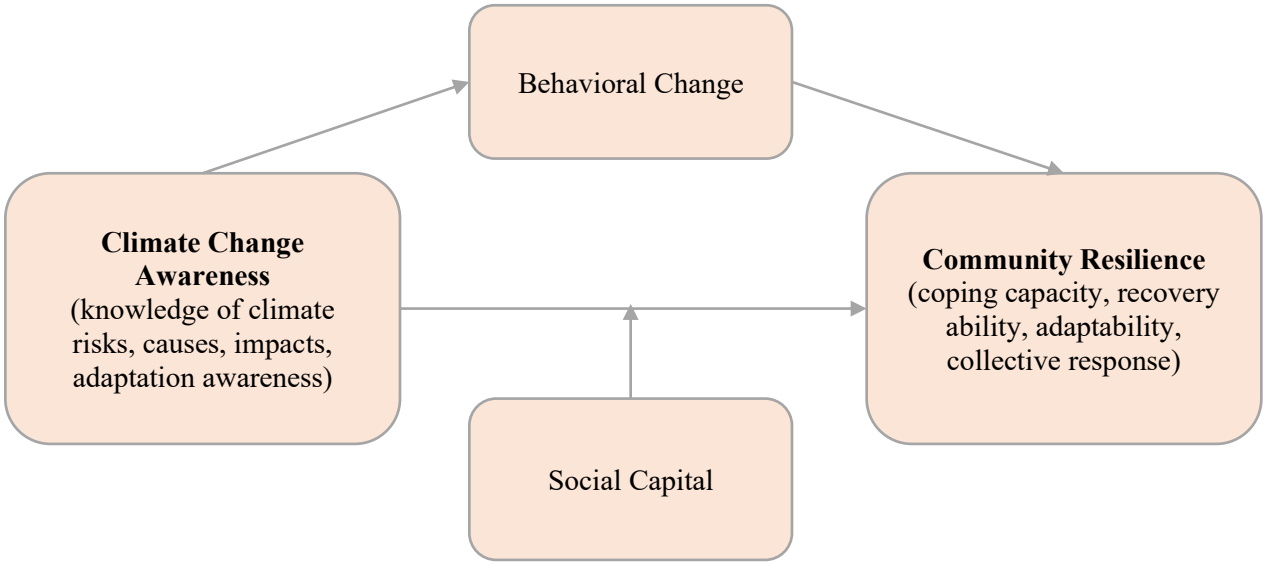


Figure 1. Conceptual framework of the study formulated after review of existing literature

Methodology

The research design chosen in the present study is the explanatory, quantitative research design that is based on the positivist research philosophy to investigate relationships between climate change awareness, behavior change, community resilience, and social capital in the Sindh region in Pakistan. Primary data will be received using a cross-sectional survey technique that will target the residents of climate-sensitive communities, especially the ones that have been subjected to floods, heatwaves, and water shortages. The population group

of interest is the adult members of the community and data collection is done through the help of structured questionnaire. The sampling method is a non-probability one, e.g., convenience or purposive sampling, because it is not possible to access dispersed and vulnerable areas. The research will be ethical as it will consist of voluntary participation, informed consent, anonymity, and the confidentiality of study participants.
To conduct data analysis, SPSS is applied in the preliminary data analysis, which involves descriptive statistics and reliability tests, and the SmartPLS is utilized to test the measurement and structural models with the help of Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is regarded as suitable because the model is exploratory, it has mediation and moderation effects, and can be used when there are complex models and the sample size used is relatively small and medium. Path coefficients, R2 values, effect sizes, and predictive relevance are used to evaluate the structural model, whereas effects of mediation and moderation are evaluated by bootstrapping.

Measures

The measurement of all study variables is done using previously tested scales modified to the local context of Sindh where the answers will be measured in a five-point Likert scale ranging between 1 (strongly disagree) and 5 (strongly agree). The scale of Climate Change Awareness is based on 5 items that were modified according to the works of Lee et al. (2015) and O'Connor et al. (1999), and the scope of the awareness of the causes of climate change, its effects, and the risks at the local level. Behavioral Change is assessed using 6 items modified according to Kollmuss and Agyeman (2002) and Bamberg and Moser (2007) to measure adaptive behavior, preparedness, and environmentally responsible behavior. The Community Resilience has been measured using 7 questions based on Norris et al. (2008) and Cutter et al. (2010): that is, the coping power, recovery, and community response. The moderating variable is Social Capital, which will be measured with the help of 5 items, which are the modified version of Putnam (2000) and Aldrich and Meyer (2015), and these are the items of trust, social networks, and community cooperation. The scales are checked regarding clarity and cultural appropriateness, reliability and validity are evaluated based on the Cronbach alpha, composite reliability, and average variance extracted (AVE).

