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Iron men manned wooden ships! vs. iron ships manned by wooden men? socio-psychological impacts on seafarers due to accidents/incidents

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IRON MEN MANNED WOODEN SHIPS!

Vs.

IRON SHIPS MANNED BY WOODEN MEN?

Socio-Psychological Impacts on Seafarers Due to Accidents/ Incidents

By

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

Tile of Dissertation: **Iron men manned wooden ships! Vs. Iron ship's manned by wooden men?**
Socio-Psychological Impacts on Seafarer's Due to Accidents/ Incidents

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The complex multi-dimensional issue affecting maritime safety, security and environment protection revolves around the human activities carried out by ship's crews and others alike ashore. The seafarers tend to be a special work force, engaging themselves in one of the most dangerous occupations in the world. In the domain of a hazardous nature, the lurking danger of socio-psychological impacts on seafarers may unveil itself when least expected. Under the pretext of a form of social *apartheid* these impacts tend to become elevated. In the contemporary maritime domain the unnatural external forces of nature such as piracy have magnified the psychological impacts on seafarers.

This research intends to analyse and highlight the socio-psychological issues faced by seafarers due to accidents/ incidents and injuries on-board ships. It focuses on the social and physical factors that contribute towards the psychological impacts. This sheds light into the need for special socio-psychological attention during marine accident investigations. Furthermore, this research addresses the need for education, training and medical examinations that will aid in alleviating, if not eliminating these issues.

KEYWORDS: Accidents/ Incidents, Injuries, Social challenges, Psychological challenges, Training and Education, Medical Examinations.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A/B	Able-body Seaman
A.D.	Anno Domini
BEAmer	Le Bureau d'enquêtes sur les événements de mer (French Marine Accident Investigation Office)
BIMCO	Baltic International and Maritime Council
CMI	Caribbean Maritime Institute
CRS	Chronic Responsibility Syndrome
DNV	Det Norske Veritas
EMSA	European Maritime Safety Agency
FOC	Flag of Convenience or Open Registry
GAD	Generalised Anxiety Disorder
HIS	Intermittent Husband Syndrome
ICSW	International Committee on Seafarer's Welfare
ILO	International Labour Organisation
IMMA	International Maritime Medical Association
IMO	International Maritime Organisation
ISF	International Shipping Federation
ITF	International Transport Worker's Federation
IUMI	International Union of Marine Insurance
MARPOL	International Convention for the Prevention of Pollution from Ships
MLC	Maritime Labour Convention
MSC	Maritime Safety Committee
MSc.	Master of Science
NUMAST	National Union of Marine, Aviation and Shipping Transport Officers

OCD	Obsessive Compulsive Disorder
OECD	Organisation for Economic Co-operation and Development
PTSD	Post Traumatic Stress Disorder
SAD	Social Anxiety Disorder
SCI	Seamen's Church Institute
SSSS	Sick Ship Syndrome Symptoms
STCW	International Convention on Standards of Training and Certification and Watchkeeping for Seafarers
STCW Code	Seafarer's Training, Certification and Watchkeeping Code.
UK	United Kingdom
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
WWW	World Wide Web
WHO	World Health Organisation
WMU	World Maritime University

CHAPTER 1 - INTRODUCTION

1.1 Background

"...It is general sea law that a master of a ship shall never sail out of port, never weigh or drop anchor, cut masts or cable, or indeed do anything of consequence, let him be in whatever danger may happen, without the advice of the major part of his company... He must call all together to consult."[1]

Prior to the hierarchical regime of the shipping industry, there was a time in maritime history where every seafarer on-board had a voice in its operation. [2]

The above statements are quite significant in recent times where there is very little evidence that humans are regarded as an important component in the maritime industry. Considering the very large capital investment on ships that can run into millions, very little attention is paid to the people who are entrusted with its operation. Seafarers in many instances are hired at very low rates and considered dispensable. There are comprehensive diaries, journals, court records and historical studies which reveal throughout history many seafarers have in fact been subjected to abuse, dangerous and difficult work were separated for unpredictable long periods from their homes and families.[3]

Little more than 150 years ago, John Ashley[4] who subsequently founded the Mission to Seamen[5] in 1856, visited ships at anchorage in the Bristol Channel. When asked if they were ever visited "with a look of sovereign contempt", John Ashley received a

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[1] A.D 1300 Maritime Law called the *Laws of Oleron*, Art.II, pg.1171-1187, requires that the captain consult the crew before making a decision relating to the operation of the ship. He had to ask before sailing *"Gentlemen, what do you think of this wind"*, quoted in thirty federal cases.

[2] "…and since the harbour was unsuitable for wintering, the majority were putting out [to sea] from there…"Acts *of Apostles*, Act 27:12.

[3] The diary *Two Years before the Mast* by Richard Henry Dana, Jr., in which he recorded his voyage of 1834-34 on the *Pilgrim* and the *Alert*, is one of the famous documents.

[4] *John Ashley* was a Reverend Doctor and an Anglican Priest.

[5] In 2000 the name was changed to *Mission to Seafarers*.

very interesting response from one ship captain. He answered, "Visit us sir? No sir, as long as they can get anything by us poor seamen, I believe the will leave us to perish like dogs." (Couper, 1999, p. 1).

Not much changed even after a century, where the crew of the Adriatic Tanker *Nova Progress* made a statement to the journal, *Trade Winds* "our family's welfare is dramatically changing from bad to worse. In fact we are up to date slaves of ruthless owners. We hope you will publish our letter in your newspaper and maybe somebody will save us." (Couper, 1999, p. 2). In a recent ship detention case in the United Kingdom Tommy Molloy (Nautilus/ITF Inspector), described that the challenges faced by the crew on-board were unpaid wages, no cook, no proper work and rest hours, lack of communication and other alike. He adds on "some of the crew want to go home but they are worried sick about the prospect of returning without any wage" and "there are good grounds for serious concern over the physical and mental health of some seafarers" ("Fresh problems", 2011, p. 7).

Seafarers are recognised as a special work force in the maritime industry. Seafarers come in contact with various activities on-board vessels, which can be considered as hazardous in nature. They are subjected to an environment that has physical, sociological and psychological elements to it. In a statement made by Britain's Princess Royal to the shipping industry, "Seafarers are not merely a workforce or a human resource, but vulnerable and valiant human begins who endure much to bring us our home comforts" ("Princess seeks", 2010, p. 4). Despite these encouraging statements there seems to be several acts of ill treatment towards seafarers on a daily basis that goes unnoticed to the common man. As put by former *Lloyds List* editor Michael Grey, seafarers tend to be marginalised, invisible, unappreciated, 'treated like lepers' and illegal immigrants or potential terrorists, let alone as human beings ("Crew 'treated", 2011, p. 9).

The IMO, in its Resolution A.947 (23), defines the human element as "a complex multi-dimensional issue that affects maritime safety, security and marine environmental protection" which involves "the entire spectrum of human activities performed by ship's crews, shore-based management, regulatory bodies, recognized organizations, shipyards, legislators and other relevant parties." Officer trainees to the International Shipping Federation at the manning and training conference have acknowledged this. However, they also acknowledge that despite their love for the job there are challenges such as paperwork, difficulty in finding companies for work, the limited social life and communication with family and friends ("Trainees with", 2010, p. 25).

Shipping has been vulnerable to the economic downturn, and seafarers are the least resilient in the maritime world. Complementing to the possible lacunae in seafarers legal rights, the *adagium* "to err is human" with regards to marine casualties, is very much of a cliché even in the contemporary technologically advanced maritime industry as it was when iron men manned wooden ships. They are more vulnerable due to their remoteness from law, uncertain in their relationships and status in a multicultural social structure and suffer from a lack of effective communication with their families. This marginalisation of seafarers as a section of the world's working population renders them even more vulnerable to economic exploitation than in the past (Couper, 1999, p.3). There have been enormous changes to the standards of training provided to seafarers and formalised procedures to casualty investigation. This has alleviated the problem to a certain degree.

However, aside from the deficiencies in adequate training and competence of seafarers, the physical and socio-psychological aspects that comprise the welfare component of the human element, also contribute to marine casualties (Mukherjee, 2008). In recent times there has been some address to the physical aspect, but not enough importance and recognition has been given to the socio-psychological aspects.

The ever-orchestrating contemporary issue the shipping industry is focusing and highlighting upon is the acts of piracy. In Mombasa, Kenya, the Mission to Seafarers Station Chaplin Father Michael Sparrow, a former seafarer, spends days helping crews and their families. He assists crew, who were held captive by pirates, with post trauma care (Heffer, 2011). It seems that seafarers are usually affected mentally post attacks or hostage situations by pirates.

The Seaman's Church Institute based in New York City, U.S.A, have provided guidelines for post-piracy care for seafarers following a piracy incident. These guidelines highlight the requirements of a full physical and psychological assessment of the crewmember after a piracy incident.

It goes further to suggest that:

> These psychological assessments are to be carried out by mental health professionals. In cases where these professionals are not reasonably available, phone or internet assessments can be conducted. Seafarers should be trained to recognise warning signs of symptoms and should be provided with contact information of professionals who can be contacted privately if needed (The Seamen's Church Institute, 2010, pp. 1-4).

Seafarers can also be sociologically and/or psychologically affected due to incidents like collision, grounding, fire, man-overboard, death, injury and many other maritime accidents. Additional contributing factors such as fast turnaround of ships, reduced crew levels, the intense work load when ship is in port, the location of new ports and terminal developments away from existing services, mixed nationality crews, and new port security regimes have placed increased pressure on seafarers ("Port welfare workers", 2011, p. 4). Several cases of suicide aboard merchant ships have been widely reported. These could be a result of depression or other psychological issues.

In a recent case a French Master Mariner committed suicide soon after having a meeting at the company office where he was told he was being withdrawn from

active service (Apter, 2011, p. 25). He was the Master of a vessel that was involved in a collision case at sea. Reports suggest that, post incident he was asked to leave sea and join shore-based work until internal and external investigations were completed.

> He was not dismissed. Pending results of internal and external investigations, we asked him to come to earth to fulfil missions. There was a particular issue that deals with the simulator, in Marseilles, he works on the selection of officers or the management of crisis situations, which he had experience (*Mer et Marine*, 2011 and "Inquiry begins", 2011).

Studies carried out by *The International Committee on Seafarer's Welfare and Melbourne Port Welfare Association* have shown high percentage rates of suicide among seafarers.

In cases where non-seafarers are involved in an incident or accident or any kind of situation that endangers their personal safety and security, it seems that they are usually entitled a temporary leave of absence from work. They may also request for psychiatric counselling. This may very well be to ensure that they are fit to continue with their normal lives and work. However, in the shipping industry seafarers have tend to become very much of the category who spends much of their time at sea, away from the usual support structures that people who work on land are familiar with ("Speaking out for", 2010, pp. 4-5).

It seems that this kind of assistance is seldom seen for seafarers except in the case of piracy, which has been promulgated recently. Seafarers may be expected to continue with the activities aboard and complete their sailing contracts on-board. Only when a seafarer is declared physically unfit for duty he/she may be repatriated.

There may also be a very good possibility that a stigma on seafarers could be branded on those who seek or attempt to seek psychological care. One can draw

some relevance towards this in Sweden's seafaring tradition. According to Lennart Johnsson "…there has always been a feeling that to be a seaman is low status work. Why is it so hard to say, but perhaps it comes from the perception in the 1950's and 60's that if a young boy had social problems he should be sent to sea" ("Tribute to", 2011, p. 29).

The above emphasises the importance of welfare of the seafarer as a human being, and hence the safety of life at sea. Mukherjee connotes the seafarer as "ship-locked", who comes under the scrutiny of national authorities such as administrators, regulators and law and policy makers, who very often fail to recognise the welfare issues inadvertently or deliberately. Hence the socio-psychological plight of the seafarer cannot be left out of the law and policy equation in the fight against maritime casualties and in efforts to eliminate maritime security risks (Mukherjee, 2008).

CHAPTER 2 - The Seafarer a Human Element: Evolution and Challenges

2.1 Background

In recent times there have been discussions on piracy across the globe and its effects on the shipping industry. Pirates have kidnapped or taken hostage several hundreds of merchant mariners and have robbed or attacked many more. There is utmost focus on preventing and suppressing the acts of piracy by use of force, arming ships with guards and prosecution of pirates.

However, there have been questions raised on what happens to merchant mariners who survive an attack or a hostage situation.

Stevenson[6] raised the following questions during his statement[7] -

"Do they continue working as seafarers? Are they fit to work on ships? Do they need continuing medical attention? Do they receive medical attention? Where do they get help to deal with the aftermath of surviving a piracy incident?"

He further goes on to address, that merchant mariners and their families need to receive care after such incidents, taking into account the possible psychological impacts on the seafarers. Creating guidelines and resource centres could provide assistance to affected seafarers and ship owners alike.

It may be correct to say that the above questions and possible care for mariners and their families may also be extended towards post accidents or incidents that occur on-board ships.

As the IMO puts it, some industry experts claim that in general 80% of accidents at sea are caused by people making mistakes or by the so-called Human Factors[8].

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[6] Douglas B. Stevenson, Director, Center for Seafarer's Rights. The Seamen's Church Institute of NY & NJ.

[7] Statement made at the Meeting of States Parties to the UNCLOS, UN, New York, June 26, 2009.

[8] IMO's 50th Anniversary: A record of success, IMO 2002.

Others have further corroborated within the industry, that 96% of industrial accidents are the result of human error (Osler, 2011, p. 4). According to Hisamune, Amagai, Kimura and Kishida (2006) disaster and accident rates in seafaring have decreased sharply in the last few decades. However, the rate of decrease has also shown a slow down since 1997. The primary factor relating to this decrease is the decline in the number of crewmembers per vessel (Hisamune et al., 2006). Such figures of total losses attributed to human error do not really provide sufficient information on areas of improvement. The alternate possibility maybe that these figures tend to show a high rate when taking into account the current fleet sizes.

Studies carried out on fatal work-related accidents on-board UK merchant ships, have also suggested large reductions in mortality rates due to fatal disasters and personnel accidents over a period between 1919 and 2005 (Roberts, 2008). The exception was accidents on deck and their associated risk to fatal accidents are still quite similar. Additionally, Danish mortality study shows that accidents among seafarers were 11.5 times higher than among the Danish male work force on shore (Hansen, 1996).

Confirming these facts it maybe concluded that seafaring could be characterised by several occupational hazards. As Verbeek (2011) puts it, as long as there are people on-board they will be given the responsibility of accident, as humans are the weakest link. One among them is the invisible psychological hazard. Here then the question arises as to what is or are the psychological hazards?

The WHO provides a broad categorisation of psychological hazards. They go further to address that these psychological hazards can trigger work related stress (WHO, 2009 and Econtech, 2008 as cited in Performance Benchmarking of Australian Business Regulation: Occupational Health and Safety, 2010, p. 281). Some of these hazards include:

⇒ Work factors (such as excessive hours, unreasonable demands, or inflexible work arrangements leading to poor work-life balance)

⇒ The physical work environment (such as noise or overcrowding or ergonomic problems)

⇒ Organisational practices (including poor lines of communication and unclear roles and responsibilities, poor leadership, and lack of clarity about organisational objectives and strategies)

⇒ Workplace change (can contribute to job insecurity and high staff turnover)

⇒ Relationships at work (for example poor relationships of staff with supervisors).

⇒ Management and colleagues who may contribute to bullying, harassment or violence.

The above categorisation is well applicable to merchant mariners. In addition to these hazards, there is another important dimension, which is the social aspect of a seafarer that possibly contributes to the challenge.

"The reactions of the human body are less influenced by sociocultural factors than those of the psychological structure. However, the reactions of the psychological structure are deeply influenced by sociocultural factors" (Böhm, 1973 as cited in Goethe et al., 1984, pp. 152-161).

This chapter will define and highlight the psychological and sociological hazards that are faced by a seafarer in the industry and it intends to associate these hazards to maritime accidents or incidents.

2.2 Psychological Hazards

Almost all jobs at sea are to a greater or lesser extent safety-critical and so decrements in performance from whatever cause, including psychological ones, may put other seafarers, passengers or the vessel at risk (Carter, 2005).

According to Böhm, "even if the basic individual psychological structures and the factors of the environment are the same in a defined situation, two people will react differently according to their sociocultural programme if they are members of different groups" (Böhm, 1973 as cited in Goethe et al., 1984, pp. 152-161).

In a seafaring perspective it can be construed that mariners from different countries share similar problems, but they react in different ways.

The science of nautical medicine and nautical psychology has a common objective, to improve the working and living conditions of seafarers. While nautical medicine has had a long history, nautical psychology is in its infancy (Böhm, 1973 as cited in Goethe et al., 1984, pp. 152-161). Even though this statement was made more than two decades ago, it is still a valid point in the contemporary maritime industry.

It is still unclear as to what are the main causes to the increasing number and severity of psychological issues among seafarers. Mentioned below are the some of the possible factors that maybe pondered into[9]:

➢ Labour intensification, risk of both mental and physical overwork
➢ Manning levels, and related issues: the qualifications and experience of crew members
➢ Increased monotony of working and living on-board modern ships leading to boredom and social isolation
➢ Fatigue, which slows down a seafarer's reaction time and reduces their ability to make decisions
➢ Stress due to worrying about the consequences of making a mistake
➢ Stress due to being away from home for long periods of time
➢ Family pressure to remain at sea longer in order to earn more money and continue sending funds home

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[9] Guidelines for Mental Care Onboard Merchant Ships. Launched by the International Committee on Seafarer's Welfare, in the Seafarer's Health Information Programme, sponsored by the ITF Seafarer's Trust.

- ➢ Severity of the environmental conditions; the dangers of being at sea
- ➢ Automation, the complexity of systems and related issues of control, reliability, training, and alarm management
- ➢ The fear of criminalisation
- ➢ Shift patterns of work and disruptions to that system in ports e.g. the restrictions on shore leave by authorities
- ➢ The quality of rest periods both in relation to environmental conditions like noise, vibrations and movements of the ship; and adequate time for uninterrupted rest
- ➢ The pressure of more frequent inspections and administrative tasks
- ➢ Greater commercial pressure from ashore
- ➢ Fast turnaround times in port and fewer opportunities to de-stress, e.g. going ashore, or leisure activities on-board
- ➢ Reduced common language and/or culture: due to multinational crews there exists a reduced ability to communicate with each other in a meaningful way
- ➢ Familiarity with working together: knowing colleagues, their practices, communication and habits is important to increase the quality of work
- ➢ Increased use of multinational crews and the dispersion of recruitment has brought an end to tried and tested forms of solidarity and sociability

As it is hard to confirm that the above factors are the main contributors to psychological issues, it is prominent in other forms in the maritime working environment. Reduced performance, fatigue, risk to the individual or colleagues, risk to the vessel or cargo, anti social behaviour among crewmembers are some of the examples.

Psychological theories agree that it is important for the mental hygiene and development to change roles in a work place and living environment. Generally a work place and living environment can be divided into (a) place of work, (b) social field and (c) individual sphere (Böhm, 1973 as cited in Goethe et al., 1984, p. 154).

However, on-board ships the above-mentioned three fields are never changing. They are inseparable. They always work as a unit and each influences the other. For example, the roles played by officers or crewmembers continue to be played even during hours of leisure.

When the change of roles is being denied to a person then the consequences can be frustration and rigidity. Frustration can further lead to aggression, regression, indifference and fixation. The ability to tolerate frustration varies from person to person. Some of the symptoms of widespread frustration are accidents, sickness, crimes and misdeeds, quarrels and fights and heavy drinking (Böhm, 1973 as cited in Goethe et al., 1984, pp. 152-161).

Environmental psychologists'[10] theories have summarised that several environmental factors also have adverse effects on the physical as well as the mental health. For example the physical interaction with the environment, noise, weather as well as climate change, natural and technological catastrophes have measurable impacts on human behaviour (Bell, Greene, Fisher & Baurn, 2001). Working at sea is a perfect environment for a seafarer to encounter the above factors. Thus providing a suitable breeding ground for possible psychological hazards.

Figure 1 shows an analogy that has been drawn by the author, from the model *Sick Building Syndrome*[11] (Bell et al., 2001, pp. 236-237), to ships. Some of the factors, but not limited to that cause the sick building symptoms may very well exist on-board ships. Several eminent maritime scholars have defined seafarers as "ship-locked" and/or have defined ships as prisons or asylum to seafarers.

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[10] Environmental psychologists are those who study the moral relationships between behavior and experience and the built and natural environments.
[11] Ship Building Syndrome involves symptoms and discomfort like headache, eye and nose irritation, stress (lethargy or fatigue), or both, but no clear disease.
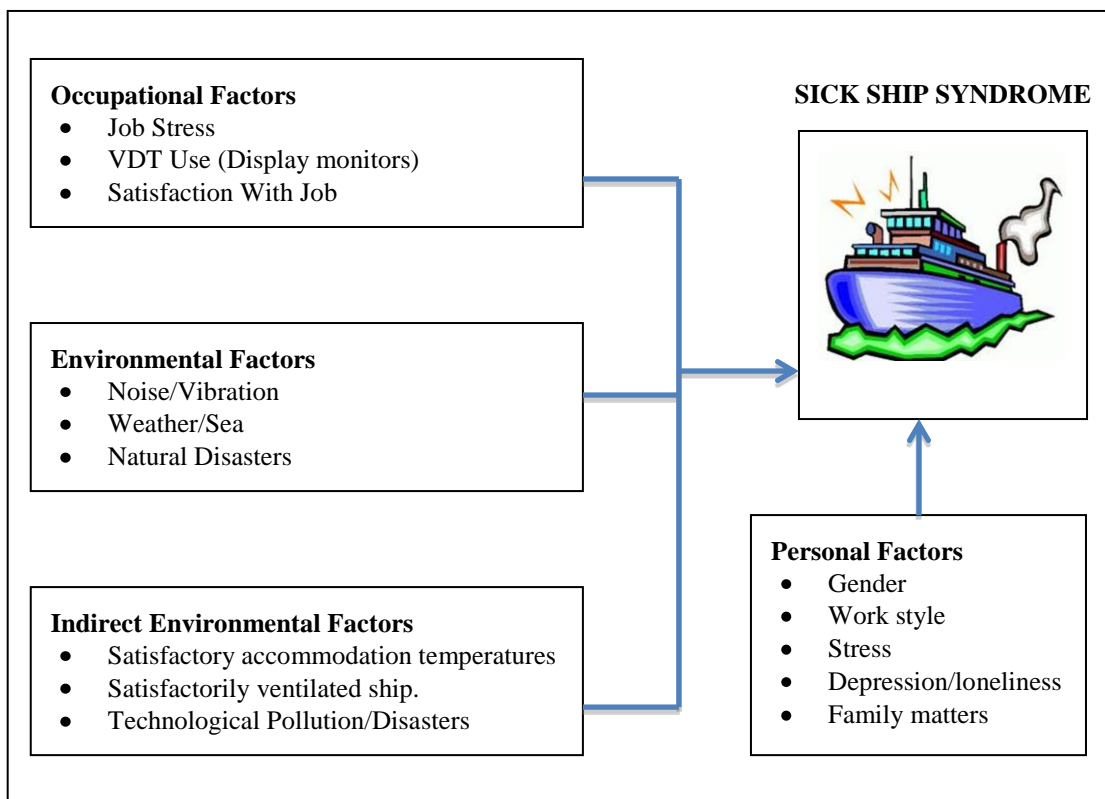
Figure 1 - A model of some of "Sick Ship Syndrome Symptoms"
Source: Author

Ohashi and Hattori carried out a very comprehensive study on the psychological factors of the workload of seafarers and their inter-relationships. The results were analysed using a special problem solving method known as *Kawakita Jir (or K.J.)* method. They eventually were convinced that the concept of a seafarer is not merely a workman on-board but also an individual person living on-board (Ohashi & Hattori, 1982 (as cited in Goethe et al., 1984, pp. 162-172)).

Several studies have been carried out by various national maritime organisations on seafarers' psychiatric problems. In Australia, a study carried out revealed around 3% suffered from psychiatric problems (Parker et al., 1997). In Poland, this figure was much more, an approximate of 15% (Nitka, 1989). There is also evidence suggesting

that development of *neurosis* [12] is a major health problem among seafarers irrespective of their age and is more concerned with the time spent at sea (Filikowski, 1989). A study on the repatriation of seafarers found that mental disorders and diseases of the nervous system were the second most prevalent cause next to circulatory system disorders (Tamaszunas & Moroziski, 1990).

Now some of the common psychological hazards or issues that may very well be present among seafarers will be defined and briefly described.

2.2.1. Harassment and bullying on-board ships

According to the Guidelines for Mental Care On-board Merchant Ships (ICSW 2009), harassment is deemed to be a form of discrimination that occurs when unwanted conduct takes place, which has the purpose or effect of violating the dignity of a person and thereby creating an intimidating, hostile, degrading, humiliating or offensive environment. No seafarer should be harassed or bullied. All seafarers have a responsibility of ensuring that their ships are free of harassment and bullying. The guide further describes various kinds of harassing behaviours.

Some surveys have shown shocking results of harassment on seafarers. An older study carried out revealed 75% of the respondents had suffered harassment and only 23% formally reported it. And a more recent study showed 42% suffered from bullying, harassment or discrimination ("Nautilus Calls for", 2011, pp. 24-25). An illustration has been provided on the forms of unfair treatment in Appendix V.

2.2.2. Anxiety

Anxiety is a stage when the human body's natural response to danger activates like an alarm when felt threatened.

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[12] Neurosis, coined by the Scottish Doctor William Cullen in 1769, refers to someone who is unhappy or dissatisfied but not considered dangerously ill or out of touch with reality. See Zimbardo et al., Psychology Core Concepts, 2009, p. 539.

It is quite normal for humans to feel scared or tensed under pressure or when facing a stressful situation. Hence anxiety can at times help you stay alert and focused in an act or to solve problems. However, when anxiety is constant, then one may find it difficult to relax and sleep and eventually get out of control of being aware of one's own state of mind. This then becomes a form anxiety disorder in humans.

There are several forms of symptoms such as emotional, physical and then finally the attack itself.

There are six major types of anxiety disorders (Zimbardo et al., 2009):

1. Generalised Anxiety Disorder (GAD) – also known as "free-floating" anxiety by clinicians, is a form of anxiety disorder where people feel worried and anxious all the time with symptoms like insomnia, restlessness and fatigue.

2. Obsessive–Compulsive Disorder (OCD) – occurs in people with unwanted thoughts, images or behaviours (obsessions) that recur or persist despite the person's efforts to supress them. This is combined with repetitive, purposeful acts performed (compulsions) in response to the obsession.

3. Panic Disorder – occurs in people who have repeated and unexpected panic attacks and/or might have the fear of having them. This may also be accompanied by *agoraphobia*[13], which is basically the fear of being in places where help will be difficult to find in case of an attack, like for example confined spaces or crowded public places.

4. Phobic Disorders – occurs in people who experience unrealistic or exaggerated fear of a specific object, activity or situation when in reality there is no danger. For example fear of heights (acrophobia), fear of closed-in spaces (claustrophobia), etc.

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[13] Literal Greek translation is "fear of the market place"

5. Post-Traumatic Stress Disorder (PTSD) – people suffer from PTSD after a traumatic or life threatening event with symptoms of nightmares and withdrawal from others.

6. Social Anxiety Disorder – this is also known as social phobia where people fear being seen negatively by others. Some examples are commonly known as stage fright or performance anxiety.

The above disorders may very well be applicable to seafarers. The ever-demanding work schedule with deprived sleep; no physical exercise and the pressure from home or at work can lead to seafarers becoming anxious.

2.2.3. Depression

Psychologist Martin Seligman (1973, 1975) has called it as the "common cold" of psychological problems (as cited in Zimbardo et al., 2009, p. 540). Basically there are two forms of depression. Situational Depression and Clinical Depression. The former is more of a reaction to the events happening around one. An example is the death of a close friend. The latter is a more serious one where it eventually interferes with one's daily routines like work, eating and sleep (Guidelines for Mental Care On-board Merchant Ships, ICSW 2009).

In the society, people suffering from depression are viewed / considered as a weak person or one with excessive emotions. Very depressed people may commit suicide and it is therefore essential to recognize those at risk so that correct precautionary measures can be taken. There are several signs and symptoms that can give the warning signs or signals about a possible suicidal individual. The best way to prevent suicide is to know and watch for these warning signs and to get involved if they are spotted.

On-board ships seafarers may be emotionally up one day and down the next to the

extent of being morose and even sullen. It may be difficult to get a clear story from a depressed seafarer because they simply want to be left alone. Additionally loneliness contributes to this effect. A decrease in the number of crewmembers on-board and the reducing social contacts between seafarers also adds to the challenge. Besides all the above there is no form of training provided where seafarers can identify possible suicidal individuals or as a matter of fact check oneself.

Depression can be closely related to suicides. According to Bostwick and Pankratz (2000), suicide claims one in 50 depression sufferers (as cited in Zimbardo et al., 2009). How this is linked in the shipping industry, will be shown in the following.

2.2.4. Suicide cases

Table's 1 and 2 shows suicide cases among seafarers that have been reported. This is a serious number and a problem. In a study conducted by Swansea University out of the 369 deaths among British seafarers, 22 among them disappeared at sea (Roberts & Williams, 2007). 185 seafarers died an inconclusive death and out of the 185, 87 disappeared at sea. It was believed that about half of these seafarers committed suicide (Roberts & Marlow, 2005).

Table 1 - Percentage of all deaths by suicide

Reference	Nationality	Total Deaths	Suicides	% Suicide
Roberts & Williams 2007	UK	369	16	4.3[3]
Szymanska et al.. 2006.	Polish	324	33	10.2
Roberts & Marlow 2006	UK	60	6	10.0
Roberts 2006	UK	65	2	3.1
Roberts & Marlow 2005	UK	835	55	6.6[4]
Roberts 2003	FOC[5]	1,063	36	3.4
Li 2002	UK	5,839	348	6.0
Cooper 2000	Various	2,027	91	4.5
Nielsen 1999	Various	123	4	3.3
Hansen 1996	Danish	147	12	8.2
Jaremin et al.1996	Polish	109	4	3.7
Larsson & Lindquist 1992	Swedish	223	18	8.1

Source: Seafarers Welfare Forum. Australia Maritime Safety Authority, 9th September 2010.

Table 2 - Percentage of non-traumatic deaths by suicide

Reference	Nationality	Non-traumatic Deaths	Suicides	% Suicide
Roberts & Williams 2007	UK	166	16	9.6
Roberts & Marlow 2006	UK	41	6	14.6
Roberts 2006	UK	20	2	10.0
Roberts 2003	FOC[5]	68	7	10.3
Li 2002	UK	2,640	348	13.2
Cooper 2000	Various	521	91	17.5
Nielsen 1999	Various	21	4	19.0
Hansen 1996	Danish	53	12	22.6
Jaremin et al. 1996	Polish	44	4	9.1
Larsson & Lindquist 1992	Swedish	117	18	15.4

Source: Seafarers Welfare Forum. Australia Maritime Safety Authority, 9th September, 2010.

As can be seen from Table 2, the percentage of suicide cases is much higher than that of Table 1. However, in many cases due to the inconclusive nature of the cause of death and considering the suggestion by Roberts and Marlow, it may be correct to say that real percentage of suicide cases among seafarers is much higher than shown.

2.3 Sociological Hazards

In a letter to his son Mærsk Mc-Kinney Møller on 2nd December1946, Mærsk founder A.P. Møller wrote *"My old saying: 'No loss should hit us which can be avoided with constant care' this must be a watchword throughout the entire organization."* (Hornby, 1988).

According to the author this watchword may be used in the entire maritime industry. By putting words into actions and if well established, there is a good chance that accidents or incidents can very well be alleviated if not nullified.

This section will highlight the social aspects and factors that challenge seafarers.

2.3.1   Loneliness

"Loneliness is a seafarer's heaviest cross, the Brazilian priest said, noting that many seafarers are away from home up to 10 months. It's the presence of God and the thought of their families that is awakened at sea, he said – especially at night when you're alone on the bridge. What you see is darkness. What you hear is the talk of the waves." Quote by Fr. Mario Bilbi - 80 year old Brazilian (Lefevere, 2000).

Some authors have addressed that the main psychological problems encountered were social isolation and its effects on seafarers, loneliness, home sickness or long periods away from home, "burn-out" syndrome and the decrease in number of seamen per ship with the increase of automation (Agterberg & Passchier, 1998; Thomas, 2003).

2.3.2 Separation from family members

Studies carried out by Morrice and Taylor (1978) indicated that seafarers' spouses showed increased levels of anxiety and depression due to frequent separations from their husbands. In their study almost 10% of the spouses showed ineffective coping strategies. This was termed as "Intermittent Husband Syndrome (HIS)" (Morrice & Taylor et al., 1985; Hubinger et al., 2002). A study on Australian seafaring families involving 52 wives indicated that 83% of the wives experienced stress when their partners were either due to return home or to sea.

It is common practice that once a seafarer comes to port the most common visiting venue would be a telephone booth or computer café so as to communicate with their family. Many ports have the facility of free internet services through seamen

missions. Some centres offer the facility to wire money home to families. A few ship owners allow some crew members to have their families on board.

The above factors may contribute to the added sociological and psychological stress on the seafarer.

2.3.3 Lack of shore leave

This is one of the important aspects faced by seafarers. There are many factors that restrict seafarers from going ashore. Apart from turnaround times in ports (which accounts to less percentage), working or port watches, need for rest, lack of visas in certain countries and depression are some of the other factors that prevent seafarers from going ashore. As von Dreele (2008) puts it, a study[14] carried out in the US shows shore leave levels averaging to only 20-25% per ship (as cited in Iversen, 2011, p. 24).

In some countries there are restrictions in going ashore until the authorities have cleared the vessel with respect to immigration and customs. There are occasions where authorities tend to take their own time to get to the ship or in some cases they are practically understaffed to carry out these tasks. This can amount to the possibly already depressed seafarer.

2.3.4 Short ship turnaround time

Short ship turnaround times are a problem with the advent of containerisation. In general, turnaround times for container ships are not more than two days and in most cases much less than 6 hours perhaps. However, bulk cargo ships or the combination container/bulk ships may be in port for somewhat longer periods. This is also decreasing due to the advent of faster shore based cargo gears. The car carriers have a turnaround time of maximum 24 hours or less, for a load or discharge of 5,000 or 6,000 automobiles. These factors seem to provide a rare chance for a seafarer to step

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[14] Shore Leave Survey, 2009 carried out by The Seamen's Church Institute, New York & New Jersey (SCI).

ashore because their duties aboard ships do not provide enough time for even a half a day of shore leave. Faster turnaround times have also limited the possibilities for seafarers to have any form of social contact beyond the shipboard community (Kahveci, 1999).

2.3.5 Job security

Many companies still have contractual employment for all officers and crew. Some of their contracts are between 6-8 months for officers and 9-12 months for crew (Alderton, Zhao, Thomas, Bloor, Sampson & Kahveci, 2004, p. 116). Contract periods also vary with nationalities where by OECD nationals tend to work lesser periods at sea as opposed to non-OECD. Towards the end of their contracts the seafarers are known to be very concerned that their contracts may not be renewed. As Alderton (2004) puts it seafarers are employed on a casual basis and despite the fact that experienced shipmasters and chief engineers are unlikely to be without work, more often than not they have periods without contracts. Thus possibly ending a chance to send money home. Generally, this is more the case with crew as opposed to officers.

As a result of the great financial crisis of 2008 the international shipping industry was severely affected with many ships unable to obtain charters. This caused many seafarers to worry about job retention. Some lost their jobs and many stayed on-board for longer periods in the hope that they might be able to get another contract on-board. Hence, job security is still a very contemporary issue faced by seafarers across the globe. Thus possibly contributing to the social and psychological factors affecting seafarers.

2.3.6 Cultural problems

According to von Dreele, (2008),

> Chaplains and ship visitors often confront the clash of cultures and nationalities aboard ship. Certain nationalities should never be put together on the same ship. Racism and abuse are prevalent on many open registry

ships today. To compound all of this, the seafarer has to deal with the immense isolation aboard ship. He is gone for up to nine months and rarely has an opportunity to contact his family (as cited in Iversen, 2011, p. 24).

However these days many reputable shipping companies have their crew participate in cross cultural courses. They also conduct team building seminars and courses involving seafarers from different cultures. Many companies have a strict policy of recruiting different nationalities and multi-cultural crew. Many ships these days are also fitted with email and Internet facilities aboard ships.

2.4 Socio-physical Factors

The author intends to discuss what other factors possibly challenge seafarers. These maybe categorised as socio-physical factors, as there is a combination of the social elements that interacts with the physical element of a seafarer.

2.4.1 Stress

Studies were carried out by the Maritime Academy in Gdynia between merchant marine students and merchant marine officers with long period of sea service. Results shows that maritime students regard their future profession as being *highly burdening* and *stressing* at the beginning of their career. The students consider this profession to be a highly competitive one where repeated activities are carried out under strict discipline and vigilance, and also requiring interpersonal skills to be performed under hard psychological conditions. On the other hand, merchant marine officers with long periods of sea service are better accustomed to the conditions on-board ships (Jezewska, Leszcynska & Jaremin, 2006).

Another study was conducted on a French Oceanographic ship between the seamen and some control subjects on the same ship. The results showed greater stress on the seamen than the control subjects (Lodde et al., 2008).

The International Committee on Seafarers' Welfare booklet "Guidelines for Mental

Care On-board Merchant Ships" has one chapter devoted to the problem of stress for seafarers (ICSW 2009). According to ICSW, even though the job stress varies from person to person, the typical symptoms of stress are insomnia, loss of mental concentration, anxiety, substance abuse, extreme anger and frustration, family conflict and physical illnesses such as heart disease, migraine, stomach problems and back problems.

Six key areas (or 'risk factors') according to ICSW (2009) were identified as the possible causes of work related stress on board. These are: the demands of the job; the level of control seafarers have over their work; the support received from management and colleagues; relationships at work; the seafarers' role in the organization; change and how it is managed. An important point to note here is, when under severe stress a seafarer fails to take clear-cut decisions, re-evaluate and reassess priorities and lifestyles, and ultimately tends to fall into unproductive distractions, which are described as a classic case of 'burnout' (ICWS, 2009). This is a point where it may be correct to say that accidents / incidents happen or tend to happen on-board ships. The author has commonly heard the words among seafarers "there is too much work to do on-board and no only else can do it but me". Such a stage known as Chronic Responsibility Syndrome (CRS), which is common among hard working people (seafarers for example) who become emotionally, psychologically and physically exhausted (ICSW, 2009).

2.4.2 Fatigue

"A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities including: strength; speed; reaction time; coordination; decision making; or balance." (IMO –MSC/Circ. 1014, 2001)[15].

The above statement confirms that fatigue is one of the important factors

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[15] IMO - Guidance on Fatigue Mitigation and Management, Guidelines on Fatigue - Model 1 – Fatigue – Defining Fatigue.

contributing to accidents or incidents. Allen et al. (2008) in a review of the literature on fatigue have summed up the problems associated with fatigue. They conclude by saying that currently there is less work being carried out to measure fatigue as opposed to its more prevalent existence.

"Fatigue is strongly linked to mental health problems which are clearly risk factors for more chronic disease and early death (e.g. suicide)." (Smith, 2007).

2.4.3 Seafarers' legal rights to mental health care

According to Stevenson (2009),

> *Neither traditional maritime law or the ILO Maritime Labour Convention, 2006, specifically addresses mental health care, but court decisions in the past fifty years make it very clear that a seafarers' right to free medical care includes a right to free mental health care…*

2.5 Conclusions

From the above descriptions and examples there seems to be substantial evidence to show that psychological issues play an important role in decision making on-board ships. It also seems that there is a large lacuna in the social aspect of a seafarer. These aspects play an important contributing factor when considering pre and post-accident / incident prevention, education, training and investigation systems. Despite the fact that there is international recognition towards this challenge, it seems that universal cooperation between maritime organisations has not yet been institutionalised.

