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ABSTRACT

Climate change is defined as a change in the statistical properties of meteorological variables, which are considered over a long period of time, regardless of the cause. Modern climate change is mainly dominated by human influences, which is now large enough to exceed the bounds of natural variability. The main sources of global climate change are human induced changes in the atmospheric composition. Changes to the climate system is observed at a global scale through measurement of temperature at the surface in the middle of the atmosphere, increased sea level, increased sea surface temperature, increased ocean heat content and water vapour in the atmosphere. The decrease in polar ice sheet, decreased global sea ice content, and the net decrease in glacier volumes were all observed. The aim of the study is to assess the recent trends of global climate change & create awareness among the public based on the topic. A questionnaire comprising 15 questions was circulated among 100 participants with the aid of an online survey platform. The data collection was performed using Google forms. The statistical analysis was done using SPSS software. When inquired about the awareness of the risks of global warming, 99% of the participants responded positively. It was observed that, according to the participants' opinion, global climate change is too late to be prevented or reduced. 80% of the participants believe that a technological breakthrough would influence climate change and global warming rates. The participants of the survey were questioned whether global warming was linked to extreme weather events like hurricanes et cetera, and 96% of the participants responded positively. When they were questioned about their awareness and impacts of global climate change on the future, the majority responded that it would result in rise in sea levels, as well as a rise in global temperature. The recent trends of global climate change was studied, surveyed and demonstrated that this climate change has a vast impact on the future. It must be reduced to maximum to avoid complex circumstances in the future.

Keywords: Global, Climate, Awareness

INTRODUCTION

Climate change is defined as a change in the statistical properties of meteorological variables, which are considered over a long period of time, regardless of the cause. The earth orbiting satellites, remote meteorological stations, ocean buoys are all used to monitor the present day weather and climate (1). The paleoclimatology data from natural resources such as ice cores, tree rings, corals, oceans and lake sediments have enabled scientists to extend the earth climatic records back to millions of years (2).

Modern climate change is mainly dominated by human influences, which is now large enough to exceed the bounds of natural variability. The main sources of global climate change are human induced changes in the atmospheric composition (3). Changes to the climate system is observed at a global scale through measurement of temperature at the surface in the middle of the atmosphere, increased sea level, increased sea surface temperature, increased ocean heat content and water vapour in the atmosphere. The decrease in polar ice sheet, decreased global sea ice content, and the net decrease in glacier volumes are all observed (4). Greenhouse gases play an important and prominent role in keeping the planet warm enough to inhabit. The greenhouse gases mainly consist of carbon dioxide, methane nitrous oxide and ozone. The amount of these gases skyrocketed in the recent decades. According to the Intergovernmental Panel on Climate Change (IPCC), the concentration of carbon dioxide, methane and nitrous oxides has increased to unprecedented levels in the last 800,000 years (5).

Climate change is expected to cause approximately 250,000 additional deaths per year. With the rise in global temperature, there is a simultaneous rise in the number of fatalities. Occurrence of heat stress, to heatstroke cardiovascular diseases and kidney diseases also multiplies immensely (6).

Responding to climate change involves two possible approaches- reducing & stabilising the levels of heat-trapping greenhouse gases in the atmosphere, which is otherwise known as mitigation (7), or adapting to the climate change which is already in the pipeline (8); commonly known as adaptation. The aim of the study is to study the recent trends of global climate change & create awareness among the public based on the topic.

MATERIALS & METHODS

The study setting was done through an online survey, among the general population. The usage of online surveys is time-saving & also involves a varied number of people. There were 100 participants involved in the survey. A previous study sample was opted which included four categories $n = 300$. The sampling was done by the simple random sampling method. A questionnaire comprising of 15 questions was posted on the online survey platform. The questionnaire validity checking was performed by consulting an expert. The data collection was done through Google forms and the data manipulation through MS Excel. The data obtained was plotted in the form of pie charts & bar graphs. Age and education were considered as independent variables whereas awareness about global climate change and knowledge about it were in the list of dependent variables. Descriptive analysis and the correlation analysis by Chi square test was analysed using SPSS software.

