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To my beloved parents, family and respected teachers

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ABSTRACT

Climate change is one of the most fatal threats to the world existence. Education through curriculum has a key role to develop the right kind of attitude and effective awareness towards climate change. Apropos Pakistani context, proper education can decrease the effects of climate change along with other steps. The objectives of the study were to analyze climate change awareness among students and teachers of Islamabad and identification of gaps in their knowledge. To achieve the objectives, the study conducted a descriptive survey. The stratified random sampling technique was used to get the opinion of 320 students and 80 teachers in public sector colleges of Islamabad at the secondary level through questionnaires. Purposive sampling was used to review the curriculum of 8 subjects for climate change content and the opinion of 30 curriculum developers on a Likert scale. SPSS chi-square test was used for data analysis. The results showed that 44% of students and 69% of teachers completely understand the term climate change and the reason for this difference is their different levels of education, experience and exposure to the world environment. Students have limited climate change knowledge; however, teachers appear to be more aware of the causes and effects, adaptation strategies and improvement techniques, but gaps still exist in their knowledge. In addition, science students and teachers are better aware of the concept. However, climate change awareness has not been given proper space in the curriculum. Curriculum developers also endorsed the same.

ABBREVIATIONS

EPA   Environmental Protection Agency

FDE   Federal Directorate of Education

GHG   Greenhouse gases

HSSC   Higher Secondary School Certificate

ICT   Islamabad Capital Territory

IPCC   Intergovernmental Panel on Climate Change

NCC   National Curriculum Council

NGO   Non-Governmental Organizations

ODS   Ozone Depleting Substances

SPSS   Statistical Package for Social Science

UNEP   United Nations Environment Program

UNESCO   United Nations Educational, Scientific and Cultural Organization

UNFCCC   United Nations Framework Convention on Climate Change

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The world is facing one of the most fatal threats to its existence due to climate change. The awareness about the effects of climate change is widespread in the developed countries of the world as compared to the underdeveloped world. Both the natural and manmade factors have contributed to climate change. However, the share of the manmade factors is larger than the natural ones. The paradox is that the countries contributing less in terms of carbon emissions, deforestation, etc. will be affected more by its horrific effects.

Countries like Pakistan are no exception to climate change effects. Therefore, its awareness amongst the masses has a significant role in Pakistan. Such awareness is needed regarding all the aspects of climate change, its causes, effects, and the way out. A lot of studies have been carried out that prove that a large number of people, particularly in the developing countries, are still unaware of the havoc climate change can play with earth (Dalelo, 2011).

This calls for an approach on part of all the people and the government to learn new ways to lead their lives so that climate change can not only be stopped but it can also be reversed. For this purpose, the role of education and educational institutions cannot be overemphasized. If the people are educated about the causes, effects, and remedies of this phenomenon, a lot of improvement can be seen in this area. In our educational system, the efficacy of climate awareness is questionable. There is no actual education about climate change awareness at any level in so many countries. If some lessons are taught at different levels, their impact is negligible. The curriculum has an important role to play to make this awareness effective (Chang and Pascua, 2017).

Currently, in Pakistan, climate change awareness studies do not give a comprehensive picture regarding awareness among students and teachers. Therefore, the study was established to find out climate change awareness among students and teachers. At present, there is no suitable mechanism for providing knowledge of climate change to the students. Teachers are in a critical position to improve climate change

knowledge of young students. So, it is very important to know the teachers' awareness on climate change because the teachers' awareness is likely to affect students' climate change knowledge. Teachers can be very effective in improving students' knowledge by learning and motivating climate change concepts more efficiently (UN CC, 2013).

The climate learning of students is vital because they have to face situations that involve decisions making relating to the environment in the future. Correcting climate change misconceptions is effective through proper schooling. Students enter secondary level education at a young age. Secondary level education occupies the critical position and crucial stage in a students' life. In this stage habits, ideas, and attitudes are formed. Secondary education is the final stage for so many students, and also a preliminary stage for professional and higher education for the majority of students. During the secondary level of education, the objectives should be very comprehensive (Mehmood, 2014). Student learning throughout secondary level education is an important opportunity to correct concepts about climate change.

Unfamiliarity with the science of climate change is the most important factor for an individual's inspiration to feel concerned regarding climate change (Harker-Schuch and Bugge-Henriksen, 2013). We need to teach students about the effect of climate change on the lives of humans. Teachers are an important connection between students and educators. There is a positive relationship between teachers' climate change awareness and their students. The students are more aware of climate change when the awareness level of teachers is high (Dal et al., 2015).

An educated individual is well prepared to identify the threats posed by climate change and act subsequently (Halady and Rao, 2010). Recognizing the decisive part played by education in creating climate change awareness. Few studies have been conducted in Pakistan regarding climate change awareness. Recognizing the risks posed by climate change and inadequate research especially in Pakistan is linked to the role of education in creating climate change awareness. It is pertinent for this study to investigate the role of education in creating awareness of climate change among students and learners in public sector colleges at the higher secondary level in Islamabad, Pakistan.

Keeping in view these conditions the researcher conducted this study. The following points highlight the significance of the study:

1. The study is likely to shed light on possible ways of improving the current curriculum in creating climate change awareness.

2. The curriculum developer will understand the strengths and weaknesses of the current curriculum regarding climate change awareness. This will assist the authorities concerned and stakeholders in improving the curriculum to better address the emerging issues about climate change.

3. The study will make teachers aware of the extent to which their students are knowledgeable about the idea of climate change. This will enable teachers to improve on how they deliver content to change the attitude of learners about climate change awareness in a positive way.

4. Environment protection agencies (EPAs), Non-Governmental organizations (NGOs), parents will establish whether the education curriculum is sufficient in creating awareness about climate change. All the stockholders may find it necessary to intensify campaigns in schools and colleges to enlighten teachers and students on causes, impacts, mitigation, and adaptation measures.

5. The environmentalists may also push the government for community awareness to build pressure on the government to take practical measures to create awareness among students regarding curriculum change.

6. The teacher training institutions will also be made aware of the knowledgeability of teachers about climate change. Such institutions may also develop new courses in line with the emerging issue of climate change.

7. The findings of this study will not only help in understanding students' and teachers' knowledge and perception of climate change but also inform climate change policy planning in the curriculum in Pakistan.

8. This study will also form a base on which other scholars and institutions can develop their studies. The study will open further avenues for the researchers to study the problems and other angles of climate change awareness.

9. The researcher has not gone through or seen a study regarding climate change awareness in the institutions of Islamabad, hence the study hopefully will fill this perceived gap.

1.1 Introduction to Climate Change

Climate change is the greatest threat facing the global and its community in the present era. There was a time when many people considered it a myth but it is now before our very eyes. It has come to be considered as the most widespread ecological, economic, and political problems of the globe presently (Rahman et al., 2014). The issue of climate change, though real, has become controversial in the field of meteorological studies. The experts don't even seem to agree on one definition of this complex phenomenon. In a situation like this, the most important issues of its causes, effects, and remedies have, unfortunately, been relegated to a secondary place.

The term climate refers to the basic conditions of the weather such as atmospheric pressure, changes in wind flow, patterns of rainfall, humidity indicators, changes in temperature, rising smoke, etc. Statistical change in the pattern of weather over a certain period can be called "climate change". Climate change is used to identify any change in climate, due to man-made or natural processes. Climate change has become familiar because the catastrophic effects of climate change are felt all over the earth and are more likely to be felt in the future (Hussain et al., 2018).

Climate change is a long-term change in the average weather of a particular region or the whole world. This is an unexpected change in the global climate and usually occurs in decades or millions of years (Ekpoh and Ekpoh, 2011). According to United Nations Framework Convention on Climate Change (UNFCCC), climate change occurs directly or indirectly due to human activities and changes the composition of the Earth's atmosphere, which is in addition to natural climate changes over comparable times. The Intergovernmental Panel on Climate Change (IPCC) generally defines climate change as a change in climate over time as a result of natural fluctuations or human activities (Pielke Jr, 2004). Climate change is a reality which deals with the problem of climate variability and change, and it deals with descriptions, causes, implications, interactions, impact, and remedies.

1.2 Causes of Climate Change

There are many causes of climate change. These may be natural or artificial. The long-term natural causes include the sun rays coming to earth, the position of the

earth in relation to the sun, the position of the continents in relation to the equator, and the internal distances of the continents. There are some short-term natural causes of climate change such as volcanic eruptions and the effects of asteroids. These causes lead to an increase in greenhouse gas levels in the milieu. This effect can be better understood by the analogy of wrapping the world with another blanket. The chief artificial activities responsible for this increase are the combustion of fossil fuels, deforestation, urbanization, and air pollution (Desonie, 2008).

It is a fact that natural causes also contribute to climate change; however, the man-made activities contribute a lot more in this regard. It is estimated that these changes will keep haunting humans for the decades to come (Pielke Sr et al., 2009). Climate change is the most pervasive of all the problems facing the world presently. The situation has been worsened by the carbon emission resulting from fossil fuels. The greenhouse gases are being produced by almost all human activities, be it farming, a household, or a company. The effects of climate change are numerous, and the third countries are likely to be affected by its worst. Though their role is not too much (Tol, 2009).

Forests absorb carbon in huge amounts and release oxygen which makes them effective carbon sinks. Trees not only produce oxygen after absorbing carbon dioxide but also store large amounts of carbon in their leaves, stems, and roots. They cover one-fourth of the total land of the earth and serve as storehouses for threequarters of carbon in plants. They also store about 40% of soil carbon. On clearing forests, their carbon adds to the atmosphere. The biggest amount of carbon goes into the air when deforestation takes place, either by directly burning them or by the impact created due to their absence. It is estimated that in this way around 5.9 gigatons or billion metric tons of CO_2 annually, about 17% of all annual anthropogenic Greenhouse gases (GHGs) emissions add to the atmosphere. Keeping in view such a huge contribution to GHGs emissions, efforts are being made to decrease deforestation significantly on the international level (Gorte and Sheikh, 2010).

Another factor that impacts climate change is the waste management system. An effective waste management system leads to a safer environment. The underdeveloped countries do not have resources to cope with this problem resulting in climate change. If climate change has to be checked, the waste management systems need to be improved around the world. Poor management systems, from waste collection to waste disposal, can lead to air, marine, and land pollution. The collection

of garbage and infrastructure for recycling are also important challenges (Koop and van Leeuwen, 2017).

Global warming, another humungous threat facing our planet is one of the main causes of climate change. The causes of global warming are the combustion of fossil fuels either for industry or transportation. Deforestation is also responsible for this because it lessens the earth's ability to cool its clime. Therefore, agencies like the United Nations are trying to fight this menace through public awareness and other such strategies (Halady and Rao, 2010).

1.3 Effects of Climate Change

The effects of climate change are pervasive, affecting all human beings and the flora and fauna of the earth. It has the potential to challenge our life in general. It can pose a threat to our agriculture, our economy, our health care systems, our food, the use of energy in our urban and rural life (Ekpoh and Ekpoh, 2011). The extreme weather conditions like floods and droughts, storms, and hurricanes, volcanic eruptions are feared to increase in the near future owing to climate change. These events would have far-reaching effects on human lives. Changes in the climate due to human has increased the intensity of diurnal temperatures, leading to an increase in daily rainfall (Stott, 2016).

The things which were being predicted by scientists 50 years ago are being seen and experienced by us now. Millions of years old glaciers and snow masses are melting never to reinstate. The weather patterns are changing, the winters are getting shorter and the summers longer. The flowers and fruits are blooming earlier. The birds are moving to cold climes for survival. Coral reefs and sea life are under severe threat. The catastrophic weather conditions, like hurricanes and storms, which were not very frequent in the recent past are becoming more and more frequent. The ocean's current patterns are changing unprecedently (Desonie, 2008).

Melting of ice and glaciers in Asian regions is a significant hydrological process, and changes in temperature and rainfall are likely to have a severe effect on the properties of millions. In Asia, little is known about the glacier melting and the effects of climate change on water flow and insecurity of food. The water of the Indus, the Ganges and the Yangtze River support irrigation systems in large areas (Immerzeel et al., 2010). Scientists have been warning about the harmful effects of certain human

activities over the past century or so. The overall change in climate has taken such deep roots that its effects are becoming irreversible with every passing day. Examples of such instances may include the melting of the Greenland ice sheet which cannot be repaired again.

Climate change has adverse effects on poverty and poor nations. The funds which could be utilized for poverty alleviation have to be diverted to minimize climate change effects. The poor countries are more prone to its harmful effects for they are under-resourced to fight with it, though their contribution to worsening the climate is less (Laukkonen et al., 2009).

Climate change has been a source of concern for experts around the world for quite some time and its results are now becoming visible at a great speed. The reality of climate change is very much before our naked eyes and we are experiencing its damaging consequences. Some of its effects are desertification, species going extinct, rising sea levels, floods, extreme heat waves, and tsunamis. It has posed a threat to our health as well. Malaria, vector-borne diseases, food crisis, heatstroke, and waterborne diseases have been intensified due to climate change.

1.4 Climate Change in Pakistan

The aforementioned harmful effects of climate change are doing much worse for developing countries like Pakistan. The reason, as stated before, is the lack of resources to cope with such harmful effects. Climate change will badly affect the water, food, and energy sectors of countries like ours. Such effects will be severer in the arid lands and are feared to impact people's lives physiologically and socioeconomically (Saifullah and Mahmood-UL-HASAN, 2013).

The poor countries like Pakistan are already under-resourced for fighting the menace of climate change. Due to the unexpected rapid change in weather conditions, the number and frequency of floods will rise in the near future. The simplest kind of measure to improve climate change is a plantation. Pakistan is such a poor country that it cannot even afford to plant and rear trees, let alone the other such measures that need more resources. The climate change effects may impact our country's ecosystem and biodiversity, water resources, and related fields as agriculture, forestry, fisheries and even greenery (Arshad et al., 2016).

The situation is more threatening to countries like Pakistan who largely depend on agriculture and related industries for their economic growth. The scarcity of water may lead to poor agriculture as water and water management systems are a backbone for agriculture. Climate change will badly affect our irrigation system. Glaciers around the world and the Gilgit-Baltistan region of Pakistan are shrinking at a great speed resulting in the paucity of water for irrigation and household (Akhtar et al., 2008).

It is predicted that by the year 2050, Pakistan will face an average 1.8ºC rise in temperature. Rainfall is also predicted to be affected by it by 6%. The sea levels are also expected to rise by 30 cm causing harm to people in coastal areas. The fluctuating nature of monsoon will cause agriculture to face unprecedented problems. If the glaciers keep melting at the present speed, it may cause floods. The situation is particularly grave for Pakistan because most of our population lives in the lowland flood plains of the Punjab and Sindh. The effect of climate change on water-related issues is much graver and bigger than it is realized, especially for Pakistan (O'Brien, 2000).

Pakistan is home to the world's three mightiest and the longest mountain ranges in the world viz., the Himalayas, the Karakoram, and the Hindukush. These mountain ranges start from the Gilgit-Baltistan region in the north of Pakistan. More than 5000 glaciers feed the Indus in this region. There are many small tributaries, besides global warming has adversely affected the glaciers and their melt is leading to a rise in sea levels. This melt may lead to sudden floods downstream disturbing the lives of a large population (Rasul et al., 2011).

The whole world is facing heavy damages done by climate change. South Asia, particularly Pakistan, is no exception. Pakistan is facing what the rest of the world is facing in this regard. The temperature rise, uneven weather patterns, pest-disease, health issues, water crisis are all different facets of the bigger phenomenon of climate change. As stated earlier, Pakistan and the other third world countries are facing it worse than the developed world because of our already poor infrastructure to cope with such issues of greater magnitude (Hussain et al., 2018).

1.5 Mitigation and Adaptation to Climate Change

In this particular context, mitigation refers to the protection of nature from the harmful effects of society and the adaptation refers to the protection of society from the harmful effects of nature. It must be bored in mind that one strategy or a set of strategies

cannot work for all the contexts. Therefore, both these strategies differ in nature for different regions around the world. The need of the hour is that we devise strategies which best suit our needs and society (Stehr and Von Storch, 2005).

The scientist and the academics are trying hard to come up with the mitigation and adaptation strategies to fight out this menace of climate change. However, the thing that concerns most experts is that the local governments, especially in poor countries, do not have enough resources and expertise to do so. The United Nations Development Program has called for an end to this debate, climate change is happening and necessary steps should be taken. Mitigation is a common tactic that aims to decrease the effects of climate change and to cope with the effects of climate change are the adaptations (Laukkonen et al., 2009).

Various measures have been taken in recent decades about the growing concerns of climate change. The United Nations Environment Program (UNEP) is the leading international environmental protection agency. The UNEP focuses on the different aspects of climate change including sustainable development. The UNFCCC is an intergovernmental agreement designed to cope with the menace of climate change. In June 1992, an agreement, known as the Rio Summit, was signed to deal with climate change in the United Nations Conference on Climate Change (Zakkour et al., 2014).

The Kyoto Protocol was adopted by more than 160 parties of the UNFCCC in December 1997 in Japan. Kyoto Protocol established legal bindings for industrialized countries on carbon dioxide emission and other greenhouse gases (Iwata and Okada, 2014).

The Montreal Protocol is a landmark treaty on ozone-depleting substances (ODS) in 1987, which has succeeded in reducing the production, consumption, and emissions of ozone-depleting gases. ODS are greenhouse gases that help in reducing the impacts of climate change (Velders et al., 2012).

A lot of international agencies were set up to increase an understanding amongst the countries on climate change. One of the most effective agencies for environmental protection is the IPCC. This intergovernmental agency was set up in 1988 by the UNEP and the World Meteorological Organization (Kimuyu, 2017).

These agencies work through different local agencies. There is a consensus regarding the role of local governments to devise strategies of mitigation and adaptions and act upon them to protect the environment. Local governments are required to work in collaboration with people to implement these programs. No such strategy can work

if the people are not prepared accordingly to fight with this menace. Without public participation, all these proposed strategies are doomed to fail. Therefore, effective public participation should be made an important part of the whole process (Baker et al., 2012). The role of the governments is to streamline these efforts by ensuring the policies thus made are acted upon effectively. For example, the replacement of thermal energy projects with renewable energy resources is the responsibility of the governments. A lot of advancement has been made in this filed however, it is not being implemented as required. Only the governments can ensure that energy is produced using eco-friendly methods. There is a hope that decisions reached by the government of Pakistan regarding banning plastic bags and introducing electrical vehicles will have far-reaching effects and will be expanded to the other fields as well.

We have discussed the role of governments; however, the role of an individual is much more important in this connection. If the individual does not realize the importance of such measures taken by governments, all efforts will be wasted. Everyone must participate in this drive to save our environment because we are all benefiting from it and we all will be harmed by it if it becomes injurious. We need to minimize the use of plastic, need to avoid smoking, need to buy energy-efficient home appliances, need to walk or bicycle small distances. Above all, we should not consider these steps unimportant. Every positive step in the right direction counts in the overall protection of our dear homeland (Kent, 2009). Article 3 of the UNFCCC encourages governments to adapt to climate change.

1.6 Climate Change Awareness

In order to create awareness of mitigation and adaptation techniques, climate change education through the curriculum is very effective. In this connection, the role of high school years in the creation of this awareness is very crucial. It is therefore the responsibility of the educational institutions to instil environment protection awareness in their students so that they become responsible citizens when they grow up. For this purpose, it is imperative to incorporate environment related study material and practical through the curriculum. This should be done at all educational levels so that the students learn about the importance of this issue (Rahman et al., 2014).

Climate change experts have been pointing out that the long-term solution to this problem lies in the awareness and understanding of this problem by everyone. The

best way to doing this is through educating the students at a very early age when the mind is most receptive and impressionistic. Lack of awareness and authentic knowledge results in peoples' taken-for-granted attitude towards the climate (Olatumile, 2013). If we can make people sensitive towards climate change, this will help eradicate the problem.

We must provide our people with the proper knowledge of climate change future projections. In this way, we can enable societies to learn about the exact threats facing our planet, and we can take precautionary measures to avoid it. Political awareness is also key to preserving and protecting the environment. We can achieve this awareness by using media, public, and private sector collaboration and involving the NGOs (Oruonye, 2011).

The rightly educated and guided students can play a very vital role in the mitigation and adaptation of climate protection strategies. The new generation has more awareness regarding environmental problems. The United Nations (2004) report says that youth comprises 18% of the world's population with the majority (87%) residing in developing countries. Therefore, it is very important to increase their awareness levels about the environment because they are the citizens of the future and decision-makers that must live with the effects of climate change. It is the youth who is responsible for making our future secure and free from climate change effects. A dynamic contribution of young people can offer an inter-generational lookout for posterity (Barreda, 2018).

Teachers are said to be builders of a nation, implying that they make secure the future of a nation by instilling the right kind of environmental protection training in their students. Therefore, there exists a correlation between teachers' and their students' awareness of climate change. The more aware teachers are on the climate issue, the more aware their students are. A teacher can transfer the same awareness to their students (Dal et al., 2015). A teacher's belief that climate change is happening appears to predict a student's belief.

The research studies have shown that the teachers, as well as students, hold misconceptions about climate change. Education has a key role to play to eradicate these misconceptions and develop the right kind of attitude towards climate change. The students are the most important strata of a society that can help decrease climate change effects if they are properly trained (Papadimitriou, 2004). Students and teachers

can make a visible difference in this connection provided they are properly guided by the curriculum.

Along with other problems, third world countries have a low level of awareness regarding climate change. In Pakistan, the general public does not know much about this important issue. The irony of the matter is that Pakistan, in terms of climate change, is one of the badly affected countries in the world and most people still believe that it is a myth, not reality. The Global Climate Risk Index 2020 of German Watch ranked Pakistan at 5th in 2020 (Eckstein et al., 2019). The awareness situation in Pakistan is not very satisfactory. The situation is very grave beyond doubt.

1.6.1 Knowledge Gaps

Knowledge is defined as the awareness, information, and understanding about something or it can be a skill that you have acquired after experience or education. The gap is a faulty or incomplete understanding or information about something. There may be many reasons for the knowledge gap. They may be there due to the poor quality of the information received. They may exist due to the poor understanding of the receiver and the like. The underdeveloped countries are still showing such knowledge gaps regarding climate change information. The researches addressing these knowledge gaps would be able to lessen these gaps thus showing the way forward for climate experts for future policymaking (Pachauri and Reisinger, 2008).

Knowledge gaps may occur due to the poor organization of study material. The better integration of study material will help reduce the knowledge gap. Knowledge leads to action: the more certain the knowledge, the more effective the action will be (Hulme, 2018). Therefore, effective and integrated knowledge must be provided to students that result in positive action for climate betterment. Another facet of the knowledge gap is its distribution amongst different sections of society. The media can play a vital role for those who do not have the opportunity to attend school. They may be reached out through electronic and print media (Jäntti, 2014).

