

UNIVERSITI TEKNOLOGI MARA

THE IMPACT OF CLIMATE CHANGE
ON MALAYSIAN SOCIETY

SYED ZAINAL ABIDIN JAMALLULAIL SYED ABD AZIZ

MSc

January 2015

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Dissertation submitted in partial fulfilment of the requirements
for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

In the event that my dissertation be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

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ABSTRACT

Public knowledge, awareness and human behaviour on climate change is crucial to combating climate change. This study assesses the level of knowledge, awareness and human behaviour of Malaysian society impact on climate change. Adopting a descriptive survey research design, a self-designed questionnaire titled "Climate Change Awareness 2014" was administered on a sample of 467 respondents from 3 main groups; university student, general public and government servants. The findings indicate that a number of Malaysians society have fair level of awareness and behaviour toward climate change, but the level of knowledge of impacts or consequences of the climate change very low. Even though government has promote their initiatives and policy on climate change but it cannot be reflected that society are having a high level of knowledge, awareness and human behaviour on reducing climate change. In addition, this study also measure the effectiveness of national policy of climate change to Malaysia society. This study offers decision makers fundamental insights regarding public knowledge, awareness and human behaviour on climate change issues that could potentially assist in promoting better responsive policies and strategies to reduce the greenhouse gasses and minimize impact of climate change at once. Cronbach's alpha for this study is $\alpha = 0.749$, which indicates validity and an acceptable level of internal reliability of the scale with this specific sample.

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Last but not least, I dedicated this dissertation to my late grandmother Hajah Roshita Mohamad Amin who passed away on Dec 4, 2014, she took care of me since a baby and her unconditioned love kept me on going even until today and after battling with full stroke for more than 10 years she had to go to meet her Creator. My backbone who never left me alone and always provide unlimited financial support my very own mother S.A.C Hajah Noraishah Zainuddin. My father S.A.C Syed Abd Aziz Syed Hamzah and siblings and cousin who have always stood beside me when the going got tough. I am deeply sorry for the time we spent apart. It would be impossible to name each and every one of them. Thank you Allah for the opportunity given.

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Ready or not it is confirmed that the earth surface temperature records have indicated that the climate of the earth is warming. Based on the The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) our earth surface temperature has come to 0.61°C increase in global average surface temperature for the past 50 years based upon past IPCC assessments and new findings reported in researches carried out during the last 19 years (IPCC, 2014).

In just recent year 2009, Malaysia has come out with national policy on climate change. Although neighbouring countries had produce the policy earlier than Malaysia but it always never too late. Based on the National Plans, Malaysia will adopt a dual strategy in addressing climate change impacts where to adapt strategies onto protecting the economic growth and development factors from the impact of climate change; and secondly to come out the strategies onto reducing the emission of greenhouse gases (GHGs) where carbon dioxide (CO₂) is the major culprit. These climate change events not only have the potential to destroy ecosystem, lives and communities, but also pose a significant economic risk. (EPU, 2010). Throughout the year, Malaysia has rectified various international environmental treaties and this portray that Malaysia is concerned to environment issues including climate change (INC, 2000 & NC2, 2011).

According to The Global Climate Risk Index (CRI) developed by Germanwatch analysis, Malaysia CRI within the 20 years on climate variability which was from

1993-2012 was at ranking 86 but ranked at 116 in 2012 from 178 countries. The ranking were measured and quantified based on the impact of extreme weather events where it counted numbers of fatalities as well as the economic losses occurred during the events and the events were based on the past climate variability to the current variability which have left its own footprint for the last 20 years on climate change (Sonke et al., 2014).

For the past few years Malaysia faced various event on climate change such as haze, storm, dry spell, flood and many more. Some of the events have caused fatal to the public and damaged to properties, millions of ringgit were spend to support the mitigation and the adaptation of climate change (NC2, 2011& EPU, 2010)

1.2 Problem Statement

Since people start to take notice of climate change issues, the study on how far is the level of knowledge, awareness and behaviour toward climate change among the society become important. Campaign and promotion through media source is one of the methods to improve the knowledge, awareness and behaviour of society towards climate change issues. Even though government have promote their initiatives and policy on climate change but it cannot be verified that society are having the knowledge and awareness of it. Thus it is important to value these three key elements of knowledge, awareness and behaviour through qualitative and quantitative method from there it can be determine which group of Malaysian society such as student, general public and government servants have weak level of knowledge, low level of awareness and lack of behaviour This classifying makes it possible to characterize the level of knowledge, awareness and behaviour among the Malaysian society toward the impact to climate change.

To summarise the problem statement:

1. Society without knowledge of climate change will continue increase destroying the environment through their habit and behaviour of anthropogenic activities such as open burning, use fossil fuel instead of other environment friendly sources and others.
2. Knowledge on climate change can increase level of awareness but with awareness and behaviour on climate change it doesn't mean that the level of knowledge is present.
3. Even though Malaysia has develop good policy and initiated campaign and promotion on climate change, but the level of knowledge, awareness and behaviour is low.

1.3 Objectives

The objective of this research is to identify the level of knowledge, awareness and behaviour pattern among Malaysian society and to evaluate national policy of climate change. Specific objectives are as follow:

1. To characterize level of knowledge and awareness on climate change.
2. To characterize Malaysian behaviour toward climate change.
3. To measure the effectiveness of national policy to reduce 40% of greenhouse gases (GHG) in Malaysia.

1.4 Scope of work

Scope of work involves the process to determine climate change knowledge, awareness and behaviour among universities student and general public and government servants. For the purpose of this study, the following works were executed:

- i. Literature review to find critical issues on climate change
- ii. Design questionnaires in regards on climate change.
- iii. Distribute surveys by online and on paper
- ii. Data collection
- iv. Result analysis and discussion
- v. Conclusion and recommendation

Scope of work and limitations of study will be further detailed in Chapter 3.

1.5 Significant of study

Climate change is not a new issue to the world even to Malaysia, and Malaysia agreed to reduce the intensity of carbon emissions to 40% by 2020 (UNFCCC, 2010 & NC2, 2011). Since 1989, Malaysia have rectify many international environmental treaty and there are a lot of involvements and initiatives from the government such as having a framework of national policy of climate change in 2009. Many events on climate change happen in few years back, reports, news and article are available in the media source but that cannot value the level of knowledge, awareness and behavior of Malaysian society towards climate change. The result obtained from this study will discuss the effectiveness of government initiatives and policy on climate change that give the impact to Malaysian society on their level of knowledge, awareness and behaviour toward climate change. As this is the first study in Malaysia on measuring the level of knowledge, awareness and behavior from these three group clusters; university student, general public and government servant. This study can fill in the literature gap and other study on the impact of society toward climate change.

CHAPTER TWO

LITERATURE REVIEW

2.1 Understanding of Climate change

The term climate change appeared in the scientific literature before the term global warming, and has been used more frequently in peer-reviewed articles for more than forty years. According to Leiserowitz et al., (2014) in a study conducted by Yale Project on Climate Change Communication and the George Mason University Centre for Climate Change Communication stated that the term climatic change was first used by Gilbert N. Plass in a seminal 1956 paper, whereas as identified by NASA (2008) the term global warming wasn't used until 1975 by author Wallace Broecker.

NASA (2008) also share the definition of global warming and climate change as:

- a. Global warming: the increase in Earth's average surface temperature due to rising levels of greenhouse gases.
- b. Climate change: a long-term change in the Earth's climate, or of a region on Earth.

IPCC (2007) defined climate change as:

A change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity (p. 30).

United Nations Framework Convention on Climate Change (UNFCCC) (1992) climate change refer as:

A change of climate that is attributed directly or indirectly to human activities that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (p.3)

Although the terms may be differ from each agency however it is obvious that climate change is a long term changes in the composition of atmosphere due to anthropogenic activities. Because global warming refers to an increase in average global temperatures, which in turn causes climate change thus more researcher prefer to use the term climate change.

2.1.1 Climate Change and Greenhouse Gases (GHG)

In all living things the weather and climate plays an important role. They are essential for health, food production and well-being and this the part of the daily routine and experience of human beings. The climate changes happen due to external forcing by the anthropogenic activities such as releasing the greenhouse gases (GHG) and landscape changes due to urbanization it can say that human-induced climate change are also partly predictable (IPCC, 2001). Unfortunately this cannot accurately be forecast such as population change, economic up-downward, advance and sophisticated technological development, and other relevant characteristics of future human activity. Therefore to determine climate projections, a scenarios have to be constructed based on human behaviour.

There five major components in the climate system; the atmosphere, the hydrosphere, the cryosphere, the land surface and the biosphere, forced or influenced by the most crucial force is the Sun and anthropogenic activities (see Figure 2.1).

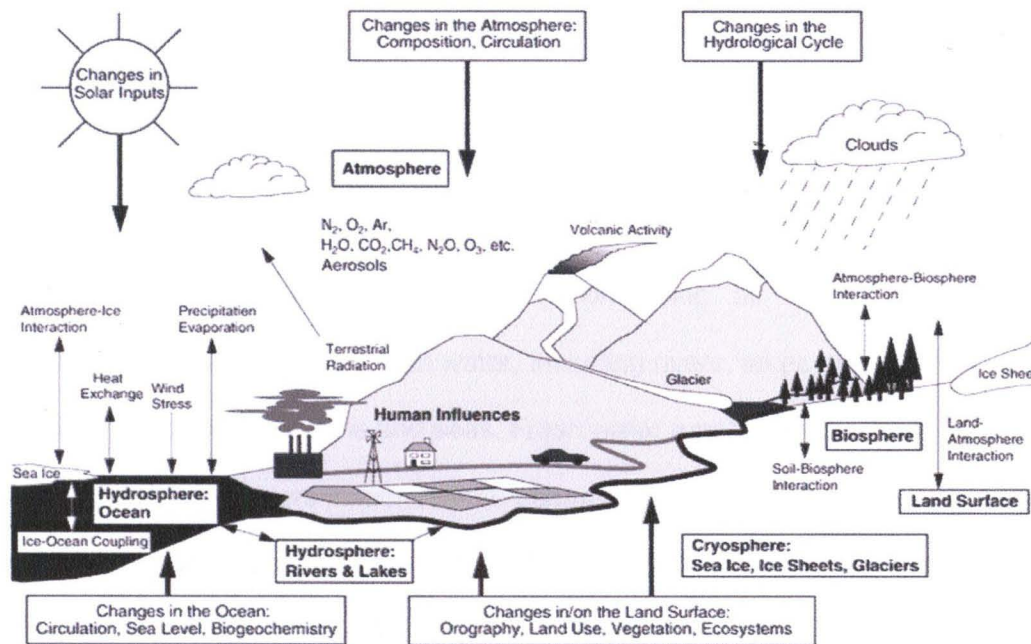


Figure 2.1: Schematic view of the components of the global climate system (bold), their processes and interactions (thin arrows) and some aspects that may change (bold arrows). (Source: IPCC, 2001. p.23)

From figure 2.1, the atmosphere is the most ambiguous and unpredictable part of the system and it happened along with the evolution of Earth. Atmosphere is mixed of 78.1% of nitrogen (N_2), 20.9% of oxygen (O_2) and 0.93% of argon (Ar). These gases can be consider as inert which they do not interact with the infrared radiation emitted by the Earth. Unfortunately there are a number of trace radiative or gases, absorb and emit infrared radiation and known as the GHG. The 0.1% of GHG are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and ozone (O_3). Water vapour (H_2O) also a natural greenhouse gas. Because these greenhouse gases absorb the infrared radiation emitted by

the Earth and emit infrared radiation up- and downward, they tend to raise the temperature near the Earth's surface. Water vapour, CO₂ and O₃ also absorb solar short-wave radiation. Ozone in the lower part of the atmosphere, the troposphere and lower stratosphere, acts as a greenhouse gas. Higher up in the stratosphere there is a natural layer of high ozone concentration, which absorbs solar ultra-violet radiation. In this way this so-called ozone layer plays an essential role in the stratosphere's radiative balance, at the same time filtering out this potentially damaging form of radiation.

The hydrosphere is the component comprising all liquid surface and subterranean water, both fresh water, including rivers, lakes and aquifers, and saline water of the oceans and seas. Fresh water runoff from the land returning to the oceans in rivers influences the ocean's composition and circulation. The oceans cover approximately 70% of the Earth's surface. They store and transport a large amount of energy and dissolve and store great quantities of carbon dioxide (IPCC, 2007 & UNFCCC, 1992).

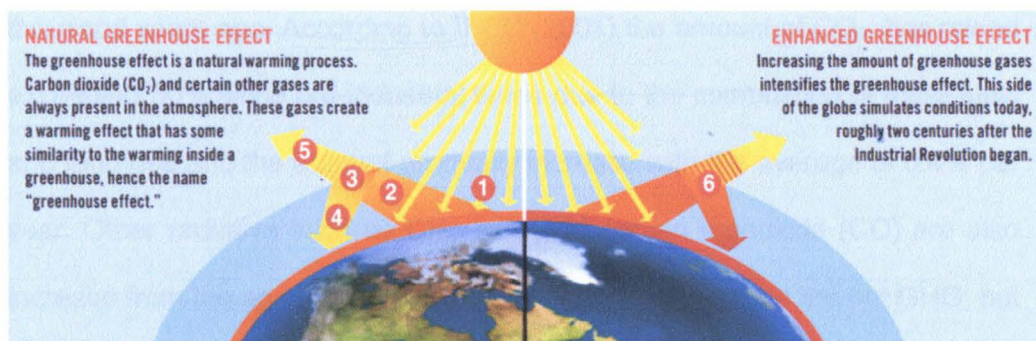


Figure 2.2: Greenhouse effect. (Source: The National Academy of Sciences)

Based on figure 2.2, the visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight striking the earth [1] is absorbed and converted to heat, which warms the surface. The surface [2] emits heat to the atmosphere, where some of it [3] is absorbed by greenhouse gases and [4] re-emitted toward the surface; some of the heat is not trapped by greenhouse

gases and [5] escapes into space. Human activities that emit additional greenhouse gases to the atmosphere [6] increase the amount of heat that gets absorbed before escaping to space, thus enhancing the greenhouse effect and amplifying the warming of the earth.

It is a must to understand that natural GHG radiative are important for earth system and ecology as they help to entrap the heat from earth so that the temperature of earth did not go down to negative and if human do not have the help of this natural GHG, the earth would be as cold in the ice age. Sadly the quantity or the intensity of GHG in the atmosphere unstopably increasing and the major culprit of CO₂ as the result of the uncontrollable burning fossil fuel. Due to that our earth now are becoming warmer and warmer.

2.1.2 Anthropogenic Activities

The concentration of various GHG has increased since industrial revolution thousand years ago. According to IPCC (2001) the amount of CO₂, has raised exceeding 30% since pre-industrial times due to the combustion of fossil fuels and land use and the amount gradually increase with the average of 0.4% per year. Other radiative such as CH₄, NO₂ and carbon monoxide (CO) are also increase from the agricultural industry. Although these gases are not GHG, but the atmospheric chemistry reaction that increase in tropospheric ozone, a greenhouse gas, by 40% since pre-industrial times.

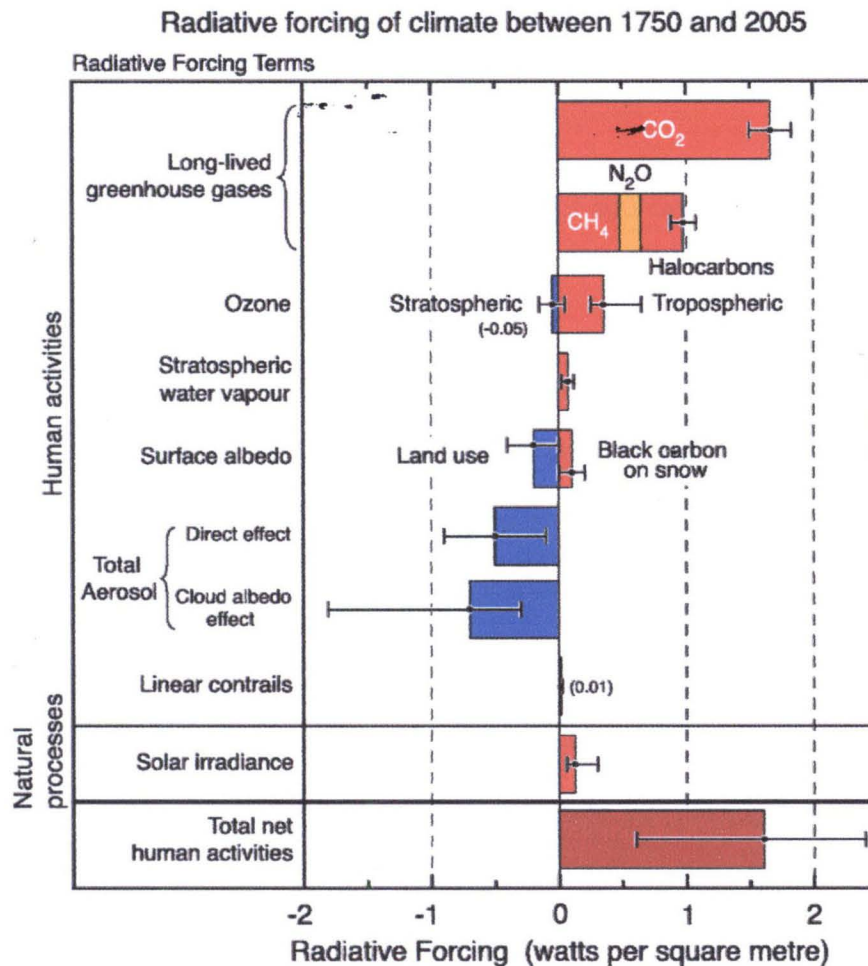


Figure 2.3: Summary of the principal components of the radiative forcing of climate change. (Source: IPCC, 2001. p.392)

Based on figure 2.2, all these radiative forcing result from one or more factors that affect climate and are associated with human activities or natural processes as discussed in the earlier. Anthropogenic activities caused significant changes in long-lived gases, ozone, water vapour, aerosols and others. The only increase in natural forcing of any significance between 1750 and 2005 occurred in solar irradiance. Positive forcing lead to warming of climate and negative forcing lead to a cooling. The thin black line attached to each coloured bar represents the range of uncertainty for the respective value.

Table 2.1: Changes in greenhouse gas concentrations from 1750 to 2005

GHG	Percent change 1750-2005	2005 atmospheric concentration	Major sources, human and natural
Carbon dioxide	+35%	379 ppm	Fossil fuel use, deforestation and land use changes, agriculture, cement production, decomposition of organic matter, oxidation of organic carbon in soils, oceans
Methane	+142%	1,774 ppb	Agriculture, fossil fuel use, ruminants and manure management, landfills, wetlands, decomposition of organic matter
Nitrous dioxide	+18%	319 ppb	Agriculture, fossil fuel use, animal manure management, sewage treatment, nitric acid production, variety of biological sources in soil and water

Note: IPCC, (2007) Concentrations of carbon dioxide are measured in parts per million (ppm), which refers to the total number of carbon dioxide molecules per one million molecules of dry air by volume. Methane and nitrous oxide are measured in parts per billion (ppb).

As conclusion, human activities had caused the climate change since thousand years before and apparently it seems like it will never stop. There are so many studies discuss the major activities in the combustion of fossil fuel, agriculture and deforestation due to urbanization. At this year there many technologies

shows how advance is our intellectual however when it comes to save reduce the climate change human should also be able to choose wisely.

2.2 Climate Change and GHG Emission Projection in Malaysia

Malaysia is located in South East Asia, comprises Peninsular Malaysia and the states of Sabah and Sarawak along with the Federal Territory of Labuan on the island of Borneo. The total area is 329,750 km² and contains a varied topography ranging from coastal areas to mountainous regions. Malaysia is also bounded over by a coastline of 4800km. The climate is tropical with mean daily temperatures of between 26°C to 28°C. There are two monsoon periods occur between November to March and May to September. Rainfall is abundant, averaging 2,000mm to 4,000mm annually. Malaysia receives about 6 hours of direct sunlight daily substantial as the result of clouds cut off an amount of direct sunlight in the afternoon and evening.

From figure 2.4 below, Malaysia's GHG emission was 222.99 Mt CO₂ eq in 2000 and removal was 249.78 Mt CO₂ eq. The net emission after accounting for the removal was -26.79 Mt CO₂ eq, thus indicating that Malaysia was a net sink in 2000. According to Malaysia's Second National Communication to the UNFCCC (NC2, 2011), Increases in emissions in the energy, industrial processes and waste sectors ranged between 50% to 184% between the years 1994 and 2000 resulting in a significant increase in emissions of each Emission Carbon Dioxide.

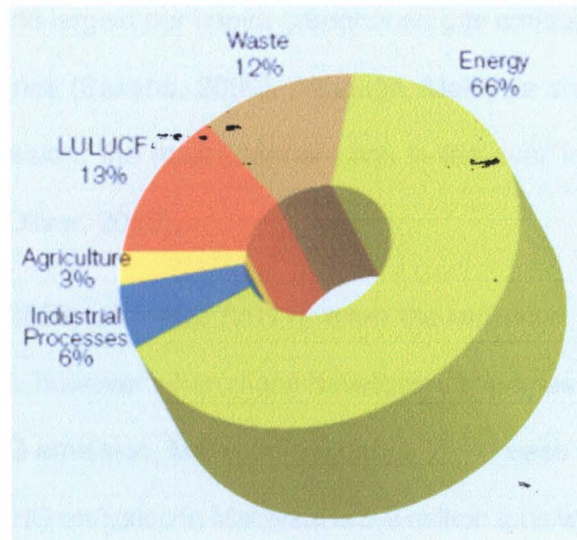


Figure 2.4: Percentage of Greenhouse Gas Emission by Sectors in 2000.

(Source: NC2, 2011. p.24)

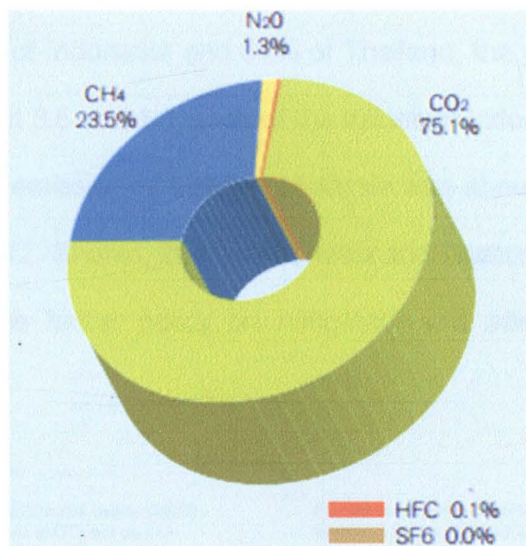


Figure 2.5: Percentage Emissions According to Greenhouse Gases in 2000.

(Source: NC2, 2011. p.24)

Based on figure 2.5, the CO₂ emissions amounted to about 75 percent of the total greenhouse gas emissions in 2000, higher 1% than the Initial National Communication (INC, 2000). The global average of CO₂ emissions for developing countries based on the INC was 63 percent of their total emissions, amounting to an equivalent of 7.4 billion tCO₂ (NC2, 2011; INC, 2000).

Malaysia is second largest per capita greenhouse gas emitter among the group of ASEAN countries (Saxena, 2009). Although, Malaysia shares only 0.3% of global GHG emission, the major concern lies in the ever increasing trend of GHG emission (Oliver, 2013).

Based on INC (2000) and NC2 (2011), even the emission of CO₂ happen to increase only 1%, however when many developing countries have successfully reduced the GHG emission, Malaysia continues to increase its emission level. The per capita GHG emission in Malaysia is 5.9 million tons which is three times more than the levels recorded for the whole Southeast Asia.

In terms of total GHG emission, Malaysia's position is also high among the other developing Southeast Asian countries. Although the total emission for Malaysia is only about 40% of Indonesia and 64% of Thailand, the per capita emission of Malaysia is about 3.5 and 1.6 times of the values of Indonesia and Thailand, respectively. Total emission of GHG in Malaysia was about 180 million metric tons in the year 2012 (Shahid, 2014). Indonesia and Thailand are neighbouring countries that have better policy on mitigation and adaptation on climate change.

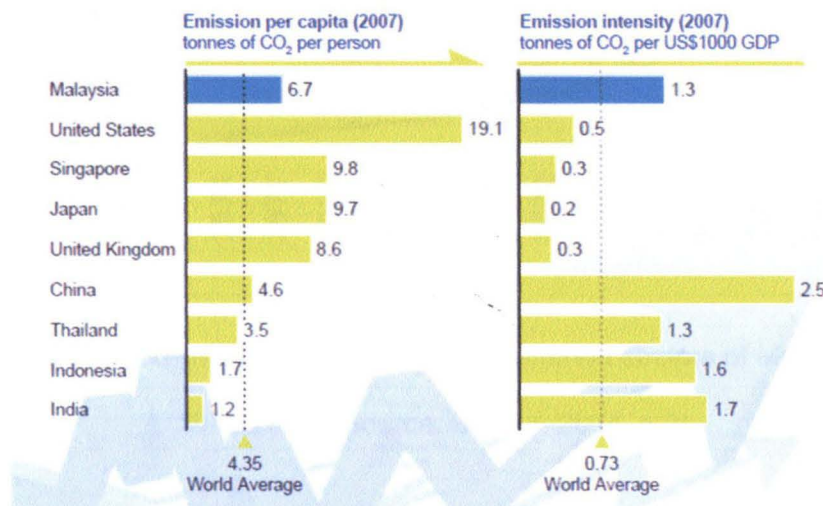


Figure 2.6: Emission per capita and intensity (2007). (Source: International Energy Agency, 2009)

Energy generation, transport, Industry, residential building and agriculture are the major sectors contributing to GHG in the country. The energy generation contributes about 54.9% of the total emissions followed by the transport, which accounted for 22.9%. The Industry shares about 17.4% of total GHG emission ranks third which is followed by residential buildings and other sectors. Time series of CO₂ emission by different sectors is shown in Figure 2.7. Also in figure 2.6, Malaysian's emission intensity was higher than the global average by GDP and per capita (Shahid, 2014 & EPU, 2010). Based on Second National Communication to UNFCCC report (NC2), in 2000 a total of 167.44 Mt CO₂ was emitted. The emission from the energy industries was the highest at 58.48 Mt CO₂ (35%) followed by emission from the transportation at 21% as shown figure 2.8 (NC2, 2011)

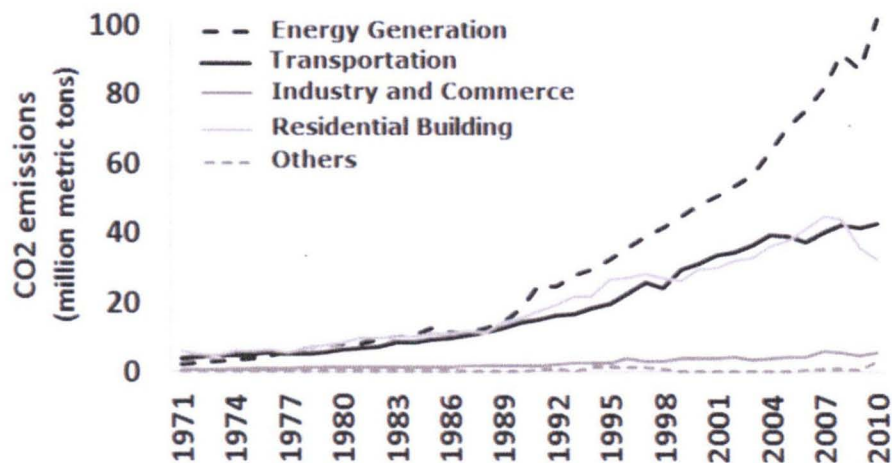


Figure 2.7: Trends in CO₂ emission by different sectors of Malaysia during 1971-2010. (Source: Shahid, 2014. p.2)

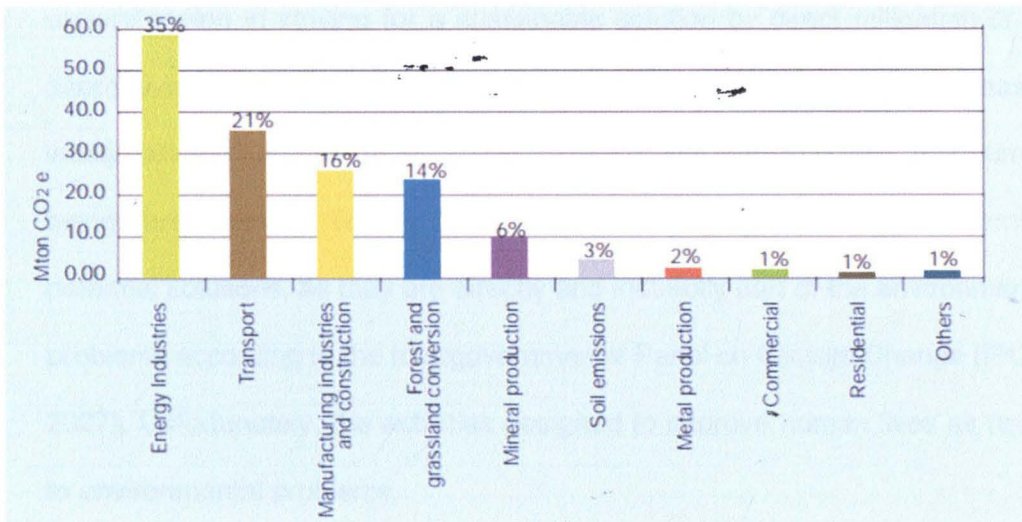


Figure 2.8: Emission of CO₂ by sectors. (Source: NC2, 2011. p.25)

Although there are some researcher mentioned transportation industry release higher CO₂ emission but it should be noted that the energy generation which include fossil fuel, coal and other are the one who releasing bigger emission than other sector or industry as energy sector is economically driven yet give a major impact our climate change. There are differences with the percentage of emission of CO₂ in energy sector because some researcher divided the percentage with different sectors and/or industries nonetheless still energy sector will be the top emitter sector.

2.3 Knowledge, Awareness and Behaviour Pattern of Society towards Climate Change

The global attention resulting from the growing extent of many environmental impacts has brought together scientists and policymakers to search for a sustainable solution. Consequently, the notion of awareness and

understanding in striving for a sustainable solution by direct mitigation or an alternative strategy has been a focus of research since increased industrialization (Masud et al., 2013). Scientific literature suggests that human beings are central to finding a way forward, engaging in debates concerning potential solutions, as they are directly and indirectly part of the environmental problems according to the Intergovernmental Panel on Climate Change (IPCC, 2007). Unfortunately, the activities designed to improve human lives as result to environmental problems.

From previous study majority of people in most countries, believe that climate change is an environmental problem that needs to be tackle (IFRC, 2011; UWI, 2012 and Martin, 2006). Example in United States, Vietnam and Jamaica; almost half of respondents think that climate change is real and need to be address and another half were even unclear with the term of climate change which then show the lack of knowledge and awareness thus taking the warning an solution on reducing climate change for granted.

According to Martin (2006) the writing about many people's unwilling to take action to mitigate climate change, note that the refusal in the face of political and moral urging to change behaviour may be promote and this supported by the shortfall of agreement that the climate problem is as serious as made out.

