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## Expressed Willingness and Awareness of Students towards Climate Change in Lahore, Pakistan

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### ABSTRACT

Global climate change is one of the most significant threats to our generation, the fundamentals of the issue lie in the fact that the anthropogenic contribution of greenhouse gases is changing the global climate at a rapid rate causing immense warming trends and displaced cold weather. This study examined the awareness levels of college/university students on climate change and their willingness to mitigate the effects of climate change. 69 students from Lahore's different public and private sector universities were asked to fill out a survey questionnaire form online and were questioned on their attitudes about climate change and their willingness to take action to mitigate its effects.

### INTRODUCTION

One serious threat that the human generation faces today is global climate change (GCC) also more commonly known as global warming. The crux of this emergent issue is that increased urbanization and foul anthropogenic activities have rendered our planet vulnerable and hence more prone to disasters and catastrophes, the earth is warming up, glaciers are melting, drastic heat waves are being recorded all around the world, and occurrence of natural forest fires have increased manifold in the past years. In addition to these, several other factors are also permanently altering our atmosphere and earth as we know it. The only solution to this issue is mitigation, which involves conscious efforts by countries to stop fossil fuel burning, shift to cleaner energy sources, and other strategies (Sinatra *et al*, 2012).

The Intergovernmental Panel on Climate Change (IPCC) is a group consisting of about 2400 prominent scientists from all around the world who frequently evaluate the status of indicators and update the world governments on prospects and doubts of coming changes. Ever since the UN Conference on Environment and Development in 1992 (the Earth Summit in Rio de Janeiro), the countries that agreed to study and respond to

climate issues have been considering alternatives for addressing what is perceived as causes of the problem. About 5000 delegates from those 150 countries met in December 1997 in Kyoto, Japan. Their efforts produced the Kyoto Protocol, with national targets for reductions in greenhouse gas emissions. The debates in Kyoto reflect internal debates in the representative countries (Fortner *et al*, 2000).

Climate change is an environmental crisis that requires extensive attention all over the world is not just policymakers but also the general public. To check public knowledge on climate change in Pakistan we chose college students as our target audience. There are many conceptual difficulties faced by students on such topics due to limited knowledge and many misconceptions. Due to limited media coverage around the topic locally, students may believe anything and everything which might make a simple scientific phenomenon a controversy in their heads, many might question the legitimacy of the claim that climate is warming although the question should only be how much and how fast is human activities promoting the warming trends. The common challenges faced in the understanding of climate change issues are that the science is complex, lengthy, multidimensional, and

requires systematic and analytical thinking. In addition to conceptual errors, certain misguided judgments lead to thinking adrift on the issue of worldwide climate change, such as the difference between weather and climate. For example, when people are generally inquired about their views and understanding of climate change, they often use their memory of temperature fluctuations in their own life to evaluate whether the planet is warming. Misattributing short-term weather instabilities to long-term climate influences may affect in part the conceptual misconceptions of understanding timing and relationship between geophysical events that have occurred during the Earth's history (Sinatra *et al*, 2012).

Another issue, one displayed by socio-scientific subjects, is that learners are frequently committed to their own opinions on the issue and this commitment may cause a motivation to actively counterchange. Strong commitment to a specific point of view may ascend from private experiences (such as recalling a few recent scorching hot summers) but may also arise from one's beliefs, or outlooks toward new knowledge. Strong, steadfast notions are extremely resilient to change in part due to their rich interconnections with other ideas. Resistance creates barriers to learning that range from the absolute rejection of new ideas and concepts to a thoughtful review of old concepts to fit with preexisting notions (Sinatra *et al*, 2012).

Charlton Research Company, Gallup, Krosnick & Visser, The Pew Research Center for the People and the Press, World Wildlife Fund (WWF), and many more NGOs/governmental organizations have internationally conducted extensive surveys to gauge public opinions and trends amongst people, classes and societies on their understanding and opinion on global climate change the science and also its implications (Fortner *et al*, 2000).

