How to make nice figures and tables in scientific publications

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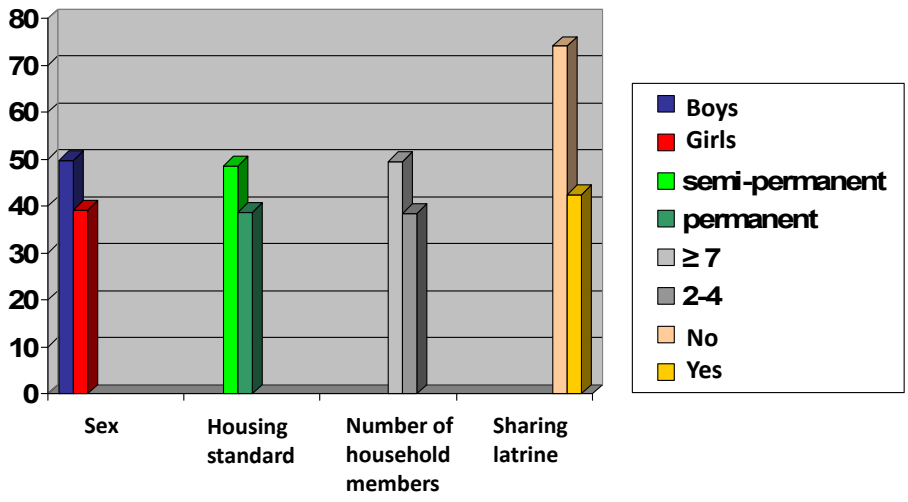

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Overview

Four parts:

1. Basics about tables and figures in scientific papers
2. Choosing to present data as a table or as a figure
3. Tables
4. Figures

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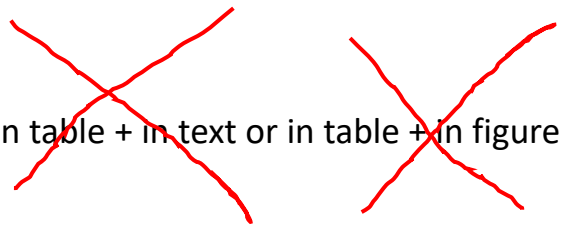
Scientific papers

In scientific papers data are presented, either:

1. in the text or
2. in a table or
3. in a figure

Do not duplicate the data: in table + in text or in table + in figure



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What is a figure in scientific text?

- Anything that is not a table or text
- It includes photographs, pictures, illustrations, drawings, diagrams, anything
- It is numbered:
  - Figure 1. Overview of XYZ
  - Figure 2. Next illustration
- There is always an anchor in the text, figure 2.

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Classical way to organise a manuscript

- Manuscripts are commonly in parts:
  - One file with title page (title, authors and affiliations), abstract, main text and references
  - One file with tables
  - One file for each figure
- A good way to avoid headaches

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Hint to make it neat (for instance in your thesis)

2 types of fonts:
1. With 'serifs' (= feet)
2. Without 'serifs', sans-serifs

With serifs	Sans-serifs
Times New Roman	Arial
Bodoni MT	Calibri
Palatino Linotype	Tahoma
DejaVu Serif	DejaVu Sans

Classic rule 1:
1. Serif font for main text
2. Sans-serif font for figures and tables

Classic rule 2: Maximum:
- 2 different fonts and
- 2 different sizes and
- 2 different types (regular + italic) or (regular + bold)

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Figure or table?

- Use figures for:
  - simple messages, trends, relationships
- Use tables are for
  - complex data, exact numbers, data with a wide range

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Table headings always ABOVE the table

Figure legends always BELOW the figure

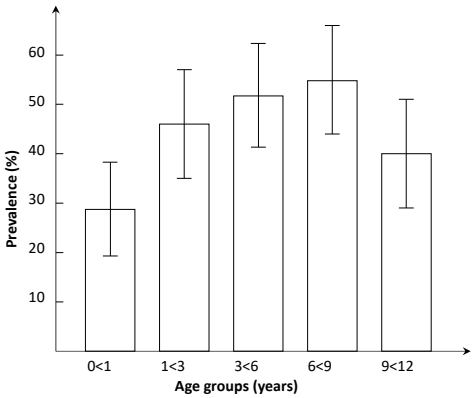

Figure 2. Prevalence (± 95% CI) of *H. Pylori* by age group in Kampala, Uganda.

