TOOL FOR ESTIMATING AT-RISK POPULATION FOR SEVERE COVID-19

Joint SARI.net / REVELAC-i Regional Meeting
“Leveraging influenza surveillance and immunization toward COVID-19 pandemic control”
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Presenters:
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Roberta Caixeta PAHO/NMH – Advisor on NCD surveillance, prevention and control
CONTENTS

1 Background and concepts
2 Regional adaptation of the tool
3 Country scenario
4 Technical support provided
Estimate how many are at increased and high risk of severe COVID-19 disease due to underlying health conditions for planning activities.
**PURPOSE**

- **Shielding strategies** (self-isolation, asking support from close contacts to deliver food and/or medical supplies…)
- Planning chronic care disease management
- Planning vaccination (procurement)

*Shielding* is defined as a measure to protect extremely vulnerable people by minimizing interaction between those who are extremely vulnerable and others.

1 I BACKGROUND

The model originally uses GBD 2017 data for 11 conditions by sex and 5-year age ranges –

- GBD prevalence's produced separately – Modelling needed and data from China & Scotland multimorbidity studies was used:
  - 1+ condition
  - Multiple conditions
- Doesn’t include tobacco smoking, hypertension and severe obesity.

Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study

Andrew Clark, Mark Jit, Charlotte Warren-Gash, Bruce Guthrie, Harry HX Wang, Stewart W. Mercer, Colin Sanderson, Mart in McKee, Christopher Troeger, Kunyin L. Ong, Francesco Checchi, Pablo Perez, Sarah Joseph, Hamish P Gibbs, Amitava Banerjee, Rosalind M Eggo, with the Centre for the Mathematical Modelling of Infectious Diseases COVID-19 working group*

Summary

Background: The risk of severe COVID-19 if an individual becomes infected is known to be higher in older individuals and those with underlying health conditions. Understanding the number of individuals at increased risk of severe COVID-19 and how this varies between countries should inform the design of possible strategies to shield or vaccinate those at highest risk.

Model key outcomes:

**INCREASED RISK** of severe COVID-19:
- have at least one condition

**HIGH RISK** of severe COVID-19:
- would require hospitalization if infected
"severe acute respiratory illness presenting fever and at least one sign/symptom of respiratory disease, (e.g., cough, shortness of breath); AND requiring hospitalization". 

WHO, 2020
1. CONCEPTS

Underlying health conditions (11 + 3):

(1) cardiovascular disease + (14) hypertension
(2) chronic kidney disease
(3) chronic respiratory disease
(4) chronic liver disease
(5) diabetes mellitus
(6) cancers with direct immunosuppression (IS)
(7) cancers with possible IS due to treatment
(8) HIV/AIDS
(9) tuberculosis (active)
(10) chronic neurological disorders
(11) sickle cell
(12) tobacco smoking
(13) severe obesity (BMI ≥ 40)

References:

World Health Organization
Public Health England
Centers for Disease Control and Prevention
Regional model – use of country data when available.

Development of the LAC pooled estimates and multimorbidity fraction by age and sex replacing the cross-sectional multimorbidity studies from Scotland and China.

Data sources identified: currently 25 data sets available
- WHO NCD microdata repository
- National Statistical Offices websites
- files and surveys reported in the NCD Country Capacity Survey

Data availability by 5-year age ranges/10-year age ranges, sex and 14 underlying health conditions.

When there is country data available, results on population at increased risk can be presented by social stratifiers.
## 2 I REGIONAL ADAPTATION OF THE TOOL

### 1 – Underlying conditions: estimates for 14 underlying health conditions separately
- Use country data when available
- Latin America and Caribbean estimates (LAC)
- Global Burden of Diseases (GBD)

### 2 – Multimorbidity: one or more conditions

#### Adjustment for multimorbidity – LAC estimates

Proportion of individuals with at least two underlying conditions (LAC pooled estimates) among those with at least one underlying condition (P)

### 3 – Increased risk of severe COVID-19: at least one condition

\[ P = e \times r \]

- **P** – Proportion of individuals who have at least one underlying condition
- **e** – Expected proportion of individuals with at least one COVID-19 related condition
- **r** – Ratio between the observed (LAC pooled estimates) and expected percentage of individuals with at least one condition (e)

### 4 – High risk of severe COVID-19: would require hospitalization if infected

The models uses age-specific infection hospitalization ratios (IHRs) recently estimated for mainland China by Verity et al.
## 3 | COUNTRY SCENARIO

### Sources of information available: PARAGUAY

<table>
<thead>
<tr>
<th>Underlying health condition</th>
<th>Source 1 (national)</th>
<th>Source 2 (regional)</th>
<th>Source 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease + hypertension</td>
<td>STEPS 2011 – sólo HTN</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>STEPS 2011</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Severe obesity (BMI ≥40)</td>
<td>STEPS 2011</td>
<td>LAC</td>
<td>Not available</td>
</tr>
<tr>
<td>Smoking tobacco</td>
<td>STEPS 2011</td>
<td>LAC</td>
<td>Not available</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>Not available</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td>Not available</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Cancers with direct immunosuppression (IS)</td>
<td>Not available</td>
<td>No disponible</td>
<td>GBD</td>
</tr>
<tr>
<td>Cancers with possible IS due to treatment</td>
<td>Not available</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Chronic liver diseases</td>
<td>Not available</td>
<td>Not available</td>
<td>GBD</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>Not available</td>
<td>Not available</td>
<td>GBD</td>
</tr>
<tr>
<td>Tuberculosis (active)</td>
<td>Not available</td>
<td>LAC</td>
<td>GBD</td>
</tr>
<tr>
<td>Chronic neurological disorders</td>
<td>Not available</td>
<td>Not available</td>
<td>GBD</td>
</tr>
<tr>
<td>Sickle cell</td>
<td>Not available</td>
<td>Not available</td>
<td>GBD</td>
</tr>
</tbody>
</table>

