



RESEARCH PAPER

Public Perceptions and Attitudes toward Climate Change in Pakistan

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ABSTRACT

The basic objective of this study was to examine the relationship of Pakistani people's perceptions of climate change reality and climate change causes, the consequences, and temporal distance and spatial distance of the consequences of climate change with the New Ecological Paradigm (NEP), the negative affect associated with climate change, and the risk perception of climate change. Despite the expanding scientific accord, the public agreement towards the risks of climate change is uncertain. People's perceptions and attitudes toward climate change led to the understanding of how people respond to the risks caused by climate change, yet this mass subjective assessment has not been sufficiently done in terms of highlighting risks and consequences. To conduct this study, an online survey was employed including the respondents from several areas of Pakistan who were educated enough to understand the terminologies related to climate change. The study sample consisted of 200 people with the age range 16 to 36 & above. The findings suggest that people's perceptions of climate change reality and climate change causes, the consequences, and temporal distance and spatial distance consequences of climate change are interestingly related and directly proportional to how people advocate the New Ecological Paradigm (NEP), experience the negative affect associated with climate change, and anticipate the climate change risks. It is crucial to address the absence of subjective assessment to inform evidence-based policies and communication strategies that connect with the Pakistani public. This will help foster meaningful engagement and encourage collective action to mitigate the effects of climate change.

Keywords: Climate Change Perceptions, Climate Change Risks, Climate Change, Public

Introduction

The term "climate change" is no longer obscure (Deng, et al., 2020). Climate change is the result of long-term shifts in the Earth's climate and weather patterns, which can last for millions of years. It is marked by changes in temperature, patterns of precipitation, and the occurrence and severity of extreme weather events. Although natural processes like volcanic eruptions, solar radiation variations, and natural greenhouse gas emissions have historically played a role in driving climate changes, the current trend of rapid climate change is primarily linked to human activities (Masson-Delmotte et al., 2021). Deforestation and land-use changes also lead to "greenhouse effect" worsening the Earth's ability to absorb CO₂ (Lomonaco et al., 2020). Alterations in precipitation patterns have led to an increase in the frequency and intensity of droughts, floods, and storms, causing negative impacts on agriculture, water supply, and infrastructure. In addition, the effects of climate change on biodiversity are significant, as numerous species face challenges in adjusting to rapidly changing environments. This has resulted in shifts in ecosystems and a decline in biodiversity (World Health Organization, 2019). The consequences of climate change are extensive, affecting environment and human culture. An obvious and conspicuous consequence is the increase in global mean temperatures. According to the Intergovernmental Panel on Climate Change (IPCC), there has been a significant rise in temperatures in recent decades, leading to different consequential effects (Masson-

Delmotte et al., 2021). An important consequence of rising temperatures is the accelerated melting of polar ice caps and glaciers. This threatens coastal communities worldwide with rising sea levels. Many people who live in low-lying areas are in danger, and many marine and coastal species are losing their native habitats. Given its varied topography and socio-economic difficulties, Pakistan is especially susceptible to the consequences of climate change. The nation confronts a variety of climate-related challenges that jeopardize its ecological equilibrium and economic progress. An urgent issue of great concern is the rapid thawing of glaciers in the Himalayas and the Hindu Kush region (Immerzeel et al., 2020). The country's dependence on monsoon rains for irrigation renders it very vulnerable to fluctuations in rainfall, which can result in either severe droughts or devastating floods (Shahzad et al., 2019). However, attitudes towards climate change have a significant impact on both public opinion and the actions taken by individuals and groups. Studies indicate that public perceptions play a crucial role in assessing the level of popular endorsement for measures aimed at mitigating and adapting to climate change (Bord et al., 2000). An individual's perception of the reality and seriousness of climate change has a direct impact on their inclination to address the issue, endorse attempts to reduce its effects, and advocate for policy measures from governments and businesses. The insufficient consideration of public opinions and attitudes towards climate change in Pakistan poses a significant obstacle to the development of effective policies and public engagement initiatives. Therefore, the main objective of this study is two-fold: firstly, to gain a comprehensive understanding of how the Pakistani population perceives and feels about climate change; and secondly, to shed light on the public perception of risks and consequences of climate change using a large-scale subjective assessment method. This research aims to fill the gap in the existing literature by thoroughly analysing public perceptions and attitudes towards climate change in Pakistan. It seeks to provide a more comprehensive understanding of this topic by focusing on subjective assessments.

