



**SIGNIFICANCE OF MEDICAL EXAMINATION OF SEAFARERS:
A DESCRIPTIVE STUDY ABOUT
MARITIME INDUSTRY**

**RESEARCH DISSERTATION
For the Swiss School of Business and Management**

DBA Program

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RESEARCH DISSERTATION

For the Swiss School of Business and Management

DBA Program

Declaration

This is to declare that the study entitled “SIGNIFICANCE OF MEDICAL EXAMINATION OF SEAFARERS” is prepared for the fulfillment of the **Dissertation** of the **Doctor of Business Administration** (Global DBA) by me under the guidance of **Dr. Hrvoje Volarevic**

I confirm that this dissertation truly represents my work. This work is not a replication of work done previously by any other person. I also confirm that the contents of the report and the views contained therein have been discussed and deliberated with the research guide/mentor.

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EXECUTIVE SUMMARY

Significance of Medical Examination of Seafarers: A Descriptive Study About the Maritime Industry

The maritime industry plays a crucial role in global trade by enabling the movement of goods and services across international waters.

At the heart of this industry are seafarers, who operate vessels under challenging conditions that demand optimal health and fitness. Given the nature of their work—long voyages, physically demanding tasks, and limited access to medical care—ensuring their medical readiness before embarking on a voyage is crucial. This study explores the awareness and satisfaction levels of Indian seafarers regarding Pre-Employment Medical Examination (PEME), highlighting its significance in promoting maritime health and operational efficiency.

Study Focus and Objectives

This research aims to:

- **Analyze Regulatory Frameworks:** Discuss national and international medical standards governing seafarers, including compliance with the International Labour Organization (ILO), International Maritime Organization (IMO), and Maritime Labour Convention (MLC) 2006 regulations.
- **Evaluate Awareness:** Assess Indian seafarers' knowledge and understanding of PEME procedures, including their scope, importance, and regulatory requirements.
- **Measure Satisfaction Levels:** Examine how satisfied seafarers are with PEME protocols and whether they feel the medical examinations adequately assess their fitness for duty.



- Identify Common Health Issues: Highlight prevalent medical conditions among Indian seafarers and their potential impact on occupational performance and maritime safety.
- Benefits of PEME (pre-employment medical examination) to the Maritime Industry.

Key Findings

- Regulatory Compliance Gaps: Although India follows MLC 2006, STCW Code, and Merchant Shipping Rules, certain disparities exist in the standardization of medical screening practices, which may affect the trust and effectiveness of PEME.
- High Awareness with Minor Gaps: Most Indian seafarers are well-informed about PEME procedures, with strong understanding across core medical tests. Some uncertainty exists around less frequently encountered screenings.
- Satisfaction Levels Are High: Most Indian seafarers regard PEME as purposeful and beneficial, particularly in early disease detection and overall health assessment. Few expressed neutral views, highlighting scope for further refinement.
- Prevalent Health Conditions: Common health concerns among Indian seafarers include hypertension, diabetes, obesity, hearing loss, musculoskeletal disorders, and mental health challenges—reinforcing the necessity of comprehensive PEME protocols.
- Enhanced crew health, risk reduction, and cost savings are direct benefits of pre-employment medical examinations.

Recommendations for the Maritime Industry

1. Strengthen Awareness Campaigns – Employers and regulatory bodies must educate seafarers on the scope and necessity of PEME through workshops, online training, and onboard briefings.



2. Enhance Standardization & Transparency – Ensuring uniform medical screening protocols across different clinics will reduce inconsistencies and improve trust among seafarers.
3. Expand Psychological Health Evaluations – Mental health screening should be integrated into PEME protocols, as maritime workers face high stress levels and isolation that can affect performance.
4. Leverage Telemedicine for Remote Health Support – Using telehealth solutions can help seafarers receive preliminary medical guidance before undergoing full examinations, thereby reducing procedural delays.
5. Regulatory Improvements & Industry Collaboration – Policymakers must review PEME frameworks regularly, ensuring medical assessments align with evolving health risks and industry demands.

Conclusion

Medical examinations are a critical component of seafarer health management, ensuring fitness for duty and minimizing operational risks in the maritime industry. Given India's significant role in global seafaring, further development of Pre-Employment Medical Examination (PEME) protocols to enhance awareness, satisfaction, and standardization would greatly benefit both individual seafarers and the wider industry. By addressing knowledge gaps and enhancing medical evaluation practices, stakeholders can build a health-focused maritime work environment, ensuring safer seas and more resilient workforce operations.

KEYWORDS: *Pre-Employment Medical Examinations (PEME), Seafarers, ILO (International Labour Organization), IMO (International Maritime Organization), MLC Maritime Labour Convention (2006).*

CHAPTER 1

INTRODUCTION



CHAPTER 1: INTRODUCTION

1.1 Introduction

The Maritime industry is one of the largest global sectors, facilitating the movement of goods and people across international waters. It serves as the backbone of international trade, enabling commerce and economic interconnectivity among nations. As per the Indian Ministry of Shipping, approximately 95% of India's trade by volume and 70% by value is conducted via maritime transport (FICCI, 2025). This highlights the industry's critical role in global logistics and supply chains.

Despite advancements in technology—such as automation, artificial intelligence, and remote-controlled vessels—the maritime industry still heavily relies on human resources. Seafarers remain integral to the safe operation, navigation, and maintenance of ships. There are approximately 1.89 million international seafarers worldwide, and they play a vital role in sustaining modern lifestyles by keeping maritime trade flowing efficiently (The Mission to Seafarers. n.d.).

India ranks third globally in supplying seafarers, accounting for 9.35% of the world's maritime workforce (DG Shipping, 2017). The health and well-being of these professionals are crucial for maritime operations, as the demanding nature of their work involves long voyages, isolation, exposure to environmental hazards, and limited medical facilities onboard.

Recognizing the need for ensuring seafarer fitness, international organizations such as the International Labour Organization (ILO) and the International Maritime Organization (IMO) mandate Pre-Employment Medical Examination (PEME) as an essential criterion for maritime employment. Every seafarer must undergo rigorous medical screenings before joining a vessel, ensuring they possess a valid medical certificate in accordance with industry standards.

This research examines awareness and satisfaction levels regarding PEME among Indian seafarers, evaluating its effectiveness in safeguarding seafarers' health, enforcing regulatory compliance, and enhancing industry-wide standards.

1.2 International Labour Organization (ILO)

The International Labour Organization (ILO), founded in 1919, serves as a specialized agency of the United Nations dedicated to the formulation of international labor standards. It is the only tripartite UN agency, bringing together governments, employers, and workers to collaboratively establish fair labour standards.

ILO's Role in Maritime Health and Safety

ILO plays a critical role in protecting maritime workers, ensuring that labour conditions meet international human rights and safety standards. The organization has introduced several conventions aimed at improving seafarer health assessments and welfare:

- Medical Examination of Young Persons (Sea) Convention, 1921 (No. 16) – One of the first conventions mandating medical screenings for young seafarers. (Wikipedia Contributors, 2025)
- Medical Examination (Seafarers) Convention, 1946 (No. 73) – Standardized health evaluations for seafarers across nations. (Sectoral Activities Programme ILO/IMO/JMS/2011/12 Guidelines on the medical examinations of seafarers INTERNATIONAL LABOUR OFFICE, GENEVA, n.d.)
- Maritime Labour Convention (MLC, 2006) – A comprehensive framework that consolidates earlier medical conventions and sets minimum health and employment standards for maritime professionals worldwide. (Maritimeeducation.com, 2024)

These conventions reinforce global medical uniformity for seafarers, ensuring standardized health assessments, employment protections, and fair working conditions.

Image 1: ILO Flag



Source: Google

ILO FLAG: The blue flag with the ILO emblem in the center symbolizes the organization's commitment to promoting social justice and internationally recognized human and labor rights.

1.3 International Maritime Organization (IMO)

Founded in 1948, the International Maritime Organization (IMO) operates as a specialized United Nations agency, responsible for developing and overseeing global maritime regulations. Its core mission is to enhance safety, security, and environmental standards within the shipping industry.

The effectiveness of the shipping industry, a truly international sector, hinges on globally agreed-upon regulations and standards that are consistently adopted and implemented. The International Maritime Organization (IMO) serves as the crucial platform where this indispensable international collaboration takes place.



IMO covers all aspects of international shipping, including ship design, construction, equipment, manning, operation, and disposal to ensure that all the vitals are safe, sound, secure, and energy efficient.

The International Maritime Organization (IMO) plays a crucial role in shaping global maritime regulations, ensuring safety, environmental protection, and operational efficiency across the shipping industry.

Key IMO Conventions Affecting Maritime Health

- Safety of Life at Sea (SOLAS) – Establishes comprehensive ship safety standards, including construction, equipment, and operational protocols.
- International Convention for the Prevention of Pollution from Ships (MARPOL) – Sets international standards for minimizing environmental pollution from shipping activities.
- Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) – This international convention establishes uniform standards for the training, certification, and medical fitness of seafarers across the globe.

Through its collaborative efforts with the ILO, the IMO ensures that maritime medical assessments align with global safety and health regulations, reducing medical risks for seafarers at sea.

The International Maritime Organization (IMO), through the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW) 1978, as amended, mandates that seafarers possessing certificates under the Convention must also hold a valid medical certificate in accordance with Regulation I/9 and Section A-I/9 of the STCW Code.

However, national fitness standards for seafarers differ significantly across various countries. (IMO, 2019)

Image 2: IMO Flag



Image Source: Google

IMO Flag: IMO Flag is light Blue with IMO Logo in the center, symbolizing the organization's commitment to safe, secure, and efficient shipping on clean oceans.

The International Labour Organization (ILO) established the Medical Examination of Young Persons (Sea) Convention, 1921 (No. 16), establishing requirements for health assessments of young seafarers. This was later succeeded by the Medical Examination (Seafarers) Convention, 1946 (No. 73), which set uniform standards for medical evaluations across different nations. Over time, these regulations were integrated into the Maritime Labour Convention, 2006 (MLC, 2006), creating a more comprehensive framework to safeguard seafarers' health and welfare.



1.4 Maritime Labour Convention (MLC, 2006)

The Maritime Labour Convention (MLC, 2006) is regarded as the "fourth pillar" of international maritime law, alongside SOLAS, MARPOL, and STCW. It serves as a global framework guaranteeing seafarers' rights, well-being, and working conditions. (www.dgshipping.gov.in, n.d.)

The 'bill of rights' for seafarers provides them with the fundamental rights of workers and also provides minimum international standards for living and working conditions (www.dgshipping.gov.in, n.d.).

These guidelines help in the standardization of minimum health requirements for service at sea across the world. Most maritime nations enforce regulations requiring all seafarers to possess a valid medical certificate. These rules aim to ensure that seafarers meet the necessary health standards before undertaking their duties. (*Guidelines on the medical examinations of seafarers, Sectoral Activities Programme, n.d.*)

MLC 2006 as amended is the key to carrying out all the PEMEs. MLC 2006 Regulation 1.2 - Medical Certificate states that the seafarers who have joined the duty are medically fit. (www.edumaritime.net, n.d.).

Medical Certificate Requirements Under MLC 2006

According to Regulation 1.2, all seafarers must:

- Undergo routine medical examinations to verify fitness for maritime service.
- Meet internationally recognized health standards to ensure operational efficiency.
- To remain eligible for employment on maritime vessels, seafarers must hold a valid medical certificate. This certification confirms their fitness for duty, ensuring compliance with international health and safety standards, such as those outlined in the **Maritime Labour Convention (MLC, 2006)**. Regular medical assessments help safeguard both individual well-being and operational efficiency



India implements MLC 2006 through its Merchant Shipping Rules, 2016, ensuring compliance with internationally recognized medical protocols.

1.5 Medical Examination Rules 2000, as amended, Directorate General of Shipping, Government of India.

India, as a leading maritime nation, has implemented stringent medical examination regulations for seafarers through the Ministry of Surface Transport (Department of Shipping) under the Central Government. These regulations are essential to ensuring that all seafarers meet the required medical fitness standards before undertaking their duties onboard ships. The medical examination of seafarers plays a crucial role in maritime workforce management, safeguarding individual health and safety while also enhancing operational efficiency and mitigating risks within the industry. Sections 98 and 111 of the **Merchant Shipping Act, 1958**, legally mandate that every seafarer, regardless of age, must possess a valid medical certificate confirming their fitness for duty (Government of India, 1958).

Issuance and Compliance Standards for Medical Certificates

Medical certificates issued to seafarers must comply with the following regulations:

- **Merchant Shipping (Medical Examination) Rules, 2000**, as amended (Directorate General of Shipping, 2000).
- **STCW 2010 Convention**, which sets internationally recognized standards for maritime training, certification, and watchkeeping (International Maritime Organization, 2010).
- **ILO and WHO guidelines** for conducting pre-sea and periodic medical fitness examinations for seafarers (International Labour Organization & World Health Organization, 2013).
- **Merchant Shipping (Medical Examination) Rules, 2016**, specifically Rule No. 5, which governs medical fitness examinations in India (Directorate General of Shipping, 2016).



Validity and Renewal of Medical Certificates

To ensure continued fitness for duty, medical certificates issued to seafarers must adhere to the following validity criteria:

- **General Validity:** Certificates remain valid for two years for seafarers aged 18 and above.
- **Underage Seafarers:** Those below 18 years receive medical certificates valid for up to one year.
- **Extension Upon Expiry During a Voyage:** If a medical certificate expires while a seafarer is at sea, it remains valid until the next accessible port, where an authorized Medical Examiner of Seafarers can conduct a new assessment.
- **Extension Limitations:** The extension period cannot exceed three months, ensuring timely renewal and compliance with STCW and ILO health requirements.

Legal Framework Governing Medical Examinations in India

The **Merchant Shipping Notification**, dated 19 January 2000, officially introduced the **Medical Examination Rules 2000**, which regulate health assessments for seafarers in India (Directorate General of Shipping, 2000). These rules were established under the authority of the Ministry of Surface Transport (Department of Shipping), Government of India, pursuant to:

- **Sub-section (3) of Section 98 of the Merchant Shipping Act, 1958**, granting the Central Government authority to draft rules concerning seafarer qualifications, competency examinations, certification, and employment standards (Government of India, 1958).
- **Clauses (a) and (c) of Sub-section (1) of Section 113**, detailing offenses and penalties related to non-compliance with maritime health regulations, employment standards, and vessel operations.

Key Legislative Provisions

1. **Section 98 of the Merchant Shipping Act, 1958:** Grants the Central Government the power to formulate rules governing:
 - Competency qualifications for seafarers.
 - Certification procedures ensuring adherence to maritime standards.



- Employment regulations governing seafarers serving aboard Indian-flagged vessels.
- 2. **Sub-section (3) of Section 98:** Defines the scope and implementation of medical examination standards, including:
 - Eligibility criteria for Indian seafarers seeking certification.
 - Content of competency examinations to assess fitness for duty.
 - Issuance of medical certificates confirming adherence to required health standards.
- 3. **Section 113 of the Merchant Shipping Act, 1958:** Establishes penalties for violations of medical examination guidelines, including:
 - Fines and penalties for non-compliance with medical certification regulations.
 - Sanctions against shipowners, employers, and crew members violating medical safety protocols.

Significance of the Merchant Shipping Act, 1958

The **Merchant Shipping Act, 1958** remains one of the most comprehensive legislative frameworks governing maritime safety, seafarer employment, environmental protection, and regulatory compliance. It ensures that Indian shipping operations align with international health, employment, and safety standards, fostering a secure maritime environment for all stakeholders (Government of India, 1958).

Amendments to Medical Examination Rules

Recognizing evolving maritime health risks, the **Medical Examination Rules 2000** were amended on 29 January 2016 by the Ministry of Shipping, leading to the formation of the **Merchant Shipping Amendment (Medical Examination) Rules, 2016**. These amendments introduced enhanced medical assessment protocols, ensuring greater compliance with industry health challenges (Directorate General of Shipping, 2016).

1.6 Protection & Indemnity (P&I) Clubs and Their Role in PEME

Protection and Indemnity (P&I) Clubs provide liability insurance to shipowners, covering costs related to crew medical treatments, repatriations, and accident claims. Many P&I Clubs have



developed enhanced PEME programs, ensuring that medical screenings detect hidden illnesses before seafarer's board vessels.

The P&I Clubs PEME Scheme is an initiative introduced by P&I (Protection and Indemnity) clubs to enhance crew health and reduce the risk of crew claims arising from pre-existing medical conditions. Some key points about the scheme are that:

i.) Purpose: The PEME (Pre-Employment Medical Examination) scheme aims to ensure that crew members recruited for seafaring positions are fit for duty and do not have significant pre-existing health conditions that could impact their ability to work onboard ships.

ii.) Implementation: The scheme typically involves a comprehensive medical examination conducted before crew members are hired. This examination assesses various aspects of the crew member's health, including physical fitness, vision, hearing, and overall well-being.

iii.) Components of the PEME Examination:

Medical History: Crew members provide details about their medical history, including any past illnesses, surgeries, or chronic conditions.

Laboratory Tests: Blood and urine tests, and other diagnostic tests may be performed.

Physical Examination: A qualified medical professional conducts a thorough physical examination.

Vision and Hearing Tests: Ensures crew members meet the required standards.

Fitness Assessment: Evaluates overall physical fitness.

Benefits:



- **Risk Reduction:** By identifying potential health issues early, the scheme helps prevent crew members with undisclosed medical conditions from joining ships. This reduces the risk of medical emergencies at sea.
- **Cost Savings:** P&I clubs benefit from reduced claims related to pre-existing conditions, leading to cost savings.
- **Enhanced Crew Health:** Ensuring crew members are fit for duty contributes to safer and more efficient ship operations. (UK P&I, n.d.)

Collaboration: The scheme involves collaboration between P&I clubs, shipowners, and approved medical clinics or practitioners. Approved clinics adhere to specific guidelines set by the clubs.

The specifics of the PEME scheme may vary among different P&I clubs, but the overall goal remains consistent: promoting crew health and safety in the seafaring industry.

P&I-backed medical assessments reinforce reliable and risk-free maritime employment, ensuring safer voyages for seafarers worldwide.

1.7 Research Problem

The Pre-Employment Medical Examination (PEME) is an essential tool used to evaluate the fitness of seafarers before they embark on maritime duties. It follows internationally recognized guidelines, primarily set by the Maritime Labour Convention (MLC, 2006) and other global maritime health standards.

India, being the third-largest provider of seafarers globally, plays a crucial role in the maritime workforce. Given the stringent operational demands of the industry, ensuring the medical fitness of Indian seafarers is of utmost importance. However, challenges persist regarding awareness, understanding, and compliance with PEME procedures.

Key Issues Identified in the Research

- **Standardization and Variability:** Differences in PEME protocols across clinics may lead to inconsistencies, affecting trust in medical certifications.



- **Limited Awareness Among Seafarers:** Many seafarers lack sufficient knowledge about the scope and importance of PEME, which may lead to inadequate preparation before medical assessments.
- **Concerns About Examination Transparency:** Some maritime workers perceive medical screenings as bureaucratic hurdles rather than essential health checks.
- **Medical Findings Impacting Employment:** Temporary or permanent disqualification due to medical conditions raises concerns among seafarers regarding job security and future career prospects.

Since ships operate in isolated environments where medical intervention is limited, ensuring seafarers understand and comply with PEME protocols is essential to prevent avoidable health risks, medical emergencies, and operational disruptions. This study explores the perspectives of Indian seafarers, examining how they view PEME procedures, challenges, and areas for improvement.

Image 3: Image of s Ship



Source: Internet

1.8 Purpose of Research

The Study done by the researcher is a descriptive study to understand the importance of PEME in the Indian seafarers. The researcher will check with the Indian seafarers, appreciate their understanding of pre-employment medical examinations.