Table 1. Baseline characteristics.

	Number N = 345	Percent
Education status		
Not educated	181	52.46
Primary	109	31.59
Secondary	36	10.43
Tertiary	18	5.22
Marital status		
Single	5	1.45
Married	329	95.36
Separated	10	2.90
Widowed	1	0.29
Employment status		
Unemployed	221	64.06
Self-employed	94	27.25
Employed	30	8.70

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Tables

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A classical table (for printing) has only 3 horisontal lines:

Table 1. Baseline characteristics.

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Unemployed	221	64.06
Self-employed	94	27.25
Employed	30	8.70

Keep it simple, give OVERVIEW

Table 1. Baseline characteristics.

	Number N = 345 n (%)
Education	
No formal education	181 (52.5)
Primary	109 (31.6)
Secondary or higher	54 (15.6)
Marital status	
Married	329 (95.4)
Single, separated, widowed	16 (4.6)
Employment status	
Unemployed	221 (64.0)
Self-employed	94 (27.2)
Employed	30 (8.7)

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Table 1. Baseline characteristics.

	Number N = 345 n (%)
Age (years), mean (SD)	29.09 (5.63)
Parity, mean (SD)	3.28 (1.75)
Gestation age (weeks), median (IQR)	28 (22 - 32)
Distance from hospital (Km), median (IQR)	4 (3 - 5)
Time to hospital (mins), mean (SD)	32.87 (15.28)
Duration on treatment (months), median (IQR)	36 (12 - 60)
Education	
No formal education	181 (52.5)
Primary	109 (31.6)
Secondary or higher	54 (15.6)
Marital status	
Married	329 (95.4)
Single, separated, widowed	16 (4.6)
Employment status	
Unemployed	221 (64.0)
Self-employed	94 (27.2)
Employed	30 (8.7)

Try to avoid mixing different types of data in the same table.
At least do not put an incorrect heading on the column.

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		Unintended pregnancy	
	N = 345	Bivariable logistic regression	Multivariable logistic regression
	n	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
Age (years)			
≤19	20	1	1
20-24	54	0.87 (0.27-2.80)	0.64 (0.17-2.38)
25-29	104	0.86 (0.29-2.59)	0.76 (0.22-2.64)
30-34	99	0.47 (0.16-1.4)	0.40 (0.11-1.44)
≥35	68	0.31 (0.10-0.96)	0.33 (0.09-1.26)
Education Status			
Not educated	182	1	1
Primary	109	1.41 (0.86-2.31)	1.14 (0.67-1.98)
Secondary	36	1.88 (0.86-4.13)	1.69 (0.70-4.10)
Tertiary	18	5.79 (1.29-25.93)	4.3 (0.89-20.87)
Marital status			
single	16	1	1
married or cohabiting	329	4.15 (1.41-12.23)	4.44 (1.30-15.14)
Parity			
0 to 4 children	262	1	1
5 to 9 children	83	0.32 (0.20-0.54)	0.37 (0.20-0.68)

Do not use small groups as reference group in logistic regression

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Best tool for tables

- Excel

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Figures

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Types of graphics

- Photographs
  - Consists of pixels
  - When you search on internet you can see, for instance 2500 x 2282
- Diagrams are of two types
  - Pixel-based, also called bitmap (not scalable), like photographs
  - Vector-based (scalable)

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Pixel-based file types (Raster)

- .tif
  - common for photographs/graphics (can be high-resolution)
- .jpg
  - common for photographs / graphics
- .gif
  - Graphics Interchange Format, common for graphics (low-resolution)
- .png
  - Portable Network Graphics, common for graphics

