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# Impact of Climate Change on Human Development: Resilience as a Strategy for Adaptation

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## Abstract

Climate change is a complex phenomenon that restricts human development directly and indirectly. It is ironical for sustainability of a country, which rank 135$^{th}$ in per capita emission of greenhouse gases globally, but rank fifth on climate change vulnerability. Numerous dimensions of the sustainable development are influenced by the threat of climate change. It has widespread impression across different sectors and ecosystem like water, food, forest, energy, and biodiversity; marine and coastal environment; similarly, intensity of climate hazard such as drought and floods impacts the human development. This study consists on overall

objectives to evaluate the current and future potential influences of changing climate on human development in Punjab. This study is divided into two parts; in first slice we measure the impact of climate change on human development by applying Autoregressive Distributed Lag Model (ARDL) on the data collected from Global Data Lab for the period of 1990 to 2024. In second part we elaborate the resilience framework to describe the process and required resources at different levels of population groups that can prepare them to contend with the impacts of climate change. To illustrate the implication of framework we used examples of different interventions that focused on mobilization of powerful adaptive system to build social cohesions, hope, agency, and belonging sense. Study concludes that climate variables have negative association with human development and we call development scientists to engage in research of resilience to address unprecedented and existential climate change threat. On the basis of our finding study suggest that government should emphasize the climate policies to enhance the human development in Punjab, Pakistan.

**Key words:** Climate Change, Resilience, Human Development, Punjab, Pakistan

# 1. Introduction

The most pressing challenge of 21st century is climate change with extensive inferences of environmental sustainability, economic development, and human capital (Feulner, 2015; Баула et al., 202). It refers to the alterations in the patterns of the humidity, temperature, emissions, and intense variations in weather events, based on anthropogenic activities like deforestation, industrialization, and fossil fuels combustion (Calvin et al., 2023). Initially it was recognized as a multidimensional phenomenon which directly or indirectly hit development and socio-economic process (Bandh et al., 2021). Its impacts are pervasive across the sectors and disproportionately affect marginalized class of the population, therefore, posing a serious threat to the humans (Thomas & Warner, 2019).

The term “climate change” is broader that include global warming driven from greenhouse gases emission and variability in the patterns of weather globally (Bhatti et al., 2024; Kumar, 2018). Historically, in the nineteenth the phenomenon of climate change emerged when the identification of greenhouse effects firstly recognized and changes in climate were suspected (Jain, 1993; Mitchell, 1989). Emission of gases via combustion of fossil fuel, agricultural and industrial practices, and deforestation has resulted in global warming since Industrial revolution (Bajoria et al., 2024; Kumar, 2018). Resulting, influence of climate stress has been

evident in form of changing rainfall patterns, high degree temperature, severity in conditions of weather in form of droughts, floods, storms, heat waves, and rising level of sea crushing environment, natural eco system and human development (Ogunbode et al., 2022).

The industrialization processes of developed countries have altered the natural climate of the mother earth due to the carbon concentration in environment (Letcher, 2020). In 2012, America responsible 14.5 percent carbon emission globally, followed by China with 27 percent and Europe with 10 percent (den Elzen et al., 2016). However, the consequences of this emission are faced by the developing countries (Akhbari & Nejati, 2019; Cao, 2003; Lutter, 2000). For example, South Asian women and children are nutritionally deficit, entire harvest of Africa ruined by climate; inhabitants are enforced to vacate their natural territory in Latin America. Glaciers are melting, forests are converting in societies, sea levels are raising and world is becoming hotter and hotter day by day (Singh, 2025; Barnett & Adger, 2007).

Changing climate is becoming a biggest threat to economic development, stability, peace, and development of human therefore it is identified as "accelerant of instability" and "threat multiplier" (ain Abbas & Riaz, 2021; Barnett & Adger, 2007). Climate change first cause the economic destruction, facilitate poverty, and unemployment leads to the human destruction (Ahmed et al., 2018). The economic decline caused by drought, reduction in agricultural productivity, water shortage, and high food process. So, all these factors accelerate terrorism, wars, protests, uncertainty, hunger, diseases, and illiteracy which alternatively restrict human development on observed region.