The internet plays the most pivotal role in the spread of knowledge about climate change. The access, connectivity and the expertise to use the internet for gaining knowledge would help reduce the knowledge gap. This can work in many ways. Specialized websites can be designed for a specific section of society targeting their

needs. There may be some general kinds of sites that provide general information on the issue. Education is key to fighting this peril, climate change.

1.6.2 Role of Social Media in Climate Change Awareness

Climate change is a very important problem of the present time. Media is also playing its role in the dissemination of knowledge and information about the mitigation and adaptation strategies of climate change. The present age is the age of media and the people believe in what media says more than anything else. Therefore, media can mold public opinion in favor of anything they want. In the same way, the media can pave the way for the solution to climate change problems. New media like the 'internet' has an important role in the spreading of material on climate change (Deepak, 2014).

The internet and the associated media have taken the world by storm, especially the younger generation is so internet savvy that it cannot live without it. Some of the most used social media are Facebook, Instagram, and Twitter. These can shape the world of ideas. If these instruments are properly and positively used, there is no reason that climate change awareness should not reach everyone. However, it should be kept in mind that these platforms are available to everyone and all kinds of information and knowledge can be accessed by all. It is therefore very important that only the authentic knowledge reaches the user. For this purpose, the government should act vigilantly so that people get authentic information on these platforms (Mavrodieva et al., 2019).

1.6.3 Role of Education in Climate Change Awareness

The institutions of higher education have an important role to play regarding the spread of environmental protection awareness throughout the world. This is being done using all the available resources at such institutions. The teachers are trying to do this through classroom activities, the administration using their platforms, and the students by acting upon the advice given by all of them. Some of the universities award certain marks to students for planting and rearing a tree during their stay at university. They also cover such topics in their classrooms so that students become aware of the gravity of the problem. The social media pages of such institutions can be used for the dissemination of environment-related issues (Hamid et al., 2017).

Environment protection education is the only key to predict what shape this menace is going to take in the future. The public engagement for environmental protection can only be ensured through the effective literacy of climate issues from a very early age to the highest level of education (Lee et al., 2015).

Authentic information about environmental protection for teachers and students alike is important. For this purpose, the educational institution should take extra responsibility and provide its people with this information. As stated earlier, this can be done through social media platforms, by organizing awareness seminars, walks, and by preparing the students for practical activities. One way of doing this is by making climate change education the very part of formal education and curriculum (Stevenson et al., 2017).

To deal with the problem of climate change effectively, the role of higher education, cannot be overemphasized. On the one hand, it is important to create awareness amongst the youth of the country; on the other hand, it is imperative to enable them to come up with solutions to curb this change. It can train them to make expert researches who devise new strategies to fight the peril of climate change (Barreda, 2018).

Article 6 of UNFCCC also emphasizes the importance of education in dealing with climate change. In both its facets, formal and informal, education has got the power to roll back the effects of climate change by understanding and devising mitigation and adaptation strategies. In the same context, United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2009 states that climate change education should emphasis on transforming students into critical thinkers and lifelong learners (Mapolisa, 2016).

The United Nations has voiced its resolve through UNESCO (2016) that education has the key role to play in creating climate change consciousness, adaptation competences, and reducing its harmful effects. It has reiterated its stance that the engagement of the education sector is imperative to curb the effects of climate change. It has stressed the need to educate the teachers, students, and communities for improving the current situation regarding climate change. Presently, climate change is being mostly studied as part of geography in educational institutions. However, it is the need of the hour that it should be made part of all curricula (Chang and Pascua, 2017).

The curriculum has a very crucial role in developing climate change awareness among our students. It can tell them the causes, effects, mitigation, and adaption

strategies necessary to control this most pervasive evil of the modern-day. The curriculum is not merely syllabus as misconceived by most people. It is concerned with the overall school experience encompassing all activities of school life, the subject matter, the teachers, the students, the teaching methodology, the classroom activities and the evaluation process. The syllabus, on the other hand, has a limited scope and deals only with the material to be covered in an academic year. The curriculum has long term plans while the syllabus has short term plans. Therefore, climate change education needs to be made part of the curriculum objects which would make the syllabus accordingly (KARIUKI, 2017).

Pakistan's government has given the national climate change policy in 2012. The policy stated the need for climate change awareness education to make the younger generation aware of the hurdles facing our planet and our country (Adger et al., 2005). The policy also underlined the importance of including practical training in the given subject. It has stressed the need to train teachers and students through the curriculum to cope with the challenges of climate change and the form it may take soon. Pakistan is feared to be amongst one of the worst affected countries by climate change impacts. The irony of fate is that it is one of the least greenhouse gas emissions contributors (Shaw, 2015).

Therefore, research has been planned to study the opinion of students and teachers about climate change, its impacts and how to cope with the problem. The main purpose of the work is to know and evaluate the awareness and knowledge about climate change among the students and teachers of the government colleges in Islamabad.

1.7 STUDY OBJECTIVES

The objectives of the research study were:
1. To analyze climate change awareness in public sector colleges of Islamabad.
2. To identify knowledge gaps in climate change awareness.
3. To propose suitable measures to reduce the impacts of climate change through education.

CHAPTER 2

METHODOLOGY

2.1 Study Area

The research area of the study was the capital city of Pakistan. Islamabad Capital Territory (ICT) is located in the northwest of the country at 33.43°N 73.04°E, and at the northern edge of the Pothohar Plateau and the foot of the Margalla hills. The literacy rate of the city is high due to the presence of the educational facilities in the city.
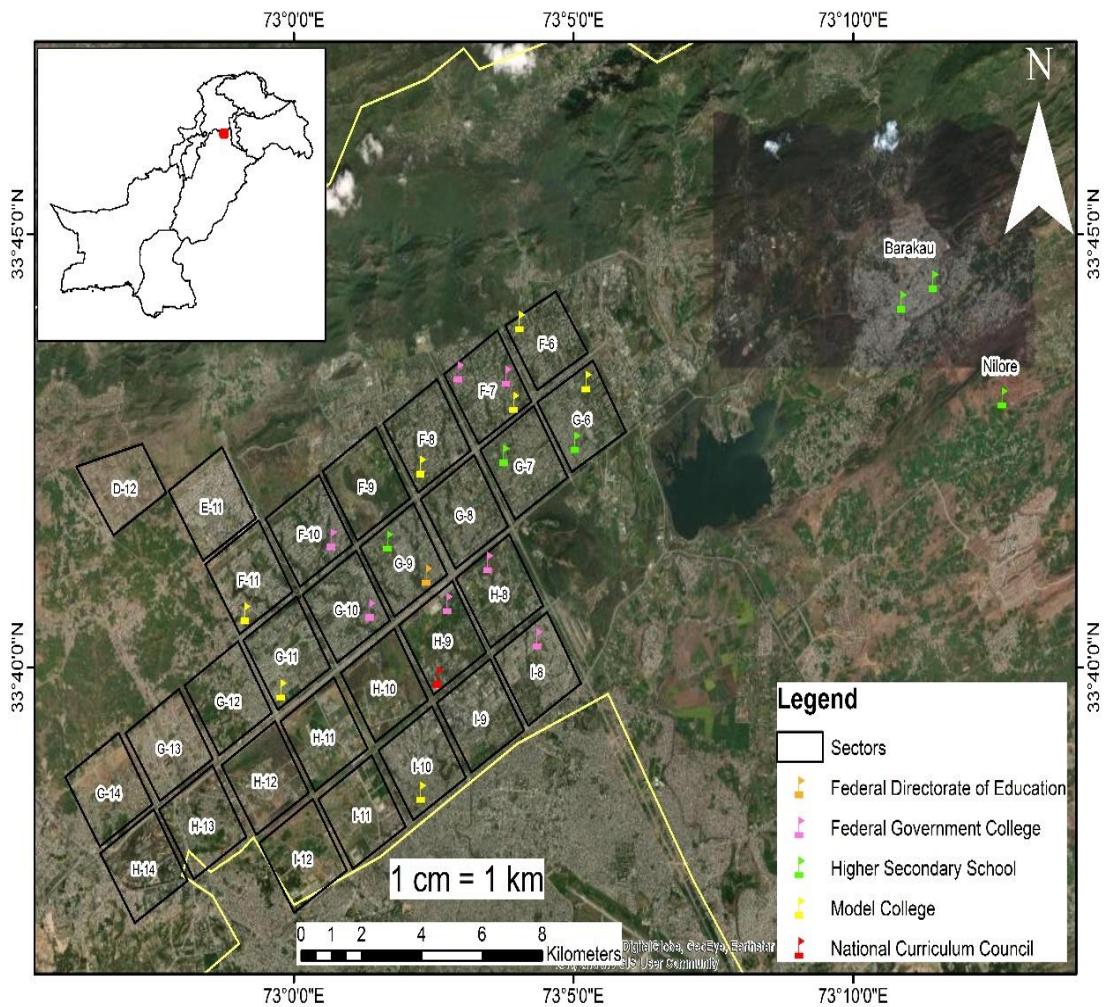
Figure 2.1 Map of the study area showing all the sampled institutes

2.2 Research Design

Descriptive research design is considered very suitable to collect information, respondents' opinions about a particular situation, data analysis and interpretation. This type of research not only collects and summarizes the facts, but also includes choices, comparison, and identification of relationships and trends. The outcomes of descriptive research can be very useful in forming the baseline for more studies (Schuldt et al., 2011). In the present research descriptive method was applied to assess awareness and personal opinion of students and academia regarding climate change.

A self-structured questionnaire was used that can be easily understood and useful to receive maximum attention and outcome from respondents from various groups with multiple levels of education, intelligence, social classes, and people with different regional backgrounds (EAC, 2011). Survey questionnaires were used to get the opinion of the students and teachers in colleges of ICT at the higher secondary level. And another questionnaire containing the Likert scale was designed for the curriculum developers. A survey questionnaire containing the Likert scale was used to get the opinion of the curriculum developers. The Likert scale is undoubtedly the most essential and widely used psychometric tool, for researchers of social sciences. Likert scale was created to record attitude scientifically and validly (Joshi et al., 2015).

A quantitative approach was applied for this study because it is considered as the most appropriate for the accuracy of the result. Quantitative approaches use statistical methods to examine relations between the concerned variables and ideal for large samples (Tsang, 2014).

2.3 Population

The population of this study was as under:
1. The students enrolled at the Higher Secondary School Certificate (HSSC) and teachers teaching in the public sector colleges of ICT.
2. The officials of the Federal Directorate of Education (FDE), the regulatory body of educational institutions located in ICT.
3. The curriculum developers of the National Curriculum Council (NCC), which has the authority to develop a curriculum for ICT.

4. The curriculum being taught at the higher secondary level in educational institutions of ICT.

The detail of the students enrolled and teachers teaching in the govt. colleges of ICT:

Table 2.1 Detail of population

Institutes Under FDE	Total No. of Colleges 75		Total No. of Teachers 2272		Total No. of Students 20764	
	Male	Female	Male	Female	Male	Female
Model Colleges	10	10	487	546	3572	4602
FG Colleges	5	7	324	387	3522	5232
Higher Secondary	17	26	149	385	940	2896

Source: FDE 2019-2020

2.3.1 Delimitation

Due to time constraints and limited resources, the study was delimited to:
1. The public sector colleges providing higher secondary level education in Islamabad.
2. The students enrolled at higher secondary level at public sector colleges of ICT.
3. The teachers teaching at higher secondary level at public sector colleges of ICT.
4. To subjects Biology, Chemistry, Physics, Civics, English, Geography, Islamic Studies, and Urdu taught at higher secondary level at public sector colleges of ICT.

2.4 Sampling and Sampling Techniques

Purposive and stratified random sampling techniques were applied in selecting a representative sample. Islamabad was purposively selected because of its high literacy rate and with a supposedly more aware population. The education sector was also purposively selected due to its vital role in creating climate change awareness.

The purposive sampling technique also called judgemental sampling, is the deliberate choice of a participant due to the qualities the participant possesses (Kariuki

et al., 2016). In stratified random sampling, which is a traditional survey sampling method, individuals select the sample from a heterogeneous population. Then heterogenous populations stratified into homogenous groups or strata before selecting a sample from each group or stratum (Maharjan, 2013).

Using a stratified sampling technique, the colleges were stratified into boys and girls, urban and rural, Federal Government (FG), Model, and higher secondary colleges before selecting the representative sample. Out of the 75 colleges in the city; 32 were boys and 43 were girls' colleges, 37 in urban areas, and 38 in rural areas. Using a simple random sampling technique 10 boys' colleges and 10 girls' colleges were selected from each group. 400 samples were collected using a stratified sampling technique. Therefore 4 teachers and 16 students were selected from each of the sampled colleges, making a sample of 80 teachers and 320 students respectively.

Using a purposive sampling technique, 8 out of 42 examinable subjects at the higher secondary level were selected to form part of the study. The subject's selection was based on previous information that they possessed content relating to the environment or climate change.

Finally, using a purposive sampling technique, 30 officers (10 from NCC, 10 from FDE, and 10 college principals) were selected to form part of the sample. This technique was also used since the researcher feels that the sampled officer knows the content and, in a position, to give better feedback relating to climate change.

Table 2.2 Sample of the study

Institutes Under FDE	Total No. of Colleges 20		Total No. of Teachers 80		Total No. of Students 320	
	Male	Female	Male	Female	Male	Female
Model Colleges	4	3	16	12	64	48
FG Colleges	3	4	12	16	48	64
Higher Secondary	3	3	12	12	48	48

2.5 Research Instrument

Data was collected through a survey questionnaire. Three questionnaires were developed to find out the level of climate change awareness and existing knowledge gaps in understanding climate change awareness. Questionnaire surveys are useful in providing a proper base for exploring knowledge gaps. (Zsóka, 2008)

2.5.1 Questionnaires for Students and Teachers

To collect the data from sampled students and teachers, two different questionnaires with minor variations were developed. Each questionnaire consists of 38 closed-ended questions. Data obtained was vital in making conclusions on the first two objectives of the study.

The questionnaire for students and teachers consisted of 3 sections. Section A consisted of demographic questions. Section B consisted of climate change awareness questions to establish respondents' basic knowledge of climate change including its causes, effects, and possible mitigations, whereas section C consisted of climate change education questions to assess respondents' views on knowledge gaps regarding climate change awareness and inclusion into the college curriculum.

2.5.2 Questionnaire for Curriculum Developers

A questionnaire of 10 items based on a five-point Likert scale was used to collect the data from officers of FDE, NCC, and college heads. The respondents were to respond on a five-point Likert scale ranging from strongly agree to strongly disagree. It aimed at establishing their views on whether the current curriculum precisely addresses issues of climate change. It also aimed at considering attempts being made by the NCC to improve climate change content into the curriculum. Data obtained was vital in making conclusions on the second objective of the study.

2.6 Data Collection

The research involved both primary and secondary data. Primary data was collected through a questionnaire survey to obtain students' and teachers' climate change awareness. Primary data was also collected from students and teachers in the public sector colleges of Islamabad while secondary data i.e curriculum of different subjects was obtained from NCC.

Data collection was carried out in three months. During a visit to different public sector colleges from December 2019 to February 2020, the questionnaires were handed over to vice-principals and senior teachers in each college, who then distributed

questionnaires to different teachers and students. Completed questionnaires were returned in the next week.

The data from teachers and officials of FDE, NCC, and college heads were collected personally. The questionnaires were self-administered since the respondents were literate, but the researcher was available to clarify. The data from students collected during classes through their respective teachers.

Secondary data included curriculum designed for different subjects, which was collected from NCC, Ministry of Federal Education and Professional Training, Pakistan.

2.7 Data Analysis

The collected data from the questionnaire was arranged properly and systematically for analysis. Data was analyzed through the Statistical Package for Social Science (SPSS). SPSS is a program for analyzing, and presenting data in a better way. This program is also extensively used by different researchers of social sciences throughout the world (White et al., 2014). The responses were entered into SPSS, creating a data set of climate change awareness of students and teachers.

Descriptive statistics were used to summarize the obtained data. Cross tabulations of the respondents and the education levels were also done to determine if they are correlated. The crosstab is usually used to study the association between two or more categorical variables. For this type of data, associations were done by the use of the chi-square test to analyse and compare the responses of respondents on each item (Wong et al., 2008).

CHAPTER 3

RESULTS

Results from questionnaires have been presented in the form of tables and graphs.

3.1 Analysis of Demographic Information of Respondents

The distribution of respondents by gender was almost even. The total number of respondents approached for the study was 400. Out of 400 respondents, 320 were students and 80 teachers. The overall gender ratio was maintained.

3.1.1 Demographic Information of Students

The gender, education level and academic discipline of students were analyzed and presented in the form of charts.

The distribution of gender was exactly even in the sample, with 160 females and 160 male students (Fig. 3.1). Even the number of students in the sample was also the same, i.e., 160 from class HSSC-I and 160 from HSSC-II (Fig 3.2). Whereas, the distribution of students according to academic discipline was indicated in figure 3.3, that 60% of respondents from the discipline of science, 25% humanities and 15% from commerce to form a true representative sample.
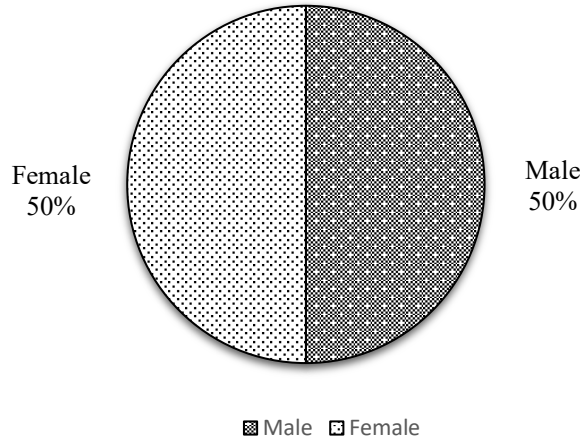
Figure 3.1 Percentage of gender distribution among students
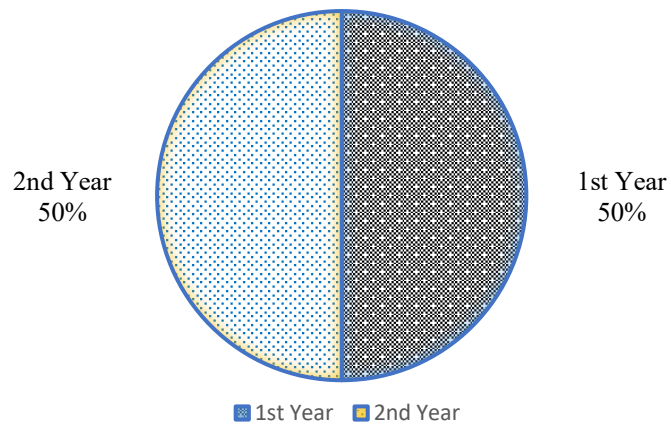
Figure 3.2 Percentage of the education level of students
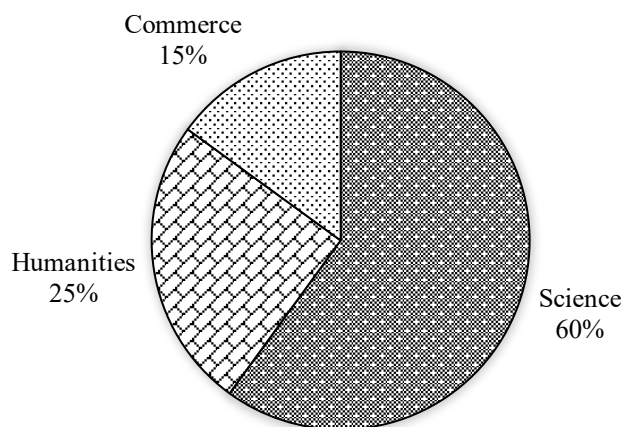
Figure 3.3 Percentage of the academic discipline of students

3.1.2 Demographic Information of Teachers

The demographic data of teachers was analyzed and presented in the form of a table.

Table 3.1 Demographic data of teachers

	Teachers		Total	%
	Male	Female		
Qualification				
Masters	17	23	40	50
M.Phil. / M.S.	20	10	30	37.5
Ph.D.	3	7	10	12.5
Teaching Experience (Years)				
Less than 10	13	12	25	31
10 to 20	19	25	44	55
More than 20	8	3	11	37
Subject of Specialization				
Science	20	9	29	36
Social Sciences	8	12	20	25
Humanities	7	18	25	31
Commerce	5	1	6	8

Table 3.1 explains that the equal number of male and female teachers and the majority of the respondents (50%) holds Masters' degree, followed by MS 37.5%, while only 12.5% having Ph.D. in various disciplines, mostly having 10 to 20 years of experience.