RESULTS & DISCUSSION

When inquired about the awareness of the link between global warming and extreme weather events like hurricanes, 96% of the participants responded affirmatively (Figure 1). It was observed that, according to the 89% of the participants' opinion, global climate change will have a great impact on the rise of sea levels and global temperature (Figure 2). 80% of the participants believe that a technological breakthrough would influence climate change and global warming rates (Figure 3). 91% of the participants assume that reforestation, divest from fossil fuels and reduction of energy demand can help in the reduction of global warming rates (Figure 4). 99% of the respondents think that climate change has an adverse effect on agriculture (Figure 5). 33% of the participants of the survey think that it is too late to prevent climate change (Figure 6). Majority of the participants have stated that increasing levels of carbon dioxide, greenhouse gases and coal burning power plants are the main causes of climate change (Figure 7). The association between gender and the link between global warming and extreme weather events like hurricanes was found, with the help of Chi square test. p is statistically more than 0.05, which is insignificant (Figure 8). Similarly, the association between gender and the impacts of global climate change on the future was determined, and p is statistically more than 0.05 and hence is insignificant (Figure 9). The association between gender and the influence of technological breakthrough on global climate change determined using Chi square test was statistically significant $p = 0.005$ ($p < 0.05$) (Figure 10). The gender and methods to stop or reduce global warming was correlated. p is statistically insignificant ($p > 0.05$) (Figure 11). The association between gender and the prevention of climate change was found, and statistically, $p > 0.05$, which is insignificant (Figure 12).

The participants of the survey were questioned whether global warming was linked to extreme weather events like hurricanes et cetera, and 96% of the participants responded positively. Some researchers have supported the statement. Among all the weather measures, the total number of extreme weather events in the past three years are the only significant indicators of perceived weather (9). Another study reported that the term global warming was popularly used to refer to the recent reported increase in the mean surface temperature of the Earth (10). On the contrary, a survey taken among the population of the United States stated that extreme weather events like local storms, hurricanes, floods are mainly caused due to changes in the society and not due to global warming (11).

When the participants were questioned about their awareness and impacts of global climate change on the future, the majority responded that it would result in rise in sea levels, as well as a rise in global temperature. A study proved confident predictions of the global mean sea level rise, modified by regional differences in the steric (density-related) component of sea level rise and change in gravitational interactions between ocean and the ice sheets, which affects the regional distribution of the eustatic (mass-related) contributions to the sea level rise (12). Some studies proved the presence of alarming consequences for biodiversity, which in worst-case scenarios would result in increased extinction rates due to global climate change (13). The causes of global climate change is mainly due to increase in carbon dioxide, greenhouse gases, coal burning power plants et cetera (14). Climate change reports prepared by the IPCC (Intergovernmental Panel on Climate change) proved the scientific framework, which led to the Kyoto protocol, which was based on the reduction of greenhouse gas emissions (mainly CO₂), due to burning of fossil fuels (15).

Does a technology breakthrough reduce the effects of global climate change? Studies prove that the value of having a new technology to address global climate change, depends on the extent to which technology will be

diffused (16), subsequent to its development (17). And improved solar technology which is capable of producing energy at a lower cost than fossil fuels is ideal, but not forthcoming (18) (19).

Global climate change can also be the cause of the development of new diseases and disorders. For example, an extreme temperature difference in the atmosphere can result in various changes in the thyroid gland (20) and its functioning and can lead to diseases such as endemic goitre, which is defined as the swelling of the thyroid gland due to iodine deficiency (21). Not only that, but climate change also affects the sleep pattern of an individual adversely. The effects of rising temperature, extreme weather events, flood or wildfires diminishes total sleep time or sleep disruption, especially among the most vulnerable population, the old-aged and the low-income population (22) (23). Climate change increases water and air pollution which can cause and aggravate chronic respiratory disease, such as asthma. Increased temperatures due to climate change lead to increased ground-level ozone, which causes airway inflammation and damages lung tissue (24). It can involve alteration in the local temperature that an individual is exposed to, which in turn may affect skeletal muscle temperature. The underlying effects of temperature on the mechanical performance of skeletal muscle can affect organismal performance in key activities, such as locomotion and fitness-related behaviours (25)(26). Seasonal drops in temperature may affect the viscosity of synovial fluid in joints, which can result in back pain or joint pain (27). Additionally, researchers have observed that there's a bidirectional link between obesity and climate change. The current food production, transport, land use and urban design negatively impact both climate change and obesity outcomes (28). The experience of the previous studies (29-34) have led to create awareness about the recent trends on global climate change.