Note: Data should be disaggregated by 5-year age ranges/10-year age ranges, sex and each one of the conditions separately.
### 3 I COUNTRY SCENARIO: increased risk

<table>
<thead>
<tr>
<th>Category</th>
<th>No conditions</th>
<th>One condition</th>
<th>Two or more conditions</th>
<th>Increased risk (At least one condition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both sexes</td>
<td>5,811,049 (81%)</td>
<td>1,012,995 (15%)</td>
<td>308,487 (4%)</td>
<td>1,321,481 (19%)</td>
</tr>
<tr>
<td>Males</td>
<td>3,031,073 (42%)</td>
<td>467,555 (6%)</td>
<td>125,732 (2%)</td>
<td>593,287 (8%)</td>
</tr>
<tr>
<td>Females</td>
<td>2,779,976 (39%)</td>
<td>545,440 (9%)</td>
<td>182,754 (2%)</td>
<td>728,194 (11%)</td>
</tr>
</tbody>
</table>

**Distribution of population by categories of underlying conditions by sex. Paraguay**
Percentage of population at increased risk of severe COVID-19 due to underlying conditions by age groups and sex. Paraguay

Percentages are calculated based on the reference age group.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Female</th>
<th>Male</th>
<th>&lt;20 years</th>
<th>20-59 years</th>
<th>&gt;60 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 years</td>
<td>4%</td>
<td></td>
<td>103,212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-59 years</td>
<td>22%</td>
<td></td>
<td>801,098</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>59%</td>
<td></td>
<td>417,171</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Population at increased risk:
- <20 years: 103,212
- 20-59 years: 801,098
- >60 years: 417,171
3 COUNTRY SCENARIO: increased risk

- STEPS 2011
- LAC pooled estimates
- GBD 2017

**Percentage distribution of underlying conditions by age, Paraguay**

- Cigarettes per day 25+
- Body Mass Index 40+
- Sickle cell disorders
- Chronic neurological disorders
- Tuberculosis (active)
- HIV/AIDS
- Cancers with possible IS
- Cancers with direct IS
- Diabetes mellitus
- Chronic liver disease
- Chronic respiratory diseases
- Chronic kidney diseases
- Cardiovascular diseases
- Multimorbidity (2+ conditions)

<table>
<thead>
<tr>
<th>15-64 (working age population)</th>
<th>65 and older</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ CVD (including hypertension)</td>
<td>✓ CVD (including hypertension)</td>
</tr>
<tr>
<td>✓ Diabetes</td>
<td>✓ Diabetes</td>
</tr>
<tr>
<td>✓ Chronic respiratory disease</td>
<td>✓ Chronic respiratory disease</td>
</tr>
<tr>
<td>✓ Tobacco use</td>
<td>✓ Severe obesity</td>
</tr>
<tr>
<td>✓ Severe obesity</td>
<td>✓ Neurological disorders</td>
</tr>
<tr>
<td></td>
<td>✓ Cancer</td>
</tr>
</tbody>
</table>
COUNTRY SCENARIO: high risk

Population at increased and high risk of severe COVID-19 by age groups and sex. Paraguay

- STEPS 2011
- LAC pooled estimates
- GBD 2017

% pop. at high risk
3% (222 thousand)
4% males / 2% females
### 3.1 COUNTRY SCENARIO: summary

#### Estimating the number (%) of people at increased risk of severe COVID-19 disease due to underlying health conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
<th>Population</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least one underlying health condition</td>
<td>1,321,481</td>
<td>7,132,530</td>
<td>19%</td>
</tr>
<tr>
<td>No conditions but older than 65 yrs</td>
<td>184,826</td>
<td>7,132,530</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,506,307</strong></td>
<td><strong>7,132,530</strong></td>
<td><strong>21%</strong></td>
</tr>
</tbody>
</table>

#### High risk (would require hospitalisation if infected)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Population</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>74,290</td>
<td>3,508,170</td>
<td>2%</td>
</tr>
<tr>
<td>Males</td>
<td>147,974</td>
<td>3,624,360</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>222,263</strong></td>
<td><strong>7,132,530</strong></td>
<td><strong>3%</strong></td>
</tr>
</tbody>
</table>

**Note:** The values presented are based on intermediate estimates. The model generates low, intermediate and high prevalence estimates.
More information:

✔ Technical note: COVID-19 and co-morbidities – AMERICAS
Available at: https://www.paho.org/en/documents/covid-19-and-comorbidities-americas-background-information

✔ Frequently asked questions: COVID-19 and co-morbidities – AMERICAS
Available at: https://www.paho.org/en/documents/covid-19-and-co-morbidities-americas-frequently-asked-questions-faq
The Minister of Health of Paraguay, Dr. Julio Mazzoleni indicated today in a press conference that one in five people in Paraguay has an underlying health condition that puts them at increased risk of severe COVID-19. The information comes from a collaborative work between PAHO/WHO in Paraguay and the London School of Hygiene and Tropical Medicine, Mazzoleni indicated.
THANKS!

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