Maltese Public Perceptions on Climate Change and Health

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Faculty of Medicine and Surgery
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To my mother and father, Mary Rose and Emmanuel,

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Supervisor’s Declaration

In my opinion, this dissertation is good enough to be awarded at least a PASS by the MSc Public Health Examining Board

29/8/2009

Date

DR KAREN VINCENTI
Declaration of Authenticity

I, the undersigned, declare that this dissertation, entitled ‘Maltese Public Perceptions on Climate Change and Health’, is my own original work and was carried out under the supervision of Dr Karen Vincenti, Consultant in Public Health Medicine, Department for Environmental Health (Public Health Regulation Division), Ministry of Social Policy.

29/8/09.

Date

DR ROBERTO DEBONO
Abstract

Scientific evidence about climate change leaves no doubt that the climate is changing and that it is mainly the product of human behaviour and lifestyle. The health effects of climate change are diverse in nature and range from the direct effects of extreme weather events on health such as heatwaves, floods and storms to the more indirect effects on health such as water shortages and food shortages. Recently, the World Health Organisation identified protecting health from climate change as a defining challenge of the 21st century.

Meeting this challenge requires a concerted intergovernmental effort: to reduce greenhouse gas emissions, to garner public support for mitigation policy and to encourage committed action by individuals and communities. Social surveys on public perceptions' of climate change have been conducted since the 1980s. Studies have largely focused on the levels of public support for mitigation policy and their willingness to adopt mitigation behaviour. It was found that even though the public is generally aware of climate change, climate change lacks issue salience in people's daily lives and is generally viewed as a distant threat in place and time.

This cross-sectional study is among the first to study the Maltese public perceptions on climate change, with a special emphasis given to the public perceptions of the human health effects of climate change. Together with risk perception and knowledge about the health effects of climate change, awareness, concern and knowledge about the causes of climate change were analyzed in relation to support for climate change mitigation policy and willingness to adopt climate change mitigation behaviour.
A telephone survey was conducted during January and February 2009 on a representative stratified random sample of the Maltese resident population over the age of 18 years (n=543). The design of the survey was primarily quantitative but qualitative information was also collected through a focus group, an open-ended question and opinion probing during the telephone interview.

This research concludes that the Maltese public is generally aware of climate change, concerned about it, but confounds climate change with a variety of other environmental hazards including air pollution, ozone depletion and agricultural pesticide use. Notwithstanding this flawed understanding of climate change, the Maltese public still associates climate change with health and disease. It is also generally willing to support climate change mitigation policy and to adopt climate change mitigation behaviour once there is the understanding that the environment is conducive to such behaviour.

This study finds that the perception that climate change is a threat to health was the strongest driving force behind the Maltese public’s willingness to support policy and change behaviour. Furthermore, an accurate knowledge of the human health effects of climate change was also found to correlate positively with a willingness to take up climate change mitigation measures. Thus, the author of this study argues that climate change could become salient in people’s lives if it is framed as a threat to health rather than as a distant ecological concern.
“Up to now the polar bear has been the poster child for climate change... ...*humanity* is really the most important species endangered by climate change”

Dr Margaret Chan,
Director General of the World Health Organization (WHO, 2008)
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**Abbreviations**

CO₂, Carbon dioxide

DEFRA, Department for Environment, Food and Rural Affairs, London

ECDC, European Centre for Disease Prevention and Control, Stockholm, Sweden

EHIS, European Health Interview Survey

IPCC, Intergovernmental Panel on Climate Change

ISCO – 88, International Standard Classification of Occupations

MCA, Malta Communications Authority, Malta

MetOffice, Meteorological Office for Malta International Airport plc.

MITC, Ministry for Infrastructure, Transport and Communications, Malta

NSO, National Statistics Office

WHO, World Health Organization

WSC, Water Services Corporation
Definitions

Districts

Southern Harbour - Žabbar, Xghajra, Valletta, Tarxien, Santa Lucija, Paola, Marsa, Luqa, Kalkara, Senglea, Floriana, Fgura, Cospicua, Vittoriosa

Northern Harbour - Ta’ Xbiex, Swieqi, Sliema, Santa Venera, San Ġwann, St. Julians, Qormi, Pieta’, Pembroke, Msida, Hamrun, Gżira, Birkirkara

South Eastern - Żurrieq, Żejtun, Safi, Qrendi, Mqabba, Marsaxlokk, Marsaskala, Kirkop, Gudja, Ghaxaq, Birżebbuġia

Western - Żebbuġ (Malta), Siġġiewi, Rabat (Malta), Mtarfa, Mdina, Lija, Iklin, Dingli, Balzan, Attard

Northern - St. Paul’s Bay, Naxxar, Mosta, Mgarr, Mellieha, Gharghur

Gozo and Comino - Rabat (Gozo), Fontana, Ghajnsielem and Comino, Gharb, Ghasri, Kerċem, Munxar, Nadur, Qala, San Lawrenz, Sannat, Xaghra, Xewkija, Żebbuġ (Gozo)
Chapter 1: Introduction

1.1 Background

Scientific evidence about climate change dates back almost 200 years. In 1827, the French scientist Jean-Baptiste Fournier noted an enhanced greenhouse effect. This warming effect was later linked to increased atmospheric concentrations of carbon dioxide by the Swedish chemist Svante Arrhenius in 1896 (Houghton, 1994:12). By 1979, climate change was already starting to be considered as the most important environmental issue in the world at the time (Nature, 1979).

Today, the term ‘climate change’ has become common currency in scientific, public and political fora alike. It is however being increasingly seen as a threat to health rather than a threat only to other species or to the environment. As emphasised by Dr Margaret Chan (Director General, WHO) on the 21\textsuperscript{st} of January 2008, in an address to the 122\textsuperscript{nd} session of the World Health Organization Executive Board, “... humanity really is the most endangered species by climate change” (WHO, 2008).

The health impacts of climate change are diverse in nature and range from the direct effects of extreme weather events on health such as floods, storms, heat waves and cold stress to the re-emergence and change of patterns of vector-borne diseases such as malaria and dengue fever. Although vector-borne diseases will extend their reach and death tolls will increase as a result of the effects of heat waves, the indirect effects of climate change on water, food security and air quality are likely to have the biggest effect on human health (Costello, et al., 2009; WHO, 2009; Kovats, et al., 2005). Thus, the World Health Organization considers climate change as being a “significant and
emerging threat to public health” (WHO, 2009a). Protecting health from the impacts of climate change is recognised as one of the defining challenges of the 21st century (WHO, 2009b).

Climatic changes are expected to increase at an exponential rate in the coming decades if no action is taken, to the detriment of human life and planet life in general. In the knowledge that climate change is probably entirely human-induced and that it is primarily caused by increased emissions of carbon dioxide (CO₂) from the burning of fossil fuels, much can be done to slow down the process, halt it or actually reverse it (IPCC, 2007).

Meeting this challenge will require a concerted international and intergovernmental effort to dramatically reduce greenhouse gas emissions. “It will also, however, require public support for political leaders and public mitigation policies, and committed action by individual citizens and consumers.” (Leiserowitz, 2003, p. iv)

Social research on climate change emerged in the 1980’s (Bord, et al., 1998), the main reason being that climate change is mainly the product of human behaviour and lifestyle (IPCC, 2007). Studies on public perception provide a window of opportunity to forecast or project the degree of support that will be given to climate change mitigation policy and the public’s willingness to adopt climate change mitigation behaviour.

Social research shows that climate change is not salient¹ in people’s lives (Norton & Leaman, 2004; Lorenzoni, et al., 2007, Bord, et al., 2000). The lay public often confuses climate change with a range of other environmental hazards and

¹ ‘Salient’ means that people ponder about the subject in their daily lives.
perceives it as a threat mainly to others, to distant places and to future generations (Leiserowitz, 2006). Climate change mitigation policy is likely to be met with an absence of opposition rather than with active support (Bord, et al., 2000) and willingness to take measures which decrease greenhouse gas emissions is mostly for measures which are easy to carry out, can be done at home and are not costly (e.g. O’Connor, et al., 2002). Furthermore, among the reasons given for changing behaviour were financial reasons and health reasons rather than a sincere concern for climate change (DEFRA, 2002).

To date, however, social research has mainly focused on climate change as an ecological concern rather than as a threat to health. A few studies have skimmed over some of the indirect health effects of climate change e.g. standard of living and water shortages (Leiserowitz, 2006; Bord, et al., 1998, 2000) but none have delved deep into the public perceptions of the direct (e.g. dehydration from heat waves) and indirect health effects of climate change.

This study, on the Maltese public perceptions of climate change, focuses mostly on the public perceptions of the health effects of climate change. Awareness, concern and knowledge about climate change are also studied but are not the focus of the study. Health related items that have already been used in other questionnaires (e.g. perceptions that people are dying or becoming ill because of climate change) are replicated but, in addition, a new item on knowledge about the health effects of climate change has been introduced for the first time. Risk perception and knowledge about the health effects of climate change are in turn analysed in relation to concern and knowledge about climate change, support for climate change mitigation policy and willingness to adopt climate change mitigation behaviour.
Literature shows that climate change is not a salient issue. This study argues that since health is at the centre of everyone’s lives, climate change could become a salient issue through health.

1.2 Aim and objectives

The aim of the study is to study the Maltese public perceptions on climate change and its human health effects.

The objectives of this research are to study:

1. The level of awareness and concern of the Maltese public on climate change.
2. The Maltese public’s level of knowledge about the contributors of climate change.
3. The Maltese public’s level of knowledge and perception of the health effects of climate change.
4. The extent to which the Maltese public is ready to support climate change mitigation policy.
5. The extent to which the Maltese public is willing to adopt climate change mitigation behaviour.
Chapter 2: Literature review

A thorough literature review was carried mainly using Google Scholar and JSTOR search engines. Articles were searched using a combination of words: climate change, global warming, health, public, people, perceptions, views and policy. Furthermore, a search for articles was done by looking at the publications of prominent authors on the subject of public perceptions of climate change and health. These authors are Anthony Leiserowitz, Irene Lorenzoni, Nick F. Pidgeon, R.J. Bord and Robert O’Connor.

A focused search for articles was also carried out in journals which were found to publish most of the studies on the subject. These journals are Climatic Change, Global Environmental Change, Risk Analysis and Public Understanding of Science. In addition, articles were looked up in the references and citations of core studies.

A search for local studies was also undertaken in the Library catalogue of the University of Malta. There are two local dissertations which study Maltese public perceptions and policy on climate change (Zammit, 2008; Refalo, 2008). None of the two studies focus on the Maltese public perceptions of climate change and health.

Social surveys including global warming or climate change items surfaced in the early 1980s and full blown interest emerged in the late 1980s (Bord, et al., 1998). To date, most of the research on public perceptions of climate change has been carried out in the United States (e.g. Bord, et al., 1997, 1998, 2000; Leiserowitz, et al., 2003, 2005, 2006) and in Britain (Lorenzoni, et al., 2006, 2007; Bickerstaff, 2008). However, there have also been a number of Eurobarometer surveys on citizens of the Member States of
the European Union and some global surveys comparing public’s views between different countries (Brechin, 2003).

There are very few studies on the public perceptions of the effects of climate change on health (Leiserowitz, 2006, Bord, et al., 1998, 2000).

2.1 Awareness and salience

2.1.1 Awareness

Research shows that large majorities of the public are aware of climate change or global warming. Studies show that 92% and 99% of the American and English public respectively heard about ‘climate change’, ‘global warming’ or the ‘greenhouse effect’ (Leiserowitz, 2003; DEFRA, 2002). In addition, 91% of Britons believe that the climate is changing (Pidgeon, et al., 2008).

2.1.2 Climate change as a problem

At first glance, many people seem to view climate change as a serious problem. In Leiserowitz’s 2003 study, 76% of Americans state they view climate change as a somewhat serious to very serious problem. More than 65% of the surveyed populations in 13 out of 24 nations participating in the 1992 Gallup Health of the Planet (HOP) survey indicated that they feel global warming is a serious or somewhat serious issue (Brechin, 2003, p. 109). Similarly, a recent Eurobarometer survey on Europeans’ attitudes towards climate change found that when compared to other worldwide problems, Europeans feel that climate change is the second most important global problem facing the world today after “poverty, the lack of food and drinking water” (TNS Opinion and Social, 2008). Again, 64% of the Maltese public, a slightly higher
Chapter 2: Literature review

percentage than the European\textsuperscript{2} average (62%), feel that climate change is one of the most serious problems our world faces today.

Although findings of apparently high importance given to climate change as a problem are consistent in many studies, this importance seems to disappear when climate change is compared to other environmental and social problems. Dunlap (1994) states that, when compared to other environmental issues, climate change was still considered by the public as an important environmental problem, but less than air pollution, water pollution, loss of rain forest, loss of ozone, loss of species and contaminated soil. In the 1992 Gallup Health of the Planet (HOP) survey, climate change ranked ninth out of ten environmental issues in importance (Brechin, 2003) and in Wirthlin’s group national survey (1995) twelfth of thirteen environmental issues (The Wirthlin Group, 1995).

When asked an open-ended question about the single most important problem facing the United States today, all environmental issues were eclipsed by social concerns (The Wirthlin Group, 1995) such as health, family, finances and crime. Two UK surveys undertaken in 2004 indicate that although people rate global warming as the most important environmental issue for the world, they see terrorism and domestic issues as having a higher priority (Norton and Leaman, 2004; Kirby, 2004).

2.1.3 Salience

Researchers argue that climate change lacks ‘issue salience’ i.e. it is not something people regularly ponder and worry about (Bord, et al., 1998). This is one of European in this context refers to the Member States of the EU27 together with the candidate countries Croatia, Turkey and the Former Yugoslav Republic of Macedonia.
the main reasons why the public has not yet reached a state of 'engagement'\textsuperscript{3} with the issue of climate change. People state they are concerned about climate change, but, in the context of other issues, even many environmental issues, climate change takes a low priority (Dunlap and Saad, 2001; Poortinga and Pidgeon, 2003; Bord, et al., 1998, 2000; OST and MORI, 2004). In England, disposal of hazardous waste, livestock methods/BSE, water and air pollution, loss of plants/animals, tropical forest destruction and ozone depletion are rated more concerning than climate change (DEFRA 2002).

In addition, the public feels that personal goals (e.g. income and marriage) and social goals (e.g. crime reduction and improving schools) take precedence over other issues. Health, security, employment and crime are all perceived as more important than environmental issues to the public (Nortan and Leaman, 2004; Poortinga and Pidgeon, 2003; MORI, 2005; Bord, et al., 2000). Thus, climate change, compared with other societal, personal and environmental risks, winds up at the bottom of a list of concerns (Bord, et al., 1997, 1998, 2000).

Eiser (2004) and Lorenzoni et al. (2007) argue that climate change is salient for only a minority of individuals because there is a "lack of a directly experienced link between the causes of climate change and its consequences" (Eiser, 2004) and that this may be creating a false impression that activities which lead to dangerous outcomes are in fact safe. Other researchers also argue that climate change is overshadowed by other events which are more directly experienced in everyday life (Höhle, 2002, p.117; Lorenzoni and Pidgeon, 2006). When risks are perceived as being removed from daily life, the danger is seen as distant in space and time, and personal concern and action

\textsuperscript{3} The term 'engagement' is defined by Lorenzoni et al. (2007) as a personal state of connection with the issue of climate change, concurrently comprising cognitive, affective and behavioural aspects.
seem to be increasingly futile (Bulkeley, 2000). Thus, the general view is that until such time that climate change becomes salient in people’s lives, the public will never reach a state of ‘engagement’ with the issue of climate change and will thus find it very difficult to take effective behavioural climate change mitigation action (Lorenzoni, et al., 2007).

2.1.3.1 Complex phenomenon

Another reason why climate change lacks issue salience is that climate change is a complex phenomenon characterised by great uncertainty, even for those bearing the ‘expert’ label (Bord, et al., 2000; Kempton, 1993; Berk & Schulman, 1995). It is generally difficult for people to conceptualise climate change and relate it to their daily activities (Ungar, 2000; Bostrom, et al., 1994; Kempton, 1997).

2.1.3.2 Long lags

Climate change is characterised by long lags between changes in the emission of CO₂ and detectable changes in the weather. (Bord, et al., 2000) Since most people equate ‘the future’ with 10 years from now, images of the future become unclear when considering 15-20 years from now (Tonn, et al., 2006).

2.1.4 Concern

Research shows that, in general, the public is somewhat concerned about climate change (Leiserowitz, 2006, in the US; DEFRA, 2002, in England; Bord, et al., 1998, worldwide view) and to a certain extent, concern about climate change has increased over the past two decades (Thompson and Rayner, 1998; DEFRA, 2002) especially since 2003 (Globescan, 2006). Concern tends to be highest in Canada, most of Europe and South America (Bord, et al., 1998). However, it is also generally assumed that
surveys overstate respondent concern (Sterngold, et al., 1994) and, when compared to other issues, climate change is secondary in relation to other environmental, personal and social issues including health, family, safety and finances (Poortinga and Pidgeon, 2003a). Bord et al. (1997) also argue that people show more concern towards issues that are directly related to health and well being than issues that are ambiguous, complex and whose relation to health is indirect.

2.1.4.1 Concern variation with time

Concern tends to wax and wane with time, especially in relation to weather fluctuations and media attention (Pidgeon, et al., 2003; Kasperon & Kasperon, 2005). Ungar (1992) has demonstrated peaks in public concern during hot, dry summers while Krosnick (1997) has shown an increase in climate change concern after media coverage of the 1997 Kyoto conference on global climate change.

2.2 Knowledge

2.2.1 Importance of accurate knowledge

In the literature, knowledge 4 about climate change has been presented as an important factor in determining willingness to support climate change mitigation policy and behavioural intentions towards reducing greenhouse gas emissions from one’s lifestyle. While there is no doubt that accurate knowledge about climate change has been repeatedly scientifically proven to be a strong predictor of support for policy and behavioural intentions (Bord, et al., 1998, 2000; Read, et al., 1994; Kempton, 1997), a number of studies carried out in the last decade argue that knowledge and the provision of tailored information, though important, are not enough to engage the public into

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4 In the literature, knowledge about climate change is taken to mean knowledge about the causes/contributors of climate change
action (Leiserowitz, 2006; Lorenzoni, et al., 2007; Lorenzoni & Pidgeon, 2006; Bulkeley, 2000). As will be shown in Section 2.6.1, there are a number of factors, besides knowledge and information provision, which must be in place before public intentions translate into action towards climate change mitigation behaviour.

Nevertheless, accurate knowledge about the contributors of climate change is important because, as Stern et al. (1999), Baldassare and Katz (1992) and Bostrom et al. (1994) maintain, people who do not know that greenhouse gas emissions cause global warming and what releases greenhouse gas emissions, are unable to take decisions that reduce greenhouse gas emissions. Thus, even though knowledge may not be enough to prompt action, accurate knowledge about the causes of climate change should serve as a baseline for the public to distinguish between effective and ineffective strategies. As is argued by Bord et al. (2000), responsible decision-making requires at least some minimal knowledge of cause and effect, and effective public education on global warming, and other environmental threats, is essential.

2.2.2 Misunderstandings about climate change

Unfortunately, the vast majority of studies which have been conducted to date show that the public lacks a clear understanding of the human contributions of climate change (Kempton, 1991, 1993; Kempton, et al., 1995; Dunlap, 1998 – 1992 Gallup survey of laypeople in Canada, USA, Mexico, Brazil and Portugal; Lorenzoni, 2003 – Italy and UK; Brechin, 2003). Misunderstandings persist worldwide and mainly include confusion with ozone depletion, confounding with air pollution and the perception that climate change is part of an umbrella of environmental issues without being seen as distinct. The only study that comments favourably on the public’s level of knowledge on the contributors of climate change is that by Pidgeon et al. (2008), which states that
unprompted, the British public could identify one or two correct causes of climate change. Despite this, a good percentage of respondents still confounded air pollution (39%) and ozone depletion (19%) with the causes of climate change.

Widespread confusion between ozone depletion and climate change is persistent in a lot of studies (Bickerstaff, et al., 2004; Lowe, et al., 2005; Dunlap, 1998; Brechin, 2003; Hargreaves, et al., 2003; DEFRA, 2002; Kirby, 2003; Poortinga, et al., 2006). Apparently many people see climate change and ozone depletion (known as 'the ozone hole' by the lay person) as part of the same process (Bord, et al., 1998) when in actual fact they are two separate ecological processes. Consequently, people assimilate information on climate change into pre-existing mental models of ozone depletion (Kempton, et al., 1995), confusing the causes and effects of ozone depletion with the causes and effects of climate change. For example, many studies have found that respondents wrongly think that banning aerosol sprays slows down climate change (Bord, et al., 1998). Others confound the health effects of the 'ozone hole', such as skin cancer, with the health effects of climate change (Bostrom, et al., 1994).

The public also confuses climate change with air pollution (Pidgeon, et al., 2008; Brechin, 2003). It was argued for some time that since climate change and air pollution share similar causes (e.g. motor vehicle transport, emissions from electricity plants), people who are aware and concerned about air pollution may be equally aware and concerned about climate change, and thus raising awareness about air pollution would automatically make climate change more salient. This hypothesis was dropped when it was scientifically proven that the air pollution framework has little explanatory power for behavioural intentions in multivariate analysis including knowledge, risk perceptions and general environmental beliefs (Bord, et al., 2000). In addition, the role
of motor vehicle transport and the use of coal and oil by utility and electric companies are still poorly seen as major contributors to climate change (O’Connor, et al., 2002; Bord, et al., 2000). The association between the use of electricity at home (e.g. through use of appliances, heating or cooling homes, refrigerators, air conditioners) and climate change is also very poorly linked (O’Connor, et al., 2002; Bord, et al., 1998, 2000).

In addition, very few people accurately identify the burning of fossil fuels as the primary contributor to climate change. This is witnessed by an international study about knowledge on global warming, where, in 1999, Finland led the other twenty-six countries with just 17% of its respondents correctly identifying burning fossil fuels as the primary cause of global warming. The same study was repeated in 2001, and again Mexico led all fifteen countries surveyed with just 26% of the survey respondents correctly identifying burning fossil fuels as the primary cause of global warming (Brechin, 2003). These findings are consistent with other studies such as that by O’Connor et al. (2002) who finds that 51% of respondents think that the use of coal and oil by electric companies is not a major cause of climate change.

Lack of knowledge about climate change is also accompanied by a general sense of denial or scepticism. This has been demonstrated in the 2008 Eurobarometer survey on European’s attitudes towards climate change where 26-31% of Europeans think that “the seriousness of climate change has been exaggerated”, “CO₂ emissions have only a marginal impact on climate change”, and that “climate change is unstoppable and we can do nothing about it” (TNS Opinion and Social, 2008, p. 23). In this survey, Malta had one of the highest rate of respondents (30%) stating “don’t know” for the statement “emission of CO₂ has only a marginal impact on climate change” which indicates that a substantial percentage of Maltese respondents lack the knowledge to form an opinion.
Moreover, 43% of Maltese respondents declared that they would like to take action but do not know what they can do to fight climate change (EU27 average was 34%) (TNS Opinion and Social, 2008).

2.3 Perceived risk to health

Risk perception is defined by Slovic (2000) as public perceptions which are “influenced not only by scientific and technical descriptions of danger, but also by a variety of psychological and social factors, including personal experience, affect and emotion, imagery, trust, values and worldviews” (Leiserowitz, 2006, p.46). Social scientists give a lot of importance to risk perception, as they believe that behavioural intentions are not only guided by knowledge but more importantly by concern, affect (emotions) and the perception of danger. As Leiserowitz (2006, p. 45) puts it, “public support or opposition to climate policies will be greatly influenced by public perceptions of the risks and dangers posed by global climate change.”

2.3.1 Distant threat

It is evident from the literature that the public perceives climate change as a distant threat in space (i.e. to geographically distant places) and time (i.e. future generations or 50 years time) (Leiserowitz, 2005, 2006; Lorenzoni & Pidgeon, 2006; Lorenzoni, et al., 2007; Bord, et al., 1998; Norton and Leaman, 2004; DEFRA, 2002). This is evident from studies in the United States, United Kingdom and Germany amongst others; 50% of Americans think that climate change will affect people all over the world whereas only 13% were concerned about the impacts on themselves or their families (Leiserowitz, 2006). In the UK, 52% of people were found to believe that climate change will have ‘little’ or ‘no effect’ on them personally (Kirby, 2004).
However, 85% of 321 respondents in a survey by Bickerstaff et al. (2008) view climate change as posing risks to future generations.

Furthermore, climate change is not perceived as a personal threat, and negative outcomes for others are judged as more likely than negative outcomes for the respondent (Bord, et al., 1998; Zwick & Renn, 2002; Lorenzoni, 2003). When asked about the effects of climate change on worldwide standards of living, water shortages and rates of serious disease, the American public feels that these effects are somewhat likely and that the impacts will be more pronounced on non-human nature. Importantly, however, they were less concerned about local impacts, rating these as somewhat unlikely (Leiserowitz, 2006). These findings are consistent with the previous study of Bord et al. (1998) who finds that respondents perceive little threat from climate change to their standards of living and to their health.