The purpose of the present study is to elaborate on previous researches and to get a more localized take on global climate change and its knowledge in the college students of Lahore, Pakistan. The survey is also supposed to understand the willingness of students to adopt mitigative steps at the individual level to reduce drastic effects of climate change at local, city levels. This study is inspired by prior surveys conducted internationally in reputable journals targeting college students to understand

their knowledge on climate change and willingness to take action against it.

## **METHODS**

A famous city in Pakistan, Lahore was chosen for the research. Lahore has been facing drastic climate change recently. Lahore is the capital of the province of Punjab and is the 2nd largest city of Pakistan after Karachi, as well as it is the 26th largest city in the world. The population of Lahore is around 12,642,000. Lahore has many educational institutes. Most of the reputable colleges and universities are public, but in recent years there has also been an increase in the number of private colleges and universities. The current literacy rate of Lahore is 64%. Lahore has a wide range of schools, colleges, and universities that caters to diverse streams.

This study is based on a narrative and quantitative research design which helped gain access to information like the level of awareness and attitudes in the students towards climate change. Responses were collected from college students, undergraduate and postgraduate university students of different majors such as pure sciences, environmental sciences, biotechnology, botany, zoology, and psychology, etc.

Questionnaires were used as a medium for the research. A google-form based questionnaire was developed and conducted online keeping the current situation of Covid-19 in mind. The questionnaires were kept in a simplified and easy language so that it is comprehensible. The questionnaire was reviewed multiple times before finalizing. The definitive version of the survey consists of 24 statements in total and these statements were divided into four sections. The first section was related to participants' profiles which included information like participant's email address, gender, age, educational level, and household income. Then comes the second section of the questionnaire which included almost 6 statements regarding the awareness towards climate change. The third section again contains 6 statements in total. These statements were to check the agreement of the participants towards different aspects of climate change. Lastly, the fourth section contains 7 statements in total. The statements of this section were designed to check the attitude of the participants towards climate change.

A three-point Likert scale was used to quantify the responses of students. The second section of the questionnaire included the three-point Likert scale where 0 represented “Aware”, 1 represented “Moderately aware” and 2 represented “Unaware. This scale was used to indicate students’ level of awareness towards the given statements. However, the third section of the questionnaire included the same scale where 0 represented “Agree”, 1 represented “Disagree” and 2 represented “Unsure”. This scale was used to indicate students’ level of agreement towards the given statements. Lastly, the fourth section of the questionnaire again included the three-point Likert scale but there 0 represented “Totally willing”, 1 represented “Not willing at all” and 2 represented “Willing enough to convince others”. This scale was used to gain information regarding the attitude of the respondents towards the environment. Total 69 responses were collected, out of which 53 (76.8%) were female respondents and 16 (23.2%) male respondents. (34.8%) were below 20, (60.9%) were in the age limit of 20-25, and (4.3%) were older than 25. (11.6%) participants were college students, (87%) were bachelor's students and very few were postgraduate students. (18.2%) respondents have their house income below 50000, (47%) have their house income ranging from 60000-100000 and (34.8%) have house income above 150000. The results were concluded from the

responses in the form of percentages and the discussion was generated from the results.

**RESULTS AND DISCUSSION**

To gauge the understanding and knowledge of students we started with statements related to the science of climate change.

**Climate does not mean the same thing as weather**

Out of the 69 answers 58 answers marked ‘aware’ to the above statement, while 9 were moderately aware and 2 were unaware of the difference. This showed that 84.1% of students at the university level are aware of the difference between climate and weather, whereas 13% are somewhat conscious and 2.9% are oblivious. So, if we combine the students that are somewhat aware and those who are completely unaware, we’ll get a percentage of 15% of university students who are not sure about the difference between climate and weather, which is as simple as that weather is the state of the atmosphere at a particular place and at a particular time as regards to heat, sunshine, wind, and rain. However, the climate is the long-term average of weather, typically averaged for 10 to 30 years (Schneider, S. H. 2011). The results of this statement are not so shocking as there is little to no importance given to how climate and the changes it is undergoing will affect every being on this planet.

