ORIGINAL ARTICLE

**Retrospective 10-year study on Filipino seafarer medical repatriations: comparing two time periods**

Short title: Antonio Roberto Abaya et al., Comparison of two 5-year repatriation studies

Antonio Roberto Abaya, Regina Bacnis Abola, Manuel S Vidal, Jian Kenzo O. Leal, Jonathan P. Chan, Saren Bogalonta Roldan, Jaime Jose Lorenzo C De Rivera

Health Metrics Inc., Makati, Philippines

DOI: [10.5603/imh.100438](https://doi.org/10.5603/imh.100438)

Jonathan P. Chan, Health Metrics Inc., Makati, Philippines, e-mail: [jpchanmd@gmail.com](mailto:jpchanmd@gmail.com)

Received: 26.04.2024 Accepted: 25.11.2024

# **ABSTRACT**

**Background:** Our group has published two 5-year studies on the repatriation rates of Filipino seafarers from 2010 to 2014 and 2015 to 2019. The Maritime Labor Convention (MLC) 2006, which promotes seafarers’ rights, was ratified in the Philippines in 2012. The current study investigates whether any change occurred since then.

**Materials and methods:** We analyzed the total repatriation rates and medical causes of repatriation throughout the 10-year period. We performed a t-test to compare the repatriation rates in both 5-year periods, and χ-square tests for the medical causes.

**Results:** The repatriation rate decreased from 2015 to 2019 with a t-test score of 0.0453 (P < 0.05). Musculoskeletal and gastrointestinal diseases, as well as injuries/traumas were the most frequent causes of repatriation. There was a significant increase in the number of musculoskeletal and psychiatric/psychological causes for repatriation, and a decrease in injuries/traumas.

**Conclusions:** A historical review of the 10-year period across the two studies revealed that these changes coincided with implementation of MLC 2006 in August 2013. This was designed as the seafarers’ Magna Carta, promoting and establishing various provisions to improve global seafarers’ welfare including areas such as minimum age, seafarers’ employment agreements, hours of work or rest, payment of wages, onboard medical care, accommodation, food and catering standards, health and safety protection, and accident prevention. Our study shows changes in repatriations that indicate an improvement in trauma rates, and while no method can definitively show statistical correlation or cause and effect, we can safely conclude that there is a positive correlation between the implementation of the 2006 MLC and the repatriation rates of Filipino seafarers.

**Keywords: occupational health, medical repatriation, epidemiology, seafarers, occupational injury**

# **INTRODUCTION**

A global reference document for the promotion of seafarers’ employment rights and decent working conditions was developed by the International Labor Organization known as The Maritime Labor Convention 2006 (MLC 2006). This document detailed the requirements for seafarers’ pay, fitness for work benefits, working conditions, health, safety, and welfare, and has established regulatory obligations for governments, ship owners, and operators. In 2012, the Philippines has ratified this and was obligated to implement it through national laws, policies, and regulations [1].

The pre-employment medical examination (PEME) is considered a crucial step in assessing both fitness for work and the overall welfare of the seafarer. Injuries and illnesses are inevitable while working on board. Seafarers are entitled to repatriation due to medical causes like illness, injury, or other medical conditions, which requires their repatriation when found medically fit to travel [2].

Various stakeholders understand that the health, safety, and welfare of seafarers are crucial to the maritime industry’s success [1]. Therefore, research on this topic is warranted.

We have published two papers based on 5-year periods on this matter [3, 4]. Both described the epidemiology of medical repatriation among seafarers in the Philippines and highlighted the most common causes of repatriation and disorders or diseases by organ systems from 2010 to 2014 [3] and 2015 to 2019[4]. In our first study of more than 6500 cases in 2010 to 2014 from various shipping companies and vessels, the medical repatriation was at 1.7%, with the most common causes being injuries or trauma, musculoskeletal disorders, gastrointestinal problems, and genitourinary illnesses [3]. Our subsequent study of a similar size in 2015 to 2019 from almost the same sources and using the same methods showed a medical repatriation rate at 1.4%, with similar most common causes [4]. However, these are separate studies, and a comparison between these two time periods is warranted to see any significant differences and contextualize these with progressive improvements due to the implementation of MLC 2006.

