

Factors Affecting The Stress Level Among The Asian Sea-Farers

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Abstract: Seafarer's job is mostly long durational, contact base, and tiring in nature that is correlated with their stress. We are exploring the level of stress among the Asian sea-farers with the associated personal and professional factors in the COVID-19 pandemic using an online-based cross-sectional survey (n=95). The 5-Likert scale used in the stress scale and a combination of all the stressors construct the stress score where simple linear regression analysis and Pearson correlation have applied. Most of the sea-farers are young aged (46.3%), married (58.9%), and ranked as deck officer (55.8%). Only 28.4% of seafarers have more than ten years of experience. Stress level among them is comparatively high (μ , SD; 75.13, 16.192) and pertains among 77% seamen. We also found that the age of the seafarers is positively correlated with the sea-going experience and stress score while negatively related to the port call frequency and extension of the contract. We also found a statistically negative correlation of sea-going experiences and extension of the contract. Regression analysis explains stress level 20.1% through the effect of pandemic and sea-farers age at $p < 0.05$. Therefore, more concentration on the sea-farers stress has suggested during critical conditions like pandemics

Index Terms: Stress level, Factors, COVID-19, Seafarers, and Asian

1 INTRODUCTION

More than 80% in volume and 70% in value of goods are transported by ships on a worldwide basis with maritime transport being a strong base for global trade and growth [1]. Statistically, 1647500 seafarers worldwide are operating merchant ships abroad, while 46.98% are officers, and the rest of them are ratings (crews and others). In these Asian countries like China, the Philippines, Indonesia, and the Indian sub-continent contributed most of the seafarer's supply region in all kinds of rankings [2]. Statistics of the United Kingdom Protection and Indemnity Club reports that suicide was the cause of 4.45 of seafarer's death onboard from 2014-2015, and this figure increased to 15.3% for the year 2015-2016 [3]. Latest review [4] suggests an increase in maritime research on depression and suicide, although several previous case series demonstrate that suicide tends to be problematic.

Stress is our body's response to any kind of event, situation, threat, or demand. It is part of the standard adaption process to the environment. It consists of behavioural responses for the functional restructuring of the body [4, 5] due to the relationship between people and the environment, which is regarded as important for their well-being [4, 6]. Seafaring is undeniably a tough profession and remains the driving force of shipping for a long time, and the human factor will influence the safety of marine navigation. Seafarers who are separated from their families often live in a small society, monotonous routines, and diverse working conditions, contributing to different forms of stress [7]. Because of the stressful working environment like Schneiderman, Ironson, and Siegel emphasized that they have for a long time been subject to

many physical, psychological, social, and environmental stressors [8]. Seafarers are subject to different stressors, including high management responsibilities (time pressure and decisional pressure, undertrained crew), multicultural interactions, sleep loss, physical needs, leisure deprivation, and noise at work, ship movement and vibration [9,10]. Seafarers sign for long-term contracts with the shipping and ship management companies for a certain period on the ship, leaving family, friends and society [6] which resulted in the contribution of psychological stressors. There are poor accommodations and a lack of recreational activities (the issue is much greater when sailors embark on a long journey), and these conditions intensify the feeling of seafarer loneliness and the family's alienation [11]. Besides, a shortage of workers, frequency of port calls in association with an increasing workload, and long working hours is contributing factors of their stress regarding the high work demand. There has been evidence that younger seafarers are more vulnerable to occupational stress than to officer level that is associated with social relations, physical burden of work, lack of self-control, and unsupportive environment [12]. Researchers estimated that the majority of seamen worked every day of the week and in a total of 67 to 70 hours a week over a span of 2.5 to 8.5 months in a questionnaire study by Jensen et al. [13], with a sample of 6461 seamen from eleven countries. The physical and mental health of seafarers is compromised by workplace stress, thereby jeopardizing the vessel, along with its social benefits in LMICs for seafarers and their families [14]. There are often limited onboard contact possibilities (only in the next port of call) and time (during a short port stay), and therefore the communications needs of many seafarers can be insufficiently satisfied [15]. Onboard, additional burdens are often caused by irregular, often long hours of service, particularly on small ships operating on a coastal run and with a high frequency of port call [16]. Differing from land-based working conditions are additionally burdensome to seafarers because of the constant physical stress of noise, vibration, and movements of ships for 24 hours (during free time and working hours) and for nine months in a row [17]. On the contrary, several ships do not have the requisite provisions, leisure facilities and support systems for mental health that increase the risk of onboard psychological breakdown. The confined setting of a ship presents particular opportunities to provide support programmes for seafarers to help them to reduce