The limitation of the study is that it is done under a limited number of participants, under small constraints of time.

The study will establish future scope by creating awareness among the general population to reduce risks of global warming and climate change.

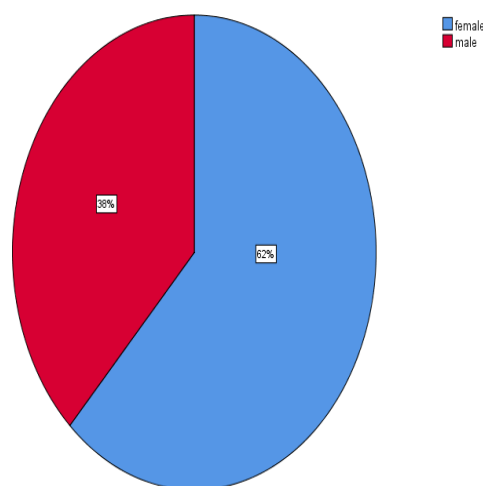


Figure 1- The pie chart represents the distribution of gender. The red colour - male ; blue colour- female. Majority of the participants were females (62%).

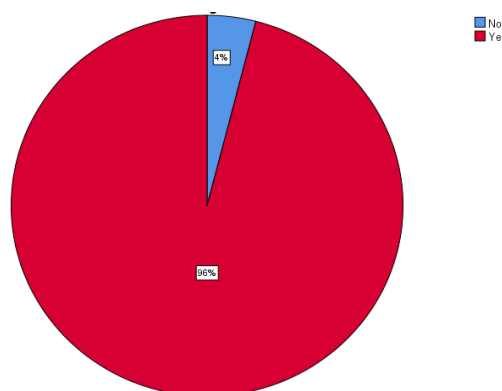


Figure 2- The pie chart represents the distribution of the link between global warming and extreme weather events like hurricanes. Red - yes ; blue - no. Majority of the participants have responded affirmatively (96%),

