

# Factors associated with COVID-19 mortality among hospitalized patients in the North-West Province, South Africa, 2020-2022

Lavhelesani Negondeni

*South African Field Epidemiology Training Programme (SAFETP)  
Alumni, Department of Health North-West Province*

*University of Pretoria, South Africa*

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## Introduction

- Coronavirus-19 (COVID-19), is an acute respiratory illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 virus
- It has been associated with high morbidity and mortality rates
  - An estimated 655.5 million COVID-19 cases and 6.6 million related deaths were reported globally by 31 December 2022
  - South Africa reported an estimated 102 568 deaths by 31 December 2022
  - The North-West province recorded over 5000 deaths as of December 2022
- Several factors such as age, sex, diabetes, tuberculosis, ethnicity have been associated with COVID-19 mortality

# Aim and objectives

## Aim

- To determine the risk factors associated with in-hospital COVID-19 mortality in the North–West Province of South Africa for the period from 1 March 2020 to 31 March 2022

## Objectives

- To describe the demographic and clinical characteristics of COVID-19 patients admitted to hospitals in North–West Province, South Africa: 1 March 2020 to 31 March 2022
- To determine the risk factors associated with in-hospital COVID-19 mortality in the North–West Province, South Africa, from 1 March 2020 to 31 March

## Methods

### Study design

- Cross-sectional analytic study

### Study setting

- Thirty (30) hospitals: 17 public and 13 private hospitals in all districts in the North-West (Bojanala, Ngaka Modiri Molema, Dr. Ruth Segomotsi Mompati & Dr. Keneth Kaunda)

### Study population

- Patients with a laboratory-confirmed diagnosis of SARS-CoV-2 virus

### Inclusion Criteria

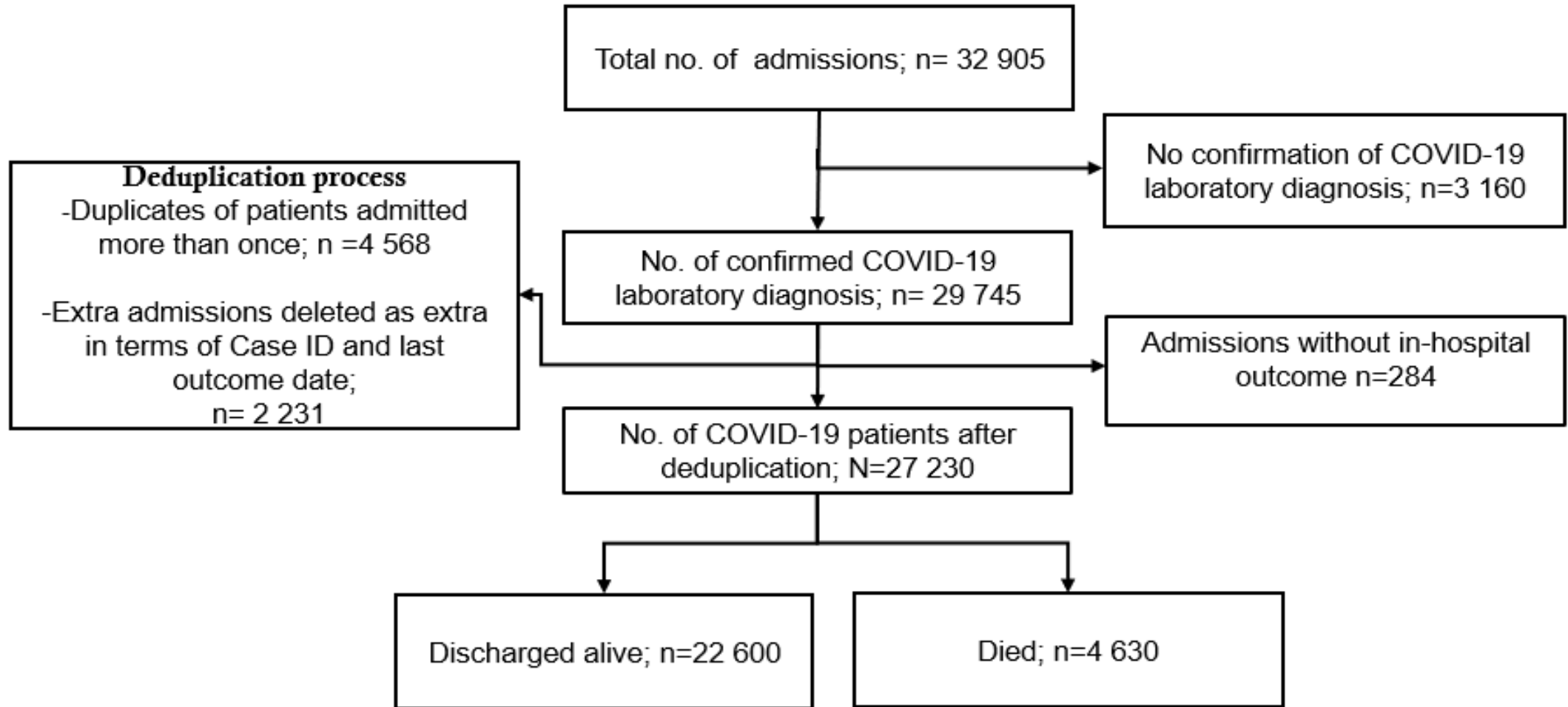
- Patients of all ages with laboratory-confirmed COVID-19 diagnosis