**MATERIALS AND METHODS**

We collected aggregate data for the period of January 2010 to December 2014[3] and January 2015 to December 2019 [4] from the claims and legal departments of various manning agencies in Metro Manila.

We ensured the privacy of the participants by de-identifying their data: crew age, position, vessel type, embarkation date, repatriation date, diagnosis, and return to work status. We did not collect personally identifiable information, and we did not have any interaction with any of the crew members. The data obtained from these two studies were taken from the same manning companies.

We also obtained the total number of seafaring deployments by the manning agencies and by the Philippine Overseas Employment Administration (POEA) to calculate the total repatriation rate. To get this repatriation rate, we divided the number of repatriation cases by the total number of deployments. We determined the most common causes of repatriation using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) [5].

We ran a t-test to compare the repatriation rates from 2010 to 2014 and 2015 to 2019, as well as χ-square tests for each affected organ system that caused the repatriation in the two 5-year periods. We set the significance level at 0.05. We managed, analyzed, and visualized the data with Microsoft Excel®, Google Sheets®, IBM SPSS, Social Science Statistics, and Flourish™.

# **RESULTS**

Since the implementation of MLC 2006 in the Philippines in 2013, the number of cases and rates of repatriation generally started to decrease in 2015 until 2019 as seen in Figure 1. The t-test score was statistically significant at 0.0453, P < 0.05. We observed the trends for the different disease categories that caused repatriation from 2010 to 2019.

Figure 2 shows the relative contribution of each category of repatriation across time. The musculoskeletal, gastrointestinal, and injury/trauma categories contributed almost 60% of all the repatriation cases. In the figure, green indicates a downward trend of cases since 2012, while yellow is for neutral, and red is for upward. Since the ratification, only injury/trauma resulted in a decrease of repatriation, while musculoskeletal, gastrointestinal, dermatological, ophthalmological, otological, and psychiatric/psychological illnesses increased. The other categories stayed approximately the same across time. Table 1 lists the number and percentage of repatriation cases per disease category throughout the 10-year period as seen in Figure 2.

Table 2 shows the results of the χ-square tests for the two 5-year periods for each disease category. The changes in dental, dermatological, gastrointestinal, genitourinary, infectious, injury/trauma, musculoskeletal, obstetrical-gynecological, ophthalmological, otological, and psychiatric/psychological causes were statistically significant.

Figure 3 illustrates the percentages of the different disease classifications that caused medical repatriation between the two 5-year periods. The top three causes in both periods were musculoskeletal, gastrointestinal, and injury/trauma. The highest cause in the first 5-year period was injury/trauma, but was the third highest in the second 5-year period. After the implementation of MLC 2006, the following causes contributed more to repatriation than before the implementation: musculoskeletal, gastrointestinal, dermatological, respiratory, ophthalmological, psychiatric/psychological, otological, dental, obstetrical-gynecological, and others.

# **DISCUSSION**

In the present world of fast-moving data, epidemiology continues to be relevant in exploring past trends to explain the present, and hopefully improve future outcomes.

Several studies have done so and arrived at different conclusions [3, 4, 6]. Our group has used these papers to help influence stakeholders in the maritime industry to understand the health issues surrounding the seafarer and how to minimize and prevent unnecessary medical repatriations: we have advocated through lectures, health bulletins sent to ships, and shipowner meetings the need to continuously teach crew safety measures to prevent accidents and encouraging proper posture and techniques in labor intensive tasks, giving more rest time to lessen musculoskeletal injuries, and ensuring adequate hydration in the engine room to prevent kidney stones. The importance of looking at either specific companies or a nationality group are important to draw out more conclusive statements. We decided to compare our two descriptive papers [3, 4] with the hope of also correlating medical repatriations with socio-political changes that have occurred during the 10-year period. While the MLC 2006 was implemented in 2013, the changes in its implementation may not become apparent immediately until years thereafter, as we expect that the individual policies across shipping lines will be rolled out slowly and be more efficiently implemented the longer these companies are exposed to these amendments.