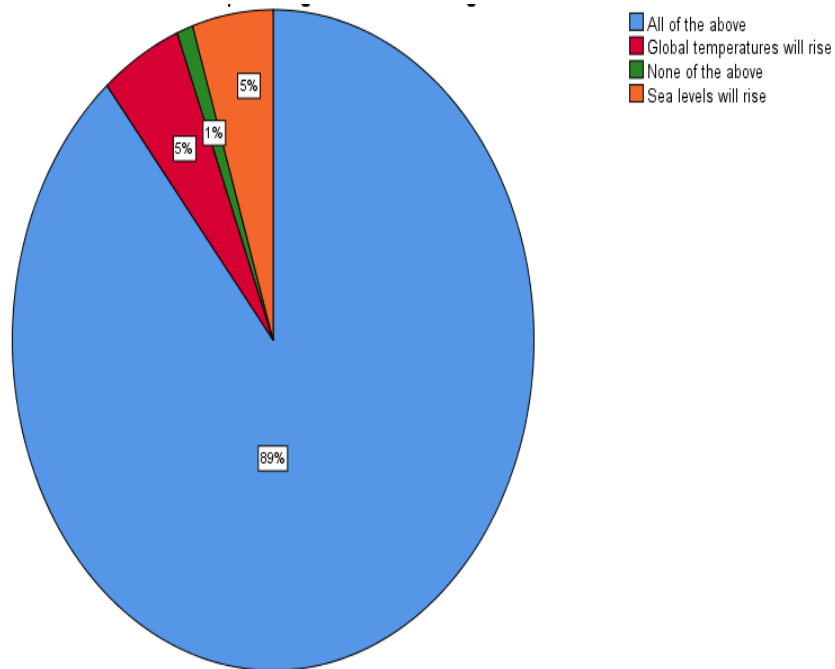


Figure 3- The pie chart represents the distribution of the impacts of global climate change on the future. Orange - rise in sea level ; red - global temperatures will rise ; green - none ; blue - all of the above. Majority of the participants have responded that a rise in sea level and a rise in global temperatures might be observed (89%).

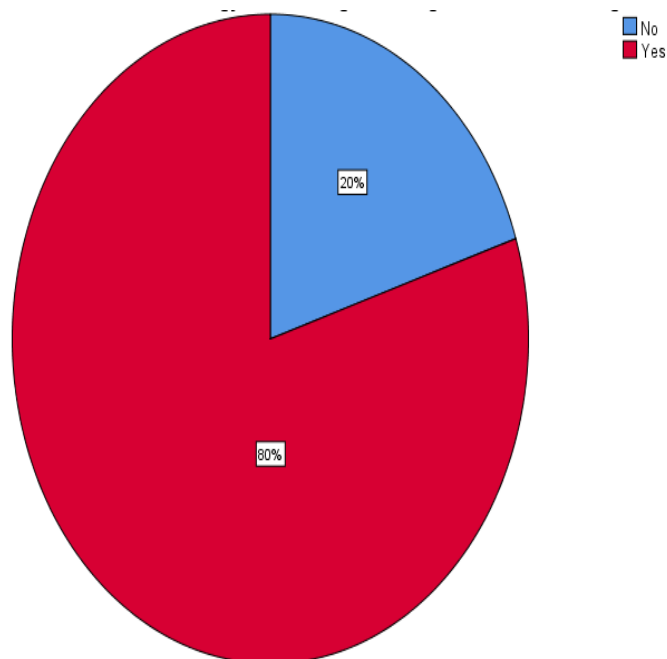


Figure 4- The pie chart represents the distribution of the effects of a technological breakthrough on global climate change. Red colour - yes ; no - blue. Majority of the participants have responded positively (80%).