The purpose of this research is to evaluate the awareness and satisfaction levels of Indian seafarers regarding Pre-Employment Medical Examination (PEME) and its impact on employment, health, and maritime industry standards.

Research Objectives:

This paper has the following objective:

1. To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.
2. To evaluate the awareness of medical examinations among seafarers
3. To measure the satisfaction level of seafarers for medical examinations
4. To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.
5. To list the benefits of medical examination to the Maritime Industry.

1.9 Significance of Study

PEME plays a crucial role in ensuring that seafarers are physically and mentally fit for duty, thereby safeguarding maritime operations. The significance of this study extends to multiple stakeholders within the industry, including seafarers, shipowners, health professionals, and regulators.

Why This Study Matters

- For Seafarers: Ensuring that medical examinations provide accurate and transparent results that do not unfairly impact employment.
- For Employers & Shipowners: Reducing medical repatriation costs by ensuring seafarers are fully fit before deployment.
- For the Indian Maritime Industry: Establishing consistent PEME protocols that align with international standards while addressing regional challenges.
- For Policymakers & Regulators: Strengthening compliance with MLC 2006 and STCW, ensuring Indian seafarers meet global health and safety requirements.



Enhancing Pre-Employment Medical Examination (PEME) protocols and promoting greater awareness can help India foster a healthier, safer, and more efficient maritime workforce. Strengthening these measures ensures seafarers meet essential health standards, contributing to improved operational safety and industry sustainability.

1.10 Research Purpose and Questions

Previous research has often focused on checking students' awareness levels (not seafarers) regarding PEMEs. Somewhat similar researches have been done on Phillipines seafarers and on Chinese seafarers. However, there was a lack of data on Indian seafarers, which prompted the researcher to explore the awareness levels of Indian seafarers concerning the mandatory medical examinations they undergo before joining any vessel.

This study aims to investigate the effectiveness of PEME in the maritime industry and its awareness among Indian seafarers.

Key Research Questions

1. How aware are Indian seafarers of PEME medical tests and their implications?
2. What is the level of satisfaction among seafarers regarding current medical examination procedures?
3. What are the most common health issues identified among Indian seafarers through PEME?
4. How aligned are India's current PEME practices with international maritime health regulations?
5. How beneficial is pre-employment medical examination to maritime industry?

The findings from this study will provide critical insights into PEME execution, highlighting its strengths, weaknesses, and areas for improvement.

1.11 Common Health Issues Faced by Indian Seafarers

Indian seafarers encounter numerous occupational health risks that affect their fitness for duty. Based on PEME evaluations, the most commonly diagnosed medical conditions include:

Physical Health Issues

- Hypertension & Cardiovascular Disease – Due to high stress levels, irregular sleep, and unhealthy diet patterns.
- Obesity & Metabolic Disorders – Caused by limited physical activity and poor nutrition while onboard ships.
- Musculoskeletal Disorders – Resulting from heavy lifting, prolonged standing, and repetitive movements.

Infectious & Environmental Diseases

- Respiratory Illnesses – Exposure to ship pollutants, poor ventilation, and tobacco use.
- Skin Infections & Dermatitis – Caused by prolonged exposure to seawater, chemicals, and humid conditions.
- Sexually Transmitted Diseases (STDs) – Risks associated with shore leave and overseas travel.

Mental Health Challenges

- Depression & Anxiety – Due to long periods of isolation, separation from family, and high-pressure workloads.
- Sleep Disorders – Disruptions in circadian rhythm due to irregular shift patterns.

Addressing these conditions through PEME screenings, health awareness programs, and industry reforms can significantly enhance the overall well-being and performance of Indian seafarers.



1.12 Personal Health & Safety

PEME verifies that seafarers meet the necessary physical fitness standards to carry out their responsibilities at sea, safeguarding both their personal well-being and overall workplace safety.

Key Benefits of PEME

- Early Detection of Medical Conditions – Identifies hidden health risks before deployment.
- Reduced Workplace Accidents – Ensures seafarers are mentally alert and physically capable of handling maritime tasks.
- Prevention of Contagious Diseases – Helps detect and manage infectious illnesses before they spread onboard.

By prioritizing seafarer health, PEME contributes to a safer, more efficient maritime workforce.

1.13 Emergency Preparedness

Medical screenings also evaluate seafarers' ability to respond to emergencies, ensuring they are capable of:

- Firefighting & Evacuations – Physically fit to operate fire suppression systems and life-saving equipment.
- Medical Crisis Management – Capable of administering first aid and handling onboard medical emergencies.
- Survival & Rescue Operations – Fit enough to participate in lifeboat drills and water survival scenarios.

A well-executed PEME enhances a seafarer's ability to protect themselves and others during onboard emergencies.

1.14 Compliance with Regulations

PEME follows strict international maritime conventions, ensuring seafarers meet global health standards:

- MLC 2006 – Mandates valid medical certificates for maritime employment.
- STCW Code – Establishes mandatory fitness requirements for maritime workers.
- Merchant Shipping Rules, India – Aligns national medical protocols with international standards.

By complying with these frameworks, India ensures that its seafarers remain globally competitive, reliable, and safe.

Image 4: Image of a seafarer on board



Source: Google

CHAPTER 2

LITERATURE

REVIEW

CHAPTER 2: LITERATURE REVIEW

This Chapter outlines the analysis of the literature related to the topic.

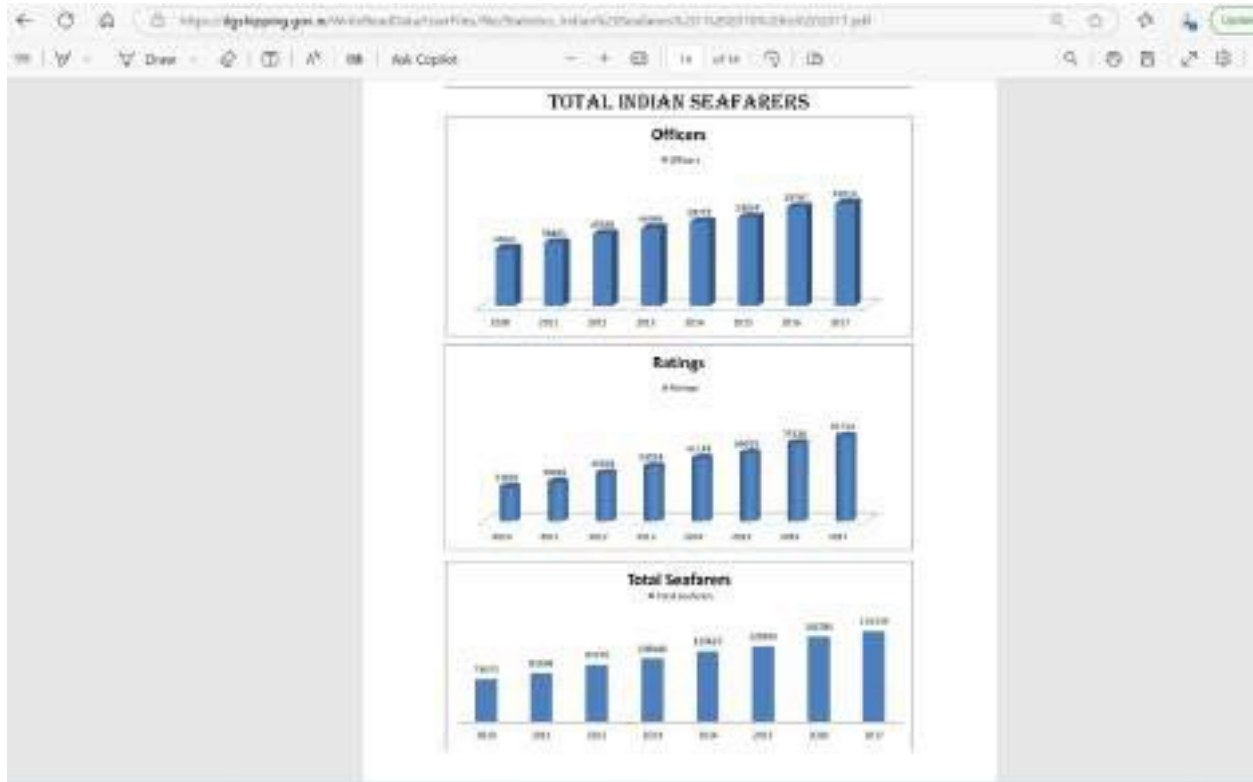
2.1 Introduction: Seafarer Health and Safety

Ensuring seafarers maintain good health is crucial for a safe, enjoyable, and productive maritime industry (Tan, 2022). The well-being of seafarers directly impacts maritime safety, efficiency, and operational effectiveness.

India ranks as the world's third-largest supplier of seafarers, trailing only China and the Philippines, and accounts for roughly 9.35% of the global seafarer workforce (NEXT IAS, 2024). Government policies aim to increase this share to 20% in the next 10 to 20 years, emphasizing the industry's growing significance.

The rise in Indian seafarers has been remarkable - employment on Indian and foreign flag vessels increased by 42.3% between 2013 and 2017, growing from 108,446 to 154,349 (DG Shipping, 2017). India ranks 4th for Officers and 5th for Ratings in global seafarer supply (Bahtić, 2021). However, this expansion brings challenges in medical awareness and healthcare accessibility that require further investigation.

Below is the screenshot of pdf link on official website of Directorate General Shipping India showing “Statistics of Indian Seafarers 2010-2017”



Source:

https://dgshipping.gov.in/WriteReadData/UserFiles/file/Statistics_Indian%20Seafarers%20-%202010%20to%202017.pdf

The medical care for seafarers must not be temporary but a continuous, long-term medical follow-up, especially today when the safety at sea has become more stressed.

2.2 Medical Care and Awareness Among Seafarers

Seafarers work long, strenuous shifts, including day and night rotations, often exposed to harsh environments. Continuous medical monitoring is essential—not merely pre-employment examinations, but long-term healthcare follow-up (Saarni, 2003). The importance of routine medical check-ups for seafarers is now stressed more than ever, considering safety concerns and regulatory requirements (Hansen, Tüchsen & Hannerz, 2005).

Despite significant research on seafarers globally, studies focusing on Indian seafarers remain limited. This gap motivated the present research, aiming to examine awareness levels regarding medical examinations among Indian seafarers, and how this knowledge impacts their career longevity and health outcomes. This made the researcher eager to find out the situation of Indian seafarers which will help the Indian Shipping companies.

2.3 Existing Research on Seafarer Health Awareness

- **Maritime Student Awareness**

Sarmiento (2015) examined maritime students' level of awareness regarding medical examinations in his study. Using questionnaires, the study found that students considered medical tests essential for pursuing a maritime career, with an awareness score of 3.84 (Asia Pacific Journal of Maritime Education, 2015). This suggests that health consciousness is embedded early in maritime training.

- **Chinese Seafarers' Health Rights**

Zhang and Zhao (2017) studied Chinese seafarers' medical rights, health protection, and onboard care, identifying major health issues and certification challenges. Their research highlighted inconsistencies in medical checkups, leading to new maritime health standards. The study sought



to examine the status of Chinese seafarers' rights concerning health protection and onboard medical care. The paper's objective was to examine the main health issues that Chinese seafarers face and also to investigate the main problems concerning medical examination and certification faced by Chinese seafarers. The paper concluded with many health issues faced by Chinese seafarers after which a wide range of standards were introduced.

The present study mirrors this research but focuses on Indian seafarers to explore awareness, satisfaction, and improvement areas.

2.4 Role of Telemedicine in Seafarer Healthcare

Sagaro et al. (2021) proposed telemedicine solutions for pre-employment medical exams and follow-ups aboard ships. Their study examined electrocardiograms (ECG), spirometry tests, blood glucose monitoring, and urinalysis, advocating for remote screening protocols in periodic medical exams. As the number of Indian seafarers continues to rise, integrating telemedicine could greatly enhance their access to healthcare services.

Image 5: Image of a Shore Doctor providing Telemedical Advice



Source: Sharma, H. (2021).

2.5 Level of awareness and importance of medical examinations among maritime students.

Mervin Carl E. et al. (2015) conducted a study on maritime students, aiming to assess their awareness and the significance of medical examinations in their field. The study further recommended the implementation of a program to strengthen maritime students' understanding of the medical examinations required for seafarers. Although the findings indicated that students were already familiar with these examinations, development programs were introduced to strengthen their understanding and knowledge.

2.6 Pre-Employment Drug Testing and Safety

Pachman, J. (2009) conducted a study for the International Labor Organization, highlighting that around 80% of global drug testing was carried out during the pre-employment phase. Similarly, pre-employment drug testing was performed by 98% of companies in the USA, while only 3% of companies did this in 1986. However, 80% of the companies never performed a cost-effective analysis. It appeared that pre-employment testing did not impact on reducing either absenteeism or productivity and so White has suggested that there is insufficient support for drug testing programs as pre-employment tools.

Fox, Jon Myron (2013) assessed the association between Pre-employment Drug screening and fewer accident and injury cases. www.proquest.com. (n.d.).

The present research is closely related to the paper, Maritime Health of Chinese seafarers. What is missing from past studies is the Importance of medical examinations and their awareness among Indian seafarers.

India is a diverse nation with varied lifestyles, socio-economic conditions, literacy, etc. hence the health issues are different from those of the developed nations.

Image 6: Image of Indian Seafarers



Source: Indian Seafarers (2023)

2.7 Unique Challenges for Indian Seafarers

India's seafarers come from diverse socio-economic backgrounds, spanning urban centers, coastal regions, and rural areas. This heterogeneity introduces unique challenges in medical awareness, accessibility, and health risks, distinguishing them from seafarers in developed nations.

- **Geographic & Environmental Influences**

Regional health disparities – Seafarers from rural areas often face limited healthcare access before joining maritime professions, leading to lower awareness of pre-employment medical requirements.

Climate adaptation – Indian seafarers often transition from tropical conditions to cold oceanic climates, increasing susceptibility to respiratory illnesses and fatigue-related issues.

Exposure to occupational hazards – Prolonged working hours in extreme maritime environments create additional health risks that demand regular medical monitoring (Hansen, Tüchsen & Hannerz, 2005).

- **Dietary & Lifestyle Factors**

Nutritional differences – Indian dietary habits vary widely, influencing nutritional deficiencies compared to international counterparts who follow standardized maritime diets. Health risks due to cultural habits – Some Indian seafarers may have higher tendencies toward conditions like diabetes, hypertension, and gastrointestinal issues, requiring customized health programs(Saarni,2003).

Impact of work shifts – Irregular working hours, long durations at sea, and sleep deprivation exacerbate mental health concerns and physical exhaustion among Indian maritime professionals.

- **Socioeconomic & Educational Barriers**

Access to medical education – Unlike developed nations, where maritime medical training is standardized, Indian seafarers may lack awareness about preventive healthcare due to varying levels and accessibility gaps.

Financial constraints – Many Indian seafarers come from economically modest backgrounds, meaning they may avoid seeking medical care unless mandated by employers or regulatory requirements (DGShipping,2017).

Gaps in government healthcare policies – While India has expanded health insurance programs, there remains a need for specialized seafarer-focused healthcare regulations (NEXT IAS, 2024).

2.8 Limited Research & Need for Targeted Policies

Despite existing studies on Chinese and global seafarers, limited research explicitly focuses on Indian seafarers' medical awareness. Most maritime health studies concentrate on Western or East Asian populations, leaving Indian seafarers underrepresented in health research (Zhang & Zhao, 2017).

This study will help and give insights that will:

- Assist Indian shipping companies in implementing better health screening policies.
- Encourage policymakers to develop region-specific awareness programs.

Image 7: Image of Seafarer during Cargo operations



Source: Google (Seafarer's doing cargo operations)

2.9 Theory of Reasoned Action

In this study, the descriptive method will be used to analyze the awareness of medical examination among Indian seafarers, satisfaction level of seafarers concerning medical examinations.

The seafarers work long hours, and usually around-the-clock shifts (Hansen, Tiichsen, & Hannerz, 2005). Medical care for seafarers should not be a temporary measure but rather a continuous, long-term commitment. A follow-up is especially crucial in the present scenario, where maritime safety has gained increased emphasis (Saami, 2003).

(Wan et al., 2023) did a study on the Burnout and work ability, mental health of Chinese seafarers from the job demand resource model perspective. Here, the job demand resource (JD-R) model to integrate and extends previous studies to better understand, explain, and predict the relationships among relevant factors (such as the environment and burnout). Shuttleworth (2008) defines descriptive research as a scientific method focused on observing and documenting a subject's behavior without exerting any influence over it (Asia Pacific Journal of Maritime Education, Vol. 1, No. 1, January 2015)

In this study the main method to gather the data was a questionnaire prepared and approved by the researchers. The awareness level of maritime students was assessed. The result shows that the students considered medical examinations as very important to determine if the student is capable of pursuing the course and has the highest rank with a weighted mean of 3.84. Having a good health condition was the most important criteria to choose the maritime profession. In this study, researchers got to know that students are highly aware of the importance of medical examinations. The researchers have also studied the main problems with regard to medical examination and certification faced by Chinese seafarers; an interdisciplinary approach is used to get the data. The overall aim of this study was to investigate the conditions of Chinese seafarers' rights relating to their health protection and medical care on board ship. This paper has many objectives such as presenting a systematic review of the international standards regarding seafarers' physical requirements made by the international organizations, to examine the main health issues faced by Chinese seafarers. (Zhang and Zhao, 2017)

The researcher's paper is closely related to the paper of Zhang and Zhao, 2017, in which the Chinese seafarers were the subject to study.

In this paper Indian seafarers are the main subject to study.

CHAPTER 3

RESEARCH

METHODOLOGY

CHAPTER 3: RESEARCH METHODOLOGY

This chapter outlines the research methodology used to analyze the awareness, satisfaction, challenges, and industry benefits associated with Pre-Employment Medical Examination (PEME) among Indian seafarers. A mixed-method research approach is adopted, integrating both primary and secondary research methodologies to ensure a comprehensive assessment of PEME implementation and effectiveness. The chapter is divided into multiple sections that detail the objectives, data collection techniques, analytical framework, and study limitations.

3.1 RESEARCH MOTIVATION

The maritime industry is a critical driver of global trade and logistics, with seafarers playing a pivotal role in ensuring the smooth operation of merchant vessels. Unlike conventional workplaces, the maritime environment exposes seafarers to prolonged work durations, extreme weather conditions, isolation, and occupational hazards. Given these challenges, ensuring the physical and mental fitness of seafarers is crucial for operational safety and efficiency.

India, the most populous country in the world, hosts one-sixth of the global population (Wikipedia Contributors, 2019). As one of the largest providers of maritime professionals globally, India mandates that all seafarers undergo Pre-Employment Medical Examination (PEME) before being deployed at sea. These examinations are designed to detect underlying health conditions that could impact their ability to perform onboard duties safely. Seafarers visit medical centers affiliated with their shipping companies to undergo fitness evaluations while the companies organize briefing sessions and travel arrangements. If found fit, they receive fitness certificates and proceed to their offshore assignments. However, if health issues are detected during the medical, their fitness certification is put on hold, preventing them from joining seafaring/offshore duties until treatment is completed.

However, despite PEME being a regulatory requirement, challenges persist in its implementation, awareness, accessibility, and satisfaction among seafarers. Many seafarers have

limited knowledge of examination protocols, which leads to uncertainty regarding certification procedures and employment eligibility. Additionally, discrepancies in health screening across different medical centers, procedural delays, and varying satisfaction levels necessitate a deeper investigation into how PEME is perceived and implemented in India.

This study is motivated by the need to critically analyze awareness levels, satisfaction rates, and industry benefits associated with PEME while presenting a systematic review of maritime medical examination standards. Findings from this study will provide valuable insights for policymakers, shipping companies, and regulatory bodies, aiding in optimizing PEME frameworks and improving maritime health protocols.