We then also compared the different system groups to see any statistically significant changes. The biggest change was the lowered rates of trauma and injury. MLC 2006 has prioritized safety training and guidelines, and implemented mandatory rest periods for all seafarers [2]. These subtle changes may have contributed to the significant decrease in trauma and injury cases as the third highest cause of medical repatriations. The biggest cause of medical repatriations is presently musculoskeletal disease, reflecting the manual labor intensive nature of seafaring as a profession especially in the deck and engine departments [7]. This includes, but is not limited to, heavy lifting, repetitive shoulder, arm and hand movements, walking in slippery and unstable weather conditions, and climbing [7]. The percentage may have increased when comparing the two periods (Table 2) but, when we look at the trend from year to year (Table 1), we see a steady number of cases except for two years where it exceeded 270 cases. This slight increase may have caused the chi square changes to be significant. This reflects the continued risk of this type of manual work on board, such as repetitive muscle action that can lead to musculoskeletal injury. More training on safety, proper posture, lifting techniques, and ensuring mandatory rest time may help to lower this risk.

Gastrointestinal diseases were also a top contributor to repatriation throughout the 10-year period. A shipping company examined repatriation cases among Filipino seafarers over 10 years from 2013 to 2022, and showed that gastrointestinal diseases account for the largest proportion of repatriations [6]. Gastrointestinal diseases are also common illnesses in seafarers in Germany and Italy [8, 9] This may be due to irregular night work and work-related stress [8, 9]. Additionally, appendicitis continues to be one of the most common causes of repatriation among gastrointestinal diseases [3, 4].

Throughout the 10-year period, repatriation due to musculoskeletal, gastrointestinal, and psychiatric/psychological illnesses increased. The same trend for musculoskeletal diseases was found in another study on Filipino seafarers, but the opposite for gastrointestinal diseases [6].

Another notable significant difference is the increase in psychiatric/psychological illnesses among seafarers, which we can probably attribute to an increased awareness and acceptance of psychological stresses. Filipino seafarers may have started to become more open with their own mental health issues, as shown in the current study with a statistically significant increase in mental health cases of up to 50 medical repatriation cases a year in 2019. Crucial to this would be the landmark signing of the Mental Health Act[10] in 2017, which mandates the Department of Labor and Employment, together with the Civil Service Commission, to develop guidelines and standards on appropriate and evidence-based mental health programs for the workplace, and develop policies that promote mental health in the workplace and combat stigma and against people with mental illness [10]. This may have led to a growing awareness and acceptance of the mental stress experienced by seafarers. Almost simultaneously, there has been a significant increase in seafarer’s mental health education by welfare organizations, Protection & Indemnity (P&I) clubs, shipowners, and other stakeholders to raise awareness of the importance of mental health. There also has been an increase in medical research about the mental health of seafarers [11–14]. Filipino seafarers may have started to become more open with their own mental health issues, as shown in the current study through a statistically significant increase in mental health cases of up to 50 medical repatriation cases a year in 2019.

It has been more than a decade since the ratification of MLC 2006, and the Philippine government has been keeping its promise to implement the agreement through the act instituting the magna carta of Filipino seafarers and the Philippine Maritime Industry Development Plan (MIDP 2028) [15,16]. The Magna Carta bill seeks to protect the welfare and safety of seafarers by establishing their rights and responsibilities and the corresponding duties and obligations of employers and government agencies and was recently signed into law last September 2024. It will provide standards ensuring the health, well-being, and security of seafarers [15]. MIDP 2028 envisions to increase access to a safe, reliable, efficient, affordable, sustainable, and integrated sea transport system for passengers and shippers. The action plan includes strengthening of a mental health and wellness program for seafarers, streamlining, and codifying of safety rules and regulations [16].

## **Strengths and limitations of the study**

For the present study, about 20% of Filipino seafarers were included over a period of 10 years and can therefore be considered representative. Our first two epidemiological papers with large samples can now be evaluated more clearly and may even be associated with socio-political reforms such as the MLC 2006, MIDP 2028 and the Mental Health Act. The major difference our research has contributed is the ability to calculate correlations or rates. Since we use the number of deployments as a denominator, we can actually determine a repatriation rate. This can then be used as a benchmark to compare repatriation rates across the different stakeholders, especially the shipping companies. This helps them pinpoint on how to improve their performance against an established benchmark. The use of such benchmarks is a double-edged sword: The intended encouragement of shipping companies to take good care of the health of their employees could also be implemented in the opposite direction by avoiding repatriations that may be necessary for health reasons in order to get a better benchmark. However, it is certainly beneficial to mirror the performance of each company separately using its own data. We may then use these conclusions to further improve the repatriation data through proper screening, education, and enforcing the mandatory rest times and safety guidelines on board the ships.