Demographic Characteristics of the Respondents.

The demographics were that most respondents were men (59%), and significant percentage of female respondents (41%), also represented so that the sample was gender-diverse. The high proportion of 31-40 years and 18-30 years falls in the economically active categories indicating that the data are mostly representative of the opinions of the people taking an active part in livelihood and household decision-making. Regarding education, mixed educational background was noted and a significant percentage of 60 percent of the respondents had secondary or higher education which is significant in interpreting the difference in climate change awareness and adaptive behavior among the respondents.
In terms of occupational and residential factors, the sample was mostly rural (67 percent) with the greatest occupational group of 39 percent being agriculture related occupations. This is in line with the fact that the study focuses on climate vulnerable communities in Sindh, where the rural populations are disproportionately vulnerable to the risks caused by climate. Moreover, almost half of the participants described direct experience with floods (48%), then heatwaves and water shortage, which indicates the topicality of the problems of climate change in the region of the research. In general, the population structure justifies the aptness of the sample to explore climate change cognition, behavior change, and resilience at the community level across a high-risk region.

Table 1: Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	118	59.0
	Female	82	41.0
Age Group	18–30 years	54	27.0
	31–40 years	72	36.0
	41–50 years	46	23.0
	Above 50 years	28	14.0
Education Level	No formal education	32	16.0
	Primary	48	24.0
	Secondary	66	33.0
	Higher education	54	27.0
Occupation	Agriculture/Farming	78	39.0
	Daily wage labor	44	22.0
	Small business	38	19.0
	Other services	40	20.0
Residence Type	Rural	134	67.0
	Semi-urban	42	21.0
	Urban	24	12.0
Climate Exposure Experience	Floods	96	48.0
	Heatwaves	54	27.0
	Drought/Water scarcity	50	25.0

Descriptive Statistics: Standard Deviation and Mean

According to the descriptive statistics, the respondents tended to show moderately high scores in all the variables of the study, which is indicated by the mean values being at or above the midpoint rating of the five-point Likert. The highest mean score was found in the social capital (Mean = 3.82), indicating that community trust, social networks, and supportive mechanisms formed in the community are comparatively high among the sampled communities in Sindh. In the same way, climate change awareness (Mean = 3.78) is a satisfactory degree of awareness of the threats and effects of climate change, which is probably due to various forms of repetitive exposure to the effects of climate change e.g. floods and heatwaves.

Table 2: Mean and Standard Deviation of Study Variables

Variable	No. of Items	Mean	Standard Deviation
Climate Change Awareness	5	3.78	0.71
Behavioral Change	6	3.64	0.68
Community Resilience	7	3.69	0.73
Social Capital	5	3.82	0.66

The mean values of behavioral change and community resilience were also positive (3.64 and 3.69, respectively) which means that respondents are undertaking adaptive behaviors and have a fairly good ability to withstand and overcome climate stressor impacts. The values of standard deviation (between 0.66 and 0.73) indicate that there was a moderate variability of the responses, which means that there were some differences in the awareness, behavior, and level of resilience between respondents. Altogether, the descriptive findings present a sufficient basis of the subsequent inferential analysis incorporating reliability evaluation and structural equation modeling.

Reliability Analysis

The findings indicate a high internal consistency reliability of all constructs of the study. The alpha values of Cronbach are between 0.81 and 0.87, which is greater than the recommended level of measuring 0.70, which implies that the measurement scales are acceptable in their reliability. On the same note, rho A values, which give a better estimate of construct consistency in PLS-SEM, are also larger than the level of acceptability, which proves the strength of latent constructs.

Table 3: Internal Consistency Reliability of Constructs

Construct	Cronbach's Alpha	rho_A	Composite Reliability
Climate Change Awareness	0.83	0.84	0.88
Behavioral Change	0.85	0.86	0.89
Community Resilience	0.87	0.88	0.91
Social Capital	0.81	0.82	0.87

Moreover, the values of Composite Reliability (CR) stand at 0.87-0.91 which is way above the recommended cut off of 0.70 yet below the upper cut off of 0.95 which means that there is no redundancy in the measurement of the constructs. On the whole, these results prove that the measurement model is highly reliable and can be used to conduct a further validation of the study and assess the structural model.