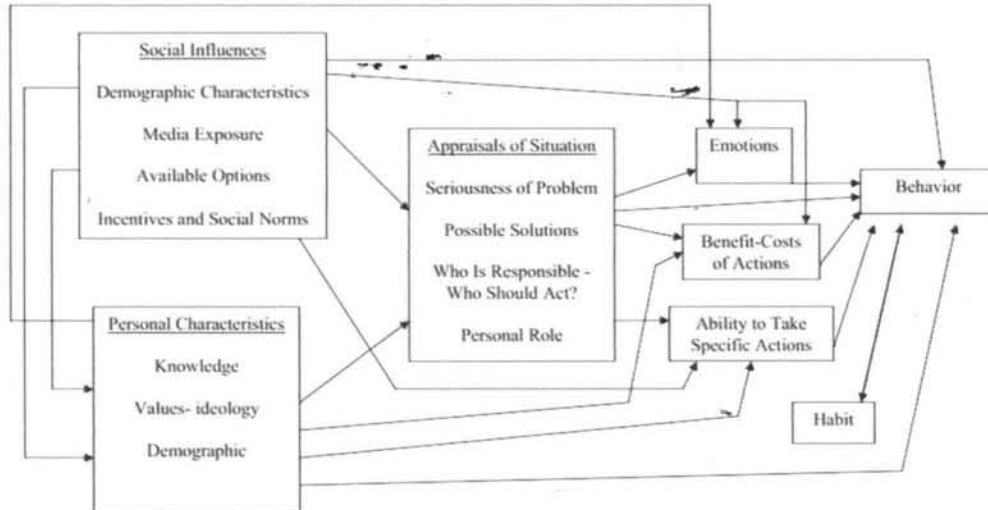


Figure 2.9: A model of the determinants of behaviour relevant to climate change. (Source: Martin, 2006. p.4)

Figure 2.9 indicates, the human characteristics and the social influences affected by the emotions, behaviour, the expected gains or appraisals from the behaviour. As explained by Martin (2006), the evidence reviewed so far indicates that behaviours that contributes to, or counters, climate change is affected by people's emotions and by the benefits they expect from their behaviour, which are, in turn, affected by their appraisals of the situation and this is supported by Masud et al., (2013) that people with high levels of awareness about climate change vulnerability are more likely to act towards reducing the impact of climate change. Nevertheless this shows that in other word human are living in denial although the impact of climate change is obvious.

To sum up, because the climate change is a somewhat cannot be directly observed; people who lack of knowledge and awareness towards climate change are rather delayed in time to pro act as result to the behaviour of people that tent to ignore these phenomenon.

2.4 International Involvement and National Policies of Climate Change of

Malaysia

In terms of climate policy, Malaysia is a signatory of many international accords for greenhouse gas emission reduction including Montreal protocol of 1989, Kyoto protocol of 1992 and Copenhagen accord of 2009. Malaysia has also declared to reduce its greenhouse gas emissions by up to 40% by the year 2020 as comparable with 2005 levels to implement the Cancun agreements and the Bali declaration of joint efforts of emission reduction by both developed and developing countries (NC2, 2011).

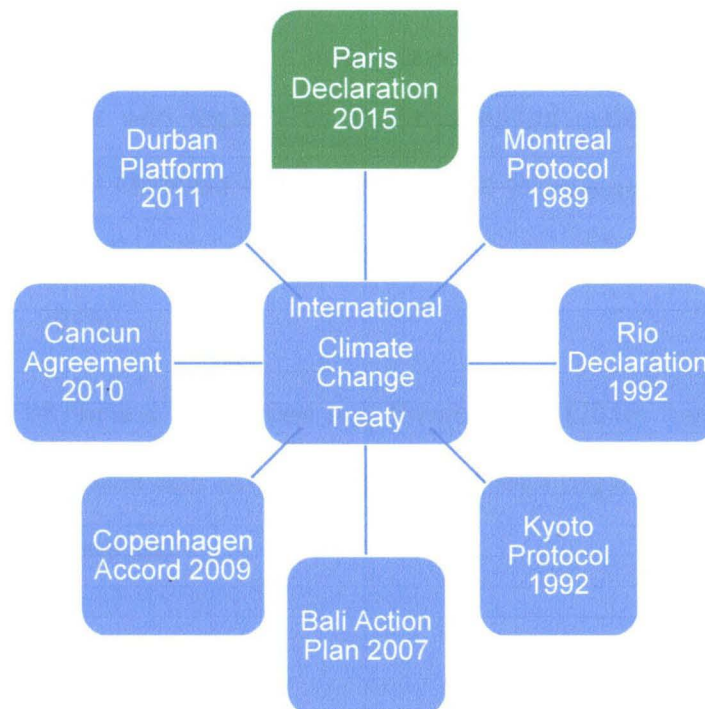


Figure 2.10: Malaysia involvement in international climate change treaties.

As shows in Figure 2.10 almost 30 years ago our government are aware on the environmental problem issue and which include climate change. An interest can be seen in the enforcement to develop and implement policies for mitigating

climate change. However the main issue is there is no quantified emission reduction targets for any developing countries.

Upcoming agreement will be the Paris Declaration 2015 that would be held in February 2015 in Paris. The summit will be discussing and debating issues on promoting the collaboration of public and private stakeholders on green economy, present solutions to the UNFCCC and other key national and local government and to sign a joint declaration known as the Paris Declaration for an international climate deal. This will be the strongest and most influential voice, platform and process supporting a global deal in Paris (Wclimate, 2014)

In November 2009, the cabinet of Malaysia had endorsed the Malaysian Policy on Climate change, The fundamental policy statement that was agreed upon by the government with regards to the environment especially for climate reservations is that Malaysia will and committed to 'Ensure climate resilient development to fulfil national aspirations for sustainability (NRE, 2010 & Shahrul et al., 2013)

The Ministry of Natural Resources and Environment (2010) had underlined three major objectives and five major principles with regards to this climate change policy. There are:

Objective: (p. 147)

1. *Mainstreaming climate change through wise management of resources and enhanced environmental conservation resulting in strengthened economic competitiveness and improved quality of life.*
2. *Integration of responses into national policies, plans and programs to strengthen the resilience of development from arising and potential impacts of climate change.*

3. Strengthening of institutional and implementation capacity to better harness opportunities to reduce negative impacts of climate change.

Principles: (p 147)

1. Development on a sustainable Path – Integrate climate change responses into national development plans to fulfil the country's aspiration for sustainable development.
2. Conservation of environmental and natural resources – Strengthen implementation of climate change actions that contribute to environmental conservation and sustainable use of natural resources.
3. Coordinated Implementation – Incorporate climate change considerations into implementation of climate change responses.
4. Effective Participation – Improve participation of stakeholders and major groups for effective implementation of climate change responses.
5. Common but differentiated Responsibilities and Respective Capabilities – International involvement on climate change will be based on the principle of common but differentiated responsibilities and respective capabilities.

Table 2.2: Progressive National Policies on Environmental Protection and Conservation

National Policy on the Environment (2002)	National Green Technology Policy (2009)	National Climate Change Policy (2009)
<ul style="list-style-type: none"> • Ensure economic, social and cultural progress through environmentally sustainable development. • Strategies focus on effective management of natural resources and the environment, prevention and control of pollution, strengthening institutional capacity, education and awareness efforts and formulation of action and implementation plans. 	<ul style="list-style-type: none"> • Ensure sustainable development. • Develop roadmaps to guide application of green technologies in various sectors, including power generation, transport and construction. • Establishment of a Green Technology Financing Scheme (GTFS) with a RM1.5 billion fund to encourage investments in green technology, construction and innovation. 	<ul style="list-style-type: none"> • Streamline and coordinate across existing legislation and policies. • Establish inter-ministerial and cross-sectoral committee to drive and facilitate implementation of adaptation and mitigation measures. • Identify options and strategies to achieve a low-carbon economy.

(Source: 10MP, 2010 p.298)

Table 2.2 is outline under Awareness, Faculty, Finance, Infrastructure, Research and Marketing (AFFIRM) framework, which outlines the government's approach towards creating a comprehensive ecosystem for environmental sustainability.

The evidence suggest that the government of Malaysia acknowledge that climate change have adverse effects on human wellbeing, threatened the sustainability of natural resources and would further weaken the development including the security of the country. Perhaps more unified responsibility and collaboration could be achieve not just from government and non-government agencies but also from any global entity in order to have a better adaptation and mitigation climate change to ensure the short and long term national sustainability.

2.4.1 Comparing National Policy with China

As far as international climate negotiations are concerned the history has been made when the U.S. and China declared their support for the UNFCCC negotiations process in early 2014. During the U.S.-China Strategic and Economic Dialogue in July, the first issue the working group tackled was fuel and greenhouse gas emission standards. However, China's chief climate official, Xie Zhenhua, stressed that his country would not agree to the same emission specifications as the U.S. Previously during the Kyoto Protocol Canada, Japan and Russia pull out from the agreement in 2011. Canada criticized that U.S. did not rectify the protocol and China commitment to cut emissions is not legally binding as result the emitted biggest greenhouse gases emission. As mention by Clay, 2011 Canada managed to cut its greenhouse emissions to 6% below 1990 levels by 2012, however in 2009 emissions were 17% higher than in 1990. Because of the been forced to spent 14 billion dollar under the Clean Development Mechanism (CDM) mechanism to buy carbon credits abroad they are planning to waste their money by pulled out from the protocol.

The Chinese government launched its National Climate Change Programme in 2007 and it's White Paper on Climate Change in 2008. The White Paper introduced national energy intensity targets for a 20 per cent reduction by 2010 in comparison to 2005 and targets for closing down inefficient coal power stations, decreasing the share of heavy industry, investing in energy efficiency and promoting renewable energy. China's much debated position at the Copenhagen and Cancun climate negotiations was a 45% reduction in carbon intensity reduction by 2020 in comparison to 2005 while Malaysia volunteer to reduce 40% the intensity of carbon dioxide. (UNFCCC, 2010).

Since energy sector is the bigger factor in emitting CO₂ emission perspective, both countries have a range of policies and legislative frameworks in place with the same objective to target the low carbon economy, China came out with Chinese Renewable Energy Law from 2006 which aims to 'promote the development and utilization of renewable energy' (National People's Congress of China 2005) in Malaysia the National Renewable Energy Policy and Action Plan started in (2009) and have include the renewable energy as part of Energy sector (NC2, 2011).

Other policies which promote low carbon energy are the Five Year Plans, most recently the 12th Five Year Plan for 2011–2015. The government body NDRC introduced Renewable Energy Targets in 2007 which are comparable to those of the European Union. Fifteen per cent of the total primary energy should be from renewable energy by 2020. This policy promotes biomass, geothermal energy, hydropower, solar power, tidal energy and wind energy and aims to use these renewable energy sources to achieve decentralised electrification in remote rural areas (NDRC, 2007; Urban et al., 2009).

With the growing of green economy and accepted policy on climate change, China and Malaysia should remain to be a driver of climate change mitigation actions and creates an enabling environment for low carbon businesses.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Methodology Framework

This chapter outlines the methodological approach used for the study. Figure 3.1 is the methodology framework this study. A detailed quantitative and qualitative approached were describe in this chapter.

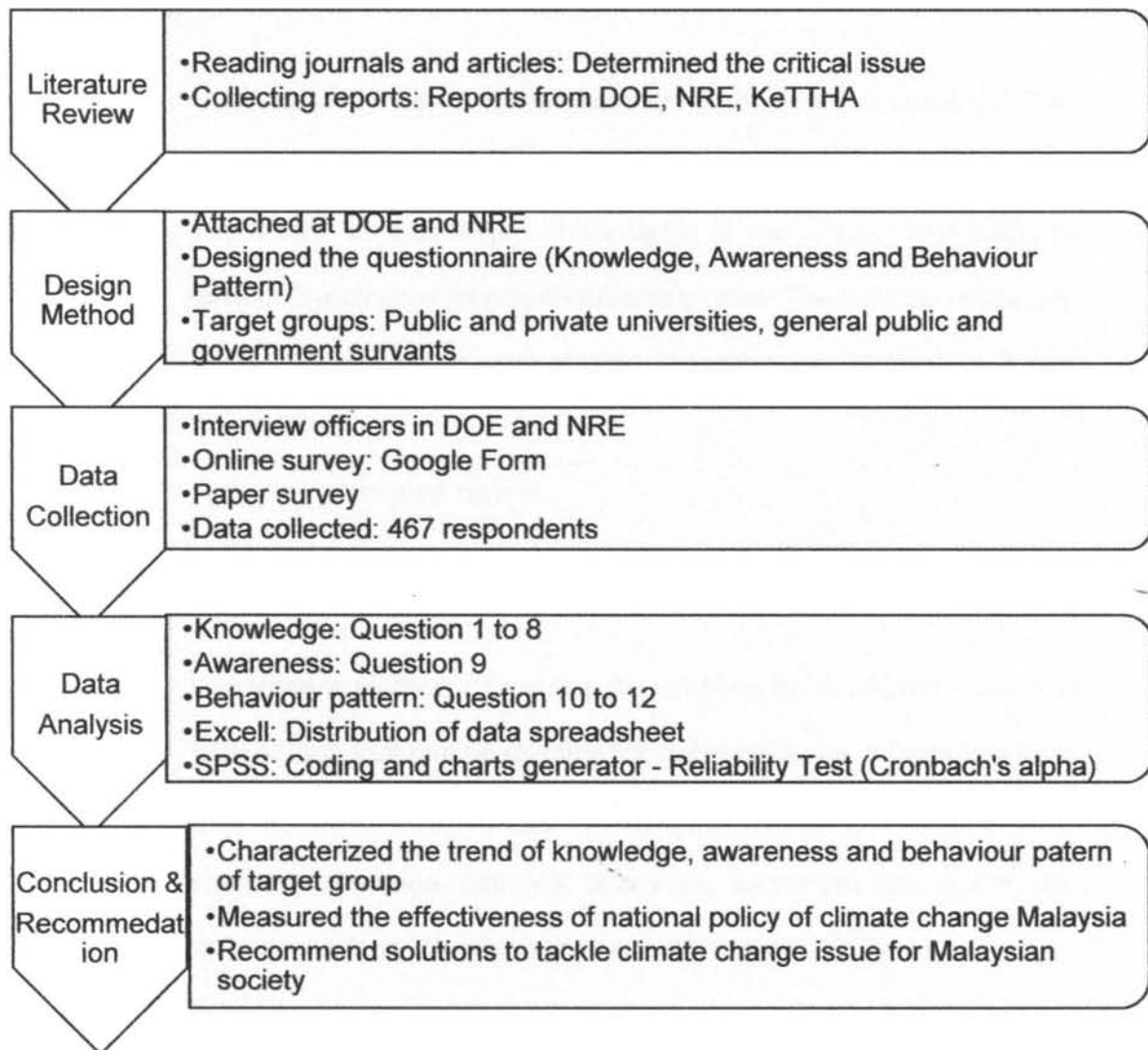


Figure 3.1: Methodology framework.

For this study a mix of procedure to gather the information for the development of a comprehensive communication strategy. Mixed methodology is generally preferable to any single method as the phenomenon being investigated can benefit from the strengths of both quantitative and qualitative research paradigms (Christine, 2008)

The attitude and the understanding of the surrounding of climate change and adaptability are different and complex. Thus quantitative data alone may limit the ability to understand why people do the things they do when it comes to climate change and resilience. The methodology, therefore, involved the following:

1. Qualitative method – A fundamental or introductory of a research. This method is to gain an overview of the underlying issues, opinions, and inspirations as it contribute the insights of the problem and helps to develop hypotheses for potential research idea. The collection data vary using unstructured or semi-structured techniques (Mohamed, 2013).

Example:

- a. Literature review
- b. Interview

2. Quantitative method - Evaluate the problem by producing numerical data or data that can be useable for statistical study. It formulate facts and conclude data from bigger sample by quantifying define variables such as knowledge, opinions, behaviors, awareness and others The collection data much more structured (Mohamed, 2013).

Example:

- a. Online survey
- b. Paper survey

3.2 Qualitative and Quantitative Method

3.2.1 Qualitative Method

Firstly is to pin point the critical issue and to come out with a problem statement by reading relevant publications such as journals, articles and reports on climate change matter. A literature review is a process of studying or evaluating on what has already been written on a particular topic. The benefits of literature review is that it can serve multiple function at different stages of the research and writing process where it will provide the gaps that can be used to be further investigate. The role of a literature review in qualitative research depends on the methodology in use, and also on the goals of the research itself, which ironically can generally only be determined by consulting available research literature (Boote & Beile, 2005). According to Cresswell (2009) usually require that the researcher show some knowledge about prior research related to their question. For this study all the literature review relates to the scenario of climate change in Malaysia, Southeast Asia and globally where the study is focused on the society knowledge, awareness and behaviour pattern toward climate change. Other than that the study of effectiveness of national policy of climate change is also important as this lead to the purposes of having the policy and level of impact to society by comparing with other countries.

During this study, it gave a significant help when been attached to relevant government agency as to give the insider and the real story in relevant department. Attachment done in Department of Environment (DOE) at Putrajaya, Malaysia for a months starting on October 20 until November 20, 2014. Given a free access to all units and departments such as Air Division and Environment Institute of Malaysia (EiMAS) thus have a clear view on what are

the nature of their function; to prevent, eliminate, control pollution and improve the environment, consistent with the purposes of the Environmental Quality Act 1974 (DOE, 2014). Given permission within the period, visited and meet officer at Ministry of Natural Resources and Environment (NRE) from Environmental Management and Climate Change Division where the division is responsible to establish a holistic policy framework to ensure a healthy, clean, safe and productive environment so as to achieve sustainable development and to ensure that the country's interest in global and regional environmental issues is protected (NRE, 2014). During the attachment managed to interview two officers from different divisions ; Mr Mohd Famey Yusoff the Chief Assistant Director of Air division from DOE and Mr Muhammad Ridzwan Ali the Assistant Secretary of Environmental Management and Climate Change Division from NRE.

3.2.2 Quantitative Method

For quantitative method is done by doing survey approach. The design of the questionnaire has been divided into 4 segments which are demographic, knowledge, awareness and the behavior pattern. The questionnaire inputs were gathered based on journals and reports on Malaysia's Second National Communication to the UNFCCC and Knowledge, Awareness and Behavior Pattern of Climate Change reports from other countries like Vietnam and Jamaica and also online materials from Environmental Protection Agency (EPA) and The National Aeronautics and Space Administration (NASA) (IFRC, 2011; UWI, 2012; NC2, 2011; NASA, 2014; EPA, 2014).

The questionnaires been distributed in two ways; online and paper survey. Google form was used as a platform for online survey. As a marketing to

promote the survey, a Facebook page was created and the link to the page was pasted on every university's pages, communities, faculties, groups, personal page profile and government and non-government agency pages into three groups; public and private universities in Malaysia, the general public and government servants. For paper survey, it was distributed to 6 universities half public universities (University of Malaya, Universiti Teknologi MARA and Universiti Putra Malaysia) and the remaining were private universities (Multimedia University, Taylor's University and Universiti Kuala Lumpur), government servants from Royal Malaysia Police (PDRM), Ministry of Natural Resources and Environment (NRE), and Department of Environmental (DOE) and lastly the general public. Each group were given 100 questionnaires and respondents were selected randomly thus they may have a different occupations and education background and age range.

The questionnaire started with demographic questions such as their age, nationality, occupation and other relevant question. Followed by questions which were created to measure and to measure their levels of knowledge, awareness and behaviour toward climate change. Respondents have to answer 14 questions which include dichotomous or open ended, multiple choice, filter or contingency questions and Likert scale type of questions. From question no. 1 until question no. 8 focus more on the knowledge on climate change such as the respondents rate of understanding on climate change, the type of media sources on where the respondents gain the knowledge of climate change and many other relevant questions; question no. 9 and no. 10 focus more on the respondents awareness on climate change example by rating the respondents concern on the potential climate changes and awareness statement that they may have or haven't faced either past or present or future of climate changes; and behavior pattern toward climate change is for question

no. 11 and no. 12, where here to measure the respondents willingness and attitude on what activities they can do or done that can reduce the greenhouse gases which lower the impact of climate change. The questionnaire ended with the correspondent opinion and their concern whether to continue to read and search relevant issues on climate change. The survey was fielded online and on paper over a 30-days period, during October 20 to November 20, 2014. (Sample of questionnaire is attached in Appendices)

All collected data then keyed into the excel spreadsheet and every column represent the number of questions from the survey. Once completed the spreadsheet data was transferred into Statistical Package for the Social Sciences (SPSS) to generate charts by doing numerical coding.

3.3 Statistical Package for the Social Sciences (SPSS)

It is simple to use SPSS for survey study as can handle the matrix input data type in clustering procedure and nevertheless it is simpler than other software like Statistic Software (SAS) (Ibrahim, 2010).

Although cluster analysis is a more primitive technique but it is designed to detect clusters in a set of objects and as mentioned earlier the questionnaire were designed with various type of questions and it is suitable to use SPSS as the answers needed from respondents could be in numerical, linguistic or structural data. Most efforts to produce a rather simple group structure from a complex data by creating set of coding and it is important to measure the closeness or similarity of the data. In generating the charts it is significant to consider the nature of the variables (discrete, continuous and binary) or scales of measurement (nominal, ordinal, and interval or scale) and subject matter knowledge (Daehak, 2009).

It is suggested by Ibrahim (2010) and Barry (2014) two key steps must be applied:

1. Measure the inter-object or coding similarity.
2. Specify a procedure for forming the clusters based on the chosen measure of similarity

Once the measurements were coding, it will quantified the coding and can be generated as chart known as output.

SPSS also can generate Cronbach's alpha, the most common measure of internal consistency also known as reliability. This instrument reliability is important in survey study as it shows the validity that the survey will yields the same results on repeated trials. It is most commonly used when to determine if the scale is reliable, the questions are set to have multiple Likert questions in a survey that form a scale. In general, alpha scores reaching 0.7 and above are considered acceptable, 0.8 and above considered good, and 0.9 and above are excellent (Gliem, 2003 & Laura, 2014)

Clearly SPSS is more straightforward from other statistical software and in the fact of that this software have been used in various survey studies. For this study SPSS version 17 is used.

3.4 Online Survey Tools: Google Form

Previously survey done through only paper or email but now parallel with the advance technology and sophisticated idea a well-developed online survey tools merge to ease out field research. This tool permit user to easily define survey questions and possible responses and then send users a link to the survey and it comes with basic, paid or free version all in a free or basic version.

There are four most popular survey tools on the market such as Google Forms, SurveyMonkey, Zoomerang and SurveyGizmo (Nate, 2012 & Tiffany, 2012).

Google Forms is a survey development interface with built-in reporting. By using Google Form user can create unlimited number of polls and surveys free with unlimited number of respondents in such surveys via the web browser. Although other online survey tools come with basic version however the questions that can be created only limit up to 10 questions only although more questions are allowed to be fill in paid version but a little bit pricey (Amit, 2014 & Tiffany, 2012)

Google Form allow user to create many types of questions example Likert question, open ended questions and many more. The forms created with Google Form are mobile friendly and correspondent can therefore send in their responses from mobile phone browsers as well regardless whether in Android, IOS, or Windows platforms. The most important objective of using online survey tools is to have the collected responses in Excel spreadsheet and with Google Form all the responses are automatically collected in an Excel spreadsheet and this is easier to analyze large sets of data using charts and other complex spreadsheet functions. Compare to other online survey tools the respondents are limited up to 100 people a day and the responses cannot be downloaded for basic version. On top of that every responses who fill in the survey using Google Form, the user can receive email notifications and it will provide info such as the number of responses. Lastly on the limitation of using Google Form, although all responses can be analyze automatically and produce chart or pie chart or bar chart however user can not personally choose desire type of charts and again this can be done using paid version of other online survey tools. Fortunately the desire chart can be chosen using other

statistical software like SPSS as the generator Excel spreadsheet can be imported into the software (Amit, 2014).

CHAPTER FOUR

RESULTS & DISCUSSION

4.1 General

As detailed out in Chapter 3, the research is to characterize the level of knowledge and awareness and also the behaviour pattern toward climate change. This can reflect the effectiveness of the national policy of climate change in Malaysia. As mentioned earlier Malaysia is committed to reduce the 40% intensity of carbon dioxide. From this research, the completed questionnaires is 467 out of 850 and this give 55.76% of response rate, indicating that the finding for this survey is valid for further analysis.

4.2 Characterization Level of Knowledge and Awareness on Climate Change



Figure 4.1: Percentage level of knowledge by gender

Figure 4.1 demonstrates the percentage level of knowledge by gender. This survey measures level of knowledge of male and female respondents from

universities, general public and government servants. Characterization of knowledge can be divided into three main groups; weak level of knowledge (I don't know and I know a little bit) and moderate level of knowledge (I'm somewhat familiar) and high level of knowledge (I know a lot and I'm an expert).

An approximately 48.89% and 48.78% represent weak level of knowledge for male and female respondents respectively. For moderate level of knowledge of climate change, average percentage of male and female respondents were 35% and 39.72% respectively. For high level of knowledge, 16.11% and 11.50% from male and female respectively.

Overall the surveys shows that 48.84% of respondent have weak knowledge of climate change, indicating that overall respondents have minimal knowledge that Malaysia is now experiencing climate change and global warming issues. This is serious issues since there are significant similarity for weak level of knowledge between male and female, Malaysian government should plan effective mitigation measure to provide knowledge on climate change to Malaysian society but it should be holistically focus by gender equality. Perhaps to consider on promoting cleaner-burning fuel for household use, which will help to reduce the indoor and outdoor air pollution and other harmful emissions to the atmosphere, and will benefit women by cutting their annual cooking costs to a certain level and also can reduce the utilities bill for the men to pay. In other word both gender must have the responsibility and the togetherness value to reduce the releasing greenhouse gases and lower the impact of climate change.

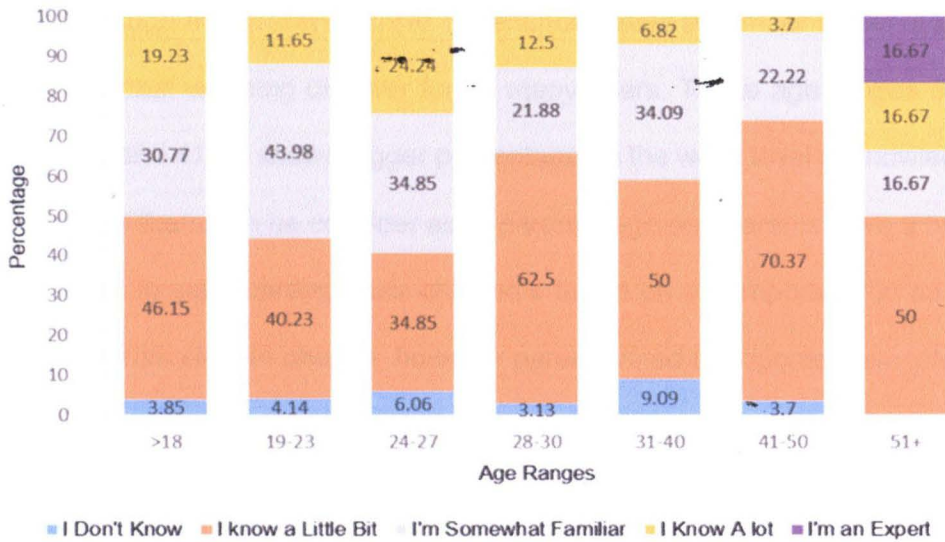


Figure 4.2: Percentage level of knowledge by age

Figure 4.2 demonstrates the percentage level of knowledge by age. This survey measures level of knowledge of respondents range age of >18, 19-23, 24-27, 28-30, 31-40, 41-50 and 51+ from universities, general public and government servants. Characterization of knowledge can be divided into three main groups; weak level of knowledge (I don't know and I know a little bit) and moderate level of knowledge (I'm somewhat familiar) and high level of knowledge (I know a lot and I'm an expert).

An approximately 50%, 44.37%, 40.91%, 65.63%, 59.09%, 74.07% and 50% represent weak level of knowledge for range age of >18, 19-23, 24-27, 28-30, 31-40, 41-50 and 51+ respondents respectively. For moderate level of knowledge of climate change, the percentage of the age groups of range age of >18, 19-23, 24-27, 28-30, 31-40, 41-50 and 51+ were 30.77%, 43.98%, 34.85%, 21.88%, 34.09%, 22.22% and 16.67% respectively. For high level of knowledge, 19.23%, 11.65%, 24.24%, 12.5% , 6.82%, 3.7% and 33.34% from range age of >18, 19-23, 24-27, 28-30, 31-40, 41-50 and 51+ respectively.

Overall the surveys shows that 54.86% of respondent have weak knowledge of climate change, indicating that almost half the respondents have surface

knowledge that Malaysia have experienced quite a number of climate change and global warming disaster for so many years. These age ranges of 28-30, 31-40 and 41-50 shows bigger percentage on the weak level of knowledge and most of them can be consider as at parent stage and parents have a huge role to play in safeguarding their children's future on the important on saving the world from climate change, however parents need to educate themselves first. This is a severe issues and Malaysian government should organize specific campaigns and awareness program for every range of age such as the significant value of recycling and composting waste. As nowadays people just simply throw the waste which later end up in the landfill and most Malaysian did not realized on what and how the waste can contribute to the climate change. Clearly it is important to nurture the knowledge on climate change to every Malaysian society regardless at any age.

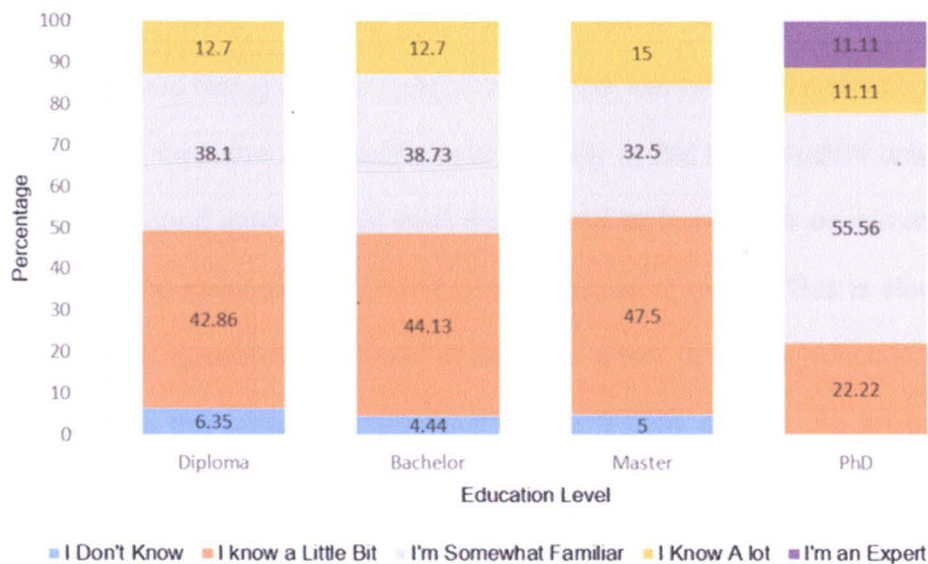


Figure 4.3: Percentage level of knowledge by education level

Figure 4.3 demonstrates the percentage level of knowledge by the education level. This survey measures level of knowledge of respondents form different

education level such as diploma, bachelor degree, master degree and PhD degree from universities, general public and government servants. Characterization of knowledge can be divided into three main groups; weak level of knowledge (I don't know and I know a little bit) and moderate level of knowledge (I'm somewhat familiar) and high level of knowledge (I know a lot and I'm an expert).

From the figures, 49.21%, 48.57%, 52.5% and 22.22% represent weak level of knowledge for education level of diploma, bachelor degree, master degree and PhD respondents respectively. For moderate level of knowledge of climate change, the percentage of education level of diploma, bachelor degree, master degree and PhD were 38.1%, 38.73%, 32.5% and 55.56% respectively. For high level of knowledge, 12.7%, 12.7%, 15% and 22.22% from diploma, bachelor degree, master degree and PhD respectively.

