Relationship among Climate Change Awareness and Online Media, Environment-friendly Beliefs and Behavior

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A B S T R A C T

Each year Pakistan suffers monetary set-back and loss of precious lives due to climate change and related catastrophes. Global Climate Risk Report (2021) declared Pakistan to be amongst the top 10 countries to be most affected by climate change and the very next year the country got hit by mega floods. Citizen's awareness about issues faced by a nation help towards resolution of those issues. Right to a healthy environment and right to information regarding issues of society are considered fundamental. Awareness regarding climate change is the right of every Pakistani so they realize the magnitude of this problem. Green awareness has the potential to make an impression on citizens and help tackle issues related to climate change. Awareness can reach citizens through several ways, including online media which enjoys vast penetration in Pakistan. According to Pakistan Telecommunication Authority (2023) 54% of Pakistani population have broadband connections and 53% have mobile broadband connectivity which provides an opportunity to impart awareness. Green awareness through online media has positive impacts on environmental beliefs and behavior of citizens. Data coming from 1420 university students of Punjab revealed various associations tested with Pearson Chi-Square. Results indicated association between online media usage of citizens and green awareness. Additionally, awareness carried a positive association with pro-environment beliefs of respondents. Positive association was also found between green awareness and pro-environment behavior of respondents.

Introduction

In July of 2022 an important resolution was passed at the United Nations General Assembly Headquarters in the New York City, which highlighted the basic human right to a clean environment and declared Climate change and its adverse effects to be the most pressing threat to humanity's future. In Pakistan the adverse effects of climate change have hit home the hardest and the country's environment performance remains low. Global Environmental Performance Index (EPI) ranked Pakistan 176th country out of 180 countries across the globe (2022). The 2022 mega floods of Pakistan affected 33 million people and killed at least 1700 (World Bank, 2022). Additionally, Bloomberg estimates that this shocker catastrophe caused the country $40 billion in economic losses. A million livestock animals were killed in the super flood which submerged one-third of the entire country underwater (Pakistan's Ministry of Planning, Development and Social Initiatives). It is worth mentioning here that Pakistan is the world's fifth most populated country

with 230 million populaces which puts a stain on its fragile environment. Additionally, bad government policies, deforestation mass immigration to urban cities and disrespect of ecosystems are a few reasons of environmental degradation in the Asian region (Halady & Rao, 2010).

Climate change catastrophe is not only a problem for Pakistan but every country around the world. To deal with this growing problem awareness of citizens regarding climate change and local environmental problems is a must. It is suggested by United Nations Development Agency UNDP (2015) that a country should get its citizens onboard in addition to government and private agencies to resolve environmental problems. Along with this advice UNDP formulated SDGs for Pakistan in 2015 which highlighted the importance of dealing with climate change. UN Climate Change Conference (COP 26) in 2021 informed that only formulating government policies are not working out for many countries. Countries have to get their citizens involved if they wish to counter adverse effects of climate change.

Getting citizens onboard means that first and foremost citizens need information about a given problem. Pakistan's environmental problems are immense and its citizen's awareness in this regard is essential. Any given issue faced by a nation first needs to be addressed by informing and educating its citizens. Information, education and awareness about climate change will result in enhancing critical thinking of citizens about this issue. Providing citizens education about their basic rights, facilitating their critical thinking for resolving national problems such as environmental injustice is imperative. Shwom et al. (2017) write about the importance of climate literacy which should provide an insight and understanding to the general public about the adverse effects of climate change. Climate change awareness based on credible scientific information can educate general public so they make informed and responsible decisions to deal with impacts of climate change (Shwom et al., 2017). Similarly, O'brien et al. (2018) suggest that in the long journey towards resolving environmental problems, the first and most important step is to raise critical thinking for climate change. O'brien et al. further state that at the heart of resolving climate change lies climate literacy. In the recent years environmental activists have demanded governments around the world to provide their respective citizens with environmental information (Cramer, 2009). In the 1998 Aarhus Convention agreed upon by forty countries, including some Asian countries, the right to environmental information has converted into the new human rights.

