# Clinicodemographic Predictors of Mortality Among COVID-19 Patients Admitted in a Tertiary Hospital

Hanna Claire P. Bejarasco, MD,[1] and Ramcis Pelegrino, MD[1]


## Abstract

**Background.** COVID-19 has significantly impacted global mortality, particularly among those aged 45–84 years. Worldwide deaths exceeded official reports, reaching at least 3 million in 2020. In the Philippines, mortality increased in 2021 but declined by 2022. Key factors include comorbidities like diabetes and hypertension. Limited research, resources, and healthcare challenges hinder localized mortality prediction and management efforts.

**Methods.** This study analyzed 234 randomly selected COVID-19 patients admitted between April 1, 2020 and April 1, 2021, using quantitative methods, descriptive and predictive designs, and advanced statistical techniques

**Results.** Most COVID-19 patients in our study were older adults, predominantly female, with non-severe cases and mild $PaO_2/FiO_2$ ratios, indicating mild respiratory distress. Comorbidities were uncommon, but when present included hypertension and diabetes, affecting hospitalization length. Patients generally had low Sequential Organ Failure Assessment (SOFA) scores and were linked to better outcomes. Most recovered and were discharged, with a mortality rate lower in the Philippines compared to global figures. Severe cases were more common in older adults and males, often requiring mechanical ventilation. SOFA scores and $PaO_2/FiO_2$ ratios correlated with severity, while comorbidities prolonged hospital stays. Hospitalization averaged 11.3 days, shorter than global durations.

**Conclusion.** COVID-19 patients with two or more accompanying diseases are likely to stay longer in the hospital. On the other hand, patients on mechanical ventilation support are likely to have shorter hospital stay.


**Keywords.** COVID-19, predictors of mortality, co-morbidity

## Introduction

The impact of COVID 19 on mortality rate remains one of the primary sources of death globally. It has caused the death of many patients aged 45 to 84 years old, and in the main four foundations for every age cohort except for children under five years of age. When COVID-19 first hit in 2020, there were about 1.8 million deaths recorded at the end of the year however, initial estimates suggest that the total number of deaths worldwide attributable to COVID-19 is at least 3 million which represents an additional of 1.2 million more deaths than what was officially reported.[1] Also, in the Philippines, an estimated death of 26,108 were recorded at the end of 2020, which increased to 228,789 by 2021, and decreased to 170,907 by 2022.[2]

As a worldwide problem, the comorbidities, complications, and other factors are lethal results of the coronavirus. The comorbidities include chronic kidney injury, chronic obstructive pulmonary disease, cardiovascular disease, diabetes, hypertension, and obseity.[3] However, in the Philippines, the mortality rate is higher among Filipino adults especially those with respiratory illnesses or problems, diabetes and hypertension.[4] While worldwide studies are attempting to see the potential factors to predict COVID-19 mortality, the country may find challenges in determining the factors for mortality due to the limited researches in the locality. COVID-19 mortality is evident in many hospitals thus, the deficiency of medical care, availability of medical workers, and other problems might have caused some of these challenges. Information on COVID-19 mortality and improving preventive measures to lighten this emergency is fundamental, especially in a country with limited resources.

Our country belongs in the lower to middle income generating country with generally poor-quality reporting of data about COVID-19 mortality. A shortage of researches accessible for many stakeholders is one of the reasons why it is difficult to predict mortality among COVID-19 patients. Subsequently, there is a need to create and update records on the clinicodemographic

[1] Department of Internal Medicine, Davao Regional Medical Center
Corresponding Author: Hanna Claire P. Bejarasco, MD eMail: clairebejarasco@gmail.com