Overall the surveys shows that 43.13% of respondent have weak knowledge of climate change, indicating that the respondents have lower knowledge that Malaysia is facing climate change and global warming and it can be seen from diploma, bachelor and master level. Usually at this level student only focus on scoring good marks rather than the internal or local issue on climate change and not to mention the climate change issues at global. This is alarming and Malaysia government should tackle this issue at every education level by including the subject on environment as a core subject. As an example in Universiti Teknologi Mara (UiTM), the institution include sustainability management course for master student as a core subject and in faculty of civil engineering and environmental science in faculty of applied science. It will be great if every universities include relevant subject that can promote the sustainability of the environment, economic and social which can contribute to lowering greenhouse gases effect and reduce climate change impact at once;

the goal is that every citizen who study in any institution of education regardless in any program or faculty can have a better level of knowledge toward climate change.

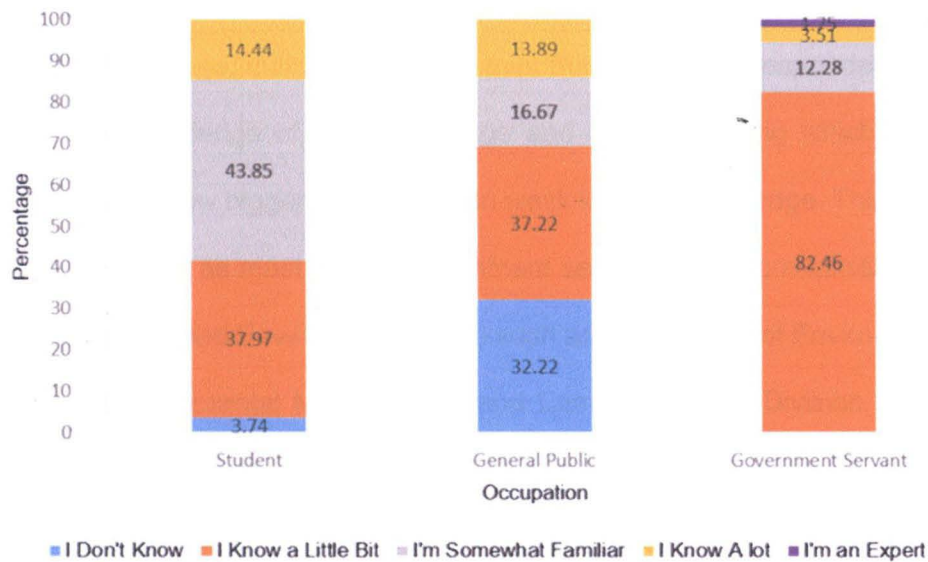


Figure 4.4: Percentage level of knowledge by occupation

Figure 4.4 demonstrates the percentage level of knowledge by the occupation. This survey measures level of knowledge of respondents from different occupation background such as student, general public and government servants from three cluster group of universities, general public and government servants respondents. Characterization of knowledge can be divided into three main groups; weak level of knowledge (I don't know and I know a little bit) and moderate level of knowledge (I'm somewhat familiar) and high level of knowledge (I know a lot and I'm an expert).

From the figures, 41.71%, 69.44% and 82.46% represent weak level of knowledge from different occupation background such as student, general public and government servants' respondents respectively. For moderate level of knowledge of climate change, the percentage of different occupation

background such as student, general public and government servants were 43.85%, 16.67% and 12.28% respectively. For high level of knowledge, 14.44%, 13.89% and 5.26% from diploma, bachelor degree, master degree and PhD respectively.

Overall the surveys shows that 64.53% of respondent have weak knowledge of climate change, indicating that the over than half of the respondents have lack of the knowledge of climate change and global warming which government servants show bigger percentage on weak level of knowledge. This is important to take note as most of the government servant were from Ministry of Natural Resources and Environment (NRE) such as Department of Environment (DOE) and Environmental Management and Climate Change Division. The internal staff who work in the department that responsible to spread the knowledge awareness to the society on climate change issue must first educate themselves on this issue. Malaysian government also should impart the knowledge of climate change to every individual without looking at the background of occupation; every sector and industry should take the responsibility to reduce climate change by sharing the knowledge of the impact of greenhouse gases to the employer and together to combat and reduce climate change. Campaign such as changes office light source to more energy efficient bulb and educate them the advantage of using energy efficient product, other than that to encourage company to have greenhouse gasses inventory this is to measure and calculate the level of emission of greenhouse gasses release by the company or building to the atmosphere. Obviously it is a need to have a knowledge of climate change so that society lower the impact of climate change and can serve better place for future generation.

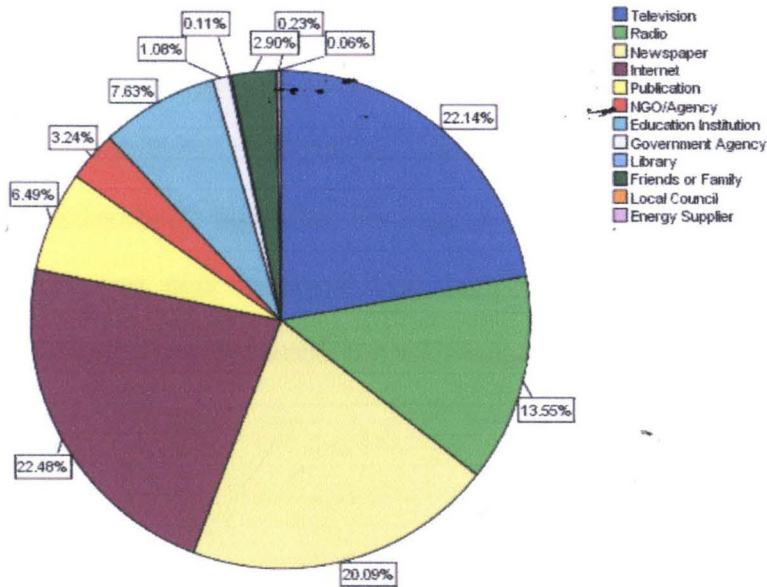


Figure 4.5: Percentage of media source that deliver knowledge on climate change

Figure 4.5 demonstrate the percentage of media source that deliver knowledge on climate change. Majority 22.48% of them read or heard the term from the internet, 22.14% from watching television and 20.09% from reading newspaper. Other than that 13.55%, 7.63%, 6.49%, 3.24%, 2.90%, 1.06%, 0.23%, 0.11% and 0.06% respectively to radio, education institutions, publications, non-government agencies, friends and families, government agencies, libraries, energy suppliers and local council. The three most effective media for delivering information on climate change are: Internet (22.48%), television (22.14%) and newspaper (20.09%); these indicate that the respondents prefer the knowledge come from these three source of media source and all the media source are free. Since internet, television and newspaper are the medium that been chosen by the respondent as the source to gain knowledge on climate change therefore government should increase the promotion of climate change such as advertisement, debate on climate change, animation and many more. Sector information, communication and technology (ICT) should play important role channel and share the knowledge of climate change regularly to the society

such as by sharing current data and scenario of climate change in Malaysia. However other media source such as audio and publication from radio, education institutions, publications, non-government agencies, friends and families, government agencies, libraries, energy suppliers and local council should increase and continue their support too and together help the government initiative to promote the knowledge of climate change to Malaysian Society.

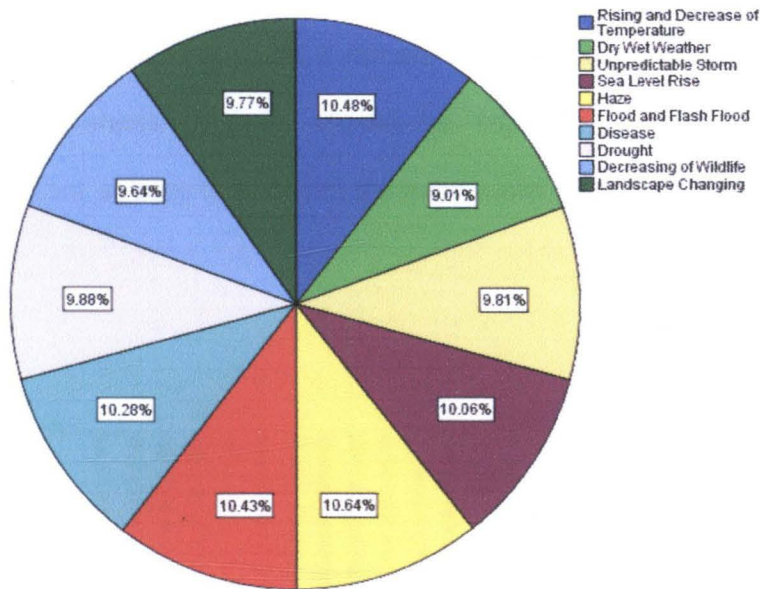


Figure 4.6: Percentage of level of awareness the concern on climate change events.

Figure 4.6 provide the percentage of level of awareness on the respondent on their concern of climate change events. From the figures, the percentage of the level of awareness of the respondents concern on climate change event were averagely fair for every proposed event. 10.64% worried on haze event, 10.48% on the rising and decreasing of earth temperature, 10.43% on flood and flash flood and 10.28% on the disease concern. 9.88%, 9.81%, 9.77%, 9.64% and 9.01% concerned on drought, unpredictable storm, landscape changing,

decreasing of wildlife and dry wet temperature respectively. It is not a surprise that respondent have bigger concern on climate change event such as haze, the rising and decrease of temperature and flood and flash flood apparently happen decade ago as Malaysian society have been facing with various weather events such as haze, dry spell and floods events. Nevertheless, this indicate that the awareness level is there among the society and unfortunately they cannot visualize the impact of climate change. Activities such as creating a mock disaster of climate change can be organized so that the society can feel and see the real potential disaster that can caused impact to the environment, economic and human health if climate change is continually increase. Thus more awareness program should be organize by government or non-government agency to increase the awareness level of climate change to the public.

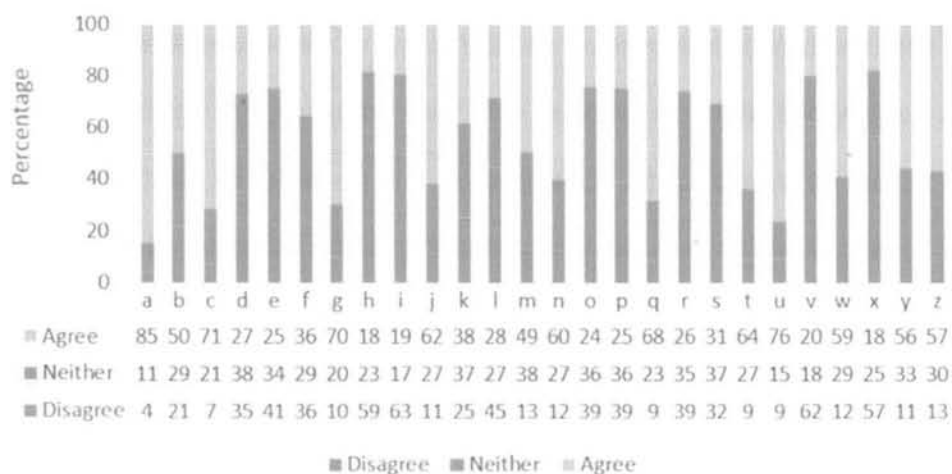


Figure 4.7: Percentage of level of awareness on awareness statement of climate change issues.

Figure 4.7 demonstrates the percentage level of awareness on awareness statement of climate change issues. Characterization of awareness can be divided into three main groups; low level of awareness (Disagree and Disagree

Strongly) and neither and high level of awareness (Agree and Agree Strongly). In this question no.10 from the questionnaire, the respondent were requested to indicate and rate on how much they agree or disagree with the mixed climate change statements which measure their level of awareness on climate change. From the figures, the average percentage was taken, 27.40% represent low level of awareness, 27.90% for neither and for high level of awareness was 44.70%. Overall the surveys shows that 44.70% of respondent have high level of awareness of climate change. This indicate that the respondents have the level of awareness. However public have a thought that the climate change issue is a small matter thus taking it for granted. Hence more awareness activities such as encourage society to choose to buy environmentally friendly products and products that are produced locally, a huge difference can be made as example if consumer buy international product thus government have to allowed importing goods from other countries and using flight and ships to transporting the goods will use more fuel which release more greenhouse gasses to the atmosphere. On top of that the government should embrace the green technology not just goods but also building structure everywhere and awareness must be given to the society such as to create an act where professional like engineer and architect to use green material or build a building only with green technology and create more designated area of green technology friendly for public such as solar mobile charger. It is important for the society to be aware on the climate change issues

4.3 Characterization Malaysian Behaviour toward Climate Change

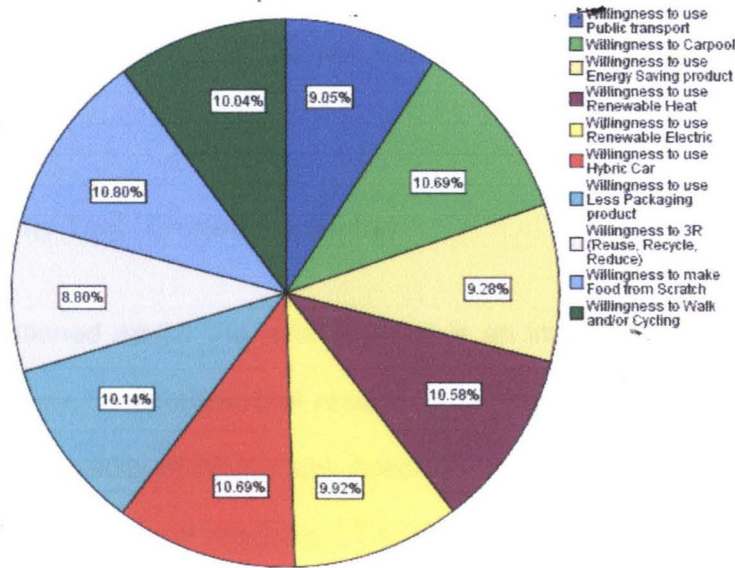


Figure 4.8: Percentage of level of behaviour or willingness on climate change

Figure 4.8 provide the percentage of level of behaviour or willingness the Malaysia society behaviour on climate change. The percentage for the level of willingness is rather fair for every points. From the figures willingness to make food from scratch is 10.80%, willingness to carpool and using hybrid car shared same percentage of 10.69% others the willingness to use renewable heat, walking and/or cycling, use renewable electric, use energy saving product, use public transport and perform 3R (Reuse, Reduce, Recycle) with 10.58%, 10.14%, 10.04%, 9.92%, 9.28%, 9.05% and 8.80% respectively. However from the figures the top three of willingness was to make food from scratch with 10.80% and willingness to carpool and using hybrid car which shared same percentage 10.69%. This shows that, the Malaysian society prefer gardening and in addition of the trend to eat organic food they prefer to have their own garden and cook it rather than buy from outside. On top of that the also willing to carpool in one car rather than drive separately especially in Malaysia the

road are congested during office hour and carpooling would be the best solution. As the petrol price is rising more respondents choose to use hybrid car as it more eco-friendly and can save their finance.

4.4 Reliability Test (Cronbach's alpha)

As mentioned earlier the reliability test is an important test as it shows the consistency of repetition trial results by generating the Cronbach's alpha to shows the validity of this survey. According to Gliem (2003) and Laura (2014), the alpha scores that reaching 0.7 and above are considered acceptable, 0.8 and above considered good, and 0.9 and above are excellent. . For this study, the assessing systematic processing were averaged into twelve questions gauging respondents' interpretation of their level of knowledge, awareness and behaviour on climate change were part of the larger set of 14 questions. Based on a satisfactory reliability check, the Cronbach's alpha for this study is $\alpha = 0.749$, which indicates an acceptable level of internal reliability of the scale.

4.5 The Effectiveness of National Policy and Initiative to Reduce 40% of GHG in Malaysia

As mentioned earlier, according to the UNFCCC (2010) report, Malaysia agreed to reduce its carbon emissions 40% by 2020 with support from developed countries. Prime Minister Datuk Seri Najib Razak said the cut was conditional on receiving the transfer of technology and adequate financing from the developed world. He announced in Copenhagen UNFCCC, 16 December 2009 that Malaysia is adopting an indicator of a voluntary reduction of up to 40% in terms of emissions intensity of GDP by the year 2020 compared to 2005 levels.

UNFCCC aims at fostering technology transfer for global warming abatement from industrialized countries to developing countries and could reduce the carbon emissions based on the targeted amount of 40% by 2020 (NRE, 2011).

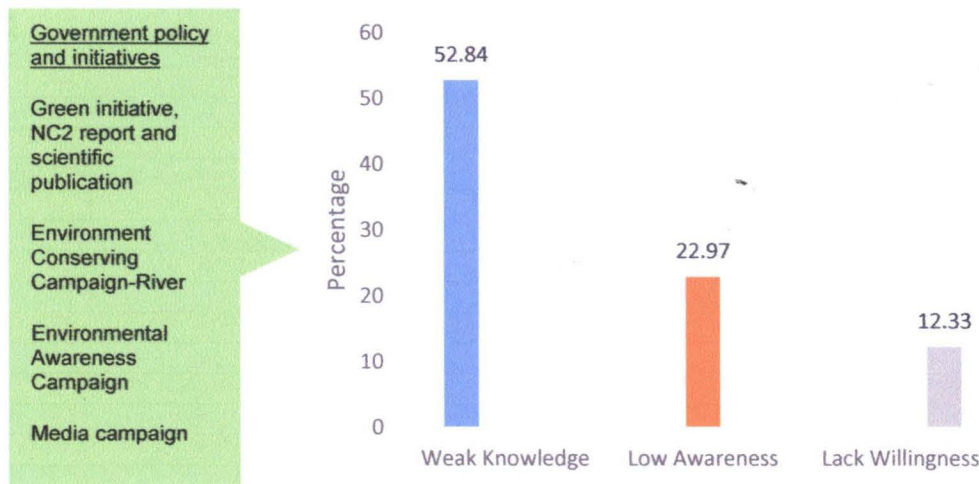


Figure 4.9: Percentage of the level of knowledge, awareness and behaviour (willingness)

Figure 4.9 demonstrates of the effectiveness of national policy on level of knowledge, awareness and behaviour (willingness). The results shows that, 52.84% is weak level of knowledge, 22.97% low level of awareness and lack of willingness behaviour 12.33%, indicating that the Malaysian government have a good well design policy however the implementation of the policy to the society is consider unsuccessful. Proactive mitigation measure are needed from the government such as 5 years plan approach to Malaysian society such encourage society to write publication on the important to reduce greenhouse gasses that lead in reducing the impact climate change, advertise awareness on climate change and encourage participant not just from urban area but also from rural area. The need to leverage the knowledge and awareness and behaviour of climate change such do not open burning, use energy save product and composting the waste and many more can give the impact to

society. It should be promoted holistically through various sources agencies government and non-government, industry and media, so that every individual have better and improve level of knowledge, awareness and behaviour on climate change.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

The findings indicate that there is a significant relationship level of knowledge, awareness, and behaviour among universities, general public and government servants where a number of Malaysians society have fair level of awareness and behaviour toward climate change, but the level of knowledge of impacts or consequences of the climate change very low. Cronbach's alpha for this study is $\alpha = 0.749$, which indicates an acceptable level of internal reliability of the scale with this specific sample. To promote greater knowledge of such issues, several approaches were identified to be practice at the government and non-government agencies and individual level. Example to highly encourage public to use less emission car, to choose energy efficient product, to buy local goods and goods with environmental friendly value, to start to have and calculate the greenhouse gasses inventory, to compost and recycling waste, to use green technology in household and everywhere and many more..

Society that have high levels of knowledge and awareness about climate change vulnerability are more likely to act towards reducing the impact of climate change and it can be said there are some Malaysian society who aware and behave more environmentally friendly because of the experienced to the past climate change events and from there they behaviour have changed and started to reduce any activities that will caused climate change.

This study offers decision makers fundamental insights regarding public knowledge, awareness and behaviour about climate change that could potentially assist in promoting responsive policies and strategies. The government should initiate more initiatives by making climate change as

highlight in everywhere. It can be done by enforcing every sector and industry to promote the knowledge and awareness from media sources such as advertisement in internet, television, newspaper and other. The Malaysian society such as parent, government and private servants and especially the group of engineers should first be enlighten with knowledge and awareness of climate change and in fact at every education level such as from kindergarten, primary or even secondary school should already started to educate the youngsters the climate change problem and concern and it does not have to wait until at university level. The knowledge and awareness must not be kept to own self but rather spread to everyone as many platform are now available such as social media. This climate change issues also can be overcome if the society can visualize the impact and had known the impact much earlier. A clear explanation on the anthropogenic issues should be shared to all the citizen. Having a repetition animation of 3R (Reuse, Recycle, Reduce) is not enough while the main input such the landfill that emitted greenhouse gasses and increase the climate change event were not clearly visualized and this is example of unsuccessful climate change campaign. The discussion on climate change issues should be done frequently perhaps it should be debated in universities even in national television. Media source such as internet, television, newspaper and others must play the responsibility to deliver the knowledge and awareness to all Malaysian society.

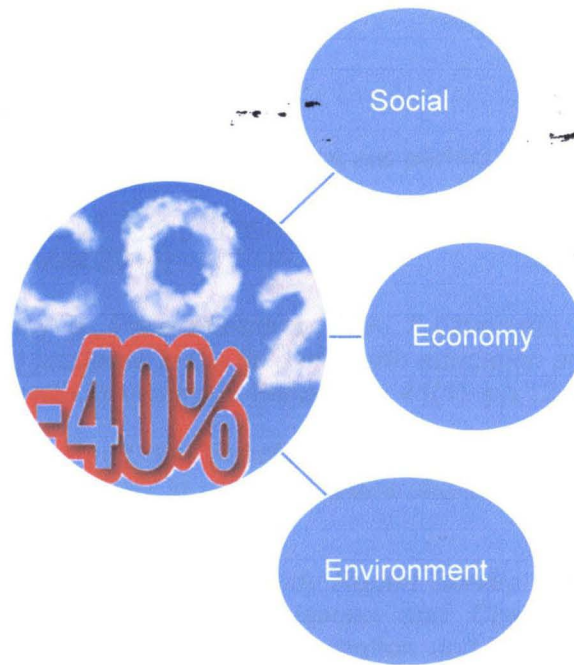


Figure 5.1: The fragment of 40% of GHG reduction with sustainability pillars

Based on figure 5.1, in order to achieve the 40% target, all sustainability pillars should work simultaneously. In this study, social pillar become the focus, however there are other pillars such as economy and environment that have to be look into deeper on how the pillars can help to reduce the impact of climate change.

A full and thorough mitigation and adaptation of climate change impact to society should be done immediately as other developing country already have at least one full report of Knowledge, Attitude and Behavioural Practice on Climate Change known as KAP which endorsed by UNFCCC which Malaysia by now should have at least one report on climate change matter and from this it can tackle bigger issues and can discuss bigger scope.

REFERENCE

- Amit, A., 2014. Why Forms in Google Docs are perfect for Creating Online Survey [Online]
Available at: <http://www.labnol.org/software/google-docs-forms-for-surveys/10056/>
[Accessed 3 December 2014]
- Barry, A. E., Chaney, B., Piazza-Gardner, A. K., & Chavarria, E. A. (2014). *Validity and reliability reporting practices in the field of health education and behaviour: A review of seven journals*. *Health Education & Behaviour*. 41(1). pp.12–18
- Boote, D.N. & Beile, P. (2005). *Scholars before researchers: On the centrality of the dissertation literature review in research preparation*. *Educational Researcher*. pp. 3-15.
- Christine, H., 2008. *Pilot Baseline Study Report Survey of Public Awareness of and Attitudes towards Climate Change Issues and Challenges. Kiribati Adaptation Programme (Stage II)*. Adviser on Participation and Awareness Processes (KAP II Component 1.2.4)
- Clay, D., 2011. *Canada Pulls Out of Kyoto Protocol, Making It The First Country to Legally Opt Out*. *Popular Science*.
[Online]
Available at: <http://www.popsci.com/science/article/2011-12/canada-pulls-out-kyoto-protocol-making-it-first-country-legally-opt-out>
[Accessed 29 November 2014]
- Creswell, J.W. (2009) *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications. pp. 1-26
- Daehak, K., 2009. *A Practical Application of Cluster Analysis Using SPSS*. *Journal of the Korean Data & Information Science Society*. 20(6). pp. 1207–1212
- DOE, 2014. *Core services*. Department of Environment (DOE) Malaysia.
[Online]
Available at: <http://www.doe.gov.my/portalv1/en/about-doe/introduction/core-services>
[Accessed 2 December 2014].
- EPA, 2014. *What you can do?* Environmental Protection agency (EPA).
[Online]
Available at: <http://www.epa.gov/climatechange/wycd/>
[Accessed 2 December 2014]
- EPU, 2010. *Tenth Malaysia Plans*. Economic Planning Unit. pp. 1-472
- Gliem, J. A., Gliem, R. R., 2003. *Calculating, interpreting, and reporting cronbach's alpha reliability coefficient for likert-type scales*. *Midwest Research to Practice Conference in Adult, Continuing, and Community Education*. pp. 82–88
- Ibrahim, H. I., 2010. *Differences between Statistical Software Packages (SAS, SPSS, and MINITAB) As Applied to Binary Response Variable*. Faculty of Commerce. Tanta University. pp. 1-23

IFRC, 2011. *Study on Knowledge, Attitudes and Practices of community members in Tien Giang and Ho Chi Minh City with regards to dengue fever and climate change*. Hanoi. International Federation of Red Cross and Red Crescent Societies. pp. 1-35

INC, 2000. *Initial National Communication Malaysia*. Ministry of Natural Resources and Environment (NRE) Malaysia. pp. 1-119

IPCC, 2001. *Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change (IPCC). pp. 1-881

IPCC, 2007. *Climate Change 2007: Synthesis Report*. IPCC Fourth Assessment Report: Climate Change 2007. Intergovernmental Panel on Climate Change (IPCC). Geneva, Switzerland. pp 1-104

IPCC, 2014a. *Assessment Report 5: Working Group III – Mitigation of Climate Change*. Intergovernmental Panel on Climate Change. 13 April 2014

Laura, N. R., Janet, Z. Y., Mihye, S., Teresa, M. H., 2014. *The "I" in climate: The role of individual responsibility in systematic processing of climate change information*. Global Environmental Change. pp. 39–52

Leiserowitz, A., Feinberg, G., Rosenthal, S., Smith, N., Anderson A., Roser-Renouf, C. & Maibach, E. (2014). *What's In a Name? Global Warming vs. Climate Change*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication pp. 1-30

Nate, G., 2012. *The Advantage of Google Docs in Education*
[Online]

Available at: <http://www.edsocialmedia.com/2012/02/the-advantages-of-google-docs-in-education/>

[Accessed 3 December 2014]

NASA, 2008. *What's in a Name? Global Warming vs. Climate Change*

[Online]

Available at:

http://www.nasa.gov/topics/earth/features/climate_by_any_other_name.html

[Accessed 28 November 2014]

NASA, 2014. *The evidence for rapid climate change is compelling*

[Online]

Available at: <http://climate.nasa.gov/evidence/>

[Accessed 2 December 2014]

NC2, 2011. *Malaysia's Second National Communication to the UNFCCC*. Ministry of Natural Resources and Environment (NRE) Malaysia. pp. 1-115

NDRC, 2007. *National Development and Reform Commission of China*. China's National Climate Change Programme.

NRE, 2010. *National Policy on Climate Change*. Ministry of Natural Resources and Environment Malaysia (NRE).

[Online]

Available at:

http://www.nre.gov.my/Environment/Documents/NCCP_080710_forweb.pdf.

[Accessed 28 November 2014]

NRE, 2014. Division information: Environmental Management and Climate Change Division. Ministry of Natural Resources and Environment (NRE) Malaysia.

[Online] Available at: <http://www.nre.gov.my/en-my/CorporateInfo/DivisionInformation/Pages/Environmental-Management-and-Climate-Change-Division.aspx>

[Accessed 2 December 2014].

Martin, P., 2006. *Public Attitudes and Behaviour About Climate Change What Shapes Them and How to Influence Them*. Purdue Climate Change Research Centre. pp. 1-46

Masud, M.M., Akhtar, R., Afroz, R., Al-Amin, A.Q., Kari, F.B., 2013. *Pro-Environmental Behavior and Public Understanding of Climate Change*. Mitigation Adaptation Strategy Global Change. pp. 1-10.

Mohamed, A. I., 2013. *Discuss Strengths and Weaknesses of Qualitative and Quantitative Research Approaches*. KU-HU Graduate Partnership Program, Hargeisa-Somaliland, Garowe-Puntland & Mogadishu-Somalia. pp. 1-6

Olivier, J.G.J., 2013. *Trends in Global CO2 Emissions: 2013 Report*. Environmental Assessment Agency, The Hague.

Saxena, A. K. 2009. *Greenhouse Gas Emissions: Estimation and Reduction*. Asian Productivity Organization, India

Shahid, S., Minhans, A., Puan, O.C., 2014. *Assessment of greenhouse gas emission reduction measures in transportation sector of Malaysia*. Jurnal Teknologi. pp. 1-8

Shahrul, N. S., Muhammad, M. A., Nazia, A. N., 2013. *Emissions: Sources, Policies and Development in Malaysia*. Universiti Tenaga Nasional. International Journal of Education and Research. 1(7). pp. 1-12

Sönke, K., David, E., 2014. "Global Climate Risk Index 2014. Who Suffers Most from Extreme Weather Events? Weather-Related Loss Events in 2012 and 1993 to 2012". Germanwatch Report. pp 1-28

Tiffany, H., 2012. 4 Online Survey Tools: Which One is best for you?

[Online]

Available at: <http://whinot.com/blog/2012/4-online-survey-tools-which-one-is-best-for-you/>

[Accessed 3 December 2014]

UNFCCC, 1992. *Articles 1: United Nations Framework Convention on Climate Change* United Nations. pp. 1-24

UNFCCC., 2010. *Emission Reduction Targets for the US. Letter to the UNFCCC Secretariat by the US Office of the Special Envoy for Climate Change*. United Nation Framework of Climate Change.

Urban, F., R.M.J. Benders, H.C. Moll. 2009. *Renewable and low-carbon energy as mitigation options of climate change for China*. Climatic Change, Vol. 94:169–188.

UWI, 2012. *Report on Climate Change Knowledge, Attitude and Behavioural Practice Survey*. Caribbean Institute of Media and Communication. The University of the West Indies. pp.1-157

WClimate, 2014. *Road to Paris 2015*.

[Online]

Available at: <http://www.wclimate.com/road-to-paris-2015/>

[Accessed 1 December 2014]

APPENDIX I



UNIVERSITI TEKNOLOGI MARA

RESEARCH: CLIMATE CHANGE AWARENESURVEY 2014

This is a questionnaire in fulfilment of the requirements for the award of the degree of Master at Universiti Teknologi MARA (UiTM), Malaysia. This survey is specifically design to measure the level of knowledge, awareness and behaviour of universities students, general public and government servant.

Climate change is the change in average weather over time and over a region and it is beginning to transform life on Earth. Around the globe, seasons are shifting, temperatures are climbing and sea levels are rising. And meanwhile, our planet must still supply us – and all living things – with air, water, food and safe places to live. If we don't act now, climate change will rapidly alter the lands and waters we all depend upon for survival, leaving our children and grandchildren with a very different world. Climate change includes changes in temperature, wind patterns and precipitation such as rain and snow. Climate change may happen naturally as it has over the course of the earth's history, and it may also be attributed increased levels of greenhouse gases such as carbon dioxide emissions in the atmosphere as a result of human activity.

For research purposes please help me to encourage your friends to do this survey. This survey will only takes about less than 5 minutes and only valid from 20 Oct - 20 Nov 2014. Thank you so much.