In the 21st century the basic human right of access to internet is highlighted by activists and academia. Denial to internet access is considered a violation of human rights (Skepys, 2012). Internet censorship during the Arab Spring was declared a violation of basic citizen's rights (Ford, 2014). While discussing various series of citizen's rights, Lucchi (2013) states that information and knowledge access through internet should be considered as basic rights and liberties of human beings. A healthy society's working is made possible when the rights and liberties of its citizens are face guarded. The fundamental right to information and awareness about issues such as climate change which effect the lives of each and every citizen, must be ensured. Internet has the ability to impart information in addition to providing several online platforms for citizen's discussions. Internet has become a mechanism of interaction and collaboration enhancing citizen participation (Milakovich, 2010).

Smart government initiatives are fast gaining popularity. Smart governments are formed by combining latest internet technologies and citizen participation. Modern governments worldwide are offering its citizens online platforms to participate in civic issues and interact with authorities (Gutiérrez et al. 2013). This is made possible by modern governments who have adopted IoT (Internet of things) to engage their citizens. According to Guenduez et al. (2020) IoT and e-participation is an interesting upcoming field of research. Participation of citizens for issues faced by a country are considered compulsory by academics if certain goals need to be achieved.

Literature Review

In the 21st Century online media has provided citizens with new forms of participation and engagement with issues of society. New opportunities of active citizenry are now available because online media platforms are enabling citizens to engage with issues of society. The modern man is now living a hybrid life spent in both online and offline worlds (Van Dijk, 2020). Cyber-optimists highlight the positive role of online media as an information source bringing the world of knowledge to the public. New online engagement is related to discussion about minorities' right, rights of women, right to education and so forth. According to Norris (2002) the best representative of new forms of online engagements is the engagement with environmental issues. Many academics label this new form of engagement as *lifestyle politics* (Kahne et al., 2021; De Moor, 2017; Loader et al., 2014; Östman, 2014; Ekman & Amnå, 2012). Lifestyle politics is based on issues which enthuse individuals and are labelled by Norris as *cause-oriented repertories* (2007).

In China civic organizations are making use of online media to bring about a social change. Online media and related ICTs are employed for creating awareness about climate change and connecting with

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citizens (Yang, 2007). Yang's survey of civic organizations revealed that new organizations are investing in ICTs to impart climate change awareness, connect with public, international agencies and markets. Climate change has become a big global problem and since two decades scientific knowledge about its adverse effects are becoming common knowledge (Ballard et al., 2017). Zhang and Skoric's (2018) based in Hong Kong studied the role of traditional news media and social media in environmental awareness and behavior. They collected data through survey which revealed that respondents were using social media more for gathering climate change information but it had little effect on their lives. Respondents' use of traditional media was for gathering news and related information, but for climate change issues respondents turned to social media. A study of online news portal of three Philippine newspapers was conducted by Pacoma (2019). It was content analysis of their websites for the time period of 2015-2016. The results of the content analysis revealed that websites of three popular Philippine newspapers were gradually increasing climate related content on their websites. Similarly, in Nghiem et al.'s (2016) study of Google Trends search volume related to climate change and related issues were on the rise. Issues of climate change, deforestation, habitat loss and so forth were gaining Google search volume. This was based on Nghiem et al.'s time series analysis of Google Trends from the 2004 till 2013.