This study is limited in reporting only the acute cause of repatriation, and not the antecedent history of the patients. Ideally, it would have been prudent to account for potentially previously diagnosed cases among repatriated crew to have a comprehensive overview as to how co-morbidities may have contributed to repatriations. Also, our access to health information was only limited, and acquisition of more data from additional sources would give us a better overview of repatriation across different shipping lines.

The COVID pandemic from 2020 to 2023 may have changed attitudes and behaviors of the maritime industry[11, 17, 18] that may affect the results of what we have reported. It is thus necessary to continue studying medical repatriations to monitor the health and welfare of the Filipino seafarer and regularly review the repatriation rates as benchmarks. This will aid the maritime industry, being a significant contributor to the Philippine economy.

# **CONCLUSIONS**

In this study with data over a 10-year period, we found a low repatriation rate, which could mean that Filipino seafarers are generally healthy. We then examined the medical causes of repatriation, which differed year by year, but were all centered around the implementation of the MLC 2006. Epidemiologic data can be used to formulate better health policies. It is hoped that more improvement in the PEME screening process and implementation of more safety policies will also lead to lower musculoskeletal injuries, which have recently been the most common cause of repatriations. We have shown a positive correlation between the implementation of MLC 2006 and a lower number of injuries and trauma on board, resulting in lower repatriation rates. Although it is difficult prove statistically, it will be interesting to observe and evaluate how social policy reforms, such as the local MIDP 2028 will affect the health of Filipino seafarers. Further studies on how behaviors and attitudes changed by the COVID-19 pandemic affect repatriation rates are recommended. Continuous monitoring of repatriation rates may be used to benchmark these health outcomes.

**Data availability statement:** Original contributions presented in the study are included in the article and that further inquiries can be directed to the corresponding author.

**Ethics statement:** Ethical approval and/or consent were not required as we collected aggregate data, which we de-identified. We did not collect personally identifiable information, and we did not have any interaction with the participants.

**Author contributions:** The manuscript has been read and approved by the authors. We believe that the manuscript represents honest work.

**Funding:** No funding, grants, or other support was received.

**Acknowledgments: N/A**

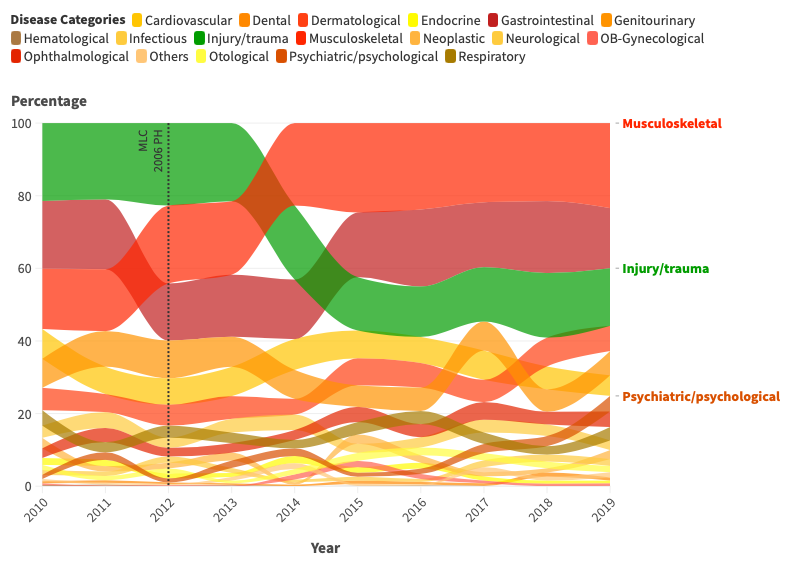
**Conflict of interest:** No conflict of interest.

