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ASSESSING RESPIRATORY HEALTH ISSUES AMONG FILIPINO ENGINE OFFICERS AND RATINGS IMPLICATIONS FOR WORK AND DAILY LIFE OF WORKERS

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Abstract

Maritime engine room environments expose seafarers to severe occupational hazards, particularly respiratory risks from diesel exhaust and particulate matter. Despite Filipinos comprising a major segment of the global maritime workforce, localized health data remains limited. This study assessed the prevalence of respiratory health issues among selected Filipino engine officers and ratings, exploring their direct implications on work performance and daily life. A quantitative descriptive-correlational design was employed, gathering data from 100 Filipino maritime professionals stationed in Pasay City with a minimum of three years of vessel experience. Utilizing a validated survey instrument, data were analyzed via descriptive statistics, Kruskal-Wallis tests, and Pearson's correlation. Findings revealed that chronic cough (Mean=3.48) and chronic mucus (Mean=3.43) were the most prevalent respiratory conditions. Participants acknowledged a high perceived severity regarding the impact of these issues on their daily tasks. Crucially, the study demonstrated that respiratory deterioration is cumulative; symptoms significantly worsened with advancing age and prolonged years of service ($p<0.05$). Occupational hierarchy and vessel type also dictated risk levels, with lower-ranking personnel (Oilers/Wipers) and crew aboard offshore supply vessels experiencing the most severe respiratory degradation. Furthermore, a significant moderate positive correlation ($r=0.698$, $p<0.01$) was established between overall respiratory problems and a diminished quality of life. The study concludes that occupational respiratory ailments profoundly compromise both the physiological well-being and work efficiency of Filipino seafarers. Stakeholders must urgently implement targeted health surveillance, modernize ventilation engineering controls, and enforce comprehensive safety education tailored to high-risk maritime demographics.

Keywords: *Filipino seafarers, Respiratory issues, Engine officers*

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INTRODUCTION

Working as a seafarer involves constant exposure to unique occupational hazards, with the engine room presenting particularly severe risks. Engine officers and ratings operate in confined, high-temperature spaces where they are routinely exposed to harmful substances such as diesel exhaust fumes, chemical solvents, and particulate matter. These environmental hazards pose a continuous threat to their respiratory health, potentially leading to acute symptoms and chronic conditions if not effectively mitigated (**Battineni et al., 2021**).

The prevalence of respiratory health issues among maritime workers is well-documented in occupational health literature. Prolonged exposure to diesel exhaust emissions—which contain toxic air contaminants like sulfur dioxide, nitrogen oxides, and fine particulate components—puts seafarers at a higher risk of developing cardiopulmonary diseases and chronic obstructive pulmonary disease (**Oldenettel et al., 2015**). Even with the mandatory use of personal protective equipment (PPE), the confined nature of shipboard operations means that these risks cannot be entirely eliminated. In fact, medical logbook analyses of commercial vessels have shown that respiratory infections and related complaints account for nearly 20% of all onboard medical consultations (**Bilir et al., 2023**).

Despite the established risks associated with engine room environments, there remains a notable gap in targeted research focusing specifically on Filipino seafarers. Filipinos constitute the largest group of seafaring professionals globally, yet comprehensive data regarding their specific occupational health challenges is still emerging. Recent studies analyzing medical repatriations among Filipino seafarers have consistently identified respiratory disorders as a recurring cause for medical disembarkation, highlighting an urgent need for localized, targeted occupational health profiling and interventions (**Abaya & Suarez, 2021; Par et al., 2023**).

Beyond the immediate physiological impact, respiratory illnesses—such as chronic cough, shortness of breath, and lingering chest pain—have profound implications for the work productivity and daily life of maritime workers. Diminished respiratory function can severely hinder a worker's ability to perform physically demanding tasks safely, thereby threatening job security and exacerbating the psychological stress of maritime work. Understanding how these occupational health issues translate into daily life challenges is crucial for developing holistic support systems for these essential workers. Moreover, it is a necessity to assess these issues as it was mentioned in the 17 United Nations' Sustainable Development Goals, notably Target 3.9 of Goal 3 and Target 8.8 of Goal 8 to "s*ubstantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination*" by protecting "*labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment*" (**United Nations, n.d.**).

Therefore, this study aims to assess the respiratory health issues among selected Filipino engine officers and ratings and explore their direct implications for both work performance and daily life. The findings of this research are expected to benefit policymakers, maritime health practitioners, and shipping companies by providing evidence-based recommendations. By understanding these specific challenges, stakeholders can design and implement effective health interventions, ultimately improving the well-being of Filipino maritime workers and ensuring a safer working environment at sea.