Climate change and its adverse effects are a bigger problem for the poor nations. Masud et al. (2016) conducted their research in Malaysia studying public's attitudes, intentions and behavior towards climate change. The study's findings suggested that climate change information is a pre-requisite of creating an understanding in the public about this problem. Masud et al. emphasized that with climate change awareness the situation cannot improve. A study of 498 German residents by Loy et al. (2020) showed that respondents were able to educate themselves about climate change issues through the use of various media, especially online media. Results indicated that respondents had interest in this issue which also made them feel empowered. Education, information and awareness about climate change and its adverse effects has positive consequences. Exposure to this problem through online sources leads to understanding of the issue. Climate change effect the lives of millions and it is right of every individual to have knowledge and an understanding about it. The present study investigates whether online media is raising awareness about this issue in Pakistan. By providing exposure to environmental problems, online media has the potential to raise awareness in the public.

Democratic Theory and Media

In Pakistan online penetration rate is high with 128 broadband subscribers and 125 mobile broadband subscribers (PTA Telecom Indicators, July 2023). Awareness about issues which affect Pakistani citizens can easily be imparted through this media. Knowledge about social issues empowers the public and makes a democracy strong makes a (Pew Research Center, 2018). According to Thomas Ehrlich (2000) responsible citizens make up the fabric of society and care about their society's issues. Online media has made the participation of citizens possible in society's issues (Carpentier, 2007). Being a participatory media, online media offers its users the ability engage with society's issues, whether on a minimalistic level or a maximalist level. Carpentier explains that any level of interaction by citizens strengthens a democracy. On the other hand Dahlgren (2013) pointed out that people are increasingly losing interest in party politics. Due to lack of trust and a feeling of distance with formal politics people are increasing tuning away. On the other hand issue-based democratic engagement through online media is gaining popularity. This alternative engagement by citizens is also strengthening democracy. Issue-based and alternative citizens' engagement can have many forms, one of which is caring about environmental problems. According to Livingston (2010) a paradigm shift has occurred with regards to citizen's engagement which is free on institutional involvement. This new form of engagement is inclusive of life politics and active citizenry. This kind of public engagement can effectively function through online media platforms.

Objectives and Research Questions

The present study intends to highlight the importance of online media's potential in spreading awareness regarding environmental problems of Pakistan which can lead to environment-friendly beliefs and behavior in Pakistan. The present study is defined by the following objectives and research questions:

Objective 1 – Examine whether online media is creating awareness among citizens regarding climate change in Pakistan.

Objective 2– Examine the role of climate change awareness in instilling environment-friendly beliefs and behavior.

1) Research question (i). Are respondents utilizing online media to gather information about environmental problems and climate change Pakistan?
2) Research question (ii). How much awareness do respondents have regarding environmental problems and climate change in Pakistan?

3) Research question (iii). Does having climate change awareness lead to environment-friendly beliefs and behavior?

To meet the objectives and research questions mentioned above the present study devised four variables. The first variable of online engagement was about the usage pattern of the study's selected sample with regards to climate change. The second variable dealt with the level of awareness about climate change issues. The third and fourth variables were defined by environment-friendly beliefs and behaviors of the sample. Variables lead to testing of three hypotheses of the study which measured association between these variables.

Methodology

To meet the objectives and research questions of the present study quantitative method was employed, empirical data was collected through a questionnaire based on the four variables of the present study. Four scales were developed for the questionnaire - Online Engagement Scale, Climate Change Awareness Scale, Pro-Environment Belief Scale and Environment-friendly Behavior Scale. These variables were tested using a three point Likert scale. After devising the questionnaire sample was collected from HEC recognized university students of Punjab. List sampling technique was used to first select HEC recognized universities from Punjab. Ten universities were selected namely Bahauddin Zakariya University, Govt. College University, University of Sargodha, The Islamia University of Bahawalpur, University of Gujrat, Government College University, Lahore University of Management Sciences, Forman Christian College University, Lahore College for Women University and Punjab University. Next Taro Yamane's formula was used to decide the required sample for the study. According to HEC (2017-2018) 209,230 students were enrolled in universities across Pakistan. Therefore, the sample size following this number was 1389. Through simple random sampling technique data was collected and 1420 complete responses were collected.