**Supplementary material: N/A**

# 

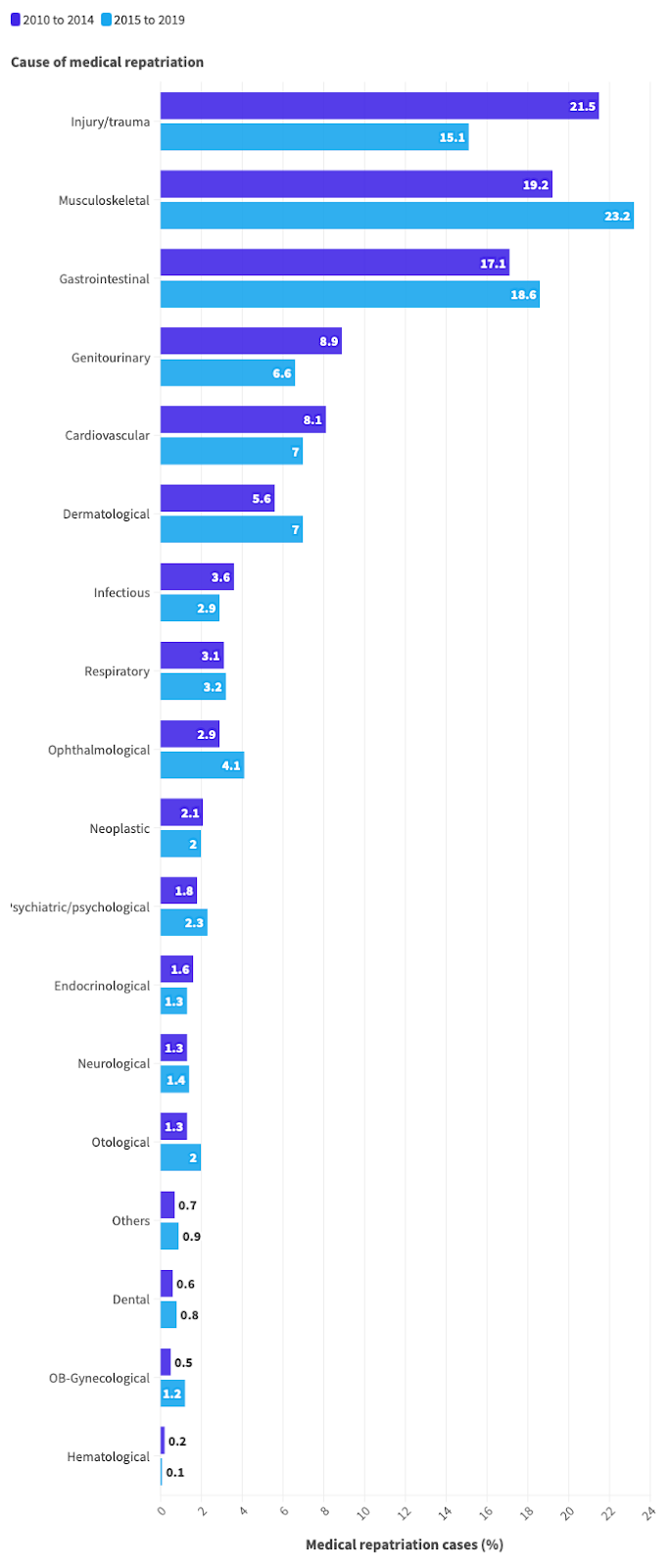
# **REFERENCES**

1. Amante MSV. Maritime Labor Convention 2006 and Subsequent Amendments: Tripartism in Philippine Ratification and Institutional Capacity Building. In: Chall Cond Sustain Seafar Supply Case Philipp. Bangkok Research Center, JETRO Bangkok/IDE-JETRO, Bangkok 2023.
2. International Labour Organization Convention. Maritime Labour Convention, 2006, as amended. <https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---normes/documents/normativeinstrument/wcms_763684.pdf> (17 April 2024).
3. Abaya AR, Roldan S, Ongchangco JC, et al. Repatriation rates in Filipino seafarers: a five-year study of 6,759 cases. Int Marit Health. 2015; 66(4): 189–195, doi: [10.5603/IMH.2015.0038](http://dx.doi.org/10.5603/IMH.2015.0038), indexed in Pubmed: [26726888](https://www.ncbi.nlm.nih.gov/pubmed/26726888).
4. Abaya AR, Chan JP, Leal JK, et al. Five-year (2015–2019) follow-up study of 6,526 cases of medical repatriation of Filipino seafarers. Int Marit Health. 2023; 74(3): 161–170, doi: [10.5603/imh.96970](http://dx.doi.org/10.5603/imh.96970), indexed in Pubmed: [37781941](https://www.ncbi.nlm.nih.gov/pubmed/37781941).
5. World Health Organization. International Statistical Classification of Diseases and Related Health Problems 10th Revision. <https://icd.who.int/browse10/2019/en> (10 April 2024).
6. Huerte MS, Lubaton C, Tongson M, et al. Trends in the medical repatriation of Filipino seafarers: a ten year study of a Philippine maritime shipping company (OSM Maritime). Int Marit Health. 2023; 74(4): 243–252, doi: [10.5603/imh.96667](http://dx.doi.org/10.5603/imh.96667), indexed in Pubmed: [38111244](https://www.ncbi.nlm.nih.gov/pubmed/38111244).
7. Freeth M. The Nautical Institute on Command. 3rd ed. United Kingdom: The Nautical Institute, London 2015.
8. Bilir NA, Scheit L, Dirksen-Fischer M, et al. Accidents, diseases and health complaints among seafarers on German-flagged container ships. BMC Public Health. 2023; 23(1): 963, doi: [10.1186/s12889-023-15943-x](http://dx.doi.org/10.1186/s12889-023-15943-x), indexed in Pubmed: [37237421](https://www.ncbi.nlm.nih.gov/pubmed/37237421).
9. Sagaro GG, Dicanio M, Battineni G, et al. Incidence of occupational injuries and diseases among seafarers: a descriptive epidemiological study based on contacts from onboard ships to the Italian Telemedical Maritime Assistance Service in Rome, Italy. BMJ Open. 2021; 11(3): e044633, doi: [10.1136/bmjopen-2020-044633](http://dx.doi.org/10.1136/bmjopen-2020-044633), indexed in Pubmed: [33727272](https://www.ncbi.nlm.nih.gov/pubmed/33727272).
