Strategies to support the COVID-19 response in LMICs

A virtual seminar series
Monitoring and Evaluation during COVID-19

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M&E: What we have
In the COVID-19 pandemic, does epidemiology = modeling?
But, without good data, can these models tell us what we need to know?

• **Wide** variability in estimates/contradictory inferences from dynamic modeling

• Models have an important role to play not a substitute for **real data**

• Models rely on inputs/parameters that need to be **accurately measured**

• Need **accurate, real-time data collection** to monitor trends, measure the impact of interventions, guide response etc...

• With COVID-19, everything is changing **daily**

https://www.nature.com/articles/d41586-020-01003-6
We do have more than models: Real-time COVID-19 data resources

• COVID-19 Global Cases (CSSE at Johns Hopkins University)

• Coronavirus Disease (COVID-19) – Statistics and Research
  https://ourworldindata.org/coronavirus

• COVID-19 Educational Disruption and Response (UNESCO)

• World Health Organization Situation Reports
  https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

• Coronavirus Data (EU Open Data Portal)
  https://covidtracking.com/data
Tracking COVID-19 cases & deaths

https://www.arcgis.com/apps/opsdashboard/index.html#bda7594740fd40299423467b48e9ecf6
Tracking temporal trends in cases

Total confirmed COVID-19 cases: how rapidly are they increasing?

The number of confirmed COVID-19 cases is lower than the number of total cases. The main reason for this is limited testing.

Source: European CDC – Situation Update Worldwide – Last updated 10th May, 11:00 (London time)  

https://ourworldindata.org/coronavirus
Important to understand what underlies case counts

https://ourworldindata.org/coronavirus
Limitations of existing resources

• Aggregated data based on existing sources
  • Consider the quality of data that underlies these sources
  • How reliable is testing data?
  • Are all deaths captured?

• Tells you the what but not the how or why
  • Denominators?
  • Stratification?
M&E: What we need
In an ideal world...

**OPTION 1**

- Test everyone who visits a health center for SARS-CoV-2 (regardless of symptoms)
- Monitor outcomes: hospitalization, death, discharge and collect data on comorbidities
- Continue to follow in community post-discharge (long-term outcomes)

**OPTION 2**

- Test a community-based sample (regardless of symptoms) and determine true prevalence of infection
- Follow prospectively to ascertain new cases (incidence)
- Follow cases to monitor adverse outcomes, hospitalization, death etc
Where can M&E be helpful?

- Testing coverage
- Case counts/rates
  - Transmission, Case detection
- Symptom profile
- Disease severity
- Morbidity/Mortality
- Treatment impacts
  - Clinical Consequences
- Impact on social and economic well-being
- Impact on other health outcomes
  - Total COVID-19 burden
Some general thoughts

• **Denominators** are important!!

• The importance of **risk stratification** (can better characterize risk faced by specific groups of individuals, communities, states, countries)

• Important to understand **definitions**

• **Collect enough data** to not overwhelm the system but to answer key questions of interest
### Some suggested M&E indicators

<table>
<thead>
<tr>
<th><strong>Recommended Indicator</strong></th>
<th><strong>Proposed stratifications</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tests completed</td>
<td>Asymptomatic vs. Symptomatic/Secondary contact vs. not/age, gender, comorbidity, occupation</td>
</tr>
<tr>
<td>Number SARS-CoV-2 positive</td>
<td>Asymptomatic vs. Symptomatic/Secondary contact vs. not/age, gender, comorbidity, occupation</td>
</tr>
<tr>
<td><em>Proportion of those tested who test SARS-CoV-2 positive</em></td>
<td>Asymptomatic vs. Symptomatic/Secondary contact vs. not/age, gender, comorbidity, occupation</td>
</tr>
<tr>
<td>Number with respiratory symptoms hospitalized</td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td>Number of known cases hospitalized</td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td><em>Proportion of known cases hospitalized</em></td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td>Number of known cases with severe outcomes</td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td><em>Proportion of known cases with severe outcomes</em></td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td>Number of deaths</td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td><em>Proportion of known cases who die</em></td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td>Number of non-COVID-19 deaths</td>
<td>Age, sex, comorbidity</td>
</tr>
<tr>
<td><em>Proportion of deaths that are COVID vs. non COVID related</em></td>
<td>Age, sex, comorbidity</td>
</tr>
</tbody>
</table>
The importance of stratification

A single estimate can mask key differences between subgroups

Stratification can reveal new trends (i.e., deaths among very young children)

Different prevention/treatment strategies may be needed for different groups

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**Coronavirus: case fatality rates by age**

Case fatality rate (CFR) is calculated by dividing the total number of confirmed deaths due to COVID-19 by the number of confirmed cases.

