THE PUBLIC PERCEPTION TOWARD STEM CELL TECHNOLOGY IN THAILAND

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ABSTRACT

The stem cell technology is considered as an emerging technology with many unknown, public cannot totally depend on knowledge to justify the acceptance and perception toward it. This study aims to identify any factors that influence the perception of public toward stem cell technology in Thailand by conducted a survey through internet channel on Thai population. In conclusion, demographics that actual influence the stem cell technology perception are gender, education level, and income level but not religious belief as previously reported in other countries. Thai society relies on knowledge than familiarity to set a perception which contrasts with other societies. The public perception on stem cell technology requires media attention level of public and reliability of media sources and the trustworthy key persons such as scientists (support by university not private) and medical doctors as the key persons to communicate the technical information. With right information and communication, the public will perceive benefits of this technology and use it to build the right perception on stem cell technology. These factors can be adapted by government and private sectors for preparation of public and building the right perception toward stem cell technology.

KEY WORDS: stem cells / stem cell technology / public perception

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CHAPTER I
INTRODUCTION

Stem cells are undifferentiated cells commonly found in multicellular organisms; they have the ability to renew themselves through cell division and can be differentiated into a wide range of specialized cell types. When scientists first successfully extracted stem cells from human embryos in 1968, there is a hope that these malleable cells can ultimately be “programmed” to replace damaged bodily tissues. This breakthrough consequently created a widespread expectation that through the use of these embryonic cells, we could effectively tackle such life-threatening diseases as Alzheimer’s or diabetes, as well as make possible recovery from unrecovered injuries such as spinal cord injuries. During this past few years, this breakthrough of stem cell research has reached the exciting stage of offering the prospect of restoring normal function to a much wider variety of tissues damaged by serious disease or injury than could have been contemplated just a few years ago. The presses published articles related stem cell therapies in early phase as future of medicine, and there is widespread of biotechnology startups, joint ventures, and pharmaceutical companies around the world targeting on developing new therapies based on stem cells.

1.1 Problem Statement

However, there are a much unknown need to be addressed before this promising new medical area will applicable. There are many concerns about stem cells in different aspects, while scientific community is on the quest to decode the unknown related to stem cells such as the most suitable source of stem cells, how to obtain pure populations of the desired types of differentiated cells, and the knowledge needed to organize and retain stem cells in required stage in order to yield the right cell types for effective therapy. The society has additional concerns that cannot be ignored include the ethical issue and public perception toward stem cell technology. Whether a fair

description or not, this idea would seem to be particularly relevant for issues involving complex and unfamiliar science and emerging technology. Developments in such new scientific areas as nanotechnology, genetically modified (GM) foods, or stem cell research involve novel knowledge claims, ideas which many people may not have confronted previously. Although, many observers have assumed that in case of science-related controversies, enhancing public scientific understanding and knowledge will bring public opinion on these topics closer to the same level of the scientific community, the real scenario is much more complex because these debates involve values and expectations, not purely scientific facts (Nisbet, 2005). Especially, stem cell research is emerging science and there was few of science- and technology-related issues have sparked as much public attention as cell research and therapeutic cell therapy due to its direct benefit change the future of healthcare.

Moreover, another aspect that plays an important role in the perception of public on this sensitive issue is some Christian conservatives idea which holds the "embryos are human beings created in God's image and worthy of full moral protection from the moment of conception" believe (Nisbet & Goidel, 2007). The stem cell controversy is widely seen as a battle between religious and scientific values. Interested groups, advocates, and policymakers on both side of the debate have taken advantage of the new finding and news to against each other. Furthermore, the effectiveness of stem cell therapy in patients is another diversity viewpoint that still unclear for public understanding.

This complex environment involved with various factors results in a different level of perception of public toward stem cell research and therapeutic cell therapy; it plays an important role in country-specific policy on stem cell usage and readiness of market on therapeutic cell therapy.

1.2 Research Question

Most of the related researches on the perception of the community toward stem cells technology were a study in western and developed countries with higher level of scientific knowledge among the population, and with different religious beliefs and

cultures. This research question is; What are the factors influence the perception toward stem cells technology in Thailand and is it similar to the factors in previous study?

1.3 Research Objective

We aim to study and develop more understanding on public perception of Thais toward the stem cell technology. and the factors such as familiarity, religion, media influence, trust, and interpersonal communication that influence that perception including demographics of respondents.

1.4 Research Scope

The research scope will concentrate on;

Explore potential factors that influence the stem cell technology perception in Thailand and finding the actual main factors.

Study the main factors such as knowledge and familiarity, religion influence, media influence, trust in key persons, interpersonal communication, and perceived risks and benefits, on perception on stem cell technology in Thailand.

Comparison on the difference in finding of the influence of each factor on stem cell technology perception between Thailand and western countries.

The quantitative research approach will be conducted in this study. The quantitative data will collect by conducting an online questionnaire with at least minimum 100 respondents from every region in Thailand without any limit on age, gender, education level, income level, and other.

1.5 Expected Benefit

This research will explore the factors affect the perception of Thai community toward stem cell technology which provides the understanding of public perception on stem cell technology in Thailand and its main influencing factors. This

insight will be valuable for public and private sectors, in term of shaping policy and commercial strategy toward this new emerging technology.

CHAPTER II
LITERATURE REVIEW

1.1 Definition of stem cells & Stem cell technology

Stem cells are basic cells of all multicellular organisms having the potency to differentiate into a wide range of adult cells. Stem cells, whether they occur in the body or in the lab, must contain two characteristics; self-renew (generate perfect copies of themselves upon division) and differentiate (produce specialized cell types that perform specific functions in the body). The promise of stem cells as new tools for benefiting human health resides in these two properties that allow production of unlimited quantities of required cell types for use in therapeutic purposes or transplantation (EuroStemcell, 2013).

Beyond this definition, any cells possess two characteristics are considered as stem cells classified into two types, based on the range of specialized cells they can generate. Tissue or adult stem cells are found throughout the body, they function to maintain the organ or tissue in which they reside, throughout the lifespan. Most rapidly renewing tissues are maintained by stem cells, with the notable exception of the liver, which is maintained by specialized liver cells called hepatocytes. Under normal physiological conditions, each type of tissue stem cell only generates cells of the organ or tissue system to which it belongs: the blood (hematopoietic) stem cell generates blood; the skin stem cell generates skin, and so on. An exception is the mesenchymal stem cells, which can generate bone, cartilage, and muscle (Bianco et al., 2013). However, while the mesenchymal stem cells have generated much valuable research field, it has also attracted controversy. Pluripotent stem cells, in contrast, have the potential to generate any type of cells found in the body. Pluripotent stem cells are generated in the laboratory by capturing or recreating cell types that exist only transiently during embryonic development and have not been identified in the adult body. There are currently three types of pluripotent stem cell, each generated by a different route: *Embryonic stem (ES) cells* are derived from early-stage, pre-

implantation embryos, and were the first type of pluripotent stem cells to be discovered. *Epiblast stem cells* are a type of pluripotent mouse stem cells derived from a slightly later stage of embryonic development than mouse ES cells. *Induced pluripotent stem (iPS) cells* were discovered in 2006 using mouse cells, just a year later, this finding was replicated in human cells. The iPS cells are generated from specialized cells by using a technique called “reprogramming”. This groundbreaking work was awarded the Nobel Prize in Physiology or Medicine in 2012. Researchers have rapidly adopted iPS cells for study and application.

With unique characteristics of stem cells on regenerative abilities, there are many potential usages of stem cells in research and clinic. In term of research, studies of human embryonic stem cells will provide useful information regarding complex events during the human development process. This is related to turning genes on and off to trigger undifferentiated stem cells to become the differentiated cells with a specific form of tissues and organs. A more understanding of the genetic and molecular controls of these process may yield information about how serious medical conditions, such as cancer and birth defects, arise and potential to offer new strategies for cure. (National Institutes of Health).

Drug Discovery and toxicity testing are getting benefits from stem cell technology as well. There is presently application of human stem cells for testing of potential drugs. The human pluripotent cell lines are differentiated to specific cell type on which drugs will be tested and can be effectively used for screening of potential drugs (National Institutes of Health, 2015b).

However, the most important potential application of human stem cells is the generation of cells and tissues that could be used for the treatment of diseases. Today, donated organs and tissues are often used to replace ailing or destroyed tissue, but the need for transplantable tissues and organs far outweighs the available supply. The ability to direct differentiate into specific cell types of stem cells offers the possibility of a source of replacement cells and tissues to treat diseases including macular degeneration, spinal cord injury, stroke, burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis. With this knowledge, scientists, medical practitioners, and societies are speculating about the possibility of advance in the treatment of injuries and life-threatening diseases and generates new therapy field which

is referred as cell-based therapy, regenerative or reparative medicine (National Institutes of Health, 2015b).

1.2 Public Perception towards Stem Cell Technology

Although stem cells show the benefit to human society, they also generate risks to human society as well. There are only a few areas of recent technology have received as much focus or generated as much excitement and debate as stem cell technology. It has captured the attention of policymakers, the popular press, funding agencies, patient groups and the public. Moreover, the therapeutic promise of this field generates hopes and social concerns associated largely with the stem cells sources and their usages. These promise and controversy have contributed to the understanding of societies and led to different policies toward stem cell technology in different countries around the world.

Considering stem cell technology as emerging technology, which is technology that radical new, fast growth, and perceived on its capability of changing the status quo. It could be understandable that assessment of public attitudes toward it may not be possible at this point of emerging, because of low levels of awareness and knowledge of public toward new technology. However, narrow focusing on scientific knowledge of public when examining attitude toward emerging technologies will measure only one aspect of how people develop opinions and attitude toward new technologies. In contrast to the traditional Scientific Literacy Model (Figure 1.1) relies on the clear understanding of technology, concept, and benefits; that concerns with informational deficits among public play an important role in human decision making, people tend to make decisions based on little or no information as part of human nature. Most of emerging technologies which public have little or no direct experience, the attitudes and perceptions toward new technologies are made on little information as they think is necessary to make a decision on that issue, or based on cognitive and heuristic decision making (Scheufele & Lewenstein, 2005).

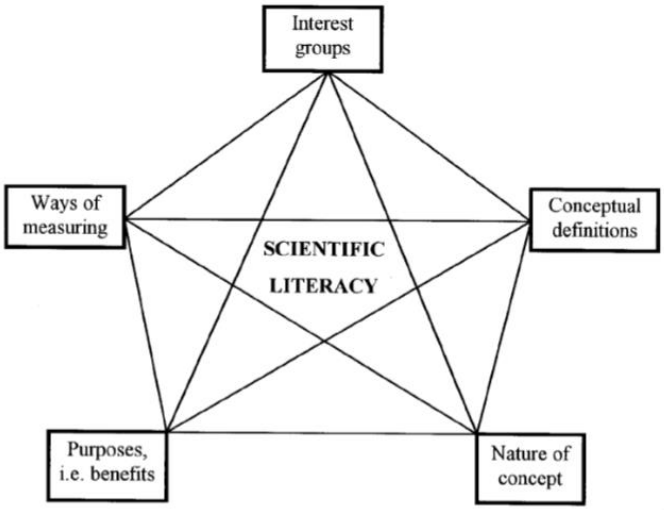

Figure 1.1 A conceptual overview of Scientific Literacy Model.
Source: (Laugksch, 2000)

If we consider adoption of any innovative technology, the process occurs as a continuous and slow as sequential step starts from initial knowledge of an innovative technology, to form an attitude toward it, to reaching an adoption decision. This can be considered as diffusion process which influence by innovation itself, communication channels, time, and social system (Rogers, 1983). This technology diffusion process can be seen as the cumulative or aggregate result of series of individual calculation that weight the incremental benefits of adoption of technology against the cost of change, or risk. The early phase of adoption of any technology which involves the initial knowledge on technology and beginning to form an attitude toward it is the critical phase and influence by other factors as well.

Focusing specifically in term of emerging technologies, there are many studies aim to find the factors that affected public perception on emerging technology similar to stem cell technology as described here.

1.2.1 Knowledge and Familiarity

People are afraid of the “unknown”. Higher levels of knowledge of science are often assumed to enhance people’s understanding of associated risk and benefit and result in more optimistic attitudes, in contrast, skepticism about emerging technology is

often believed to come from lack of knowledge and familiarity. There is a study shown that level of scientific knowledge is associated with positive attitudes toward science (Sturgis & Allum, 2004). (Cobb & Macoubrie, 2004) found that greater familiarity with nanotechnology is associated with more positive perceptions of benefits versus risks. However, there are number of studies find that knowledge contributes little to people's positive perceptions of science (Nisbet & Goidel, 2007). Some findings even suggest that higher levels of science literacy negatively contribute to public perceptions of new technology, for example, (Cobb & Macoubrie, 2004) test knowledge of nanotechnology and find that a large percentage of surveyed respondents could not even answer one true or false question correctly.

However, a lack of factual information does not mean an individual cannot form an opinion on a science-related controversy. Sometimes familiarity is a more important factor influence on public attitudes and perception toward emerging technology than specific knowledge of scientific facts.

1.2.2 Religion influence

Although, the stem cell therapy is considered to be the miracle cure for life-threatening diseases such as Alzheimer's, diabetes or other serious injuries. However, the source of stem cells generates the concern to society as it may involve with the definition of other human being's life. The definition of life in religious concept can play an important role to society acceptance on this new technology. For example, the Christian conservatives believe on "embryos are human beings created in God's image and worthy of full moral protection from the moment of conception". This belief interferes the progress of stem cell technology in countries with a strong belief in Christianity and results the other sources of stem cells are being investigated that do not require the destruction of human embryos. Despite interfering on country's policy level toward stem cell technology, religion also plays an important role in public perception on stem cell therapy as well (Liu & Priest, 2009). There was previous report that intensity of religious worship is negatively associated with the public benefit perceptions of stem cell research and remains the most important factor in fostering public reservations about emerging technologies (Liu & Priest, 2009). While another in-depth study among Protestants and Catholics subjects by (Nisbet, 2005) reported the

strength of religious belief ties to institutions and frequency of church visit have negative effect toward support of research.

1.2.3 Media influence

Media influence in public opinion has been a debate for decades. Media can perform a strong role in shaping public perceptions on highly technical or scientific issues. Especially, in a society that most members of the public will not have much experiential knowledge to draw from about these subjects, creating increased dependency on information from the media (Ball-Rokeach & DeFleur, 1976). Numerous studies have demonstrated that media serve as a key factor for the public to understand biotechnology and other scientific-related issues (Nisbet, 2005); (Nisbet & Goidel, 2007); (Scheufele & Lewenstein); (Eyck, 2005).

1.2.4 Trust in key persons

There is a theory that the trust could be a strong factor in shaping public attitudes toward the emerging technologies. (Lee, Scheufele, & Lewenstein, 2005) found that previous research has focused on a variety of trust variables, including trust in business executives or government, trust in information sources, trust in laws and regulations, trust in scientists, and trust in citizen groups.

Trust can be predictive of the general public's attitudes toward science controversies. To a great degree, the level of public risk and benefit perceptions associated with these emerging technologies reflects a number of trust people place in important social factors.

The example of the influence of trust on public perception toward emerging technologies is American society, Americans has traditionally placed a high value on science and technology. The American public trust in science can be reflected in the fact that science tends to be idealized "as an ultimate authority". Although scientific fraud and misconduct are frequently exposed in media, it does not seem to hurt science's reputation as a "pure and dispassionate profession". There was reported that trust is an important factor in shaping people's opinion about nanotechnology, with people tending not to believe that big businesses can protect them from risks (Cobb & Macoubrie, 2004). There is a finding report that scientists are often regarded as more persuasive

information sources (Eyck, 2005). (Lee et al., 2005) observe from their study that public trust in scientists better predicts general support for nanotechnology than trust in science.

Another study in Australia examined the public opinion on stem cell research found that people participated in the research less likely to approve on stem cell researches, if the research was conducted by the scientists received funding from private sectors. The respondents were more accepting of publicly funded stem cell research because university scientists are trusted more, and that this trust is partly dependent upon a perception that they are more concerned with the public good than private scientists are (Critchley, 2008).

The different types of trust might produce differential effects on public perceptions of novel technology. Trust should be further differentiated since each area of science and technology might trigger completely different concerns. For example, GM foods might raise public health concerns, nanotechnology might make people worry about privacy, and stem cell research involves specific health and moral concerns (Nisbet, 2005).

1.2.5 Interpersonal communication

Another factor that might affect the perception of stem cell technology is interpersonal communication. Despite the fact that mass media are widely recognized as extremely important information providers and play an important role in shaping our attitudes toward many social issues, especially in the case of issues related to science where other sources of information may be in limited supply, interpersonal communication is also important and has often been argued to be even more important (Liu & Priest, 2009).

Interpersonal communication may reinforce by media. Based on the reinforcing model which that the media provide the public with discussion content and stimulate interpersonal communication (Ball-Rokeach & DeFleur, 1976). Specific to the stem cell technology, the reinforcing model may help to explain the interaction between media and interpersonal communication in forming public opinion. Prior to exposure to media coverage of stem cell controversies, the issue would be unlikely to spontaneously arise and few relevant interpersonal discussions are expected to take place. As past

findings show that media generally highlight more benefits than risks associated with stem cell research, we expect that interpersonal discussions tend to revolve around the same theme and would tend to reinforce positive media effects on attitudes in most cases.