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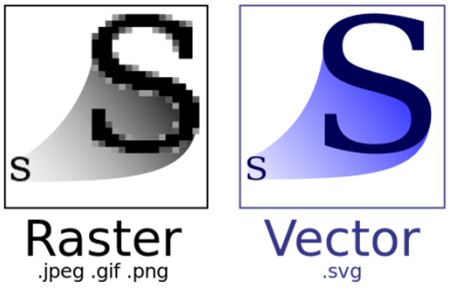
Vector-based file types

- .eps
  - Encapsulated post-script, common for graphics
- .svg
  - Scalable Vector Graphics (SVG)/graphics
- .ai
  - Adobe Illustrator



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Resolution

- Resolution is defined in
  - Dots per inch (dpi)
- Screen resolution is 72 dpi
- Minimum resolution for printing is 300 dpi
- High resolution printing is 1200 dpi

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If you use photographs

- Do not torture them!

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Portugal
Spain
Italy
Greece
Turkey
North Atlantic Ocean
Mediterranean Sea
Morocco
Algeria
Libya
Egypt
Lebanon
Syria
Iraq
Iran
Israel
Jordan
Saudi Arabia
Western Sahara
Mauritania
Mali
Niger
Chad
Sudan
Red Sea
Eritrea
Yemen
Gulf of Aden
Djibouti
Senegal
Gambia
Guinea-Bissau
Guinea
Burkina Faso
Benin
Togo
Nigeria
Sierra Leone
Liberia
Côte d'Ivoire
Ghana
Central African Republic
South Sudan
Ethiopia
Cameroon
Somalia
Equatorial Guinea
Gabon
Kenya
The Equator
Republic of Congo
DR Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
Madagascar
Swaziland
Lesotho
South Africa
South Atlantic Ocean
Indian Ocean
Map by Google additions by bugbog
Google

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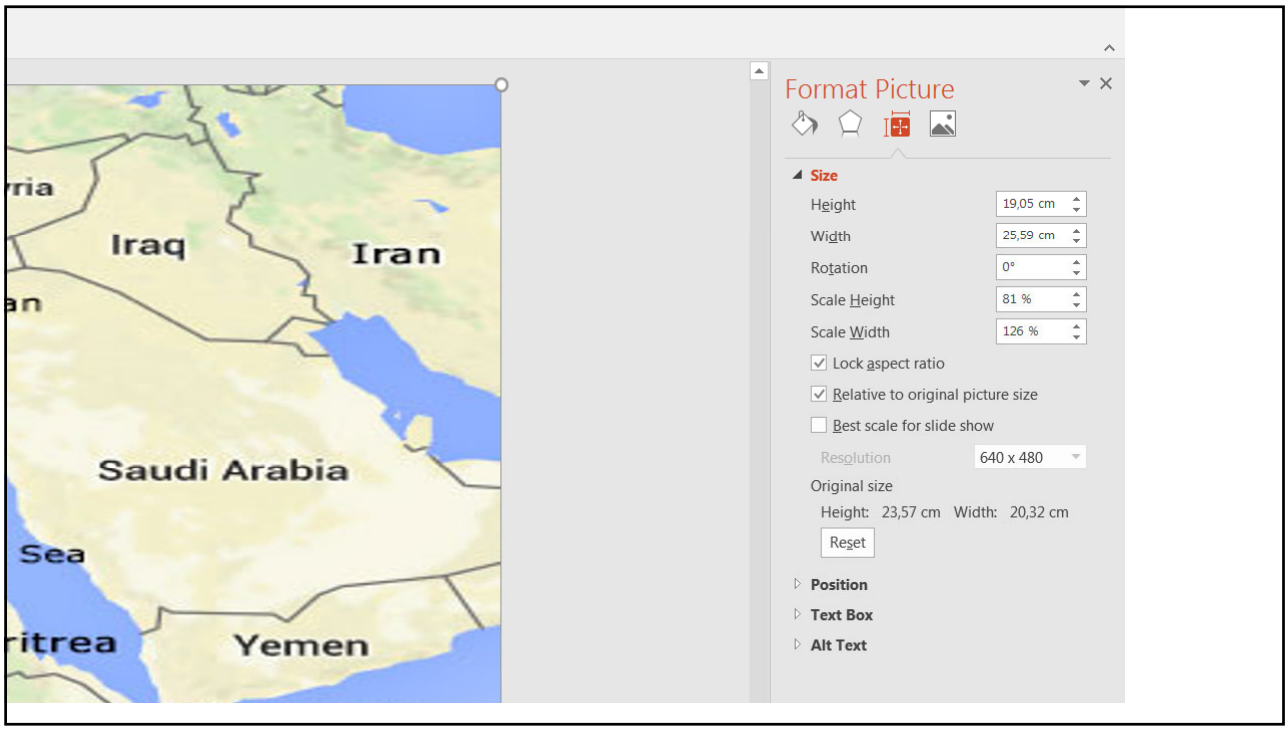
Iraq
Iran
Saudi Arabia
Sea
Yemen
Format Picture
Size
Height 19,05 cm
Width 25,59 cm
Rotation 0°
Scale Height 81 %
Scale Width 126 %
Lock aspect ratio
Relative to original picture size
Best scale for slide show
Resolution 640 x 480
Original size
Height: 23,57 cm Width: 20,32 cm
Reset
Position
Text Box
Alt Text