The primary motivation for this study is to gauge the awareness among Indian seafarers about pre-employment medical examinations (PEME) conducted before their voyages. Additionally, the study seeks to understand the satisfaction level of seafarers with these medical examinations mandated by every shipping company.

3.2 OPERATIONALIZATION OF THEORETICAL CONSTRUCTS

Operationalization refers to defining abstract research concepts in measurable terms, ensuring structured data collection and meaningful analysis. This study explores five key constructs:

1. Systematic Review of Medical Examination Standards

- A comparative analysis will be conducted on global and national medical regulations, including:
 - ILO Maritime Labour Convention (MLC 2006) – Defines fitness criteria for seafarers.
 - IMO Standards of Training, Certification, and Watchkeeping (STCW 2010) – Establishes certification guidelines.
 - Merchant Shipping (Medical Examination) Rules, 2016 – Governs medical fitness examinations for Indian seafarers.
 - P&I Club PEME Guidelines – Insurance-backed screening protocols.
- This systematic review will highlight strengths, gaps, and areas requiring improvement.

2. Awareness of Medical Examinations

- Awareness levels will be assessed using structured survey questionnaire, investigating:
 - Seafarers' knowledge of PEME protocols.
 - Understanding of required health screenings.
 - Perceived importance of medical examinations in ensuring onboard safety.

The questionnaire is structured to assess their knowledge of various medical screening procedures, including physical examinations, blood tests, vision tests, psychological assessments, and disease detection.

Questionnaire is provided as an attachment at the end in the Appendix 5. The questions are as follows :-"Survey to Check the Awareness of PEME":

1. Pre-Employment Medical Examination (PEME) helps in early detection and treatment of medical conditions before going for service at sea.
2. Physical examination helps to find signs of any past or present medical conditions.
3. Identity verification helps to eliminate someone else appearing for medicals against one's name.
4. Medical history should be declared in full, and no information should be hidden.
5. All ongoing medication should be declared to the medical officer.
6. Vision check by Snellen Chart helps to assess distant vision of a person.
7. Color test by Ishihara book helps to assess any deficiencies of red, yellow, or green color.
8. Near vision check helps to assess the need for prescription glasses for reading purposes.
9. Blood pressure is an important indicator of heart health.
10. BMI is an important calculation for physical capability assessment.
11. Audiometry is done to assess the level of hearing.
12. Blood tests help to detect infections, kidney function, liver function, sexually transmitted diseases, cholesterol levels, sugar levels, etc.
13. Urine test helps to know more about kidney health and other health conditions.
14. ECG and treadmill test help to assess the health of the heart.

15. Chest X-ray helps to know the structure and health condition of the chest and its organs.
16. Dental examination helps to maintain teeth health, gums, and oral cavity.
17. Stool or fecal test helps to detect contagious health conditions in food handlers.
18. Psychological tests help in assessing emotional and mental well-being of a person.
19. Spirometry or lung function test is used to find respiratory health of a person.

Each question in the survey is structured to assess awareness of different aspects of PEME among seafarers, covering physical, vision, hearing, cardiovascular, and psychological health assessments. The survey provides five response options for each statement related to Pre-Employment Medical Examination (PEME) awareness. These responses allow seafarers to express their level of agreement or disagreement with the provided statements. The available responses are:

- Strongly Agree
- Agree
- Neutral
- Do not Agree
- Strongly Disagree

These response choices help in analyzing seafarers' understanding and awareness of PEME and various health assessments

3. Satisfaction with Medical Examination Implementation

- Satisfaction will be measured through Likert-scale survey responses, assessing:
 - Trust in examination accuracy.
 - Efficiency and transparency of screening procedures.
 - Access to medical facilities and assistance at sea.

The questionnaire is structured to assess the satisfaction level of seafarers for medical examinations.



Questionnaire is provided as an attachment at the end in the Appendix 5. The questions are as follows :-"Satisfaction level of seafarers for medical examinations"

1. Do you find any purpose in PEME done by employer?
2. Do you feel PEME helps you to find out if there are any underlying disease?
3. Do you see it as good tool to get your full health assessment done?
4. Do you see the PEME as an obstacle for your offshore career?

The responses allow seafarers to express their level of agreement or disagreement with the provided statements. The available responses are:

- Strongly Agree
- Agree
- Neutral
- Do not Agree
- Strongly Disagree

These response choices help in analyzing seafarers' level of satisfaction towards medical examinations.

These constructs will be examined using both quantitative and qualitative research methodologies, ensuring a holistic assessment of PEME implementation. To address the proposed research questions, the study focuses on seafarers visiting medical centers in Mumbai for PEME. This research is using a survey as a research method. The study targeted 1,500 seafarers, irrespective of their ranks or positions, to gather primary data. Research questionnaires were distributed to the seafarers after taking permission from the owner/director of the clinics. The primary data was collected from seafarers undergoing medical examinations. While waiting for their examination reports, seafarers used this time to complete the questionnaire.

The researcher collected primary data to answer the objectives, with statistics generated using the Shuttleworth theory (Shuttleworth, 2019). According to Shuttleworth, descriptive research



involves observing and describing a subject's behavior without influencing it. The questionnaire aids the researcher in achieving objectives.

The results may reveal whether seafarers recognize the importance of medical examinations or remain unaware. The satisfaction levels will also be assessed. The paper will present findings crucial to the maritime industry.

4. Health Challenges of Indian Seafarers

- The study will analyze common medical conditions detected in PEME, such as:
 - Hypertension, cardiovascular diseases, obesity, and respiratory illnesses.
 - Dental health deterioration and vision impairments.
 - Mental health challenges due to isolation and high-stress work environments.

5. Industry Benefits of Medical Examinations

- The research will evaluate PEME benefits to the maritime industry, focusing on:
 - Reduction in medical repatriation cases.
 - Improved workforce reliability and operational safety.
 - Cost efficiency and risk mitigation strategies.

3.3 PROBLEM STATEMENT

The safety and efficiency of maritime operations depend significantly on the physical and mental well-being of seafarers. Given the demanding nature of their profession, medical examinations play an essential role in ensuring that seafarers are fit for duty. However, despite being a mandatory global requirement, PEME is often viewed as a procedural hurdle rather than a preventive health measure, leading to limited awareness and concerns regarding examination transparency and employment security.

Additionally, Indian seafarers frequently experience lifestyle-related health issues such as high blood pressure, metabolic disorders, muscle strains, vision impairment, and mental stress, yet early detection and intervention through PEME remain underexplored. Furthermore, disparities



in medical screening protocols, variations in certification validity, and limited healthcare accessibility during voyages pose significant concerns.

This study seeks to bridge gaps in awareness, satisfaction levels, and industry-wide PEME benefits, ultimately contributing to the optimization of maritime medical frameworks.

Pre-Employment Medical Examinations (PEME) serve as a tool to assess the health of seafarers, and they are conducted in line with the guidelines set by the Maritime Labour Convention (MLC 2006).

India, the third-largest provider of seafarers to the maritime industry, places great importance on these examinations before joining. The most commonly detected issues during PEME include high blood pressure, high cholesterol, high blood sugar levels, obesity, dental caries, skin infections, hepatitis B, and kidney stones. Timely detection and intervention can rectify or control at least half of these findings, preventing medical illnesses while on board.

Below are some known challenges: -

Limited access to medical care on board ship: Every vessel (ship) engaged in maritime navigation should be required to carry a medicine chest, the contents of which should be prescribed by the competent authority, taking into account such factors as the number of persons on board, and the nature and the duration of the voyage. Special provision should be made for the custody, by the master or other responsible officer, of medicaments the use of which is restricted. The rules and regulations concerning the minimum contents of the medicine chests should apply whether there is a ship's doctor on board or not (Edumaritime.net, 2021). While the ship has a medicine chest it may not be enough to cater to all needs of a sick seafarer, hence a sick seafarer may have to be signed off from the vessel for treatment. A healthy seafarer reduces the number of sign-off cases from the ship, thus lowering the costs for shipowners. By treating or providing medical advice during PEME the seafarer is better equipped to manage the lifestyle diseases or any ongoing medical condition while on-board the vessel, thereby helping the industry to minimize number of medical sign-offs and its costs to shipping



companies. PEME is mandatory for seafarers before joining any offshore duty, as per MLC 2006 guidelines.

Diverse Ranks and Education: The seafarers employed on ship are of various ranks based on their skills or academic qualification. Education levels vary widely across the seafarers. (Refer Appendix 7 for departments and ranks on a ship)

Illiterate individuals may hide their medical history to avoid job loss, while educated ranks tend to follow the medical advice given.

Perceptions of PEME: Some seafarers view PEME as an obstacle, especially if abnormal findings lead to temporary unfitness and missed job opportunities. In some cases, PEME findings can result in permanent job loss, leading to negative perceptions of PEME.

Challenges at Sea: Access to medical care is limited and sometimes unavailable at sea, complicating medical treatment.

Conclusion: This research will help determine the awareness and satisfaction levels of Indian seafarers concerning pre-employment medical examinations.

3.4 RESEARCH PURPOSE AND QUESTIONS

Previous research has often focused on checking students' awareness levels regarding PEMEs and has also been conducted on Chinese seafarers. However, there was a lack of data on Indian seafarers, which prompted the researcher to explore the awareness and satisfaction levels of Indian seafarers with regards to medical examinations they undergo before joining any vessel.

Research Purpose

The primary purpose of this study is to:

1. Present a systematic review of global and national standards concerning seafarer fitness.
2. Evaluate awareness levels regarding medical examinations.
3. Measure the satisfaction levels of seafarers concerning PEME implementation.
4. List common health challenges affecting Indian seafarers and assess difficulties in obtaining medical assistance.
5. Evaluate the benefits of medical examinations to the maritime industry.

Research Questions

1. How aligned are India's current PEME practices with international maritime health regulations?
2. How aware are Indian seafarers of PEME medical tests and their implications?
3. What is the level of satisfaction among seafarers regarding current medical examination procedures?
4. What are the most common health issues identified among Indian seafarers through PEME?
5. How beneficial is pre-employment medical examination to maritime industry?

3.5 RESEARCH HYPOTHESIS

Given the descriptive nature of the study, a single overarching hypothesis has been formulated to guide the investigation:

H0 (Null Hypothesis):

Indian seafarers do not demonstrate high awareness or satisfaction with PEME procedures.

H1 (Alternative Hypothesis):

Indian seafarers demonstrate a high level of awareness and high level of satisfaction with PEME procedures.

This hypothesis reflects the central assumption of the study and will be explored through multiple research questions

3.6 RESEARCH DESIGN

This study utilizes a mixed-method research design, combining both primary and secondary research methodologies.

Primary Research

- Surveys conducted among 1500 Indian seafarers to assess awareness levels and satisfaction rates.
- Statistical analysis using Likert-scale scoring and response categorization.

Secondary Research

- Comparative review of ILO, IMO, and DG Shipping medical standards.
- Evaluation of industry reports and maritime health publications.

This approach ensures data triangulation, allowing for robust conclusions and practical recommendations.

For ready reference below are the objectives:-

1. To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.
2. To evaluate the awareness of medical examinations among seafarers
3. To measure the satisfaction level of seafarers for medical examinations
4. To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.
5. To list the benefits of medical examination to the Maritime Industry.

Objectives number 2 and 3 are achieved by conducting a primary research whereas objectives 1, 4 and 5 are achieved by doing a secondary research.

Primary Research

Definition:

Primary research refers to the process of collecting original data directly from first-hand sources. This type of research is conducted to generate new insights, answering specific questions through direct interaction with individuals, events, or experiments.

Key Characteristics:

- The data is original, meaning it has not been previously collected or published.
- The researcher directly interacts with the subjects or environment to gather fresh insights.
- It is customized to fit the specific needs of the research study.
- Time-consuming and resource-intensive but highly targeted and specific.

Common Methods of Primary Research:

Method	Description
Surveys	Collecting quantitative or qualitative responses using structured or semi-structured questionnaires.
Observations	Directly recording responses in a natural or experimental setting.
Experiments	Scientific testing of hypotheses under controlled conditions to draw conclusions.

Secondary Research

Definition:

Secondary research involves analyzing, summarizing, or synthesizing existing data that has already been collected and published by others. It is used when researchers need background information, historical data, or broad insights without direct data collection.

Key Characteristics:

- The data is already collected, often by organizations, scholars, or agencies.
- Less time-consuming and cost-intensive compared to primary research.
- Used for exploratory analysis, comparisons, and theoretical understanding.

- Relies on credible sources like books, reports, government records, and previous studies.

Common Sources of Secondary Research:

Source	Description
Books & Journal Articles	Published research providing extensive theories, case studies, and expert analysis.
Government & Institutional Reports	Statistics and documentation from official agencies or think tanks.
Company Records	Internal documents providing data on sales, demographics, or market trends.
Online Databases	Digital repositories hosting academic papers, market research, and demographic studies.

According to Shuttleworth (2008), descriptive research is a scientific method that involves observing and describing the behavior of a subject without influencing it. It is often used as a precursor to quantitative research designs, providing valuable insights into which variables are worth testing quantitatively (Shuttleworth, 2019).

3.7 POPULATION AND SAMPLE:

The population includes Indian seafarers across merchant shipping, offshore operations, and specialized maritime sectors. A sample size of 1500 seafarers is selected to represent different ranks, experience levels, and employment backgrounds.

3.8 PARTICIPANT SELECTION:

Participants were selected using random and stratified sampling techniques, ensuring unbiased representation.



Indian seafarers were selected as participants for this study. They were given the survey questionnaire while visiting the medical centers for their PEMEs. The survey was distributed randomly to seafarers regardless of their ranks.

3.9 INSTRUMENTATION:

Data instrumentation refers to the instruments and processes used in data collection. In this research, the instrument used was the survey questionnaire. The questionnaire comprised 19 questions to assess the awareness of seafarers regarding pre-employment medical examinations (see Appendix 5).

Additionally, a set of 5 questions was provided to study the satisfaction level of seafarers with their medical examinations (see Appendix 6).

3.10 DATA COLLECTION PROCEDURES

Data collection was carried out using questionnaires attached as Appendix 5 and Appendix 6. The survey consisted of 19 questions with a 5-point Likert scale response. The aim was to survey with 1,500 seafarers from 4 medical centers located in the Mumbai and Navi Mumbai regions. Seafarers were given a hard copy of the questionnaire while waiting for their PEME reports.

The survey was not time-restricted, and respondents handed over the questionnaire once completed.

Due to incomplete surveys, an additional survey was conducted at center No. 1 to collect 68 more responses, reaching the target of 1,500 respondents. Out of these 68 responses, 7 were incomplete. Therefore, 7 more responses were collected to achieve a complete count of 1,500 seafarers for the study.

3.11 DATA ANALYSIS

A Likert-scale analysis was used for quantitative assessment, while comparative regulatory reviews and industry impact studies informed qualitative analysis.

A **Likert scale** is a rating system used to measure opinions, attitudes, or behaviors. It typically consists of a statement or question followed by a series of five or seven answer options. Respondents choose the option that best reflects their feelings about the statement or question. (Bhandari and Nikolopoulou, 2023)

A Likert scale is a [psychometric](#) (Wikipedia Contributors, 2018) scale named after its inventor, American social psychologist [Rensis Likert](#),^[2] which is commonly used in research [questionnaires](#). (Wikipedia Contributors, 2019)

It is the most widely used approach to scaling responses in survey research, such that the term (or more fully the Likert-type scale) is often used interchangeably with [rating scale](#), (Wikipedia, 2024) although there are other types of rating scales. [Rensis Likert - Wikipedia](#).

3.12 RESEARCH DESIGN LIMITATIONS:

Limited research has been conducted in this area, making the literature review brief.

The researcher targeted 1,500 seafarers for data collection, which took approximately 6 months to complete from 4 medical centers.

Data was collected by handing out hard copies of the questionnaire, resulting in a large volume of papers from the data collection centers.

While the study provides valuable insights, certain limitations include:

- Limited global generalizability.
- Self-reported bias in survey responses.
- Cross-sectional data collection, limiting the ability to track long-term trends.

Despite these limitations, the study employs rigorous statistical methodologies to ensure reliable conclusions.

3.13 RESEARCH JOURNEY:

Embarking on this research journey has been an experience filled with challenges, learning, and personal growth. When we initially set out to survey 1,500 seafarers, we were well aware of the complexities involved in obtaining responses from a workforce that operates across different regions and often spends extended periods at sea. Despite these challenges, the researcher successfully gathered 1,417 responses, a commendable achievement in itself.

However, upon careful review and validation, it became evident that 83 responses were incomplete, with many missing key answers. Some questionnaires contained only the participant's rank and date, leaving crucial sections unanswered. While we had made substantial progress in data collection, this unexpected issue meant that our initial target was still unmet.

At this point, data analysis had already commenced, making it difficult to quickly gather additional responses while maintaining the consistency of the research process. Yet, the research team was determined to bridge the gap and reach the intended goal of 1,500 complete responses. Recognizing the importance of a thorough and representative dataset, we resumed data collection efforts, focusing on participants from Center No. 1 to secure the remaining responses.

This phase required an additional 30 days, during which we diligently worked to ensure that every respondent provided complete and accurate data. The extended collection period meant continuous coordination with participants, maintaining engagement, and ensuring adherence to survey guidelines. Ultimately, we successfully met the target, marking the culmination of a six-month data collection process, spanning from December 2023 to June 2024.

Despite the logistical hurdles, the data collection and analysis process proved to be an exciting and fulfilling experience. The insights gathered from this survey are invaluable, offering a deeper understanding of seafarer perceptions regarding Pre-Employment Medical Examination (PEME) and their overall satisfaction levels.



On a personal level, thesis writing progressed at a slower pace, primarily due to balancing personal responsibilities and professional commitments. Nevertheless, the journey was immensely rewarding. Conducting this research after a long academic gap was both challenging and deeply gratifying, reinforcing my passion for scholarly work and the significance of maritime health studies.

Looking back, the journey reflects perseverance, adaptability, and commitment to research excellence. The experience of overcoming obstacles, managing data collection hurdles, and ultimately achieving the research goal is something I will carry forward as an integral milestone in my academic and professional career.

CHAPTER 4

RESULTS

Overview:

This study utilizes a mixed-method research design, combining both primary and secondary research methodologies.

For ready reference below are the objectives:-

1. To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.
2. To evaluate the awareness of medical examinations among seafarers
3. To measure the satisfaction level of seafarers for medical examinations
4. To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.
5. To list the benefits of medical examination to the Maritime Industry.

Objectives number 2 and 3 are achieved by conducting primary research, whereas objectives 1, 4, and 5 are achieved by doing secondary research.

Primary Research

- Surveys were conducted among 1500 Indian seafarers to assess awareness levels and satisfaction rates.
- Statistical analysis using Likert-scale scoring and response categorization.

Secondary Research

- Comparative review of ILO, IMO, and DG Shipping medical standards.
- Evaluation of industry reports and maritime health publications.

This approach ensures data triangulation, allowing for robust conclusions and practical recommendations.



Below are the findings of primary research done by collecting responses from 1500 seafarers to the questionnaire.

4.1 To evaluate the awareness of medical examinations among seafarers

A set of 19 questions was distributed to 1,500 seafarers to assess their awareness levels regarding various medical tests. The questionnaire is attached as Appendix 5.

Only active seafarers currently serving at sea were included in the analysis of medical examination awareness. The seafarers were randomly selected for this survey, regardless of age, designation, or location

Total list of 1500 seafarers as per below: -

A random selection of seafarers was made to get the data

- ▶ 350 samples from Clinic A
- ▶ 662 samples from Clinic B
- ▶ 274 samples from Clinic C
- ▶ 214 samples from Clinic D

Duration of data collection: Dec 2023 to June 2024

Method of Analysis:

Likert scale analysis measured seafarers' awareness of medical examinations.

Below are the tables in the Likert scale format with the total results of the seafarers' responses to the 19 questionnaires. For each question, there were five options provided, and the respondent was required to select and mark one response.