The changing climate is impacting differently across countries around the world. Fortunately or unfortunately, Pakistan is a territory where there are glaciers, deserts, and fertile land. Moving toward the service sector, Pakistan is agriculture based country, so the changing climate could be a huge financial threat. Due to the higher rate of poverty people are not able to afford luxurious life and their direct interaction to the climate the chances of influence are higher. Slum area and mud houses are the primary target of the all climate indicators. However, people are changing their life style but the resources and legislation about climate change may not fruitful. In current scenario it's important to examine the trends in climate indicators, their impacts on human development, and to rationalize the resilience and its frameworks.

Despite the rising body of literature on climate change and development along with climate resilience, there remains a significant gap in empirical research that estimates these

relationships at the district level. Most studies focus on national or cross-country analyses, which often mask local variations and fail to capture context-specific dynamics. Additionally, existing research tends to examine individual dimensions of human development in isolation. Rather than approving a comprehensive and integrated approach. This limits the ability to understand the full degree of climate impacts and to design effective policy interventions.

This study aims to fill the gap by providing a multidimensional investigation of the influence of climate change on human development in Punjab, Pakistan. By integrating data on temperature, humidity, CO2, and socio-economic indicators (gini), and population the study seeks to capture both the direct and indirect effects of climate change on health, education, and income composite index known as Human Development Index (HDI). The use of time series data permits for the examination of temporal trend and spatial heterogeneity, providing a more nuanced understanding of the association between climate change and human development for the period of 1990 to 2024).

## 2. Literature Review

In last few years, overs 160,000 articles were published on changing climate on Web of science database and Scopus covering various areas of knowledge (Burkett et al., 2015). These papers highlight climate and intergovernmental panels (IPCC), restricted to the hothouse gases effects and addresses climate change, adaptation, vindication techniques and practices. The mounting advancement scientifically gained ground to address complex moral and ethical issues. Thesis problems get attentions during the sixth UNFCCC conference of parties (COP 6) in 2000, in Hague Netherlands. This explanation provides the basis to many academic papers (((UNDP), 2016; Chiappetta Jabbour et al., 2019; Pachauri et al., 2014; Perkiss, 2024).

Different methods can be used to define climate change, one of the most common being a long-term alteration in the average patterns of weather globally (Council et al., 2011). Global warming is a key manifestation of climate alteration, driven primarily by the accumulation of carbon dioxide along with other greenhouse gases trap heat within the atmosphere of mother earth (Nicholls, 1995). Since the onset of the Industrial Revolution in the 18th century, carbon dioxide emissions have increased by nearly 40 percent, meaningfully increasing the effects of chloro fluoro gases and contributing to intensifying global temperature (Letcher, 2020). In addition to warming the planet, increased concentrations of greenhouse gases have been linked to the depletion of the ozone layer, which is located in the Earth's stratosphere (Dyominov &

