Estimating Excess Mortality During the Covid-19 pandemic in the largest township in Gauteng, South Africa: Results from a Health and Demographic Surveillance System

Portia C. Mutevedzi (MSc; PhD)
Senior Epidemiologist – WITS-VIDA
PRESENTATION OUTLINE

- Background
- Methods
- Results
- Discussion

Improving Knowledge

CHAMPS addresses an important knowledge gap by producing high-quality data on stillbirths and deaths in children under age 5 in Sub-Saharan Africa and South Asia by using several different sources of information to determine the cause of death.
Since December 2019, the COVID-19 pandemic has caused varying but devastating levels of mortality.

South Africa has experienced four waves of SARS-CoV-2 transmission

- with the second, third, and fourth waves being driven by the Beta, Delta, and Omicron variants, respectively.

Like many African countries, excess mortality owing to COVID-19 is likely underestimated

- mortality estimates are largely based on health facility death counts excluding community deaths.
- Diagnostic challenges

We utilised data from a health and demographic surveillance system (SaT-HDSS), in Soweto the largest township in South Africa, to estimate excess mortality during the Covid-19 pandemic.
**STUDY SETTING**

**Gauteng**

- Gauteng, the “economic hub” and one of nine South African provinces
- Gauteng constitutes 1.5% of South Africa’s landmass of 18,178 km², but 26% (15.9/59.6 million) of its population.
- The overall population density (people per km²) in Gauteng is 737 - range <10 to 63,211 by municipality.
- The City of Johannesburg (CoJ) district (population density 3400 people/km²) ranks among the top-10 most densely populated cities globally.
  - Soweto is in CoJ
- CHAMPS SA in Soweto – 1 of the 7 sites in Africa
  - SaT-HDSS
# METHODS – DATA COLLECTION

## Baseline Households

<table>
<thead>
<tr>
<th>Year</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>R6</th>
<th>Total Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>16,403</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>88,346</td>
<td>81,659</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>7,924</td>
<td>18,270</td>
<td>130,476</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
<td>53,761</td>
<td>132,378</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>118,433 120,717 32,000</td>
</tr>
</tbody>
</table>
DATA ANALYSES

Objectives
- Quantify year specific mortality rates from 2018-2021
- Estimate annual age-specific mortality rates from 2018-2021

Study design
- Prospective cohort in a geographically defined area
  - health and demographic data collection

Data analyses
- Outcome – mortality
- Mortality rates computed per 1000 population
- Population denominators & death counts annualised to account for the twice a year data collection
- $X^2$ to compare mortality rates pre- and post- Covid-19
- STATA software (Stata Statistical Software: College Station, TX: StataCorp LLC) was used for analyses
RESULTS

Total deaths
- 2298 deaths were recorded

Total number of deaths pre- and post-Covid-19
- Pre Covid-19 (40%) - 914
- Post Covid-19 (60%) - 1384

Number of deaths per year stratified by age group
RESULTS

Annualised mortality rates by age category

<table>
<thead>
<tr>
<th>Age group</th>
<th>Mortality rate per 1000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>5.9, 2.4, 3.3</td>
</tr>
<tr>
<td>5-14 years</td>
<td>0.2, 0.6</td>
</tr>
<tr>
<td>15-24 years</td>
<td>0.6, 1.4, 1.1</td>
</tr>
<tr>
<td>25-49 years</td>
<td>2.7, 3.5, 3.6</td>
</tr>
<tr>
<td>50-65 years</td>
<td>6.4, 9.4, 10.0</td>
</tr>
<tr>
<td>65+ years</td>
<td>15.9, 19.4, 27.3</td>
</tr>
</tbody>
</table>

Mortality rate per 1000 population
RESULTS

Mortality rates per 1000 population pre- and post-Covid 19

- Age at death categories: 0-4 years, 5-9 years, 10-14 years, 15-19 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years, 40-44 years, 45-49 years, 50-54 years, 55-59 years, 60-64 years, 65-69 years, 70-74 years, 75-79 years, 80+ years

- Mortality rates are shown for both pre-Covid-19 and post-Covid-19 periods.
Overall, mortality rates increased from 3.4 in 2019 to 4.9 in 2021 (44% ↑)

The greatest increase was in the >50 years and 65+ years age groups
- 6.4 to 11.5
- 15.9 to 29.4

There was notable increase in mortality in children aged <5 years

These findings are in alignment with national excess mortality reports (SA-MRC) and with data on decoupling of cases from Covid-19 disease severity

Estimates of excess mortality are significantly higher than reported Covid-19 mortality
- Limitations in attributing covid-19 to deaths during the pandemic
- Restricted access to health care services and Covid-19 testing

The impact of Covid-19 on mortality is under-estimated in resource poor settings
- More-so in poor African townships where transmission rates may have been high but Covid-19 diagnostic capacity limited

Mortality surveillance is generally suboptimal in resource limited settings.
THANK YOU!
SIYABONGA!
TATENDA!