The tables below present responses to 19 questions, categorized into five levels: STRONGLY AGREE, AGREE, NEUTRAL, DO NOT AGREE, and STRONGLY DISAGREE. Most responses show strong agreement (AGREE/STRONGLY AGREE), indicating consensus and positive attitudes. However, certain questions (Q. 17-Q. 19) have higher neutral responses, suggesting uncertainty or mixed opinions. Minimal disagreement is observed, reinforcing overall acceptance of the survey statements.

This is shown below through various data tables: -

Frequency Distribution: -

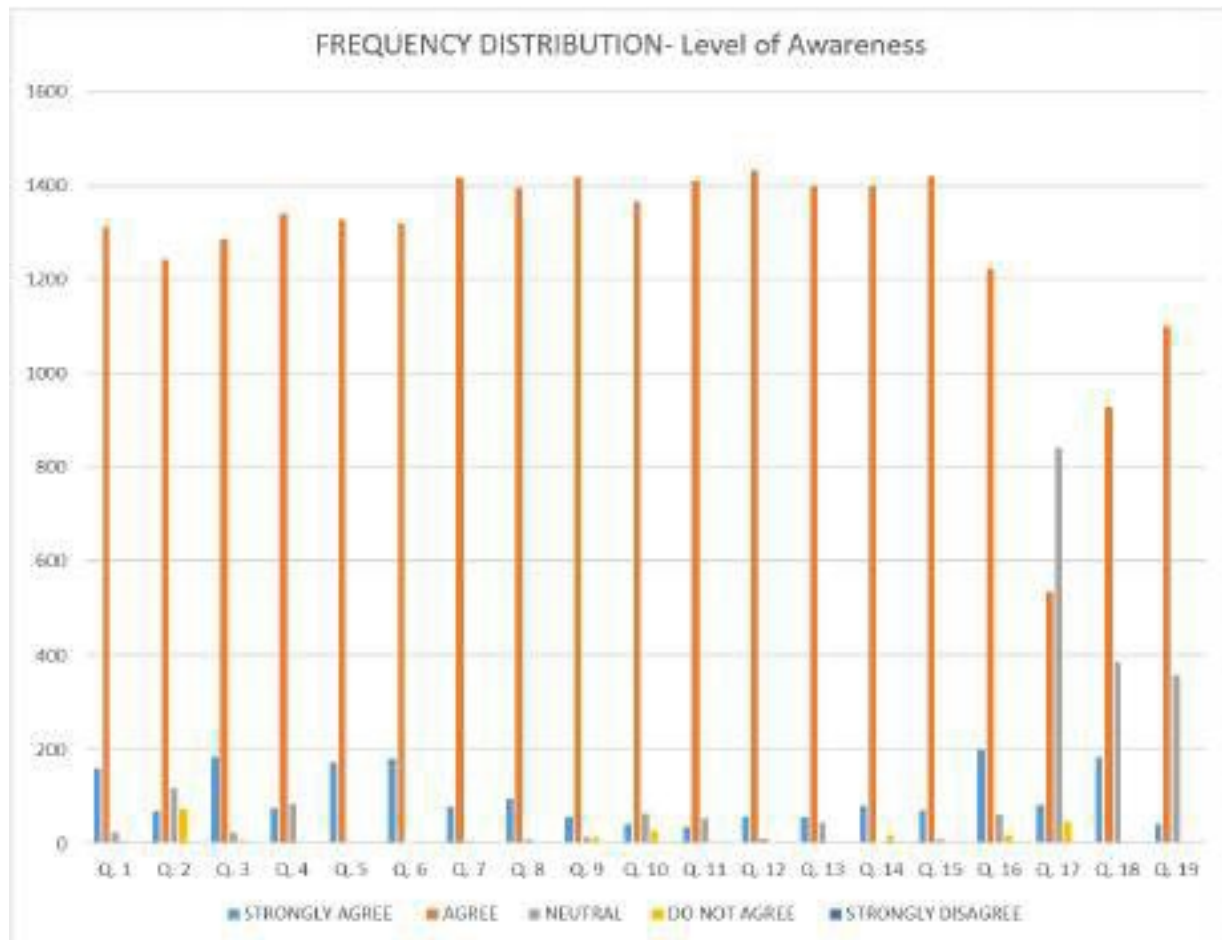
Table 1: Frequency Distribution of the responses to 19 questions for the level of awareness

FREQUENCY DISTRIBUTION

	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10	Q. 11	Q. 12	Q. 13	Q. 14	Q. 15	Q. 16	Q. 17	Q. 18	Q. 19
STRONGLY AGREE	160	69	184	75	173	180	79	95	57	42	35	56	56	80	70	198	83	185	41
AGREE	1312	1242	1285	1339	1326	1320	1415	1394	1417	1367	1410	1432	1400	1400	1420	1222	533	927	1100
NEUTRAL	23	117	23	85	0	0	5	9	13	64	55	11	43	2	9	63	839	387	358
DO NOT AGREE	5	72	8	1	1	0	1	2	13	27	0	1	1	18	1	17	45	1	1
STRONGLY DISAGREE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Created by Author.

Graph 1: Frequency Distribution of the responses to 19 questions for level of awareness



Source: Created by Author.

Table 2: Percentage Distribution of responses to 19 questions for level of awareness

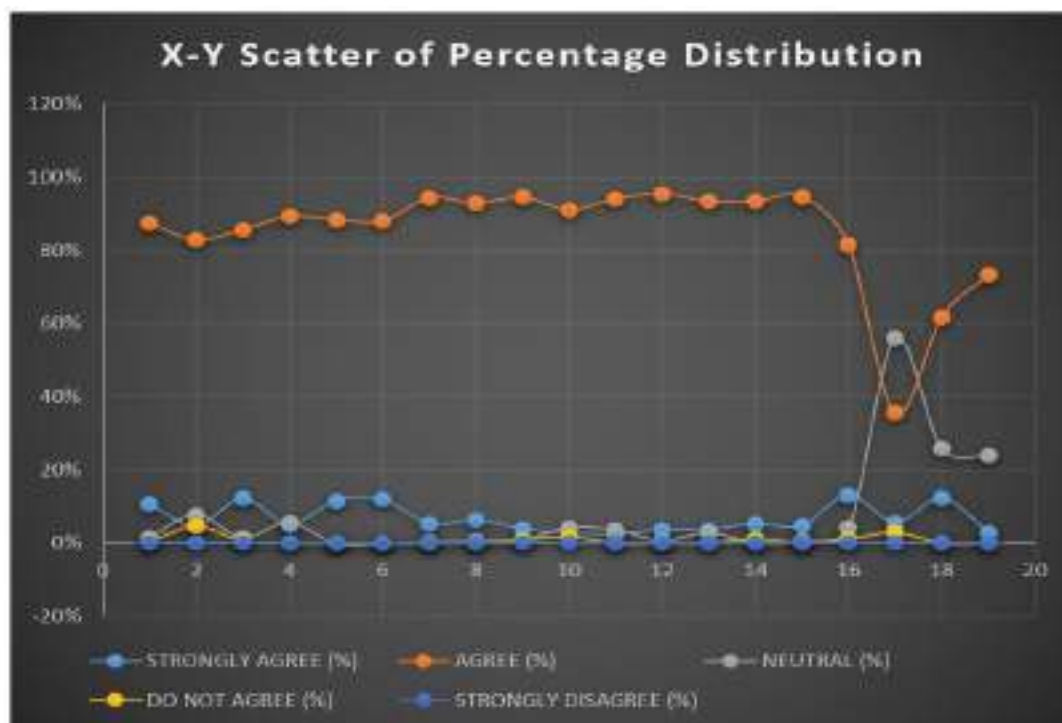
PERCENTAGE DISTRIBUTION

	Q. 1	Q. 2	Q. 3	Q. 4	Q. 5	Q. 6	Q. 7	Q. 8	Q. 9	Q. 10	Q. 11	Q. 12	Q. 13	Q. 14	Q. 15	Q. 16	Q. 17	Q. 18	Q. 19
STRONGLY AGREE (%)	11%	5%	12%	5%	12%	12%	5%	6%	4%	3%	2%	4%	4%	5%	5%	13%	6%	12%	3%
AGREE (%)	87%	83%	86%	89%	88%	88%	94%	93%	94%	91%	94%	95%	93%	93%	95%	81%	36%	62%	73%
NEUTRAL (%)	7%	8%	2%	6%	0%	0%	0%	1%	1%	4%	4%	1%	3%	0%	1%	4%	56%	26%	24%
DO NOT AGREE (%)	0%	5%	1%	0%	0%	0%	0%	0%	1%	2%	0%	0%	0%	1%	0%	1%	3%	0%	0%
STRONGLY DISAGREE (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Created by Author.

The table provides the percentage responses of participants to 19 questions across five categories: "STRONGLY AGREE," "AGREE," "NEUTRAL," "DO NOT AGREE," and "STRONGLY DISAGREE."

Graph 2: X-Y Scatter of Percentage Distribution of responses to 19 questions for the level of awareness



Source: Created by Author.

Weighted Mean:

Numerical values were assigned to each response:

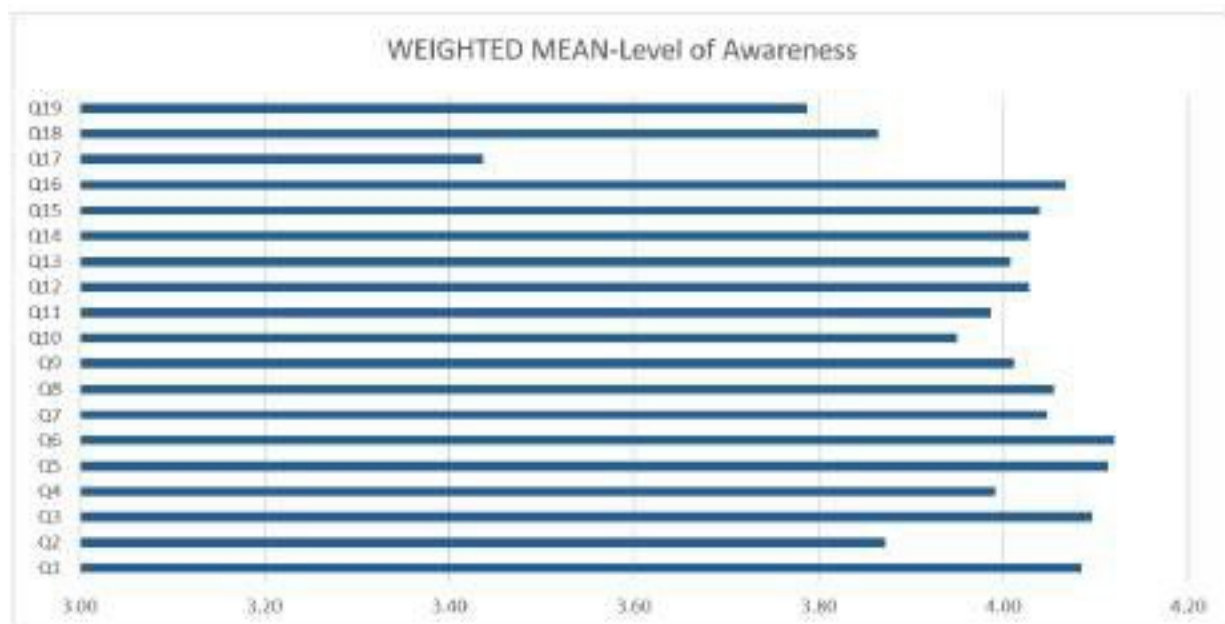
- Strongly Agree = 5
- Agree = 4
- Neutral = 3
- Do Not Agree = 2
- Strongly Disagree = 1

Table 3: Weighted Mean of the responses to 19 questions for the level of awareness

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
WEIGHTED MEAN	4.08	3.87	4.10	3.99	4.11	4.12	4.05	4.05	4.01	3.95	3.99	4.03	4.01	4.03	4.04	4.07	3.44	3.86	3.79

Source: Created by Author.

Graph 3: Weighted Mean of the responses to 19 questions for the level of awareness



Source: Created by Author.

Table 4: Standard Deviation of the responses to 19 questions for the level of awareness.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
SOS: Standard Deviation (Sample)	0.34	0.51	0.33	0.32	0.29	0.28	0.21	0.26	0.22	0.32	0.22	0.19	0.24	0.32	0.24	0.44	0.63	0.61	0.45
SDP: Standard Deviation (Population)	0.36	0.55	0.39	0.33	0.32	0.32	0.24	0.17	0.28	0.37	0.24	0.22	0.26	0.32	0.23	0.46	0.65	0.60	0.47
Comparison SOS vs SDP	0.02	0.04	0.06	0.01	0.03	0.05	0.03	0.01	0.07	0.05	0.03	0.03	0.02	0.00	0.01	0.02	0.01	0.01	0.02

Source: Created by Author.

A systematic random sampling approach was used, where every 8th participant was selected from the total dataset of 1,500 responses. To ensure unbiased representation, the first selection was randomized before applying a fixed interval of 8. This method provides a balanced sample while reducing selection bias and maintaining consistency.

Comparison of Standard deviation (SD) values ranging from 0.00 to 0.07 indicates that the responses in the dataset are highly consistent and show very little variation from the mean.

Key Interpretations:

Low SD (Near 0.00 - 0.07) → Responses are closely clustered around the average, meaning participants generally have similar opinions.

Minimal Dispersion → There's little disagreement or variability in how participants answered.

Reliable Mean Score → The mean can be considered highly representative of the overall sentiment.

Implications for Survey:

As the survey was about awareness, it suggests a uniform understanding among participants.

Table 5: Response to the 19 questions for the level of awareness

Sr. No	Questions on Level of Awareness	WM	VI	RANK
1	Pre-employment medical examination (PEME) helps in the early detection and treatment of medical conditions before going for service at sea.	4.08	Highly Aware	4
2	Physical examination helps to find signs of any past or present medical conditions	3.87	Highly Aware	16
3	Identity verification helps to eliminate someone else appearing for medicals against one's name.	4.09	Highly Aware	3
4	Medical history should be declared in full, and no information should be h	3.99	Highly Aware	13
5	All ongoing medication should be declared to the medical officer.	4.11	Highly Aware	2
6	Vision check by Snellen Chart helps assess a person's distant vision.	4.12	Highly Aware	1
7	Color Test by Ishihara book helps to assess any deficiencies of red, yellow, or green color.	4.04	Highly Aware	7
8	Near Vision check helps to assess the need for prescription glasses for reading purposes.	4.05	Highly Aware	6
9	Blood pressure is an important indicator of heart health.	4.01	Highly Aware	11
10	BMI is an important calculation for physical capability assessment.	3.94	Highly Aware	15
11	Audiometry is done to assess the level of hearing.	3.98	Highly Aware	14
12	Blood tests help to detect infections, kidney function, liver function, sexually transmitted diseases, cholesterol levels, sugar levels etc.	4.02	Highly Aware	9.5
13	Urine test helps to know more about kidney health and other health conditions.	4	Highly Aware	12
14	ECG and Treadmill test helps to assess the health of our heart.	4.02	Highly Aware	9.5
15	Chest X-ray helps to know the structure and health condition of our chest and its organs.	4.03	Highly Aware	8
16	Dental examination helps to maintain healthy teeth, gums, and oral cavity.	4.06	Highly Aware	5
17	Stool or Fecal test helps to detect contagious health conditions in food handlers.	3.43	Aware	19
18	Psychological tests help in assessing the emotional and mental well-being of a person.	3.86	Highly Aware	17
19	Spirometry or Lung function test is used to find the respiratory health of a person	3.78	Highly Aware	18
Composite Mean		3.97	Highly Aware	
Scale: Highly Aware: 3.5-4.49; Aware:2.50-3.49; Less Aware: 1.50-2.49; Not Aware: 1.00-1.49				

Source: Created by Author.

Figure No. 1, 2,3, and 4 _ : Four randomly selected sections of the heatmap, displaying agreement trends across participants. Due to the large dataset (n=1500), these representative images offer insight into observed response patterns while ensuring readability. Dark green represents strong agreement, yellow indicates neutral responses, and red highlights disagreement trends.

Figure 1: The heatmap, displaying agreement trends across participants

PARTICIPANT NO.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
1	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
2	5	5	4	4	4	5	4	4	4	3	4	4	4	4	4	4	4	4	4
3	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	5	3
4	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	4
6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	3
7	5	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	4
8	4	4	5	4	4	5	5	5	4	4	4	4	4	4	4	4	4	5	4
9	5	3	5	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	3
10	4	4	5	4	4	5	5	5	5	5	4	5	5	5	5	5	5	5	5
11	5	5	5	5	5	5	5	5	4	4	5	4	5	5	5	5	5	5	4
12	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	5	4
13	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	3	5	3
14	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	5	3
15	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	3
16	4	3	3	3	4	5	4	4	4	3	3	4	3	4	3	3	3	3	4
17	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
18	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4	3	4	4
19	5	3	3	3	4	5	4	4	4	4	4	4	4	4	4	4	3	4	3
20	4	4	4	4	4	5	4	4	4	4	4	3	3	4	3	3	3	3	4
21	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
22	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3
23	4	5	4	4	4	4	4	4	4	3	3	4	4	4	4	4	2	3	4
24	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4	3	4	3
25	4	2	2	3	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4
26	4	4	4	4	4	5	4	4	4	4	4	4	4	4	5	4	4	5	4
27	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	3
28	4	4	5	4	4	5	4	4	4	2	3	4	3	4	3	3	3	5	3
29	4	4	4	4	4	5	4	4	4	4	4	4	4	4	5	4	4	5	4
30	4	4	5	3	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
31	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
32	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
33	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3
34	4	4	5	5	5	4	4	4	4	2	3	4	3	2	4	2	2	3	4
35	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
36	4	4	5	5	5	5	4	4	4	4	4	4	4	4	5	4	4	4	4
37	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
38	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	5	3
39	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	5	3
40	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	5	4

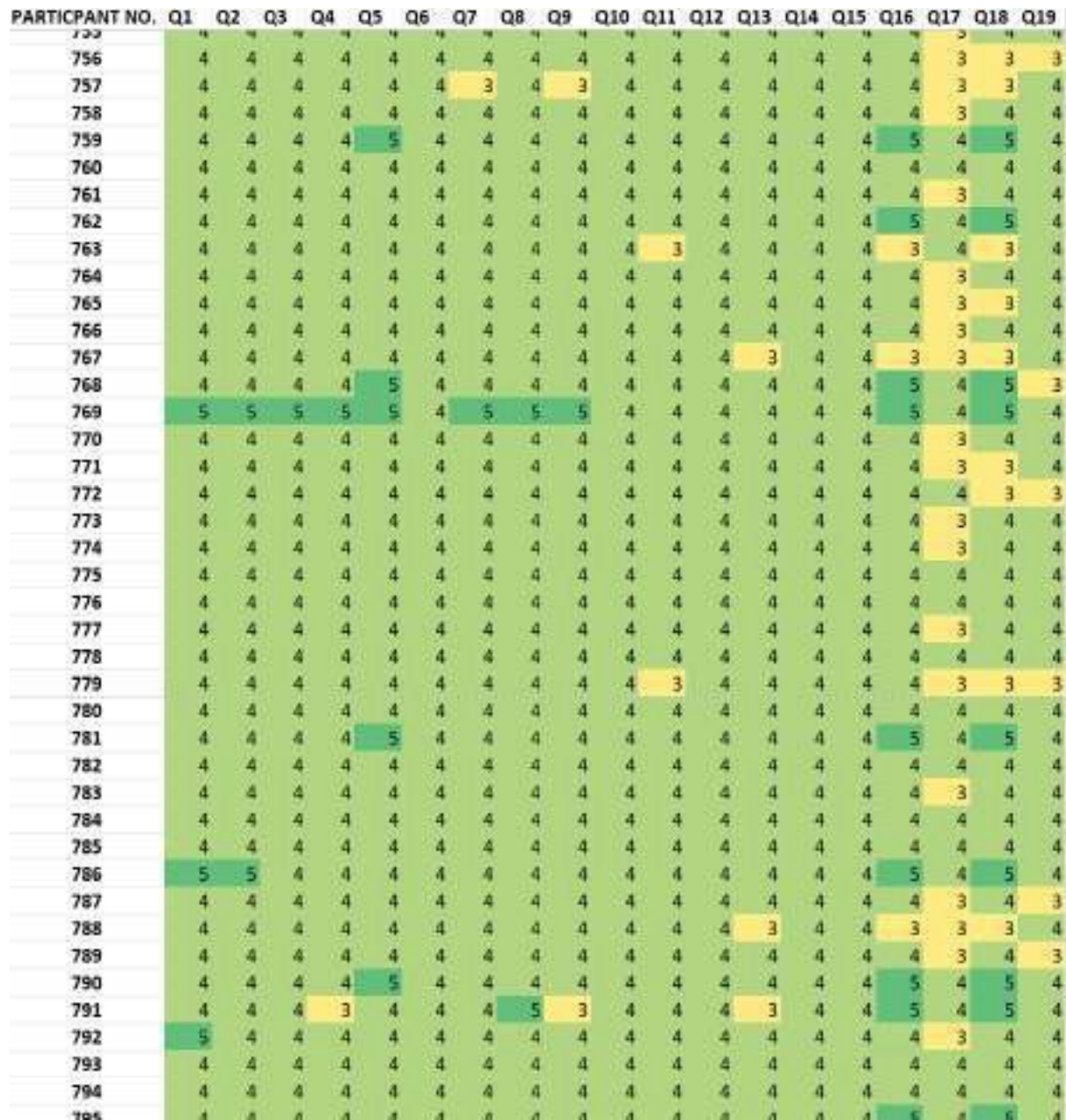
Source: Created by Author.