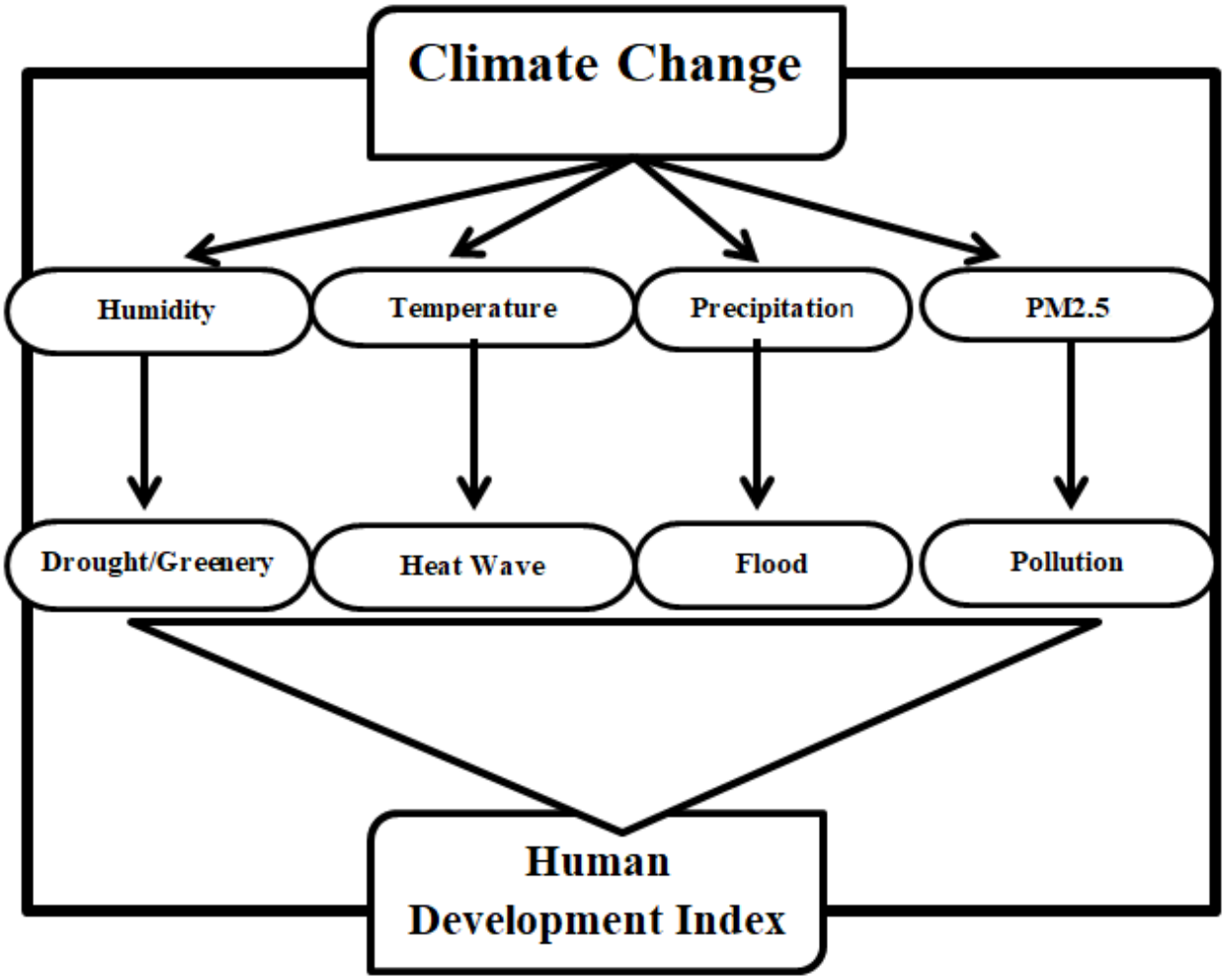
Zadorozhny, 2008). This layer plays a vital role in absorbing the maximum radiation of the sun's harmful ultraviolet rayses, thereby protecting life on (Letcher, 2020) Earth. Any degradation of this protective shield possesses serious environmental and health risks.

(Qaiser et al., 2021), evaluate the composite drought index to recognize drought seasonal patterns and their connection with climate dynamics in Punjab's Northern areas of Pakistan by using the quantitative methodology. They conclude increasing levels of sea, falling snow coverage, extreme weathers, droughts, and floods have persuaded people and policy makers to treat climate change as threat in reality, and it will catastrophic in case of negligence.

Fahey et al. 2017, estimate the physical drivers of environmental changes by using qualitative approach. The conclude, light energy's output drive from sun is known as solar energy, so variations in this energy directly impact climate system due to irradiance is main source of energy for earth. Because of industrial revolution, emission of CO2 growth rate was exponential. Over fifty years, CO2 show the largest radio frequency (Fahey et al., 2017).