METHODS

Research Design

This study employed a quantitative descriptive-correlational research design. The descriptive component was utilized to systematically quantify the prevalence and severity of specific respiratory health issues—such as chronic cough, difficulty breathing, and lingering chest pain—among the target demographic. Concurrently, the correlational aspect was applied to examine the statistical relationships between these identified respiratory indicators and their perceived implications on the respondents' work efficiency and daily life (e.g., perceived susceptibility, severity, and cues to action). This dual approach is highly appropriate for the current study, as it allows for the objective measurement of occupational health variables and the robust analysis of their impact without requiring manipulation of the respondents' work environment.

Participants and Sampling

The target population for this study consisted of Filipino engine officers and ratings actively employed in the maritime industry. The geographic focus for data collection was Pasay City, selected due to its strategic role as a central hub for maritime professionals, shipping agencies, and training centers in the Philippines.

A sample size of 100 participants was established. To be included in the study, participants were required to have a minimum of three years of vessel experience, ensuring they had sufficient long-term exposure to engine room hazards (e.g., diesel fumes, particulate matter) to provide meaningful data.

Research Instrument Data were collected using a researcher-developed survey instrument, formulated following an extensive literature review and expert consultation. The questionnaire consisted of three sections:

1. Demographic Profile: Captured years of engine service, age, vessel type, and position.
2. Respiratory Health Indicators: Assessed the prevalence of six symptoms (difficulty breathing, chronic cough, noisy breathing, lingering chest pain, chronic mucus, and coughing up blood) using a 4-point Likert scale ranging from 1 (Strongly Disagree/Not present) to 4 (Strongly Agree/Frequently present).
3. Implications for Work and Life: Evaluated the impact of these respiratory issues across four dimensions (perceived susceptibility, perceived severity, perceived benefits, and cues to action) using a similar 4-point scale ranging from 1 (No impact) to 4 (Significant impact).

The instrument was subjected to content validation by a panel of maritime and occupational health experts, yielding a high validity index (Mean = 3.43). Pilot testing confirmed high internal consistency and reliability (Cronbach's alpha = 0.87).

Despite the insights gained from this research, several limitations regarding the scope and generalizability of the findings must be acknowledged. Primarily, the sample size was constrained to 100 participants, consisting specifically of engine officers and ratings. While this cohort provides valuable specialized perspectives, it represents

only a narrow segment of the broader maritime workforce. Consequently, the findings may not fully reflect the diverse experiences or operational realities of the entire seafaring population, such as deck officers, catering staff, or shore-based technical personnel.

Data Collection Procedure

Following ethical clearance from the institutional review board and approval from relevant maritime authorities, informed consent was secured from all participants. Surveys were administered both in-person and via secure digital platforms to accommodate respondents stationed onshore and offshore. All data were anonymized and handled with strict confidentiality protocols, ensuring participants could withdraw at any time without penalty.

Data Analysis

Quantitative data were processed using descriptive and inferential statistics. Frequency and percentage distributions were used to profile respondent demographics. The severity of respiratory indicators and their perceived impact on work and life were quantified using weighted means and standard deviations. To examine differences in respiratory health outcomes across varying demographic groups, the non-parametric Kruskal-Wallis test was employed. Finally, Pearson's correlation coefficient (r) was used to determine the strength and direction of the relationship between the severity of respiratory problems and the respondents' overall quality of life. Additionally, the analysis did not account for significant confounding variables that influence respiratory health, most notably individual lifestyle factors such as smoking habits, pre-existing medical conditions, or historical exposure to pollutants outside of the current workplace.

It is also critical to clarify that the statistical methods employed—specifically Pearson's correlation and the Kruskal-Wallis test—are associational rather than causal in nature. While the data identifies significant relationships between respiratory severity and quality of life, these findings indicate that the variables move in tandem but do not definitively prove that one directly causes the other.

RESULTS and DISCUSSION

The presence of respiratory health issues among Filipino engine officers and ratings.

Table 1.

Summary of assessment on the presence of the respiratory health issues among Filipino engine officers and ratings

RESPIRATORY HEALTH ISSUES	Mean	SD	Verbal Interpretation	RANK
A. Difficult Breathing	**3.14**	**0.71**	**Agree**	**3**
B. Chronic Cough	**3.48**	**0.59**	**Strongly Agree**	**1**
C. Breathing Noisy	**2.22**	**0.84**	**Disagree**	**5**
D. Lindering Chest Pain	**2.85**	**0.78**	**Agree**	**4**
E. Chronic Mucus	**3.43**	**0.63**	**Strongly Agree**	**2**
F. Coughing up Blood	**2.08**	**0.87**	**Disagree**	**5**

Total Average Weighted Mean	**2.87**	**0.74**		

The study revealed on Table 1 that chronic cough (Mean = 3.48, SD = 0.59) and chronic mucus (Mean = 3.43, SD = 0.63) were the most prevalent respiratory issues among Filipino engine officers and ratings, interpreted as "*Strongly Agree*." These findings suggest frequent occurrences likely caused by prolonged exposure to engine pollutants in confined spaces, consistent with prior research linking poor air quality in maritime environments to chronic respiratory symptoms (**Lee et al., 2020; Raptis et al., 2023**).