CHAPTER THREE - Research Questions, Methods and Measures

3.1 Objectives and outline

This research intends to focus, identify and highlight the socio-psychological issues faced by seafarers on-board and ashore. The research primarily intends to focus on the need for special socio-psychological attention on seafarers and their families pertaining to post marine incidents/accidents. The author intends to prove that there is a lacuna in the industry in this regard. Secondly, he also tries to identify what possible care and/or assistance are currently available to the seafarer.

Chapter 2 extensively discussed some of the socio-psychological factors that may affect a seafarer. It also discusses the various accidents/incidents that occur on-board while trying to link the role of a seafarer with the socio-psychological aspects.

This chapter will highlight the specific research questions, the methods used to address them and the reasons for choosing them. The approach uses both qualitative and quantitative tools of research as well as comparative analysis from statistical data.

3.2 Research Questions

The theoretical concept, which is the bases of this research and the literature that supports the same, has been discussed in Chapter 2. Based on these concepts and the gaps found in them by the literature provided, the author has arrived at the following research questions:

⇒ What are the social factors that affect seafarers?

⇒ What are the psychological factors that affect seafarers?

⇒ Are seafarers affected socio-psychologically after an accident/incident?

⇒ Is there a need for special socio-psychological attention on seafarers before carrying out tasks on-board?

$\Rightarrow$ Is there a need for special socio-psychological attention on seafarers and their families after an accident/incident?

$\Rightarrow$ Is there a need for special socio-psychological attention on seafarers and their families during the marine accident investigations?

$\Rightarrow$ What are the current socio-psychological assistances available to seafarers and their families?

$\Rightarrow$ What are the possible solutions to address these issues?

Answering the above questions will give an insight to the following aspects:

$\Rightarrow$ Provide the seafarers with the necessary tools in the form of training or shore-based assistance to handle socio-psychological issues.

$\Rightarrow$ Provide additional support to the IMO-ILO working group in the revision of Seafarers rights to Medical Care on-board ships and ashore as embalmed into the ILO Maritime Labour Convention 2006 (MLC 2006).

$\Rightarrow$ Provide a learning curve to the industry; if these aspects are left out, there could be a manifestation into the possible shortage of skilled seafarers.

$\Rightarrow$ By giving credence to this concept, it provides knowledge / information as to how risk assessments maybe approached using different perceptions.

$\Rightarrow$ To what extent these concepts maybe used in Marine Accident Investigation and the possible revision of the Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code).[16]

3.3 Research Methodology: Mixed Methods

The history of mixed methods dated back to 1959, when Campbell and Fiske used multiple methods to study psychological traits (Creswell, 2003). This encouraged many others into triangulating data sources to seek convergence between qualitative

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[16] Adopted by IMO when the Maritime Safety Committee (MSC) met in London, for its 84th session in May 2008.

and quantitative methods (Jick, 1979). Creswell goes on to say that the mixed methods approach is one in which the researcher tends to base knowledge claimed on pragmatic grounds. It uses data collection either simultaneously or sequentially, to best understand the research problems. The data collection also involves gathering both numeric information as well as text information. This will help the final database representing both qualitative and quantitative information.

Implementation	Priority	Integration	Theoretical Perspective
No Sequence Concurrent	Equal	At Data Collection	Explicit
Sequential-Qualitative first	Qualitative	At Data analysis	
		At Data Interpretation	Implicit
Sequential-Quantitative first	Quantitative	With Some Combination	

Figure 2 - Decision Choices for Determining a Mixed Methods Strategy of Inquiry
Source: Creswell et al. (2003).

Figure 2 shows the four stages that go into the selection of mixed methods strategy of inquiry (Creswell, 2003). The above stages were used as a reference in this research.

This research commenced with an initial unstructured interview or pilot interview on a selected number of candidates. This was followed by a more semi-structured interview on more numbers of candidates. This provided a qualitative analysis on the characteristics to the research. A questionnaire was designed using the interviews as a basis and this was distributed among seafarers from different nationalities and

ranks. Literature from various scholarly writings, publications, journals and articles were also used to identify the sources and theoretical concepts behind this research.

All the above methods used culminated to a mixed method research methodology.

> Mixed methods research helps in complementing one method with another, considering that taking polarised methodological positions in research does not often do justice to the complexity of social analysis. Furthermore, the hard line difference between qualitative and quantitative research is waning and there are increasingly more advocates for the more pragmatic and realistic research paradigm of mixed methods. (Manuel, 2009, p. 101).

3.4 Qualitative Analysis

The first step of this research was initiated with an initial unstructured interview or pilot interview on 4 randomly selected candidates, whose interviews were recorded. There were 2 female and 2 male candidates with fairly significant sea-going experience (senior management officers). There was general agreement among the 4 candidates that there is a very good link between marine accidents/incidents and socio-psychological aspects of seafarers.

This led to a more semi-structured interview on an additional 16 candidates. A total of 20 candidates were interviewed. Among the group, 10 candidates where students enrolled in the MSc. Maritime Affairs programme at World Maritime University. The candidates were from different countries with varying sea-going experience. There were a total of 5 females and 15 males.

On transcribing the recorded interviews, the qualitative data gathered provided the basis and sufficient proof to the concepts and questions raised in this research.

3.5 Quantitative Analysis

A structured questionnaire was developed and distributed among seafarers of different nationalities and various ranks.

The questions addressed the following main areas:

1. General information providing personal background of the seafarer.
2. Social challenges and experiences encountered by seafarers.
3. Accidents / Incidents experienced by seafarers and its current status.
4. Possible psychological experiences post accident / incident encountered by seafarers and the current systems available to combat this issue.
5. A seafarer's perspective on what may be the future training and examination procedures to address the possible socio-psychological challenges.

The motivation behind this structured questionnaire comes from various factors. Despite the fact that seafarers arise from various quarters of the globe they tend to share essential sameness of all people. Great legendary military conquests have been won in the past. Not to mention *Alexander the Great,* who in his conquests used what now is understood to be psychological, sociological, and anthropological insights. He understood that lasting victory depended on the goodwill and moral support of the conquered people (Garcia, 1984 as cited in Patton, 1990). This structured questionnaire is intended to provide an insight on seafarers from diverse backgrounds. It also shows how they seem to be affected psychologically by their mundane social nature and the dangerous, eventful nature of the maritime occupation.

Some of the questions were given a number scale to choose from. Each number comprised of statements to which the candidates had to give their degree of agreement. This was a 5-point, *Likert* response format (de Vaus, 2002, p. 102):
1 - Strongly Agree; 2 - Agree; 3 - Neutral; 4 - Disagree; 5 - Strongly Disagree.

Once a questionnaire was developed, each question and the questionnaire as a whole were evaluated rigorously before the final administration. Evaluating the questionnaire is called *pilot testing* or *pretesting* (de Vaus, 2002). All three stages of 'pilot testing questions' were carried out in the development of this questionnaire.

Stage 1: The question development stage was carried out during the personal interviews. Candidates were informed that a questionnaire was being developed and the interview was a way to improve on individual questions. This is called a *declared* or participating pretest (de Vaus, 2002).

Stage 2: The questionnaire development stage is where the comments provided by the candidates during the interviews were used to improve the questionnaire. The questionnaire was then sent out to a group of experts (industry experts and academic experts) and some candidates to whom the final questionnaire would be sent. This is carried out so as to get a feedback from the insiders in the industry and academia, to try to get a closer match between the pilot sample and final sample (de Vaus, 2002). A total of 10 pretests were carried out.

This stage is called *undeclared* because this is only a simulation and respondents are not told that the questionnaire is still under development (de Vaus, 2002).

Stage 3: Stage 2 provided more information to refine the questions that where necessary and the final questionnaire was developed. This was then sent out to several candidates.

3.6 Organisation

This dissertation is organised into 6 chapters. Chapter One presents the evolution of the seafarer and highlights some of the challenges that he or she faces. Chapter Two presents in detail the literature review supporting the research. Chapter Three presents the research questions, methods used and the measures taken. Chapter Four presents the findings and analyses in relation to the interviews and questionnaires

carried out on seafarers. Chapter Five provides a discussion on how the socio-psychological aspect of seafarer plays an important role in the safety of life at sea. This is carried out in association with the findings from the research, interviews, relevant literature and personal practical knowledge of the author. Chapter Six provides a conclusion and possible recommendations and suggestions with respect to this challenge in the industry based on the findings and analysis drawn from this research.

3.7 Research ethics

All the interviews were voice-recorded with the informed consent of all interviewees. Prior to the interview, each candidate was advised on the nature and purpose of the research interviews. All candidates participated willingly and have confirmed their informed consent with signatures on the form. A sample of the interview consent form is shown in Appendix D. The above is as per requirements of World Maritime University.

3.8 Limitations of the research

- The focus of this thesis has been strictly limited to accidents/incidents and how social and psychological aspects contribute, prior to and post accidents/incidents.

- The background of the author towards this research, being a seafarer (master mariner) may suggest a subjective approach towards this topic. Efforts have been made to avoid or limit such subjective approach. However, being a seafarer this research could bring out an understanding on the intricate challenges faced by seafarers, which perhaps is not perceived by researchers who are not familiar with the maritime industry.

- The sample data collected during the survey questionnaire for the quantitative research is limited. This is due to the time constrains given for this research.

This is to imply that the findings inferred from this limited sample data may not necessarily apply to the whole seafaring population without more detailed data collection. This has been stressed in the relevant chapters.

- The interviews that were used for the qualitative data may seem to depict a very subjective view of the interviewees. This may be seen as a limitation. However, this is one of the key themes of qualitative research, which is referred to as 'naturalistic inquiry' (Patton, 1990). Many of the quotations from these interviews presented in this research paper under relevant chapters speak for themselves.

Chapter 4 – Research Findings and Analysis

4.1 Purpose and outline

This chapter presents the results obtained from the research carried out. The research queries are based on the seafarer's background as well as their social interaction on-board and ashore. The inquiry further investigates into accidents or incidents experienced by seafarers and how they might be psychologically affected. Finally, a study is also carried out on what possible methodologies maybe adopted to combat this issue.

Results from the quantitative data are presented first. The data collected is in the form of simple random samples without replacement. The data analysis presented in this chapter is in the form of descriptive and inferential statistics.

Inferential statistical analyses were carried out in order to derive associations between the variables. This was carried out mainly using the Chi-Squared Independence Test. All detailed calculations are presented in Appendixes G – N. However, as described by Weiss (2008, p. 573) it is important to keep in mind that association does not imply causation.

The specific questions that were deliberated are as follows:

- ➢ What is the association between the age of a seafarer and accidents/ incidents experienced or witnessed by seafarers?
- ➢ What is the association between the age of a seafarer and the injuries experienced or witnessed by seafarers?
- ➢ What is the relationship between number of years spent at sea and accidents/ incidents experienced or witnessed by seafarers?
- ➢ What is the relationship between number of years spent at sea and injuries experienced or witnessed by seafarers?

- ➢ Do different nationalities associate seafaring social elements differently?
- ➢ What is the association between seafarer's contract/ vacation periods and social interaction when at home?
- ➢ Is there a relationship between seafarers' who have experienced or witnessed accidents/ incidents and psychological symptoms shown by them?
- ➢ Is there a relationship between seafarers' who have experienced or witnessed injuries and psychological symptoms shown by them?
- ➢ What are the associations between seafarers who have undertaken some form of psychological training or examinations for handling such issues? Thus promoting the need for a universal training and the examination scheme for seafarers.

4.2 Quantitative research findings and analysis

The main method of administering the survey questionnaire was using an internet based online survey form[17]. This was sent out in the form of an email to all participants. A total of 37-answered questionnaires were received. There were no missing or incomplete information in the data received. The response rate was calculated to be 74%[18].

The survey questionnaire was sent out to some shipping companies to be distributed among their fleet. However, there was no response to this form of survey questionnaire administration. It seemed to some companies that this survey did not pose a direct relevance to their fleet. Hence, only responses from the online survey were used, thus providing a final data sample for analysis of n = 37.

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[17] Google Documents Application was used to create this form, the sample of which can be found in Appendixes B and C. The data collected is automatically converted into Google Documents Spreadsheet Application.
[18] This was calculated using the de Vaus formula (2002), p.127.
Response Rare = (Number returned * 100) / [N in sample – (ineligible + unreachable)].
i.e. (28*100) / (50-0).

The questionnaire is divided into five sections. The findings and analysis will be presented under each section. The motivation behind this questionnaire and the sectional division has been described under Chapter 3, p. 29.

Section 1: General Information – this section gives a general background of the respondents.

Section 2: Social Experiences – this section provides the social challenges and experiences encountered by the respondents.

Section 3: Accident / Incidents – this section provides data on the amount and types of accidents / incidents experienced by the respondents.

Section 4: Post Accident / Incident – this section provides data on the possible psychological symptoms post accident / incident. This section also provides information on training and examinations currently available and used in the industry.

Section 5: Training and Examination – provides a view on possible future training and examinations in addition to discussing the various officials' responsibility in addressing these issues.

In the following pages all numerical data corresponding to respondents have been identified as the respondent number and their percentages. For example: XX (YY%), where XX is the number of respondents and YY is the percentage of respondents.

Some of these numerical data are illustrated with charts. All charts and graphs are available under Appendix F.

4.2.1 Section 1- General Information

The sample data of 37 respondents had a mean age of 37 years.

There were:

➢ 4 (11%) between 20 - 30 years, 17 (46%) between 30 - 40 years, 7 (19%) each between 40 - 50 and 50 - 60 years and 2 (5%) aged greater than 60 years.

➢ 34 males (92%) and 3 females (8%)

Among them 30 (81%) are married, 3 (8%) co-habiting and 4 (11%) single.

The sample data consisted of nationalities from various geographical regions[19]:

18 (49%) from Asia, 12 (32%) from Europe, 3 (8%) each from Africa and the Americas and 1 (3%) from Oceania.

All respondents are seafarers, either current or former sailing staff who have served under various ranks or positions on-board ships. Among them were:

24 (65%) senior officers or management level officers, 7 (19%) junior officers or operational level officers, 1 (3%) rating and 5 (13%) others[20].

More detailed demographics of the sample and descriptive statistics for age, gender, nationality, rank and other variables are shown in Appendix T.

29 (78%) had some prior knowledge about the shipping industry as opposed to 8 (22%) who did not. This data is useful to understand how much knowledge is available to seafarers about the shipping industry, prior to joining. Traditionally, seafaring used to be a job that was passed on from father to son. Over the years the rationale to join this profession changed to being a very adventurous life and a chance to see places around the world. This brought in people from the streets into

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[19] Regions have been divided in accordance with data provided by the United Nations Statistics Division. Refer - http://unstats.un.org/unsd/methods/m49/m49regin.htm

[20] Others include pilots, cadets and seafarers with some military background.

the high seas. However, intricacies of the profession are only experienced once within the industry. Hence the above figures do not necessarily portray the complete knowledge of the profession.

The sample shows a fair distribution of seafarers who are currently sailing and ones who are ashore. 23 (62%) are currently sailing and 14 (38%) are former seafarers currently undertaking shore jobs.

The amount of time spent at sea is between 10-15 years, with the number of respondents being 12 (32%).

An analogy that may be construed here is that there is a fair amount of seafarers that leave the life at sea and seek shore jobs. This is seen more among younger seafarers who find it difficult to adapt to the rock and roll at sea under varying climatic conditions (Singh, *Seaways*, June 2011, p. 3). BIMCO/ISF (2010) manpower survey shows positive signs in the shortage of seafarers. However, there are concerns of shortage of skilled or trained seafarers in certain sectors of the industry.

Q 9. What was your average contract period onboard a ship?

0-2 Months	2	5%
2-4 Months	17	46%
4-6 Months	10	27%
6-12 Months	6	16%
>12 Months	2	5%
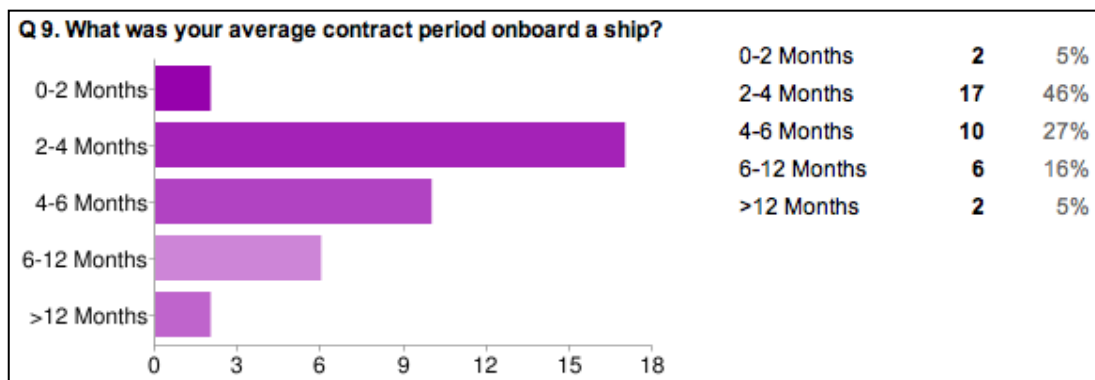
Figure 3 - Average contract period on-board a ship
Source: Author

The average contract period on-board is between 2-4 months, with 17 (46%) in agreement as shown in Figure 3. However, if analysing the trend of the contract

period at sea an increasing number of months spent at sea, 35 (94%)[21] of the sample data can be seen.

Q 10. What was your average vacation period between two contract?

0-2 Months	**18**	49%
2-4 Months	**17**	46%
4-6 Months	**2**	5%
6-12 Months	**0**	0%
>12 Months	**0**	0%
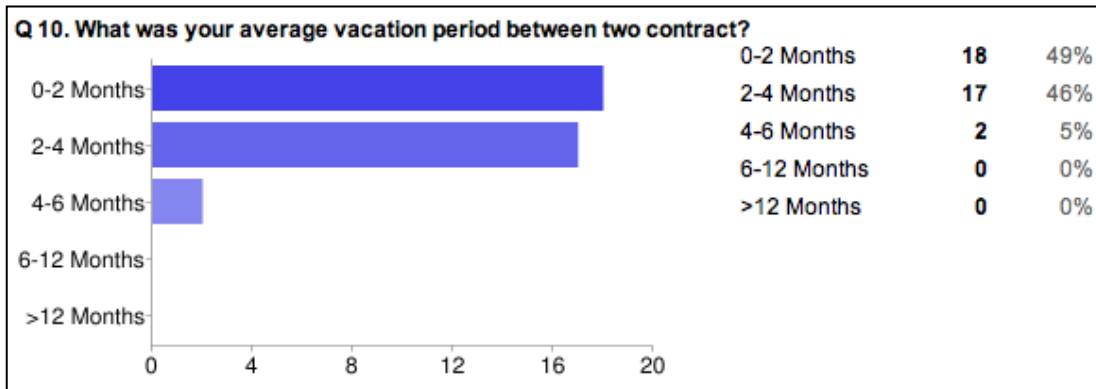
Figure 4 - Average vacation period between contracts

Source: Author

On the other hand, the time spent at home on vacation has peaked at 0-2 months, with 18 (49%) as shown in Figure 4. This shows that the time spent at home is substantially less when compared to time spent at sea.

In this section the author has discussed an overall basic characteristic of the respondents. A majority of the respondents are from Asia and Europe. A good number of respondents have had prior knowledge of this profession and are currently sailing. Respondents are from various service positions on-board ships with varying sea service experience. On an average, it seems that seafarers spend a lot more time at sea when compared to vacation time ashore per contract.

4.2.2 Section 2 - Social Experiences

Under this section, a descriptive statistical analysis of the graphs generated from the survey will be provided. This will be followed by a more inferential statistical

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[21] This has been calculated by take a sum of all the categories, i.e. 2-4, 4-6,6-12 and >12 months periods.

analysis on certain key aspects under this section. This analysis will provide a relationship between the variables.

The majority of the respondents, 30 (81%), have worked with multi-national crew on-board ships. Figure 5 shows the challenges faced working with a multi-national crew. Among which cultural, language barrier, rank or position and nationality challenges were ranked the highest.
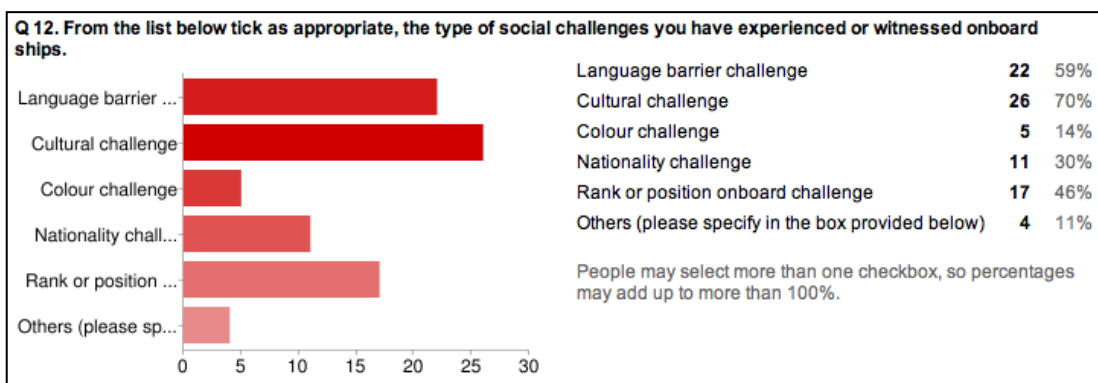
Figure 5 - Social Challenges

Source: Author

In addition to the above challenges some respondents have faced other challenges-

Respondent A:

Biggest challenge was that different nationalities did not mix. Rarely talked to each other (except work), ate at separately tables, etc. especially the lower ranks (less the officers).

Respondent B:

Seemly-unqualified personnel occupying positions on-board.

Respondent C:

Huge variation in the level of expertise, depending of nationality.

Respondent D:
Ego problems

On the contrary to the challenges, one respondent's comments were -
Respondent E:
No challenges - there were many people on-board with increased intellectual capacity the chances for inter-human conflicts become less.

The analogy that maybe drawn from this response question is that there are many intricate factors that seafarers need to be aware of when embarking on a voyage in the high seas. Let alone the well-known common factors such as language, culture and nationality, individual differences also play an important and contributing role.

The next sets of questions under this section (Q13) were constructed using the *Likert Scales* so as to arrive at a level of agreement or disagreement with each particular question. A descriptive analysis is carried out and explained in the following pages. A more detailed graphical representation is provided under Appendix F.

⇒ A good percentage of the respondents enjoy working as a seafarer, 15 (41%). The trend shows more liking towards the job.

⇒ When comparing the level of salary satisfaction 13 (35) % took a neutral stand. However, a total of 16 (44%) are in agreement and 8 (22%) disagree.

⇒ Salaries when compared with shore-based jobs, respondents agree that seafaring is a better-paid job. A total of 19 (52%) are in agreement and 12 (32%) have a neutral standpoint towards this. The trend seems to be positive.

⇒ 17 (46%) of the respondents are neutral on whether seafaring is an attractive job. However, a good total of 13 (35%) have disagreed with seafaring being

40

attractive. Hence it may be construed that the trend strongly shows towards being less attractive. Several factors may affect this decision, which will be discussed in the next chapter.

$\Rightarrow$ Social life on-board ships is still quite active according to a total of 14 (37%) of the respondents, despite the fact that 12 (32%) have a neutral stand. The trend is positive and this is a good sign. However, a comparison made to the number of seafarers who are currently sailing (from the sample data) seem to reveal that this maybe the case of the past and not accurate with the current sailing population. Refer to graphical illustration under Appendix S.

$\Rightarrow$ On interaction among the crew and officers during off duty hours, a total of 16 (43%) were in agreement with this. 10 (27%) have a neutral view towards this. The overall trend shows good interaction among seafarers during off duty.

$\Rightarrow$ Regarding on-board activities, 14 (38%) agree but 12 (32%) disagree and 3 (8%) strongly disagree. The inference that maybe drawn is that there seems to be very less on-board interaction due to the lack of recreational activities. This will be further discussed in the following chapter.

$\Rightarrow$ A majority of the seafarers do not get enough shore leave in ports. 14 (38%) disagree and 9 (24%) strongly disagree to the question "I get shore leave in port". The tendency is very much towards less to very less shore leave when seafarers arrive at ports. Analyses carried out to determine which crewmembers are more likely to go ashore revealed that senior officers on-board ships have the least likelihood of going ashore. This will be further discussed in the following chapter. A graphical illustration of the same is presented under Appendix S.

One of the respondents had the following comment:

> *Often and in particular when watches are kept in port the seafarer does not have to ask for shore leave, he or she can go ashore if so wishes when not on duty. Personally I went ashore as often as possible, a negative consequence of this is that often you have not obtained the necessary rest hours.*

⇒ There seems to be a more neutral stand when it comes to "going on shore leaves with colleagues on-board", 15 (41%). However, the tendency shows more respondents towards agreement with a total of also 15 (41%).

⇒ 18 (49%) have a neutral view with regards to the family's understanding of the job as a seafarer. Followed by a total of 10 (27%) who agree and on the other hand a total of 9 (25%) who disagree. The analogy is that there is almost equal amount of respondents who agree and disagree. The neutral cases maybe skewed either way and this will be discussed further in the next chapter.

⇒ 13 (35%) have a neutral standpoint with regards to recommending seafaring as a profession to family and friends. However, the trend shows more towards disagreement with 14 (38%) compared to 10 (27%) who agree. The possible reasons towards this will be discussed in the next chapter.

⇒ There seems to be a very good interaction with family and friends while a seafarer is at home, a total of 23 (63%) are in agreement. However this may not necessarily quantify the level of interaction with family and friends. The next chapter will discuss further on this aspect.

An inferential statistical analysis was carried out to address the following:

- Do different nationalities associate seafaring social elements differently?

- What is the association between seafarer's contract/ vacation periods and social interaction when at home?

The first step was to examine the relation between various nationalities and seafaring social elements. Various seafaring social elements according to the author are, but are not limited to, are described in Q 13 of the survey. There are 12 items to which seafarers from various continents have responded.

Table 3 - Chi-Squared Independence Test (1)

Nationality	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Africa	53.299	44	60.481	0.159	0.05
Americas	36.084	44	60.481	0.796	0.05
Asia	69.724	44	60.481	0.008	0.05
Europe	57.934	44	60.481	0.078	0.05
Oceania	24	44	60.481	0.994	0.05

Source: Author

Table 3 shows various Chi-Square values for the variables used.
The following inferences can be drawn from the table:

- It seems that Asian seafarers are largely influenced by the social elements. From the given sample size 50% are Asian seafarers, which is a comparative substantial amount.
- On the other hand it seems that European seafarers are not largely influenced by the social elements. 32.4% of the sample data are European seafarers.
- Seafarers from Africa, America and Oceania also show that they are not influenced by the social elements. However, due to the insufficient sample size from these nations the author chooses not to use this data for analysis until further research.

The second step was to identify the relationship between seafarer's contract period at sea and vacation period between the contracts and how they influence the social life / interaction with family and friends when the seafarer returns home (as in Q 13). A graphical illustration can be found under Appendix S.

Table 4 - Chi-Squared Independence Test (2)

Contract Period	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
At Sea (Q 9)	15.704	16	26.296	0.474	0.05
Vacation Period	**Calculated X^2**	**df**	**X^2 @ 0.05**	**P – Value**	**α - Value**
At Home (Q 10)	13.925	16	26.296	0.604	0.05

Source: Author

According to Table 4, in both cases it can be interpreted that the 'P'-Values are higher than the 'α'-Values. This means that contract periods and vacation periods are not associated with seafarers' social life/ interaction when they are at home.

Hence it seems that, irrespective of how long a time seafarers spend at sea, they have a good social life when they are at home. The same analogy applies to the vacation periods; irrespective of the time spent at home, on vacation seafarers have a good social life at home.

In this section the social challenges faced by a majority of the respondents who have worked with a multi-national crew on-board ships have been analysed. Some respondents have experienced challenges in addition to the list provided. Thus emphasising those individual differences also plays a contributing role towards social challenges. There seems to be a good level of job and salary satisfaction in addition

to a good social interaction, with various on-board activities on-board ships. The same applies to interaction with family and friends when at home. Comparative results show that Asian seafarers are more influenced by social elements than Europeans. However, results also show that there seems to be grim chances of shore leave and very less family understanding of the job as a seafarer. Thus possibly making this profession less attractive and recommended to family and friends.

4.2.3   Section 3 – Accidents / Incidents

This section will contain descriptive statistical analysis from the graphs generated using the survey. This is followed by inferential statistical analysis on certain key issues, which will provide a relationship between these variables.

Figures 6 and 7 show that a substantial number of the respondents have experienced and witnessed some form of accident / incident on-board ships.

25 (68%) have experienced accidents / incidents on-board ships.
31 (84%) have witnessed accidents / incidents on-board ships.

The nature of these accidents / incidents can be varying in magnitude from minor to major. However, with the given size of sample data it may be disputed that this does not hold water with the general seafaring population. The following chapter will discuss this further in detail.
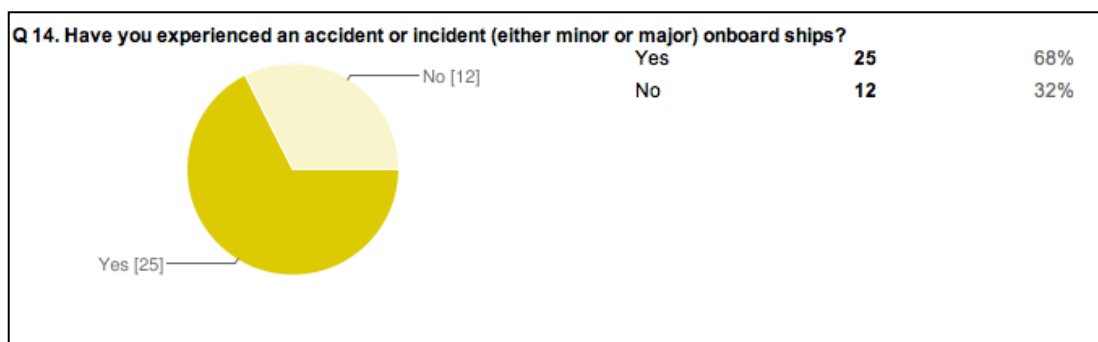
Figure 6 - Experienced Accidents / Incidents
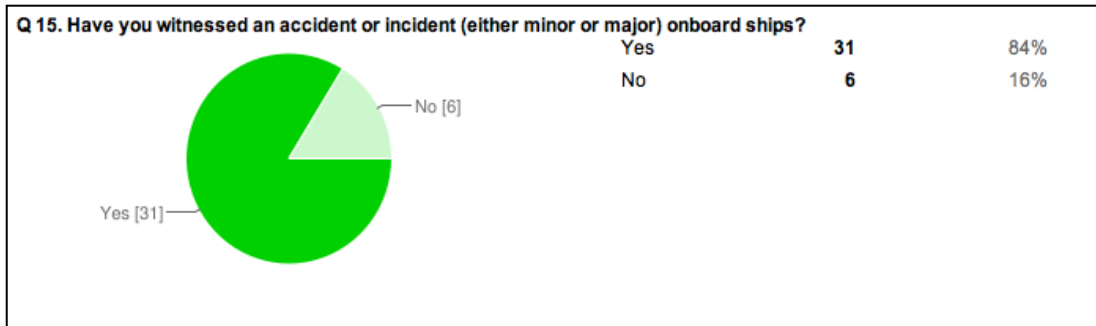
Figure 7 - Witnessed Accident / Incident
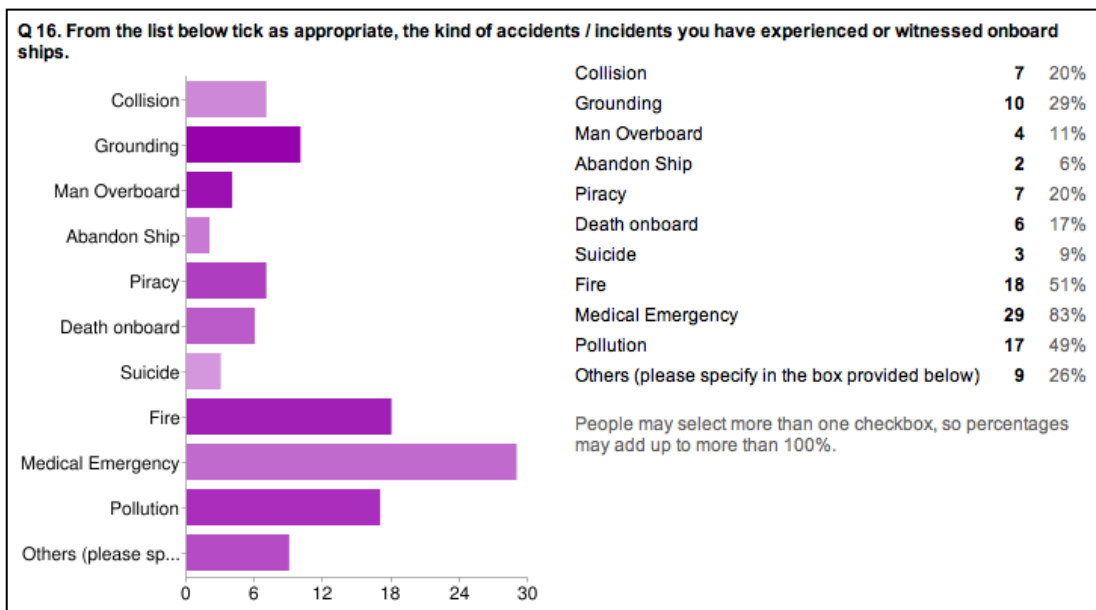
Figure 8 - Types of Accidents / Incidents

Figure 8 shows a list of accidents/ incidents experienced or witnessed by the respondents. This list is limited to the scope of this research and does not take into account other forms of accidents/ incidents, for example natural disasters involving ships and seafarers.

Other examples pointed out by some respondents, who consider these as accidents/ incidents were:

Respondent A:
Damage to ship and crew whilst under attack in a war zone.

Respondent B:
Robbery (not piracy)

Respondent C:
Picking up refugees. Stowaways are a major problem in West African ports where it is a real tension for a master and crew of a ship due to various human rights issues.

From this list it can be seen that a majority of the respondents have experienced medical emergencies, 29 (83%). Medical emergencies could vary in degree from minor to major and how a prudent mariner would administer each case on-board. Apart from medical emergencies some of the other kinds of accidents/ incidents experienced by the respondent were fire 18 (51%), pollution 17 (49%) and grounding 10 (29%). 6 (17%) and 3 (9%) of the respondents have witnessed death and suicide respectively. This is an important factor to be analysed with more pertinence towards this research. A detailed discussion will be carried out in the following chapter. Piracy is another concern with 7 (20%) having experienced or witnessed the act. As the analysis shows each respondent may choose more than one type of accident or incident. This means that each respondent could have easily faced more than one accident/ incident during his/ her sea service experience.

All the above are important factors to be considered with respect to how a seafarer may infer from these accidents/ incidents in continuing the profession he or she has chosen.

Figures 9 and 10 provide details on how many respondents have suffered injuries or witnessed injuries or death on-board ships. 18 (49%) have suffered some form of injury (minor or major) on-board ships. In contrast, almost an equal number of respondents have not suffered any form on injury, i.e. 19 (51%). Nevertheless, the former figures seem to be a large number considering the sample size. This may yet be debated if these figures are valid for the general population.

The same considerations are to be maintained with the number of respondents who have witnessed injuries or deaths on-board ships, with a substantial 26 (70%) against 11 (30%) who have not.
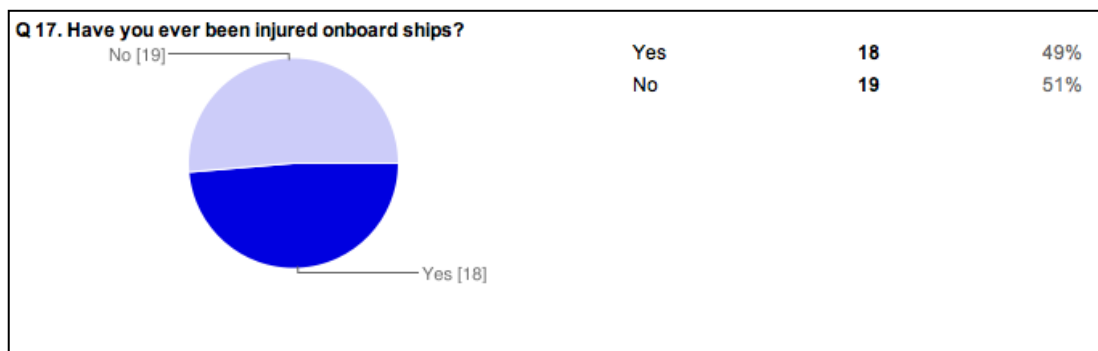
Figure 9 – Experienced injury

Source: Author
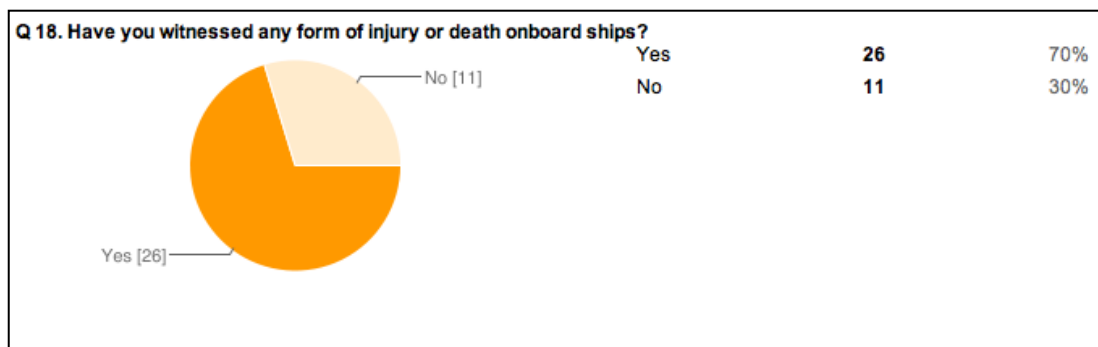
Figure 10 - Witnessed injury or death

Source: Author

Using inferential statistical analysis the following questions were addressed:

- What is the association between the age of a seafarer and accidents/ incidents experienced or witnessed by seafarers?
- What is the association between the age of a seafarer and injuries experienced or witnessed by seafarers?
- What is the relationship between number of years spent at sea and accidents / incidents experienced or witnessed by seafarers?
- What is the relationship between number of years spent at sea and injuries experienced or witnessed by seafarers?

In this section the author will begin by examining the relationship between the age of a seafarer and the likelihood of experiencing and witnessing accidents/ incidents. Also an association between age of a seafarer and the likelihood of experiencing and witnessing injuries is examined.

Table 5 shows higher values of 'P' are higher than 'α' – values in all cases.
This implies the following:
- Age of a seafarer is not associated with experiences and witness to accidents/ incidents on-board ships.
- Age of a seafarer is not associated with experiences and witness to injuries on-board ships.

Table 5 - Chi-Squared Independence Test (3)

Age of Seafarer	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Q 14	6.591	4	9.488	0.159	0.05
Q 15	2.781	4	9.488	0.595	0.05
Q 17	2.184	4	9.488	0.702	0.05
Q 18	7.988	4	9.488	0.092	0.05

Source: Author

Hence it seems that seafarers of any age group may experience and witness accidents/ incidents on-board ships. The same analogy applies to personal injuries experienced and injuries witnessed by seafarers on-board ships. The author would like to emphasise that even very young seafarers may be prone to this inference.

The second analysis is to examine the relationship between seafarers' sea service experience and the likelihood to experience and witness accidents/ incidents. The same analysis is also carried out for the likelihood to experience and witness injuries on-board ships.