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Portugal
Spain
Italy
Greece
Turkey
North Atlantic Ocean
Tunisia
Mediterranean Sea
Syria
Lebanon
Iraq
Iran
Morocco
Israel
Jordan
Algeria
Libya
Egypt
Western Sahara
Saudi Arabia
Mauritania
Mali
Niger
Red Sea
Chad
Sudan
Eritrea
Yemen
Senegal
Gambia
Burkina Faso
Djibouti
Gulf of Aden
Guinea-Bissau
Guinea
Benin
Togo
Nigeria
Ethiopia
Sierra Leone
Côte d'Ivoire
Ghana
Liberia
Central African Republic
South Sudan
Cameroon
Somalia
Equatorial Guinea
Kenya
Gabon
The Equator
DR Congo
Republic of Congo
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Madagascar
Botswana
Swaziland
South Atlantic Ocean
Lesotho
South Africa
Indian Ocean
Map by Google additions by bugbog
Google

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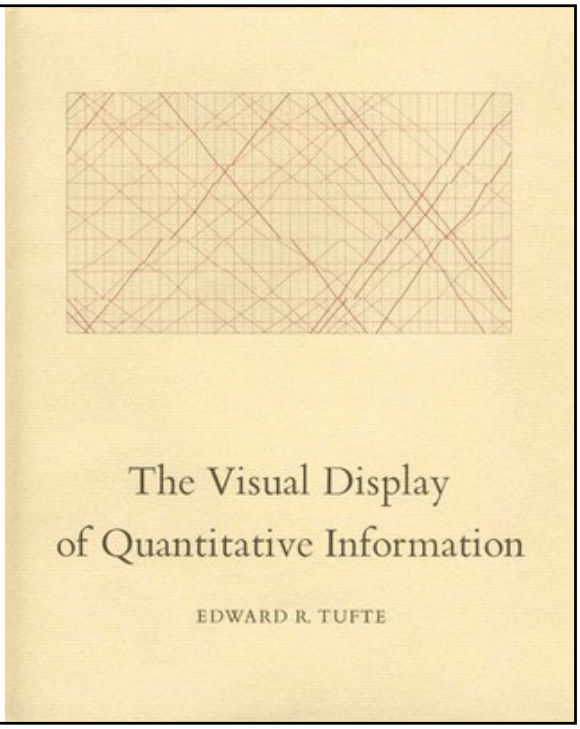
Edward R. Tufte

- Jeffrey Nicols PowerPoint:
  - http://www.cs.cmu.edu/~jeffreyn/talks/tufte-lecture.ppt
- Tufte himself:
  - https://www.youtube.com/watch?v=Th_1azZA2OY
- An explanation:
  - https://www.youtube.com/watch?v=qQGcK20pJk0



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Displaying Quantitative Information

An exploration of Edward R. Tufte's
The Visual Display of Quantitative Information

Jeffrey Nichols
Programming Usable Interfaces
May 2, 2003

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How can we make better graphics?

