Applying multidimensional poverty methodologies to construct a COVID vulnerability index

Solly Molayi
Statistics South Africa
Indices at Stats SA

• Stats SA has developed several indices to help it measure and report on multidimensional poverty issues, namely:

  ➢ South African Multidimensional Poverty Index (SAMPI)
    o Constructed in 2014 to improve the country’s ability to measure poverty “in all its forms and dimensions” (Post-2015 Agenda for the SDGs)

  ➢ Youth MPI
    o Constructed in 2016 in partnership with SALDRU at UCT for the Presidency
Responding to COVID

• In response to the COVID-19 pandemic, Stats SA revisited previous census data and used MPI techniques and methodologies to construct a vulnerability index

- South African COVID-19 Vulnerability Index (SACVI)
  - Constructed in 2020 as part of Stats SA’s response to the pandemic

- The SACVI was adjusted in 2021 to also serve as an input into the country’s vaccine rollout
South African Multidimensional Poverty Index (SAMPI)
What is the SAMPI?

- A multidimensional measure of acute poverty
- Captures the severe deprivations that each person or household faces with respect to education, health, living standards, and economic activity
- An analytical tool to identify the most vulnerable people in society
- Enables policymakers and municipalities to target resources and design policies more effectively
Creating the SAMPI

The guiding factors in the creation of the SAMPI

- The Global MPI *(Oxford Poverty & Human Development Initiative (OPHI))*
- “The South Africa I know, the home I understand”
- Stakeholder consultations
- Data availability *(Census 2001 and 2011)*
- Data suitability & confrontation *(Principal Component Analysis (PCA))*
The four dimensions of the SAMPI

- **Health**
  - Child mortality (death of child under 5)

- **Education**
  - Years of schooling (completed 5 years of schooling)
  - School attendance (school-aged child out of school)

- **Living standards**
  - Lighting (no electricity)
  - Heating (no electricity)
  - Cooking (no electricity)
  - Water (no piped water)
  - Sanitation (no flush toilet)
  - Dwelling (informal/traditional/caravan/tent)
  - Assets (no radio/TV/phone/car)

- **Economic activity**
  - Unemployment (adults unemployed)

<table>
<thead>
<tr>
<th>Year</th>
<th>Headcount (H)</th>
<th>Intensity (A)</th>
<th>SAMPI (HxA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>17.9%</td>
<td>43.9%</td>
<td>0.08</td>
</tr>
<tr>
<td>2011</td>
<td>8.0%</td>
<td>42.3%</td>
<td>0.03</td>
</tr>
<tr>
<td>2016</td>
<td>7.0%</td>
<td>42.8%</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Source: The South African MPI
In 2001 wide dispersion of Poverty with Msinga having a poverty Headcount of around 60%

Between 2001 and 2011 poverty generally declines for all municipalities

However between 2011 and 2016 poverty trends diverge between municipalities
High levels of poverty in rural areas of SA

Location of the ten poorest municipalities (by headcount) in 2016

1. Intsika Yethu 28%
2. Msinga 25%
3. Umzimvubu 24%
4. Port St Johns 23%
5. Engcobo 23%
6. Ntabankulu 23%
7. Mbizana 23%
8. Umhlabuyalingana 23%
9. Emalahleni 23%
10. Ngquza Hill 22%

Source: The South African MPI
Multidimensional Poverty Drivers

Youth Multidimensional Poverty Index (Youth MPI)
Youth MPI by Province

% Multidimensionally Poor
- 90%-100%
- 80%-90%
- 70%-80%
- 60%-70%
- 50%-60%
- 40%-50%
- 30%-40%
- 20%-30%
- 10%-20%
- 0%-10%

Atlas Ocean

Copyright © 2016 Statistics South Africa: Geography Division: HO
Youth MPI by Municipality
Youth MPI by Ward

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- 90%-100%
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- 50%-60%
- 40%-50%
- 30%-40%
- 20%-30%
- 10%-20%
- 0%-10%
South African COVID-19 Vulnerability Index (SACVI)
What is the SACVI?

- The South African COVID-19 Vulnerability Index (SA CVI) aims to statistically and spatially identify vulnerable populations that are more likely to be adversely affected should COVID-19 spread in the affected area.

- The Index uses Census 2011 data and eight indicators related to labour force activity, access to media, household services, overcrowding, multigenerational status, age and chronic illness to output a composite indicator to reflect the vulnerability status of citizens to the Covid-19 virus and where these individuals are located.

- The index uses a natural counting approach to determine the headcount of vulnerable individuals within a population, as well as measure their level of simultaneous vulnerability determining intensity.

- Employed with private vehicle
- Access to media
- Access to water
- Access to sanitation
- Overcrowding
- Multigenerational households
- Age (elderly 60+)
- Chronic medication
Composition of the SACVI

4 themes of vulnerability

Population
- Employment status and no private vehicle: 1/8
- Access to media (TV, cell, internet, radio): 1/8

Household services
- Access to water (within 200m dwelling): 1/8
- Access to sanitation (toilets within the dwelling): 1/8

Household composition
- Overcrowding (+3 people per room): 1/8
- Multigenerational households: 1/8

Health
- Elderly (+60 years): 1/8
- Use of chronic medication: 1/8
### Rationale for the Indicators and Cut-Offs

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
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<td>Employed + no private vehicle</td>
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<tr>
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<td>Likelihood of using public transport</td>
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<td>Likelihood of understanding the infection spread</td>
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<td>Children (0-15 years) and elderly (60+) in household</td>
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<td>Likelihood of children as inadvertent carriers infecting others</td>
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<td>Age (elderly 60+)</td>
<td>If any person is 60 years and older</td>
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<td>Likelihood of population at risk for fatality if infected</td>
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<td>Chronic medication</td>
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Using the SACVI (1)

Nelson Mandela Metropole
SACVI

The hotspots and SACVI are strongly correlated when overlaid.

Example: Booysen Park.
Adjusting the SACVI

• In 2021, Stats SA revisited the design of SACVI to make adjustments to the index to make it more relevant to vaccine roll-out efforts

• Adjustments that were considered:
  ➢ Adding new indicators
  ➢ Adjusting the weighting structure
  ➢ Changing cut-offs or other thresholds
With Covid-19 vaccines in short supply, government need to prioritise distribution. Similar indexes used in other countries (e.g. USA Social Vulnerability Index algorithm) to highlight and target the most vulnerable communities.

Opportunity to reframe index to support the process and strengthen approach.
Rationale for the Indicators and Cut-Offs

There are 8 indicators under 4 themes all with a split weighting in terms of contributions to vulnerability.

- **Population**
  - Employment status and no private vehicle: 1/10
  - Access to media (TV, cell, internet, radio): 1/10

- **Household services**
  - Access to water (within 200m dwelling): 1/10
  - Access to sanitation (toilets within the dwelling): 1/10

- **Household composition**
  - Overcrowding (+3 people per room): 3/20
  - Multigenerational households: 3/20

- **Health**
  - Elderly (+60 years): 3/20
  - Use of chronic medication: 3/20

**Weights**
- Population: 40%
- Household services: 40%
- Household composition: 30%
- Health: 30%
Thank you