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stress and to support their overall well-being while at sea [3]. Recently, the pandemic (COVID-19) contributed to the multidimensional crisis and manifested a significant impact on the mental health of the seafarers [18]. However, International Maritime Organizations (IMO) formulated a series of protocols for changing the crews, their safe return to home, or ship during the COVID-19 pandemic [19]. Due to restrictions, seafarers are experiencing the extension of their service contact onboard and unable to repatriate after the contract. This unsustainable situation emphasizes the safety and well-being of the seafarers [19]. It added the level of frustration and stress in the following quote of a seafarer stuck onboard due to this pandemic reported in the United Nations News in July 2020- "I am tired, exhausted, and hopeless. I have been at sea for 12 months already and don't know when I can see kids and family. It's very frustrating." In the history of the Maritime Industry, seafarers are experiencing the effects of stress on the working environment, even though they are facing as well as managing stress effectively in both organizations and families. However, the level of stress is only on a particular stage when the work pressure is very high, restricted to stick to specific shift time, and the age factors are inducing more stress among the seafarers. Several studies have identified the level of stress among the seafarer and factors associated with their stress level. Nevertheless, study literature is scarce about the correlational factors based on the personal and professional attributes. Besides, recent pandemics of the world might have an impact on their stress level. This study is conducted to identify the stress level among Asian seafarers and find the correlated variables. We also assessed a regression analysis of the effect of the pandemic on their stress level. Based on the study objectives, this study is going to answer the following research hypotheses-

H₀₁: There is no relationship between seafarers stress and exposure to the pandemic

H₀₂: There is no correlation between the seafarer's stresses with personal factors

H₀₃: There is no correlation between the seafarer's stresses with professional factors

It is expected that the study results would provide a lenient point of view to the respective authorities about the stress of Asian seafarers during the pandemic. Several items that can induce the stress of the seafarers, such as port call frequency and work extension during the pandemic, might be re-evaluated.

2 MATERIALS AND METHODS

2.1 Sample and Data Collection

An online survey based on the Google platform has been used to formulate the survey questionnaire and shared it into the particular social media (Facebook, LinkedIn, and Whatsapp) group of seafarers on 17 July to 7 August in 2020. The online platform for sharing the questionnaire has been designed as a purposive sampling process for isolating the Asian seafarer's group, and the responses are acquired randomly. A total of 95 seafarers responses are collected in this survey. Respondents of this study are mainly the seafarers who originated from the Asian countries regardless of their working experiences and rank category. It was guaranteed that all the responses are only served as the purpose of the study and not handover to any organization. The researcher validates all the information. Besides, emails of each of the respondents are collected that

guaranteed no repetitive responses from the same respondents.

2.2 Questionnaire

The questionnaire of the study has deviated into (i) general information, (ii) condition of the ship, (iii) voyage, (iv) work, and living conditions, and (v) stress scale. Stress measurement scales have been formulated by the past studies of Rengamani and Murugan [20] and Oldenburg et al. [21]. The stress scale contains (a) physical, (b) psychological, (c) social, (d) high work demand, and (e) management task stressors constructing several latent variables. All these hidden variables are evaluated by using the 5-items of Likert scale ranging from profoundly disagree (1) to agree (5) highly. Later on, the stress factors generate the stress level based on the dichotomous assessment of the high and low level of stress based on Bloom's cut-off point. We admire possible demographic factors such as age, marital status, current rank, sea-going experiences and nationality of the seafarers; factors related to the condition of the ship such as ship type, size, total crew member, sea-worthiness, and technological adaptation; voyage related factors, i.e., length of the voyage, number of port calls per month, duration of port stay; and factors of their work and living conditions that can contribute to the stress level of the seafarers. We only added a query about the effect of COVID-19 in 5-rating scale to identify the real-time impact of the pandemic.

2.3 Data analysis

This paper used univariate analysis for the sample characteristics of the study population. Descriptive statistics also presented with the frequency distribution of the sample characteristics. Bi-variate analysis, such as correlational analysis with the Pearson correlation coefficient, has been used for identifying the interrelationship of various factors associated with the seafarers and their stress. Later on, we used the simple linear regression model with a stepwise method to see the relationship of stress score of seafarers regarding exposures such as (a) age, (b) sea-going experience, (c) number of crew, (d) frequency of port call, (e) adaptation of new technology, (f) an extension of contact, (g) emergency workload, and (h) effect of the pandemic. All indicated p-values considered two-sided with at least a 5% level of significance.

3 RESULTS

We represent the sample characteristics of the seafarers in Table 01. About 46.3% of seafarers are young aged (Age 21-30) and married (58.9%). There is a significant number of seafarers who are single (38, 40.0%). The rank of officers in both deck and engine is higher than the rank of the crew and others. Among the seafarers, 55.8% of them are deck officers while the percentage of engine officers is 28.4 and few of them are deck crew (7.4%) and engine crew (3.2%). We also get 5.3% of the seafarers who are posted in other ranks like cook, cook assistant, and stewards. Most of their sea-going experience is three years or less (41.1%). The proportion of seafarers are decreasing as the increasing of their experiences, whether only 28.4% of them have more than ten years of experience. We found that more than 75 per cent of seafarers have a high level of stress.