10. Congress of the Philippines. Republic Act No. 11036. https://legacy senate gov ph/republic\_acts/ra (17 April 2024).
11. Abila SS, Acejo IL. Mental health of Filipino seafarers and its implications for seafarers' education. Int Marit Health. 2021; 72(3): 183–192, doi: [10.5603/IMH.2021.0035](http://dx.doi.org/10.5603/IMH.2021.0035), indexed in Pubmed: [34604987](https://www.ncbi.nlm.nih.gov/pubmed/34604987).
12. Oldenburg M, Hogan B, Jensen HJ. Systematic review of maritime field studies about stress and strain in seafaring. Int Arch Occup Environ Health. 2013; 86(1): 1–15, doi: [10.1007/s00420-012-0801-5](http://dx.doi.org/10.1007/s00420-012-0801-5), indexed in Pubmed: [22915144](https://www.ncbi.nlm.nih.gov/pubmed/22915144).
13. Pia JV, Galam R, Bartusevičienė I. Regulating seafarers' welfare: an examination of the protection of Filipino seafarers' well-being through a legal analysis of the POEA-Standard Employment Contract. Int Marit Health. 2024; 75(1): 10–18, doi: [10.5603/imh.98244](http://dx.doi.org/10.5603/imh.98244), indexed in Pubmed: [38647055](https://www.ncbi.nlm.nih.gov/pubmed/38647055).
14. Szafran-Dobrowolska J, Grubman-Nowak M, Renke M, et al. The psychosocial burden and stress coping strategies among seafarers. Int Marit Health. 2023; 74(2): 122–128, doi: [10.5603/IMH.2023.0018](http://dx.doi.org/10.5603/IMH.2023.0018), indexed in Pubmed: [37417846](https://www.ncbi.nlm.nih.gov/pubmed/37417846).
15. Zubiri IF. An Act Instituting the Magna Carta of the Filipino Seafarers. <https://legacy.senate.gov.ph/lisdata/3598432421!.pdf> (23 August 2021).
16. Maritime Industry Authority. The Philippine Maritime Industry Development Plan 2028. Maritime Industry Authority; 2024. <https://marina.gov.ph/wp-content/uploads/2024/04/MIDP-2028-as-of-08-April-2024-1.pdf> (17 April 2024).
17. Terzis LD, Saltzman LY, Lowman JH, et al. Attitudes and perceptions towards public health safety measures during a global health crisis: Social and personal consequences. PLoS One. 2023; 18(11): e0289357, doi: [10.1371/journal.pone.0289357](http://dx.doi.org/10.1371/journal.pone.0289357), indexed in Pubmed: [38011113](https://www.ncbi.nlm.nih.gov/pubmed/38011113).
18. Khachatryan K, Beutel ME, Stöbel-Richter Y, et al. Are Attitudes towards COVID-19 Pandemic Related to Subjective Physical and Mental Health? Int J Environ Res Public Health. 2022; 19(21), doi: [10.3390/ijerph192114538](http://dx.doi.org/10.3390/ijerph192114538), indexed in Pubmed: [36361419](https://www.ncbi.nlm.nih.gov/pubmed/36361419).