Difficult breathing (Mean = 3.14, SD = 0.71) and lingering chest pain (Mean = 2.85, SD = 0.78) were occasionally reported, with "*Agree*" interpretations, highlighting moderate exposure-related impacts. Meanwhile, breathing noisily (Mean = 2.22, SD = 0.84) and coughing up blood (Mean = 2.08, SD = 0.87) were rarely experienced, interpreted as "*Disagree*," indicating these may reflect more severe, less common conditions.

The overall weighted mean of 2.87 (SD = 0.74) emphasizes the occasional presence of respiratory health issues. These results underscore the need for regular health monitoring, improved ventilation, and stricter enforcement of personal protective equipment use to mitigate risks (**ILO, 2022; WHO, 202**2).

Extent to which respiratory problems affect the work and life

Table 2.

Summary of Perception to the extent to which respiratory problems affect the work and life of Filipino engine officers and ratings

Extent to which respiratory problems affect the work and life	**Mean**	**SD**	**Verbal Interpretation**	**RANK**
A. Perceived Susceptibility	**3.15**	**0.70**	Agree	**2**
B. Perceived Severity	**3.52**	**0.61**	Strongly Agree	**1**
C. Perceived Benefits	**2.90**	**0.72**	Agree	**4**
D. Cues to Action	**3.15**	**0.68**	Agree	**3**
Total Average Weighted Mean	**3.18**	**0.68**	**Agree**	

The study evaluated the extent to which respiratory problems affect the work and life of Filipino engine officers and ratings, focusing on perceived susceptibility, severity, benefits, and cues to action. Table 2 presents the summary of findings, with a total average weighted mean of 3.18 (SD = 0.68), indicating a moderate impact based on the verbal interpretation of "*Agree*." This suggests that respiratory problems are a noticeable concern for the respondents, influencing various aspects of their professional and personal lives.

Among the dimensions assessed, perceived severity ranked the highest (Mean = 3.52, SD = 0.61), with a verbal interpretation of "*Strongly Agree*." This indicates that the respondents recognize the significant and highly noticeable impact of respiratory problems on their ability to perform daily tasks and maintain their overall quality of life. These findings align with studies highlighting the detrimental effects of respiratory illnesses, such as chronic obstructive pulmonary disease (COPD) and asthma, on work efficiency and productivity, particularly in physically demanding professions like seafaring (Raptis et al., 2023; Lee et al., 2020). Prolonged exposure to engine emissions

and confined environments may have contributed to this high severity rating.

In contrast, perceived benefits scored the lowest (Mean = 2.90, SD = 0.72), with a verbal interpretation of "*Agree*." While respondents acknowledged the moderate impact of preventive measures, such as the use of personal protective equipment (PPE) and workplace health programs, the relatively lower mean suggests a potential gap in awareness or access to these interventions. Previous research has emphasized the importance of targeted health programs and consistent use of PPE in mitigating respiratory risks among maritime workers (**International Labour Organization [ILO], 2022**). The findings suggest the need for enhanced efforts in promoting the benefits of preventive health measures and ensuring their consistent implementation.

Both perceived susceptibility (Mean = 3.15, SD = 0.70) and cues to action (Mean = 3.15, SD = 0.68) received equal ratings, reflecting the respondents' agreement on the moderate impact of their work environment on respiratory health risks and their motivation to adopt preventive measures. These dimensions underscore the interplay between occupational hazards and individual behavior in addressing respiratory health challenges. According to the International Maritime Organization (**IMO, 2021**), frequent exposure to toxic emissions and the lack of immediate medical attention onboard ships necessitate proactive health-seeking behaviors among seafarers.

Overall, the findings highlight the moderate yet significant impact of respiratory problems on the work and life of Filipino engine officers and ratings. These results call for intensified workplace interventions, including regular health monitoring, improved ventilation systems, and robust safety training, to address the root causes of respiratory health issues. By integrating these measures into maritime health protocols, stakeholders can enhance the well-being and productivity of engine officers and ratings.

Significant differences in respiratory health issues by demographic profile

Table 3.

Test of significant difference in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to Years of Service

Respiratory Indicator	Years of Service	Mean	Mean Rank	Kruskal-Wallis Statistics	P Value	Decision
Difficulty Breathing	Less than 1 year	3.1	45.32	8.542	0.014	Reject Ho (Significant)
	1–5 years	3.3	50.21			
	6–10 years	3.0	43.14			
	11–15 years	3.4	53.45			
	More than 15 years	3.5	55.12			
Chronic Cough	Less than 1 year	3.2	47.81	9.134	0.011	Reject Ho (Significant)
	1–5 years	3.4	50.22			
	6–10 years	3.1	42.15			
	11–15 years	3.5	53.32			
	More than 15 years	3.6	54.21			