Table 6 - Chi-Squared Independence Test (4)

Years at Sea	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Q 14	13.521	4	9.488	0.009	0.05
Q 15	5.299	4	9.488	0.258	0.05
Q 17	10.705	4	9.488	0.030	0.05
Q 18	10.092	4	9.488	0.039	0.05

Source: Author

Table 6 shows lower 'P' values in all cases expect for Q 15.
The following inferences can be drawn from this table:

- Sea service experience of seafarers is associated with experience to accidents/ incidents on-board ships.
- Sea service experience of seafarers is not associated with witnessing accidents/ incidents on-board ships.
- Sea service experience of seafarers is associated with personal injuries to seafarer's.
- Sea service experience of seafarers is associated with witnessing injuries on-board ships.

From the above analysis it seems that seafarers with limited sea service experience have less likelihood of experiencing accidents/ incidents. They are also less prone to personal injuries to themselves and witnessing injuries to others on-board ships. On the other hand, it seems that a witness to accidents/ incidents is not subjected to sea service experience. Therefore, in other words seafarers with any level experience at sea are likely to witness accidents/ incidents.

In this section accidents/ incidents and injuries experienced and witnessed by respondents have been analysed. A substantial number of respondents who have encountered such events have been seen. Statistical analysis show that seafarers of any age group may experience and witness accidents/ incidents. The same analogy applies to experiencing personal injuries. However, sea service experience seems to be associated with experiencing accidents/ incidents and injuries, but not in the case of witnessing them. Once again the emphasis is drawn towards young seafarers joining this profession who may be prone to such scenarios.

4.2.4   Section 4 – Post Accidents / Incidents

In this section the author will analyse the possible psychological symptoms, physical and mental, faced by seafarers post accident / incident. Graphical illustrations of the values presented can be found under Appendix F.

These set of questions (Q 20) were constructed using *Likert Scales* and the rating scales used are adverbs of frequency[22]. These are 1-always, 2-often, 3-sometimes and 4-never. Figure 11 shows the percentages or strength of the rating scale in use. However, it is very important to note that they are only the approximate frequencies. The key importance is the relative frequency and not the absolute number. Hence this chart will be used as a reference for the analysis.

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[22] Adverbs of frequency are words that show how often we do something. Refer Wren & Martin, High School English Grammar and Composition, 2000.

An important note to be made, the sample size is not large enough to substantiate these results for the entire population.
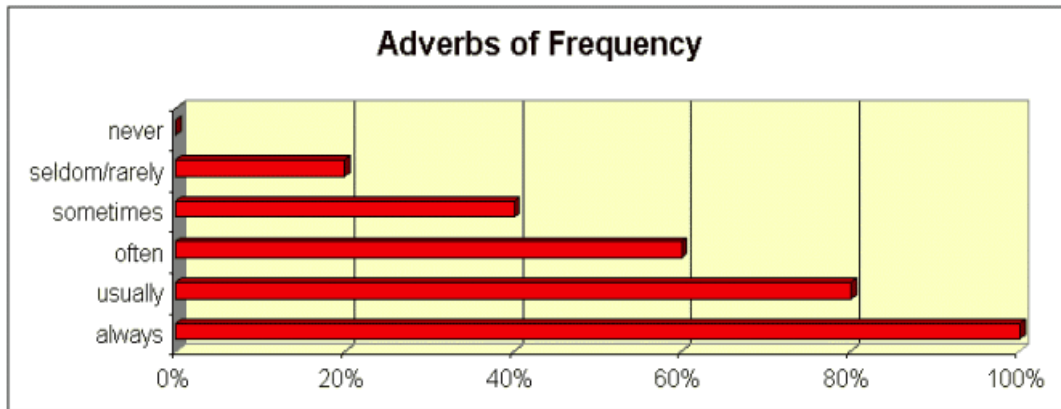
Figure 11 - Adverbs of Frequency Percentages
Source: http://www.englishcorner.vacau.com/grammar/rules/advfreq.html

➢ On disturbed sleep patterns, 17 (46%) have responded sometimes. This is around 40% in accordance with the adverbs of frequency percentage. However if analysing the tendency, we see that a total of 23 (62%) have encountered disturbed sleep patterns.

➢ 13 (35%) of the respondents sometimes, experienced dreams and nightmares. 5 (14%) have responded to neutral. Ignoring the neutral factor, then there is a tendency that a total of 17 (46%) have experienced this symptom.

➢ 16 (43%) have sometimes experienced headaches. Ignoring the neutral factor 4 (11%), the tendency is more towards the likely hood of experiencing headaches compared to 13 (35%) who have never experienced it.

➢ 21 (57%) have never experienced stomach problems. This seems to hold more ground when compared to a total of only 10 (27%) who have had some experience.

- A fairly substantial number, 16 (43%) have responded to feeling anxiety sometimes. The tendency is more likely to feel anxiety post accident / incident, with a total of 23 (62%).

- 19 (51%) never felt afraid post accident / incident. However, the number of respondents who have felt this is fairly close with a total of 13 (35%), ignoring the 2 (5%) neutral responses.

- A fair majority had no problems in concentrating on tasks, 19 (51%). There is a fair amount of respondents who have faced lack of concentration, a total of 12 (32%).

- 16 (43%) never felt nervous when carrying out the tasks the following day. However, a fair amount of respondents with a total of 13 (35%) have felt some kind of nervousness.

- 14 (38%) sometimes felt like going home. However, if looking at the tendency, there is a strong total of 23 (63%) who have felt like going home post accident / incident.

- Despite 13 (35%) who have never felt like leaving the profession, a fair amount of respondents, a total of 19 (52%) did feel like leaving the profession post accident/ incident.

- The feeling of talking to family and friends post accident / incident as per most respondents is never, 12 (32%). On the other hand, 17 (46%) felt like talking to family and friends. There can be several reasons for this, which will be discussed in the next chapter.

➢ A substantial number of respondents 28 (76%) never felt like talking to a professional clinical psychologist when home. There could be reasons for not choosing this, which will be discussed in the next chapter.

➢ It is very seldom a seafarer gets the chance to go home post accident / incident unless he or she is personally injured. This has been agreed by 20 (54%) of the respondents.

➢ The same is true for days off work on-board the ship, which is seldom seen. 22 (59%) agree with this by responding to never.

➢ A professional clinical psychologist is seldom heard of in a Marine Accident Investigation Team. This is concurred by 27 (73%) of the respondents.
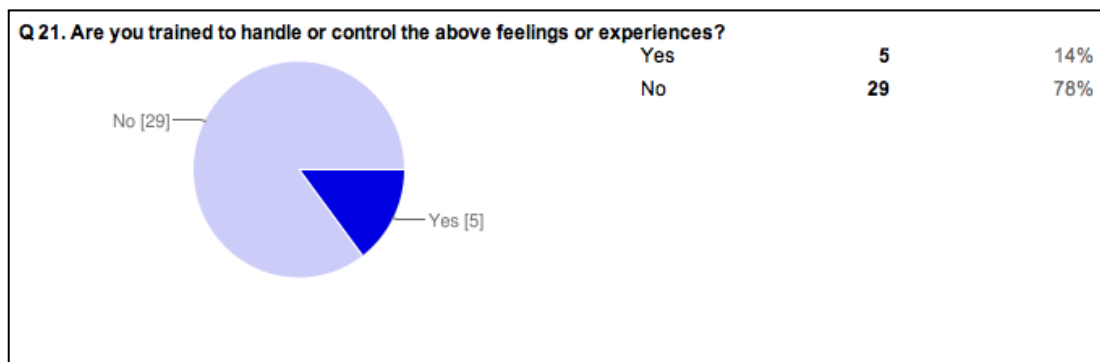
Figure 12 - Available Training

Source: Author
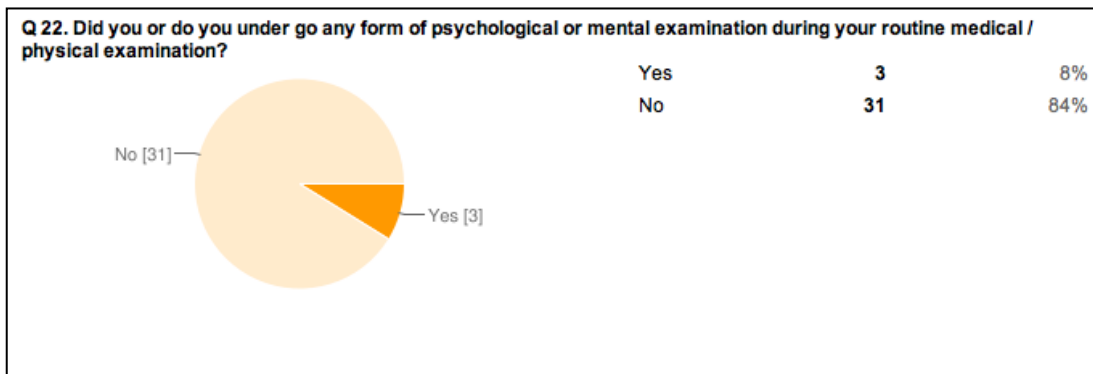
Figure 13 - Available Medical Examinations

Source: Author

Figures 12 and 13, show the training and medical examinations currently available. 29 (78 %) say no to training and 31 (84%) said no to medical examinations. This shows that there seems to be insufficient basic training for seafarers to handle psychological challenges on-board ships. Additionally there also seems to be insufficient medical examinations or care for seafarers who are affected by these issues.

On the other hand some respondents have had some form of training and/or medical examination. They are as follows:

> *Respondent A:*
> *I studied psychology to degree level.*

> *Respondent B:*
> *I grew up in a neighbourhood that was violent so seeing the accident disturbed me a little but everything went back to normal mode afterwards but occasionally the thought of it comes up.*

> *Respondent C:*
> *Medical certificate training every other five years.*

Respondent D:

I took combat training courses that involves some types of accidents that can occur on-board in case of a war, I do [did] it when I was a young officer at least 8 to 10 years ago. After that I took short courses of one week whenever I have to be promote to the next rank. The duration of the course was 90 days and there are also some seminars related with accidents on board that takes one day and are scheduling according with the type of ship in which you are working.

Inferential statistical analyses were carried out to address the following:

- Is there a relationship between seafarers who have experienced or witnessed accidents/ incidents and psychological symptoms shown by seafarers?
- Is there a relationship between seafarers who have experienced or witnessed injuries and psychological symptoms shown by seafarers?

The analyses were carried out with respect to two important aspects of responses by seafarers with possible psychological issues as described under Q20 in the survey questionnaire.

The first aspect is to relate seafarers who have experienced and witnessed accidents / incidents (Q14 & Q15) on-board ships with the possible psychological issues.

Table 7 - Chi-Squared Independence Test (5)

Psychological Challenges	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Q14 & Q15	150.943	56	74.468	1.185E-10	0.05

Source: Author

Table 7 shows a very low 'P' - Value compared to the 'α' - Value. This is to say that seafarers who have experienced and witnessed accidents/ incidents on-board ships

are associated with possible psychological issues. The detailed calculations, as shown in Appendix K, also reveal that a total of 40.2% of the respondents have experienced possible psychological symptoms and challenges. 47.3% of the respondents have responded "never" and 12.5% have responded "neutral".

The second aspect is to relate seafarers who have experienced personal injury and witnessed injuries (Q17 & Q18) on-board ships with the possible psychological issues.

Table 8 - Chi-Squared Independence Test (6)

Psychological Challenges	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Q17 & Q18	127.025	56	74.468	1.948E-07	0.05

Source: Author

Table 8 also shows very low 'P' - Value compared to the 'α' – Value. This is to say that seafarers who have experienced personal injuries and witnessed injuries on-board ships are associated with possible psychological issues. The detailed calculations, as shown in Appendix L, also reveal that a total of 38.2% of the respondents have experienced possible psychological symptoms and challenges. 48% of the respondents have responded "never" and 13.8% have responded "neutral".

Analysing the above two aspects, the author would like to emphasise that despite the number of seafarers who have responded "never", it seems there is a substantial number of seafarers who have some form of psychological challenges.

In this section the author has analysed the possible psychological symptoms both physical and mental faced post accidents/ incidents. Notwithstanding the small sample size, it seems that there is a substantial number of seafarers who have been challenged psychologically post accident/ incident. Statistical analyses also provided

support to the above inference. Some of the key symptoms that were predominant are experiencing disturbed sleep, headaches, anxiety, feeling of going home or leaving the profession and talking to family and friends. The analyses also showed that it is very seldom, if not it is never the case that seafarers are given the chance to go home or a day off work post accident/ incident nor is a clinical psychologist a heard of as a member in an accident investigation team. Insufficient training and examination to handle psychological challenges were among the other deliberations.

4.2.5   Section 5 – Training and Examination

In this section the author will be analysing the respondent's responses to what future training and examinations may be we utilised to alleviate the socio-psychological issues faced by seafarers. Graphical illustrations of the values presented can be found under Appendix F.

The questions under this section (Q23) were constructed using the *Likert Scales* so as to get a level of agreement or disagreement for each particular question. A descriptive analysis is carried out and explained in the following pages. This is followed by inferential statistical analysis on certain key issues, which will provide a relationship between these variables.

➢ A substantial percentage, a total of 33 (89%) respondents are in agreement that seafarers must be trained to identify personal psychological challenges. The analogy can also be drawn that currently the training and education system does not sufficiently provide this form of assistance to seafarers. The issue of the sample size arises here, which may be challenged in defining the hypothesis for the general seafaring population.

➢ 33 (90%) of the respondents agree that seafarers must be trained to identify psychological challenges possibly faced by colleagues on-board ships.

Current there seems to be no harmonised form of such training or education systems available to assist seafarers.

➢ A substantial number of respondents, 15 (41%) agree that seafarers must be examined prior to joining ships for potential psychological challenges. 10 (27%) each, strongly agree and take a neutral standpoint. Hence there is a very strong tendency in agreement towards this aspect. Currently, there seems to be no harmonised system effectively available in the shipping industry.

➢ A good total of 29 (79%) are in agreement that seafarers must be examined for potential psychological challenges during their routine medical examinations.

➢ The responsibility should lie on the shipping companies with regards to training and examinations and there seems to be a significant agreement from most of the respondents, a total of 32 (86%).

➢ National governments may also take up these responsibilities. A total of 22 (59%) of the respondents are in agreement.

➢ There seems to be a strong notion among a good majority of the respondents that a professional clinical psychologist should be part of the Marine Accident Investigation Team. This agreement has been show by a total 28 (75%) of the respondents.

Using inferential statistics, analyses were carried out to examine two aspects of responses by seafarers with possible psychological issues as described under Q20 of the survey questionnaire. This would provide answers to the following:

• What are the associations between seafarers who have undertaken some form of psychological training or medical examinations with handling of such

issues? Thus, promoting the need for a universal training and examination scheme for seafarers.

- What are the associations between seafarers who have not undertaken any form of psychological training or medical examinations with handling of such issues?

The two aspects were sub-divided into two, "Yes" and "No". This analysis was carried out to provide support to the responses received for Q23 of the survey questionnaire. Q23 supports the idea of further imparting socio-psychological training to seafarers. It also supports the idea of psychological medical examination of seafarers at various levels in the industry.

The first aspect is the comparison between seafarers who have and have not undergone some form of socio-psychological training to deal with the psychological issues encountered.

Table 7 - Chi-Squared Independence Test (7)

Psychological Challenges	Calculated X^2	df	X^2 @ 0.05	P – Value	α - Value
Q 21 Yes	44.863	56	74.468	0.857	0.05
Q 21 No	136.021	56	74.468	1.316E-08	0.05

Source: Author

Table 7 shows very contrasting 'P'-Values towards the sub-aspects (Yes and No). This may be inferred as following:

- Aspect "Yes" interprets that seafarers who have undergone some form of training to handle psychological issues are not associated with the psychological challenges. Hence, it seems that seafarers with this form of training tend to handle psychological challenges better.

- Aspect "No" interprets that seafarers who have not undergone any form of training to handle psychological issues are associated to psychological challenges. Hence it seems that seafarers with no form of such training may be affected psychologically.

The second aspect is the comparison between seafarers who have and have not undergone some form of psychological medical examination or care as a result of the psychological issues encountered.

Table 8 - Chi-Squared Independence Test (8)

Psychological Challenges	Calculated X²	df	X² @ 0.05	P – Value	α - Value
Q 22 Yes	53.782	56	74.468	0.559	0.05
Q 22 No	141.546	56	74.468	2.378E-09	0.05

Source: Author

Table 8 shows very contrasting 'P'-Values towards the sub-aspects (Yes and No). This may be inferred as following:

- Aspect "Yes" interprets that seafarers who have undergone some form of psychological examination or care are not associated with the psychological challenges. Hence, it seems that seafarers with this form of examination or care tend to handle psychological challenges better.
- Aspect "No" interprets that seafarers who have not undergone any form of psychological examination or care is associated to psychological challenges. Hence it seems that seafarers with no form of such examination or care may be affected psychologically.

The above analysis seems to provide sufficient support to possible advent of improved socio-psychological training and psychological medical examination or care to seafarers post accidents/ incidents on-board ships.

In this section the author has analysed the views from the respondents with regards to possible training and examination of seafarers to handle psychological challenges. This has been supported by a large number of respondents from the sample data. Statistical analysis also provides additional substantial support towards this inference.

4.3 Conclusion

A number of quantitative research findings have been presented in this chapter. Descriptive statistical analysis has been carried out to address each of the questions raised in this survey. These analyses were used to answer some of the specific questions discussed in this section.

These quantitative analyses show some links between accidents/ incidents and socio-psychological issues faced by seafarers. This analysis also found links between the lack of training and examinations currently available and the future forms of training and examinations that maybe harnessed into the shipping industry.

A further detailed discussion of these findings and analysis follows in the next chapter.

Chapter 5 – Discussions of Research Findings

5.1 Purpose and outline

This chapter presents the discussions on the research findings. The discussion will be divided into three important sections in light of the literature and analysis on the link between socio-psychological issues faced due to accidents/ incidents. The primary themes include social challenges, accidents/ incidents and their psychological associations on seafarers and future training and medical examination required in these aspects/ issues. Interviews are quoted in these discussions, with the language used by the interviewee unchanged. Quotes will be presented as they were stated and in many cases they speak for themselves.

5.2 Social Challenges

In this section the author discusses the role of a seafarer and his challenges with the social environment at different aspects of the work cycle. It is intended to explore the social life on-board a ship and at home, highlighting the challenges identified by various seafarers.

In the most general sense sociologists, social psychologists, anthropologists, et al define socialisation as the moulding of the individual into a social being or the process of learning how to behave according to the expected norms of one's culture (Giddens, 1989; Loyal & Quilley, 2004; Wiebust, 1958; Ritzer, 1996). This is very similar when a seafarer comes on-board a ship. He or she is faced with this challenge of moulding or adjusting to the on-board environment, unlike at home. The seaman's world is not like that of the landsman; they have their own occupational culture, which the novice has to make himself acquainted (Weibust, 1958).

Interviewee A:
Yes being a female was a challenge, mainly physical challenge of the work on deck. But then as you went up the rank it was easier and the feeling was less of being a

female among all men… Yes sometimes you had an odd case where men think there are irresistible or just being difficult and not understanding but was not really bad. If this was shore then it can be big problems, for men. So yes it was always a challenge but then at sea you grew into it and you choose the way you interact with people to fit in.

Interviewee B:

When I went to sea I was respected as a crewmember and not something "funny". I think as I grew up in rank I had more challenges because older officer's who had a lower rank than me felt very challenged by a female superior officer… but bullying was not a concern as I am a big and strong girl… There were not many women, we were 3 and 2 of them were older than me. So I felt very isolated, as we did not have anything in common.

Interviewee C:

Joining the ship, coming from home is also a different culture. Some do not care about and some are different, they teach you.

Seasickness was one of the challenge, but had to get used to it. You are not free to do what you used to do at home. Like when you have a job, you cannot stop and go and walk and sit around. Someone will come and tell you what to do. So you had a feeling that job never ends until the time was up. Working by the clock…

The spirit on-board was different at that time compared to what it is now. All people were on-board for a long time, so it was like you had a life on-board. It is not like today, you talk to people, they say I am only here because I want to get old and live at home, but I am doing this because it is necessary… if you look at a ship today you work morning to evening, 7 days a week. Before it was not like that. Of course not very efficient but socially much better life. We had something to talk about or remember about. Now it is more of a routine, same thing everyday.

You cannot really you dislike people, but they give you challenges. You can also be confronted by your colleagues (same nationality), don't have the same idea. So you

cannot really change people, but you can discuss only if make them want to change. A ship is like that, even if you don't like somebody, you know you have to be together. In the back of your mind you know it will only last a couple of months and then goodbye.

Interviewee D:

When I first started I was on a ferry and I did not like it at all. I did not like uniforms all the time and did not like passengers, especially when they were drunk on the ferries and we had to carry them back. I felt odd with that community with so many people. I wanted to go back ashore and felt this job was not for me. Yes as a young woman officer it was hard to get the A/B's[23] to get the work done, but then you have your tricks to get the work done. That is how you manage something when you are alone and a woman on a ship. Older men are not a problem, younger men are more problem. Yes there were some sexual challenges, especially after men drinking, but I am a big and strong and that is an advantage and I can defend myself. But overall I had a good relationship on-board with fellow officers and did not get picked upon.

Interviewee E:

There was challenges, the long time away from friends, family, home, food (that I used to eat), milk, candy and chips. The food was not what I was used to at home. No fresh milk. And when we went ashore we used to buy from Mac Donalds.
Social life on-board was not so good. We had some Asian crew who had challenges among each other. They had fights and we did not know why... Issues between individuals happen and easy to handle, but between groups was difficult to handle. But yes there was some social life, sometimes we had barbeque. Generally we had different mess and we did not eat together. I was still alone, also because of the working shifts. So I watched movies alone.

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[23] A/B's - Able-bodied seaman.

It used to be a practice in many parts of Portuguese and Norwegian coasts that maritime occupation was taken as a matter of course and that a boy must go to sea to become a real man (Weibust, 1958). Weibust also describes the initial trial period of a seafarer that is characterised as a social weaning or the breaking of the dependence of home and segregation from the world of landsmen. This eventually leads to a transition into the world of seamen. In a broader sense, Arnold van Gennep (in his book first published in 1909), who first formally enunciated the general theory of socialisation called it *"Les Rites de Passage"[24]*.

Seafaring has always been a profession which involved leaving the loved ones at home for long periods of time. According to a catering officer on-board a bulk carrier, *"[Seafaring] is a hell of a life for a married man with a family [and] more so for those at home. It's the wives that deserve all the praise, being farther and mother, while their [sic] husbands are away at least 9 months of the year"* (Fricke, 1973). Thus the old saying "A rolling stone gathers no moss"[25] is a perfect example of the life of a seafarer. A seafarer either loses his friends or never makes many, because of nearly always being away at sea, in exile or partial deprivation and disparity (Khodayari, 2008).

Interviewee A:

It was cool not to be contacted when away and the distance away from home was not challenging.

Interviewee B:

First time at sea was overwhelming. But then when I did 5 months at sea… that was long! But also staying at home for 3-4 months was boring.

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[24] In English it is called "The Rites of Passage"
[25] "Poems of Thomas Love Peacock", The Oxford book of English Verse, 1931.

Interviewee C:

Not really a challenge and I wrote many letters. People [at home] were doing different things. As you grow up they grow apart.

Interviewee E:

3-4 months was normal but was not ok! I always felt 2 months was perfect, but then it depends on the trip. Leaving home was a challenge and an experience. After some years it was hard to leave home, had a boy friend and friends and was more hard to leave home.

Language barrier is another key issue faced by seafarers from various walks of life in a shipboard environment. According to Chomsky (1957); Hartnack and Pears (1971) in the science of linguistics the correct translation is an art and would vary from one individual to the other depending upon the cultural background, general knowledge, extent of ability in the mother tongue, the group of languages that they belong to and other factors.

Interviewee C:

I don't really think that language problems are challenging. But I think it is sometimes interesting to find out and learn something. Find a way to understand and find a way to communicate. That was interesting.

Interviewee F:

Language was not an issue, we all spoke English. But yes one time we had some crew who did not speak any English at all. That was a big safety risk. But then I managed and used body language to help out.

Interviewee G:

No language was not a problem, we all spoke English. But then they also spoke bad English as I do.

From the interviews conducted it can seen that in general there is a more positive approach towards language barrier. But many seafarers have expressed the view that although there are benefits to working with other nationalities, the negative aspect of working with multinational crews is that it is much harder to communicate effectively (Kahveci et al., 2002).

Hierarchical challenges still continue to persist on-board ships. The research findings showed that a good number of respondents have faced this as a challenge. According to Kahveci et al (2004) modern cargo ships are predominantly male environments and continue to be characterised by relatively inflexible occupational hierarchies. However, as Lane (1986) puts it, even after the most extreme antagonisms there can be an overarching sense of unity. He adds to say that, if in each department the resentments of hierarchy are smoothened and modified there are also ways in which seafarers are brought together so that everyone from the master to the galley boy is self consciously a member of the community of the sea.

In spite of all the challenges, the research analyses under Chapter 4 showed that seafarers generally like their job and consider it as better salaried when compared to various shore based occupations. Matthew Dundas from Auckland, New Zealand says that he embraces all the good and bad in the industry and that the seafaring profession undoubtedly provides him with a level of job satisfaction far in excess of his friends ashore (Seaways, February 2011, p. 30).

However, many do not consider this as an attractive job. In a recent study carried out by Brian Mathias, criminalisation of seafarers is one of the prime factors in the reduction of new recruits and significant percentage of experienced staff to retire early (Seaways, March 2011, pp. 21-22). His study showed that 70% of the seafarers polled were of the opinion that criminalisation is a major concern. A survey carried out by Nautilus International shows that 90% of maritime professionals are concerned about criminalisation in the industry and two-thirds have second thoughts

about continuing a career at sea ("Scapegoat seafarers? ", 2011, p. 23). The results of this survey are illustrated in Appendix U. It shows that the shore side of the industry does not provide space to learn from mistakes, but rather blame and publically shame seafarers who become a palpable target of unfair blame. Consequentially the study revealed that a little more than 50% intend to cut short their careers and a substantial 89% are either unsure or would not recommend this profession to family and friends.

A similar figure has been perceived under this research finding, with a total of 81% who are either unsure or would not recommend this profession to family and friends.

Another aspect that is a vital link to the criminalisation of seafarers is the accident rate that may not possibly go down. According to Gregory and Shanahan, criminalisation of seafarers (especially Masters), in order to optimise safety by increasing rules and laws can lead to an increasing retirement rate (Seaways, February 2011, pp. 22-23). Thus an accelerated promotion of young seafarers to highly responsible and complex jobs may fuel the accident rate.

The other aspect that plays an important role in the social challenge is the amount of shore leave granted to a seafarer. The advent of ships with much faster "turn around" in ports and with changes in the industry's safety and security practices have exacerbated the boredom and social isolation on-board ships. Additionally there are other factors such as intense workload while ships in port, decline in crewing levels, port location and environments, security measures and visits by inspectors, surveyors and authorities during odd hours of the port stay. It can be seen in this research finding that a strong majority of respondents (63%) agree that shore leave is less granted to seafarers. Some quotations taken from reports by ITF inspectors and port welfare officers speak for themselves (Kahveci et al., 2004, pp. 106-108).

> *"To go ashore, you had to be super-human"*
> *"Ports are far away from anything"*
> *"By the end certain madness attacks certain crewmembers"*

According to this research finding, it seems that there have been good interactions and on-board activities among the seafarers. However, several research findings show that in many ships there is neither the time nor the space for recreational activities. Further, data also suggest that it is the attitude of the master that is the single most important factor influencing the "happiness" of seafarers aboard ships, a factor that has long been recognised (Kahveci et al., 2004, p. 101). Disapproval of on-board recreational social activities tends to withdraw the seafarer away from interactions with their colleagues. The advent of "zero alcohol" policy by several companies, catering to the health and safety norms has also become a negative impact on the seafarer's social lives. On the other hand this has encouraged solitary drinking behind closed (cabin) doors, which promotes social isolation and can endanger mental health (Kahveci et al., 2004, p. 101).

Interviewee H:

I liked the job, I really did. Because it was adventurous, few days in the harbour and I could take half day off and go out. But today it is not possible with the short turnaround times and very little crew.

Interviewee I:

I am not a very social person by nature, more of a loner. I think it was a better way to handle things when you go on a ship. It was a light hearted relationship on the ship. You get friendship for a while and then you leave it.

Several studies show that seafarers refer to their separation from home as a living "two lives" or existing in "two worlds".

Interviewee A:

I noticed that you are living in a parallel world, when stepping into one the other stopped. I had less or poor social life at home than on ship.

Interviewee E:

I did not need time to adjust when I went home or ship. I was very happy to see my friends.

Research findings in Chapter 4 show that seafarers have good social interaction when at home with family and friends. However, many responded that there are very few family members who understand a seafarer's job. According to Thomas (2003), transition periods between the two existences, whether from the ship to the home or from home to the ship were characterised by both partners as tension laden. This does not mean that they were not eager towards their return. However, it is equally a time that could be fraught with tensions as each person had to adjust to the new situation.

Other factors that pose challenges during seafarers' transition periods are the possibility of bringing their job back home. The every changing role of the shipping industry comes with additional pressures on seafarers to put extra hours to keep their jobs. Such pressures have resulted in increased levels of stress and fatigue ("All in Good Time", 1995, p. 6). These problems tend to be reflected when the seafarers come home as it takes time to unwind after a trip. The same seems to be applicable when seafarers return home to different sleep patterns as seafarers working hours on-board are often organised in shifts (Thomas, 2003). The cliché "ship-shape" is very common among seafarers and they tend to bring this shipboard status into their homes. This has shown to have increased problems among partners (Thomas, 2003).

Last but not the least is the degree of uncertainty as to the exact date of returning home experienced by both partners. The nature of this profession is such and has been the same for decades. However, it seems that to some partners and families the long awaited return complemented by the uncertainty has some emotional consequences.

This section showed the various aspects of social challenges that seafarers and their families face. Aspects such as criminalisation, lack of shore leave, increasing workload and reduced crewing in addition to the social barriers are some of the possible elements that make seafaring a less desirable profession. It is also seen that not only does a seafarer find it difficult to maintain long term friendships while at sea but also while at home. Hence, seafarers tend to cohere towards their partners or family members. On the other hand, when faced with stressful events at home, they tend to be reliant on their fellow crewmembers for social support. Studies show that the ship may be at best unreceptive and at worst hostile to such emotional needs (Thomas, 2003). The unusual state of a seafarer confined to his recognisable institutionalised form (the ship), with little access to other social groups or networks is a distinctive occupation. The seafarer seems to be a race of its own living in the form of a contemporary *"apartheid"*[26]. Thus social interaction either on-board or at home is a vital ingredient to emotional and physical health of a seafarer.

5.3 Accidents/ Incidents and their psychological associations on seafarers

This section briefly discusses accidents/ incidents and how they pose psychological challenges to seafarers. It is intended to explore the psychological aspects that were identified by various seafarers from the research findings.

The research findings under Chapter 4 have shown that a substantial number of respondents have either experienced or witnessed accidents/ incidents, 68% and 84% respectively. An inference may be drawn that there seems to be an increase or a high trend in the accident/ incident rates. This is taking into account that the average age group of the respondents was 37 years and a majority were currently sailing. However, given the size of the sample data, this analogy may be disputed.

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[26]1940s: Afrikaans, literally 'separateness,' from Dutch *apart 'separate'* + *-heid* (equivalent of -hood). Refer: The Compact Oxford English Dictionary, 2002.

Recent study and analysis carried out by DNV has shown an upward trend in accidents. As put by the DNV president Tor Svensen "The industry will always have to balance safety and other priorities, but the negative trend in accident rates indicates that we are no longer managing to get the balance right," (Meade, 24th May 2011, p. 1). Figure 14, shows the upward trend in accidents over the past 10 years.
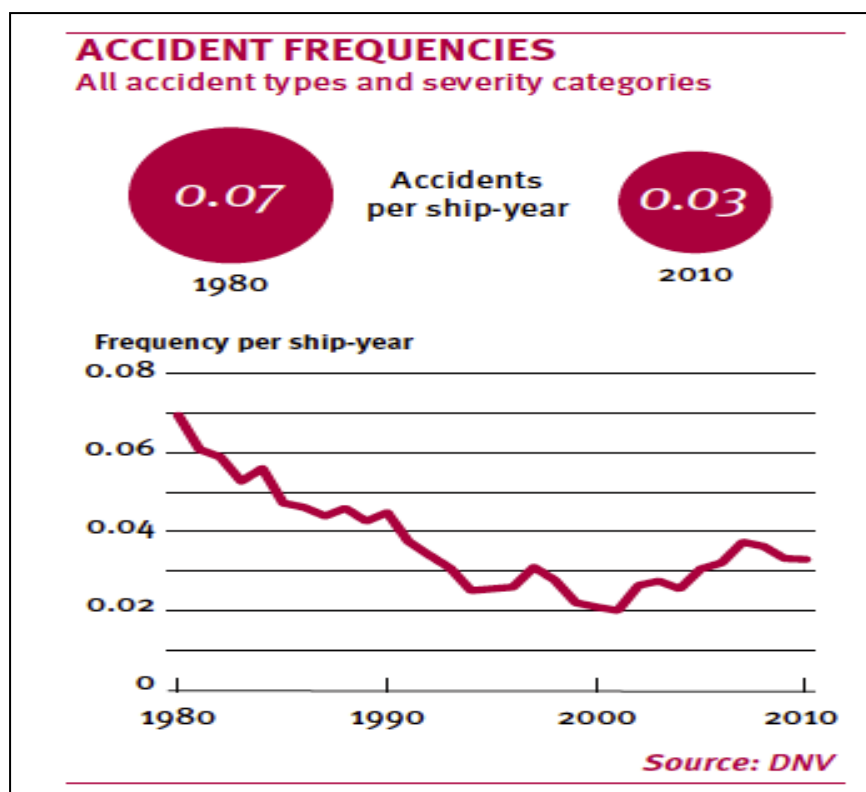
Figure 144 - Accident Frequencies
Source: *Lloyds List*, 24th May 2011, p. 1

Ipso facto this may provide some contextual support to the findings provided by this research paper.

This is also in line with the EMSA report on Maritime Accident Review 2010. According to EMSA (2010), despite the reduced severity of accidents the accident rates and loss of lives are on the rise, indicating a possible link to economic activity. A future projection shows a possible increase in accidents with the delivery of bigger and bigger ships (EMSA, 2010). Figure 15 provides an illustration.
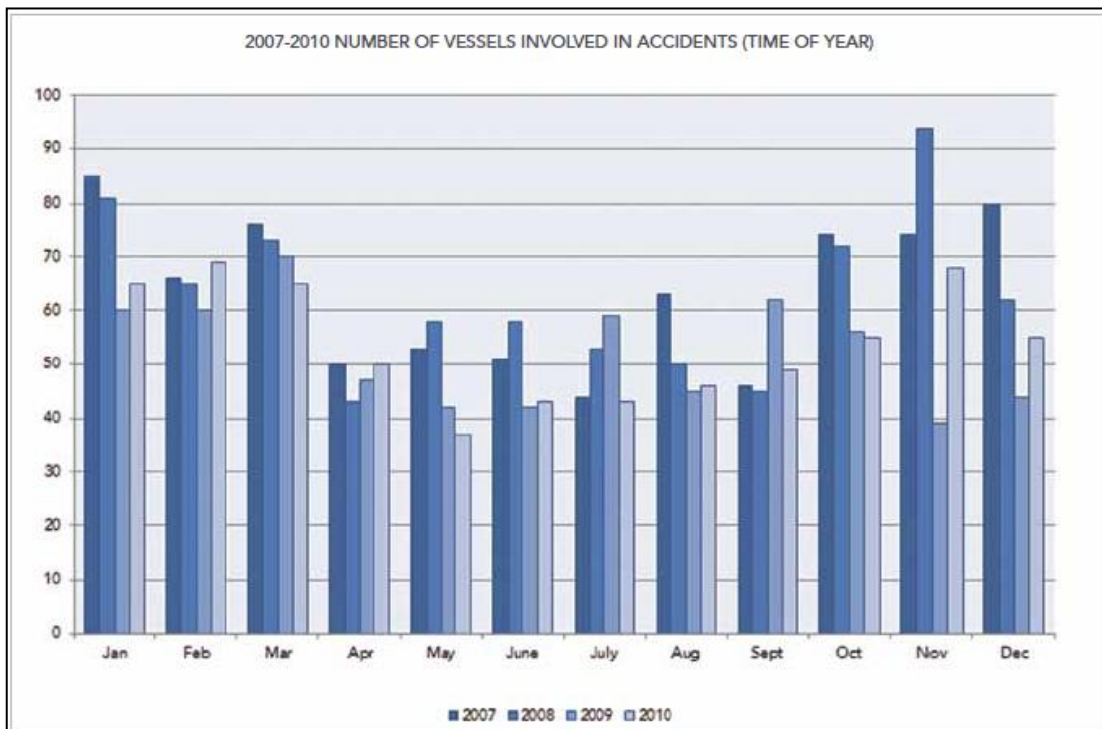
Figure 15 - Vessels Involved In Accidents (2007-2010)
Source: Maritime Accident Review 2010, EMSA

Reports from other sources also suggest similar trends. According to BEAmer (2010), the number of accidents in 2010 is significantly the same as in 2009 and loss of life has increased.

The Danish Maritime Authority, in its Marine Accidents 2009 report also suggests a gradual increase in the accident rate caused by Danish and foreign ships in Danish territorial waters between 1999 – 2008 (DMA, November, 2009).

The International Union of Marine Insurance (IUMI) is of the similar view that the year 2010 joins 2009 with similar figures on accident rates. As IUMI's Patrizia Kern has put it "even ahead of a full picture of the year from claims reports, there was no doubt that the failure to stem the high level of casualties was of great concern ("Major casualties", 2011, p. 8).

Therefore, it now seems that there is a possible rise in accidents/ incidents in the maritime industry. Shifting gears, the possible effects on seafarers post accident/ incident will be examined. The effects mainly pertaining to psychological issues and challenges.

Findings from this research have shown that there is no association between the age of a seafarer to experiencing and witnessing accidents/ incidents. The same applies to experiencing personal injuries and witnessing injuries. This is to say that seafarers of any age group are subjected to experiencing and witnessing accidents/ incidents and also personal injuries. This is a vital factor when it comes to the younger generation of seafarers who unexpectedly encounter such cases at a very early stage of their seafaring career. A slightly different inference is drawn where limited sea service experience of seafarers has less likelihood of experiencing accidents/ incidents, personal injuries and witnessing injuries. However, seafarers with any level of sea service experience are likely to witness accidents/ incidents.

The psychological symptoms and challenges experienced have been illustrated in the findings under Chapter 4. These symptoms are generally an outcome of some form of *traumatic events*. According to Atkinson, Smith et al. (2000), *traumatic events* are situations of extreme danger that are outside the range of usual human experience. Some of the examples of traumatic events are but are not limited to, natural disasters like earthquakes and floods, disasters caused due to human activity like wars and nuclear accidents and catastrophic accidents. From these examples it can also be deduced that some accidents/ incidents in the seafaring profession may also be categorised as traumatic events. This is also supplemented by the fact that seafaring is considered as one of the most dangerous occupations in the world (IMO, 2002).

The psychological symptoms that are experienced by the seafarers, post accidents/ incidents vary from individual to individual. Many people experience specific series of psychological reactions after a traumatic events (Horowitz, 1986 as cited in

Atkinson, Smith et al., 2000). There seems to be different stages towards these symptoms. First, the individual who is subjected to such events is stunned or dazed. Then they tend to become passive and unable to initiate simple tasks but tend to follow orders readily. In the third stage, they show the symptoms as illustrated in this research. Symptoms include but are not limited to anxiety, difficulty in concentrating and nightmares. However, not all accidents / incidents on-board ships are traumatic in nature. Nevertheless, many events that the contemporary shipping industry poses on the seafarers can lead to stress.