Figure 2: The heatmap, displaying agreement trends across participants

PARTICIPANT NO.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
268	4	4	5	4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	3
269	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	3	4
270	4	4	5	4	4	5	5	4	5	5	5	4	4	4	4	5	5	5	4
271	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	4
272	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5
273	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4
274	4	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
275	4	4	5	4	5	5	4	4	4	4	4	4	4	4	4	4	3	4	3
276	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
277	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4
278	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3
279	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	3
280	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
281	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	4
282	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	3
283	5	2	5	5	5	5	4	5	4	4	4	4	4	5	5	5	5	5	4
284	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	3	4
285	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
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290	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3
291	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3
292	4	4	4	4	4	5	4	4	4	4	4	3	4	4	4	3	3	3	4
293	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
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295	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
296	5	4	5	4	4	5	4	4	4	4	4	4	4	4	4	4	3	3	3
297	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
298	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	3
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304	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	3
305	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4
306	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	3	4	3
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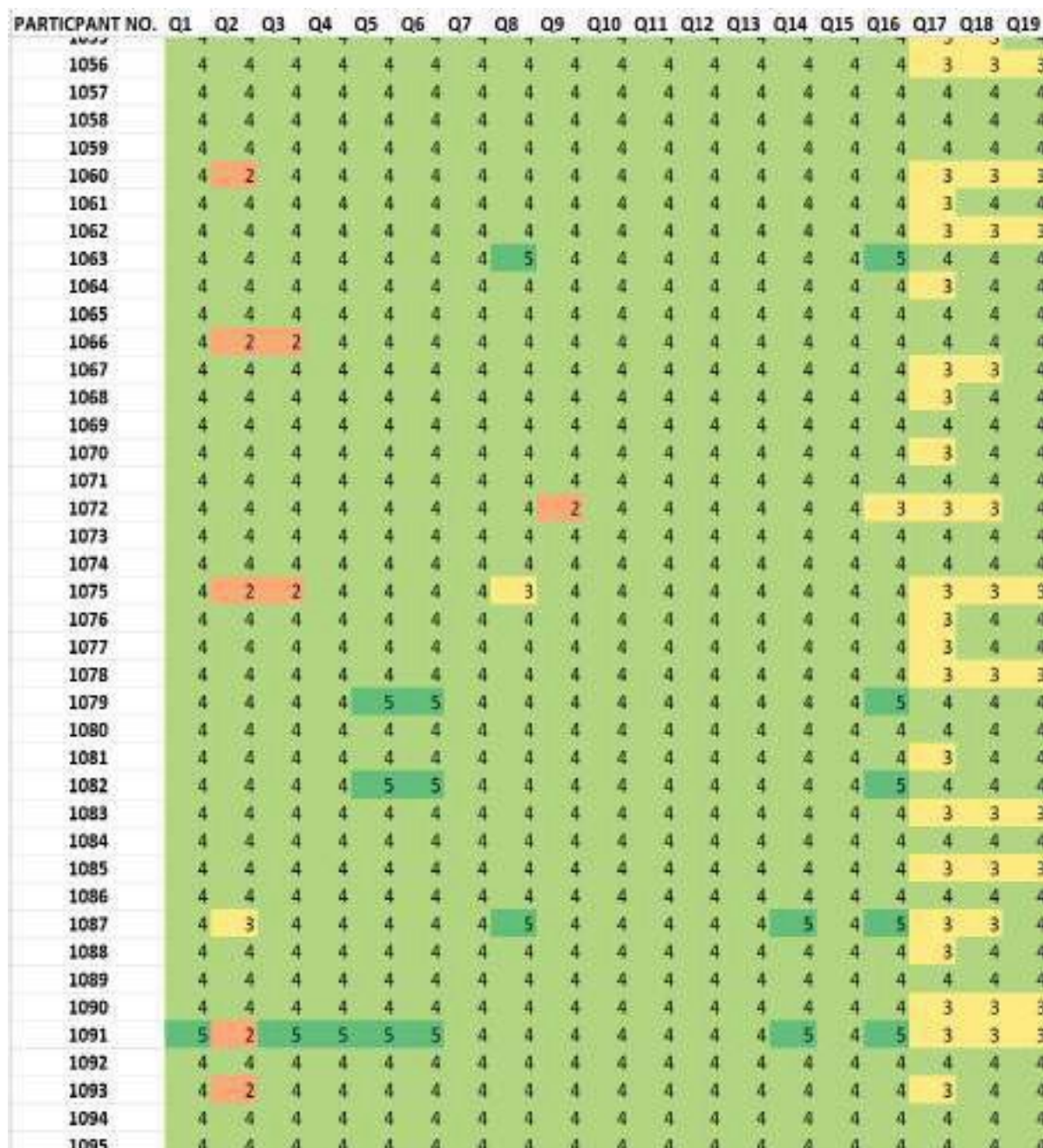
Source: Created by Author.

Figure 3: The heatmap, displaying agreement trends across participants



Source: Created by Author.

Figure 4: The heatmap, displaying agreement trends across participants



Source: Created by Author.



Here's an analysis of the responses:

High Agreement: Most questions show a strong tendency towards agreement. For instance, questions Q.1 to Q.16 predominantly has high percentages in the "AGREE" category, often accompanied by significant "STRONGLY AGREE" responses. This indicates that participants generally have a positive attitude towards the subjects addressed in these questions.

Neutral Responses: Questions Q.17 to Q.19 show a notable increase in "NEUTRAL" responses, especially Q.17, where 55% of participants chose "NEUTRAL." This might suggest ambiguity or mixed feelings about the topics covered by these questions.

Low Disagreement: Very few questions have significant "DO NOT AGREE" or "STRONGLY DISAGREE" responses. For instance, none of the questions have more than 5% in the "STRONGLY DISAGREE" category, indicating minimal outright opposition to the statements in the survey.

Questions with Highest Agreement:

Q.7: 94% "AGREE," 5% "STRONGLY AGREE"

Q.7 is as below:

The Color Test by Ishihara book helps to assess any deficiencies of red, yellow or green colour.

Q.8: 93% "AGREE," 6% "STRONGLY AGREE"

Q.8 is as below:

Near Vision check helps to assess need of prescription glasses for reading purposes.

Q.9: 94% "AGREE," 4% "STRONGLY AGREE"

Q.9 is as below:

Blood pressure is an important indicator of heart health.



Questions with Significant Neutrality:

Q. 7: 55% "NEUTRAL," 36% "AGREE," 6% "STRONGLY AGREE"

Q.17 is as below:

Stool or Fecal test helps to detect contagious health conditions in food handlers.

Q.18: 26% "NEUTRAL," 62% "AGREE," 12% "STRONGLY AGREE"

Q.18 is as below:

Psychological tests help in assessing emotional and mental wellbeing of a person.

Q.19: 24% "NEUTRAL," 73% "AGREE," 3% "STRONGLY AGREE"

Q.19 is as below:

Spirometry or Lung function test is used to find respiratory health of a person

Overall, the participants generally agree with the statements in the survey, with very few showing strong opposition. The higher neutrality in the last few questions may warrant further investigation to understand the underlying reasons. The Table shows that a maximum % of seafarers are aware of the pre-employment medical examinations which are done by the companies that they undergo.

Hypothesis Testing:

H0 (Null Hypothesis):

Indian seafarers do not demonstrate high awareness or satisfaction with PEME procedures.

H1 (Alternative Hypothesis):

Indian seafarers demonstrate a high level of awareness and high level of satisfaction with PEME procedures.

Based on the survey results, most participants expressed agreement with statements related to PEME awareness, and a significant percentage confirmed familiarity with the medical procedures conducted by their companies. Given the low level of opposition and the overall trend toward agreement, the null hypothesis (H₀) is rejected. This supports the alternative hypothesis (H₁), indicating that Indian seafarers demonstrate a high level of awareness regarding pre-employment medical examinations.

4.2 To measure the satisfaction level of seafarers for medical examinations.

A set of 05 questions was distributed to 1,500 seafarers to assess their satisfaction levels regarding various medical tests. The questionnaire is attached as Appendix 6

Only active seafarers currently serving at sea were included in the analysis of medical examination awareness. The seafarers were randomly selected for this survey, regardless of age, designation, or location

Below are the total list of 1500 seafarers. More than 1500 questionnaire responses were collected as the researcher had to leave around Random selection was made

- ▶ 350 samples from Clinic A
- ▶ 662 samples from Clinic B
- ▶ 274 samples from Clinic C
- ▶ 214 samples from Clinic D

Duration of data collection: Dec 2023 to June 2024

Method of Analysis:

Likert scale analysis measured seafarers' satisfaction levels for medical examinations.

Frequency Distribution:

The table below represents the frequency distribution of the responses of 1500 participants.

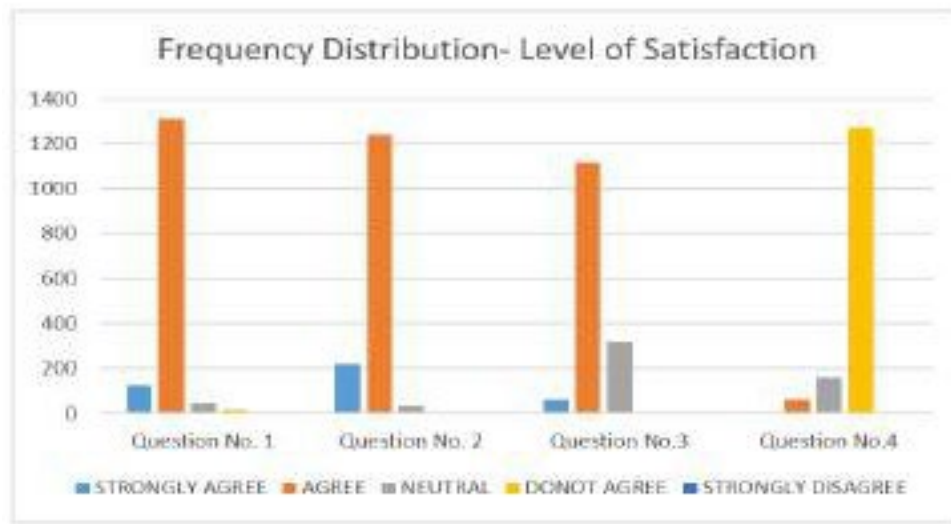
Table 6: Frequency Distribution of the responses to 4 questions on the level of satisfaction

FREQUENCY DISTRIBUTION

	Question No. 1	Question No. 2	Question No.3	Question No.4
STRONGLY AGREE	125	219	63	6
AGREE	1312	1242	1118	59
NEUTRAL	46	36	318	159
DONOT AGREE	17	3	1	1270
STRONGLY DISAGREE	0	0	0	6

Source: Created by Author.

Graph 4: Frequency Distribution of the responses to 4 questions on the level of satisfaction



Source: Created by Author.

Percentage Distribution:

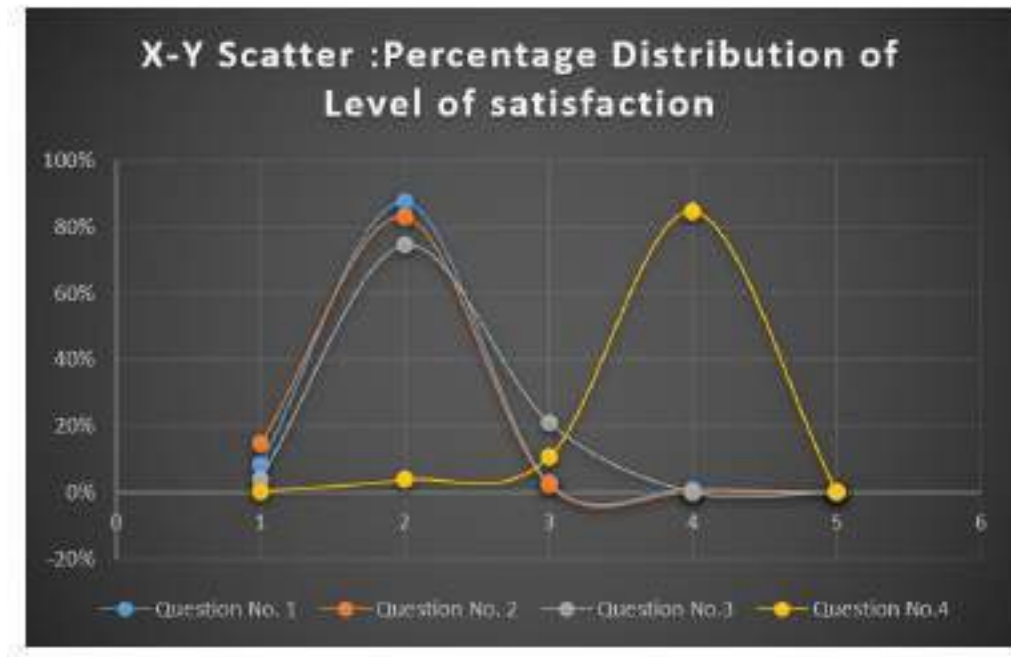
The table below represents the percentage distribution of responses received on the questionnaire on the level of satisfaction:

Table 7: Percentage Distribution of the responses to 4 questions on the level of satisfaction

PERCENTAGE DISTRIBUTION				
	Question No. 1	Question No. 2	Question No.3	Question No.4
STRONGLY AGREE(%)	8%	15%	4%	0%
AGREE(%)	87%	83%	75%	4%
NEUTRAL(%)	3%	2%	21%	11%
DONOT AGREE(%)	1%	0%	0%	85%
DISAGREE(%)	0%	0%	0%	0%

Source: Created by Author.

Graph 5: X-Y Scatter: Percentage Distribution of the responses to 4 questions on the level of satisfaction



Source: Created by Author.

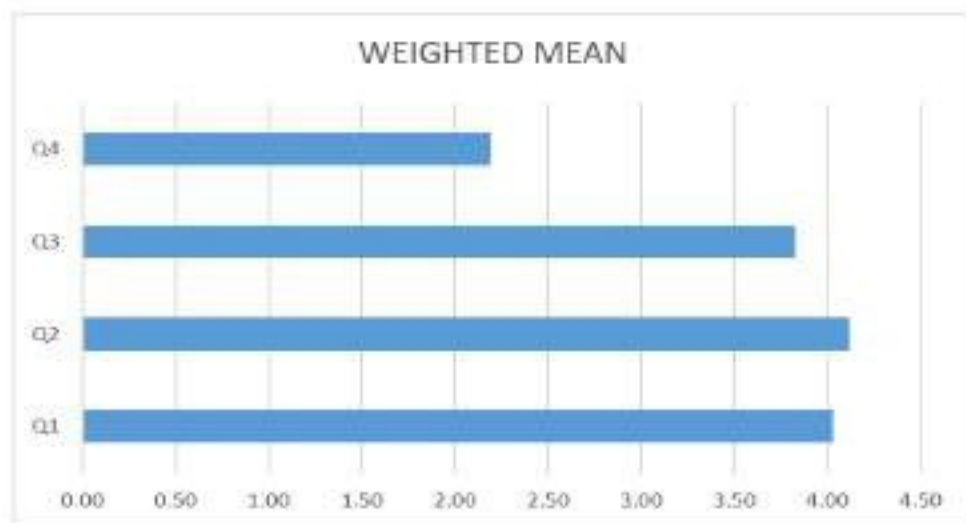
Weighted Mean of the responses to 4 questions on the level of satisfaction

Table 8: Weighted mean of the responses to 4 questions on the level of satisfaction

	Q1	Q2	Q3	Q4
WEIGHTED MEAN	4.03	4.12	3.83	2.19

Source: Created by Author.

Graph 6: Weighted mean of responses to 4 questions on the level of satisfaction



Source: Created by Author.

Table 9: Standard Deviation of responses to 4 questions on the level of satisfaction

	Q1	Q2	Q3	Q4
SDS : Standard Deviation (Sample)	0.36	0.39	0.49	0.53
SDP :Standard Deviation (Population)	0.40	0.41	0.48	0.52
Comparison SDS vs SDP	0.04	0.01	0.02	0.02

Source: Created by Author.

A systematic random sampling approach was used, where every 8th participant was selected from the total dataset of 1,500 responses. To ensure unbiased representation, the first selection was

randomized before applying a fixed interval of 8. This method provides a balanced sample while reducing selection bias and maintaining consistency.

Standard deviation (SD) values ranging from 0.01 to 0.04 indicate extremely low variation in the dataset. Here's what that means:

Interpretation of Low SD (0.01–0.04):

- Highly Consistent Responses → Participants answered similarly, with minimal deviation from the mean.
- Strong Agreement Across the Dataset → Most individuals likely hold similar views.
- Reliable Mean Representation → Since responses are tightly clustered, the mean score effectively summarizes the dataset.

Implications for Survey:

It suggests a uniform understanding among participants.