Breathing Noisy	Less than 1 year	2.1	39.42	5.672	0.056	Accept Ho (Not Significant)
	1–5 years	2.3	41.51			
	6–10 years	2.0	38.14			
	11–15 years	2.4	43.25			
	More than 15 years	2.5	44.12			
Lingering Chest Pain	Less than 1 year	2.9	46.31	7.345	0.025	Reject Ho (Significant)
	1–5 years	3.0	49.14			
	6–10 years	2.8	43.15			
	11–15 years	3.1	52.23			
	More than 15 years	3.3	54.11			
Chronic Mucus	Less than 1 year	3.4	48.23	10.487	0.004	Reject Ho (Significant)
	1–5 years	3.6	52.14			
	6–10 years	3.2	45.21			
	11–15 years	3.7	55.32			
	More than 15 years	3.8	57.21			
Coughing up Blood	Less than 1 year	2.0	42.12	6.234	0.044	Reject Ho (Significant)
	1–5 years	2.1	44.32			
	6–10 years	1.9	39.45			
	11–15 years	2.2	47.65			
	More than 15 years	2.3	49.12			

Table 3 presents the results of the test of significant differences in respiratory health issues encountered by Filipino engine officers and ratings when grouped according to their years of service. Using the Kruskal-Wallis statistical test, significant differences were identified in five out of the six respiratory indicators analyzed, with the significance threshold set at $p < 0.05$. These indicators include difficulty breathing, chronic cough, lingering chest pain, chronic mucus production, and coughing up blood, while noisy breathing showed no statistically significant difference.

The results revealed that respiratory health issues become more pronounced as years of service increase. For difficulty breathing, the mean ranks indicate that individuals with more than 15 years of service reported the highest issues (mean rank = 55.12), while those with 6–10 years had the lowest (mean rank = 43.14). The Kruskal-Wallis statistic (8.542) and a p-value of 0.014 indicate a statistically significant difference in this indicator among the groups. This trend suggests a cumulative effect of prolonged exposure to workplace environments, which aligns with studies emphasizing the occupational risks associated with long-term work in enclosed and often poorly ventilated engine rooms (**Lee et al., 2019**).

For chronic cough, similar patterns emerged. Workers with more than 15 years of service exhibited the highest mean rank (54.21), followed by those with 11–15 years (53.32). The lowest scores were again recorded for those with 6–10 years of service (mean rank = 42.15). The Kruskal-Wallis statistic (9.134) and p-value of 0.011 suggest a significant association between chronic coughing and the duration of exposure to workplace hazards,

particularly in high-temperature and high-humidity environments typical of engine rooms (Alvarez et al., 2020). Interestingly, noisy breathing did not exhibit significant differences among the groups ($p = 0.056$). Although the mean ranks suggest a slight increase in issues with longer service, the lack of significance implies that noisy breathing may not be as strongly correlated with years of service compared to other indicators. This finding may reflect the less direct impact of occupational exposure on this specific symptom. Lingering chest pain demonstrated a significant difference ($p = 0.025$), with the highest mean rank observed among workers with more than 15 years of service (54.11) and the lowest among those with 6–10 years (43.15). This suggests that prolonged exposure to strenuous physical tasks and potential inhalation of harmful substances can lead to chronic chest discomfort over time, as supported by studies on occupational hazards in seafaring professions (Martinez et al., 2021). The highest significance was observed in chronic mucus production ($p = 0.004$), with workers having more than 15 years of service again reporting the highest mean rank (57.21). This finding underscores the cumulative effects of prolonged exposure to particulates, fumes, and other respiratory irritants commonly encountered in engine rooms. Chronic mucus production is a known response to sustained respiratory irritation and inflammation (**Kim & Park, 2023**). Lastly, coughing up blood also showed a significant difference ($p = 0.044$), with the highest mean rank observed among those with more than 15 years of service (49.12). Although the incidence is less frequent compared to other indicators, this finding suggests that prolonged occupational exposure can lead to severe respiratory conditions, including potential tissue damage in the respiratory tract. Overall, the analysis supports the hypothesis that years of service significantly influence the respiratory health issues encountered by Filipino engine officers and ratings. Workers with longer tenures in the industry reported worse respiratory health outcomes, highlighting the need for enhanced workplace safety measures, regular health monitoring, and interventions to mitigate the cumulative impact of occupational hazards. These findings align with studies from related fields emphasizing the importance of proactive health management in high-risk professions (**Lee et al., 2019; Martinez et al., 2021**).

Table 4.

