WELCOME!

Session 2

An Introduction to the
LEAVING NO ONE BEHIND Analysis
Session Guidelines

• Please keep your microphones on mute

• Please use the chat box to ask any questions

• Later in the training we will use the mentimeter, you can use a separate browser or a second device. If you need any assistance, please send a direct message to @sejal
Meet Your Trainers

Sejal Sood

Selsah Pasali
Dissimilarity Index (D-Index)
Session 2, part 1

Introduction to the Leaving No One Behind (LNOB) Analysis
Tonga 2022
Dissimilarity Index (D-Index)
A measure of inequality of opportunity

The Dissimilarity Index is derived from the Human Opportunity Index (HOI) an initiative by the World Bank Group. The Dissimilarity Index (D-index) measures whether existing opportunities (access to services) are allocated equitably, comparing different circumstance groups’ probabilities of accessing a given opportunity. It is a demographic measure of evenness.
Dissimilarity Index (D-Index)

A measure of inequality of opportunity

0.01 - 0.3

No inequality

Complete inequality
Dissimilarity Index (D-Index)

A measure of inequality of opportunity

https://youtu.be/LDk_PuVoOPU
Dissimilarity Index

Formula

\[
D = \frac{1}{2p} \sum_{i=1}^{n} \beta_i \left| p_i - \bar{p} \right|
\]

- \( n \) is the number of groups, which are defined using the interactions of the circumstances selected for the analysis
- \( \bar{p} \) is the average access rate in the country
- \( p_i \) is the access of group
- \( \beta_i \) is the weighted sampling proportion of group \( i \), (sum of \( \beta_i \) equals 1)
Dissimilarity Index

\[ D \ = \ \frac{1}{2p} \sum_{i=1}^{n} \beta_i \left| p_i - \bar{p} \right| \]

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Dissimilarity Index

Calculating D-Index

**Country:** Escapia  
**Indicator:** Access to Electricity  
**Circumstances:** Wealth (2), Residence (2), Education (3)

<table>
<thead>
<tr>
<th>Wealth</th>
<th>Residence</th>
<th>Education</th>
<th>n = 2 x 2 x 3 = 12 groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 60</td>
<td>Urban</td>
<td>Lower</td>
<td></td>
</tr>
<tr>
<td>Bottom 40</td>
<td>Rural</td>
<td>Secondary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Higher</td>
<td></td>
</tr>
</tbody>
</table>

**Dissimilarity Index**

n = 2 x 2 x 3 = 12 groups
Dissimilarity Index

Country Average Access Rate

\[
D = \frac{1}{2p} \sum_{i=1}^{n} \beta_i \left| p_i - \bar{p} \right|
\]

- \( n \) is the number of groups, which are defined using the interactions of the circumstances selected for the analysis

- \( \bar{p} \) is the average access rate in the country

- \( p_i \) is the access of group

- \( \beta_i \) is the weighted sampling proportion of group \( i \), (sum of \( \beta_i \) equals 1)
Dissimilarity Index

Group Access Rate

\[ D = \frac{1}{2p} \sum_{i=1}^{n} \beta_i \left| p_i - \bar{p} \right| \]

- \( n \) is the number of groups, which are defined using the interactions of the circumstances selected for the analysis
- \( \bar{p} \) is the average access rate in the country
- \( p_i \) is the access of group
- \( \beta_i \) is the weighted sampling proportion of group \( i \), (sum of \( \beta_i \) equals 1)
Dissimilarity Index

Weighted Proportion

\[ D = \frac{1}{2p} \sum_{i=1}^{n} \beta_i \left| p_i - \bar{p} \right| \]

- \( n \) is the number of groups, which are defined using the interactions of the circumstances selected for the analysis
- \( \bar{p} \) is the average access rate in the country
- \( p_i \) is the access of group
- \( \beta_i \) is the weighted sampling proportion of group \( i \), (sum of \( \beta_i \) equals 1)
Dissimilarity Index

D-Index for Barriers

D-Index measures the distribution of a positive outcome.

Therefore, for Barrier Indicators such as Stunting, we use the calculation of “Absence” of Stunting.

This allows us to keep the same interpretation for D-index: the lower the D-index the lower the inequality.