Climate change is also expected to influence the spread and intensity of infectious diseases under all IPCC climate scenarios. Vector-borne diseases, particularly malaria, are likely to expand geographically due to changing climatic conditions. Although reduced soil humidity in some areas may decrease transmission rates, the overall global burden of malaria currently affecting populations at risk of about 2.4 billion people are expected to rise. Estimates suggest that climate change could expose an additional 100 to 700 million people to malaria risk by 2050 (Martens, 2013; Martens et al., 1995).

Increasing temperatures, extreme weather and erratic rainfall events reduced agricultural productivity, damage the infrastructure, and heightened poverty. Moreover, poor sanitation, declining water table and unsafe water availability accelerate the spread of infectious and vector-borne diseases. These challenges significantly hinder progress toward development goals and exacerbate existing inequalities. The study adopts a secondary data approach, utilizing sources such as Global Data Lab and government reports for the period of 1990 to 2024 for the estimation of the relationship. It emphasizes that climate change is not merely an environmental issue but a comprehensive development concern that threatens human development, including economic, health, and educational dimensions.




## 3. Methodology

Human development is always remaining a central concern of the economists and researchers because it reflects the wellbeing of people through improvement in education, health, and income. In recent eras, temperature, emissions, and humidity factors relating to the environment getting the attention in shaping human development. Present study aims to evaluate the effect of key environmental variables along with population dynamics on human development index (HDI). To empirically test, study tries to find the impact of public CO2 omission, temperature, humidity, Gini and population on human development index (HDI). This study takes annual data of Punjab, Pakistan for the period of 1991 to 2024 from Global data lab and Government reports.

# 4. Model:

*HDI=f (Tem, Gini, Hum, CO2, Pop)*

$$HDI_t = \propto + \beta_1 tem_t + \beta_2 gini_t + \beta_3 hum_t + \beta_4 CO2_t + \beta_5 Pop_t + \mu_t$$

**Table 1:** Description of Variables

| Sr. No | Variables Name | Data Source | Description |
|---|---|---|---|
| 1 | Human Development Index | Global Data Lab | Study used HDI that captures the human growth and welfare. Three measures are used for the calculation of HDI including education, health, and income |
| 2 | Temperature | Global Data Lab | It contains on the number which drive from average yearly surface temperature $C^o$ . |
| 3 | CO2 | Global Data Lab | Carbon dioxide gas generated from industrial development and more commercial activities. This studies use the CO2 emission in tons. |
| 4 | Humidity | Global Data Lab | The water vapor present in the air is important for respiratory health, human thermoregulation, disease transmission, and cardiovascular functioning. High and low level of humidity cause negative impacts on human health. This study use the year average relative humidity percentage. |
| 5 | Gini | Global Data Lab | Developing countries are fighting against the unequal distribution of income. We use Gini coefficient to check the impact of prevailing |

| | | | |
|---|---|---|---|
| | | | disparities on HDI. Its value lays between "0" to "1", 0 means no inequality while values approaches to 1 indicating higher rate of inequality. |
| $\mu$ | | Error Term | |
| t | | Time | |
| $\alpha$ | | Intercept | |
| $\beta_1$ to $\beta_5$ are the slope of coefficients of explanatory variables | | | |

# 5. Results and Interpretation

## 5.1. Stationarity Testing

Augmented Dickey-Fuller (ADF) unit root test is used to check the stationarity of time series data (Mushtaq, 2011). Variables used in the above regression model are in mix order. A few are stationary at level while others are at 1st difference. It is being observed and checked on the basis of their critical values of t-statistics. Moreover, their p-values assist to find the stationarity level. The results of stationarity test are given below.