1.2.6 Perceived risks and benefits

Risk and benefits of risky activities are positively correlated in the real world, people in pursuit of various benefits face some degree of risk. Because of this reason, the risk and benefit play an important role in perception toward the acceptance of any innovation or emerging technology. There is an assumption that citizens have various levels of understanding of emerging technology related to scientific concepts provides an important tool which citizens can make sense about risks and benefits connected to emerging technology (Lee et al., 2005). People tend to perceive risk and benefit of risky activities as negative correlated or inverse relation, especially, in the area which its hazards and benefits still unclear. People tends to use the affect heuristics to guides their perception of benefits and risks, except the level of knowledge and expertise are developed (Sokolowska & Sleboda, 2015).

1.3 Hypothesis and Framework

Knowledge from literature review related to the perception of public toward emerging technologies and stem cells was shown that there are many factors influence public perception. We identified six factors which have strong effect on public perception toward stem cell technology as; knowledge and Familiarity, religion influence, media influence, trust in key persons, interpersonal communication and perceived risk & Benefits. These factors and demographics are targeted on this study and be summarized as a conceptual framework in Figure 1.2.

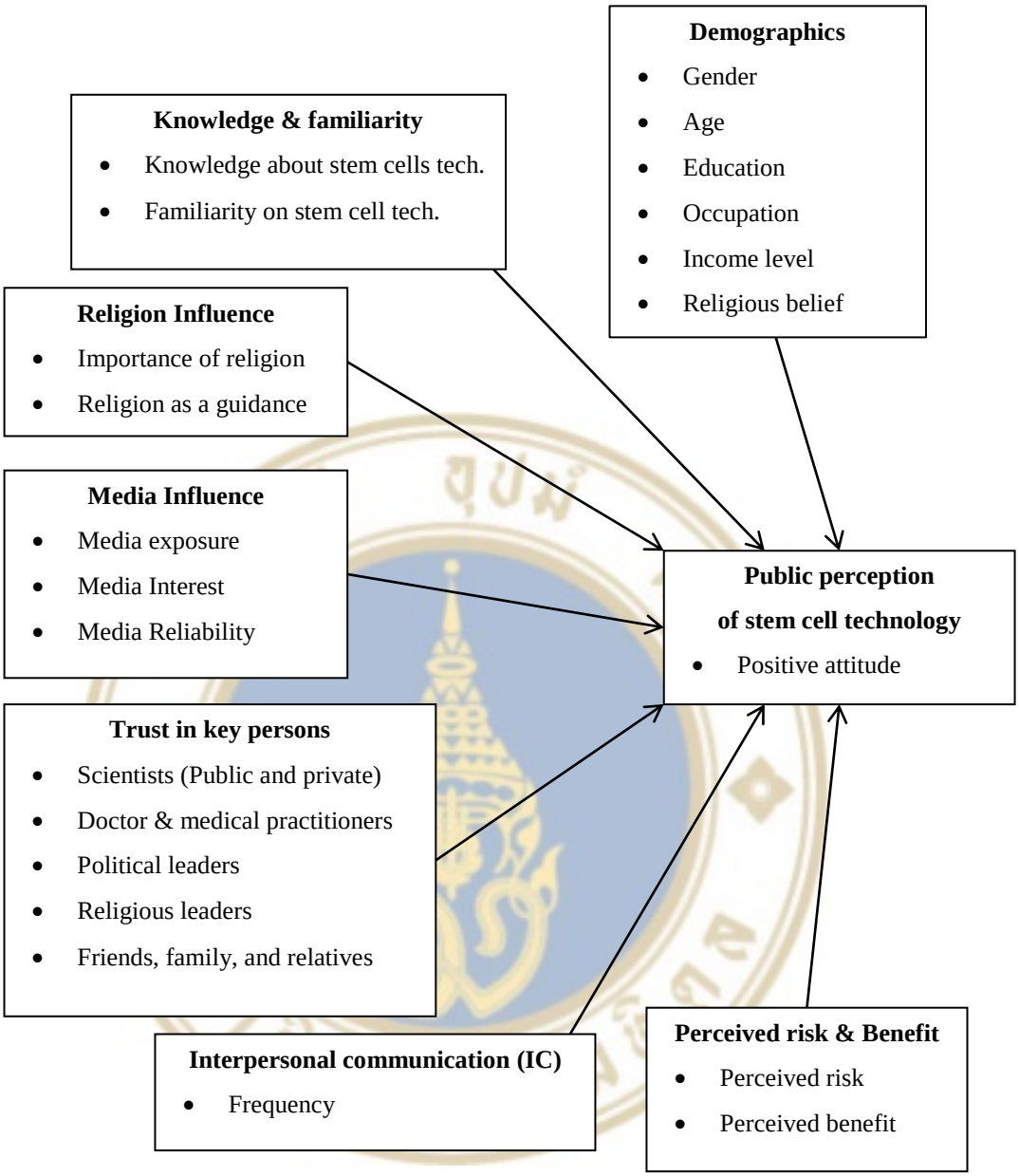

Figure 1.2 Conceptual Framework of factors influencing perception on stem cell technology

CHAPTER III
RESEARCH METHODOLOGY

This research aims to evaluate and develop an understanding perception of the community toward stem cell technology in Thailand and the factors that influence the perception.

1.1 Research Design

This research will explore the factors affect the perception of Thai community toward stem cell technology which provide the understanding of public perception on emerging technology such as stem cell technology, this information can be used to identify the main factors related to acceptance of society on stem cell technology and how these factors influence the public perception. The knowledge from this study will be valuable for public and private sectors, in term of policy and commercial strategy.

1.2 Data Collection Methodology

1.2.1 Population

In this research, we use a data collected from population resides in Thailand. Because the survey is conducted through online questionnaire approach, the target population should be able to access to the internet and social media channels to access to the survey. Due to the fact that, we would like to measure the perception of participants with various demographic backgrounds. The data was collected without limitation of age, gender, religious belief, income level, education level, and occupation of respondents. We target minimum 100 respondents to participate in this survey.

1.2.2 Sampling

The convenient sampling is used in this study. The sample size is target at least 100 respondents to represent the population.

The research approach is online close-end questionnaire because of the short data collection period and convenience for respondents to access to the questionnaire.

1.2.3 Questionnaire Development

The questionnaire was developed based on a concept from literature review. The definition of technical terms, stem cells and stem cell technology, is given in introduction section to align all respondents on the same scope.

“stem cells” are basic self-renewal cells of all multicellular organisms that having the potency to differentiate into a wide range of adult cells with two important characteristics, “self-renewal” by cell division and be able to induce to become cells with special functions related to specific tissue or organ.

The term "stem cell technology" is considered as technology related to 3 aspects:

- *Stem cell research* - usage of stem cells in researches to provide the useful information regarding complex event during the human development process.
- *Drug discovery and toxicity testing* - usage of stem cells for screening and testing of potential drugs.
- *Treatment of diseases* - usage of differentiated stem cells to specific cell types to be a source of replacement cells and tissue in the treatment of injuries and life-threatening diseases such as diabetes, cancer, Parkinson’s disease, and Alzheimer’s disease.

To collect data in different aspects from participants, Likert-type questions were used to evaluate the opinion of respondents toward stem cell technology, with score ranges from 1 (minimum) to 5 (maximum). The additional questionnaire type such as conditional questions and multiple choice questions have been used as well in this study to gathering the clear opinion and in-depth details related to specific factors.

Table 1.1 was summarized on the concepts used in questionnaire development based on literature review.

Table 1.1 Questionnaire Development Concept

Questions	Literatures
Knowledge and familiarity	(Nisbet, 2005); (Scheufele & Lewenstein, 2005); (Liu & Priest, 2009)
1. Have you ever heard about stem cells?	
2. Have you ever heard about stem cell technology as described in the previous section?	
3. How much have you seen, read, or heard about stem cell technology?	
4. According to the description of stem cell technology in the previous introduction section, would you say you are very, somewhat, not very or not at all familiar with stem cell research?	
5. Please tell if you think each statement about stem cells and stem cell technology is true or false. • Stem cells are occurring in all multicellular organism. • Stem cells can derive from various sources such as human, animals, and plants. • Experts consider stem cells to be the medical breakthrough and the future of disease treatment. • Stem cell technology is in the research phase, not using in human yet. • Stem cell technology can also be used in food and cosmetics applications. • Stem cells are the cell that actively divide and in undifferentiated phase.	
Media Influence	(Nisbet, 2005)
6. In one week, how many days are you exposed to the news?	
7. From scales 1 to 5, how much attention you pay to the following kinds of stories when you exposed to the news? • Science and technology • Medical technology and breakthrough • Specific scientific development such as stem cell technology • Policy related to new scientific development	

Table 3.1 Questionnaire Development Concept (cont.)

Questions	Literatures
8.	Have you ever read or being exposed to the news or information about stem cell technology before?
9.	From scale 1 to 5, please rate the reliability of these media sources for stem cell technology information? • TV news • Documentary • Radio news • Internet or social media • Article in newspapers • Article in magazines • Article in scientific journals
Trust in key persons	(Liu & Priest, 2009); (Scheufele & Lewenstein, 2005)
10.	Using a scale of 1 to 5, where 1 is not at all credible and 5 is extremely credible, how much would you trust that stem cell technology information to be credible from scientists whose work in a university or is funded by the government?
11.	How much would you trust that stem cell technology information to be credible from scientists whose work in the private sector or funded by a private company?
12.	how much would you trust that stem cell technology information to be credible from doctors or medical practitioner?
13.	How much would you trust that stem cell technology information to be credible from political leaders?
14.	How much would you trust that stem cell technology information to be credible from religious leaders?
15.	How much would you trust that stem cell technology information to be credible from your friends, family, and relatives?
Interpersonal communication	(Liu & Priest, 2009)
16.	Have you ever discussed stem cell technology with anyone?
17.	In past six months, how often do you discuss with other about stem cell technology?

Table 3.1 Questionnaire Development Concept (cont.)

Questions	Literatures
Religion influence	(Liu & Priest, 2009)
18. Whether or not you attend any religious ceremonies or services, do you consider religion to be an important part of your life, or not?	
19. Would you say your religious beliefs provide some guidance on your day-to-day living?	
Perceived risks and benefits	(Nisbet, 2005); (Liu & Priest, 2009); (Lee et al., 2005)
20. To what extent do you think stem cell research might benefit our society?	
21. Which area do you think stem cell technology will benefit our society? • Researches • Drug discovery and development • Medical treatment of uncured diseases • Organ replacement	
22. To what extent do you think stem cell research might cause some risk to society?	
23. which area do you think stem cell technology will cause risk to our society? • Unethical source of stem cells • Medical malpractices • Medical frauds and scams • health-related or life-threaten issues • Religious conflicts • Increasing of medical treatment cost	
Perception toward stem cell technology	(Liu & Priest, 2009)
24. Overall, I think stem cell technology has more benefit than risk.	

1.2.4 Demographics

Demographics data consists of gender, ages, education level, field of study, occupation, income, and religious belief, are collected as different categories and assigned with categorical codes for statistical analysis. The questions, categories and assigned codes of each demographic factor are shown in Table 1.2.

Table 1.2 Questionnaire related to demographics information

Demographics	Question	Categories	Code
Gender	What is your gender?	Male	1
		Female	2
Age	How old are you?	Under 20	1
		20 – 29	2
		30 – 39	3
		40 – 49	4
		50 – 59	5
		More than 60	6
Education level	What is your education level?	Secondary school	1
		Bachelor degree	2
		Master degree	3
		Ph.D.	4
		Other	5
Major of study	What best describe your major subject during the study?	Science and technology	1
		Medical science	2
		Social science	3
		Business and finance	4
		Language and art	5
		Other	6
Occupation	What best describe your occupation?	Student	1
		Employee	2
		Government officer	3
		Business owner	4
		Unemployed	5
		Retired	6

Table 3.2 Questionnaire related to demographics information (cont.)

Demographics	Question	Categories	Code
Income level	Please specify your household income?	Less than 15,000 THB	1
		15,001 – 25,000 THB	2
		25,001 – 35,000 THB	3
		35,000 – 45,000 THB	4
		More than 45,000 THB	5
Religion	What best describe your religion belief?	Buddhist	1
		Christian	2
		Muslim	3
		Atheist or Freethinker	4
		None of above	5

1.2.5 Data Collection

Data was collected via online close-ended questionnaire which is separated into 4 parts: Introduction, definition, specific questions related to factors in conceptual framework, and demographic questions, respectively.

- The introduction provides the explanation and objective of the survey.
- Definition part provides the information about stem cell and stem cell technology. Because of stem cells and stem cell technology are broad subject with misconception. This section will align all respondents to the same concept on stem cells and stem cell technology.
- Specific questions explore in detail of variables according to the framework. This part will ask the respondents the opinion in different aspects and will be measured by Likert-type, multiple choices, and dichotomous questions to observe the level of agreement or disagreement, opinion and in-depth information from respondents. The questions will cover factors such as knowledge and familiarity, religion influence, media influence, trust in key persons, interpersonal communication, perceived risk and benefit and respondents' perception toward stem cell technology.

- The demographic questions will collect the general personal information about the respondents such as age, gender, education level and background, occupation, income, and religious belief.

The online questionnaire will be shared via different channels such as social media networks, email, and discussion groups.

1.3 Data Analysis

The collected Data was analyzed by SPSS® software. The demographics information of respondents was measured by converting the responses into categorical codes, then it was treated as ordinal data and analyzed using frequencies analysis in descriptive statistics to represent percentage of each group in sampling population.

The data on factors related to framework were collected and explained in details with frequencies analysis and evaluated for their influence on dependent variable.

The perception toward stem cell technology which measuring in term of attitude are collected in this questionnaire as dependent variable, due to the fact that this dependent variable was collected using Likert-type scale, the variable is fall into ordinal type. This means that the parametric statistical analysis likes ANOVA, and linear regression could not be applied to this data set. It will be more appropriate to analyze this data with non-parametric analysis such as Kruskal-Wallis test for analysis of variance instead.

CHAPTER IV
FINDINGS AND DISCUSSION

In this study, total responses from 113 respondents from Thailand were collected and analyzed. Unfortunately, the response rate could not be calculated due to impossibility to track returning of all potential respondents through the questionnaire distribution channels such as internet and social media. The data was summarized and analyzed using SPSS® statistics software to elucidate the overall respondents' demographics and their opinions and perceptions toward stem cell technology. The results from SPSS® analysis were described in this chapter, the data from statistical process was included with this thematic paper for reference in Appendix A.

1.1 Demographics

Demographics information collected in this study are gender, age, education level, field of study, occupation, income level, and religious belief. The demographics data was analyzed per described in **Error! Reference source not found.** in chapter 3.

Overview of respondents' demographics was shown in Figure 1.1. In conclusion, total 113 respondents can be identified as 67 males (59.3%) and 46 females (40.7%), with age ranges in between 20 – 29 (35.4%), 30 – 39 (31.9%), 40 – 49 (10.6%), 50 – 59 (8.8%) and more than 60 years old (13.3%), respectively.

The highest education level of respondents is Bachelor degree (N=50, 44.2%), Master degree (N=55, 48.7%), and Doctor of Philosophy (N=8, 7.1%) with different education backgrounds. Almost half of respondents has education background in science and technology field (N=55, 48.7%). The rest are in business and finance (N=37, 32.7%), medical Science (N=8, 7.1%), language and art (N=7, 6.2%), and social science (N=6, 5.3%).