TABLE 1.

SAMPLE CHARACTERISTICS OF THE STUDY POPULATION		
Characteristics	Frequency (n)	Percentage (%)
Age group (34.07, 9.863)		
Age 21-30	44	46.3
Age 31-45	34	35.8
Age 46+	17	17.9
Marital status		
Single	38	40.0
Married	56	58.9
Divorced/separated	1	1.1
Current rank		
Deck officer	53	55.8
Deck crew	7	7.4
Engine officer	27	28.4
Engine crew	3	3.2
Others	5	5.3
Sea-going experience (SGE) (100.38, 101.157)		
SGE <=3	39	41.1
3<SGE<=10	29	30.5
SGE>10	27	28.4
Stress level (75.13, 16.192)		
Low-stress level	22	23.2
High-stress level	73	76.8

Our results manifest (See table 02) as expected that age of the seafarers is positively correlated with the sea-going experience ($p<0.001$) and stress score ($p<0.05$) while negatively related to the port call frequency ($p<0.05$) and extension of the contract ($p<0.05$). We also found a statistically negative correlation of sea-going experiences and extension of the contract (-0.215 , $p<0.05$). Therefore, age and sea-going experiences are negatively correlated with port call frequency and extension of the contract while the stress score is positively related.

TABLE 2.**CORRELATION CO-EFFICIENT OF FACTORS WITH SEAFARER'S STRESS**

	Current age	Sea-going experience	Frequency of port call	Extension of Contract	Total stress
Current age	r 1	.830**	-.206	-.263	.243
	α	0.000	0.045	0.010	0.018
Sea-going experience	r .830**	1	-0.165	-.215*	0.168
	α	0.000	0.109	0.036	0.103
Frequency of port call	r		1	-0.016	-
	α			0.876	0.009
Extension of Contract	r			1	0.067
	α				0.517
Total stress	r				1
	α				

* $p<0.05$, and ** $p<0.01$ level.

In this study, we applied the multiple linear regression model of predicting the seafarer's stress subject to personal factors (age, income, lifestyle) and professional factors (sea-going experience, crew number, the technological adaptation of the ship, port call frequency per month), and effect of the pandemic. We use regression analysis to explore the significant expounding factors that can predict the stress level of the seafarers.

Factors	Beta (SE.)	p-value
Age**	0.805 (0.350)	0.024
Marital status	-2.286 (4.113)	0.580
Sea-going experience	-.041 (.030)	0.180
No. of crew	.003 (.008)	0.664
Adaptation of new technology	-2.250 (1.570)	0.155
Frequency of port call	-0.002 (.084)	0.982
Effect of pandemic***	3.853 (1.192)	0.002
Model summary		
R-square: 0.201; F-test: 3.122 at $p<0.05$, DW score: 2.526		
** $p<0.05$, *** $p<0.001$		

In the model, age ($b=0.805$ (0.350), $t=2.301$, $p<0.05$) and effect of pandemic ($b=3.853$ (1.192), $t=3.233$, $p<0.001$) are highly significant and positively associated with seafarers stress. Marital status and adaptations of the new technology are inversely associated with the stress but not significant. The rest of the explanatory factors are very less effect on the stress among the seafarers. Altogether explains 20.1% of the total variation of the stress level among the seafarers in this model. We also use the Durbin Watson test to assess the multi-collinearity of the model. The score of Durbin Watson is 2.526 suggested that the residuals of the model are uncorrelated.

4 DISCUSSION

This study explores the stress level among the Asian seafarers and those personal and professional factors correlated to their stress. Based on these objectives, we are also going to answer the following hypothesis of whether the exposure of pandemic can explain the Asian seafarer's stress. We found that the age and effect of a pandemic can predict the stress level of the seafarers. Besides, the technological adaptation of the ship and marital status has a negative impact but not significant. Seamen life is adventurous to those young seafarers. They are more positive in the sea-life career, and the initial journey of a seaman allows them to learn from their mistakes. They have the opportunity to get advice from the higher-ranked officer to follow the rule and orders. Besides, initial cadets and ratings have less responsibility, and most of their duties are based on physical work than brainstorming activities. Increasing age is associated with sea-going experiences, which also helps to improve the rank order. As well the rank order is promoted with the workload, which is more of the brainstorm than physical. As expected, the seafarer's age is positively correlated to the sea-going experience and stress in our study. Besides the seaman life, they are also a family member, where the responsibility of family maintaining, increasing with age also, without staying with the family member contributed to the stress level. Carotenuto et al., [12] exemplify an interview of 134 seafarers showed long separation from family as the main stress factor for most of the seafarers on board. It increases considerably when some family members are not well or when contacts with family (phone calls or other means of contact) are difficult [22]. Recently, COVID-19 pandemic has a worldwide impact and seamen are one of the at-risk population. Evidence found several COVID-19 positive cases in China sea-port where all of them are Filipino [23] and Japan, the completely chaotic condition of Diamond princes cruise ship [24] where more than 700 cases are recorded from different countries [25]. Historical evidence of pandemic (SARS, H1N1-influenza, HIV.) has an impact in several ways in the shipping strategies due to mobilizing restrictions, quarantines, and heightened vigilance on the maritime health [26]. Due to pandemic, most of the seafarers who