**Table 2:** Stationarity Testing

| **Variables** | **AT-Level** | | | | **1st Difference** | | | |
|---|---|---|---|---|---|---|---|---|
| | **Intercept** | | **Trend and Intercept** | | **Intercept** | | **Trend and Intercept** | |
| | **ADF Stat** | **P-Value** | **ADF Stat** | **P-Value** | **ADF Stat** | **P-Value** | **ADF Stat** | **P-Value** |
| **HDI** | -1.1706 | 0.6757 | -1.0234 | 0.9950 | -3.2964 | 0.0190* | -3.7378 | 0.0000* |
| **CO2** | -1.2675 | 0.6331 | -4.9012 | 0.0220** | -4.9217 | 0.0006* | -4.7217 | 0.0047* |
| **Gini** | 0.4061 | 0.9803 | -4.6489 | 0.0037* | -5.4446 | 0.0001* | -5.3047 | 0.0007* |
| **TEM** | -4.4182 | 0.0013* | -4.9186 | 0.0019* | -9.2439 | 0.0000* | -9.1056 | 0.0000* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **HUM** | -3.6750 | 0.0091* | -4.4271 | 0.0065* | -5.3573 | 0.0001* | -5.2534 | 0.0009* |

*Note: *, **, *** shows the level of significance at 1 %, 5% and 10% respectively*

### 5.2. Bound Test Results

Table 3 present the results of bund test of data. ARDL bound test was developed by Pasaran, Shin, And Smith in 2001 to check the existing long-run association between variables (Pesaran et al., 2001). Following table shows the calculated values of bound test where F value (14.0091) exceeds the upper bond limit and indicate the presence of co-integration. This defines that there is long-run affiliation among climate change and human development.

**Table 3:** ARDL Co-Integration Bound Testing

| Test Statistic | Value | K |
|---|---|---|
| F-statistic | 14.0091 | 5 |
| **Critical Value Bounds** | | |
| Significance | lower Bound | upper Bound |
| 10% | 2.08 | 3 |
| 5% | 2.39 | 3.38 |
| 2.5% | 2.7 | 3.73 |
| 1% | 3.06 | 4.15 |

*Note: F ratio is significant at the 1%, 2.5%, 5% and 10% level of significance respectively*

**Table 4:** HDI and Climate change variables (ARDL co-integration approach)

| Co-integrating Long Run Form | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| TEM | -0.025725 | 0.013422 | -1.921324 | 0.0545*** |
| GINI | -0.396652 | 0.188202 | -2.106234 | 0.0355* |
| HUM | 0.004354 | 0.002432 | 1.765234 | 0.0773*** |
| CO2 | -6.664507 | 2.995432 | -2.22521 | 0.0261* |
| C | 2.489874 | 1.077032 | 2.31243 | 0.0207* |
| R squared 0.938592<br>Adjusted R-squared 0.907892<br>Akaike info criterion -6.335767 | | | | |

| |
|---|
| Durbin-Watson stat 1.998905 |
| Prob(F-statistics) 0.000000* |

*Note: *, **, *** shows the level of significance at 1 %, 5% and 10% respectively*

The findings of the study closely align with both national and international studies, which emphasize environmental and climate degradation pose numerous challenges to the human development. Temperature shows the negative association in long run results employs that one unit increase in average temperature lead approximately 0.0257 reductions in human development. Dell et al., 2012 discover that climate change and rise in the level of temperature adversely affect human development by hitting the health outcomes and productivity (Dell et al., 2012; Haines et al., 2006; Zivin & Shrader, 2016). Similarly, CO2 emission has co-efficient -6.6645 statistically significant at five percent exhibit increase in emission will reduce the human development by same proportion. Environmental degradation through CO2 emission undermines human development (Costa et al., 2011; Steinberger et al., 2012). On the other hand humidity with a positive co-efficient indicates that increase in humidity level will help to improve the human development outcomes. Literature authenticates that humidity influence human health and agriculture productivity (Davis et al., 2016; McMichael et al., 2006; Mujan et al., 2019). On an opposite track, population and wealth inequality (Gini) shows negative and significant relationship with HDI, implying that one unit increase in income disparities place the pressure on employment opportunities, natural resources, and public services which restrict the HDI by -0.3966 units. Literature portrait the same indications, explain that income inequality significantly hinder the human development by restricting access to healthcare and education (Wilkinson & Pickett, 2009).