The degree of stress once again differs from individual to individual. According to Holmes and Rahe (1967), any changes in life that requires numerous readjustments can be perceived as stressful. This is very much the case of a seafarer when he/she embarks on a voyage aboard a ship.

Interviewee A:

… A friend of mine in another ship was seriously injured. He had to leave sea service and he would become stressed, very stressed some sort of psychological problem happened to him… when the Estonia happened that was very traumatic. I was home and I had some friends who was there. They were crew my friends but not working, they were sailing as passengers. Not a best friend but still. Then we went to the sailor pub and no one there was upset or cared about the incident… it was a very strange feeling and stayed with me for a long time and maybe the reason I came ashore to do research…

… I had a abandon ship situation. All of us survived. All of us were together except for the Captain as he was secluded in a separate room for all kinds of interview and interrogation. The rest of us talked it through for a few days. Many of us felt we abandoned her [the ship]. We felt for the ship, but then we helped by talking to each other… I had mixed feeling personally, it was more of a professional feeling that I should stay back and do something… but then I am more aware of fire and smell of smoke and I think it is related to that incident.

Interviewee B:

… Yes on major accident where 4 people died. That is something I think about off and on. The captain on-board, I did not like him, he was very snobbish. He just ignored the whole incident. The crew needed to talk about this. I felt so terrible that we could not share this experience and also show that we were also upset about this incident. Initially I thought this is some kind of joke, as in how can 4 people just die…

Yes it does come back [the memories of the incident]. I also felt very isolated in a way about this incident and I did not go back on that ship.

Another case was a crewmember his girlfriend broke up with him and he was drinking and crying. He talked to be initially, but after he sobered up and he avoided me. Maybe he felt embarrassed about the whole thing.

Once when my relative passed away, actually 2 occasion. I did not talk to anyone. I did not have anyone who I could trust to share that with.

Interviewee C:

Yes once we had a A/B who fell into the hold and we got him out. Lots of adrenalin rush but nothing more. Once I had to make a suture on a A/B who had a big gash on his eyebrow. Now how do you do a suture on a persons eyebrow! Well then you feel that you have to pull yourself together. In the end I was glad about the suture I did though I was getting worked up in between as it was a very big gash…

Every time something happens bad you feel bad for a day or two. Then after a while it is ok. For all incidents the feeling is the same and these days the feeling is also more like, shit I have to report this. I was looking forward to leaving here and having a nice rest.

I had a case a 1st Engineer, he came and told me that he cannot go down to the engine room. He said, I sit in my cabin crying. And so I wasn't to quit. So then I told him you are ill and you can go home ill…

Well grown man sitting in his cabin and crying, obviously something is wrong.

I had a similar case on another ship, the electrician wanted to go to the doctor as something wrong with his eye. So I sent him to the doctor in port and when he came back he told me that the doctor told him that he had depression! Nothing was wrong with his eye, that was just an excuse to go to the doctor. Then it showed out that he has just been declared fit for duty because he has a previous case of depression. But in his medical book he was fit for duty!

Interviewee F:

… Yes on one trip that was my last as I was pregnant and we were bound for Europe. The weather was so rough that I felt that the ship was going to break apart and that this was my last trip. But everything was ok…

…once we had pirates on-board. I did not see them, but it was announced on the ships radio and we raised the alarm. I was not afraid, but I felt very angry because they might come and take away my electronic stuff I bought from Japan. We had 2 other women on the ship and they locked themselves and hide inside boxes as they though they might be raped or something. I was just angry and I had a knife and was ready to use it.

Interviewee G:

I had a case where a A/B tried to commit suicide because his girl friend broke up with him. But he did not succeed with the suicide… I think the problem is when you are at sea you feel powerless and you cannot do anything when things like this happen. You cannot talk to the person and explain why you want to break up. Maybe it is easier now with email and internet, but its still different sitting eye to eye and talk about it. It is like brining bad ballast from home and all the work on-board…

Life Event	Value
Death of spouse	100
Divorce	73
Marital separation	65
Jail term	63
Death of close family member	63
Personal injury or illness	53
Marriage	50
Fired from job	47
Marital reconciliation	45
Retirement	45
Change in health of family member	44
Pregnancy	40
Sex difficulties	39
Gain of a new family member	39
Business readjustment	39
Change in financial state	38
Death of a close friend	37
Change to a different line of work	36
Foreclosure of mortgage	30
Change in responsibilities at work	29
Son or daughter leaving home	29
Trouble with in-laws	29
Outstanding personal achievement	28
Wife begins or stops work	26
Begin or end school	26
Change in living conditions	25
Revision of personal habits	24
Trouble with boss	23
Change in residence	20
Change in school	20
Change in recreation	19
Change in church activities	19
Change in social activities	18
Change in sleeping habits	16
Change in eating habits	15
Vacation	13
Christmas	12
Minor legal violations	11

Figure 16 - The Life Events Scale
Source: Holmes & Rahe, 1967

Figure 16 shows the Life Events Scales, which ranks the life events that are more stressful. A more readable figure is presented in Appendix W. From this list it can be seen that it is very likely that a seafarer may undergo any of the events during his seafaring career. After all they are no different from a normal person ashore.

The author would like to point out a key event that is more relevant to this topic and section of this chapter. Events like Personal Injury or Illness is assigned with a high stressor value. This is an important aspect as it has been shown that seafarers experiencing personal injuries or illness and witnessing the same are high or on the rise. It is needless to say that the other events are not important. They tend to have a more social aspect towards their nature.

As referred to earlier in this section one of the important symptoms toward a traumatic and stressful event is *Anxiety*. Anxiety is also characterised by terms such as "worry", "apprehension", "tension" and "fear" (Atkinson, Smith et al., 2000). When such stressful events go beyond the normal range of human suffering this develops into what is known as *Post-traumatic stress disorder* or PTSD (World Health Organisation, 2007). The symptoms of PTSD include (a) sleep disturbances, (b) headaches, (c) "flashbacks" or nightmares, (d) difficulty in concentrating and

over-alertness, (e) insomnia and such like (World Health Organisation, 2007 and Atkinson, Smith et al., 2000).

The findings of this research have shown that almost all the respondents have experienced such symptoms post accidents/ incidents. Hence it may be construed that seafarers are prone to face Post-traumatic stress disorder after experiencing an accident / incident on-board ships.

The above symptoms are also applicable to other forms of psychological issues such as Anxiety Disorder and Mood Disorders. With the given nature of the occupation of seafarers, there seems to be a constant sense of tension and fear. This may perhaps be due to various reasons as described in the initial section of this chapter.

An important aspect of mood disorder is *depressive disorders*, which is also a form of reaction to many of life's stresses. According to Atkinson, Smith et al. (2000), the emotional symptoms of depression are sadness and dejection. While on the other hand changes in appetite, sleep disturbances, fatigue, and loss of energy are associated with the physical symptoms. Once again, the respondents of this research have experienced similar symptoms. It is shown that 10% of men and 20% of women suffer depression at some time in their lives while 2-3% of men and 5-10% of women suffer depression at any given time (World Health Organisation, 2007).

Hence, this seems to present enough evidence to substantiate that seafarers undergo depression. Figure 17 illustrates the possible symptoms of depression that seafarers may undergo after an accident/ incident or the mere social challenges they come across on-board ships.
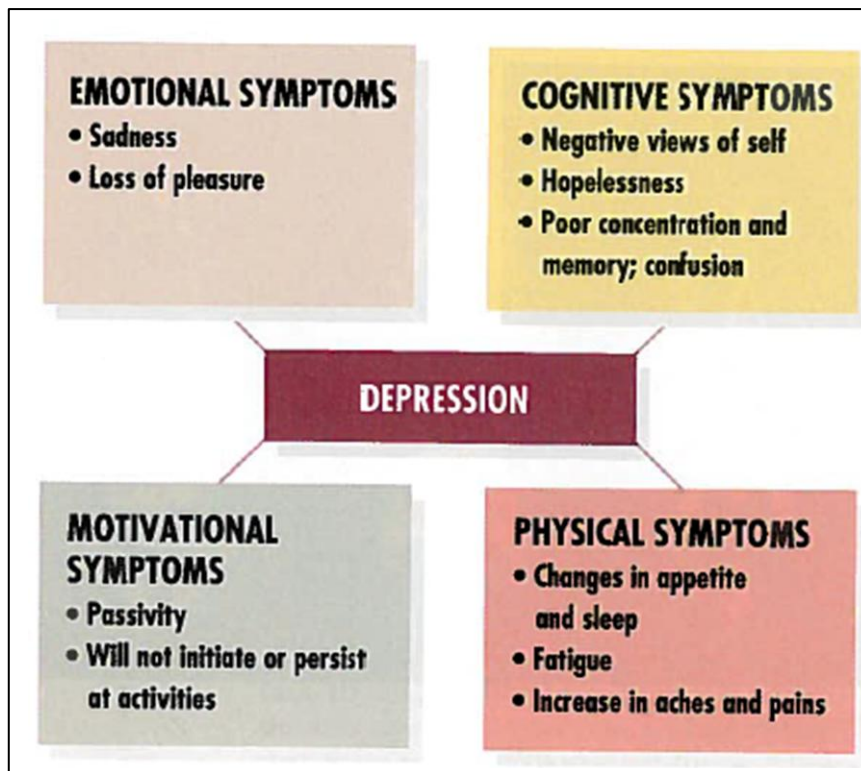
Figure 17 - The Symptoms of Depression
Source: Atkinson et al., 2000

A close association to depression is suicide. As Atkinson et al., (2000) puts it, despite the fact that women attempt to commit suicide three times more often than men do, men succeed more often than women in killing themselves. In a predominantly male environment this analogy fits very well with the seafaring community. Several studies have shown a possible rise in the rates of suicides among seafarers. In a study reported by Roberts and Marlow (2005), 55 out of 835 deaths were due to suicide and the cause of death of 185 seafarers was inconclusive. 87 out of the 185 disappeared at sea, although there were reported indications that many had shown symptoms of suicide.

In addition to the literature provided, statistical evidence from the research findings have further supplemented that those seafarers who have experienced and witnessed

accidents/ incidents and injuries on-board ships are associated with psychological issues.

This leads to the part of the discussion where it is very seldom seen that seafarers get the opportunity to get repatriated or take absence of leave of absence from work for a few days, post accident / incident. This is the case only when the seafarer is physical incapacitated to work on-board due to an accident/ incident. The psychological side of accidents / incidents tend to be ignored or under-researched by the industry.

Findings also show that a large majority of seafarers prefer to talk to family and friends after an accident / incident. This has been well illustrated by Thomas (2003) where she puts it that seafarers' turn to their female partners for emotional support. It also appeared that women engaged in considerable amounts of emotional work in order to protect their partner's wellbeing (Hochschild, 1983 as cited in Thomas, 2003). In recent times this would also apply to female seafarers who might look for emotional support towards their partners back home.

When it comes to talking to a professional clinical psychologist it seems that seafarers are either very reluctant to do so or prefer to find some sort of salvation with family and friends. According to the author, the former very often seems to be the case considering the possibility of stigmatisation of seafarers who seek such assistance. As Stevenson (2009) puts it, a greater obstacle to seafarers seeking mental health care is the stigma of receiving the care and the fear of being labelled as a person with mental illness. Thus having consequences towards seafarers' social acceptance and self-esteem. As Chapman (1931) puts it, seafarers tend to mask their feelings about the threats of dangerous weather, serious storms and disasters, but they often reach shore with frayed nerves and their courage seriously challenged. Thus, this may possibly be a reason why a marine accident investigation team seem not to have a clinical psychologist.

An interesting remark made by an interviewee ponders the effectiveness of the usage of such help.

Interviewee L:

... I spoke to one of my batchies [for batch-mate] on Peter[27] [name of the ship] the other day... a couple of days after his Captain died on-board... he was the one who was on watch... and he said the psychologist who came on-board did more bad than good...[laughs]... asking him stuff like... "have you thought about your death" and stuff like that...

In this section the author has discussed the possible steady state or rise in the accident rates and also how accidents/ incidents are linked with psychological welfare of seafarers. It seems that the overall mental health adjustment, personality integration and ego strength potential of seafaring personnel have been adversely affected by the demands of a maritime profession (Barnes, n.d. as cited in Chapman, 1931). This has further been corroborated by a research conducted on Filipino seafarers which showed that a higher than normal percentage of seafarers showed evidence of psychiatric disorders (Reyes & Jimenez's study as cited in Chapman, 1931). Findings also show that a majority of the seafarers are neither trained to handle such psychological issues, nor are there medical examinations being conducted to ensure their mental wellbeing.

5.4 Future Training and Medical Examination

Findings from this research show that a good majority (89%) of the respondents agree upon the need for additional training to identify the possible psychological issues among themselves and their fellow colleagues on-board ships. There also seems to be a good number of respondents who agree that seafarers must be examined for potential psychological disorders or issues prior joining ships and at regular medical examinations. Statistical evidence from the findings also

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[27] Name of the ship is deliberately changed in order to maintain ethics of confidentiality.

corroborated that those seafarers who have undergone some form of training and medical examination tend to handle psychological issues, post accidents/ incidents, better. The responsibility to handle these trainings and medical examinations should lie in the hands of the shipping companies and national governments. The notion of having a clinical psychologist in a marine accident investigation team is well conceived and agreed upon by a majority (74%) of respondents.

In accordance with the above findings, what laws or tools are currently available to seafarers should be contemplated on. Firstly, the advent of the ILO's MLC 2006 should be explored. It is in the opinion of the author that the MLC 2006 does not fully substantiate the intricacies of seafarer's mental wellbeing, post accident/ incident.

Regulation 1.2 – Medical Certificate, Standard A1.2.6 (a) and (b)[28] provides the particular requirements that shall be stated on a seafarer's medical certificate. Notwithstanding the fact that both hearing and vision are very important for seafaring, there seems to be neither a reference nor emphasis made towards the mental fitness of the seafarer. However, it is tenable that general medical condition of a seafarer will include mental health. But in practice there is no evidence (in the form of a scan or report) to prove that mental fitness check is actually carried out. The general practice seems to be a very simple question that is put forward to the seafarer by the medical examiner, where he or she would say, "Yes, I am fit doctor".

Regulation 4.1 – Medical care on board ship and ashore, Standard A4.1.1[29] provides member state responsibility towards medical care and dental care for its seafarers working on-board ships flying its flag. Once again there is no reference or emphasis towards mental fitness of seafarers.

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[28] ILO, MLC 2006.
[29] *Ibid.*

If looking closely at *Guideline B4.3.1.2*[30], which provides guidelines to address particular aspects related to occupational health and safety, a good majority of the aspects listed in this section are contributing factors towards stress to seafarers. Some of these are environmental stressors, general stressors and others that are associated with possible depression. Despite the fact that the guidelines suggest to take mental occupational health effects of seafarers into consideration, there seems to be no universal standard.

Last but not the least, *Guideline B4.3.6.2 (c), (d), (e), (f)*[31] suggest considerations to be given to these aspects during accident and injury investigations. According to Kuhlman (2977), there can be several sources of influence in a person's life, health or welfare. If threatened in an accident, the individual is subjected to psychological stress, which makes the individual less than perfect observer and recorder of the scene. It is seldom, if not at all, that there is a specialist who can deal with these particular issues under these sub-sections. The issues are physiological, psychological, stress and human failures related problems. It is very common to have accident investigation teams comprising individuals with only maritime background.

Several shipping companies have taken steps to recruit individuals with the appropriate personality that cater to the company profile. Psychometric[32] selection tests are a methodology that is used in recruitment and selection. Some shipping companies use private human resource consultants to carry out such tailor made tests. International Maritime Medical Association (IMMA), an international body that was set up not long ago aims to represent and promote the health and medical interests of the world's seafarers, port workers and cruise passengers as well as improve shipboard hygiene ("New body formed", 2010, p. 1).

According to Parafian (2006), individuals who took part in a daily 15-minute

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[30] *Ibid.*

[31] *Ibid.*

[32] In Greek this word means mental measurement.

exercise regime were six times less likely to develop mental health related problems than those who did not. "Physical exercise is the best recipe against mental illness," he concluded. Such research outcomes and suggestions are more effective provided they have been implemented and practiced regularly by seafarers. This becomes the task of the educational institutions to make such innovations and good practices aware of the existing and upcoming seafarers.

The training requirement for seafarers, where the notion seems to be that inadequate or sub-standard maritime training is the main reason for marine casualties. STCW along with more strict port state control measures, in many ways tries to alleviate this problem. However, the STCW curricula contain no topic addressing the potential woeful consequences of human error emanating from socio-psychological causes and how these can be surmounted (Mukherjee, 2008). He adds to say that if maritime casualties resulting from human error are to be minimised with a view of their complete elimination, then it is important for a seafarer trainees to be acquainted with the socio-psychological factors at least at the elementary level (Mukherjee, 2008).

This section infers to three important aspects, primarily that there is currently insufficient training for seafarers to handle such psychological issues caused due to post accidents/ incidents. Secondly, there is also inadequate medical examination towards mental wellbeing of seafarers post accidents/ incidents. Finally, there seems to be a possibility of providing assistance by a clinical psychologist in the team of marine accident investigators.

5.5 Conclusion

The chapter has discussed in detail the various socio-psychological issues faced by seafarers due to accidents/ incidents and injuries. Discussions on various contributing factors that are associated towards these challenges have been highlighted. The goal is to create a profound link using the light of evidence from available literature,

research findings, interviewee's personal experiences and the author's insight as a seafarer.

In essence, this research has shown that the influence by the psychological structure on the human body is more prominent due to accidents/ incidents. Several other researchers have focused in depth on either social or physical factors that contribute toward the so-called Human Error concept. Research studies carried out in other industries such as aviation, space missions, nuclear power plants and alike have shown sufficient analyses on psychological impacts. This research provides more emphasis on the psychological aspects in seafaring with the social and physical factors contributing towards them. The small sample size in this research has shown some significant results in certain aspects that underpin the hypothesis of psychological impacts in seafaring. In recent years nautical medicine has shown significant improvements in catering for seafarer's health. However nautical psychology still seems to be in its infancy (Böhm, 1973 as cited in Goethe et al., 1984, p. 152). This research may open the door to rejuvenate the psychological aspects on human relationships on-board ships. Thus the common objective of nautical medicine and nautical psychology, which is to continuously improve the working and living conditions of seafarers, can be achieved.

Chapter 6 – Research Conclusions and Recommendations

6.1 Purpose and outline

This chapter will present the conclusion to this research and give some recommendations for the industry and other stakeholders. The complete original findings of this research are presented in Chapter 4 of the dissertation. The conclusions presented in this chapter are based on these findings. The recommendations presented are derived from the following conclusions.

6.2 Research conclusions

The cornerstone for this research work was to explore the possible psychological effects that a seafarer undergoes due to maritime accidents/ incidents and injuries; and how the social surroundings of a seafarer, whether shipboard or at home, may contribute to these psychological issues.

The study was set in motion with the exploration of an idea by bringing together various key maritime conceptual elements that could be hypothesised to affiliate with the research questions. An underpinning to the hypothesis was provided by the literature review. The review of the literature not only pointed out the various discussions on the social and psychological issues faced by seafarers but also provided justifiable theoretical rationale to be utilised in this work. The literature review was also the basis for the generation of the three key themes that are used in this research. These include – *Social challenges, Accidents / Incidents and their psychological associations on seafarers* and *the need for future training and medical examination needs*.

Specific questions were raised from these themes:
- ⇒ What are the social factors that affect seafarers?
- ⇒ What are the psychological factors that affect seafarers?
- ⇒ Are seafarers affected socio-psychologically after an accident/incident?

⇒ Is there a need for special socio-psychological attention on seafarers before carrying out tasks on-board?

⇒ Is there a need for special socio-psychological attention on seafarers and their families after an accident/incident?

⇒ Is there a need for special socio-psychological attention on seafarers and their families during the marine accident investigations?

⇒ What are the current socio-psychological assistance available to seafarers and their families?

⇒ What are the possible solutions to address these issues?

The methodology used to address these questions was the mixed-methods approach. It involved interviews and survey questionnaire on various candidates. Inferences were drawn from the individual responses to the interviews and survey questionnaire. The highlights of the research findings and discussion are presented in the following sections. The research findings provided a significant number of associations between accidents/ incidents, injuries, various social challenges and psychological challenges. Also found were the current status of the available training and medical examinations to alleviate these issues. Finally, the findings showed the future need for such training and medical examinations and who would mantle this responsibility. The consequences that are seen from this potential challenge are the steady state or a potential rise in maritime accidents and casualties. The orchestrating jargon the so-called "Human Error" will perhaps need a more in-depth analysis and redefinition, considering these parameters.

A potential solution to these challenges may lie in the enhancement of awareness of these issues. This awareness needs to start right from very core of this industry, being the end consumer. Global markets thrive on international shipping and international shipping is practically moved by seafarers. As the well-known statement goes *"without ships and without the seafarers to man them – one half of the world would freeze for lack of the fuel to heat it, and the other half would starve for lack of the*

grain that gives it its daily bread" (Efthimios Mitropoulos, IMO Secretary-General, November 2008). Awareness seems to be the global potential barrier. As Fritz Pinnock, executive director of the Caribbean Maritime Institute (CMI) puts it "The CMI is striving to develop awareness of the importance of the maritime industry, thereby fostering a maritime conscience, which is almost non-existent within the region" ("The World Says", 2011).

Then comes the awareness of these challenges within the maritime industry starting with the international organisations, maritime administrations, shipping companies and other stakeholders. Furthermore, the awareness among seafarers of these potential challenges must be enhanced in the form of education and training. Such issues may very well be incorporated within the maritime curriculum. According to Mukherjee (2008), seafarers should be trained to recognise their own human element deficiencies and overcome them. All the above will provide a more concrete platform for the maritime industry to introduce new techno-economical advancements on ships without much maritime casualties. Such changes and its achievements have already been seen under other demanding industries, such as aviation, aerospace missions and nuclear plant industries.

Figure 18 shows a conceptual illustration of the Socio-Psychological Impacts on Seafaring. This may enable the scope for a further enhanced research towards this subject matter. Thus, providing a basis for the development of socio-psychological model for seafarers.
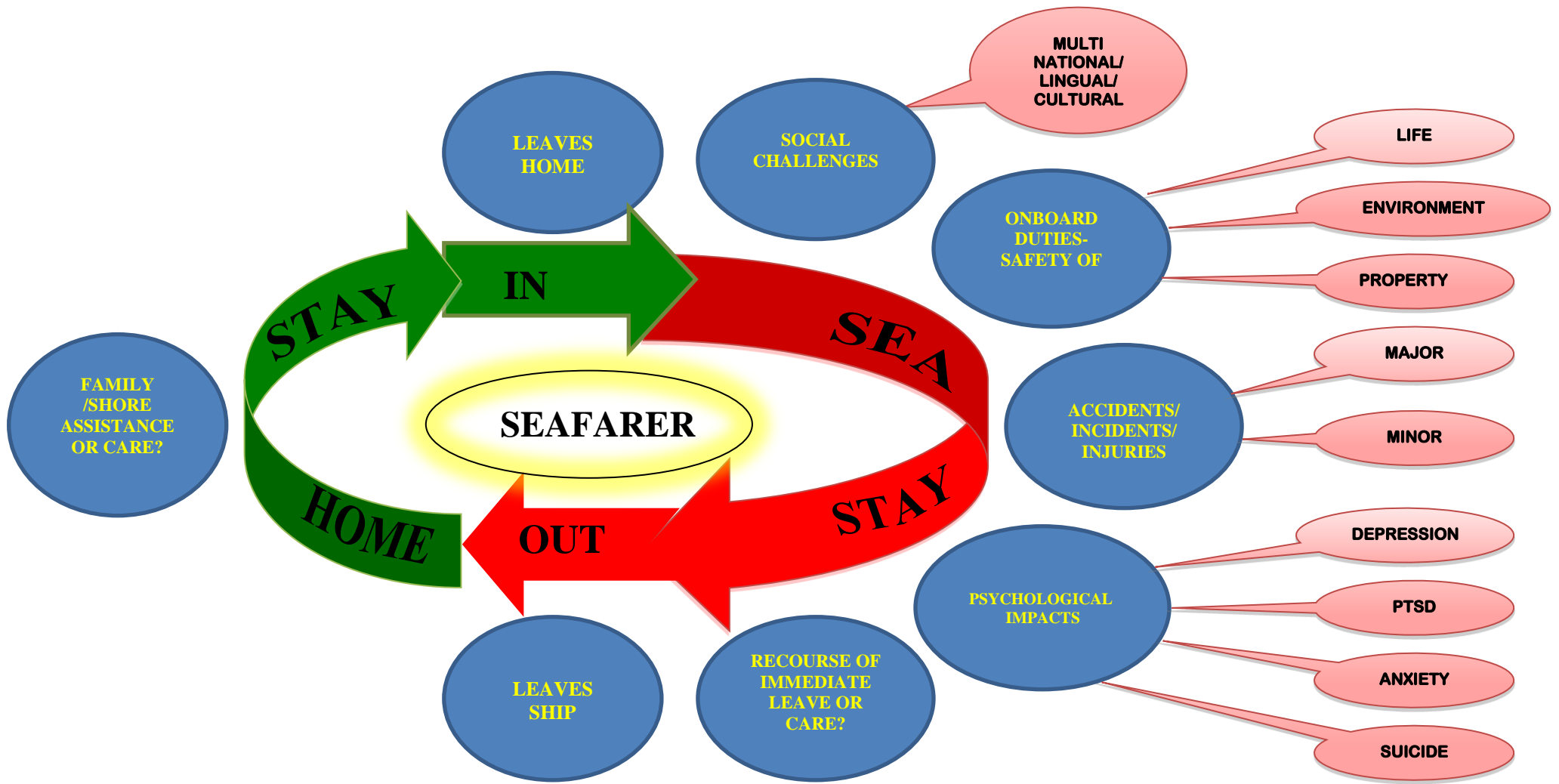
Figure 18 - Concept of Socio-Psychological Impacts in Seafaring
Source: Author

6.3 Research findings, conclusions and recommendations

Based on the research findings summarised below are the social challenges, psychological challenges, future training and medical examinations and recommendations respectively.

6.3.1 Social Challenges

- Separation from the loved ones at home is the immediate challenge for all seafarers.

- Separation from the customary social environment at home is a challenge for seafarers. When on-board ships the seafarers encounter various barriers such as, but are not limited to, language, culture, nationality and even something that is as very primeval as hierarchy.

- Shore leave in ports for seafarers sees a decreasing trend in the contemporary maritime world. There are several factors such as intense workload with fast turnaround of ships, decline in crew levels, port location, security, immigration laws and visits by surveyors, inspectors and authorities that contribute to this issue.

- Criminalisation and unfair treatment of seafarers is an ever-growing concern within the industry. If such actions persist without any recourse, seafaring will be seen as a less lucrative work place for the younger generation of seafarers.

- Social interactions on-board ships also sees a possible decreasing trend as some of the above mentioned factors such as workloads and reduced crewing are among some of the contributors.

- Social interactions when seafarers are home seem to be very good. However, there are certain issues during the transition periods and the possibility to bring work back home have shown high stress levels among partners. Furthermore, the uncertain nature of the exact date of return of a seafarer to their loved ones has shown some emotional consequences.

Recommendation:

As Dickinson puts it "it was time for a profound shift to a position where maritime professionals genuinely feel their worth and their contribution is recognised" ("Union's 10-point", 2010, p. 25). Under this note the following recommendations are suggested –

- The ILO along with the IMO should provide a platform for their members to enhance their voice on the social standards of seafarers. Thus highlighting the social component pertinent to safety on-board ships. More rigorous rules should be provided towards the welfare of seafarers particularly with regards to social life on-board ships, shore leaves in ports, manning levels of ships let alone *"safe manning"* or *"minimum manning levels"*.

- The ILO maritime labour rules should be revisited to redefine the standards for maximum duration of service period's on-board ships. This may enable to alleviate if not eliminate the separation from families and cultures felt by a seafarer.

- Maritime administrations and national governments should try and adopt special provisions for seafarers to obtain shore leave without much duress, keeping aside the security and other administrative issues. This may enhance and benefit the seafarer's health and wellbeing as stipulated in the ILO MLC 2006.

- Governments and maritime administrations should uphold the IMO/ ILO guidelines on the Fair Treatment of Seafarers in addition to UNCLOS and MARPOL, following maritime incidents. This may aid in the retention of seafarers and may thereby encourage young persons to go to sea.

- The shipping companies should enhance their voice by providing a more holistic approach towards social standards of seafarers. By improving this they will benefit from a more engaging seafarer towards his or her job and also while at home. Furthermore, this may ameliorate the seafarer retention factor within the maritime industry.

6.3.2 Psychological Challenges

- Research findings and reviews from literature has shown substantial evidence that seafarers undergo psychological impacts due to accidents / incidents and injuries.

- The level of the impact, however, varies from individual to individual.

- There are various forms of psychological challenges that a seafarer may undergo depending on the environment he or she is present in.

- Several social factors on-board and at home also contribute towards psychological impacts.

- Research findings show that seafarers are not trained to handle such challenges, and no form of medical examination is provided to cater for these impacts.

Recommendations

- The key element to the alleviation of this issue is awareness in the maritime industry. It is highly recommended that all maritime organisations, stakeholders and seafarers should be educated in this respect, thus enhancing the quality of the industry in a more holistic approach.

- Making provisions to the social welfare issues as addressed in the earlier section may alleviate this challenge.

- Introducing these challenges into the educational and training systems may bring about more awareness and provide tools to handle such possible situations on-board and at home.

- Introducing additional, enhanced mental health care and evaluation programmes may aid in the quality of seafarers produced. This may also increase the mental hygiene on-board ships and at home.

6.3.3 Future Training and Medical Examinations

- Researching findings, literature and evidence from personal experiences have shown that there is a need for additional education and training for seafarers on possible psychological issues with the nature of the occupation.

- Currently there are insufficient universal standards adopted by shipping companies in the form of psychological evaluation of seafarers prior to joining the profession.

- There are insufficient, specific international guidelines for mental well-being and regular mental evaluation of seafarers.

- Insufficient recognition of a seafarer's mental well-being during maritime accident investigations. There seems to be a need for a clinical psychologist to be present among members of the accident investigation team.

Recommendations

- The IMO should utilise the STCW, by revisiting and considering topics addressing the potential consequences of human errors arising from socio-psychological impacts on seafarers.

- The ILO recognises the particular facts that potentially pose a barrier to managing occupational health and safety. However, they should enhance their voice in defining and introducing additional standards to be adopted for mental health care, check-up and treatment (where necessary) for seafarers. Guidelines provided by several private organisations and institutions should assist towards such improvement.

- ILO should also devise uniform international guidelines to be setup for psychological evaluation of seafarers prior to joining the profession. These maybe incorporated during the entry-level stage at maritime educational institutions.

- Maritime administrations, flag states and shipping companies should utilise health promotions and health education programmes as means of campaign towards the mental health of seafarers. They should use this opportunity to

provide mental health care assistance programmes to affected seafarers at all stages of their carriers.

- Maritime administrations, flag states and shipping companies should carry out additional enhanced mental health care examinations on their seafarers in line with their physical examinations.

- The ILO recognises the considerations that should be given by accident investigators when carrying out investigations, under Guideline B4.3.6.2 of the ILO MLC 2006. It is recommended that this sensitive area should be revisited and new guidelines should be adopted by the introduction of a clinical psychologist into the team of marine accident investigators. The other option will be to provide sufficient training to marine accident investigators to identify and handle such situations when carrying out investigations.

6.4 Further Research

The research carried out in this dissertation used limited sample data size. This was owing to the time frame provided towards this research. Using a larger sample data size, the research can be expanded. Sample sizes from different nationalities/ regions will provide a more accurate response level to the questions framed. The same would apply if more shipping companies would have participated in this questionnaire. This would provide a good platform for augmenting the findings of this research. Thus it will also enable to highlight the positive innovations used by certain companies and assist in the development of good practices within the industry.

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APPENDIX A - Glossary

- Accident:

    An accident is an undesired event which results in physical harm and/ or property damage. It usually results from a contact with a source of energy above the threshold limit of the body or structure *(Kuhlman, 1977)*.

- Hazard:

    A hazard is a dangerous condition, potential or inherent, which can bring about an interruption or interference with the expected orderly progress of an activity *(Kuhlman, 1977)*.

- Injury:

    An injury is the result of accident that can be evaluated in terms of physical harm, which ranges between minor to catastrophic injuries *(Kuhlman, 1977)*.

- Marine Accident:

    A Marine Accident means any unforeseen occurrence or physical event connected to the navigation, operations, manoeuvring or handling of ships, or the machinery, equipment, material, or cargo on board such ships which results in or has the potential to result in an unforeseen outcome such as damage to the ship, its cargo, or the environment, or injury to any individual or damage to property and which may result in the detention of seafarers. *(Kuehmayer, 2008)*.

- Marine Incident

    A marine incident means an event, or sequence of events, other than a marine casualty, which has occurred directly in connection with the

operations of a ship that endangered, or, if not corrected, would endanger the safety of the ship, its occupants or any other person or the environment. *(IMO Res. MSC. 255(84, 2008)*.

A Marine incident means an occurrence or event being caused by, or in connection with, the operations of a ship by which the ship or any person is imperilled, or as a result of which serious damage to the ship or structure or the environment might be caused. *(IMO Res. A.849(20, 1997)*.

- Psychology

  Psychology comes from *"psyche"* in Greek for *"mind"* and the suffix *"ology"* meaning *"a field of study"*. Literally it means *"the study of the mind"*. Psychology fundamentally is the science of behaviour and mental process *(Zimbardo et al., 2009)*.

  Psychology can be defined as the scientific study of behaviour and mental process *(Atkinson et al., 2000)*.

- Psychologist

  A psychologist, like other scientists use the scientific methods to test their ideas *(Zimbardo et al., 2009)*.

- Psychiatrists

  A psychiatrist is a Doctor of Medicine and, in addition, have specialised training in the treatment of mental and behavioural problems, typically with drugs. This is not a part of psychology. *(Zimbardo et al., 2009)*.

- Sociology

Sociology is the study of human social life, groups and societies *(Giddens, 1989)*.

Sociology is a science concerning itself with the interpretive understanding of social action and thereby with a casual explanation of its course and consequences *(Ritzer, 1996)*.

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APPENDIX B - Survey Invitation Letter

Date:

Title of Research: **THE HUMAN ELEMENT ISSUES***

Socio-Psychological Issues Arising From Maritime Accidents And Incidents

Dear Sir / Madam,

I am a student at the World Maritime University. I come with a seafaring background with 12 years of seagoing experience on various types of dry cargo ships trading across the globe. Working at sea has become my motivation factor towards an academic stream.

During my days at sea I have educated, practiced and observed various safety ethics in the industry. Accidents or incidents continue to happen despite the adherence of good safety practices. In many occasions "err is Human".

Working with various nationalities has always been highly educative as we all share many common challenges but tend to express them differently. Failure to understand each other in many occasions has led to operational challenges, accidents or incidents per se. However, what goes through a seafarer's mind is seldom assessed both prior to an incident and after it.

IMO's focus on the Human aspect of shipping is still in its infancy when compared to other industries such as aviation. Certain IMO instruments, IMO-ILO joint work groups have worked rigorously in these matters in recent times. The Maritime Labour Convention 2006 addresses certain aspects of seafarer's social and psychological wellbeing. However, there seems to be lacunae in the legality of these

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matters. The gravity of the basic seafarer's wellbeing issues in the shipping industry, in the author's perception, and the dearth of evidence that the industry is addressing them unerringly has complemented to the cause of this intended research.

It is known that the World Maritime University is committed to respect data collection ethics. Hence, it is **guaranteed** that respondent's answers will be considered **highly confidential** at all stages of this intended research. The guarantee is also valid for results used in the Master thesis, possible research papers and conference presentations. Only the undersigned has access to the returned questionnaire. Individual's name or organisation shall not be identified at any stage of this intended research.

For any relevant queries please feel free to contact undersigned at s11065@wmu.se or cazkevin@gmail.com .

I thank you in advance for your kind assistance and participation.

Yours sincerely

Vivek Menon
MSc Student
World Maritime University

* The title has been amended in the final text.

A study on Human Element Issues faced by Seafarers

*Required

General Information
This section describes your back ground.

Q 1. How old are you? *

[   ]

Q 2. What is your gender? *
○ Male
○ Female

Q 3. What is your relationship status? *
○ Single
○ Cohabiting (or living together)
○ Married
○ Divorced
○ Others (Please specify)

Others
Please fill out if you have ticked "Others" in the above question.

[   ]

Q 4. What is your nationality? *

[   ]

Q 5. Did you have prior knowledge about the Shipping Industry, before joining? *
Prior Knowledge means - if you have or had your family members or friends working in the shipping industry / You came to know about the shipping industry through other sources.
○ Yes
○ No

Q 6. Are you currently a seafarer? *
The above question is asking if you currently a sailing staff or working ashore in the shipping industry or retired or working in another profession.

○ Yes

○ No

Q 7. How many years have you worked at sea? *

○ 0-5 Years

○ 5-10 Years

○ 10-15 Years

○ 15-20 Years

○ >20 Years

Q 8. What is your rank onboard (or your last rank if you are off the ship now)? *

[   ]

Q 9. What was your average contract period onboard a ship? *
Average Contract Period means - average time you spent on one ship.

○ 0-2 Months

○ 2-4 Months

○ 4-6 Months

○ 6-12 Months

○ >12 Months

Q 10. What was your average vacation period between two contract? *
Average Vacation Period means - how much time you spent at home between two ship contracts.

○ 0-2 Months

○ 2-4 Months

○ 4-6 Months

○ 6-12 Months

○ >12 Months

(« Back) (Continue »)

A study on Human Element Issues faced by Seafarers

Social Experiences
This section describes your experiences onboard the ship.

Q 11. Have you worked with multinational crew onboard ships? *

◯ Yes

◯ No

Q 12. From the list below tick as appropriate, the type of social challenges you have experienced or witnessed onboard ships. *
Experienced means - you yourself have faced it onboard ships. Witnessed means - you yourself have not faced it, but have seen others onboard having this challenge.

☐ Language barrier challenge

☐ Cultural challenge

☐ Colour challenge

☐ Nationality challenge

☐ Rank or position onboard challenge

☐ Others (please specify in the box provided below)

Others
Please fill out if you have ticked "Other" in the above question.

[text box]

Q 13. For the next several questions please choose a number from 1-5 as appropriate. *
1- Strongly Agree, 2- Agree, 3- Neutral, 4- Disagree, 5- Strongly Disagree

	1	2	3	4	5
I enjoy working as a seafarer.	◯	◯	◯	◯	◯
I am satisfied with the salary I receive.	◯	◯	◯	◯	◯
This job gives me good salary compared to my friends (non-seafarers) working ashore.	◯	◯	◯	◯	◯

Seafaring is a very attractive job.	○	○	○	○	○
I have a good social life with other crew and officers onboard ships.	○	○	○	○	○
I interact with all other crew and officers onboard the ship during off-duty hours.	○	○	○	○	○
Onboard ships there are regular get-togethers like parties or games.	○	○	○	○	○
I get shore leave every time the ship comes to port.	○	○	○	○	○
I go on shore leave in ports, together with other crew and officers onboard.	○	○	○	○	○
My family and friends understand me and my job very well.	○	○	○	○	○
I will recommend this job to my family and friends.	○	○	○	○	○
I have a good social life and interaction with family and friends, when I am home.	○	○	○	○	○

« Back   Continue »

A study on Human Element Issues faced by Seafarers

*Required

Accidents / Incidents

Q 14. Have you experienced an accident or incident (either minor or major) onboard ships? *
Experienced means - you yourself were involved in an accident / incident onboard your ship.