3.2 Level of Climate Change Awareness among Sampled Respondents

A summary of responses to all questions in the survey is shown in tables and gr
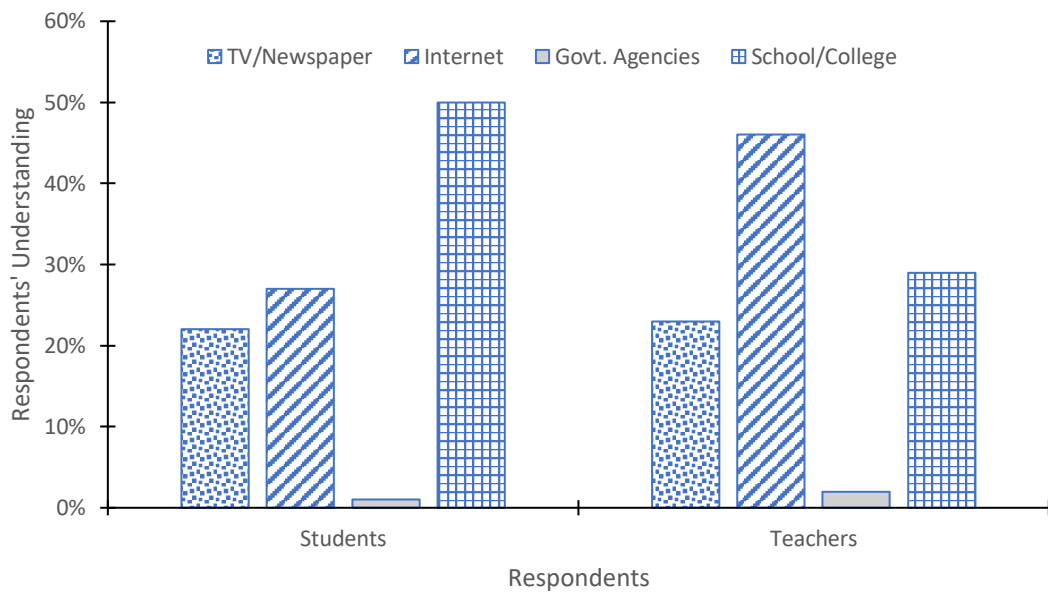
Figure 3.4 Climate change source of information among students and teachers

Table 3.2 Chi-square test among respondents' group regarding their source of information

Categories		p-value
Students	Male	0.759
	Female	
Teachers	Male	0.166
	Female	
Respondents	Students	0.001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.4 exhibits that the majority of the students heard about climate change from school or colleges while teachers' major source of information is the internet. Almost the same number of students and teachers heard about climate change from TV or newspapers. Table 3.2 demonstrates that p-values between genders of students and teachers on the statement 'climate change source of information', are 0.759 and 0.166 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.001, which shows that there is a significant difference between respondents on climate change sources of information
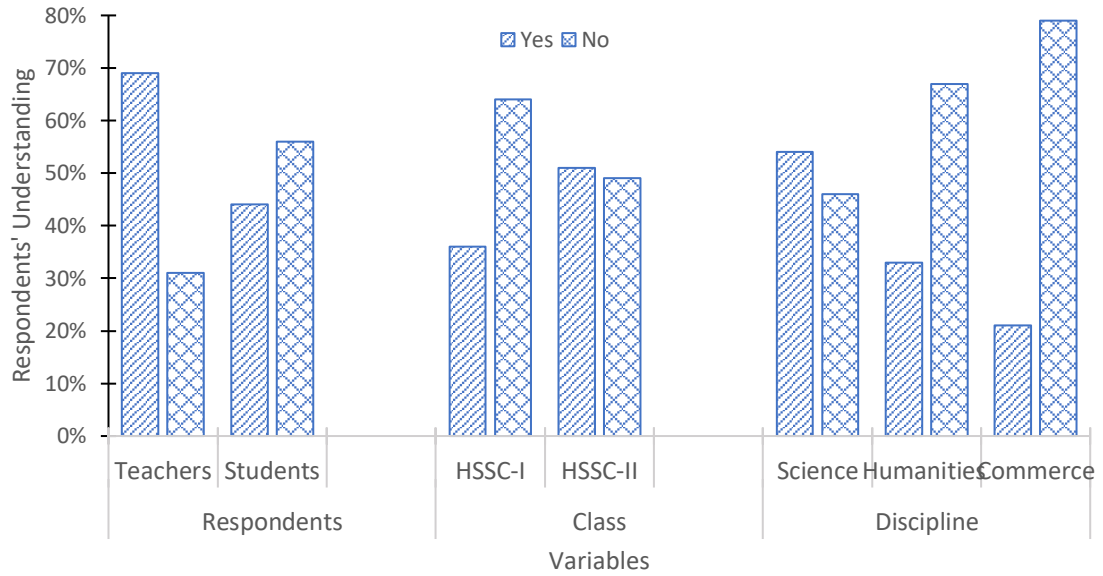
Figure 3.5 Complete understanding of climate change among students and teachers

Table 3.3 Chi-square test among respondents' group regarding their understanding of climate change

Categories		p-value
Students	Male	0.822
	Female	
Teachers	Male	0.228
	Female	
Respondents	Students	0.00006*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Above figure depicts that 69% of teachers and 44% of students think that they completely understand climate change. Similarly, only 36% of students at HSSC level I, whereas 51% at HSSC II understand the term climate change. The majority of the science students' (54%), 33% of the students of humanities and just 21% of commerce students comprehend the term. Table 3.3 exhibits that p-values between genders of students and teachers on the statement 'I completely understand what climate change means', are 0.822 and 0.228 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.00006, which shows that there is a significant difference between respondents on a complete understanding of climate change.

Figure 3.6 Climate change is happening right now among students and teachers

Table 3.4 Chi-square test among respondents' group regarding their understanding about climate change happening right now

Categories		*p*-value
Students	Male	0.420
	Female	
Teachers	Male	0.762
	Female	
Respondents	Students	0.0002*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.6 demonstrates that 84% of teachers and 62% of students think that climate change is happening right now. Similarly, students at HSSC level I, 59% whereas at HSSC II is 66%. Students' discipline wise comparison, such as science 65%, humanities 66% and commerce 44% respectively. Table 3.4 depicts that p-values between genders of students and teachers on the statement 'climate change is happening right now', are 0.420 and 0.762 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.0002, which shows that there is a significant difference between respondents on climate change is happening right now.
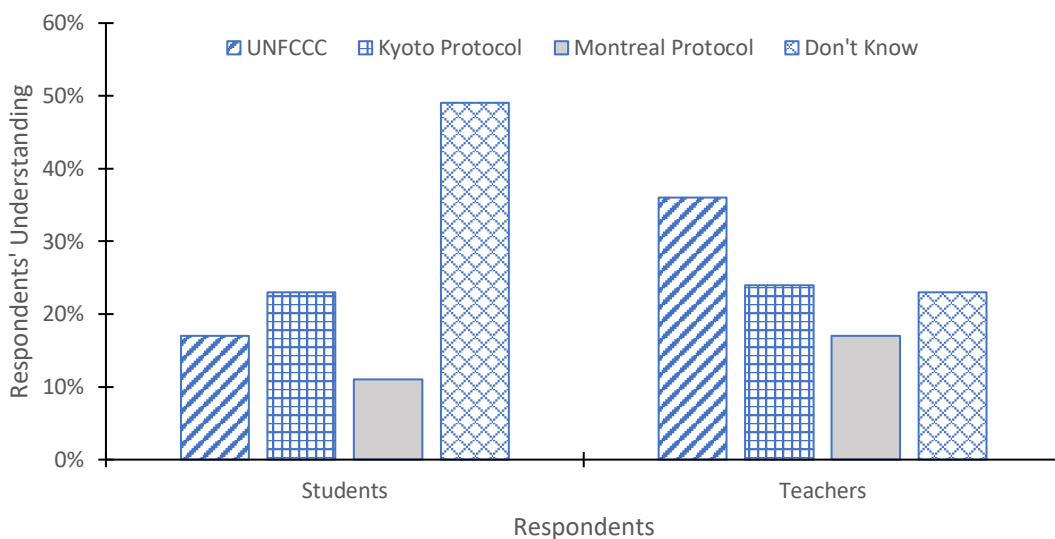
Figure 3.7 Awareness about world climate change policies or initiatives

Table 3.5 Chi-square test among respondents' group regarding their awareness about world climate change policies or initiatives

Categories		p-value
Students	Male	0.788
	Female	
Teachers	Male	0.190
	Female	
Respondents	Students	0.00002*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.7 exhibits that the majority of students (49%) have no idea of the world policies, even many of the teachers don't know about UNFCCC, Kyoto protocol and Montreal protocol. Table 3.5 indicates that p-values between genders of students and teachers on the statement 'awareness about world climate change policies or initiatives', are 0.788 and 0.190 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.00002, which shows that there is a significant difference between respondents on awareness about world climate change policies or initiatives.
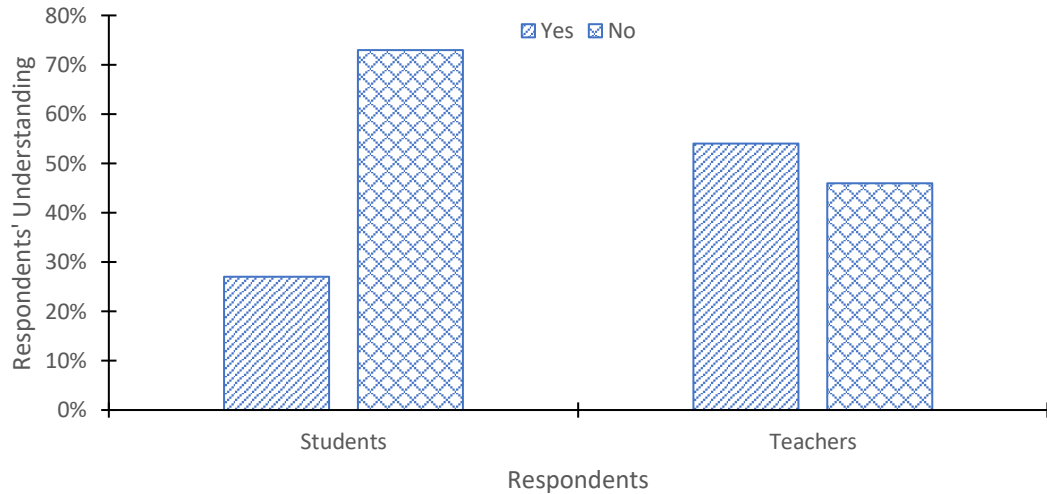
Figure 3.8 Awareness about the country's climate change policies

Table 3.6 Chi-square test among respondents' group regarding their awareness about the country's climate change policies

Categories		p-value
Students	Male	0.706
	Female	
Teachers	Male	0.262
	Female	
Respondents	Students	0.000006*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Above figure shows that only 27% of students and 54% of teachers aware of the country's climate change policies. Table 3.6 reveals that p-values between genders of students and teachers on the statement 'awareness about the country's climate change policies', are 0.706 and 0.262 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.000006, which shows that there is a significant difference between respondents on awareness about the country's climate change policies.
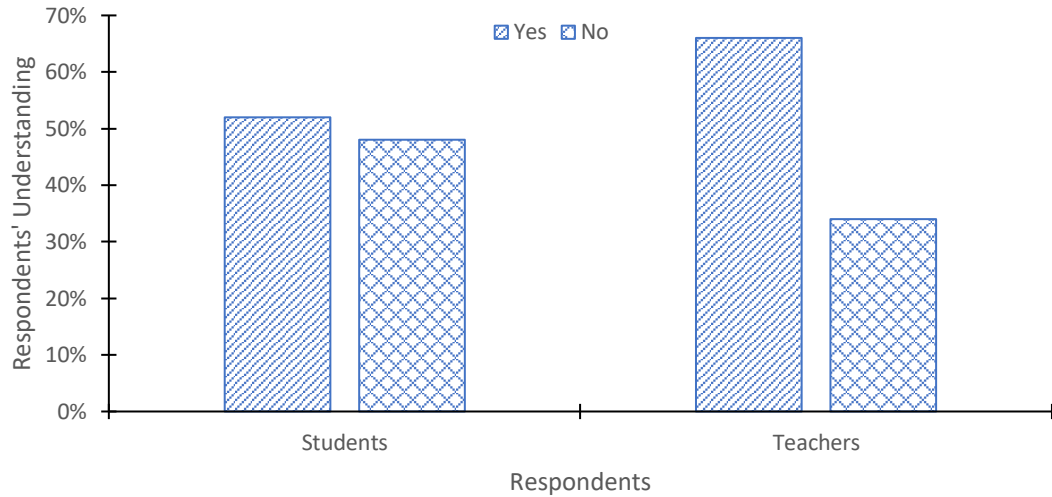
Figure 3.9 Awareness about the country's climate change campaigns

Table 3.7 Chi-square test among respondents' group regarding their awareness about the country's climate change campaigns

Categories		p-value
Students	Male	0.654
	Female	
Teachers	Male	0.098
	Female	
Respondents	Students	0.027*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.9 indicates that 52% of students and 66% of teachers know about the country's climate change campaigns. Table 3.7 discovers that p-values between genders of students and teachers on the statement 'awareness about country's climate change campaigns', are 0.654 and 0.098 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.027, which shows that there is a significant difference between respondents on awareness about the country's climate change campaigns.
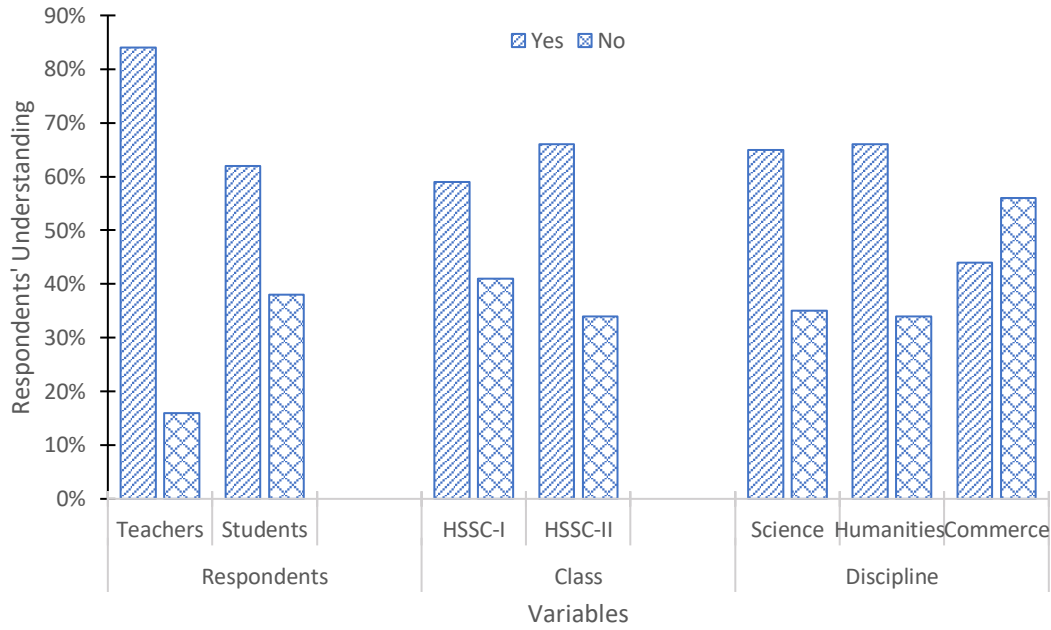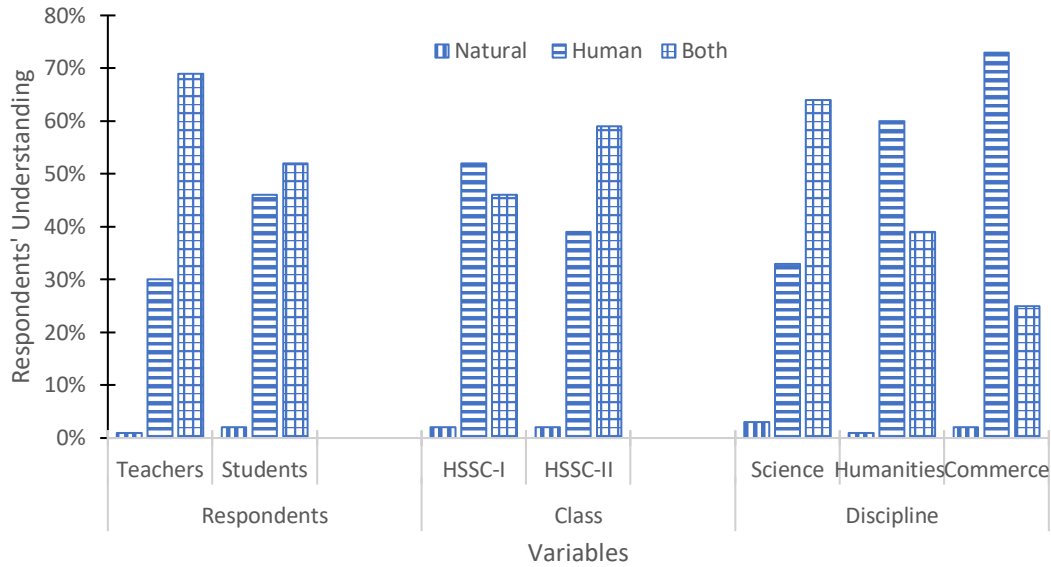
Figure 3.10 Causes of climate change

Table 3.8 Chi-square test among respondents' group regarding their understanding of the causes of climate change

Categories		p-value
Students	Male	0.711
	Female	
Teachers	Male	0.514
	Female	
Respondents	Students	0.028*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.10 reveals that 69% of teachers and 52% of students think that climate change is caused by both human and natural phenomena. However, 46% of students and only 30% of teachers think that human activities are causing climate change. Similarly, students at HSSC level I, 46% whereas at HSSC II is 59% think climate change is caused by human and natural process. Students' discipline wise comparison, such as 64% science, 39% humanities 39% and 25% commerce students think both reasons for climate change. Table 3.8 reflects that p-values between genders of students and teachers on the statement 'causes of climate change', are 0.711 and 0.514 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.028, which shows that there is a significant difference between respondents on the causes of climate change.

31

Figure 3.11 Understanding of the natural causes of climate change

Table 3.9 Chi-square test among respondents' group regarding their understanding of the natural causes of climate change

Categories		p-value
Students	Male	0.820
	Female	
Teachers	Male	0.260
	Female	
Respondents	Students	0.012*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.11 shows that 41% of students and 56% of teachers understand the natural causes of climate change. Table 3.9 identifies that p-values between genders of students and teachers on the statement 'understanding of the natural causes of climate change', are 0.820 and 0.260 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.012, which shows that there is a significant difference between respondents on the understanding the natural causes of climate change.
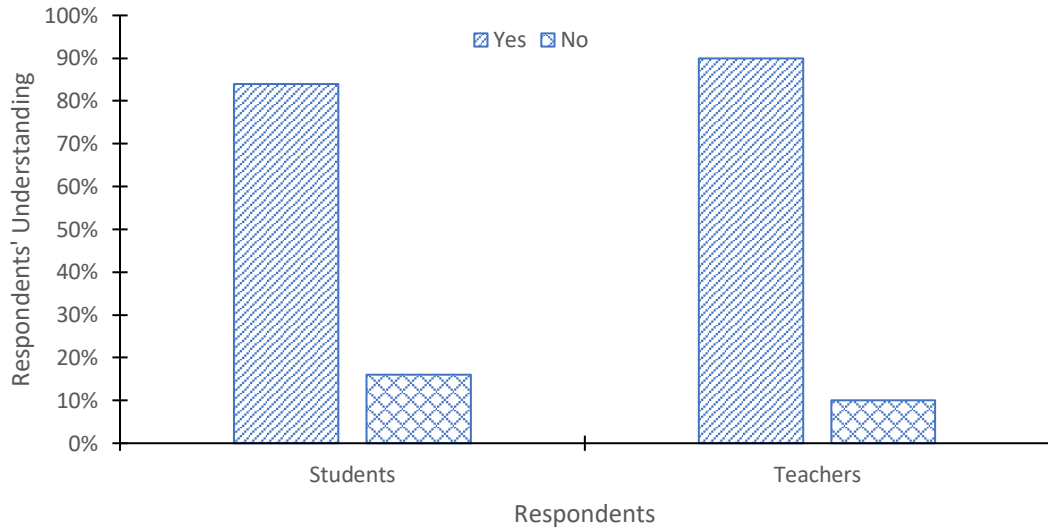
Figure 3.12 Understanding of the anthropogenic causes of climate change

Table 3.10 Chi-square test among respondents' group regarding their understanding of the anthropogenic causes of climate change

Categories		p-value
Students	Male	0.130
	Female	
Teachers	Male	0.456
	Female	
Respondents	Students	0.161
	Teachers	

Above figure exhibits that 84% of students and 90% of teachers understand the anthropogenic causes of climate change. Table 3.10 tells that p-values between genders of students and teachers on the statement 'understanding of the anthropogenic causes of climate change', are 0.130 and 0.456 respectively, and which are greater than the p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.161, which shows that there is also no significant difference between respondents on the understanding of the anthropogenic causes of climate change.
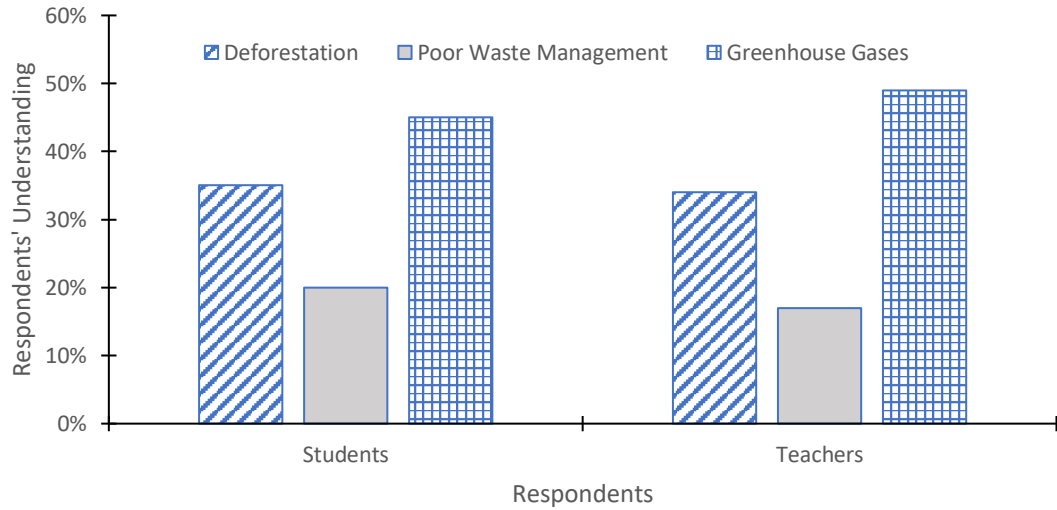
Figure 3.13 Most important factor contributed to global climate change

Table 3.11 Chi-square test among respondents' group regarding their understanding about the most important factor contributed to global climate change

Categories		*p*-value
Students	Male	0.696
	Female	
Teachers	Male	0.494
	Female	
Respondents	Students	0.839
	Teachers	

Figure 3.13 indicates that 45% of students and 49% of teachers think that climate change is primarily caused by greenhouse gases and almost a similar number of students and teachers think that deforestation is the main cause of climate change. Just 20% of students and 17% of teachers think that poor waste management is the reason for climate change. Table 3.11 states that p-values between genders of students and teachers on the statement 'most important factor contributed to global climate change', are 0.696 and 0.494 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.839, which shows that there is also no significant difference between respondents on the most important factor contributing to global climate change.
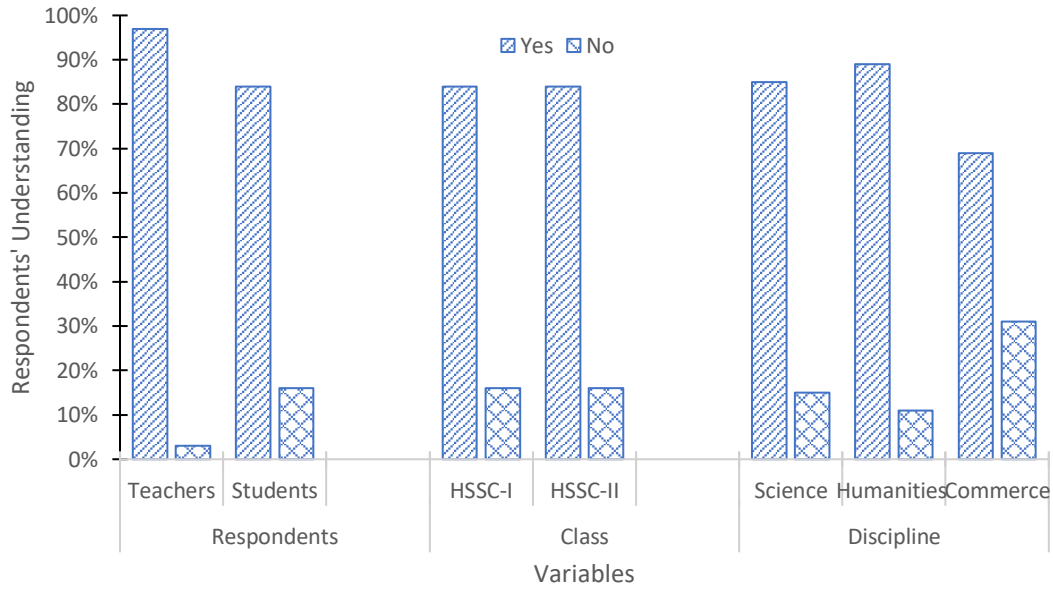
Figure 3.14 Climate change is a threat to world