A qualitative study by Bickerstaff et al. (2004) indicates that even individuals in localities that are proximal and potentially vulnerable to the effects of climate change, had difficulties relating the impacts of climate change to their local area or day-to-day life. However, these findings are contrasted with those of Brody et al. (2008), who find that people who live on higher ground and farther away from the coast perceive a significant lower risk from climate change ($p<0.05$). Nevertheless, personal risk perceptions on climate change remain relatively low when compared to perception of risk to people living in distant countries.

2.3.2 Reasons behind low personal risk perceptions

The reasons behind these low personal risk perceptions of climate change could be related to the fact that global climate change is far removed from the public’s direct
experience (Bord, et al., 1998). People perceive heart disease, cancer and car accidents to be more personally relevant and more personally threatening than climate change (Bord, et al., 1998). Höhle (2002, p. 117) observes that among German interviewees, climate change has “a lower cognitive presence” as it is overshadowed by other events that are more directly experienced in everyday life. Leiserowitz (2003) agrees with this analysis when he states that there are higher-ranking national issues (e.g. the economy, education, and healthcare) and environmental issues (clean air, clean water) which are more easily understood and have more direct local relevance to the public.

Lorenzoni and Pidgeon (2006, p. 82) further suggest that an individual’s downplaying of a certain risk to him/herself, while recognising its relevance to society overall, could be interpreted as “a manifestation of a personal denial about direct effects and, more importantly, dissociation from any personal involvement in possible solutions”. On the other hand, some researchers maintain that the scientific community acknowledges the reality that the risks of climate change will be unequally distributed (IPCC, 2007). Thus, the public is justified in believing that developing countries – generally perceived to be more vulnerable or less adaptable to the consequences of climate change – or future generations are at higher risk (Bickerstaff, et al., 2004; Höhle, 2002).

2.3.3 Affect

Despite all this, climate change continues to lack issue salience among the public and, as discussed, is perceived more as a threat to others than to oneself. After showing how affective imagery influences risk perception and support for national climate policies, Lorenzoni (2006) argues that the reason for the lack of issue salience is
a lack of affective imagery\textsuperscript{5}. Bickerstaff et al. (2008) second this argument by stating that climate change lacks a deeply affective cultural imagery – which had the effect of keeping risks materially and culturally remote.

2.4 Knowledge about the health effects

There is very little literature about knowledge on the health effects of climate change. In addition, social research on climate change risk perceptions, which included health, was mostly focused on the American public (Leiserowitz, 2003, 2005, 2006; O'Connor, 2002). Research including health items, however, has dealt more with the broad effects of climate change on health (e.g. people dying or becoming ill) than with the specific effects on health (e.g. vector-borne diseases such as Dengue fever, diarrhoea from Salmonellosis, air pollution related health effects such as asthmatic attacks, dehydration, and cardiac events and increased mortality from heatwaves).

More importantly, people do not see health as central in the climate change issue, rather they see climate change as an ecological concern. In Leiserowitz's (2006) study, when asked to mention any 'images' that came to their mind when they heard the words 'climate change' or 'global warming', the respondents made no associations between the impacts of climate change and its effects on human health. Apart from this, there were no associations with temperature-related morbidity and mortality, health effects of extreme weather events, air pollution health effects, water- and food-borne disease, or vector-borne disease, all of which are potential health consequences of

\textsuperscript{5} Imagery refers to all forms of mental representation or cognitive content. Images include both perceptual representations (pictures, sounds, smells) and symbolic representations (words, numbers, symbols) (Damasio 1999:317-21). Affective images are thus "broadly construed to include sights, sounds, smells, ideas, and words, to which positive and negative affect or feeling states have become attached through learning and experience" (Slovic, et al. 1998:3).
global climate change. On a more general note, Americans said that current deaths and injuries due to global warming number in the hundreds, and in 50 years’ time will number in the thousands (Leiserowitz, 2003, p.128). Science and research, however, show that climate change is estimated to have already resulted in tens of thousands of deaths today, and is projected to result in the death of tens of millions of people worldwide in the future (Costello, et al., 2009). It is perhaps even more significant that 38-41% of respondents selected ‘don’t know’ when asked about deaths and injuries due to global warming in the present and in 50 years’ time – by far the dominant response. This is another strong indication that Americans do not currently perceive global warming as a grave danger to human health either now or in the future (Leiserowitz, 2006).

However, O’Connor (2002) and Leiserowitz (2003) both demonstrated, that those people who expect climate change to lower standards of living, bring more disease and cause food or water shortages, are more willing to sacrifice to reduce emissions than are people who think such problems are unlikely even if climate change occurs.

2.5 Willingness to support national climate change mitigation policy

Very often, the aim of social research on public risk perceptions, knowledge, affect and concern on climate change is carried out to determine the reasons why the public is willing or not willing to support national climate change mitigation policy or to take measures that would result in less greenhouse gas emissions.

In general, literature shows that people are willing to support initiatives that mitigate climate change, as long as these initiatives do not have a significant impact on
individual lifestyles. Thus, studies show that the public is willing to support incentives and technological solutions but is much more reluctant or outright opposes mitigation policy in the form of tax, gasoline tax, business energy tax or higher electricity bills i.e. initiatives that threaten car use or home heating and cooling options among other things (Bord, et al., 1998; Kempton, et al., 1995; Doble, et al., 1990; Leiserowitz, 2006; Shackley, et al., 2004; Kasemir, et al., 2003a; O’Connor, et al., 1999). In Leiserowitz’s (2006) survey among the American public, 78% opposed a gasoline tax and 60% opposed a business energy tax to reduce greenhouse gas emissions.

People who do not consider the climate change issue as a very serious societal or ecological problem, or, more importantly, one affecting them personally, are unlikely to support initiatives addressing climate change (Lorenzoni & Pidgeon, 2006). Bord et al. (1998) argue that concern for global warming will still translate into some form of support for policy initiatives, but, rather than support, they argue, there will be “absence of opposition to initiatives that are not perceived to have significant impact on individual lifestyles”.

Studies also show that those people who have an accurate understanding of climate change are more willing to support initiatives that mitigate global climate change (Kempton, et al., 1995; Bord, et al., 1998) and O’Connor et al. (2002) demonstrate that cognitive explanations of support for reducing greenhouse gas emissions are significant and even more powerful than economic ones. People who can accurately identify the causes of climate change and who expect bad consequences from climate change (i.e. perceive climate change as a threat to health and well being) are more likely to support government anti-fossil fuel initiatives and take voluntary actions (O’Connor, et al., 1999, 2002). However, this view counts as long as they think climate
change mitigation policies will not cost them their jobs (O’ Connor, et al., 2002) or significantly affect their lifestyle.

Public risk perceptions and policy support, in turn, are strongly influenced by experiential factors; including affect, imagery, and values (Leiserowitz, 2006). This demonstrates that public responses to climate change are influenced by both psychological and socio-cultural factors. Leiserowitz (2006) argues that simply providing more detailed and accurate information, while important, is not sufficient to generate appropriate public concern for some risks. Efforts that have traditionally concentrated on the provision of scientifically sound information as a means to educate the public, change behaviour and gain support for policy (Eden, 1996) may not be enough (Bulkeley, 2000). Interpretations of scientific data and analysis by the public are mediated by societal values, personal experience and other contextual factors (Sturgis & Allum, 2004; Irwin & Wynne, 1996), and these must be taken seriously into account.

Interestingly, the findings of a global poll on 18,758 respondents in 2009 (WorldPublicOpinion, 2009) shows that an average of 73% of respondents in the largest 19 countries across the world want higher priority for climate change. The people in fifteen countries think that their government should give more priority to measures addressing climate change than it does currently.

In contrast, in a recent Eurobarometer survey (TNS Opinion and Social, 2008), the Maltese public has been criticised that it lacks the knowledge to decide whether a 20% reduction in greenhouse gas emissions for the European Union is an ‘ambitious target’, ‘about right’ or ‘too modest’. 40% of Maltese respondents (second only to Bulgaria) did not have an opinion.
2.6 Willingness to change behaviour so as to contribute less to greenhouse gases

A very important difference must be drawn between climate change and other global environmental issues, such as ozone depletion and acid rain. Ozone depletion and acid rain demanded technological innovation and regulation while requiring little public engagement (Lorenzoni, et al., 2007). Conversely, climate change is largely the product of lifestyle and therefore, in addition to technology and regulation, it also requires the public’s commitment to change lifestyle to one that is less carbon-intensive in order to tackle climate change. Changing or influencing behaviour is one of the greatest challenges of any public health strategy (e.g. literature by Ajzen and Fishbein, the Health Belief Model). This challenge applies first and foremost to salient issues which have a direct impact on health (such as quitting smoking and a healthy diet in the case of cardiovascular disease and cancer, and physical activity in the case of obesity), but is even of a greater challenge to issues which are not perceived as salient by the public, such as climate change (Fischer, et al., 1991).

Engagement of the public in the issue of climate change is essential. Failure to get the public on board to support climate change mitigation policy and change behaviour might dangerously result in the failure to reduce global greenhouse gas emissions. Most studies in the literature have focused on the public’s willingness to change behaviour rather than actual behavioural change and relationships between demographic variables, concern, affect, knowledge, perceived risk and willingness to take behavioural mitigation action have been studied in substantial depth. Only some studies focus on the reasons why willingness to change behaviour does not translate into actual behavioural change and the barriers that individuals perceive in engaging in the climate change issue (Lorenzoni & Pidgeon, 2006; Lorenzoni, et al., 2007).
Chapter 2: Literature review

Literature shows that the public is generally neither in favour of, nor against, taking action. By and large, many people declare that they are willing to take up measures that would decrease greenhouse gas emissions as long as these measures could be easily undertaken in the home, cost nothing or close to nothing, and do not decrease comfort (Kirby, 2004; Bord, et al., 2000). Kirby (2004) states that 92-96% of British respondents who were willing to change behaviour, were willing to start recycling and use less energy. However many were reluctant to reduce their private transport. These findings are consistent with findings in the United States – Americans are willing to avoid buying a fuel inefficient car, install more insulation in the home and replace inefficient appliances. However, they are not ready to volunteer to drive less or to use less air conditioning or heating, depending on the season (Bord, et al., 2000).

A recent Eurobarometer survey shows that a majority of Europeans (61%) agree to have taken actions aimed at helping fight climate change. Again, these actions mostly translated into those “that normally require the least personal and financial effort: waste separation and reducing the consumption of energy, water and disposable items” (TNS Opinion and Social, 2008, p.62). Despite this, the public may be willing to invest money in measures that would render financial savings in the long term. This is demonstrated in a study among residents of Pennsylvania (O’Connor, et al., 2002) where between 40 and 60 percent of respondents expressed a willingness to take voluntary actions that would save money; such as buying efficient appliances, water heaters, and lighting and adjusting the thermostat in ways to reduce the energy bill.

Who is willing to take action? Literature shows that people who expect climate change to lower the standard of living, bring more disease, and cause food shortages are more willing to make sacrifices so as to reduce emissions than are people who think
such problems are unlikely (O’Connor, et al., 2002). Another survey finds that of the minority of people who conserve energy, most do so for financial and health reasons rather than for environmental ones (DEFRA, 2002). This forms a basis for the argument that climate change should be framed more as a health concern rather than as an environmental concern, and that health should be more strongly emphasised “as a justification for action against climate change” (Kovats, 2005).

2.6.1 Reasons behind inaction

Many people refuse to take action against climate change for a number of reasons. On one side, there are qualitative studies that show that people do articulate their “moral obligation towards society in relation to climate change, recognize their responsibility for personal actions and acknowledge the failure to enact those actions” (Bickerstaff, 2004). On the other side, there are many people who deny climate change or who believe that their contribution towards mitigating climate change comes at too high a cost for them to make a difference. In a 2004 British survey, 46% of respondents stated that changes to their own personal behaviour would not reduce the impact of climate change (Kirby, 2004).

Lorenzoni, et al. (2007) argue that the reasons why the public is not yet fully engaged in the issue of climate change and supportive towards policy and behavioural change, lie in a number of perceived barriers which deter the public from doing so. These barriers consist of individual barriers (e.g. lack of knowledge) and social barriers (e.g. lack of political action). Individual barriers consist mainly in a lack of a correct understanding of climate change, uncertainty and scepticism, distrust in information providers, climate change as a distant threat, reluctance to change lifestyle and a feeling
of helplessness due to the global scale of the problem. Social issues consisted of lack of political action, lack of action by businesses, worry about the 'free-rider' effect (refraining from taking interest or action because no one else is), social norms and expectations, and lack of enabling initiatives.

A perceived unavailability of efficient and accessible public transport, in addition to the convenience and habitual use of a car (Bamberg & Schmidt, 2003; Verplanken, et al., 1997), were cited by respondents in Lorenzoni et al.'s study (2007) as reasons for continuing to use this form of transport. Participants often maintained that their behaviour was constrained by the lack of enabling infrastructures and mechanisms e.g. lack of affordable and reliable public transport, higher prices of environmentally-friendly goods, design of the built environment encouraging car use, lack of disincentives to pollute (e.g. higher car tax for bigger cars), and so on.

The findings in Lorenzoni et al.'s study (2007) are also found in previous studies. For example, social identity has been shown to be an important influence on people's energy use (Layton, et al., 1993; Steg, et al., 2001). Knowledge, in addition to concern, is important for people to be willing to act (O'Connor, et al., 1999). Climate change is seen as a distant threat and thus, benefits associated with current lifestyles are sometimes felt to outweigh, on a personal level, the possible risks of climate change (Poortinga & Pidgeon, 2003a). Jackson (2005) argues that the very prospect of having to change one's lifestyle, even when these may be, overall, more beneficial to the individual and to the environment, is in and of itself a barrier to taking action on climate change.
A Eurobarometer survey has shown that the Maltese are willing to take action to fight climate change. Malta had one of the highest percentages of respondents who believed that changing their behaviour would have an impact on climate change. However, 43% of respondents in the survey (EU average 34%), declared that they would like to take action but do not know what they can do to fight climate change (TNS Opinion and Social, 2008).
Chapter 3: Materials and Methods

3.1 Research Design

An observational cross-sectional design was chosen for the study to gain more information about the research topic. No hypotheses were being tested.

3.1.1 Research method

A telephone survey was chosen over other forms of data collection methods. The main reason behind this decision was that in telephone surveys data is collected over a relatively short period when compared to face-to-face interview surveys. On the other hand, telephone surveys, unlike postal mail surveys, include both the literate and illiterate sectors of the population. This was particularly important for the research topic under study, since climate change calls for a contribution by all – literate and illiterate – and so the perceptions of both groups were important.

Telephone surveys, unlike mail surveys, allow for opinion probing. Although the research design was primarily quantitative, this characteristic of telephone surveys emerged to be a very good source of qualitative information as, many times, respondents justified (and/or further elaborated) their answer to the closed-ended questions with a short explanation of their choice. These short narratives were jotted down during the questionnaire and analysed in detail later to interpret the quantitative results. This proved to be an excellent way to triangulate results.

Thirdly, telephone surveys yield high response rates in Malta with attrition rates as low as 10% (Borg & Vella, 2007). In addition, telephone surveys include respondents
who may be disinterested in the research topic; these are less likely to refuse to participate in a telephone survey whereas they are more likely to ignore a postal questionnaire.

Lastly, climate change is not a sensitive topic and thus anonymity was not mandatory. Also, from a budgetary point of view, telephone calls on landlines in Malta are relatively inexpensive at €0.023 cents per minute.

3.1.2 Target population

The population under study was the Maltese resident population over the age of 18 years. As at 31st December 2008 this stood at 310,819 (NSO, Malta, 2009a). The Maltese population is distributed over two islands – Malta and Gozo. Both islands were included in the study.

3.1.3 Sampling

The sampling frame used for the study was the March 2008 Electoral Register. The choice of sampling frames was between the Census Register (2005), the 2004 Telephone Directory and the March 2008 Electoral Register. The Census Register could not be used, as the Census Act (1948) prohibits the use of information collected during the Census process for research purposes.

The 2004 Telephone Directory was found to be inappropriate after the pilot study showed that random sampling taken from this sampling frame was not representative of the population. On the other hand, the Electoral Register was the most

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6 Maltese resident: any person who is a Maltese national and is residing in Malta (at least 6 months).
up-to-date register at the time of the study. It is a public domain register that is based on the Census Register (2005) and maintained by regular updates from various auxiliary sources by the Electoral Office.

The type of sample chosen for the study was a representative stratified random sample of the population which was stratified by gender (male, female), age group (18-24, 25-34, 35-44, 45-54, 44-64, 65-74, 75+) and district (Southern Harbour, Northern Harbour, South Eastern, Western, Northern, Gozo). The subgroups were weighted according to their representation in the population.

The minimum sample size required for the study was calculated to be 384 participants using the following criteria:

- Population size: 310,819 (NSO, Malta, 2009)
- Power: 80%
- Confidence intervals: 5%
- Confidence level: 0.05

The sample was eventually inflated to 800 participants following analysis of the results of the pilot study, which found that:

- a number of participants did not have an available contact number thus making them untraceable; and
- a substantial number of participants had never heard of the terms ‘climate change’ or ‘global warming’ before and thus could not answer all the questions in the questionnaire.
3.2 The Research Tool - Questionnaire

The process of devising the research tool for the study was a laborious multi-step process which included:

- Requesting permission to use a previously validated questionnaire
- Adapting the research tool to the objectives of the study
- Adapting the research tool to a telephone survey methodology
- Adapting the research tool to the local circumstances
- Testing items of the research tool in a focus group
- Continuous peer review by experts in the fields of public health, environmental health, climate change, medical statistics and the social sciences
- Piloting the questionnaire

The questionnaire used as the basis for this study was authored by Dr Anthony Leiserowitz (2006) (Appendix E). Dr Leiserowitz is the author of many studies on climate change risk perceptions among the American public. His research tool has already undergone reliability and validity testing\(^7\). In fact, the tool was found to produce repeatable results as determined by fielding these items in two national surveys conducted a couple of weeks apart with no statistically significant difference between the results on each item.

A number of modifications were made to the research tool to tailor it to the objectives, methodology and local circumstances (Malta) of the present study.

Since the research tool in Leiserowitz’s (2006) study was intended for a postal mail survey, the questionnaire had to be modified to suit a telephone survey.

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\(^7\) Validity testing, here, refers to face validity and content validity. Predictive validity was not tested as the aim of the research tool was not to be the standard measure of climate change policy preferences and behaviours, but to look for relationships between independent and dependent variables.
Chapter 3: Materials and Methods

Additionally, one question (question number 14) was adopted from another study of O’Connor et al., (2002) since the researcher felt that this item was more appropriate for a telephone survey.

Another item asking the question “How concerned are you about climate change” was split into two items asking first “Are you concerned about climate change?” (Question number 4) and then “If yes, how concerned are you about climate change?” (Question number 5). This was done to avoid overestimating public concern, which, as Sterngold et al. (1994) argue, is a common pitfall of many surveys.

A question on knowledge about the human health effects of climate change (Question number 11) was introduced for the first time. This question was discussed in a focus group to study the level of knowledge they have about the human health effects of climate change and any possible misconceptions and misunderstandings. Feedback from the focus group was then used to design the question.

Other questions were also discussed in the focus group so as to cater for cultural variation in perceptions between the American and the Maltese public. One example of this was the perception among the Maltese respondents that the Maghtab\textsuperscript{8} landfill is a contributor of climate change. This was understandably not present in the American questionnaire.

All modifications in the research tool were reviewed with a number of experts in the field of public health, environmental health, climate change, medical statistics and social research. Many times this led to multiple revisions of the research tool.

\textsuperscript{8} The Maghtab landfill is one of the biggest landfills in Malta and has grown the size of a small hill.
Chapter 3: Materials and Methods

The questionnaire was also translated from English to Maltese by the author of the study and back translated from Maltese to English by a professional translator. The translated English version was compared with the original version, discussed and the necessary amendments were carried out to produce one correct Maltese version. Since Malta has two official languages – Maltese and English – questionnaires were offered to the respondents in both languages.

Finally, the research tool was piloted to check for flow, length, clarity and respondent cooperation and attention. Few modifications were made to the research tool after the pilot study. An example of this is the modification of item 8a from “Do you think people can become ill or get injured because of climate change?” to “Do you think people can become ill because of climate change?” This was done as some respondents complained that they had different answers for people becoming ill and for people getting injured, making it impossible for them to answer the question with a simple “Yes” or “No”.

3.3 Focus group

A focus group was held at the Department of Health Information and Research on the 7th November 2008 between 10.00am and 11.00am. Ten participants were selected from among employees of the Department of Health Information and Research through convenience sampling. A good mix of age, gender and occupational background was ensured. Ages ranged from 22 to 60 years with a mean age of 43 years, including seven females and three males. Occupations included a receptionist, a data inputter, two nurses, three IT personnel, a research officer, an administrator and one support staff worker. The focus group was moderated by the author of the study. The discussion was recorded on a tape-recorder (which was subsequently transcribed) and points were taken separately by a rapporteur. A public health specialist was also present as an observer to provide advice where necessary.

The focus group was held for three reasons:

1) To introduce a question on the public's level of knowledge about the human health effects of climate change.
2) To make questions more applicable to the local scenario.
3) To obtain qualitative information on the knowledge of the Maltese public on climate change and its effects on human health, and the extent to which they would support climate change mitigation policy and change their behaviour to reduce greenhouse gas emissions. Data from the focus group also proved to be a rich source of qualitative information, which was used to substantiate quantitative findings thereby providing a degree of triangulation to the study.
3.4 Pilot study

A pilot study was carried out between the 17th and the 28th of November 2008 to:

1) Assess the overall feasibility of the study design
2) Test the adequacy of the research instrument
3) Establish whether the sampling frame was effective
4) Identify logistical problems
5) Estimate variability in outcomes (which in turn affects sample size)
6) Collect preliminary data
7) Determine whether resources were adequate for the main study (Gilbert, 2001).

Overall, the study design worked out well and was feasible. The research instrument was adequate and required only minor changes after the pilot study.

3.4.1 Results of the pilot study

A random sample of 37 households was taken from the 2004 Telephone Directory. Of these, 26 were traceable and 22 participated in the survey thereby achieving a response rate of 85% (n=26). Dillman’s last birthday method⁹ was used to randomise individuals within the household (Dillman, 2000). Of the 22 who responded to the survey, 15 were females and 7 were males. Twelve of the respondents were older than 55 years of age. This clearly showed that random sampling from the Telephone Directory provided a preponderance of females and older individuals, and this was the reason why the 2004 Telephone Directory was not taken as the sampling frame for the study (See Section 3.1.3).

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⁹ Last birthday method: person in the household who had his birthday last participates in the survey. This is a form of randomization of persons within a household.
The pilot study revealed that the respondents complied very satisfactorily and participated willingly in the study. There were no problems with questionnaire length, flow or clarity. One question was found by respondents to be misleading and had to be modified (See Section 3.2).

The questionnaire was designed to take between 8 and 10 minutes. However, questionnaires took between 15 and 20 minutes to be completed. This was because many respondents felt the need to give a rationale to their answers and this prolonged the interview. Nevertheless, explanations were greatly encouraged as this gave meaning to closed-ended questions and was a source of qualitative data. However, this also meant that with 800 interviews to complete, the fieldwork of the study would have taken several months to complete with one interviewer, which was not desirable, as literature shows that respondent concern about climate change changes with time (Ungar, 1992; Krosnick, 1997). It is also desirable in a cross-sectional study that the ‘snapshot’ of the survey is as sharp as possible i.e. taken in the shortest time possible. For this reason, following the pilot study, it was decided that another interviewer should be recruited and trained to assist in the fieldwork of the main study.

The interviewer chosen for the survey was a 46-year old female, housewife, with a post-secondary level of education. She had no formal knowledge of climate change. Training consisted mainly in going through the questionnaire (question by question), asking if there were any difficulties in reading out the questions, and monitoring the first few questionnaires of the main fieldwork. No major difficulties were encountered. In the circumstance that a respondent needed clarification about a question, the guideline given was to re-read the question, and, if an answer was still not given, to skip the question.
Overall, the pilot study took 12 days to complete 22 questionnaires – the reason being that many participants did not answer the questionnaire the first time they were contacted but preferred being contacted at a later, more convenient day and time. Others were not at home and thus had to be contacted again later on in the week.

Five out of 22 (23%) participants had never heard of climate change. Consequently, these participants could not answer any subsequent questions related to climate change and the sample size had to be enlarged to ensure significance on each item.

### 3.4.2 Online Telephone Directory

The details of participants provided in the sample from the March 2008 Electoral Register did not include participants’ telephone numbers. Telephone numbers had to be looked up for each participant on the online telephone directories provided by Malta’s two main telephony providers (MCA, 2007). These online directories are updated regularly by the providers but do not provide telephone numbers of customers who opt to be ex-directory. The percentage of customers who opt to be ex-directory stands between 5.5% and 6%, an estimate communicated by the Senior Manager Communications of the larger telephony company.

