Assessing Gender-Based Mean Differences in the Recovery Speed among COVID-19 Case Patients in Mpumalanga Province, South Africa

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Abstract

The primary objective of this research study was to assess whether there exist gender-based mean differences in the recovery speed from COVID-19 infection among case-patients in Mpumalanga province. A sample of 5723 case-patients in the province was used. Using the date at which the result confirming positivity for each case was received and the date at which discharge occurred, the date function in Excel was used to compute the speed of recovery, measured by the number of days. The speed of recovery from infection was computed as the number of days from first positive to first negative SARSCoV-2 PCR test result. Data was processed in Excel and Statistical Package for Social Sciences (SPSS) software prior to conducting statistical data analysis. Results show that female case patients in each age group were larger than their counterpart male case patients, while Nkangala district had the largest numbers of case patients across all age groups. The average recovery speed for male case patients was 16.89 days, with a standard deviation of ±7.23 days, while the mean recovery speed for female case patients was marginally lower at 16.87 days, but with a marginally higher standard deviation of ±7.47 days. The Levene's test for equality of variance statistics (F-statistic = 0.686; p-value > 0.05) reveals no evidence of variability in the recovery speed (days) between male and female case patients.

Key words: Gender mean differences, recovery speed, Covid 19, Mpumalanga Province

1. Introduction

COVID-19 affects humans in all gender groups, and also affects other health conditions. Until a vaccine is found and approved, the pandemic will remain as a grave global health hazard. SARS-CoV-2 has been confirmed as the causative virus of COVID-19, which has rapidly become a global pandemic continuing to spread across countries in the world. Since COVID-19 is a new disease, there is much limited information regarding risk factors for severe disease. In some cases, people who get COVID-19 can become seriously ill and develop difficulties in breathing, whereas severe complications can lead to death. Populations with underlying medical conditions such as those who are immunocompromised like serious heart problems and chronic lung disease are more likely to develop serious illnesses. As more data become available, additional risk factors of severe COVID-19 may be identified. Since its outbreak worldwide, the COVID-19 pandemic has shown relatively similar proportions of cases among people in all gender groups (National Institute of Communicable Diseases, 2020).

Most of case-patients initially identified were dealers and vendors at a seafood, poultry and live wildlife market in China (WHO, 2020). In line with the global statistics, people who are most at higher risk are the elderly, individuals with co-morbidities and healthcare workers (Department of Health, 2020). The spread of the disease is believed to happen primarily via respiratory droplets produced when an infected person coughs or sneezes, similar to how influenza and other respiratory pathogens spread. Thus, the majority of cases have occurred in people with close physical contact to patient cases and healthcare workers proving healthcare to patients with COVID-19 (National Institute of Communicable Diseases, 2020). The treatment of COVID-19 is mainly supportive in form provision of oxygen for patients with some shortness of breath, coupled with other associated symptoms likes fever, dry cough and sore throat, Human antibiotics do not treat viral infections, but such antibiotics may be required if a bacterial secondary infection develops.

1.1. Research Objective

- To assess whether there exist gender-based mean differences in the recovery speed among COVID-19 case-patients in Mpumalanga province.

1.2. Research Question

- Are there gender-based mean differences in the recovery speed among COVID-19 case-patients in Mpumalanga province?

1.3. Research Hypothesis

- There are no gender-based mean differences in the recovery speed among the COVID-19 among case-patients in Mpumalanga province.

1.4. Significance of the Study

The results from this analysis on gender-based mean differences in the recovery speed from COVID-19 infection among case-patients in Mpumalanga are expected to provide insights to both health practitioners and policy makers on health interventions that can be pursued to curb the spread of the disease among cases based on gender group. In terms of monitoring, findings can provide insights on the ways in which infection prevention and control can be directed to gender-group based case-patients.

2. Materials and Methods

2.1. Design

A descriptive research design was used in the analytical study. The categorical factor was the gender group of case patients, while the dependent variable was the "recovery speed measured in number of days".

2.2. Population and Sample

The population for the study was case patients who got infected and first tested positive from a first SARS CoV-2 PCR test and later tested negative to SARS-CoV-2 PCR test after a certain period. The sample consists of 5 723 clinically confirmed recovered cases as at 21 July 2020.