○ Yes

○ No

Q 15. Have you witnessed an accident or incident (either minor or major) onboard ships? *
Witnessed means - you yourself were not involved in an accident / incident but seen an accident / incident onboard your ship or another ship.

○ Yes

○ No

Q 16. From the list below tick as appropriate, the kind of accidents / incidents you have experienced or witnessed onboard ships.
Only if you have answered YES to any of the above questions in this section.

☐ Collision

☐ Grounding

☐ Man Overboard

☐ Abandon Ship

☐ Piracy

☐ Death onboard

☐ Suicide

☐ Fire

☐ Medical Emergency

☐ Pollution

☐ Others (please specify in the box provided below)

Others
Please fill out if you have ticked "Others" in the above question.

116

Q 17. Have you ever been injured onboard ships? *
Injury can either be minor or major and that stikes you or reminds you all the time.

○ Yes

○ No

Q 18. Have you witnessed any form of injury or death onboard ships? *
Injury can either be minor or major and that stikes you or reminds you all the time.

○ Yes

○ No

Q 19. Have you answered YES to any of the questions in this page? *

○ Yes

○ No

(« Back) (Continue »)

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A study on Human Element Issues faced by Seafarers

Post Accident / Incident
These are possible psychological symptoms after an accident or incident.
Kindly answer if you have experienced the same after an accident or incident.

Q 20. For the next several questions please choose a number from 1-5 as appropriate. *
1- Always, 2- Often, 3- Sometimes, 4- Never, 5- Neutral

	1	2	3	4	5
I had disturbed sleep patterns.	○	○	○	○	○
I had dreams / nightmares.	○	○	○	○	○
I had headaches.	○	○	○	○	○
I had stomach problems.	○	○	○	○	○
I felt anxiety.	○	○	○	○	○
I felt afraid.	○	○	○	○	○
I could not concentrate on my tasks.	○	○	○	○	○
I felt very nervous when carrying out tasks the following day.	○	○	○	○	○
I felt like going home.	○	○	○	○	○
I felt like leaving this profession.	○	○	○	○	○
I had to talk to my family and friends.	○	○	○	○	○
I had to talk to a professional clinical psychologist when I went home.	○	○	○	○	○
I was given the opportunity to go home after the accident / incident.	○	○	○	○	○
I was given a few days off work onboard the ship after the accident / incident.	○	○	○	○	○
During the marine accident investigation I was interviewed by a professional clinical psychologist.	○	○	○	○	○

Q 21. Are you trained to handle or control the above feelings or experiences? *

○ Yes

○ No

Briefly describe the type of training you underwent. When you did you do this, the duration and frequency (how often you do this) of this training?
If you answered YES in the above question.

```



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Q 22. Did you or do you under go any form of psychological or mental examination during your routine medical / physical examination? *

○ Yes

○ No

Briefly describe the type of examination you underwent. When you did you do this, the duration and frequency (how often you do this) of this examination?
If you answered YES in the above question.

