Analysis of Indicators Using Visual Presentations

Statistical Capacity Building Workshop
Using Education Statistics and Indicators for Planning
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Sometimes, Tables can be confusing
### Power of charts

- Why use charts and graphs?
  - Gives reader a compact and structured synthesis
  - Many details can be shown in a small area
  - Gives an immediate depiction of the differences and patterns in a set of data
  - Reader can see immediately major similarities and differences without having to compare and interpret figures

### Main Purpose

- The main purpose of graphs is to visually impart information that cannot be easily read from a data table.
- It would be very difficult to readily ‘see’ trends and contrasts in a tables having many data points.
Sometimes, Tables can be confusing

A Graph can paint a clearer picture
These days, presenting data is quite easy

- Presentation materials are basically data tables and charts, both of which are designed together.
- Usually, several software (e.g. Excel, Powerpoint, SPSS) are available for the preparation of these kinds of presentations.
- These can be imported into platforms like PowerPoint to prepare a slide presentation or MS Word to prepare a report.

General Principles

- Choice of an appropriate graph
- Enable the reader to ‘see’ directly both the overall patterns and details;
- Amenable to comparisons and analysis;
- Easily understandable to the targeted users
- Self-contained
- Special diagrams show subject-specific structures, like the demographic pyramid and thematic maps.
Is that better?

Supporting Explanatory Text

- Supporting text is also essential to facilitate interpretation, bearing in mind that too many details and decorations obscure the main message;
- One should also take into consideration the order in which the reader looks at the elements of a page;
- By virtue of reading habit: the eyes first see the overall pattern and then discover the details;
- A typical pattern might be for the reader to focus on the heading, then move to the graph itself, and finally on to the legend.
Essential Information


Source: MOET, Vietnam
Selecting the right type of visual tools

- In general, the appropriate type of visual aid depends on a number of factors:
  - The appropriateness of type of graphs
  - The objective of analysis
  - The simplicity or complexity of the presentation depends on the target readers

Commonly used visual tools

- Charts:
  - Bar
  - Line
  - Pie
  - XY
  - Area
- Thematic map
Bar Chart

- Bar graphs compare the values of different items in specific categories or at discrete points in time, e.g. survival rates for boys and girls respectively, compared across grade levels and/or between those in urban and rural areas.
- Simple to create and easy to interpret
- Used to illustrate variable values which are distinct (i.e. qualitative variable)

Bar Chart (Example)

Normally, we use horizontal bar chart when there are
- variable values with long name
- many variables
Group bar chart and Stacked bar chart

Group Bar Chart  Stacked Bar Chart

Group bar chart – easy to compare the different categories with one another
Stacked bar chart – Total value of categories are easily visible

Bar Chart (Example)

Is it an appropriate graph?
Bar Graph (Example)

Official school age population (Primary) by Region: Vietnam 1990-1991

Is it a good graph?
100% Stacked Bar Graph

- Used to show relative share of percentage;
- Emphasizes the percentages within a stack, but remove the distinction in values between stacks;
- Use when the total extension completely covers the quantitative axis so that what the segments show represents 100% - e.g. the breakdown of educational expenditures, comparing government and non-government budget breakdown.
Line Graph

- Line graphs show the progression of values over time, e.g. the number of schools in operation over time; gross and net admission rates for boys and girls, respectively, over time.
- Easier for the eye to follow curves for different series
- Easier to get a clearer picture of the development over time
- Good for answering the following questions:
  - In what periods were the changes large?
  - When were the turning points?
Area graphs

- Area graphs show the actual value each series contributes to the total;
- Best show patterns created over time, e.g. how total enrolment changed over time, due to enrolment changes in urban and rural schools respectively; how total children of school-age, consisting of those in and those out of school, grew over time;
- Good for illustrating situations with only a few parts that have simple development patterns.

Source: GMR 2002
Pie Chart

- Suitable for illustrating percentage distributions of qualitative variables - e.g. the breakdown of the annual education budget into categories of expenditure such as teacher salaries, school construction, etc;
- Displays the contribution of each value to a total;
- Best suited for overviews;
- Should not have too many sectors - maximum 5 or 6
XY ‘Scatter-Plot’ Graph

- XY ‘scatter-plot’ graphs plot values in one series against those in another
- Compares pairs of values
- Shows disparities

XY Scatter Plot Graph (Example)
Analyzing charts

Some of the charts described in Global Monitoring Reports
Data analysis in GMRs – some of the highlights

Trends in Literacy

Where is the literacy challenge most pressing?

Figure 7.2: Youth and adult literacy rates for selected countries, 2000–2004

Note: See source table for detailed country rates.
Source: Statistical annex, Table 21A
Data analysis in GMRs – some of the highlights

Where is the literacy challenge most pressing?