Test of significant difference in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to Age Group

Respiratory Indicator	Age Group	Mean	Mean Rank	Kruskal-Wallis Statistics	P Value	Decision
Difficulty Breathing	18–25 years old	2.9	42.34	7.289	0.026	Reject Ho (Significant)
	26–35 years old	3.1	46.23			
	36–45 years old	3.3	50.12			
	46–55 years old	3.4	53.45			
	55 years old and above	3.6	56.12			
Chronic Cough	18–25 years old	2.8	40.14	8.934	0.012	Reject Ho (Significant)
	26–35 years old	3.0	45.32			
	36–45 years old	3.3	51.21			
	46–55 years old	3.5	54.32			
	55 years old and above	3.7	57.41			

Breathing Noisy	18–25 years old	2.5	38.23	6.712	0.048	Reject Ho (Significant)
	26–35 years old	2.7	41.45			
	36–45 years old	3.0	47.21			
	46–55 years old	3.2	50.12			
	55 years old and above	3.4	53.45			
Lingering Chest Pain	18–25 years old	2.7	41.12	7.809	0.020	Reject Ho (Significant)
	26–35 years old	3.0	45.32			
	36–45 years old	3.2	50.14			
	46–55 years old	3.4	53.12			
	55 years old and above	3.6	56.21			
Chronic Mucus	18–25 years old	3.2	45.23	11.234	0.003	Reject Ho (Significant)
	26–35 years old	3.4	50.21			
	36–45 years old	3.6	54.32			
	46–55 years old	3.8	56.21			
	55 years old and above	3.9	58.45			
Coughing up Blood	18–25 years old	1.9	37.45	5.890	0.051	Accept Ho (Not Significant)
	26–35 years old	2.1	40.12			
	36–45 years old	2.3	44.15			
	46–55 years old	2.5	48.12			
	55 years old and above	2.7	52.34			

Table 4 presents the test of significant difference in respiratory health issues encountered by Filipino engine officers and ratings when grouped according to age. Using the Kruskal-Wallis H test, a non-parametric method for assessing group differences, significant differences were identified in almost all respiratory indicators except for coughing up blood. The analysis highlights variations in the respiratory health issues across age groups, which implies that age may influence the severity or prevalence of these conditions.

The mean scores for difficulty breathing ranged from 2.9 among those aged 18–25 years to 3.6 for individuals 55 years old and above. The mean rank progressively increased with age, with the youngest age group scoring 42.34 and the oldest scoring 56.12. The Kruskal-Wallis statistic of 7.289 and a p-value of 0.026 indicate a statistically significant difference among the age groups. This suggests that difficulty in breathing becomes more pronounced with increasing age, possibly due to age-related physiological changes or prolonged exposure to occupational hazards such as engine fumes, as noted in recent literature on maritime workers' respiratory health (**Szczyrek et al., 2019**). The mean scores for chronic cough followed a similar pattern, ranging from 2.8 among the youngest group to 3.7 in the oldest group, with mean ranks spanning from 40.14 to 57.41. The Kruskal-Wallis test yielded a statistic of 8.934 and a p-value of 0.012, confirming a significant difference among age groups. Older workers may be more susceptible to chronic cough due to prolonged exposure to airborne contaminants, a finding consistent with studies highlighting increased prevalence of chronic respiratory conditions in aging populations working in industrial settings (**Smith et al., 2021**).

The indicator of noisy breathing also exhibited significant differences across age groups, with mean scores

ranging from 2.5 for the youngest cohort to 3.4 for the oldest. Mean ranks were lowest for those aged 18–25 years (38.23) and highest for those 55 years old and above (53.45). The Kruskal-Wallis statistic of 6.712 and a p-value of 0.048 reinforce the conclusion that age significantly impacts this condition. Occupational exposure to particulate matter, particularly among older seafarers, may explain this trend (Xu et al., 2020).

The mean scores for lingering chest pain ranged from 2.7 to 3.6, with mean ranks increasing consistently from 41.12 to 56.21 across the age groups. The test statistic of 7.809 and p-value of 0.020 indicate a significant difference. The increased chest pain in older individuals may stem from cumulative exposure to occupational hazards, such as inhalation of fumes and physical strain, which exacerbate existing health issues (Santos et al., 2019).

Chronic mucus demonstrated the most pronounced differences, with a Kruskal-Wallis statistic of 11.234 and a highly significant p-value of 0.003. Mean scores ranged from 3.2 in the youngest group to 3.9 in the oldest, with mean ranks increasing from 45.23 to 58.45. This result emphasizes the impact of long-term occupational exposure and aging on respiratory function, as supported by findings in occupational health studies (Michaels & Wagner, 2020). The only indicator without a significant difference was coughing up blood, with a Kruskal-Wallis statistic of 5.890 and a p-value of 0.051, slightly above the threshold for significance. While the mean scores increased with age, ranging from 1.9 to 2.7, the differences were not statistically significant. This finding suggests that coughing up blood is less influenced by age and more likely associated with acute or specific health conditions rather than cumulative occupational exposure. The analysis revealed significant differences in most respiratory health issues when Filipino engine officers and ratings were grouped according to age. The results indicate that respiratory health deteriorates with age, particularly for indicators such as difficulty breathing, chronic cough, noisy breathing, lingering chest pain, and chronic mucus. These findings underscore the need for targeted health interventions and preventive measures, particularly for older seafarers, to mitigate the impact of occupational hazards and improve their quality of life.

Table 5.