Table 10: Response to the Level of Satisfaction Questionnaire

QUESTIONS	LEVEL OF AWARENESS	WM	VI	RANK
1	Do you find any purpose in PEME done by employer	4.03	Very Important	2
2	Do you feel PEME helps you to find out if there are any underlying disease	4.11	Very Important	1
3	Do you see it as good tool to get your full health assessment done?	3.82	Very Important	3
4	Do you see the PEME as an obstacle for your offshore career?	2.19	Less Important	4

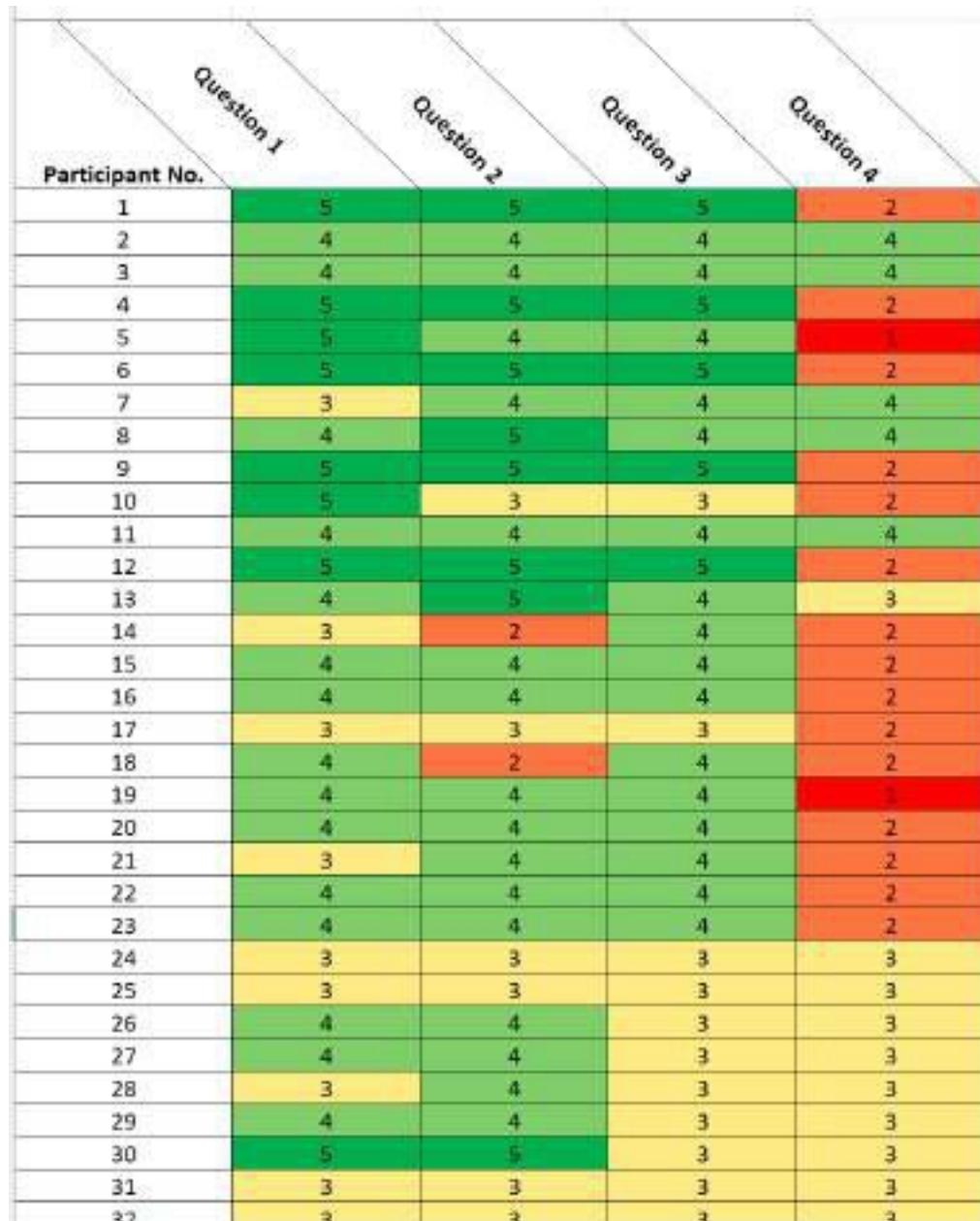
Scale: Very Important: 3.5-4.00; Important:2.50-3.49; Less Important: 1.50-2.49; Not Important:1.00-1.49

Source: Created by Author.

Figure No. 5,6,7, and 8_: Four randomly selected sections of the heatmap, displaying agreement trends across participants. Due to the large dataset (n=1500), these representative images offer

insight into observed response patterns while ensuring readability. Dark green represents strong agreement, yellow indicates neutral responses, and red highlights disagreement trends.

Figure 5: The heatmap, displaying agreement trends across participants



Source: Created by Author.

Figure 6: The heatmap, displaying agreement trends across participants

419	4	4	4	2
420	4	4	3	2
421	5	5	4	2
422	4	4	3	2
423	4	4	4	2
424	4	4	4	2
425	5	5	4	2
426	4	4	4	2
427	4	4	3	2
428	4	4	4	2
429	4	4	3	2
430	4	4	4	2
431	4	4	4	2
432	4	4	4	2
433	4	4	4	2
434	4	4	4	2
435	5	5	3	2
436	4	4	4	2
437	4	4	3	2
438	4	4	4	2
439	4	4	4	2
440	4	4	3	3
441	4	4	3	2
442	4	4	4	2
443	4	4	4	2
444	4	4	4	2
445	4	4	4	2
446	5	5	4	2
447	4	4	3	2
448	4	4	4	2
449	5	5	3	3
450	4	4	4	3
451	4	4	3	2
452	4	4	3	2
453	4	4	4	3
454	4	4	3	2
455	4	4	3	2
456	4	4	3	2

Source: Created by Author.

Figure 7: The heatmap, displaying agreement trends across participants

905	4	4	4	2
906	4	4	4	2
907	4	4	4	2
908	4	5	4	2
909	4	4	4	2
910	4	4	4	2
911	4	4	4	2
912	4	4	4	3
913	4	4	4	2
914	4	4	4	2
915	4	3	4	2
916	4	4	4	2
917	4	5	4	3
918	4	4	4	3
919	4	4	4	3
920	4	4	4	3
921	4	4	4	3
922	5	3	5	3
923	4	4	4	3
924	4	4	4	2
925	4	4	4	2
926	4	4	4	2
927	4	4	4	3
928	4	5	4	2
929	4	4	4	2
930	4	4	4	3
931	5	5	5	3
932	4	4	4	2
933	4	4	4	2
934	4	4	4	3
935	4	4	4	3
936	4	4	4	2
937	4	4	4	2
938	4	4	4	2
939	4	4	4	2
940	4	4	4	2
941	4	4	4	2

Source: Created by Author.

Figure 8: The heatmap, displaying agreement trends across participants

1466	4	5	4	2
1467	4	4	4	2
1468	4	4	4	2
1469	4	4	4	2
1470	4	4	4	3
1471	4	4	4	2
1472	4	4	4	2
1473	4	4	4	3
1474	4	4	4	2
1475	4	4	4	2
1476	4	4	4	2
1477	5	5	5	2
1478	4	4	4	2
1479	4	4	4	2
1480	4	4	4	3
1481	4	4	4	2
1482	4	4	4	2
1483	4	4	4	2
1484	4	5	4	2
1485	4	4	4	2
1486	4	4	4	2
1487	4	4	4	2
1488	4	4	4	2
1489	4	4	4	2
1490	4	4	4	2
1491	4	4	4	3
1492	4	4	4	3
1493	4	5	4	2
1494	4	4	4	2
1495	5	5	5	5
1496	4	4	4	3
1497	5	5	5	2
1498	4	4	4	2
1499	5	4	5	3
1500	4	4	4	2

Source: Created by Author.

Interpretation of the Heatmap:

Darker Green Areas: Indicate strong agreement across participants.

Yellow Areas: Represent neutral responses.

Red Areas: Show strong disagreement trends.

The heatmap illustrates participant responses, with green indicating strong agreement, yellow representing neutrality, and red showing disagreement. This visualization highlights key response patterns and areas requiring further attention.

Here's an analysis of the responses:

Question No. 1

- STRONGLY AGREE: 8%
- AGREE: 87%
- NEUTRAL: 3%
- DON'T AGREE: 1%
- STRONGLY DISAGREE: 0%

Analysis: The vast majority of respondents (95%) either agree or strongly agree with the statement in Question No. 1, indicating a high level of consensus or positive response. Very few respondents are neutral or disagree.

Question No. 2

- STRONGLY AGREE: 15%
- AGREE: 83%
- NEUTRAL: 2%
- DON'T AGREE: 0%
- STRONGLY DISAGREE: 0%



Analysis: Again, a strong positive response is evident, with 98% of respondents agreeing or strongly agreeing. There is minimal neutrality and no disagreement, indicating a clear favorability towards the statement in Question No. 2.

Question No. 3

- STRONGLY AGREE: 4%
- AGREE: 75%
- NEUTRAL: 21%
- DON'T AGREE: 0%
- STRONGLY DISAGREE: 0%

Analysis: While there is still a positive response with 79% agreeing or strongly agreeing, there is a notable increase in neutral responses (21%). This suggests that while many agree, a significant portion of respondents are undecided or ambivalent about the statement in Question No.3

Question No. 4

- STRONGLY AGREE: 0%
- AGREE: 4%
- NEUTRAL: 11%
- DON'T AGREE: 85%
- STRONGLY DISAGREE: 0%

Analysis: This question shows a strong negative response, with 85% of respondents not agreeing and only 4% agreeing. The remaining 11% are neutral. This indicates a clear disagreement with the negative statement in Question No. 4.

Summary

The responses indicate:

High agreement for Questions 1 and 2, with overwhelming positive responses.

Mixed sentiments for Question 3, with a substantial neutral response.

Strong disagreement for Question 4 (negatively worded). Respondents do not agree with the negative statement, which supports satisfaction.

Hypothesis Testing:

H0 (Null Hypothesis):

Indian seafarers do not demonstrate high awareness or satisfaction with PEME procedures.

H1(Alternative Hypothesis):

Indian seafarers demonstrate a high level of awareness and high level of satisfaction with PEME procedures.

The survey results show high agreement with positively worded statements (Q1 and Q2) and strong disagreement with the negatively worded statement (Q4), indicating a clear trend of awareness and satisfaction among Indian seafarers regarding PEME procedures. Although Question 3 showed some neutrality, it does not significantly detract from the overall positive sentiment. Therefore, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is supported: Indian seafarers demonstrate a high level of awareness and satisfaction with PEME procedures.

4.3 To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.

Results of secondary research are as below:

- Regulatory Compliance Gaps: Although India follows MLC 2006, STCW Code, and Merchant Shipping Rules, certain disparities exist in the standardization of medical screening practices, which may affect the trust and effectiveness of PEME.

Key Observations after secondary research are as below:

- ILO Guidelines (MLC 2006) establish minimum global health standards for seafarers, ensuring basic fitness for duty, but do not mandate detailed disease screening.
- Medical Examination Rules 2016 (DG Shipping, India) align with STCW 2010 and national maritime health laws, ensuring compliance with international standards while incorporating additional assessments relevant to Indian seafarers.
- P&I Clubs' PEME schemes go beyond basic compliance, focusing on detecting pre-existing health conditions that could result in medical repatriation claims. These assessments provide additional safeguards for shipowners.

4.4 To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.

Results of secondary research are as below:

Health Issues Faced by Indian Seafarers:

1. Musculoskeletal Disorders- Heavy lifting, repetitive tasks, and poor posture contribute to back and joint pain (Drylli et al., 2019).
2. Hypertension and Cardiovascular Diseases - Stressful working conditions, poor diet, and lack of exercise lead to high blood pressure and heart-related issues (Abraham, 2023).
3. Respiratory Infections - Close quarters and limited ventilation increase the risk of respiratory illnesses (Drylli et al., 2019).
4. Gastrointestinal Disorders - Food poisoning and infections due to inadequate food safety measures (Abraham, 2023).
5. Mental Health Issues- Isolation, long working hours, and separation from family contribute to depression and anxiety (Sarika & Bhupender, 2023).
6. Dental Problems- Lack of immediate access to dental care can lead to severe pain and complications (Drylli et al., 2019).

7. Obesity and Diabetes- Poor dietary habits and limited physical activity onboard contribute to these chronic conditions (Abraham, 2023).

Difficulties in Getting Medical Help:

1. Limited Onboard Medical Facilities - Ships often lack specialized medical personnel and equipment (Drylli et al., 2019).
2. Delayed Shoreside Treatment - Many cases require shoreside evaluation, but logistical challenges delay treatment (Abraham, 2023).
3. Emergency Evacuations - Serious medical emergencies may require vessel diversions, leading to operational delays (Sarika & Bhupender, 2023).
4. Lack of Mental Health Support - Limited access to counseling services and mental health programs (Sarika & Bhupender, 2023).
5. Pandemic and Epidemic Risks- Seafarers are exposed to global health risks due to frequent travel (Drylli et al., 2019).

These findings highlight the urgent need for improved healthcare policies and support systems for Indian seafarers.

4.5 To list the benefits of medical examination to the Maritime Industry.

Results of secondary research are as below:

1. Ensuring Crew Fitness- Pre-employment medical examinations (PEME) assess the fitness of seafarers, ensuring they can handle the physical and mental demands of working at sea (Carter, 2017).
2. Reducing Medical Emergencies - Identifying underlying health conditions before deployment helps prevent medical emergencies at sea, reducing the need for costly evacuations (Diskin, 2024).

3. Compliance with Regulations- Medical examinations help shipowners comply with international maritime health and safety standards, such as those set by the International Maritime Organization (IMO) and the Maritime Labour Convention (MLC) (ILO/IMO, 2013).
4. Enhancing Workplace Safety- A healthy crew contributes to a safer working environment, reducing accidents and improving overall vessel operations (Diskin, 2024).
5. Mental Health Assessment - Medical screenings increasingly include mental health evaluations, ensuring seafarers are psychologically fit for long voyages and isolation (Carter, 2017).
6. Preventing Spread of Diseases - Regular health checks help detect infectious diseases early, preventing outbreaks onboard (ILO/IMO, 2013).
7. Boosting Productivity- Healthy seafarers are more efficient and productive, leading to better performance and reduced downtime due to illness (Diskin, 2024).
8. Drug and Alcohol Testing - Some medical examinations include substance abuse tests, ensuring crew members are fit to perform their duties safely (ILO/IMO, 2013).

These results emphasize the crucial role of medical examinations in ensuring both the safety and productivity of maritime professionals.

4.6 Summary of Findings:

i.) Objective 1: Systematic review of guidelines:

India adheres to key maritime health regulations, including MLC 2006, STCW Code, and Merchant Shipping Rules. However, inconsistencies in medical screening practices raise concerns about the reliability of Pre-Employment Medical Examinations (PEME).

Key Observations:

- ILO Guidelines (MLC 2006) set minimum health standards for seafarers but lack detailed disease screening requirements.

- Medical Examination Rules 2016 (DG Shipping, India) align with international maritime health laws while incorporating additional assessments specific to Indian seafarers.
- P&I Clubs' PEME Schemes exceed standard compliance, focusing on identifying pre-existing health conditions to mitigate medical repatriation risks for shipowners.

ii.) Objective 2: Level of awareness for pre-employment medical examinations:

- High Agreement: Most questions had strong agreement (both "AGREE" and "STRONGLY AGREE"), indicating that participants generally have positive attitudes toward the survey statements. Notable questions with high agreement were Q.7, Q.8, and Q.9.
- Neutral Responses: Questions Q.17 to Q.19 had higher neutral responses, suggesting some uncertainty or mixed feelings about these questions.
- Disagree and strongly disagree: Few participants strongly disagreed or disagreed, indicating general consensus.

iii.) Objective 3: Level of Satisfaction for medical examination:

- Question No. 1: 95% of respondents agreed or strongly agreed, showing high consensus and positive response.
- Question No. 2: 98% agreed or strongly agreed, indicating very strong favorability.
- Question No. 3: While 79% agreed or strongly agreed, 21% were neutral, indicating some ambivalence.
- Question No. 4 (negatively worded): 85% did not agree, showing strong disagreement to a negative statement, hence showing a high level of satisfaction.

iv.) Objective 4: Health issues faced by Indian seafarers: -

Indian seafarers face various health challenges, including musculoskeletal issues, cardiovascular diseases, respiratory ailments, gastrointestinal disorders, and mental health concerns. Poor diet, isolation, and physically demanding work increase risks. Additionally, accessing medical help is difficult due to limited onboard facilities, delays in shoreside treatment, and a lack of mental health support. These findings underscore the need to enhance healthcare policies and support systems to ensure the well-being of seafarers.

v.) Objective 5: Benefits to the maritime industry: -

Medical examinations are crucial for the maritime industry, ensuring seafarers are fit for duty, reducing medical emergencies, and enhancing workplace safety. They help shipowners comply with international regulations, support mental health assessments, and prevent disease outbreaks. Additionally, these exams boost productivity and include drug and alcohol testing to maintain operational efficiency.

Overall Summary

Strong Agreement: Participants generally showed strong agreement with most statements, indicating positive sentiment toward the survey topics. This highlights the general attitudes and opinions of participants, as well as areas that may require more attention or clarity.

The research highlights key aspects of maritime medical examinations in India, focusing on regulatory frameworks, awareness levels, satisfaction rates, health challenges, and industry benefits. While India follows international maritime health regulations, inconsistencies in medical screening affect the reliability of Pre-Employment Medical Examinations (PEME). Seafarers generally have positive awareness of medical examinations, with high agreement on their importance. Satisfaction levels are strong, though some areas require improvement. The research also identifies common health risks faced by Indian seafarers, including musculoskeletal disorders, cardiovascular diseases, and limited access to medical care. Medical examinations are



essential in the maritime industry, helping maintain crew fitness, minimize emergencies, enhance workplace safety, and optimize operational efficiency

4.7 Conclusion

Although the data is limited to 4 clinics, the seafarers come from different parts of India to the medical centers for pre-employment medical examinations. Most of the manning companies are based in Mumbai, and the seafarers come to Mumbai for documentation at the office before traveling to their ship destinations. During these visits, they are asked to go to medical clinics in Mumbai for their PEME. Hence, this population represents a diverse background of various parts of India. The data shows that the majority of participants agree with the survey statements, with minimal outright opposition, which suggests that the topics addressed are generally well-received by the participants.

In summary, the study emphasizes the vital role of medical examinations in the maritime sector, showcasing their importance in regulatory adherence and the tangible advantages they offer to both seafarers and shipowners. While India adheres to international health regulations, inconsistencies in medical screening standards affect the reliability of Pre-Employment Medical Examinations (PEME). Despite a generally high awareness and satisfaction level among seafarers, gaps in healthcare accessibility and the prevalence of various health risks demand attention. Strengthening medical assessment protocols, improving support systems, and ensuring uniform implementation can enhance seafarer well-being and operational efficiency. A standardized, comprehensive approach to medical examinations will not only protect individual health but also contribute to the industry's overall safety and sustainability

Suggestions of further investigation methods to gain more clarity: -

Further Investigation Methods

1. **Follow-Up Interviews:** Conduct in-depth interviews with a subset of participants to gain more detailed insights into their responses, especially for questions with high neutrality or strong disagreement.
2. **Focus Groups:** Organize focus group discussions to explore participants' views and experiences in more detail. This can provide a deeper understanding of their opinions and the reasons behind them.
3. **Additional Surveys:** Distribute more specific surveys targeting the areas of uncertainty or dissatisfaction identified in the initial survey. This can help clarify and expand on the initial findings.
4. **Comparative Studies:** Compare the survey results with similar studies conducted on different populations, such as seafarers from other countries. This can provide context and highlight any unique aspects of the Indian seafarers' experiences.
5. **Case Studies:** Conduct case studies on specific instances where PEME had a significant impact, either positively or negatively. This can provide concrete examples and insights into the effects of PEME.

Improvement Methods

1. **Enhanced Communication:** Improve communication about the purpose and benefits of PEME to seafarers, addressing any misconceptions or concerns. This can be done through informational sessions or educational materials.
2. **Feedback Mechanism:** Implement a feedback mechanism allowing seafarers to express their concerns or suggestions about PEME. This can help continuously improve the process based on real-time feedback.

3. **Training for Medical Staff:** Provide additional training for medical staff conducting PEMEs to ensure consistent and empathetic interactions with seafarers, addressing any potential issues in the examination process.

4. **Streamlined Processes:** Revise and optimize the PEME process to improve efficiency and reduce the time required for seafarers. This can help reduce any perceived obstacles associated with the examinations.

5. **Regular Monitoring and Evaluation:** Establish a system for regular monitoring and evaluation of the PEME process, using survey results and feedback to identify areas for improvement and implement necessary changes.

By implementing these methods, you can gain deeper insights into the survey data and continuously improve the PEME process for seafarers.