In order to determine the feasibility of searching for telephone numbers on the online telephone directory, the search for telephone numbers of a representative sample of 100 individuals (again provided by NSO) was piloted. Both telephone and mobile numbers were looked up manually primarily by address but also by name and surname. Telephone and mobile numbers were found for 84% of individuals, the majority of which were telephone numbers.
Since approximately 6% were taken to be ex-directory and it is known that about 3% of the Maltese public in Malta do not own a fixed telephone line in Malta (Eurobarometer, 2007), there was no clear reason why the remaining 7% did not have an available online telephone number. Nevertheless, the percentage of the sample with available telephone numbers (84%) was demographically similar to the demographics of the population. Following the pilot study, the sample for the main study was inflated by a further 15–20% to account for those participants who did not have an online telephone number available.
3.5 Main study/Data collection

Ethical approval was granted from the University Research Ethics Committee (Appendix B). Data collection was carried out over a 7-week period between the 12th of January 2009 and the 28th of February 2009. In total, 543 questionnaires were completed through a telephone survey method by the author of the study and the trained interviewer. Figure 1 shows that most of the questionnaires were completed in the first 4 weeks of the fieldwork. The author of the study completed 352 (64.8%) questionnaires while the interviewer completed 191 (35.2%) questionnaires. The vast majority of respondents (97.4%) preferred to answer the questionnaire in Maltese.

![Figure 1: Number of questionnaires completed per week for the 7-week period of the study 12th January to 28th February 2009.](image)

Informed consent was obtained over the telephone. Participants were contacted on the days and times that were most convenient for them. A minimum of five attempts
during different days and on different times were carried out for each participant. After five failed attempts, the household was considered “empty” and the participant considered as untraceable. Therefore, by definition, an empty household is taken to be a household that does not respond to a minimum of five telephone call attempts on different days and at different times.
3.6 Data analysis/ Statistical Analysis

Data was inputted, validated and analysed using Microsoft Excel 2007 and SPSS 16.0. Content analysis was carried out for qualitative data collected through the open-ended question as will described in Chapter 3.6.1. Quantitative data was summarized by computing frequencies of demographic characteristics and dependent variables. Indices were constructed for a number of related items to summarise data and to study the relationship between different concepts.

3.6.1 Content Analysis

There is only one qualitative open-ended question in the questionnaire, the second one. Respondents who had heard of climate change or global warming were asked to mention any thoughts or images that came to their mind when they heard the terms 'climate change' or 'global warming'. This produced a rich dataset of over 1000 respondent images that took the form of either single word associations (e.g. "pollution") or short narrative statements. Content analysis was then performed reducing these responses into 31 categories, in the tradition of grounded theory, in which respondents’ images were coded into categories that represented shared meanings e.g. OZONE, POLLUTION. These categories are not always mutually exclusive. Thus, a respondent who said “car exhaust” ("dhahen tal-karozzi") was coded as both POLLUTION and TRANSPORT. A respondent who said “the weather is changing because of the ozone hole” ("qed jinbidel it-temp habba l-ozone") was coded as both WEATHER and OZONE.

POLLUTION: This category includes all references to air pollution, the causes of air pollution or the effects of air pollution. For example: “Pollution” ("Pollution").
“A lot of fumes” ("Hafna dhahen"). “Asthma” ("Aţţma"). “Car exhaust” ("Dhahen tal-karozzi").

OZONE: This category includes all references to ozone depletion. For example: “Ozone” ("Ozone"). “Ozone layer” ("Ozone layer"). “UV rays”. “Sun burns” ("Ix-xemx tahraq"). “Skin cancer”. “CFC sprays”. “Because of the hole in the atmosphere around the world, the sun’s rays come in more powerfully” ("minhabba dik it-toqbafic-cinturin ta’ madwar id-dinja, ix-xemx tidhol b’iktar sahha").

GREENHOUSE: This category includes all references to the greenhouse effect. For example: “Greenhouse effect”. “CO2”. “Greenhouse gases”. “GHGs”. “Gases” ("Gassijiet"). “Emissions” ("Emissjonijiet").

FOSSIL FUELS: This category includes all references to fossil fuels. For example: “Diesel and petrol” ("Diesel u petrol"). “Oil”. “Oil companies” ("Bjar taz-żejt"). “We’re burning too much oil” ("Qed naharqu hafna żut żejiđa").

HEAT: This category includes all references to rising temperature. For example: “Global warming”. “Increase in temperature” ("Lżżid it-temperatura"). “The world gets warmer” ("Tishon id-dinja"). “Excessively hot” ("Shana li ma tissaportihiex").

ICEMELT: This category includes all references to melting snow and ice. For example: “The ice in the Arctic is melting”. “Antarctic is melting” ("Idub l-Antartiku"). “Ice melting” ("Silg idub"). “Polar bear”.

SEALEVEL: This category includes all references to sea level rise. For example: “The sea is rising” ("Bahar joghla"). “Waters are rising” ("Ilma jiilha"). “Rising sea level” ("Joghla l-livell tal-bahar").
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CHANGING TEMPERATURE: This category includes references to general changes in temperature. Note that this is not the same as category HEAT. HEAT responses indicate a direction (warming) to changes in temperature. This category does not indicate a direction. For example: “Temperature gets warmer or colder in certain areas” (“Temperatura tishon jew tiksah f’certi bnadi”). “Unbalanced temperature” (“Żbilanċ li għandna fit-temperatura”). “Change in temperature” (“Bidla fit-temperatura”). “Temperature” (“Temperatura”).

FORESTS: This category includes references to forests. For example: “Forests” (“Foresti”). “Amazon” (“Amazonja”). “Cutting of trees” (“Qtugh tas-sigar”).

WEATHER: This category includes all references to weather or changes in weather. For example: “Weather changes” (“Taqlib fit-temp” “It-temp jithawwad”). “Rainfall out of season” (“Xita barra minn żmienha”). “It’s raining one moment, the nest it’s sunny” (“Filli liafna xita, filli liafna xemx”). “Storms and strange winds” (“Maltemp u irjiḥat strambi”).

CHANGING CLIMATE: This category includes all references to changing seasons or climate. For example: “Weather changes” (“Bidla fl-istaguńi”). “The Summer is not as we know it” (“Saff m’ghadux li kien”). “The climate is not as we know it when we were young” (“Klima m’ghadhiex kif kienet bhal meta konna żghar”). “Climate is changing” (“Klima qed tinbidel”).

EXTREME WEATHER EVENTS: This category includes all references to extreme weather events. For example: “Heatwaves”. “Excessive heat, excessive cold” (“Hafna shana, hafna ksieħ”, “Kesha u shana esagerata”). “Floods” (“Għarar”). “More severe storms” (“Maltemp iktar qawwi”).
ENERGY: This category includes all references to energy, alternative energy or electrical power plants. For example: “We need to waste less energy” (“Nahlu ingas energija”). “Electricity” (“Elettriku”). “Energy” (“Energija”). “Power station”. “Wind farms” (“Rdieden tar-rih”). “Wind and solar energy” (“Energija tar-rih u x-xemx”). “Solar panels”.

DRY/DESERT: This category includes all references to drought or a drier climate. For example: “Lack of rainfall” (“Nuqqas ta’ xita”). “Less water” (“Jongos l-ilma”). Drought over the Mediterranean (“Niexfa fiľ-Mediterran”). “Desert” (“Deżert”).

FOOD: This category includes one reference to food. This is: “More people suffering hunger” (“Iktar nies bil-guh”).

TRANSPORT: This category includes all references to motor vehicle transport and air transport. For example: “Exhaust from cars” (“Dhahen tal-karozzi”). “Aeroplane pollution”. “All cars” (“Karozzi kollha”). “Public transport and heavy vehicles” (“Karozzi tal-linja u trakkijiet tal-gebel”). “Exhaust”.


HUMAN HEALTH: This category includes all references to human health or disease, whether related to climate change or not. For example: “A problem for our
health” ("Problema ghal sahhitna"). "Harm to everyone” ("Hsara lil kulhadd"). "Lung cancer” ("Kancer tal-pulmun"). "Skin cancer". "Disease” ("Mard"). "Asthma” ("Ażżma"). "Not good for our health” ("Ma jaghmilx tajjeb ghas-sahha"). "Children will get ill” ("Jomordu t-tfal").

ANTHROPOGENIC: This category includes all references that climate change is caused by humans. For example: “Human people are causing this change”. “Human activity” ("L-attivita’ tal-bniedem"). "This change [climate change] is a consequence of our own responsibility” ("Din il-bidla hloqniha alina bl-irresponsabbilta’ taghna"). “Man is ruining the world” ("Il-bniedem qed jirrovina id-dinja ta’ madwaru"). “We’re doing harm” ("Naghmlu hsara").

DISASTER: This category refers to a range of responses that imply disaster. For example: “Disaster for everybody”. “Disasters” ("Dizasti"). “World in danger” ("Periklu tad-dinja"). ”Catastrophe” ("Katastrofi"). “Disastrous effects” ("Effetti dīzastruzi"). “The end of the world” ("L-ahhar tad-dinja").

EMOTION: This category includes any reference to an emotion of fear felt by the respondent. “Fear and death” ("Biża u mewl"). "Scary things” ("Affarijiet tal-biża").

SCEPTICS: This category includes any reference to scepticism about climate change. For example: “I don’t believe” ("Ma nemminx"). “Still controversial” ("Kontroversji ghadhom hemm"). “It’s a hoax, like that of the millenium bug” ("Bhal tal-‘millenium bug; xi hadd dahhal f’mohhu fuq din").

FUTURE GENERATIONS: This category includes all references to future generations. For example: “My children, and the children of my children” ("It-tfal
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NATURE: This category includes all references to non-human nature and biodiversity. For example: “A lot of harm to non-human nature”. “Some animals become extinct” (“Ċerti annimali estinti”). “Wild life, plants, animals”.

TSUNAMIS/EARTHQUAKES: This category includes all references to tsunamis and earthquakes. For example: “Earthquakes” (“Terremoti”). “Tsunamis”.

POLITICS: This category includes all references to government or the European Union. For example: “Measures taken by government” (“Miżuri tal-gvern”). “European Union” (“Unjoni Ewropea”). “The government needs to help”.

INDUSTRY: This category includes all references to industry. For example: “Fumes which come out from industrial plants” (“Duhħan li johroġ mill-industrija”). “Companies emitting chemicals in the air” (“Kimika minn kumpanija toħroġ fl-arja”). “Factories” (“Fabbriki”). “Big companies causing the major impact”.

NEED ACTION/EDUCATION: This category includes all references to a need for action or a need for education. For example: “We can do a lot but we still have a long way to go” (“Nistghu naghmlu hafna imma ghadna lura”). “Something has to be done” (“Xi haġa trid issir”). “Education”. “People are not aware [of climate change] (“in-nies mhumiex konxji”). “We need to protect the climate” (“Ghandna bżonn nipproteġu l-klima”).

LIFESTYLE: This category includes all references to lifestyle. For example: “We’re more comfortable than before” (“Kumdita’ iktar minn qabel”). “We’re burning
a lot of fossil fuels” (“Qed naharqu hafna żjut”). “An idle car with the engine on” (“Karozza mixghula wieqfa”). “We need to change our lifestyle” (“Inbiddlu l-hajja taghna”). “It’s about what we are consuming” (“X’qed nikkonsmaw”).

DON'T KNOW: This category refers of not knowing anything about climate change. For example: “Nothing comes to my mind because I don’t what it means” (Ma jiġini xejn f’mohhi ghax ma nafx xi tisser”). “I forgot them” (“Insejthom”). “I don’t know” (“Ma nafx”).

NEGATIVE: This category includes references of negativity to climate change but not disastrous. For example: “Everything goes the other way of nature”. “Always for the worse” (“Dejjem sejrin ghall-aghar”). “Nothing is normal anymore” (“Xejn m’ghadu normali”). “Deterioration of the climate”.


3.6.2 Indices

Several indices were constructed for sets of items to summarise data and analyse it. Babbie (1990) defines indices as being efficient data reduction devices that summarise a respondent’s answers to different questions measuring different dimensions of the same complex concept in a single score.
It is important to state that indices were generated to study the relationship between one concept and another. They are not intended to be the measure of concepts in relation to climate change. Internal consistency reliability testing was carried out for each index to determine "how well the items that reflect the same construct, yield similar results" (Web Centre for Social Research Methods, 2009). Cronbach’s alpha was used for reliability testing of items using Likert scales. Guttman’s Lambda 2 is more complex than Cronbach’s alpha and preferred by certain researchers, though less common (Garson, 2009). It is more adapted for binary variables and thus was used for items with a Boolean or binary ('yes' or 'no') response. An explanation of how each index was generated will be given in following sub-sections.

In total, five indices were constructed by the author of the study: the ‘Knowledge on Climate Change Index’, the ‘Risk Perception Index’, the ‘Health Effects of Climate Change Index’, the ‘Support for Policy Index’ and the ‘Willingness to Act Index’. Both the ‘Knowledge on Climate Change Index’ and the ‘Health Effects of Climate Change Index’ consist of binary variables and thus internal consistency reliability testing was done using Guttman’s Lambda 2. The ‘Risk Perception Index’, the ‘Support for Policy Index’ and the ‘Willingness to Act Index’ consist of Likert scales and thus internal consistency reliability testing was done with Cronbach’s alpha.

3.6.2.1 Knowledge on Climate Change Index

The ‘Knowledge on Climate Change Index’ is constructed from 8 items, 4 correct and 4 incorrect causes of climate change. Respondents were asked to state whether they thought each of a list of items was a cause of climate change. Four items – ‘power stations’, ‘cars and other transport vehicles’, ‘the production and consumption
of potable water’ and ‘the use of electrical appliances such as freezers, televisions, air-conditioners, toasters’ – were correct causes of climate change. Another four items – ‘aerosol spray cans’, ‘pesticides’, ‘the ozone hole’ and ‘mobile phones’ – were incorrect causes of climate change. The ‘Maghtab Landfill’ was not included in the construct of the index as, at the time of the study, the landfill was undergoing restructuring to become a source of alternative energy. Thus, both respondents who answered ‘yes’ and respondents who answered ‘no’ to the question: “Do you think the Maghtab landfill causes or contributes to climate change?” could have been right, depending on whether they identified the landfill as a source of greenhouse gases causing climate change, or as a source of alternative energy.

Respondents were given one point for each item they correctly identified as being a cause of climate change and one point for each item they correctly identified as not being a cause of climate change. One point was deducted for each item they incorrectly identified as being a cause or not a cause of climate change. ‘Don’t know’ answers were neither given points nor deducted points. Thus, respondents could get a maximum of 8 points and a minimum of -8 (minus eight) points. By chance alone, a respondent would get 0 points.

In this study, the ‘Knowledge on Climate Change Index’ achieved a Guttman Lambda 2 reliability score of 0.602 meaning that it is good for exploratory purposes.¹⁰

¹⁰ Guttman’s lambda 2: A common rule of thumb is 0.80 or higher for adequate reliability and 0.90 or higher for good reliability. However, for exploratory research, a cut-off as low as 0.60 is not uncommon (Garson, 2009).
3.6.2.2 Risk Perception Index

The "Risk Perception Index" is constructed from 6 items asking respondents about how likely they think climate change will affect standard of living, water shortages or rates of serious disease, in 50 years time, worldwide and locally, on a Likert scale of 1 (very unlikely) to 4 (very likely).

The index is an average of the Likert scales of six items. 'Don’t know' answers were not excluded from the average but given a mid-point score on the Likert scale of 2.5. Thus, a respondent who answered 'very likely' (i.e. 4 on the Likert scale) on all six items got an average score of 4.0, whereas a respondent who answered 'very likely' on one item and 'don’t know' on five items got an average score of 2.75. An average score of 2.75 means that a respondent is in between 'somewhat unlikely' (2.0 on the Likert scale) and 'somewhat likely' (3.0 on the Likert scale) but closer to 'somewhat likely'. If 'don’t know' answers were excluded from the calculation of the index, the latter respondent would have got an average score of 4.0 on the Likert scale ('very likely'). In actual fact, the respondent displayed ambivalence on five out of six items and does not merit a construct of 4.0 ('very like') on the 'Risk Perception Index'. Thus, 'don’t know' answers were included in the construct and given a mid-point value of 2.5.

In this study, the 'Risk Perception Index' achieved a Cronbach’s alpha score of 0.797, which means that it is a good index.\textsuperscript{11}

\textsuperscript{11} Cronbach alpha (\(\alpha\)) is a measure of the internal consistency of an index, i.e., whether all the items within the index measure the same construct. Values range from 0 to 1. The internal consistency of the index increases as a value approaches 1. A rule of thumb is that an \(\alpha > 0.9\) is excellent; \(\alpha > 0.8\) is good; \(\alpha > 0.7\) is acceptable; \(\alpha > 0.6\) is questionable; \(\alpha > 0.5\) is poor; and, \(\alpha < 0.5\) is unacceptable (George and Mallory, 2001).
3.6.2.3 Health Effects of Climate Change Index

The ‘Health Effects of Climate Change Index’ is a measure of knowledge about the direct health effects of climate change. It is constructed from seven items related to the direct health effects of climate change and is constructed in a similar way to the ‘Knowledge on Climate Change Index’. Respondents get a point for a correct answer and lose a point for an incorrect answer. ‘Don’t know’ answers do not carry points.

The seven items in this index are all related to the direct health effects of climate change e.g. infectious diseases, diarrhoeal diseases, asthma and respiratory conditions. This is in contrast to the ‘Risk Perception Index’ which deals more with the indirect health effects of climate change e.g. water shortages, or broader terms e.g. increased rates of disease. In addition, whereas the ‘Risk Perception Index’ is a construct of perception, the ‘Health Effects of Climate Change Index’ is a construct of knowledge.

Respondents were asked: “Which of the following is affected by climate change?” and given a list of possibly affected items by climate change. Five of the seven items are truly affected by climate change and their correct answer was ‘yes’ whereas the other two items are not affected by climate change and so their correct answer was ‘no’.

In this study, this index achieved a Guttman Lambda 2 score of 0.605 which means that it is good for exploratory purposes.

3.6.2.4 Support for Policy Index

The ‘Support for Policy Index’ is a measure of the extent to which respondents are willing to support climate change mitigation policy. It is a construct of six Likert
scale items relating to support for policy and is calculated by taking the average of the six Likert scales. Similarly to the 'Risk Perception Index', ‘don’t know’ answers are not excluded from the construct but given a mid-point value of 2.5 on the Likert scale, as ‘don’t know’ answers are taken to demonstrate a degree of ambivalence on the part of the respondent.

Therefore, a respondent who answered ‘strongly agree’ to all six items got an index of 4.0 (‘strongly agree’) on the Likert scale, whereas a respondent who answered ‘strongly agree’ to two items and ‘don’t know’ to four items got an index of 3.0 (‘somewhat agree’) on the Likert scale. If ‘don’t know’ answers were excluded from the calculation there would have been no distinction between those respondents who fervently give their opinion to all the questions, to those who demonstrate a degree of ambivalence by answering ‘don’t know’ to a number of items.

The ‘Support for Policy Index’ achieved a Cronbach’s alpha reliability score of 0.452 meaning that this index is very poor or unacceptable.

3.6.2.5 Willingness to Act Index

The ‘Willingness to Act Index’ is a measure of the extent to which respondents are willing to change behaviour and take up climate change mitigation measures. It is a construct of six Likert scale items and is calculated by taking the average of all six Likert scales. If an item did not apply to the respondent, it was excluded from the calculation of the index. For example, some respondents who were asked about their willingness to install solar panels answered that they do not own a roof. Thus, in reality, these respondents did not have a choice and so the item did not apply.
The ‘Willingness to Act Index’ achieved a Cronbach’s alpha reliability score of 0.538, which means that his construct is a poor one but still acceptable.
Chapter 4: Results

4.1 Introduction

The results are divided into four sections: response rate, demographics of respondent population, frequencies of dependent variables and correlations between different indices and variables. The way indices have been generated is fully explained in Section 3.6.2.
4.2 Response rate

Overall, 543 participants answered the questionnaire. Of the total sample of 800 participants, 192 participants (24.0%) were untraceable, 22 (2.8%) were excluded, and 43 (5.4%) were difficult to find or refused to participate in the survey (Table 1).

Table 1: Status of participants in the sample

<table>
<thead>
<tr>
<th>Status</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
<td>543</td>
<td>67.9%</td>
</tr>
<tr>
<td>Difficult/Refused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to find</td>
<td>32</td>
<td>4.0%</td>
</tr>
<tr>
<td>Refused to participate</td>
<td>11</td>
<td>1.4%</td>
</tr>
<tr>
<td>(Total eligible)</td>
<td>(586)</td>
<td>(73.3%)</td>
</tr>
<tr>
<td>Excluded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard of hearing, death, dementia, mentally disability, long term hospitalization</td>
<td>13</td>
<td>1.6%</td>
</tr>
<tr>
<td>Abroad during the whole study period</td>
<td>9</td>
<td>1.1%</td>
</tr>
<tr>
<td>Untraceable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not have available telephone or mobile number</td>
<td>128</td>
<td>16.0%</td>
</tr>
<tr>
<td>Abnormal dialling tone</td>
<td>27</td>
<td>3.4%</td>
</tr>
<tr>
<td>Empty household(^{12})</td>
<td>31</td>
<td>3.9%</td>
</tr>
<tr>
<td>Changed address</td>
<td>6</td>
<td>0.8%</td>
</tr>
<tr>
<td>(Total ineligible)</td>
<td>(214)</td>
<td>(26.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Excluding those participants who were untraceable and those who were excluded for other reasons, the total sample eligible to participate in the study was thus of 586. Of these 543 (92.7%) successfully answered the questionnaire, 11 (1.9%) refused and 32 (5.5%) were difficult to find. This gave a response rate of 92.7% (n=543) and a completion rate\(^{13}\) of 92.0% (n=539).

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\(^{12}\) Empty household was defined as a household who fails to answer to at least five telephone call attempts at different days and at different times during the day.

\(^{13}\) Completion rate: the percentage of completed questionnaires.
Chapter 4: Results

The respondent sample (n=543) was compared to the total sample (n=800) for gender, age and district.

Males and females are almost exactly equally distributed in the respondent sample as in the total sample (Table 2).

Table 2: Distribution of the respondent sample as compared to the distribution of the total sample by gender.

<table>
<thead>
<tr>
<th></th>
<th>Respondent Sample</th>
<th>Total Sample</th>
<th>% of Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>267</td>
<td>394</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49.2%</td>
<td>49.3%</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>276</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.8%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>543</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Chapter 4: Results

The respondent sample basically over-represents those in the 45-54 and 18-24 year age group and under-represents those in the 75+ and 25-34 year age group. However, when compared to the total sample, this difference is not significant at a confidence level of 0.05 (probability of Chi-Squared value = 0.767) and there is no clear trend of over or under-representation of older age groups against younger age groups (Table 3).

Table 3: Distribution of the respondent sample as compared to the distribution of the total sample by age group.

<table>
<thead>
<tr>
<th>Age group / yrs</th>
<th>Respondent Sample</th>
<th>Total Sample</th>
<th>% of Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>67</td>
<td>93</td>
<td>72.0%</td>
</tr>
<tr>
<td></td>
<td>12.3%</td>
<td>11.6%</td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>88</td>
<td>147</td>
<td>59.9%</td>
</tr>
<tr>
<td></td>
<td>16.2%</td>
<td>18.4%</td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td>85</td>
<td>123</td>
<td>69.1%</td>
</tr>
<tr>
<td></td>
<td>15.7%</td>
<td>15.4%</td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>116</td>
<td>152</td>
<td>76.3%</td>
</tr>
<tr>
<td></td>
<td>21.4%</td>
<td>19.0%</td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>98</td>
<td>143</td>
<td>68.5%</td>
</tr>
<tr>
<td></td>
<td>18.0%</td>
<td>17.9%</td>
<td></td>
</tr>
<tr>
<td>65-74</td>
<td>57</td>
<td>81</td>
<td>70.4%</td>
</tr>
<tr>
<td></td>
<td>10.5%</td>
<td>10.1%</td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td>32</td>
<td>61</td>
<td>52.5%</td>
</tr>
<tr>
<td></td>
<td>5.9%</td>
<td>7.6%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>543</td>
<td>800</td>
<td>67.9%</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
In addition, the respondent sample over-represents participants from the Southeastern district and under-represents participants from the Northern district and Gozo. A possible reason for the apparent under-representation of the latter two districts could be because some participants who appear to be registered on a summer house in St. Paul’s Bay (which falls under the Northern district) or on a house in Gozo, actually live in other localities in Malta. When compared to the total sample, however, this difference is not significant at a confidence level of 0.05 (probability of Chi-Squared value = 0.812) (Table 4).

Table 4: Distribution of the respondent sample as compared to the distribution of the total sample, by district.