Literature Review

Climate change exacerbates extreme weather phenomena such as hurricanes, heatwaves, floods, and droughts. For instance, the impact of increasing global temperatures is evident in the melting of ice caps and glaciers, which poses a significant threat to coastal communities due to rising sea levels (World Health Organization, 2019). There has been an increase in the frequency of severe storms in the North Atlantic, posing significant risks to individuals, infrastructure, and economies (Kossin et al., 2020). Severe weather occurrences result in major interruptions to food and water supplies, cause damage to property, and contribute to large economic losses, amounting to billions of dollars annually. Furthermore, alterations in climate patterns exert a substantial influence on agricultural output on a global scale. In agriculture-dependent areas, temperature and rainfall changes can harm crop output and food security (Lobell et al., 2011). This raises global food costs and promotes poverty and malnutrition, especially in underdeveloped nations. According to Lorenzoni and Pidgeon (2006), most persons comprehend climate change based on their personal knowledge, experience, as well as the benefits and costs associated with it (Lorenzoni and Pidgeon, 2006). The World Health Organization (WHO) predicts a substantial rise in mortality rates from hunger, malaria, diarrhoea, and heat stress because of climate change between 2030 and 2050 (World Health Organization, 2019). This emphasizes the urgent need for a comprehensive strategy to tackle the extensive and substantial repercussions. Pakistan, specifically, is extremely susceptible to the effects of climate change. The country is confronted with a multitude of climate-related challenges, such as the melting of glaciers in the Himalayas, a rise in the frequency of extreme weather events, and changes in monsoon patterns. The alterations present considerable dangers to Pakistan's water resources, agriculture, and overall socio-economic stability (Khan et al., 2020). The glaciers of Pakistan play a vital role in providing freshwater for the country. They supply the Indus River system, which is essential for supporting the agricultural and drinking water requirements of millions of people. The acceleration of glacier melting

caused by escalating temperatures results in a higher likelihood of glacial lake outburst floods (GLOFs), posing a significant danger to communities downstream by subjecting them to abrupt and catastrophic flooding (Immerzeel et al., 2020). The agricultural industry in Pakistan, which constitutes a substantial component of the workforce, is extremely vulnerable to the impacts of climate change. Alterations in precipitation patterns, heightened occurrence of droughts, and exceptional weather phenomena have adverse effects on crop production and food security. The fluctuations in rainfall causing severe droughts or devastating floods and making vulnerable environment (Shahzad et al., 2019). In addition, the coastal regions of Pakistan are vulnerable to the rising sea levels and heightened cyclonic activity. Metropolises such as Karachi, characterized by high population density and economic importance, are vulnerable to the dangers posed by storm surges and coastline erosion. This not only poses a threat to human lives but also causes disruptions to economic activity and infrastructure (Rizvi et al., 2015). The socio-economic consequences of climate change in Pakistan are significant. The country already has a lot of poverty, and disasters caused by climate change make things worse by forcing people to move, decreasing the output of crops, and putting a strain on resources. In addition, climate change presents health hazards, such as the increased transmission of vector-borne diseases like malaria and dengue fever, which are expected to become more widespread due to shifts in temperature and precipitation patterns (Khan et al., 2020). Thus, Climate change is a global concern caused by humans that has serious environmental, economic, and social effects. Comprehensive understanding, effective policies, and global action are needed to address this situation. The influence of public perception is essential in defining the level of awareness and the extent of action taken towards addressing climate change. In a global comparison involving 19 countries, a study was conducted to gain a deeper understanding of attitudes towards climate change. Pakistan's values, in this context, fall somewhere in the middle. According to a study conducted in Pakistan, a significant majority of the population, specifically 8 out of 10 individuals, express concern regarding the effects of climate change (Asad et al., 2023). Interestingly, the study also reveals that women and individuals with higher levels of education tend to display a greater level of concern. Survey conducted among parents in Pakistan reveals that although more than 80% expressed concern about the impact of climate change on children, it did not always rank as their highest priority. Less than a quarter of parents considered it one of the top three issues facing the country (Asad et al., 2023). Studies in psychology and behavioural science indicate that individuals' actions are greatly influenced by their attitudes, beliefs, and values (Steg and Vlek, 2009). For instance, individuals concerned about climate change are more likely to take part in pro-environmental activities, such as reducing energy consumption, using public transportation, and supporting renewable energy initiatives (Bamberg & Möser, 2007). In addition, public perceptions of climate change have the power to influence political outcomes and opinion surveys, which in turn affect policy decisions. Politicians and policymakers frequently adapt their policy agendas in response to public mood, especially in democratic nations where public opinion holds considerable influence (Jagers & Matti, 2010). Thus, a thorough understanding of climate hazards is crucial for well-informed decision-making, related remedies, and policy issues. This study aims to reveal the intricate factors that influence individuals' understanding and interpretations of climate change in diverse regions of Pakistan, through surveys and analysis of responses.