**Table I. Clinicodemographic Profile of the Patients with COVID-19**

| | Frequency | % |
|---|---|---|
| **Age** | | |
| <18 | 9 | 3.8 |
| 18 to 30 | 55 | 23.5 |
| 31 to 40 | 46 | 19.7 |
| 41 to 50 | 40 | 17.1 |
| 51 to 60 | 23 | 9.8 |
| >60 | 61 | 26.1 |
| **Sex** | | |
| Male | 107 | 45.7 |
| Female | 127 | 54.3 |
| **PaO2/FiO2 ratio** | | |
| None | 118 | 50.4 |
| Mild | 62 | 26.5 |
| Moderate | 22 | 9.4 |
| Severe | 32 | 13.7 |
| **Comorbidities** | | |
| None | 120 | 51.3 |
| DM | 14 | 6.0 |
| HPN | 41 | 17.5 |
| Others | 7 | 3.0 |
| Multiple | 52 | 22.2 |
| **SOFA score** | 0.71 ± 3.82 | |
| **MV support** | | |
| No | 183 | 78.2 |
| Yes | 51 | 21.8 |
| **COVID-19 severity** | | |
| Non-severe | 161 | 68.8 |
| Severe | 36 | 15.4 |
| Critical | 37 | 15.8 |

Note: n = 234

**Table II. Clinical Outcome of Patients with COVID-19**

| | Frequency | % |
|---|---|---|
| Length of hospital stay (days) | 11.3 ± 7.5 | |
| Died | 56 | 23.9 |
| Discharged | 178 | 76.1 |

Note: n = 234

profiles related to COVID-19 mortality from the hospitals that may be significant for future creation and the execution of management programs in the locality.

## Methods

This study utilized a quantitative, observational, cohort, descriptive, comparative, analytical, and predictive research design involving COVID-19 patients admitted at the Davao Regional Medical Center between April 1, 2020, and April 1, 2021. The study was conducted among 234 patients selected through random sampling. Data collection form was utilized and its data was treated with mean and standard deviation, frequency and percentage, one-way analysis of variance, Kruskal-Wallis, linear regression, and logistic regression.

## Results

The results revealed that most of the adult patients with COVID-19 were above 60 years old, mostly females, with mild $PaO_2/FiO_2$ ratio, without comorbidities, very low SOFA scores, and mostly treated for non-severe COVID-19. The average length of hospital stay was 11.3 days. Most of the patients were discharged. Age, sex, $PaO_2/FiO_2$ ratio, comorbidities, SOFA score, and mechanical ventilation support significantly vary between COVID-19 severities. Furthermore, the presence of two or more comorbidities would mean longer hospital stay and patients with mechanical ventilation support are likely to have shorter hospital stay.

## Discussion

Most of the patients with COVID-19 belonged to 60 years old and above. Most of the patients with COVID-19 are females. The findings are congruent with the claim of Gebhard et al.[3] also cited that infection rates by COVID-19 are higher among females; although, ICU hospitalization is higher among males.

Most of the patients with COVID-19 had mild PaO2/FiO2 ratio. The ratio of partial pressure of oxygen in arterial blood (PaO2) to the fraction of inspiratory oxygen concentration (FiO2) is an indicator of pulmonary shunt fraction. PaO2/FiO2 (P/F) ratio is used to classify severity of acute respiratory distress syndrome (ARDS).[4] Since most of the patients with COVID-19 had mild COVID-19, the PaO2/FiO2 ratio is also mostly mild.

Most of the patients with COVID-19 do not have comorbidities. The findings are similar with the study of Hussain et al.[4] that on average, more than 50% of the patients with COVID-19 do not have accompanying diseases. However, for those with comorbidities, the most common diseases are hypertension, diabetes, obstructive airway disease, and interstitial lung disease.

Most of the patients with COVID-19 have very low SOFA scores. The Sequential Organ Failure Assessment (SOFA) score is a scoring system that assesses the performance of several organ systems in the body (neurologic, blood, liver, kidney, and blood pressure/hemodynamics) and assigns a score based on the data obtained in each category.[5] Patients with significantly lower SOFA score exhibit mild COVID-19.