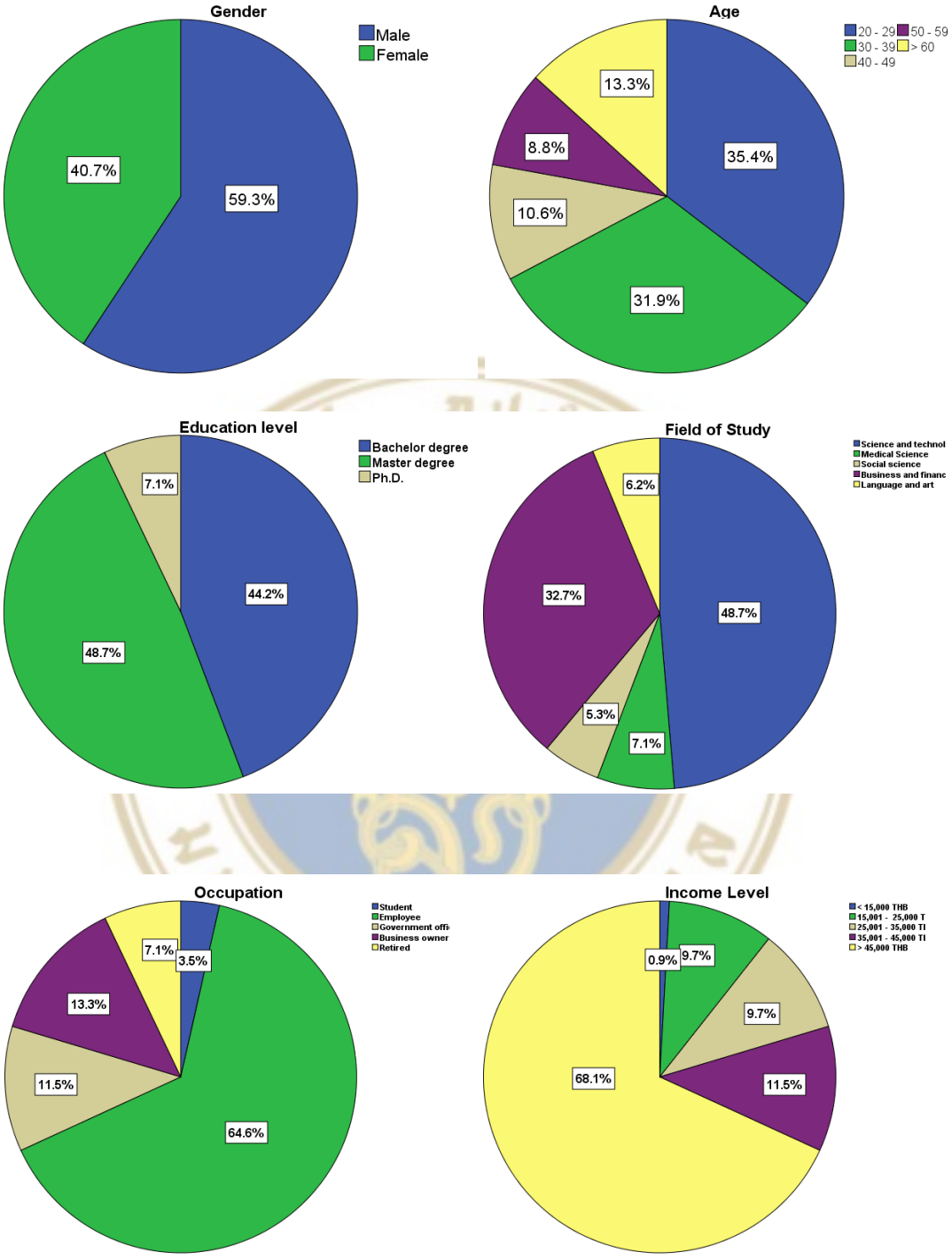

Figure 1.1 Demographic information of respondents.

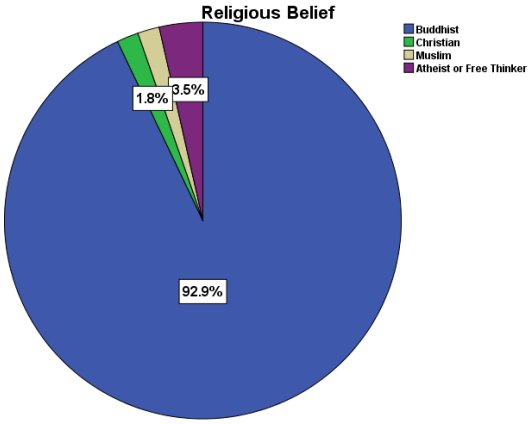

Figure 4.1 Demographic information of respondents (cont.)

Majority of respondents are company employee (N=73, 64.6%). The rest are business owner (N=15, 13.3%), government officer (N=13, 11.5%), retired person (N=8, 7.1%), and student (N=4, 3.5%). The income level of respondents is range from highest to lowest; income level more than 45,000 Thai Baht (N=77, 68.1%), 35,001 – 45,000 Thai Baht (N=13, 11.5%), 25,001 – 35,000 Thai Baht (N=11, 9.7%), 15,001 – 25,000 Thai Baht (N=11, 9.7%) and only one respondent has income level below 15,000 Thai Baht (0.9%).

In contrast with previous studies (Liu & Priest, 2009; Nisbet, 2005) which most of respondents were associated with any Christian belief such as Catholic or protestant, demographics in term of religious belief in Thailand is more toward Buddhist (Agency, 2016). Most of our respondents are Buddhists (N=105, 92.9%), only 8 respondents have different religious belief. There are 2 Christians (1.8%) and 2 Muslims (1.8%), and there are 4 respondents (3.5%) who classified themselves as Atheist or Freethinker.

1.2 Perception toward stem cell technology

In this study, we measure the perception toward stem cell technology by measure the positive attitude of respondents toward benefit stem cell technology. The attitude was measured by evaluating the level of agreement that stem cell technology has more benefit. Overall the respondents agreed that stem cell technology has more

benefit, with the different level of agreement. Half of respondents (N=56, 49.6%) highly agreed that stem cell technology has more benefit than risk. While 6.2% (N=7) of respondents still did not completely agree on this statement, the 31% (N=35), and 13.3% (N=15) of overall show the moderate and extreme level of agreement (Figure 1.2).

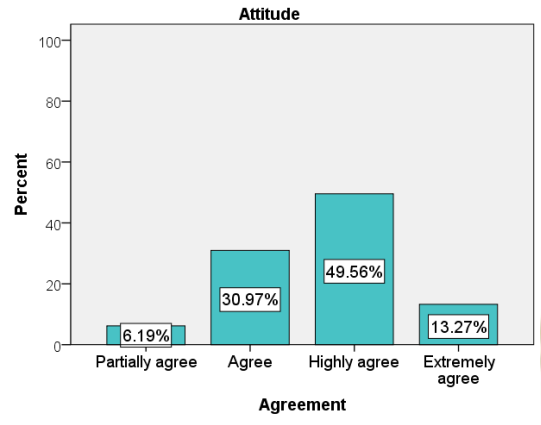

Figure 1.2 Perception toward stem cell technology based on attitude

This opinion result on perception toward stem cell technology was used for further analysis to identify the influence of demographics and factors related to framework on perception toward stem cell technology.

1.3 Effect of Demographics and Factors Related to Framework on perception toward stem cell technology

As previously described in chapter 2, there are many factors reported by researchers worldwide for their influence on public attitude and perception on stem cell controversy, policies, and other similar emerging technologies such as genetic engineering or nanotechnology. The previous studies were done mostly in western countries with difference in research contexts such as culture, religious belief, scientific knowledge level and involvement. We identified six factors that could play an important role in public perception toward stem cell technology. These six factors are consisted of knowledge and familiarity, influence of religious belief, media influence, trust in key persons, interpersonal communications, and perceived of risk and benefit. With

descriptive statistics and Analysis of Variance using Kruskal-Wallis H test, we explain the interested finding on the factors that affect the perception of public toward stem cell technology. The result from our study were explained as in following section.

1.3.1 Effect of Demographics on Stem Cell Technology Perception

The demographics factor was analyzed further using the Kruskal-Wallis H test to identify its effect on perception toward stem cell technology perception. The statistical analysis result of demographic factors such as gender, age, education level, field of study, occupation, income level, and religious belief on perception of stem cell technology was shown in Table 4.1.

The result from Kruskal-Wallis H test showed that there was a statistical significant difference in attitude toward stem cell technology between respondents with different gender, education level, and income level.

For different gender, the statistical significant difference in attitude toward stem cell technology was occurred with a mean rank of 63.96 for male and 46.87 for female, $\chi^2(2) = 8.766$, $p = 0.003$. This mean that gender does make the difference in perception on stem cell technology and the finding is consistent with other studies (Liu & Priest, 2009; Nisbet et al., 2002), which may be the effect of the higher level of reservation in women than men (Liu & Priest, 2009).

The different education level of respondents was another factor showed the statistical significant difference in perception toward stem cell technology, $\chi^2(2) = 7.360$, $p = 0.025$, with a mean rank attitude score of 52.68 for Bachelor degree, 57.03 for Master degree, and 83.81 for Doctorate degree.

The last factor showed the statistical significant difference in perception toward stem cell technology is income level, $\chi^2(2) = 14.273$, $p = 0.006$, with a mean rank score of 25.00 for income level less than 15,000 THB, 34.91 for income range 15,001 - 25,000 THB, 38.00 for 25,001 - 35,000 THB, 55.27 for 35,001 - 45,000 THB, and 63.05 for income higher than 45,000 THB. Both findings were inconsistency with previous study reported that education level and income level did not influence the perception on stem cell research (Liu & Priest, 2009).

Table 1.1 Non-parametric statistical analysis of demographic factors

Variables	Group	Mean Rank	df	Chi-Square	P value
Gender	Male	63.96	1	8.766	.003*
	Female	46.87			
Age	20 – 29	46.65	4	9.109	.058
	30 – 39	63.30			
	40 – 49	61.25			
	50 – 59	52.30			
	> 60	68.50			
Education level	Bachelor degree	52.68	2	7.360	.025*
	Master degree	57.03			
	Ph. D.	83.81			
Field of study	Science and technology	57.21	4	1.519	.823
	Medical science	61.25			
	Social science	64.81			
	Business and finance	56.28			
	Language and art	46.57			
Occupation	Student	47.75	4	5.880	.208
	Employee	53.01			
	Government officer	70.96			
	Business owner	66.23			
	Retired	63.56			
Income	< 15,000 THB	25.00	4	14.273	.006*
	15,001 - 25,000 THB	34.91			
	25,001 - 35,000 THB	38.00			
	35,001 - 45,000 THB	55.27			
	> 45,000 THB	63.05			
Religious Belief	Buddhist	56.93	3	4.649	.199
	Christian	25.00			
	Muslim	47.75			
	Atheist or Freethinker	79.38			

**Statistically significant difference*

1.3.2 Effect of knowledge and familiarity

The knowledge and familiarity toward stem cell technology were evaluated using self-reported questions about their knowledge and familiarity on the stem cell technology. The responses from self-reported questions regarding stem cell knowledge explained that overall around 81 respondents (71.7%) claimed that they have knowledge about stem cells and 73 respondents (64.4%) for stem cell technology (Figure 1.3).

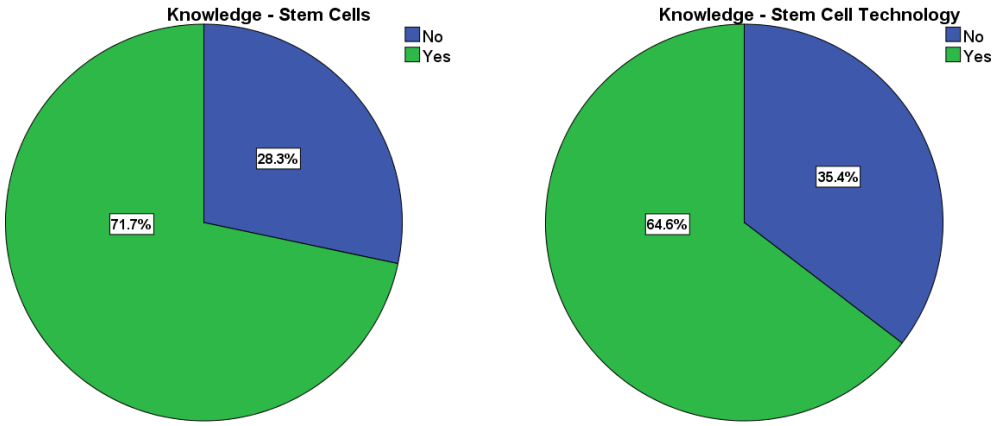

Figure 1.3 Self-report knowledge of respondents on stem cell and stem cell technology.

An additional technical question set was set up as a following section in questionnaire to assess actual knowledge regarding stem cell and stem cell technology based on conditional questionnaire style, number of correct were collect and evaluated as actual knowledge on stem cell technology of respondents. The respondents actually have better knowledge on stem cells and stem cell technology than they claimed, considering the number of correct answers on question set. Around 8.9% of respondents (N=10) did not have or have few knowledges about stem cells and stem cell technology, while 33.6% (N=38) are in moderate level of knowledge and 57.5% (N=65) of respondents are considered as high to very high level as shown in Figure 1.4. The data was simplified to two respondent groups to make it comparable with result from self-reported questionnaire by rate the respondent with score more than 50% as the group than possessed the knowledge about stem cells and stem cell technology, high number

of respondents (N=103, 91.2%) has actual knowledge about stem cells and stem cell technology (Figure 1.5).

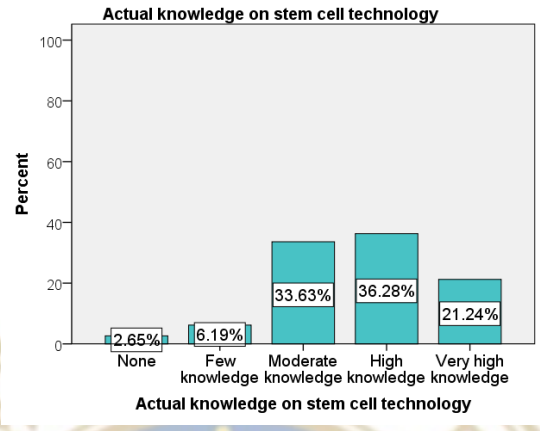

Figure 1.4 Actual knowledge on stem cell and stem cell technology

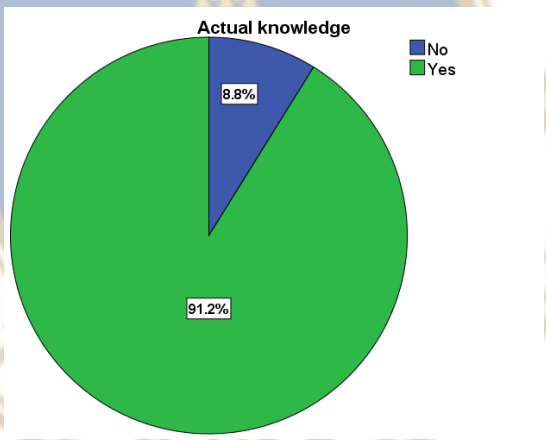

Figure 1.5 The simplified result of actual knowledge on stem cell and stem cell technology

The familiarity was measured with a self-reported question. The analyzed result shown that 16.8% of respondents (N=19) considered themselves not familiar with concept of stem cell technology. Almost half of respondents (N=51, 45.1%) which is the majority group responded that they are somewhat familiar with this concept, and the rest 16.8% and 5.3% of total respondents are shown their familiarity level at moderate and high. However, none of respondent claimed that he/she has very high level of

familiarity with this concept (Figure 1.6). There is no question set to measure the familiarity of respondents on stem cell technology.

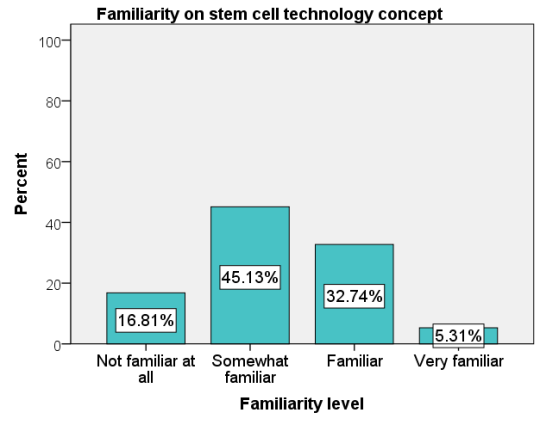

Figure 1.6 Familiarity level with stem cell technology concept

Knowledge and familiarity factors were test for their influence on perception on stem cell technology with Kruskal-Wallis H test. The result showed that there was a statistically significant difference in perception toward stem cell technology between group of respondents who had different level of knowledge on stem cell ($\chi^2(2) = 9.569$, $p = 0.002$) and stem cell technology ($\chi^2(2) = 4.445$, $p = 0.035$) with mean range as shown in Table 4.2. Either the knowledge is about stem cells or stem cell technology, the group that responded in questionnaire that they possessed knowledge on both specific areas had more positive perception on stem cell technology than the group that not. But this was not related to the actual knowledge on stem cell and stem cell technology of respondents as there is no statistically significant difference between respondent groups with different actual knowledge level. Interestingly, the previous study on perception toward nanotechnology provided the similar result the what really affected the perception is how respondents say they know than what they really know or their actual knowledge about the technology (Cobb & Macoubrie, 2004).

In contrast with previous study (Liu & Priest, 2009), familiarity on stem cell technology did not affect the perception of respondents as there is no statistical significant different between group as shown in Table 4.2.

Table 1.2 Non-parametric statistical analysis of knowledge and familiarity factors

Factor	Group	Mean Rank	df	Chi-Square	P value
Knowledge - stem cell	No	43.05	1	9.569	0.002*
	Yes	62.51			
Knowledge - stem cell tech.	No	48.93	1	4.445	0.035*
	Yes	61.42			
Actual knowledge	No	62.85	1	0.413	0.520
	Yes	56.43			
Familiarity	Not familiar at all	44.00	3	6.042	0.110
	Somewhat familiar	56.12			
	Familiar	64.77			
	Very familiar	57.75			

**Statistically significant difference*

1.3.3 Influence of religion

Previous studies reported that the public perception of stem cells are closely connected with religious belief and values, especially, how individual's institutional ties to religion. However, measuring of religious belief and personal belief ties to religion is sensitive for some respondents. Moreover, the demographic information such as religious belief itself does not provide any level measure of the strength of individual's tie to the institution such as religion (Nisbet, 2005). The previous study suggested to measuring the religious belief effect in term of indirect questions such as how often of respondents attend the service or performing worship per week and how the respondents rely on religion as a guidance in life (Liu & Priest, 2009; Nisbet, 2005). In our case, we decided to measure this factor accordingly and frame it as the importance of religion and religion as guidance in life.