Name: _____
 Email address: _____
 Country: _____ Nationality: _____
 What is your gender: M or F Age: _____
 University: _____ Faculty: _____
 Occupation: _____ Current education level: _____

1. Have you ever heard the term 'climate change'? (Yes or No)
2. How would you rate your understanding of climate change? (**Please underline**)
(I don't know anything/ I know a little bit/I am somewhat familiar/ I know a lot/ I am an expert)
3. Do you think your government climate change policy effective? (Yes or No or N/A)
4. Do you know the ministry or department or agency in your country that deal with climate change issues? [If yes please name at least one]
(Yes: _____ or No)

5. How much do you know about your government's response to climate change by sectors? *(Please Tick with /)*

Sectors	Hardly anything	Not much	At least a fair amount	N/A
a. Agriculture				
b. Construction				
c. Energy				
d. Healthcare				
e. Tourism				
f. Water				
g. Wholesale & retail				
h. Education				
i. Information and Communication Technology				
j. Business and Finance				

6. Do you know any countries that emitting highest carbon emission thus contribute to global climate change? If yes please name at least one country **(Yes: _____ or No)**

7. Do you know any protocols in regards to climate change? If yes please name any (you can give more than one protocol) **(Yes: _____ or No)**

8. Where have you heard about climate change? *(Tick '/' as many as you feel apply *)*

- Television
- Radio
- Newspaper
- Internet
- Specialist publications/academic journals
- Environmental groups (e.g. Worldwide Fund for Nature, Department of Environment)
- School/ college/ university
- Government agencies/ information
- Public libraries
- Friends/ family
- Local council
- Energy suppliers
- Other: _____

9. Which of the following potential changes in our climate are you concerned about?
(Please Tick with /)

	Not concerned	A little bit concerned	Very concerned
a. Rising and decreasing temperature			
b. Drier summers and wetter winters			
c. More frequent and severe storm events			
d. Sea Level Rise			
e. Haze			
f. Flood and Flash Flood			
g. Increasing More Heat-Related illness and disease (heat stroke, malaria, dengue etc.)			
h. Increasing risk of drought			
i. Decreasing of wild life (polar bear etc.)			
j. Changing of landscape			

10. Please indicate how much you agree or disagree with the following statements about climate change by ticking one box on each row. (Please put numbers: Agree Strongly = 5; Agree = 4; Neither Agree nor Disagree = 3; Disagree = 2; Disagree Strongly = 1)

	No
a. Together we can help to reduce the effects of climate change	
b. Climate change is unavoidable because of the way modern society works	
c. People should reduce their energy consumption if it reduces climate change	
d. Human can adapt to climate change	
e. Climate change is just a natural fluctuation in earth's temperatures	
f. I would only do my bit to reduce climate change if everyone else did as well	
g. The government should provide incentives for people to look after the environment	
h. It is already too late to do anything about climate change	
i. Human activities have no significant impact on global temperatures	
j. Climate change is something that frightens me	
k. Developing countries should take most of the blame for climate change	
l. I am uncertain about whether climate change is really happening	
m. Radical changes to society are needed to tackle climate change	
n. People are too selfish to do anything about climate change	

o. The evidence for climate change is unreliable	
p. Climate change is just a natural cycle of earth that reach its equilibrium.	
q. The government should create a clear regulation and to enforce the rules.	
r. Develop and developing countries shouldn't help least develop country because they don't contribute to climate change.	
s. Rather than spending money on climate change the money should tackle the poverty and education issues	
t. Every food product should have carbon footprint labelling in their nutritional facts so that customer can make wiser choice.	
u. Every country should work together to reduce the carbon emission.	
v. We are allowed to be selfish and ignore the environmental issues especially in making profits.	
w. The price of renewable energy such as solar panel is expensive	
x. No special preparations are needed for climate change because it caused by God	
y. We should segregate our waste generated at home	
z. You will use public transport if the ticket price is reduce	

11. Of the following possible strategies for mitigation, please indicate whether you are willing to be part of the mitigation (the things we can do to reduce our greenhouse gas emissions climate change) and adaptation (the changes we can make in our communities so we are less vulnerable to the effects of climate change. ***(Please Tick with /)***)

	High Priority	Medium Priority	Low Priority	N/A
a. Public Transit (Subway, LRT - Light Rail Transit etc.)				
b. Carpooling				
c. Energy Saving (LED bulb, etc.)				
d. Renewable Heat (wood insulation and roof insulation)				
e. Renewable Electricity (solar panel, wind turbine etc)				
f. Hybrid Car				
g. Choose items with less packaging				
h. Reuse, recycle, and reduce (donate old cloths, collecting bottles and make money from it)				
i. Make food from scratch (gardening, etc.)				
j. Walking or Cycling				
k. Waste composting for soil nourishment				

12. Please let us know whether you are in favour of the following renewable energy technologies for your communities. *(Please Tick with /)*

	Very Opposed	A little opposed	No opinion	A little in favour	Very much in favour
a. Solar					
b. Tidal					
c. Wind					
d. Hydro					
e. Biomass					

13. Are there any particular issues or suggestion on the mitigation that you are concerned on the impacts of climate change in your area/country/world? (Yes: _____ or No)

14. How likely are you to seek additional information about climate change from any other source in the next few days or weeks? *(Please underline)*(Definitely Will Not / Probably Will Not / Probably Will / Definitely Will)

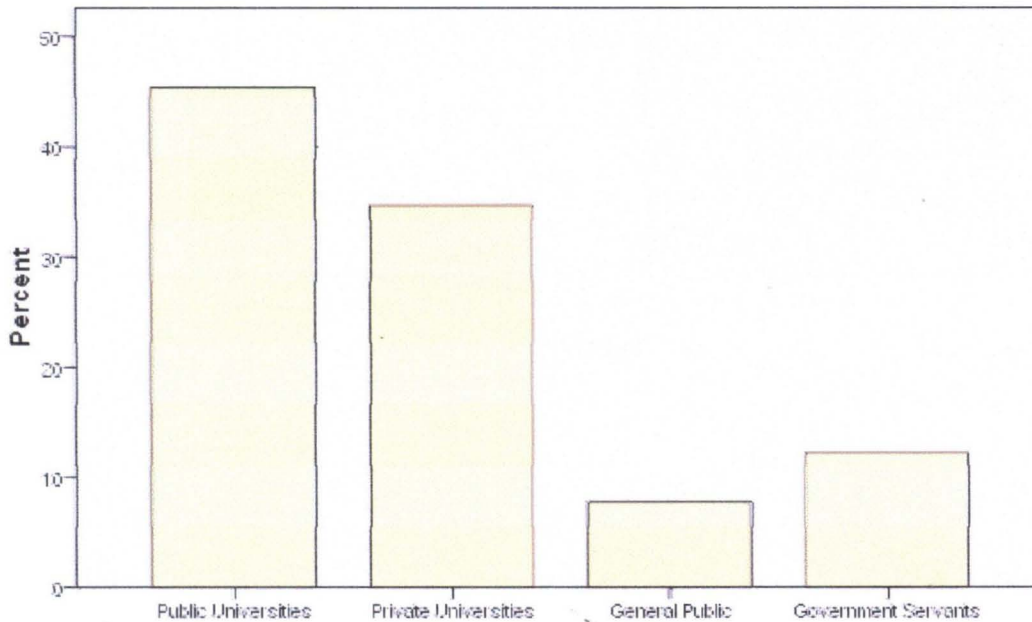
APPENDIX II

Appendix A: Table and graph of Group: University from Public, Private, International, General Public and Government Servants

Group: University from Public, Private, International, General Public and Government Servants

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Public Universities	212	45.4	45.4	45.4
Private Universities	162	34.7	34.7	80.1
General Public	36	7.7	7.7	87.8
Government Servants	57	12.2	12.2	100.0
Total	467	100.0	100.0	

Group: University from Public, Private, International, General Public and Government Servants



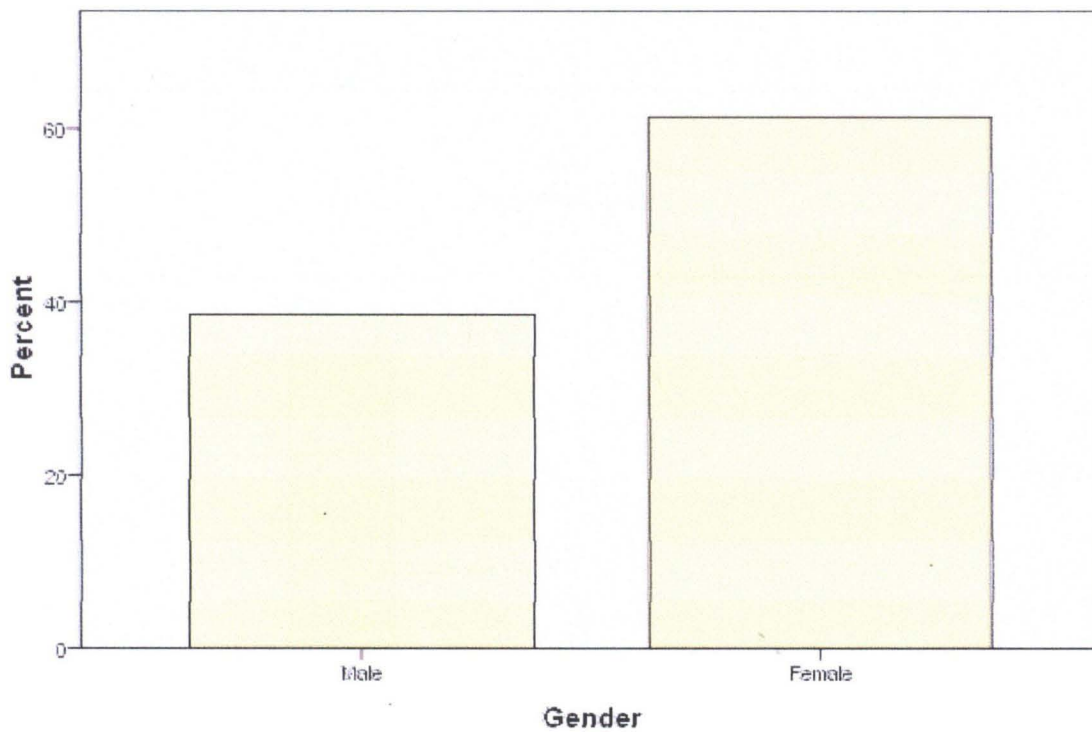
Group: University from Public, Private, International, General Public and Government Servants

Appendix B: Table and graph of Gender

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	180	38.5	38.5	38.5
	Female	287	61.5	61.5	100.0
	Total	467	100.0	100.0	

Gender

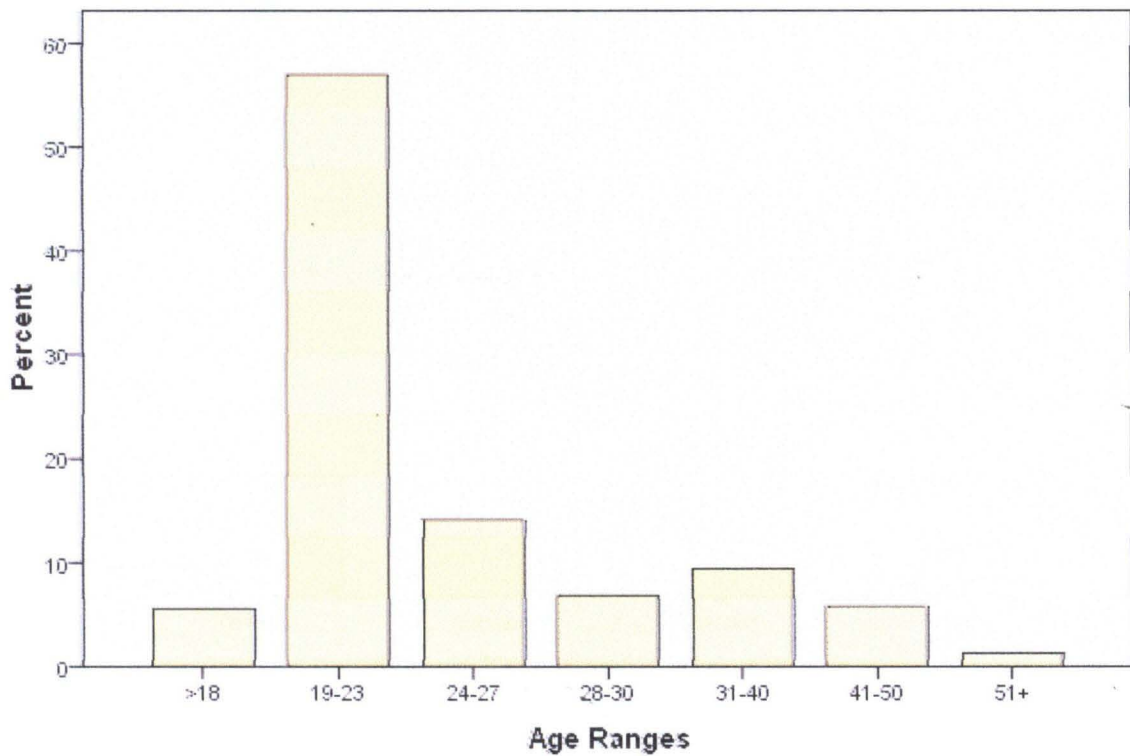


Appendix C: Table and graph of Age range

Age Ranges

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>18	26	5.6	5.6	5.6
	19-23	266	57.0	57.0	62.5
	24-27	66	14.1	14.1	76.7
	28-30	32	6.9	6.9	83.5
	31-40	44	9.4	9.4	92.9
	41-50	27	5.8	5.8	98.7
	51+	6	1.3	1.3	100.0
	Total	467	100.0	100.0	

Age Ranges

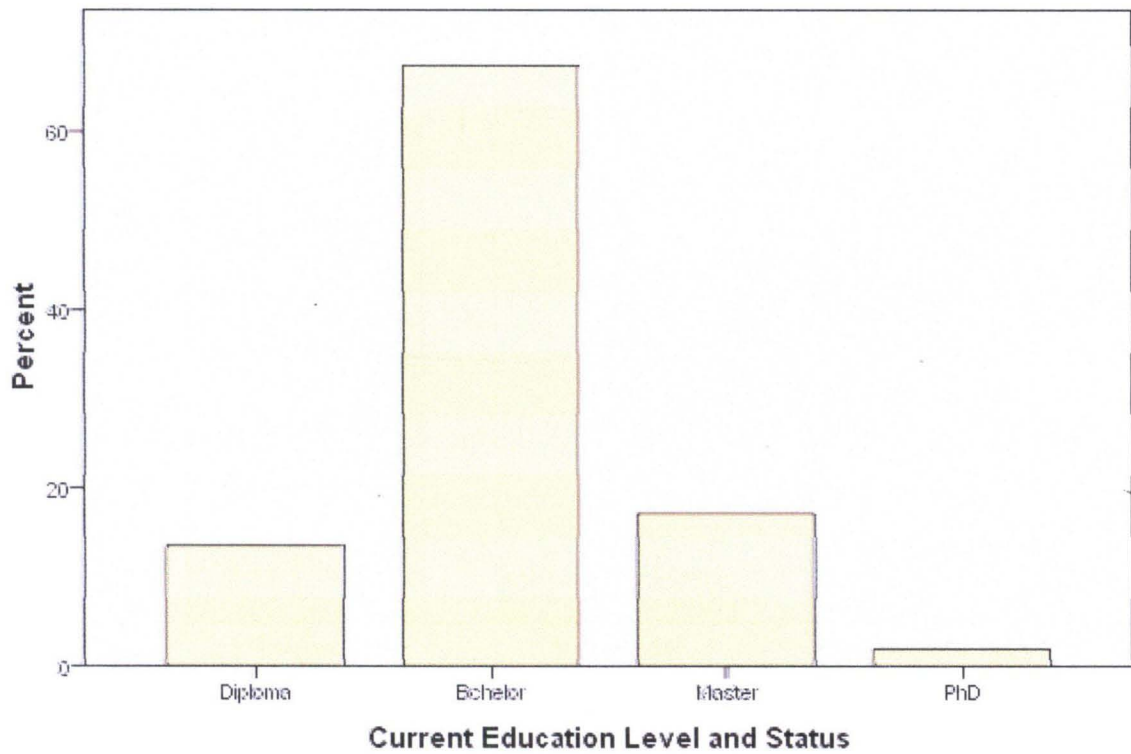


Appendix D: Table and graph of Current Education Level

Current Education Level

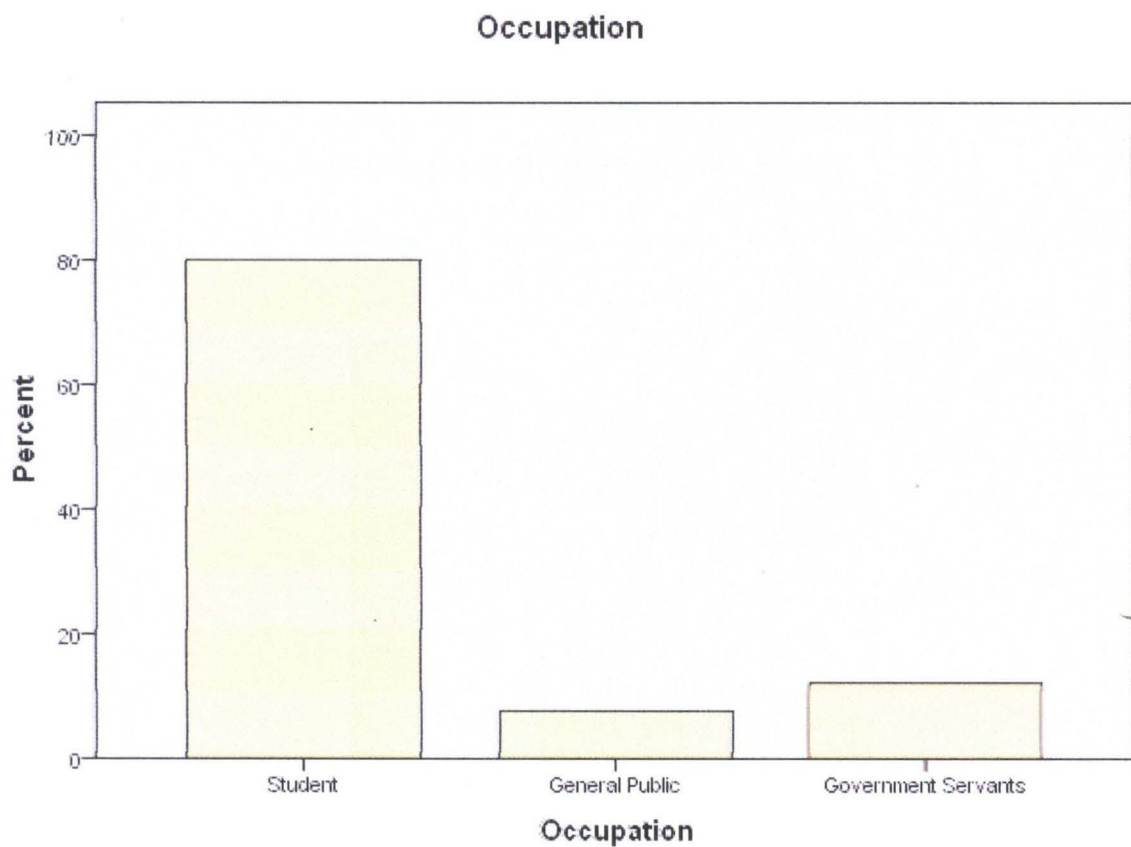
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Diploma	63	13.5	13.5	13.5
Bachelor	315	67.5	67.5	80.9
Master	80	17.1	17.1	98.1
PhD	9	1.9	1.9	100.0
Total	467	100.0	100.0	

Current Education Level and Status



Appendix E: Table and graph of type of Occupation

		Occupation			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	374	80.1	80.1	80.1
	General Public	36	7.7	7.7	87.8
	Government Servants	57	12.2	12.2	100.0
	Total	467	100.0	100.0	

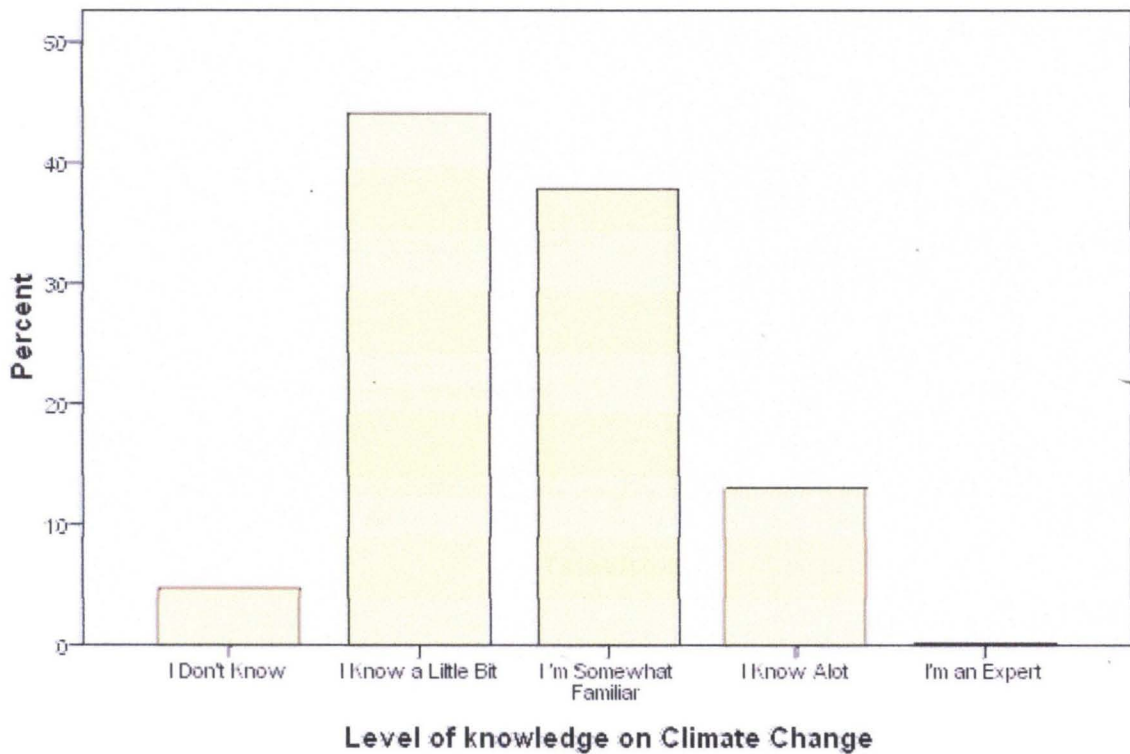


Appendix F: Table and graph of Level of knowledge on Climate Change

Level of knowledge on Climate Change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I Don't Know	22	4.7	4.7	4.7
	I Know a Little Bit	206	44.1	44.1	48.8
	I'm Somewhat Familiar	177	37.9	37.9	86.7
	I Know A lot	61	13.1	13.1	99.8
	I'm an Expert	1	.2	.2	100.0
	Total	467	100.0	100.0	

Level of knowledge on Climate Change

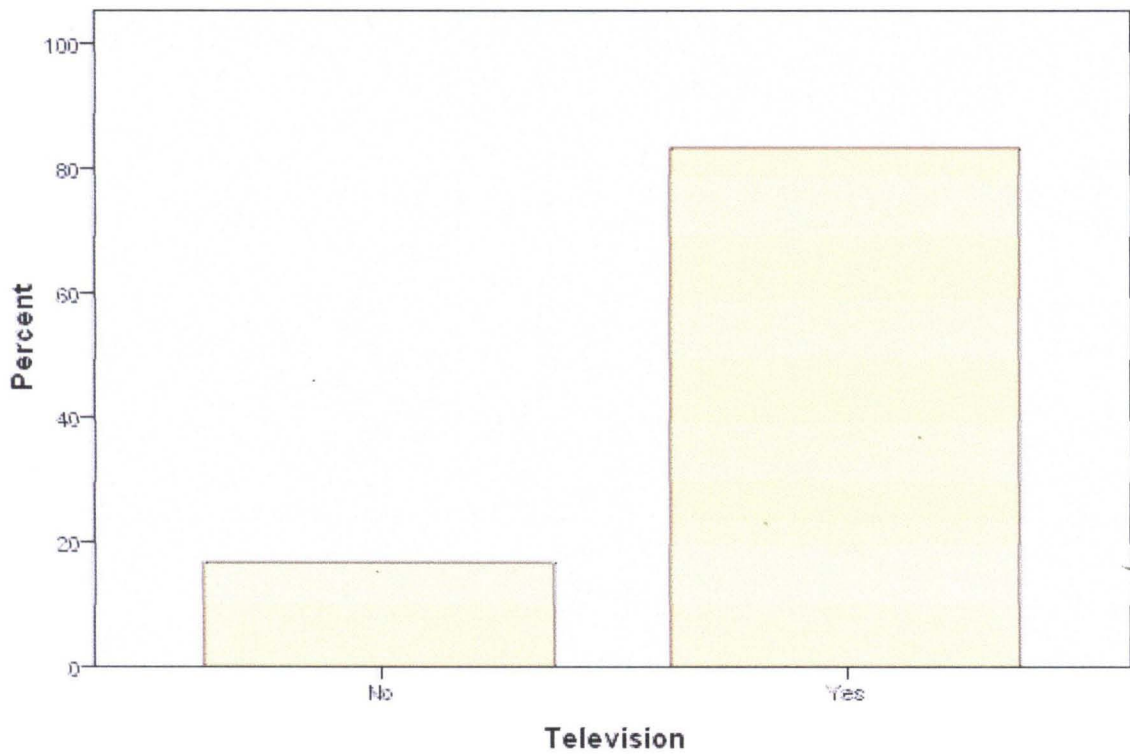


Appendix G: Table and graph of Media Source That Deliver Knowledge on Climate Change.

Television

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	78	16.7	16.7	16.7
	Yes	389	83.3	83.3	100.0
Total		467	100.0	100.0	

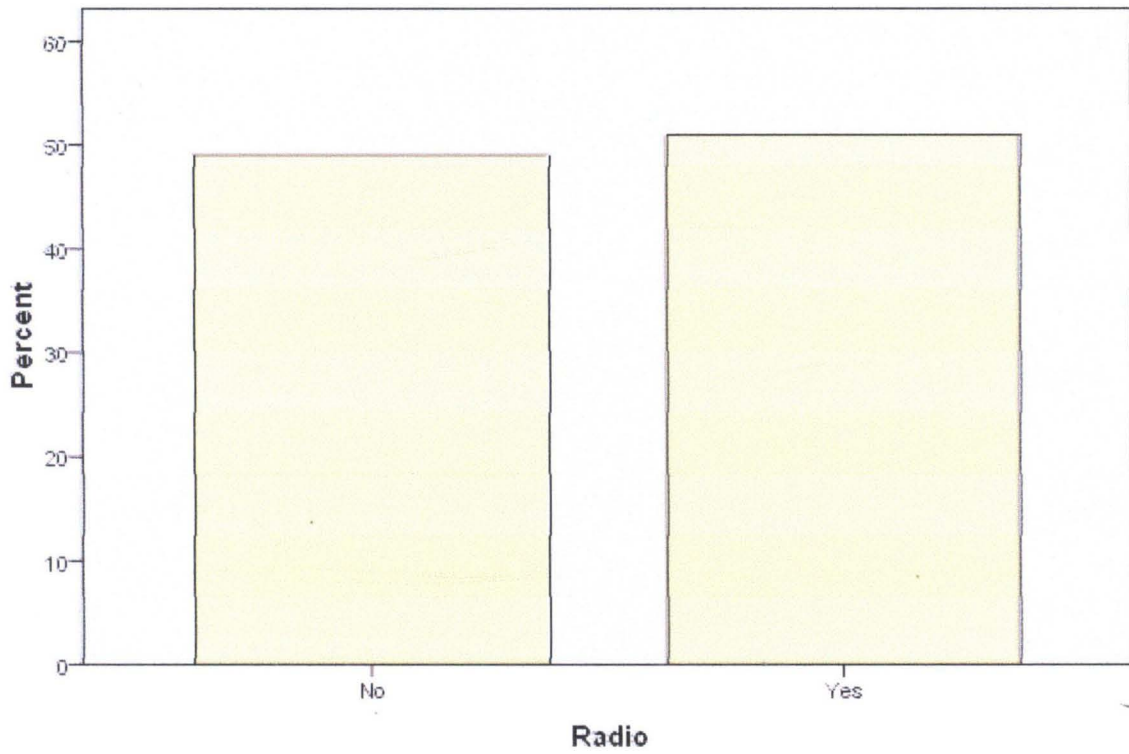
Television



Radio

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	229	49.0	49.0	49.0
	Yes	238	51.0	51.0	100.0
	Total	467	100.0	100.0	

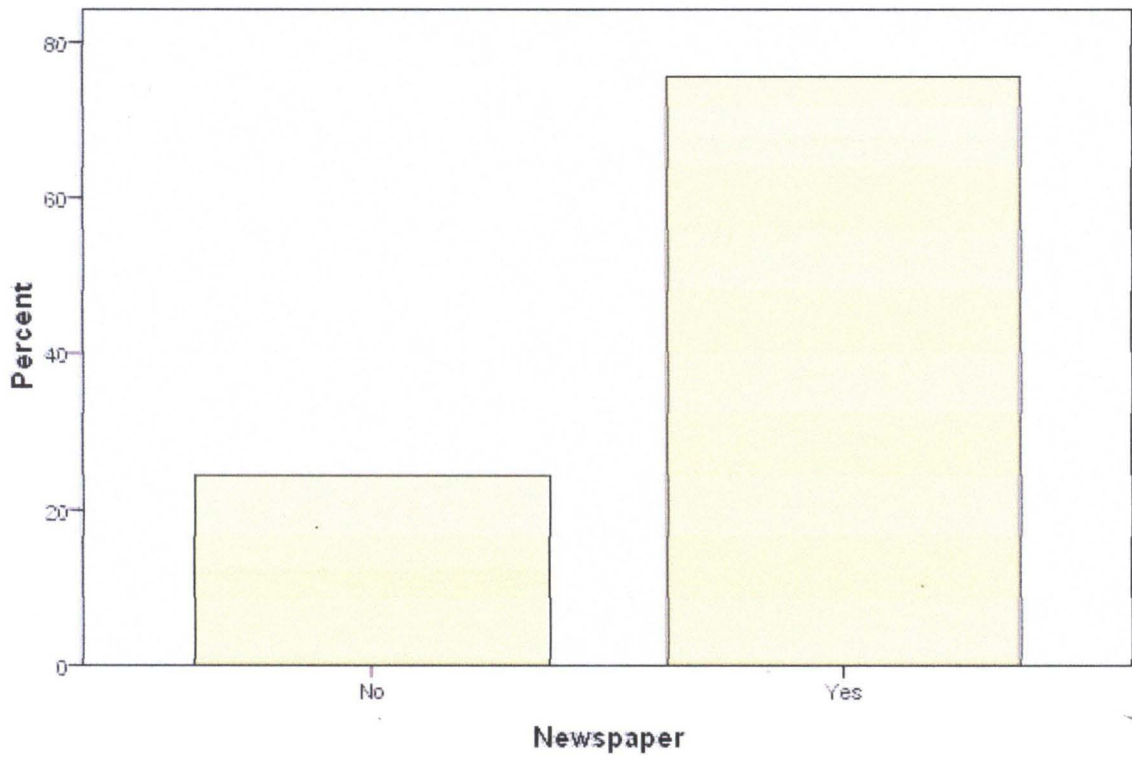
Radio



Newspaper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	114	24.4	24.4	24.4
	Yes	353	75.6	75.6	100.0
	Total	467	100.0	100.0	