Convergent Validity: Factor Loadings and AVE

The factor loading of all the measurement items is higher than the stipulated factor loading of 0.70 which means that the items measure the latent construct they are supposed to measure. This establishes the indicator reliability of the measurement model.

Table 4: Factor Loadings and Average Variance Extracted (AVE)

Construct	Item	Factor Loading	AVE
Climate Change Awareness	CCA1	0.78	0.60
	CCA2	0.81	
	CCA3	0.76	
	CCA4	0.79	
	CCA5	0.74	
Behavioral Change	BC1	0.80	0.62
	BC2	0.83	
	BC3	0.77	
	BC4	0.79	
	BC5	0.75	
	BC6	0.81	
Community Resilience	CR1	0.82	0.65
	CR2	0.85	
	CR3	0.78	
	CR4	0.81	
	CR5	0.79	
	CR6	0.83	
	CR7	0.76	
Social Capital	SC1	0.77	0.59
	SC2	0.80	
	SC3	0.74	
	SC4	0.78	
	SC5	0.76	

Also, the values of the Average Variance Extracted (AVE) of all constructs are larger than the minimum acceptable 0.50, which proves that all constructs explain more than 50 percent of the variance in the indicators. All these findings substantiate the existence of convergent validity in the measurement model.

Discriminant validity (Fornell-Larcker Criterion)

All constructs have adequate discriminant validity as attested by the Fornell-Larcker criterion. All the square root of AVE of the constructs exceeds the correlation of the constructs with other constructs which signifies that each latent variable is empirically stand out and reflects distinct elements of the model. Such results indicate that changes in climate change awareness, behavioral change, community resilience, and social capital are conceptually and statistically distinct constructs in the measurement construct.

Table 5: Fornell–Larcker Discriminant Validity

Construct	CCA	BC	CR	SC
Climate Change Awareness (CCA)	**0.77**			
Behavioral Change (BC)	0.54	**0.79**		
Community Resilience (CR)	0.49	0.58	**0.81**	
Social Capital (SC)	0.46	0.52	0.56	**0.77**

Diagonal values (bold) represent the square root of AVE.

In general, the findings verify that the measurement model meets the convergent and discriminant validity criteria, and the study can be further conducted with a high degree of confidence towards the evaluation of the structural model and hypothesis verification.

Structural Model Evaluation: f 2 and R 2

The values of R 2 show that the structural model has a good explanatory power. The degree of behavioral change is accounted by the climate change awareness at a moderate to substantial level (42%). This indicates that the awareness has a major role in influencing the adaptive and preparedness-related behaviors among Sindhi communities. Likewise, community resilience is attributed to a combination of three factors: awareness of climate change, behavior change, and social capital, which provide 56 percent of the variance in the model, which is a good fit to social science studies. These values are above the minimum values that have been suggested in the behavioral and environmental research, which validates the strength of the proposed model.

Table 6: Coefficient of Determination (R^2) and Effect Size (f^2)

Endogenous Construct	R^2	Exogenous Construct	f^2	Effect Size
Behavioral Change	0.42	Climate Change Awareness	0.72	Large
Community Resilience	0.56	Climate Change Awareness	0.14	Small–Medium
		Behavioral Change	0.38	Large
		Social Capital (Moderator)	0.21	Medium

The f2 effect size analysis will give us the information on the contribution of each exogenous construct to the endogenous variables in comparison to others. Behavioral change is highly influenced by climate change awareness (f2 = 0.72) and that is why it is critical in the initiation of adaptive processes. A significant effect size (f2 = 0.38) of behavioral change on community resilience supports the primary role of behavior as a resilience driver. Conversely, climate change awareness has a small-to-medium impact (f2 = 0.14) on

community resilience, which implies that its effect is partly indirect. Social capital moderating role has a medium effect ($f2 = 0.21$), which means that social networks and trust have a significant effect on resilience through enhancing the efficiency of adaptive behavior.