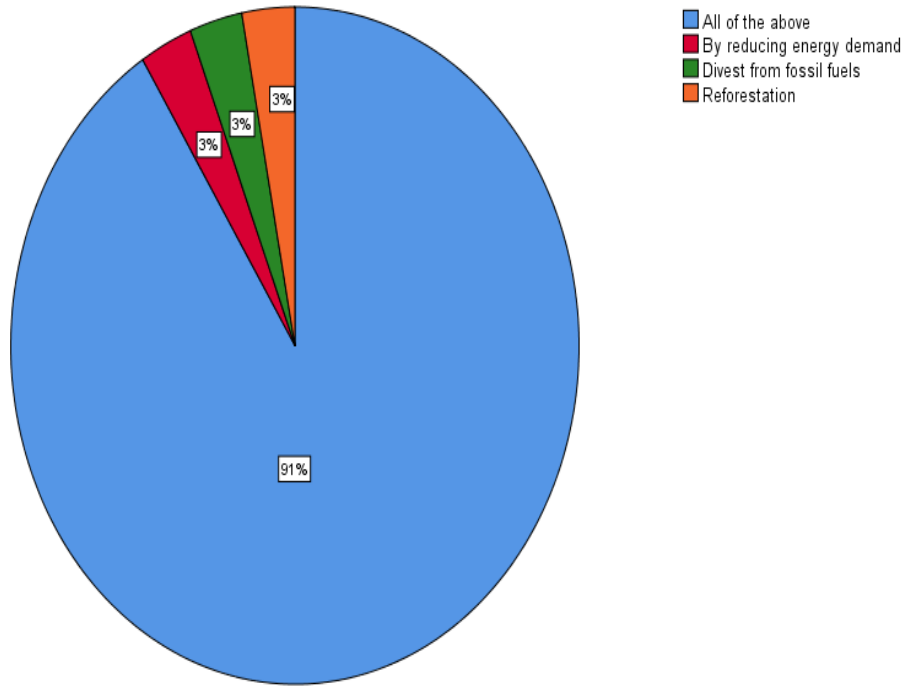


Figure 5- The pie chart represents the distribution of the methods that can be employed to reduce or stop climate change. Orange - reforestation ; green - divest from fossil fuels ; red - reducing energy demand ; blue - all of the above. Majority of the respondents have responded that it can be reduced by reducing the energy demand, through reforestation, and divesting from fossil fuels (91%).

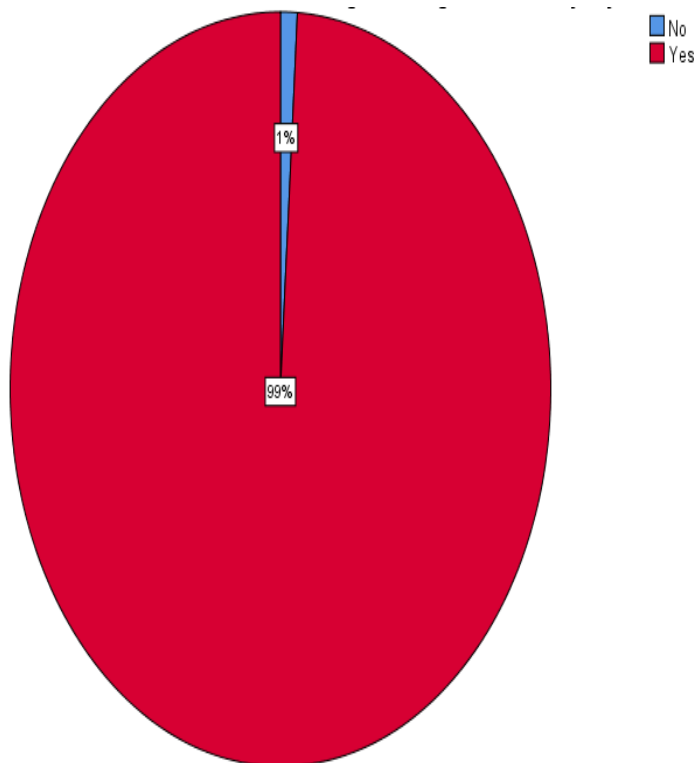


Figure 6- The pie chart represents the distribution of climate change affecting agriculture. Red - yes ; blue - no. Majority of the participants have responded affirmatively (99%).

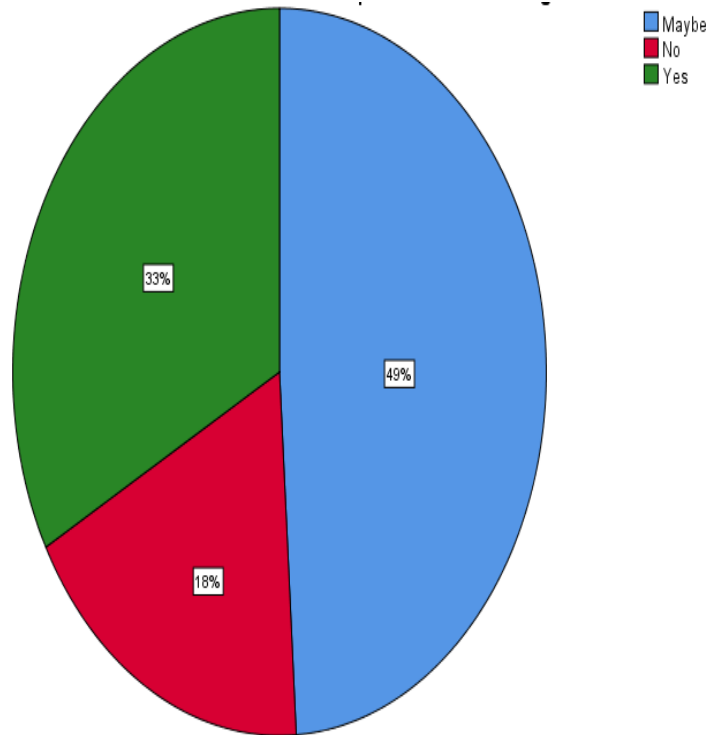


Figure 7- The pie chart represents the distribution of the prevention of climate change. Green - yes ; red - no ; blue - maybe. Majority of the participants have responded conceivably (49%).