Research Hypotheses

H1a: Public perception of climate change reality significantly correlate with New Ecological Paradigm (NEP)

H1b: Public perception of climate change causes significantly correlate with New Ecological Paradigm (NEP)

H1c: Public perception of climate change valence of consequences, temporal, and spatial distance consequences significantly correlate with New Ecological Paradigm (NEP)

H2a: Public perception of climate change reality significantly correlates with negative affects of climate change.

H2b: Public perception of climate change causes significantly correlate with negative affects of climate change.

H2c: Public perception of climate change causes significantly correlates with negative affects of climate change.

H3a: Public perception of climate change reality significantly correlates with climate change risk perception.

H3b: Public perception of climate change causes significantly correlate with climate change risk perception.

H3c: Public perception of climate change causes significantly correlate with climate change risk perception.

Theoretical Framework

Contemporarily, public, in general, is aware of the potential controversies and key concepts emerging in science. But information about the realms of climate change, though incomplete, has widely become more dramatic and easily available for public. This phenomenon is in the eyes of public, revealing itself through drastic changes happening in weather and through unexpected climate change incidents such as striking of hurricanes, storms, and warming of oceans all over the world. In addition to this, scientists agreed upon the existence, causes, and potential consequences of climate change but public is still somehow uncertain about it. To study the public perceptions and attitudes toward climate change happening around the world and in a developing country like Pakistan, knowledge deficit model attributed to Everett Rogers is being employed in this research. Several communication scholars have critiqued and refined the concept over the years. Knowledge deficit model or theory significantly used in communication as a measuring tool and accurate scale to give clear understanding of core reason behind public's lack of understanding and misconception about a scientific topic as it indicates a deficit in their information or knowledge. The key assumption of this theory is: the possession of "scientific knowledge", "scientific literacy", or "scientific understanding" is of utmost importance to derive oneself to make a good decision on certain scientific topic (Grant, 2023). Likewise, public is uncertain about climate change due to some prominent reasons knowledge deficit model justifiably predicts, such as, unaware of the science behind climate change, misconception, skepticism or denial, limited knowledge about impacts, and unaware of the potential solutions. The public's negative attitude towards science and technology become a root of their negative attitudes towards it (Ahteensuu, 2012). Therefore, the analysis of this study includes the relation of public perceptions of climate change reality, causes, valence of consequences, and spatial and temporal distance and three theoretically related constructs New Ecological Paradigm (NEP), negative affect of climate change, and climate change risk perception mentioned in Van Valkengoed et al. (2021).

Materials and Methods

This research employs the quantitative design with survey method to understand the relation between climate change reality, causes, valence of consequences, and spatial and temporal distance and New Ecological Paradigm (NEP), negative affect of climate change, and climate change perception among public. To analyse the research objectives of this study, an online survey is conducted by acquiring three theoretically related constructs, New Ecological Paradigm (NEP) (Whitmarsh, 2008, 2009), negative affect of climate change (Van der Linden, 2017), and climate change risk perception (Kellstedt et al., 2008), having