Table 3.12 Chi-square test among respondents' group regarding their understanding of climate change as a threat to world

Categories		_p_-value
Students	Male	0.225
	Female	
Teachers	Male	0.152
	Female	
Respondents	Students	0.001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.14 reveals that 97% of teachers and 84% of students think that climate change is a threat to the world. Similarly, students at HSSC level I and II is 84%. Students' discipline wise comparison, such as science 85%, humanities 89% and commerce 69% respectively. Table 3.12 demonstrates that p-values between genders of students and teachers on the statement 'climate change is a threat to world', are 0.225 and 0.152 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.001, which shows that there is a significant difference between respondents on climate change is a threat to the world.
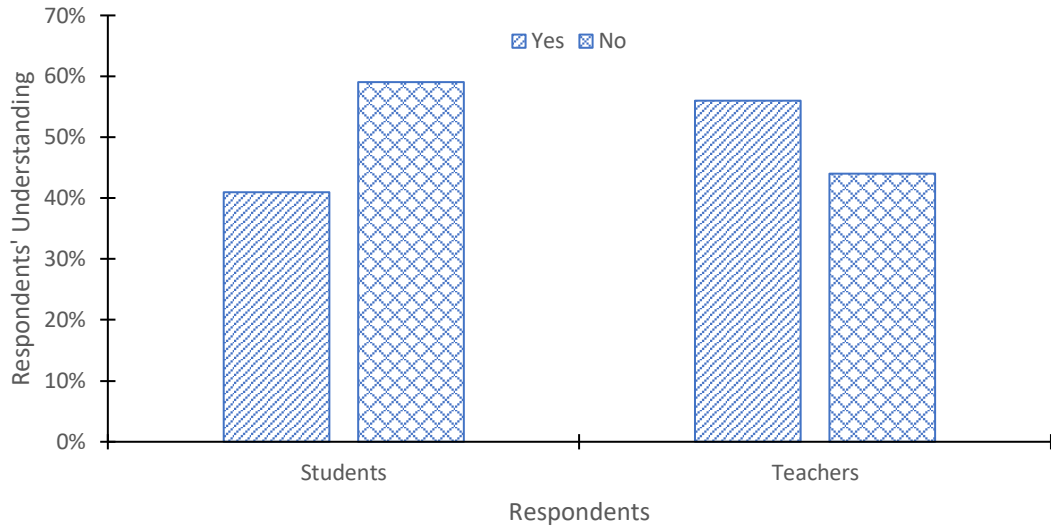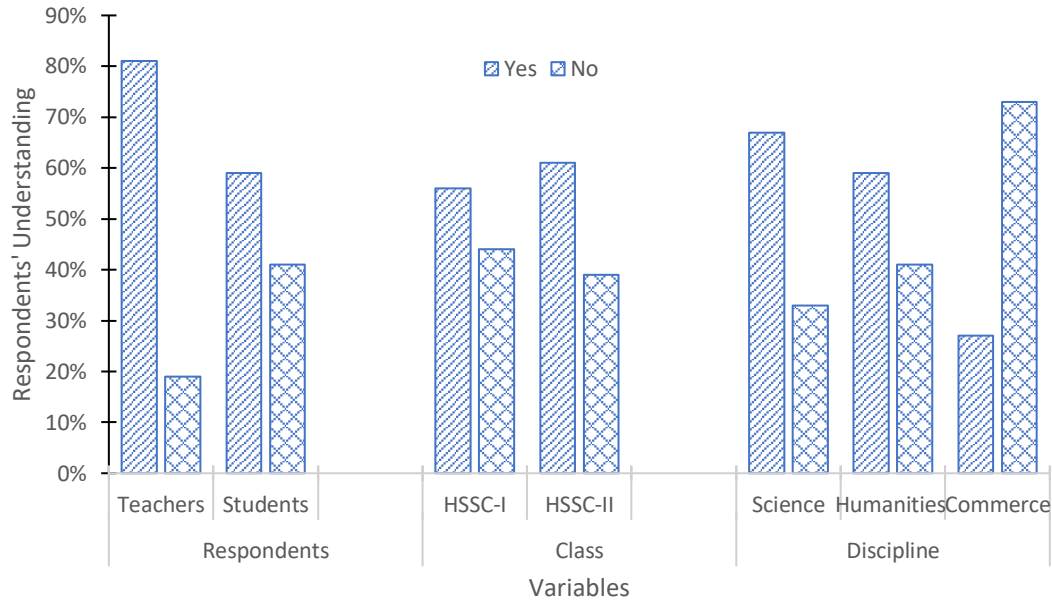
Figure 3.15 Climate change is a threat to Pakistan

Table 3.13 Chi-square test among respondents' group regarding their understanding of climate change as a threat to Pakistan

Categories		p-value
Students	Male	0.364
	Female	
Teachers	Male	0.775
	Female	
Respondents	Students	0.0001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.15 shows that 89% of teachers and 59% of students think that climate change is a threat to Pakistan. Similarly, students at HSSC level I, 56% and HSSC II is 61%. Students' discipline wise comparison, such as science 67%, humanities 59% and commerce 27% respectively. Table 3.13 exhibits that p-values between genders of students and teachers on the statement 'climate change is a threat to Pakistan', are 0.364 and 0.775 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.0001, which shows that there is a significant difference between respondents on climate change is a threat to Pakistan.
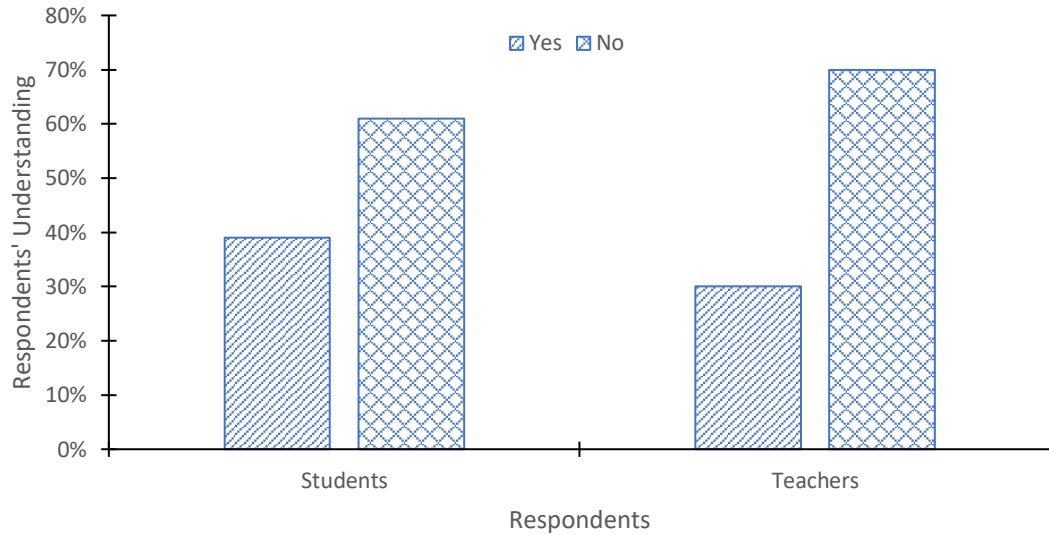
Figure 3.16 Too late to do anything about climate change

Table 3.14 Chi-square test among respondents' group regarding their understanding about climate change action

Categories		p-value
Students	Male	0.360
	Female	
Teachers	Male	0.329
	Female	
Respondents	Students	0.121
	Teachers	

Figure 3.16 indicates that 39% of students and 30% of teachers think that it is too late to do anything about climate change. Table 3.14 depicts that p-values between genders of students and teachers on the statement 'too late to do anything about climate change', are 0.360 and 0.329 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.121, which shows that there is also no significant difference between respondents on too late to do anything about climate change.
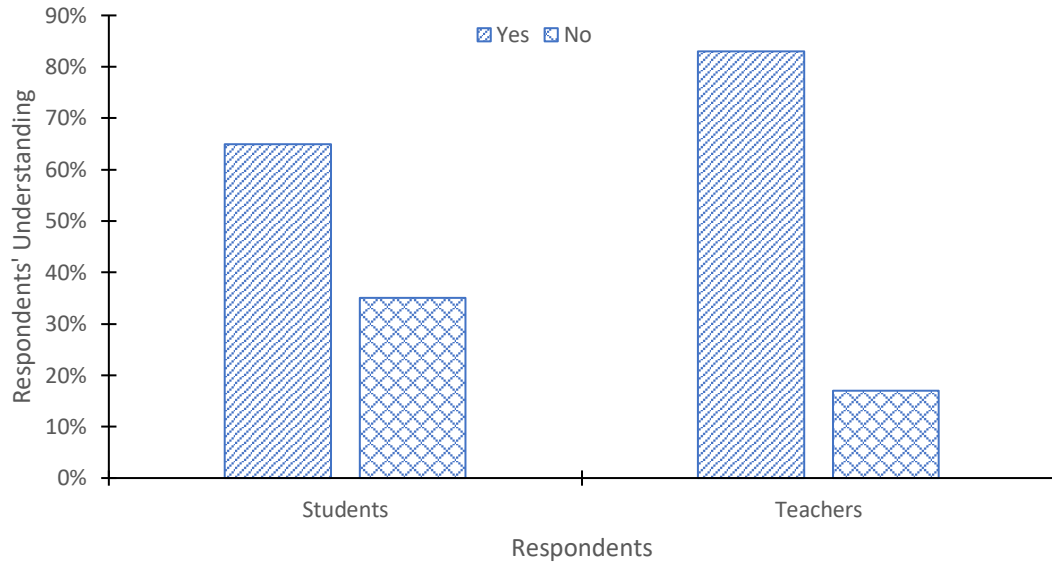
Figure 3.17 Unexpected weather changes are the result of climate change

Table 3.15 Chi-square test among respondents' group regarding their understanding about unexpected weather changes

Categories		p-value
Students	Male	0.061
	Female	
Teachers	Male	0.086
	Female	
Respondents	Students	0.003*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.17 exhibits that 65% of students and 83% of teachers think that unexpected weather changes are the result of climate change. Table 3.15 indicates that p-values between genders of students and teachers on the statement 'unexpected weather changes are the result of climate change', are 0.061 and 0.086 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.003, which shows that there is a significant difference between respondents on unexpected weather changes are the result of climate change.
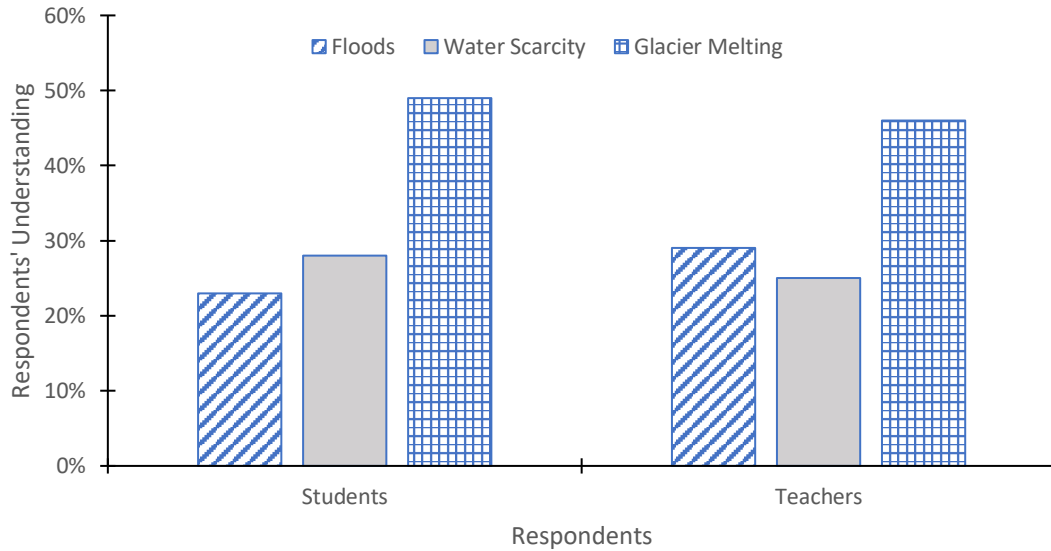
Figure 3.18 Most visible effect of climate change in our country

Table 3.16 Chi-square test among respondents' group regarding their understanding about the most visible effect of climate change in our country

Categories		p-value
Students	Male	0.193
	Female	
Teachers	Male	0.178
	Female	
Respondents	Students	0.523
	Teachers	

Figure 3.18 exhibits that 49% of students and 46% of teachers think that glacier melting is the most visible effect of climate change in Pakistan. 23% of students and 29% of teachers think that floods are the most visible effect, whereas 28% of students and 25% of teachers think that water scarcity is the most noticeable effect in our country. Table 3.16 reveals that p-values between genders of students and teachers on the statement 'most visible effect of climate change in our country' are 0.193 and 0.178 respectively, and which are greater than the p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.523, which shows that there is also no significant difference between respondents on the most visible effect of climate change in our country.
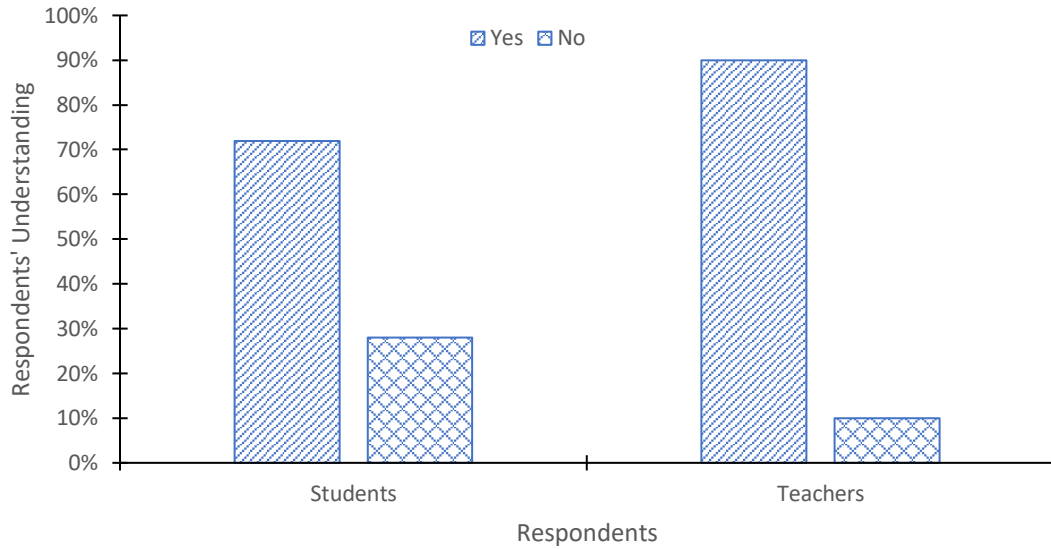
Figure 3.19 Himalayan glaciers are melting due to climate change

Table 3.17 Chi-square test among respondents' group regarding their understanding about melting of Himalayan glaciers

Categories		p-value
Students	Male	0.533
	Female	
Teachers	Male	0.456
	Female	
Respondents	Students	0.001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.19 shows that 72% of students and 90% of teachers think that Himalayan glaciers are melting due to climate change. Table 3.17 reflects that p-values between genders of students and teachers on the statement 'Himalayan glaciers are melting due to climate change', are 0.533 and 0.456 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.001, which shows that there is a significant difference between respondents on Himalayan glaciers are melting due to climate change.
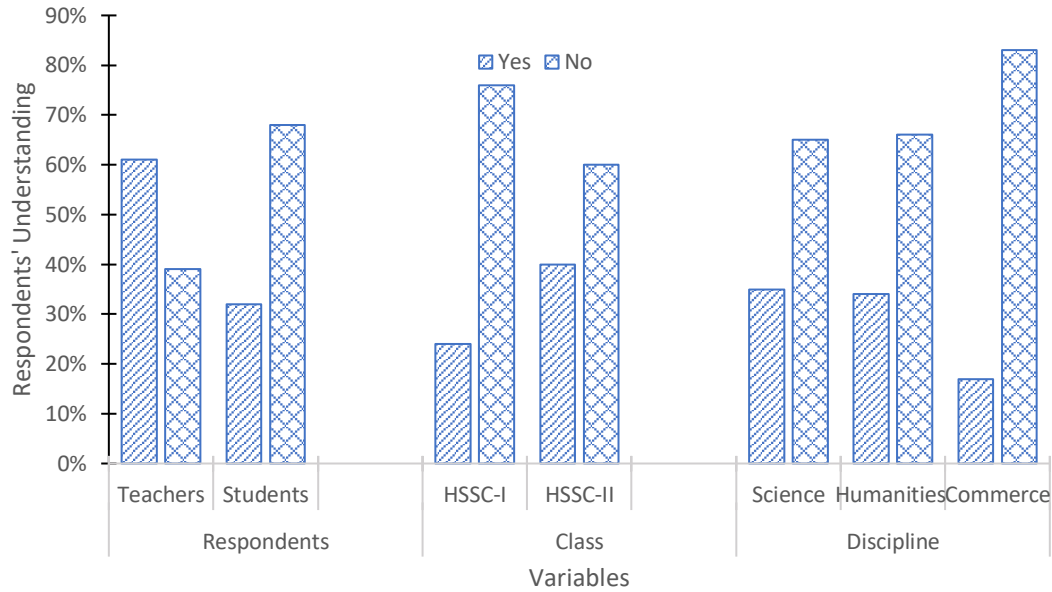
Figure 3.20 Knowledge of climate change mitigation and adaptation

Table 3.18 Chi-square test among respondents' group regarding their knowledge of climate change mitigation and adaptation

Categories		p-value
Students	Male	0.905
	Female	
Teachers	Male	0.491
	Female	
Respondents	Students	0.000002*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Above figure reveals that 61% of teachers and 32% of students think that they know about climate change mitigation and adaptation. Similarly, students at HSSC level I, 24% whereas at HSSC II is 40%. Students' discipline wise comparison, such as science 35%, humanities 34% and commerce 17% respectively. Table 3.18 tells that p-values between genders of students and teachers on the statement 'knowledge of climate change mitigation and adaptation', are 0.905 and 0.491 respectively, and which are greater than the p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.000002, which shows that there is a significant difference between respondents on knowledge of climate change mitigation and adaptation.
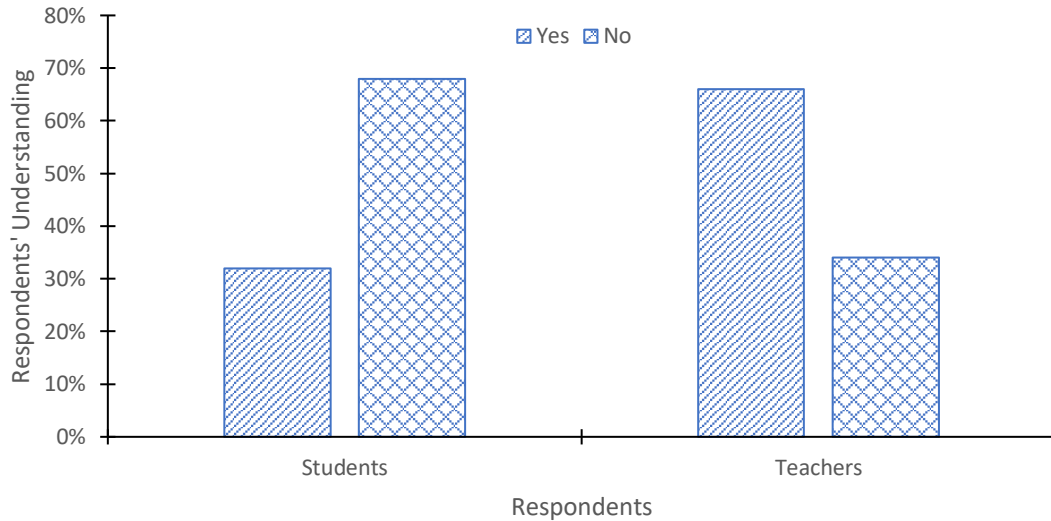
Figure 3.21 Action taken to reduce the impacts of climate change

Table 3.19 Chi-square test among respondents' group regarding their actions taken to reduce the impacts of climate change

Categories		p-value
Students	Male	0.077
	Female	
Teachers	Male	0.478
	Female	
Respondents	Students	0.000001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.21 demonstrates that 32% of students and 66% of teachers think that they have taken action to reduce the impacts of climate change. Table 3.19 states that p-values between genders of students and teachers on the statement 'action taken to reduce the impacts of climate change', are 0.077 and 0.478 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.000001, which shows that there is a significant difference between respondents on action taken to reduce the impacts of climate change.
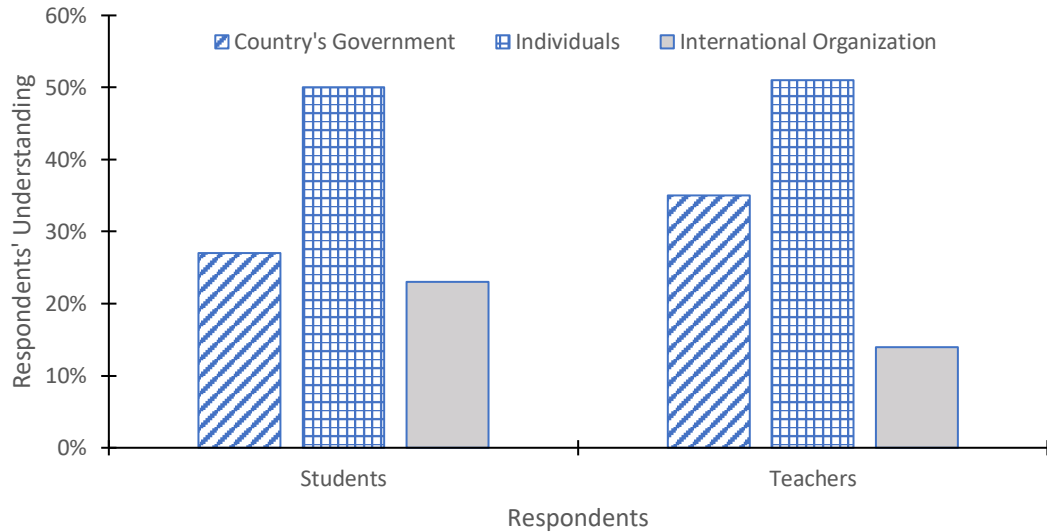
Figure 3.22 Main responsibility for tackling climate change