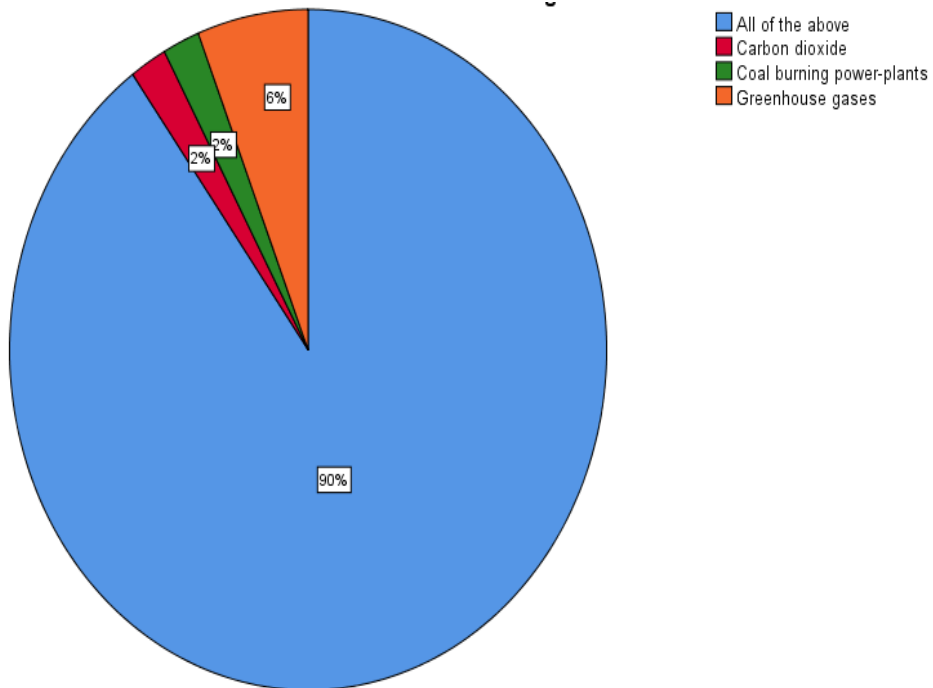


Figure 8- The pie chart represents the distribution of the causes of climate change. Red- carbon dioxide ; green and orange colour - coal-burning power plants and greenhouse gases respectively ; blue- all of the above. Majority of the participants have responded that it is mainly due to increased levels of carbon dioxide, greenhouse gases in the atmosphere and increasing coal-burning power plants (90%).