2.3. Data

The secondary dataset used in the analysis was obtained from Mpumalanga Department of Health (MDoH). Data cleaning and processing was initially conducted in Excel and Statistical Package for Social Sciences (SPSS) prior to conducting statistical analysis. The variable "recovery speed (days)" was calculated by inserting the date at which the result confirming positivity was received and the date discharge occurred into the DATEDIF() function in Excel. Therefore, the time from infection to recovery is measured as the number of days from first positive to first negative SARSCoV-2 PCR test result.

2.5. Statistical Technique

The independent samples t-test was used to assess whether there exists a statistically significant difference between means in the recovery speed (dependent variable) across gender groups (independent categorical variable) defined by the function specified in equation (1) below:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{S_1^2}{N_1} - \dfrac{S_2^2}{N_2}}}$$

(1)

where $(N_1 + N_2) - 2$ is the degree of freedom (df), $\overline{x}_1$ is the mean recovery speed (days) of the first gender group (male) and $\overline{x}_2$ is the mean recovery speed (days) of the second gender group (female), S_1^2 is the standard deviation in the mean recovery speed of male case patients and S_2^2 is the standard deviation in the mean recovery speed of female case patients, while N_1 is the sample size of male case patients and N_2 is the sample size of female case patients.

3. Results and Analysis

The frequencies and descriptive statistics are presented in Figures 1 and 2 and Tables 1 and 2 below.

Figure 1: Distribution of cases per age group by gender

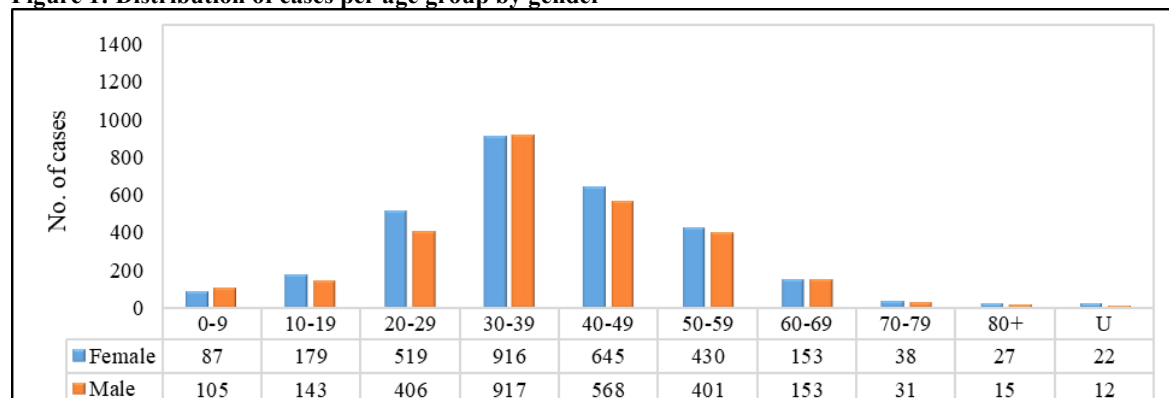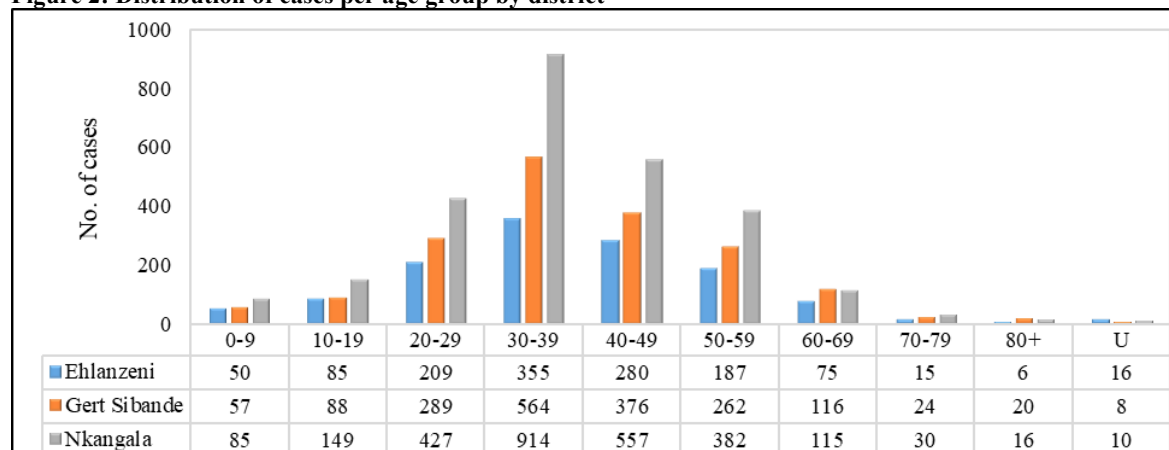|	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80+	U
Female	87	179	519	916	645	430	153	38	27	22
Male	105	143	406	917	568	401	153	31	15	12

