Analysis of WHO’s World Health Statistics 2009 using Spotfire visualization tool

World Health Statistics 2009 (http://www.who.int/whosis/whostat/2009/en/index.html) contains WHO’s annual compilation of data from its 193 Member States, and includes a summary of progress towards the health-related Millennium Development Goals and targets. Health-related Millennium Development Goals, and Mortality and burden of disease dataset were analyzed using Spotfire visualization tool. The data were normalized to make it compatible to Spotfire input and analyzed to find out insights, patterns and anomalies. Health-related Millennium Development Goals data and Mortality and burden of disease data had 21 and 8 attributes, and 193 and 1738 rows respectively.

World Health Organization grouped various countries by regions. Figure 1 shows 6 WHO regions and associated countries.


Figure 1
Figure 2 show that overall Life expectancy has been increased from 1990 to 2007 for each WHO region.
1. High Number of HIV cases in South Africa and Zimbabwe even with more than 50% contraceptive prevalence among adults.

Figure 3 shows the % of contraceptive prevalence and number of HIV cases reported for each country. Usually number of HIV cases reported is higher in those areas where contraceptive prevalence is lesser or vice versa. However, it’s not the case with Zimbabwe and South Africa. They have much higher HIV cases reported compared to other countries with more than 50% of contraceptive prevalence. This shows that the use of contraceptive in these countries is more for family planning rather than HIV prevention.
2. Deaths of Ethiopian mothers are relatively low irrespective of having minimum medical care

Figure 4: Maternal mortality rate in the African region

Scatter plot was used to visualize countries with their maternal mortality rate against the births attended by skilled personnel. The expectation was to see that more the number of births attended by skilled personnel, lower the maternal mortality rate would be. This was the case with most of the countries with few exceptions, the visibly extreme was Ethiopia where less than 10% for the births were attended by skilled personnel and still the maternal mortality rate was relatively low compared to other countries of the same region.

For further analysis, the dots were sized based on the percentage of antenatal care of the countries (Figure 5). WHO statistics defines antenatal care as at least one visit to a medical facility during the period of pregnancy. This visualization shows that Ethiopia has minimum antenatal coverage for women and therefore again reinforces that there are other reasons for the relative low maternal mortality rate in Ethiopia. This visualization also points out that, basic antenatal coverage cannot reduce maternal rate as seen in Sierra Leone where maternal mortality rate is the highest and antenatal coverage is also quite high. It clearly states that the current antenatal care is quite inadequate there.
Deaths of Ethiopian mothers are relatively low irrespective of having minimum medical care.
3. Females live longer than males.

Figure 6

The figure 6 shows the life expectancy data in the year of 2007 taken from the WHO World Health Statistics 2009. Instantly one can see that majority of the females have a higher life expectancy than males.

Consequently for further analysis bar charts (figure 7, 8, 9) were plotted showing the difference of life expectancy between females and males against countries. This clearly shows that only two countries had a negative difference, namely Zimbabwe and Tonga. For the purpose of readability the countries were grouped into WHO regions and snapshots were taken accordingly.
Figure 7: Difference of life expectancy in the African Region
Figure 8: Difference of life expectancy in the Western Pacific Region
Figure 9: Difference of Life Expectancy in the Americas, Europe, South East Asia and Eastern Mediterranean
4. There is no country in South East Asia and Africa where people cross their diamond jubilee Birthday.

Figure 10

Figure 10 shows the WHO regions and number of the countries in each region. These countries have average life expectancy higher than 75 years. Africa and South East Asia regions are not visible as they don’t have any country having average age more than 75 years. South East Asia’s seclusion is really interesting here, as it includes India which consists of 1/6 of world population. So, it seems that more than 1/6 people in the world couldn’t cross their 75 years of age (diamond jubilee birthday).
Spotfire Critique:

Spotfire visualization tool was used for the above analysis which is really fantastic. Visualization generation is very fast and it also facilitates switch between visualization. It provides with a wide variety of filters. The response time in which visualization is re-generated while switching between filters is very less. Inserting calculated column, columns and rows from external data features are really helpful in analysis. Trellis feature is also great which helps user to view the visualization together for different values of attribute (Figure 10 uses Trellis feature of spot fire where user can see 3 visualizations together for 3 values of attribute, year).

However, there are few points where improvements can be done to make this tool more useful. In the visualization from Figure 10, we weren’t able to add the missing region in the legend as Spotfire doesn’t display filtered data in the legend., even though we had filtered the ‘Age’ attribute and not the ‘WHO region’.

Overall Spotfire really provides great platform for data analysis. It’s response time and various features like filtering, trellis are really impressive which make this tool unique in various aspects. We really thank Spotfire to build this great tool.

Finally, this analysis of data can help to pin point the areas where more effort needs to be made in order to improve health standards in that country.

30th September 2009

Team member:

Swetha Reddy (sreddy@umd.edu)

Puneet Sharma (puneet@cs.umd.edu)

University of Maryland, College Park

References:

1. WHO’s World health statistics 2009