Tufte presents some principles of data graphics

- Above all else, show the data
- Maximize the data-ink ratio
  - Within reason
  - Every bit of ink on a graphic requires a reason
- Erase non-data-ink
- Erase redundant data-ink
- Revise and edit

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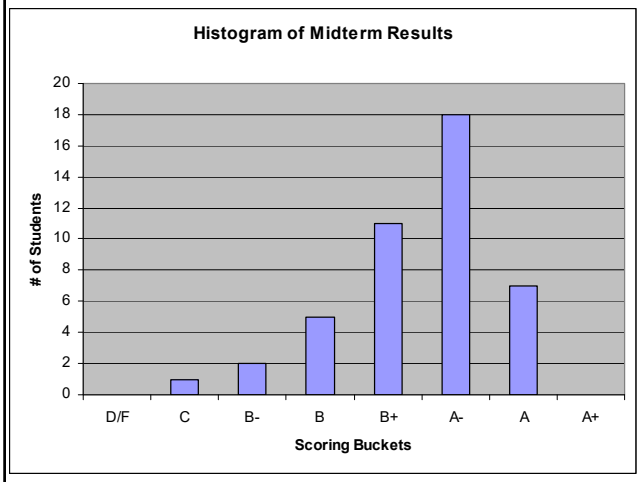

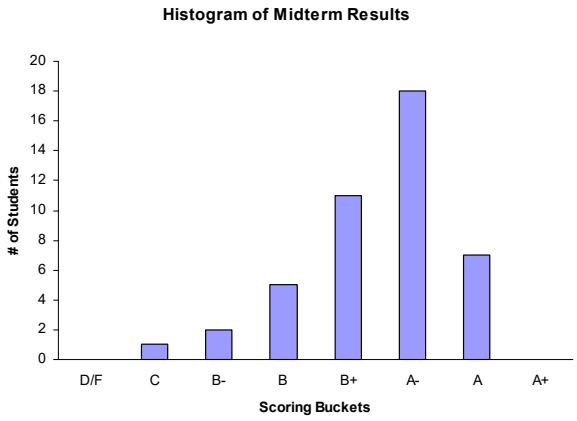

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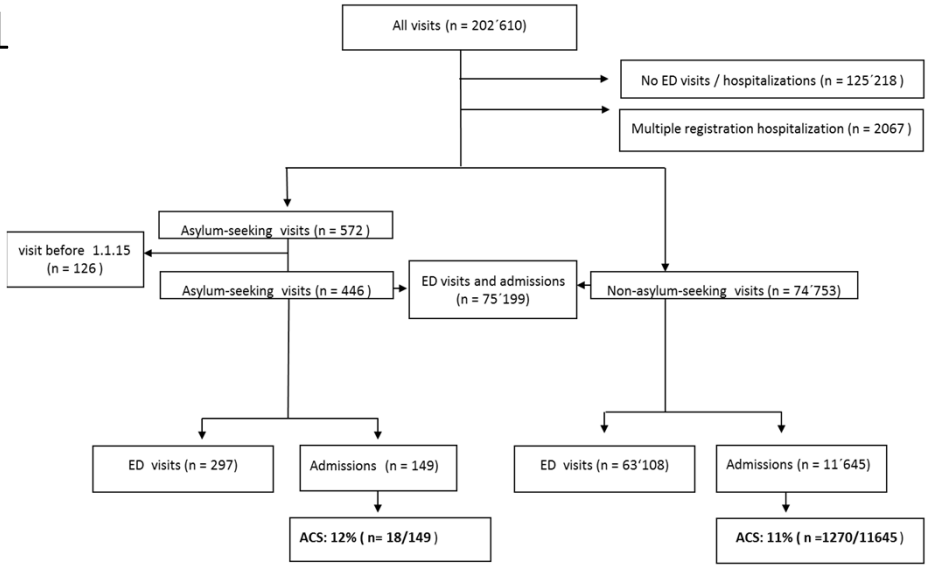
Example 1