Figure 1 shows that the female case patients in each age group were larger than their counterpart male case patients, with exception of the 0-9 years age group in which there were 87 female case patients relative to 105 male case patients. Middle age groups 30-39 years and 40-49 years case patients in all gender groups accounted for the largest numbers of COVID-19 case patients in the province.

Figure 2: Distribution of cases per age group by district

	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80+	U
Ehlanzeni	50	85	209	355	280	187	75	15	6	16
Gert Sibande	57	88	289	564	376	262	116	24	20	8
Nkangala	85	149	427	914	557	382	115	30	16	10

The frequencies presented in Figure 2 show that Nkangala district had the largest numbers of case patients in all age groups, except the 60-69 years in which Gert Sibande had 116 case patients while Nkangala had 115 case patients, and 80+ years age groups in which Gert Sibande had 20 case patients while Nkangala had 16 cases. Ehlanzeni district generally had the lowest numbers of case patients across all age groups.

Table 1: Gender distribution frequencies

		Frequency	Percent
Missing	Male	2734	47.8
	Female	2989	52.2
	Total	5723	100.0

Table 1 gender distribution frequencies indicate that female case patients accounted for the bulk 52% of the total case patients, while the remaining 48% were male case patients.

Table 2: Descriptive statistics

	Gender	N	Mean (std dev)	Std. Error Mean
Recovery speed (days)	Male	2734	16.89 ±7.23	.138
	Female	2989	16.87 ±7.47	.137

Table 2 descriptive statistics show that the average recovery speed for male case patients was 16.89 days, with a standard deviation of ±7.23 days, while the mean recovery speed for female case patients was marginally lower at 16.87 days, but with a marginally higher standard deviation of ±7.47 days. Results of the average differences in the recovery speed between the gender groups are presented in Table 3 below.

Table 3: Independent samples test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Recovery speed (days)	Equal variances assumed	.686	.408	.090	5721	.929	.017	.195	-.364	.399
	Equal variances not assumed			.090	5702.42	.929	.017	.194	-.364	.398

The Levene's test for equality of variance statistics (F-statistic = 0.686; p-value > 0.05) reveals no evidence of variability in the recovery speed (days) between male and female case patients. The mean differences are not statistically significantly different (p = 0.408), hence the null hypothesis of equal variances could not be rejected. Therefore, results of the Equal variances not assumed should not be used, whose t-statistic = 0.090 and a mean difference = 0.017 calculated by subtracting the mean of the second group (female case patients) from the mean of the first group (male case patients). The computed mean difference equal to 0.017 lies within the computed confidence interval of the difference.

4. Conclusion and Recommendations

This research study found no evidence of statistically significant differences in the average recovery speed (days) from COVID-19infection between male and female case patients. The findings imply that provision of clinical and health-related interventions aimed at curbing the spread of the COVID-19 disease should not be differentiated based on gender since the average recovery speed among case-patients in all gender groups is not significantly different. ages. Concurrently, follow-ups on recovery cases should be conducted in a standardised manner as well, predominantly with close monitoring on case-patients who might have comorbidities and chronic health conditions.

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