The result was shown in

Figure 1.7, the respondents evaluated the religion as an important factor in their life in different level; there are 11.5% of respondents (N=13) who did not consider religion as important, while 18.6% (N=21), 33.6% (N=38), 27.4% (N=31), and 8.8% (N=10)

considered religion as somewhat important, important, very important, and extremely important, respectively.

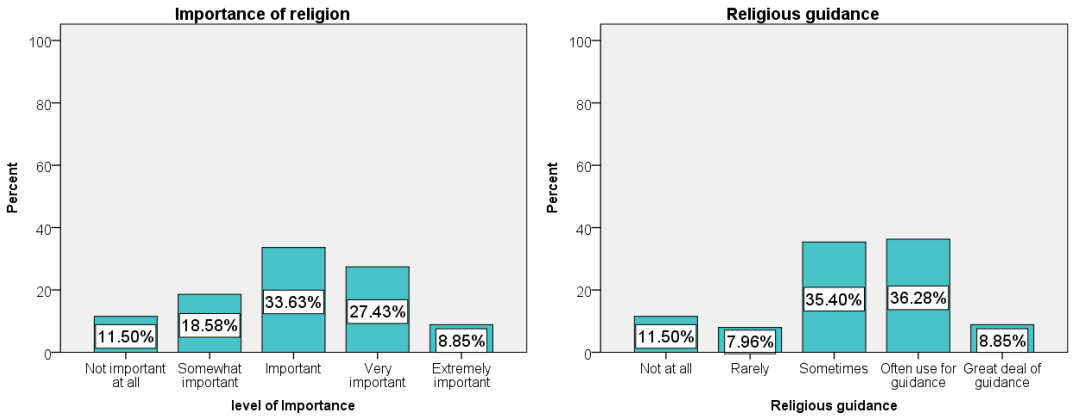

Figure 1.7 Importance of religion and religion as a guidance in day-to-day living

According to question evaluated the religion as a guidance in day-to-day living many respondents reported often usage of religion as a guidance (N=41, 36.3%), but a roughly equal number (N=40, 43%) also indicated that they sometimes used religion as a guidance. So we can conclude that there are the same number of people who see this in opposite. The rest are 9 respondents (8%) that rarely use religion as a guidance in their living and 10 respondents (8.8%) that considered religion as a great deal of guidance. Interestingly, the same number of respondents (N=13, 11.5%) did not considered religion is important, are the same number of respondents who did not use religion as a guidance as well. However, we did not test that both groups composed of the same respondents or not.

The influence of religion on perception on stem cell technology was measured by evaluation the importance of religion and level of usage of religion as a guidance on day-to-day living. Our data as report in Table 1.3 showed that both factors, importance of religion and usage as a guidance, did not have any influence on perception on stem cell technology in our studied group ($p = 0.702$ and 0.459). Contrary to previous studies by Liu and Priest (2009) that the religious worship is negatively associated with the public benefit perception of stem cell research. We suspected that the inconsistency of our result with previous studies may cause by the difference in religious belief and

values based on Buddhism religious belief, as previous report in demographics analysis section that more than 90% of our respondents has Buddhist religious belief.

Table 1.3 Non-parametric statistical analysis of religion influence factors

Factor	Group	Mean Rank	df	Chi-Square	P value
Importance of religion	Not important at all	50.96	4	2.186	0.702
	Somewhat important	51.17			
	Important	59.72			
	Very important	60.87			
	Extremely important	54.75			
Religion as guidance	Not at all	58.73	4	3.626	0.459
	Rarely	65.44			
	Sometimes	50.61			
	Often use for guidance	58.54			
	Great deal of guidance	66.40			

**Statistically significant difference*

1.3.4 Media influence

Media is another potential factor influencing attitude and perception of public on stem cell technology. We measured different aspects of media in this study as media exposure in term of frequency of news exposure, respondents' attention level on specific contents of media, and media reliability as three potential independent factors influence perception on stem cell technology.

Firstly, the exposure level of respondent to media was measured in term of frequency of news exposure per week. Overall 91% of the respondents (N=103) exposed to the media in different level. The 27.4% of respondents reported everyday exposure to the news on media, while the 3.5%, 6.2%, 5.3%, 17.7%, 14.2%, and 16.8% of respondents reported their exposure as 6, 5, 4, 3, 2, and only one day per week, respectively. Interestingly, there are 10 respondents which considered as 8.8% that reported themselves no exposure to any news on media (Table 1.4).

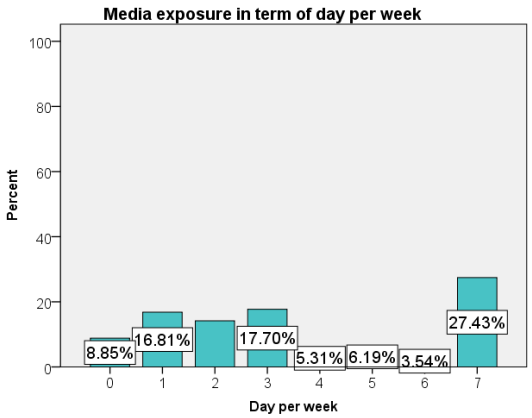

Table 1.4 Media exposure in term of day per week

Focusing on stem cell technology exposure to the respondents group, another question was examined their exposure to stem cell technology through media. The result was separated into two groups, there were 66.4% (N=75) of respondent reported themselves previously being exposed to news and information about stem cell technology. In opposite, 33.6% of respondents (N=38) claimed never previously exposed to the stem cell technology news and information (Figure 1.8).

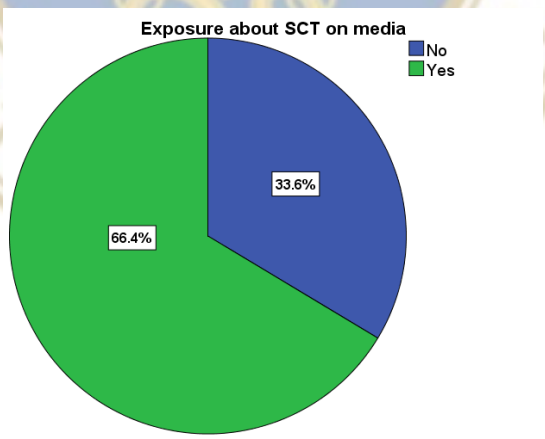

Figure 1.8 Exposure of respondents about SCT on media

The media exposure in this study was evaluated by two variables, the frequency of media exposure, calculated from number of the day per week that the respondents were exposed to media, and the exposure on stem cell technology through media. Both variables were analyzed with Kruskal-Wallis H test for their effect on perception on stem cell technology represented by attitude. The result showed in Table 1.5 that there was no statistically significant difference between groups with different exposure to media ($p = 0.078$), this mean that the frequency of exposure to media did not influence the perception, same as the exposure to stem cell technology through media also did not have any effect ($p = 0.545$). We can conclude that frequency of media exposure and exposure on stem cell technology on media did not have any effect on attitude toward stem cell technology perception. This finding was in opposite with a previous study done by Liu and Priest (2009) that the exposure to national TV news showed a weak positive influence on benefit perceptions on stem cell research which researcher claimed that it was in contrast with some studies (result not shown in literature). However, the researcher explained that this effect was influence by media attention of the respondents but did not have any additional data support. We decided to involve in both effects by further conducting the additional set of questions regarding media attention in the next section.

Table 1.5 Non-parametric statistical analysis of media exposure

Factor	Group	Mean Rank	df	Chi-Square	P Value
Media exposure - Frequency	None	50.65	7	12.768	0.078
	1 day per week	64.13			
	2 days per week	45.41			
	3 days per week	46.70			
	4 days per week	40.17			
	5 days per week	69.07			
	6 days per week	68.00			
	Everyday	66.42			
Media exposure - SCT	No	59.41	1	0.365	0.545
	Yes	55.78			

**Statistically significant difference*

Secondly, although there are large number of respondents already exposed to the news and information about stem cell technology, the level of attention of respondents may not concentrate to the scientific-related topics and this can influence the effect of media toward the perception on stem cell technology (Liu & Priest, 2009). The attention level of respondents related to scientific-related topics was evaluated in this study to measure the effect of media attention level by let the respondents rated their own attention level on specific related area on stem cell technology. The focusing area are science and technology, medical technology and breakthrough, policy related to new scientific development, and specific scientific development (Stem cell technology) and the result was summarized in Table 1.6.

Table 1.6 Summary of attention level of respondents on specific topic related to stem cell technology

Topic	Attention level				
	No attention	**Not much attention**	**Neutral attention**	**Somewhat attention**	**High attention**
Science and technology	4.4% (N=5)	20.4% (N=23)	44.2% (N=50)	22.1% (N=25)	8.8% (N=10)
Medical technology and breakthrough	7.1% (N=8)	25.7% (N=29)	39.8% (N=45)	16.8% (N=19)	10.6% (N=12)
Policy related to new scientific development	11.5% (N=13)	31.0% (N=35)	36.3% (N=41)	14.2% (N=16)	7.1% (N=8)
Specific scientific development (SCT)	8.0% (N=9)	43.4% (N=49)	38.1% (N=43)	5.3% (N=6)	5.3% (N=6)

The Figure 1.9 explained the variation of attention level of respondents according to the topics. In term of general topics related to science and technology, medical technology and breakthrough, and policy related to new scientific development;

Most of respondents showed the moderate attention level over these topics. However, the respondents had less attention in specific topic related to stem cell technology.

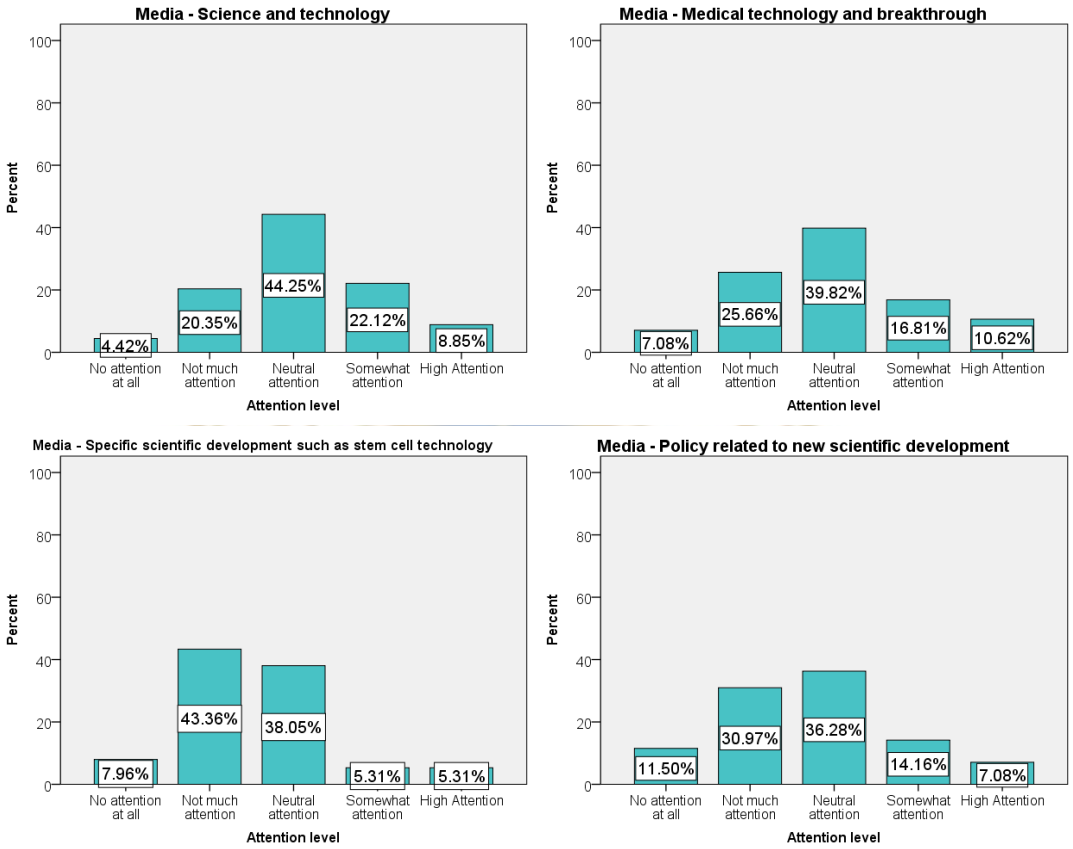

Figure 1.9 Attention level of respondents on specific topic related to stem cell technology

The attention level on specific topic on media was considered as potential factor influence the stem cell technology perception. This study collected the respondents' attention level on science and technology, medical technology and breakthrough, specific scientific development such as stem cell technology, and Policy related to new scientific development. Then analyzed their influence on stem cell perception. The results suggested that there was no statistically significantly difference between different level of attention on medical technology and breakthrough and policy related to new scientific development, as their p value were less than 0.05 (Table 1.7). However, there was a statistically significantly difference between the different level of attention on topics such as science and technology ($\chi^2(2) = 14.622$, $p = 0.006$, as reported

in Table 1.7) and specific scientific development such as stem cell technology ($\chi^2(2) = 17.233$, $p = 0.002$, mean rank as reported in Table 1.7).

Table 1.7 Non-parametric statistical analysis of attention level on specific topic of media

Factor	Group	Mean Rank	df	Chi-Square	P value
Science and technology	No attention at all	21.50	4	14.622	0.006*
	Not much attention	51.35			
	Neutral attention	58.03			
	Somewhat attention	71.34			
	High Attention	46.75			
Medical technology and breakthrough	No attention at all	32.94	4	6.690	0.153
	Not much attention	58.45			
	Neutral attention	59.68			
	Somewhat attention	62.55			
	High Attention	50.71			
Specific scientific development such as stem cell technology	No attention at all	25.39	4	17.233	0.002*
	Not much attention	58.91			
	Neutral attention	62.60			
	Somewhat attention	73.08			
	High Attention	32.58			
Policy related to new scientific development	No attention at all	51.73	4	1.692	0.792
	Not much attention	58.46			
	Neutral attention	58.27			
	Somewhat attention	60.09			
	High Attention	46.50			

**Statistically significant difference*

We may conclude that the attention level of respondents toward specific topic such as science and technology and specific scientific development such as stem cell technology have effect on perception on stem cell technology. This finding was

consistent with one possible explanation of Liu and Priest (2009) that the heightened of media attention through TV news about stem cells during their survey conducting in 2005 may influence the perceptions, although they did not conduct any additional survey to testing the actual influence. Another research group suspected the same influence of media attention from the past result of national survey in 2001, 2002, and 2004 that the negative and positive information about stem cells via TV news may influence negative and positive perception of respondents (Nisbet, 2005). Our finding really confirmed that the attention on science and technology and specific topics such as stem cell technology were really influence the perceptions.

Table 1.8 Summary of reliability of media as a source of stem cell technology information

Media Channel	Reliability				
	Not reliable at all	**Somewhat reliable**	**Reliable**	**Very Reliable**	**Extremely reliable**
TV news	5.3% (N=6)	37.2% (N=42)	46% (N=52)	10.6% (N=12)	0.9% (N=1)
Documentary	4.4% (N=5)	19.5% (N=22)	37.2% (N=42)	33.6% (N=38)	5.3% (N=6)
Radio news	10.6% (N=12)	51.3% (N=58)	29.2% (N=33)	8.8% (N=10)	0% (N=0)
Internet or social media	16.8% (N=19)	59.3% (N=67)	21.2% (N=24)	1.8% (N=2)	0.9% (N=1)
Article in newspapers	2.7% (N=3)	42.5% (N=48)	41.6% (N=47)	13.3% (N=15)	0% (N=0)
Article in magazines	5.3% (N=6)	39.8% (N=45)	46.9% (N=53)	8.0% (N=9)	0% (N=0)
Article in scientific journal	4.4% (N=5)	12.4% (N=14)	27.4% (N=31)	34.5% (N=39)	21.2% (N=24)

Lastly, we would like to examine that the reliability of the media sources and its influence. The opinion of respondents toward reliability of media as a source of stem cell technology information was summarized in Table 1.8 and
Figure 1.10. According to the responses, the most reliable source of stem cell technology information is the article in scientific journal which was highly rated in very reliable level (N=39, 34.5%). Media channels such as TV news, documentary, and article in magazines were considered as reliable as they were rated highly as 46% (N=52), 37.2% (N=42), and 46.9% (N=53) as reliable source. The media channels such as radio news (N=58, 51.3%), internet or social media (N=67, 59.3%), and article in newspapers (N=48, 42.5%) were considered less reliable source on stem cell technology information as they were rated more on somewhat reliable on respondents' opinion.

The reliability of media sources was tested for its influence on people's perception toward stem cell technology. The reliability level of seven media sources consisting of TV news, documentary, radio news, internet and social media, article in newspaper, articles in magazine, and article in scientific journals were collected and evaluated. Only two media sources, documentary and article in scientific journals, showed the influence of its reliability on perception of stem cell technology at $\chi^2(2) = 15.639$, $p = 0.004$) and $\chi^2(2) = 15.569$, $p = 0.004$, with a mean rank according to data reported in Table 1.9. This mean that the level of reliability of stem cell technology information on documentary and article in scientific journals is affected the perception on stem cell technology.