Statistical Analysis

Data collected with the help of questionnaire based on a Likert scale was fed into IBM SPSS Statistics 25 and tested for association between the four variables. To calculate association between variables Chi-square test of Independence, denoted by the Greek symbol X_2 was selected. Chi-square test of Independence is an inferential statistical test used to analyze categorical variables. This non-parametric test allows the researcher to see whether two variables are independent of each other or are related. This test is considered a robust test of measuring independent of variables while presenting detailed information about association (McHugh, 2013). Karl Pearson first developed Chi-Square test in 1900 and then in 1904 he developed an extension to measure independence between variables. Data collected from 1420 respondents contained missing values which managed by applying the method of imputation which calculates the median of 5 nearest values. Response rate was 89% which is sufficient for applying Chi-square test of Independence. Next Cronbach's Alpha was applied to check the internal consistency of the questionnaire which is presented in Table.1:

Table.1

Summary of responses

Valid cases	Cronbach's Alpha	Cronbach's Alpha on Standardized Items	Number of Items
1420	0.851	0.881	59

Note. Cronbach's Alpha value of 0.851 is considered satisfactory indicating a reliable tool of measure.

The present study measures associations between four variable namely, online media engagement, climate change awareness, pro-environment beliefs and environment friendly behavior. Percentages and counts of these variables are demonstrated in the Tables 2, 3, 4 and 5.

Table.2

Descriptive Statistics of data regarding online media engagement , pro-environment beliefs and environment friendly behavior.

Respondents' Online Engagement	Frequent		Average		Infrequent	
	N	*%*	*N*	*%*	*N*	*%*
Coming across CC information via online media	1075	*76%*	*211*	*15%*	*134*	*9%*
Searching CC issues on Google	851	59%	394	28%	187	13%
Watching CC videos on You Tube	728	51%	486	34%	218	15%
Commenting and sharing CC videos present on You Tube	546	38%	679	47%	207	15%
Coming across CC issues on Facebook	808	56%	431	30%	193	14%

Table 2 demonstrates that majority of the respondents come across climate change information through online media. Most of them search, watch and come across climate change information on Google, Youtube

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and Facebook. But when it comes to commenting on these issues online not a majority of them are doing so.

Table.3

Descriptive Statistics of data regarding climate change awareness

Awareness about Pakistan's climate change problems	High		Medium		Low	
	N	*%*	*N*	*%*	*N*	*%*
Air pollution	1180	83%	206	15%	34	2%
Rising temperature	689	48%	667	47%	76	5%
Water pollution	925	65%	440	30%	67	5%
Melting glaciers	529	37%	692	48%	211	15%
Droughts/ lack of rainfalls	600	42%	656	46%	176	12%
Floods/ increased rainfall	469	33%	728	51%	235	16%
Food shortage/ insecurity	825	58%	488	34%	119	8%
Noise pollution	820	57%	537	38%	75	5%
Deforestation	913	64%	446	31%	73	5%
Plastics waste pollution	960	67%	410	29%	62	4%
Vehicular emissions	887	62%	441	31%	104	7%
Industrial emissions	934	65%	423	30%	75	5%

Several climate change related issues are faced by Pakistan. To check awareness levels about some issues respondents were asked to indicate how much they know about them. Majority of the respondents indicate that they know a lot about air pollution in Pakistan. They awareness about industrial and vehicular emissions, as indicated by them, is also high. Their awareness about deforestation, noise pollution, and water pollution are also high. But awareness level about rising temperature is either low or medium. Similarly, low and medium awareness levels are indicated for melting glaciers and droughts.