Path Coefficient Analysis

The findings on the path coefficients show that the concept of climate change awareness has a great positive influence on community resilience ($b = 0.26$, $p < 0.01$), which supports H1. This implies that the more communities know about climate risks, the more they can cope with and recover the climate related problems. Moreover, the awareness of climate change shows the presence of a strong and highly significant effect on changing behavior ($b = 0.65$, $p < 0.001$) that supports H2 and puts awareness in the center of adaptive and preparedness behaviors among populations in Sindh.

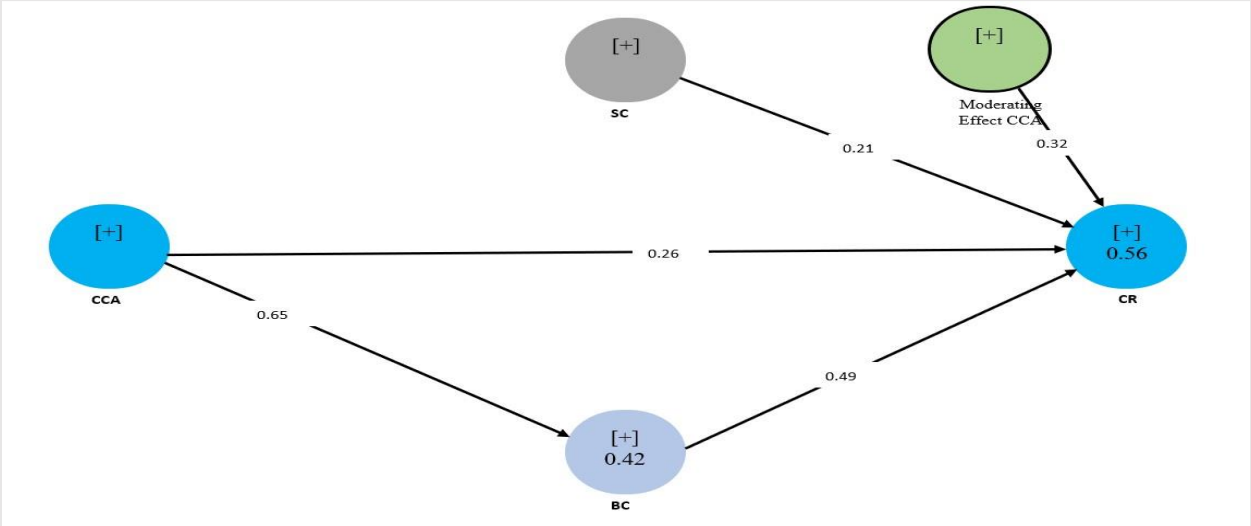
Behavioral change is also positively correlated to community resilience ($b = 0.49$, $p < 0.001$), which is a solid evidence of H3. This observation reiterates the importance of behavioral adjustment including preparedness planning, resource management, and action togetherness- in enhancing resilience to climate shocks. Combined, these direct impacts reveal that community resilience is a key component involving awareness and behavior.

Table 7: Path Coefficients and Hypothesis Testing Results

Hypothesis	Structural Path	β (Path Coefficient)	t-value	p-value	Decision
H1	Climate Change Awareness → Community Resilience	0.26	3.12	0.002	Supported
H2	Climate Change Awareness → Behavioral Change	0.65	9.84	0.000	Supported
H3	Behavioral Change → Community Resilience	0.49	6.71	0.000	Supported
H4	Climate Change Awareness → Behavioral Change → Community Resilience	0.32	4.98	0.000	Supported
H5	Behavioral Change × Social Capital → Community Resilience	0.21	2.89	0.004	Supported

According to the mediation analysis, behavior change is a significant mediator between climate change awareness and community resilience ($b = 0.32$, $p < 0.001$), meaning that H4 is true. It suggests that a large part of the effect of climate awareness on resilience is indirect, via behavior change, supporting the theoretical argument that knowledge should result in action to deliver the effect of resilience.

Figure 2. Structural Equation Model



Besides, the effects of behavior change and social capital interact positively and significantly ($b = 0.21$, $p < 0.01$), which substantiates H5. This observation supports the hypothesis that social capital reinforces the association between adaptive behavior and community resilience that, communities that have stronger trust, networks, and cooperation gain more resilience benefits as a result of behavioral change. On the whole, the path analysis confirms the proposed structural model and gives a good empirical evidence to all hypothesized relationships.