### Exclusion criteria

- Patients without a known in-hospital outcome



# Data management flow chart 01 March 2020 - 31 March 2022



# Data Analysis

## Objective

To describe the demographic and clinical characteristics of COVID-19 patients

To determine risk factors associated with in-hospital COVID-19 mortality

## Analysis

- Descriptive analysis was used, and results were reported using frequencies and percentages
- Pearson Chi square was used to test for differences in categorical variables.

### **Univariate**

- A p-value threshold of  $<0.25$  was used to select independent variables for the multivariable logistic regression model

### **Multivariable**

- Variables with a p-value of  $<0.05$  were considered as factors associated with in-hospital COVID-19 mortality

# Demographic and clinical characteristics of laboratory-confirmed COVID-19 cases in North-West province, 01 March 2020-31 March 2022

| Independent variable(s)           | Total N=27 230 (%) | Outcome variable       |                   | p-value* |
|-----------------------------------|--------------------|------------------------|-------------------|----------|
|                                   |                    | Not died; n=22 600 (%) | Died; n=4 630 (%) |          |
| <b>Age group (in years)</b>       |                    |                        |                   | <0.001   |
| 0-19                              | 2329 (8.6)         | 2283 (98.0)            | 46 (2.0)          |          |
| 20-29                             | 2739 (10.1)        | 2659 (97.0)            | 80 (2.9)          |          |
| 30-39                             | 4314 (15.8)        | 4006 (92.9)            | 308 (7.1)         |          |
| 40-49                             | 4494 (16.5)        | 3945 (87.8)            | 549 (12.2)        |          |
| 50-59                             | 5447 (20.0)        | 4459 (81.9)            | 988 (18.1)        |          |
| 60-69                             | 4119 (15.1)        | 2882 (70.0)            | 1237 (30.0)       |          |
| 70-79                             | 2504 (9.2)         | 1620 (64.7)            | 884 (35.3)        |          |
| 80+                               | 1284 (4.7)         | 746 (58.1)             | 538 (41.9)        |          |
| <b>Median Age: 49 (IQR;34-62)</b> |                    |                        |                   |          |
| <b>Sex</b>                        |                    |                        |                   | <0.001   |
| Female                            | 14979 (55.0)       | 12625 (84.3)           | 2354 (15.7)       |          |
| Male                              | 12243 (45.0)       | 9968 (81.4)            | 2275 (18.6)       |          |
| Unknown                           | 8 (0.0)            | 7 (87.5)               | 1 (12.5)          |          |
| <b>Race</b>                       |                    |                        |                   | 0.020    |
| Black African                     | 19379 (71.2)       | 16121 (83.2)           | 3258 (16.8)       |          |
| Coloured                          | 418 (1.5)          | 332 (79.4)             | 86 (20.6)         |          |
| Indian                            | 170 (0.6)          | 134 (78.8)             | 36 (21.2)         |          |
| White                             | 3339 (12.3)        | 2732 (81.8)            | 607 (18.2)        |          |
| Other                             | 51 (0.2)           | 47 (92.2)              | 4 (7.8)           |          |
| Unknown                           | 3873 (14.2)        | 3234 (83.5)            | 639 (16.5)        |          |
| <b>Hospital sector</b>            |                    |                        |                   | <0.001   |
| Private                           | 11445 (42.0)       | 9742 (85.1)            | 1703 (14.9)       |          |
| Public                            | 15785(58.0)        | 12858 (81.5)           | 2927 (18.5)       |          |
| <b>Admission reason</b>           |                    |                        |                   | <0.001   |
| COVID-19 symptoms                 | 9403 (34.5)        | 7383 (78.5)            | 2020 (21.5)       |          |
| Isolation                         | 8921 (32.8)        | 7838 (87.9)            | 1083 (12.1)       |          |
| Other                             | 780 (2.9)          | 666 (85.4)             | 114 (14.6)        |          |
| Unknown                           | 8126 (29.8)        | 6713 (82.6)            | 1413 (17.4)       |          |
| <b>Length of hospital stay</b>    |                    |                        |                   | <0.001   |
| 0-7 days                          | 16082 (59.1)       | 13203 (82.1)           | 2879 (17.9)       |          |
| 8-14 days                         | 8519 (31.3)        | 7535 (88.5)            | 984 (11.5)        |          |
| ≥ 15 days                         | 2629 (9.7)         | 1862 (70.8)            | 767 (29.2)        |          |
| <b>Median LOS : 6 (IQR: 3-10)</b> |                    |                        |                   |          |
| <b>Hypertension</b>               |                    |                        |                   | <0.001   |
| Not hypertensive                  | 13119 (48.2)       | 11564 (88.1)           | 1555 (11.9)       |          |
| Hypertensive                      | 7607 (27.9)        | 5555 (73.0)            | 2052 (27.0)       |          |
| Unknown                           | 6504 (23.9)        | 5481 (84.3)            | 1023 (15.7)       |          |
| <b>Diabetes</b>                   |                    |                        |                   | <0.001   |
| Not diabetic                      | 16211 (59.9)       | 14031 (86.6)           | 2180 (13.4)       |          |
| Diabetic                          | 3445 (12.7)        | 2386 (69.2)            | 1059 (30.8)       |          |
| Unknown                           | 7574 (27.8)        | 6183 (81.6)            | 1391 (18.4)       |          |
| <b>HIV status</b>                 |                    |                        |                   | <0.001   |
| Negative                          | 16800 (61.7)       | 14250 (84.8)           | 2550 (15.2)       |          |
| Positive                          | 1809 (6.6)         | 1432 (79.1)            | 377 (20.9)        |          |