## 6. Human Development and Climate Change (Short Run Estimates)

The short-run statistics are also important in the valuation of the role of climate change in human development. Supportive with De-Boef (2000), that short-run change is essential to continue the long-run association (De Boef, 2001).

**Table 5:** Climate change and Human development

| Short Run Coefficients | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| TEM | -0.025675 | 0.011043 | -2.326531 | 0.0200** |
| GINI | -0.396575 | 0.233002 | -1.702321 | 0.0890** |
| HUM | 0.004324 | 0.002372 | 1.825211 | 0.0677** |
| CO2 | -0.043217 | 0.020543 | -2.104002 | 0.0352** |
| Coint Eq 1 | -0.489764 | 0.082500 | -5.936511 | 0.0000* |
| R squared 0.918799 | | | | |
| Adjusted R-squared 0.907659 | | | | |
| Akaike info criterion -5.701216 | | | | |
| Durbin-Watson stat 2.007175 | | | | |
| Prob(F-statistics) 0.004969* | | | | |

*Note: *, **, *** shows the level of significance at 1 %, 5% and 10% respectively*

The short run results reveal that all the explanatory variables exert significant effect on the human development, can be seen through the direction of coefficient. Rise in temperature reduce the human development by 0.025675 units in short run, explain that even minor temperature fluctuations immediately worsen the human health, education, and income. Literature indicates the same phenomenon (Dell et al., 2012). Similarly, income inequality (Gini) -0.396575 shows strong negative short-run effect, implying that increasing inequality sharply restricts access to education, health care, and basic services (Cifuentes et al., 2008; Wilkinson & Pickett, 2009). In contrast, humidity exhibits a positive and significant coefficient (0.004324), describe that moderate humidity level support agriculture, and human comfort, thereby improved the living standard (Mahmood et al., 2019; McMichael, 2012; Tsutsumi et al., 2007; Yan et al., 2020). Environment degradation measured by CO2 emissions significantly harm human development in short run by increasing pollutions in an air (World Bank, 2013; Kim et al., 2014).. The negative error correlation coefficient confirm speedy adjustment in the equilibrium of long run, about 48 percent of short-run disequilibrium adjusted during the period of one year, help in strong system stability. Value of Durbin Watson (2.00) further confirms the absence of autocorrelation in model. Significant value of F-Statistics validates joint effect of climate change and socio-economic indicators on human development in the period of short run.

# 7. Diagnostic Tests

Different Diagnostic tests are applied to highlight the sufficiency of the model in terms of the reliability of statistics for suggestion. The model permits the diagnostic test where Heteroskedasticity Test, Breusch-Pagan-Godfrey and Breusch-Godfrey Serial Correlation LM Test are used. To test the reliability of model Ramsey RESET test is applied. The results of these tests are shown in the following table.

**Table 6**

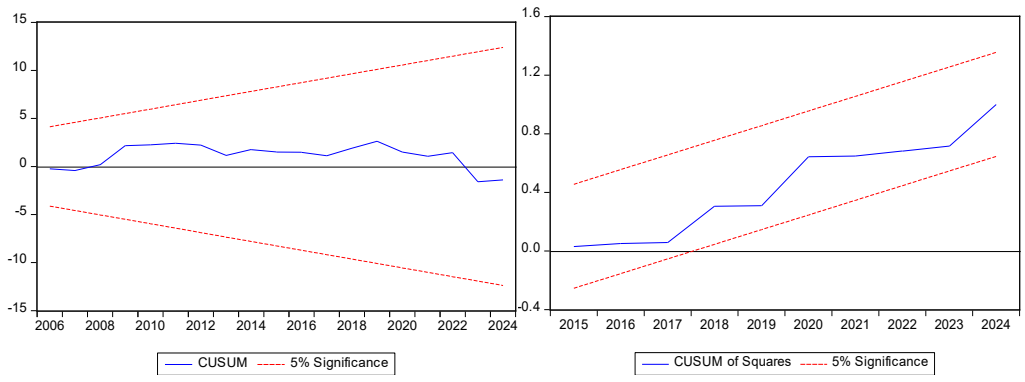
| **Diagnostic Tests** | | |
|---|---|---|
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | F-statistic 0.202584 | P-value 0.4551 |
| Ramsey RESET | F-statistic 0.788575 | P-value 0.4506 |
| Breusch-Godfrey Serial Correlation LM Test : | F-statistic 0.737856 | P-value 0.2057 |