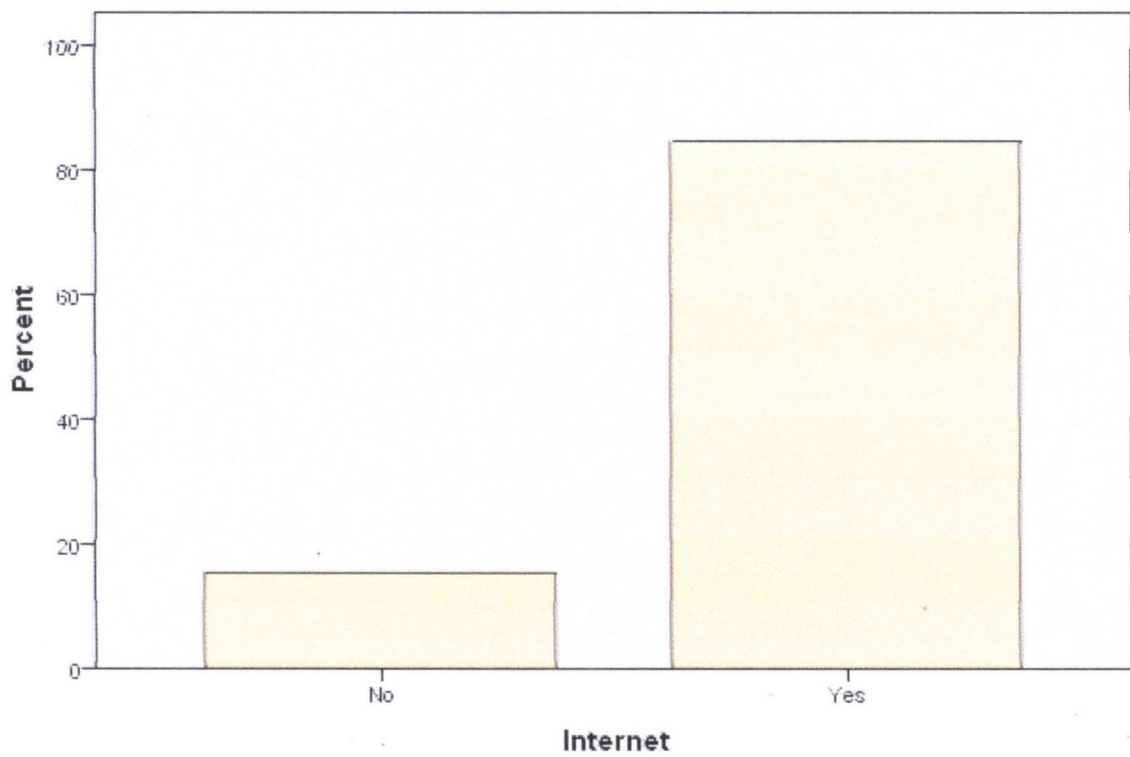
Newspaper



Internet

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	72	15.4	15.4	15.4
Yes	395	84.6	84.6	100.0
Total	467	100.0	100.0	

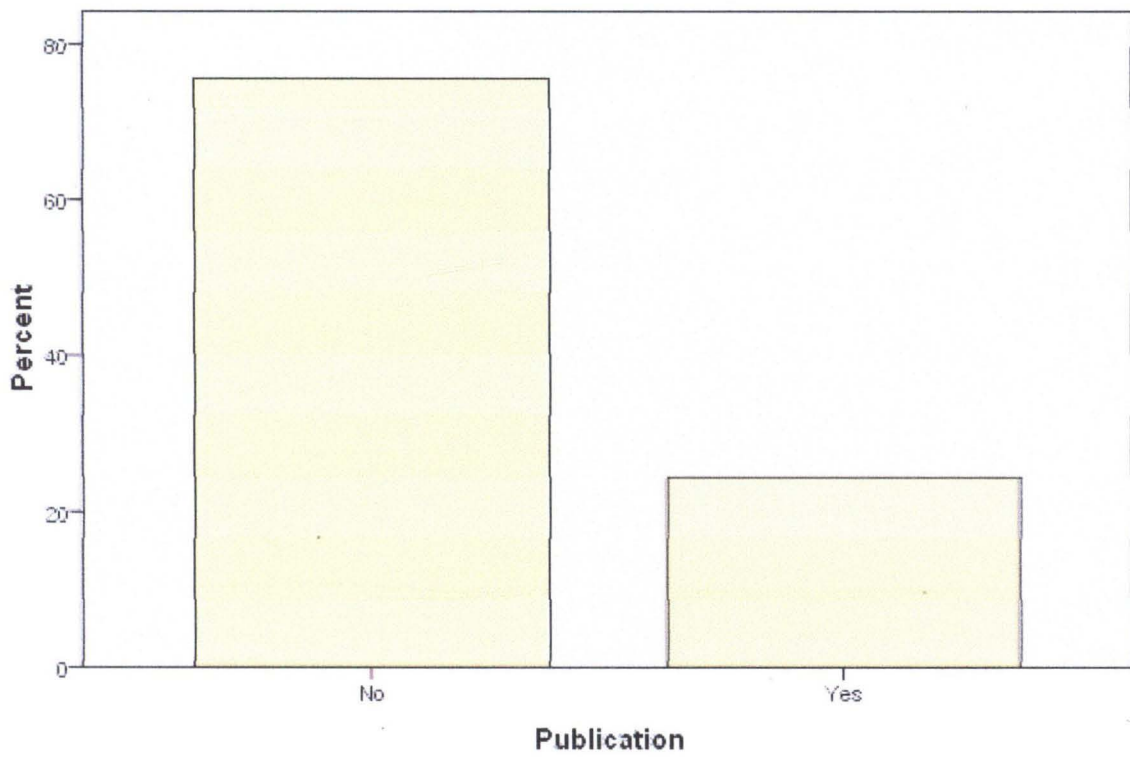
Internet



Publication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	353	75.6	75.6	75.6
	Yes	114	24.4	24.4	100.0
	Total	467	100.0	100.0	

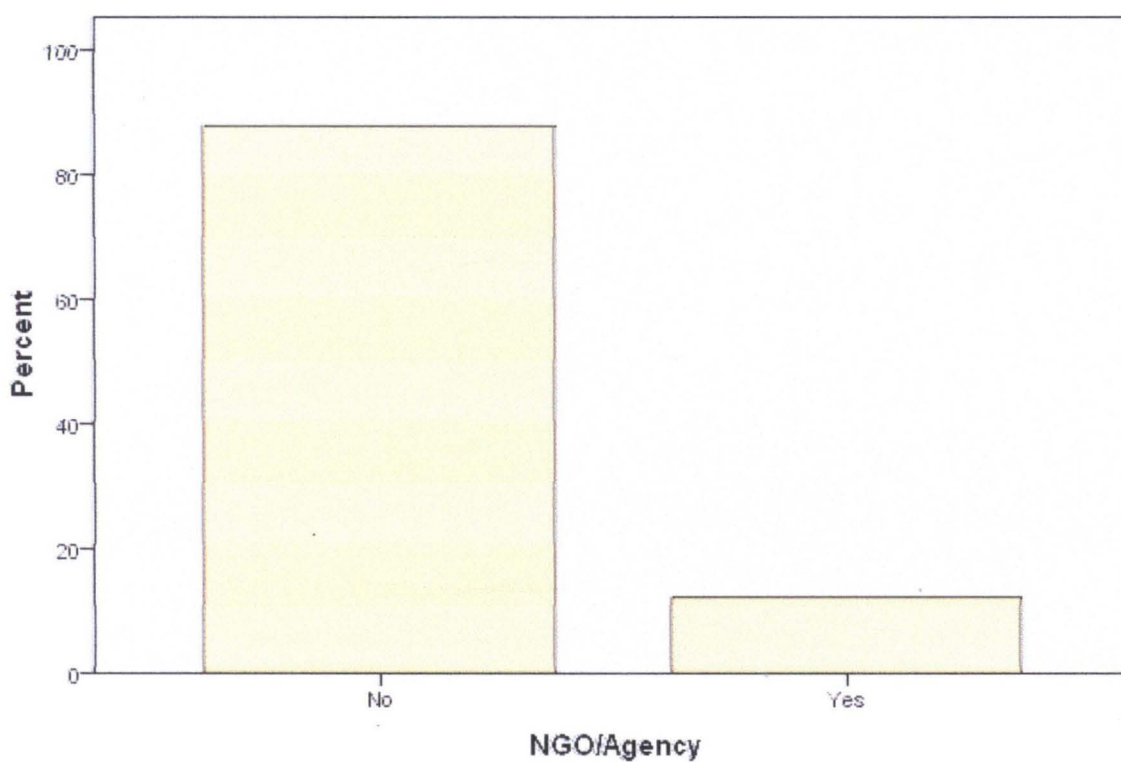
Publication



NGO/Agency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	410	87.8	87.8	87.8
	Yes	57	12.2	12.2	100.0
	Total	467	100.0	100.0	

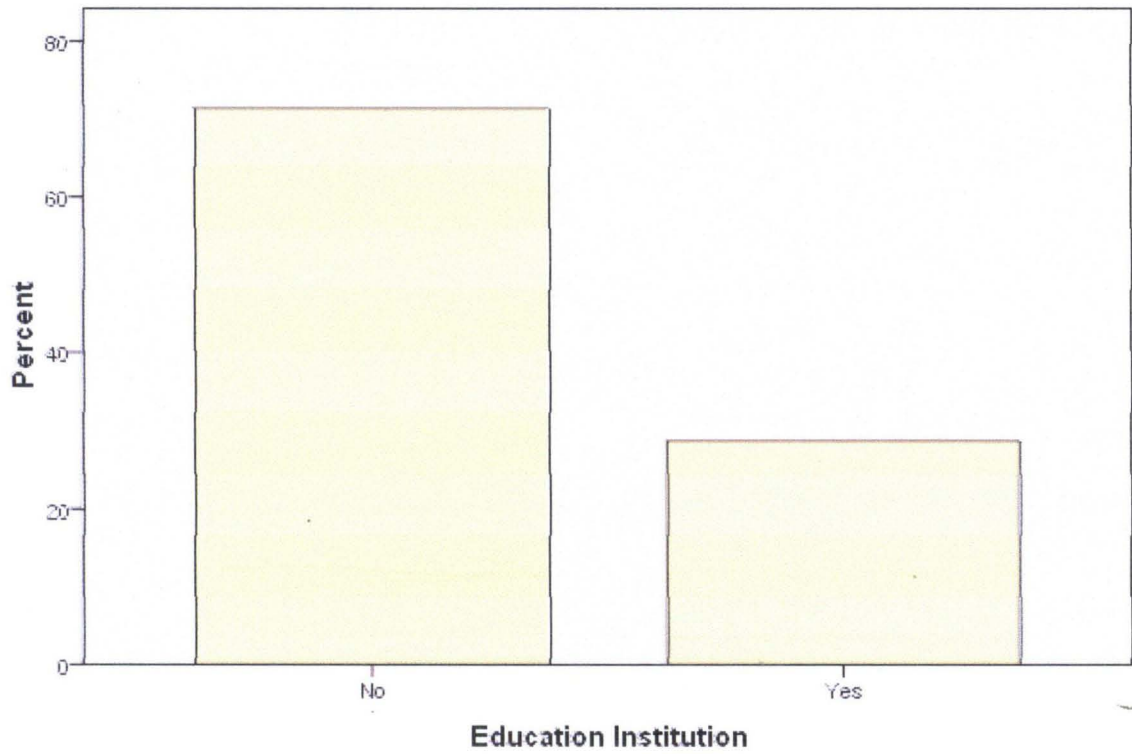
NGO/Agency



Education Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	333	71.3	71.3	71.3
	Yes	134	28.7	28.7	100.0
	Total	467	100.0	100.0	

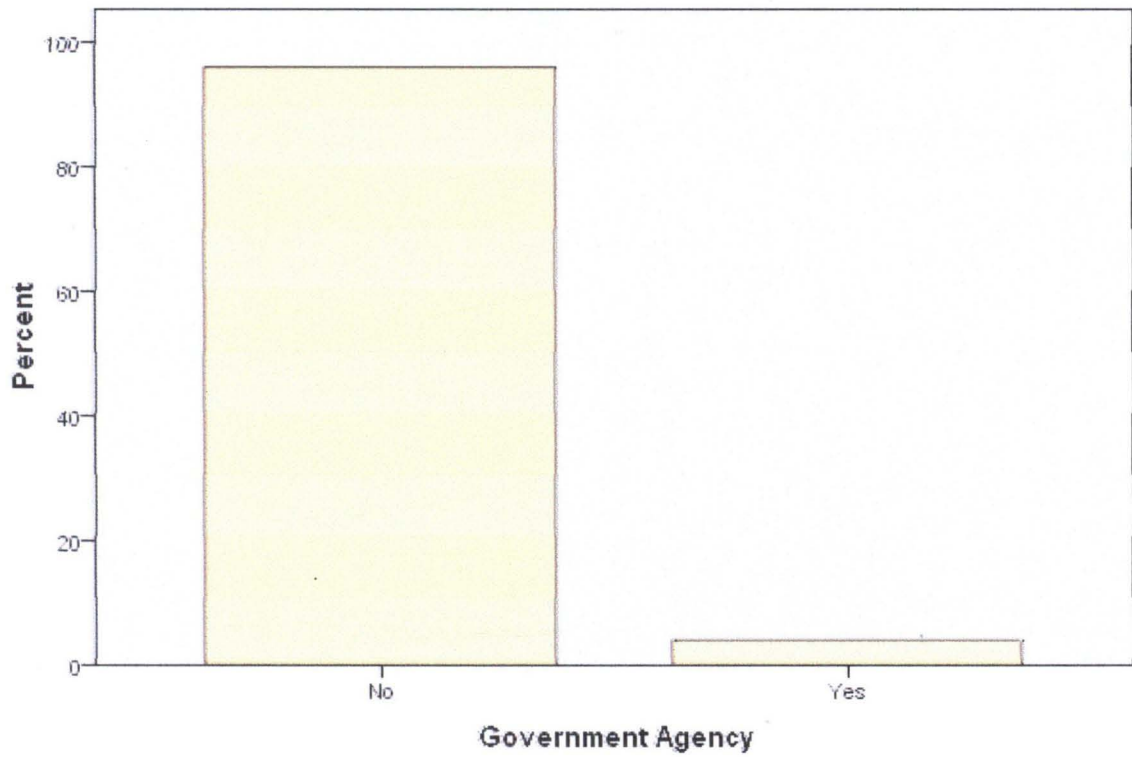
Education Institution



Government Agency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	448	95.9	95.9	95.9
	Yes	19	4.1	4.1	100.0
	Total	467	100.0	100.0	

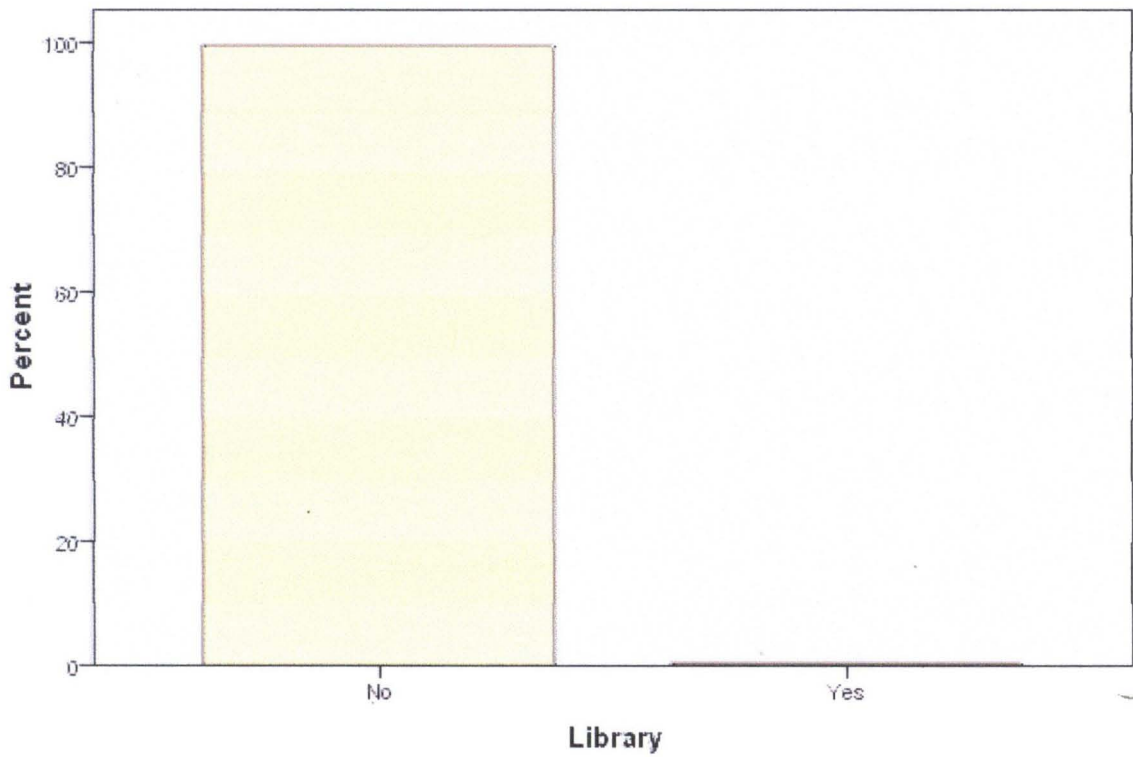
Government Agency



Library

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	465	99.6	99.6	99.6
	Yes	2	.4	.4	100.0
	Total	467	100.0	100.0	

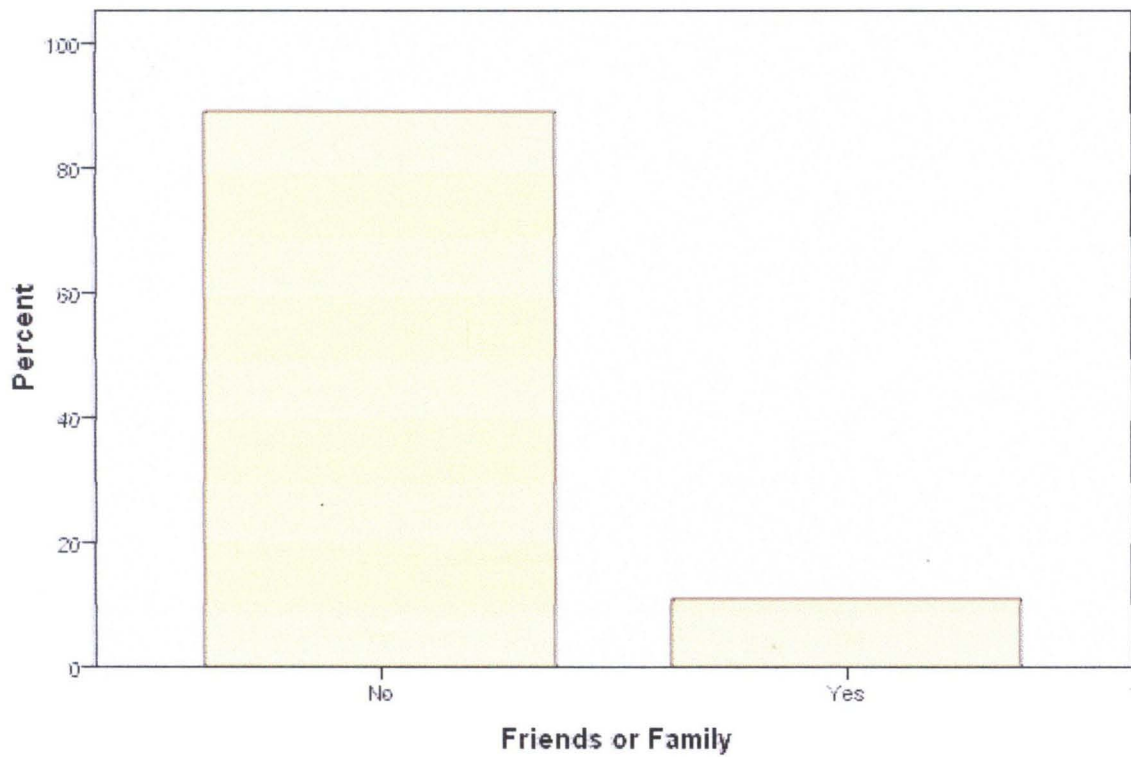
Library



Friends or Family

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	416	89.1	89.1	89.1
	Yes	51	10.9	10.9	100.0
	Total	467	100.0	100.0	

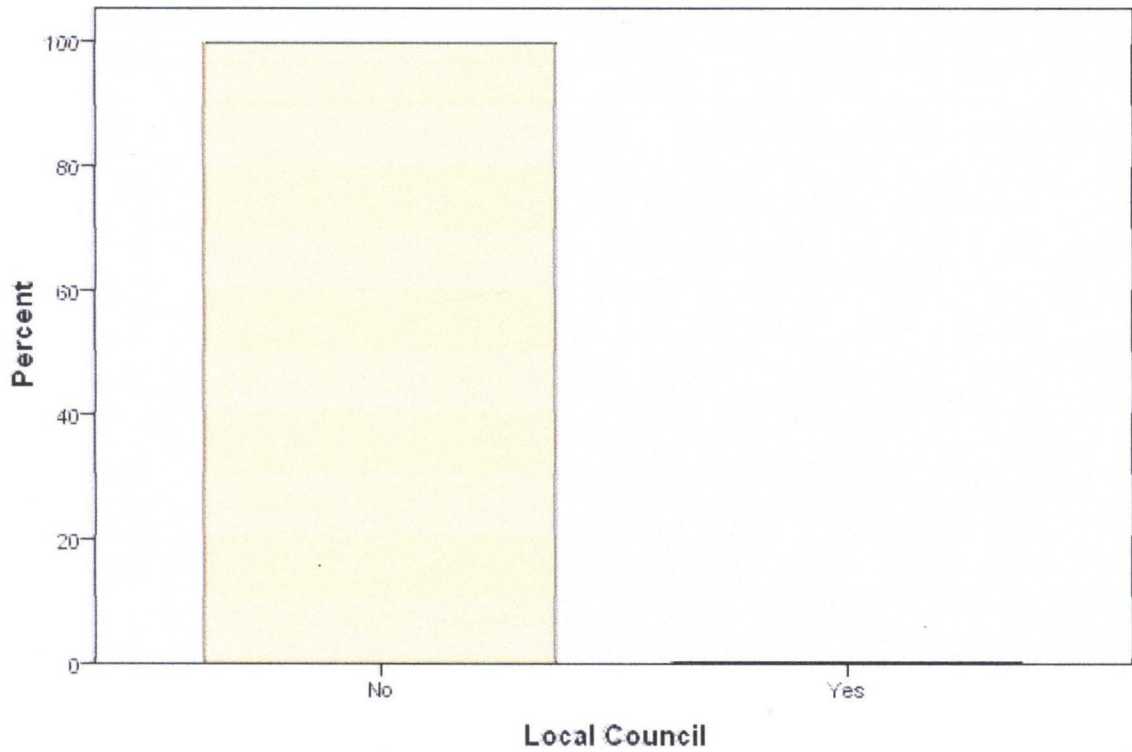
Friends or Family



Local Council

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	466	99.8	99.8	99.8
	Yes	1	.2	.2	100.0
	Total	467	100.0	100.0	

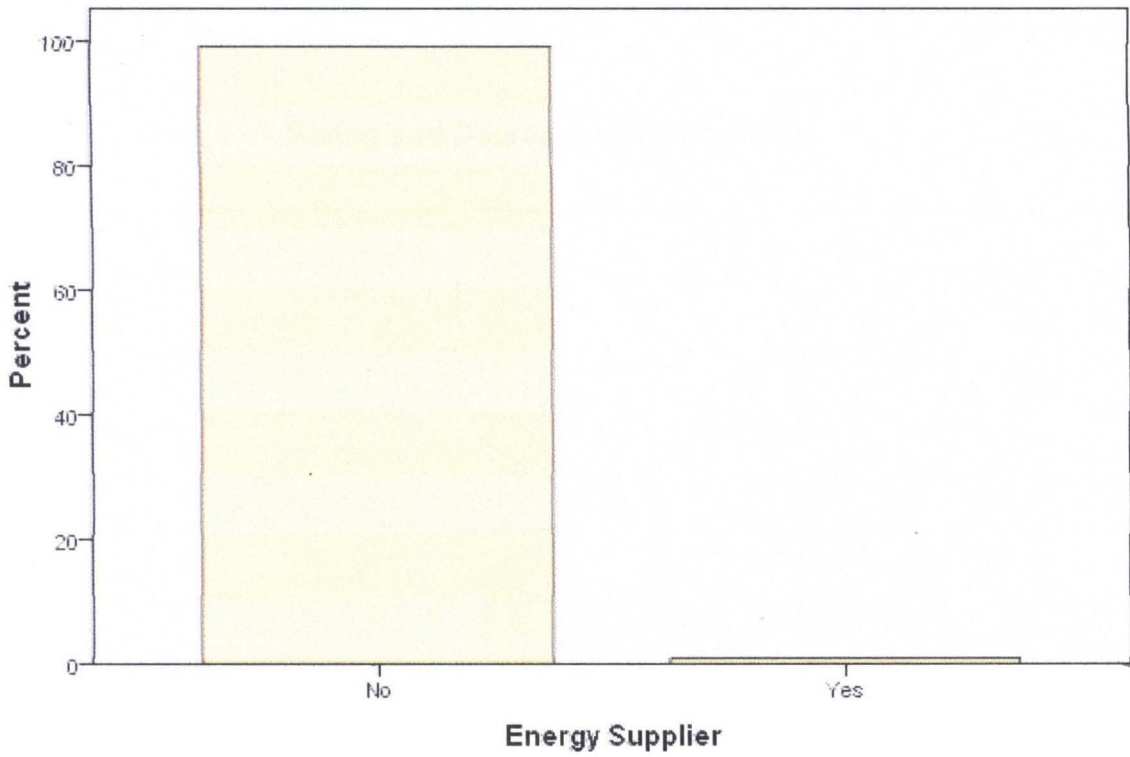
Local Council



Energy Supplier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	463	99.1	99.1	99.1
	Yes	4	.9	.9	100.0
	Total	467	100.0	100.0	

Energy Supplier

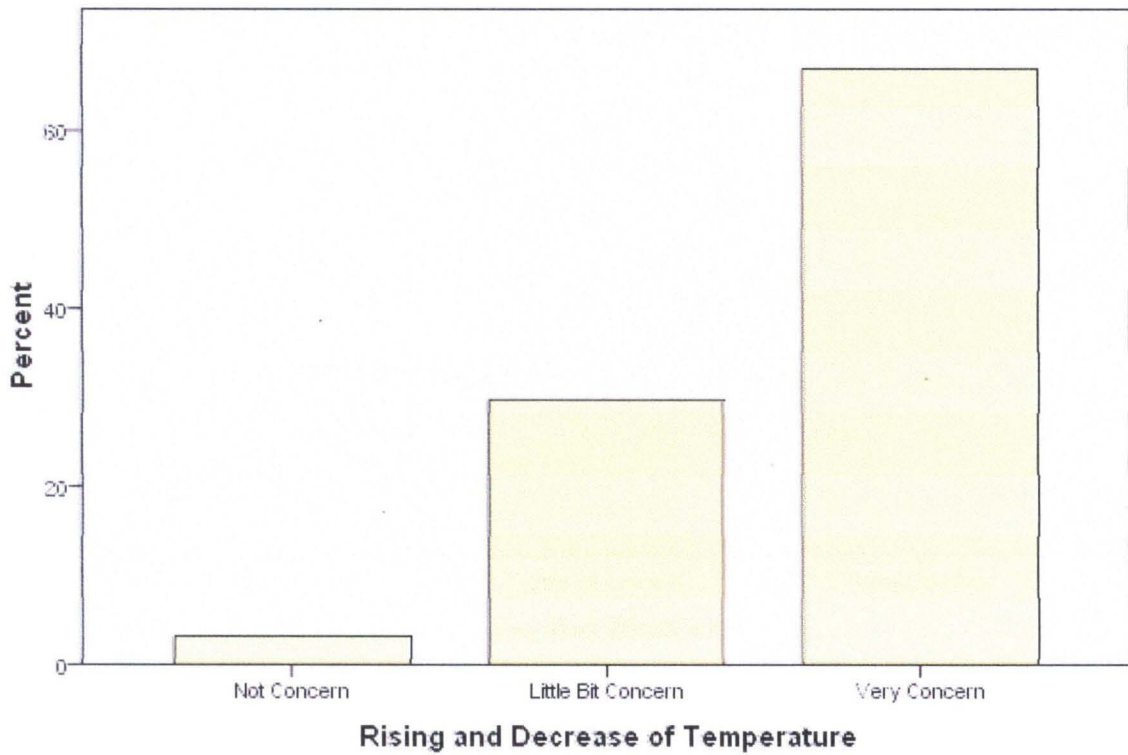


Appendix H: Table and graph of the concern toward climate change events

Rising and Decrease of Temperature

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Concern	15	3.2	3.2	3.2
Little Bit Concern	139	29.8	29.8	33.0
Very Concern	313	67.0	67.0	100.0
Total	467	100.0	100.0	

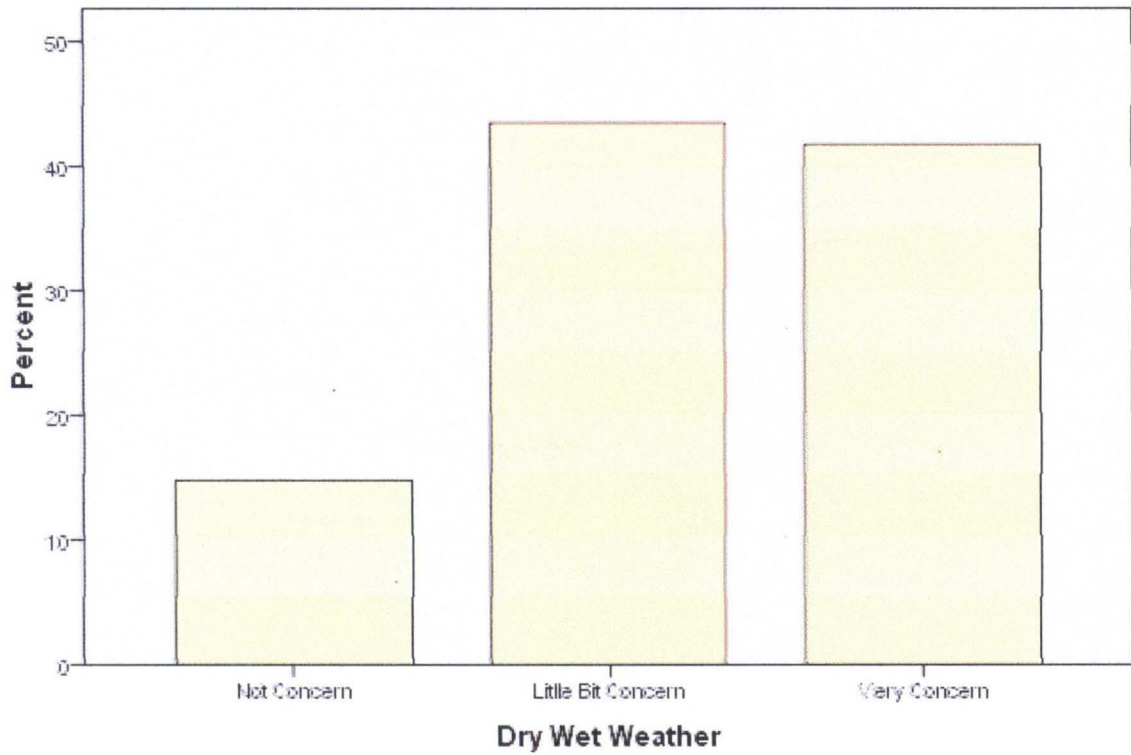
Rising and Decrease of Temperature



Dry Wet Weather

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	69	14.8	14.8	14.8
	Little Bit Concern	203	43.5	43.5	58.2
	Very Concern	195	41.8	41.8	100.0
	Total	467	100.0	100.0	