Table 3.20 Chi-square test among respondents' groups regarding their understanding about responsibility for tackling climate change

Categories		p-value
Students	Male	0.891
	Female	
Teachers	Male	0.456
	Female	
Respondents	Students	0.109
	Teachers	

Figure 3.22 exhibits that 50% of students and teachers think that it is the responsibility of individuals to fight against climate change, whereas 27% of students and 35% of teachers think that country's government is responsible for tackling climate change. However, 23% of students and just 14% of teachers think that international organizations are responsible to tackle climate change. Table 3.20 demonstrates that p-values between genders of students and teachers on the statement 'main responsibility for tackling climate change', are 0.891 and 0.456 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.109, which shows that there is also no significant difference between respondents on the main responsibility for tackling climate change.
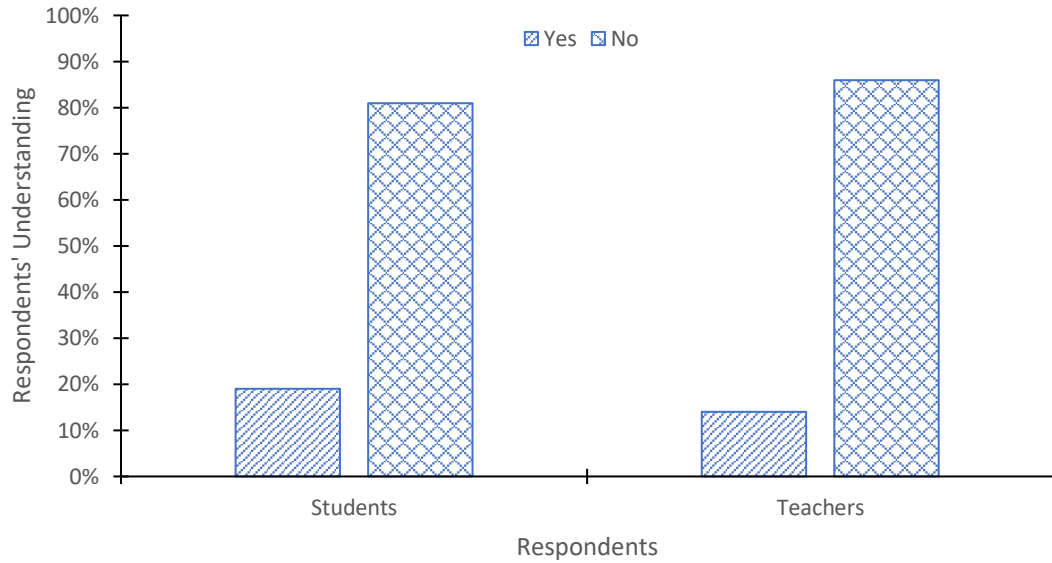
Figure 3.23 Government is doing enough to tackle climate change

Table 3.21 Chi-square test among respondents' groups regarding their perception about Government performance to tackle climate change

Categories		p-value
Students	Male	0.157
	Female	
Teachers	Male	0.330
	Female	
Respondents	Students	0.244
	Teachers	

Above figure shows that only 19% of students and 14% of teachers think that the government is doing enough to tackle climate change. Table 3.21 exhibits that p-values between genders of students and teachers on the statement 'government is doing enough to tackle climate change', are 0.157 and 0.330 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.244, which shows that there is also no significant difference between respondents on the government is doing enough to tackle climate change.
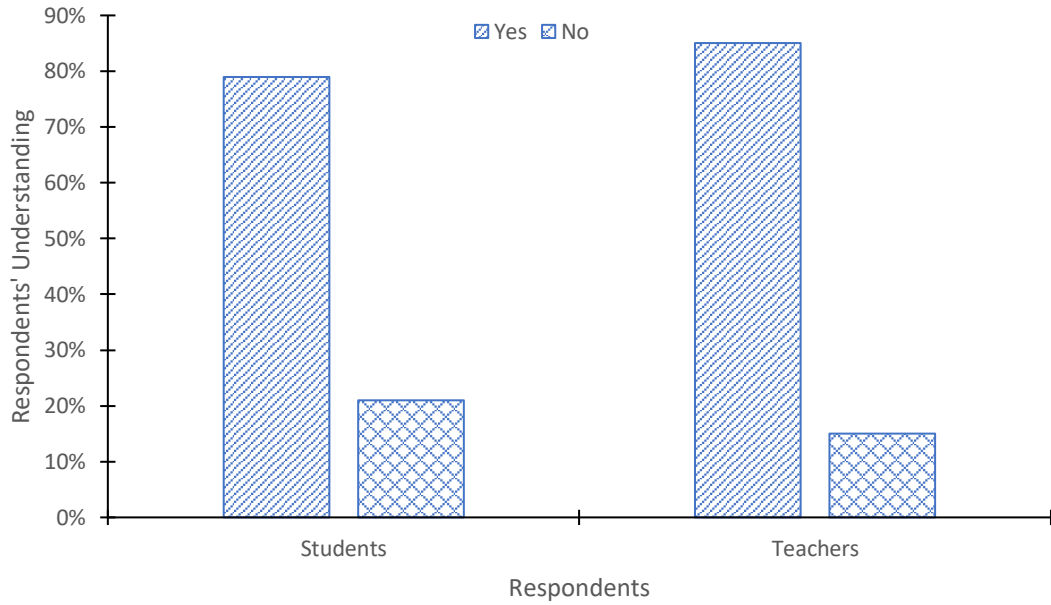
Figure 3.24 Willingness to promote climate change awareness

Table 3.22 Chi-square test among respondents' groups regarding their willingness to promote climate change awareness

Categories		p-value
Students	Male	0.172
	Female	
Teachers	Male	0.210
	Female	
Respondents	Students	0.211
	Teachers	

Figure 3.24 reveals that 79% of students and 85% of teachers willingly promote climate change awareness. Table 3.22 depicts that p-values between genders of students and teachers on the statement 'willingness to promote climate change awareness', are 0.172 and 0.210 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.211, which shows that there is also no significant difference between respondents on willingness to promote climate change awareness.
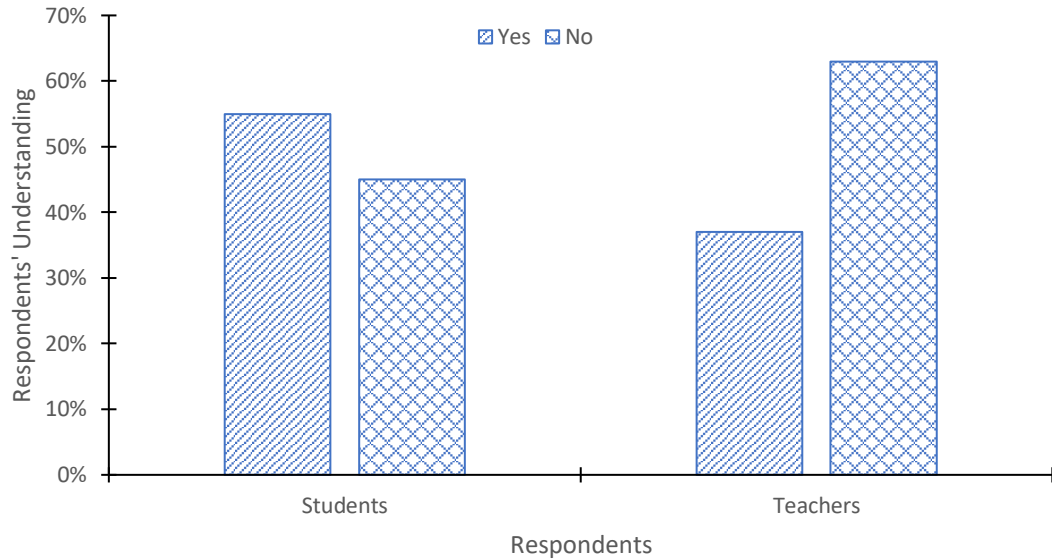
Figure 3.25 Use of public transport to protect the environment

Table 3.23 Chi-square test among respondents' groups regarding their use of public transport to protect the environment

Categories		p-value
Students	Male	0.013*
	Female	
Teachers	Male	0.065
	Female	
Respondents	Students	0.004*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.25 shows that 55% of students and 37% of teachers use public transport to protect the environment. Table 3.23 indicates that the p-value of teachers' gender on the statement 'use of public transport to protect the environment', is 0.065, which is greater than the p-value (0.05). It shows that there is no significant difference between teachers' genders on the statement. The overall p-values of respondents and students' gender are 0.004 and 0.013 respectively, which shows that there is a significant difference between respondents ' and students' gender on the use of public transport to protect the environment.
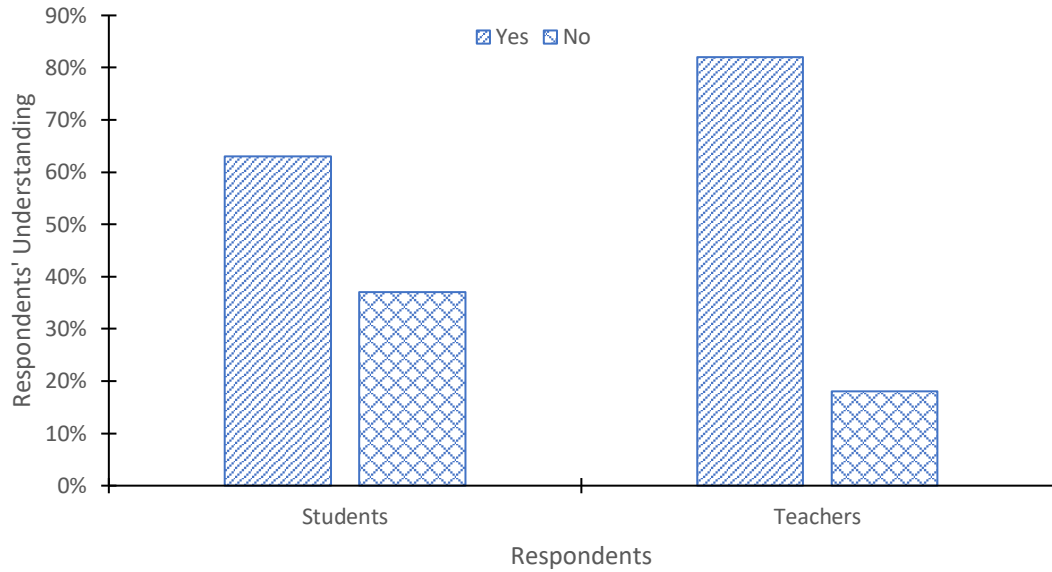
Figure 3.26 Use of energy-efficient devices to protect the environment

Table 3.24 Chi-square test among respondents' groups regarding their use of energy-efficient devices to protect the environment

Categories		p-value
Students	Male	0.728
	Female	
Teachers	Male	0.239
	Female	
Respondents	Students	0.001*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.26 exhibits that 63% of students and 82% of teachers use energy-efficient devices to protect the environment. Table 3.24 reveals that p-values between genders of students and teachers on the statement 'use of energy-efficient devices to protect the environment' are 0.728 and 0.239 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.001, which shows that there is a significant difference between respondents on the use of energy-efficient devices to protect the environment.
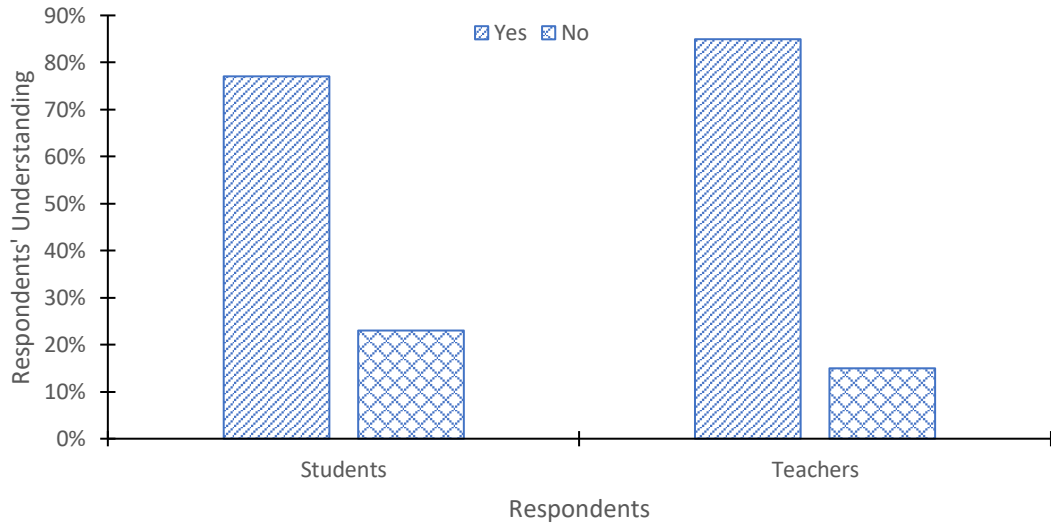
Figure 3.27 Use of eco-bags

Table 3.25 Chi-square test among respondents' groups regarding their use of eco-bags

Categories		p-value
Students	Male	0.895
	Female	
Teachers	Male	1.000
	Female	
Respondents	Students	0.102
	Teachers	

Figure 3.27 exhibits that 77% of students and 85% of teachers think that the use of eco-bags can also be a good way to protect the environment. Table 3.25 reflects that p-values between genders of students and teachers on the statement 'use of eco-bags', are 0.895 and 1.000 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.102, which shows that there is also no significant difference between respondents on the use of eco-bags.
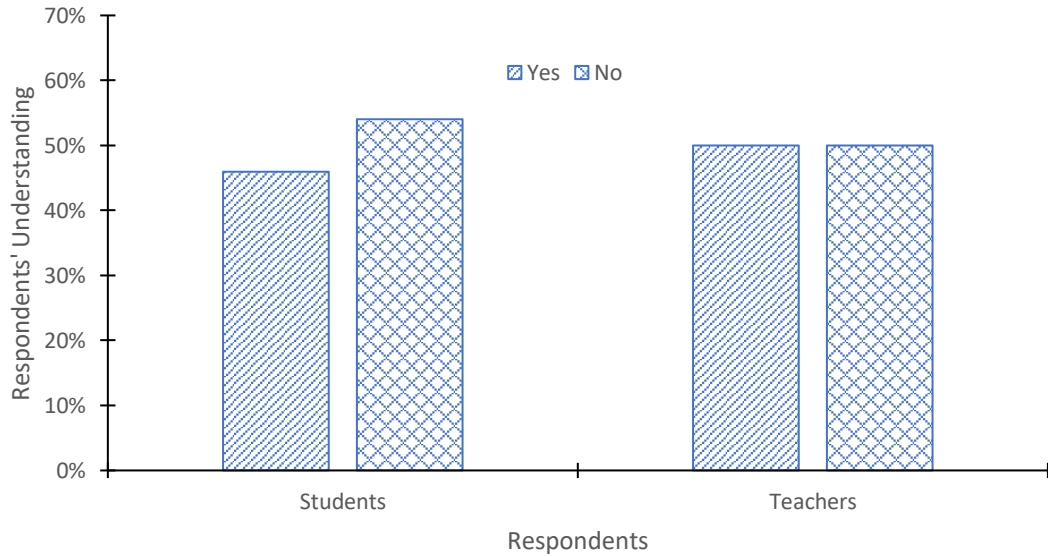
Figure 3.28 Plantation of trees to reduce impacts of climate change

Table 3.26 Chi-square test among respondents' groups regarding their act of planting trees to reduce impacts of climate change

Categories		p-value
Students	Male	0.092
	Female	
Teachers	Male	0.371
	Female	
Respondents	Students	0.515
	Teachers	

Above figure discovers that 46% of students and 50% of teachers planted tree/trees to reduce the impacts of climate change. Table 3.26 tells that p-values between genders of students and teachers on the statement 'plantation of trees to reduce impacts of climate change', are 0.092 and 0.371 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.515, which shows that there is also no significant difference between respondents on the plantation of trees to reduce the impacts of climate change.
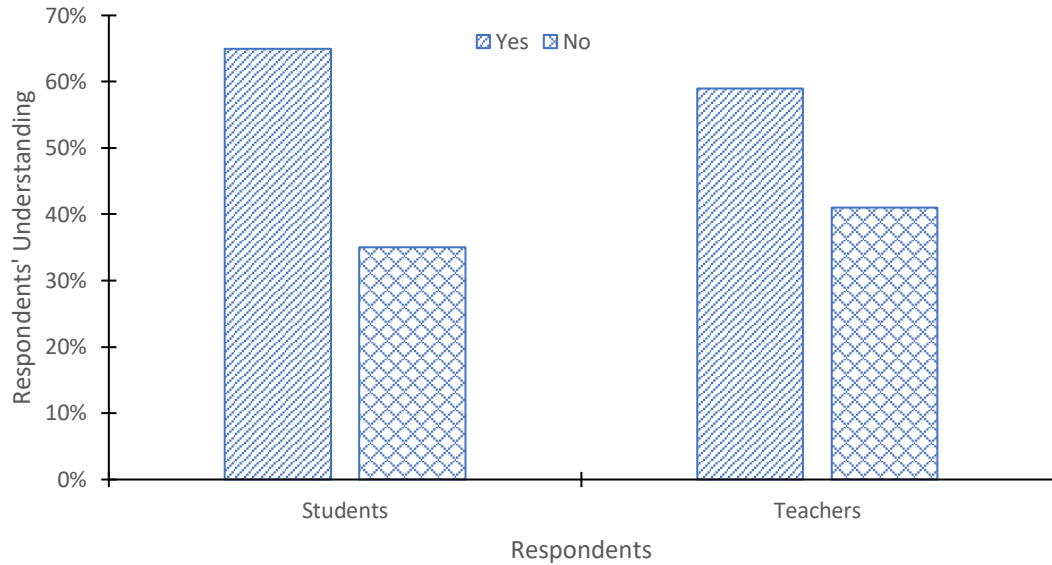
Figure 3.29 Subjects provide knowledge of climate change

Table 3.27 Chi-square test among respondents' groups regarding their knowledge of climate change in subjects

Categories		p-value
Students	Male	0.047*
	Female	
Teachers	Male	0.256
	Female	
Respondents	Students	0.324
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.29 reveals that 65% of students and 59% of teachers think that subjects at the higher secondary level provide knowledge of climate change. Table 3.27 states that p-values of teachers' genders and the overall respondents on the statement 'subjects provide knowledge of climate change', are 0.256 and 0.324 respectively, and which are greater than the p-value (0.05). It shows that there is no significant difference between teachers' genders and respondents on the statement. The p-value of students' gender is 0.047, which shows that there is a significant difference between students' gender on subjects provide knowledge of climate change.
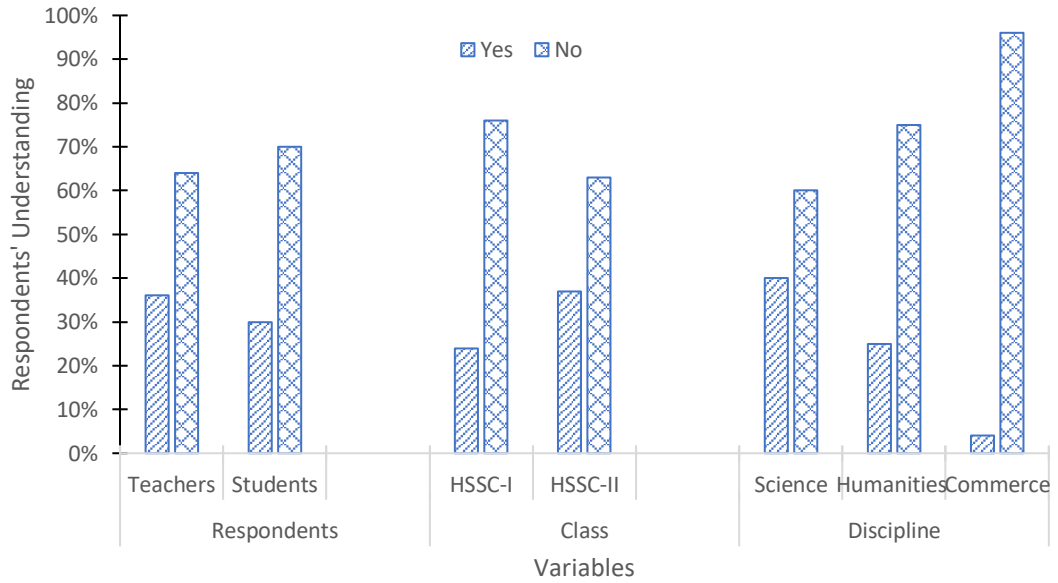
Figure 3.30 Causes, impacts and mitigation measures of climate change in syllabus

Table 3.28 Chi-square test among respondents' groups regarding their information of causes, impacts and mitigation measures of climate change in syllabus

Categories		p-value
Students	Male	0.146
	Female	
Teachers	Male	0.485
	Female	
Respondents	Students	0.334
	Teachers	

Figure 3.30 depicts that just 30% of students and 36% of teachers think that causes, impacts and mitigation measure of climate change is mentioned in the syllabus. Similarly, students at HSSC level I, 24% whereas at HSSC II is 37%. Students' discipline wise comparison, such as science 40%, humanities 25% and commerce 4% respectively. Table 3.28 demonstrates that p-values between genders of students and teachers on the statement 'causes, impacts, and mitigation measures of climate change in the syllabus', are 0.146 and 0.485 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.334, which shows that there is also no significant difference between respondents on causes, impacts, and mitigation measures of climate change in the syllabus.
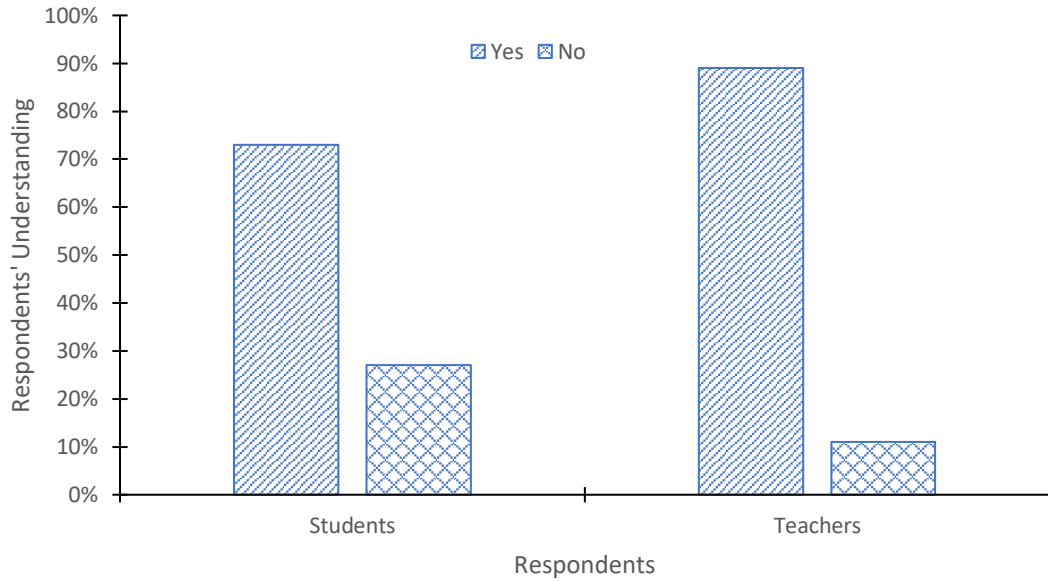
Figure 3.31 Government should include climate change knowledge into the curriculum