<table>
<thead>
<tr>
<th>District</th>
<th>Respondent Sample</th>
<th>Total Sample</th>
<th>% of Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Harbour</td>
<td>111</td>
<td>159</td>
<td>69.8%</td>
</tr>
<tr>
<td></td>
<td>20.4%</td>
<td>19.9%</td>
<td></td>
</tr>
<tr>
<td>Northern Harbour</td>
<td>158</td>
<td>238</td>
<td>66.4%</td>
</tr>
<tr>
<td></td>
<td>29.1%</td>
<td>29.8%</td>
<td></td>
</tr>
<tr>
<td>Southeastern</td>
<td>93</td>
<td>118</td>
<td>78.8%</td>
</tr>
<tr>
<td></td>
<td>17.1%</td>
<td>14.8%</td>
<td></td>
</tr>
<tr>
<td>Western</td>
<td>75</td>
<td>110</td>
<td>68.2%</td>
</tr>
<tr>
<td></td>
<td>13.8%</td>
<td>13.8%</td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>69</td>
<td>110</td>
<td>62.7%</td>
</tr>
<tr>
<td></td>
<td>12.7%</td>
<td>13.8%</td>
<td></td>
</tr>
<tr>
<td>Gozo</td>
<td>37</td>
<td>65</td>
<td>56.9%</td>
</tr>
<tr>
<td></td>
<td>6.8%</td>
<td>8.1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>543</td>
<td>800</td>
<td>67.9%</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
The respondent sample was also compared to the Census 2005 for education, occupation and labour status. Although this data gives an indication of the representativeness of the sample to the study population, two factors must be borne in mind when interpreting this data. Firstly, the Census was carried out in 2005 whereas the sample was taken from a 2008 register. Secondly, the Census reflects information on the portion of the population above the age of 15 years whereas the sample consists of participants above the age of 18 years. For these reasons, significance testing could not be carried out.

Data shows that the respondent sample tends to over-represent those with a post-secondary (by 1.7%) and a tertiary level of education (by 7.2%) and under-represent those with a primary (by 2.0%) or a secondary level of education (by 6.0%) (Table 5). This is understandable, as those over the age of 18 years tend to have completed a higher level of education than those over 15 years of age. Secondly, older individuals with a primary level of education may have died between 2005 and 2008.

Table 5: Distribution of the respondent sample as compared to the distribution of the Census (2005), by education.

<table>
<thead>
<tr>
<th>Education</th>
<th>Respondent sample</th>
<th>Census 2005 (15 years and over)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>No formal education</td>
<td>8</td>
<td>1.5%</td>
</tr>
<tr>
<td>Primary</td>
<td>128</td>
<td>23.7%</td>
</tr>
<tr>
<td>Secondary</td>
<td>214</td>
<td>39.6%</td>
</tr>
<tr>
<td>Post secondary</td>
<td>99</td>
<td>18.3%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>91</td>
<td>16.9%</td>
</tr>
<tr>
<td>Total</td>
<td>540</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Chapter 4: Results

Data also shows that, when compared to the Census (2005), the respondent sample over-represents professionals, and plant and machine operators but under-represents service workers, shop and market sales workers, and craft and related trades workers (Table 6).

Table 6: Distribution of the respondent sample as compared to the distribution of the Census (2005) by occupation.

<table>
<thead>
<tr>
<th>Occupation classified according to ISCO-88</th>
<th>Respondent sample</th>
<th>Census 2005 (15 years and over)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>Legislators, senior officials &amp; managers</td>
<td>41</td>
<td>9.1%</td>
</tr>
<tr>
<td>Professionals</td>
<td>68</td>
<td>15.0%</td>
</tr>
<tr>
<td>Technicians &amp; associate professionals</td>
<td>68</td>
<td>15.0%</td>
</tr>
<tr>
<td>Clerks</td>
<td>44</td>
<td>9.7%</td>
</tr>
<tr>
<td>Service workers, shop &amp; market sales workers</td>
<td>49</td>
<td>10.8%</td>
</tr>
<tr>
<td>Skilled agricultural &amp; fishery workers</td>
<td>16</td>
<td>3.5%</td>
</tr>
<tr>
<td>Craft &amp; related trades workers</td>
<td>37</td>
<td>8.2%</td>
</tr>
<tr>
<td>Plant &amp; machine operators &amp; assemblers</td>
<td>69</td>
<td>15.3%</td>
</tr>
<tr>
<td>Elementary occupations</td>
<td>58</td>
<td>12.8%</td>
</tr>
<tr>
<td>Armed forces</td>
<td>2</td>
<td>0.4%</td>
</tr>
<tr>
<td>Total</td>
<td>452</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

As regards labour status, there are more who are employed in the respondent sample than in the Census (2005), but again, those over the age of 18 years have a higher chance of being employed than those over the age of 15 years (Table 7).

Table 7: Distribution of the respondent sample as compared to the distribution of the Census (2005), by labour status.

<table>
<thead>
<tr>
<th>Labour status</th>
<th>Respondent sample</th>
<th>Census 2005 (15 years and over)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>Employed</td>
<td>276</td>
<td>51.3%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>11</td>
<td>2.0%</td>
</tr>
<tr>
<td>Inactive(^{14})</td>
<td>251</td>
<td>46.7%</td>
</tr>
<tr>
<td>Total</td>
<td>538</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\(^{14}\) The term ‘inactive’ in the Census (2005) refers mainly to housewives, pensioners and students.
4.3 Demographics

The respondent sample consisted of 267 (49.2%) males and 276 (50.8%) females.

The mean age of the sample was 46.8 years (+/-17) with a range of 18 - 89 years. The median and mode age were 47.0 and 45.0 years respectively (Figure 2).

Figure 2: Distribution of respondents by age group and gender. (n=543)
The majority of respondents were from the Northern Harbour district (158). The Southern Harbour district (111), the Northeastern district (93), the Western district (75) and the Northern district (69) followed. The smallest group of respondents was from the island of Gozo (37) (Figure 3).

Figure 3: Distribution of respondents by district. (n=543)
A secondary level of education was the commonest highest level of education attained amongst respondents (260, 48.1%) (Figure 4).

![Bar chart showing distribution of respondents by highest level of education.]

0% 10% 20% 30% 40% 50% 60%

- 16.7% Primary
- 48.1% Secondary
- 18.3% Post secondary
- 16.9% Tertiary

Figure 4: Distribution of respondents by highest level of education completed using the European Health Interview Survey (EHIS) system of classification. (n=540)
Occupation was coded using the International Standard Classification of Occupation – 88. As shown in Figure 5, the highest number of respondents were plant and machine operators (15.3%), professionals (15.0%) and technicians and associate professionals (15.0%). Figure 5 does not include those who never worked (n=44) or those whose occupation was unspecific (n=47).

<table>
<thead>
<tr>
<th>Occupation Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Legislators, senior officials and managers</td>
<td>9.1%</td>
</tr>
<tr>
<td>2. Professionals</td>
<td>15.0%</td>
</tr>
<tr>
<td>3. Technicians and associate professionals</td>
<td>15.0%</td>
</tr>
<tr>
<td>4. Clerks</td>
<td>9.7%</td>
</tr>
<tr>
<td>5. Service workers and shop and market sales workers</td>
<td>10.8%</td>
</tr>
<tr>
<td>6. Skilled agricultural and fishery workers</td>
<td>3.5%</td>
</tr>
<tr>
<td>7. Craft and related trades workers</td>
<td>8.2%</td>
</tr>
<tr>
<td>8. Plant and machine operators and assemblers</td>
<td>15.3%</td>
</tr>
<tr>
<td>9. Elementary occupations</td>
<td>12.8%</td>
</tr>
<tr>
<td>0. Armed forces</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Figure 5: Respondents by occupation using the International Standard Classification of Occupation (ISCO) – 88. (n=452)
51.0% of respondents were gainfully occupied. A considerable number of respondents were fulfilling domestic tasks (24.6%) or retired (17.2%). Only a small minority of respondents were students, unemployed or permanently disabled (Figure 6).

![Figure 6: Respondents by labour status, using the European Health Interview Survey (EHIS) system of classification. (n=541)]
4.4 Analysis of Dependent Variables

Analysis of dependent variables is further sub-divided into five sections: awareness and concern, knowledge on climate change, knowledge and perception on the human health effects of climate change, willingness to support national mitigation policy, willingness to change lifestyle to reduce greenhouse gas emissions.

4.4.1 Awareness and concern about climate change

Of 543 respondents, 455 (83.8%) answered ‘yes’ to the question: “Have you ever heard of climate change or global warming?” Overall, males (86.9%) were more aware of climate change than females (80.8%), although this difference was not significant at a confidence level of 0.05 (p=0.054). Similarly, younger age groups were more aware of climate change, although this difference was also not significant at a confidence level of 0.05 (p=0.082) (Table 8).

Table 8: Distribution of respondents to the question: “Have you ever heard of ‘climate change’ or ‘global warming’?” by age group. (n=543)

<table>
<thead>
<tr>
<th>Age group / yrs</th>
<th>18-34</th>
<th>35-54</th>
<th>55+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>136</td>
<td>171</td>
<td>148</td>
<td>455</td>
</tr>
<tr>
<td></td>
<td>87.7%</td>
<td>85.1%</td>
<td>79.1%</td>
<td>83.8%</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>30</td>
<td>39</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>12.3%</td>
<td>14.9%</td>
<td>20.9%</td>
<td>16.2%</td>
</tr>
<tr>
<td>Total</td>
<td>155</td>
<td>201</td>
<td>187</td>
<td>543</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.082
Chapter 4: Results

Awareness about climate change varied very significantly (p<0.00001) by education reaching levels as high as 98.9% in respondents having a tertiary level of education and as low as 67.8% in those having a primary level of education (Figure 7).

![Bar chart showing percentage of respondents aware of climate change by level of education.](image)

**Figure 7:** Percentage of respondents who answered ‘yes’ to the question “Have you ever heard of climate change or global warming?” by level of education. (n=540)

Awareness about climate change also varied by occupation with respondents in ISCO-88 category 1 achieving a 100% awareness rate whilst respondents in ISCO-88 category 9 achieving 65.5% awareness rate (Table 9).
Table 9: Distribution of respondents to the question “Have you ever heard of ‘climate change’ or ‘global warming’?” by occupation. (n=452)

<table>
<thead>
<tr>
<th>Occupation (International Standard Classification of Occupation - 88)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislators, senior officials and managers</td>
<td>385</td>
</tr>
<tr>
<td>Professionals</td>
<td>85.6%</td>
</tr>
<tr>
<td>Technicians and associate professionals</td>
<td>100.0%</td>
</tr>
<tr>
<td>Clerks</td>
<td>98.5%</td>
</tr>
<tr>
<td>Service workers and shop and market sales workers</td>
<td>91.2%</td>
</tr>
<tr>
<td>Skilled agricultural and fishery workers</td>
<td>90.9%</td>
</tr>
<tr>
<td>Craft and related trades workers</td>
<td>91.8%</td>
</tr>
<tr>
<td>Plant and machine operators and assemblers</td>
<td>87.5%</td>
</tr>
<tr>
<td>Elementary occupations</td>
<td>78.4%</td>
</tr>
<tr>
<td>Total</td>
<td>65.5%</td>
</tr>
<tr>
<td>Yes</td>
<td>65</td>
</tr>
<tr>
<td>No</td>
<td>14.4%</td>
</tr>
<tr>
<td>0.0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>1.1%</td>
<td>8.8%</td>
</tr>
<tr>
<td>9.1%</td>
<td>9.1%</td>
</tr>
<tr>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>0.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
No significant difference was found between respondents of different districts regarding awareness about climate change ($p=0.357$).

When asked whether respondents thought that climate change is a problem, a clear majority (94.7%) of respondents replied in the affirmative. There was no significant difference in response at a confidence level of 0.05 for gender, age group and education.

When asked whether respondents were concerned about climate change, 186 (40.9%) said that they were very concerned. The rest were either somewhat concerned, not very concerned or not at all concerned (Figure 8).

![Figure 8: Level of concern about climate change. (n=455)](image-url)
Level of concern varied significantly by gender \( (p<0.01) \) with females being more concerned than males, and by level of education \( (p<0.05) \) with those having only a primary level of education being more concerned than those with higher levels of education. Average concern was calculated for each category to facilitate comparison (Table 10 and Table 11).

Average concern was calculated by taking an average of level of concern for all respondents. 'Not at all concerned' was given a weighting of 0, 'not very concerned' a weighting of 1, 'somewhat concerned' a weighting of 2, and 'very concerned' a weighting of 3. Therefore, average concern ranges from 0.0 to 3.0, where 0.0 represents 'not at all concerned' and 3.0 represents 'very concerned'.

<table>
<thead>
<tr>
<th>Table 10: Level of concern about climate change by gender. ( (n=455) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Not concerned about climate change</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Not very concerned about climate change</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Somewhat concerned about climate change</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Very concerned climate change</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Average concern *</td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.00107

* Scales range from 0.0 to 3.0 where 0.0 represents 'not concerned', 1.0 represents 'not very concerned', 2.0 represents 'somewhat concerned' and 3.0 represents 'very concerned'. The mid-point is 1.5.
Table 11: Level of concern about climate change by level of education. (n=453)

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Primary</th>
<th>Secondary</th>
<th>Post secondary</th>
<th>Tertiary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not concerned</td>
<td>6</td>
<td>43</td>
<td>23</td>
<td>16</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>9.8%</td>
<td>20.9%</td>
<td>24.0%</td>
<td>17.8%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Not very concerned</td>
<td>3</td>
<td>44</td>
<td>15</td>
<td>19</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>4.9%</td>
<td>21.4%</td>
<td>15.6%</td>
<td>21.1%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Somewhat concerned</td>
<td>16</td>
<td>38</td>
<td>24</td>
<td>20</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>26.2%</td>
<td>18.4%</td>
<td>25.0%</td>
<td>22.2%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Very concerned</td>
<td>36</td>
<td>81</td>
<td>34</td>
<td>35</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>59.0%</td>
<td>39.3%</td>
<td>35.4%</td>
<td>38.9%</td>
<td>41.1%</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>206</td>
<td>96</td>
<td>90</td>
<td>453</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Average concern * 2.34 1.76 1.72 1.82 1.84

Probability of Chi-Squared value = 0.0176
* Scales range from 0.0 to 3.0 where 0.0 represents 'not concerned', 1.0 represents 'not very concerned', 2.0 represents 'somewhat concerned' and 3.0 represents 'very concerned'. The mid-point is 1.5.

Level of concern also varied by age group, with older age groups being more concerned than younger age groups. However, this did not reach significance at a confidence level of 0.05 (Table 12). (p=0.0771)

Table 12: Level of concern about climate change by age group. (n=455)

<table>
<thead>
<tr>
<th>Age groups / yrs</th>
<th>18-34</th>
<th>35-54</th>
<th>55+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not concerned</td>
<td>33</td>
<td>28</td>
<td>27</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>24.3%</td>
<td>16.4%</td>
<td>18.2%</td>
<td>19.3%</td>
</tr>
<tr>
<td>Not very concerned</td>
<td>30</td>
<td>35</td>
<td>18</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>22.1%</td>
<td>20.5%</td>
<td>12.2%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Somewhat concerned</td>
<td>29</td>
<td>37</td>
<td>32</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>21.3%</td>
<td>21.6%</td>
<td>21.6%</td>
<td>21.5%</td>
</tr>
<tr>
<td>Very concerned</td>
<td>44</td>
<td>71</td>
<td>71</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>32.4%</td>
<td>41.5%</td>
<td>48.0%</td>
<td>40.9%</td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>171</td>
<td>148</td>
<td>455</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Average concern * 1.62 1.88 1.99 1.84

Probability of Chi-Squared value = 0.0771
* Scales range from 0.0 to 3.0 where 0.0 represents 'not concerned', 1.0 represents 'not very concerned', 2.0 represents 'somewhat concerned' and 3.0 represents 'very concerned'. The mid-point is 1.5.
Respondents were asked to choose whether they were mostly concerned about the effects of climate change on themselves and their families, on the Maltese people, on people all over the world or on non-human nature. The highest percentage of respondents (32.0%) declared that they were mostly concerned about the effects of climate change on people all over the world. This was closely followed by concern about the effects of climate change on the respondent himself/herself and his/her family (30.6%) and by concern about the effects of climate change on non-human nature (25.5%) (Figure 9).

Figure 9: Respondent answers to the question: “Which of the following are you most concerned about? The impacts of climate change on...” (n=447)
4.4.2 Image analysis

Respondents who had heard about climate change were asked about thoughts or images that came to their mind when they heard the words ‘climate change’. Image analysis is “an innovative, simple, yet powerful technique to ‘map’ the range, diversity and distribution of subjective and connotative meanings within individuals, groups and populations” (Leiserowitz, 2003). It is an effective way to quickly identify dominant associations and common misconceptions in public understanding of risks including climate change risks. As Szalay and Deese (1978) put it “... associations are simply a remarkably easy and efficient way of determining the contents of human minds without having those contents expressed in the full discursive structure of language”. Furthermore, image analysis minimises researcher bias that can occur with closed-ended questions.

All answers were categorised as described in Section 3.6.1. The category ‘Pollution’ was the one which was associated most times with climate change (38% of respondents), exceeding the number of mentions over the second most-associated category ‘Heat’ (19.6%) by almost double. These were followed by categories ‘Ozone’ (19.1%), ‘Extreme Weather Events’ (17.8%), ‘Environment’ (17.1%), ‘Icemelt’ (14.3%), ‘Transport’ (13.0%), ‘Weather’ (12.1%), ‘Changing Climate’ (11.0%), ‘Greenhouse’ (9.7%) and ‘Human Health’ (9.5%). Other less popular categories were ‘Sea level’, ‘Changing temperature’, ‘Energy’, ‘Disaster’ and ‘Anthropogenic’ amongst others (Figure 10, Appendix F: Table 18).
Figure 10: Percentage of respondents making reference to any of the above categories when asked the question: "When you hear the words 'climate change' what is the first thought or image that comes to mind?" Some respondents gave more than one answer. (n=455)
4.4.3 Knowledge

Respondents were given a list of possible contributors and non-contributors to climate change, and were asked to state for each one whether they thought that it contributed to climate change or not. The majority of respondents (ranging from 65.1% to 97.8%) answered ‘yes’ to ‘cars and other transport vehicles’, ‘power stations’, ‘the ozone hole’, ‘aerosol spray cans’, ‘pesticides’, ‘the Maghtab landfill’ and ‘the use of electrical appliances’. Only a minority of respondents considered ‘mobile phones’ and ‘the production and consumption of potable water’ to be contributors of climate change (Figure 11).

![Figure 11: Percentage of respondents who answered ‘yes’, ‘no’ or ‘don’t know’ to the question: “In Malta, which of the following contributes to climate change?” (n=453)]
When asked to indicate which one of the items listed they thought contributes to climate change most, most respondents (42.9%) chose ‘cars and other transport vehicles’ as the prime contributor to climate change. Power stations (28.6%) and the ozone hole (15.6%) were the second and third commonest choice respectively (Figure 12).

Figure 12: Percentage of respondents answering the question, “In Malta, which one do you think contributes most to climate change?” (n=447)
4.4.4 Human health effects of climate change

4.4.4.1 Awareness about people dying or becoming ill because of climate change

Respondents were then asked whether they thought that people die or become ill because of climate change, and if so, whether this is happening now or will happen in the future. 351 (77.3%) respondents think that people can die and 403 (88.8%) respondents think that people can become ill because of climate change. Of those who think that people can die, 225 think that people are dying now because of climate change. Of those who think that people can become ill, 288 think that people are becoming ill now because of climate change. The rest either think that it will happen in the future or replied ‘don’t know’ (Figure 13 and Figure 14).
Chapter 4: Results

Figure 13: Distribution of respondents to the questions: “Do you think people can die because of climate change?” and “If yes, worldwide, do you think this is happening now or is it something which will happen in the future?” (n=454)

Figure 14: Distribution of respondents answering to the questions: “Do you think people can become ill because of climate change?” “If yes, worldwide, do you think this is happening now or is it something which will happen in the future?” (n=454)
More females (55.0%) than males (44.4%) think that people are dying now because of climate change. However, this difference did not reach significance at a confidence level of 0.05 (Table 13).

**Table 13: Distribution of respondents who think that people are dying now because of climate change, that people will die (because of climate change) but not now, or that people will not die because of climate change, by gender. (n=454)**

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Yes and now</td>
<td>103</td>
<td>122</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>44.4%</td>
<td>55.0%</td>
<td>49.6%</td>
<td></td>
</tr>
<tr>
<td>Yes but not now</td>
<td>68</td>
<td>58</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29.3%</td>
<td>26.1%</td>
<td>27.8%</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>28</td>
<td>22</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.1%</td>
<td>9.9%</td>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>33</td>
<td>20</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.2%</td>
<td>9.0%</td>
<td>11.7%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>232</td>
<td>222</td>
<td>454</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.107
Those falling in the 18-34 year age group (40.4%) were less likely to think that people are dying now because of climate change than respondents falling in the 35-54 year age group (53.8%) and in the 55+ year age group (53.1%). This difference was also not significant at a confidence level of 0.05 (Table 14).

Table 14: Distribution of respondents who think that people are dying now because of climate change, that people will die (because of climate change) but not now, or that people will not die because of climate change, by age group. (n=454)

<table>
<thead>
<tr>
<th></th>
<th>Age group / yrs</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18-34</td>
<td>35-54</td>
<td>55+</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Yes and now</td>
<td>55</td>
<td>92</td>
<td>78</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40.4%</td>
<td>53.8%</td>
<td>53.1%</td>
<td>49.6%</td>
<td></td>
</tr>
<tr>
<td>Yes but not now</td>
<td>51</td>
<td>43</td>
<td>32</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.5%</td>
<td>25.1%</td>
<td>21.8%</td>
<td>27.8%</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16</td>
<td>16</td>
<td>18</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.8%</td>
<td>9.4%</td>
<td>12.2%</td>
<td>11.0%</td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>14</td>
<td>20</td>
<td>19</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.3%</td>
<td>11.7%</td>
<td>12.9%</td>
<td>11.7%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>136</td>
<td>171</td>
<td>147</td>
<td>454</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.0780
However, a significant difference (p<0.05) was found by level of education. Respondents with a lower level of education were more likely to think that people are dying now because of climate change. In contrast, those with a higher level of education were more likely to think that people will die in the future (Figure 15).

![Figure 15: Percentage of respondents who think that people are dying now because of climate change, will die but not now, will not die because of climate change or answered ‘don’t know’, by level of education. (n=453) (p=0.0430)](image)

With regards to perceptions that people are becoming or will become ill because of climate change, there was no clear trend (or significant difference) between respondents of different gender, age group or education.
4.4.4.2 Risk perception of climate change in the next 50 years

Respondents were asked to indicate the extent to which they perceived climate change as having an effect on people’s standard of living, on water shortages and increased rates of serious disease, both worldwide and locally, in the next 50 years. Average likelihood was calculated for each variable to facilitate comparison between different variables.

Average likelihood was calculated by taking an average of likelihood of agreement for all the respondents. ‘Very unlikely’ was given a weighting of 1.0, ‘somewhat unlikely’ was given a weighting of 2.0, ‘somewhat likely’ was given a weighting of 3.0 and ‘very likely’ was given a weighting of 4.0. ‘Don’t know’ answers were given a mid-point weighting of 2.5 as it was considered that ‘don’t know’ answers reveal a degree of ambivalence on the part of the respondent for that item. Thus, average likelihood ranges from 1.0 (very unlikely) to 4.0 (very likely). The mid-point stands at 2.5.
Overall, respondents think that climate change is more likely than unlikely to have a negative effect on people’s standard of living, water shortages and serious disease, both worldwide and locally. Secondly, as shown in Figure 16, respondents think that the negative effects of climate change are more likely to affect people worldwide (average likelihood of 2.85, 2.85, 3.28) than people locally or family members (average likelihood of 2.65, 2.66, 3.00). More detailed information is provided in Appendix F: Table 19.

Figure 16: Extent to which respondents think it is likely that people’s standard of living, water shortages and increased rates of serious disease will be affected by climate change in the next 50 years. For average likelihood, scales range from 1.0 to 4.0. 1.0 stands for ‘very unlikely’, 2.0 stands for ‘somewhat unlikely’, 3.0 stands for ‘somewhat likely’ and 4.0 stands for ‘very likely’. The mid-point stands at 2.5. (n=453)
Chapter 4: Results

The likelihood that climate change will lead to increased rates of serious disease was the only variable that got an average likelihood score equal to or more than 3.00. This means that, on average, respondents think that the likelihood of climate change leading to increased rates of serious disease in the next 50 years is more than ‘somewhat likely’ for people worldwide (average likelihood = 3.28) and ‘somewhat likely’ (average likelihood = 3.00) for the family of the respondents themselves.

With regards to the negative effects of climate change on people’s standard of living and water shortages, respondents gave average likelihood scores of 2.65 – 2.85, meaning that respondents think that the effects of climate change on people’s standard of living and water shortages, though more likely than unlikely, are less than ‘somewhat likely’ to occur.
4.4.4.3 Direct human health effects of climate change

Respondents were then asked to indicate whether they think that climate change has an effect on a list of diseases, conditions or temperature-related mortality. The vast majority of respondents think that climate change has an effect on asthma and respiratory conditions (91%), on skin cancer (90%), heat waves (84%) and allergies (84%). In contrast, only 49% of respondents think that climate change has an effect on infectious diseases such as malaria or infectious diarrhoeal diseases and 38% think that climate change has an effect on cardiovascular conditions (Figure 17).