On the basis of results of table 6, it can be inferred that in above mentioned model, the issue of heteroscedasticity and serial correlation is not identified. The Ramsey Reset test for model specification has been applied which sanctions that this model is well identified.

## 7.1. CUSUM & CUSUMSQ

Test statistics of stability are graphed to recognize the significances and also finds when a possible instability happened. The model is stable and correctly specified when statistics are within the bounds of 5% level of significance.

**Figure 1:**



In figure 1, the effects of Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares Recursive Residuals CUSUMSQ test are described. These tests are the diagnostic tests used in econometrics to examine the stability of coefficients of regression models over time. In time series data we use these tests because unstable coefficients may lead unreliable estimates and incorrect policy suggestions. The plot of CUSUM and CUSUMSQ test indicate that the graphs do not cross the lower and upper critical limits; it means that the estimates are stable. So, it can be said that the estimated model is reliable. .

# 8. Resilience as a Strategy for Adaptation

## 8.1. Defining Resilience

Resilience is related to the functioning of the ecological system rather than the ability to maintain the ecological state (Johnson, 1996). It can be defined in different ways. “A buffer ability of the system for the perturbation absorption, or the magnitude that can be used to absorb disturbance before the structural change of the system, through the variable change and process that control behavior”(Ma et al., 2025; Yarveisy et al., 2020). Other definitions of resilience highlight speed of recovery from disturbance, and emphasize on the difference between resistance and resilience, when the delay translated the disturbance into impact (Sadiq & Shuvo, 2025). Variability in climate is predictable in some ways, but few ways are always surprising which are grounded on the notion of discontinuity and nature of the eco-system (Stemkovski et al., 2026; Williams et al., 2021). Holling (1995), dejected the philosophical basis for the management of the environment is determined by the view of the world regarding nature how people manage resources to perceive climate as either benign, resilient, and recognition ability (Holling et al., 1995).

## 8.2. Building Resilience for Human Development to Climate Threat

To address the complex threat of climate change to human capital required attention for multidimensional process to protect individuals and nurture resilience for future. Numerous resilience models offer theoretical background, empirical evidences and guidelines about what can be done to avoid or counter the risks of changing climate towards human development, particularly for children and youth (Masten, 2021; Sanson et al., 2022). All these models are presented and tested by the researchers on protective factors to support human development in context of disaster. Decades of previous research on resilience by those who overcome the

threats aligned with acute and cumulative diversity associated with the growing research body focused on the responses in context of climate disasters and multidimensional strategies for the reduction of risk and enhancement of resilience. In contemporary research on human capital growth resilience is defined as a capacity to adapt adversity by using different systems (Sanson et al., 2022; Theron, 2021).

The capabilities and resources related to the resilience include individual behavior, skills, cognitive development for problem solving, self-regulation, optimism, to enhance the sense of purpose; support from family, friends and teachers, and engagement with social resources. It provides shield against adversities in present and prepare for future disasters and nurture resilience (Abate et al., 2024; Sanson & Masten, 2024). Using various local level policies, climate resilience capacity can be strengthen on different levels through awareness to control temperature, CO2 emission, and playing the role in balancing humidity with the help of better education facilities, health infrastructure, and creation of opportunities.

### 8.3. Three Major Frameworks to Address the Climate Change Threats

Climate challenges already exist and urgent, efforts for the reduction of disasters and promotion of resilience cannot wait for researchers to evaluate the process and suggest for actions. However, it is important to understand the effectiveness of strategies for implementation, stakeholder including individuals, families, and policy makers as well as humanitarian scientists are authorized to protect people from hazards. As a result, resilience frameworks are used for intervention have emerged along with research programs, additional knowledge accumulate relating specific threats and best response (Masten, 2021).