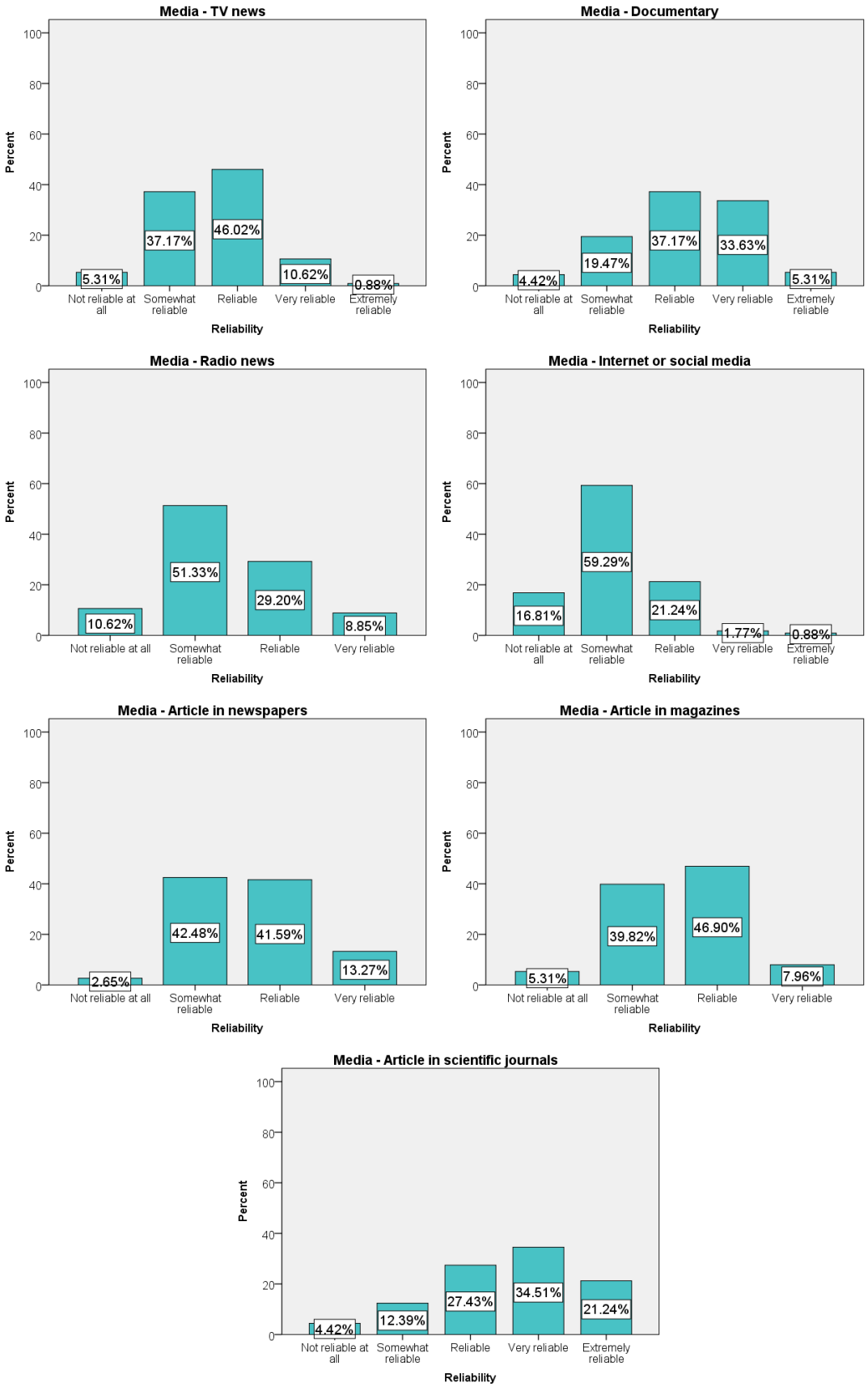

Figure 1.10 Reliability of media as a source of stem cell technology information

Table 1.9 Non-parametric statistical analysis of reliability of media sources

Factor	Group	Mean Rank	df	Chi-Square	P value
TV news	Not reliable at all	44.25	4	3.348	0.501
	Somewhat reliable	55.26			
	Reliable	58.63			
	Very reliable	65.04			
	Extremely reliable	25.00			
Documentary	Not reliable at all	25.70	4	15.639	0.004*
	Somewhat reliable	44.43			
	Reliable	66.51			
	Very reliable	55.08			
	Extremely reliable	74.75			
Radio news	Not reliable at all	48.04	3	6.870	0.076
	Somewhat reliable	57.72			
	Reliable	64.55			
	Very reliable	38.65			
Internet and social media	Not reliable at all	48.61	4	2.200	0.699
	Somewhat reliable	58.99			
	Reliable	58.29			
	Very reliable	47.75			
	Extremely reliable	70.50			
Article in newspapers	Not reliable at all	33.17	3	3.560	0.313
	Somewhat reliable	60.24			
	Reliable	53.48			
	Very reliable	62.43			
Article in magazines	Not reliable at all	33.17	3	7.115	0.068
	Somewhat reliable	63.28			
	Reliable	53.12			
	Very reliable	64.33			

Table 4.9 Non-parametric statistical analysis of reliability of media sources (cont.)

Factor	Group	Mean Rank	df	Chi-Square	P value
Article in scientific journal	Not reliable at all	34.80	4	15.569	0.004*
	Somewhat reliable	39.29			
	Reliable	55.50			
	Very reliable	56.73			
	Extremely reliable	74.33			

**Statistically significant difference*

1.3.5 Effect of trust in key persons

Even though, trust is understudied variable in public understanding. There was previous study trust on few key actors such as scientists, political leaders, and religious leaders as variable affected the public understanding of stem cell controversy (Liu & Priest, 2009). In comparison with previous study, we examined trust in similar key persons or key opinion leaders in stem cell technology field such as scientists, political leaders, and religious leaders. In addition, we separated the scientists into two groups according to their funding sources (government and private sector funding source) as the source funding may affect the trustworthy of scientists (Critchley, 2008). Moreover, we suspected that the potential influencers such as the doctors and medical practitioners or family, friends, and relatives may influence the opinion through interpersonal communication were added into this study.

The trust in each key person was measured as opinion on creditability in term of stem cell technology information source. The summary was shown in Table 1.10 and Figure 1.11. The scientists funding by government, scientist funding by private sectors, and doctors and medical practitioners were rated as credible key persons in term of stem cell technology information, with 41.6% (N=47), 37.2% (N=42), and 36.3% (N=41), respectively. The trust level in another potential key person such as friend, family, and relatives, was somewhat credible (N=55, 48.7%) but less than the first group. However, the key persons who considered as influencers for policy area such as political and religious leaders were considered least in term of creditability, 47.8% (N=54) and 48.7% (N=55).

Table 1.10 Summary of trust in key persons in term of stem cell technology information

Key persons	Creditability				
	Not credible at all	Somewhat credible	Credible	Very credible	Extremely credible
Scientists (Government)	2.7% (N=3)	21.2% (N=24)	41.6% (N=47)	22.1% (N=25)	12.4% (N=14)
Scientists (Private sector)	5.3% (N=6)	30.1% (N=34)	37.2% (N=42)	22.1% (N=25)	5.3% (N=6)
Doctors or medical practitioners	3.5% (N=4)	19.5% (N=22)	36.3% (N=41)	30.1% (N=34)	10.6% (N=12)
Political leaders	47.8% (N=54)	36.3% (N=41)	14.2% (N=16)	1.8% (N=2)	0% (N=0)
Religious leaders	48.7% (N=55)	39.8% (N=45)	9.7% (N=11)	1.8% (N=2)	0% (N=0)
Friends, family, and relatives	24.8% (N=28)	48.7% (N=55)	22.1% (N=25)	3.5% (N=4)	0.9% (N=1)

The effect of trust of different key persons on perception on stem cell technology was analyzed. The result from Kruskal-Wallis H test elucidated there was a statistically significant difference in perception on stem cell technology between different level of trust in scientists (funding by government) and trust in doctors and medical practitioners at $\chi^2(2) = 13.486$, $p = 0.009$) and $\chi^2(2) = 18.031$, $p = 0.001$. With a mean rank according to Table 1.11. However, the trust in other key persons such as scientist funding by private sectors, political leaders, religious leader, and friends, family and relatives did not have influence on perception on stem cell technology. The influence of trust on scientist funding by government was previously reported having influence on perception on stem cell technology (Critchley, 2008; Liu & Priest, 2009).

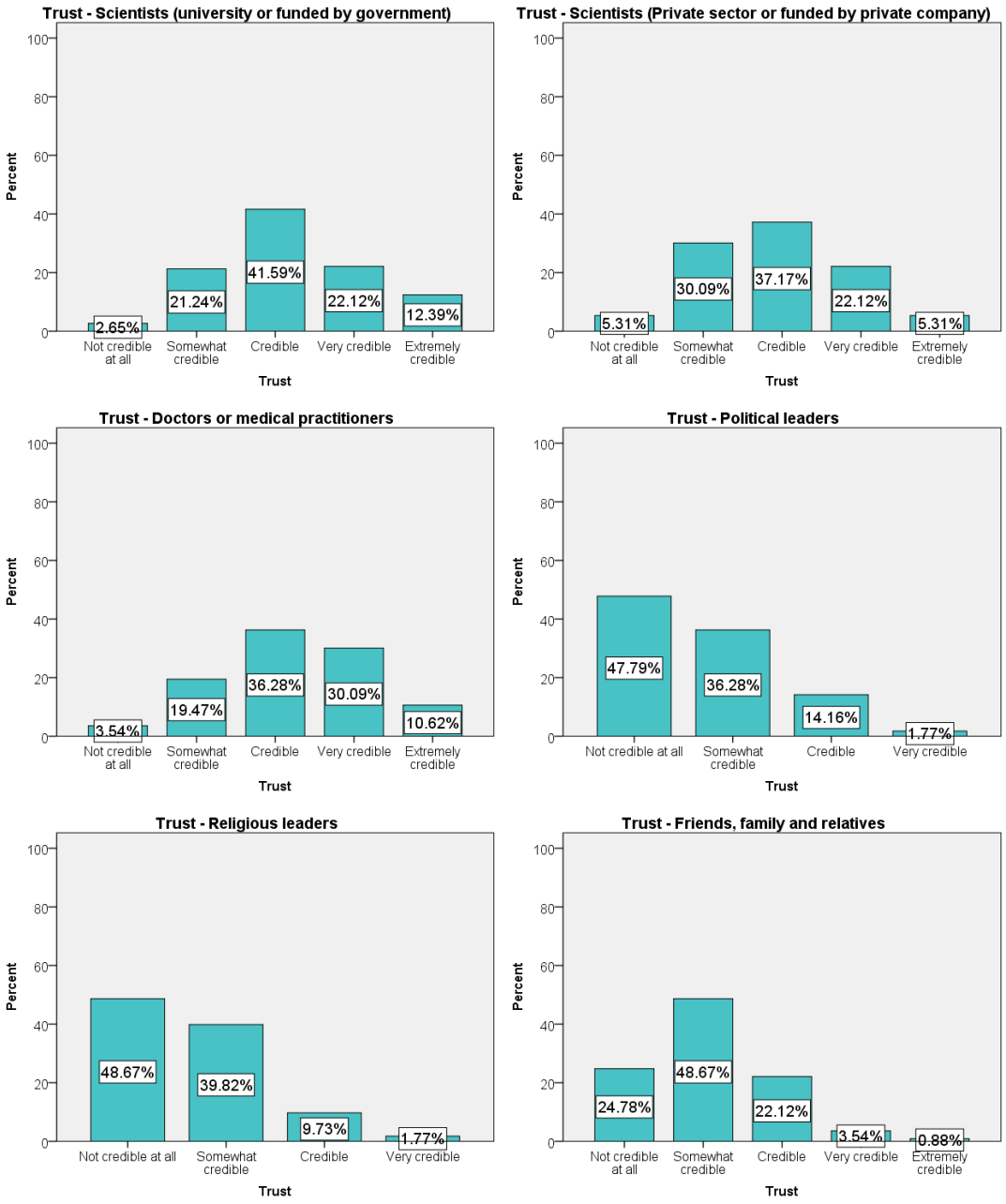

Figure 1.11 Trust in key persons in term of stem cell technology information

Critchley (2008) did the comparison on effect of trust on scientists received funding support from government and private sector source and found the similar result that the trust on public scientists are higher than private scientists. Because of perceiving of public scientists were more likely to produce benefits accessible to the public, in contrast that the private scientists were more self-interest. However, the religious leaders which previously reported making significant contribution to people's attitudes related

to stem cell research (Liu & Priest, 2009), did not have any influence on public opinion on stem cell technology in our study. The political leaders who supposed to involve with stem cell technology in term of policy. But the trust in political leaders did not show any influence on stem cell technology.

As we introduced some new key persons to this study, the trust in doctors and medical practitioners are factor that we were interested to study. Due to the fact that, the stem cell technology involved with the disease treatment and medical practices, the result showed that the trust in this new key person had influence on perception on stem cell technology as well. Although, there was no other study that examine the trust in this group that we can used for comparison. But we believe this will be the effect of level of involvement of this new key person group in term of knowledge on medical usage of stem cells and related healthcare policy.

Friends, family and relatives were grouped as another key person group that supposed to influence the perception by interpersonal communication. The trust in these key persons should influence the perception on stem cell technology. However, the result was shown there was no statistically significantly different in stem cell technology perception among different level of trust in this group. This mean the trust in this close peers did not have any effect on perception.

Table 1.11 Non-parametric statistical analysis of trust in key persons

Factor	Group	Mean Rank	df	Chi-Square	P value
Trust in scientists (Government)	Not credible at all	33.17	4	13.486	0.009*
	Somewhat credible	40.04			
	Credible	60.80			
	Very credible	61.62			
	Extremely credible	70.18			
Trust in scientists (Private sector)	Not credible at all	33.17	4	4.968	0.291
	Somewhat credible	54.09			
	Credible	60.49			
	Very credible	59.80			
	Extremely credible	61.25			
Trust in doctors or medical practitioners	Not credible at all	42.50	4	18.031	0.001*
	Somewhat credible	36.32			
	Credible	61.24			
	Very credible	59.66			
	Extremely credible	77.71			
Trust in political leaders	Not credible at all	63.06	3	6.364	0.095
	Somewhat credible	50.48			
	Credible	57.25			
	Very credible	25.00			
Trust in religious leaders	Not credible at all	63.40	3	4.873	0.181
	Somewhat credible	50.78			
	Credible	52.14			
	Very credible	47.75			
Trust in friends, family, and relatives	Not credible at all	54.54	4	3.834	0.429
	Somewhat credible	59.45			
	Credible	53.90			
	Very credible	47.75			
	Extremely credible	106.00			

**Statistically significant difference*

1.3.6 Effect of interpersonal communication

Interpersonal communication has been rarely introduced into research on public opinion, although, it was reported as an important factor shaping public opinion on stem cell controversy (Liu & Priest, 2009). We examined the interpersonal communication regarding stem cell technology of respondents through the questionnaire and the result was shown in Figure 1.12. The result showed that within 6 months, most of respondents (N=61, 59.2%) never had a previous discussion regarding stem cell technology with anyone, while some of them (N=33, 32%) had at least 1-2 times discussion about stem cell technology. Few of respondents (N=6, 5.8%) had discussion about stem cell technology around 3-5 times.

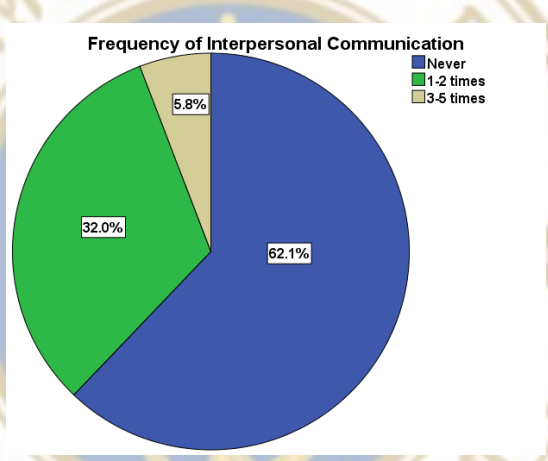

Figure 1.12 Frequency of interpersonal communication regarding stem cell technology

Although our respondents have different levels of interpersonal communication regarding stem cell technology with their close peers, but these different levels did not influence their perception on stem cell technology. As reported in statistical analysis result in Table 1.12, there was no statistically significantly difference between group of respondents that had different number of communication about stem cell technology. This result is similar to result from similar study done in USA and Canada (Liu & Priest, 2009), the researcher cannot identify the effect of interpersonal communication on stem cell technology perception. Despite of the fact that, the interpersonal communication normally has influence in people's opinions and perceptions (Mazur & Hall, 1990). We decided to evaluate the same factor with previous

study, in case the different culture context on a society toward collectivism as Thailand (Hongladarom, 1999) may give the different insight. However, the result was similar to previous study.