![Figure 17: Percentage of respondents who answered 'yes', 'no' or 'don't know' to the question, "Which of the following is affected by climate change?". (n=452)](chart.png)
4.4.5 Support for Climate Change Mitigation Policy

Respondents were also asked to indicate the extent to which they support a number of national mitigation policies on a verbal scale from 'strongly disagree', 'somewhat disagree', 'somewhat agree' to 'strongly agree'. Average agreement or disagreement was calculated to facilitate comparison between levels of support for different measures.

Average agreement was calculated by taking the average of levels of agreement/disagreement for all respondents. 'Strongly disagree' was given a weighting of 1.0, 'somewhat disagree' was given a weighting of 2.0, 'somewhat agree' was given a weighting of 3.0 and 'strongly agree' was given a weighting of 4.0. 'Don’t know' answers were given a mid-point weighting of 2.5 as it was considered that 'don’t know' answers reveal a degree of ambivalence on the part of the respondent to answer the question. Average agreement thus ranges from 1.0 (very unlikely) to 4.0 (very likely). The mid-point is 2.5.
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On average, respondents were very supportive (average agreement ranged between 3.80 – 3.86) on four measures: that money is spent on clean energy projects such as wind farms, that money is spent on more information provision and better education of the Maltese public, that money is spent to increase subsidies on alternative energy sources like solar panels, and that money is spent on a public transport system to make it more efficient (Figure 18). There was a degree of support towards the introduction of a tax on businesses and companies that use energy inefficiently (average agreement of 2.76). Respondents somewhat disagreed (average agreement of 1.93) with a tax on petrol and diesel to discourage car use. More detailed information is presented in Appendix J: Table 20.

Figure 18: Extent to which respondents agree or disagree with national climate change mitigation measures. For average agreement, scales range from 1.0 to 4.0. 1.0 stands for ‘strongly disagree’, 2.0 stands for ‘somewhat disagree’, 3.0 stands for ‘somewhat agree’ and 4.0 stands for ‘strongly agree’. The mid-point stands at 2.5. (n=453)
4.4.6 Awareness and willingness to change lifestyle to reduce greenhouse gas emissions

When asked whether they thought that lifestyle influenced the effect they have on climate change, 68.8% of respondents answered ‘yes’, 19.5% answered ‘no’ and 11.7% answered ‘don’t know’.

Respondents in the 18-34 year age group (76.5%) were more likely to think that their lifestyle influenced the effect they have on climate change than respondents in older age groups. This difference reached significance at a p value of less than 0.05 (Table 15).

Table 15: Number and percentage of respondents answering ‘yes’, ‘no’ or ‘don’t know’ to the question: “Do you think that the way you manage your lifestyle can influence the effect you have on climate change?” by age group (n=452)

<table>
<thead>
<tr>
<th>Age group / yrs</th>
<th>18-34</th>
<th>35-54</th>
<th>55+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yes</strong></td>
<td>104</td>
<td>115</td>
<td>92</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>76.5%</td>
<td>67.3%</td>
<td>63.4%</td>
<td>68.8%</td>
</tr>
<tr>
<td><strong>No</strong></td>
<td>20</td>
<td>40</td>
<td>28</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>14.7%</td>
<td>23.4%</td>
<td>19.3%</td>
<td>19.5%</td>
</tr>
<tr>
<td><strong>Don't know</strong></td>
<td>12</td>
<td>16</td>
<td>25</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>8.8%</td>
<td>9.4%</td>
<td>17.2%</td>
<td>11.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>136</td>
<td>171</td>
<td>145</td>
<td>452</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.035
Furthermore, those with a lower level of education were less likely to think that their lifestyle influences the effect they have on climate change (probability of Chi-Squared value < 0.00001). Those with secondary education (60.2%), however, and not those with primary education (64.4%) were the least likely to think that their lifestyle influences the effect they have on climate change (Table 16).

Table 16: Number and percentage of respondents answering ‘yes’, ‘no’ or ‘don’t know’ to the question: “Do you think that the way you manage your lifestyle can influence the effect you have on climate change?” by level of education (n=451)

<table>
<thead>
<tr>
<th></th>
<th>Primary</th>
<th>Secondary</th>
<th>Post secondary</th>
<th>Tertiary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>38</td>
<td>124</td>
<td>74</td>
<td>74</td>
<td>310</td>
</tr>
<tr>
<td>64.4%</td>
<td>60.2%</td>
<td>77.1%</td>
<td>82.2%</td>
<td></td>
<td>68.7%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>49</td>
<td>16</td>
<td>16</td>
<td>88</td>
</tr>
<tr>
<td>11.9%</td>
<td>23.8%</td>
<td>16.7%</td>
<td>17.8%</td>
<td></td>
<td>19.5%</td>
</tr>
<tr>
<td>Don't know</td>
<td>14</td>
<td>33</td>
<td>6</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td>23.7%</td>
<td>16.0%</td>
<td>6.3%</td>
<td>0.0%</td>
<td></td>
<td>11.8%</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>206</td>
<td>96</td>
<td>90</td>
<td>451</td>
</tr>
<tr>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Probability of Chi-Squared value = 0.000009

Respondents were also asked to indicate the extent to which they were willing to adopt a number of ‘climate change friendly’ measures. Average willingness was calculated to facilitate comparison between different ‘climate change friendly’ measures.

Average willingness was calculated by averaging the extent to which respondents were willing to adopt a measure. This was calculated for every measure. ‘Definitely not’ was given a weighting of 1.0, ‘probably not’ was given a weighting of 2.0, ‘probably yes’ was given a weighting of 3.0 and ‘definitely yes’ was given a weighting of 4.0. Measures that were not applicable for respondents were excluded from the calculation. Thus, average willingness ranges from 1.0 (‘definitely not’) to 4.0 (‘definitely yes’). Mid-point stands at 2.5.
Chapter 4: Results

Of all measures, respondents were most willing to buy more energy efficient light bulbs, appliances or motor vehicles (average willingness = 3.74), and, to a lesser extent, use less air-conditioning during the summer months (3.14) or purchase solar panels (2.94). They were less willing to car pool at least a couple of days a week (2.74) and walk or cycle to work, to go shopping or other places (2.61). Respondents were relatively unwilling to use public transport at least twice a week with the index (2.36) approaching more ‘probably not’ than ‘probably yes’ (Figure 19). More detailed information is available in Appendix F: Table 21.

Figure 19: Extent to which respondents are willing to adopt ‘climate change friendly’ measures. For average willingness, scales range from 1.0 to 4.0. 1.0 stands for ‘definitely not’, 2.0 stands for ‘probably not’, 3.0 stands for ‘probably yes’ and 4.0 stands for ‘definitely yes’. Mid-point stands at 2.5.
4.4.7 Source of news

Overall, 70.6% of respondents (n=540) considered the television as a main source of news. This was followed by the World Wide Web (38.7%), the radio (32.4%), newspapers and magazines (29.8%) and friends and relatives at the end (4.3%).

There was a significant difference in the main source of news between respondents who were aware of climate change and respondents who were not aware of climate change (p<0.00001) (Figure 20).

Figure 20: Main source of news among respondents who are aware of climate change (n=453) and respondents who are unaware of climate change (n=87).

Television was the main source of news for both respondents who were aware of climate change (68%) and respondents who were unaware of climate change (84%). However, whereas those who were aware of climate change also indicated the World Wide Web (45%), newspapers (34%) and the radio (32%) as main source of news, those
unaware of climate change indicated only the radio (37%) as a main source of news. A very small minority of respondents who were unaware of climate change indicated newspapers (8%) and the World Wide Web (5%) as a main source of news.

4.5 Relationship between variables and indices

Indices were constructed for a number of items as described in Section 3.6.2 to analyse relationships between different concepts. In total, five indices were constructed. These are the “Knowledge about Climate Change Index”, the “Risk Perception Index”, the “Human Health Effects of Climate Change Index”, the “Support for Policy Index” and the “Willingness to Act Index”.

All indices are constructs of a number of items that are related to the same concept. Internal consistency reliability testing was carried out for each index using either Cronbach’s alpha or Guttman Lambda 2 reliability testing as explained in Section 3.6.2.

In addition to the relationship between indices, the relationship between some variables and indices was also studied. These variables included ‘awareness about climate change’, ‘concern about climate change’, ‘the perception that people are dying because of climate change’ and ‘the perception that people are becoming ill because of climate change’.

Table 17 describes the relationships between different variables and indices in tabulated form. Spearman correlation analysis was used to study the relationships between different variables and indices. The variable names and index names used in the table are defined as follows:
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Awareness: refers to awareness about climate change

Concern: refers to the level of concern about climate change

People dying: refers to the perception that people are dying because of climate change

People becoming ill: refers to the perception that people are becoming ill because of climate change

Knowledge on Climate Change Index: is a construct of eight items relating to knowledge about the causes of climate change. The index achieves a Guttman Lambda 2 reliability score of 0.602 which means it is good for exploratory purposes.

Risk Perception Index: is a construct of six items relating to the perception that climate change will have an impact on people’s standard of living, water shortages and increased rates of serious disease in 50 years time, both worldwide and locally. The index achieves a Cronbach’s alpha reliability score of 0.797, which means it is a good index.

Health Effects of Climate Change Index: is a construct of seven items relating to knowledge about the direct human health effects of climate change. The index achieves a Guttman Lambda 2 reliability score of 0.605, which means it is good for exploratory purposes.

Support for Policy Index: is a construct of six items relating to willingness to support national climate change mitigation policy. The index achieves a Cronbach’s alpha reliability score of 0.452, which means it is a very poor index.

Willingness to Act Index: is a construct of six items relating to willingness to adopt a set of ‘climate change friendly’ measures. The index achieves a Cronbach’s alpha reliability score of 0.538 which means that it is a poor index but still acceptable.
Table 17: Correlations between variables and indices using Spearman Correlation Analysis

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Knowledge about Climate Change Index</th>
<th>People dying</th>
<th>People becoming ill</th>
<th>Risk Perception Index</th>
<th>Human Health Effects of Climate Change Index</th>
<th>Support for Policy Index</th>
<th>Willingness to Act Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concern</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge about Climate Change Index</td>
<td>-0.069</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People dying</td>
<td>0.204****</td>
<td>-0.119*</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People becoming ill</td>
<td>0.127**</td>
<td>-0.062</td>
<td>0.450****</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk Perception Index</td>
<td>0.146**</td>
<td>-0.077</td>
<td>0.319****</td>
<td>0.346****</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Health Effects of Climate Change Index</td>
<td>-0.087</td>
<td>0.002</td>
<td>0.199****</td>
<td>0.186****</td>
<td>0.276****</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Support for Policy Index</td>
<td>0.137**</td>
<td>-0.009</td>
<td>0.154**</td>
<td>0.119*</td>
<td>0.220****</td>
<td>0.067</td>
<td>1.000</td>
</tr>
<tr>
<td>Willingness to Act Index</td>
<td>0.032</td>
<td>-0.068</td>
<td>0.136**</td>
<td>0.165**</td>
<td>0.268****</td>
<td>0.108*</td>
<td>0.282****</td>
</tr>
</tbody>
</table>

****. Correlation is significant at the 0.0001 level (2 tailed)
***. Correlation is significant at the 0.001 level (2 tailed)
**. Correlation is significant at the 0.01 level (2 tailed)
*. Correlation is significant at the 0.05 level (2 tailed)
4.5.1 Awareness

Respondents who were unaware of climate change and thus had never heard of the words ‘climate change’ or ‘global warming’ were unable to answer any questions about climate change. However, they were still asked questions about willingness to act. This was done so as to determine whether awareness about climate change, after all, was related to willingness to act. Spearman correlation analysis shows that the relationship between awareness about climate change and willingness to act is very significant ($p<0.0001$). The two are positively correlated meaning that those who were aware of climate change were also more willing to take action that would reduce their greenhouse gas emissions.

4.5.2 Concern

Concern about climate change correlates positively and significantly with the perception that people are dying because of climate change ($p<0.0001$), with the ‘risk perception index’ ($p<0.01$), with the ‘support for policy index’ ($p<0.01$) and with the perception that people are becoming ill because of climate change ($p<0.01$). Concern does not reach significance at a $p$ value of 0.05 when correlated with willingness to act, knowledge about climate change and knowledge about the human health effects of climate change.

4.5.3 Knowledge about climate change index

The ‘knowledge about climate change index’ does not correlate significantly with any of the variables or indices in Table 17 except with the variable about people dying because of climate change. The relationship between knowledge about climate
change and the perception that people are dying because of climate change correlates negatively meaning that those respondents who were more informed about the causes of climate change were less likely to think that people are dying because of climate change.

4.5.4 People dying

The variable ‘people dying’ correlates significantly with all the variables under study. It correlates positively and very significantly (p<0.0001) with the perception that people are becoming ill because of climate change, with the ‘risk perception index’, with concern about climate change and with knowledge about the human health effects of climate change. It also correlates positively and significantly (p<0.01) with the ‘support for policy index’ and the ‘willingness to act index’. In contrast, it correlates negatively (p<0.05) with knowledge about the causes of climate change index.

4.5.5 People becoming ill

Similar to the variable ‘people dying’, the variable ‘people becoming ill’ correlates positively and very significantly (p<0.0001) with the perception that people are dying because of climate change, with the ‘risk perception index’ and with knowledge about the human health effects of climate change. It also correlates positively and significantly (p<0.01) with concern about climate change and with the ‘willingness to act index’, and less significantly but still significant (p<0.05) with the ‘support for policy index’.
4.5.6 Risk Perception Index

The ‘risk perception index’ correlated positively and very significantly (p<0.0001) with the variable ‘people dying’, the variable ‘people becoming ill’, the ‘human health effects of climate change index’, the ‘support for policy index’ and the ‘willingness to act index’. The ‘risk perception index’ also correlated positively (p<0.01) with the variable ‘concern’.

4.5.7 Human Health Effects of Climate Change Index

Knowledge about the human health effects of climate change correlated positively and very significantly (p<0.0001) with the variable ‘people dying’, the variable ‘people becoming ill’, the ‘risk perception index’ and also significantly (p<0.05) with the ‘willingness to act index’. The correlation was not significant at a p value of 0.05 with the ‘support for policy index’, the ‘knowledge about climate change index’ and with concern about climate change.

4.5.8 Support for Policy Index

The ‘support for policy index’ correlated positively and very significantly (p<0.0001) with the ‘willingness to act index’ and the ‘risk perception index’. It also correlated positively and significantly (p<0.01) with the perception that people are dying because of climate change and concern about climate change. There was also positive correlation between support for policy and people becoming ill at a p value of 0.05 but no significance with knowledge about the causes of climate change.
Chapter 4: Results

4.5.9 Willingness to Act Index

The ‘willingness to act index’ correlated positively and very significantly (p<0.0001) with the ‘support for policy index’, the ‘risk perception index’ and awareness about climate change. There was also significant positive correlation (p<0.01) with people becoming ill because of climate change and people dying because of climate change. Correlation was positive and significant (p<0.05) with knowledge about the human health effects of climate change index. Correlation was weakly positive with concern and negative with knowledge about the causes of climate change, however, these were not significant at a p value of 0.05.
Chapter 5: Discussion

The results of the study are discussed in this chapter, which will also undertake a comparison with other studies. In addition, qualitative data from the focus group, from the open-ended question on imagery and from respondent statements given during the telephone interviews, are used to substantiate and give meaning to the quantitative results, thereby providing a degree of triangulation to the study.

5.1 Awareness

The study shows that there is a widespread misunderstanding of climate change among the Maltese public. This is not surprising, as many studies show that climate change is very commonly confounded with air pollution, ozone depletion or seen under an umbrella of environmental problems without being seen as distinct (Bostrom, et al., 1994; Kempton, et al., 1995; Bord, et al., 1997, 1998, 2000; O'Connor, et al., 2002; Lorenzoni, et al., 2007).

It is quite astonishing, however, to find that 16% (+/- 3.1) of the Maltese public have never heard of the terms ‘climate change’ or ‘global warming’ before in their lives. This contrasts greatly with most studies on public perception of climate change among the American and British public but also in global surveys, which show that there is widespread awareness about climate change (DEFRA, 2002; Kempton, 1991; Lorenzoni, 2006). Although the results in foreign studies must be interpreted with caution, as high rates of awareness could be the result of non-response bias in postal surveys or the way the questionnaire was structured in telephone interviews, the relatively low awareness rate among the Maltese public could be a characteristic of a
small island state with a relatively insular population that is immune to messages from outside. This concept is supported by some of the respondent statements during the telephone interview, which show that respondents lack a global view of climate change; “I live in Floriana - there are a lot of cars, I can’t even take a table outside” ("noqghod il-Furjana – hafna karozzi, ma tohrogx mejda") or “I would like all roads to be covered in asphalt” ("nixtieq li t-toroq isiru kollha bl-asfalt").

It must be mentioned that a Eurobarometer survey in 2008 finds that 88% of the Maltese public perceives climate change as a very serious problem. It must also be pointed out, however, that this survey achieves a response rate of <50% (in Malta) and that the way the question is worded assumes that the respondent is already aware of climate change, clearly exposing the individual to social desirability bias\textsuperscript{15} (TNS, September 2008).

Understandably, the younger age groups (not significant at p value of 0.05) and the more educated (significant at p<0.00001) are more aware of climate change than their older and less educated counterparts. Probably, this is because younger generations are growing up in an environment that is much more tuned to environmental and climate change issues. It is however still unacceptable that, in the year 2009, 32.2% of Maltese respondents with a primary level of education and 20.8% of those with a secondary level have still not heard about climate change. This is a clear indication that awareness campaigns about climate change should be primarily targeted at the lower educated.

\textsuperscript{15} Social desirability bias is a term used to describe the tendency of respondents to reply in a manner that will be viewed favourably by others.
Interestingly, those who are aware of climate change tend to have a mix of sources of news including the television (68%), the World Wide Web (45%), newspapers/articles (34%) and radio (32%). In contrast, those not aware of climate change are more likely to have television (84%) and the radio (37%) as their sole sources of news, very few indicating the World Wide Web (5%) and newspapers (8%).

5.2 Concern about climate change

It is clear that the Maltese public views climate change as a problem and is, in general, concerned about it. This is evident by the high percentage of respondents (94.7%) who claimed climate change is a problem. Despite this, some individuals who identified climate change as a problem made statements such as “If it ever happens!” (“Jekk jiği! [il-bidla fil-klima]”) or “This is a natural process which the world passes through every so often” (“Process naturali li d-dinja tghaddi minnu”) subtly showing that deep down lies a certain degree of scepticism. Others claimed that climate change is a problem which must be tackled by governments and not by the people with statements such as, “It’s not our problem, but of governments” (“[Il-problema] mhux taghna, imma tal-gvernijiet”), absolving themselves of any responsibility they might have towards mitigating climate change.

On the other hand, concern about climate change translates mostly into concern for future generations, “for our children” (“ghat-tfal taghna”) or “for the children of our children” (“ghat tfal tat-tfal taghna”) and concern for other poor countries, “Malta will not be affected that much, climate change will mostly affect poor countries close to the Equator” (“mhux ha taffettwana daqshekk f’Malta imma ha taffettwa pajjizi fjari fejn l-Equator”). This is in line with other research which shows that people mostly
perceive climate change as a distant threat in space and time (Leiserowitz, 2006; Bord, et al., 2000; Bickerstaff, et al., 2008).

Nevertheless, the Maltese show as great a concern for themselves and their families (30.6%) as they show for people all over the world (32.0%). This contrasts with Leiserowitz’s (2006) study on the American public, which finds that Americans are mostly concerned about people all over the world (50%) and they show little concern for themselves or for their families (12%). This could also be a characteristic of a closely-knit densely populated Maltese community, which shows that the Maltese display a substantial amount of concern for their families, especially their children.

Having said that, these characteristics about concern are probably not unique to the issue of climate change alone; they are likely to emerge also on other global environmental issues of concern such as ozone depletion. In truth, climate change has been shown to lack issue salience in many countries, owing to its complex and insidious nature (Fischer, et al., 1991; Bord, et al., 2000; Poortinga & Pidgeon, 2003; Lorenzoni, et al., 2007). Although this argument cannot be substantiated quantitatively in this study on the Maltese public, as climate change was not compared to other social and environmental issues in salience, statements given by some respondents during the telephone interview indicate that climate change is, in fact, not at the top of everyone’s daily priorities. Such statements include, “daily problems are already big enough to stay worrying [about climate change]” (“il-problemi tal-hajja huma wisq kbar biex nogghodu ninkwetaw [fuq il-bidla fil-klima]”) or “there are other things which affect me more closely” (“hemm affarijiet ohra li jolqtuni iktar mill-qrib”) or “I’ve never given it much thought” (“Qatt ma hsibt fuqha daqshekk”). Lack of issue salience is
repeatedly documented in the literature as it is considered one of the main barriers to people not engaging in the issue of climate change (Lorenzoni, et al., 2007).

Interestingly, the groups of respondents who were more aware about climate change were overall less concerned about it. Thus, for example, respondents with a tertiary level of education achieved a 98.9% awareness rate but displayed a level of concern of less than 'somewhat concerned'. On the other hand, respondents with a primary level of education achieved a 67.8% awareness rate but displayed a level of concern somewhere between 'somewhat concerned' and 'very concerned'. Similarly, in Spearman correlation analysis, concern correlates negatively with knowledge about climate change and knowledge about the human health effects of climate change. Although this correlation does not reach significance at a 95% confidence level, these findings are consistent with other social research on climate change, which shows that those who are more informed about climate change are not necessarily more concerned about it. (Kellstedt, 2008; O' Connor, 1999).

5.3 Knowledge

This study reveals that, in Malta, people have a very limited understanding of climate change. Climate change is confounded with air pollution, ozone depletion, agricultural pesticide use and other environmental problems. Some respondents correctly referred to climate change as global warming, ice melting and sea level rise in the open-ended question. However, even these associations were most of the time contaminated with other incorrect associations by the same respondent. A typical example would be, "Temperatures always rising because of pollution, ice melting and
sea levels rising" ("Temperaturi dejjem joghlew kawża tal-pollution, silg jinhall u il-livell tal-bahar joghla").

From this research, it transpires that, the Maltese largely confound climate change with air pollution. They correctly identify cars and power stations as causes of climate change but mostly because cars and power stations are also causes of air pollution. For example some respondent statements included, "When [cars] emit fumes"\(^{16}\) ("Meta [l-karozzi] jdalilinu") or "Especially the Marsa power station, when I sweep the yard, it looks like black soil" ("Spejjalment tal-Marsa, niknes il-bitha, hamrija sewda").

When asked to indicate the health effects of climate change some identified asthma giving reasons such as "Because of pollution" ("Iktar liabba pollution"). In the open-ended question on imagery about climate change, 38% of respondents made reference to air pollution either directly as "pollution" or with short narratives such as "dire consequences, pollution, lung cancer" ("konsegwenzi koroh, pollution, kanċer tal-pulmun") or "pollution, public transport buses emitting black fumes, disease" ("'pollution', karozzi tal-linja jdahhnu, mard").

Given that Malta is a very densely populated country (1,309 persons per square kilometre) (NSO, Malta, 2009a), with a high car per capita ratio (NSO, Malta, 2009b), it is not surprising that air pollution is at the top of the Maltese public’s concerns. This is more so since Malta is characterised by polluting public transport buses waiting to be scrapped by a proposed reform for 2015 (MITC, 2008) and has been scientifically

\(^{16}\) "Duhhan" in Maltese refers to coloured fumes, black fumes or smoke which are an indication of incomplete combustion rather than normal transparent emissions of carbon dioxide from complete combustion.
shown to have exorbitant increasing rates of asthma among children (Montefort, et al., 2009). Thus, for the Maltese public, speaking about climate change is to a certain extent speaking about air pollution.

Many respondents (19%) also made connotations with ozone depletion, spray cans, CFCs (chlorofluorocarbons), high ultraviolet index and skin cancer, when they spoke about climate change. This is not surprising, as confusion between climate change and ozone depletion is widespread (Bord, et al., 1998; Kempton, et al., 1995; Bostrom, et al., 1994; DEFRA, 2002; Poortinga, et al., 2006). Interestingly, however, participants in the focus group noted that while climate change is being increasingly given more media coverage, strangely, ozone depletion “has now run out of fashion” (“‘Lately, l-‘ozone layer’ lanqas għadu moda”).