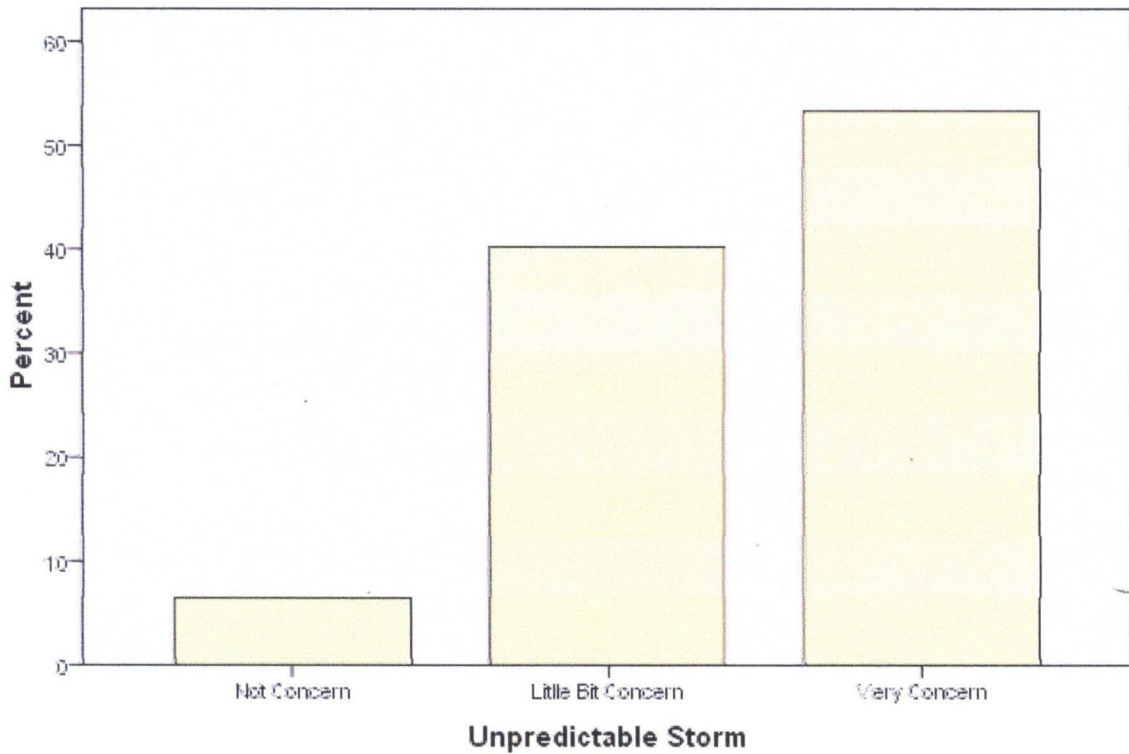
Dry Wet Weather



Unpredictable Storm

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	30	6.4	6.4	6.4
	Little Bit Concern	188	40.3	40.3	46.7
	Very Concern	249	53.3	53.3	100.0
	Total	467	100.0	100.0	

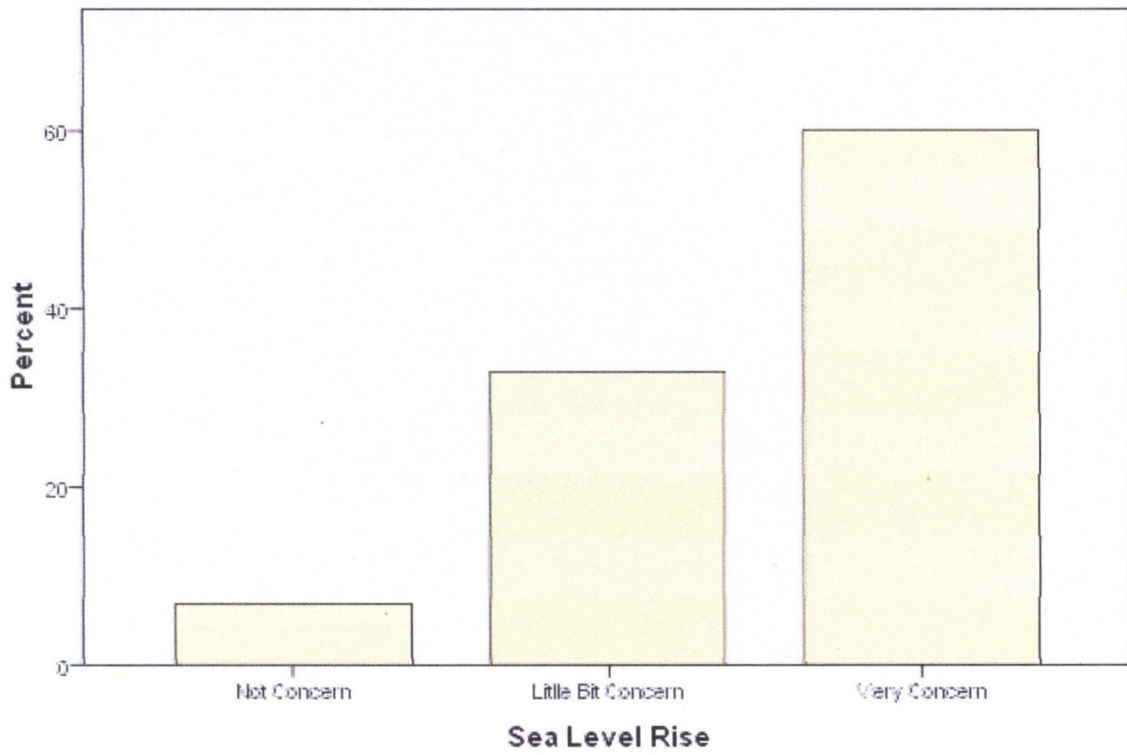
Unpredictable Storm



Sea Level Rise

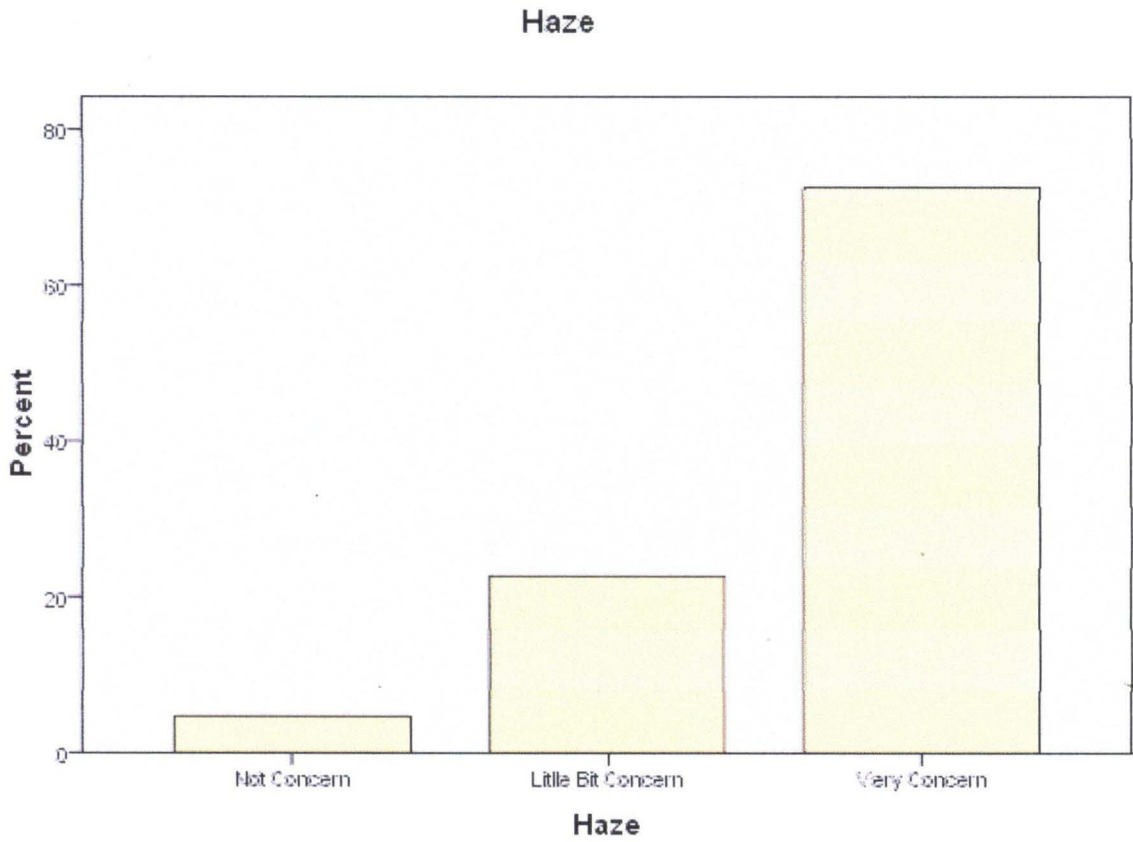
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	32	6.9	6.9	6.9
	Little Bit Concern	154	33.0	33.0	39.8
	Very Concern	281	60.2	60.2	100.0
	Total	467	100.0	100.0	

Sea Level Rise



Haze

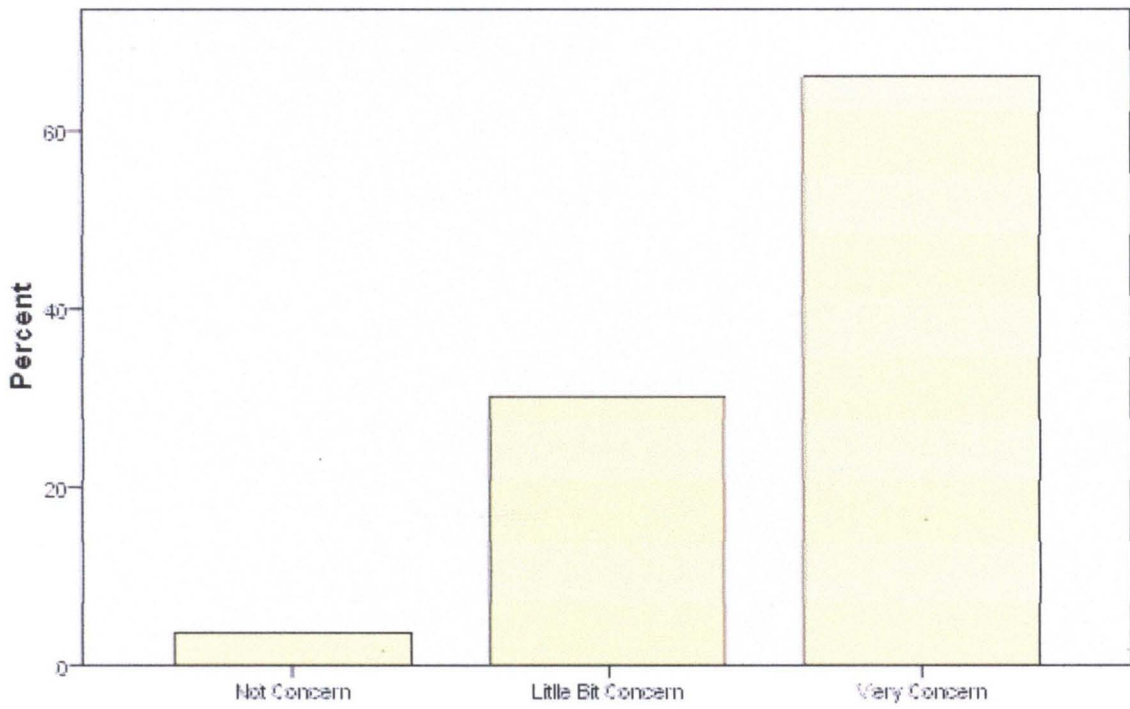
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	22	4.7	4.7	4.7
	Little Bit Concern	106	22.7	22.7	27.4
	Very Concern	339	72.6	72.6	100.0
	Total	467	100.0	100.0	



Flood and Flash Flood

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	17	3.6	3.6	3.6
	Little Bit Concern	141	30.2	30.2	33.8
	Very Concern	309	66.2	66.2	100.0
	Total	467	100.0	100.0	

Flood and Flash Flood

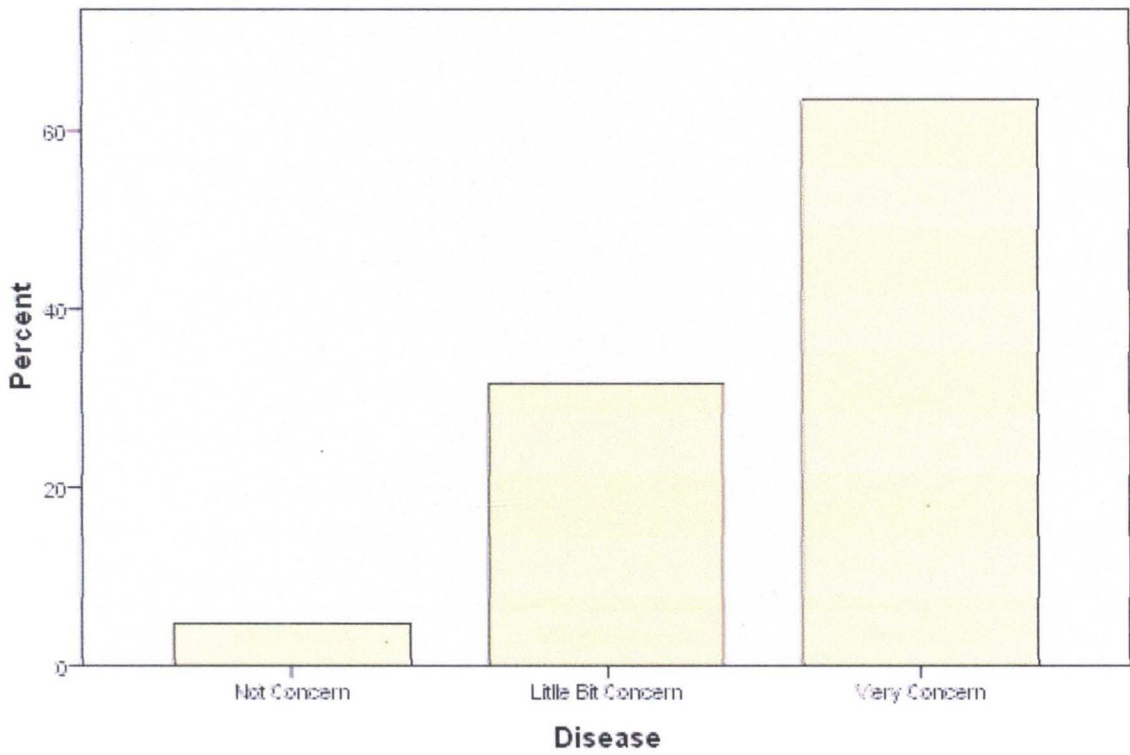


Flood and Flash Flood

Disease

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Concern	22	4.7	4.7	4.7
Little Bit Concern	148	31.7	31.7	36.4
Very Concern	297	63.6	63.6	100.0
Total	467	100.0	100.0	

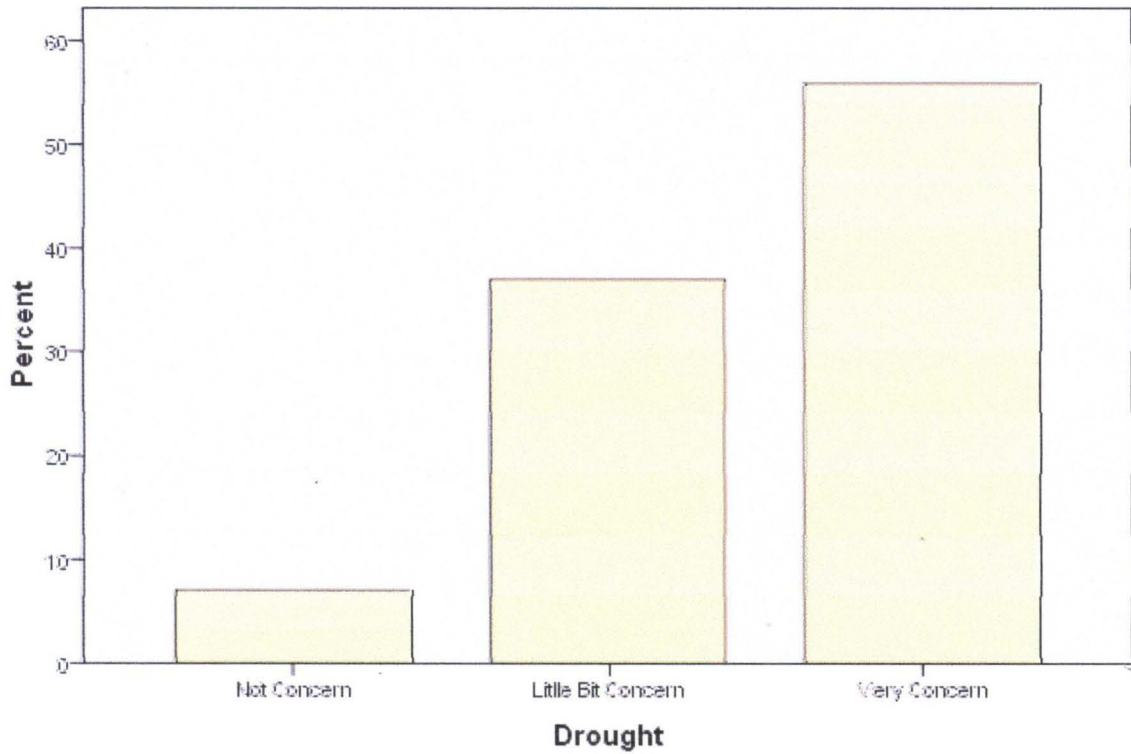
Disease



Drought

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	33	7.1	7.1	7.1
	Little Bit Concern	173	37.0	37.0	44.1
	Very Concern	261	55.9	55.9	100.0
	Total	467	100.0	100.0	

Drought



Decreasing of Wildlife

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	38	8.1	8.1	8.1
	Little Bit Concern	191	40.9	40.9	49.0
	Very Concern	238	51.0	51.0	100.0
	Total	467	100.0	100.0	

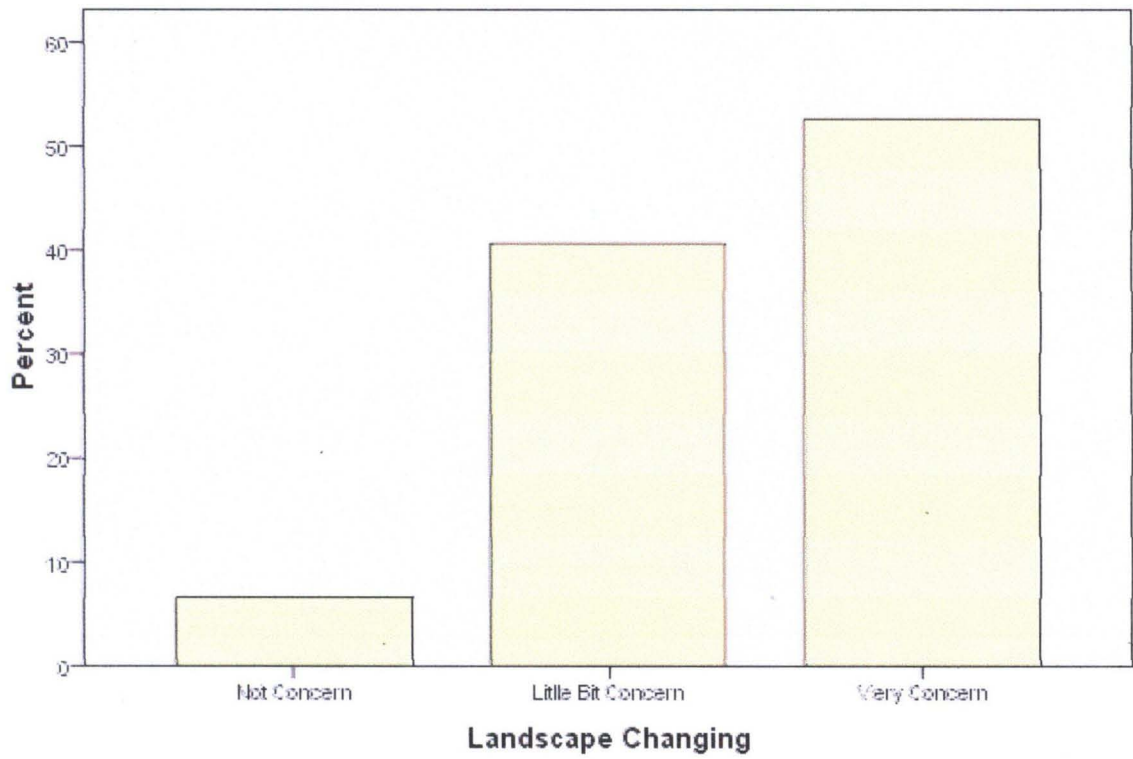
Decreasing of Wildlife



Landscape Changing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Concern	31	6.6	6.6	6.6
	Little Bit Concern	190	40.7	40.7	47.3
	Very Concern	246	52.7	52.7	100.0
	Total	467	100.0	100.0	

Landscape Changing

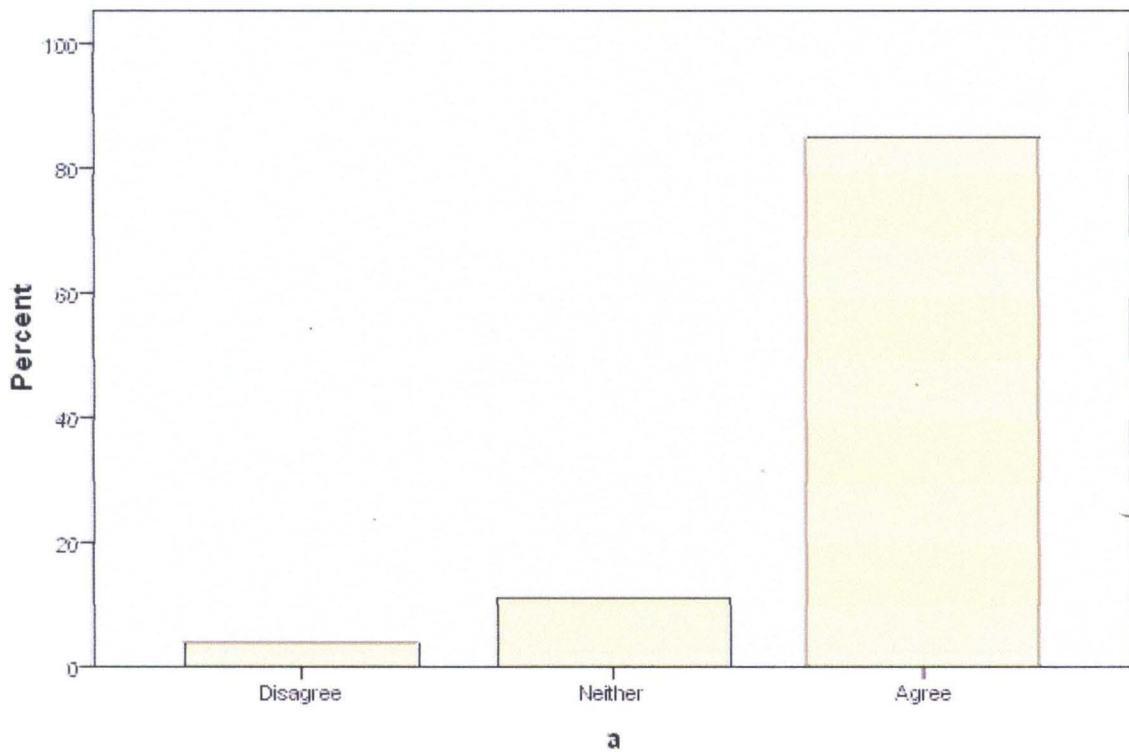


Appendix H: table and figure on awareness statement (Q10)

a

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	18	3.9	3.9	3.9
Neither	52	11.1	11.1	15.0
Agree	397	85.0	85.0	100.0
Total	467	100.0	100.0	

a

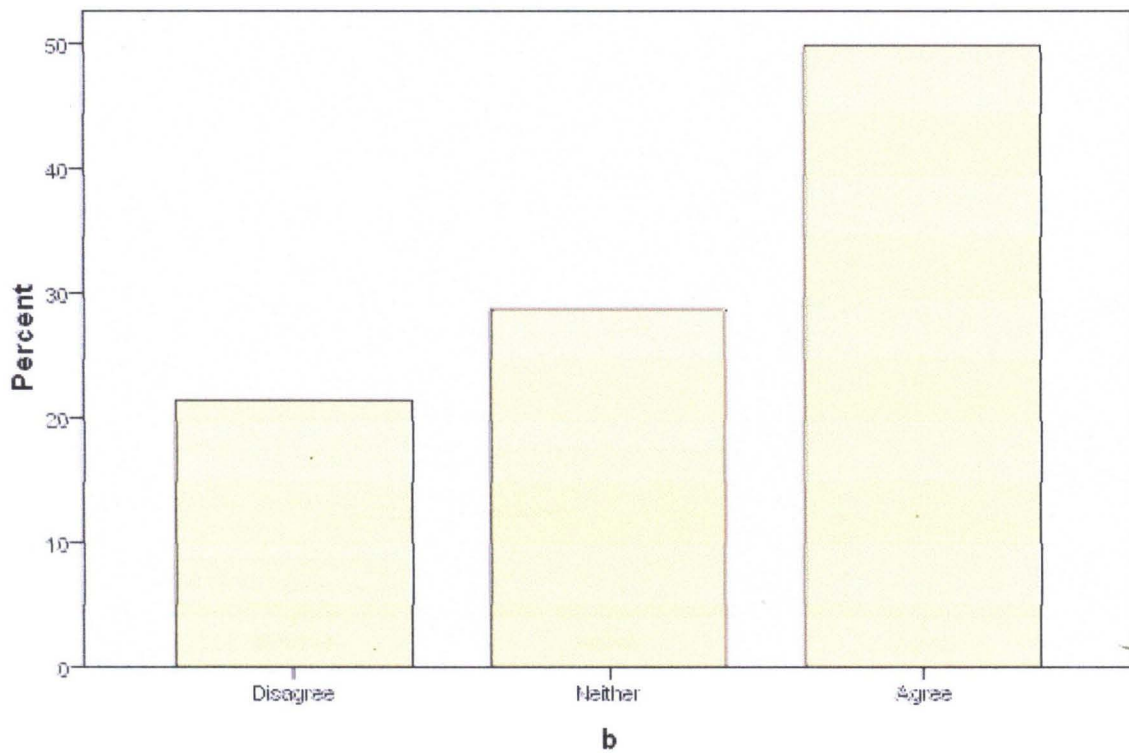


a

b

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	100	21.4	21.4	21.4
	Neither	134	28.7	28.7	50.1
	Agree	233	49.9	49.9	100.0
	Total	467	100.0	100.0	

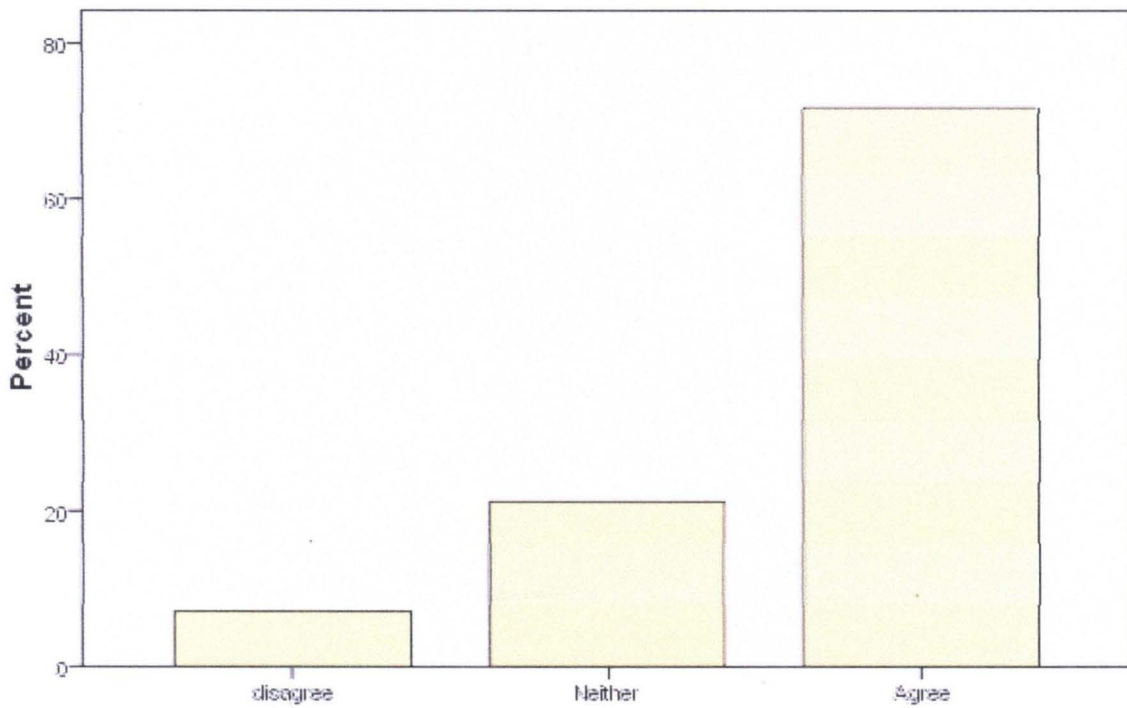
b



c

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	33	7.1	7.1	7.1
Neither	99	21.2	21.2	28.3
Agree	335	71.7	71.7	100.0
Total	467	100.0	100.0	

c

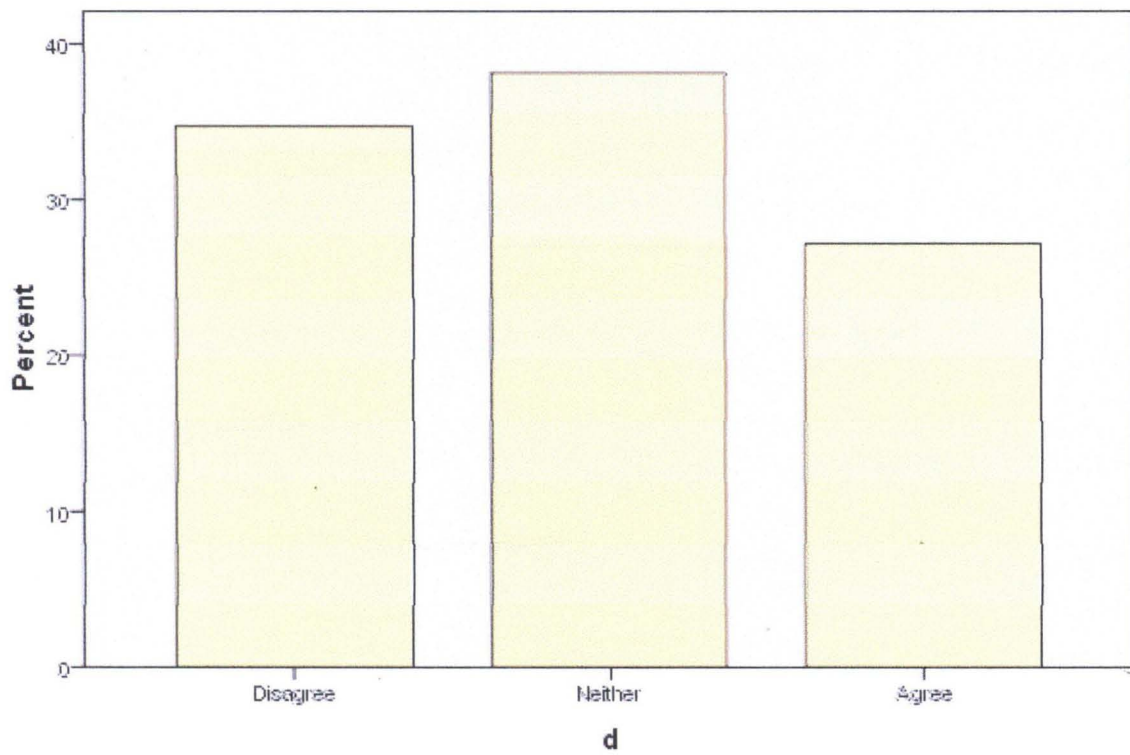


c

d

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	162	34.7	34.7	34.7
Neither	178	38.1	38.1	72.8
Agree	127	27.2	27.2	100.0
Total	467	100.0	100.0	