Figure 1: Flow diagram showing the inclusion process of the study population



ACS: ambulatory care sensitive conditions; **ED:** Emergency Department

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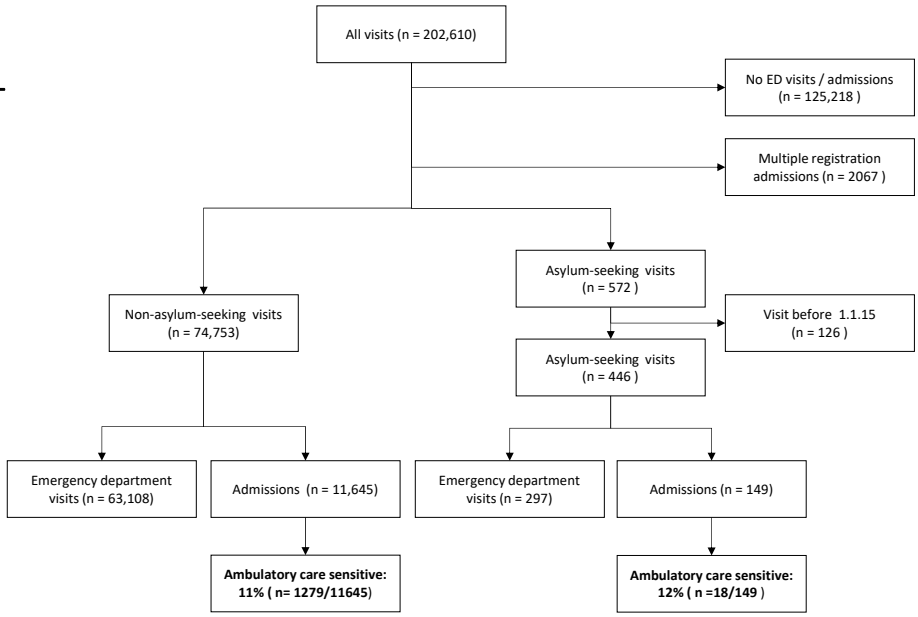
Example 1 Adjusted



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- NEVER use Microsoft Word for ANY graphics EVER!
- For flow charts and similar:
  - Use Microsoft PowerPoint to make the graphics!
  - Learn some of the basics
  - Copy as much as possible
    - If you have made one box, just copy and recycle it for all other boxes

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More principles:

1. Reduce data “Simplify, simplify, simplify”
2. Use a logical order, for instance go from big to small
3. Keep comparisons close vertically close
4. Self-explaining legend:
   - What, Where, When, Units, Source
   - Avoid the use of abbreviations, reduce the number of footnotes

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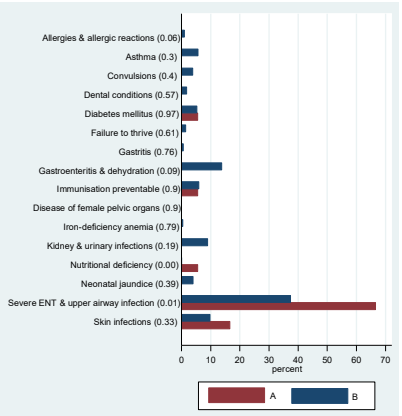
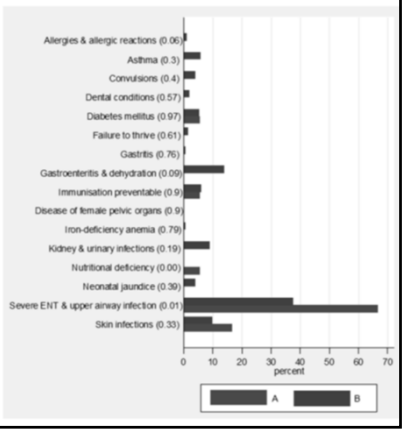
Use colour according to the audience