```



```

(« Back) (Continue »)

A study on Human Element Issues faced by Seafarers

Training and Examination
This section is to get your views on what may be achieved in the future.

Q 23. For the next several questions please choose a number from 1-5 as appropriate. *
1- Strongly Agree, 2- Agree, 3- Neutral, 4- Disagree, 5- Strongly Disagree

	1	2	3	4	5
Seafarers must be trained to identify personal psychological challenges.	○	○	○	○	○
Seafarers must be trained to identify psychological challenges possibly faced by colleagues onboard.	○	○	○	○	○
Seafarers must be examined prior to joining ships for potential psychological challenges.	○	○	○	○	○
Seafarers must be examined for potential psychological challenges during their routine medical examinations.	○	○	○	○	○
Shipping companies must take responsibility for the care, training and examination of seafarers with regards to socio-psychological issues.	○	○	○	○	○
National governments must take responsibility for the care, training and examination of seafarers with regards to socio-psychological issues.	○	○	○	○	○
The team of Marine Accident Investigators should include a professional clinical marine psychologist.	○	○	○	○	○

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APPENDIX D – Research informed consent form (example)

Title of Research: **THE HUMAN ELEMENT ISSUES***

Socio-Psychological Issues Arising From Maritime Accidents And Incidents

Master of Science Candidate: Mr.Vivek Menon

I…………………………………………………………………….. (Name)

of……………………………………………………………………. (Organisation)

have agreed to participate in this research project voluntarily.

I confirm that I have been made aware of the objectives and the purpose of the research. I have been assured of the confidentiality of the interviews and subjects will never be identified by their names in any stage of the research.

I agree / disagree with having the interview voice-recorded.

Pursuant to the above, I give permission for the appropriate use of the information gained from the interview in subsequent publications and writings related to the research.

Signed:

....

Name   Date

* The title has been amended in the final text.

APPENDIX E – Semi-structured interview questions*

1. What was the reason for joining this profession?

2. Where you aware about this profession before you joined?

3. Where there any challenges in getting into this profession?

4. Where there any challenges you faced in the beginning of your career?

5. How many years of sea service do you have and what positions?

6. What kind of ships on and what trading routes have you sailed on?

7. Which nationalities have you sailed with?

8. Did you experience any social challenges on-board and home?

9. While on-board have you experienced or witnessed an incident or accident of any kind (for e.g.: collision, grounding, fire, abandon ship, death, suicide, piracy or any other)?

10. If yes, how did you feel or react post incident or accident?

11. Did you talk to anyone about these accidents or incidents?

12. Did you undergo or feel the need for an external counsel after the incident?

---

* These questions were used as a guide to keep both the author and the interviewee within the subject area.

13. What were the reactions of your fellow colleagues?

14. Did they talk to you about this and or did you find a need to talk or counsel any of your fellow colleagues?

15. Did they require any external counselling after any particular incident?

16. Are you and the crew on-board trained to handle these kinds of incidents or accidents?

17. Are you trained to handle and provide counselling to your fellow colleagues after an incident or accident?

18. Is there a necessity of psychological counselling to deal with psychological effects for seafarers?

19. Is there a need for training of seafarers in identifying and dealing with psychological issues on-board or ashore?

20. Has your social life ashore or at home changed from the time you have joined this career?

21. What do you think about the present technology advancement in communication on-board? Is the "IT" good or bad in the industry when it comes to social life on-board and ashore?

---

* These questions were used as a guide to keep both the author and the interviewee within the subject area.

APPENDIX F – Results from survey questionnaire

37 responses

Summary See complete responses

General Information

This section describes your back ground.

Q 1. How old are you?

29 58 34 44 31 66 56 40 44 33 50 41 58 37 35 32 40 42 50 65 35 50 37 29 36 42 36 56 34 35 35 33 33 37 29 32 23

Q 2. What is your gender?

Male	34	92%
Female	3	8%

Q 3. What is your relationship status?
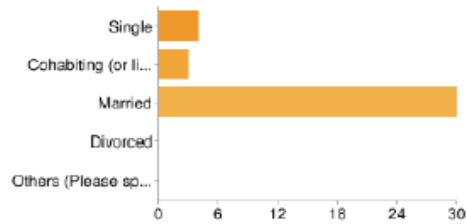
Single	4	11%
Cohabiting (or living together)	3	8%
Married	30	81%
Divorced	0	0%
Others (Please specify)	0	0%

Others

Q3: not married during the years at sea

Q 4. What is your nationality?

Indian British Turkish Swedish Chinese Swedish Danish Ghanaian Swedish Indian fijian Swedish Danish indian Nigerian Korean Danish FRENCH Swedish

Q 5. Did you have prior knowledge about the Shipping Industry, before joining?

Yes	29	78%
No	8	22%

Q 6. Are you currently a seafarer?
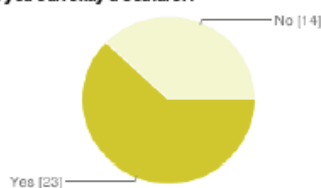
Yes	23	62%
No	14	38%

124

Q 7. How many years have you worked at sea?

0-5 Years	5	14%
5-10 Years	7	19%
10-15 Years	12	32%
15-20 Years	7	19%
>20 Years	6	16%
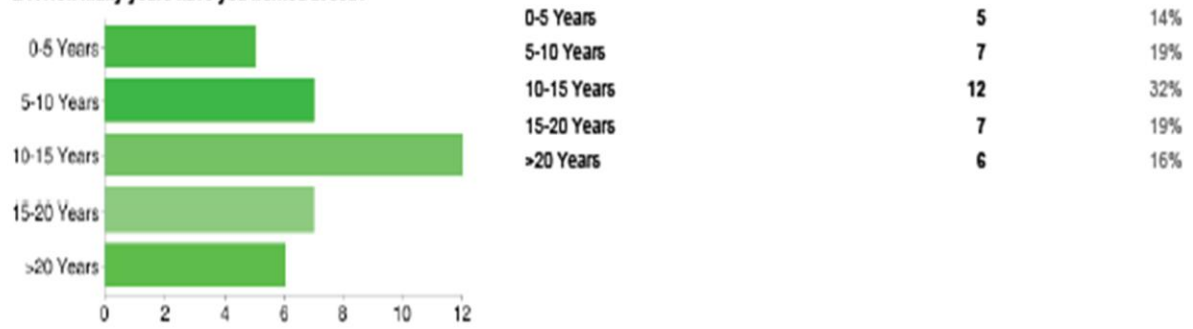
Q 8. What is your rank onboard (or your last rank if you are off the ship now)?

2nd Engineer   Master   Chief Officer   2nd officer   2nd officer   Chief Officer   Master   Master   Pilot   Master   Chief Engineer   2nd officer   Master   Commandant   Rating   2nd officer   Chief Engineer   Master   3rd engineer   Master   Chief Officer   ...

Q 9. What was your average contract period onboard a ship?

0-2 Months	2	5%
2-4 Months	17	46%
4-6 Months	10	27%
6-12 Months	6	16%
>12 Months	2	5%

Q 10. What was your average vacation period between two contract?

0-2 Months	18	49%
2-4 Months	17	46%
4-6 Months	2	5%
6-12 Months	0	0%
>12 Months	0	0%

Social Experiences

This section describes your experiences onboard the ship.

Q 11. Have you worked with multinational crew onboard ships?
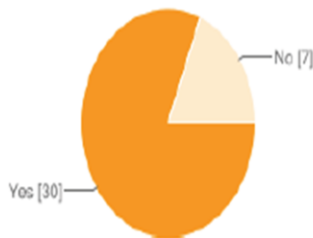
Yes	30	81%
No	7	19%

Q 12. From the list below tick as appropriate, the type of social challenges you have experienced or witnessed onboard ships.
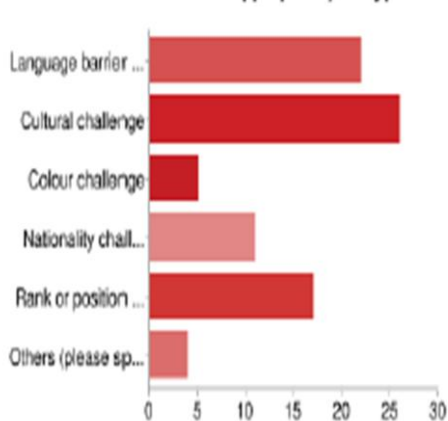
Language barrier challenge	22	59%
Cultural challenge	26	70%
Colour challenge	5	14%
Nationality challenge	11	30%
Rank or position onboard challenge	17	46%
Others (please specify in the box provided below)	4	11%

People may select more than one checkbox, so percentages may add up to more than 100%.

Others

No challenges - there were many people onboard - with increased intellectual capacity the chanses for interhuman conflicts become less   "Seemly" unqualified personnel occupying positions on board.   Biggest challenge was often that different nationalities did not mix. Rarely talked to each other (except work), ate at separate tables etc. especially the lower ranks (less the officers)   Huge variation in thelevel of expertise, depending of nationality.   Ego problems

126

Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I enjoy working as a seafarer.

1	10	27%
2	15	41%
3	7	19%
4	4	11%
5	1	3%
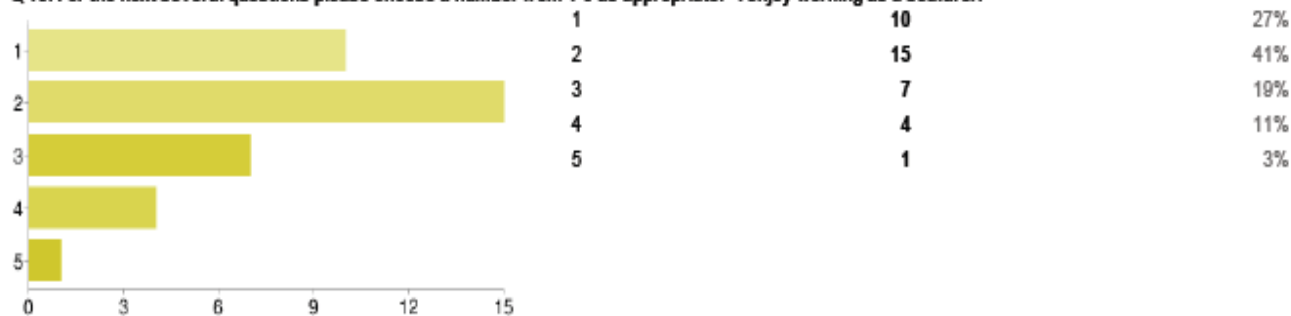
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I am satisfied with the salary I receive.

1	5	14%
2	11	30%
3	13	35%
4	8	22%
5	0	0%
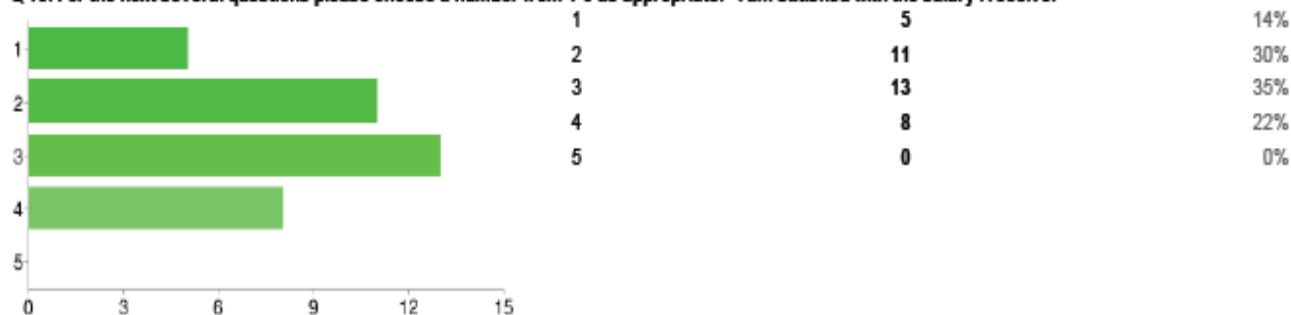
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - This job gives me good salary compared to my friends (non-seafarers) working ashore.

1	4	11%
2	15	41%
3	12	32%
4	5	14%
5	1	3%

Q 13. For the next several questions please choose a number from 1-5 as appropriate. - Seafaring is a very attractive job.
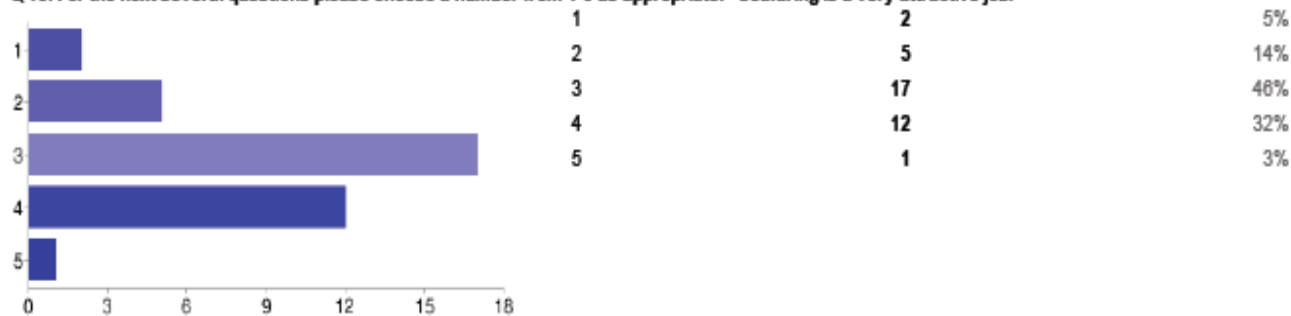
1	2	5%
2	5	14%
3	17	46%
4	12	32%
5	1	3%

127

Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I have a good social life with other crew and officers onboard ships.

1	2	5%
2	12	32%
3	12	32%
4	9	24%
5	2	5%

Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I interact with all other crew and officers onboard the ship during off-duty hours.

1	4	11%
2	12	32%
3	10	27%
4	8	22%
5	3	8%
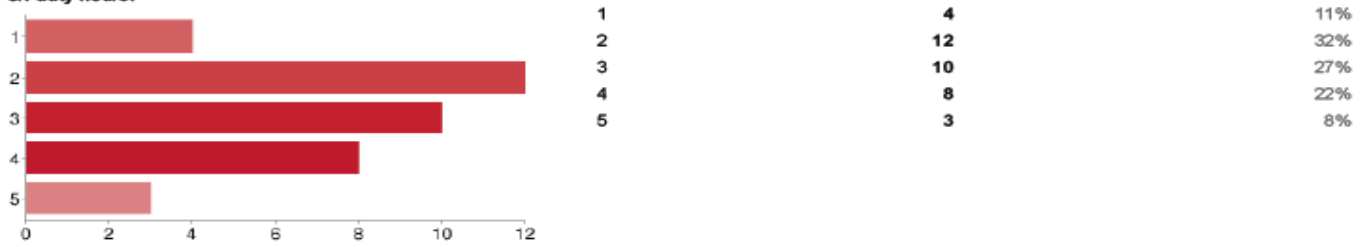
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - Onboard ships there are regular get-togethers like parties or games.

1	0	0%
2	14	38%
3	8	22%
4	12	32%
5	3	8%
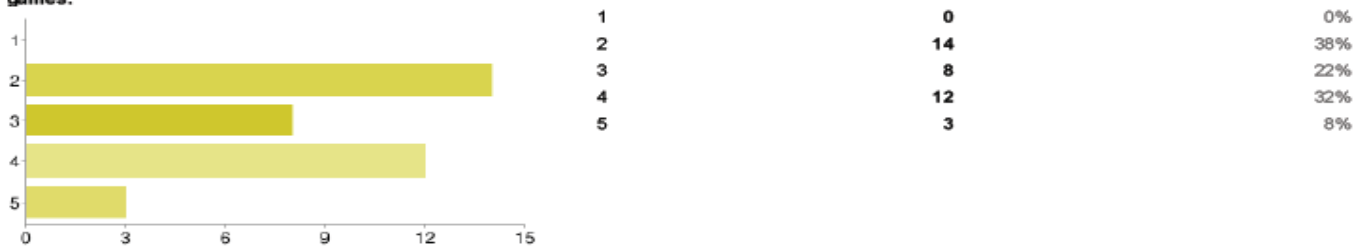
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I get shore leave every time the ship comes to port.

1	0	0%
2	7	19%
3	7	19%
4	14	38%
5	9	24%
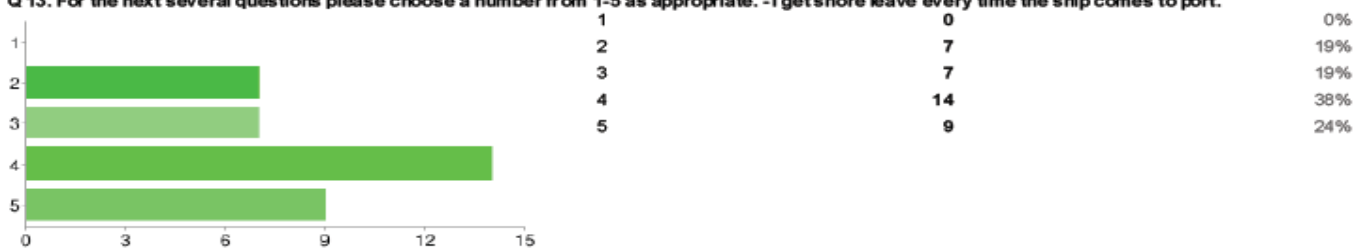
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I go on shore leave in ports, together with other crew and officers onboard.

1	1	3%
2	14	38%
3	15	41%
4	5	14%
5	2	5%

128
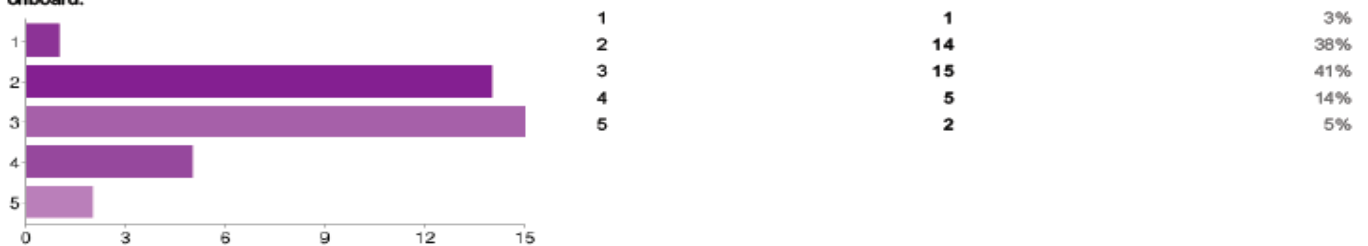
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - My family and friends understand me and my job very well.

1	1	3%
2	9	24%
3	18	49%
4	8	22%
5	1	3%
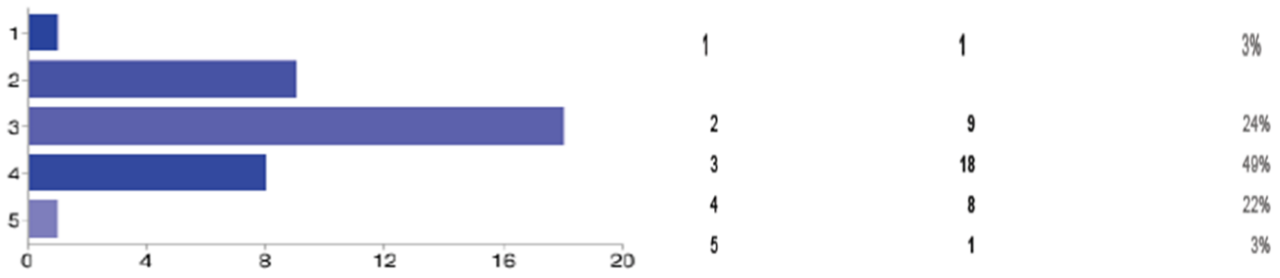
Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I will recommend this job to my family and friends.
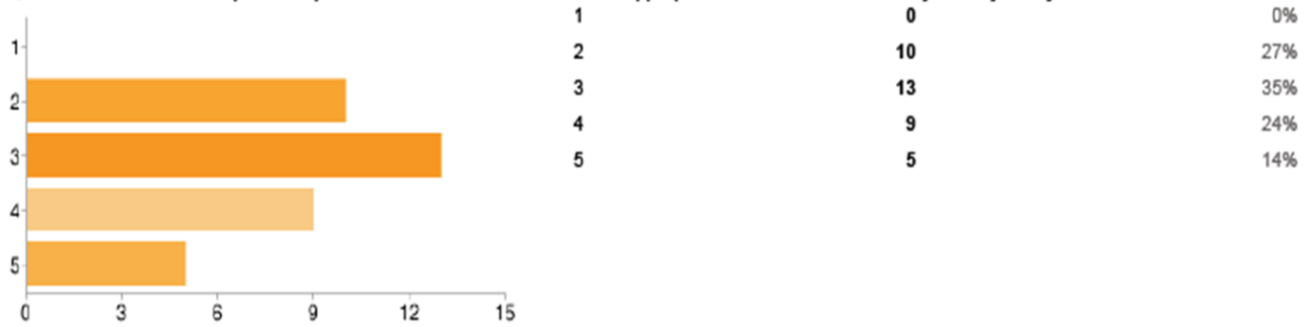
1	0	0%
2	10	27%
3	13	35%
4	9	24%
5	5	14%

Q 13. For the next several questions please choose a number from 1-5 as appropriate. - I have a good social life and interaction with family and friends, when I am home.

1	8	22%
2	15	41%
3	7	19%
4	6	16%
5	1	3%

129

Accidents / Incidents

Q 14. Have you experienced an accident or incident (either minor or major) onboard ships?
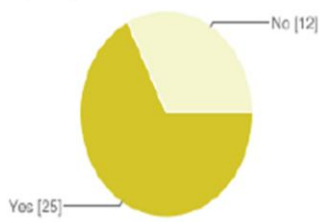
Yes	25	68%
No	12	32%

Q 15. Have you witnessed an accident or incident (either minor or major) onboard ships?
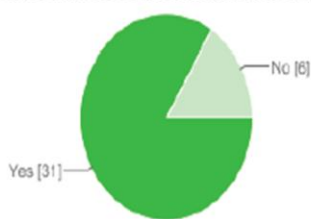
Yes	31	84%
No	6	16%

Q 16. From the list below tick as appropriate, the kind of accidents / incidents you have experienced or witnessed onboard ships.

Collision	7	20%
Grounding	10	29%
Man Overboard	4	11%
Abandon Ship	2	6%
Piracy	7	20%
Death onboard	6	17%
Suicide	3	9%
Fire	18	51%
Medical Emergency	29	83%
Pollution	17	49%
Others (please specify in the box provided below)	9	26%

People may select more than one checkbox, so percentages may add up to more than 100%.
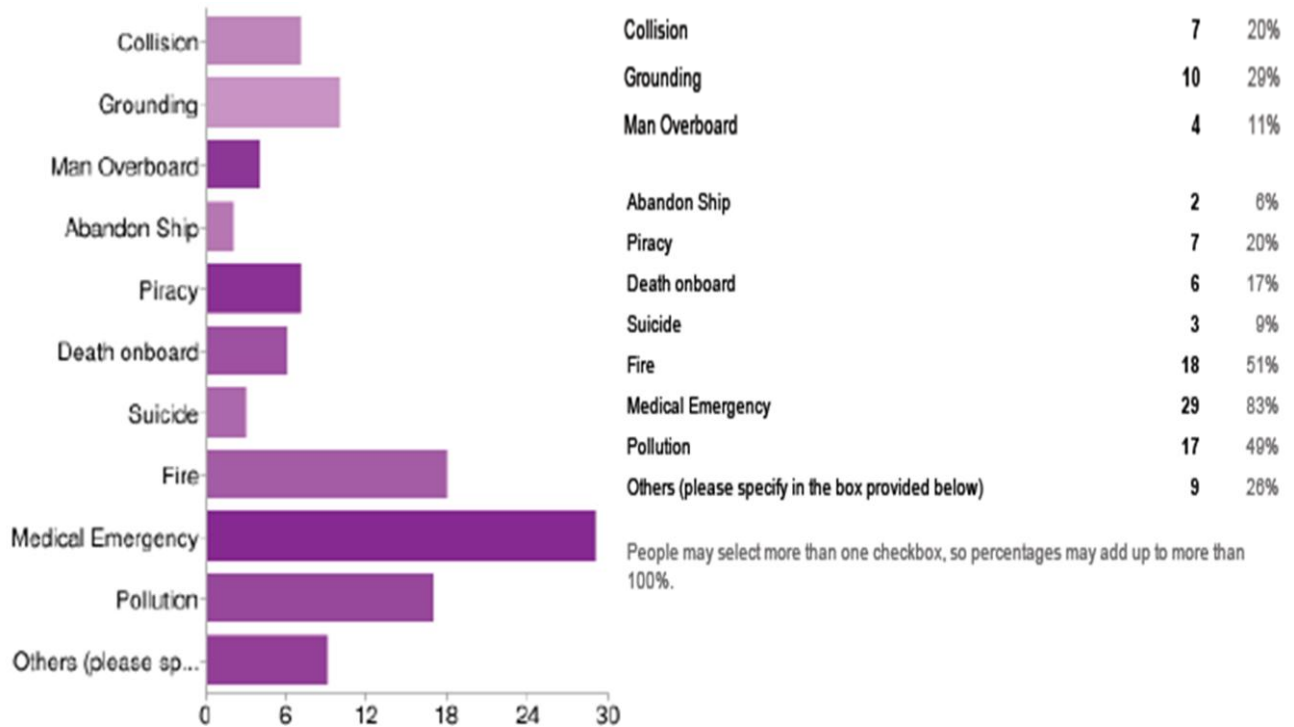
Others

Damage to ship and crew whilst under attack in a war zone   Q13: often and in particular when watches are kept in port the seafarer does not have to ask for shoreleave, he or she can go ashore if so wishes when not on duty. Personnaly I went ashore as often as possible, a negative consequence of this is that often you have not obtained the nessessary rest hours.   robbery (not really piracy)   Picking up refugees.   allission   Stowaway is a major problem in west african ports where it is a real tension for master and crew of a ship due to various human rights issues.   differents types of rescue at sea Esp   ...

Q 17. Have you ever been injured onboard ships?
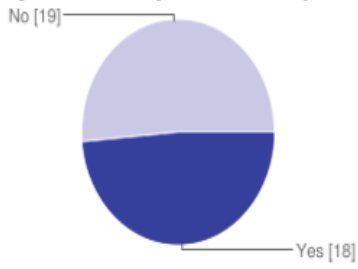
Yes	18	49%
No	19	51%

No [19]

Yes [18]

Q 18. Have you witnessed any form of injury or death onboard ships?
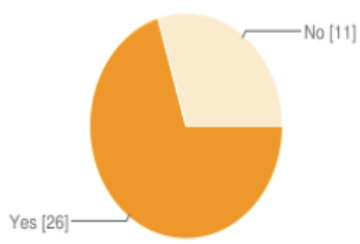
Yes	26	70%
No	11	30%
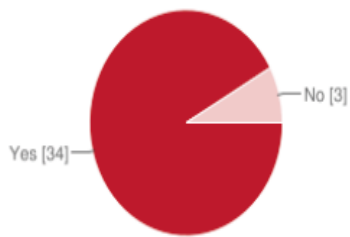
No [11]

Yes [26]

Q 19. Have you answered YES to any of the questions in this page?

Yes	34	92%
No	3	8%

No [3]

Yes [34]

131

Post Accident / Incident

These are possible psychological symptoms after an accident or incident. Kindly answer if you have experienced the same after an accident or incident.

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had disturbed sleep patterns.

1	4	11%
2	2	5%
3	17	46%
4	8	22%
5	3	8%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had dreams / nightmares.

1	1	3%
2	3	8%
3	13	35%
4	12	32%
5	5	14%
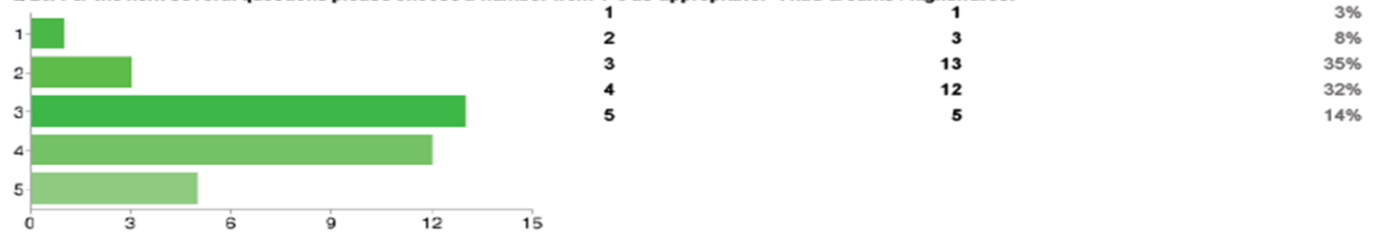
Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had headaches.

1	0	0%
2	1	3%
3	16	43%
4	13	35%
5	4	11%
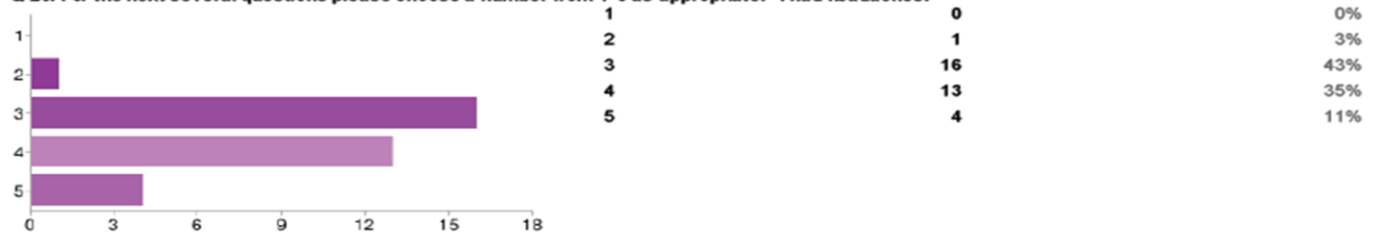
Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had stomach problems.

1	1	3%
2	2	5%
3	7	19%
4	21	57%
5	3	8%
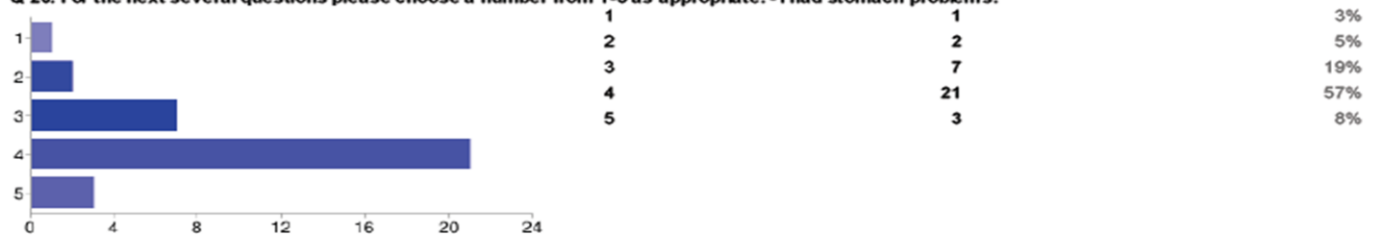
Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I felt anxiety.

1	3	8%
2	4	11%
3	16	43%
4	7	19%
5	4	11%
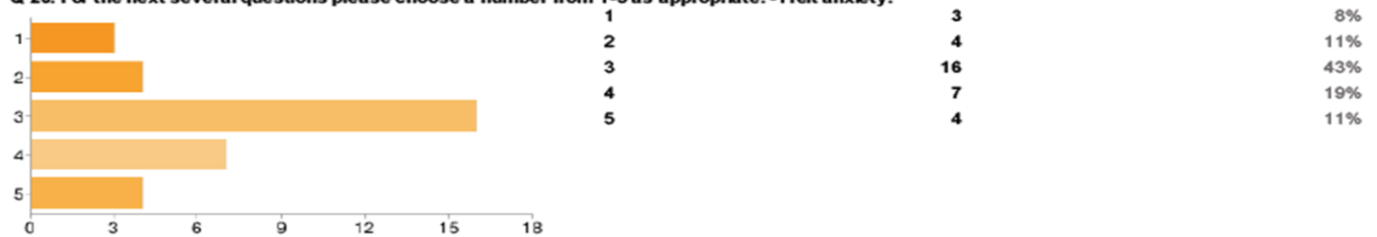
Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I felt afraid.
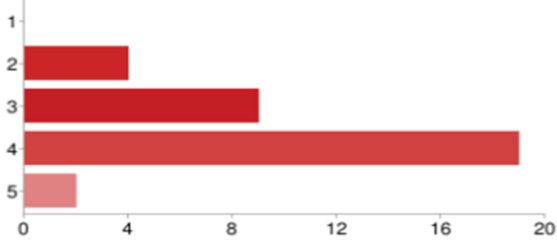
1	0	0%
2	4	11%
3	9	24%
4	19	51%
5	2	5%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I could not concentrate on my tasks.
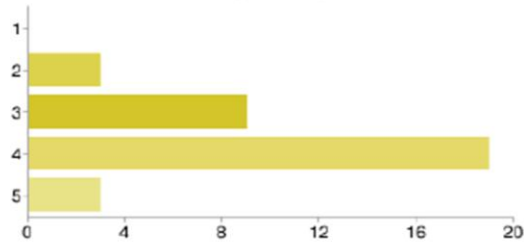
1	0	0%
2	3	8%
3	9	24%
4	19	51%
5	3	8%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I felt very nervous when carrying out tasks the following day.
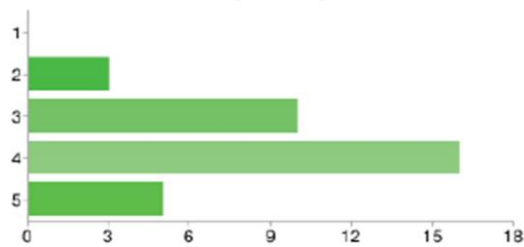
1	0	0%
2	3	8%
3	10	27%
4	16	43%
5	5	14%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I felt like going home.
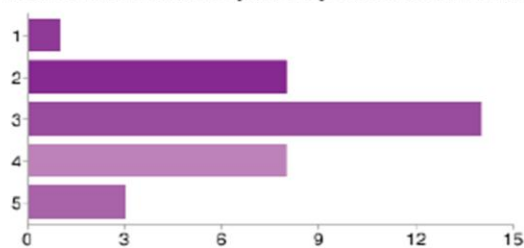
1	1	3%
2	8	22%
3	14	38%
4	8	22%
5	3	8%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I felt like leaving this profession.
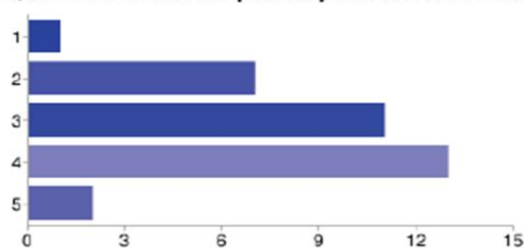
1	1	3%
2	7	19%
3	11	30%
4	13	35%
5	2	5%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had to talk to my family and friends.
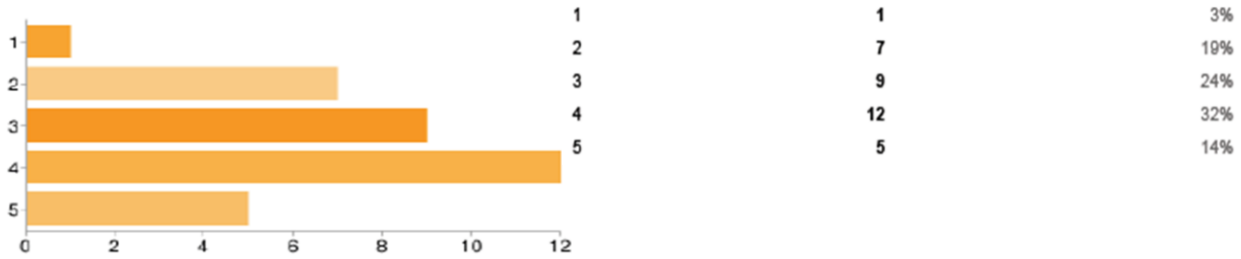
1	1	3%
2	7	19%
3	9	24%
4	12	32%
5	5	14%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I had to talk to a professional clinical psychologist when I went home.

1	0	0%
2	0	0%
3	3	8%
4	28	76%
5	3	8%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I was given the opportunity to go home after the accident / incident.
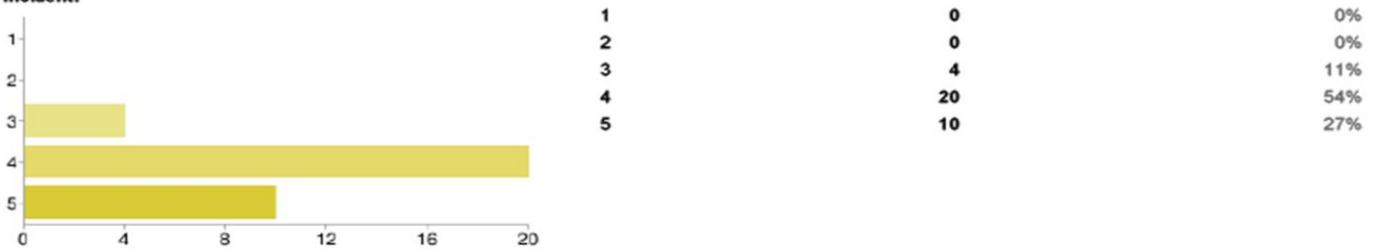
1	0	0%
2	0	0%
3	4	11%
4	20	54%
5	10	27%

Q 20. For the next several questions please choose a number from 1-5 as appropriate. - I was given a few days off work onboard the ship after the accident / incident.

1	0	0%
2	0	0%
3	4	11%
4	22	59%
5	8	22%
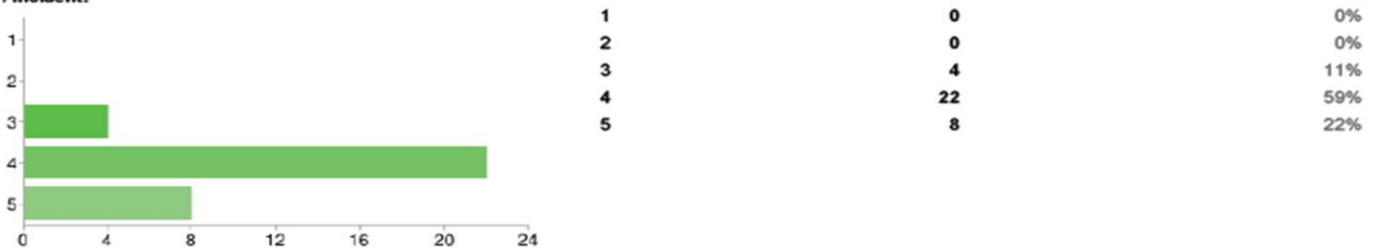
Q 20. For the next several questions please choose a number from 1-5 as appropriate. - During the marine accident investigation I was interviewed by a professional clinical psychologist.

1	0	0%
2	0	0%
3	3	8%
4	27	73%
5	4	11%

134
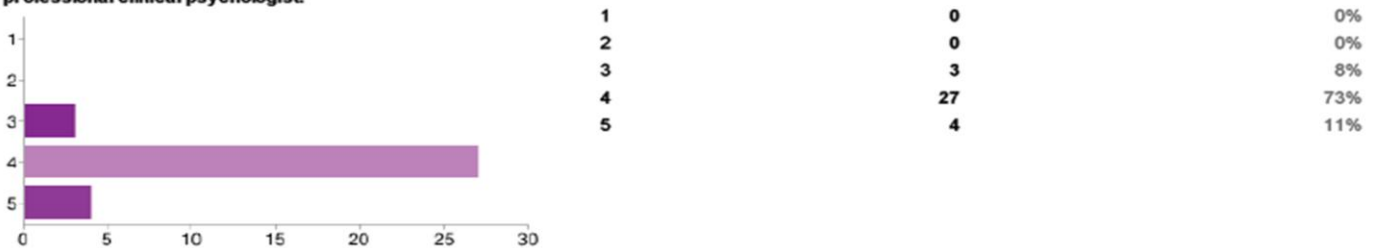
Q 21. Are you trained to handle or control the above feelings or experiences?

Yes	**5**	14%
No	**29**	78%
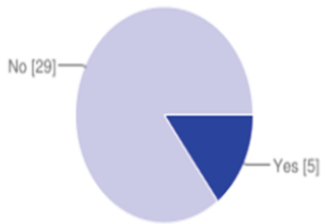
Briefly describe the type of training you underwent. When you did you do this, the duration and frequency (how often you do this) of this training?

I studied psychology to degree level   ....   I grew up in a neighbour hood that was violöent so seeing the accident disturbed me a little but everything went back to normal mode afterwards but occcassionally the though of it comes up.   medical cert training every other five years   i took combat training courses that involves some types of accidents that can occur on board in case of a war, i do it when i was a young officer at least 8 to 10 years ago. after that i took short courses of one week whenever i have to be promote to the next rank. The duration of the course was 90 days and there are also s   ...

Q 22. Did you or do you under go any form of psychological or mental examination during your routine medical / physical examination?

Yes	**3**	8%
No	**31**	84%
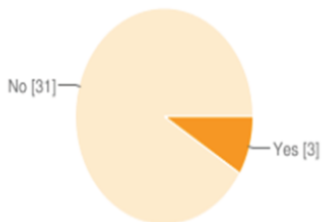
Briefly describe the type of examination you underwent. When you did you do this, the duration and frequency (how often you do this) of this examination?

.....   1. Routine Flag state medicals before joining 2. Psychometric Tests before joining present employer 3. Psychometric Tests with earlier employer during a course 4. Stress Test with earlier employer (for senior ranks)   Just briefly not deeply.

135

Training and Examination

This section is to get your views on what may be achieved in the future.

Q 23. For the next several questions please choose a number from 1-5 as appropriate. - Seafarers must be trained to identify personal psychological challenges.

1	13	35%
2	20	54%
3	4	11%
4	0	0%
5	0	0%

Q 23. For the next several questions please choose a number from 1-5 as appropriate. - Seafarers must be trained to identify psychological challenges possibly faced by colleagues onboard.

1	15	41%
2	18	49%
3	4	11%
4	0	0%
5	0	0%

Q 23. For the next several questions please choose a number from 1-5 as appropriate. - Seafarers must be examined prior to joining ships for potential psychological challenges.

1	10	27%
2	15	41%
3	10	27%
4	2	5%
5	0	0%

Q 23. For the next several questions please choose a number from 1-5 as appropriate. - Seafarers must be examined for potential psychological challenges during their routine medical examinations.

1	8	22%
2	21	57%
3	8	22%
4	0	0%
5	0	0%

Q 23. For the next several questions please choose a number from 1-5 as appropriate. - Shipping companies must take responsibility for the care, training and examination of seafarers with regards to socio-psychological issues.

1	19	51%
2	13	35%
3	3	8%
4	1	3%
5	1	3%
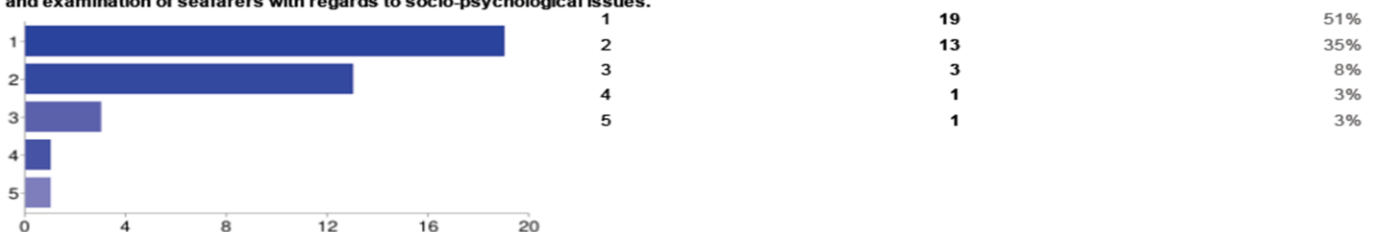
Q 23. For the next several questions please choose a number from 1-5 as appropriate. - National governments must take responsibility for the care, training and examination of seafarers with regards to socio-psychological issues.

1	13	35%
2	9	24%
3	12	32%
4	2	5%
5	1	3%
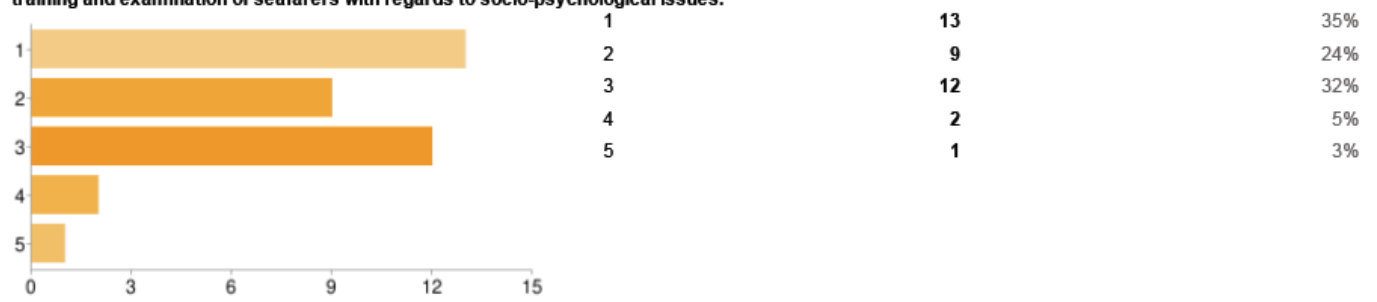
Q 23. For the next several questions please choose a number from 1-5 as appropriate. - The team of Marine Accident Investigators should include a professional clinical marine psychologist.

1	12	32%
2	16	43%
3	9	24%
4	0	0%
5	0	0%

137

APPENDIX G – Results from Chi-squared calculations for variables (Nationality vs. social experiences)

Test (1) — **Africa**

Social Experiences	Q 4 1	Q 4 2	Q 4 3	Q 4 4	Q 4 5	R Total	E 1	E 2	E 3	E 4	E 5
Q 13 a	0	0	2	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 b	0	1	1	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 c	0	3	0	0	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 d	0	0	2	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 e	0	1	2	0	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 f	0	0	2	0	1	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 g	2	0	0	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 h	0	1	1	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 i	0	1	2	0	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 j	0	1	1	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 k	0	1	1	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
Q 13 l	0	2	0	1	0	3	0.166666667	0.916666667	1.166666667	0.666666667	0.083333333
C Total	**2**	**11**	**14**	**8**	**1**	**36**					

Key
C - Column
R - Row
E - Expected

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
-0.166666667	-0.916666667	0.833333333	0.333333333	-0.083333333
-0.166666667	0.083333333	-0.166666667	0.333333333	-0.083333333
-0.166666667	2.083333333	-1.166666667	-0.666666667	-0.083333333
-0.166666667	-0.916666667	0.833333333	0.333333333	-0.083333333
-0.166666667	0.083333333	0.833333333	-0.666666667	-0.083333333
-0.166666667	-0.916666667	0.833333333	-0.666666667	0.916666667
1.833333333	-0.916666667	-1.166666667	0.333333333	-0.083333333
-0.166666667	0.083333333	-0.166666667	0.333333333	-0.083333333
-0.166666667	0.083333333	0.833333333	-0.666666667	-0.083333333
-0.166666667	0.083333333	-0.166666667	0.333333333	-0.083333333
-0.166666667	0.083333333	-0.166666667	0.333333333	-0.083333333
-0.166666667	1.083333333	-1.166666667	0.333333333	-0.083333333

H₀: H_0: African seafarers and their social experiences are independent (or not associated)
Hₐ: H_a: African seafarers and their social experiences are not independent (or associated)

Conclusion: The value of the test statistics X^2=53.299, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that African seafarers
and their social experiences are independent or not associated.
This data can be counted as not sufficient due to very small smaple size. Hence further research needs to be carried out to assertain the same

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0.027777778	0.840277778	0.694444444	0.111111111	0.006944444
0.027777778	0.006944444	0.027777778	0.111111111	0.006944444
0.027777778	4.340277778	1.361111111	0.444444444	0.006944444
0.027777778	0.840277778	0.694444444	0.111111111	0.006944444
0.027777778	0.006944444	0.694444444	0.444444444	0.006944444
0.027777778	0.840277778	0.694444444	0.444444444	0.840277778
3.361111111	0.840277778	1.361111111	0.111111111	0.006944444
0.027777778	0.006944444	0.027777778	0.111111111	0.006944444
0.027777778	0.006944444	0.694444444	0.444444444	0.006944444
0.027777778	0.006944444	0.027777778	0.111111111	0.006944444
0.027777778	0.006944444	0.027777778	0.111111111	0.006944444
0.027777778	1.173611111	1.361111111	0.111111111	0.006944444

Calculated X^2	53.299	
df	44	(r-1)*(c-1)
X^2 @ 0.05	60.457	From Tables
X^2 @ 0.05	60.481	Excel Formula

sing Excel Formula

P-Value	0.159	P-Value > α
df	44	
α	0.05	

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
0.166666667	0.916666667	0.595238095	0.166666667	0.083333333
0.166666667	0.007575758	0.023809524	0.166666667	0.083333333
0.166666667	4.734848485	1.166666667	0.666666667	0.083333333
0.166666667	0.916666667	0.595238095	0.166666667	0.083333333
0.166666667	0.007575758	0.595238095	0.666666667	0.083333333
0.166666667	0.916666667	0.595238095	0.666666667	10.08333333
20.16666667	0.916666667	1.166666667	0.166666667	0.083333333
0.166666667	0.007575758	0.023809524	0.166666667	0.083333333
0.166666667	0.007575758	0.595238095	0.666666667	0.083333333
0.166666667	0.007575758	0.023809524	0.166666667	0.083333333
0.166666667	0.007575758	0.023809524	0.166666667	0.083333333
0.166666667	1.28030303	1.166666667	0.166666667	0.083333333
22	**9.727272727**	**6.571428571**	**4**	**11**
				53.2987013

Test (1)				Asia							
	Q 4	Q 4	Q 4	Q 4	Q 4						
Social Experiences	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 13 a	5	8	4	1	0	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 b	2	6	6	4	0	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 c	1	7	7	3	0	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 d	1	4	6	6	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 e	1	6	4	6	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 f	2	7	5	3	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 g	0	6	6	5	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 h	0	2	4	6	6	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 i	0	6	9	2	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 j	1	4	11	1	1	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 k	0	5	6	4	3	18	1.416666667	5.583333333	6	3.75	1.25
Q 13 l	4	6	4	4	0	18	1.416666667	5.583333333	6	3.75	1.25
C Total	17	67	72	45	15	216					

Key
C - Column
R - Row
E - Expected

	1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
	3.583333333	2.416666667	-2	-2.75	-1.25
	0.583333333	0.416666667	0	0.25	-1.25
	-0.416666667	1.416666667	1	-0.75	-1.25
	-0.416666667	-1.583333333	0	2.25	-0.25
	-0.416666667	0.416666667	-2	2.25	-0.25
	0.583333333	1.416666667	-1	-0.75	-0.25
	-1.416666667	0.416666667	0	1.25	-0.25
	-1.416666667	-3.583333333	-2	2.25	4.75
	-1.416666667	0.416666667	3	-1.75	-0.25
	-0.416666667	-1.583333333	5	-2.75	-0.25
	-1.416666667	-0.583333333	0	0.25	1.75
	2.583333333	0.416666667	-2	0.25	-1.25

H₀: Asian seafarers and social experiences are independent (or not associated)

H_0: Asian seafarers and social experiences are independent (or not associated)
H_a: Asian seafarers and social experiences are not independent (or associated)

Conclusion: The value of the test statistics X^2=69.724, which falls in the "Reject" region.
Same goes with P-Value > α, i.e. the Hypothesis is rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that Asian seafarers
and their social experiences are not independent or they are associated.
It seems that Asian seafarers are very well affected by the social elements and experiences within the shipping industry.

Calculated X²	69.724	
df	44	(r-1)*(c-1)
X² @ 0.05	60.457	From Tables
X² @ 0.05	60.481	Excel Formula

sing Excel Formula		
P-Value	0.008	P-Value < α
df	44	
α	0.05	

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
12.84027778	5.840277778	4	7.5625	1.5625
0.340277778	0.173611111	0	0.0625	1.5625
0.173611111	2.006944444	1	0.5625	1.5625
0.173611111	2.506944444	0	5.0625	0.0625
0.173611111	0.173611111	4	5.0625	0.0625
0.340277778	2.006944444	1	0.5625	0.0625
2.006944444	0.173611111	0	1.5625	0.0625
2.006944444	12.84027778	4	5.0625	22.5625
2.006944444	0.173611111	9	3.0625	0.0625
0.173611111	2.506944444	25	7.5625	0.0625
2.006944444	0.340277778	0	0.0625	3.0625
6.673611111	0.173611111	4	0.0625	1.5625

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
9.06372549	1.0460199	0.666666667	2.016666667	1.25
0.240196078	0.031094527	0	0.016666667	1.25
0.12254902	0.359452736	0.166666667	0.15	1.25
0.12254902	0.449004975	0	1.35	0.05
0.12254902	0.031094527	0.666666667	1.35	0.05
0.240196078	0.359452736	0.166666667	0.15	0.05
1.416666667	0.031094527	0	0.416666667	0.05
1.416666667	2.299751244	0.666666667	1.35	18.05
1.416666667	0.031094527	1.5	0.816666667	0.05
0.12254902	0.449004975	4.166666667	2.016666667	0.05
1.416666667	0.060945274	0	0.016666667	2.45
4.710784314	0.031094527	0.666666667	0.016666667	1.25
20.41176471	5.179104478	8.666666667	9.666666667	25.8
				69.72420252

Test (1)						Americas					
	Q 4	Q 4	Q 4	Q 4	Q 4						
Social Experiences	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 13 a	1	1	0	1	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 b	1	1	1	0	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 c	0	1	1	1	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 d	0	0	1	2	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 e	0	1	1	0	1	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 f	1	0	0	1	1	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 g	0	2	0	0	1	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 h	0	1	0	2	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 i	0	2	0	1	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 j	0	1	1	1	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 k	0	1	0	2	0	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
Q 13 l	0	2	0	0	1	3	0.25	1.083333333	0.416666667	0.916666667	0.333333333
C Total	3	13	5	11	4	36					

Key
C - Column
R - Row
E - Expected

H_0: Seafarers from the Americas and their social experiences are independent (or not associated)
H_a: Seafarers from the Americas and their social experiences are not independent (or associated)

Conclusion: The value of the test statistics X^2=36.084, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that Seafarers from the Americas
and their social experiences are independent or not associated.
This data can be counted as not sufficient due to very small smaple size. Hence further research needs to be carried out to assertain
the same

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
0.75	-0.083333333	-0.416666667	0.083333333	-0.333333333
0.75	-0.083333333	0.583333333	-0.916666667	-0.333333333
-0.25	-0.083333333	0.583333333	0.083333333	-0.333333333
-0.25	-1.083333333	0.583333333	1.083333333	-0.333333333
-0.25	-0.083333333	0.583333333	-0.916666667	0.666666667
0.75	-1.083333333	-0.416666667	0.083333333	0.666666667
-0.25	0.916666667	-0.416666667	-0.916666667	0.666666667
-0.25	-0.083333333	-0.416666667	1.083333333	-0.333333333
-0.25	0.916666667	-0.416666667	0.083333333	-0.333333333
-0.25	-0.083333333	0.583333333	0.083333333	-0.333333333
-0.25	-0.083333333	-0.416666667	1.083333333	-0.333333333
-0.25	0.916666667	-0.416666667	-0.916666667	0.666666667

	Calculated X^2	36.084		
	df	44	(r-1)*(c-1)	
	X^2 @ 0.05	60.457	From Tables	
	X^2 @ 0.05	60.481	Excel Formula	

Using Excel Formula
P-Value	0.796	P-Value > α
df	44	
α	0.05	

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0.5625	0.006944444	0.173611111	0.006944444	0.111111111
0.5625	0.006944444	0.340277778	0.840277778	0.111111111
0.0625	0.006944444	0.340277778	0.006944444	0.111111111
0.0625	1.173611111	0.340277778	1.173611111	0.111111111
0.0625	0.006944444	0.340277778	0.840277778	0.444444444
0.5625	1.173611111	0.173611111	0.006944444	0.444444444
0.0625	0.840277778	0.173611111	0.840277778	0.444444444
0.0625	0.006944444	0.173611111	1.173611111	0.111111111
0.0625	0.840277778	0.173611111	0.006944444	0.111111111
0.0625	0.006944444	0.340277778	0.006944444	0.111111111
0.0625	0.006944444	0.173611111	1.173611111	0.111111111
0.0625	0.840277778	0.173611111	0.840277778	0.444444444

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
2.25	0.006410256	0.416666667	0.007575758	0.333333333
2.25	0.006410256	0.816666667	0.916666667	0.333333333
0.25	0.006410256	0.816666667	0.007575758	0.333333333
0.25	1.083333333	0.816666667	1.28030303	0.333333333
0.25	0.006410256	0.816666667	0.916666667	1.333333333
2.25	1.083333333	0.416666667	0.007575758	1.333333333
0.25	0.775641026	0.416666667	0.916666667	1.333333333
0.25	0.006410256	0.416666667	1.28030303	0.333333333
0.25	0.775641026	0.416666667	0.007575758	0.333333333
0.25	0.006410256	0.816666667	0.007575758	0.333333333