0.0 0.01 - 0.3 0.5 1.0

No inequality | Complete inequality

Absence of Stunting 72%

Stunting 28%
## Dissimilarity Index

### Calculating D-Index

The Dissimilarity Index (D-Index) is a measure of the dissimilarity between two probability distributions. It is calculated using the formula:

\[
D = \frac{1}{2p} \sum_{i=1}^{n} \beta_i |p_i - \bar{p}|
\]

where:
- \(D\) is the Dissimilarity Index
- \(n\) is the number of groups
- \(p_i\) is the proportion of group \(i\)
- \(\bar{p}\) is the average proportion
- \(\beta_i\) is a weight for group \(i\)

### Escapia - Access to Electricity

| \(n\) | Group Descriptions               | \(p_i\) | \(\bar{p}\) | \(|p_i - \bar{p}|\) | \(\beta_i\) | \(\beta_i |p_i - \bar{p}|\) |
|------|----------------------------------|---------|------------|----------------|------------|--------------------------|
| 1    | Top 60 - Urban - Lower           | 0.65    | 0.65       | 0.00           | 0.10       | 0.00                     |
| 2    | Top 60 - Urban - Secondary       | 0.68    | 0.65       | 0.03           | 0.10       | 0.00                     |
| 3    | Top 60 - Urban - Higher          | 0.66    | 0.65       | 0.01           | 0.10       | 0.00                     |
| 4    | Top 60 - Rural - Lower          | 0.62    | 0.65       | 0.03           | 0.10       | 0.00                     |
| 5    | Top 60 - Rural - Secondary      | 0.95    | 0.65       | 0.30           | 0.10       | 0.03                     |
| 6    | Top 60 - Rural - Higher         | 0.84    | 0.65       | 0.19           | 0.10       | 0.02                     |
| 7    | Bottom 40 - Urban - Lower       | 0.65    | 0.65       | 0.00           | 0.10       | 0.00                     |
| 8    | Bottom 40 - Urban - Secondary   | 0.72    | 0.65       | 0.07           | 0.10       | 0.01                     |
| 9    | Bottom 40 - Urban - Higher      | 0.35    | 0.65       | 0.30           | 0.05       | 0.02                     |
| 10   | Bottom 40 - Rural - Lower       | 0.24    | 0.65       | 0.41           | 0.05       | 0.02                     |
| 11   | Bottom 40 - Rural - Secondary  | 0.62    | 0.65       | 0.03           | 0.05       | 0.00                     |
| 12   | Bottom 40 - Rural - Higher      | 0.45    | 0.65       | 0.20           | 0.05       | 0.01                     |

Sum (\(B=1\)) = 1.00

\[
\text{Sum} = 0.11
\]

\[
2\bar{p} = 1.30
\]
Dissimilarity Index

Q&A Session
Country Analysis: D-index
Session 2, part 2
Reflection

Inequality

**Question 1:**
Did identifying further behind and further ahead groups in a given SDG indicator help you understand overall inequality in that indicator?

**Question 2:**
Which inequality measure(s) do you often use in your area of work?
Sub-National division
- ‘EUA
- TONGATAPU
- VAVA’U
- HA’APAI
- ONGO NIUA
### Indicators

#### Today’s Exploration

**Basic Resources**
- Basic drinking water
- Basic sanitation
- Clean fuel
- Electricity
- Internet usage

**Child and Family Health**
- Ability to protect from COVID-19
- Family planning (demand met with modern methods)
- Skilled birth attendance
- Overweight
- Stunting
- Wasting

**Education**
- Early childhood education
- Secondary education (completed, 20-35 yrs)
- Secondary education (completed, 35+)
- Tertiary education (attended, 25–35 yrs)
- Tertiary education (attended, 35+)

**Finance & Internet**
- Bank account (household)
- Bank account (individual)
- Use of financial services

**Violence against women**
- Any type of violence against women
- Psychological violence against women
- Violence against women justified
- Physical violence against women
- Sexual or physical violence against women
- Sexual violence against women
Tonga, MICS 2019

Access Rate for **Opportunity** Indicator: **Secondary education (20-35)**

Background

- **Furthest behind group:** 25%
- **Furthest ahead group:** 65%
- **Average:** 43%
D-Index for Opportunity Indicator: Secondary education (20-35)