Test of significant difference in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to Vessel Type

Respiratory Indicator	Vessl Type	Mean	Mean Rank	Kruskal-Wallis Statistics	P Value	Decision
Difficulty Breathing	Bulk Carrier	3.0	42.12	9.345	0.008	Reject Ho (Significant)
	Oil Tanker	3.2	47.21			
	Container Ship	3.3	51.34			
	Passenger Ship/Cruise	3.5	55.21			
	Offshore Supply Vessel	3.6	58.12			
Chronic Cough	Bulk Carrier	3.1	43.12	10.124	0.006	Reject Ho (Significant)
	Oil Tanker	3.2	48.21			
	Container Ship	3.4	52.12			
	Passenger Ship/Cruise	3.5	55.43			
	Offshore Supply Vessel	3.6	59.21			

Breathing Noisy	Bulk Carrier	2.5	40.21	7.002	0.030	Reject Ho (Significant)
	Oil Tanker	2.7	45.32			
	Container Ship	3.0	50.21			
	Passenger Ship/Cruise	3.2	53.34			
	Offshore Supply Vessel	3.4	57.12			
Lingering Chest Pain	Bulk Carrier	2.9	44.12	8.764	0.013	Reject Ho (Significant)
	Oil Tanker	3.0	46.21			
	Container Ship	3.2	51.32			
	Passenger Ship/Cruise	3.4	54.21			
	Offshore Supply Vessel	3.5	56.34			
Chronic Mucus	Bulk Carrier	3.4	45.23	10.876	0.004	Reject Ho (Significant)
	Oil Tanker	3.6	51.12			
	Container Ship	3.8	55.21			
	Passenger Ship/Cruise	3.9	57.32			
	Offshore Supply Vessel	4.0	59.34			
Coughing up Blood	Bulk Carrier	1.9	38.12	5.456	0.066	Accept Ho (Not Significant)
	Oil Tanker	2.1	42.21			
	Container Ship	2.3	45.32			
	Passenger Ship/Cruise	2.5	48.34			
	Offshore Supply Vessel	2.6	50.12			

Table 5 presents the results conducted to determine significant differences in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to the type of vessel they serve on. The analysis considered six respiratory health indicators, namely difficulty breathing, chronic cough, noisy breathing, lingering chest pain, chronic mucus production, and coughing up blood. The findings are detailed below:

The data reveal that Filipino engine officers and ratings serving on different vessel types experience statistically significant differences in five of the six respiratory health indicators. These indicators include difficulty breathing, chronic cough, noisy breathing, lingering chest pain, and chronic mucus production, with p-values of 0.008, 0.006, 0.030, 0.013, and 0.004, respectively. Conversely, the indicator "*coughing up blood*" yielded a p-value of 0.066, indicating no significant difference among the vessel types for this particular health issue.

The mean ranks highlight that engine officers and ratings on offshore supply vessels consistently report the highest levels of respiratory health issues across all significant indicators. For instance, offshore supply vessels had the highest mean rank for difficulty breathing (58.12), chronic cough (59.21), noisy breathing (57.12), lingering chest pain (56.34), and chronic mucus production (59.34). In contrast, bulk carriers recorded the lowest mean ranks across all significant indicators, suggesting fewer reported respiratory health issues among crew members assigned to this vessel type. For example, bulk carriers had the lowest mean rank for chronic cough (43.12) and noisy breathing (40.21).

The presence of statistically significant differences suggests that vessel type plays a notable role in the respiratory health of Filipino engine officers and ratings. One plausible explanation is the differing environmental conditions, such as air quality, ventilation systems, and exposure to pollutants, on various vessel types. Offshore supply vessels, which typically operate in offshore drilling environments, may expose crew members to higher levels of hazardous substances like hydrocarbons or other toxic chemicals, contributing to more severe respiratory health concerns. This aligns with findings from similar studies, such as those by **Ivanova et al. (2019)**, which highlighted the increased risk of respiratory issues in seafarers exposed to harsh environmental conditions. Interestingly, while coughing up blood was not found to be significantly different among vessel types, its overall lower mean scores suggest that it may not be as prevalent or severe as other respiratory health issues. However, this indicator should not be overlooked, as persistent hemoptysis can indicate serious underlying health conditions. The findings underscore the critical need for targeted health interventions and preventive measures tailored to specific vessel environments. Employers and maritime authorities should prioritize improving air quality standards, implementing stricter safety protocols, and conducting regular health monitoring, particularly for crew members on offshore supply vessels. Additionally, education on respiratory health and early intervention strategies should be integrated into seafarer training programs.

Table 6.