# Factors associated with in-hospital COVID-19 mortality in the North–West Province: 01 March 2020-31 March 2022

| Independent variable(s)        | Multivariate |               |         |
|--------------------------------|--------------|---------------|---------|
|                                | aOR          | 95% CI        | p-value |
| <b>Age group ( in years)</b>   |              |               |         |
| 0-19                           | Ref          |               |         |
| 20-29                          |              |               |         |
| 30-39                          | 2.50         | 1.97 - 3.16   | <0.001  |
| 40-49                          | 4.01         | 3.19 - 5.03   | <0.001  |
| 50-59                          | 6.25         | 5.04 - 7.76   | <0.001  |
| 60-69                          | 11.30        | 9.14 - 13.98  | <0.001  |
| 70-79                          | 17.40        | 13.94 - 21.73 | <0.001  |
| ≥80                            | 25.03        | 19.56 - 32.05 | <0.001  |
| <b>Sex</b>                     |              |               |         |
| Female                         | Ref          |               |         |
| Male                           | 1.18         | 1.08 - 1.29   | <0.001  |
| <b>Hospital sector</b>         |              |               |         |
| Private                        | Ref          |               |         |
| Public                         | 7.26         | 6.09 - 8.65   | <0.001  |
| <b>Admission reason</b>        |              |               |         |
| COVID-19 symptoms              | Ref          |               |         |
| Isolation                      |              |               |         |
| Other                          | 1.48         | 1.15 - 1.90   | 0.002   |
| <b>Length of Hospital Stay</b> |              |               |         |
| 0-7 days                       | Ref          |               |         |
| 8-14 days                      |              |               |         |
| >15 days                       | 0.82         | 0.71 - 0.96   | 0.013   |
| <b>Diabetes mellitus</b>       |              |               |         |
| Not diabetic                   | Ref          |               |         |
| Diabetic                       | 1.27         | 1.13 - 1.43   | <0.001  |
| Unknown                        |              |               |         |
| <b>Chronic renal failure</b>   |              |               |         |
| No chronic renal disease       | Ref          |               |         |
| Chronic renal disease          | 3.17         | 2.13 - 4.73   | <0.001  |
| Unknown                        |              |               |         |
| <b>Malignancy</b>              |              |               |         |
| No malignancy                  | Ref          |               |         |
| Malignancy                     | 2.48         | 1.48 - 4.13   | 0.001   |
| Unknown                        |              |               |         |
| <b>HIV status</b>              |              |               |         |
| Negative                       | Ref          |               |         |
| Positive                       | 1.36         | 1.17 - 1.58   | <0.001  |
| Unknown                        |              |               |         |
| <b>Current tuberculosis</b>    |              |               |         |
| No current TB                  | Ref          |               |         |
| Current TB                     | 1.49         | 1.04 - 2.12   | 0.028   |
| Unknown                        |              |               |         |

Notes: OR, Odds Ratio; aOR, Unadjusted Odds Ratio; CI, Confidence Interval; Ref, Reference Category



## Discussions

- Factors associated with in-hospital COVID-19 mortality in this study: age, male sex, public sector admission, unrelated COVID-19 symptoms, and pre-existing conditions
- Older age is associated with chronic conditions and a weakened immune system
- Sex differences in COVID-19 mortality influenced by immune response, lifestyle, underlying conditions, and sex hormones
- Public vs private sector inequalities linked to poorer health outcomes
- A UK study found some patients to have contracted the SARS virus in the hospital
- Higher COVID-19 mortality rates have been found in Finland among patients with Hospital Acquired COVID-19

## Discussion cont...

- Pre-existing conditions compromise the body's ability to fight the virus effectively

## Conclusions

- Older age, male sex, pre-existing conditions, public sector, admission with unrelated COVID-19 symptoms were found as risk factors for in-hospital COVID-19 mortality

## Recommendations

Prioritization of the following vulnerable groups:

- Elderly people, and males for preventative measures and treatment,
- Addressing pre-existing conditions and,
- Strengthening differential diagnoses

## References

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