Table 1.12 Non-parametric statistical analysis of interpersonal communication factors

Factor	Group	Mean Rank	df	Chi-Square	P value
Interpersonal communication	Never	56.04	2	0.187	0.911
	1-2 times	58.33			
	3-5 times	59.58			

**Statistically significant difference*

1.3.7 Perceived risks & Benefits

There was previous study (Liu & Priest, 2009) examined the public perception of benefits associated with stem cell research. However, there was no assessment of perceived of associated risk examined in the same study. According to another study (Slovic, Finucane, Peters, & MacGregor, 2004), risk and benefit are associated and should be studied in term of their effects on attitude and perception. With this suggestion, we decided to examine both perceived benefits and risks in this study. From total 113 respondents, there were 2 respondents (1.8%) did not perceived stem cell technology as benefit. Most of them perceived benefit of stem cell technology, but the benefit level they perceived was different. Half of respondents (N=56, 49.6%) indicated that stem cell technology is high benefit, 28 respondents (24.8%) and 26 respondents (23%) indicated the benefit at moderate and extreme level, respectively. In term of perceived risk, only 4 respondents (3.5%) consider stem cell technology as no risk at all. The rest of response indicated level of perceived risk as somewhat (N=32, 28.3%), risk (N=58, 51.3%), high risk (N=16, 14.2%), and extreme risk (N=3, 2.7%). The overall response in term of perceived benefit and risk are shown in Figure 1.13.

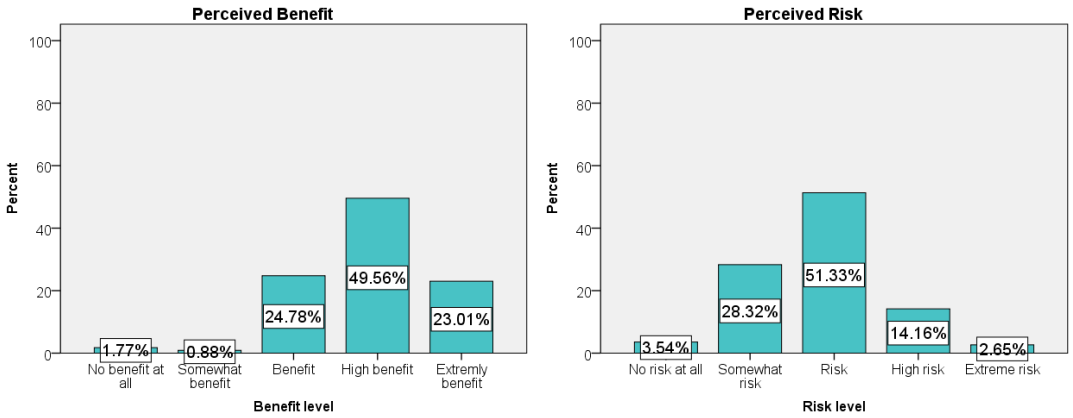

Figure 1.13 Perceived benefits and risks toward stem cell technology

We studied benefits and risks related to stem cell technology in more specific area. The opinion of respondents that the stem cell technology gives the benefit to specific area such as researches, drug discovery and development, medical treatment of uncured diseases, and organ replacement was evaluated. In the same time, the different area with potential risk caused by stem cell technology such as unethical source of stem cells, medical malpractices, medical frauds and scams, health-related or life-threaten issues, conflicts with religious belief, and increasing of medical treatment cost were evaluated.

In term of benefits (Figure 1.14), the level of respondents who believed that stem cell technology will cause benefit were 74.3% (N=83) for researches, 75.2% (N=85) for drug discovery and development, 83.2% (N=94) for medical treatment of uncured diseases, and 61.1% (N=69) for organ replacement.

In term of risks (Figure 1.15), the respondents concerned on specific area which may have risk associated with stem cell technology. According to this result, there were 71.7% (N=81) of respondent concerned on unethical source of stem cells, 57.5% (N=65) on medical malpractices, 77.9% (N=88) medical frauds and scams, 39.8% (N=45) on health-related or life-threaten issues, 20.4% (N=23) on conflicts with religious belief, and 34.5% (N=39) on increasing of medical treatment cost.

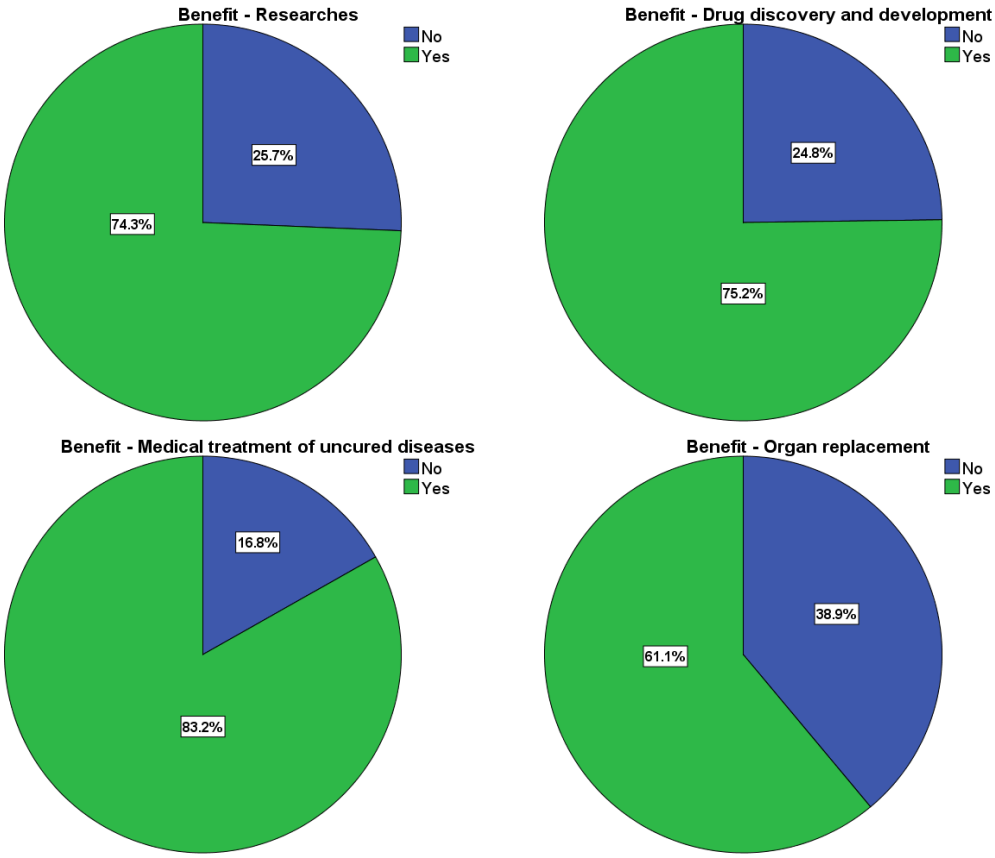

Figure 1.14 Perceived benefits of stem cell technology on specific area

The effect of perceived risks and benefits on perception on stem cell technology was analyzed. The result from Kruskal-Wallis H test revealed that perceived benefit had statistically significant difference in perception on stem cell technology at $\chi^2(2) = 33.863$, $p = 0.000$, with mean range according to the Table 1.13. While perceived risk did not have statistically significant different in perception on stem cell technology ($p = 0.193$) We can summarize that the perceived benefits had influence on perception toward stem cell technology while the perceived risks did not have any effect. We cannot compare this effect with other study about stem cell perception as no one did any research in term of perceived risk and benefits.

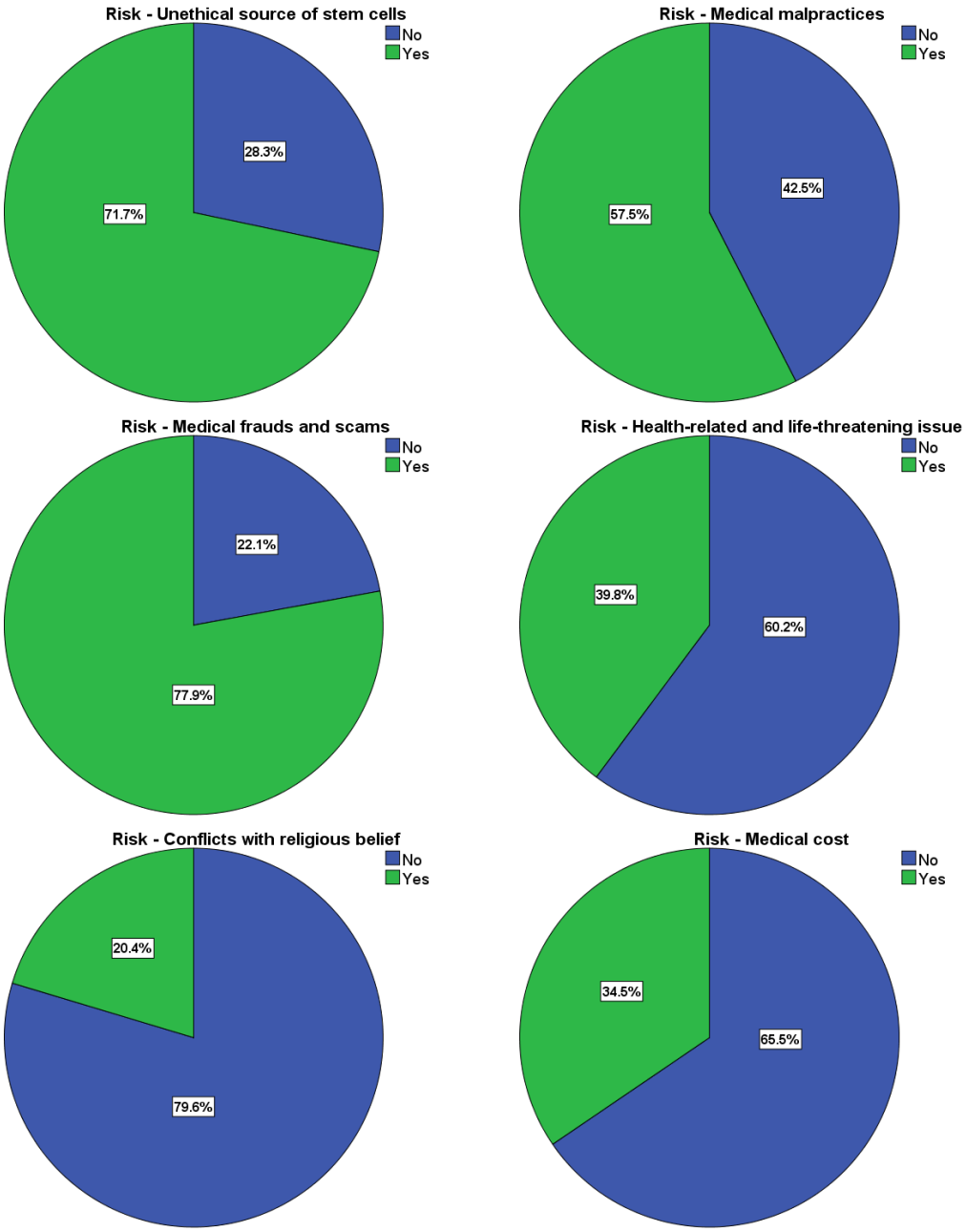

Figure 1.15 Perceived risk of stem cell technology on specific area

From overall data reported, there were similar and opposite findings with other previous studies.

In term of demographics, our finding is gender, education level and income level showed the influence on perception toward stem cell technology. Our finding is similar to previous study in term of gender, as also a report showed that the women were more reserved toward emerging technologies than men and resulted in negative

perception toward stem cells (Liu & Priest, 2009; Nisbet & Goidel, 2007). We found similar effect in our study as well. However, the education and income level were never reported as the factors influence the perception on stem cells. We suspected that the education and income level may associated with the knowledge level of the respondents as better education and income open the opportunities to access the knowledge in higher level.

Table 1.13 Non-parametric statistical analysis of perceived risk and benefit factors

Factor	Group	Mean Rank	df	Chi-Square	P value
Perceived benefit	No benefit at all	14.50	4	33.863	0.000*
	Somewhat benefit	4.00			
	Benefit	44.63			
	High benefit	53.04			
	Extremely benefit	84.15			
Perceived risk	No risk at all	76.88	4	6.078	0.193
	Somewhat risk	64.13			
	Risk	51.12			
	High risk	57.19			
	Extreme risk	67.17			

**Statistically significant difference*

The influence of knowledge and familiarity in our study is contrasted with result from other studies. With limitation on knowledge and clear understanding about stem cell technology, public depends on the heuristic factor likes familiarity than knowledge level to shape their own opinion and perception toward it. This concept is confirmed in previous study by Nisbet and Goidel (2007); Scheufele and Lewenstein (2005); Liu and Priest (2009). However, our finding has shown that even the respondents knowledge has influence with stem cell technology perception, while the familiarity is not the main factor influence perception. This may be affected from difference of time of study, as the previous study was done in early phases when stem

cell technology still be new concept. While our study was done when people already acquire knowledge about stem cell technology. Stem cell technology is not a new concept or unknown technology anymore, results in the perception is relied on knowledge than familiarity.

The most interesting finding is the effect of religious belief toward perception of stem cell technology. The research conducted in USA found strongly significant effect of religious belief to the perception toward stem cell technology (Liu & Priest, 2009), however, our study did not find any significant correlation between respondent's religious belief to perception of benefit of stem cells. We suggested that the different contrast between previous study and our study may affect from different religious belief as the study done by Liu and Priest (2009) was conducted on respondents with Christianity belief, while most of respondents from Thailand are Buddhists and do not have as strong opinion as the stem cells contain life in western countries with strong Christianity belief.

Media influence plays an important role in stem cell technology perception in term of media attention and reliability of media, not media exposure level as previously reported (Liu & Priest, 2009). Our finding also supports the theory that the influence of media exposure may not the actual factor but it is the influence of media attention of public toward specific topic, as our result showed that there was no influence of media exposure but media attention level instead. Furthermore, reliability of media source was measured as one factors under media influence as well, which the result clearly identified that the information about stem cells on documentary and article in scientific journals are most reliable source that influence the perception. These findings can be used for better strategy the information sharing through different media channels.

The result pointed out that the key person trusted by public and can be an influencer on the perception of stem cell technology, except the similar finding that the perception on stem cell technology was influenced more by the scientists funding by government than private sector. In contrary, the religious leaders were not the influencer in this area, same as the political leaders. The interesting group of key persons added to our study was the doctors and medical practitioners which influence the public perception toward stem cell technology. This can be explained that Thai society rely

more on information of both groups in term of technology that related to medical technology like stem cell technology.

The interpersonal communication was reported to have statistically significant impact on people attitude as mentioned in literature review. However, our result did not show any significant impact of interpersonal communication on people perception on stem cell technology. This finding is same as reported by Liu and Priest (2009) which the interpersonal communication also does not have impact on perception on stem cell technology. Although, there was the report that the interpersonal communication should reinforce and should have similar effect as media influence (Lenart, 1994). We suspected interpersonal communication may be influential but may be too weak to show up in the study and the reinforce effect may depend on the trust in the source of this communication as our study showed no influence of trust on friends, family and relatives which supposed to be key persons in interpersonal communication.

Another important factor in our consideration is the trust on key person. Previous research found that the trust in university scientists and religious leaders have strong impact on perception of people toward emerging technologies. However, our research does not show any significant on trust on religious leader. The data showed that there is a significant relationship between perception and trust toward some key persons such as scientists (university) or medical doctors.

Final factor, our finding found that the perceived benefits is only factor in term of risk and benefit that influence on perception toward stem cell technology. This finding is in contrary with the concept that Sokolowska and Sleboda (2015) explained. The technology that poorly understood and public still lack of knowledge will cause some social resistance and would be judge in term of risk aversion. In conclusion, people will resist the unknown until the knowledge level on that technology increase. However, the social positive perception tends to outweighs its risk, if its benefits associated to personal benefit as previous found in a study done by Satterfield et. al., (2009). Due to the fact that the knowledge level of Thais on stem cell technology is in the level that this technology is not an unknown, this may be a reason that perceived benefits play more important role in perception than perceived risk.

CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

1.1 Conclusions

Considering stem cell technology as an emerging technology with many unknown, people cannot totally base on their knowledge to justify the acceptance and perception toward it. Previous studies in literature review demonstrated about some factors that evaluated by researchers from different countries have shown the influence on public perception on stem cell technology. This study emphasized the similar factors and measured on different environment and cultural context in emerging developing country like Thailand with interesting findings in term of similarity and opposite with previous reported. In conclusion, we finalized our finding to the new framework as shown in Figure 1.1. The demographics that actual influence the perception are gender, education level, and income level. The influence of knowledge and familiarity in our study is contrasted with result from other studies, as public is relied on knowledge than familiarity to set a perception toward the stem cell technology. Media influence still plays an important role in stem cell technology perception in term of media attention and reliability of media. In term of trust on key persons, Thai public perception relies on trust toward some key persons such as scientists (university) or medical doctors than others. The last factor, perceived benefits, is only factor in term of risk and benefit that influence on perception toward stem cell technology.

