Critical analysis of the efficacy of data visualisations:

Smoking by Hannah Ritchie and Max Roser (2013)

Access at https://ourworldindata.org/smoking

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1. Data and Methods

The visualisations in *Smoking* are based on Institute of Health Metrics and Evaluation's Global Burden of Disease and World Bank's World Development Indicators datasets. Deaths by cause and smoking prevalence are available by country, year and gender. The data is aggregated using totals or average rates, in some cases standardising to make figures more comparable across countries.

2. Critique of Selected Visualisations

I've focused on three visualisations that support **key points** made in *Smoking*. For each visualisation, I comment on the aspects that work to convey the intended message, and aspects that can be improved to make the story more convincing.

1. **Smoking is one of the world's largest health problems, and has been for decades.**

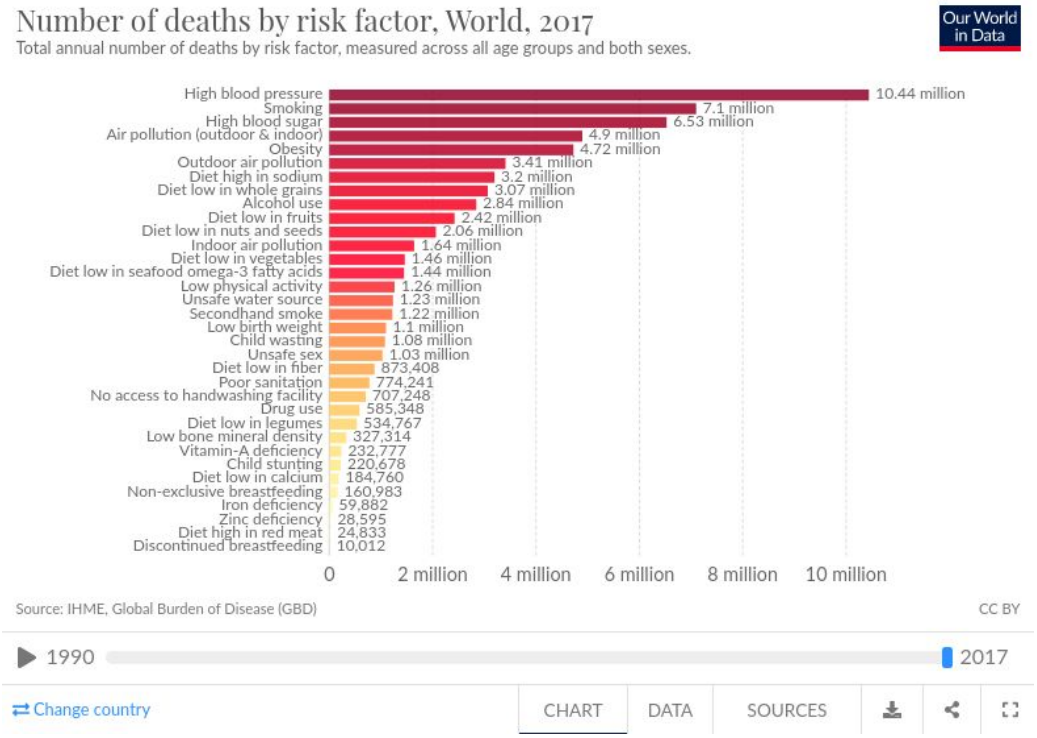

Figure 1: Interactive bar chart highlighting smoking as one of the world's largest health problems, causing the second highest number of (early) deaths in 2017 (Richie & Roser 2013).

Features that help:

- Information hierarchy encourages the user to focus on the prominent title and top few elements within the colorful chart, before encountering interactivity and other optional elements at the bottom.

- The play symbol and distinctive blue link signal interactivity to the user, allowing them to see that smoking has been in the top risk factors over recent decades, and that the story is personally relevant.

Features that can be improved:

- The key insight should be highlighted, initially within the prominent title, then through the use of a feature color (e.g. orange) for the smoking category, with subtle colors (e.g. blue) used for a shorter number of other factors (Nediger 2018).
- The exact number of deaths is not particularly relevant. These could be omitted, or replaced with proportions to supplement the amounts shown on the horizontal axis.