Table 1. Climate does not mean the same thing as weather

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	58	84.1	84.1	84.1
Moderately aware	9	13.0	13.0	97.1
Unaware	2	2.9	2.9	100.0
Total	69	100.0	100.0	

**Climate change comes with the rise in sea level**

The responses to this statement were varying. 40 (58%) students were ‘aware’, 24 (34.8%) were ‘moderately aware’ and 5 (7.2%) were completely unaware of this phenomenon. As global temperatures rise, glaciers and ice caps melt resulting in a lot of water flowing downstream and ending up in oceans. This rise in oceanic levels is causing drastic climatic changes especially in

urban areas located near the seas, they’re experiencing heavy rainfalls causing urban flooding and temperatures never seen before in winters and summer months. Overall, rising sea levels are increasing the threat of coastal floods. High-tide flooding is already a serious problem in many coastal communities, and it is only expected to get worse soon with this trend of continued rising seas (Rahmstorf, S. 2010).

Table 2. Climate change comes with rise in sea level

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	40	58.0	58.0	58.0
Moderately aware	24	34.8	34.8	92.8
Unaware	5	7.2	7.2	100.0
Total	69	100.0	100.0	

**Acid rain causes climate change**

56 (81.2%) marked “aware”, 11 (15.9%) were “moderately aware” whilst 2 (2.9%) were unaware. This statement might sound confusing to an average student at university who has not engaged in any environmental science since high school, but the phenomenon is quite simple to comprehend and grasp. Acid rain is caused when accelerated anthropogenic activities impart acids (chemicals) in the atmosphere that start to

precipitate downwards in the form of fog/smog or rain. In an instance, we can consider a coal-fired powerplant which daily emits huge amounts of chemicals into the air out of which NOX’s, CO<sub>2</sub> and CH<sub>4</sub> are primary, these chemicals are also good absorbers of heat causing global warming and later due to the frequency of this phenomenon also start causing climatic changes (Reis *et al*, 2012).

Table 3. Acid rain causes climate change

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	56	81.2	81.2	81.2
Moderately aware	11	15.9	15.9	97.1
Unaware	2	2.9	2.9	100.0
Total	69	100.0	100.0	

**More garbage/waste causes climate change**

58 (84.1%) marked “aware”, 9 (13%) were “moderately aware” and 2 (2.9%) unmarked “unaware”. Similarly, to the statements above this statement might confuse students who are not studying science subjects or have little know-how

about climate change. Garbage/waste/rubbish ends up in landfills or at random dumping grounds, here, when they decompose carbon dioxide and methane are released and both these contribute to climate change (Ackerman, F. 2000).

Table 4. More garbage/waste causes climate change

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	58	84.1	84.1	84.1
Moderately aware	9	13.0	13.0	97.1
Unaware	2	2.9	2.9	100.0
Total	69	100.0	100.0	

**Climate change causes more floods and droughts**

55 (79.7%) were aware of this, 11 (15.9%) were moderately aware while 3 (4.3%) were unaware. This statement is pretty obvious in its nature since climate changes cause extreme

temperatures and in the case of extreme summers sea levels rise causes more rains, floods and at some places, climate change causes long periods without any rains causing droughts to occur (Whetton *et al*, 1993).