Table 3.29 Chi-square test among respondents' groups regarding their opinion on inclusion of climate change knowledge into the curriculum by government

Categories		p-value
Students	Male	0.255
	Female	
Teachers	Male	0.288
	Female	
Respondents	Students	0.004*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.31 indicates that 73% of students and 89% of teachers agree that the government should include climate change knowledge into the curriculum. Table 3.29 exhibits that p-values between genders of students and teachers on the statement 'government should include climate change knowledge into the curriculum' are 0.225 and 0.288 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.004, which shows that there is a significant difference between respondents on government should include climate change knowledge into the curriculum.
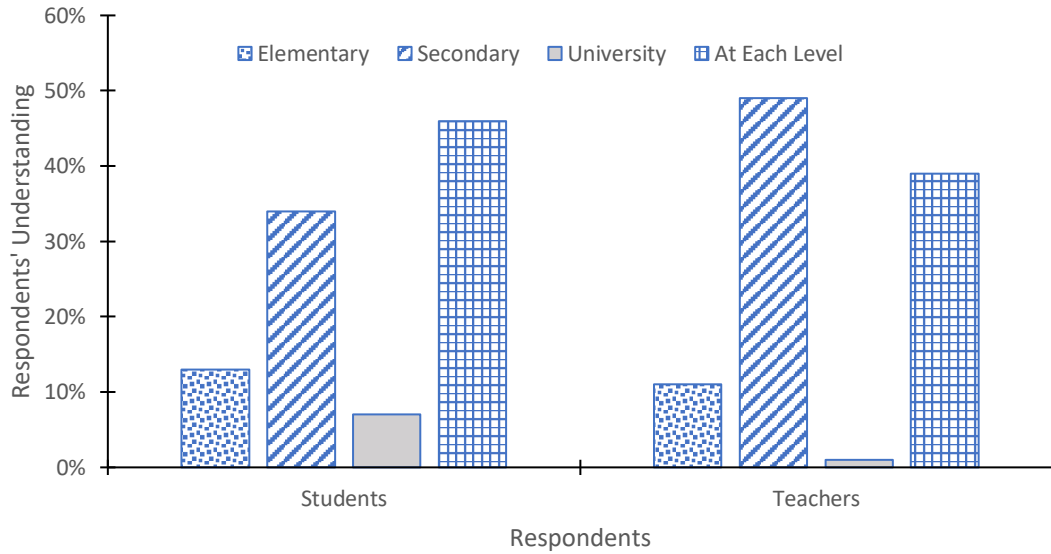
Figure 3.32 Appropriate level of education for climate change knowledge

Table 3.30 Chi-square test among respondents' groups regarding their opinion to include climate change knowledge at appropriate level of education

Categories		p-value
Students	Male	0.375
	Female	
Teachers	Male	0.520
	Female	
Respondents	Students	0.035*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Above figure demonstrates that 34% of students and 49% of teachers think the secondary level is appropriate for climate change knowledge. However, 46% of students and 39% of teachers think that knowledge of climate change should be taught at each level. Table 3.30 depicts that p-values between genders of students and teachers on the statement 'appropriate level of education for climate change knowledge', are 0.375 and 0.520 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.035, which shows that there is a significant difference between respondents on the appropriate level of education for climate change knowledge.
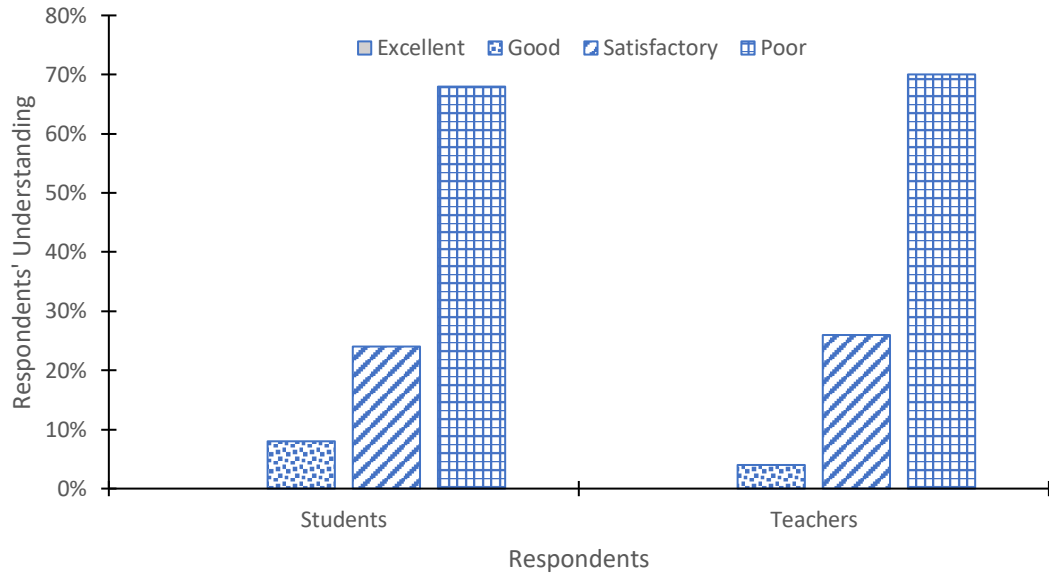
Figure 3.33 Higher secondary school curriculum rating for creating climate change awareness

Table 3.31 Chi-square test among respondents' groups regarding their opinion about rating of higher secondary school curriculum for creating climate change awareness

Categories		p-value
Students	Male	0.682
	Female	
Teachers	Male	0.189
	Female	
Respondents	Students	0.428
	Teachers	

Figure 3.33 exhibits that 68% of students and 70% of teachers rate that curriculum at the higher secondary level as poor regarding disseminating climate change awareness. Table 3.31 indicates that p-values between genders of students and teachers on the statement 'higher secondary school curriculum rating for creating climate change awareness', are 0.682 and 0.189 respectively, and which are greater than the p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.428, which shows that there is also no significant difference between respondents on higher secondary school curriculum rating for creating climate change awareness.
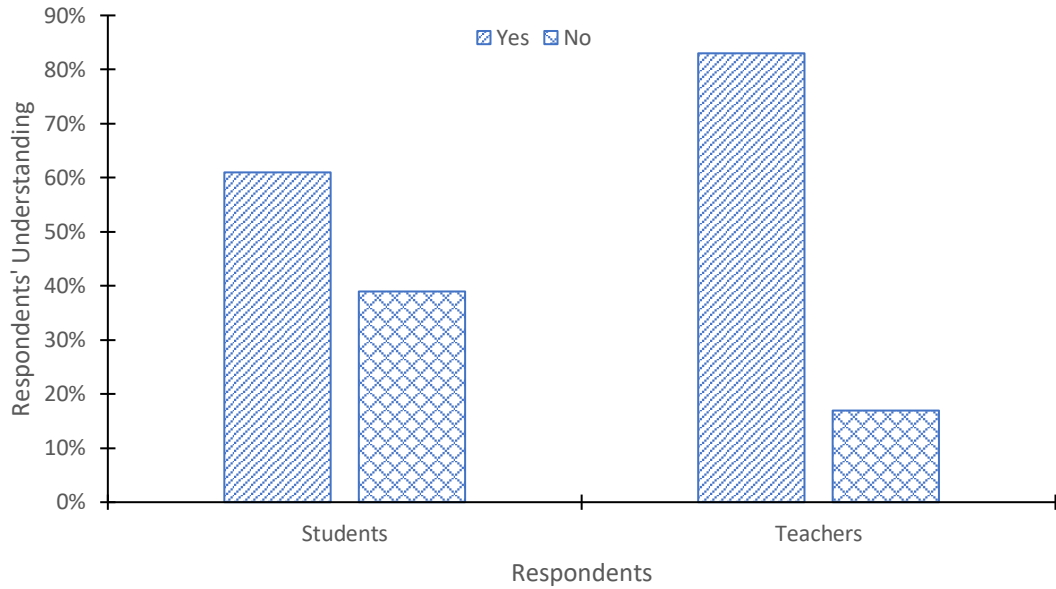
Figure 3.34 Provision of climate change knowledge through seminars or workshops

Table 3.32 Chi-square test among respondents' groups regarding provision of climate change knowledge through seminars or workshops

Categories		*p*-value
Students	Male	0.066
	Female	
Teachers	Male	0.239
	Female	
Respondents	Students	0.0003*
	Teachers	

* It shows awareness among students and teachers is significantly different at 0.05.

Figure 3.34 depicts that 61% of students and 83% of teachers think that climate change knowledge may increase through seminars or workshops. Table 3.32 reflects that p-values between genders of students and teachers on the statement 'provision of climate change knowledge through seminars or workshops', are 0.066 and 0.239 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.0003, which shows that there is a significant difference between respondents on the provision of climate change knowledge through seminars or workshops.
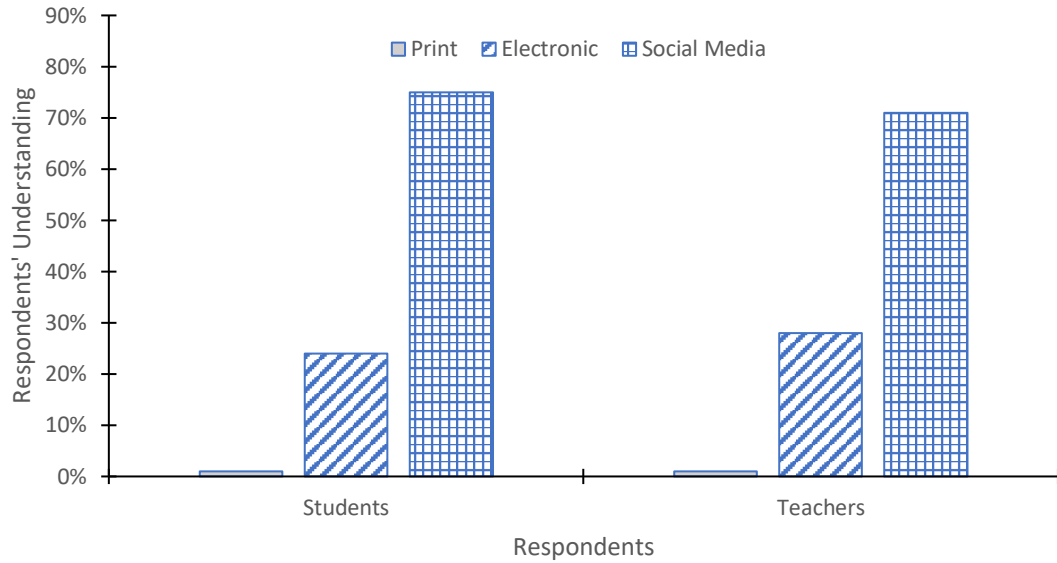
Figure 3.35 Most effective medium in disseminating climate change awareness

Table 3.33 Chi-square test among respondents' groups regarding their opinion about most effective medium in disseminating climate change awareness

Categories		p-value
Students	Male	0.076
	Female	
Teachers	Male	0.549
	Female	
Respondents	Students	0.816
	Teachers	

Figure 3.35 reveals that 75% of students and 71% of teachers think that social media can be very effective in creating climate change awareness. However, 24% of students and 28% of teachers think that electronic media is the most effective in disseminating climate change awareness. Table 3.33 states that p-values between genders of students and teachers on the statement 'most effective medium in disseminating climate change awareness', are 0.076 and 0.549 respectively, and which are greater than p-value (0.05). It shows that there is no significant difference between genders on the statement. The overall p-value of respondents is 0.816, which shows that there is also no significant difference between respondents on the most effective medium in disseminating climate change awareness.
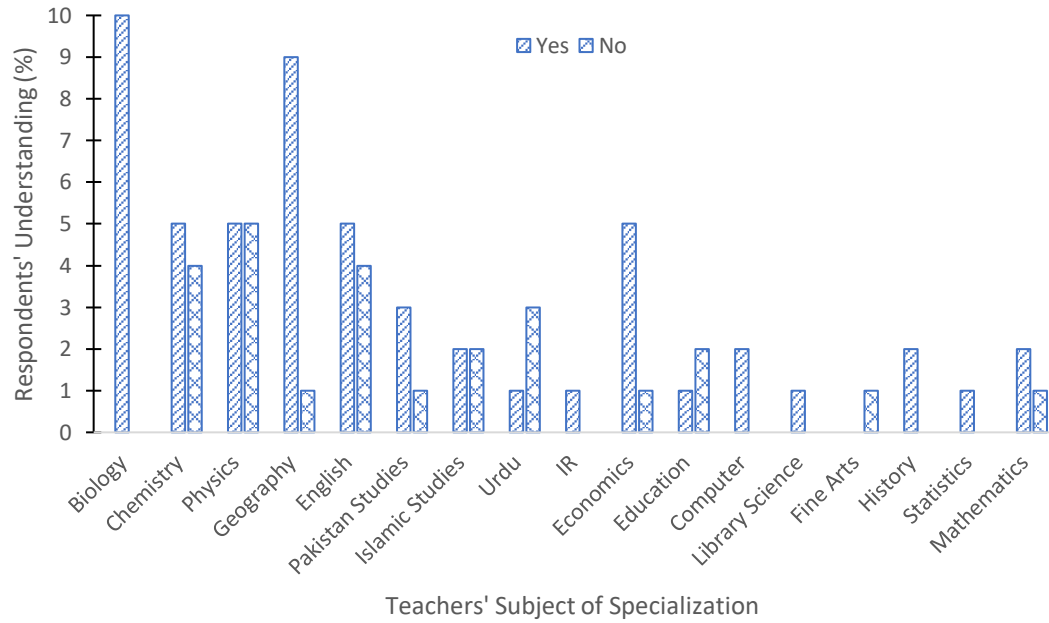
Figure 3.36 Complete understanding of climate change among teachers

Above figure depicts that majority of teachers from biological sciences think that they completely understand climate change. Similarly, the understanding of social science teachers is also better. Whereas the understanding of teachers of Fine Arts, Urdu, Education is very poor.

3.3 Analysis of Climate Change Content in the Curriculum

Climate change and related topics were not adequately covered in the entire higher secondary level curriculum. For instance, out of eight analyzed sampled subjects, only four covered topics related to the environment, but specifically climate change content has been missing. Not a comprehensive separate chapter about climate change in any of the analyzed subjects, except for a few topics or themes regarding the environment. The only word global warming was mentioned in the curriculum which could be taken synonymously with climate change. (Schuldt et al., 2011).

In Biology, the concepts of global warming, pollution, acid rain, and ozone depletion were addressed under the chapter name 'Ecology'. But the chapter even failed to define the concept of climate change. The subject, however, addressed some of the causes and effects of global warming but mitigation and adaptation measures were ignored completely. Biology possessed only 4% of the identified content related to the environment at HSSC-II only.

But Chemistry possessed only 3% content related to the environment under the chapter name 'Environmental Chemistry'. The topics of water pollutants, automobile pollutants, industrial smog, acid rain, destruction of ozone, greenhouse effect, global warming and climate change were addressed. The information regarding climate change was completely ignored at HSSC-I, although at HSSC-II climate change knowledge was neither adequate nor sufficient.

On the other hand, Geography contained only 10% of the content about environmental problems. The topic also discussed types of pollution, the greenhouse effect, global warming but failed to throw lights on climate change. However again, it failed to provide climate change content at HSSC-I.

But in English, some mitigation measures were discussed under the theme of 'Preservation of Environment', other than language ability, which covers about 2% of the whole curriculum.

Vice versa, the curriculum of Physics, Urdu, Civics and Islamic Studies at the higher secondary level did not carry any concept of environment or climate change.

3.4 Analysis of Curriculum Experts' Opinion on Climate Change Knowledge

A summary of responses for all questions in the research is shown by graphs.
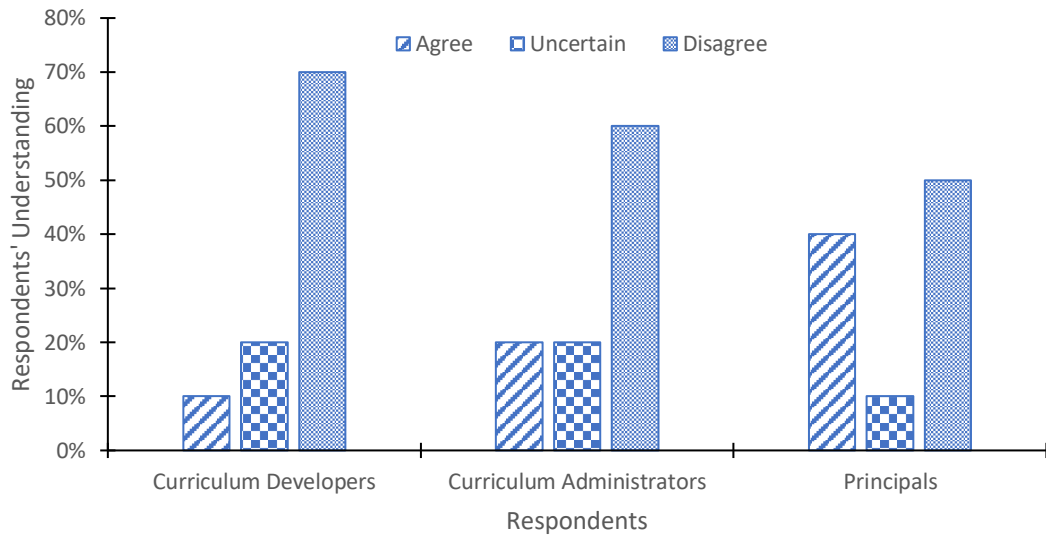
Figure 3.37 Idea of climate change has properly been addressed in the current curriculum

Figure 3.37 indicates that there is a little difference in opinions among respondents. Curriculum developers and curriculum administrators almost reject the statement whereas principals partially reject that the idea of climate change has properly been addressed in the current curriculum. 70% of curriculum developers, 60% curriculum administrators and 50% principals disagree whereas 40% of principals, 20% curriculum administrators and just 10% of curriculum developers agree with the statement.
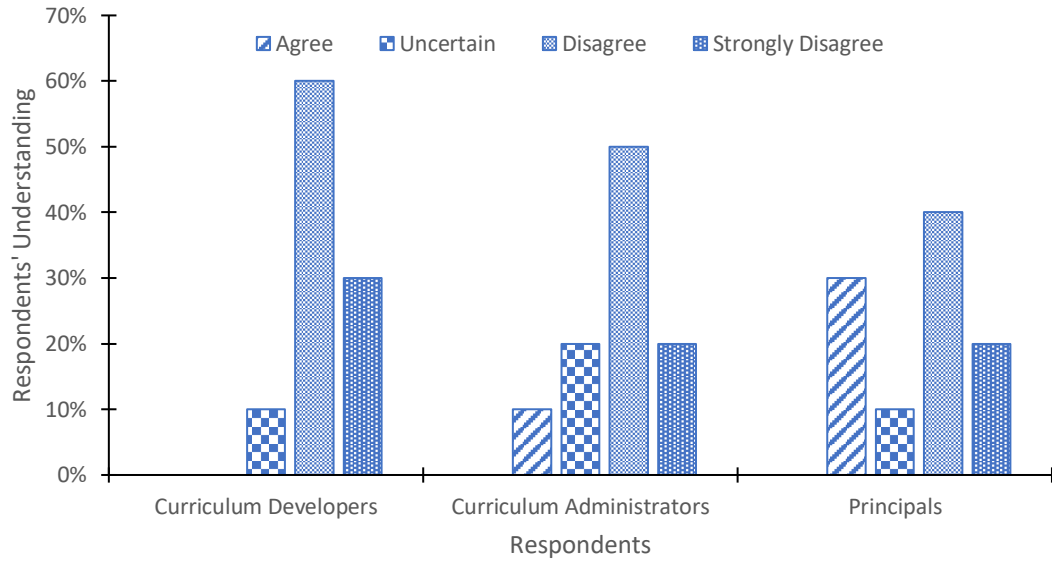
Figure 3.38 Causes, impacts and mitigation of climate change are well addressed by the curriculum

Figure 3.38 shows that 90% (SDA 30%+DA 60%) curriculum developers, 70% (SDA 20%+DA 50%) curriculum administrators and 60% (SDA 20%+DA 40%) principals disagree with the statement, whereas 30% principals and only 10% curriculum administrators agree with the statement that causes, impacts, and mitigation of climate change are well addressed by the curriculum.
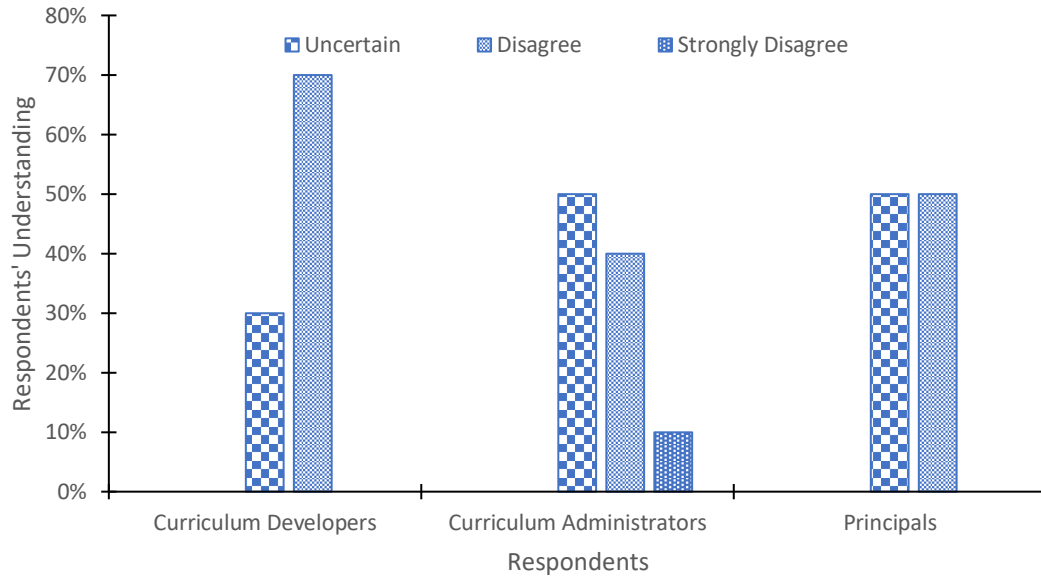
Figure 3.39 Bodies dealing with climate change have been introduced in the curriculum