The Maltese public also perceives climate change as encompassing any possibly imaginable environmental hazard such as ‘detergents’, ‘soaps’ (‘spapen’), ‘sea pollution’ (‘tingż fil-bahar’), ‘waste’, ‘recycling’, ‘plastic bags’ (‘boroż tal-plastik’), ‘things we dump in the drainage’ (‘affarijiet li nitfghu fid-drainage’), ‘pesticide’ (‘bexx’), ‘chemicals’, ‘landfills’ (‘mizbliet’), ‘cigarettes’, ‘passive smoking’ and many others. Climate change is seen as something ‘bad’, thus, anything which is labelled as ‘bad’ in the Maltese mind is associated with climate change. For example, the reasons given by some respondents who incorrectly identified aerosol spray cans, pesticides and mobile phones as causes of climate change were, “[because] they go against nature” (“[ghax] kollha kontra n-natura”) or “all these are bad” (“Dawn l-affarijiet kollha ħżiena”). All this shows that the Maltese public’s level of knowledge about the contributors of climate change is extremely poor.
Some authors argue that the complexity of climate change science together with the lack of a clear understanding by experts themselves is one of the main reasons why climate change remains vague in the public’s mind (Bord, et al., 2000). This is in contrast with, for example, ozone depletion, which can be very easily pictured as a ‘hole’ in the ozone layer in the public’s mind and whose mechanism can be much more easily understood.

5.4 Human Health Effects

Due to the Maltese public’s low level of knowledge about the contributors of climate change, it was to be expected that misunderstandings about climate change would also persist when discussing the human health effects of climate change. Not surprisingly, when given a list of possible human health effects of climate change, respondents identified asthma and skin cancer as the two main human health effects of climate change. Clearly, asthma and skin cancer fit in the Maltese public’s mental model of climate change i.e. air pollution and ozone depletion.

‘Asthma and respiratory conditions’ topped the list with 91% of respondents indicating it as a human health effect of climate change. Skin cancer, evidently a human health effect of ozone depletion and not climate change, followed very closely with 90% of respondents indicating it as a human health effect of climate change. It was actually quite surprising that some respondents indicating asthma as a human health effect of climate change gave the correct reasoning for choosing it i.e. as a result of more frequent occurrences of heat: ‘High temperatures’ ('Temperaturi gholja'). However, the majority chose asthma either “because it has increased dramatically” ("Ghax żiedet drastikament") or “because of air pollution” ("Iktar habba pollution").
‘Allergies’ were also commonly indicated by the respondents (84%), the main reason being that the Maltese public associates asthma and allergies with each other. Thus, without giving it too much thought, most respondents who indicated ‘asthma’ as a human health effect of climate change also indicated ‘allergies’ as a human health effect of climate change.

Less than a majority of respondents (49%) indicated ‘infectious diseases’ such as malaria as a human health effect of climate change. However, it was evident from some respondent statements that not everyone understands exactly what malaria is. Some respondents claimed that “it comes from trees releasing yellow dust” ("Iktar mis-sigar li jitfghu it-trab l-isfar") or that it is more a matter of hygiene. Others incorrectly stated that a vaccine is available against malaria. On the other hand, the ones who correctly identified vector-borne diseases (infectious diseases such as malaria) as human health effects of climate change also commented that it would mostly affect Third World countries. To a certain extent, this is correct, as many vector-borne diseases do reside in poorer countries and would probably affect mostly poorer countries. However, it is not excluded that vector-borne diseases such as malaria or dengue fever might appear in Europe following the appearance of the mosquito Aedes albopictus (vector for dengue fever and chikungunya fever) in Italy in 2007 which gave rise to an outbreak of chikungunya fever for the first time in Europe (ECDC, 2007).

‘Diarrhoeal diseases’ are also expected to rise with climate change. In Third World countries, as water becomes scarce, diseases such as cholera tend to become commoner (European Research, 2007). Also in the developed countries, the frequency of diseases such as Salmonellosis corroborates very closely with temperature rise (Kovats, et al., 2004). This is beyond the Maltese public’s understanding of climate
change. Many respondents indicated or did not indicate diarrhoeal diseases as a human health effect of climate change because they claimed that diarrhoeal diseases had more to do with pesticides on agricultural products e.g. “Vegetables with pesticide” (“Ħaxixijiet bil-bexx”) than with climate change.

On the other hand ‘cardiovascular conditions’ winded down to the bottom of the list with only 32% of respondents indicating it as a human health effect of climate change. It appears that the Maltese public associates cardiovascular disease and cardiovascular events with physical activity, lifestyle and dietary intake. This is not surprising, seeing the high incidence of cardiovascular events that results from incorrect diets, obesity and relative physical inactivity. However, this does not exclude the fact that, as some respondents correctly pointed out, increased frequency and intensity of heatwaves will undoubtedly have an effect on cardiac-related mortality. Nevertheless, it seems that even though many Maltese make a link between climate change and heatwaves, few make the link between heatwaves and cardiac-related deaths.

In fact, ‘heatwaves’ were among the most commonly indicated human health effects of climate change (84%) despite not fitting in the air pollution or the ozone depletion framework. Interestingly, it was from the respondents’ experience that heatwaves are increasing in frequency – “they’re becoming commoner” (“Qed jiżdiedu”) – that many respondents decided to choose ‘heatwaves’ as one of the human health effects of climate change. This finding is doubled in the open-ended question on imagery where 17.1% of respondents (4th highest number of mentions) referred to extreme weather events such as heatwaves, cold spells and flooding when thinking about climate change – ‘heatwaves’ and ‘cold spells’ (“Ħafna shana, hafna ksieh”, “Kesha u shana esagerata”), ‘floods’ (“Gharar”) and ‘storms’ (“Maltemp”). This is
quite interesting as the Mediterranean region is actually projected to suffer from prolonged periods of drought and extreme weather events such as heatwaves and cold spells (IPCC, 2007). Interestingly, many respondents derive explanations for these references from experience and not from scientific literature. For example: "Excessive heat – excessive cold, the weather is not anymore like it used to be in the past" ("Hafna shana - hafna ksieh, it-temp m'ghadux bhal ma kien qabel") or "The seasons are not as they used to be, it's either very hot or very cold" ("Staguni m'ghadhomx li kienu, jew shana hafna, jew kesha hafna"). These views, though limited by their subjectivity, are a typical example of how the effects of climate change derived from experience are given more weighting by the public than other more scientifically correct but vague connotations to climate change.

Coincidentally, the Australian forest fire incident that followed above-normal high temperatures which started on 9 February 2009, occurred half way through the fieldwork (Guardian, 2009). This probably influenced some of the respondents' answers which included, "Like in Australia" ("Bhall-Awstralja") "It has already begun in Australia" ("Awstralja ga bdew").

In a nutshell, the Maltese public mostly understands the health effects of climate change through the air pollution and ozone depletion mental models. At the same time, it acknowledges the link between climate change and heatwaves but not the link between climate change and vector-borne diseases and infectious diarrhoeal diseases owing to its limited understanding of vector-borne diseases and to the overshadowing link between diarrhoeal disease and pesticides. Similarly, since cardiovascular events are very strongly linked to diet and physical activity in the Maltese mind, it was very
difficult for the Maltese public to conceptualise cardiovascular events as being possible effects of climate change.

In the open-ended question on imagery, 9.5% of respondents unprompted referred to health or disease when thinking about climate change. This is quite striking, taking into consideration that not one single respondent in an American study referred to health in an open-ended question on imagery about climate change (Leiserowitz, 2006). It is true that Maltese respondents who referred to health mostly understood climate change as air pollution, ozone depletion or as the prototype of all environmental problems, and thus was referring to conditions or diseases such as asthma and cancer. However, it is still impressing that, amidst this confusion and these misunderstandings associated with climate change, the Maltese public manages to make the link between the term 'climate change' and the concept of health and disease. This means that, at least, climate change in the Maltese mind is somehow linked to disease and seen as a threat to health.

5.5 Risk perceptions

5.5.1 People dying or becoming ill

When asked whether they think that people are dying or becoming ill because of climate change, 49.6% of respondents correctly stated that people are dying now and almost two thirds of respondents (63.3%) correctly stated that people are becoming ill now because of climate change. In addition, one quarter of respondents, think that people can die or become ill in the future.
Of particular interest is that among reasons given by respondents on why people
die or become ill, many correctly identified 'elderly dying from extreme temperatures'
('Anzjani bit-temperaturi għoljin' 'Ix-xjuh ma jifilhux għaliha'), 'floods' ('għarar'),
'fires from excessive heat' ('nirien minn snana eccessiva'), and water and food
shortages. Others correctly pointed out that low-lying countries are more at risk from
the effects of climate change, supposedly from sea level rise and storms. As expected,
many others incorrectly identified asthma, cancers and melanoma as reasons why
people die, and pollution, ozone and pesticides as reasons why people can become ill.

Some found it difficult to believe that people are dying more because of climate
change as they felt that "[today] many people are living longer" when compared to
decades ago. Others refrained from answering the question because they felt that,
whether people die or become ill because of climate change or not, depends on the
degree of adaptation to climate change. Nevertheless, overall, with the correct or the
incorrect reasoning, the Maltese public perceives climate change as a threat now and in
the future leading to people dying or becoming ill.

Of interest, respondents with a lower level of education were more likely to
think that people are dying now, whereas respondents with a higher level of education
were more likely to think that people will be dying in the future because of climate
change (p<0.05). This finding is consistent with the other finding that those with a
lower level of education were the least informed but the most concerned about climate
change. In fact, Spearman correlation analysis shows that concern for climate change
and the perception that people are dying because of climate change, are positively
correlated (p<0.0001).
5.5.2 Effects on standards of living, water shortages or rates of serious disease

Similarly, when asked to indicate the likelihood of lower standards of living, water shortages or higher rates of serious disease because of climate change in the next 50 years, respondents indicated rates of serious disease to be the most likely (average likelihood 3.00 – 3.28) of the three, again making reference to asthma, pollution, cars, melanoma and cancer.

Climate change was still considered to have an effect on standards of living and water shortages but the average likelihood ratios (2.65 to 2.85) were very close to the mid-point of 2.5, indicating that the perceptions of likelihood were very weak. Some respondents stated that standards of living had more to do with economics and purchasing power rather than climate change; making statements such as “It’s more about world economics” (“Iktar l-andament ekonomiku tad-dinja jaffettwa”) or “Prices are already going up” (“L-affarijiet qed joghlew diża”). This is not surprising given that the fieldwork was carried out during the peak of a global financial crisis. Consequently, these attributions could have undermined the link between climate change and standards of living.

The finding that the Maltese public thinks it is little likely that climate change will affect water shortages is quite surprising, given that it correctly attributes an increasing number of heatwaves to climate change. On the other hand, in the context that the Mediterranean region is projected to suffer from increased periods of drought and possibly water shortages (IPCC, 2007), the incorrect perception that climate change will have little effect on water shortages can undermine public support towards climate
change adaptation policy to harvest rainwater. Notwithstanding, respondents gave a variety of plausible justifications for their reasoning.

Firstly, they claimed that even though the Maltese islands suffer from a lack of rainfall, potable water has never been scarce, mostly because desalination plants pump up seawater and produce the required amount of potable water to meet public demand. In fact, it is estimated that more than 50% of potable water on the Maltese islands is produced from desalination plants (WSC, 2006). Thus, in the eventuality that rainfall decreases, respondents reasoned that desalination plants could always augment their production to compensate for the lack of water availability in water tables. Examples of respondent statements included “Because we get water from the sea” (“Habba li ngibu ilma mill-bahar”), “reverse osmosis”, “Man produces [water]” (“Il-bniedem jiproduci”).

Secondly, it happened that January and February 2009 – the period of the fieldwork - were characterised by above normal rainfall levels when compared to a 30-year mean (MetOffice, 2009). This was picked up by some respondents to argue that climate change will not bring about water shortages. Some examples of respondent statements included “[Unlikely], seeing that this year we had a lot of rain” (“[Aktarx le meta] tqis li dis-sena ghamlet hafna”) or “January we had the most rain” (comment given in English).

Thirdly, a good number of respondents incorrectly associated the melting of polar ice caps by climate change with a better availability of potable water. Such statements included, “The Arctic circle melts, that’s all sweet water” (“L-‘Arctic circle’ jishon, kollu ilma helu”). In my opinion, this is quite worrying, because it reveals not
only a poor knowledge of climate change but also very little common sense, given that between the poles and the Maltese islands is a vast bed of ocean sea water.

This finding, that the Maltese public believes or poorly associates climate change with periods of drought or water shortages, is also characterised in the open-ended question on imagery where only 2.9% of respondents attributed images of drought, deserts or water shortages to climate change.

Despite these limitations, a risk perception index – comprising of perceptions that standards of living, water shortages or increased rates of serious disease will occur because of climate change – correlated positively with support for climate change mitigation policy and a willingness to adopt climate change mitigation behaviour (p<0.0001).

Not surprisingly, respondents perceived climate change more of a threat to standards of living, water shortages and rates of serious disease worldwide than to people locally. This is consistent with other studies, which find that the lay public tends to underestimate risk on itself (Bickerstaff, 2008; Leiserowitz, 2003).

### 5.6 Support for National Climate Change Mitigation Policy

The Maltese public seems to be very supportive of climate change mitigation policy that includes projects for harvesting alternative energy, information provision and education, subsidies on domestic appliances such as solar panels, and the improvement of public transport. As one would expect, and similar to what other studies have shown, the Maltese are less supportive of, or outrightly oppose, measures which translate into a personal financial burden. These include a tax on petrol and diesel and
an eco-tax on energy inefficient businesses possibly leading to higher prices of some things that the public buys (Leiserowitz, 2006; Bord, et al., 1998; Kasemir, et al., 2003a; Shackley, et al., 2004).

More importantly, however, many respondents chose to support certain measures conditionally or stated that despite giving them their full support some measures had limitations. These conditions and limitations are not reflected quantitatively in the results but will be discussed using respondent statements given during the telephone interview.

For example, even though overall support for clean energy projects such as wind farms was high, many respondents stated that wind farms, as such, are not viable in Malta because of lack of space and because of high maintenance costs, “Only if there is space” (“Jekk ikun hemm post”) or “Not efficient, maintenance costs are high” (“Mhux effjenti, ‘maintenance’ għoli”).

Again, respondents who chose to support policy on education and information provision about climate change made comments such as, “It’s rather difficult to educate the Maltese public” (“Daqsxejn diffiqli biex teduka il-poplu Malti”) or “In this day and age, whoever is not informed is because he does not want to” (“Min ma jafx ghax ma fridx illum”). Arguably, this shows that even though the Maltese public is in favour of education in general, deep down there is an underlying scepticism that money spent on information provision could be either ineffective or could be better spent otherwise.

Similarly, the Maltese public supports subsidies on solar panels because it perceives subsidies as being generally ‘good’. Correctly, some respondents were in favour of subsidies on solar panels, as they see solar panels as an alternative to high
electricity fares, "[I agree] if electricity tariffs continue rising" ([Naqbel hafna] jekk jibqa’ jogħla d-dawl’). However, it was evident that many respondents did not make a difference between solar panels and solar water heaters, solar panels being relatively cost ineffective and solar water heaters being relatively cost effective. Some insinuated that many times, subsidies end up in the pockets of businesspeople rather than consumers, as the former usually adjust prices to make bigger profits. Others correctly stated that people living in apartments without having access to a roof would not benefit from these subsidies. In addition, with the growing number of permits issued to develop high-storey buildings, many respondents felt that high-storey buildings could shadow their roofs anytime. “It’s a problem - my neighbour could build three storeys anytime” ("Hafna intoppi – jiġi ta’ hdejk u jibnilek tliet sulari").

By far, the proposed measure to introduce a tax on petrol and diesel to discourage car use was the one which was met with the most fervent opposition. Respondents stated that apart from the recent increases in the prices of fuels, car use in Malta remains indispensable and people do not have alternative modes of transport. The public transport system was heavily criticised as being inefficient, inaccessible and virtually inexistent late at night or very early in the morning. Some respondents dared to state that “public transport is disastrous” ("trasport publiku brodu").

Parents stated they need the car to take their children to school. Others stated that this measure hits hard companies, small businesses and the workers, “Workers will be hit hard” ("Min hu haddiem se jbati") or “Business will slow down” ("Tnaqqas il-kummerċ"). Many stated that nowadays life is too hectic not to have a car, “This is a bit impossible in today’s hectic life” ("Naqra impossibli din. Fil-hajja mghaggla tal-lum"). Very few were in favour of this climate change mitigation measure, and the reasoning
they gave for supporting it was to decrease air pollution or because they were disgusted by heavy traffic.

Similarly, an eco-tax on businesses to encourage energy efficiency did not receive much support from respondents as many respondents felt that it was not fair that the price of incompetence on the part of companies is borne by consumers through higher prices. Thus, many respondents stated that they were more in favour of legislation and fines rather than tax, “I am in favour of legislation not tax” (“Naqbel ma’ legislazzjoni imma mhux ma’ tassa”). On the other hand many respondents commented that it was not in the interest of the company to waste energy and that contrary to being taxed or fined they could be helped through subsidies or information provision to become more energy efficient, “I don’t think that companies like wasting electricity” (“Ma nahsibx li kumpanija tiehu gost tahli l-electriku”), “Incentives and help” (“Incentivi u ghajnuna”). In consistence with the tax on petrol and diesel, some respondents felt that an ecotax on businesses would jeopardise jobs and this was the reason why they did not support this measure. This is also consistent with the finding of O’Connor et al. (2002) among Pennsylvanians, where the public was willing to support climate change mitigation policy as long as this did not affect jobs.

The proposition of spending money to improve the public transport system was fully supported. The Maltese public has been waiting for a reform in the public transport system for decades and let down over and over again through unmet promises. To a certain extent, consequently, some respondents viewed this proposition with scepticism. Nevertheless, a public transport reform was welcomed by the majority of respondents as long as the service is efficient, operates during hours which are convenient for the public, is manned by courteous and educated drivers, consists of non-polluting public
transport buses, and tariffs are kept at a reasonable price. Examples of respondent statements who welcomed this proposition but at a condition included, “If the times of operation are comfortable for the public” ("Jekk il-hinijiet ikunu komdu ghan-nies") or “If the change is radical” ("Jekk ikun hawn bidla radikali").

Interestingly, among the Maltese public, those most concerned about climate change and who perceive climate change as being a threat to health, standards of living and water shortages, were the ones to support climate change mitigation policy most. This is consistent with other research that finds that risk perception is a strong predictor of support for policy (Leiserowitz, 2006; Bord, et al., 2000). On the other hand, those who had a better knowledge of the contributors of climate change and of the human health effects of climate change did not necessarily show more support towards mitigation policy. This is quite surprising as literature shows that knowledge about climate change is an independent predictor of support for policy (Kempton, et al., 1995; Bord, et al., 1998). Despite this, the construct on support for policy in this present study is quite weak and achieves Cronbach’s alpha of 4.52. This indicates that the construct for support for policy reflects other issues other than simply a support for climate change mitigation policy. These issues include the feasibility of proposed measures which were taken into account by some respondents when deciding on the extent to support climate change mitigation policy. Furthermore, respondents who were better informed about climate change were also better informed about the pros and cons of measures to mitigate climate change, and so were in a better position to discuss why some measures were not feasible in Malta.
5.7 Willingness to adopt climate change mitigation behaviour

Similar to support for climate change mitigation policy, willingness to adopt climate change mitigation behaviour among the Maltese public is also to a great extent determined by the perception that climate change is a threat to health, standards of living and water shortages (p<0.01). However, in addition to risk perception, willingness to adopt climate change mitigation behaviour was also found to be determined by knowledge about the human health effects of climate change (Spearman correlation analysis = 0.108, p<0.05) but not by knowledge about the contributors of climate change.

Overall, the Maltese demonstrate a willingness to adopt climate change mitigation behaviour, mostly for financial and health reasons. Very few declared that they were willing to take action because of their environmental concerns towards climate change. As expected, respondents were most willing to take action that did not require substantial personal sacrifice, did not come at a cost and could easily be done at home. This is consistent with findings in other studies on the American and British public that demonstrate a degree of ambivalence and apathy towards adopting climate change mitigation behaviour (Bord, et al., 1998; Kirby, 2004; Leiserowitz, 2006). Furthermore, a survey by DEFRA (2002) also finds that among Britons who are willing to conserve energy, most do so for financial and health reasons.

Despite this, Spearman correlation analysis of the results of this study shows that, independently from financial or other reasons, those respondents who were aware of climate change were still more willing to take climate change mitigation action when compared to respondents who were unaware of climate change (Spearman correlation
analysis = 0.246, p<0.0001). Although education could possibly have a confounding effect in this regard, it makes sense that awareness about climate change is basic in getting the public tuned to messages about climate change and in influencing the public’s willingness to take mitigation measures.

In view of the fact that electricity tariffs had been increased in the months prior to the fieldwork, it was to be expected, that respondents were willing to buy energy efficient light bulbs and to use less air-conditioning during the summer months. Some respondent statements included “For financial reasons” (“Habba l-but”), “Because otherwise I’ll have to pay high electricity costs” (“Habba d-dawl ghax jiġi gholi”) and “To save on costs” (“Biex tnaqqas mill-ispejżeż’). Similarly, some respondents were willing to cycle to work or car pool “to save petrol” (“Biex niffranka l-petrol’), although these were very few.

On the other hand, a good number of respondents were still not willing to use less air-conditioning despite the rise in electricity tariffs, because they felt that using air-conditioning is not a choice but a must in Malta during the summer months. “It has become a necessity” (“Saret necessità’). The heat at night was described by some as unbearable, “I do not sleep if I do not use air-conditioning” (“Ma norqod xejn jekk ma nixghelux’).

Interestingly, it was felt that many respondents were not in the habit of throwing things away, even if this meant replacing old energy inefficient appliances with new energy efficient ones. Maltese have a culture of throwing away appliances, only, if they have run out of use irrevocably. As some respondents stated, “I will buy energy efficient [appliances] only, once the others have run out of use” (“X’hin jispiċċawli,
nixtri dawk li jiffrankaw” or “X’hin jinharqu l-ohrajn”). A participant in the focus group stated that it is “man’s instinct not to throw things away until they have stopped functioning” (“L-istint tal-bniedem huwa li meta jispiċċalek tibdel’”). This is in contrast to the American public, which showed a high degree of willingness to replace inefficient appliances (Bord, et al., 2000). Interestingly, some participants in the focus group suggested a part-exchange system where old appliances are part exchanged for new ones at a discounted price. They said that, in the eventuality that this system existed, they would consider replacing their older appliances.

Many respondents confounded solar panels with solar water heaters.17 Although respondents claimed they were somewhat willing to purchase solar panels, many of them were referring to solar water heaters, which in fact are more economically viable. Nevertheless, many respondents were still hesitant about the financial capital outlay that this measure required, “I do not afford them at the moment” (“Ma naffordjahomx bhalissa’) and argued that government must help more, “Still expensive” (“Ghadhom ‘expensive’”), “We need more subsidy” (“Bzonn iktar sussidju”).

Many argued that since they live in apartments they either do not have a roof or else have a shared roof with neighbours living in the same building, in which case they have to apply for special permits to install solar panels or solar water heaters on their roof. “I live in an apartment. If I had a roof, I would have already installed [solar panels]” (“Go ‘flat’ noqghod. Kieku għandi l-bejt, kieku ga ghamilt [solar panels]”).

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17 Solar panels convert light energy into electrical energy which is usually fed back into the national electricity grid. Solar water heaters store solar thermal energy in the form of hot water, ready for use in showers.
“I’d like, but I do not have any rights on the roof” (“Nixtieq imma m’ghandix dritt ghall-bejt”).

Car-pooling proved to be somewhat unpopular among the Maltese public even though overall, the Maltese public is still willing to adopt this measure. Reasons for refusing to car pool ranged from “I don’t want anybody in my car”, “I don’t like being dependent on other people” (“Ma nhobbx niddependi fuq haddiehor”) or “Life is hectic” (“Il-hajja mghagglá”) to “I can’t, because of the nature of my job” (“Bix-xoghol li ghandi ma nistax”) or “Because of my children” (“Habba t-tfal’’). It is evident that car-pooling demands a great deal of personal sacrifice. People are not ready to give up their comfort to mitigate climate change even if this saves money. This is consistent with other research (Bord, et al., 2000). The reason given by respondents who were willing to car pool was that it was otherwise difficult to park during weekends. “During weekends because it is difficult to find parking.” (“Fil-weekends minhabba parking”).

Not surprisingly, the Maltese public is unwilling to use the public transport because, as already discussed, they perceive it as inefficient and unpractical, “You can’t rely on the service” (“Is-servizz ma torbotx fuqu”) or “they are not efficient” (“Mhumiex effijenti’’). Some respondents feel that they do not even consider using the service as they have not used it in ages now, “I haven’t used public transport in ages” (“Ili ma nuża l-karozza tal-linja żmien u ghomor”). Others claim that even if the public transport were to become efficient, life has become so hectic that car use is indispensable and they would still not use the public transport service. “Life has become too fast [to use public transport]” (“Il-hajja mghagglá wisq [biex nuża tal-linja’’).
Similarly, Maltese are very reluctant to walk or cycle to work or other places instead of making use of other modes of transport, to mitigate climate change. Rightly, they claim that the roads in Malta are not safe for cyclists. There are no proper cycle lanes and roads are dense with car traffic. “There’s no safety on the roads” (“Toroq mhux safe bizzejjed”). In addition, workplaces are not equipped with showers, and even though some respondents were willing to risk their lives on the road, they disliked the idea of arriving sweaty at work. Some respondents had mobility problems and so, faced with an inaccessible public transport system, were left with no other alternative but to use a car. Others have become so much ingrained in the habit of using a car that they find it extremely difficult to change their lifestyle and start walking or cycling to places instead. One respondent claimed that “I also use my car to go to places within Haż-Żebbuġ 18 itself” (“Anki ġo Haż-Żebbuġ bil-karossa ukoll”).