Figure 7.3: Distribution of global adult illiterate population, 2000–2004

In which countries are adult literacy rates especially low?

Figure 7.4: Adult literacy rates by gender in fifty-five low-literacy developing countries, 2000–2004

Note: See source table for detailed country rates.
Source: Statistical annex, Table 2A.
Data analysis in GMRs – some of the highlights

Link with poverty

Figure 7.5: Literacy rate and poverty

Figure 7.6: Relationship between adult literacy and average household expenditure in India, by selected states

Data analysis in GMRs – some of the highlights

Social and demographic disparities in literacy

Figure 7.8: Adult literacy rates by urban/rural residence, 2000–2004

Social and demographic disparities in literacy

Figure 7.9: Comparison of adult literacy rates by poorest and richest wealth quintiles

Note: Only includes countries with an adult literacy rate lower than 95%.

Note: The official adult literacy rates for Guinea-Bissau and the Gambia were not available.
Data analysis in GMRs – some of the highlights

**Figure 7.10: Adult literacy rates by these educational levels: no schooling, 1–3 years of schooling and 4–9 years of schooling, 2000**

**Towards an expanded understanding of literacy**

**Figure 7.11: Distribution of adults by level of prose literacy proficiency, 1995–1998**

Note: The figure shows the distribution of adults by level of prose literacy proficiency, defined as the ability to understand and use written information. It covers adults aged 15 and over who have completed four or more years of formal education. The proficiency levels are based on the International Adult Literacy Survey (IALS) and the Programme for the International Assessment of Adult Competencies (PIAAC). The figure includes data from 37 countries, grouped by region.
Data analysis in GMRs – some of the highlights

Towards an expanded understanding of literacy – proportion below or above functionally competent numeracy

Figure 2.21: Results of PISA 2000: mathematics skills of 15-year-old students

<table>
<thead>
<tr>
<th>Country</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Below level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>25%</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>Developing</td>
<td>15%</td>
<td>25%</td>
<td>35%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Least developed</td>
<td>25%</td>
<td>40%</td>
<td>50%</td>
<td>45%</td>
<td>30%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Note: Countries are ranked in increasing order of the proportion scoring 3 or below level 1.

Towards an expanded understanding of literacy – increase or decrease in proportion virtually illiterate

Figure 2.23: Evolution of PISA results between 2000 and 2003: reading

<table>
<thead>
<tr>
<th>Year</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Below level 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>25%</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>2003</td>
<td>15%</td>
<td>25%</td>
<td>35%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Note: Countries are ranked in increasing order of the proportion scoring 3 or below level 1.
Data analysis in GMRs – some of the highlights

Where quantity and quality meet

Figure 3.11: Survival rates to grade 5 and average number of grades reached when dropping out of primary school, 2001

Monitoring the quality of teachers and teaching

Figure 3.22: Percentage of primary-school teachers meeting national qualification standards in sub-Saharan Africa, 2001
Data analysis in GMRs – some of the highlights

Teacher development and education outcomes

Which countries meet the goals of quantity and quality of education
Thematic Maps

- Thematic maps plot values on geographical maps, showing variation in the values by geographical boundaries, e.g. the disparity between regions: enrolment rate by regions/provinces; gender disparity ratio (ratio of female enrolment rate to that of male) by regions/provinces.

Thematic Map (Example)
Primary Completion Rate – Viet Nam

Extracted from presentation of DEVINFO - UNICEF
Before Preparing Charts

- Who is the target audience?
  - What is their level of understanding
  - What are their interests
- Role of charts in conveying your message
  - Trends
  - Contrast
  - Achievement, way forwards
  - Absolute, relative
  - Magnitude, percentage
- How will the charts be presented?
  - In colour, B&W
  - In a publication, as a presentation using overhead projector
- What chart is the best?
  - Bar, Pie, Maps?????
  - Compare various styles

After Making Charts

- Is it easy to understand?
  - Too fancy, too dull, too much, too little
- Does this give the message that I would like to convey?
  - What is my question before doing this graph
- Can this chart be misinterpreted?
  - Am I giving the wrong message?
- Is it self-contained?
  - Title
  - Legend
  - Axis title
  - Scale
  - Sources
  - Other relevant information
- Is the chart in right place?
Conclusion

- The main purpose of graphs is to visually impart information that cannot be easily read from a data table;
- Should include information essential for highlighting policy-relevant trends and contrasts, not minute details;
- Presents the net results, relegating the detail tables used for calculation to a separate technical reference section or document;
- Highlights the magnitude of differences between comparative groups or categories of the analytical variables;
- From a design point of view, the optimal visual arrangement of comparisons also depends on the objective of the analysis;
- It is important to select analytical variables and group the order of comparisons according to the objective of your analysis.

Thank you for your time.
Please feel free to ask any questions.