Table 5. Climate change causes more floods and droughts

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	55	79.7	79.7	79.7
Moderately aware	11	15.9	15.9	95.7
Unaware	3	4.3	4.3	100.0
Total	69	100.0	100.0	

**People can prevent climate change by using renewable energy sources and by planting more trees**

This statement is pretty self-explanatory hence a majority of 64 students (92.8%) marked “aware”, 4 (5.8%) were “moderately aware” and 1 (1.4%) marked “unaware”. Climate change mitigation can be adopted by avoiding and reducing emissions of heat-trapping greenhouse gases into

the atmosphere to avoid the planet from warming to more extreme temperatures. Mitigation includes retrofitting buildings to make them more energy-efficient, implementing renewable energy sources like solar, wind, and small hydro-powerplants, helping cities develop more sustainable transport such as bus rapid transit, electric vehicles, and biofuels, and promoting more sustainable uses of land (Teller *et al*, 2002).

Table 6. People can prevent climate change by using renewable energy sources and by planting more trees

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Aware	64	92.8	92.8	92.8
Moderately aware	4	5.8	5.8	98.6
Unaware	1	1.4	1.4	100.0
Total	69	100.0	100.0	

In the following section, we targeted the questions in a way to know the opinions of our subjects.

**Scientific evidence points to a warming trend in global climate**

59 (85.5%) marked “agree”, 1 (1.4%) marked “disagree” and 9 (13%) were “unsure”. The earth

is warming up due to global warming caused by various anthropogenic and some natural events (Rahmstorf *et al*, 2017).

Table 7. Scientific evidence points to a warming trend in global climate

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Agree	59	85.5	85.5	85.5
Disagree	1	1.4	1.4	87.0
Unsure	9	13.0	13.0	100.0
Total	69	100.0	100.0	

**Human activity has been the driving force behind the warming trend over the last 50 years**

60 (87%) marked “agree”, 3 (4.3%) marked “disagree” whilst 6 (8.7%) marked “unsure”.

Table 8. Human activity has been the driving force behind the warming trend over the last 50 years

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Agree	60	87.0	87.0	87.0
Disagree	3	4.3	4.3	91.3
Unsure	6	8.7	8.7	100.0
Total	69	100.0	100.0	

**Climate change is a very big problem**

63 (91.3%) persons agreed, 1 (1.4%) disagreed and 5 (7.2%) was unsure.

Table 9. I believe climate change is a very big problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	63	91.3	91.3	91.3
	Disagree	1	1.4	1.4	92.8
	Unsure	5	7.2	7.2	100.0
	Total	69	100.0	100.0	

**There is still time to prepare for climate change problems**

54 (78.3%) agreed, 5 (7.2%) disagreed and 10 (14.5%) were unsure regarding this. Expert opinion says it's still not too late to start mitigation efforts. However, it is also true that there is a time

lag between what we do and when we feel it, so the things we humans are doing right now will show the magnitude of their effects much later on. Hence if we right our wrongs from today, start using cleaner energy and promote sustainability, we have a promising future ahead of us.

Table 10. There is still time to prepare for climate change problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	54	78.3	78.3	78.3
	Disagree	5	7.2	7.2	85.5
	Unsure	10	14.5	14.5	100.0
	Total	69	100.0	100.0	

**Read news and keep myself updated on climate change and its effects**

35 (50.7%) students read the news to stay updated about climate change, 22 (31.9%) don't really read news for getting updates on climate change and 12 (17.4%) students are not sure about it. So according to the survey half of the students read the news and are aware of the changing climate. But why is climate still changing drastically and is becoming a big issue? A very common idiom "Go in one ear and out the other"

perfectly answers this question. People listen to the news of climate change and feel bad about it but they do not dig in and find out what is causing the climate change. Humans are the biggest reason for climate change but they are not willing to change their lifestyles. On the other hand, many students marked that they do not read news about climate change. One of its reason could be that our traditional and social media are busy highlighting many other affairs hence they do not address important issues like climate change.