Figure 3.39 reveals that there is a similarity in the opinions of curriculum developers, curriculum administrators and principals that bodies dealing with climate change have not been introduced in the curriculum. 70% curriculum developers, 50% (SDA 10%+DA 40%) curriculum administrators and principals disagree with the statement while 50% curriculum administrators, principals and only 30% curriculum developers are not sure with the statement.
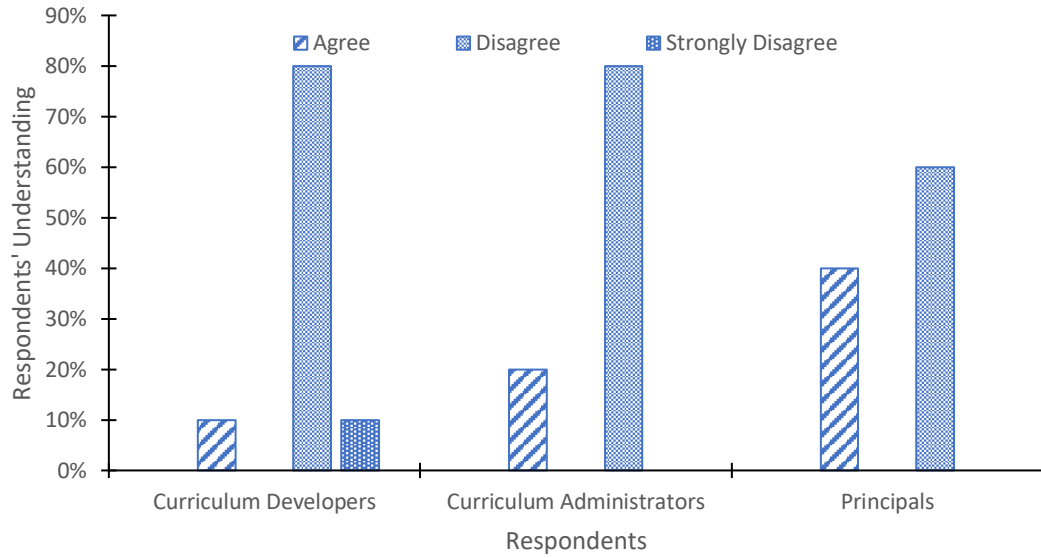
Figure 3.40 Developments regarding climate change have been inculcated gradually through curriculum review

Figure 3.40 suggests that 90% (SDA 10%+DA 80%) curriculum developers, 80% curriculum administrators and 60% principals disagree with the statement, whereas 40% principals, 20% curriculum administrators and just 10% curriculum developers agree with the statement that developments regarding climate change have been inculcated gradually through curriculum review.
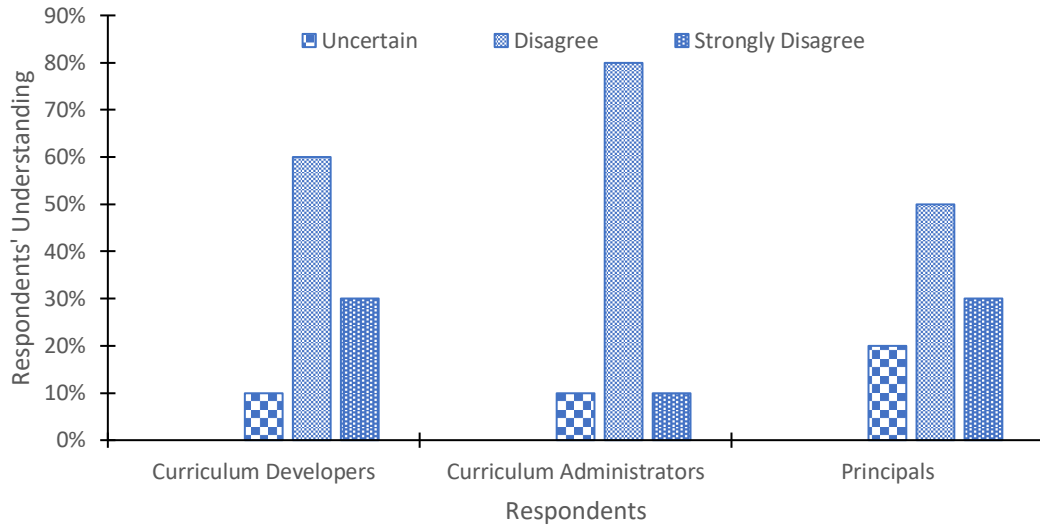
Figure 3.41 After each curriculum review, teachers are trained to assimilate the concept of climate change through in-service training

Above figure reflects that there is a similarity in the opinions of curriculum developers, curriculum administrators and principals that after each curriculum review, teachers are trained to assimilate the concept of climate change through in-service training. 90% curriculum developers (SDA 30%+DA 60%), and curriculum administrators (SDA 10%+DA 80%) and 80% (SDA 30%+DA 50%) principals disagree with the statement while only 10% curriculum developers and curriculum administrators, and only 20% principals are not sure with the statement.
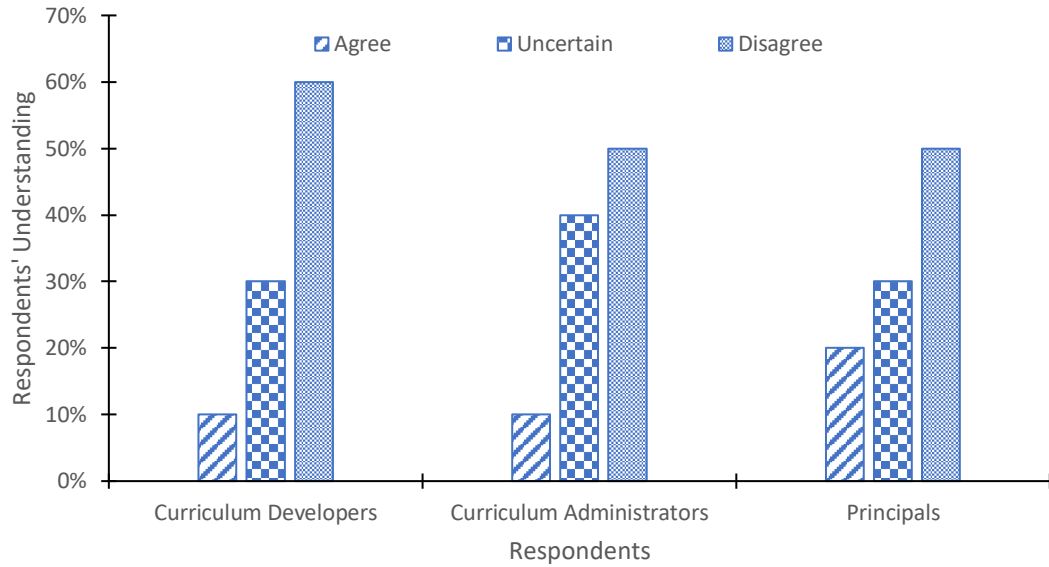
Figure 3.42 Current higher secondary level curriculum create enough climate change awareness

Figure 3.42 exhibits that opinion of curriculum developers, curriculum administrators and principals, is almost the same that the current higher secondary level curriculum does not create enough climate change awareness. 60% of curriculum developers and 50% of curriculum administrators and principals disagree with the statement. Only 10% of curriculum developers and curriculum administrators whereas 20% of principals agree with the statement.
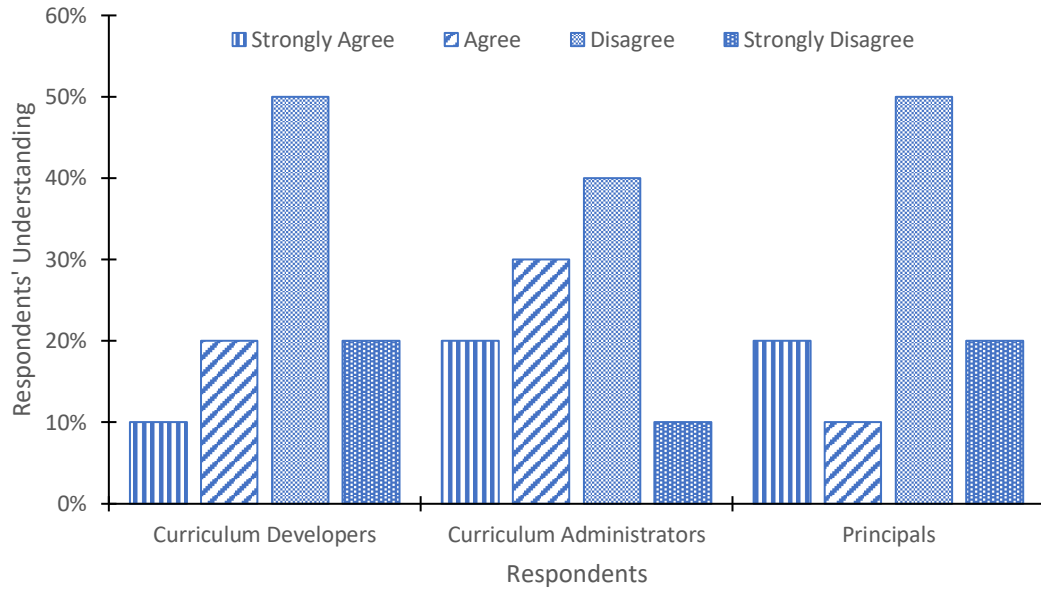
Figure 3.43 There is a dire need to introduce a stand-alone subject at the higher secondary level to address climate change

Figure 3.43 demonstrates that there is a difference of opinion among curriculum administrators with curriculum developers and principals on the statement that there is a dire need to introduce a stand-alone subject at the higher secondary level to address climate change. 50% of curriculum administrators agree (SA 20%+A 30%) while 50% disagree (SDA 10%+DA 40%) with the statement. Whereas 30% of curriculum developers and principals agree and 70% disagree (SDA 50%+DA 20%) with the statement.
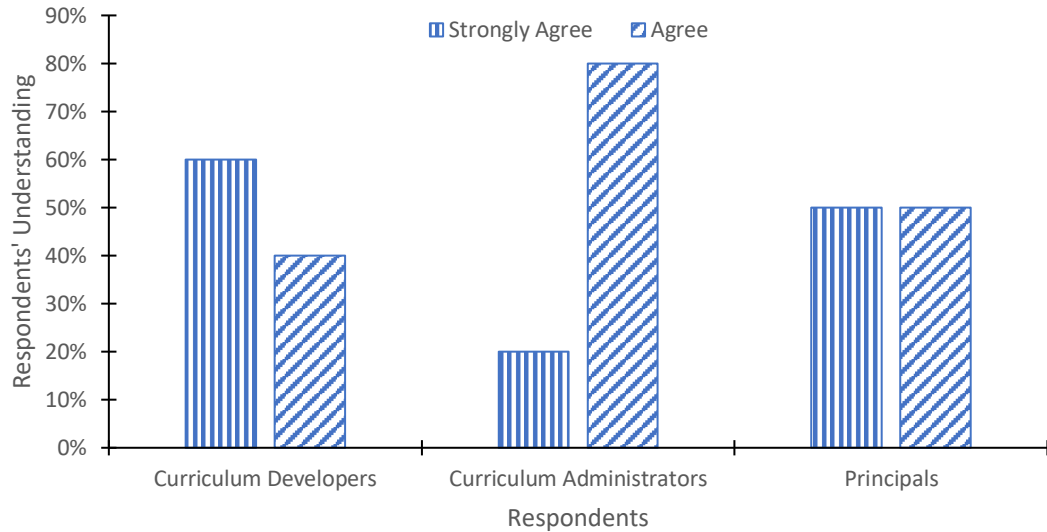
Figure 3.44 Social media should be properly used to create climate change awareness among students and teachers

Above figure depicts that opinions of all three groups of respondents are exactly the same that social media should be properly used to create climate change awareness among students and teachers. 100% curriculum developers (SA 60%+ A 40%), curriculum administrators (SA 20%+A 80%) and principals (SA 50%+A 50%) agree with the statement.
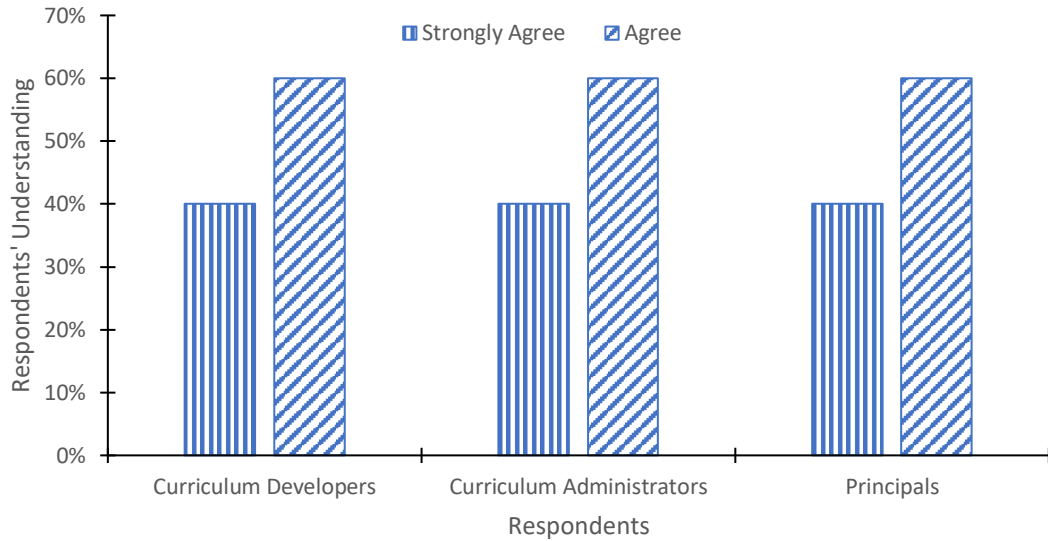
Figure 3.45 To motivate students towards environment protection, incentives may be provided for practical activities like planting a tree

Figure 3.45 shows that there is no difference of opinion at all among all the three groups of respondents. 100% of curriculum developers, curriculum administrators and principals agree with the statement that to motivate students towards environment protection, incentives may be provided for practical activities like planting a tree.
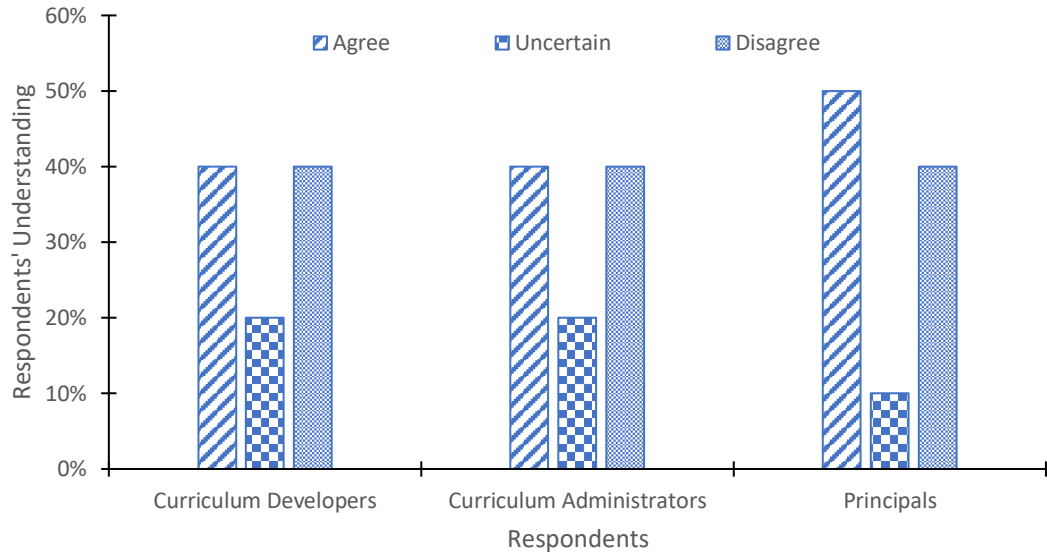
Figure 3.46 The government is taking initiatives to reduce the impacts of climate change through education

Figure 3.46 indicates that the opinion of curriculum developers, curriculum administrators and principals, is divided regarding the statement that the government is taking initiatives to reduce the impacts of climate change through education. 40% of all respondents reject the statement while almost 40% of all respondents agree with the statement and remaining are not sure.

CHAPTER 4

DISCUSSION

This chapter presents a brief discussion in light of the results of the study. The findings of the study disclose that there is a difference of opinion among students and teachers on several points regarding climate change awareness, but in some cases, they are of the same view. The findings of the study indicate that only 44% of students completely understand the term climate change. In addition, they may have their own interest in the subject and availability of related content in the syllabus. A similar study conducted in the United States demonstrated the fact that high school students do not fully understand climate change (Shealy et al., 2019).

The findings reflect that 84% of students consider the anthropogenic activities are causes of climate change, whereas just 41% account for the natural causes of climate change. Sufficient material is available in the curriculum about human causes; therefore, students comprehend accordingly. Similarly, the results are justified by the findings made by (Meehan et al., 2018) that most of the curriculum identifies anthropologic activity as a key factor in today's climate change.

The results of the study reveal that 45% of the students think that greenhouse gases mostly contribute to global climate change. Here the onus of understanding is not disgruntled due to their physical interaction with the environment. Similarly (Singh and Singh) acknowledge the same that 42% of students believe that the emission of greenhouse gases is the main reason for climate change.

The result also shows that 84% of students think that climate change is a threat to the world because youth is more concerned and aware. The same views have been expressed by (Upadhyaya, 2006) that 81% of students say that global climate change is extremely dangerous.

The findings of the study indicate that 50% of the students think that it is the responsibility of individuals to take action against climate change. This kind of understanding has manifolds reasons, such as brought up, religious obligations and a sense of responsibility. Similar results were reported by Singh and Singh, 2014 that

64% of students agreed that local communities and people must have taken steps to mitigate climate change at the local level.

The result also reflects that 79% of the students are agreed on promoting climate change awareness willingly. Both, civic sense and one's natural response to its existence as a human being are the valid reasons. A similar outcome has been drawn by (Upadhyaya, 2006) that about 81% of students say they are eager to pay for green products to limit the effects of climate change.

The result shows that the majority of students think that social media is the most effective medium in disseminating climate change awareness, due to its cheaper mode of communication and widely used all over the world. The same views have been expressed by (Upadhyaya, 2006) that mass media especially new media, (especially Facebook and Twitter) can raise climate change awareness.

The findings of the study indicate that 74% of the science students completely understand climate change, however, just 19% and 7% of humanities and commerce students understand respectively. It is quite logical that science students have strong knowledge as compare to other disciplines. The same has been expressed by (Yembuu et al., 2019) that the issues of climate are taught only in the subject of science and geography at high schools. Therefore, the lack of climate change knowledge and skills in students who do not opt for these subjects.

The results reflect that the level of climate change awareness among teachers is not very high but comparatively better than students due to their higher education and experience. A similar outcome has been drawn by (Padmanabhan et al., 2017) that the college students were less familiar with their teachers. The results are also supported by (Ekpoh and Ekpoh, 2011) that high school teachers are usually unaware of the concept of climate change and related problems.

The results of the study indicate that teacher's awareness about world policies is very limited, just 36% know about UNFCCC, 24% know about the Kyoto protocol, 17% having knowledge about the Montreal protocol and 23% teachers have no idea about all these world agreements. All the laws and treaties related to climate change are not included in the syllabus, only inclusion would be sufficient to enhance the knowledge and competency. The same was concluded by (BA, 2014) that teachers had limited knowledge of the presence of the UNFCCC, the Kyoto Protocol, etc.

The finding also reveals that 82% of teachers agree that climate change knowledge should be provided through seminars, workshops, or short courses because

they are eager to expand their knowledge positively. A similar outcome has been drawn by (Shaw, 2015) that students and teachers should be given training on new scientific trends in climate change to improve capacity. (Padmanabhan et al., 2017) also recommended that workshops are needed to help secondary school teachers, better understand how to deal with the threat of climate change.

The results of the study indicate that there is little climate change content in the current higher secondary level curriculum due to lack of interest and professional ignorance in past practices. The same results have been deduced in (EAC, 2011) report that in many developing countries, almost at all levels of the curriculum, from primary to secondary education, there is a significant shortage of material on climate change. The same also concluded by (Maharjan, 2013) that there is very little information on climate change in the science curriculum of upper secondary schools. The prevailing curriculum of science fails to convey the concept of climate change in secondary schools.

The results show that none of the sampled subjects have reasonable climate change content. Climate change-related topics are only discussed in Biology, Chemistry and Geography, all these subjects are pure science subjects. Similar results were reported by (Chang and Pascua, 2017) the topics related to climate change mostly cover in these subjects. Issues related to pollution, ozone depletion, global warming and the effects have been discussed, but prevention and adaptative measures have been largely ignored.

The findings reveal that Geography contained 10% content related to climate change at HSSC-II only. The major theme in geography, 'man-environment relationship' propounds the strong connection elaborated at HSSC-II. Almost the same results indicated by (Dalelo, 2011) in his study that climate change-related issues claimed 8.3% of the topics listed in the Geography curriculum for grade 12 and 6.9% in grade eleven.

The findings also show that Biology and Chemistry having less content as compare to Geography. A similar result has been drawn by (Wise, 2010) that topics of climate change covered more in Geography than in Chemistry, and Physics. The finding of the research conducted by (Kariuki et al., 2016) noted that sampled subjects contained far less content than expected and Biology exhibits most of the content, although the concept of climate change is most clearly mentioned in Geography. The

same research also concluded that the causes and impacts of climate change were addressed but mitigation and adaptation measures were poorly addressed.

The findings reveal that curriculum developers agree that the current higher secondary level curriculum failed to create enough climate change awareness because climate change has not been properly addressed in the current curriculum and developments also not inculcated through curriculum reviews. The results also indicate that the department concerned is not taking proper initiatives like in-service climate change training for teachers and the overall reduction of the impacts of climate change through education. The results show that they also agree on the proper use of media and improving climate change content for a better understanding of climate change rather than introducing a stand-alone subject to address the issue. A study by (KARIUKI, 2017) claims similar results that climate change content is not explicit in the syllabus and curriculum developers poorly rate the curriculum in disseminating climate change awareness. The issue of providing in-service training for teachers upon curriculum review also emerged as a major problem. They also felt that the current curriculum was already burdening the students hence needed no extra subject.