Most of the patients had non-severe COVID-19. This coincides with the results of the World Health Organization that in the Philippines, patients with COVID-19 will only have mild symptoms and will fully recover from it.[6]

On average, most of the patients with COVID-19 stayed at the hospital for 11.3 days. In global studies, the mean length of hospital stay was 14.49 days and varies by disease prognosis, comorbidities, availability, and accessibility to health services.[7]

Most of the patients with COVID-19 were discharged. Globally, initial reports that the mortality rate for COVID-19 is between 4.05% to 5.43%.[8] However, in the Philippines, between January 3, 2020 to November 8, 2023, the mortality rate is at 1.62%.[9]

Age significantly varies between COVID-19 severities and older patients are most likely to have critical COVID-19. The results are similar with the findings of Abul et al.[10] that early and late reports showed that older adults have

**Table III. COVID-19 Clinical Outcome Based on COVID-19 Severity Across Profiles**

| Clinicodemographic Profile | Non-Severe (N=161) F (%) | Severe (N=36) F (%) | Critical (N=37) F (%) | x2, F | p |
|---|---|---|---|---|---|
| Age | | | | | |
| <18 | 7 (4.3) | 2 (5.6) | - | 49.25 | ***0.000*** |
| 18 to 30 | 53 (32.9) | - | 2 (5.4) | | |
| 31 to 40 | 41 (25.5) | 3 (8.3) | 2 (5.4) | | |
| 41 to 50 | 23 (14.3) | 9 (25.0) | 8 (21.6) | | |
| 51 to 60 | 12 (7.5) | 4 (11.1) | 7 (18.9) | | |
| > 60 | 25 (15.5) | 18 (50.0) | 18 (48.6) | | |
| Sex | | | | | |
| Male | 64 (39.8) | 21 (58.3) | 22 (59.5) | 7.401 | ***0.025*** |
| Female | 97 (60.2) | 15 (41.7) | 15 (40.5) | | |
| $PaO_2/FiO_2$ ratio | | | | | |
| None | 117 (72.7) | | 1 (2.7) | 147.97 | ***0.000*** |
| Mild | 44 (27.3) | 10 (27.8) | 8 (21.6) | | |
| Moderate | | 14 (38.9) | 8 (21.6) | | |
| Severe | | 12 (33.3) | 20 (54.1) | | |
| Comorbidities | | | | | |
| None | 109 (67.7) | 5 (13.9) | 6 (16.2) | 58.41 | ***0.000*** |
| DM | 10 (6.2) | 2 (5.6) | 2 (5.4) | | |
| HPN | 18 (11.2) | 10 (27.8) | 13 (35.1) | | |
| Others | 4 (2.5) | 2 (5.6) | 1 (2.7) | | |
| Multiple | 20 (12.4) | 17 (47.2) | 15 (40.5) | | |
| SOFA score | 0.08 | 1.84 | 2.38 | 7.762 | ***0.001*** |
| MV support | | | | | |
| No | 115 (96.3) | 25 (69.4) | 3 (8.1) | 138.53 | ***0.000*** |
| Yes | 6 (3.7) | 11 (30.6) | 34 (91.9) | | |

**Table IV. Clinicodemographic Profiles Associated with Length of Hospital Stay**

| Factors | B | t | p |
|---|---|---|---|
| (Constant) | 8.066 | 3.426 | 0.001 |
| Age | 0.659 | 1.811 | 0.072 |
| Sex | 0.539 | 0.569 | 0.570 |
| $PaO_2/FiO_2$ ratio | 0.768 | 1.031 | 0.304 |
| Comorbidities | 0.713 | 2.483 | 0.014 |
| SOFA score | 0.179 | 1.368 | 0.173 |
| MV support | -6.124 | -3.491 | 0.001 |
| COVID-19 severity | -0.486 | -0.391 | 0.696 |

Note: Significant at $p < .05$

increased severity of COVID-19 with higher case fatality rates and higher intensive care needs compared with younger adults. Infection and vaccine-induced antibody response and long-term effects of COVID-19 also differ in older adults.

Sex varies across COVID-19 severities where non-severe COVID-19 is mostly dominated by female patients while critical COVID-19 is mostly dominated by male patients. A growing pool of evidence suggests that being male is also a risk factor for severe COVID-19. It has been estimated that the risk of death from COVID-19 is 20% higher in men than women.[11]

$PaO_2/FiO_2$ ratio varies across COVID-19 severities where severe COVID-19 is mostly dominated with patients with severe $PaO_2/FiO_2$ ratio.