A graph of a graph showing the number of the number of cases

Description automatically generated with medium confidence**Figure 1.** Repatriation rates from 2010 to 2019; MLC 2006 — Maritime Labor Convention 2006; PH — Philippines

**Figure 2.** Relative contribution of disease categories on repatriation rate from 2010 to 2019; MLC 2006 — Maritime Labor Convention 2006; OB — obstetrical; PH — Philippines



**Figure 3.** Causes of medical repatriation from 2010 to 2014 vs. 2015 to 2019

**Table 1.** Repatriation cases per disease category from 2010 to 2019

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Disease category,  n (%)** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** |
| Cardiovascular | 108 (8.2) | 97 (7.5) | 99 (7.3) | 111 (8.1) | 102 (8.5) | 129 (7.7) | 98 (7.2) | 89 (8.0) | 65 (6.3) | 66 (5.7) |
| Dental | 8 (0.6) | 9 (0.7) | 6 (0.4) | 6 (0.4) | 5 (0.4) | 15 (0.9) | 9 (0.7) | 8 (0.7) | 12 (1.2) | 10 (0.9) |
| Dermatological | 81 (6.1) | 64 (4.9) | 78 (5.7) | 86 (6.3) | 52 (4.3) | 125 (7.4) | 92 (6.8) | 68 (6.1) | 82 (7.9) | 81 (6.9) |
| Endocrine | 25 (1.9) | 22 (1.7) | 18 (1.3) | 15 (1.1) | 24 (2.0) | 26 (1.5) | 22 (1.6) | 13 (1.2) | 9 (0.9) | 9 (0.8) |
| Gastrointestinal | 245 (18.6) | 247 (19.1) | 213 (15.7) | 235 (17.1) | 197 (16.4) | 299 (17.8) | 289 (21.2) | 198 (17.9) | 205 (19.8) | 193 (16.6) |
| Genitourinary | 105 (8.0) | 126 (9.7) | 141 (10.4) | 114 (8.3) | 96 (8.0) | 100 (5.9) | 88 (6.5) | 89 (8.0) | 64 (6.2) | 78 (6.7) |
| Hematology | 4 (0.3) | 4 (0.3) | 1 (0.1) | 3 (0.2) | – | 2 (0.1) | 3 (0.2) | 1 (0.1) | – | 1 (0.1) |
| Infectious | 44 (3.3) | 56 (4.3) | 38 (2.8) | 52 (3.8) | 51 (4.2) | 42 (2.5) | 39 (2.9) | 39 (3.5) | 33 (3.2) | 31 (2.7) |
| Injury/trauma | 282 (21.4) | 270 (20.9) | 308 (22.7) | 296 (21.5) | 245 (20.4) | 247 (14.7) | 189 (13.9) | 166 (15.0) | 184 (17.8) | 185 (15.9) |
| Musculoskeletal | 218 (16.5) | 219 (16.9) | 291 (21.4) | 278 (20.2) | 273 (22.7) | 414 (24.6) | 324 (23.8) | 242 (21.8) | 222 (21.5) | 273 (23.4) |
| Neoplastic | 38 (2.9) | 19 (1.5) | 22 (1.6) | 30 (2.2) | 8 (0.7) | 43 (2.6) | 28 (2.1) | 13 (1.2) | 12 (1.2) | 29 (2.5) |
| Neurological | 18 (1.4) | 16 (1.2) | 23 (1.7) | 19 (1.4) | 9 (0.7) | 18 (1.1) | 11 (0.8) | 21 (1.9) | 20 (1.9) | 22 (1.9) |
| OB-gynecological | 6 (0.5) | 2 (0.2) | 3 (0.2) | 2 (0.1) | 17 (1.4) | 29 (1.7) | 19 (1.4) | 8 (0.7) | 7 (0.7) | 8 (0.7) |
| Ophthalmological | 35 (2.7) | 50 (3.9) | 32 (2.4) | 36 (2.6) | 33 (2.7) | 70 (4.2) | 49 (3.6) | 54 (4.2) | 36 (3.5) | 50 (4.3) |
| Others | 8 (0.6) | 6 (0.5) | 4 (0.3) | 14 (0.1) | 19 (1.6) | 9 (0.5) | 4 (0.3) | 15 (1.4) | 11 (1.1) | 17 (1.5) |
| Otological | 18 (1.4) | 15 (1.2) | 19 (1.4) | 10 (0.7) | 18 (1.5) | 37 (2.2) | 29 (2.1) | 22 (2.0) | 19 (1.8) | 20 (1.7) |
| Psychiatric/ psychological | 15 (1.1) | 27 (2.1) | 15 (1.1) | 28 (2.0) | 25 (2.1) | 18 (1.1) | 20 (1.5) | 28 (2.5) | 29 (2.8) | 50 (4.3) |
| Respiratory | 56 (4.2) | 36 (2.8) | 45 (3.3) | 40 (2.9) | 28 (2.3) | 58 (3.5) | 49 (3.6) | 35 (3.2) | 24 (2.3) | 43 (3.7) |