Table.4

Descriptive Statistics of data regarding pro-environment beliefs

Respondents' pro-environment beliefs	Strong		Average		Low	
	N	*%*	*N*	*%*	*n*	*%*
Belief about having understanding about causes of CC	1032	73%	123	9%	265	18%
Belief about having understanding about CC solutions	760	53%	276	19%	396	28%
Belief that CC is causing health issues	1204	85%	115	8%	101	7%
Belief that environmental protection is for better quality of life	1166	82%	153	11%	101	7%
Belief that better world with environmental protection	1155	82%	143	10%	122	8%
Local pollution affecting other parts of the world	980	68%	196	14%	256	18%

Table 4 indicated respondents' pro-environment beliefs. Majority believe that they have an understanding about the causes of climate change. Majority also believes that bad environment causes health issues and local environment affects other parts of the world. They also believe that better environment is necessary for quality of life and a better world.

Table.5

Descriptive Statistics of data regarding environment-friendly behavior

Respondents' environment-friendly behavior	Frequent		Average		Infrequent	
	N	*%*	*N*	*%*	*N*	*%*
Avoid environmentally hazardous products	734	52%	368	26%	318	22%
Careful water usage/ close taps	1140	80%	147	10%	133	10%
Turning off TV when not in use	1163	82%	154	11%	103	7%
Turning off lights when not used	1144	81%	170	12%	106	7%
Recycling paper, glass, and cans	602	42%	550	38%	280	20%
Cloth grocery bag usage	937	65%	331	23%	164	12%
Influence family and friends	1005	71%	241	17%	174	12%
Planted trees	872	62%	357	25%	191	13%
Discuss CC problems with family and friends	1041	74%	192	13%	187	13%

Most of the respondents are conserving water, electricity and holding discussions with family and friends with regards to climate change. Many have planted trees, are using cloth bags and avoiding hazardous products harmful for environment. Respondents indicate having an environment-friendly lifestyle. Next to test associations between these variables three hypotheses were devised which are undermentioned. The first hypothesis measures association between the frequency of online engagement and level of climate change awareness in respondents.

H1 - A positive association exists between online engagement and climate change awareness.

Table.6 *Summary of the association between respondents' online engagement and their level of awareness*

about climate change in Pakistan

Table 6 demonstrates that association between online engagement and climate change awareness is present. Chi-square value of 31.998 and significant p-value of .000 supports H1. Median value counts are indicative of the association as well. 35.4% of the respondents who are frequently engaging with online media for climate change information also present a high level of climate change awareness. Comparatively 24.4% respondents are using online media on an average level but have high level of awareness about climate change in Pakistan. 2.3% respondents are infrequently employing online media. 4.5% respondents indicate that their online media usage is low and their awareness level is also low. These values are also presented in Figure.1 which graphically indicate that high climate change awareness is related to most frequent online engagement.

Online Engagement Median Value and Climate Change Awareness Median Value							
		CC Awareness – Median					
		High	Medium	Low	Total	X_2	p-value
Frequent	Count	503	220	8	731	31.998	.000
	% within OE-Median	68.8%	30.1%	1.1.%	100%		
	% within Awa-Median	57%	43.3%	27.6%	51.5%		
	% of Total	35.4%	15.5%	0.6%	51.5%		
Average	Count	347	260	18	625		
	% within OE-Median	55.5%	2.9%	41.6%	100%		
	% within Awa-Median	39.3%	51.2%	62.1%	44%		
	% of Total	24.4%	18.3%	1.3%	44%		
Infrequent	Count	33	3	28	64		
	% within OE-Median	51.6%	43.8%	4.7%	100%		
	% within Awa-Median	3.7%	5.5%	10.3%	4.5%		
	% of Total	2.3%	2%	0.2%	4.5%		
Total	Count	883	508	29	1420		