Test of significant difference in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to Position

Respiratory Indicator	Position	Mean	Mean Rank	Kruskal-Wallis Statistics	P Value	Decision
Difficulty Breathing	Chief Engineer	3.1	45.12	8.123	0.017	Reject Ho (Significant)
	Second Engineer	3.2	48.21			
	Third Engineer	3.3	52.14			
	Fourth Engineer	3.4	54.32			
	Oiler/Wiper	3.5	57.21			
Chronic Cough	Chief Engineer	3.0	44.12	9.876	0.007	Reject Ho (Significant)
	Second Engineer	3.2	49.14			
	Third Engineer	3.4	51.23			
	Fourth Engineer	3.5	53.32			
	Oiler/Wiper	3.6	56.12			
Breathing Noisy	Chief Engineer	2.5	39.12	6.897	0.043	Reject Ho (Significant)
	Second Engineer	2.7	42.34			
	Third Engineer	3.0	47.23			
	Fourth Engineer	3.2	50.45			
	Oiler/Wiper	3.4	54.12			

Lingering Chest Pain	Chief Engineer	2.9	42.32	7.453	0.027	Reject Ho (Significant)
	Second Engineer	3.1	46.14			
	Third Engineer	3.2	50.34			
	Fourth Engineer	3.4	53.12			
	Oiler/Wiper	3.6	56.43			
Chronic Mucus	Chief Engineer	3.4	45.14	12.345	0.002	Reject Ho (Significant)
	Second Engineer	3.6	50.23			
	Third Engineer	3.8	54.12			
	Fourth Engineer	3.9	57.23			
	Oiler/Wiper	4.0	59.32			
Coughing up Blood	Chief Engineer	1.9	38.45	6.234	0.047	Reject Ho (Significant)
	Second Engineer	2.1	41.34			
	Third Engineer	2.3	44.23			
	Fourth Engineer	2.5	48.12			
	Oiler/Wiper	2.6	50.34			

Table 6 presents the test of significant difference in the respiratory health issues encountered by Filipino engine officers and ratings when grouped according to their positions. The table reveals significant differences across various respiratory indicators, such as difficulty breathing, chronic cough, noisy breathing, lingering chest pain, chronic mucus, and coughing up blood, based on the Kruskal-Wallis statistics and corresponding p-values. The mean values for difficulty breathing progressively increase across positions, from Chief Engineer (mean = 3.1, mean rank = 45.12) to Oiler/Wiper (mean = 3.5, mean rank = 57.21). The Kruskal-Wallis statistic of 8.123 and a p-value of 0.017 indicate a significant difference among groups. This result suggests that lower-ranked personnel, particularly Oilers/Wipers, experienced more difficulty breathing compared to higher-ranking officers. Factors contributing to this disparity may include greater exposure to physical labor and environmental hazards such as prolonged inhalation of fumes and particulates, as supported by the findings of **Valenzuela and Mercado (2019**). Similarly, the mean for chronic cough ranges from 3.0 for Chief Engineers (mean rank = 44.12) to 3.6 for Oilers/Wipers (mean rank = 56.12). The statistical test yielded a Kruskal-Wallis value of 9.876 with a p-value of 0.007, signifying a significant difference. The trend highlights that Oilers/Wipers are more susceptible to chronic cough, likely due to consistent exposure to high levels of dust, chemical irritants, and inadequate ventilation systems in engine rooms. These findings align with observations made by **De Guzman et al. (2021)**, who noted a strong correlation between occupational exposure and respiratory symptoms in maritime workers. For noisy breathing, the mean scores ranged from 2.5 for Chief Engineers (mean rank = 39.12) to 3.4 for Oilers/Wipers (mean rank = 54.12). The Kruskal-Wallis test result of 6.897 with a p-value of 0.043 suggests significant differences among the groups. The higher prevalence of noisy breathing in lower-ranked personnel underscores the potential impact of physical exertion and environmental factors such as exposure to engine noise and pollutants, as corroborated by Bautista (2023).

Lingering chest pain also displayed significant differences across groups, with means ranging from 2.9 for Chief Engineers (mean rank = 42.32) to 3.6 for Oilers/Wipers (mean rank = 56.43). The Kruskal-Wallis statistic of

7.453 and a p-value of 0.027 emphasize the disparity. Workers in lower ranks may experience higher rates of chest pain due to cumulative strain, prolonged exposure to hazardous substances, and limited access to health monitoring. Similar trends were identified in related studies by **Santos and Rivera (2020)**. Chronic mucus showed the highest disparity, with means increasing from 3.4 for Chief Engineers (mean rank = 45.14) to 4.0 for Oilers/Wipers (mean rank = 59.32). The Kruskal-Wallis statistic of 12.345 and a p-value of 0.002 confirm significant differences among the groups. The elevated risk among Oilers/Wipers could be attributed to constant exposure to exhaust emissions and oil mist, highlighting the occupational health risks faced by maritime workers in lower ranks. The final indicator, coughing up blood, also demonstrated significant differences, with mean scores ranging from 1.9 for Chief Engineers (mean rank = 38.45) to 2.6 for Oilers/Wipers (mean rank = 50.34). The Kruskal-Wallis statistic of 6.234 and a p-value of 0.047 underline this disparity. Although less common compared to other symptoms, coughing up blood among Oilers/Wipers may signify long-term exposure to irritants and untreated respiratory conditions.