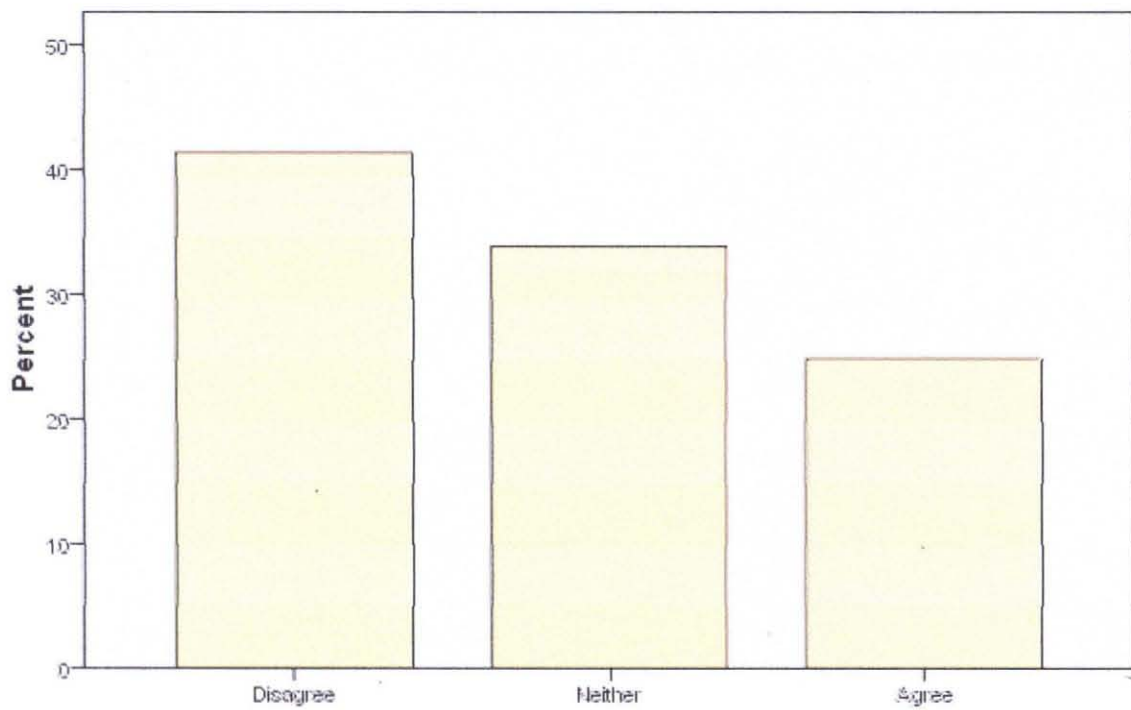
d



e

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	193	41.3	41.3	41.3
	Neither	158	33.8	33.8	75.2
	Agree	116	24.8	24.8	100.0
	Total	467	100.0	100.0	

e

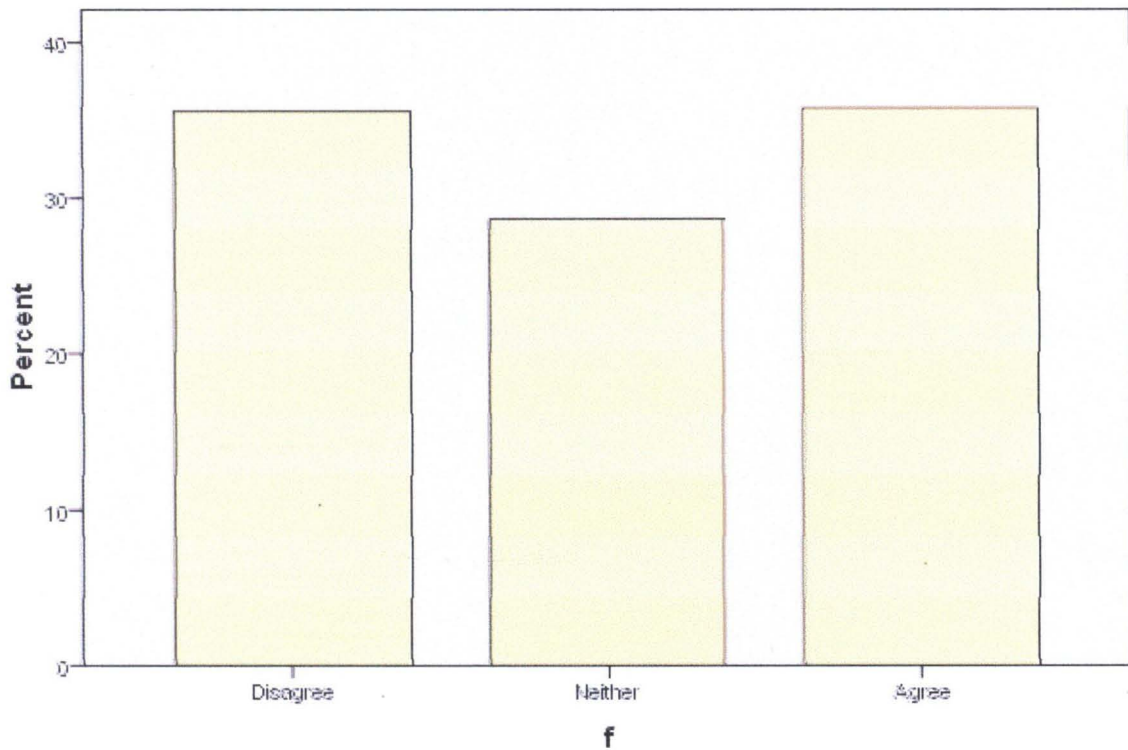


e

f

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	166	35.5	35.5	35.5
	Neither	134	28.7	28.7	64.2
	Agree	167	35.8	35.8	100.0
	Total	467	100.0	100.0	

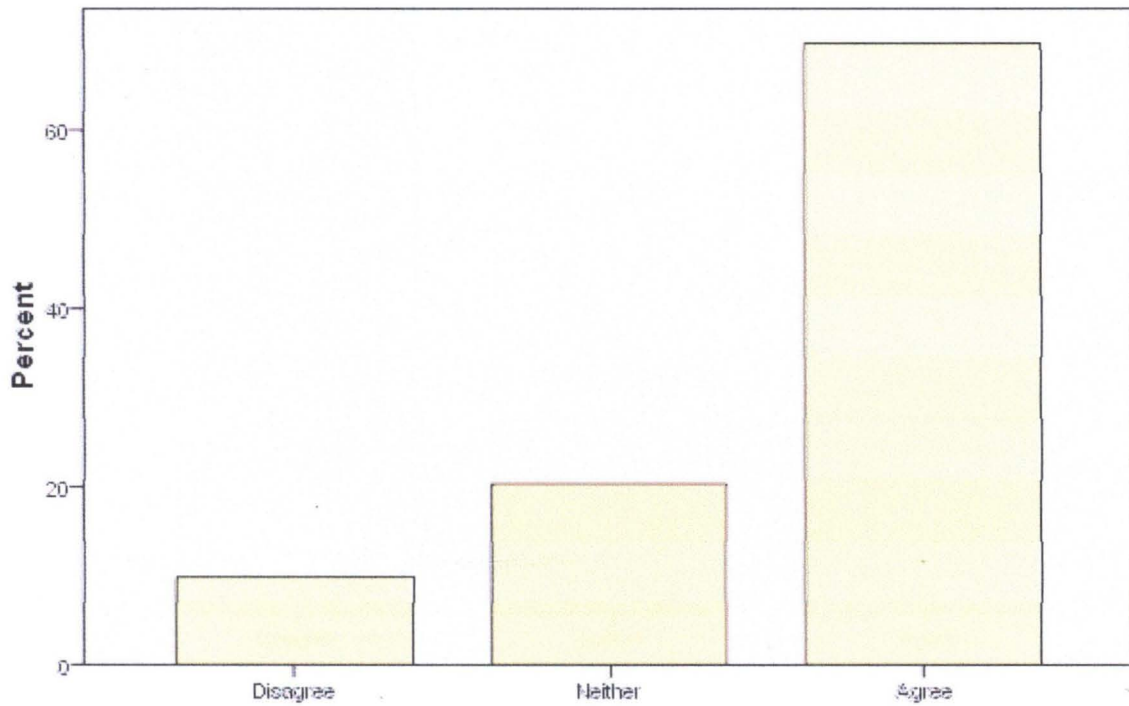
f



g

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	46	9.9	9.9	9.9
	Neither	95	20.3	20.3	30.2
	Agree	326	69.8	69.8	100.0
	Total	467	100.0	100.0	

g

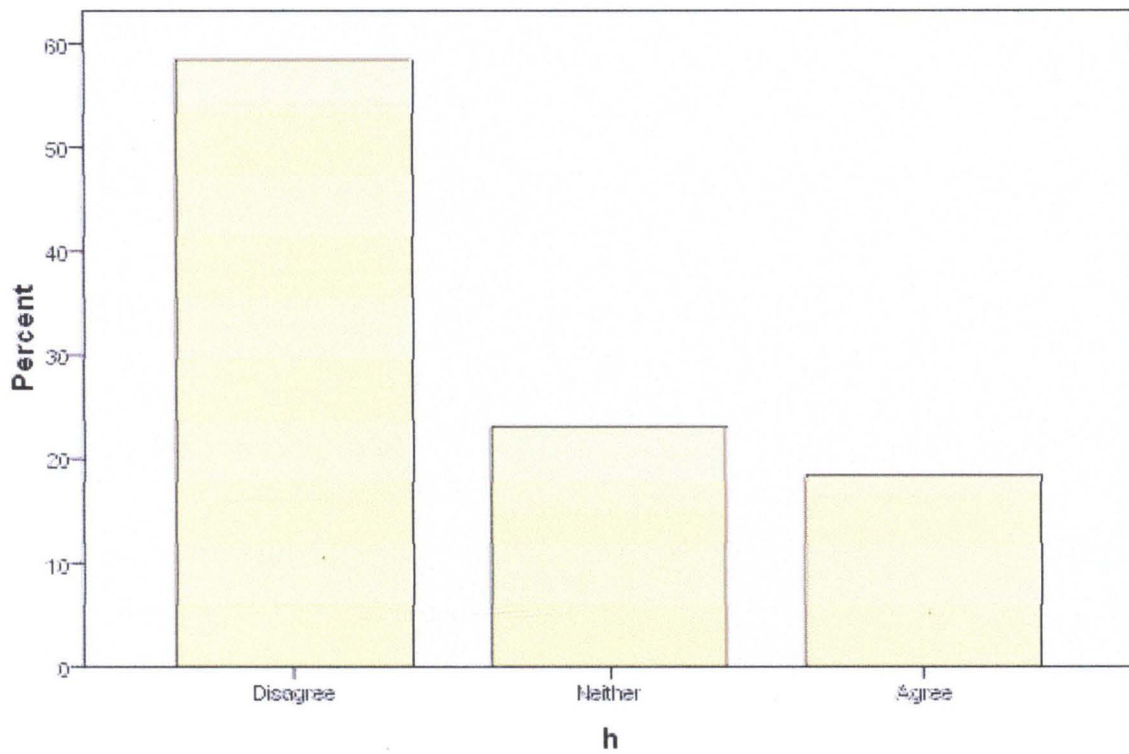


g

h

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	273	58.5	58.5	58.5
	Neither	108	23.1	23.1	81.6
	Agree	86	18.4	18.4	100.0
	Total	467	100.0	100.0	

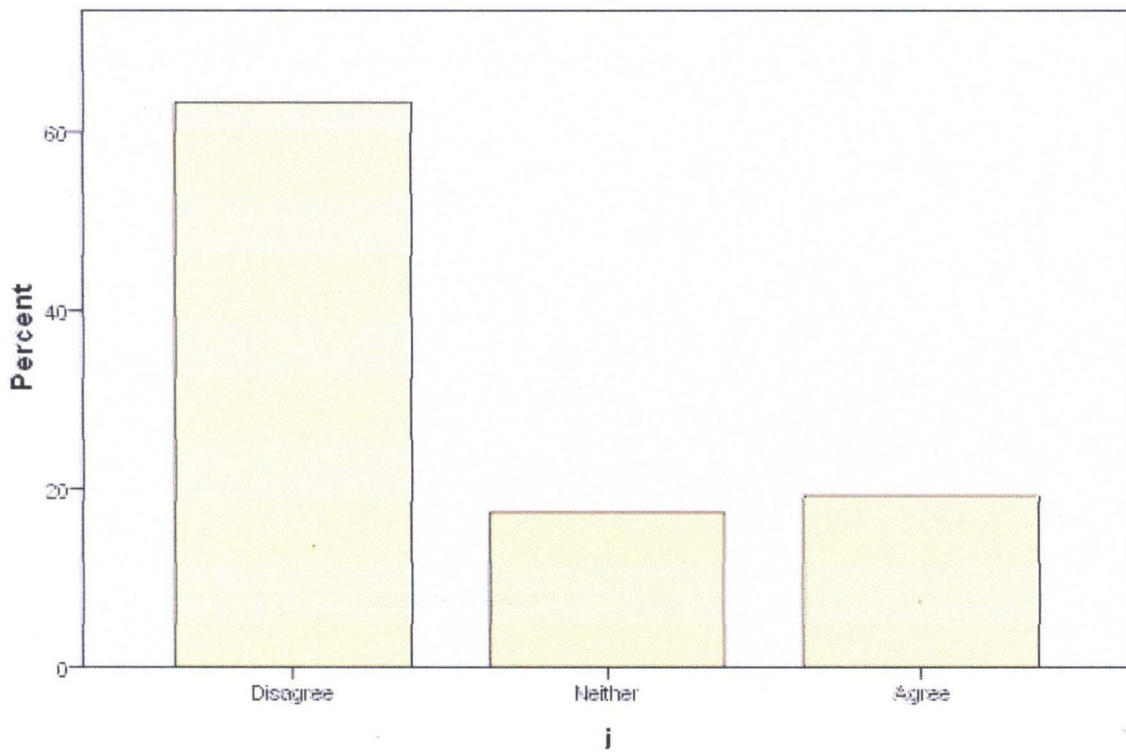
h



i

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	296	63.4	63.4	63.4
Neither	81	17.3	17.3	80.7
Agree	90	19.3	19.3	100.0
Total	467	100.0	100.0	

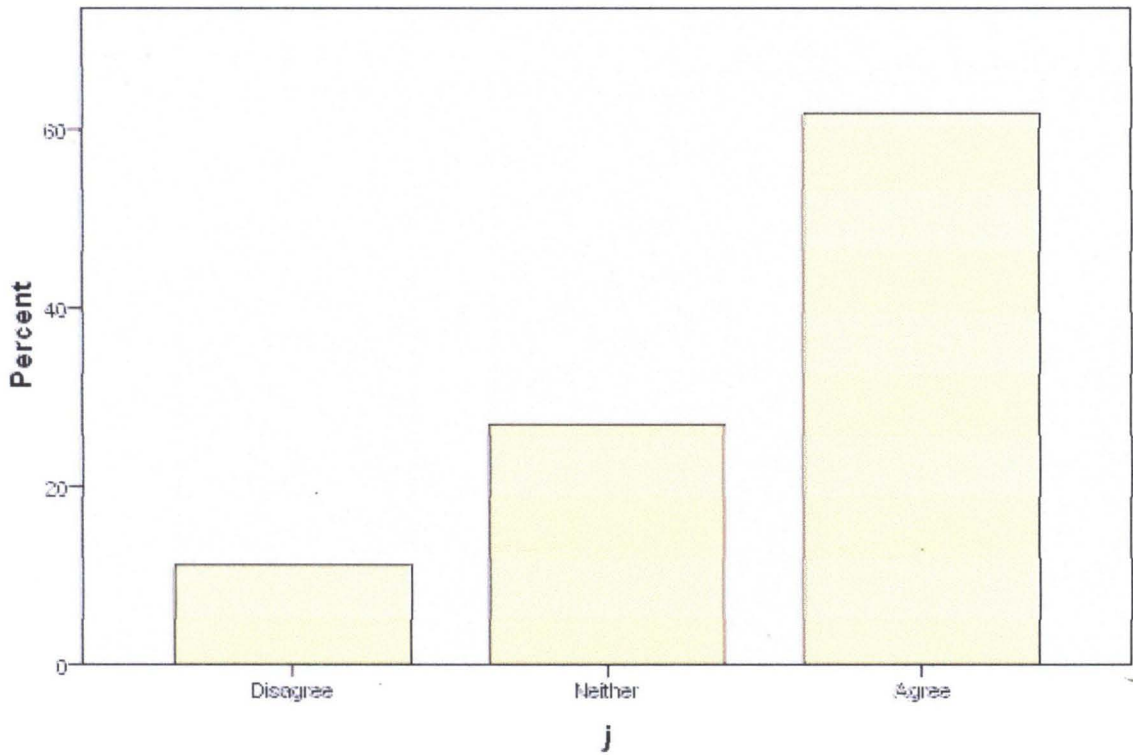
i



j

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	52	11.1	11.1	11.1
	Neither	126	27.0	27.0	38.1
	Agree	289	61.9	61.9	100.0
	Total	467	100.0	100.0	

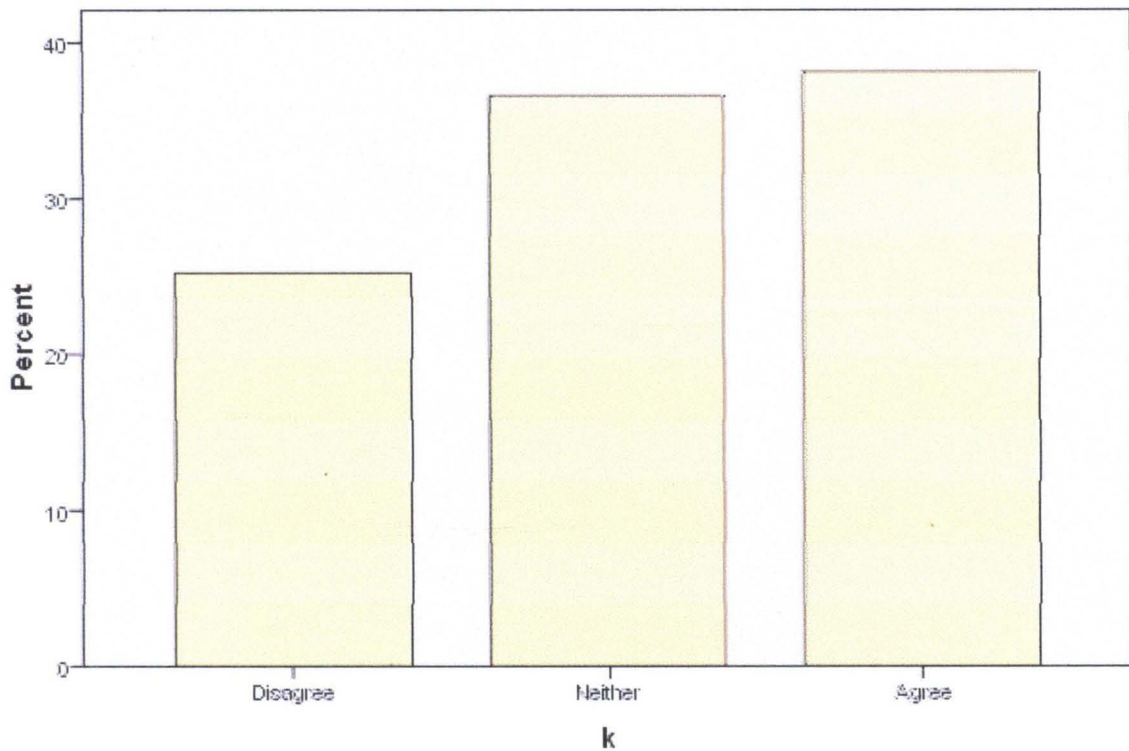
j



k

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	118	25.3	25.3	25.3
	Neither	171	36.6	36.6	61.9
	Agree	178	38.1	38.1	100.0
	Total	467	100.0	100.0	

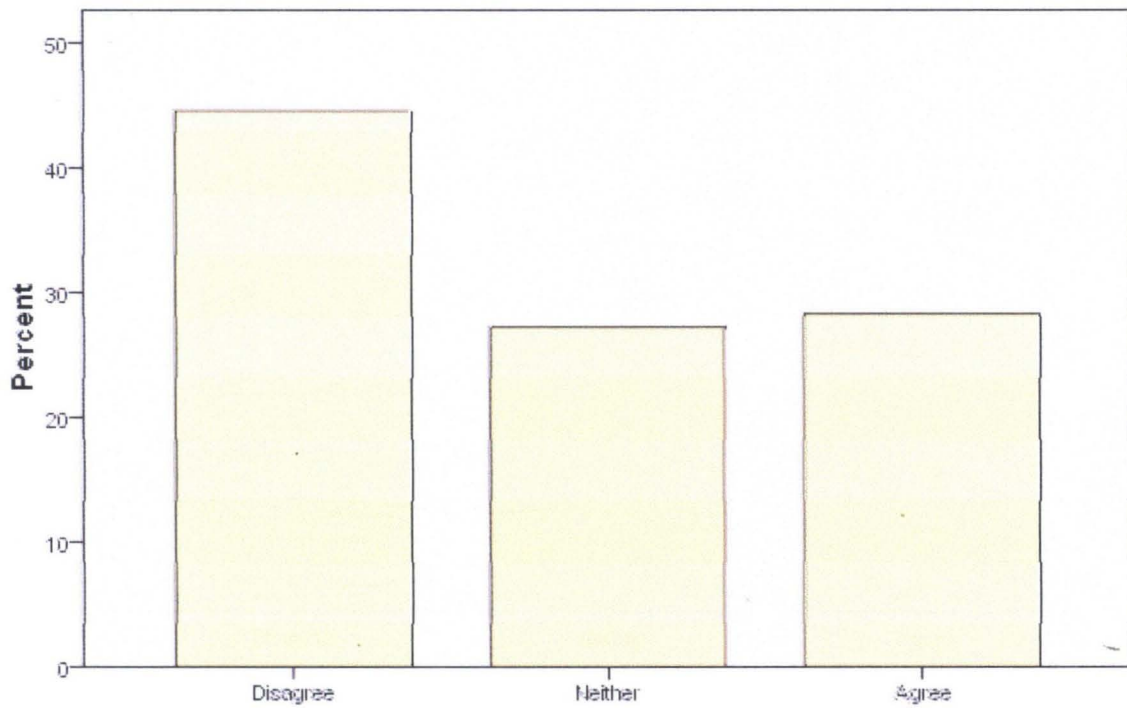
k



I

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	208	44.5	44.5	44.5
	Neither	127	27.2	27.2	71.7
	Agree	132	28.3	28.3	100.0
	Total	467	100.0	100.0	

I

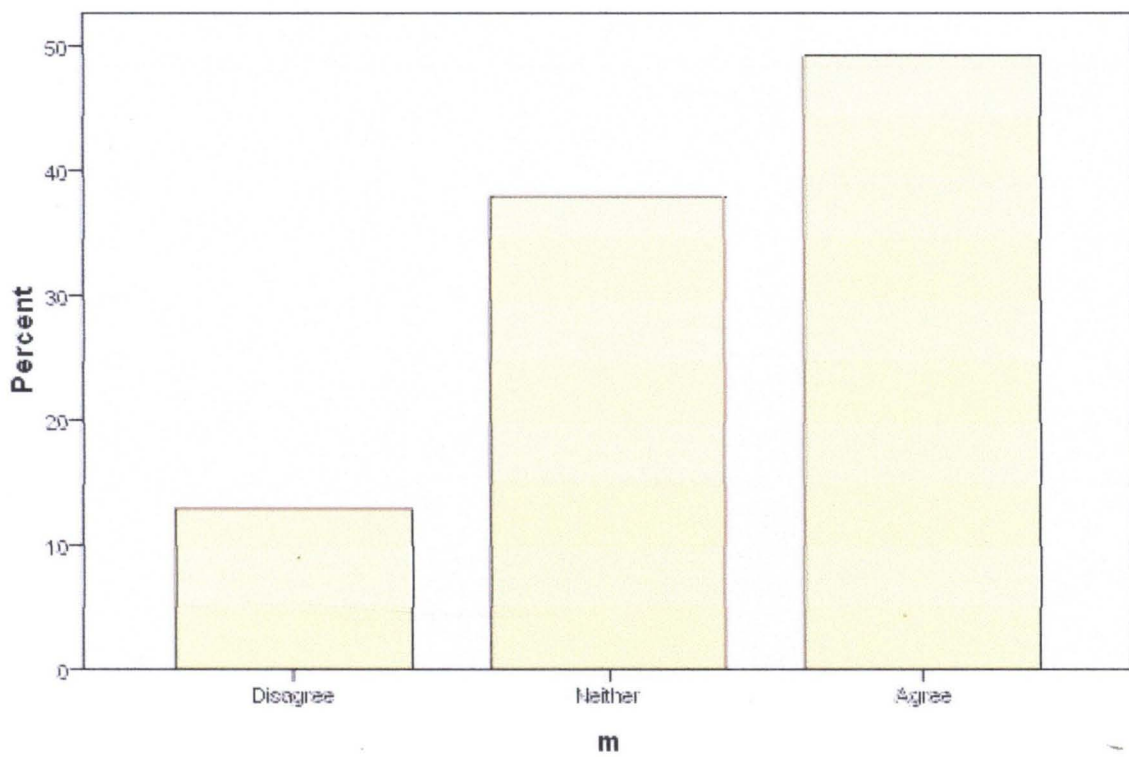


I

m

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	60	12.8	12.8	12.8
	Neither	177	37.9	37.9	50.7
	Agree	230	49.3	49.3	100.0
	Total	467	100.0	100.0	

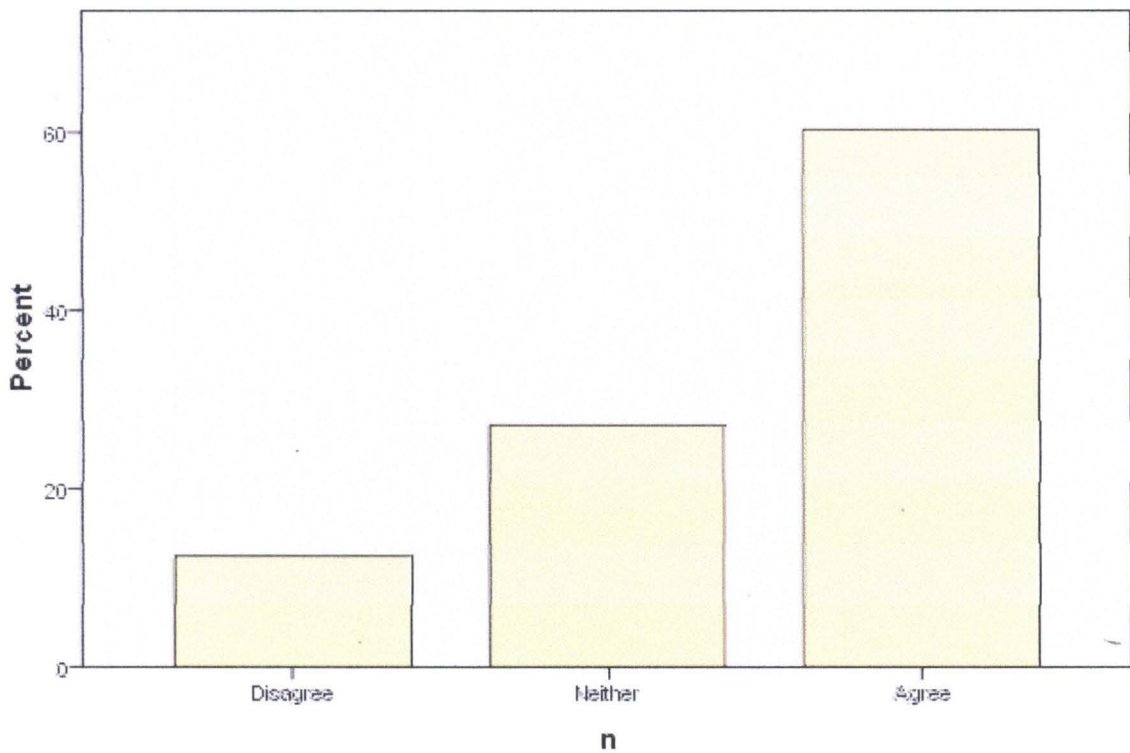
m



n

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	58	12.4	12.4	12.4
Neither	127	27.2	27.2	39.6
Agree	282	60.4	60.4	100.0
Total	467	100.0	100.0	