are onboard cannot go back to their family while they have finished their predetermined contract and helplessly continue their work extensions. Besides, the tension of family members in this pandemic condition added another level of stress among them. Technological adaptation of the ship refers to the ship equipped with modern communication facilities. It is contributed to possibilities of seafarer leisure and connects them with their family and friends [27] as well as reduce their workload and improve the safety of the ship [28]. Oldenburg and others suggested the shipboard internet or cell phone as the medium of communication with their families have an impact on the onboard stress among the seafarers [21]. Our results also indicate the as the age increases the sea-going experience increases, but the frequency of port call and extension of contract decreases, i.e., inversely correlated. The possible reasons are experience, promotion regarding rank and shipping company, and effect of age. Port call is a complex event for the seamen. It involves the decision of port choice and terminal involvement which has taken by the captain of the ship with the assistance of the combination of ship crews [29]. A tiny mistake can lead to a tremendous loss, and port call duties added another pressure onboard. Generally, with the experiences, seamen tried to avoid those shipping companies or ships that have frequent port calls. According to the Maritime Labour Convention, 2006, seafarers must be repatriated due to contract expiration, termination, and inability to carry the rest of the journey for specific circumstances. It is also enlisted that, contract duration (duration of service period) should be less than a year [30]. Separation from family and friends triggered as the age increases. Their experience assists them in avoiding such a post that keeps them away from home for a longer time. Our findings also supported the negative relationship between the extension of work with age and sea-going experiences. A study on Nigerian marine workers provides evidence of the serious impact of Nigerian shipping industries in multidimensional sectors. Many of their mariners are disturbed mentally as little support from management and contact with home [31]. Due to COVID-19, several reports are breaking out that seamen are stuck in the ship for more than 12 months and bound to continue their longer extension of the work period. Shipping companies are also unable to repatriate them due to the recent pandemic [32]. Our analysis also shows several insignificant results of stress concerning marital status, frequency of port calls, and extension of the contract. We consider this as the study limitation for several reasons. Due to the COVID-19 situation, this study has been conducted based on an online survey. Therefore the response rate is impossible to specify, and there is a higher possibility to occur a sample bias. Besides, afraid of information disclosure and accused by respective authority (i.e., Port State Control, and company managers) is another factor that drives these results flawed and small sample size. However, our survey declared handle the information with the most rigorous confidentiality with any of the shipping organization and respected authorities. Along with these limitations, this study also suggests using more advanced statistical formulas to specify the root of stress among the seafarers.

5 CONCLUSIONS

Pandemic impacts in the sea also as it does in the land. Our results initiate the evaluation of seafarer's stresses during the pandemic. Several issues have been identified but unsatisfactorily attributed to stress at the non-pandemic time. Though our hypothesis being answered based on the results of the study, many other factors need to be assessed regarding the stress during the critical time. Personal attributes have an impact on their stress while the situation of the world also

degrades the mental condition. Besides, professional attributes that may increase the burden of the workload might be specified and minimized. Recreational facilities and satellite communication system from ship to their family might improve the mental condition reducing worriedness. It is recommended that evaluation of the mental condition and associated factors should be considered for those activities that enhance depressive and stressful symptoms specifically during the critical time period, for example, extending contact and engaging frequent calls to the port and so on.

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5.2 Fund

There is no fund for the study

5.3 Conflict of interest

Authors declare that there is no conflict of interest in this study.

5.4 Abbreviations

SD	Standard Deviation
COVID-19	Coronavirus Disease 2019
UNCTAD	United Nations Conference of Trade and Development
ICS.	International Chamber of Shipping
IMO	International Maritime Organization
LMIC	Low and Middle Income Countries
S.G.E.	Sea-going experience
DW	Durbin and Watson
SARS	Severe Acute Respiratory Syndrome
HIV	Human Immunodeficiency Virus
I.L.O.	International Labour Organization
U.N.	United Nations

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