Figure.1: Median Scores of Online Engagement and Climate Change Awareness

Figure 1 shows associations graphically with highest level of awareness in those respondents who are also the most frequent users of online media for climate engagement. The respondents who have low online engagement also indicate very low awareness.
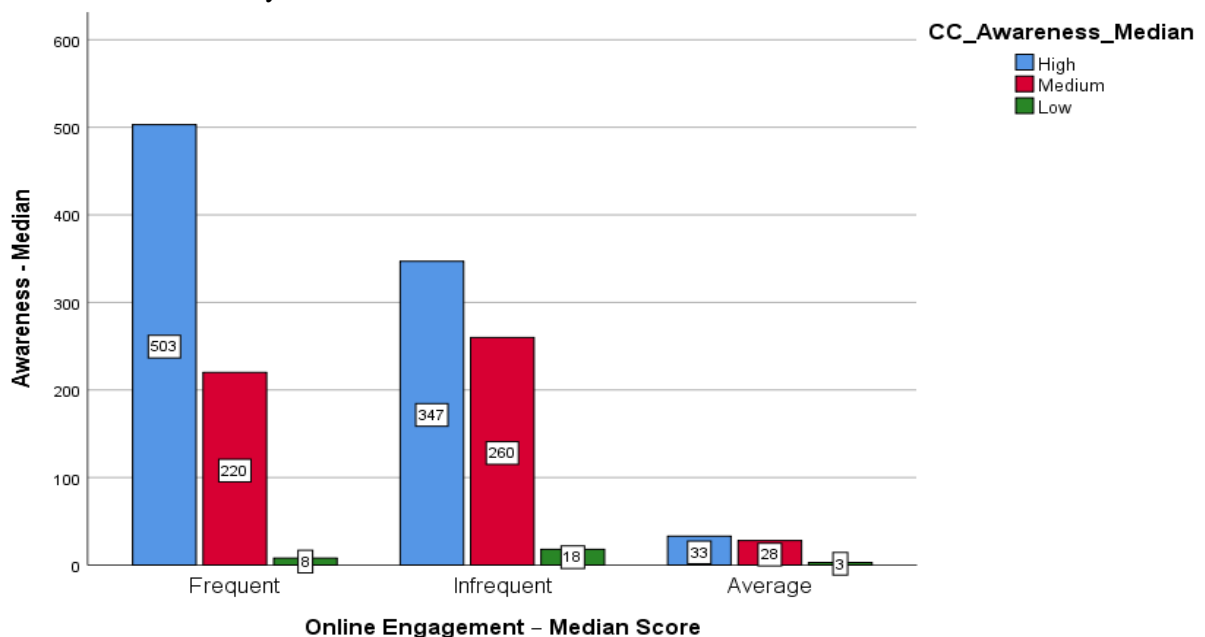
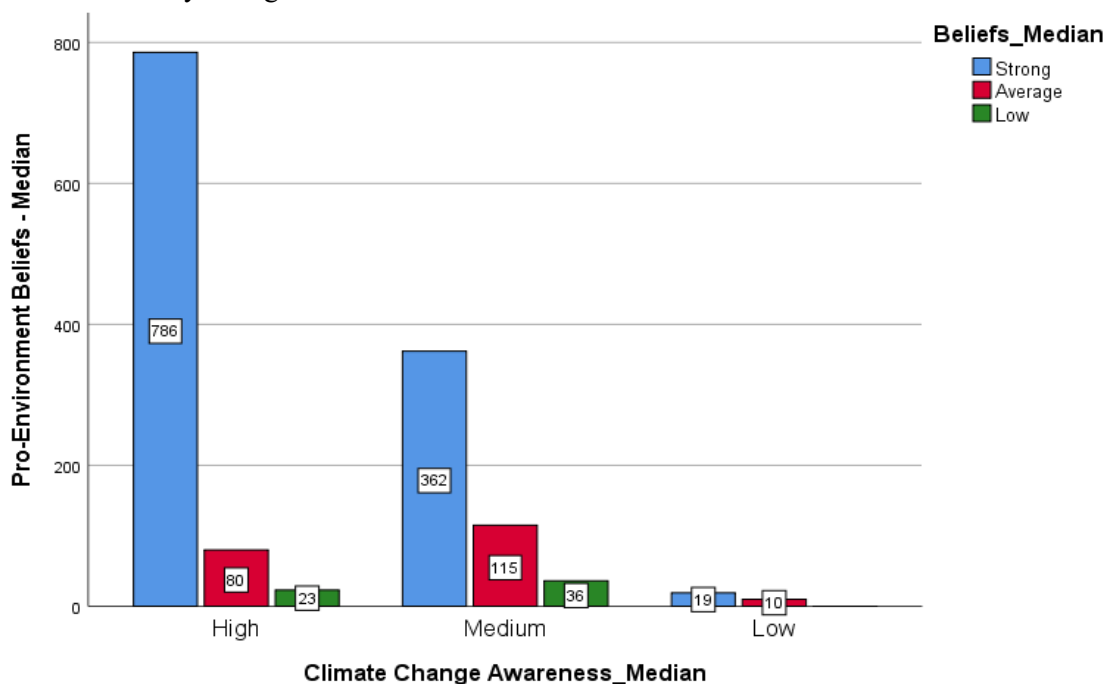**H2 – Climate change awareness and pro-environment beliefs of respondents are positively associated.**
Table.7 *Summary of the association between climate change awareness and respondents' pro-environment beliefs*