**Table 2.** Causes of medical repatriation in 2010 to 2014 vs. 2015 to 2019

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cause of medical repatriation, n (%)** | **2010 to 2014** | **2015 to 2019** | **χ-square statistic** | **P value** |
| Cardiovascular | 549 (8.1) | 460 (7.0) | 2.8181 | 0.093209 |
| Dental | 38 (0.6) | 55 (0.8) | 4.5517 | 0.032885 |
| Dermatological | 376 (5.6) | 456 (7.0) | 15.8987 | 0.000067 |
| Endocrinological | 109 (1.6) | 86 (1.3) | 1.2835 | 0.257254 |
| Gastrointestinal | 1,155 (17.1) | 1,213 (18.6) | 11.1404 | 0.000845 |
| Genitourinary | 602 (8.9) | 430 (6.6) | 18.7337 | 0.000015 |
| Hematological | 12 (0.2) | 7 (0.1) | 0.9704 | 0.324581 |
| Infectious | 242 (3.6) | 186 (2.9) | 3.8625 | 0.049377 |
| Injury/trauma | 1,450 (21.5) | 988 (15.1) | 69.4492 | < 0.00001 |
| Musculoskeletal | 1,294 (19.2) | 1,516 (23.2) | 48.7253 | < 0.00001 |
| Neoplastic | 144 (2.1) | 133 (2.0) | 0.0014 | 0.970137 |
| Neurological | 88 (1.3) | 94 (1.4) | 0.9715 | 0.33812 |
| Obstetrical- Gynecological | 31 (0.5) | 80 (1.2) | 25.716 | < 0.00001 |
| Ophthalmological | 193 (2.9) | 268 (4.1) | 19.1793 | 0.000012 |
| Others | 47 (0.70) | 60 (0.9) | 2.7308 | 0.098431 |
| Otological | 85 (1.3) | 129 (2.0) | 12.8763 | 0.000333 |
| Psychiatric/ psychological | 118 (1.8) | 153 (2.3) | 7.6964 | 0.005533 |
| Respiratory | 206 (3.1) | 212 (3.2) | 1.4714 | 0.225129 |