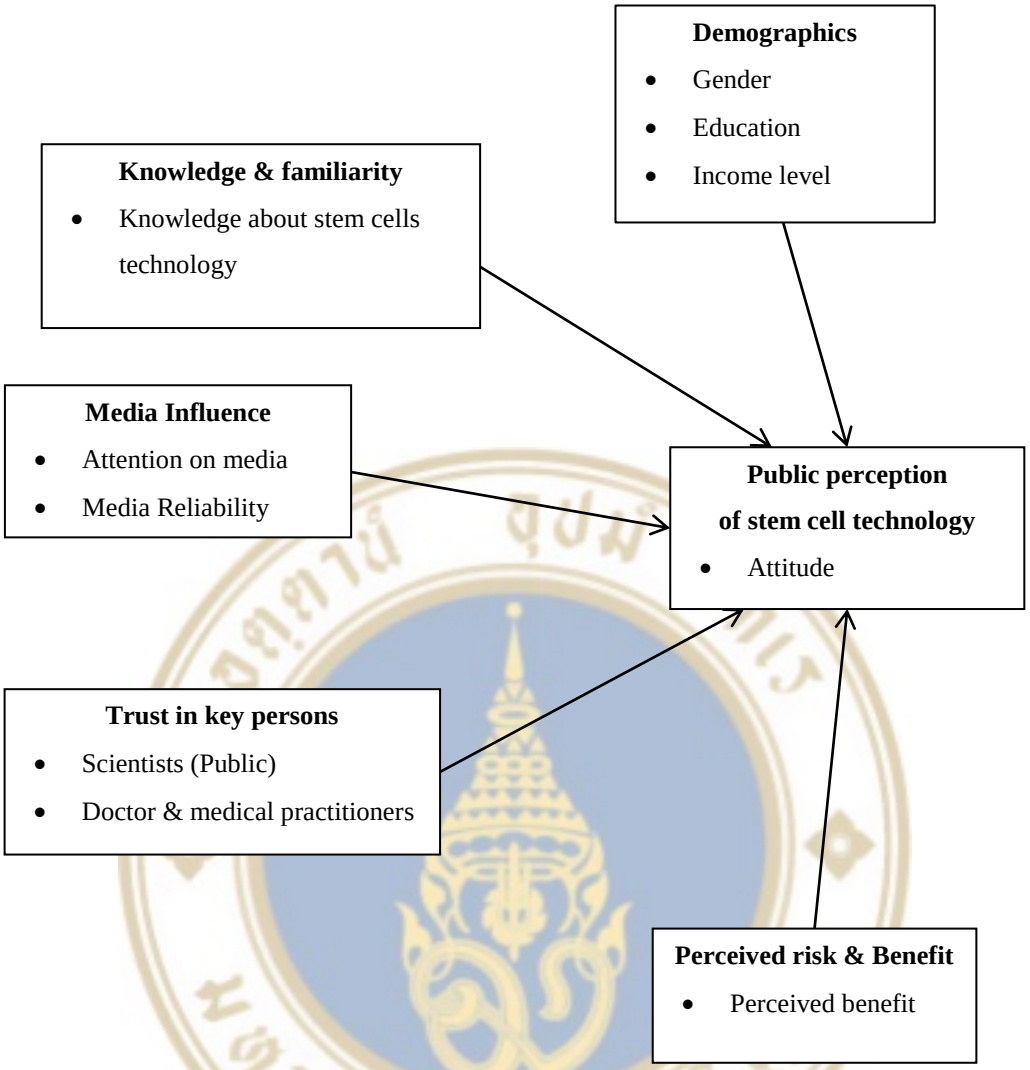

Figure 1.1 Actual framework of factors influence perception toward stem cell technology (Our finding)

1.2 Recommendations

As this study was aimed to create more understanding on the public perception in Thailand for emerging technology such as stem cell technology, we finally identified the main factors influence the public perception as previously described in new actual framework in Figure 1.1. Considering that stem cell technology is a new technological concept for Thailand, policy and regulation are still in unclear direction. Our finding can be benefit two target groups; first group is the government segment working on policy and regulation related to stem cell technology as a consideration and preparation of public perception, and second group is private sector that commercializes stem cell related products which can use our finding to shape the right strategy for market preparation and introduction of their products to the market. Our recommendations are:

Firstly, **education** the public and market to have the right knowledge about stem cell technology before introduction of the new policy, regulations, or related product. This will help to prepare the public and market to perceive the benefit and risk of this technology at appropriate level, leads to correct perception and acceptance of stem cell technology.

Secondly, the information related to stem cell technology must be communicated through **trustworthy media channels** to build up the positive perception toward stem cell technology. Due to the fact that the public must pay attention on this information in the level that create effective communication for building the right perception, the communication through media channel must be in the level that bring the attention of society toward this technology.

Thirdly, as the trust in key persons who communicate the knowledge and understanding of the stem cell technology is one of the important factor. **Engagement with the right Key Opinion Leaders (KOLs)** such as experienced and knowledgeable scientists and medical doctors as the key persons who provide the technical knowledge about stem cell technology must be key factors that help build up the correct knowledge in society and leads to right perception on stem cell technology.

Lastly, to make sure that public perceived correct benefits about stem cell technology and lead to positive perception. Communication and information must

project the actual benefits of stem cell technology to **create the right level of perceived benefits** on stem cell technology.

1.3 Limitations and suggestions for future research

This research faced limitation of data collection in short time period and limit number of respondents, comparing with other studies which done in nation-wide level and collected data from many respondents. We suggest larger sample size with diverse respondents' background to increase accuracy of the research. Furthermore, during the research data collection through survey, there are some feedback from medical practitioners in term of regulation may be another factor related to perception of people on stem cell technology. This factor should be considered to be another interesting aspect for further study. We recommended to conduct the similar research with more number of respondents and in combination of different research technique such as interview or focus group to gain more accurate insight in this topic.

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APPENDICES

APPENDIX A
STATISTICAL ANALYSIS RESULT

1.1 Frequency Analysis

1.1.1 Demographics

Frequencies

Statistics

		Gender	Age	Education level	Field of Study	Occupation	Income level	Religious belief
N	Valid	103	103	103	103	103	103	103
	Missing	0	0	0	0	0	0	0
Mean		1.40	3.18	2.66	2.38	2.64	4.34	1.17
Median		1.00	3.00	3.00	1.00	2.00	5.00	1.00
Mode		1	2	3	1	2	5	1

Frequency Table

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	67	59.3	59.3	59.3
	Female	46	40.7	40.7	100.0
	Total	113	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 29	40	35.4	35.4	35.4
	30 - 39	36	31.9	31.9	67.3
	40 - 49	12	10.6	10.6	77.9
	50 - 59	10	8.8	8.8	86.7
	> 60	15	13.3	13.3	100.0
	Total	113	100.0	100.0	

Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor degree	50	44.2	44.2	44.2
	Master degree	55	48.7	48.7	92.9
	Ph. D.	8	7.1	7.1	100.0
	Total	113	100.0	100.0	

Field of Study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Science and technology	55	48.7	48.7	48.7
	Medical Science	8	7.1	7.1	55.8
	Social science	6	5.3	5.3	61.1
	Business and finance	37	32.7	32.7	93.8
	Language and art	7	6.2	6.2	100.0
	Total	113	100.0	100.0	

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	4	3.5	3.5	3.5
	Employee	73	64.6	64.6	68.1
	Government officer	13	11.5	11.5	79.6
	Business owner	15	13.3	13.3	92.9
	Retired	8	7.1	7.1	100.0
	Total	113	100.0	100.0	

Income level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 15,000 THB	1	.9	.9	.9
	15,001 - 25,000 THB	11	9.7	9.7	10.6
	25,001 - 35,000 THB	11	9.7	9.7	20.4
	35,001 - 45,000 THB	13	11.5	11.5	31.9
	> 45,000 THB	77	68.1	68.1	100.0
	Total	113	100.0	100.0	

Religious belief

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buddhist	105	92.9	92.9	92.9
	Christian	2	1.8	1.8	94.7
	Muslim	2	1.8	1.8	96.5
	Atheist or Free Thinker	4	3.5	3.5	100.0
	Total	113	100.0	100.0	

1.1.2 Knowledge and familiarity

Frequencies

Statistics

		Knowledge1	Knowledge 2	Familiarity 1	Familiarity 2
N	Valid	113	113	113	113
	Missing	0	0	0	0
Mean		.72	.65	2.27	2.27
Median		1.00	1.00	2.00	2.00
Mode		1	1	3	2

Frequency Table

Knowledge1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	32	28.3	28.3	28.3
	Yes	81	71.7	71.7	100.0
	Total	113	100.0	100.0	

Knowledge 2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	40	35.4	35.4	35.4
	Yes	73	64.6	64.6	100.0
	Total	113	100.0	100.0	

Familiarity with stem cell technology concept

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not familiar at all	19	16.8	16.8	16.8
	Somewhat familiar	51	45.1	45.1	61.9
	Familiar	37	32.7	32.7	94.7
	Very familiar	6	5.3	5.3	100.0
	Total	113	100.0	100.0	

1.1.3 Religious belief

Frequencies

Statistics

		Importance of religion	Religious guidance
N	Valid	113	113
	Missing	0	0
Mean		3.04	3.23
Median		3.00	3.00
Mode		3	4

Frequency Table

Importance of religion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not important at all	13	11.5	11.5	11.5
	Somewhat important	21	18.6	18.6	30.1
	Important	38	33.6	33.6	63.7
	Very important	31	27.4	27.4	91.2
	Extremely important	10	8.8	8.8	100.0
	Total	113	100.0	100.0	

Religious guidance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	13	11.5	11.5	11.5
	Rarely	9	8.0	8.0	19.5
	Sometimes	40	35.4	35.4	54.9
	Often use for guidance	41	36.3	36.3	91.2
	Great deal of guidance	10	8.8	8.8	100.0
	Total	113	100.0	100.0	

1.1.4 Media influence

Frequencies

Statistics

		Exposure about SCT on media	Media - frequency of exposure
N	Valid	113	113
	Missing	0	0
Mean		.66	3.64
Median		1.00	3.00
Mode		1	7

Frequency Table

Exposure about SCT on media

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	38	33.6	33.6	33.6
	Yes	75	66.4	66.4	100.0
	Total	113	100.0	100.0	

Media - frequency of exposure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	10	8.8	8.8	8.8
	1	19	16.8	16.8	25.7
	2	16	14.2	14.2	39.8
	3	20	17.7	17.7	57.5
	4	6	5.3	5.3	62.8
	5	7	6.2	6.2	69.0
	6	4	3.5	3.5	72.6
	7	31	27.4	27.4	100.0
	Total	113	100.0	100.0	

Frequencies

Statistics

		Media - Science and technology	Media - Medical technology and breakthrough	Media - Specific scientific development such as stem cell technology	Media - Policy related to new scientific development
N	Valid	113	113	113	113
	Missing	0	0	0	0
Mean		3.11	2.98	2.57	2.743
Median		3.00	3.00	2.00	3.000
Mode		3	3	2	3.0

Frequency Table

Media - Science and technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No attention at all	5	4.4	4.4	4.4
	Not much attention	23	20.4	20.4	24.8
	Neutral attention	50	44.2	44.2	69.0
	Somewhat attention	25	22.1	22.1	91.2
	High Attention	10	8.8	8.8	100.0
	Total	113	100.0	100.0	

Media - Medical technology and breakthrough

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No attention at all	8	7.1	7.1	7.1
	Not much attention	29	25.7	25.7	32.7
	Neutral attention	45	39.8	39.8	72.6
	Somewhat attention	19	16.8	16.8	89.4
	High Attention	12	10.6	10.6	100.0
	Total	113	100.0	100.0	

Media - Specific scientific development such as stem cell technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No attention at all	9	8.0	8.0	8.0
	Not much attention	49	43.4	43.4	51.3
	Neutral attention	43	38.1	38.1	89.4
	Somewhat attention	6	5.3	5.3	94.7
	High Attention	6	5.3	5.3	100.0
	Total	113	100.0	100.0	

Media - Policy related to new scientific development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No attention at all	13	11.5	11.5	11.5
	Not much attention	35	31.0	31.0	42.5
	Neutral attention	41	36.3	36.3	78.8
	Somewhat attention	16	14.2	14.2	92.9
	High Attention	8	7.1	7.1	100.0
	Total	113	100.0	100.0	

Frequencies

Statistics

		Media - TV news	Media - Documentary	Media - Radio news	Media - Internet or social media	Media - Article in newspapers	Media - Article in magazines	Media - Article in scientific journals
N	Valid	113	113	113	113	113	113	113
	Missing	0	0	0	0	0	0	0
Mean		2.65	3.16	2.36	2.11	2.65	2.58	3.56
Median		3.00	3.00	2.00	2.00	3.00	3.00	4.00
Mode		3	3	2	2	2	3	4

Frequency Table

Media - TV news

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	6	5.3	5.3	5.3
	Somewhat reliable	42	37.2	37.2	42.5
	Reliable	52	46.0	46.0	88.5
	Very reliable	12	10.6	10.6	99.1
	Extremely reliable	1	.9	.9	100.0
	Total	113	100.0	100.0	

Media - Documentary

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	5	4.4	4.4	4.4
	Somewhat reliable	22	19.5	19.5	23.9
	Reliable	42	37.2	37.2	61.1
	Very reliable	38	33.6	33.6	94.7
	Extremely reliable	6	5.3	5.3	100.0
	Total	113	100.0	100.0	

Media - Radio news

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	12	10.6	10.6	10.6
	Somewhat reliable	58	51.3	51.3	61.9
	Reliable	33	29.2	29.2	91.2
	Very reliable	10	8.8	8.8	100.0
	Total	113	100.0	100.0	

Media - Internet or social media

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	19	16.8	16.8	16.8
	Somewhat reliable	67	59.3	59.3	76.1
	Reliable	24	21.2	21.2	97.3
	Very reliable	2	1.8	1.8	99.1
	Extremely reliable	1	.9	.9	100.0
	Total	113	100.0	100.0	

Media - Article in newspapers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	3	2.7	2.7	2.7
	Somewhat reliable	48	42.5	42.5	45.1
	Reliable	47	41.6	41.6	86.7
	Very reliable	15	13.3	13.3	100.0
	Total	113	100.0	100.0	

Media - Article in magazines

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	6	5.3	5.3	5.3
	Somewhat reliable	45	39.8	39.8	45.1
	Reliable	53	46.9	46.9	92.0
	Very reliable	9	8.0	8.0	100.0
	Total	113	100.0	100.0	

Media - Article in scientific journals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not reliable at all	5	4.4	4.4	4.4
	Somewhat reliable	14	12.4	12.4	16.8
	Reliable	31	27.4	27.4	44.2
	Very reliable	39	34.5	34.5	78.8
	Extremely reliable	24	21.2	21.2	100.0
	Total	113	100.0	100.0	

1.1.5 Trust in key persons

Frequencies

Statistics

		Trust - Scientists (university or funded by government)	Trust - Scientists (Private sector or funded by private company)	Trust - Doctors or medical practitioners	Trust - Political leaders	Trust - Religious leaders	Trust - Friends, family and relatives
N	Valid	113	113	113	113	113	113
	Missing	0	0	0	0	0	0
Mean		3.20	2.92	3.25	1.70	1.65	2.07
Median		3.00	3.00	3.00	2.00	2.00	2.00
Mode		3	3	3	1	1	2

Frequency Table

Trust - Scientists (university or funded by government)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	3	2.7	2.7	2.7
	Somewhat credible	24	21.2	21.2	23.9
	Credible	47	41.6	41.6	65.5
	Very credible	25	22.1	22.1	87.6
	Extremely credible	14	12.4	12.4	100.0
	Total	113	100.0	100.0	

Trust - Scientists (Private sector or funded by private company)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	6	5.3	5.3	5.3
	Somewhat credible	34	30.1	30.1	35.4
	Credible	42	37.2	37.2	72.6
	Very credible	25	22.1	22.1	94.7
	Extremely credible	6	5.3	5.3	100.0
	Total	113	100.0	100.0	

Trust - Doctors or medical practitioners

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	4	3.5	3.5	3.5
	Somewhat credible	22	19.5	19.5	23.0
	Credible	41	36.3	36.3	59.3
	Very credible	34	30.1	30.1	89.4
	Extremely credible	12	10.6	10.6	100.0
	Total	113	100.0	100.0	

Trust - Political leaders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	54	47.8	47.8	47.8
	Somewhat credible	41	36.3	36.3	84.1
	Credible	16	14.2	14.2	98.2
	Very credible	2	1.8	1.8	100.0
	Total	113	100.0	100.0	

Trust - Religious leaders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	55	48.7	48.7	48.7
	Somewhat credible	45	39.8	39.8	88.5
	Credible	11	9.7	9.7	98.2
	Very credible	2	1.8	1.8	100.0
	Total	113	100.0	100.0	

Trust - Friends, family and relatives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not credible at all	28	24.8	24.8	24.8
	Somewhat credible	55	48.7	48.7	73.5
	Credible	25	22.1	22.1	95.6
	Very credible	4	3.5	3.5	99.1
	Extremely credible	1	.9	.9	100.0
	Total	113	100.0	100.0	

1.1.6 Interpersonal communication

Frequencies

Statistics

		Interpersonal communication	Frequency of communication	Interpersonal communication with family, friends, and relatives
N	Valid	113	113	113
	Missing	0	0	0
Mean		.44	1.44	.36
Median		.00	1.00	.00
Mode		0	1	0

Frequency Table

Interpersonal communication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	63	55.8	55.8	55.8
	Yes	50	44.2	44.2	100.0
	Total	113	100.0	100.0	

Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	69	61.1	61.1	61.1
	1-2 times	38	33.6	33.6	94.7
	3-5 times	6	5.3	5.3	100.0
	Total	113	100.0	100.0	

Interpersonal communication - FFR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	72	63.7	63.7	63.7
	Yes	41	36.3	36.3	100.0
	Total	113	100.0	100.0	