According to Table 7 the association between climate change awareness and pro-environment beliefs is present. Chi-square value of 79.626 and a significant p-value of .000 supports H2. Median value counts are indicative of the association as well. A majority of respondents, i.e. 88% who indicate having high level of climate change awareness also hold strong beliefs about the issue. Those having low awareness also do not indicate having any beliefs about the environment. This shows their lack of interest in the problem as well. These values are also presented in Figure.2 which graphically indicate that high climate change awareness is related to pro-environment beliefs.

Climate Change Awareness Median Value and Pro-environment Beliefs							
		Beliefs – Median Value					
		Strong	Average	Low	Total	X_2	p-value
High	Count	786	80	23	889	79.626	.000
	% within OE-Median	88.4%	9%	2.6%	100%		
	% within Awa-Median	67.4%	39%	39%	62.1%		
	% of Total	54.9%	5.6%	1.6%	62.1%		
Medium	Count	358	115	36	509		
	% within OE-Median	70.6%	22.4%	7%	100%		
	% within Awa-Median	31%	56.1%	61%	35.8%		
	% of Total	25.3%	8%	2.5%	35.8%		
Low	Count	12	10	0	22		
	% within OE-Median	65.5%	34.5%	0%	100%		
	% within Awa-Median	1.6%	4.9%	0%	2%		
	% of Total	1.3%	0.7%	0%	2%		
Total	Count	1156	205	59	1420		

(The left margin label for the table reads vertically: Climate Change Awareness– Median)

Figure.2: Median Scores of Climate Change Awareness and Pro-environment Beliefs

Figure 2 shows associations graphically with strong beliefs of respondents who are also the most aware of environmental problems. The respondents who have low and medium awareness levels about climate change also don't carry strong beliefs about the same.

**H3 - A positive association exists between climate change awareness and environment-friendly behavior.**

Table.8 *Summary of the association between respondents' level of awareness about climate change in Pakistan and their environment-friendly behavior*

Table 8 demonstrates that association between climate change awareness and environment-friendly behavior is present. Chi-square value of 93.417 and a significant p-value of .000 supports H3. Median value counts are indicative of the association as well. A majority of respondents, i.e. 76% indicate having high level of climate change awareness and also frequent environment-friendly behavior. Those having low awareness also indicate not performing environment-friendly behavior. These values are also presented in Figure.3 which graphically indicate that climate change awareness is related to environment-friendly behavior.