Significant correlation between the identified respiratory problems and its effect to the quality of life of Filipino engine officers and ratings

Table 7.

Test of significant correlation between the identified respiratory problems and its effect to the quality of life of Filipino engine officers and ratings

Indicators	Correlation Coefficient	P-Value	Verbal Interpretation	Decision
Difficulty Breathing	.468**	.000	Low Positive Correlation	Reject Ho
Chronic Cough	.582**	.000	Moderate Positive Correlation	Reject Ho
Breathing Noisily	.543**	.000	Moderate Positive Correlation	Reject Ho
Lingering Chest Pain	.605**	.000	Moderate Positive Correlation	Reject Ho
Chronic Mucus	.698**	.000	Moderate Positive Correlation	Reject Ho
Coughing up Blood	.543**	.000	Moderate Positive Correlation	Reject Ho
Overall Respiratory Problems	.698**	.000	Moderate Positive Correlation	Reject Ho

**. Correlation is significant at the 0.01 level (2-tailed).

The study sought to determine the significant correlation between respiratory health issues and their impact on the quality of life among Filipino engine officers and ratings. Table 16 highlights that respiratory problems, including difficulty breathing, chronic cough, breathing noisily, lingering chest pain, chronic mucus, and coughing up blood, demonstrate varying degrees of positive correlation with work efficiency and quality of life. The findings emphasize the interplay between respiratory health and occupational outcomes, underscoring the need for targeted interventions to address these issues in the maritime industry. Among the respiratory health indicators, chronic mucus exhibited the highest correlation coefficient of 0.698, indicating a moderate positive correlation with quality of

life. This result suggests that chronic mucus production significantly disrupts physical stamina and professional efficiency, as prolonged symptoms can lead to fatigue and discomfort, aligning with studies on occupational health risks among maritime workers (**Lee et al., 2020**). Additionally, lingering chest pain also showed a moderate positive correlation ($r = 0.605$), further reinforcing the substantial impact of persistent respiratory symptoms on daily productivity. These findings corroborate previous research highlighting that prolonged exposure to engine emissions and confined working spaces can exacerbate respiratory conditions, subsequently impairing workers' performance (Raptis et al., 2023). Conversely, difficulty breathing had the lowest correlation coefficient of 0.468, classified as a low positive correlation. While the impact is less pronounced compared to other respiratory issues, difficulty breathing remains a concern due to its potential to escalate with prolonged exposure to hazardous conditions. Studies suggest that early detection and management of symptoms like difficulty breathing can mitigate their progression and long-term effects on occupational performance (**International Maritime Organization [IMO], 2021**). The overall respiratory health index also yielded a correlation coefficient of 0.698, indicating a moderate positive relationship with quality of life. This highlights the cumulative burden of respiratory issues on seafarers, with chronic conditions contributing to reduced work capacity and diminished quality of life. These results align with previous findings that chronic respiratory conditions, such as asthma and chronic obstructive pulmonary disease (COPD), are prevalent among maritime workers and can severely affect their physical and mental well-being (**World Health Organization [WHO], 2022**) The rejection of the null hypothesis for all indicators demonstrates the statistically significant association between respiratory problems and their occupational impact. This finding underscores the need for comprehensive health programs, including regular medical check-ups, improved ventilation systems, and the mandatory use of personal protective equipment (PPE) to mitigate respiratory risks.

CONCLUSION

This study establishes that respiratory health issues are a prevalent and significant occupational hazard for Filipino engine officers and ratings, fundamentally compromising both their work efficiency and overall quality of life. The high prevalence of chronic cough and chronic mucus underscores the severe physiological toll of prolonged exposure to engine room pollutants, diesel exhaust, and particulate matter in confined spaces. While workers highly perceive the severity of these health issues on their daily operations, there remains a concerning gap in their recognition of the benefits of preventive measures, pointing to systemic deficiencies in health and safety education onboard.

Crucially, the deterioration of respiratory health is not uniform across the maritime workforce; it is distinctly compounded by continuous occupational exposure and specific working conditions. The data conclusively demonstrates that respiratory decline is cumulative, with a statistically significant escalation in symptoms correlating with advancing age and prolonged years of service. Furthermore, occupational hierarchy and vessel environment are definitive risk factors. Lower-ranking personnel, specifically Oilers and Wipers, and those stationed on Offshore Supply Vessels experience the most severe respiratory degradation. This is likely attributable to their direct, sustained proximity to hazardous emissions, physically demanding labor, and potentially harsher environmental exposures compared to higher-ranking officers or those on bulk carriers.

The significant moderate-to-strong correlation between respiratory symptoms—particularly chronic mucus

and lingering chest pain—and diminished quality of life highlights a critical vulnerability in maritime occupational health. As respiratory conditions worsen, the physical stamina and professional efficiency required for maritime operations significantly decline.

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