6-items ($\alpha = .83$), 3-items ($\alpha = .93$), and 4-items ($\alpha = .96$) with three open ended questions, respectively. Moreover, a compressed version of climate change perceptions 25-items scale (Van Valkengoed et al., 2021) having 15-items in total. These items were in-line with the theory indicating that the items were correlated more strongly with each other. Moreover, the consistency of the instrument is valid as it is a reliable tool for measuring the public perceptions of climate change among researchers (Van Valkengoed et al., 2021). The data from 200 educated Pakistan citizens was collected through online survey created on Google forms. This data collection was based on random convenience sampling. The data collection was based on the principles of ethical considerations by ensuring the complete anonymity, confidentiality, and voluntary participation of respondents. Collectively, 207 respondents participated in this study, from those 200 were selected by eliminating did not fit for the requirements of study responses, among them 99 (49.5%) were male and 101 (50.5%) were female. Respondents belonged to six age groups ranges from 16 to 36 and above. Also, respondents comprised lower and higher socioeconomic statuses. Moreover, the criteria of the sample fixed on selecting educated citizens who understand intermediate level of English, concepts of the research, and the terms used in the questionnaire to prove the reliability of the study. Data was analysed on IBM SPSS Statistics Version 26 using Pearson Correlation test.

Results and Discussion

Table 1
Socio-demographics Characteristics of Respondents

Socio-demographics	Groups	Frequency (f)	Percentage (%)
Age	16-19	40	20.0
	20-23	49	24.5
	24-27	25	12.5
	28-31	30	15.0
	32-35	24	12.0
	36 & above	32	16.0
Gender	Male	99	49.5
	Female	101	50.5
Education	Matric/O levels	8	4.0
	Intermediate/ A levels	25	12.5
	Bachelors	69	34.5
	Masters	82	41.0
	Doctorate	16	8.0
Family Income	<50,000 PKR	34	17.0
	<100,000 PKR	36	18.0
	<150,000 PKR	43	21.5
	<200,000 PKR	45	22.5
	>200,000 PKR	42	21.0

Overall, the empirical findings of this research show that there is a positive correlation between public perception of climate change reality, causes, valence of consequences, and spatial and temporal distance and three theoretically related constructs New Ecological Paradigm (NEP), negative affect of climate change, and climate change risk perception except climate change causes relationship with two theoretically related constructs i.e., negative affect of climate change and climate change risk perception. In case of public perception of climate change reality and NEP, the p value was .000, which is highly significant indicating a positive correlation between the climate change perceptions element and a construct.

Table 2
Pearson Correlation test for Climate Change Reality and NEP

		Climate Change Reality	New Ecological Paradigm (NEP)
Climate Change Reality	Pearson Correlation (r)	1	.316**
	Sig. (2-tailed)		.000
	N	200	

**Correlation is significant at the 0.01 level (2-tailed).

Likewise, public perception of climate change causes shows a significant correlation with NEP with the p value .000.

Table 3
Pearson Correlation test for Climate Change Causes and NEP

		Climate Change Causes	New Ecological Paradigm (NEP)
Climate Change Causes	Pearson Correlation (r)	1	.355**
	Sig. (2-tailed)		.000
	N	200	

**Correlation is significant at the 0.01 level (2-tailed).

Similarly, the relationship of climate change consequences, spatial and temporal distance consequences and NEP was also found through Pearson correlation. The results were showing high significance with p value .000 indicating that public is aware of the climate change consequences and their awareness is building a significant human-nature bond.

Table 4
Pearson Correlation test for Climate Change Consequences, Spatial Distance, and Temporal Distance Consequences and NEP

		Valence of Consequences	Spatial Distance	Temporal Distance	New Ecological Paradigm (NEP)
Valence of Consequences	Pearson Correlation (r)	1			.351**
	Sig. (2-tailed)				.000
	N	200			
Spatial Distance	Pearson Correlation (r)		1		.424**
	Sig. (2-tailed)				.000
	N		200		
Temporal Distance	Pearson Correlation (r)			1	.307**
	Sig. (2-tailed)				.000
	N			200	

**Correlation is significant at the 0.01 level (2-tailed).

In case of public perception of climate change reality and negative affect of climate change, the p value was .000, which is highly significant indicating a positive correlation between the climate change perceptions element and a construct.

Table 5
Pearson Correlation test for Climate Change Reality and Negative affect of Climate Change

		Climate Change Reality	Negative affect of Climate Change
Climate Change Reality	Pearson Correlation (r)	1	.483**
	Sig. (2-tailed)		.000
	N	200	

**Correlation is significant at the 0.01 level (2-tailed).

But public perception of climate change causes shows an insignificant correlation with negative affect of climate change with the p value .166, thus, rejecting the hypothesis, indicating that climate change causes does not really relate with the public concern about climate change.