Comorbidities vary across COVID-19 severities. Patients with severe COVID-19 mostly have two or more accompanying diseases while those with non-severe COVID-19 have the least comorbidities. Sinatti et al. stated that patients with high $PaO_2/FiO_2$ ratio will develop severe clinical outcomes.[12] Consequently, Santus et al. discovered that a moderate-to-severe impairment in $PaO_2/FiO_2$ ratio was independently associated with a threefold increase in risk of intra-hospital mortality, concluding that the severity of respiratory failure is useful to identify patients at higher risk of mortality.[13]

The SOFA score varies across COVID-19 severities. Those with critical COVID-19 have the highest SOFA scores. A SOFA score < 2 is associated with 100% survival, while a score > 11 is associated with 100% mortality. SOFA score in COVID-19 patients with severe respiratory distress strongly correlates with the initial SOFA score.[14]

Mechanical ventilation support varies across COVID-19 severities. Those with critical COVID-19 were mostly on mechanical ventilation support and those with non-severe COVID-19 are mostly without mechanical ventilation support. Severe respiratory failure from coronavirus disease 2019 (COVID-19) pneumonia not responding to non-invasive respiratory support requires mechanical ventilation.[15]

Comorbidities are associated with longer hospital stay. The presence of two or more comorbidities would mean longer hospital stay. According to the findings, COVID-19 patients who had comorbidities were hospitalized for longer period and were more likely to have post-COVID-19 health issues. Examples of comorbidities with longer hospital stays included liver, kidney, and renal diseases. Patients with asthma and kidney disorders experienced severe post-COVID-19 health complications.[16]

Mechanical ventilation support is associated with hospital stay. Patients with mechanical ventilation support are likely to have shorter hospital stay. Mechanical ventilation support is commonly required in COVID-19 patients with respiratory failure. Despite the higher need for critical care interventions and LOS, more

**Table V. Clinicodemographic Profiles Associated with Mortality**

| Factors | B | OR | 95% CI | p |
|---|---|---|---|---|
| age | | | - | 1.000 |
| Age (1) | -431.046 | 6.30E-188 | - | 0.968 |
| Age (2) | 243.640 | 6.48E+105 | - | 0.973 |
| Age (3) | 47.779 | 5.62E+20 | - | 0.946 |
| Age (4) | 46.971 | 2.51E+20 | - | 0.938 |
| Age (5) | -11.537 | 9.76E-06 | 0 – 2.78E+267 | 0.971 |
| Sex (1) | 35.049 | 1.67E+15 | - | 0.942 |
| $PaO_2$_ratio | | | - | 1.000 |
| $PaO_2$_ratio (1) | 757.359 | | - | 0.923 |
| $PaO_2$_ratio (2) | 143.683 | 2.52E+62 | - | 0.927 |
| $PaO_2$_ratio (3) | 59.311 | 5.73E+25 | - | 0.939 |
| Co-morbidities | | | - | 1.000 |
| Comorbidities (1) | -72.442 | 3.46E-32 | - | 0.934 |
| Comorbidities (2) | 114.569 | 5.71E+49 | - | 0.965 |
| Comorbidities (3) | -60.847 | 3.76E-27 | - | 0.937 |
| Comorbidities (4) | 88.624 | 3.08E+38 | - | 0.985 |
| SOFA_score | 22.534 | 6.11E+09 | 0 – 1.14E+207 | 0.923 |
| MV_support (1) | 70.383 | 3.69E+30 | - | 0.957 |
| COVID_severity | | | - | 0.995 |
| COVID_severity (1) | 669.557 | 6.09E+290 | - | 0.922 |
| COVID_severity (2) | 634.901 | 5.42E+275 | - | 0.923 |
| Constant | -799.644 | 0.00E+00 | - | 0.922 |

than half of the patients on ventilatory support survived to hospital discharge and thus, have shorter hospital stays.[17]

## Conclusion

COVID-19 patients with two or more accompanying diseases are likely to stay longer in the hospital. On the other hand, patients on mechanical ventilation support are likely to have shorter hospital stay.