- If your reader will read a photocopied version of the article: use B/W
- If you think your readers will read from screen: you may use colour
- Consider Tufte





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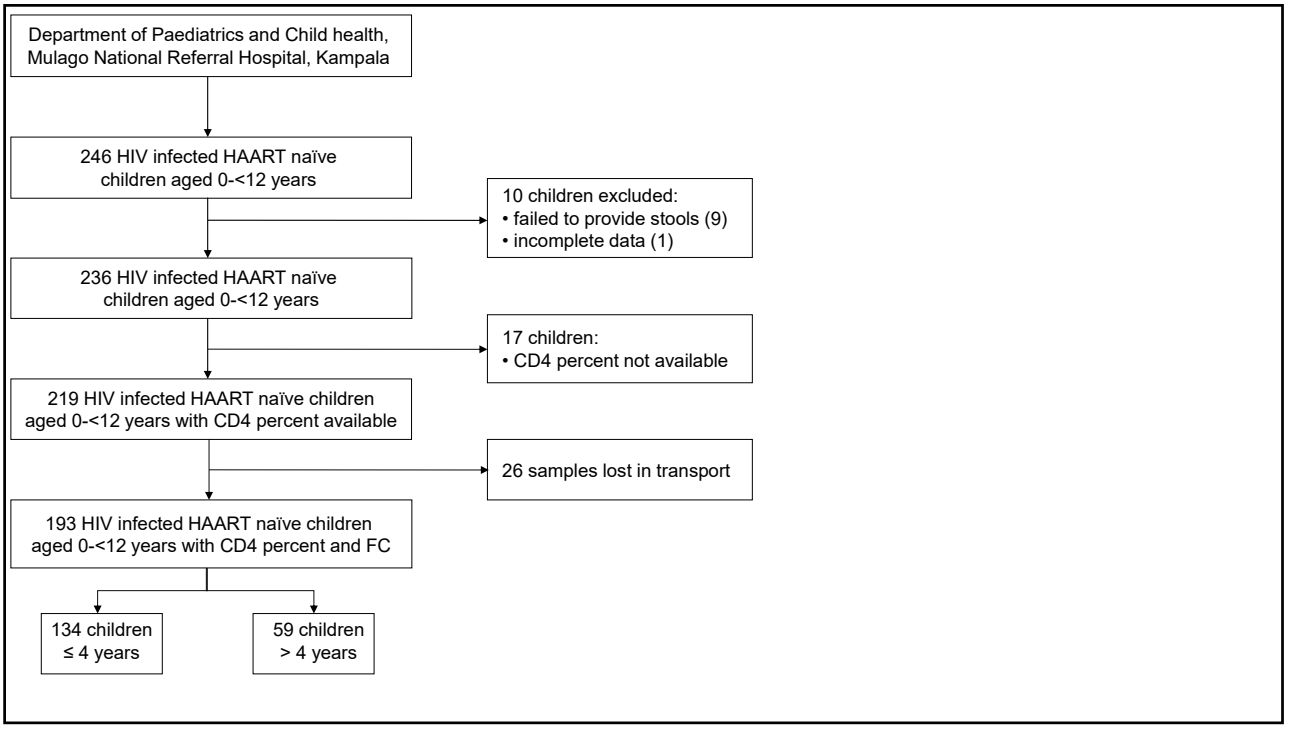

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- NEVER accept the output from any statistical software or MS Excel as a final graph!
- They always breach the data-ink rule
- Needs a lot of tidying up
- Pay attention to the look!
  - Use thin lines, 0.5 pt
  - Avoid large empty spaces

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