Discussion

The results of this paper show that the level of climate change awareness is significant in improving community resilience in Sindh, which is consistent with the previous research on the importance of climate knowledge to adaptive capacity and preparedness (Mobeen et al., 2023; Mobeen et al., 2025; Usman et al., 2023). Awareness is not enough, though, and it mostly has its impact on behavior change as the mediation effect is significant. These findings are in line with current research that underlines the role of knowledge translation into adaptive behaviour, including preparedness planning, livelihood diversification, and the implementation of climate-smart practices (Iftikhar et al., 2025; Sargani et al., 2023; Waheed et al., 2025). Practically, the results point to the idea that awareness campaigns and educational interventions in climate-sensitive communities can significantly improve the resilience only when they are accompanied by measures that would foster proactive behavior and the actual use of knowledge.

The paper also establishes that social capital enhances the connection between community resilience and behavioral change, which supports the fact that community networks, trust, and collective action are essential in climate adaptation (Shah et al., 2024; Panahi and Moayerian, 2025; Iqbal et al., 2024). Societies characterized by social cohesiveness are in a better position to synchronize responses and share resources and assist fellow community members in case of climate related shocks, thus enhancing the efficacy of adaptive responses. The latter are in line with the findings on Pakistan that social capital can be used to share knowledge and collectively solve problems in highly disaster-prone environments (Narijo et al., 2024; Shah et al., 2024). In general, the paper demonstrates the interdependence of awareness, behavior change, and social capital in the development of sustainable resilience and presents practical recommendations to the policymaker, non-governmental organizations, and local governments operating in climate-prone areas of Sindh.

Recommendations

It can be suggested based on the results of the current research that practical behavioral interventions, including the training on adaptive agriculture, disaster preparedness trainings, and livelihood diversification strategies, should accompany climate change awareness programs in Sindh. The policymakers and non-governmental organizations ought to embrace the advantage of using the current social networks to enhance dissemination of knowledge and promote community-based adaptation programs. Moreover, local governments can enhance community resilience by building trust, collaboration, and group action by using participatory planning and resource-sharing processes.

Future Directions

The associated longitudinal designs can be used in future studies to investigate the dynamics of climate awareness and behavioral transformation under varying climatic conditions and their effects on the resilience outcomes in case of successive climate occurrences. The inclusion of qualitative methods like interviews or focus groups may yield more information about the process of decision-making in communities and the cultural aspects determining adaptive behaviors. Additional research might also be conducted to understand how digital and technological-based interventions like mobile-based climatic alerts or AI-based advisory can affect behavioral adjustment in rural communities.

A limitation of this paper is that the survey data used is self reported, and therefore this form of research data is subject to social desirability bias or the inability to remember what one previously did. Also, the generalizability of the results on the entire population of climate-vulnerable communities in Sindh is restricted by the application of non-probability sampling methods. The authors also concentrate on one geographic area and this might fail to reflect on differences between geographic locations in social capital, awareness and resilience mechanisms in other locations in Pakistan or even in urban setting.

The other weakness is that the research design of the study is cross-sectional and it makes it not possible to suggest causality of the variables. Although PLS-SEM is capable of tests of mediation and moderation, the sequence of awareness, behavior, and resilience over time can not be completely determined. Those limitations could be filled in future research to augment the validity and usability of the results.

Implications

The research presents policy-relevant and practical information on ways to improve climate resilience in vulnerable communities. Effective strategies in adaptation can be achieved through the combination of behavior-oriented programs and the development of social cohesion with the awareness campaigns. These insights can be used by local governments, NGOs, and community leaders to develop specific interventions to enhance preparedness, resource sharing, and collective response to climate hazards which will eventually make the overall sustainability and well-being of at-risk populations more sustainable.

Conclusion

This research agrees that climate change awareness has a positive impact on the resilience of the community, either directly or indirectly by means of behavioral change. The results emphasize the importance of adaptive behaviors in the process of knowledge translation into tangible actions, and it proves that knowledge awareness is not enough without active participation of the community members. Moreover, social capital was identified to play a significant role in increasing the effect of behavioral change in enhancing resilience with trust, networks, and collective action being key components in the construction of sustainable adaptation strategies.

The study, in general, will help increase the understanding of the nature of interaction between awareness, behavior, and social factors to empower the resilience in climate-prone areas. The research, by offering a framework where knowledge is interconnected with action and community-support, can be used by policymakers, practitioners and researchers who aim at reducing the negative impacts of climate change and

developing adaptive capacity in the case of Sindh and other similar settings.

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