Very interestingly, those respondents who were willing to walk or cycle stated that they were ready to do so for health reasons or because their family doctor had told them to do some physical exercise every day. “My doctor tells me that walking is good for diabetes and for the heart” (“It-tabib jghidli tajjeb il-mixi ghaz-zokkor u ghall-qalb”). Maybe more importantly, there was not one single respondent who claimed he or she was willing to walk or cycle more to mitigate his or her effect on climate change. This is a case in point where climate change is not salient to the public whereas health is.

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18  Haż-Żebbuġ is a small village in the centre of Malta
5.8 Limitations

The study encountered a number of limitations that could have had an effect on the measure of its results. These limitations are mentioned and the extent to which they could have had an effect on the results is discussed.

The main limitation of the study was the telephone survey methodology, which directly excluded participants who were ex-directory and or who did not have a landline. This totalled to 16.0% (128 participants) of the total sample. In view of the fact that the telephone survey methodology was still judged to be the most appropriate survey methodology for the purpose of the study, it is recommended that to obtain a more representative sample of the study population, one could resort to a mixed-method survey methodology. Due to the timeframes of this study (18 months in total), a mixed-method survey methodology was not feasible in this study. On the other hand, it is still questionable whether the complexity of a mixed-method survey methodology is worthwhile given that this study achieved a good enough representation in the respondent sample of this study (by gender, age, district, education, occupation and labour status).

Another main limitation of the study was the March 2008 Electoral Register which was used as the sampling frame for this study. The register contains a list of all Maltese residents19 above the age of 18 years by name, surname and residing address. However, the residing addresses in the Electoral Register do not always correspond with the true residence of the individuals. This is especially true for individuals who appear to live in Gozo or in St. Paul’s Bay, in their holiday residences, but who actually reside

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19 For definition of Maltese resident see Section 3.1.2.
Chapter 5: Discussion

at a different address in Malta. Having said this, there is no better available complete
register for Maltese citizens above the age of 18 years than the Electoral Register, since
the Census (which is carried out every 10 years) is not available for research purposes.
Other methods of random sampling, such as random telephone number dialling, could
be explored – however, the representativeness of the sample and the feasibility of the
method need to be explored before the main fieldwork.

Another limitation of the study is the research tool. In social research,
questionnaires that are designed to produce quantitative results are very likely open to
biases such as social desirability bias i.e. the tendency of respondents to reply in a
manner that will be viewed favourably by others. Questions in this study have been
designed on another questionnaire that had already passed reliability and content
validity testing, and were designed in a way to prevent influencing the respondent from
answering one way or the other way. However, some biases, such as social desirability
biases, are beyond the researcher’s control and the only way to misinterpret quantitative
results is to triangulate them against qualitative results. This study has tried to achieve
this by creating opportunities whereby qualitative data could be collected i.e. a focus
group, an open-ended question, and probing for explanations during the telephone
interview.

There were two interviewers in this study – the author of the study and an
interviewer external to the study. Inter-interviewer and intra-interviewer bias were
minimised as much as possible by deciding to adhere to the exact wording in the
questionnaire when carrying out the interviews. The interviewer was trained beforehand
and participants were unsystematically and informally randomly allocated. Had
participants been systematically randomly allocated and possibly matched by gender,
age and district, 'Kappa index' could have been calculated to reveal the extent of inter-interviewer variability.

Another limitation in the study is the non-response bias. Of the eligible sample, there were 7.3% of respondents who either directly refused to participate or were difficult to find (e.g. due to long hours of work). Although, non-respondents probably have different characteristics from respondents and thus could have different opinions, 7.3% is actually quite a low non-response rate.

More importantly, the fact that the study was being carried out by a medical doctor who introduced himself as such could have subconsciously influenced respondents in making the link between climate change and health. This could have contributed towards the number of times that the two were linked together in the open-ended question, an incidence that was quite substantial when compared to other studies (Leiserowitz, 2003). At the same time, introducing the study as being carried out by a medical doctor probably helped in achieving a good response rate, as Maltese people still show a degree of trust in the medical profession.

Another limiting factor in the study is the period during which the fieldwork was carried out. In fact, a number of authors have argued that concern for climate change waxes and wanes with weather fluctuations and media attention (Ungar, 1992; Krosnick, 1997). Although, it is definitely beyond the researcher's control to determine the external factors of the study, these factors were kept in mind when interpreting results. The period of the fieldwork of the study happened to be at the peak of one of the biggest global financial crisis in history, a few months after government raised the tariffs of water and electricity, and half way through a particularly cold winter that was
characterised by above average rainfall. At the same time, Australia was experiencing record high temperatures and forest fires during the period of the study, which were claiming lives and making headlines all around the world. All these occurrences had an influence on respondent answers.

Finally, random errors with data inputting always occur, since data was inputted manually. In addition, constructs of items reflecting the same concept were generated and internal consistency reliability testing was carried out for each construct. Some constructs, especially the “Support for Policy Index”, did not achieve an internal consistency reliability value of at least 0.6 meaning that these constructs were relatively weak. These constructs were still used for relationship analysis with other variables and other constructs, however these relationships should be interpreted with caution.
Chapter 6: Conclusion and Recommendations

6.1 Conclusion

In conclusion, this study finds that the Maltese public is concerned about climate change – but its understanding of climate change is substantially different to what scientists and researchers understand by the term. The concept of climate change for the Maltese public is more of air pollution, stereotypically the picture of cars, buses and electrical power plants coughing up black smoke in the air, with deleterious effects on health in the form of asthma or cancer. It is a picture that is also confounded with ozone depletion, increased ultraviolet radiation and skin cancer. In addition, the Maltese public finds it difficult to discern climate change from other environmental issues such as agricultural pesticide use or the issue of waste and recycling.

Despite this, the Maltese still show considerable concern for their families and children, and even though naturally they perceive climate change as being more of a threat to others than to themselves, the concern they show for their families is substantially higher than that found in other studies among the American public (Leiserowitz, 2003). This concern also translates into concern for their health, the health of their families and of their children, all of which were surprisingly linked to climate change unprompted.

Despite a flawed understanding of climate change, the perception that climate change is a threat to health was the strongest driving force behind the Maltese public’s willingness to support mitigation policy and to undertake some measures to mitigate climate change. This means that even in the absence of a correct understanding of
climate change, people were still willing to do something about climate change once they recognised that climate change is a threat to health.

Notwithstanding, this study finds that accurate knowledge about the human health effects of climate change correlated positively with a willingness to take up climate change mitigation measures. And even though knowledge about the health effects of climate change was less strongly linked to a willingness to act than a perception that climate change affects health, both knowledge and perception go hand in hand as demonstrated by the highly significant correlation between knowledge about the human health effects of climate change and perceptions that climate change affects health.

Health was not the only reason behind choosing to support policy or change behaviour. As demonstrated very strongly by the qualitative analysis of this study, the rationale given by most respondents when deciding whether to support policy and change behaviour or not, included financial reasons, an opposition to measures which threatened comfort and a sheer ambivalence to change one's lifestyle.

Furthermore, the Maltese public is facing a number of barriers that are not facilitating engagement with the issue of climate change. A few of these barriers include physical barriers (e.g. lack of showers on the workplace, unsafe roads to walk or cycle), systematic barriers (e.g. a lack of an efficient public transport system) and financial barriers (e.g. capital outlay to buy energy efficient equipment). These barriers are very similar to those perceived by the British public when it comes to engaging with climate change, as the paper by Lorenzoni et al. (2007) explains in great depth. These authors argue that “targeted and tailored information provision should be supported by wider
structural change to enable citizens and communities to reduce their carbon dependency” (Lorenzoni, et al., 2007, p.445).

Finally, the author of this study argues that a number of factors must be in place for the Maltese public to engage in the issue of climate change. Awareness campaigns and information provision have been - and remain - a fundamental component to engaging the public, but only if these are placed in the context of a physical, social and political environment which is conducive to public support for policy and mitigation behaviour. Health has been demonstrated in this and other studies (Leiserowitz, 2006, Bord, et al., 2000) as having a crucial role in making climate change salient in people’s lives and in the words of Kovats et al. (2005, p.1409) health is being “increasingly used as a justification for action on climate change”. Accordingly, climate change campaigns should be framed within a context that places an added emphasis on climate change as a threat to one’s health rather than as a distant environmental phenomenon. Information provision should not be limited to the contributors and science of climate change, but has to highlight the human health effects of climate change, which are eventually bound to affect all. At the end of the day, a Maltese public which is more aware of a climate change which will affect the health of its families and of its children, is one which is better tuned to climate change messages, more supportive of climate change policy and more willing to take up climate change mitigation behaviour.
6.2 Recommendations

This study makes a number of recommendations that are targeted primarily at policymakers who are responsible for laying down the framework for better public engagement on the issue of climate change. Moreover, there are also a number of recommendations for further research on climate change and health.

6.2.1 To policymakers

6.2.1.1 Awareness-raising

Raising awareness about climate change among the Maltese public is the first recommendation presented by this study, as findings show that 16.2% (13.1-19.3%) of the Maltese public is unacceptably unaware about climate change. This is important, not only because awareness is the first step to attract the public’s attention towards more in-depth information about the issue of climate change, but also because awareness itself has been shown in this study to be an independent predictor of willingness to take up climate change mitigation behaviour.

Since this study finds that awareness varies significantly by demographic factors, a population-based approach to raising awareness may not be needed. For example, those with a post secondary and tertiary level of education achieved an almost 100% awareness rate whereas those with a primary and secondary level of education achieved a 68-78% awareness rate. In addition, this study finds that those unaware of climate change were more likely to have television and the radio as their main source of news rather than the world wide web or newspapers and magazines. Thus, a target
group based approach to raising awareness through the right communication channels could be the most effective way to raising awareness.

Awareness was also found to vary by occupation with professionals and managers achieving almost 100% awareness while those having elementary occupations achieving 65.5% awareness rate. Thus, it would be a good idea to raise awareness and provide information at workplaces where there is a higher concentration of for instance, manual labourers (e.g. factories).

Younger age groups were also more aware of climate change showing that, in addition to a general higher level of education, initiatives in schools such as Ekoskola are raising awareness on climate change among children and should be supported and maintained.

6.2.1.2 Imagery and Health

Secondly, this study finds that there are numerous misunderstandings about climate change, its causes and associated health effects. Although it is undesirable that these misunderstandings exist, it is useless to continue to blindly assume that the Maltese public have a very good understanding of climate change when in fact this study shows the contrary. This study provides a good starting point for policymakers to understand what the present Maltese public perception on climate change is, and frame their campaigns on these perceptions addressing, if required, misunderstandings. The open-ended question on imagery provides a wealth of information on the various faces that climate change takes in the Maltese mind.
Chapter 6: Conclusion and Recommendations

It is evident that climate change is not a salient issue to the Maltese public but is eclipsed by more important everyday issues—among which are health and family problems. However, the Maltese public is willing to engage in the issue of climate change if it perceives climate change as a threat to health. The author of this study thus argues that if climate change is framed as a message through health than it becomes salient to the public. Thus, if policymakers want the public to get involved in the fight against climate change, climate change must be marketed as a threat to health rather than as an ecological problem.

Furthermore, this study finds that correct knowledge about the health effects of climate change goes hand in hand with the perception that climate change affects health and correlates positively with a willingness to do something about climate change. Thus, whereas information about the causes of climate change is important as it equips the public with the knowledge required to support climate change mitigation policy, information provision about the health effects of climate change is just as important as it prompts individuals to take action to mitigate climate change. Information about the health effects of climate change will also be of utmost importance in gaining public support for adaptation policy to climate change in addition to mitigation policy.

6.2.1.3 The value of experience

An anonymous saying goes "experience is the strictest teacher, it gives you the test first and the lesson after". This study finds that many times respondents tried to understand and develop a rationale for climate change from their experience. In this study, explanations derived from experience were most of the time wrong because climate change, being a long-term phenomenon with insidious effects, is difficult to
experience directly\textsuperscript{20}. However, there were also correct references from experience to climate change such as that seasons changed from the time the respondent was a child, or that heatwaves are becoming more intense. Given that experience is likely to be more valued by the public much more than any scientific literature, policymakers can take the opportunity to focus their education programmes on correctly linked everyday experiences. Programmes that relate better to everyday experience are more likely to register a higher level of success.

6.2.1.4 Importance of critical appraisals of policies by the Maltese public

Following this study, policymakers are in a better position to identify which policies are likely to be supported by the Maltese public and which are not. For example, national investment in a more efficient public transport service is likely to enjoy greater support among the Maltese public when compared to an eco-tax on petrol and diesel as an indirect measure to discourage car use.

In addition, this study also provides the reasons behind support for certain policies and resistance to others. These reasons may be even more valuable to policymakers as this means that certain policies need not be put aside, but modified or re-designed in a way to meet the Maltese public’s expectations.

\textsuperscript{20} Climate change does not cause heatwaves, storms or floods directly. These are all the results of short-term climatic phenomena. Climate change takes place over decades and alters the overall patterns of how heatwaves, storms or floods occur. Thus, climate change may bring about more frequent and more intense heatwaves, a higher frequency of storms and concentrated rainfall precipitation, but it is not the source behind each individual event.
6.2.1.5 Addressing barriers to public engagement

Similarly, this study provides some of the reasons why the Maltese public is willing or not willing to take up certain climate change mitigation measures, and the barriers it encounters towards adopting these measures. As argued by Lorenzoni et al. (2007), the public faces a number of physical and psychological barriers towards adopting climate change mitigation behaviour. These barriers need to be addressed and brought down so as to create an environment that is more conducive towards mitigation behaviour.

6.2.2 To researchers

6.2.2.1 Research focus on climate change and health

It would be highly desirable for this study to be followed by more research on the public perceptions of climate change and its human health effects given that health appeared to be central in the public understanding of climate change.

This study generates a new hypothesis: that knowledge about the human health effects of climate change correlates with a willingness to adopt climate change mitigation behaviour. It is strongly recommended that this study is followed up by an analytical study to examine this hypothesis.

6.2.2.2 Use of constructs

The use of constructs/indices is also recommended, as these provide an opportunity to study the relationship not only between single items, but also between sets of items related to the same concept – thus, between concepts. Since some of the constructs in this study did not achieve strong internal consistency reliability indices, it
is recommended that constructs are pre-tested, modified and post-tested, to achieve higher reliability indices with more reliable correlations.

### 6.2.2.3 Characteristics of a small island state

It was outside the scope of this research project to study the public perceptions of the vulnerabilities of a small island state such as Malta. Since this study shows that the Maltese public perceptions on climate change differ in some ways from that of other bigger countries (e.g. it shows more concern to itself), it would be interesting to study the extent to which the people of small island states are aware of their vulnerabilities to climate change. Support for climate change adaptation strategies in years to come may be just as important, if not more important, to small island states.

### 6.2.2.4 Intervention study

This study hypothesises that with proper awareness campaigns, information about climate change highlighting its effects to human health, and an environment that is conducive to public climate change mitigation behaviour, the Maltese public will become more involved in the climate change issue, and willingness to change behaviour will translate into action. An intervention study is recommended whereby all these factors are put in place in a particular setting (e.g. a locality, workplace) and the behaviour of the people who are living or working in the setting is observed longitudinally.
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Appendices

Appendix A: Acceptance of proposal by the Board of Studies of the Public Health Department
Dear Dr. Debono,

3rd April, 2008

Roberto Debono,
17, Il-Gewnah, Triq l-Arkati,
Fleru De Lys,
B’Kara

The Maltese public’s perceptions on climate change

We refer to your proposal for the thesis in part fulfilment of MSc. The proposal has been reviewed by the Board of Studies and has proposed the following amendments.

Needs to emphasize the public health importance and develop rational for climate change

Clarity the sampling frame

Include costing of manpower

Thesis proposal is accepted with modifications

Please proceed to apply for ethical permission but send a revised version of the proposal by the end of April.

Dr Julian Mamo
Head, Public Health Department

Dr Charmaine Gauci
MSc Coordinator
Appendix B: Approval by the University Research Ethics Committee
Ref No: 33/2008

1st August 2008

Dr Roberto DeBono
17 Il-Gewnah
Triq l-Arkati
Fleur-de-Lys, BKR 1980

Dear Dr DeBono,

Please refer to your application submitted to the Research Ethics Committee in connection with your research entitled:

THE MALTESE PUBLIC PERCEPTIONS’ ON CLIMATE CHANGE

The University Research Ethics Committee at its meeting of 11 July 2008 approved the above-mentioned Protocol.

Yours sincerely

[Signature]

Dr M Vassallo
Chairman
Research Ethics Committee
Appendix C: Questionnaire in the Maltese language
**Questionnaire**

**Introduzzjoni:** Bongu/Il-wara nofsinhar it-tajjeb sinjur/a,

Jiena it-Tabib Roberto DeBono. Qed naghmel studju fuq il-‘Bidla fil-Klima’ jew ‘Climate Change’ bhala parti mill-istudju tieghi fil-Kors tal-Masters fis-Sahha Pubblika, u xtaqt naghmillek xi mistoqsijiet. Int jimporta ghalik jekk naghmel kwestjonarju qasir li jiehu xi ghaxar minuti jekk joghġbok?

Qabel xejn nixtieq nghidlek li inti wiehed minn kampjun ta’ 800 ruh li ittellghu bix-xorti u inghataw lili mill-Ufficju ta’ l-iStatistika.

Jekk tippreferi, nista’ ncempillek f’hin iehor, meta forsi tkun aktar komdu/a.

Kull informazzjoni li taghtini tinżamm kunfidenzjali. Se nuzaha biss ghall-finijiet ta’ l-istudju li qed naghmel u tigi processata skond ir-regoli stabbiliti fid-‘Data Protection Act’.

**‘Awareness’**

1 Qatt smajt bis-suggett tal-‘Bidla fil-Klima’, ‘Tibdil fil-Klima’ jew ‘Climate Change’? ‘Global warming’ jew ‘Bidla fit-Temp’? *(underline the one he/she has heard about)*
   
   Iva ☐ Le ☐

2 X’ğiġik f’mohhok meta tisma’ il-fraţi ‘Bidla fil-Klima’?

   ____________________________________________  ____________________________________________

3 B’mod ġenerali, tahseb li l-bidla fil-klima hija problema?

   Iva ☐ Le ☐ Ma nafx ☐

4 Il-bidla fil-klima tinkwetak?

   Iva ☐ Le ☐
5  Jekk iva, kemm tinkwetak?
   1 Ftit □
   2 Mhux ħażin (Insomma) □
   3 Hafna □

**Informazzjoni**

6  a) Se nsemmilek lista ta’ affarijiet li jistghu jikkontribwixxu jew ma jikkontribwixxux ghall-bidla fil-klima. Liema minn dawn l-affarijiet f’Malta, jikkontribwixxu ghall-bidla fil-klima?
   1 Il-‘power stations’ Iva □ Le □ Ma nafx □
   2 Il-karozzi u vetturi ohra ta’ trasport Iva □ Le □ Ma nafx □
   3 Bottijiet ta’ l-‘ispray’ Iva □ Le □ Ma nafx □
   4 Il-pestičidi Iva □ Le □ Ma nafx □
   5 Il-produzzjoni u l-konsum ta’ l-‘ilma tal-vit’ Iva □ Le □ Ma nafx □
   6 L-użu ta’ appliances li jużaw l-elettriku bhal freezers, televisions, air-conditioners, toasters Iva □ Le □ Ma nafx □
   7 Il-toqba fl-ozone Iva □ Le □ Ma nafx □
   8 Il-miżbla tal-Maghtab Iva □ Le □ Ma nafx □
   9 Il-mobiles Iva □ Le □ Ma nafx □

Ohrajn ____________________________

b) Kieku kelli nerga’ nsemmihomlok, liem wahda tahseb li l-iktar li tikkontribwixxi ghall-bidla fil-klima? (re-read the ones to whom the respondent answered ‘yes’)
______________________________ (only one)

**L-Effett tal-Bidla fil-Klima fuq is-Saħħa tal-Bniedem**

7  a) Tahseb li n-nies jistghu imutu minħabba il-bidla fil-klima?
   Iva □ Le □ Ma nafx □

b) Jekk iva, madwar id-dinja, tahseb li dan diga’ qed jiġri, jew se jsehh fil-futur?
   Issa □ Futur □ Ma nafx □

2
8 a) Taħseb li n-nies jistgħu jimirdu minħabba il-bidla fil-klima?
   Iva □ Le □ Ma nafx □

b) Jekk iva, madwar id-dinja, taħseb li dan diġa' qed jiġri, jew se jsehh fil-futur?
   Issa □ Futur □ Ma nafx □

9 Kemm taħseb li dawn l-affarijiet li se nsemmi se jsehhu fil-50 sena li gejja minħabba il-bidla fil-klima?

<table>
<thead>
<tr>
<th></th>
<th>Żgur li</th>
<th>X'aktarx</th>
<th>X'aktarx</th>
<th>Żgur li</th>
<th>Ma Naľx</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Il-livell ta' l-ghajxien ta' ħafna nies madwar id-dinja se jonqos minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>b) Se jkun hawn nuqqas ta' ilma madwar id-dinja minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>c) Se jkun hawn iktar nies madwar id-dinja li jimirdu b'mard serju minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>d) Il-livell ta' l-ghajxien tieghek jew tal-familja tieghek se jonqos minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>e) Se jkun hawn nuqqas ta' ilma f'Malta minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>f) Il-probabbilta' li int jew il-familja tieghek timirdu b'mard serju se jiżdied minħabba il-bidla fil-klima</td>
<td>1</td>
<td>2</td>
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<td>9</td>
</tr>
</tbody>
</table>

10 Liema minn dawn li gejjin l-iktar li tinkwetak? (mark only one)

**L-effett tal-Bidla fil-Klima:**

1 Fuqek u fuq tal-familja tieghek □
2 Fuq il-Maltin □
3 Fuq nies madwar id-Dinja □
4 Fuq in-Natura □
5 Ma jien inkwetat xejn □
11 Se nemmilek lista ta’ affarijiet – uhud se jigu affettwati mill-bidla fil-klima u ohrajn le. Liema minnhom tahseb li se jiġi affettwat minħabba il-bidla fil-klima?

1 Mard infettiv bhall-malaria
2 Asthma u mard tan-nifs
3 Allergiji (hay fever, rashes)
4 Mard tal-qalb
5 Mard li jiġib id-diarrhoea
6 Kanċer tal-gilda
7 Heat waves

Policies

12 Il-gvern Malti ghandu sehem importanti f’li jassigura li Malta ittaffi l-impatt taghha fuq il-klima. Kieku inti, kemm taqbel jew ma taqbilx ma’ dawn il-miżuri li ġejjin?