Climate Change Awareness Median Value and Environment-Friendly Behavior								
		Behavior – Median Value						
		Frequent	Average	Infrequent	Total	X_2	*p*-value	
High	Count	669	197	16	882	93.417	.000	
	% within OE-Median	75.7%	22.55	1.8%	100			
	% within Awa-Median	69.6%	45.3%	66.7%	62.1			
	% of Total	47%	14%	1.1%	62.1			
Medium	Count	264	237	8	511			
	% within OE-Median	52.1%	46.4%	1.6%	100			
	% within Awa-Median	27.75	54%	33.3%	35.9			
	% of Total	18.7%	16.6%	0.6%	35.9			
Low	Count	26	3	0	29			
	% within OE-Median	89.7%	10.3%	0%	100			
	% within Awa-Median	2.7%	0.7%	0%	2%			
	% of Total	1.8%	0.2%	0%	2%			
Total	Count	959	437	24	1420			

(left vertical axis label: Climate Change Awareness – Median Value)

Figure.3: Median Scores of Climate Change Awareness and Environment-Friendly Behavior

According to Figure 3 associations between awareness and behavior are presented graphically. The respondents reporting most frequent environment-friendly behavior are also the ones with the highest awareness about climate change and related problems. The respondents who have low awareness either have score very low with regards to environment-friendly behavior or don't practice such behavior at all.
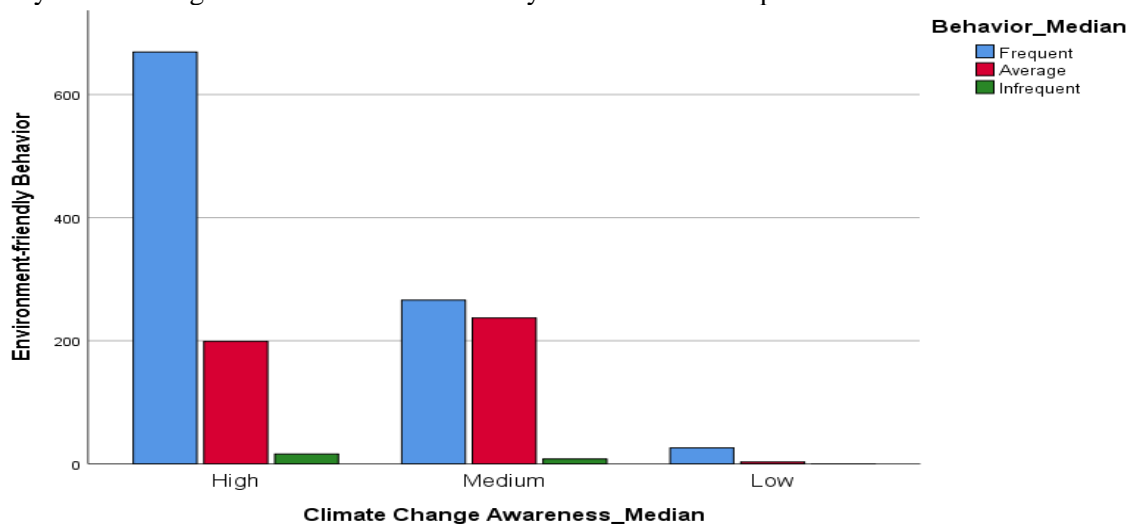
Conclusion

Online media's high penetration rate in Pakistan holds the potential to impart awareness about climate change and related problems. Data and hypotheses testing proves that online media offers a possibility that it can impart awareness about climate change. This awareness in turn has a positive association with environment-friendly beliefs and behavior. If the climate change problem is to be tackled Pakistani citizens need to involved and educated about this environmental issues. Democratic theory of media also points to the notion of online media having vast beneficial results for society as it imparts knowledge about society's issues to the general public. Hypotheses of the present study also test the benefits which can come from public gaining awareness regarding environmental issues. Testing of H1 indicated that with a sample of 1420, online media was creating awareness regarding climate change. H2 specified that climate related awareness of respondents had a positive association with their pro-environment beliefs. H3 indicated that climate related awareness also had a positive association with environment-friendly behavior. Hypotheses show that a mindful public can hold pro-environment beliefs and adopt an environment-friendly lifestyle.

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