Table 6
Pearson Correlation test for Climate Change Causes and Negative affect of Climate Change

		Climate Change Causes	Negative affect of Climate Change
Climate Change Causes	Pearson Correlation (r)	1	.098
	Sig. (2-tailed)		.166
	N	200	

In contrary, the relationship of climate change consequences, spatial and temporal distance consequences with negative affect of climate change was showing high significance with p value .000 indicating that public is aware of the climate change consequences and their awareness is building a concern among them.

Table 7
Pearson Correlation test for Climate Change Consequences, Spatial Distance, and Temporal Distance Consequences and Negative affect of Climate Change

		Valence of Consequences	Spatial Distance	Temporal Distance	Negative affect of Climate Change
Valence of Consequences	Pearson Correlation (r)	1			.351**
	Sig. (2-tailed)				.000
	N	200			
Spatial Distance	Pearson Correlation (r)		1		.532**
	Sig. (2-tailed)				.000
	N		200		
Temporal Distance	Pearson Correlation (r)			1	.407**
	Sig. (2-tailed)				.000
	N			200	

**Correlation is significant at the 0.01 level (2-tailed).

In case of public perception of climate change reality and climate change risk perception, the p value was .000, which is highly significant indicating a positive correlation between the climate change perceptions element and a construct.

Table 8
Pearson Correlation test for Climate Change Reality and Climate Change Risk Perception

		Climate Change Reality	Climate Change Risk Perception
Climate Change Reality	Pearson Correlation (r)	1	.301**
	Sig. (2-tailed)		.000
	N	200	

**Correlation is significant at the 0.01 level (2-tailed).

But public perception of climate change causes shows an insignificant correlation with climate change risk perception with the p value .191, thus, rejecting the hypothesis, indicating that climate change causes do not really relate with the public perceptions of climate change risks.

Table 9
Pearson Correlation test for Climate Change Causes and Climate Change Risk Perception

		Climate Change Causes	Climate Change Risk Perception
Climate Change Causes	Pearson Correlation (r)	1	.093
	Sig. (2-tailed)		.191
	N	200	

In contrary, the relationship of climate change consequences, spatial and temporal distance consequences with climate change risk perception was showing high significance with p value .000 indicating that public is aware of the climate change consequences and their awareness is making them perceive the potential risks of climate change.

Table 10
Pearson Correlation test for Climate Change Consequences, Spatial Distance, and Temporal Distance Consequences and Climate Change Risk Perception

		Valence of Consequences	Spatial Distance	Temporal Distance	Climate Change Risk Perception
Valence of Consequences	Pearson Correlation (r)	1			.425**
	Sig. (2-tailed)				.000
	N	200			
Spatial Distance	Pearson Correlation (r)		1		.394**
	Sig. (2-tailed)				.000
	N		200		
Temporal Distance	Pearson Correlation (r)			1	.361**
	Sig. (2-tailed)				.000
	N			200	

**Correlation is significant at the 0.01 level (2-tailed).

Discussion

The result of this study reveals that there is a positive correlation between public perception of climate change reality, causes, valence of consequences, and spatial and temporal distance and three theoretically related constructs New Ecological Paradigm (NEP), negative affect of climate change, and climate change risk perception indicating a directly proportional relationship of climate change perceptions and the three constructs. But climate change causes have insignificant correlation with negative affect of climate