2. The health burden of smoking is shifting to lower income countries.

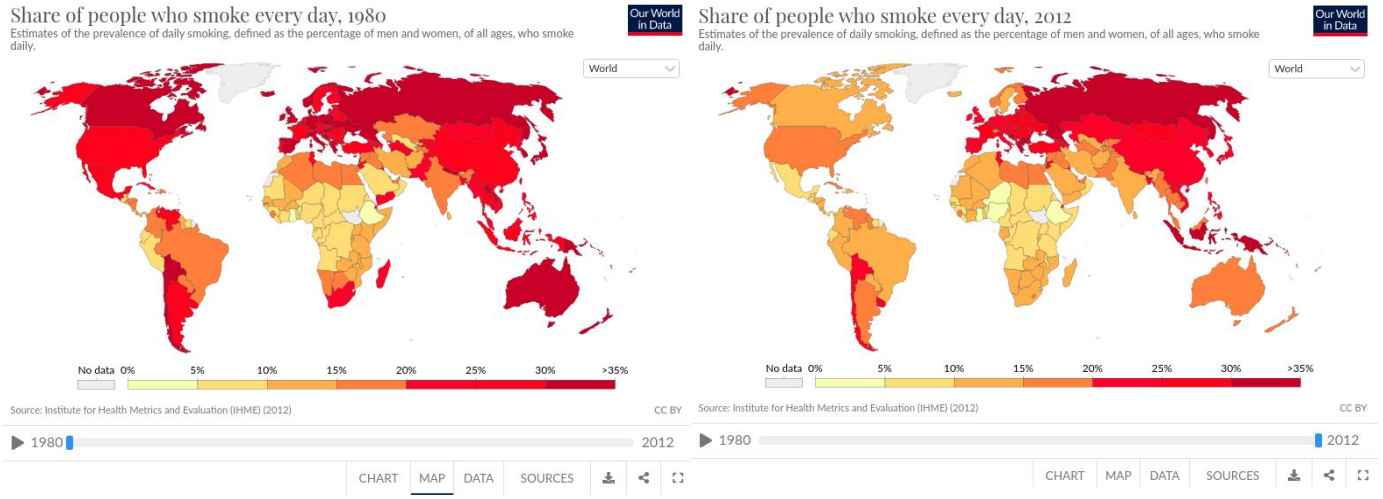

Figure 2: Interactive geo-maps highlighting the change in smoking prevalence throughout the world between 1980 and 2012 (Richie & Roser 2013).

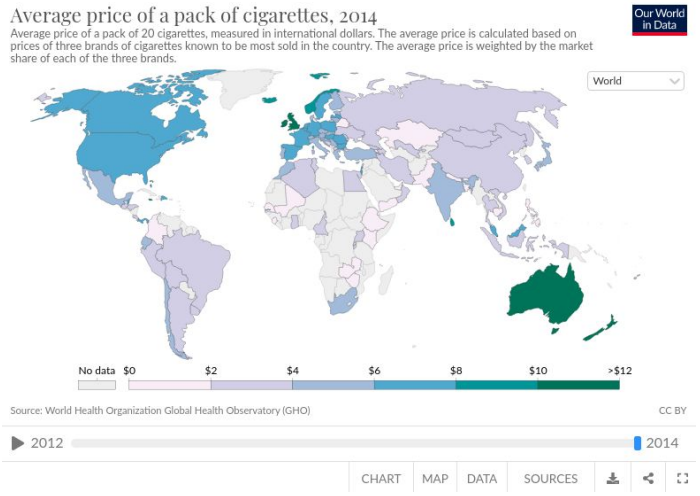

Figure 3: Interactive geo-map highlighting the relative cost of cigarettes (in international dollars) throughout the world (Richie & Roser 2013).

Features that help:

- Geographical maps with sequential colormaps enable users to quickly appreciate differences in smoking prevalence and cigarette costs throughout the world. Semantically meaningful colours reflect a negative connotation for smoking rates and positive connotation for higher prices (Tableau n.d.).
- Time-based interactivity highlights a significant decline in many countries; smoking rates remain high in East Asia and Eastern Europe, where prices are low (Figure 3), production is high and governments are complicit (Ross, H. n.d.; Wikipedia 2020; World Health Organisation 2020).

Features that can be improved:

- The story would be better illustrated using a line chart with time on the horizontal axis and countries aggregated by income or region. This would remove the assumption that the user has detailed understanding of geoeconomics, and reduce reliance on time-based interactivity.
- This can actually be achieved through the interactive “chart” tab and the region and income bands hidden within the country filter; however, it’s likely that many users won’t use the interactive chart features (Nediger 2018).