0.25	0.006410256	0.416666667	1.28030303	0.333333333
0.25	0.775641026	0.416666667	0.916666667	1.333333333
9	4.538461538	7	7.545454545	8
				36.08391608

Test (1) — **Europe**

Social Experiences	Q 4 1	Q 4 2	Q 4 3	Q 4 4	Q 4 5	R Total	E 1	E 2	E 3	E 4	E 5
Q 13 a	3	6	1	1	1	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 b	1	3	5	3	0	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 c	2	4	4	1	1	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 d	0	1	8	3	0	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 e	1	4	4	3	0	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 f	1	4	3	4	0	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 g	0	3	2	6	1	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 h	0	3	1	5	3	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 i	1	5	3	2	1	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 j	0	3	4	5	0	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 k	0	3	5	2	2	12	1.083333333	3.583333333	3.583333333	3	0.75
Q 13 l	4	4	3	1	0	12	1.083333333	3.583333333	3.583333333	3	0.75
C Total	13	43	43	36	9	144					

Key
C - Column
R - Row
E - Expected

	1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
	1.916666667	2.416666667	-2.583333333	-2	0.25
	-0.083333333	-0.583333333	1.416666667	0	-0.75
	0.916666667	0.416666667	0.416666667	-2	0.25
	-1.083333333	-2.583333333	4.416666667	0	-0.75
	-0.083333333	0.416666667	0.416666667	0	-0.75
	-0.083333333	0.416666667	-0.583333333	1	-0.75
	-1.083333333	-0.583333333	-1.583333333	3	0.25
	-1.083333333	-0.583333333	-2.583333333	2	2.25
	-0.083333333	1.416666667	-0.583333333	-1	0.25
	-1.083333333	-0.583333333	0.416666667	2	-0.75
	-1.083333333	-0.583333333	1.416666667	-1	1.25
	2.916666667	0.416666667	-0.583333333	-2	-0.75

H₀: **European Seafarers and their social experiences are independent (or not associated)**
Hₐ: **European Seafarers and their social experiences are not independent (or associated)**

**Conclusion:** The value of the test statistics X²=57.934, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that European Seafarers
and their social experiences are independent or not associated.
With this data it seems that European seafarers are not affected by the social challenges and experiences in the shipping industry

Calculated X²	57.934	
df	44	(r-1)*(c-1)
X² @ 0.05	60.457	From Tables
X² @ 0.05	60.481	Excel Formula

Using Excel Formula

P-Value	0.078	P-Value > α
df	44	
α	0.05	

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
3.673611111	5.840277778	6.673611111	4	0.0625
0.006944444	0.340277778	2.006944444	0	0.5625
0.840277778	0.173611111	0.173611111	4	0.0625
1.173611111	6.673611111	19.50694444	0	0.5625
0.006944444	0.173611111	0.173611111	0	0.5625
0.006944444	0.173611111	0.340277778	1	0.5625
1.173611111	0.340277778	2.506944444	9	0.0625
1.173611111	0.340277778	6.673611111	4	5.0625
0.006944444	2.006944444	0.340277778	1	0.0625
1.173611111	0.340277778	0.173611111	4	0.5625
1.173611111	0.340277778	2.006944444	1	1.5625
8.506944444	0.173611111	0.340277778	4	0.5625

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
3.391025641	1.629844961	1.862403101	1.333333333	0.083333333
0.006410256	0.09496124	0.560077519	0	0.75
0.775641026	0.048449612	0.048449612	1.333333333	0.083333333
1.083333333	1.862403101	5.44379845	0	0.75
0.006410256	0.048449612	0.048449612	0	0.75
0.006410256	0.048449612	0.09496124	0.333333333	0.75
1.083333333	0.09496124	0.699612403	3	0.083333333
1.083333333	0.09496124	1.862403101	1.333333333	6.75
0.006410256	0.560077519	0.09496124	0.333333333	0.083333333
1.083333333	0.09496124	0.048449612	1.333333333	0.75
1.083333333	0.09496124	0.560077519	0.333333333	2.083333333
7.852564103	0.048449612	0.09496124	1.333333333	0.75
17.46153846	4.720930233	11.41860465	10.66666667	13.66666667
				57.93440668

Test (1)					Oceania						
	Q 4	Q 4	Q 4	Q 4	Q 4						
Social Experiences	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 13 a	1	0	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 b	1	0	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 c	1	0	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 d	1	0	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 e	0	0	1			1	0.333333333	0.25	0.416666667	0	0
Q 13 f	0	1	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 g	0	1	0			1	0.333333333	0.25	0.416666667	0	0
Q 13 h	0	0	1			1	0.333333333	0.25	0.416666667	0	0
Q 13 i	0	0	1			1	0.333333333	0.25	0.416666667	0	0
Q 13 j	0	0	1			1	0.333333333	0.25	0.416666667	0	0
Q 13 k	0	0	1			1	0.333333333	0.25	0.416666667	0	0
Q 13 l	0	1	0			1	0.333333333	0.25	0.416666667	0	0
C Total	4	3	5	0	0	12					

Key
C - Column
R - Row
E - Expected

H_0: Oceania seafarers and their social experiences are independent (or not associated)
H_a: Oceania seafarers and their social experiences are not independent (or associated)

Conclusion: The value of the test statistics $X^2=24$, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that Oceania seafarers
and their social experiences are independent or not associated.
This data can be counted as not sufficient due to very small smaple size. Hence further research needs to be carried out to assertain
the same

Calculated X^2	24		
df	44	(r-1)*(c-1)	
X^2 @ 0.05	60.457	From Tables	
X^2 @ 0.05	60.481	Excel Formula	

sing Excel Formula		
P-Value	0.994	P-Value > α
df	44	
α	0.05	

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
0.666666667	-0.25	-0.416666667	0	0
0.666666667	-0.25	-0.416666667	0	0
0.666666667	-0.25	-0.416666667	0	0
0.666666667	-0.25	-0.416666667	0	0
-0.333333333	-0.25	0.583333333	0	0
-0.333333333	0.75	-0.416666667	0	0
-0.333333333	0.75	-0.416666667	0	0
-0.333333333	-0.25	0.583333333	0	0
-0.333333333	-0.25	0.583333333	0	0
-0.333333333	-0.25	0.583333333	0	0
-0.333333333	-0.25	0.583333333	0	0
-0.333333333	0.75	-0.416666667	0	0

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0.444444444	0.0625	0.173611111	0	0
0.444444444	0.0625	0.173611111	0	0
0.444444444	0.0625	0.173611111	0	0
0.444444444	0.0625	0.173611111	0	0
0.111111111	0.0625	0.340277778	0	0
0.111111111	0.5625	0.173611111	0	0
0.111111111	0.5625	0.173611111	0	0
0.111111111	0.0625	0.340277778	0	0
0.111111111	0.0625	0.340277778	0	0
0.111111111	0.0625	0.340277778	0	0
0.111111111	0.0625	0.340277778	0	0
0.111111111	0.5625	0.173611111	0	0

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
1.333333333	0.25	0.416666667		
1.333333333	0.25	0.416666667		
1.333333333	0.25	0.416666667		
1.333333333	0.25	0.416666667		
0.333333333	0.25	0.816666667		
0.333333333	2.25	0.416666667		
0.333333333	2.25	0.416666667		
0.333333333	0.25	0.816666667		
0.333333333	0.25	0.816666667		
0.333333333	0.25	0.816666667		
0.333333333	0.25	0.816666667		
0.333333333	2.25	0.416666667		
8	9	7	0	0
				24

APPENDIX H 1 – Results from Chi-squared calculations for variables (Contract Periods vs. social life and interaction)

Test (2)	Q 13	Q 13	Q 13	Q 13	Q 13						
Contract period at Sea	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
0-2 Months	0	1	1	0	0	2	0.432432432	0.810810811	0.378378378	0.324324324	0.054054054
2-4 Months	4	8	3	2	0	17	3.675675676	6.891891892	3.216216216	2.756756757	0.459459459
4-6 Months	3	2	1	4	0	10	2.162162162	4.054054054	1.891891892	1.621621622	0.27027027
6-12 Months	1	3	1	0	1	6	1.297297297	2.432432432	1.135135135	0.972972973	0.162162162
>12 Months	0	1	1	0	0	2	0.432432432	0.810810811	0.378378378	0.324324324	0.054054054
C Total	8	15	7	6	1	37					

Key
C - Column
R - Row
E - Expected

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
-0.432432432	0.189189189	0.621621622	-0.324324324	-0.054054054
0.324324324	1.108108108	-0.216216216	-0.756756757	-0.459459459
0.837837838	-2.054054054	-0.891891892	2.378378378	-0.27027027
-0.297297297	0.567567568	-0.135135135	-0.972972973	0.837837838
-0.432432432	0.189189189	0.621621622	-0.324324324	-0.054054054

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0.186997809	0.035792549	0.38641344	0.105186267	0.002921841
0.105186267	1.227903579	0.046749452	0.572680789	0.211102995
0.701972243	4.219138057	0.795471147	5.656683711	0.073046019
0.088385683	0.322132944	0.018261505	0.946676406	0.701972243
0.186997809	0.035792549	0.38641344	0.105186267	0.002921841

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
0.432432432	0.044144144	1.021235521	0.324324324	0.054054054
0.028616852	0.178166402	0.014535544	0.207737149	0.459459459
0.324662162	1.040720721	0.42046332	3.488288288	0.27027027
0.068130631	0.132432432	0.016087516	0.972972973	4.328828829
0.432432432	0.044144144	1.021235521	0.324324324	0.054054054
1.28627451	1.439607843	2.493557423	5.317647059	5.166666667
				15.7037535

H₀: Contract period at sea and social life and interaction with family and friends when at home are independent (or not associated)

Hₐ: Contract period at sea and social life and interaction with family and friends when at home are not independent (or associated)

Calculated X²	15.704	
df	16	(r-1)*(c-1)
X² @ 0.05	26.296	From Tables
X² @ 0.05	26.296	Excel Formula

Conclusion: The value of the test statistics X^2=18.09598214, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the contract period at sea

and social life and interaction with family and friends when at home are independent or not associated.

It seems that seafarers when at home socialise and interact with family and friends irrespective of how long time they spend at sea

Using Excel Formula		
P-Value	0.474	P-Value > α
df	16	
α	0.05	

APPENDIX H 2 – Results from Chi-squared calculations for variables (Vacation Periods vs. social life and interaction)

Test (2)	Q 13	Q 13	Q 13	Q 13	Q 13						
Vacation period between contracts	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
0-2 Months	2	10	4	1	1	18	3.891891892	7.297297297	3.405405405	2.918918919	0.486486486
2-4 Months	4	5	3	5	0	17	3.675675676	6.891891892	3.216216216	2.756756757	0.459459459
4-6 Months	2	0	0	0	0	2	0.432432432	0.810810811	0.378378378	0.324324324	0.054054054
6-12 Months						0	0	0	0	0	0
>12 Months						0	0	0	0	0	0
C Total	8	15	7	6	1	37					

Key
C - Column
R - Row
E - Expected

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
-1.891891892	2.702702703	0.594594595	-1.918918919	0.513513514
0.324324324	-1.891891892	-0.216216216	2.243243243	-0.459459459
1.567567568	-0.810810811	-0.378378378	-0.324324324	-0.054054054
0	0	0	0	0
0	0	0	0	0

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
3.579254931	7.304601899	0.353542732	3.682249817	0.263696129
0.105186267	3.579254931	0.046749452	5.032140248	0.211102995
2.457268079	0.657414171	0.143170197	0.105186267	0.002921841
0	0	0	0	0
0	0	0	0	0

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
0.91966967	1.001001001	0.103818104	1.261511512	0.542042042
0.028616852	0.519342872	0.014535544	1.825384208	0.459459459
5.682432432	0.810810811	0.378378378	0.324324324	0.054054054
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
6.630718954	2.331154684	0.496732026	3.411220044	1.055555556
				13.92538126

H₀: Vacation period at home vs social life and interaction with family and friends when at home are independent (or not associated)

Hₐ: Vacation period at home vs social life and interaction with family and friends when at home are not independent (or associated)

Calculated X^2	13.925	
df	16	(r-1)*(c-1)
X^2 @ 0.05	26.296	From Tables
X^2 @ 0.05	26.296	Excel Formula

Conclusion: The value of the test statistics X^2=8.61512605, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the vacation period at home

and social life and interaction with family and friends when at home are independent or not associated.

It seems that seafarers, irrespective of how long time they spend at home socialise and interact with family and friends.

Using Excel Formula		
P-Value	0.604	P-Value > α
df	16	
α	0.05	

APPENDIX I 1 – Results from Chi-squared calculations for variables (Age vs. accidents / incidents experienced)

Test (3)	Q 14	Q 14							
Age	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
20-30	2	2	4	2.702702703	1.297297297	-0.702702703	0.493791088	0.182702703	0.563333333
30-40	9	8	17	11.48648649	5.513513514	-2.486486486	6.182615047	0.538251192	1.659607843
40-50	5	2	7	4.72972973	2.27027027	0.27027027	0.073046019	0.015444015	0.047619048
50-60	7	0	7	4.72972973	2.27027027	2.27027027	5.1541271	1.08972973	3.36
>60	2	0	2	1.351351351	0.648648649	0.648648649	0.420745069	0.311351351	0.96
C Total	25	12	37					2.137478992	6.590560224

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
0.702702703	0.493791088	0.380630631
2.486486486	6.182615047	1.121356651
-0.27027027	0.073046019	0.032175032
-2.27027027	5.1541271	2.27027027
-0.648648649	0.420745069	0.648648649
		4.453081232

H$_0$: Age of Seafarers and accidents experienced are independent (or not associated)

H$_a$: Age of Seafarers and accidents experienced are not independent (or associated)

Calculated X^2	6.591	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=6.591, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the age of

Seafarers and Accidents experienced are independent or not associated.

It seems that young seafarers are also prone and experienced to several accidents.

Using Excel Formula		
P-Value	0.159	P-Value > α
df	4	
α	0.05	

APPENDIX I 2 – Results from Chi-squared calculations for variables (Age vs. accidents / incidents witnessed)

Test (3)	Q 15	Q 15							
Age	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
20-30	3	1	4	3.351351351	0.648648649	-0.351351351	0.123447772	0.036835222	0.227150538
30-40	14	3	17	14.24324324	2.756756757	-0.243243243	0.059167275	0.004154059	0.025616698
40-50	7	0	7	5.864864865	1.135135135	1.135135135	1.288531775	0.219703575	1.35483871
50-60	5	2	7	5.864864865	1.135135135	-0.864864865	0.747991234	0.127537676	0.786482335
>60	2	0	2	1.675675676	0.324324324	0.324324324	0.105186267	0.06277245	0.387096774
C Total	31	6	37					0.451002982	2.781185055

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
0.351351351	0.123447772	0.190315315
0.243243243	0.059167275	0.021462639
-1.135135135	1.288531775	1.135135135
0.864864865	0.747991234	0.658944659
-0.324324324	0.105186267	0.324324324
		2.330182073

H_0: Age of Seafarers and accidents witnessed are independent (or not associated)

H_a: Age of Seafarers and accidents witnessed are not independent (or associated)

Calculated X^2	2.781	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=2.781, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the age of

Seafarers and Accidents witnessed are independent or not associated.

It seems that young seafarers are also prone to witnessing several accidents.

Using Excel Formula		
P-Value	0.595	P-Value > α
df	4	
α	0.05	

APPENDIX I 3 – Results from Chi-squared calculations for variables (Age vs. personal injuries experienced)

Test (3)	Q 17	Q 17							
Age	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
20-30	2	2	4	1.513513514	2.486486486	0.486486486	0.236669102	0.156370656	0.251552795
30-40	7	10	17	6.432432432	10.56756757	0.567567568	0.322132944	0.050079491	0.08056266
40-50	3	4	7	2.648648649	4.351351351	0.351351351	0.123447772	0.046607832	0.074977817
50-60	1	6	7	2.648648649	4.351351351	-1.648648649	2.718042367	1.026199669	1.650842946
>60	1	1	2	0.756756757	1.243243243	0.243243243	0.059167275	0.078185328	0.125776398
C Total	14	23	37					1.357442977	2.183712615

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
-0.486486486	0.236669102	0.095182139
-0.567567568	0.322132944	0.030483169
-0.351351351	0.123447772	0.028369985
1.648648649	2.718042367	0.624643277
-0.243243243	0.059167275	0.047591069
		0.826269638

H_0: Age of Seafarers and personal injuries are independent (or not associated)

H_a: Age of Seafarers and personal injuries are not independent (or associated)

Calculated X^2	2.184	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=2.184, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the age of

Seafarers and personal injuries are independent or not associated.

Seafarers at any age are prone to injuries (minor or major).

Using Excel Formula		
P-Value	0.702	P-Value > α
df	4	
α	0.05	

APPENDIX I 4 – Results from Chi-squared calculations for variables (Age vs. injuries witnessed)

Test (3)	Q 18	Q 18							

Age	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
20-30	1	3	4	2.810810811	1.189189189	-1.810810811	3.279035793	1.166580042	3.923951049
30-40	11	6	17	11.94594595	5.054054054	-0.945945946	0.894813733	0.074905222	0.251953928
40-50	7	0	7	4.918918919	2.081081081	2.081081081	4.330898466	0.88045738	2.961538462
50-60	5	2	7	4.918918919	2.081081081	0.081081081	0.006574142	0.001336501	0.004495504
>60	2	0	2	1.405405405	0.594594595	0.594594595	0.353542732	0.251559252	0.846153846
C Total	26	11	37					2.374838397	7.98809279

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
1.810810811	3.279035793	2.757371007
0.945945946	0.894813733	0.177048706
-2.081081081	4.330898466	2.081081081
-0.081081081	0.006574142	0.003159003
-0.594594595	0.353542732	0.594594595
		5.613254393

H_0: Age of Seafarers and injuries witnessed are independent (or not associated)

H_a: Age of Seafarers and injuries witnessed are not independent (or associated)

Calculated X^2	7.988	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=7.988, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the age of

Seafarers and injuries witnessed are independent or not associated.

Seafarers at any age are prone to witnessing injuries (minor or major).

Using Excel Formula		
P-Value	0.092	P-Value > α
df	4	
α	0.05	

APPENDIX J 1 – Results from Chi-squared calculations for variables (Years at sea vs. accidents / incidents experienced)

Test (4)	Q 14	Q 14							
Years at Sea	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
0-5	1	4	5	3.378378378	1.621621622	-2.378378378	5.656683711	1.674378378	5.162666667
5-10	3	4	7	4.72972973	2.27027027	-1.72972973	2.991964938	0.632586873	1.95047619
10-15	11	1	12	8.108108108	3.891891892	2.891891892	8.363038714	1.031441441	3.180277778
15-20	4	3	7	4.72972973	2.27027027	-0.72972973	0.532505478	0.112586873	0.347142857
>20	6	0	6	4.054054054	1.945945946	1.945945946	3.786705625	0.934054054	2.88
C Total	25	12	37					4.385047619	13.52056349

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
2.378378378	5.656683711	3.488288288
1.72972973	2.991964938	1.317889318
-2.891891892	8.363038714	2.148836336
0.72972973	0.532505478	0.234555985
-1.945945946	3.786705625	1.945945946
		9.135515873

H_0: No. of years at sea and accidents experienced are independent (or not associated)

H_a: No. of years at sea and accidents experienced are not independent (or associated)

Calculated X^2	13.521	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=13.521, which falls in the "Reject" region.

Same goes with P-Value < α, i.e. Hence the Hypothesis is rejected.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the number of years at sea and accidents experienced are not independent or they are associated.

Seafarers with very less sea time seem to be less prone to experiencing accidents and incidents

Using Excel Formula		
P-Value	0.009	P-Value < α
df	4	
α	0.05	

APPENDIX J 2 – Results from Chi-squared calculations for variables (Years at sea vs. accidents / incidents witnessed)

Test (4)	Q 15	Q 15							
Years at Sea	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
0-5	3	2	5	4.189189189	0.810810811	-1.189189189	1.414170928	0.337576286	2.08172043
5-10	6	1	7	5.864864865	1.135135135	0.135135135	0.018261505	0.003113713	0.019201229
10-15	11	1	12	10.05405405	1.945945946	0.945945946	0.894813733	0.089000291	0.548835125
15-20	7	0	7	5.864864865	1.135135135	1.135135135	1.288531775	0.219703575	1.35483871
>20	4	2	6	5.027027027	0.972972973	-1.027027027	1.054784514	0.209822726	1.29390681
C Total	31	6	37					0.85921659	5.298502304

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
1.189189189	1.414170928	1.744144144
-0.135135135	0.018261505	0.016087516
-0.945945946	0.894813733	0.459834835
-1.135135135	1.288531775	1.135135135
1.027027027	1.054784514	1.084084084
		4.439285714

H_0: No. of years at sea and accidents withnessed are independent (or not associated)

H_a: No. of years at sea and accidents witnessed are not independent (or associated)

Calculated X^2	5.299	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=5.299, which falls in the "Do Not Reject" region.

Same goes with P-Value > α, i.e. Do Not Reject. Hence the Hypothesis stands.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the number of years at sea

and accidents witnessed are independent or not associated.

Seafarers with very less sea time are also prone to witnessing accidents and incidents

Using Excel Formula		
P-Value	0.258	P-Value > α
df	4	
α	0.05	

APPENDIX J 3 – Results from Chi-squared calculations for variables (Years at sea vs. personal injuries experienced)

Test (4)	Q 17	Q 17							
Years at Sea	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
0-5	2	3	5	2.567567568	2.432432432	-0.567567568	0.322132944	0.125462304	0.257894737
5-10	1	6	7	3.594594595	3.405405405	-2.594594595	6.73192111	1.872790083	3.84962406
10-15	9	3	12	6.162162162	5.837837838	2.837837838	8.053323594	1.306899004	2.686403509
15-20	2	5	7	3.594594595	3.405405405	-1.594594595	2.542731921	0.707376549	1.454051796
>20	5	1	6	3.081081081	2.918918919	1.918918919	3.682249817	1.195116169	2.45662768
C Total	19	18	37					5.20764411	10.70460178

Key
C - Column
R - Row
E - Expected

No - E No	(No - E No)^2	[(No - E No)^2]/E No
0.567567568	0.322132944	0.132432432
2.594594595	6.73192111	1.976833977
-2.837837838	8.053323594	1.379504505
1.594594595	2.542731921	0.746675247
-1.918918919	3.682249817	1.261511512
		5.496957672

H$_0$: No. of years at sea and personal injuries are independent (or not associated)

H$_a$: No. of years at sea and personal injuries are not independent (or associated)

Calculated X^2	10.705	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=10.705, which falls in the "Reject" region.

Same goes with P-Value < α, i.e. Hence the Hypothesis is rejected.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the number of years at sea

and personal injuries are not independent or are associated.

Seafarers with very less sea time seem to be less prone to personal injuries due to accidents and incidents

Using Excel Formula		
P-Value	0.030	P-Value < α
df	4	
α	0.05	

APPENDIX J 4 – Results from Chi-squared calculations for variables (Years at sea vs. injuries witnessed)

Test (4)	Q 18	Q 18							
Years at Sea	Yes	No	R Total	E Yes	E No	Yes - E Yes	(Yes - E Yes)^2	[(Yes - E Yes)^2]/E Yes	{[(Yes - E Yes)^2]/E Yes} + {[(No - E No)^2]/E No}
0-5	1	4	5	3.513513514	1.486486486	-2.513513514	6.317750183	1.798128898	6.048251748
5-10	4	3	7	4.918918919	2.081081081	-0.918918919	0.84441198	0.171666172	0.577422577
10-15	11	1	12	8.432432432	3.567567568	2.567567568	6.592403214	0.781791407	2.629662005
15-20	6	1	7	4.918918919	2.081081081	1.081081081	1.168736304	0.237600238	0.799200799
>20	4	2	6	4.216216216	1.783783784	-0.216216216	0.046749452	0.011088011	0.037296037
C Total	26	11	37					3.000274725	10.09183317

Key	No - E No	(No - E No)^2	[(No - E No)^2]/E No
C - Column	2.513513514	6.317750183	4.25012285
R - Row	0.918918919	0.84441198	0.405756406
E - Expected	-2.567567568	6.592403214	1.847870598
	-1.081081081	1.168736304	0.561600562
	0.216216216	0.046749452	0.026208026
			7.091558442

H₀: No. of years at sea and injuries witnessed are independent (or not associated)

Hₐ: No. of years at sea and injuries witnessed are not independent (or associated)

Calculated X^2	10.092	
df	4	(r-1)*(c-1)
X^2 @ 0.05	9.488	From Tables
X^2 @ 0.05	9.488	Excel Formula

Conclusion: The value of the test statistics X^2=10.092, which falls in the "Reject" region.

Same goes with P-Value < α, i.e. Reject. Hence the Hypothesis is rejected.

i.e. at 5% significance level, the data provided sufficient evidence to conclude that the number of years at sea

and injuries witnessed are not independent or are associated.

It seems that seafarers with very less sea time may witness less injuries due to accidents and incidents

Using Excel Formula		
P-Value	0.039	P-Value < α
df	4	
α	0.05	

APPENDIX K – Results from Chi-squared calculations for variables (Accidents / Incidents vs. Psychological Issues)

Test (5)			Psychological Issues								
	Q 14 / 15	Q 14 / 15	Q 14 / 15	Q 14 / 15	Q 14 / 15						
Psychological Issues	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a	4	2	17	8	3	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 b	1	3	13	12	5	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 c	0	1	16	13	4	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 d	1	2	7	21	3	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 e	3	4	16	7	4	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 f	0	4	9	19	2	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 g	0	3	9	19	3	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 h	0	7	10	12	5	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 i	1	8	14	8	3	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 j	1	7	11	13	2	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 k	1	7	9	12	5	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 l	0	0	3	28	3	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 m	0	0	4	20	10	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 n	0	0	4	22	8	34	0.8	3.2	9.666666667	16.06666667	4.266666667
Q 20 o	0	0	3	27	4	34	0.8	3.2	9.666666667	16.06666667	4.266666667
C Total	12	48	145	241	64	510					
	2.4%	9.4%	28.4%	47.3%	12.5%						

Key
C - Column
R - Row
E - Expected

H_0:Seafarers who experienced/witnessed accidents/incidents and psychological issues are independent (or not associated)
H_1:Seafarers who experienced/witnessed accidents/incidents and psychological issues are not independent (or associated)

Conclusion: The value of the test statistics X^2=150.943, which falls in the "Reject" region.
Same goes with P-Value < α, i.e. the Hypothesis is Rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who have experienced/witnessed accidents/incidents and psychological issues are not independent or are associated.
It seems that seafarers who have experienced and witnessed accidents/incidents are subject to psychological issues.

Calculated X²	150.943	
df	56	(r-1)*(c-1)
X² @ 0.05	74.451	From Tables
X² @ 0.05	74.468	Excel Formula

sing Excel Formula

P-Value	1.185E-10	P-Value < α
df	56	
α	0.05	

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
3.2	-1.2	7.333333333	-8.066666667	-1.266666667
0.2	-0.2	3.333333333	-4.066666667	0.733333333
-0.8	-2.2	6.333333333	-3.066666667	-0.266666667
0.2	-1.2	-2.666666667	4.933333333	-1.266666667
2.2	0.8	6.333333333	-9.066666667	-0.266666667
-0.8	0.8	-0.666666667	2.933333333	-2.266666667
-0.8	-0.2	-0.666666667	2.933333333	-1.266666667
-0.8	3.8	0.333333333	-4.066666667	0.733333333
0.2	4.8	4.333333333	-8.066666667	-1.266666667
0.2	3.8	1.333333333	-3.066666667	-2.266666667
0.2	3.8	-0.666666667	-4.066666667	0.733333333
-0.8	-3.2	-6.666666667	11.93333333	-1.266666667
-0.8	-3.2	-5.666666667	3.933333333	5.733333333
-0.8	-3.2	-5.666666667	5.933333333	3.733333333
-0.8	-3.2	-6.666666667	10.93333333	-0.266666667

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
10.24	1.44	53.77777778	65.07111111	1.604444444
0.04	0.04	11.11111111	16.53777778	0.537777778
0.64	4.84	40.11111111	9.404444444	0.071111111
0.04	1.44	7.111111111	24.33777778	1.604444444
4.84	0.64	40.11111111	82.20444444	0.071111111
0.64	0.64	0.444444444	8.604444444	5.137777778
0.64	0.04	0.444444444	8.604444444	1.604444444
0.64	14.44	0.111111111	16.53777778	0.537777778
0.04	23.04	18.77777778	65.07111111	1.604444444
0.04	14.44	1.777777778	9.404444444	5.137777778
0.04	14.44	0.444444444	16.53777778	0.537777778
0.64	10.24	44.44444444	142.4044444	1.604444444
0.64	10.24	32.11111111	15.47111111	32.87111111
0.64	10.24	32.11111111	35.20444444	13.93777778
0.64	10.24	44.44444444	119.5377778	0.071111111

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
12.8	0.45	5.563218391	4.050069156	0.376041667
0.05	0.0125	1.149425287	1.029322268	0.126041667
0.8	1.5125	4.149425287	0.585338866	0.016666667
0.05	0.45	0.735632184	1.514799447	0.376041667
6.05	0.2	4.149425287	5.116459198	0.016666667
0.8	0.2	0.045977011	0.535546335	1.204166667
0.8	0.0125	0.045977011	0.535546335	0.376041667
0.8	4.5125	0.011494253	1.029322268	0.126041667
0.05	7.2	1.942528736	4.050069156	0.376041667
0.05	4.5125	0.183908046	0.585338866	1.204166667
0.05	4.5125	0.045977011	1.029322268	0.126041667
0.8	3.2	4.597701149	8.863347165	0.376041667
0.8	3.2	3.32183908	0.962932227	7.704166667
0.8	3.2	3.32183908	2.191147994	3.266666667
0.8	3.2	4.597701149	7.44011065	0.016666667
25.5	36.375	33.86206897	39.5186722	15.6875
				150.9432412

APPENDIX L – Results from Chi-squared calculations for variables (Injuries vs. Psychological Issues)

Test (6)			Psychological Issues								
	Q 17 / 18	Q 17 / 18	Q 17 / 18	Q 17 / 18	Q 17 / 18						
