MEASURING RURAL ACCESS INDEX

Big Data for the SDGs

Hands-on demonstration on working with real-life data in the case of calculating SDG 9.1.1 in Jordan and the UAE

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Content

- General introduction
- Methodology
- Cases in UAE and Jordan
- Q&A
Rural accessibility has long been an important challenge particularly in developing countries...

- Rural Access Index by Roberts et al. (2006)
- 1 billion people or 68% of total rural population remain unconnected to the road network
Renewed interest in the SDG context – Indicator 9.1.1. RAI

SDG Target 9.1
“Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all”

- **Indicator 9.1.1**: Proportion of the rural population who live within 2 km of an all-season road
- **Indicator 9.1.2**: Passenger and freight volumes, by mode of transport
  - Aviation
  - Road, rail, inland water, pipeline
  - Led by ICAO; International Transport Forum; UNECE; UNCTAD
New methodology developed – Using new spatial data and techniques, while maintaining the original definition

- Rural Access Index
  - Share of rural population who has access to an “all-season road” within 2 km (approximately, 25-minute walk)

Main principles of the new methodology:

- Sustainability
- Consistency
- Simplicity
- Operational relevance
Basic method – Overlay 4 spatial data “virtually”

Spatial data required:
- Road conditions
- Road network
- Rural areas
- Population

See World Bank (2016) for more details
Step 1. Where do people live? – Detailed global population data, e.g., WorldPop, GPW, etc. or national census data
Step 2. Define “rural areas” – RAI is sometimes sensitive to urban-rural delineation

In RAI calculation, urban areas need to be excluded

- Different urban-rural classifications are available
  - Global databases – Global Rural Urban Mapping Project (GRUMP) in 1990
  - National administrative definition
  - New method to delineate cities, urban and rural areas endorsed by the UN Statistical Commission
    - UN. (2020). “A recommendation on the method to delineate cities, urban and rural areas for international statistical comparisons”
Step 3. Where do “roads” exist? – Road agencies own official road network data, while open data also exist

- Government data – Consistent with official network, classification and responsibility
- Open data may be more comprehensive particularly in urban areas, but not systematically updated, and with no road condition data attached

<table>
<thead>
<tr>
<th>Availability</th>
<th>Access</th>
<th>Consistency</th>
<th>Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government data</td>
<td>Road agencies, statistical offices</td>
<td>Subject to country policy</td>
<td>Consistent with official network</td>
</tr>
<tr>
<td>Collected by mobile applications</td>
<td>By RoadLab etc.</td>
<td>Free application</td>
<td>Consistent with official data</td>
</tr>
<tr>
<td>Commercial data</td>
<td>e.g., DeLome database</td>
<td>Commercial license</td>
<td>Consistent across countries</td>
</tr>
<tr>
<td>Open data</td>
<td>e.g., OpenStreetMap</td>
<td>Free and open</td>
<td>Vary across countries</td>
</tr>
</tbody>
</table>
Step 4. Identify “all-season roads” – Converting available road condition data (e.g. RAM) to “all season passability”

- “All-season road”?
  - If a road is impassable to the prevailing means of rural transport for more than 7 days a year, it is not regarded as all-season (Roberts et al., 2006)

- Conversion needed based on individual country context (weather, road specification, etc.)

Example of “all-season” roads based measured IRI

<table>
<thead>
<tr>
<th>Condition</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Condition</th>
<th>Gravel</th>
<th>Earth</th>
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<tbody>
<tr>
<td>Very good</td>
<td></td>
<td></td>
<td></td>
<td>Very good</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Good</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Good</td>
<td>10</td>
<td>13</td>
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<td>5</td>
<td>6</td>
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<td>Poor</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>Poor</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Bad</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>Very poor</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

But where does the road condition data come from?
A wide variety of technologies are emerging and now available

Traditional pavement laser profiler

Drones

Traditional

Innovative

High resolution satellite imagery

Smartphone app (RoadLab)
Combining all 4 layers, compute RAI…
An example – Ethiopia

81.3 million people live in rural areas
An example – Ethiopia

85,880 km of roads
An example – Ethiopia

31% of roads are in “good” condition
An example – Ethiopia

RAI = 21.6%

Wide variation in RAI among districts
Important to operationalize RAI, regularly updating underlying data

- Identify available data
- Examine different methodologies
- Agree on methodology / data sources
- Use the result in operations
- Regularly update data and RAI
Resources

World Bank Rural Access Index Website
https://datacatalog.worldbank.org/dataset/rural-access-index-rai

Rural Access Methodology Report (2016)

Rural Access Update (2017/18)

World Bank. 2020. The Fallout of War: The Regional Consequences of the Conflict in Syria
https://openknowledge.worldbank.org/handle/10986/33936
Case Studies

- UAE
- Jordan