Table 11. I read the news and keep myself updated on climate change and its effects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	35	50.7	50.7	50.7
	Disagree	22	31.9	31.9	82.6
	Unsure	12	17.4	17.4	100.0
	Total	69	100.0	100.0	

**It is arrogant to assume that humans can influence climate temperature**

23 (33.3%) students marked "agree", 35 (50.7%) marked "disagree" and 11 (15.9%) marked "unsure" for the above statement. Almost half of the students think that it is not arrogant to assume that humans can influence climate change while quite a sum thinks that it is arrogant. But the reality is that

humans are the major cause behind the increasing temperature resulting in global warming leading to climate change. The use of modern technologies like air conditioners, refrigerators, and other electronic appliances, vehicles, burning of fossil fuel and deforestation for urbanization is all the anthropogenic causes of climate change (Stern *et al*, 2014).

Table 12. It is arrogant to assume that humans can influence climate temperature

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	23	33.3	33.3	33.3
	Disagree	35	50.7	50.7	84.1
	Unsure	11	15.9	15.9	100.0
	Total	69	100.0	100.0	

In the following section, we asked questions in a way to get an idea of the ratio of students who are willing to change their lifestyles to save our environment.

**Willing to stop using plastic grocery bags and use recycled bags instead**

55 (79.7%) students were totally willing to stop using plastic bags, 1 (1.4%) were not willing at all and 12 (17.4%) were willing enough to convince others. According to the questionnaire survey, the majority of the students were willing to stop using

plastic bags anymore and were ready to replace plastic bags with recycled bags. But still, the country is facing plastic waste management problems. The government has put a ban on the use of plastic bags in the markets but we see many shopkeepers selling their products to the customers in plastic bags. Those respondents who marked “totally willing” might use plastic bags in their routine life. People want to change society but do not understand that it begins with your individual efforts.

Table 13. I’m willing to stop using plastic grocery bags and use recycled bags instead

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally willing	55	79.7	80.9	80.9
	Not willing at all	1	1.4	1.5	82.4
	Willing enough to convince others	12	17.4	17.6	100.0
	Total	68	98.6	100.0	
Missing	System	1	1.4		
Total		69	100.0		

**Willing to stop buying bottled water because the manufacturing process for plastic water bottles is carbon-intensive**

42 (60.9%) students marked “Totally willing”, 9 (13%) marked “Not willing at all” and 17 (24.6%) marked “Willing enough to convince others” in response to the above-mentioned statement. Again, the majority of the respondents showed that they are willing to stop buying bottled water. But they might not be able to convince their families to stop using bottled water and as the majority of the respondents have their house income above 50000 so their

families might afford bottled water and use it for drinking instead of boiled water. 24.6% of students said that they were willing enough to convince others. They should start convincing their families to stop using plastic bottles or bottled water so that plastic pollution can be reduced. People generally go for fresh products and hesitate in using recycled products. The use of recycled products should be encouraged otherwise we would not be able to recover the loss of the country from solid waste pollution.

Table 14. I'm willing to stop buying bottled water because the manufacturing process for plastic water bottles is carbon-intensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally willing	42	60.9	61.8	61.8
	Not willing at all	9	13.0	13.2	75.0
	Willing enough to convince others	17	24.6	25.0	100.0
	Total	68	98.6	100.0	
Missing	System	1	1.4		
Total		69	100.0		

**Willing to pay more money to buy a hybrid car**

34 (49.3%) students were willing to pay more money to buy a hybrid car, 19 (27.5%) were not willing at all and 15 (21.7%) were willing enough to convince others. Almost half of the students were willing to use hybrid cars by paying more. That's a good thing because hybrid cars are eco-friendly. Hybrid cars use electric motors so they consume less fuel. Reduced fuel consumption means less fuel

is burned and there will be fewer emissions (Barry *et al*, 2016). Ultimately, the human-enhanced greenhouse effect will be reduced. Many respondents were willing enough to convince others. Hopefully, they will get succeed in convincing people around them. On the other hand, many respondents were not willing at all because hybrid cars are expensive and they cannot afford them.