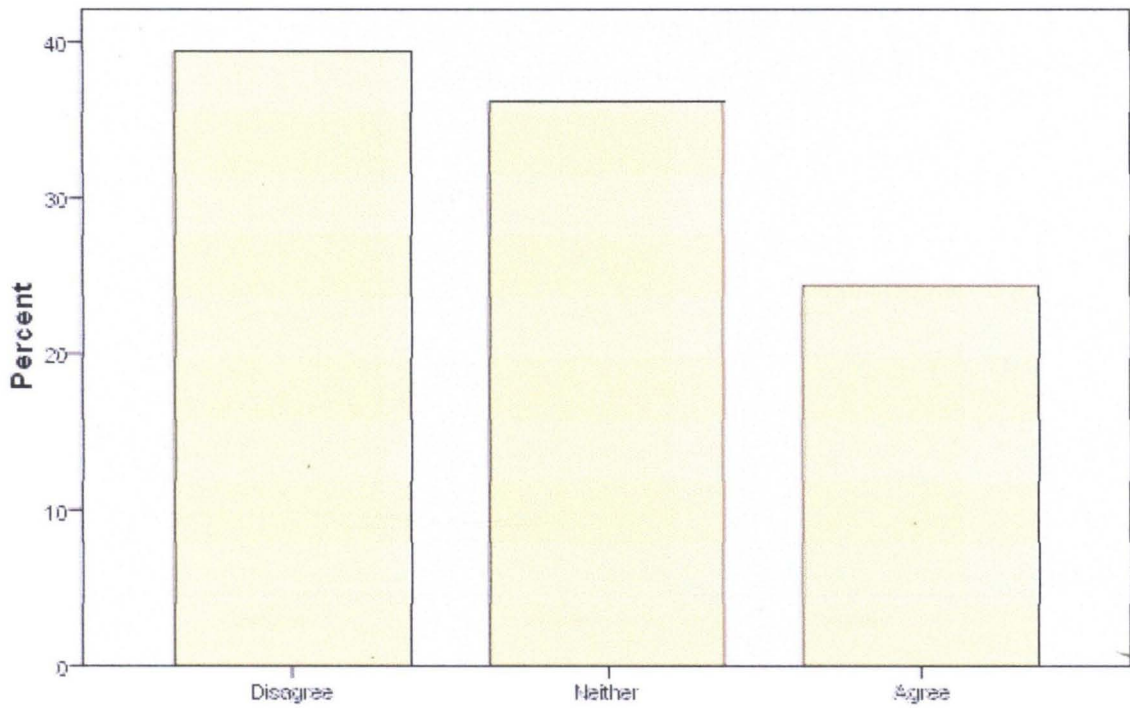
n



o

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	184	39.4	39.4	39.4
	Neither	169	36.2	36.2	75.6
	Agree	114	24.4	24.4	100.0
	Total	467	100.0	100.0	

o

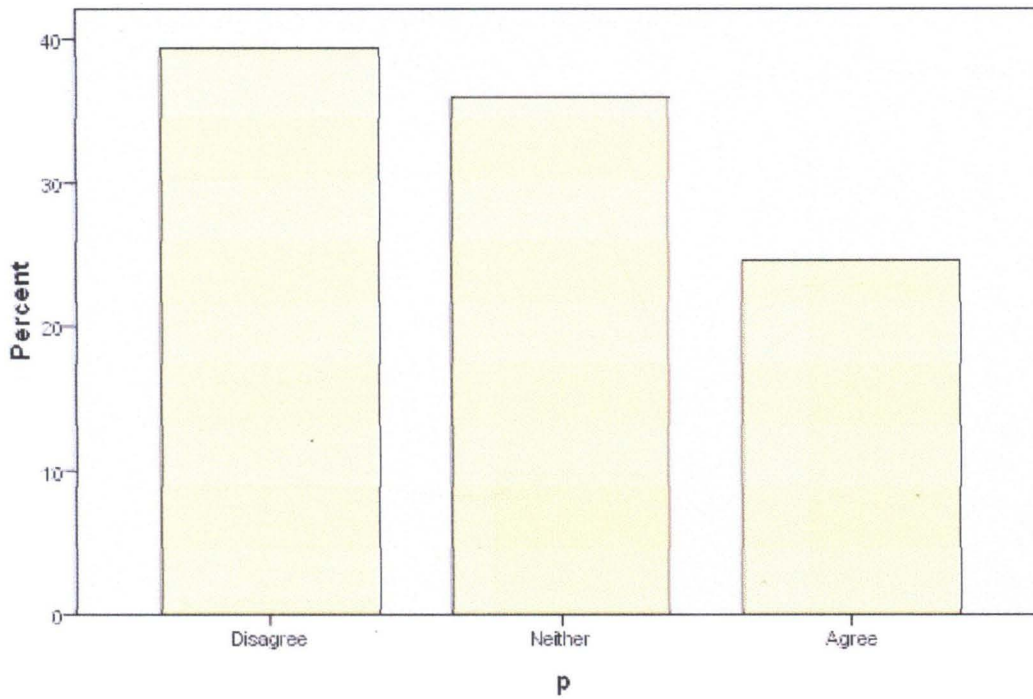


o

p

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	184	39.4	39.4	39.4
	Neither	168	36.0	36.0	75.4
	Agree	115	24.6	24.6	100.0
	Total	467	100.0	100.0	

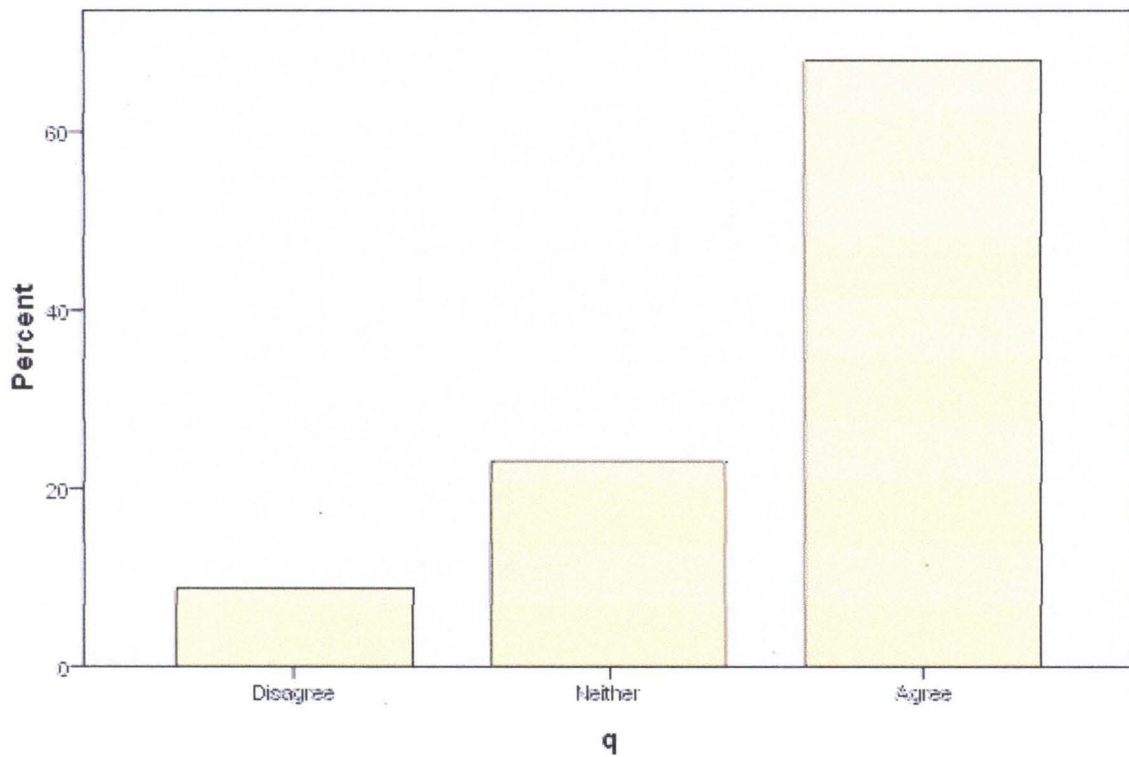
p



q

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	41	8.8	8.8	8.8
	Neither	108	23.1	23.1	31.9
	Agree	318	68.1	68.1	100.0
	Total	467	100.0	100.0	

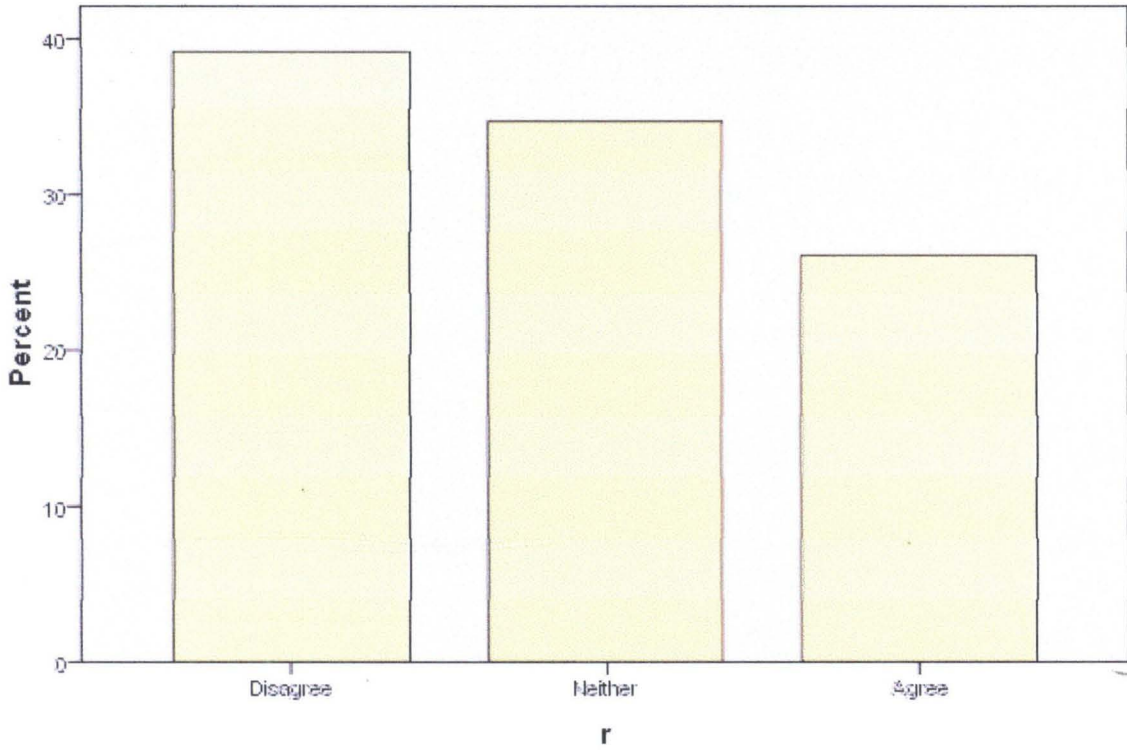
q



r

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	183	39.2	39.2	39.2
Neither	162	34.7	34.7	73.9
Agree	122	26.1	26.1	100.0
Total	467	100.0	100.0	

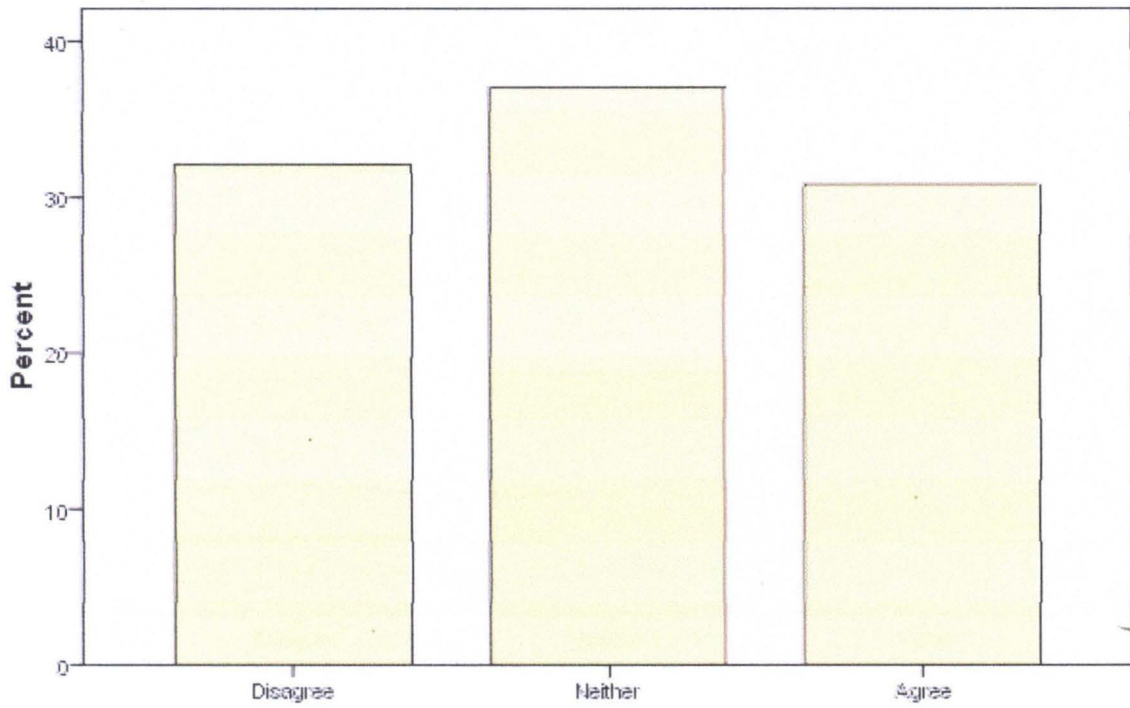
r



s

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Disagree	150	32.1	32.1	32.1
Neither	173	37.0	37.0	69.2
Agree	144	30.8	30.8	100.0
Total	467	100.0	100.0	

s

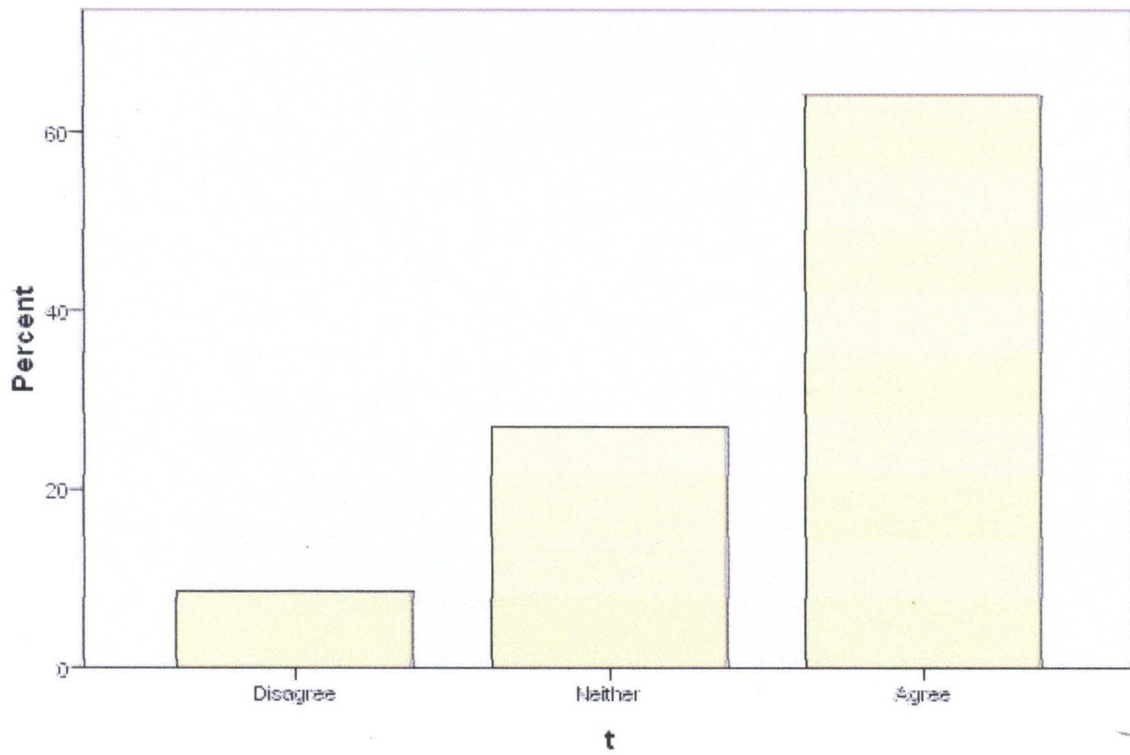


s

t

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	41	8.8	8.8	8.8
	Neither	126	27.0	27.0	35.8
	Agree	300	64.2	64.2	100.0
	Total	467	100.0	100.0	

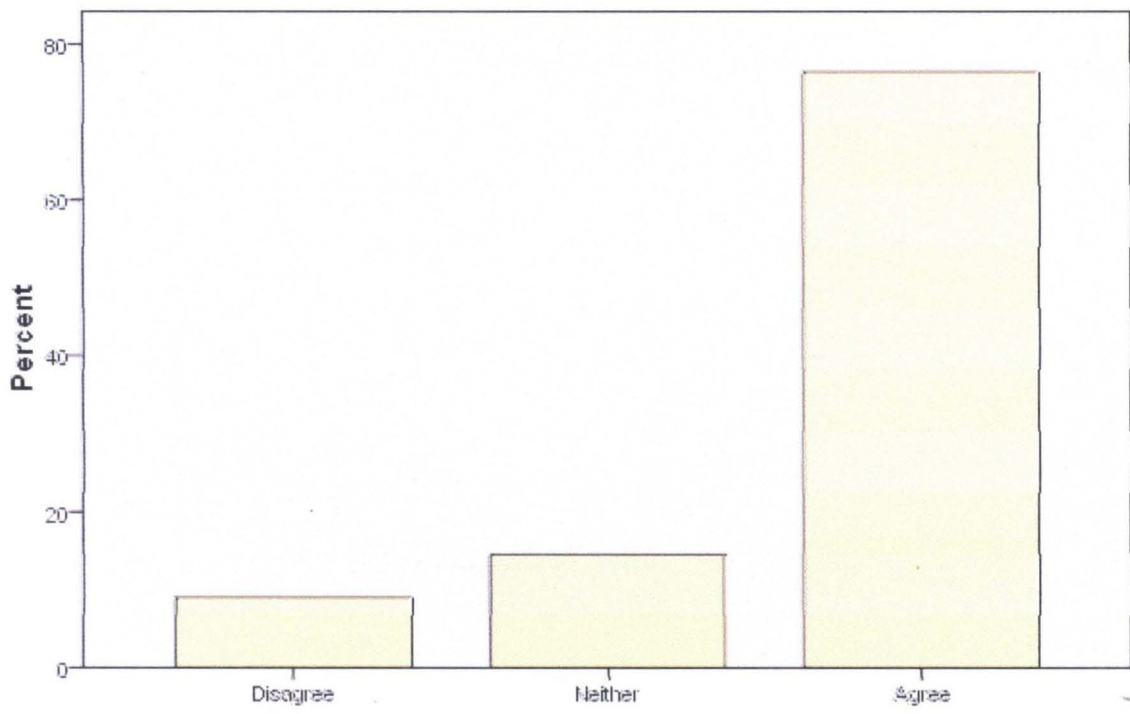
t



u

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	42	9.0	9.0	9.0
	Neither	68	14.6	14.6	23.6
	Agree	357	76.4	76.4	100.0
	Total	467	100.0	100.0	

u

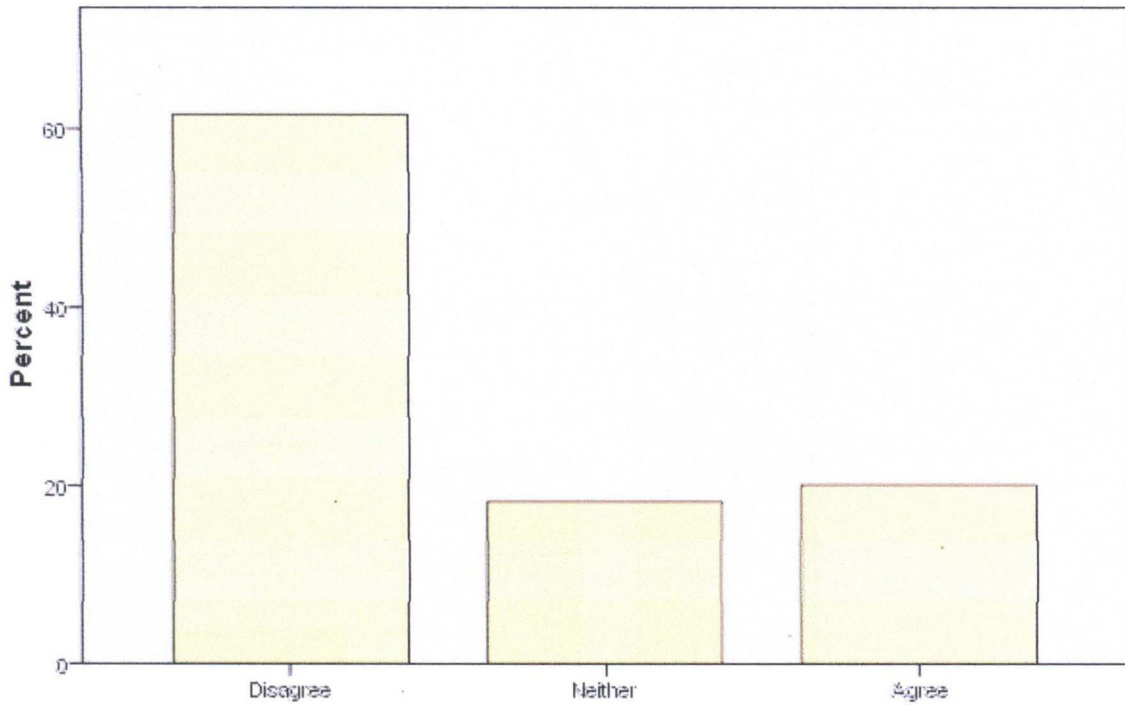


u

v

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	288	61.7	61.7	61.7
	Neither	85	18.2	18.2	79.9
	Agree	94	20.1	20.1	100.0
	Total	467	100.0	100.0	

v

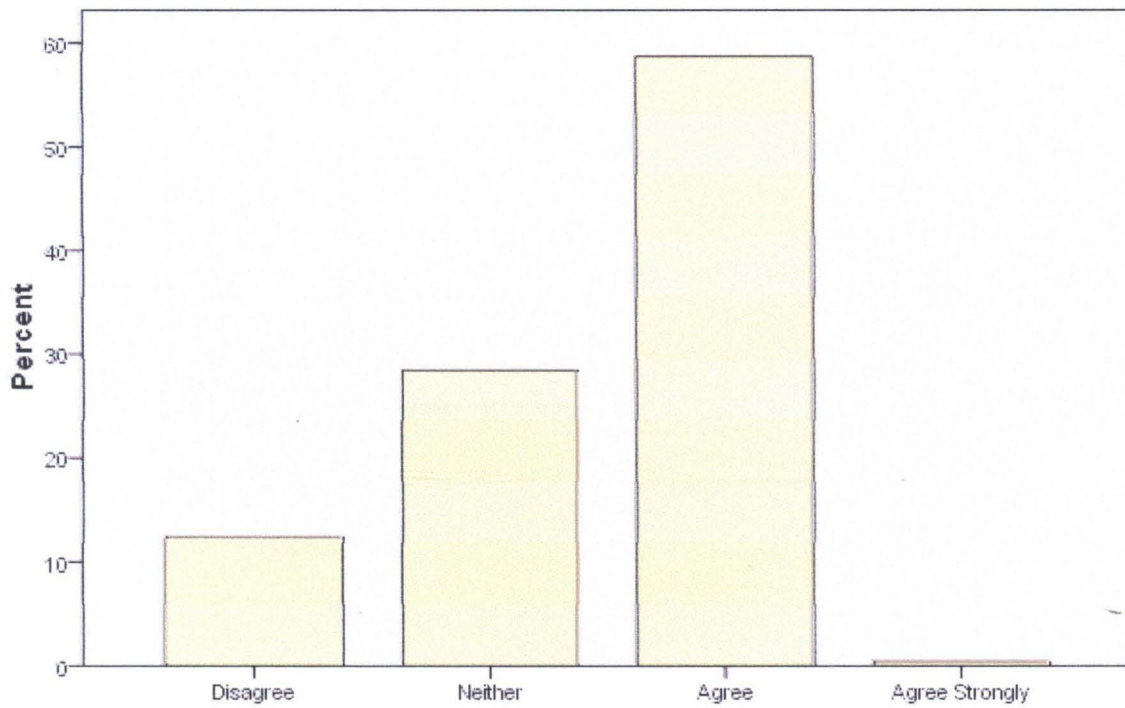


v

W

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	58	12.4	12.4	12.4
	Neither	133	28.5	28.5	40.9
	Agree	274	58.7	58.7	99.6
	Agree Strongly	2	.4	.4	100.0
	Total	467	100.0	100.0	

W

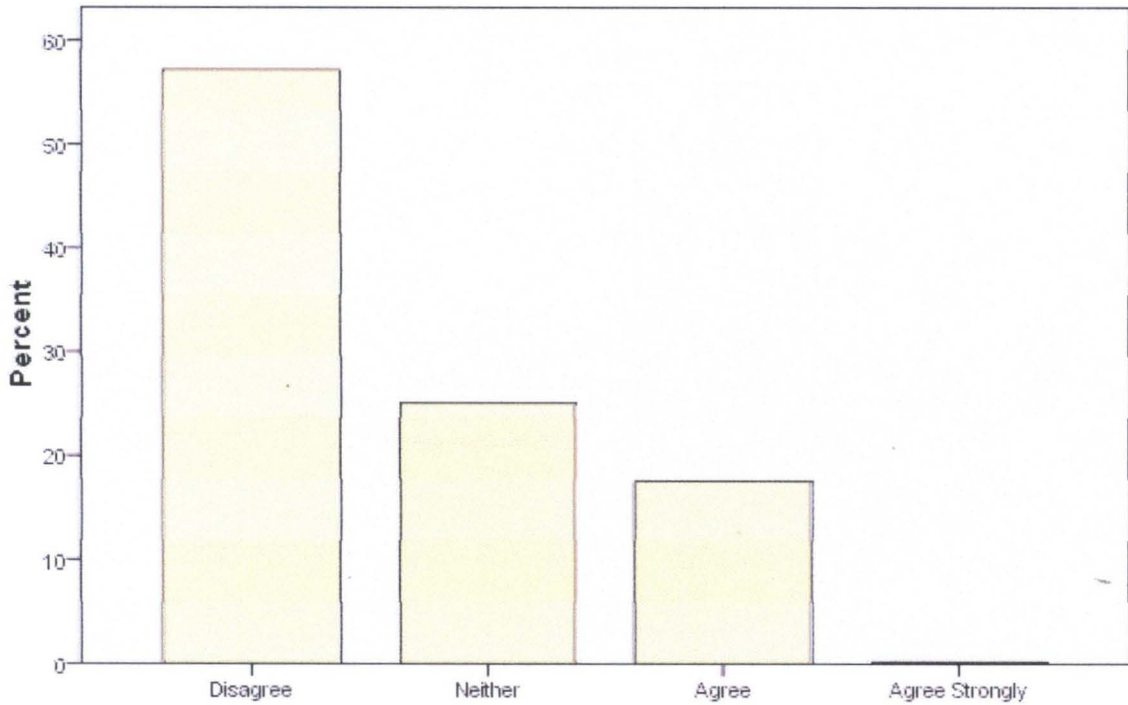


W

x

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	267	57.2	57.2	57.2
	Neither	117	25.1	25.1	82.2
	Agree	82	17.6	17.6	99.8
	Agree Strongly	1	.2	.2	100.0
	Total	467	100.0	100.0	

x

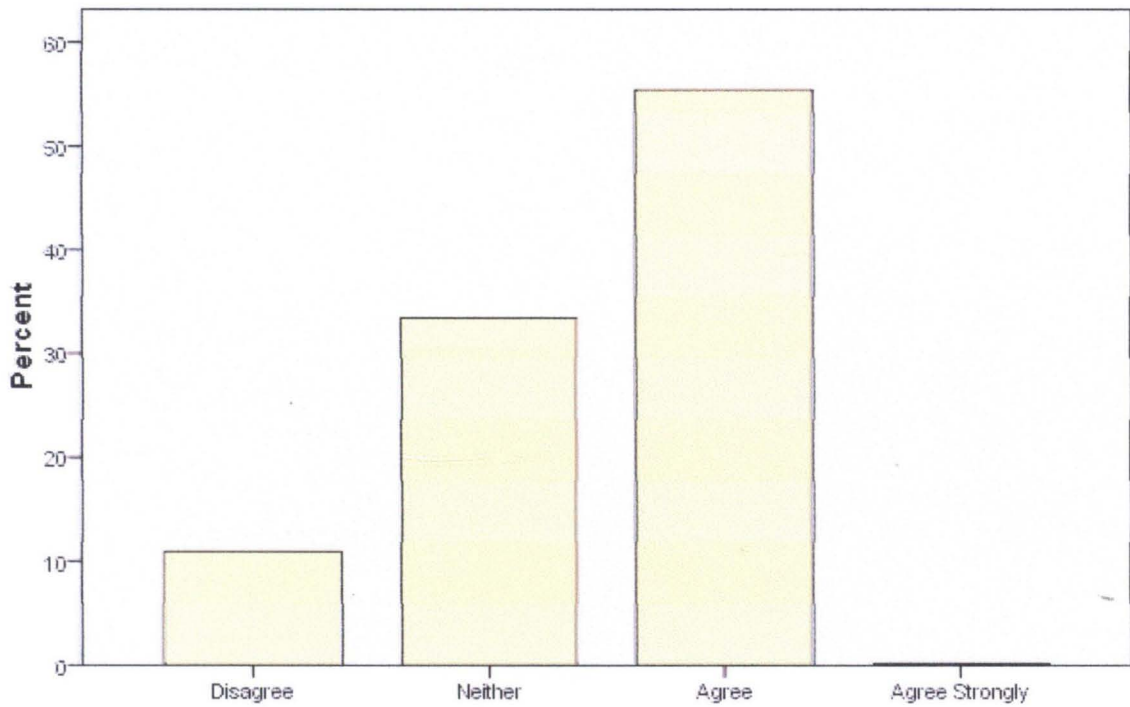


x

y

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	51	10.9	10.9	10.9
	Neither	156	33.4	33.4	44.3
	Agree	259	55.5	55.5	99.8
	Agree Strongly	1	.2	.2	100.0
	Total	467	100.0	100.0	

y

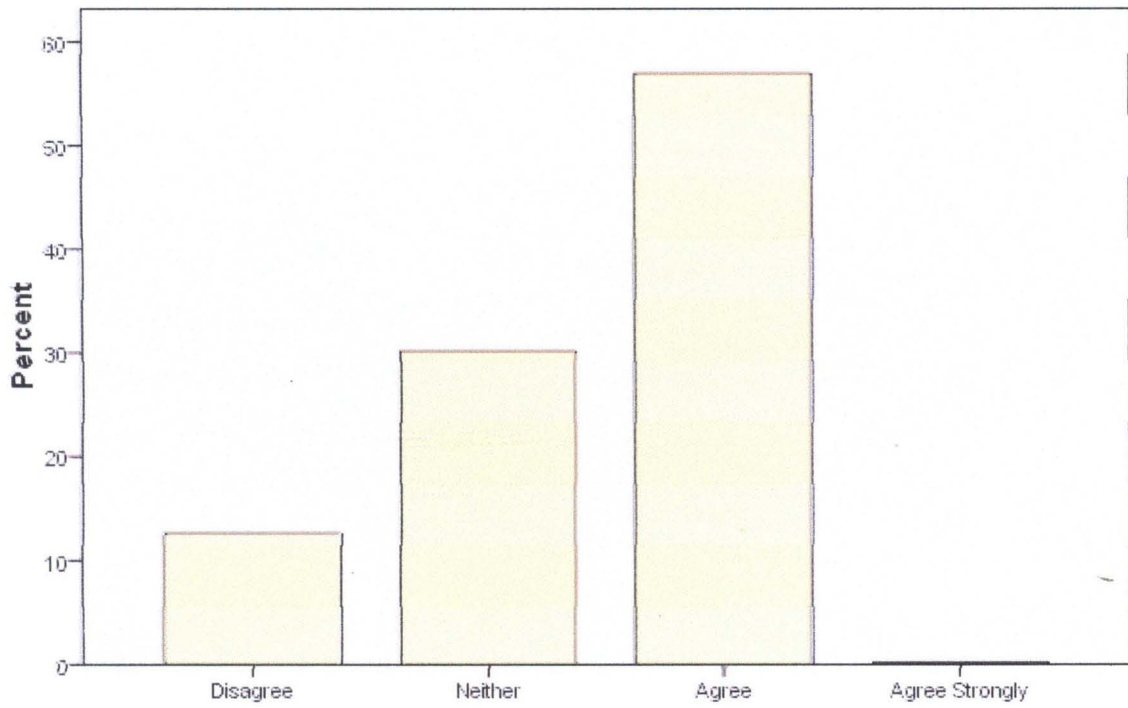


y

z

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	59	12.6	12.6	12.6
	Neither	141	30.2	30.2	42.8
	Agree	266	57.0	57.0	99.8
	Agree Strongly	1	.2	.2	100.0
	Total	467	100.0	100.0	

z



z