CHAPTER V

DISCUSSION

This section will present a discussion of each objective of this research. Below are the objectives for our ready reference:

1. To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.
2. To evaluate the awareness of medical examinations among seafarers
3. To measure the satisfaction level of seafarers for medical examinations
4. To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.
5. To list the benefits of medical examination to the Maritime Industry.

Key Research Questions:

1. How aligned are India's current PEME practices with international maritime health regulations?
2. How aware are Indian seafarers of PEME medical tests and their implications?
3. What is the level of satisfaction among seafarers regarding current medical examination procedures?
4. What are the most common health issues identified among Indian seafarers through PEME?
5. How beneficial is pre-employment medical examination to maritime industry?

5.1: Objective #1: To present a systematic review of standards and guidelines concerning the fitness of seafarers for service at sea.

The maritime industry stands as a vital pillar of global commerce, interconnecting nations and economies through vast ocean routes. In India, approximately 95% of trade by volume and 70% by value is facilitated via maritime transport, emphasizing the sector's significance. At the heart of this industry are the seafarers, whose health and competency are crucial for safe and efficient operations. India contributes significantly to the global seafaring workforce, necessitating stringent pre-employment and periodic medical examinations to ensure their fitness for duty. The guidelines established by the International Labour Organization (ILO) and the International Maritime Organization (IMO) underpin these medical assessments, ensuring international standards and consistency.

The Merchant Shipping Act, 1958, along with its subsequent amendments, establishes a comprehensive framework for seafarer certification and medical examinations, emphasizing the critical role of medical fitness in maritime operations. The introduction of the Pre-Employment Medical Examination (PEME) scheme by P&I Clubs further enhances crew health by identifying potential health issues early, thereby reducing the risk of medical emergencies at sea and ensuring cost savings through minimized claims. This collaborative effort between P&I clubs, shipowners, and approved medical clinics underscores a proactive approach to maintaining a healthy workforce.

The detailed medical examinations, encompassing medical history, physical fitness, vision, hearing, and laboratory tests, ensure that only those who meet the stringent health standards are permitted to serve onboard. These measures not only safeguard seafarers' well-being but also enhance maritime safety and ensure the efficient operation of vessels.



The Maritime Labour Convention (MLC) 2006, often referred to as the “bill of rights” for seafarers, further ensures fair employment terms, safe working conditions, and social protection, reinforcing the industry's commitment to its workforce.

The fitness of seafarers for service at sea is governed by a comprehensive framework of international standards and guidelines, ensuring their health and safety while maintaining operational efficiency. The International Labour Organization (ILO) and the International Maritime Organization (IMO) play pivotal roles in establishing these standards.

International Guidelines and Conventions

1. Maritime Labour Convention (MLC) 2006: Often referred to as the "bill of rights" for seafarers, the MLC 2006 sets minimum international standards for living and working conditions. It mandates that seafarers hold valid medical certificates to ensure they are fit for duty.

2. International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW): This convention, amended in 2010, outlines seafarers' medical fitness and eyesight requirements. It specifies the minimum physical and medical fitness criteria, including eyesight standards, to ensure seafarers can perform their duties safely.

3. Medical Examination Rules: National regulations, such as India's Merchant Shipping (Medical Examination) Rules, 2000 (amended in 2016), align with international guidelines and ensure that seafarers undergo pre-employment and periodic medical examinations.



Components of Medical Examinations

1. **Pre-Sea Medical Examination:** Conducted before a seafarer embarks on a career at sea, this examination includes a medical history review, physical examination, vision and hearing tests, and laboratory tests.
2. **Periodic Medical Examination:** Conducted at regular intervals during a seafarer's career to ensure ongoing fitness.
3. **Periodic Eye Test:** Specifically for seafarers appearing for nautical grade examinations, ensuring they meet the required eyesight standards.

Collaboration and Implementation

The PEME scheme, introduced by P&I Clubs, involves collaboration between P&I clubs, shipowners, and approved medical clinics. This scheme ensures that crew members are medically fit before joining ships, reducing the risk of medical emergencies and promoting overall crew health.

Below is a systematic review of the guidelines for medical examination of seafarers, comparing the data of ILO guidelines (MLC 2006), Medical Examination Rules 2016 (as amended by DG Shipping, Govt of India), and P&I Clubs' Pre-Employment Medical Examination (PEME) schemes.

Table 11: Comparison of Medical Examination Guidelines for Seafarers

Category	ILO Guidelines (MLC 2006)	Medical Examination Rules 2016 (India, DG Shipping)	P&I Clubs PEME Scheme
Regulatory Authority	International Labour Organization (ILO)	Directorate General of Shipping, Govt of India	Protection & Indemnity (P&I) Clubs
Applicability	Global maritime workforce	Indian seafarers serving aboard national and foreign ships	Seafarers under shipping companies covered by P&I insurance
Medical Certificate Validity	Up to 2 years , or 1 year for underage seafarers	2 years (seafarers under 18: valid for 1 year)	1 year , with periodic renewals based on the employer
Scope of Medical Examination	Comprehensive physical & psychological assessments	Mandatory pre-sea, periodic & eye tests	Enhanced testing with a focus on pre-existing conditions
Vision & Hearing Tests	Required as per STCW guidelines	Annexure II & III prescribe minimum standards	Mandatory testing; includes colour vision & hearing assessments
Laboratory & Diagnostic Tests	General health markers & communicable diseases screening	Routine tests + specific assessments for Indian seafarers	Extensive diagnostics, including cardiovascular screening

Category	ILO Guidelines (MLC 2006)	Medical Examination Rules 2016 (India, DG Shipping)	P&I Clubs PEME Scheme
Psychological Assessments	Not explicitly required, but recommended	Limited to seafarer fitness for duty	Mandatory mental health screening & cognitive function tests
Fitness Standards	Seafarers must be fit for their duties onboard	Pre-sea and periodic standards based on STCW guidelines	Tailored standards ensuring medical fitness for specific ship operations
Extension of Certificate	Allowed for up to 3 months if expiring during voyage	Allowed for up to 3 months until next port visit	Renewal requirements depend on the employer and P&I Club policies
Disease Screening	General health issues, infectious diseases	Includes lifestyle diseases like diabetes, hypertension	Comprehensive pre-existing condition screening
Penalties for Non-Compliance	Employment restrictions, inability to serve on board ships	As per the Merchant Shipping Act, 1958 , fines & penalties apply	Rejection from maritime employment, insurance claim limitations

Source: Created by Author.

Key Observations:

- ILO Guidelines (MLC 2006) establish minimum global health standards for seafarers, ensuring basic fitness for duty, but do not mandate detailed disease screening.



- Medical Examination Rules 2016 (DG Shipping, India) align with STCW 2010 and national maritime health laws, ensuring compliance with international standards while incorporating additional assessments relevant to Indian seafarers.
- P&I Clubs' PEME schemes go beyond basic compliance, focusing on detecting pre-existing health conditions that could result in medical repatriation claims. These assessments provide additional safeguards for shipowners.

This table provides a systematic review highlighting the similarities and differences across MLC 2006, Medical Examination Rules 2016 (India), and P&I Clubs' PEME schemes.

Benefits of the Standards and Guidelines

1. **Risk Reduction:** Early identification of health issues prevents crew members with undisclosed medical conditions from joining ships, reducing the risk of medical emergencies at sea.
2. **Cost Savings:** By minimizing claims related to pre-existing conditions, P&I clubs achieve cost savings.
3. **Enhanced Crew Health:** Ensuring crew members are fit for duty contributes to safer and more efficient ship operations.

The integration of international standards, national policies, and proactive health initiatives forms a strong foundation that ensures the resilience and sustainability of the maritime sector. This holistic approach is crucial for fostering a safe, efficient, and healthy maritime environment, ultimately supporting the global trade network.

In summary, the systematic review of standards and guidelines for seafarers' fitness highlights the importance of international collaboration, comprehensive medical examinations, and proactive health measures. These efforts collectively ensure the safety, health, and operational efficiency of the maritime industry, supporting its critical role in global trade and commerce.

5.2 Objective #2: To analyze the awareness of medical examinations among seafarers

• Discussion of Results pertaining to Objective # 2

Below are abbreviations in the table for a discussion of results for Research Questions 1 and 2.

1. **WM:** This stands for **Weighted Mean**. It's a type of average where each value in the dataset is multiplied by a weight before the final calculation. This is useful when different values have different levels of importance.
2. **VI:** This stands for **Verbal Interpretation**. It provides a qualitative description of the numerical data, such as categorizing scores into ranges like "Very High," "High," "Moderate," etc.
3. **RANK:** This indicates the position or order of items in a list based on a specific criterion. For example, they were ranking respondents based on their scores or responses.

Discussion of Primary Research Done for Objective #2:

Table 12: Awareness of seafarers on Pre-employment medical examinations

Questions	LEVEL OF AWARENESS	WM	VI	RANK
1	Pre-employment medical examination (PEME) helps in the early detection and treatment of medical conditions before going for service at sea.	4.08	highly Aware	4
2	Physical examination helps to find signs of any past or present medical conditions	3.87	highly Aware	16
3	Identity verification helps to eliminate someone else appearing for medicals against one's name.	4.09	highly Aware	3
4	Medical history should be declared in full, and no information should be hidden.	3.99	highly Aware	13
5	All ongoing medication should be declared to the medical officer.	4.11	highly Aware	2
6	Vision check by Snellen Chart helps assess a person's distant vision.	4.12	highly Aware	1

7	Color Test by Ishihara book helps to assess any deficiencies of red, yellow, or green color.	4.04	highly Aware	7
8	Near Vision check helps to assess the need for prescription glasses for reading purposes.	4.05	highly Aware	6
9	Blood pressure is an important indicator of heart health.	4.01	Highly Aware	11
10	BMI is an important calculation for physical capability assessment.	3.94	Highly Aware	15
11	Audiometry is done to assess the level of hearing.	3.98	Highly Aware	14
12	Blood tests help to detect infections, kidney function, liver function, sexually transmitted diseases, cholesterol levels, sugar levels etc.	4.02	Highly Aware	9.5
13	Urine test helps to know more about kidney health and other health conditions.	4	Highly Aware	12
14	ECG and Treadmill test helps to assess the health of our heart.	4.02	Highly Aware	9.5
15	Chest X-ray helps to know the structure and health condition of our chest and its organs.	4.03	Highly Aware	8
16	Dental examination helps to maintain healthy teeth, gums, and oral cavity.	4.06	Highly Aware	5
17	Stool or Fecal test helps to detect contagious health conditions in food handlers.	3.43	Aware	19
18	Psychological tests help in assessing the emotional and mental well-being of a person.	3.86	Highly Aware	17
19	Spirometry or Lung function test is used to find the respiratory health of a person	3.78	highly Aware	18
	Composite Mean	3.97	Highly Aware	

Source: Created by Author.

Scale: Highly Aware: 3.5-4.00; Aware:2.50-3.49; Less Aware: 1.50-2.49; Not Aware: 1.00-1.49

Table 5 represents the Awareness of seafarers regarding Medical Examinations. The table shows that the Indian Seafarers are aware of the multiple tests done for them, with a weighted mean of 3.97.

The questions registered low to very high mean values ranging from 3.43 to 4.18, interpreted as “Aware” and “Highly Aware” on the different medical examinations given to seafarers. With this, it can be seen that most of the respondents are aware of the different medical examinations.

The result shows that a **Vision check by (the Snellen Chart)** which helps assess a person's distant vision has got the highest rank with a weighted mean of 4.18 and is interpreted as “Highly Aware”. It was followed by questions, Ongoing medication declaration during PEME, and Identity verification before PEME. These are ranked 2nd and 3rd respectively as all the medical examinations done have this in common.

The question no. 1: PEME tests help in the early detection of any disease ranked 4th and the Dental examination ranked 5th because these are the most common examinations done for any basic profile.

On the other hand, psychological tests (psychometry) which help to assess the mental well-being of the person with a weighted mean of 3.86, spirometry to check respiratory health with a weighted mean of 3.78, and Stool test with a weighted mean of 3.43 ranked the lowest.

Psychological tests (psychometry) which help to assess the mental well-being of the seafarer ranked 17th, is not so common tests that the seafarers come across so widely hence the awareness is also low.

Spirometry to check respiratory health ranked 18th, and stool test scored the last rank which is 19th. The stool test secured the last rank as it is done only for the food handler rank, to evaluate the function and integrity of the Gastro-Intestinal Tract. These tests are uncommon and seldom encountered by seafarers which may be the sole reason for getting low rank.

5.3 Objective #3: To study the satisfaction level of seafarers for medical examinations

To study the satisfaction level of seafarers

Table 13: Responses to the Level of Satisfaction Questionnaire

Questions	LEVEL OF AWARENESS	WM	VI	RANK
1	Do you find any purpose in PEME done by employer	4.03	Very Important	2
2	Do you feel PEME helps you to find out if there are any underlying disease	4.11	Very Important	1
3	Do you see it as good tool to get your full health assessment done?	3.82	Very Important	3
4	Do you see the PEME as an obstacle for your offshore career?	2.19	Less Important	4

Scale: Very Important: 3.5-4.00; Important:2.50-3.49; Less Important: 1.50-2.49; Not Important:1.00-1.49

Source: Created by Author.

Question number 2 scored the 1st rank with a weighted mean of 4.11.

Question No. 1 scored the 2nd rank with a weighted mean of 4.03.

Question number 3 scored the 3rd rank with a weighted mean of 3.82.

Whereas, question number which is negatively worded scored the last and 4th rank.

The responses indicate:



High agreement for Questions 1 and 2, with overwhelming positive responses.

Mixed sentiments for Question 3, with a substantial neutral response.

Strong disagreement for Question 4 (negatively worded). Respondents do not agree with the negative statement, which supports satisfaction.

5.4 Objective #4: To list the various health issues faced by Indian seafarers while serving at sea and the difficulties encountered in getting medical help.

Medical Issues Faced by Seafarers:

- **Fatigue:** Seafarers often experience fatigue due to long working hours and irregular work schedules. (Source: www.seahealth.net)
- **Accidents and Injuries:** Working with large and complex machinery, at heights, in enclosed or cramped spaces, and under harsh weather conditions predisposes seafarers to accidents and injuries.
- **Hand-Arm Vibration Syndrome:** Prolonged use of vibration tools can cause pain, numbness, and tingling in the hands and arms.
- **Backache and Other Musculoskeletal Disorders:** Manual handling, heavy lifting, and repetitive movements of certain body parts may lead to wear and tear of muscles and joints.
- **Psychiatric Health Conditions:** Isolation and separation from loved ones may predispose seafarers to stress, depression, or other mental health diseases.
- **Cardiac Health Issues:** Lack of exercise, lack of recreational activities, and work stress may predispose seafarers to cardiac events.
- **Obesity and Other Metabolic Disorders:** Unhealthy eating habits and routines may lead to obesity and other metabolic disorders.
- **Dehydration, Heat Stress, and Fatigue:** Extreme hot weather conditions may cause these issues.

When at sea, access to medical care is limited and sometimes unavailable, hence prompt medical attention is not always possible. The medical inventory on board ships varies significantly, making it difficult for shore medical facilities to advise a particular line of treatment. Challenges in Accessing Medical Care:

- **Remote Locations:**
 - Seafarers frequently operate in isolated maritime regions, where access to medical facilities is limited, posing challenges in obtaining timely healthcare interventions. This underscores the importance of onboard medical preparedness and telemedicine solutions in maritime operations.
- **Limited Onboard Medical Resources:**
 - Ships may have limited medical supplies and equipment, relying on basic first aid and telemedicine for more serious conditions.
- **Port Restrictions:**
 - During emergencies or pandemics, port restrictions can delay or prevent seafarers from disembarking to seek medical treatment.
- **Telemedicine Limitations:**
 - While telemedicine offers a valuable solution, it cannot replace the need for physical examinations and immediate medical interventions.
- **Language Barriers and Cultural Differences:**
 - Seafarers from diverse backgrounds may face language barriers and cultural differences when accessing medical care in foreign ports.

Efforts to Improve Medical Care Access

Telemedicine Services:



Enhanced telemedicine services provide remote medical consultations and support, improving access to medical advice and diagnosis.

Designation as Key Workers:

Recognizing seafarers as key workers during global crises ensures they receive priority access to medical care and resources.

International Collaboration:

Collaboration between maritime organizations and healthcare providers aims to develop protocols and resources for better medical care access.

Conclusion:

Despite the challenges, concerted efforts by international maritime organizations, shipowners, and healthcare providers are crucial in improving seafarers' health and access to medical care. Addressing these issues not only enhances the well-being of seafarers but also contributes to the overall safety and efficiency of maritime operations.

5.5 Objective #5: To list the benefits of medical examination to the Maritime Industry.

Benefits of PEME to the Maritime Industry

Risk Reduction:

Early Detection: Identifies pre-existing medical conditions that may pose risks during sea voyages.

Prevention of Medical Emergencies: Reduces the likelihood of medical emergencies at sea by ensuring crew members are fit for duty.

Cost Savings:

Reduced Claims: Minimizes claims related to pre-existing conditions, leading to lower insurance premiums for shipowners.



Lower Healthcare Costs: Prevents costly medical treatments and evacuations by identifying health issues before they escalate. PEME reduces preventable illness claims, which can be costly for shipping companies, by ensuring seafarers are medically fit before joining a ship (Facebook.com, 2015).

Enhanced Safety:

Operational Efficiency: Fit and healthy crew members contribute to smoother and more efficient ship operations.

Compliance with Regulations: Ensures adherence to international and national maritime health and safety regulations.

Improved Crew Health:

- **Comprehensive Health Assessments:** Regular medical examinations help maintain and monitor the overall health and well-being of the crew.
- **Fitness for Duty:** Ensures that only those who are medically fit can undertake demanding tasks on board, reducing the risk of accidents.

Enhanced Crew Morale:

- **Peace of Mind:** Crew members gain confidence knowing they are medically fit for their roles, boosting morale and productivity.
- **Supportive Work Environment:** Demonstrates that shipowners value the health and safety of their crew, fostering loyalty and commitment.

Regulatory Compliance:

- **Meeting International Standards:** Aligns with guidelines set by the ILO and IMO, ensuring global compliance.
- **Avoiding Legal Issues:** Reduces the risk of legal complications arising from non-compliance with health and safety standards.

Proactive Health Management:



- Regular Monitoring: Periodic medical examinations help in the early detection and management of potential health issues.
- Preventive Care: Encourages a culture of preventive health care among seafarers, reducing long-term health problems.
- Promotes the well-being of seafarers by aiding in the early detection of health issues (Marinos Kokkinis, 2025).
- Improving health conditions extends the seafaring career span (Maritime-executive.com, 2024).

Efficiency in Recruitment:

Better Workforce Management: Ensures that only those who meet the medical fitness criteria are hired, enhancing the quality of the workforce.

Reduced Turnover: Healthy and fit crew members are likely to have longer careers, reducing recruitment and training costs.

The PEME scheme provides a comprehensive approach to safeguarding the health and safety of seafarers. By mitigating risks, reducing costs, and ensuring compliance with international regulations, it plays a critical role in maintaining the efficiency and reliability of maritime operations. Ultimately, these benefits contribute to a more robust and sustainable maritime industry.

According to Diskin (2024), PEME helps assess medical fitness, ensuring seafarers are fit for sea service, enhancing safety, and reducing the likelihood of accidents and injuries. PEME ensures a healthy workforce, reducing medical emergencies onboard.

Interpretation of Hypothesis Findings

H0 (Null Hypothesis):

Indian seafarers do not demonstrate high awareness or satisfaction with PEME procedures.

H1 (Alternative Hypothesis):

Indian seafarers demonstrate a high level of awareness and high level of satisfaction with PEME procedures.

The results of this study provide strong evidence to support the alternative hypothesis (H_1), which proposed that Indian seafarers demonstrate a high level of awareness and satisfaction with Pre-Employment Medical Examination (PEME) procedures.