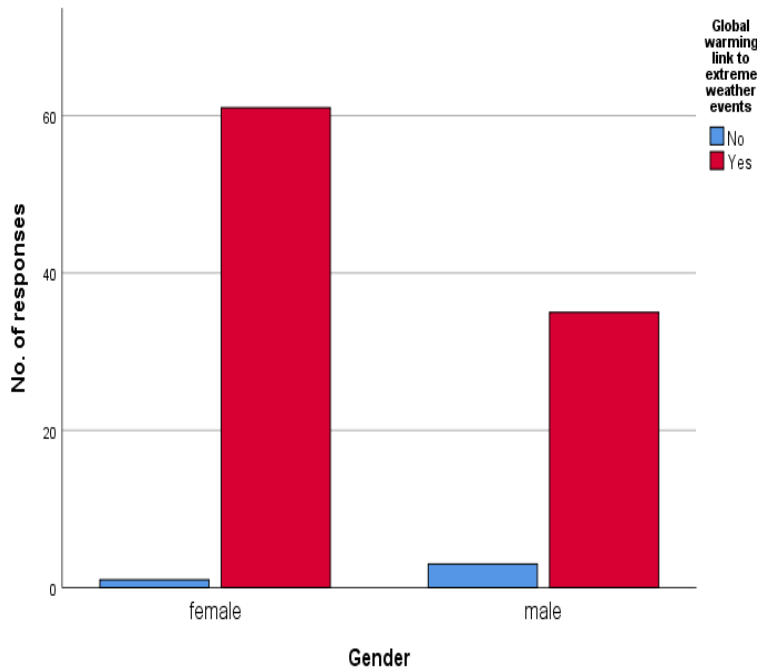


Figure 9- The graph depicts the association between gender and respondent’s awareness to the link between global warming and extreme weather events like hurricanes. The X-axis represents gender and Y-axis, number of responses. Red - yes ; blue - no. Majority of the females were more aware of the link between global and extreme weather events. Chi square test, $p = 0.120, (>0.05)$ which is statistically not significant.

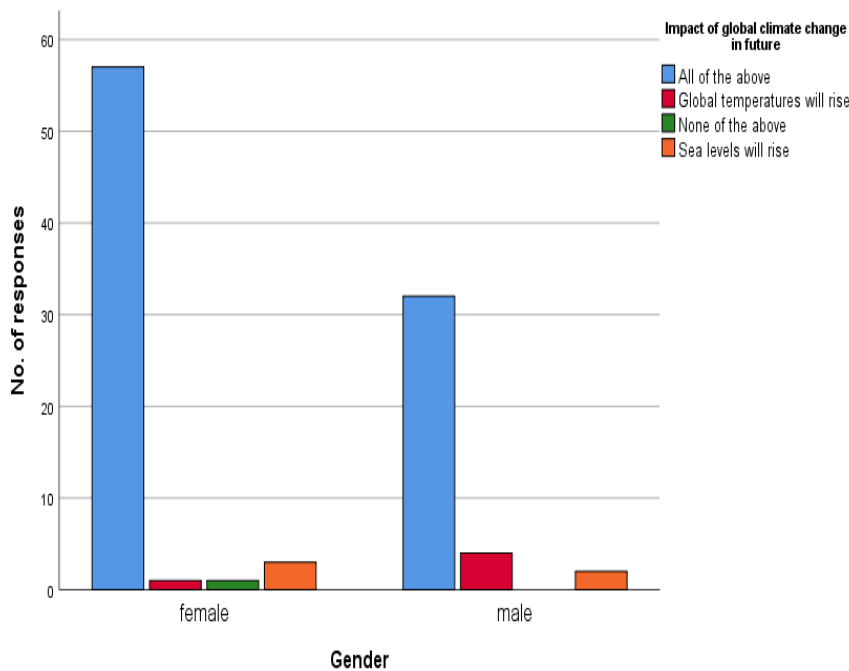


Figure 10- The graph depicts the association between gender and the awareness on the link between the impacts of global climate change on the future. The X-axis represents gender and Y-axis represents the impact of global climate change on the future. Orange - rise in sea level ; red - global temperatures will rise ; green - none ; blue - all of the above. Majority of females were more aware of the impacts of global climate change on the future. Chi square test, $p = 0.210 (>0.05)$. Hence it is not statistically significant.