The results also indicate that all curriculum experts unanimously agreed that incentives for students may be provided for practical activities like planting a tree. The same was also acknowledged by (Shaw, 2015) that climate change knowledge integrated as extra-curricular activities had been recognized in the policies of the government.

CONCLUSIONS

It may safely be concluded after viewing the research on the subject that climate change is primarily the most significant problem of the present century. Over the years, the effects of climate change have immensely increased and awareness campaigns have been launched to minimize its effects. Future generations need to positively and seriously take the matter for a safe and secure world. Awareness and proper knowledge of climate change are vitally important to protect the planet from the disastrous effects of it.

Students and teachers have a varied understanding of this concept as per the finding of the research due to differences in their level of education, experience and exposure to the world environment. Students have scanty and scattered knowledge and ideas regarding the horrific consequences of climate change hence pay little attention to the issue at hand. They feel least responsible for the measures being taken by different institutions to improve the existing situation. It is imperatively important to impart serious and tangible knowledge of climate change so that effective measures be taken to avoid the dismal end. The fast degeneration of climate needs immediate measures to adapt and implement the policies that can potentially help to improve the situation.

Teachers are comparatively better equipped with awareness and knowledge on this vitally important issue. However, teachers appear to be more aware of the causes and effects, adaptation strategies and improvement techniques, but gaps still exist in their knowledge. They acknowledge the lack of coherent and authentic measures being taken by the NCC in putting across compulsory awareness. The teachers seriously feel the need of assimilating the topic of climate change into the higher secondary level curriculum.

Science students have a comparatively better understanding of the issue of climate change but they only understand the concepts as much as provided in the curriculum. Teachers of science subjects are also aware of the far and deep effects of climate change. Unfortunately, the students and teachers of other disciplines have a flimsy understanding and surface knowledge of the issue; hence the researcher can conveniently conclude that the overall understanding of the issue needs improvement.

The concept of climate change is neither properly elaborated nor seriously taken in the current curriculum. Loosely defined and vaguely explained ideas related to climate change keep the understanding of the students at bay. Serious and integrated

efforts are immediately needed to cope with the issue. Curriculum developers need to pay rapt attention to this challenge and lead the way in a better and efficient understanding of the issue. Assessing the magnitude of the threat that confronts our battered planet, it is essentially important to pay due attention to the issue so that the disastrous effects of climate change may be averted to some degree.

RECOMMENDATIONS

Based on the findings and conclusion of the study, the following recommendations are proposed to enhance climate change awareness:

1. The Ministry of Climate Change should coordinate with NCC to improve the existing curriculum regarding climate change awareness.

2. There should be more content to create climate change awareness among students through different subjects along with activities of practical nature. There is a need to inculcate climate change content in the curriculum to fill the knowledge gap at the higher secondary level.

3. Special focus may be given in the subject of Biology and Geography to create climate change awareness.

4. Teachers and principals' feedback may also be sought for practical measures to give their opinion on how much of climate change knowledge is suitable for higher secondary level students.

5. Climate change content in the curriculum should be simple, interesting, interacting and engaging.

6. Keeping in view the ever-increasing threats of climate change, a separate subject should be introduced at the higher secondary level.

7. The Ministry of Federal Education and Professional Training through FDE should ensure capacity building programs of teachers through on job training about climate change.

8. To create awareness about the latest development in climate change, special conferences, seminars, and workshops should be arranged for principals, teachers, and students.

9. The stakeholders should develop and circulate learning materials including posters, pamphlets, documentaries, and handouts to all educational institutions.

10. Electronic, print and social media should be used effectively to create climate change awareness.

11. The government should carry out a countrywide survey on the level of climate change awareness among students and teachers at the higher secondary level.

12. Further studies should be carried out to determine factors influencing the students' and teachers' levels of awareness on climate change to explore different angles, and at a broader level to make the results generalizable.

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APPENDICES

Appendix A

**CLIMATE CHANGE AWARENESS
STUDENTS' QUESTIONNAIRE**

Section A - DEMOGRAPHIC INFORMATION
i. Please indicate your gender:
Male ☐   Female ☐

ii. Please indicate your class:
1st year ☐   2nd year ☐

iii. Please indicate your academic discipline:
Science ☐   Humanities ☐   Commerce ☐

iv. Please indicate the name of your institute: _____

Section B - CLIMATE CHANGE AWARENESS
1. Basic Knowledge
i. Have you heard of "climate change"?
Yes ☐   No ☐

ii. On which of the following platforms, have you heard about climate change?
TV/Newspaper ☐ Internet ☐ Govt Agencies ☐ School/College ☐

iii. I completely understand what climate change means.
Yes ☐   No ☐

iv. Climate change is happening right now.
Yes ☐   No ☐

v. Are you aware of the following world policies or initiatives taken to reduce climate change?
UNFCCC ☐ Kyoto Protocol ☐ Montreal Protocol ☐ Don't Know ☐

vi. Are you aware about the environmental policies in the country?
Yes ☐   No ☐

vii. Are climate change awareness campaigns carried out in the country?
Yes ☐   No ☐

2. Causes
i. The climate change takes place due to:
Natural Disasters ☐   Human Activities ☐   Both ☐

ii. I understand the natural causes of climate change.
Yes ☐   No ☐

iii. I understand the anthropogenic (man-made) causes of climate change.

Yes ☐ No ☐

iv. Which is the most important factor that has contributed to global climate change?

Deforestation ☐ Poor Waste Management ☐ Greenhouse Gases (Pollution) ☐

3. Impacts

i. It poses a serious threat for people around the world.

Yes ☐ No ☐

ii. It poses a serious threat to Pakistan.

Yes ☐ No ☐

iii. It is already too late to do anything about climate change.

Yes ☐ No ☐

iv. Unexpected rapid weather changes are the result of climate change.

Yes ☐ No ☐

v. Which of the following is the most visible effect of climate change in our country?

Floods ☐ Water Scarcity ☐ Glacier Melting ☐

vi. Do you know the Himalayan glaciers are melting due to climate change?

Yes ☐ No ☐

4. Mitigation

i. Do you possess knowledge on mitigation and adaptation to climate change?

Yes ☐ No ☐

ii. Have you ever taken any action to reduce the impacts of climate change?

Yes ☐ No ☐

iii. Who do you think should have the main responsibility for tackling climate change?

Country's Government ☐ Individuals ☐ International Organizations ☐

iv. The government is doing enough to tackle climate change.

Yes ☐ No ☐

v. I am ready to tackle climate change and participate in initiatives to reduce climate change.

Yes ☐ No ☐

vi. I prefer to walk or cycle and use public transport to protect environment.

Yes ☐ No ☐

vii. I buy more energy efficient devices and use less electricity to protect environment.

Yes ☐ No ☐

viii. I use linen or eco-bags when going for grocery shopping.

     Yes ☐   No ☐

ix. I have planted a tree (trees) in my life.

     Yes ☐   No ☐

Section C - CLIMATE CHANGE EDUCATION

i. Have you studied about climate change at HSSC level?

     Yes ☐   No ☐

ii. Do the subjects you study provide knowledge of global warming and greenhouse effect?

     Yes ☐   No ☐

iii. Have the causes, impacts and mitigation measures of climate change been discussed in your course of studies?

     Yes ☐   No ☐

iv. The government should include climate change knowledge into higher secondary school curriculum.

     Yes ☐   No ☐

v. At what level of education should climate change be taught in Pakistan's Education system?

     Elementary ☐   Secondary ☐ University ☐ At Each Level ☐

vi. Rate the higher secondary school curriculum as far as creating climate change awareness in the scale below.

     Excellent ☐   Good ☐   Satisfactory ☐   Poor ☐

vii. College students should be provided knowledge on climate change through seminars or workshops.

     Yes ☐   No ☐

viii. Which of the following mediums is the most effective one in disseminating climate change awareness?

     Print ☐   Electronic ☐   Social Media ☐

Appendix B

CLIMATE CHANGE AWARENESS
TEACHERS' QUESTIONNAIRE

Section A - DEMOGRAPHIC INFORMATION
i. Please indicate your gender:

Male ☐   Female ☐

ii. Please indicate the age bracket you are in:

21-30 ☐   31-40 ☐   41-50 ☐   51-60 ☐

iii. Please indicate your highest professional qualification:

Diploma ☐ Bachelor ☐ Masters ☐ M.Phil/MS ☐ Ph.D ☐

iv. Please indicate your subject of specialization_____

v. Please indicate the number of years you have taught:

1-5 ☐   6-10 ☐   11-15 ☐   16-20 ☐   More than 20 ☐

Section B - CLIMATE CHANGE AWARENESS
1. Basic Knowledge
i. Have you heard of "climate change"?

Yes ☐   No ☐

ii. On which of the following platforms, have you heard about climate change?

TV/Newspaper ☐   Internet ☐   Govt. Agencies ☐   School/College ☐

iii. I completely understand what climate change means.

Yes ☐   No ☐

iv. Climate change is happening right now.

Yes ☐   No ☐

v. Are you aware of the following world policies or initiatives taken to reduce climate change?

UNFCCC ☐ Kyoto Protocol ☐ Montreal Protocol ☐ Don't Know ☐

vi. Are you aware of the environmental policies in the country?

Yes ☐   No ☐

vii. Are climate change awareness campaigns carried out in the country?

Yes ☐   No ☐

2. Causes
i. Climate change takes place due to:

Natural Disasters ☐   Human Activities ☐   Both ☐

ii. I understand the natural causes of climate change.

Yes ☐   No ☐

iii. I understand the anthropogenic (man-made) causes of climate change.
Yes ☐ No ☐

iv. Which is the most important factor that has contributed to global climate change?
Deforestation ☐ Poor Waste Management ☐ Greenhouse Gases (Pollution) ☐

3. Impacts
i. It poses a serious threat to people around the world.
Yes ☐ No ☐

ii. It poses a serious threat to Pakistan.
Yes ☐ No ☐

iii. It is already too late to do anything about climate change.
Yes ☐ No ☐

iv. Unexpected rapid weather changes are the result of climate change.
Yes ☐ No ☐

v. Which of the following is the most visible effect of climate change in our country?
Floods ☐ Water Scarcity ☐ Glacier Melting ☐

vi. Do you know the Himalayan glaciers are melting due to climate change?
Yes ☐ No ☐

4. Mitigation
i. Do you possess knowledge of mitigation and adaptation to climate change?
Yes ☐ No ☐

ii. Have you ever taken any action to reduce the impacts of climate change?
Yes ☐ No ☐

iii. Who do you think should have the main responsibility for tackling climate change?
Country's Government ☐ Individual ☐ International Organizations ☐

iv. The government is doing enough to tackle climate change.
Yes ☐ No ☐

v. I am ready to tackle climate change and participate in initiatives to reduce climate change.
Yes ☐ No ☐

vi. I prefer to walk or cycle and use public transport to protect the environment.
Yes ☐ No ☐

vii. I buy more energy-efficient devices and use less electricity to protect the environment.
Yes ☐ No ☐

viii. I use linen or eco-bags when going for grocery shopping.

Yes ☐   No ☐

ix. I have planted a tree (trees) in my life.

Yes ☐   No ☐

Section C - CLIMATE CHANGE EDUCATION

i. Do the schools/colleges in Islamabad provide awareness about climate change?

Yes ☐   No ☐

ii. Do the subjects you teach provide knowledge of climate change / global warming/greenhouse effect?

Yes ☐   No ☐

iii. Have the causes, impacts and mitigation measures of climate change been discussed in your subject of specialization?

Yes ☐   No ☐

iv. The government should include climate change knowledge into the higher secondary school curriculum.

Yes ☐   No ☐

v. At what level of education should climate change be taught in Pakistan's education system?

Elementary ☐   Secondary ☐   University ☐   At Each Level ☐

vi. Rate the higher secondary school curriculum as far as creating climate change awareness in the scale below.

Excellent ☐   Good ☐   Satisfactory ☐   Poor ☐

vii. College teachers should be provided knowledge on climate change through seminars, workshops, or short courses.

Yes ☐   No ☐

viii. Which of the following mediums is the most effective one in disseminating climate change awareness?

Print ☐   Electronic ☐   Social Media ☐

Appendix C
Climate Change Questionnaire
Curriculum Developers (NCC & FDE Officers and Principals)

1. Please indicate your gender:

    Male ☐   Female ☐

2. Please indicate your highest professional qualification:

    Masters ☐   MPhil/MS ☐   PhD ☐

3. Please indicate your subject of specialization _____

4. Please indicate your experience in years as curriculum developer or implementer:

    Less than 5 ☐   6-15 ☐   More than 15 ☐

5. Please state your level of agreement for the following statements regarding climate change.

Strongly Agree (S.A.), Agree (A.), Uncertain (U.), Disagree (D.), Strongly Disagree (S.D.)

Sr. No.	Statement	S.A.	A.	U.	D.	S.D.
i.	The idea of climate change has properly been addressed in the current curriculum.					
ii.	Causes, mitigation, and impacts of climate change are well addressed by the curriculum.					
iii.	Bodies that deal with climate change have been introduced in the curriculum.					
iv.	Developments regarding climate change have been inculcated gradually through curriculum review.					
v.	After each curriculum review, teachers are trained to assimilate the concept of climate change through in-service training.					
vi.	The current higher secondary level curriculum creates enough climate change awareness.					
vii.	There is dire need to introduce a stand-alone subject at the higher secondary level to address climate change.					
viii.	Social media should be properly used to create climate change awareness among students and teachers.					
ix.	To motivate students towards environment protection, incentives may be provided for practical activities like planting a tree.					
x.	The government is taking initiatives to reduce the impacts of climate change through education.					

Appendix D

List of Subjects at Higher Secondary Level

1. Applied Sciences
2. Arabic
3. Banking
4. Basic Medical Sciences
5. Biology
6. Business Statistics
7. Chemistry
8. Civics
9. Clinical Pathology and Serology
10. Commercial Geography
11. Computer Science
12. Computer Studies
13. Dental Hygiene
14. Economics
15. Education
16. English Advance
17. English (Compulsory)
18. Fine Arts
19. Geography
20. Hematology and Blood Banking
21. Health and Physical Education
22. History of Pakistan
23. Islamic History
24. Islamic Studies
25. Library Science
26. Mathematics
27. Microbiology
28. Operation Theatre Techniques
29. Outlines of Home Economics
30. Pakistan Culture
31. Pakistan Studies
32. Persian
33. Philosophy
34. Physics
35. Physiotherapy Techniques
36. Principles of Accounting
37. Psychology
38. Sindhi
39. Sociology
40. Statistics
41. Urdu
42. Urdu Elective

(Source: Federal Board of Intermediate and Secondary Education)

Appendix E

List of Educational Institutes (HSSC & Graduate) under FDE

S No	School Name	Sector	Level	Gender
I.	**F.G. Colleges**			
1	IMCG (PG), Bhara kahu	Bhara Kau	Graduation	Girls
2	IMCB, (DEGREE) SIHALA IBD	Sihala	Graduation	Boys
3	IMCB, F-10/4, IBD	City-Urban	Graduation	Boys
4	IMCB, H-9, IBD	City -Urban	Graduation	Boys
5	IMCG Humak F.A. IBD	Sihala	Graduation	Girls
6	IMCG, I-8/3 IBD	City -Urban	Graduation	Girls
7	IMCG I-14/3 IBD	Tarnol	Graduation	Girls
8	IMPC, H-8, IBD	City -Urban	Graduation	Boys
9	IMPCC, H-8/4, ST 8 IBD	City -Urban	Graduation	Co-Edu
10	IMCG (PG), F-7/2, IBD	City -Urban	Graduation	Girls
11	IMCG (PG), G-10/4, IBD	City -Urban	Graduation	Girls
12	IMCG (PG), F-7/4, IBD	City -Urban	Graduation	Girls
II.	**Higher Secondary**			
1	IMCG (VI-XII) G-6/1-4 IBD	City -Urban	Higher Sec	Girls
2	IMCG (VI-XII), G-8/4 IBD	City -Urban	Higher Sec	Girls
3	IMCG (VI-XII), G-9/2 IBD	City -Urban	Higher Sec	Girls
4	IMCG (I-XII), I-9/1 IBD	City -Urban	Higher Sec	Girls
5	IMCB (VI-XII), G-9/4 IBD	City -Urban	Higher Sec	Boys
6	IMCB (VI-XII) G-6/2 IBD	City -Urban	Higher Sec	Boys
7	IMCB, (VI-XII), G-7/2 ST 11 IBD	City -Urban	Higher Sec	Boys
8	IMCB (VI-XII), I-10/1 IBD	City -Urban	Higher Sec	Boys
9	IMCB (VI-XII), (BSK) BHARA KAU IBD	Bhara Kau	Higher Sec	Boys
10	IMCB (VI-XII), CHAKSHAHZAD P/O N.I.H. IBD	Bhara Kau	Higher Sec	Boys
11	IMCB (VI-XII) PIND BEGWAL IBD	Bhara Kau	Higher Sec	Boys
12	IMCG (VI-XII), KOT HATHIAL, F.A IBD VILLAGE KOT HATHIAL KIANI ROAD BHARA KAU	Bhara Kau	Higher Sec	Girls
13	IMCG (I-XII), Q-A-UNIVERSITY COLONY IBD	Bhara Kau	Higher Sec	Co-Edu
14	IMCG (VI-XII) NCH, F.A IBD NATIONAL HEALTH COLONY NHC IBD	Bhara Kau	Higher Sec	Girls
15	IMCG (VI-XII) MALPUR F.A IBD VILLAGE P.O MALPUR MAIN MUREE ROAD IBD	Bhara Kau	Higher Sec	Girls
16	IMCG (I-XII) MAIRA BEGWAL F.A IBD	Bhara Kau	Higher Sec	Girls

17	IMCG (VI-XII), HERDOGHER F.A IBD	Sihala	Higher Sec	Girls
18	IMCG (VI-XII), RAWAT IBD	Sihala	Higher Sec	Girls
19	IMCB (VI-XII), MUGHAL IBD MUGHAL SIHALA IBD	Sihala	Higher Sec	Boys
20	IMCB (VI-XII), RAWAT F.A IBD KALLAR ROAD RAWAT F.A IBD	Sihala	Higher Sec	Boys
21	IMCB (I-XII) BHIMBER TRAR F.A IBD	Sihala	Higher Sec	Boys
22	IMCB (VI-XII), TARNOL, F.A IBD	Tarnol	Higher Sec	Boys
23	IMCG (I-XII), GOLRA, F.A IBD P.O GOLRA SHARIF IBD	Tarnol	Higher Sec	Girls
24	IMCB (I-XII), NEAR CHRAH CHOWK LEHTRAR ROAD NILORE IBD	Nilore	Higher Sec	Boys
25	IMCB (I-XII) JABA TAILI F.A IBD	Nilore	Higher Sec	Boys
26	IMCG (VI-XII) NILORE F.A IBD NEAR SARWAR MKT ARA ROAD IBD	Nilore	Higher Sec	Girls
27	IMCG (VI-XII), PUNJGRAN F.A IBD KHAULA SHAHEED	Nilore	Higher Sec	Girls
28	IMCG (VI-XII) P.O TARLAI IBD	Nilore	Higher Sec	Girls
29	IMCG (I-XII) JAGIOT F.A IBD VILLAGE P.O JAGIOT TEH/DISTT IBD	Nilore	Higher Sec	Girls
30	IMCG (I-XII) PEHOUNT F.A IBD VILLAGE PO PEHOUNT IBD	Nilore	Higher Sec	Co-Edu
31	IMCG (I-XII) THANDA PANI F.A P.O NILORE IBD	Nilore	Higher Sec	Girls
32	IMCG (I-XII) KIRPA F.A IBD	Nilore	Higher Sec	Girls
33	IMCG (I-XII) PIND BEGWAL VILLAGE PIND BEGWAL P.O PIND BEGWAL F.A IBD	Bhara Kau	Higher Sec	Girls
34	IMCG (VI-XII) HUMAK F.A IBD	Sihala	Higher Sec	Girls
35	IMCG (I-XII), PIND MALKAN SEC SIHALA IBD	Sihala	Higher Sec	Girls
36	IMCG (I-XII) LOHI BHER F.A IBD VILLAGE LOHI BHER P.O KORANG TOWN IBD	Sihala	Higher Sec	Girls
37	IMCG (I-XII) MOHRA NAGIAL P.O MODEL TWON HUMAK IBD	Sihala	Higher Sec	Girls
38	IMCB (I-XII) HUMAK F.A P.O HUMAK IBD	Sihala	Higher Sec	Boys

39	IMCB (I-XII) PAHG PANWAL F.A IBD P.O KORANG LOHI BHER PAGH PANWAL IBD KORAN	Sihala	Higher Sec	Boys
40	IMSB (I-XII) MOHRA NAGIAL F.A IBD	Sihala	Higher Sec	Boys
41	IMCG (I-XII), SHAH ALLAH DITTA, F.A IBD	Tarnol	Higher Sec	Boys
42	IMCB (VI-XII), G-7/4 NEAR KHADDA MARKET	City -Urban	Higher Sec	Boys
43	IMCG (I-XII), MARGALLA TOWN, F.A IBD	Bhara Kau	Higher Sec	Girls
III.	**Model Colleges**			
1	IMCB, G-10/4	City -Urban	IMC	Boys
2	ICB, G-6/3 ST 8 IBD	City -Urban	IMC	Boys
3	IMCG, F-10/3 ST 65 IBD	City -Urban	IMC	Girls
4	IMCB, F-10/3 ST 65 IBD	City -Urban	IMC	Boys
5	IMCB, F-11/1 ST 73 IBD	City -Urban	IMC	Boys
6	IMCB, F-11/3 IBD	City -Urban	IMC	Boys
7	IMCB, F-7/3 ST 1 IBD	City -Urban	IMC	Boys
8	IMCB, F-8/4 IBD	City -Urban	IMC	Boys
9	IMCB, G-11/1 ST 5 IBD	City -Urban	IMC	Boys
10	IMCB, I-10/1 ST 18 IBD	City -Urban	IMC	Boys
11	IMCB, I-8/3 IBD	City -Urban	IMC	Boys
12	IMCG, F-8/1 ST 30 IBD	City -Urban	IMC	Girls
13	IMCG, G-10/2 ST 28 IBD	City -Urban	IMC	Girls
14	IMCG, I-10/4 ST 32 IBD	City -Urban	IMC	Girls
15	IMCG, I-8/4 ST 1 IBD	City -Urban	IMC	Girls
16	IMCG, KORANG TOWN IBD	City-Urban	IMC	Co-Edu
17	IMCG, F-6/2 ST 25 IBD	City -Urban	IMC	Girls
18	ICG, F-6/2 OPP. SUPER MARKET IBD	City -Urban	IMC	Girls
19	IMCG, F-7/4 ST 52 IBD	City -Urban	IMC	Girls
20	IMCG, F-10/2 IBD	City -Urban	IMC	Girls