These findings align with previous research by Sarmiento (2015), who found high awareness of medical examinations among maritime students, and support the notion that awareness continues into professional practice. The results also suggest that Indian shipping companies have been largely effective in communicating the importance of PEME and ensuring compliance among their workforce.

However, the presence of neutrality in some responses indicates that while the system is functioning well overall, there may be areas—such as mental health screening, follow-up care, or clarity of procedures—that require refinement. This opens up opportunities for targeted improvements in PEME protocols and seafarer education.



SUMMARY, IMPLICATIONS & RECOMMENDATIONS

6.1 Summary

This research highlights the importance of medical examinations for Indian seafarers, covering regulatory compliance, awareness levels, satisfaction, health challenges, and industry benefits. While India follows international maritime health regulations, inconsistencies in screening practices affect the reliability of Pre-Employment Medical Examinations (PEME).

Seafarers generally recognize the significance of medical screenings, with high awareness and satisfaction levels, though certain gaps remain.

The study tested the hypothesis that Indian seafarers demonstrate a high level of awareness and satisfaction with PEME procedures. Based on the survey results, the null hypothesis (H0) was rejected. The findings confirmed that seafarers are generally well-informed about PEME requirements and express satisfaction with the process, particularly in terms of its purpose and perceived health benefits.

Health risks such as musculoskeletal disorders, cardiovascular diseases, respiratory infections, and mental health concerns emphasize the need for better medical support. Medical examinations not only ensure crew fitness but also contribute to operational safety, regulatory compliance, and productivity within the maritime industry.

The data was collected from the seafarers of different medical centers around the Mumbai region and it was nice to interact personally with many of them. It gave the researcher practical experience and exposure to interact and understand the research question's depth and importance at the same time.

- **Talent Pool:** India is the thirdlargest provider of seafarers globally. This means shipping g companies have access to a large, skilled workforce. (How India became a talent pool for the global shipping industry, 2024)
- **Cost Efficiency:** Utilizing Indian seafarers can lead to significant cost savings due to lower wage expectations compared to other regions. Ghosh, R. (2024)
- **Professionalism and Resilience:** Indian seafarers have demonstrated high levels of professionalism and resilience, especially during challenging times like the COVID-19 pandemic. (India's Role in Global Shipping Industry, n.d.)



- **Global Representation:** With Indian seafarers making up nearly 10% of the global maritime workforce, shipping companies can ensure diverse representation and cultural understanding on their vessels. ET Online (2024)
- **Foreign Exchange Savings:** A strong Indigenous shipping fleet reduces dependence on foreign ships, leading to savings on freight bill payments (Pib.gov.in, 2021)

Overall, the research helps shipping companies optimize their operations, reduce costs, and maintain a high standard of service.

6.2 Implications

The findings indicate that standardizing PEME procedures can enhance trust and effectiveness, ensuring seafarers receive comprehensive health screenings. The research further suggests that greater mental health support is needed, as isolation and stress remain significant concerns for maritime professionals. The industry's reliance on P&I Clubs' PEME schemes demonstrates the necessity for proactive health assessments beyond basic compliance to prevent medical repatriation claims. Additionally, the awareness and satisfaction levels reflect a generally positive attitude toward medical examinations. Addressing healthcare gaps will not only improve seafarer well-being but also optimize operational efficiency and reduce medical emergencies at sea. These findings have several important implications for the maritime industry:

- The high awareness levels suggest that current training and communication strategies regarding PEME are effective and should be continued.
- The overall satisfaction indicates that the structure and delivery of PEME procedures are meeting seafarers' expectations.
- However, the neutral responses to certain aspects of the examination process highlight the need for:
 - Enhanced clarity on the scope and depth of medical evaluations



- Greater emphasis on mental health and psychological assessments
- Improved post-examination feedback and follow-up mechanisms

The research concluded that although most seafarers are aware of the importance of medical examinations still there is scope for improvement. The importance of BMI should be briefed to the seafarers, which can be seen from the data that almost 20% people are unaware of the importance of weight being in the normal range.

6.3 Recommendations:

1. **Standardization of Medical Screening Practices** – Ensure uniformity in PEME regulations to improve reliability and effectiveness across the maritime sector.
2. **Collaboration with P&I Clubs and Industry Stakeholders** – Encourage joint efforts to expand pre-existing health assessments, ensuring preventive care measures are prioritized.
3. **Awareness Programs** – Conduct educational initiatives to enhance understanding of health risks and the role of medical examinations among seafarers.
4. **Enhanced Accessibility to Medical Care** – Improve access to medical assistance for seafarers through better onboard facilities and quicker shoreside treatment arrangements.
5. **Strengthening Expansion of Mental Health Support Services** – Introduce specialized mental health screenings and onboard counselling programs to assist seafarers in coping with stress and isolation.
6. **Continuous Evaluation and Feedback Mechanisms** – Establish mechanisms for ongoing assessment and improvement of maritime medical examination standards to align with evolving health concerns.

These recommendations, if implemented, will contribute to a safer and healthier maritime workforce while reinforcing the industry's commitment to seafarer well-being. The researcher

collected the data from seafarers and found out that 92% of seafarers are aware of the pre-employment medical examinations done by their employers. So fairly the seafarers understand the importance of Pre-employment medical examinations. For future research, I would recommend that the data to be collected from the medical officer examining in the medical clinics to understand the importance of PEME to seafarers. Because the seafarers may not give the true data all the time, but the examining officer understands that the seafarer is happy or reluctant to get the medical tests done for their employment. Also, I would recommend the data collection to be done on a small population size. Managing the gathered data is a bit tedious with the very large sample size.

6.4 Conclusion

In conclusion, this research underscores the critical role of medical examinations in the maritime industry, particularly for Indian seafarers. While India follows key international health regulations, inconsistencies in screening practices affect the reliability and effectiveness of Pre-Employment Medical Examinations (PEME). Seafarers generally acknowledge the importance of medical assessments, with high awareness and satisfaction levels, though challenges such as limited access to medical care and prevalent health risks remain significant concerns. Standardizing medical screening, strengthening mental health support, and improving access to healthcare will enhance the well-being of seafarers and promote operational efficiency. A comprehensive and proactive approach to maritime health policies will not only safeguard individual seafarers but also contribute to the industry's long-term sustainability and safety.

APPENDICES

APPENDIX-1: Annexure -I of M.S. (Medical examination) Rules 2000, as amended.

Annexure-I

Assessment of minimum entry level and in-service physical abilities for seafarers

Table B-I/9 of the Standards, Training, Certification and Watch keeping (STCW) Code

Shipboard task, function, event or condition	Relative physical ability	A medical examiner should be satisfied that the candidate
(1)	(2)	(3)
Routine movement around vessel: - on moving deck - between levels - between compartments Note 1 applies to this row	Maintain balance and move with agility climb up and down vertical ladders and stairways step over coamings (e.g., load Line Convention requires coaming to be 600 mm high) open and close watertight doors	Has no disturbance in sense of balance. Does not have any impairment or disease that prevents relevant movements and physical activities. Is, without assistance, able to: - climb vertical ladders and stairways - step over high sills - manipulate door closing system
Routine tasks on board: - Use of hand tools - Movement of ship's stores - Overhead work - Valve operation - Standing a four-hour watch - Working in confined spaces - Responding to alarms, warnings and instructions - Verbal communication Note 1 applies to this row	Strength, dexterity and stamina to manipulate mechanical devices Lift, pull and carry a load (e.g., 18 kg) Reach upwards Stand, walk and remain alert for an extended period Work in constricted spaces and move through restricted openings (e.g., SOLAS regulation II-1-3-6.5.1 requires openings in cargo spaces and emergency escapes to have the minimum dimensions of 600mm x 600mm) Visually distinguish objects, shapes and signals Hear warnings and instructions Give a clear spoken description	Does not have a defined impairment or diagnosed medical condition that reduces ability to perform routine duties essential to the safe operation of the vessel Has ability to: - work with arms raised - stand and walk for an extended period - enter confined space - fulfil eyesight standards (table A-1/9) - fulfil hearing standards set by competent authority or take account of International guidelines - hold normal conversation

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Emergency duties on board: - Escape - Fire-fighting - Evacuation	Don a lifejacket or immersion suit Escape from smoke-filled spaces Take part in fire-fighting duties, including use of breathing apparatus Take part in vessel evacuation procedures	Does not have a defined impairment or diagnosed medical condition that reduces ability to perform emergency duties essential to the safe operation of the vessel. Has ability to: - don lifejacket or immersion suit - crawl - feel for differences in temperature - handle fire-fighting equipment - wear breathing apparatus (where required as part of duties)
Note 2 applies to this row		

Notes:

- (1) Rows 1 and 2 of the above table describe (a) ordinary shipboard tasks, functions, events and conditions, (b) the corresponding physical abilities which may be considered necessary for the safety of a seafarer, other crew members and the ship, and (c) high level criteria for use by Medical practitioners assessing medical fitness, bearing in mind the different duties of seafarers and the nature of shipboard work for which they will be employed.
- (2) Rows 3 of above table describes (a) ordinary shipboard tasks, functions, events and conditions (b) the corresponding physical abilities which should be considered necessary for the safety of a seafarer, other crew members and the ship, and (c) high-level criteria for use by Medical practitioners assessing medical fitness, bearing in mind the different duties of seafarers and the nature of shipboard work for which they will be employed.
- (3) This table is not intended to address all possible shipboard conditions or potentially disqualifying medical conditions. Parties should specify physical abilities applicable to the category of seafarers (such as "Deck officer", and "Engine rating"). The special circumstances of individuals and for those who have specialized or limited duties should receive due consideration.
- (4) If in doubt, the medical practitioner should quantify the degree or severity of any relevant impairment by means of objective tests, whenever appropriate tests are available, or by referring the candidate for further assessment.
- (5) The term "assistance" means the use of another person to accomplish the task.
- (6) The term "emergency duties" is used to cover all standard emergency response situations such as abandon ship or fire fighting as well as the procedures to be followed by each seafarer to secure personal survival.

(DGSHIPPING.GOV.IN, 2019)



Eye Sight Standards for Pre-sea Medical Examination

1. Nautical Department (Deck Department) includes GP Crew:

- a. Distance vision (unaided $1.0 \times (6/6)$ in better eye and $0.67 \times (6/9)$ in other eye; and
 - b. Normal colour vision shall be tested by Ishihara test chart.
2. Engine Department :
- a. Distance vision (unaided $0.5 \times (6/12)$ in each eye or $0.67 \times (6/9)$ in better eye and $0.33 \times (6/18)$ in other eye; and
 - b. Normal colour vision shall be tested by Ishihara test chart.
3. Catering/Hospitality Department (Including Bhandising and Utility Hands):

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- a. Distance vision (unaided $0.33^*/(6/18)$ in each eye or $0.5^*/(6/12)$ in better eye and $0.25^*/(6/24)$ in other eye; and
 - b. Normal colour vision shall be tested by Ishihara test chart.
4. Radio Officers or Audio officers, Electrical Officer/Electronic Officer:
- a. Distance form vision (unaided $0.5^*/(6/12)$ in each eye or $0.67^*/(6/9)$ in better eye and $0.33^*/(6/18)$ in other eye; and
 - b. Normal colour vision shall be tested by Ishihara test chart.

*Values given in Stellen Decimal Notation.

(DGSHIPPING.GOV.IN, 2019)

APPENDIX-3: MINIMUM IN-SERVICE EYE SIGHT STANDARDS FOR SEAFARERS AS PER M.S. (MEDICAL EXAMINATION) RULES 2000, AS AMENDED.

Annexure-III

Minimum in service eyesight standards for seafarers

Table A-I/9 of Standards, Training, Certification and Watch keeping (STCW) STCW Code

STCW Convention regulation	Category of seafarer	Distance vision aided		Near/ immediate vision	Colour vision	Visual fields	Night blindness	Diplopia (double vision)
		One eye	Other eye					
II/1 II/1 II/2 II/3 II/4 II/5 VII/2	Masters, deck officers and ratings required to undertake look-out duties	0.5	0.5	Vision required for ship's navigation (e.g. chart and nautical publication reference, use of bridge instrumentation and equipment, and identification of aids to navigation)	See Note 6	Normal Visual fields	Vision required to perform all necessary functions in darkness without compromise	No significant condition evident
III/1 III/1 III/2 III/3 III/4 III/5 III/6 III/7 VII/2	All engineer officers, electro- technical officers, electro- technical ratings and ratings or other forming part of an engine- room watch	0.4	0.4 (see Note 5)	Vision required to read instruments in close proximity, to operate equipment, and to identify systems/ components as necessary	See Note 7	Sufficient visual fields	Vision required to perform all necessary functions in darkness without compromise	No significant condition evident
III/1 IV/2	GMDSS Radio operators	0.4	0.4	Vision required to read instruments in close proximity, to operate equipment, and to identify systems/ components as necessary	See Note 7	Sufficient visual fields	Vision required to perform all necessary functions in darkness without compromise	No significant condition evident

Note 1:-

- (1) Values given in Snellen decimal notation.
- (2) A value of at least 0.7 in one eye is recommended to reduce the risk of undetected underlying eye disease
- (3) As defined in the International Recommendations for Colour Vision Requirements for Transport by the Commission Internationale de l'Eclairage (CIE-143-2001 including any subsequent versions).
- (4) Subject to assessment by a clinical vision specialist where indicated by initial examination findings.
- (5) Engine Department personnel shall have a combined Eye Sight Vision of at least 0.4.
- (6) CIE colour vision standard 1 or 2.
- (7) CIE colour vision standard 1, 2 or 3.

(DGSHIPPING.GOV.IN, 2019)

APPENDIX-4: MEDICAL CERTIFICATE FOR SERVICE AT SEA AS PER M.S. (MEDICAL EXAMINATION) RULES 2000, AS AMENDED.

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ANNEXURE -IV

Medical Certificate for Service at Sea
(Issued under the Authority of Directorate General of Shipping, Govt. of India under Rule 4 of M.S. (Medical Examination) Rules, 2000 as amended)

(Seafarer Name: Last, First, Middle) _____

Date of Birth: (dd/mm/yyyy) _____ Gender: (Male/Female) _____

Colour Photograph
40 mm X 35 mm



Indian/ _____

(Number of: CDG Passport/other valid identification document – with type of document) _____ (Nationality) _____

has been examined by _____
(Name of Medical Examiner and approval no.) _____

and has been found fit/unfit* for service at sea in the job of _____

* If unfit, reasons to be specified. Also, to specify whether temporary/permanent unfitness.

(a) The hearing and sight of the seafarer concerned, and the colour vision in the case of a seafarer to be employed in capacities where fitness for the work to be performed is liable to be affected by defective colour vision, are all satisfactory; and

(b) The seafarer concerned is not suffering from any medical condition likely to be aggravated by service at sea or to render the seafarer unfit for such service or to endanger the health of other persons on board.

(c) The Seafarer complies with the requirements specified in Table A-09 of STCW Code (i.e. Minimum in-service eyesight standards for seafarers), Table B-09 of the STCW Code (i.e. Assessment of minimum entry level and in-service physical abilities for seafarers) and Regulation 1.2, Standard A-1.2 & Guideline B-1.2 of the Maritime Labour Convention 2006.

(Date & Place of Medical Examination) _____

(Signature of the Medical Examiner)

(Address with E-mail ID & Contact No. of Medical Examiner)

(Serial number of the Certificate) _____

(Dgshipping.gov.in, 2019)

APPENDIX-5: SURVEY QUESTIONNAIRE TO CHECK AWARENESS OF PEME ON SEAFARERS (Table Source: Created by Author)

Name (optional) :	
Rank :	
Years in sea service:	
Gender:	
Age:	

SURVEY TO CHECK THE AWARENESS OF PEME

Sr. No	Questionnaire	Strongly Agree	Agree	Neutral	Do not Agree	Strongly Disagree
1.	Pre-employment medical examination (PEMED) helps in early detection and treatment of medical conditions before going for service at sea.					
2.	Physical examination helps to find signs of any past or present medical conditions.					
3.	Identity verification helps to eliminate someone else appearing for medicals against one's name.					
4.	Medical history should be declared in full, and no information should be hidden.					
5.	All ongoing medication should be declared to the medical officer.					
6.	Vision check by Snellen Chart helps to assess distant vision of a person.					
7.	Color Test by Ishihara's book helps to assess any deficiencies of red, yellow or green color.					
8.	Hear Vision check helps to assess need of prescription glasses for reading purposes.					
9.	Blood pressure is an important indicator of heart health.					
10.	BMI is an important calculation for physical capability assessment.					
11.	Audiometry is done to assess level of hearing.					
12.	Blood tests help to detect infections, kidney function, liver function, sexually transmitted diseases, cholesterol levels, sugar levels etc.					
13.	Urine test helps to know more about kidney health and other health conditions.					
14.	ECG and Treadmill test helps to assess health of our heart.					
15.	Chest X Ray helps to know structure and health condition of our chest and its organs.					
16.	Dental examination helps to maintain health teeth, gums and oral cavity.					
17.	Stool or Fecal Test helps to detect contagious health conditions in food handlers.					
18.	Psychological tests help in assessing emotional and mental wellbeing of a person.					
19.	Spirometry or Lung function test is used to find respiratory health of a person.					

APPENDIX-6: SURVEY QUESTIONNAIRE TO CHECK THE SATISFACTION LEVEL OF SEAFARERS FOR PEME (PRE-EMPLOYMENT MEDICAL EXAMINATIONS)

(Table Source: Created by Author)

Name (optional) :	
Rank :	
Years in sea service:	
Gender:	
Age:	

SURVEY TO STUDY THE SATISFACTION LEVEL OF SEAFARERS FOR MEDICAL EXAMINATIONS

Sl.NO.	QUESTIONNAIRE	Strongly Agree	Agree	Neutral	Do not Agree	Strongly Disagree
1	Do you find any purpose in PEME done by employer					
2	Do you feel PEME helps you to find out if there are any underlying disease					
3	Do you see it as good tool to get your full health assessment done?					
4	Do you see the PEME as an obstacle for your offshore career?					
ANY COMMENTS :						

APPENDIX-7: The Structured Table outlining the various ranks and Departments in the Maritime Industry.

The hierarchy ensures smooth operations aboard a vessel, with each department playing a crucial role in navigation, engineering, and crew welfare (Nautic, n.d.)

Department	Rank/Position	Responsibilities
Deck Department	Captain (Master)	Overall command of the vessel, navigation, and crew management
	Chief Officer (Chief Mate)	Supervises deck operations, cargo handling, and safety procedures
	Second Officer (Second Mate)	Assists in navigation, maintains charts, and oversees safety equipment
	Third Officer (Third Mate)	Watches over navigation and safety compliance
	Deck Cadet	Undergoing training to become a deck officer
	Bosun	Leads deck crew, oversees maintenance and repairs
	Able Seaman	Performs deck duties, assists in navigation and cargo handling
	Ordinary Seaman	Entry-level deck crew member, assists in basic operations

Department	Rank/Position	Responsibilities
Engine Department	Chief Engineer	Responsible for the ship's engine and technical operations
	Second Engineer	Assists the Chief Engineer, supervises engine room operations
	Third Engineer	Manages auxiliary machinery and engine maintenance
	Fourth Engineer	Handles fuel systems and assists senior engineers
	Engine Cadet	Undergoing training to become an engineer officer
	Motorman	Assists engineers in engine maintenance and repairs
	Oiler	Lubricates and maintains engine components
Catering/Steward Department	Chief Cook	Prepares meals and manages food supplies
	Steward	Handles housekeeping and catering services
	Messman	Assists in food service and cleaning duties

(Table Source: Created by Author)

INFORMED CONSENT

The medical directors of the seafaring clinic granted authorization for the survey of seafarers completing their examinations.

Each seafarer gave verbal consent before participating in the survey, and they were then provided with a questionnaire to complete.

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