Table 15. I'm willing to pay more money to buy a hybrid car

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally willing	34	49.3	50.0	50.0
	Not willing at all	19	27.5	27.9	77.9
	Willing enough to convince others	15	21.7	22.1	100.0
	Total	68	98.6	100.0	
Missing	System	1	1.4		
Total		69	100.0		

**Willing to replace all the light bulbs in my house with energy-efficient fluorescent bulbs**

50 (72.5%) participants marked "Totally willing", 3 (4.3%) marked "Not willing at all" and 14 (20.3%) marked "Willing enough to convince others" in response to this statement. The majority of the respondents were willing to replace the light bulbs in their houses with energy-efficient fluorescent bulbs. And many were willing enough to convince others. Energy-efficient fluorescent

bulbs not only bring down your energy bills but are also beneficial for the environment. They consume fewer energy units of light emitted and so fewer greenhouse gases are emitted from the power plants as less fuel is burnt (Thejokalyani *et al*, 2014). It will be good if the families of the respondents are also willing to replace all the bulbs of their houses with energy-efficient fluorescent bulbs just like them.



Table 16. I'm willing to replace all the light bulbs in my house with energy efficient fluorescent bulbs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally willing	50	72.5	74.6	74.6
	Not willing at all	3	4.3	4.5	79.1
	Willing enough to convince others	14	20.3	20.9	100.0
	Total	67	97.1	100.0	
Missing	System	2	2.9		
Total		69	100.0		

**Willing to reduce the number of hours a week I use electronic devices (computer, cell phone, TV, etc.**

34 (49.3%) of the respondents were totally willing to reduce their screen time, 20 (29%) were not willing at all and 14 (20.3%) were willing enough to convince others. So basically, the questionnaire survey was done among students and

our youth is spending more time on electronic devices than any other age group. That's why many of the respondents were not willing at all to make this change in their lives. At the same time, almost half of the respondents were willing to change this habit of being a phone or TV addict which is a very appreciating thing.

Table 17. I'm willing to reduce the number of hours a week I use electronic devices (computer, cell phone, TV, etc.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Totally willing	34	49.3	50.0	50.0
	Not willing at all	20	29.0	29.4	79.4
	Willing enough to convince others	14	20.3	20.6	100.0
	Total	68	98.6	100.0	
Missing	System	1	1.4		
Total		69	100.0		

**Support environmental education in schools**

67 (97.1%) respondents were in favor of this statement, 1 (1.4%) was against and 1 (1.4%) believe that her support would not help. So almost everyone among the respondents was supporting environmental education in schools. Environmental education is very important as the climate is

changing rapidly. It is necessary to give our children environmental education. This will help them in acknowledging the importance of the environment and will also change their attitude and behavior towards the environment. They will be more cautious and that's how we can save the world.

Table 19. I support environmental education in schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I would	67	97.1	97.1	97.1
	No, I wouldn't	1	1.4	1.4	98.6
	I don't think it will help	1	1.4	1.4	100.0
	Total	69	100.0	100.0	

Students are often confronted with socio-scientific topics in the course of instruction. The topic of a human causative role in climate change is abstractly difficult and some students perceive it as debatable. Our goals were to examine attitudes towards human-induced climate change as well as expressions of willingness to take action to reduce human impact. Our results indicated that students expressed great inclination to take mitigatory actions to reduce their own carbon footprint.

## CONCLUSION

Climate change is a very important phenomenon. Climate is changing fast and the reason behind this change is humans. Different human activities like deforestation and industrialization are causing the climate to change. This research-based on questionnaire survey was done to know the awareness and attitude of students towards climate change. This survey would also be a help to the respondents in reflecting themselves. Many students were aware of the changing climate and were willing to make efforts to stop the climate from deteriorating any further. But practically many of them might not put effort to save the environment. The same could be the case with other people that is why we are still facing major issues like climate change. Government and the public should both play their role in reducing greenhouse emissions. Government should enforce laws and the public should strictly follow them.

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