Risk reduction is widely recognized strategy to tackle the threat posed by climate change. UNICEF (2021), report relating to “Climate Risk Index” makes it a powerful case to review due to its impacts on human health. An important form of risk reduction is lowering the level of gas emission globally through multiple levels of the multidimensional systems. If we fail to in lowering the global threat to mother Earth’s climate, there will be no chance to prevent from massive suffering. Numerous strategies are available to lower down the risk at community level. For instance, communities can conduct analysis relating climate disasters and raise awareness campaigns about climate hazards. They can install warning systems; fortify homes, plan evacuation routes, hospitals, schools and relocate individuals to less marginalized area in advance (Masten & Motti-Stefanidi, 2020; Ringsmuth et al., 2022).

The second approach of promoting resilience is the increase in resources along with broad array of strategies. Most important strategy is the provision of basic needs such as food, shelter, clean water, and medical care. For improved human development survival needs caregivers. There is need to boost the economic support to meet the need through cash transactions (Sanson & Masten, 2024). The other efforts can be made to ensure the quality care, health, education, better job opportunities, and access to world's knowledge through internet to support the life system. The challenges faced by the public during pandemic underscore the importance of savings, and restoring resources for survival of people, and supporting business (Ringsmuth et al., 2022; Sanson & Masten, 2024).

The third important approach of promoting resilience is restoring the protective process that foster the adaptation process to deal with diverse hazards. These strategies consist on the efforts to restore the sense of belongings, security, safety, and hope relating future, these efforts can become the counter feeling of helplessness through activities that can build self-efficiency. Recognition of the disasters and taking steps to control the aftershock, for instance to control the temperature adopt the best strategy of the promotion of jungles, alteration in home structure to keep the electricity usage low, limits the housing societies, and use the natural energy despite of manmade. All these small steps can bring a big positive change.

## 9. Conclusion and Recommendations

Climate changes pose adverse impacts on human development. It is a cascading catastrophe in slow motion, punctuated by acute disaster such as increases in temperature and CO2 emission which Leeds towards extreme weather events and threatening human capital. The burden of hazards falls on the shoulder of marginalized class of the society, in developing countries like Pakistan people are forced to live existing vulnerabilities. In recent two decades, adverse impacts of climate change have been increasingly evident in Pakistan on various socio economic indicators. According to the Pakistan Meteorological Department, due to the diverse geographical landscape and climate conditions country is highly vulnerable to climate changes. As for as statistics are concerned, Pakistan contribute little in CO2 emission in comparison of India, and China. Excessive emissions from neighboring countries have adverse effects on the atmosphere, and increasing frequency is causing natural disasters and climate variation across the country. Internationally, Pakistan ranked ten among the most vulnerable climate change countries in Global Climate Risk Index 2020 report, there is a need to take immediate steps.

First part of the study confirms that climate change is adversely associated with human development. There is an urgent need to support the strategies for the reduction of risks and promote the resilience at different levels. Social scientists have crucial role to play, firstly they must have to sound the alarm about risks relating to human health caused by the climate change. Second, support and promote the resilience process and make sure the provision of basic need with the help of government. Third, create awareness to take the steps for controlling the factors which cause climate change acceleration.

There is a need to move from knowledge to actions, results of the study call for policies to bridge the climate adaptation and human development, ensuring that areas hit by flood and vulnerable class of province must not left behind.

- The government should take the steps to reduce the emission of CO2 (greenhouse gases) through the transition towards the other forms of energy, adopt carbon pricing mechanism, and incentives emission reduction.
- The government should take steps to motivate people to control temperature through foresting and other measures suggested in literature. Results suggest that temperature causing immediate negative impacts on human lives.
- The finding of the thesis emphasize on integrated climate and development policy. There is a need to promote urban planning and climate consideration into national development strategies.

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