Psychological Issues	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a	4	2	14	7	3	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 b	1	2	12	10	5	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 c	0	1	14	11	4	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 d	1	2	6	18	3	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 e	3	3	14	6	4	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 f	0	4	6	18	2	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 g	0	3	7	17	3	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 h	0	3	7	15	5	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 i	1	6	13	7	3	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 j	1	5	10	12	2	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 k	1	5	9	10	5	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 l	0	0	2	25	3	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 m	0	0	4	17	9	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 n	0	0	3	20	7	30	0.8	2.4	8.266666667	14.4	4.133333333
Q 20 o	0	0	3	23	4	30	0.8	2.4	8.266666667	14.4	4.133333333
C Total	12	36	124	216	62	450					
	2.7%	8.0%	27.6%	48.0%	13.8%						

Key				1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
C - Column				3.2	-0.4	5.733333333	-7.4	-1.133333333
R - Row				0.2	-0.4	3.733333333	-4.4	0.866666667
E - Expected				-0.8	-1.4	5.733333333	-3.4	-0.133333333
				0.2	-0.4	-2.266666667	3.6	-1.133333333
				2.2	0.6	5.733333333	-8.4	-0.133333333
H₀: Seafarers who experienced/witnessed injuries and psychological issues are independent (or not associated)				-0.8	1.6	-2.266666667	3.6	-2.133333333
Hₐ: Seafarers who experienced/witnessed injuries and psychological issues are not independent (or associated)				-0.8	0.6	-1.266666667	2.6	-1.133333333
				-0.8	0.6	-1.266666667	0.6	0.866666667
Conclusion: The value of the test statistics X²=127.025, which falls in the "Reject" region.				0.2	3.6	4.733333333	-7.4	-1.133333333
Same goes with P-Value < α, i.e. the Hypothesis is Rejected.				0.2	2.6	1.733333333	-2.4	-2.133333333
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who have experienced/witnessed injuries				0.2	2.6	0.733333333	-4.4	0.866666667
and psychological issues are not independent or are associated.				-0.8	-2.4	-6.266666667	10.6	-1.133333333
It seems that seafarers who have experienced and witnessed injuries are subject to psychological issues.				-0.8	-2.4	-4.266666667	2.6	4.866666667
				-0.8	-2.4	-5.266666667	5.6	2.866666667
				-0.8	-2.4	-5.266666667	8.6	-0.133333333

Calculated X²	127.025			(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
df	56	(r-1)*(c-1)		10.24	0.16	32.87111111	54.76	1.284444444
X² @ 0.05	74.451	From Tables		0.04	0.16	13.93777778	19.36	0.751111111
X² @ 0.05	74.468	Excel Formula		0.64	1.96	32.87111111	11.56	0.017777778
				0.04	0.16	5.137777778	12.96	1.284444444
sing Excel Formula				4.84	0.36	32.87111111	70.56	0.017777778
P-Value	1.948E-07	P-Value < α		0.64	2.56	5.137777778	12.96	4.551111111
df	56			0.64	0.36	1.604444444	6.76	1.284444444
α	0.05			0.64	0.36	1.604444444	0.36	0.751111111
				0.04	12.96	22.40444444	54.76	1.284444444
				0.04	6.76	3.004444444	5.76	4.551111111
				0.04	6.76	0.537777778	19.36	0.751111111
				0.64	5.76	39.27111111	112.36	1.284444444
				0.64	5.76	18.20444444	6.76	23.68444444
				0.64	5.76	27.73777778	31.36	8.217777778
				0.64	5.76	27.73777778	73.96	0.017777778

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
12.8	0.066666667	3.976344086	3.802777778	0.310752688
0.05	0.066666667	1.686021505	1.344444444	0.18172043
0.8	0.816666667	3.976344086	0.802777778	0.004301075
0.05	0.066666667	0.621505376	0.9	0.310752688
6.05	0.15	3.976344086	4.9	0.004301075
0.8	1.066666667	0.621505376	0.9	1.101075269
0.8	0.15	0.194086022	0.469444444	0.310752688
0.8	0.15	0.194086022	0.025	0.18172043
0.05	5.4	2.710215054	3.802777778	0.310752688
0.05	2.816666667	0.36344086	0.4	1.101075269
0.05	2.816666667	0.065053763	1.344444444	0.18172043
0.8	2.4	4.750537634	7.802777778	0.310752688
0.8	2.4	2.202150538	0.469444444	5.730107527
0.8	2.4	3.355376344	2.177777778	1.988172043
0.8	2.4	3.355376344	5.136111111	0.004301075
25.5	23.16666667	32.0483871	34.27777778	12.03225806
				127.0250896

154

APPENDIX M 1 – Results from Chi-squared calculations for variables (Training vs. Psychological Issues)

Test (7)	Psychological Issues										
	Q 21 - Yes	Q 21 - Yes	Q 21 - Yes	Q 21 - Yes	Q 21 - Yes						
Psychological Issues	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a		0	3	1	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 b		0	2	2	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 c		0	2	2	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 d		0	1	3	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 e		0	5	0	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 f		0	1	4	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 g		0	2	2	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 h		0	0	4	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 i		0	4	1	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 j		0	3	2	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 k		1	1	3	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 l		0	1	4	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 m		0	1	3	1	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 n		0	1	4	0	5	0	0.066666667	1.866666667	2.6	0.466666667
Q 20 o		0	1	4	0	5	0	0.066666667	1.866666667	2.6	0.466666667
C Total	0	1	28	39	7	75					

Key
C - Column
R - Row
E - Expected

H_0: Seafarers who are not trained and psychological issues are independent (or not associated)
H_a: Seafarers who are not trained and psychological issues are not independent (or associated)

Conclusion: The value of the test statistics X^2=44.863, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. the Hypothesis is Not Rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who are trained
and psychological issues are not independent or are associated.
It seems that seafarers who have some sort of training to handke psychological issues, perform better post accidents/incidents.

Calculated X^2	44.863		
df	56	(r-1)*(c-1)	
X^2 @ 0.05	74.451	From Tables	
X^2 @ 0.05	74.468	Excel Formula	

sing Excel Formula

P-Value	0.857	P-Value > α
df	56	
α	0.05	

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
0	-0.066666667	1.133333333	-1.6	0.533333333
0	-0.066666667	0.133333333	-0.6	0.533333333
0	-0.066666667	0.133333333	-0.6	0.533333333
0	-0.066666667	-0.866666667	0.4	0.533333333
0	-0.066666667	3.133333333	-2.6	-0.466666667
0	-0.066666667	-0.866666667	1.4	-0.466666667
0	-0.066666667	0.133333333	-0.6	0.533333333
0	-0.066666667	-1.866666667	1.4	0.533333333
0	-0.066666667	2.133333333	-1.6	-0.466666667
0	-0.066666667	1.133333333	-0.6	-0.466666667
0	0.933333333	-0.866666667	0.4	-0.466666667
0	-0.066666667	-0.866666667	1.4	-0.466666667
0	-0.066666667	-0.866666667	0.4	0.533333333
0	-0.066666667	-0.866666667	1.4	-0.466666667
0	-0.066666667	-0.866666667	1.4	-0.466666667

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0	0.004444444	1.284444444	2.56	0.284444444
0	0.004444444	0.017777778	0.36	0.284444444
0	0.004444444	0.017777778	0.36	0.284444444
0	0.004444444	0.751111111	0.16	0.284444444
0	0.004444444	9.817777778	6.76	0.217777778
0	0.004444444	0.751111111	1.96	0.217777778
0	0.004444444	0.017777778	0.36	0.284444444
0	0.004444444	3.484444444	1.96	0.284444444
0	0.004444444	4.551111111	2.56	0.217777778
0	0.004444444	1.284444444	0.36	0.217777778
0	0.871111111	0.751111111	0.16	0.217777778
0	0.004444444	0.751111111	1.96	0.217777778
0	0.004444444	0.751111111	0.16	0.284444444
0	0.004444444	0.751111111	1.96	0.217777778
0	0.004444444	0.751111111	1.96	0.217777778

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
	0.066666667	0.688095238	0.984615385	0.60952381
	0.066666667	0.00952381	0.138461538	0.60952381
	0.066666667	0.00952381	0.138461538	0.60952381
	0.066666667	0.402380952	0.061538462	0.60952381
	0.066666667	5.25952381	2.6	0.466666667
	0.066666667	0.402380952	0.753846154	0.466666667
	0.066666667	0.00952381	0.138461538	0.60952381
	0.066666667	1.866666667	0.753846154	0.60952381
	0.066666667	2.438095238	0.984615385	0.466666667
	0.066666667	0.688095238	0.138461538	0.466666667
	13.06666667	0.402380952	0.061538462	0.466666667
	0.066666667	0.402380952	0.753846154	0.466666667
	0.066666667	0.402380952	0.061538462	0.60952381
	0.066666667	0.402380952	0.753846154	0.466666667
	0.066666667	0.402380952	0.753846154	0.466666667
0	14	13.78571429	9.076923077	8
				44.86263736

APPENDIX M 2 – Results from Chi-squared calculations for variables (Training vs. Psychological Issues)

Test (7) Psychological Issues	Q 21 - No 1	Q 21 - No 2	Q 21 - No 3	Q 21 - No 4	Q 21 - No 5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a	4	2	14	7	2	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 b	1	3	11	10	4	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 c	0	1	14	11	3	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 d	1	2	6	18	2	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 e	3	4	11	7	4	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 f	0	4	8	15	2	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 g	0	3	7	17	2	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 h	0	3	10	12	4	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 i	1	8	10	7	3	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 j	1	7	8	11	2	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 k	1	6	8	9	5	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 l	0	0	2	24	3	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 m	0	0	3	17	9	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 n	0	0	3	18	8	29	0.8	2.866666667	7.8	13.73333333	3.8
Q 20 o	0	0	2	23	4	29	0.8	2.866666667	7.8	13.73333333	3.8
C Total	12	43	117	206	57	435					

Key
C - Column
R - Row
E - Expected

H_0: Seafarers who are not trained and psychological issues are independent (or not associated)
H_a: Seafarers who are not trained and psychological issues are not independent (or associated)

Conclusion: The value of the test statistics X^2=136.021, which falls in the "Reject" region.
Same goes with P-Value < α, i.e. the Hypothesis is Rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who are not trained
and psychological issues are not independent or are associated.
It seems that seafarers who are not trained to handle post accident issues are affected psychologically.

Calculated X^2	136.021	
df	56	(r-1)*(c-1)
X^2 @ 0.05	74.451	From Tables
X^2 @ 0.05	74.468	Excel Formula

Using Excel Formula		
P-Value	1.316E-08	P-Value < α
df	56	
α	0.05	

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
3.2	-0.866666667	6.2	-6.733333333	-1.8
0.2	0.133333333	3.2	-3.733333333	0.2
-0.8	-1.866666667	6.2	-2.733333333	-0.8
0.2	-0.866666667	-1.8	4.266666667	-1.8
2.2	1.133333333	3.2	-6.733333333	0.2
-0.8	1.133333333	0.2	1.266666667	-1.8
-0.8	0.133333333	-0.8	3.266666667	-1.8
-0.8	0.133333333	2.2	-1.733333333	0.2
0.2	5.133333333	2.2	-6.733333333	-0.8
0.2	4.133333333	0.2	-2.733333333	-1.8
0.2	3.133333333	0.2	-4.733333333	1.2
-0.8	-2.866666667	-5.8	10.26666667	-0.8
-0.8	-2.866666667	-4.8	3.266666667	5.2
-0.8	-2.866666667	-4.8	4.266666667	4.2
-0.8	-2.866666667	-5.8	9.266666667	0.2

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
10.24	0.751111111	38.44	45.33777778	3.24
0.04	0.017777778	10.24	13.93777778	0.04
0.64	3.484444444	38.44	7.471111111	0.64
0.04	0.751111111	3.24	18.20444444	3.24
4.84	1.284444444	10.24	45.33777778	0.04
0.64	1.284444444	0.04	1.604444444	3.24
0.64	0.017777778	0.64	10.67111111	3.24
0.64	0.017777778	4.84	3.004444444	0.04
0.04	26.35111111	4.84	45.33777778	0.64
0.04	17.08444444	0.04	7.471111111	3.24
0.04	9.817777778	0.04	22.40444444	1.44
0.64	8.217777778	33.64	105.4044444	0.64
0.64	8.217777778	23.04	10.67111111	27.04
0.64	8.217777778	23.04	18.20444444	17.64
0.64	8.217777778	33.64	85.87111111	0.04

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
12.8	0.262015504	4.928205128	3.301294498	0.852631579
0.05	0.00620155	1.312820513	1.014886731	0.010526316
0.8	1.215503876	4.928205128	0.544012945	0.168421053
0.05	0.262015504	0.415384615	1.325566343	0.852631579
6.05	0.448062016	1.312820513	3.301294498	0.010526316
0.8	0.448062016	0.005128205	0.116828479	0.852631579
0.8	0.00620155	0.082051282	0.777022654	0.852631579
0.8	0.00620155	0.620512821	0.218770227	0.010526316
0.05	9.192248062	0.620512821	3.301294498	0.168421053
0.05	5.959689922	0.005128205	0.544012945	0.852631579
0.05	3.424806202	0.005128205	1.631391586	0.378947368
0.8	2.866666667	4.312820513	7.675080906	0.168421053
0.8	2.866666667	2.953846154	0.777022654	7.115789474
0.8	2.866666667	2.953846154	1.325566343	4.642105263
0.8	2.866666667	4.312820513	6.252750809	0.010526316
25.5	32.69767442	28.76923077	32.10679612	16.94736842
				136.0210697

APPENDIX N 1 – Results from Chi-squared calculations for variables (Medical Examination vs. Psychological Issues)

Test (8)	Psychological Issues										
	Q 22 - Yes	Q 22 - Yes	Q 22 - Yes	Q 22 - Yes	Q 22 - Yes						
Psychological Issues	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a	0	1	2	0	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 b	0	0	2	1	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 c	0	1	2	0	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 d	1	0	1	1	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 e	1	0	1	1	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 f	0	0	0	3	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 g	0	0	3	0	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 h	0	0	1	2	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 i	0	1	2	0	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 j	0	1	1	1	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 k	0	0	2	1	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 l	0	0	1	2	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 m	0	0	1	1	1	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 n	0	0	1	2	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
Q 20 o	0	0	1	2	0	3	0.133333333	0.266666667	1.4	1.133333333	0.066666667
C Total	2	4	21	17	1	45					

Key
C - Column
R - Row
E - Expected

H_0: Seafarers who undergo pshychological examination and psychological issues are independent (or not associated)
H_a: Seafarers whoundergo pshychological examination and psychological issues are not independent (or associated)

Conclusion: The value of the test statistics X^2=53.782, which falls in the "Do Not Reject" region.
Same goes with P-Value > α, i.e. the Hypothesis is Not Rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who undergo pshychological examination and psychological issues are not independent or are associated.
It seems that seafarers who have some sort of psychological examination/tests, are able to handle psychological issues better post accidents/incidents.

Calculated X²	53.782	
df	56	(r-1)*(c-1)
X² @ 0.05	74.451	From Tables
X² @ 0.05	74.468	Excel Formula

Using Excel Formula

P-Value	0.559	P-Value > α
df	56	
α	0.05	

1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
-0.133333333	0.733333333	0.6	-1.133333333	-0.066666667
-0.133333333	-0.266666667	0.6	-0.133333333	-0.066666667
-0.133333333	0.733333333	0.6	-1.133333333	-0.066666667
0.866666667	-0.266666667	-0.4	-0.133333333	-0.066666667
0.866666667	-0.266666667	-0.4	-0.133333333	-0.066666667
-0.133333333	-0.266666667	-1.4	1.866666667	-0.066666667
-0.133333333	-0.266666667	1.6	-1.133333333	-0.066666667
-0.133333333	-0.266666667	-0.4	0.866666667	-0.066666667
-0.133333333	0.733333333	0.6	-1.133333333	-0.066666667
-0.133333333	0.733333333	-0.4	-0.133333333	-0.066666667
-0.133333333	-0.266666667	0.6	-0.133333333	-0.066666667
-0.133333333	-0.266666667	-0.4	0.866666667	-0.066666667
-0.133333333	-0.266666667	-0.4	-0.133333333	0.933333333
-0.133333333	-0.266666667	-0.4	0.866666667	-0.066666667
-0.133333333	-0.266666667	-0.4	0.866666667	-0.066666667

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
0.017777778	0.537777778	0.36	1.284444444	0.004444444
0.017777778	0.071111111	0.36	0.017777778	0.004444444
0.017777778	0.537777778	0.36	1.284444444	0.004444444
0.751111111	0.071111111	0.16	0.017777778	0.004444444
0.751111111	0.071111111	0.16	0.017777778	0.004444444
0.017777778	0.071111111	1.96	3.484444444	0.004444444
0.017777778	0.071111111	2.56	1.284444444	0.004444444
0.017777778	0.537777778	0.16	0.751111111	0.004444444
0.017777778	0.537777778	0.36	0.017777778	0.004444444
0.017777778	0.537777778	0.16	0.017777778	0.004444444
0.017777778	0.071111111	0.36	0.017777778	0.004444444
0.017777778	0.071111111	0.16	0.751111111	0.004444444
0.017777778	0.071111111	0.16	0.017777778	0.871111111
0.017777778	0.071111111	0.16	0.751111111	0.004444444
0.017777778	0.071111111	0.16	0.751111111	0.004444444

[(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
0.133333333	2.016666667	0.257142857	1.133333333	0.066666667
0.133333333	0.266666667	0.257142857	0.015686275	0.066666667
0.133333333	2.016666667	0.257142857	1.133333333	0.066666667
5.633333333	0.266666667	0.114285714	0.015686275	0.066666667
5.633333333	0.266666667	0.114285714	0.015686275	0.066666667
0.133333333	0.266666667	1.4	3.074509804	0.066666667
0.133333333	0.266666667	1.828571429	1.133333333	0.066666667
0.133333333	2.016666667	0.257142857	0.662745098	0.066666667
0.133333333	2.016666667	0.257142857	1.133333333	0.066666667
0.133333333	2.016666667	0.114285714	0.015686275	0.066666667
0.133333333	0.266666667	0.257142857	0.015686275	0.066666667
0.133333333	0.266666667	0.114285714	0.662745098	0.066666667
0.133333333	0.266666667	0.114285714	0.015686275	13.06666667
0.133333333	0.266666667	0.114285714	0.662745098	0.066666667
0.133333333	0.266666667	0.114285714	0.662745098	0.066666667
13	11	5.428571429	10.35294118	14
				53.78151261

APPENDIX N 2 – Results from Chi-squared calculations for variables (Medical Examination vs. Psychological Issues)

Test (8)									Psychological Issues		
	Q 22 - No	Q 22 - No	Q 22 - No	Q 22 - No	Q 22 - No						
Psychological Issues	1	2	3	4	5	R Total	E 1	E 2	E 3	E 4	E 5
Q 20 a	4	1	15	8	3	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 b	1	3	11	11	5	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 c	0	0	14	13	4	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 d	0	2	6	20	3	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 e	2	4	15	6	4	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 f	0	4	9	16	2	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 g	0	3	6	19	3	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 h	0	3	9	14	5	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 i	1	7	12	8	3	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 j	1	6	10	12	2	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 k	1	6	8	11	5	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 l	0	0	2	26	3	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 m	0	0	3	19	9	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 n	0	0	3	20	8	31	0.666666667	2.6	8.333333333	15.2	4.2
Q 20 o	0	0	2	25	4	31	0.666666667	2.6	8.333333333	15.2	4.2
C Total	10	39	125	228	63	465					

Key
C - Column
R - Row
E - Expected

H_0: Seafarers who undergo pshychological examination and psychological issues are independent (or not associated)
H_a: Seafarers whoundergo pshychological examination and psychological issues are not independent (or associated)

Conclusion: The value of the test statistics X^2=141.546, which falls in the "Reject" region.
Same goes with P-Value < α, i.e. the Hypothesis is Rejected.
i.e. at 5% significance level, the data provided sufficient evidence to conclude that seafarers who are not trained
and psychological issues are not independent or are associated.
It seems that seafarers who do not undergo pshychological or mental examination/care are prone to possible pshychological issues
post accident/incident.

Calculated X^2	141.546	
df	56	(r-1)*(c-1)
X^2 @ 0.05	74.451	From Tables
X^2 @ 0.05	74.468	Excel Formula

sing Excel Formula		
P-Value	2.378E-09	P-Value < α
df	56	
α	0.05	

| 1 - E 1	2 - E 2	3 - E 3	4 - E 4	5 - E 5
3.333333333	-1.6	6.666666667	-7.2	-1.2
0.333333333	0.4	2.666666667	-4.2	0.8
-0.666666667	-2.6	5.666666667	-2.2	-0.2
-0.666666667	-0.6	-2.333333333	4.8	-1.2
1.333333333	1.4	6.666666667	-9.2	-0.2
-0.666666667	1.4	0.666666667	0.8	-2.2
-0.666666667	0.4	-2.333333333	3.8	-1.2
-0.666666667	0.4	0.666666667	-1.2	0.8
0.333333333	4.4	3.666666667	-7.2	-1.2
0.333333333	3.4	1.666666667	-3.2	-2.2
0.333333333	3.4	-0.333333333	-4.2	0.8
-0.666666667	-2.6	-6.333333333	10.8	-1.2
-0.666666667	-2.6	-5.333333333	3.8	4.8
-0.666666667	-2.6	-5.333333333	4.8	3.8
-0.666666667	-2.6	-6.333333333	9.8	-0.2

(1 - E 1)^2	(2 - E 2)^2	(3 - E 3)^2	(4 - E 4)^2	(5 - E 5)^2
11.11111111	2.56	44.44444444	51.84	1.44
0.111111111	0.16	7.111111111	17.64	0.64
0.444444444	6.76	32.11111111	4.84	0.04
0.444444444	0.36	5.444444444	23.04	1.44
1.777777778	1.96	44.44444444	84.64	0.04
0.444444444	1.96	0.444444444	0.64	4.84
0.444444444	0.16	5.444444444	14.44	1.44
0.444444444	0.16	0.444444444	1.44	0.64
0.111111111	19.36	13.44444444	51.84	1.44
0.111111111	11.56	2.777777778	10.24	4.84
0.111111111	11.56	0.111111111	17.64	0.64
0.444444444	6.76	40.11111111	116.64	1.44
0.444444444	6.76	28.44444444	14.44	23.04
0.444444444	6.76	28.44444444	23.04	14.44
0.444444444	6.76	40.11111111	96.04	0.04

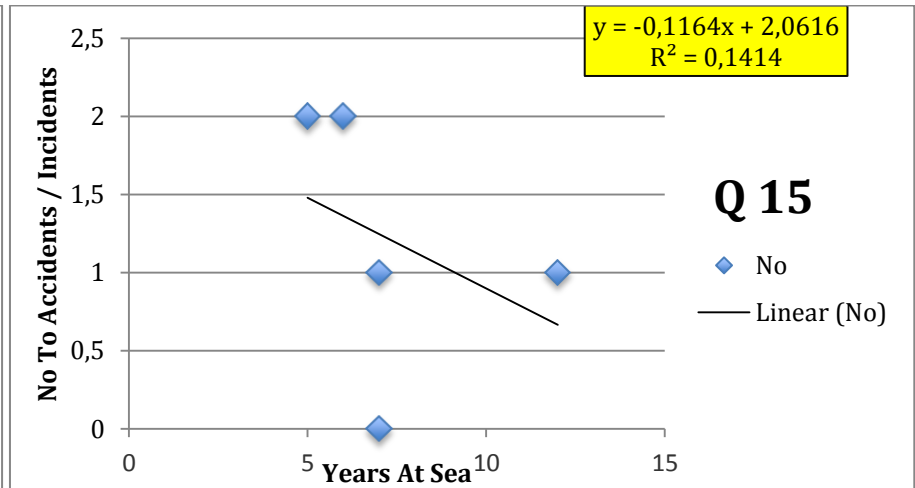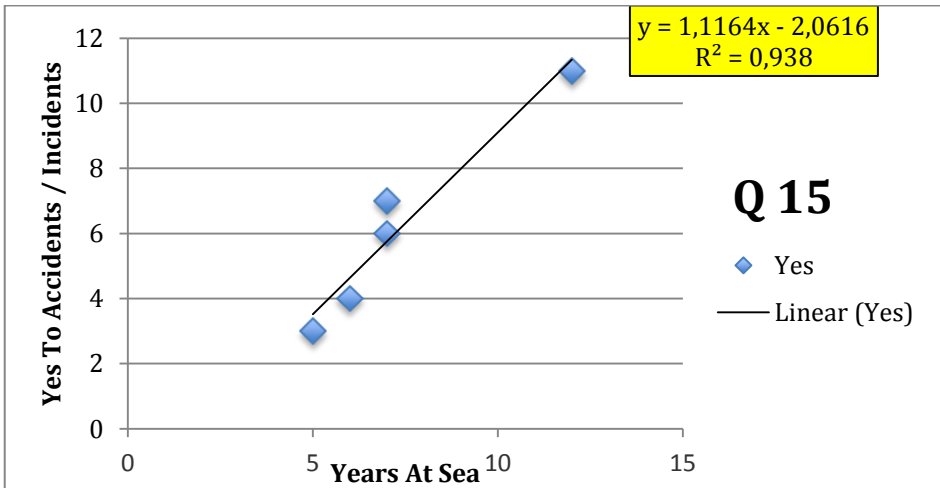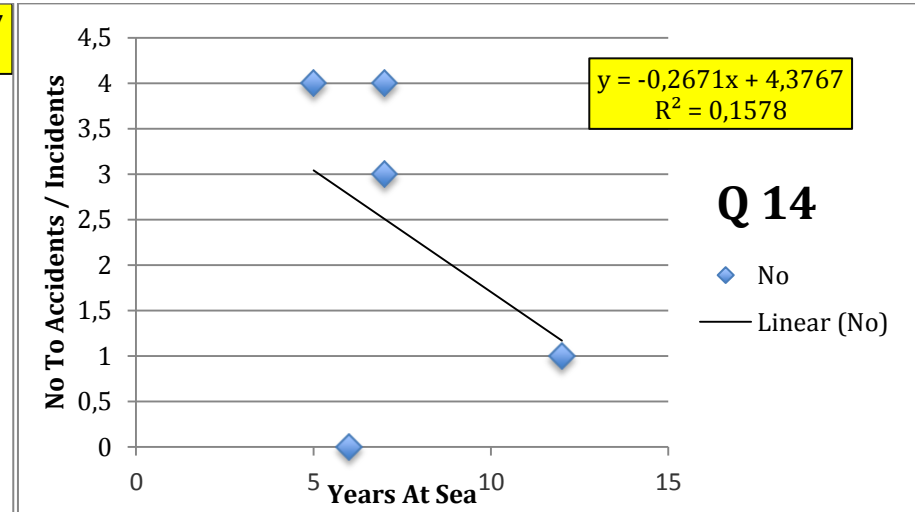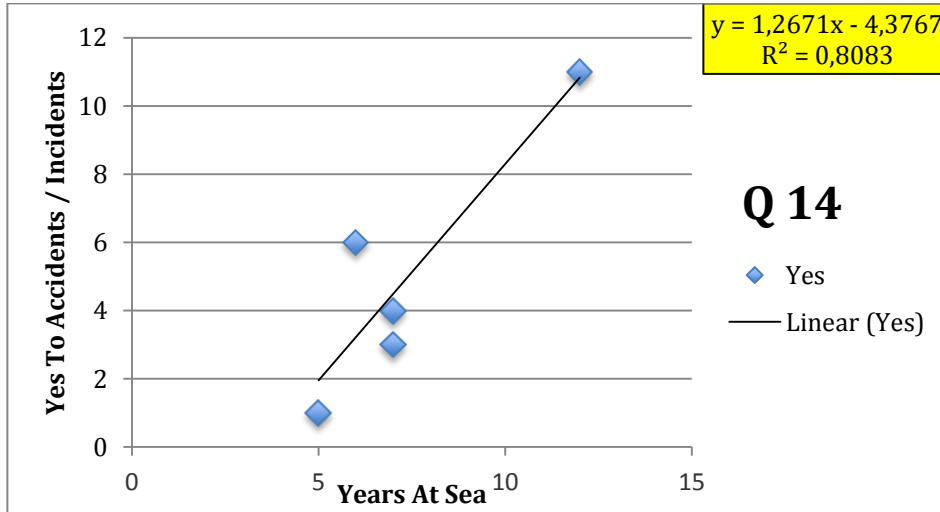| [(1 - E 1)^2] / E 1	[(2 - E 2)^2] / E 2	[(3 - E 3)^2] / E 3	[(4 - E 4)^2] / E 4	[(5 - E 5)^2] / E 5
16.66666667	0.984615385	5.333333333	3.410526316	0.342857143
0.166666667	0.061538462	0.853333333	1.160526316	0.152380952
0.666666667	2.6	3.853333333	0.318421053	0.00952381
0.666666667	0.138461538	0.653333333	1.515789474	0.342857143
2.666666667	0.753846154	5.333333333	5.568421053	0.00952381
0.666666667	0.753846154	0.053333333	0.042105263	1.152380952
0.666666667	0.061538462	0.653333333	0.95	0.342857143
0.666666667	0.061538462	0.053333333	0.094736842	0.152380952
0.166666667	7.446153846	1.613333333	3.410526316	0.342857143
0.166666667	4.446153846	0.333333333	0.673684211	1.152380952
0.166666667	4.446153846	0.013333333	1.160526316	0.152380952
0.666666667	2.6	4.813333333	7.673684211	0.342857143
0.666666667	2.6	3.413333333	0.95	5.485714286
0.666666667	2.6	3.413333333	1.515789474	3.438095238
0.666666667	2.6	4.813333333	6.318421053	0.00952381
26	32.15384615	35.2	34.76315789	13.42857143
				141.5455755

APPENDIX O – Regression and correlation values for variables from the survey sample data (Age Group)
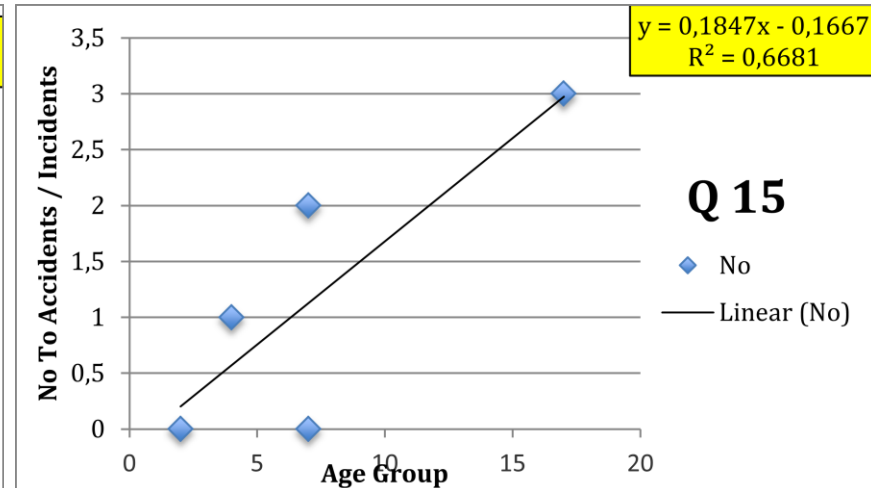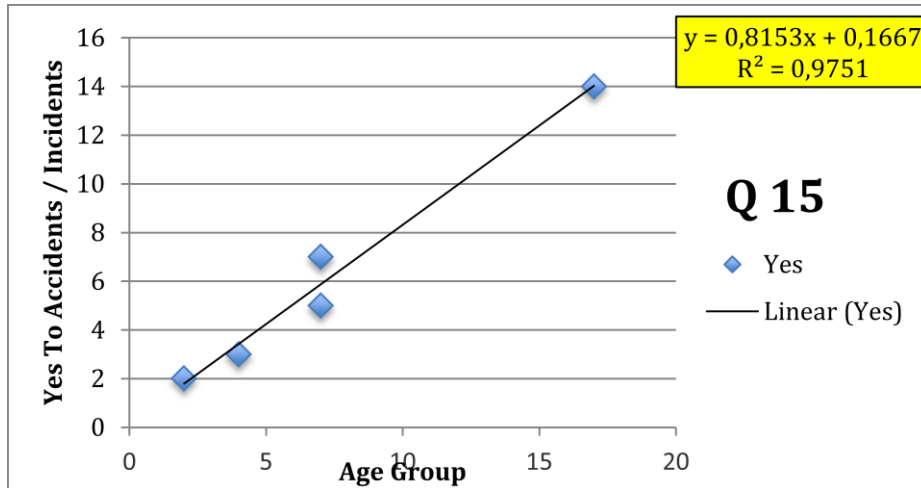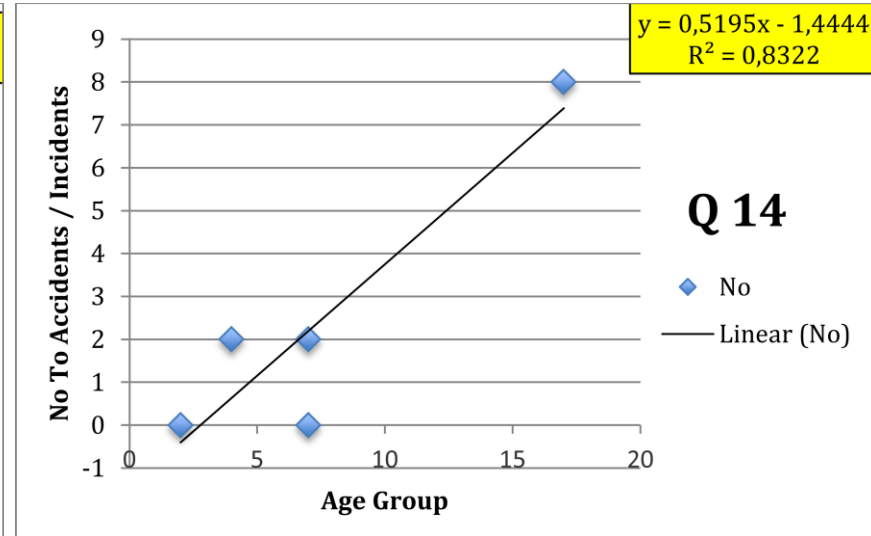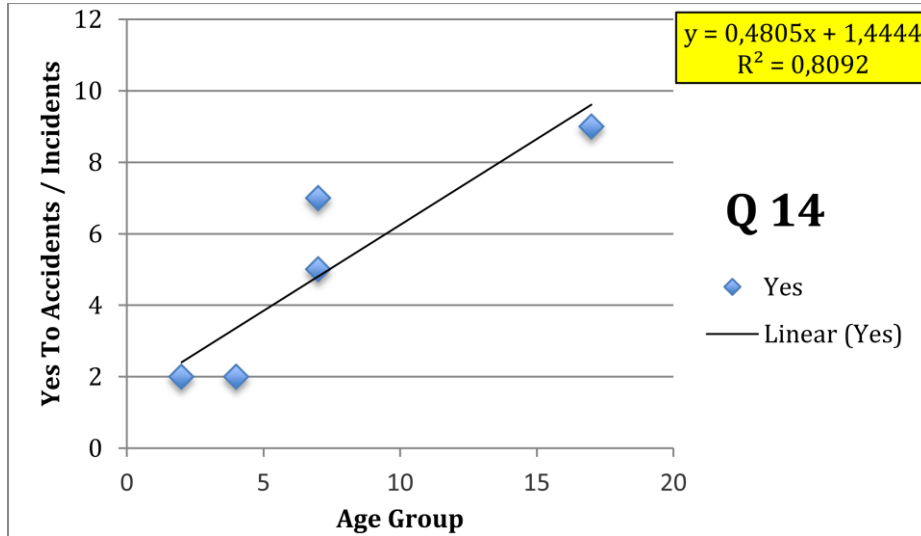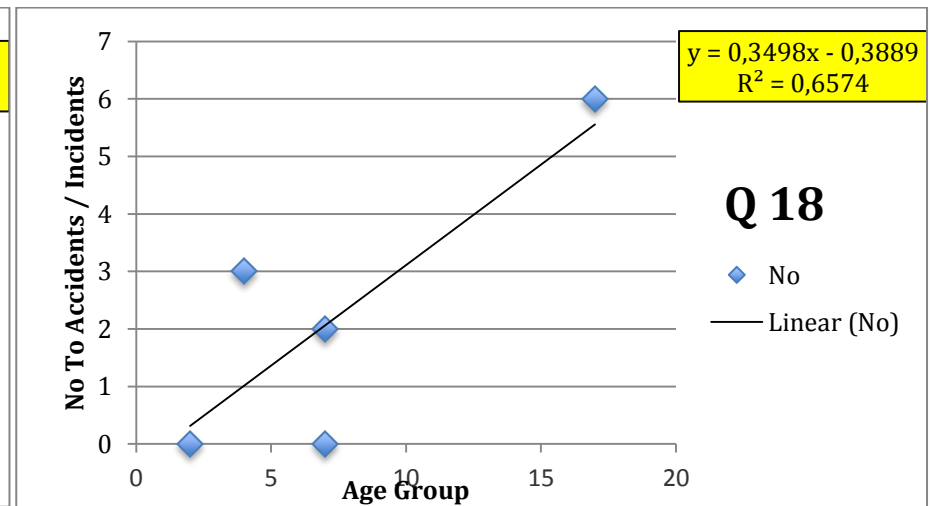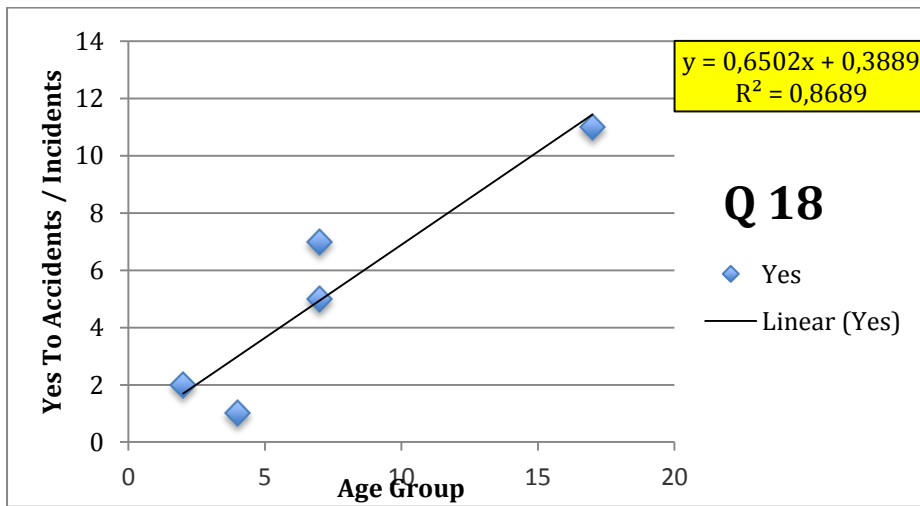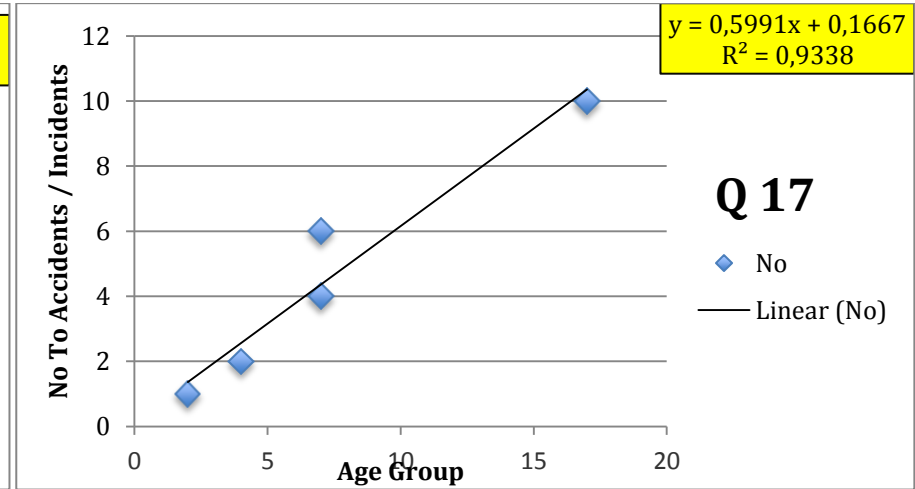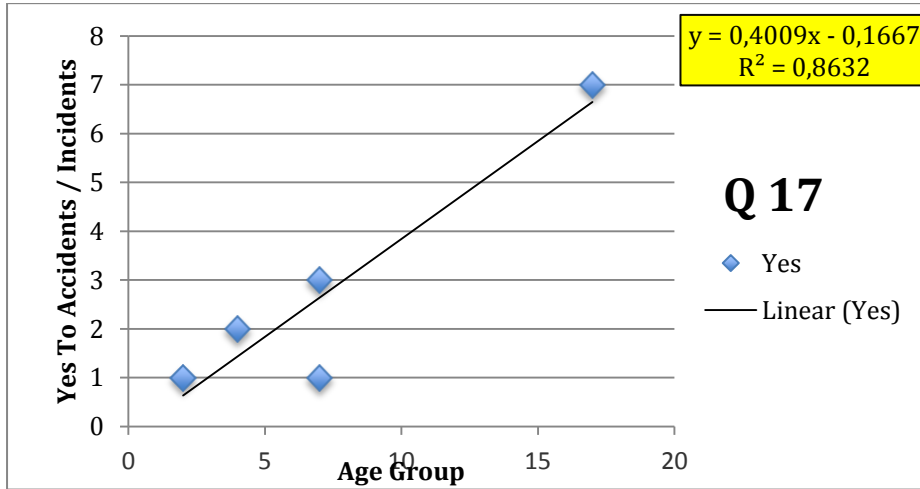
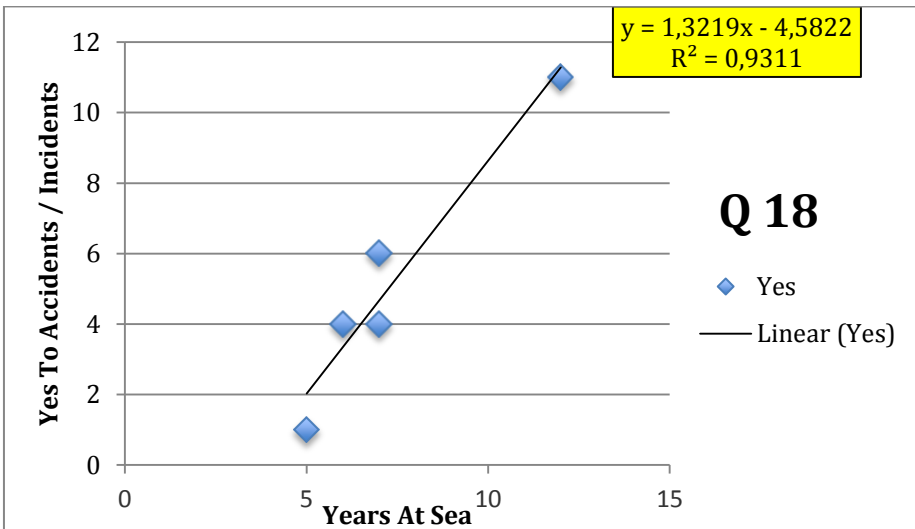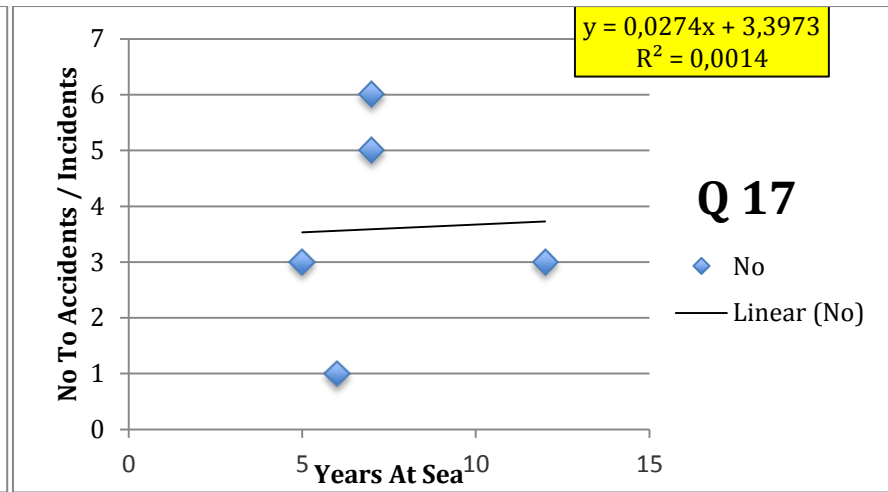**APPENDIX P – Regression and correlation values for variables from survey sample data (Years at sea service)**

Q 14 (top left): y = 1,2671x - 4,3767, R² = 0,8083. Yes / Linear (Yes). Y-axis: Yes To Accidents / Incidents. X-axis: Years At Sea.

Q 14 (top right): y = -0,2671x + 4,3767, R² = 0,1578. No / Linear (No). Y-axis: No To Accidents / Incidents. X-axis: Years At Sea.

Q 15 (bottom left): y = 1,1164x - 2,0616, R² = 0,938. Yes / Linear (Yes). Y-axis: Yes To Accidents / Incidents. X-axis: Years At Sea.

Q 15 (bottom right): y = -0,1164x + 2,0616, R² = 0,1414. No / Linear (No). Y-axis: No To Accidents / Incidents. X-axis: Years At Sea.

Q 17

y = 0,9726x - 3,3973
R² = 0,6454

Q 17

y = 0,0274x + 3,3973
R² = 0,0014

Q 18

y = 1,3219x - 4,5822
R² = 0,9311

Q 18

y = -0,3219x + 4,5822
R² = 0,445

APPENDIX Q – Bar chart illustration of sea service experience vs. accidents / incidents and injuries

Q 7 vs Q 14 - Years of sea service vs accidents experienced
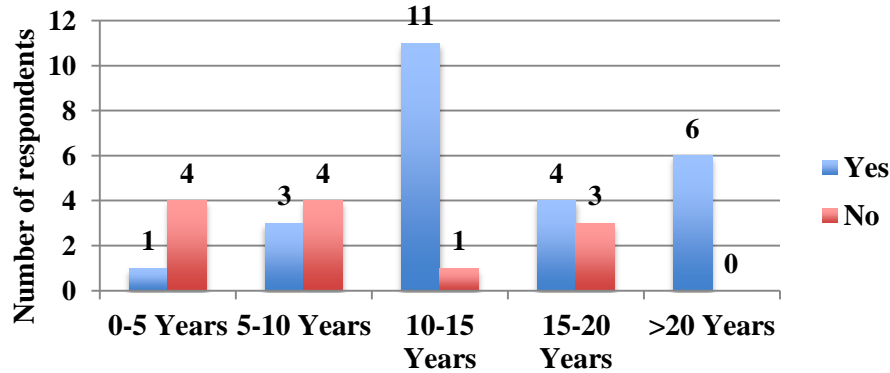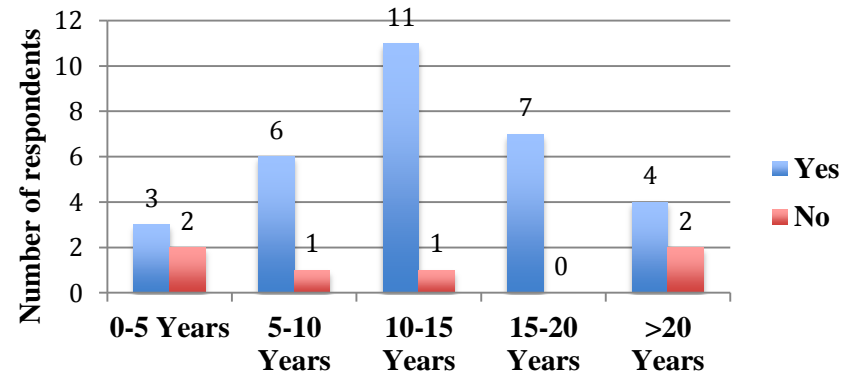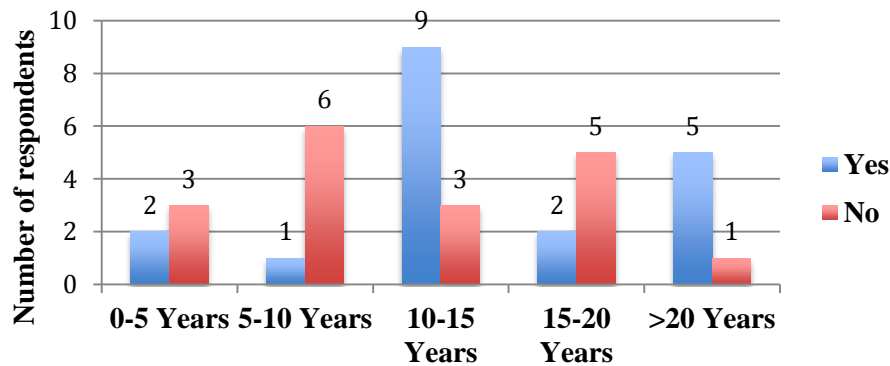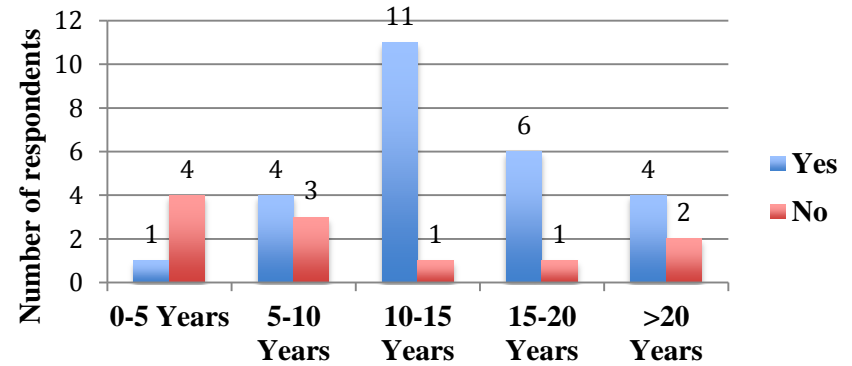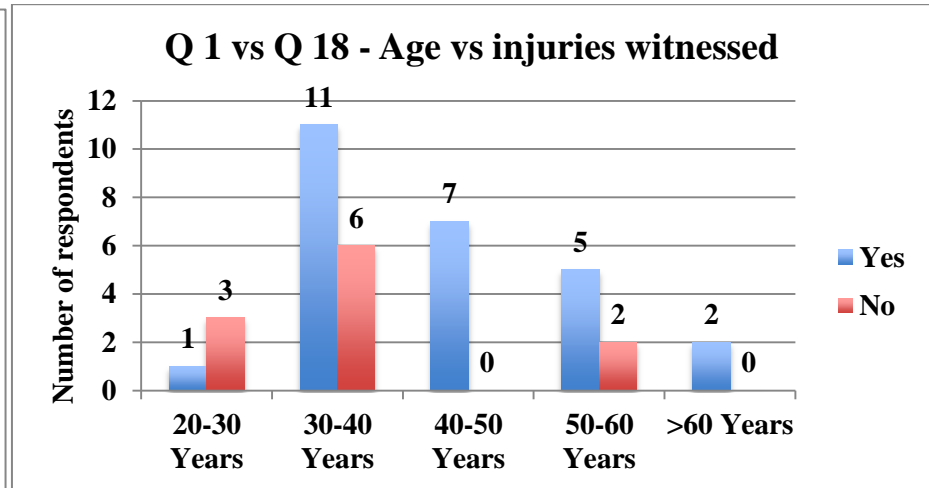
Q 7 vs Q 15 - Years of sea service vs accidents witnessed

Q 7 vs Q 17 - Years of sea service vs personal injuries experienced

Q 7 vs Q 18 - Years of sea service vs injuries witnessed

APPENDIX R – Bar chart illustration of age vs. accidents / incidents and injuries

Q 1 vs Q 14 - Age vs accidents experienced

Number of respondents

Age group	Yes	No
20-30 Years	2	2
30-40 Years	9	8
40-50 Years	5	2
50-60 Years	7	0
>60 Years	2	0

Q 1 vs Q 15 - Age vs accidents witnessed

Number of respondents

Age group	Yes	No
20-30 Years	3	1
30-40 Years	14	3
40-50 Years	7	0
50-60 Years	5	2
>60 Years	2	0

Q 1 vs Q 17 - Age vs injuries experienced

Number of respondents

Age group	Yes	No
20-30 Years	2	2
30-40 Years	7	10
40-50 Years	3	4
50-60 Years	1	6
>60 Years	1	1

Q 1 vs Q 18 - Age vs injuries witnessed

Number of respondents

Age group	Yes	No
20-30 Years	1	3
30-40 Years	11	6
40-50 Years	7	0
50-60 Years	5	2
>60 Years	2	0

APPENDIX S – Bar chart illustration of other factors of variables from survey sample data

Q 13 - I get shore leave everytime in port

Number of respondents

- Strongly Agree: 0, 0
- Agree: 3, 4
- Neutral: 6, 1
- Disagree: 10, 4
- Strongly Disagree: 9, 0

Legend: Senior Officer

Q 6 vs Q 13 (E) - Currently a seafarer vs social life onboard

Number of respondents

- Strongly Agree: Yes 1, No 1
- Agree: Yes 6, No 6
- Neutral: Yes 8, No 4
- Disagree: Yes 6, No 3
- Strongly Disagree: Yes 2, No 0

Legend: Yes, No

Q 10 vs Q 13 - Vacation Period vs I have a good social life with family and friends when home

Number of respondents

- Strongly…: 2, 4, 2, 0, 0
- Agree: 10, 5, 0, 0, 0
- Neutral: 4, 3, 0, 0, 0
- Disagree: 1, 5, 0, 0, 0
- Strongly…: 1, 0, 0, 0, 0

Legend: 0-2 Months, 2-4 Months, 4-6 Months, 6-12 Months, >12 Months

Q 9 vs Q 13 - Contract period vs I have a good social life with family and friends when home

Number of respondents

- Strongly Agree: 0, 4, 3, 1, 0
- (Agree): 1, 8, 2, 3, 1
- Neutral: 1, 3, 1, 1, 1
- (Disagree): 0, 2, 4, 0, 0
- Strongly Disagree: 0, 0, 0, 1, 0

Legend: 0-2 Months, 2-4 Months, 4-6 Months, 6-12 Months, >12 Months

APPENDIX T – Demographic variables from survey sample data

Age

- 20-30 Years
- 30-40 Years
- 40-50 Years
- 50-60 Years
- >60 Years

2; 5%
4; 11%
7; 19%
7; 19%
17; 46%

Nationality

- Africa
- Americas
- Asia
- Europe
- Oceania

1; 3%
3; 8%
3; 8%
12; 32%
18; 49%

Rank

Master / Captain
Chief Officer
2nd Officer
3rd Officer
Chief Engineer
2nd Engineer
3rd Engineer
Rating
Pilot
Others

10; 27%
7; 19%
5; 13%
1; 3%
5; 13%
2; 5%
1; 3%
1; 3%
1; 3%
4; 11%

Rank Grouping

Senior Officer
Junior Officer
Rating
Others

24; 65%
7; 19%
1; 3%
5; 13%
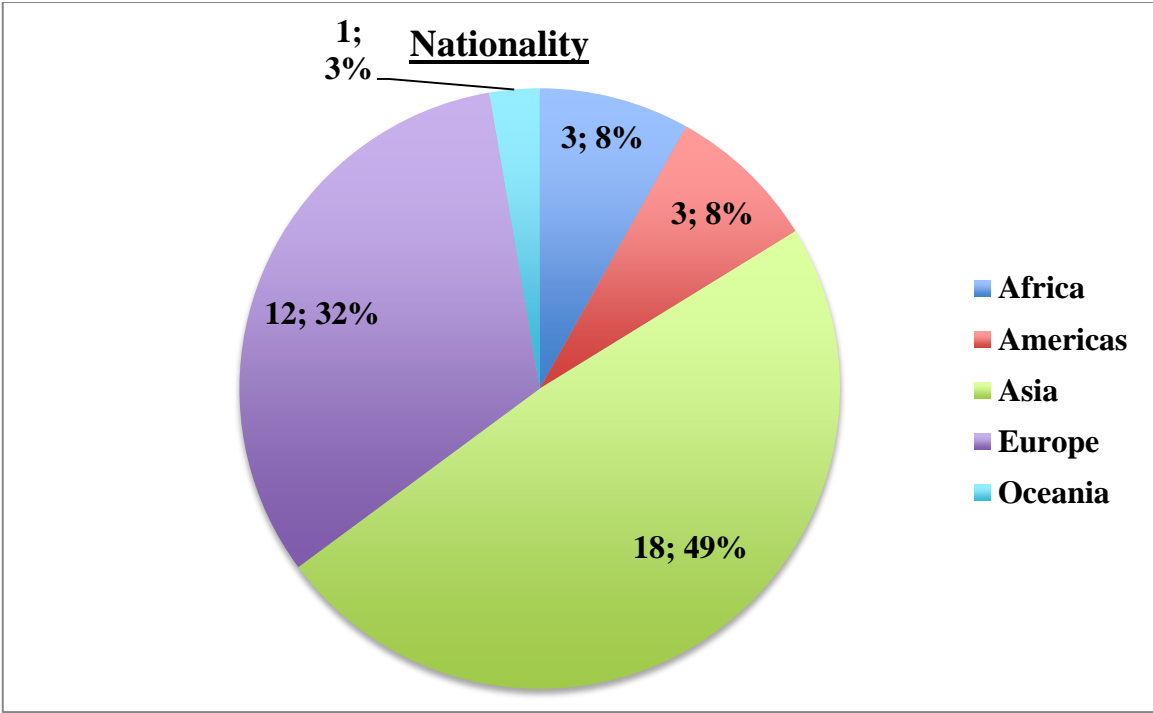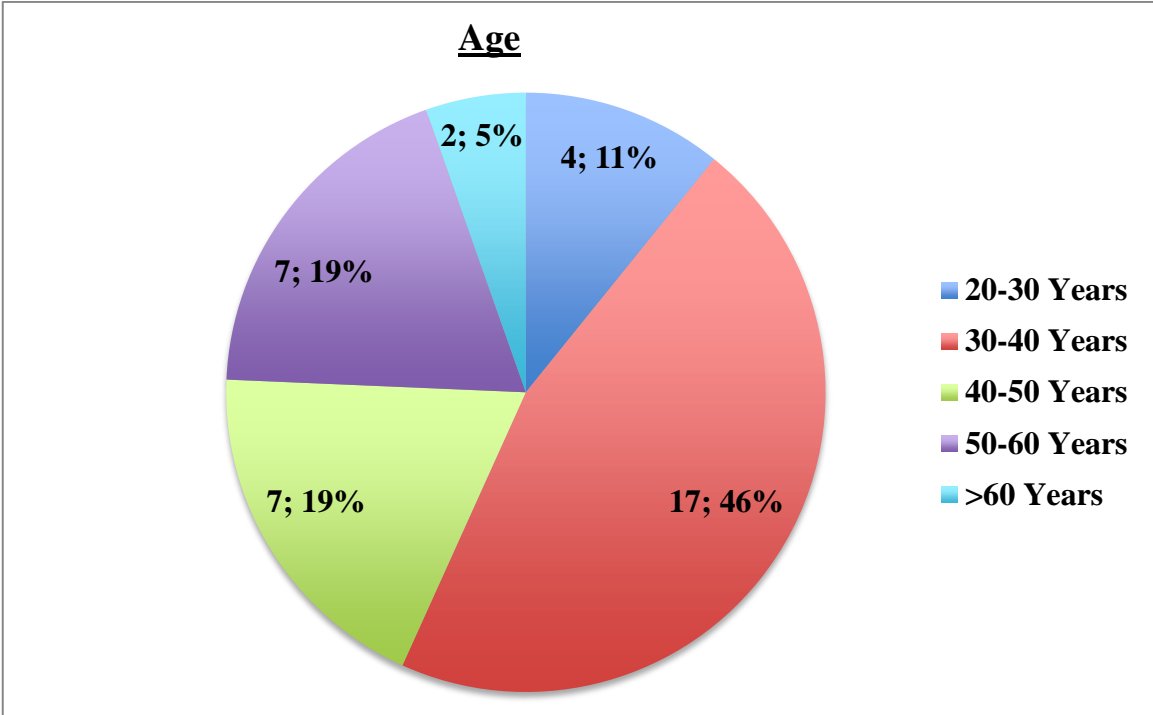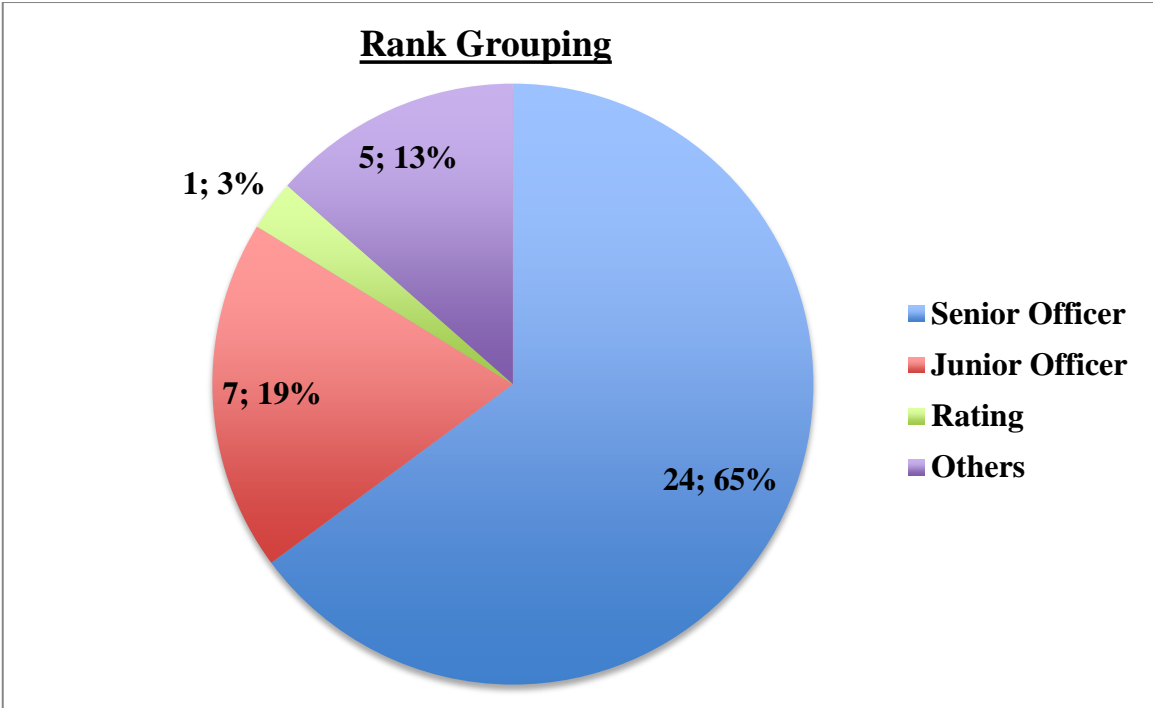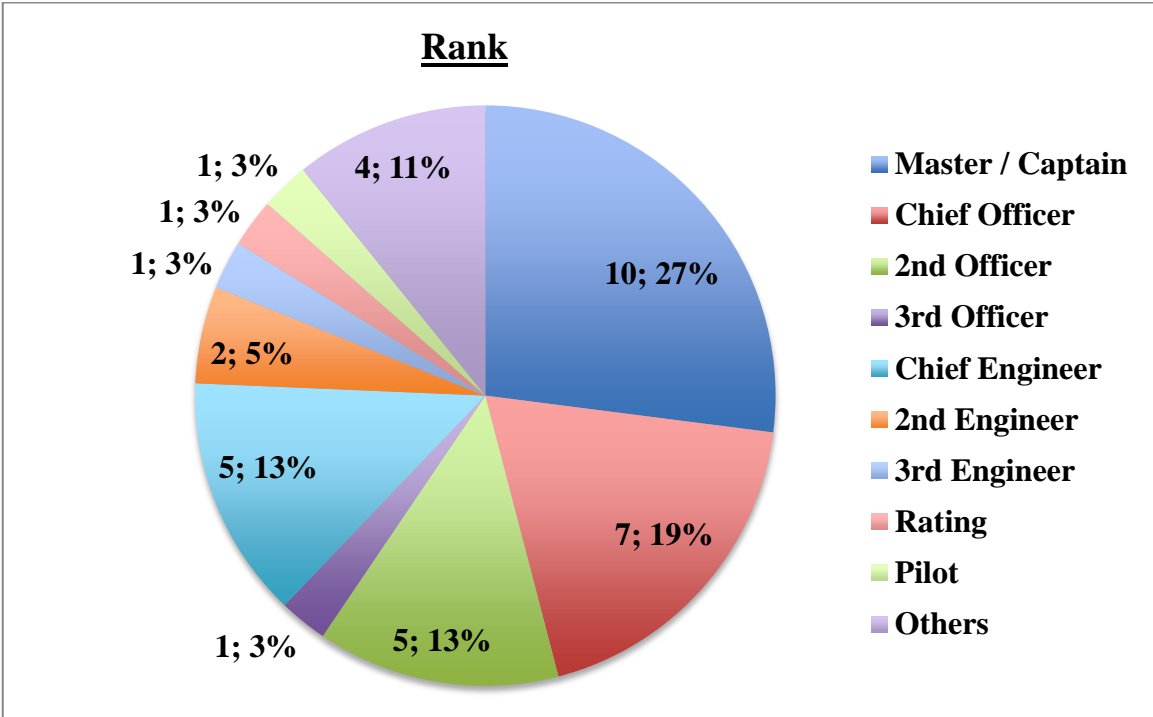
APPENDIX U – Criminalisation of seafarers (*Telegraph*, April 2011, p. 23)

What do you think are the most likely causes of being criminalised?

Cause	Value
Pollution (oil/air)	164
Collision	72
Scapegoat for third party incidents/blame culture	26
Injury/death of a crew member/passenger	17
Condition of vessel or equipment	14
Accident caused by fatigue	11
Drugs	10
An infringement of local law	10
Other	10
Corruption	6
Accidents (not specified)	5
Ignorance & generalisations	5
Incorrect/incomplete documentation (including visa)	5
MARPOL offences	4
Pornography	2
Alcohol	2

Areas where seafarers most fear criminalisation (out of 580)

Area	Value
North America	325
Europe	118
Africa	114
Middle East	106
Far East	89
Oceania	27
Central & South America	24
All	13

APPENDIX V – Forms of unfair treatment (*Telegraph*, April 2011, p. 24)

APPENDIX W – Social Readjustment Rating Scale (SSRS)

Social Readjustment Rating Scale (SRRS)

Source: Holmes, T.H. & Rahe, R.H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research, 11*, 213-218

1. Death of a spouse	100
2. Divorce	73
3. Marital Separation	65
4. Jail term	63
5. Death of a close family member	63
6. Personal injury or illness	53
7. Marriage	50
8. Fired at work	47
9. Marital reconciliation	45
10. Retirement	45
11. Change in health of family member	44
12. Pregnancy	40
13. Sex difficulties	39
14. Gain of a new family member	39
15. Business readjustments	39
16. Change in financial state	38
17. Death of a close friend	37
18. Change to different line of work	36
19. Change in no. of arguments with spouse	35
20. Mortgage over $ 50,000	31
21. Foreclosure of mortgage	30
22. Change in responsibilities at work	29
23. Son or daughter leaving home	29
24. Trouble with in-laws	29
25. Outstanding Personal achievements	28
26. Wife begins or stops work	26
27. Begin or end school	26
28. Change in living conditions	25
29. Revision of personal habits	24
30. Trouble with boss	23
31. Change in work hours or conditions	20
32. Change in residence	20
33. Change in school	20
34. Change in recreation	19
35. Change in religious activities	19
36. Change in social activities	18
37. Loan less than 50,000	17
38. Change in sleeping habits	16
39. Change in no. of family get- together	15
40. Change in eating habits	15
41. Vacation	13
42. Holidays	12
43. Minor violation of laws	11

SCORING

Each event should be considered if it has taken place in the last 12 months. Add values to the right of each item to obtain the total score.

Your susceptibility to illness and mental health problems:

Low < 149   Mild 150-200   Moderate 200-299   Major >300