There are two main limitations to keep in mind when interpreting the CFR:
1. Many cases within the population are unconfirmed due to a lack of testing.
2. Some individuals who are infected will eventually die from the disease, but are still alive at time of recording.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>South Korea</th>
<th>Spain</th>
<th>China</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 years</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>10-19 years</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>20-29 years</td>
<td>0.37%</td>
<td>0.32%</td>
<td>0.25%</td>
<td>0.25%</td>
</tr>
<tr>
<td>30-39 years</td>
<td>0.11%</td>
<td>0.14%</td>
<td>0.17%</td>
<td>0.17%</td>
</tr>
<tr>
<td>40-49 years</td>
<td>0.13%</td>
<td>0.33%</td>
<td>0.28%</td>
<td>0.28%</td>
</tr>
<tr>
<td>50-59 years</td>
<td>0.4%</td>
<td>0%</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>60-69 years</td>
<td>1.3%</td>
<td>1.9%</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>70-79 years</td>
<td>4.8%</td>
<td>3.3%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>80+ years</td>
<td>11%</td>
<td>11.1%</td>
<td>11.4%</td>
<td>11.4%</td>
</tr>
</tbody>
</table>

Source: [Our World in Data](https://ourworldindata.org/coronavirus)
Why are denominators so important?

Gudbjartsson et al. NEJM 2020
Why are denominators so important?

• The challenge of measuring mortality
  • **Case Fatality Rate**: Number of deaths/number of confirmed cases
  • **Infection Fatality Rate**: Number of deaths/number of actual SARS-CoV-2 cases

• Drastically different inference based on different denominator

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**Estimated COVID-19 mortality by age in China**

- Overall rates:
  - **1.38%** Confirmed cases
  - **0.66%** All infections*

*Includes undiagnosed cases with mild symptoms

Note: Based on data for 1,023 deaths among 70,117 COVID-19 cases in mainland China.
How frequently does data need to be collected/reported

- Ideally daily (weekly if daily is not possible)
- Set up simple electronic systems if possible (excel-based) → integrated with required reporting
COVID-19 is an emergency. Get the latest public health information. Get the latest research information.

NIH Repository of COVID-19 Research Tools

- **COVID-19 Collection Tools** (e.g., Surveys, Questionnaires)
- **Surveys with COVID-19 Specific Domains** - NIHD stacks this list, with assistance from the NIH

NIH Repository of COVID-19 Research Tools

- **COVID-19 Collection Tools** (e.g., Surveys, Questionnaires)

Source: Johns Hopkins University, Bloomberg School of Public Health
Date Published: 4/25/2020
Format: PDF
Annotation: The goal of this toolkit is to provide a set of standardized quantitative and qualitative assessments to harmonize data collection efforts and facilitate comparisons of the impact of the novel coronavirus (COVID-19), and promote collaborations across research efforts. This is intended to be a dynamic resource that will evolve as the epidemic does. These modules were created with a broad sample in mind. The goal was to develop a set of modules that could be applied to multiple populations with some minor tweaks. They can be used cross-sectionally or longitudinally and are designed for a newly selected sample (e.g., include information on basic demographics). The survey asks questions about possible exposure to the virus, experiences with testing and treatment, and some questions about how life has changed as a result of COVID-19 and the preventive measures that have been put in place.

Some final points

• Leverage data that is already being collected to monitor your epidemic/response

• Supplementing with some additional information for risk stratification etc. will provide a more comprehensive picture

• Incorporate denominators to improve interpretation

• Understand the limitations of the data/indicator definitions → how does this impact interpretation?

• Monitor changes in measurement over time → how does this impact observation of trends?
Questions?