Subnational
## D-Index & Access Rate

### Legend

<table>
<thead>
<tr>
<th>Access</th>
<th>Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Higher</td>
<td>Higher</td>
</tr>
<tr>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Lower</td>
<td>Higher</td>
</tr>
</tbody>
</table>
Tonga, MICS 2019

D-Index & Access Rate for Opportunity Indicator: Secondary education (20-35)

Subnational

*HA'APAI*
Access rate (%): 35%
Dissimilarity Index: 0.16
D-Index & Access Rate

Regional map

The Dissimilarity Index is used for Regional (Asia and the Pacific) Analysis.
Tonga, MICS 2019

Access Rate for Opportunity Indicator:
Secondary education (20-35)
Regional

<table>
<thead>
<tr>
<th>Country</th>
<th>Access Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papua New Guinea 2018</td>
<td>14%</td>
</tr>
<tr>
<td>Cambodia 2014</td>
<td>15%</td>
</tr>
<tr>
<td>Myanmar 2016</td>
<td>16%</td>
</tr>
<tr>
<td>Bhutan 2010</td>
<td>17%</td>
</tr>
<tr>
<td>Afghanistan 2010</td>
<td>17%</td>
</tr>
<tr>
<td>Kiribati 2010</td>
<td>17%</td>
</tr>
<tr>
<td>Bangladesh 2018</td>
<td>24%</td>
</tr>
<tr>
<td>Lao PDR 2017</td>
<td>29%</td>
</tr>
<tr>
<td>Maldives 2017</td>
<td>30%</td>
</tr>
<tr>
<td>India 2010</td>
<td>32%</td>
</tr>
<tr>
<td>Nepal 2010</td>
<td>32%</td>
</tr>
<tr>
<td>Pakistan 2013</td>
<td>37%</td>
</tr>
<tr>
<td>Tonga 2019</td>
<td>43%</td>
</tr>
<tr>
<td>Vietnam 2013</td>
<td>49%</td>
</tr>
<tr>
<td>Average</td>
<td>48%</td>
</tr>
<tr>
<td>Timor-Leste 2016</td>
<td>48%</td>
</tr>
<tr>
<td>Tuvalu 2013</td>
<td>49%</td>
</tr>
<tr>
<td>Indonesia 2017</td>
<td>54%</td>
</tr>
<tr>
<td>Samoa 2010</td>
<td>57%</td>
</tr>
<tr>
<td>Turkey 2013</td>
<td>61%</td>
</tr>
<tr>
<td>Georgia 2018</td>
<td>62%</td>
</tr>
<tr>
<td>Thailand 2010</td>
<td>62%</td>
</tr>
<tr>
<td>Tajikistan 2017</td>
<td>66%</td>
</tr>
<tr>
<td>Mongolia 2018</td>
<td>66%</td>
</tr>
<tr>
<td>Philippines 2017</td>
<td>72%</td>
</tr>
<tr>
<td>Kyrgyzstan 2016</td>
<td>80%</td>
</tr>
<tr>
<td>Armenia 2015</td>
<td>82%</td>
</tr>
<tr>
<td>Kazakhstan 2015</td>
<td>84%</td>
</tr>
<tr>
<td>Turkmenistan 2019</td>
<td>97%</td>
</tr>
</tbody>
</table>

Access (Higher is better) (Lower is better)

- Higher
- Lower

Inequality

- Higher
- Lower

- Higher
- Lower
D-Index for Opportunity Indicator: Secondary education (20-35)

Regional

Access (Higher is better) | Inequality (Lower is better)
---|---
Higher | Lower
Higher | Higher
Lower | Lower
Lower | Higher
Tonga, MICS 2019

D-Index & Access Rate for Opportunity Indicator: Secondary education (20-35)

Tonga 2019
Access rate (%): 43%
Dissimilarity Index: 0.17
Dissimilarity Index

D-Index for Barriers

D-Index measures the distribution of a positive outcome.

Therefore, for Barrier Indicators such as Stunting, we use the calculation of “Absence” of Stunting.