change and climate change risk perception. The directly proportional relation of climate change reality and climate change causes with NEP states that public is aware of the apparent realities and causes of climate change and with this knowledge, they're understanding human-nature bond. Likewise, the highly significant relation of climate change valence of consequences, spatial distance and, temporal distance consequences with NEP indicates that public is aware of the consequences of climate change and they're better aware of the human-nature bond as it is making them take climate change through eco-centric approach. Similarly, the significant relationship of climate change reality, valence of consequences, spatial distance, and temporal distance consequences with negative affects of climate change shows that the facts about climate change are making people worried or concerned. This concern is productive at many levels as individuals concerned about climate change are more likely to take part in pro-environmental activities, such as reducing energy consumption, using public transportation, and supporting renewable energy initiatives (Bamberg & Möser, 2007). In addition, the directly proportional relation of climate change reality, valence of consequences, spatial distance, and temporal distance consequences with climate change risk perception, indicating threat to a valued entity such as close others, reveals that four out of five climate change perceptions are making public believe that it is a greater threat to the environment in which they live with their families. Other three open ended questions of this construct about public health, economic development, and environment of the state revealed some serious opinions of public. In case of public health, public risk perception about climate change in Pakistan: heat waves can cause heat stroke, shock, cardiac arrest, dehydration, certain allergies; effected air quality or smog are resulting in lungs and skin diseases and weak immune system; psychologically, people are becoming more stressed and angrier; floods are causing water borne diseases; water scarcity and contamination due to erratic rainfall patterns have reduced the access to clean water. In case of economic development, public risk perception about climate change in Pakistan: climate change is causing floods which destroy crops and have devastating effect on agriculture sector which is our economic backbone; climate change is also causing damage to infrastructure and tourism, leading to financial losses; climate change reduces productivity, labour, and supply chain causing economy to suffer. The country already has a lot of poverty, and disasters caused by climate change make things worse by forcing people to move, decreasing the output of crops, and putting a strain on resources. In addition, climate change presents health hazards, such as the increased transmission of vector-borne diseases like malaria and dengue fever, which are expected to become more widespread due to shifts in temperature and precipitation patterns (Khan et al., 2020). In case of overall environment of the state, climate change is causing water and food scarcity, unprecedented weather patterns, heat waves, smog, rapid glacial melt, sea-level rising, loss of biodiversity, deforestation, affect to wildlife habitats, unproductivity, and poor physical and mental health in Pakistan. Moreover, climate change causes have insignificant relationship with negative affects of climate change and climate change risk perceptions indicating that people are less concerned about the causes of climate change. It shows the scientific unawareness of the public about climate change in accordance with the knowledge deficit theory. It seems that public care less about the science behind the climate change, thus, it is impacting them less as a potential concern and risk. Individuals who view climate change as a remote or theoretical issue may have less inclination to engage in proactive measures, whereas those who perceive it as an imminent danger are more inclined to endorse policies that target the reduction of greenhouse gas emissions and the adaptation to climate-related consequences (Leiserowitz et al., 2020). However, public awareness and understanding of climate change empowers individuals to make informed decisions and take proactive measures to mitigate their carbon footprint, support sustainable practices, and advocate for climate action within their communities and institutions (Maibach et al., 2019). In general, the present study describes that public is aware of all climate change perceptions except its causes which shows lack of scientific knowledge about climate change though it is readily available. However, the good outcome is people are concern about climate change, they see it as a risk on earth, and they're somewhat accept the human-nature bond by seeing climate

change through an eco-centric lens. In comparison, this study also approves the relationship of climate change perceptions with three theoretical constructs showing public is having strong perceptions toward climate change and the change in climate is somehow affecting their lives in Pakistan. But this research marks a gap by not including the effects of climate change on physical and mental health of public, age wise and gender wise. Moreover, the contribution of this research to existing literature is valid for several reasons: it has a potential to catalyse meaningful action and drive positive change toward addressing climate change challenges in Pakistan and beyond; by highlighting the risks and consequences of climate change through mass subjective assessment, this research provides policymakers with evidence-based data to develop targeted policies and adaptation strategies that are responsive to the needs and concerns of the Pakistani population.

Conclusion

In this research, the findings support the presumptions made that there is a significant relationship between public perception of climate change reality, valence of consequences, and spatial and temporal distance and three theoretically related constructs New Ecological Paradigm (NEP), negative affect of climate change, and climate change risk perception among public of Pakistan belong to age group 16 to 36 & above, while a significant relationship between public perception of climate change causes and New Ecological Paradigm (NEP) but insignificant relationship with negative affect of climate change and climate change risk perception among public of Pakistan belonging to the same age group shows an acceptance and rejection of hypotheses, respectively. Based on the findings of this research and the evidence from literature review, climate change is gradually becoming a concern for public.

Recommendations

The research motives should enrich the academic research and facilitate the informed discussions on climate change mitigation and adaptation strategies. Likewise, it should encourage corporations and organizations to give importance to sustainability measures and allocate resources towards green technologies to consumer demand and societal expectations. Also, it should provide valuable insights for policymakers, communication experts, and public engagement campaigns to effectively tackle climate change in Pakistan.

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