**Conflict of Interest.** The authors declare no conflict of interest.

## References


1. The true death toll of COVID-19: estimating global excess mortality. (n.d.). https://www.who.int/data/stories/the-true-death-toll-of-covid-19-estimating-global-excess-mortality
2. Briones KJ, Del Mundo MD, et al. Excess Deaths Associated with the Covid-19 Pandemic in the Philippines. https://psa.gov.ph/sites/default/files/Session%2010.2_Michael%20Dominic%20C.%20del%20Mundo_CRVS%20Paper%2C%20Academe%20-%20Study%20on%20Excess%20Mortality%20and%20Projections.pdf
3. Pesenti, A., Cattaneo, E., Florio, G., et al (2021). Mechanical ventilation parameters in critically ill COVID-19 patients: a scoping review. Critical Care, 25(1). https://doi.org/10.1186/s13054-021-03536-2
4. King, C. S., Sahjwani, D., Brown, et al (2020). Outcomes of mechanically ventilated patients with COVID-19 associated respiratory failure. PLOS ONE, 15(11), e0242651. https://doi.org/10.1371/journal.pone.0242651
5. Ho, F. K., Petermann-Rocha, F., Gray, S. R., et al. (2020). Is older age associated with COVID-19 mortality in the absence of other risk factors? General population cohort study of 470,034 participants. PLOS ONE, 15(11), e0241824. https://doi.org/10.1371/journal.pone.024182
6. Yanez, N. D., Weiss, N. S., Romand, J., et al (2020). COVID-19 mortality risk for older men and women. BMC Public Health, 20(1). https://doi.org/10.1186/s12889-020-09826-8
7. Jin, J., Bai, P., He, W., et al (2020). Gender Differences in Patients With COVID-19: Focus on Severity and Mortality. Frontiers in Public Health, 8. https://doi.org/10.3389/fpubh.2020.00152
8. Djaharuddin, I., Munawwarah, S. N., Nurulita, A., et al (2021). Comorbidities and mortality in COVID-19 patients. Gaceta Sanitaria, 35, S530–S532. https://doi.org/10.1016/j.gaceta.2021.10.085
9. Sanyaolu, A., Okorie, C., Marinkovic, A., et al (2020). Comorbidity and its Impact on Patients with COVID-19. SN Comprehensive Clinical Medicine, 2(8), 1069–1076. https://doi.org/10.1007/s42399-020-00363-4
10. Ngoc, S., DO, Dao, C. X., Nguyen, T. A., et al (2023). Sequential Organ Failure Assessment (SOFA) Score for predicting mortality in patients with sepsis in Vietnamese intensive care units: a multicentre, cross-sectional study. PubMed, 13(3), e064870. https://doi.org/10.1136/bmjopen-2022-064870
11. Yang, Z., Hu, Q., Huang, F., et al (2021). The prognostic value of the SOFA score in patients with COVID-19. Medicine, 100(32), e26900. https://doi.org/10.1097/md.0000000000026900
12. Zhang, J., Wang, X. F., Jia, X., et al (2020). Risk factors for disease severity, unimprovement, and mortality in COVID-19 patients in Wuhan, China. Clinical Microbiology and Infection, 26(6), 767–772. https://doi.org/10.1016/j.cmi.2020.04.012
13. Pesenti, A., Cattaneo, E., Florio, G., et al (2021). Mechanical ventilation parameters in critically ill COVID-19 patients: a scoping review. Critical Care, 25(1). https://doi.org/10.1186/s13054-021-03536-2
14. King, C. S., Sahjwani, D., Brown, et al (2020). Outcomes of mechanically ventilated patients with COVID-19 associated respiratory failure. PLOS ONE, 15(11), e0242651. https://doi.org/10.1371/journal.pone.0242651
15. Ho, F. K., Petermann-Rocha, F., Gray, S. R., et al. (2020). Is older age associated with COVID-19 mortality in the absence of other risk factors? General population cohort study of 470,034 participants. PLOS ONE, 15(11), e0241824. https://doi.org/10.1371/journal.pone.024182
16. Yanez, N. D., Weiss, N. S., Romand, J., et al (2020). COVID-19 mortality risk for older men and women. BMC Public Health, 20(1). https://doi.org/10.1186/s12889-020-09826-8
17. Jin, J., Bai, P., He, W., et al (2020). Gender Differences in Patients With COVID-19: Focus on Severity and Mortality. Frontiers in Public Health, 8. https://doi.org/10.3389/fpubh.2020.00152