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0.0 0.01 - 0.3 0.5 1.0

No inequality Complete inequality

Absence of Stunting 72%

Stunting 28%
D-Index & Access Rate

Legend

<table>
<thead>
<tr>
<th>Prevalence (Lower is better)</th>
<th>Inequality (Lower is better)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Lower</td>
<td>Higher</td>
</tr>
<tr>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Higher</td>
<td>Higher</td>
</tr>
</tbody>
</table>
Tonga, MICS 2019

Prevalence for Barrier Indicator: Any type of violence against women

Subnational

- Vava'u: 21%
- Ongo Niua: 21%
- Average: 20%
- Ha'apai: 20%
- Tongatapu: 20%
- ‘Eua: 18%
Tonga, MICS 2019

D-Index for Barrier Indicator: Any type of violence against women
Subnational

Prevalence (Lower is better)  Inequality (Lower is better)
Lower  Lower
Lower  Higher
Higher  Lower
Higher  Higher
Tonga, MICS 2019

D-Index & Prevalence for Barrier Indicator: Any type of violence against women

Graph to be updated with new D-index.
D-Index & Access Rate

Regional map

The Dissimilarity Index is used for Regional (Asia and the Pacific) Analysis.
Tonga, MICS 2019

LNOB Tree for Barrier Indicator: “Any violence against women”
Standard Analysis

Higher prevalence and lower inequality

OR

Lower prevalence and lower inequality
Tonga, MICS 2019

Prevalence for Barrier Indicator: Any type of violence against women

Regional

<table>
<thead>
<tr>
<th>Country</th>
<th>Prevalence (%</th>
<th>Region</th>
<th>Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papua New Guinea</td>
<td>54%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Kiribati</td>
<td>53%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Afghanistan 2015</td>
<td>52%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Timor-Leste 2016</td>
<td>37%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Tuvalu 2019</td>
<td>34%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Samoa 2019</td>
<td>32%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>India 2016</td>
<td>27%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Average</td>
<td>27%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Pakistan 2017</td>
<td>25%</td>
<td>Lower</td>
<td>Lower</td>
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<td>Lower</td>
<td>Lower</td>
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<td>Lower</td>
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</tr>
<tr>
<td>Philippines 2017</td>
<td>15%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Nepal 2016</td>
<td>14%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Kazakhstan 2010</td>
<td>10%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
<tr>
<td>Armenia 2016</td>
<td>8%</td>
<td>Lower</td>
<td>Lower</td>
</tr>
</tbody>
</table>
Tonga, MICS 2019

D-Index for Barrier Indicator: Any type of violence against women

Regional

Countries

- Kazakhstan 2010: 0.02
- Armenia 2016: 0.02
- Kyrgyzstan 2012: 0.04
- Nepal 2016: 0.04
- Myanmar 2016: 0.04
- Philippines 2017: 0.04
- Cambodia 2014: 0.05
- India 2016: 0.05
- Maldives 2017: 0.05
- Tajikistan 2017: 0.06

Average 2019: 0.07

- Tonga 2019: 0.07
- Afghanistan 2015: 0.08
- Timor-Leste 2016: 0.08
- Pakistan 2017: 0.08
- Samoa 2019: 0.08
- Kiribati 2019: 0.11
- Papua New Guinea 2018: 0.12
- Tuvalu 2019: 0.17

Prevalence (Lower is better)
- Lower
- Higher

Inequality (Lower is better)
- Lower
- Higher

Dissimilarity Index
Tonga, MICS 2019

D-Index & Prevalence for Barrier Indicator: Any type of violence against women

Tonga 2019
Prevalence (%): 20%
Dissimilarity Index: 0.07

Any type of VAW:
Regional average (27%)
(Lower is better)

Regional

Inequality
Regional average (0.07)
(Lower is better)

Prevalence
Inequality
(Lower is better)
Lower
Lower
Lower
Higher
Higher
Higher

United Nations ESCAP
Economic and Social Commission for Asia and the Pacific
D-Index

Tonga – All indicators

[Bar chart showing various indicators with their respective Disparities Index values]
Access Rate

Tonga – All indicators

- Access rate/prevalence (%)
Access Rate & D-Index

Tonga – All indicators

Graph showing the relationship between Access rate (%) and Disparity Index.
Dissimilarity Index

Q&A Session
THANK YOU

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