3. Men are more likely to smoke than women.

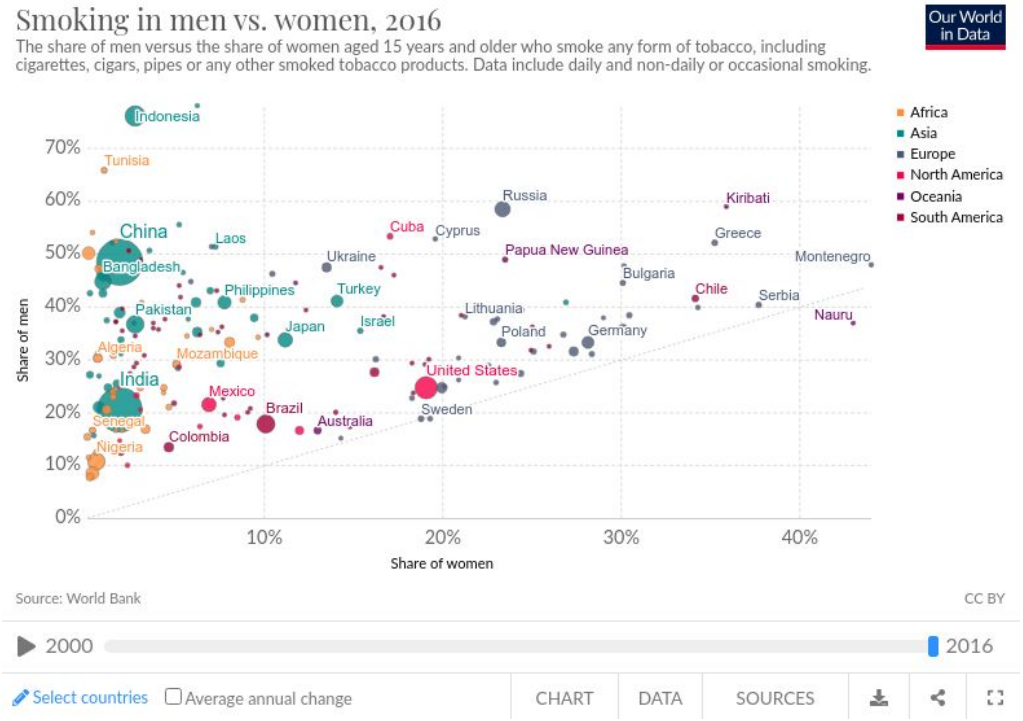

Figure 4: Interactive bubble plot comparing the proportion of males and females who are smokers (Richie & Roser 2013).

Features that help:

- The use of multiple visual channels allows the user to appreciate more complex data (Tegarden 1999). Bubble size is used to indicate countries that drive the overall trend at the World level (e.g. China), while color indicates regions, highlighting the different experience of Asia and Africa (skewed towards males) compared to other regions (greater gender equality).

Features that can be improved:

- The key message is the relative rate of smoking between men and women. This metric could be used directly, in something resembling a Bland-Altman plot, making the chart easier to interpret (Irizarry 2020).
- The interactivity, used to highlight trends in gender equality, is poorly implemented. The play button converts the bubble chart to a line chart with all countries shown by default. This should be avoided as people have limited ability to track many moving points simultaneously (Szafir 2018). Region-level data could be shown by default instead. The “average annual change” box adds no additional value, and by default uses the latest year as a time range, showing 0% on both axes for all countries.

3. Overall Recommendations

Smoking targets a range of audiences, including policymakers, smokers and non-smokers, from countries at different developmental stages.

The final section, titled "What can we do to reduce smoking?", contains a few graphs showing relative implementation levels across countries. Visualisations showing the relative effectiveness and financial implications of different interventions would provide a stronger call to action for policymakers.

For individuals who are motivated to take action, links to related resources such as social media campaigns and petitions to local governments may contribute to influencing policymakers, particularly in East Asia and Eastern Europe where smoking rates remain high. For smokers, particularly those in countries without strong anti-smoking campaigns, links to resources from countries who have successfully reduced smoking rates would help them quit themselves, as well as influence other smokers in their community.

4. References

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