<table>
<thead>
<tr>
<th>a) Li jintefqu flus biex jinholqu progetti bhal wind farms biex Malta ġigib ċertu ammont ta’ energija mir-rih u x-xemx.</th>
<th>Ma nafx</th>
<th>Naqbel xejn</th>
<th>Naqbel hafna</th>
<th>Naqbel fit</th>
<th>Naqbel hafna</th>
<th>Ma nafx</th>
</tr>
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<tbody>
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<td>1</td>
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<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b) Li jintefqu flus biex il-poplu Malti jiġi edukat u infurmat iżjed fuq il-bidla fil-klima.</th>
<th>Ma nafx</th>
<th>Naqbel xejn</th>
<th>Naqbel hafna</th>
<th>Naqbel fit</th>
<th>Naqbel hafna</th>
<th>Ma nafx</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Li jintefqu flus biex jiżdiedu sussidji fuq prodotti bhal solar panels</th>
<th>Ma nafx</th>
<th>Naqbel xejn</th>
<th>Naqbel hafna</th>
<th>Naqbel fit</th>
<th>Naqbel hafna</th>
<th>Ma nafx</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>4</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d) Li petrol u diesel jiġu intaxxati iżjed halli n-nies jużaw il-karozzi inqas.</th>
<th>Ma nafx</th>
<th>Naqbel xejn</th>
<th>Naqbel hafna</th>
<th>Naqbel fit</th>
<th>Naqbel hafna</th>
<th>Ma nafx</th>
</tr>
</thead>
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<td>1</td>
<td>2</td>
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<td>4</td>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
e) Li tigi introdotta taxxa fuq dawk il-'businesses' u kumpaniji li ma juzawx l-energija b'efficjenza. Din tista' twassal ghal zieda fil-prezz ta' xi affarijiet li nixtru.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>f) Li jintefqu flus biex is-sistema tat-trasport pubbliku issir iktar effiċjenti halli n-nies jużaw il-karozzi inqas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

**Attitudni**

13 Tahseb li bil-mod kif tghix int, personalment, jista' jkollok effett fuq il-bidla fil-klima?

Iva □ Le □ Ma nafx □

14 Kemm int lest li tagħmel xi whud minn dawn li ġejjin?

**Kemm int lest li...**

<table>
<thead>
<tr>
<th></th>
<th>Żgur li Le</th>
<th>X'aktarx Le</th>
<th>X'aktarx Iva</th>
<th>Żgur li Iva</th>
<th>Ma topplikax</th>
<th>Ghaliex?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Tixtri bozoz, <em>appliances</em> jew karozza li jużaw l-energija b'iktar effiċjenza</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>b) Tuża inqas <em>air-conditioning</em> fis-Sajf</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>c) Tixtri <em>solar panels</em></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>d) Tiftiehem ma' xi hadd iehor biex tużaw karozza wahda <em>(car pooling)</em> mill-inqas darbtejn fil-ġimgħa</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>
e) Tuża il-karozzi tal-linja ghall-inqas darbejn fil-gimgha

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>9</th>
</tr>
</thead>
</table>

f) Timxi jew tuża r-rota biex tmur ghax-xogħol, biex tixtri, biex tagħmel xi qadi jew postijiet ohra

<table>
<thead>
<tr>
<th></th>
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<th>4</th>
<th>9</th>
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</table>

**Ohrajn:**

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<th>3</th>
<th>4</th>
<th>9</th>
</tr>
</thead>
</table>

---

**Demografiija**

15 Sess:

- Raġel ☐
- Mara ☐

16 Sena ta’ twelid

17 Lokalita’

18 X’inhu l-oghla livell ta’ edukazzjoni li lest ejt? (HIS 2008)

1 L-ebda edukazzjoni formali ☐
2 Edukazzjoni primarja ☐
3 Edukazzjoni sekondarja – l-ewwel sentejn ☐
4 Edukazzjoni sekondarja – (kważi) kollha ☐
5 Edukazzjoni post-sekondarja mhux terzjarja ☐
6 Edukazzjoni terzjarja ☐
7 Kwalifiki f’livell ta’ Masters/PhD ☐

19 a) Issa nixtieq nistaqsik ftit mistoqsijiet dwar l-impjieg tieghek. Bhalissa inti...? (HIS 2008)

1 Qed tadhem ghall-paga jew profitt (inkluż xogħol bla hlas ghal negozju tal-familja, apprentistat jew waqt tahriġ bil-hlas, jew jekk bhalissa m’intix qed tmur xogħol minhabba maternita’/paternita’, sick leave jew bil-vaganzi ☐
2 Qieghed ☐
3 Student, waqt tahriġ, esperjenza ta’ xogħol bla hlas ☐
4 Irtirajt, ghaddejt bord jew waqaft minn negozju ☐
5 Tbati minn dizabbilta’ permanenti ☐
6 Qed naghti servizz fil-komunita’ kif ordnat mill-qorti ☐
7 Mara/Raġel tad-dar ☐
8 Ohrajn. Specifika:____________________ ☐
b) X’inhu jew x’kien ix-xoghol primarju tiehek?

20 Liema wiehed minn dawn il-mezzi ta’ informazzjoni l-iktar li tuża? (tista’ ssemmi iktar minn wahda)

1 Gazzetti, *Magazines* □
2 Television □
3 Radio □
4 Internet □
5 Familja u hbieb □
6 Ohrajn: □
Appendix D: Questionnaire in the English language
Questionnaire

I.D. __________

Introduction: Good morning/ Good afternoon

I am Roberto DeBono, a medical doctor. I am currently carrying out a study on climate change as part of my Masters degree in Public Health Medicine. Do you mind if I ask you some questions on this topic please? The questionnaire will take approximately ten minutes.

You may want to know that your name is one of a sample of 800 people which was taken randomly from the Maltese population and given to me by the National Statistics Office.

If you feel it is inconvenient for you to answer the questionnaire now, I can contact you at a more convenient time.

All the information given by you will be treated with strict confidentiality, will be used for the sole purpose of this study and will be processed under the regulations of the Data Protection Act.

Awareness

1. Have you ever heard of 'climate change' or 'global warming'? (Leiserowitz 2006)
   Yes □ No □

2. When you hear the words "climate change" what is the first thought or image that comes to mind? (Leiserowitz 2006)

3. Generally speaking, do you think climate change is a problem? (Leiserowitz 2006)
   Yes □ No □ Don't Know □

4. Are you concerned about climate change?
   Yes □ No □
5 If yes, how concerned are you about climate change? (Leiserowitz 2006)
   1 Not very concerned □
   2 Somewhat concerned □
   3 Very concerned □

Knowledge
6 a) I am going to mention a list of things which may or may not contribute to climate change. In Malta, which of the following contributes to climate change? (Leiserowitz 2006)
   1 ‘Power stations’ Yes □ No □ Don’t Know □
   2 Cars and other transport vehicles Yes □ No □ Don’t Know □
   3 Aerosol spray cans Yes □ No □ Don’t Know □
   4 Pesticides Yes □ No □ Don’t Know □
   5 The production and consumption of potable water Yes □ No □ Don’t Know □
   6 The use of electrical appliances such as freezers, televisions, air conditioners, toasters Yes □ No □ Don’t Know □
   7 The ozone hole Yes □ No □ Don’t Know □
   8 The Maghtab Landfill Yes □ No □ Don’t Know □
   9 Mobile phones Yes □ No □ Don’t Know □
Others__________________________________________ Yes □ No □ Don’t Know □

b) If I had to read the list out again, which one do you think contributes most to climate change? (Re-read the ones which are ticked ‘Yes’)
__________________________________________ (only one)

Human health effects of climate change
7 a) Do you think people can die because of climate change? (Leiserowitz 2006)
   Yes □ No □ Don’t Know □

b) If yes, worldwide, do you think that this is already happening, or is it something which will happen in the future?
   Now □ Future □ Don’t Know □


8. a) Do you think **people can become ill** because of climate change? (Leiserowitz 2006)
   
   Yes ☐
   
   No ☐
   
   Don’t Know ☐
   
   b) If yes, worldwide, do you think that this is already happening, or is it something which will happen in the future?
   
   Now ☐
   
   Future ☐
   
   Don’t Know ☐

9. How likely do you think it is that each of the following will occur during the **next 50 years** due to climate change? (Leiserowitz 2006)

<table>
<thead>
<tr>
<th>Event Description</th>
<th>1 Very Unlikely</th>
<th>2 Somewhat Unlikely</th>
<th>3 Somewhat Likely</th>
<th>4 Very Likely</th>
<th>5 Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Worldwide, many people’s <strong>standard of living</strong> will decrease due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>b) Worldwide, <strong>water shortages</strong> will occur due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>c) Increased rates of <strong>serious disease</strong> worldwide due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>d) You or your family’s <strong>standard of living</strong> will decrease due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>e) <strong>Water shortages</strong> will occur in Malta due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>f) The chance of you or your family getting a <strong>serious disease</strong> will increase due to climate change.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

10. Which one of the following are you most concerned about? (Leiserowitz 2006)

   *(choose only one)*

   **The impacts of climate change on...**

   1. You and your family ☐
   2. The Maltese people ☐
   3. People all over the world ☐
   4. Non-human nature ☐
   5. Not at all concerned ☐
11 The following list contains items, some of which are affected by climate change while others are not. Which of the following is affected by climate change?

1 Infectious diseases such as malaria Yes □ No □ Don’t Know □
2 Asthma and respiratory conditions Yes □ No □ Don’t Know □
3 Allergies Yes □ No □ Don’t Know □
4 Cardiovascular conditions Yes □ No □ Don’t Know □
5 Infections which can cause diarrhoea Yes □ No □ Don’t Know □
6 Skin cancer Yes □ No □ Don’t Know □
7 Heat waves Yes □ No □ Don’t Know □

Policies

12 The Maltese government has an important role in ensuring that Malta reduces its impact on the climate. To what extent would you agree or disagree with the following measures?

<table>
<thead>
<tr>
<th>Measures</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Money is spent on clean energy projects such as wind farms so that</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Malta satisfies part of its energy demands from the wind and the sun.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Money is spent on more information provision and better education of</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>the Maltese public about climate change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Money is spent to increase subsidies on things like solar panels.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>d) Petrol and diesel are taxed so that people use their cars less.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>e) The introduction of a tax on those businesses and companies that use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>energy inefficiently. This could raise the cost of some products that</td>
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<tr>
<td>we buy.</td>
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</tr>
</tbody>
</table>
f) Money is spent on a **public transport system** to make it more efficient so that people use their cars less.

---

**Willingness to act**

13 Do you think that the way you manage your lifestyle can influence the effect you have on climate change?

Yes □ No □

14 To what extent are you willing to do some of the following? (adapted from O’Connor, Bord, Yarnal 2002)

**Are you willing to...**

<table>
<thead>
<tr>
<th></th>
<th>Definitely Not</th>
<th>Probably Not</th>
<th>Probably Yes</th>
<th>Definitely Yes</th>
<th>Does not apply</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Buy more energy-efficient light bulbs, appliances, or motor vehicles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>b) Use less air-conditioning during the Summer months</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>c) Purchase solar panels</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>d) Car pool at least a couple of days a week</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>e) Use public transport at least twice a week</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
f) **Walk or cycle** to work, to go shopping or other places

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other:</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>9</td>
</tr>
</tbody>
</table>

**Demography**

15 Gender: Male □ Female □

16 In what year were you born? ____________

17 In which locality do you live? ____________

18 What is the highest level of education you have obtained? (EHIS, 2008)

1 No formal education □

2 Primary Education □

3 Lower secondary education □

4 Upper secondary education □

5 Post-secondary but non-tertiary education □

6 First stage of tertiary education □

7 Second stage of tertiary education □

19 a) How would you define your current labour status? (EHIS, 2008)

1 Working for pay or profit (including unpaid work for a family business or holding, including an apprenticeship or paid traineeship, including currently not at work due to maternity, parental, sick leave or holidays) □

2 Unemployed □

3 Pupil, student, further training, unpaid work experience □

4 In retirement or early retirement or has given up business □

5 Permanently disabled □

6 Giving a community service as ordered by court □

7 Fulfilling domestic tasks □

8 Others. Please specify: ___________________________ □

b) What is (was) your main occupation? ___________________________
20 What is your main source of news? (Leiserowitz, 2006)

1 Newspapers, magazines
2 Television
3 Radio
4 World wide web
5 Friends and relatives
6 Others
Appendix E: Permission to use items from the questionnaire of another study
Hi Roberto,

Sounds like a good project. Here is the original questionnaire. You have my permission to use items from it, with proper citation. Please use this one:


Are you planning on doing a national study or something more local? What methodology are you going to use (phone, mail, etc.)?

Cheers,

Tony

-----
Anthony Leiserowitz, Ph.D.
Director, Yale Project on Climate Change
School of Forestry & Environmental Studies
Yale University
(203) 432-4865
Appendix F: Tables
Table 18: Image categories associated with climate change. Respondents were asked the question: “When you hear the words “climate change” what is the first thought or image that comes to mind? Most respondents gave more than one answer. (n=455)

<table>
<thead>
<tr>
<th>Image categories</th>
<th># of Images</th>
<th>% of persons (n=455)</th>
<th>Cumulative % (n=1136)</th>
<th>% of images (n=1136)</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLLUTION</td>
<td>173</td>
<td>38.0%</td>
<td>38.0%</td>
<td>15.2%</td>
<td>15.2%</td>
</tr>
<tr>
<td>HEAT</td>
<td>89</td>
<td>19.6%</td>
<td>57.6%</td>
<td>7.8%</td>
<td>23.1%</td>
</tr>
<tr>
<td>OZONE</td>
<td>87</td>
<td>19.1%</td>
<td>76.7%</td>
<td>7.7%</td>
<td>30.7%</td>
</tr>
<tr>
<td>EXTREME WEATHER EVENTS</td>
<td>81</td>
<td>17.8%</td>
<td>94.5%</td>
<td>7.1%</td>
<td>37.9%</td>
</tr>
<tr>
<td>ENVIRONMENT</td>
<td>78</td>
<td>17.1%</td>
<td>111.6%</td>
<td>6.9%</td>
<td>44.7%</td>
</tr>
<tr>
<td>ICEMELT</td>
<td>65</td>
<td>14.3%</td>
<td>125.9%</td>
<td>5.7%</td>
<td>50.4%</td>
</tr>
<tr>
<td>TRANSPORT</td>
<td>59</td>
<td>13.0%</td>
<td>138.9%</td>
<td>5.2%</td>
<td>55.6%</td>
</tr>
<tr>
<td>WEATHER</td>
<td>55</td>
<td>12.1%</td>
<td>151.0%</td>
<td>4.6%</td>
<td>60.5%</td>
</tr>
<tr>
<td>CHG. CLIMATE</td>
<td>50</td>
<td>11.0%</td>
<td>162.0%</td>
<td>4.4%</td>
<td>64.9%</td>
</tr>
<tr>
<td>GREENHOUSE</td>
<td>44</td>
<td>9.7%</td>
<td>171.6%</td>
<td>3.9%</td>
<td>68.8%</td>
</tr>
<tr>
<td>HUMAN HEALTH</td>
<td>43</td>
<td>9.5%</td>
<td>181.1%</td>
<td>3.8%</td>
<td>72.5%</td>
</tr>
<tr>
<td>OTHERS</td>
<td>37</td>
<td>8.1%</td>
<td>189.2%</td>
<td>3.3%</td>
<td>75.8%</td>
</tr>
<tr>
<td>SEA LEVEL</td>
<td>34</td>
<td>7.5%</td>
<td>196.7%</td>
<td>3.0%</td>
<td>78.8%</td>
</tr>
<tr>
<td>CHG. TEMPERATURE</td>
<td>25</td>
<td>5.5%</td>
<td>202.2%</td>
<td>2.2%</td>
<td>81.0%</td>
</tr>
<tr>
<td>ENERGY</td>
<td>25</td>
<td>5.5%</td>
<td>207.7%</td>
<td>2.2%</td>
<td>83.2%</td>
</tr>
<tr>
<td>DISASTER</td>
<td>24</td>
<td>5.3%</td>
<td>213.0%</td>
<td>2.1%</td>
<td>85.3%</td>
</tr>
<tr>
<td>ANTHROPOGENIC</td>
<td>20</td>
<td>4.4%</td>
<td>217.4%</td>
<td>1.6%</td>
<td>87.1%</td>
</tr>
<tr>
<td>NEED ACTION/EDUCATION</td>
<td>19</td>
<td>4.2%</td>
<td>221.5%</td>
<td>1.7%</td>
<td>88.7%</td>
</tr>
<tr>
<td>LIFESTYLE</td>
<td>19</td>
<td>4.2%</td>
<td>225.7%</td>
<td>1.7%</td>
<td>90.4%</td>
</tr>
<tr>
<td>NEGATIVE</td>
<td>18</td>
<td>4.0%</td>
<td>229.7%</td>
<td>1.6%</td>
<td>92.0%</td>
</tr>
<tr>
<td>DRY/DESERT</td>
<td>13</td>
<td>2.9%</td>
<td>232.5%</td>
<td>1.1%</td>
<td>93.1%</td>
</tr>
<tr>
<td>FUTURE GENERATIONS</td>
<td>12</td>
<td>2.6%</td>
<td>235.2%</td>
<td>1.1%</td>
<td>94.2%</td>
</tr>
<tr>
<td>TSUNAMIS/ EARTHQUAKES</td>
<td>12</td>
<td>2.6%</td>
<td>237.8%</td>
<td>1.1%</td>
<td>95.2%</td>
</tr>
<tr>
<td>NATURE</td>
<td>11</td>
<td>2.4%</td>
<td>240.2%</td>
<td>1.0%</td>
<td>96.2%</td>
</tr>
<tr>
<td>INDUSTRY</td>
<td>8</td>
<td>1.8%</td>
<td>242.0%</td>
<td>0.7%</td>
<td>96.9%</td>
</tr>
<tr>
<td>FOSSIL FUELS</td>
<td>7</td>
<td>1.5%</td>
<td>243.5%</td>
<td>0.6%</td>
<td>97.5%</td>
</tr>
<tr>
<td>POLITICS</td>
<td>7</td>
<td>1.5%</td>
<td>245.1%</td>
<td>0.6%</td>
<td>98.2%</td>
</tr>
<tr>
<td>DON'T KNOW</td>
<td>6</td>
<td>1.3%</td>
<td>246.4%</td>
<td>0.5%</td>
<td>98.7%</td>
</tr>
<tr>
<td>FORESTS</td>
<td>5</td>
<td>1.1%</td>
<td>247.5%</td>
<td>0.4%</td>
<td>99.1%</td>
</tr>
<tr>
<td>SCEPTICS</td>
<td>5</td>
<td>1.1%</td>
<td>248.6%</td>
<td>0.4%</td>
<td>99.6%</td>
</tr>
<tr>
<td>EMOTION</td>
<td>4</td>
<td>0.9%</td>
<td>249.5%</td>
<td>0.4%</td>
<td>99.9%</td>
</tr>
<tr>
<td>FOOD</td>
<td>1</td>
<td>0.2%</td>
<td>249.7%</td>
<td>0.1%</td>
<td>100.0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1136</td>
<td>249.7%</td>
<td></td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
Table 19: Extent to which respondents think it is likely that standards of living, water shortages and increased rates of serious disease will be affected by climate change (worldwide and locally), in the next 50 years.

<table>
<thead>
<tr>
<th></th>
<th>Very unlikely</th>
<th>Somewhat unlikely</th>
<th>Somewhat likely</th>
<th>Very likely</th>
<th>Don't know</th>
<th>Total</th>
<th>Average likelihood *</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) <strong>Worldwide</strong>, many people's standard of living will decrease due to climate change.</td>
<td>24</td>
<td>93</td>
<td>184</td>
<td>98</td>
<td>54</td>
<td>453</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>5.3%</td>
<td>20.5%</td>
<td>40.6%</td>
<td>21.6%</td>
<td>11.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) <strong>Worldwide</strong>, water shortages will occur due to climate change.</td>
<td>20</td>
<td>122</td>
<td>136</td>
<td>122</td>
<td>53</td>
<td>453</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>4.4%</td>
<td>26.9%</td>
<td>30.0%</td>
<td>26.9%</td>
<td>11.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Increased rates of serious disease worldwide due to climate change.</td>
<td>4</td>
<td>28</td>
<td>210</td>
<td>178</td>
<td>33</td>
<td>453</td>
<td>3.28</td>
</tr>
<tr>
<td></td>
<td>0.9%</td>
<td>6.2%</td>
<td>46.4%</td>
<td>39.3%</td>
<td>7.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) <strong>You or your family's standard of living will decrease due to climate change.</strong></td>
<td>24</td>
<td>142</td>
<td>162</td>
<td>64</td>
<td>61</td>
<td>453</td>
<td>2.65</td>
</tr>
<tr>
<td></td>
<td>5.3%</td>
<td>31.3%</td>
<td>35.8%</td>
<td>14.1%</td>
<td>13.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) <strong>Water shortages will occur in Malta due to climate change.</strong></td>
<td>35</td>
<td>143</td>
<td>123</td>
<td>89</td>
<td>63</td>
<td>453</td>
<td>2.66</td>
</tr>
<tr>
<td></td>
<td>7.7%</td>
<td>31.6%</td>
<td>27.2%</td>
<td>19.6%</td>
<td>13.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) The chance of <strong>you or your family getting a serious disease will increase due to climate change.</strong></td>
<td>13</td>
<td>63</td>
<td>210</td>
<td>115</td>
<td>52</td>
<td>453</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>2.9%</td>
<td>13.9%</td>
<td>46.4%</td>
<td>25.4%</td>
<td>11.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For average likelihood, scales range from 1.0 to 4.0. 1.0 stands for 'very unlikely', 2.0 stands for 'somewhat unlikely', 3.0 stands for 'somewhat likely' and 4.0 stands for 'very likely'. The mid-point is 2.5.
Table 20: Extent to which respondents agree or disagree with the following national climate change mitigation measures. (n=453)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
<th>Don’t know</th>
<th>Total</th>
<th>Average Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Money is spent on clean energy projects such as wind farms so that Malta satisfies part of its energy demands from the wind and the sun.</td>
<td>12</td>
<td>8</td>
<td>19</td>
<td>409</td>
<td>5</td>
<td>453</td>
<td>3.83</td>
</tr>
<tr>
<td></td>
<td>2.6%</td>
<td>1.8%</td>
<td>4.2%</td>
<td>90.3%</td>
<td>1.1%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>b) Money is spent on more information provision and better education of the Maltese public about climate change.</td>
<td>9</td>
<td>9</td>
<td>42</td>
<td>390</td>
<td>2</td>
<td>452</td>
<td>3.80</td>
</tr>
<tr>
<td></td>
<td>2.0%</td>
<td>2.0%</td>
<td>9.3%</td>
<td>86.3%</td>
<td>0.4%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>c) Money is spent to increase subsidies on things like solar panels.</td>
<td>5</td>
<td>6</td>
<td>28</td>
<td>408</td>
<td>6</td>
<td>453</td>
<td>3.86</td>
</tr>
<tr>
<td></td>
<td>1.1%</td>
<td>1.3%</td>
<td>6.2%</td>
<td>90.1%</td>
<td>1.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>d) Petrol and diesel are taxed so that people use their cars less.</td>
<td>236</td>
<td>68</td>
<td>69</td>
<td>64</td>
<td>16</td>
<td>453</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>52.1%</td>
<td>15.0%</td>
<td>15.2%</td>
<td>14.1%</td>
<td>3.5%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>e) The introduction of a tax on those businesses and companies that use energy inefficiently. This could raise the cost of some products that we buy.</td>
<td>86</td>
<td>71</td>
<td>119</td>
<td>149</td>
<td>27</td>
<td>452</td>
<td>2.76</td>
</tr>
<tr>
<td></td>
<td>19.0%</td>
<td>15.7%</td>
<td>26.3%</td>
<td>33.0%</td>
<td>6.0%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>f) Money is spent on a public transport system to make it more efficient so that people use their cars less.</td>
<td>11</td>
<td>3</td>
<td>24</td>
<td>412</td>
<td>3</td>
<td>453</td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>2.4%</td>
<td>0.7%</td>
<td>5.3%</td>
<td>90.9%</td>
<td>0.7%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

* Scales range from 1.0 to 4.0. 1.0 stands for 'strongly disagree', 2.0 stands for 'somewhat disagree', 3.0 stands for 'somewhat agree' and 4.0 stands for 'strongly agree'. The mid-point is 2.5.
Table 21: Extent to which respondents are willing to adopt ‘climate change friendly’ policy in response to the question: “To what extent are you willing to do some of the following?” (n=453)

<table>
<thead>
<tr>
<th></th>
<th>Definitely not</th>
<th>Probably not</th>
<th>Probably yes</th>
<th>Definitely yes</th>
<th>Does not apply</th>
<th>Total</th>
<th>Average Willingness *</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Buy more energy-efficient light bulbs, appliances, or motor vehicles</td>
<td>5</td>
<td>16</td>
<td>69</td>
<td>362</td>
<td>1</td>
<td>453</td>
<td>3.74</td>
</tr>
<tr>
<td></td>
<td>1.10%</td>
<td>3.53%</td>
<td>15.23%</td>
<td>79.91%</td>
<td>0.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Use less air-conditioning during the Summer months</td>
<td>40</td>
<td>58</td>
<td>54</td>
<td>184</td>
<td>117</td>
<td>453</td>
<td>3.14</td>
</tr>
<tr>
<td></td>
<td>8.83%</td>
<td>12.80%</td>
<td>11.92%</td>
<td>40.62%</td>
<td>25.83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Purchase solar panels</td>
<td>49</td>
<td>87</td>
<td>128</td>
<td>159</td>
<td>29</td>
<td>452</td>
<td>2.94</td>
</tr>
<tr>
<td></td>
<td>10.84%</td>
<td>19.25%</td>
<td>28.32%</td>
<td>35.18%</td>
<td>6.42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Car pool at least a couple of days a week</td>
<td>127</td>
<td>38</td>
<td>53</td>
<td>186</td>
<td>49</td>
<td>453</td>
<td>2.74</td>
</tr>
<tr>
<td></td>
<td>28.04%</td>
<td>8.39%</td>
<td>11.70%</td>
<td>41.06%</td>
<td>10.82%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Use public transport at least twice a week</td>
<td>201</td>
<td>34</td>
<td>57</td>
<td>153</td>
<td>8</td>
<td>453</td>
<td>2.36</td>
</tr>
<tr>
<td></td>
<td>44.37%</td>
<td>7.51%</td>
<td>12.58%</td>
<td>33.77%</td>
<td>1.77%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Walk or cycle to work, to go shopping or other places</td>
<td>155</td>
<td>33</td>
<td>85</td>
<td>169</td>
<td>11</td>
<td>453</td>
<td>2.61</td>
</tr>
<tr>
<td></td>
<td>34.22%</td>
<td>7.28%</td>
<td>18.76%</td>
<td>37.31%</td>
<td>2.43%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Scales range from 1.0 to 4.0. 1.0 stands for 'definitely not', 2.0 stands for 'probably not', 3.0 stands for 'probably yes' and 4.0 stands for 'definitely yes'. Mid-point stands at 2.5.