1.1.7 Perceived risk & Benefits

Frequencies

Statistics

		Perceived Benefit	Perceived Risk
N	Valid	113	113
	Missing	0	0
Mean		3.91	2.84
Median		4.00	3.00
Mode		4	3

Frequency Table

Perceived Benefit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No benefit at all	2	1.8	1.8	1.8
	Somewhat benefit	1	.9	.9	2.7
	Benefit	28	24.8	24.8	27.4
	High benefit	56	49.6	49.6	77.0
	Extremely benefit	26	23.0	23.0	100.0
	Total	113	100.0	100.0	

Perceived Risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No risk at all	4	3.5	3.5	3.5
	Somewhat risk	32	28.3	28.3	31.9
	Risk	58	51.3	51.3	83.2
	High risk	16	14.2	14.2	97.3
	Extreme risk	3	2.7	2.7	100.0
	Total	113	100.0	100.0	

Frequencies

Statistics

		Benefit - Researches	Benefit - Drug discovery and development	Benefit - Medical treatment of uncured diseases	Benefit - Organ replacement
N	Valid	113	113	113	113
	Missing	0	0	0	0
Mean		.74	.75	.83	.61
Median		1.00	1.00	1.00	1.00
Mode		1	1	1	1

Frequency Table

Benefit - Researches

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	29	25.7	25.7	25.7
	Yes	84	74.3	74.3	100.0
	Total	113	100.0	100.0	

Benefit - Drug discovery and development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	28	24.8	24.8	24.8
	Yes	85	75.2	75.2	100.0
	Total	113	100.0	100.0	

Benefit - Medical treatment of uncured diseases

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	16.8	16.8	16.8
	Yes	94	83.2	83.2	100.0
	Total	113	100.0	100.0	

Benefit - Organ replacement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	44	38.9	38.9	38.9
	Yes	69	61.1	61.1	100.0
	Total	113	100.0	100.0	

Frequencies

Statistics

		Risk - Unethical source of stem cells	Risk - Medical malpractices	Risk - Medical frauds and scams	Risk - Health-related and life-threatening issue	Risk - Conflicts with religious belief	Risk - Medical cost
N	Valid	113	113	113	113	113	113
	Missing	0	0	0	0	0	0
Mean		.72	.58	.78	.40	.20	.35
Median		1.00	1.00	1.00	.00	.00	.00
Mode		1	1	1	0	0	0

Frequency Table

Risk - Unethical source of stem cells

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	32	28.3	28.3	28.3
	Yes	81	71.7	71.7	100.0
	Total	113	100.0	100.0	

Risk - Medical malpractices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	48	42.5	42.5	42.5
	Yes	65	57.5	57.5	100.0
	Total	113	100.0	100.0	

Risk - Medical frauds and scams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	25	22.1	22.1	22.1
	Yes	88	77.9	77.9	100.0
	Total	113	100.0	100.0	

Risk - Health-related and life-threatening issue

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	68	60.2	60.2	60.2
	Yes	45	39.8	39.8	100.0
	Total	113	100.0	100.0	

Risk - Conflicts with religious belief

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	90	79.6	79.6	79.6
	Yes	23	20.4	20.4	100.0
	Total	113	100.0	100.0	

Risk - Medical cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	74	65.5	65.5	65.5
	Yes	39	34.5	34.5	100.0
	Total	113	100.0	100.0	

1.1.8 Perception Toward Stem Cell Technology

Frequencies

Statistics

		Attitude	Support
N	Valid	113	113
	Missing	0	0
Mean		3.70	3.65
Median		4.00	4.00
Mode		4	4

Frequency Table

Attitude

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Partially agree	7	6.2	6.2	6.2
	Agree	35	31.0	31.0	37.2
	Highly agree	56	49.6	49.6	86.7
	Extremely agree	15	13.3	13.3	100.0
	Total	113	100.0	100.0	

Support

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not agree at all	1	.9	.9	.9
	Partially agree	3	2.7	2.7	3.5
	Agree	43	38.1	38.1	41.6
	Highly agree	54	47.8	47.8	89.4
	Extremely agree	12	10.6	10.6	100.0
	Total	113	100.0	100.0	

1.2 Kruskal-Wallis Analysis of Variance

1.2.1 Demographics

Kruskal-Wallis Test

Ranks

	Gender	N	Mean Rank
Attitude	Male	67	63.96
	Female	46	46.87
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	8.766
df	1
Asymp. Sig.	.003

a. Kruskal Wallis Test
b. Grouping Variable: Gender

Kruskal-Wallis Test

Ranks

	Age	N	Mean Rank
Attitude	20 - 29	40	46.65
	30 - 39	36	63.60
	40 - 49	12	61.25
	50 - 59	10	52.30
	> 60	15	68.50
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	9.109
df	4
Asymp. Sig.	.058

a. Kruskal Wallis Test
b. Grouping Variable: Age

Kruskal-Wallis Test

Ranks

	Education level	N	Mean Rank
Attitude	Bachelor degree	50	52.68
	Master degree	55	57.03
	Ph. D.	8	83.81
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	7.360
df	2
Asymp. Sig.	.025

a. Kruskal Wallis Test
b. Grouping Variable: Education level

Kruskal-Wallis Test

Ranks

	Field of Study	N	Mean Rank
Attitude	Science and technology	55	57.21
	Medical Science	6	61.25
	Social science	8	64.81
	Business and finance	37	56.28
	Language and art	7	46.57
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	1.519
df	4
Asymp. Sig.	.823

a. Kruskal Wallis Test
b. Grouping Variable: Field of Study

Kruskal-Wallis Test

Ranks

	Occupation	N	Mean Rank
Attitude	Student	4	47.75
	Employee	76	53.01
	Government officer	12	70.96
	Business owner	13	66.23
	Retired	8	63.56
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	5.880
df	4
Asymp. Sig.	.208

a. Kruskal Wallis Test
b. Grouping Variable: Occupation

Kruskal-Wallis Test

Ranks

	Income level	N	Mean Rank
Attitude	< 15,000 THB	1	25.00
	15,001 - 25,000 THB	11	34.91
	25,001 - 35,000 THB	10	38.00
	35,001 - 45,000 THB	11	55.27
	> 45,000 THB	80	63.05
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	14.273
df	4
Asymp. Sig.	.006

a. Kruskal Wallis Test
b. Grouping Variable: Income level

Kruskal-Wallis Test

Ranks

	Religion belief	N	Mean Rank
Attitude	Buddhist	105	56.93
	Christian	2	25.00
	Muslim	2	47.75
	Atheist or Free Thinker	4	79.38
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	4.649
df	3
Asymp. Sig.	.199

a. Kruskal Wallis Test
b. Grouping Variable: Religion belief

1.2.2 Knowledge and familiarity

Kruskal-Wallis Test

Ranks

	Knowledge1	N	Mean Rank
Attitude	No	32	43.05
	Yes	81	62.51
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	9.569
df	1
Asymp. Sig.	.002

a. Kruskal Wallis Test
b. Grouping Variable: Knowledge1

Kruskal-Wallis Test

Ranks

	Knowledge 2	N	Mean Rank
Attitude	No	40	48.93
	Yes	73	61.42
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	4.445
df	1
Asymp. Sig.	.035

a. Kruskal Wallis Test
b. Grouping Variable: Knowledge 2

Kruskal-Wallis Test

Ranks

	Actual knowledge	N	Mean Rank
Attitude	No	10	62.85
	Yes	103	56.43
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	.413
df	1
Asymp. Sig.	.520

a. Kruskal Wallis Test
b. Grouping Variable: Actual knowledge

Kruskal-Wallis Test

Ranks

	Familiarity	N	Mean Rank
Attitude	Not familiar at all	19	44.00
	Somewhat familiar	51	56.12
	Familiar	37	64.77
	Very familiar	6	57.75
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	6.042
df	3
Asymp. Sig.	.110

a. Kruskal Wallis Test
b. Grouping Variable: Familiarity

1.2.3 Religious belief

Kruskal-Wallis Test

Ranks

	Importance of religion	N	Mean Rank
Attitude	Not important at all	13	50.96
	Somewhat important	21	51.17
	Important	38	59.72
	Very important	31	60.87
	Extremely important	10	54.75
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	2.186
df	4
Asymp. Sig.	.702

a. Kruskal Wallis Test
b. Grouping Variable: Importance of religion

Kruskal-Wallis Test

Ranks

	Religious guidance	N	Mean Rank
Attitude	Not at all	13	58.73
	Rarely	9	65.44
	Sometimes	40	50.61
	Often use for guidance	41	58.54
	Great deal of guidance	10	66.40
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	3.626
df	4
Asymp. Sig.	.459

a. Kruskal Wallis Test
b. Grouping Variable: Religious guidance

1.2.4 Media Influence

Kruskal-Wallis Test

Ranks

	Media - frequency of exposure	N	Mean Rank
Attitude	0	10	50.65
	1	19	64.13
	2	16	45.41
	3	20	46.70
	4	6	40.17
	5	7	69.07
	6	4	68.00
	7	31	66.42
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	12.768
df	7
Asymp. Sig.	.078

a. Kruskal Wallis Test
b. Grouping Variable: Media - frequency of exposure

Kruskal-Wallis Test

Ranks

	Media Exposure	N	Mean Rank
Attitude	No	38	59.41
	Yes	75	55.78
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	.365
df	1
Asymp. Sig.	.545

a. Kruskal Wallis Test
b. Grouping Variable: Media Exposure

Kruskal-Wallis Test

Ranks

	Media - Science and technology	N	Mean Rank
Attitude	No attention at all	5	21.50
	Not much attention	23	51.35
	Neutral attention	50	58.03
	Somewhat attention	25	71.34
	High Attention	10	46.75
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	14.622
df	4
Asymp. Sig.	.006

a. Kruskal Wallis Test
b. Grouping Variable: Media - Science and technology

Kruskal-Wallis Test

Ranks

	Media - Medical technology and breakthrough	N	Mean Rank
Attitude	No attention at all	8	32.94
	Not much attention	29	58.45
	Neutral attention	45	59.68
	Somewhat attention	19	62.55
	High Attention	12	50.71
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	6.690
df	4
Asymp. Sig.	.153

a. Kruskal Wallis Test
b. Grouping Variable: Media - Medical technology and breakthrough

Kruskal-Wallis Test

Ranks

	Media - Specific scientific development such as stem cell technology	N	Mean Rank
Attitude	No attention at all	9	25.39
	Not much attention	49	58.91
	Neutral attention	43	62.60
	Somewhat attention	6	73.08
	High Attention	6	32.58
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	17.233
df	4
Asymp. Sig.	.002

a. Kruskal Wallis Test
b. Grouping Variable: Media - Specific scientific development such as stem cell technology

Kruskal-Wallis Test

Ranks

	Media - Policy related to new scientific development	N	Mean Rank
Attitude	No attention at all	13	51.73
	Not much attention	35	58.46
	Neutral attention	41	58.27
	Somewhat attention	16	60.09
	High Attention	8	46.50
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	1.692
df	4
Asymp. Sig.	.792

a. Kruskal Wallis Test
b. Grouping Variable: Media - Policy related to new scientific development

Kruskal-Wallis Test

Ranks

	Media - TV news	N	Mean Rank
Attitude	Not reliable at all	6	44.25
	Somewhat reliable	42	55.26
	Reliable	52	58.63
	Very reliable	12	65.04
	Extremely reliable	1	25.00
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	3.348
df	4
Asymp. Sig.	.501

a. Kruskal Wallis Test
b. Grouping Variable: Media - TV news

Kruskal-Wallis Test

Ranks

	Media - Documentary	N	Mean Rank
Attitude	Not reliable at all	5	25.70
	Somewhat reliable	22	44.43
	Reliable	42	66.51
	Very reliable	38	55.08
	Extremely reliable	6	74.75
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	15.639
df	4
Asymp. Sig.	.004

a. Kruskal Wallis Test
b. Grouping Variable: Media - Documentary

Kruskal-Wallis Test

Ranks

	Media - Radio news	N	Mean Rank
Attitude	Not reliable at all	12	48.04
	Somewhat reliable	58	57.72
	Reliable	33	64.55
	Very reliable	10	38.65
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	6.870
df	3
Asymp. Sig.	.076

a. Kruskal Wallis Test
b. Grouping Variable: Media - Radio news

Kruskal-Wallis Test

Ranks

	Media - Internet or social media	N	Mean Rank
Attitude	Not reliable at all	19	48.61
	Somewhat reliable	67	58.99
	Reliable	24	58.29
	Very reliable	2	47.75
	Extremely reliable	1	70.50
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	2.200
df	4
Asymp. Sig.	.699

a. Kruskal Wallis Test
b. Grouping Variable: Media - Internet or social media

Kruskal-Wallis Test

Ranks

	Media - Article in newspapers	N	Mean Rank
Attitude	Not reliable at all	3	33.17
	Somewhat reliable	48	60.24
	Reliable	47	53.48
	Very reliable	15	62.43
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	3.560
df	3
Asymp. Sig.	.313

a. Kruskal Wallis Test
b. Grouping Variable: Media - Article in newspapers

Kruskal-Wallis Test

Ranks

	Media - Article in magazines	N	Mean Rank
Attitude	Not reliable at all	6	33.17
	Somewhat reliable	45	63.28
	Reliable	53	53.12
	Very reliable	9	64.33
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	7.115
df	3
Asymp. Sig.	.068

a. Kruskal Wallis Test
b. Grouping Variable: Media - Article in magazines

Kruskal-Wallis Test

Ranks

	Media - Article in scientific journals	N	Mean Rank
Attitude	Not reliable at all	5	34.80
	Somewhat reliable	14	39.29
	Reliable	31	55.50
	Very reliable	39	56.73
	Extremely reliable	24	74.33
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	15.569
df	4
Asymp. Sig.	.004

a. Kruskal Wallis Test
b. Grouping Variable: Media - Article in scientific journals

1.2.5 Trust in key persons

Kruskal-Wallis Test

Ranks

	Trust - Scientists (university or funded by government)	N	Mean Rank
Attitude	Not credible at all	3	33.17
	Somewhat credible	24	40.04
	Credible	47	60.80
	Very credible	25	61.62
	Extremely credible	14	70.18
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	13.486
df	4
Asymp. Sig.	.009

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Scientists (university or funded by government)

Kruskal-Wallis Test

Ranks

	Trust - Scientists (Private sector or funded by private company)	N	Mean Rank
Attitude	Not credible at all	6	33.17
	Somewhat credible	34	54.09
	Credible	42	60.49
	Very credible	25	59.80
	Extremely credible	6	61.25
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	4.968
df	4
Asymp. Sig.	.291

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Scientists (Private sector or funded by private company)

Kruskal-Wallis Test

Ranks

	Trust - Doctors or medical practitioners	N	Mean Rank
Attitude	Not credible at all	4	42.50
	Somewhat credible	22	36.32
	Credible	41	61.24
	Very credible	34	59.66
	Extremely credible	12	77.71
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	18.031
df	4
Asymp. Sig.	.001

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Doctors or medical practitioners

Kruskal-Wallis Test

Ranks

	Trust - Political leaders	N	Mean Rank
Attitude	Not credible at all	54	63.06
	Somewhat credible	41	50.48
	Credible	16	57.25
	Very credible	2	25.00
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	6.364
df	3
Asymp. Sig.	.095

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Political leaders

Kruskal-Wallis Test

Ranks

	Trust - Religious leaders	N	Mean Rank

Attitude	Not credible at all	55	63.40
	Somewhat credible	45	50.78
	Credible	11	52.14
	Very credible	2	47.75
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	4.873
df	3
Asymp. Sig.	.181

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Religious leaders

Kruskal-Wallis Test

Ranks

	Trust - Friends, family and relatives	N	Mean Rank
Attitude	Not credible at all	28	54.54
	Somewhat credible	55	59.45
	Credible	25	53.90
	Very credible	4	47.75
	Extremely credible	1	106.00
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	3.834
df	4
Asymp. Sig.	.429

a. Kruskal Wallis Test
b. Grouping Variable: Trust - Friends, family and relatives

1.2.6 Interpersonal communication

Kruskal-Wallis Test

Ranks

	IC - Frequency	N	Mean Rank
Attitude	Never	69	56.04
	1-2 times	38	58.33
	3-5 times	6	59.58
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	.187
df	2
Asymp. Sig.	.911

a. Kruskal Wallis Test
b. Grouping Variable: IC - Frequency

1.2.7 Perceived risk and benefit

Kruskal-Wallis Test

Ranks

	Perceived Benefit	N	Mean Rank
Attitude	No benefit at all	2	14.50
	Somewhat benefit	1	4.00
	Benefit	28	44.63
	High benefit	56	53.04
	Extremly benefit	26	84.15
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	33.863
df	4
Asymp. Sig.	.000

a. Kruskal Wallis Test
b. Grouping Variable: Perceived Benefit

Kruskal-Wallis Test

Ranks

	Perceived Risk	N	Mean Rank
Attitude	No risk at all	4	76.88
	Somewhat risk	32	64.13
	Risk	58	51.12
	High risk	16	57.19
	Extreme risk	3	67.17
	Total	113	

Test Statistics[a,b]

	Attitude
Chi-Square	6.078
df	4
Asymp. Sig.	.193

a. Kruskal Wallis Test
b. Grouping Variable: Perceived Risk