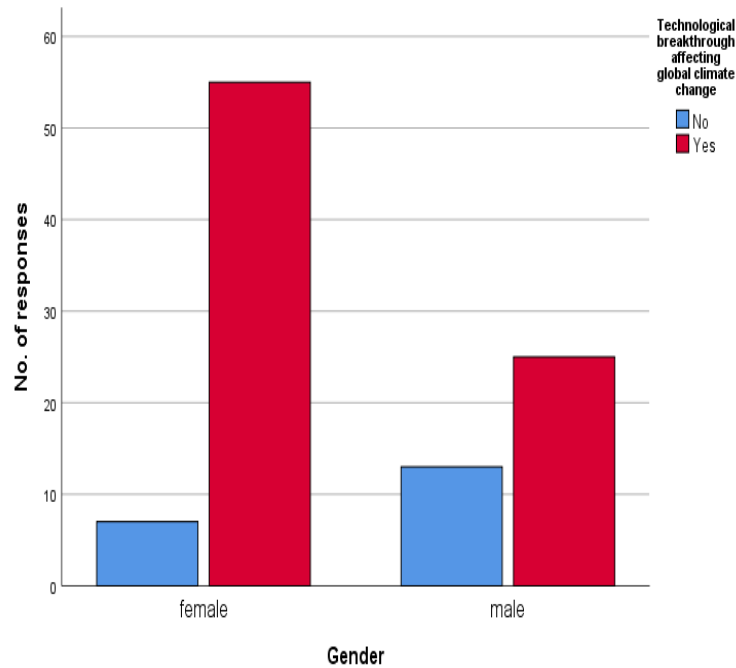


Figure 11- The graph depicts the association between gender and the awareness of the influence of solar technology on global climate change. X-axis represents gender and Y-axis represents the number of responses who were aware (red) and unaware of a technological breakthrough influencing global climate change (blue). Most of the females were aware of the influence of solar technology on climate change as compared to males. Chi square test $p = 0.005 (<0.05)$, which is statistically significant.

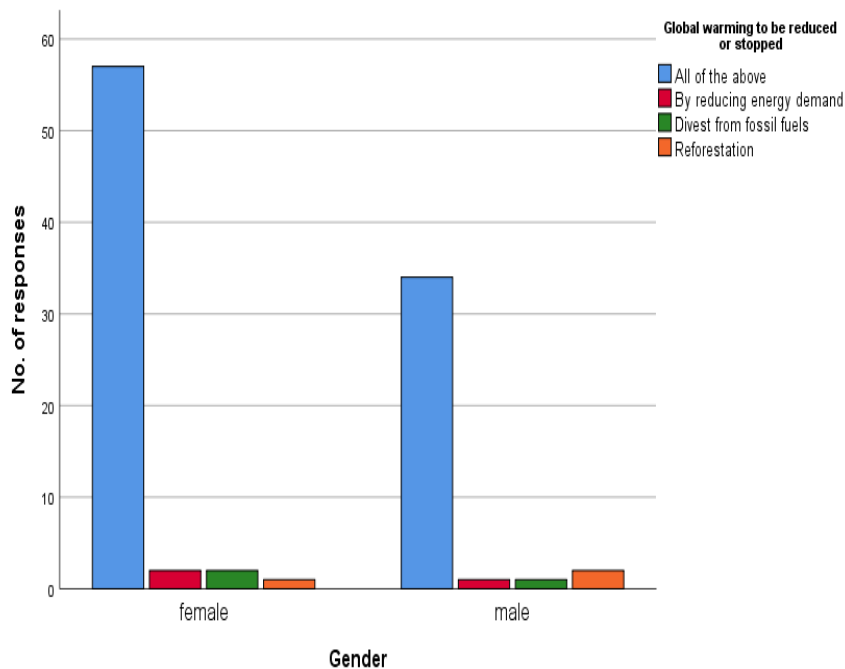


Figure 12- The graph depicts the association between gender and awareness on methods to reduce or stop global warming through Chi square test. X-axis represents gender and Y-axis represents the number of responses. The orange- reforestation ; green- divest from fossil fuels ; red - reducing energy demand ; blue- all of the above. Majority of females were more aware of the methods employed to reduce or stop global warming than males. Chi square test $p = 0.773 (>0.05)$. hence , it is not statistically significant.

CONCLUSION

Global climate change has observable effects on the environment. It has a major influence in disturbing the microbial balance in the environment. This may result in the emergence of new microbial disease and it becomes necessary to create management plans that will protect the health and quality of life of the people living in the communities. Within the limits of the study, 98% of the participants were aware of the recent trends of global climate change. This climate change has a vast impact on the future.

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