Background Information

Today, there are two major problems in healthcare plaguing the nations around the world. The first, found primarily in developed countries such as the United States and Europe, is that the cost of healthcare is rapidly increasing and taking up increasingly large portions of the national economic output. Developing nations, such as many of those in Africa, face a different yet related problem in that the quality of their healthcare is suffering because they can afford only very small expenditures on healthcare.

These issues of healthcare costs will undoubtedly have a large impact on the world in future years. By better understanding the fundamental issues at hand, it may be possible to develop reasonable solutions to the issues facing both developed and developing nations.

Problem Statement

In this assignment, students will analyze the cost of healthcare relative to GDP (Gross Domestic Product, the size of its economy) for regions all over the world to understand the relationship between healthcare and the economy.

Instructions

**IMPORTANT:** Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following files for use in this assignment:
   a. **expenditures.csv** – Per capita expenditures on healthcare in world regions between 1999 and 2014 [1].

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>Text</td>
<td>Name of region.</td>
</tr>
<tr>
<td>1999</td>
<td>Currency</td>
<td>Spending on healthcare per-capita in 1999.</td>
</tr>
<tr>
<td>2011</td>
<td>Currency</td>
<td>Spending on healthcare per-capita in 2011.</td>
</tr>
<tr>
<td>2014</td>
<td>Currency</td>
<td>Spending on healthcare per-capita in 2014.</td>
</tr>
</tbody>
</table>
b. **gdp.csv** – Gross domestic product (GDP) per capita in world regions between 1999 and 2014. For comparison, the United States per-capita GDP in 2014 was $54,398 [2].

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>Text</td>
<td>Name of region.</td>
</tr>
</tbody>
</table>

2. Begin by creating a new Microsoft Excel workbook named *lastname_firstname_hw2_hep.xlsx*.

3. We must adjust the sheets in our workbook.
   a. Rename *Sheet1* to *Health Expenditures*.
   b. Add a new sheet named *GDP per Capita*.
   c. Add a new sheet named *Healthcare Percentage*.
   d. Add a new sheet named *Analysis Questions*.

4. Import the following items into the workbook:
   a. **expenditures.csv** file – Import starting in cell A3 of the *Health Expenditures* sheet. The file is comma-delimited and has headers.
   b. **gdp.csv** file – Import starting in cell A3 of the *GDP per Capita* sheet. The file is comma-delimited and has headers.

5. We wish to apply formatting to the *Health Expenditures* sheet.
   a. Create a table based on cells A3 through G10 using a style of your choice. The table has headers.

      The table will overlap external data ranges. Convert the selection to a table and remove all external connections.

   b. We need to add additional table columns to store statistics and a sparkline.
      i. Insert four new table columns to the right of existing column G.
c. Enter text in the cells as indicated below:
   i. **A1**: Healthcare Expenditures per Capita
   ii. **H3**: Minimum Value
   iii. **I3**: Maximum Value
   iv. **J3**: 3x Increasing
   v. **K3**: Sparkline

d. Merge-and-center cells **A1** through **K1**.
e. Apply the *Title* cell style to cell **A1**.
f. Format the cells as indicated below:
   i. **B4** through **I10**: currency with no decimal places
g. AutoFit the width of columns **A** through **K**.
h. Apply *Green-Yellow-Red* color scale conditional formatting to cells **B4** through **G10**.

6. We also wish to apply formatting to the *GDP per Capita* sheet.
a. Create a table based on cells **A3** through **G10** using a style of your choice. The table has headers.
   The table will overlap external data ranges. Convert the selection to a table and remove all external connections.
b. Enter text in the cells as indicated below:
   i. **A1**: GDP per Capita
c. Merge-and-center cells **A1** through **G1**.
d. Apply the *Title* cell style to cell **A1**.
e. Format the cells as indicated below:
   i. **B4** through **G10**: currency with no decimal places
   f. AutoFit the width of columns **A** through **G**.

7. We must also apply formatting to the *Healthcare Percentage* sheet.
a. Enter text in the cells as indicated below:
   i. **A1**: Healthcare Percentage
   ii. **A3**: Region
   iii. **B3**: 1999
   iv. **C3**: 2002
v.  D3: 2005  
vi.  E3: 2008  
ix.  A4: East Asia & Pacific  
xii.  A7: Middle East & North Africa  
ixii. A8: North America  
ixvi. A9: South Asia  
ixv. A10: Sub-Saharan Africa  
b.  Merge (but not center) cells A1 through G1.  
c.  Apply the Title cell style to cell A1.  
d.  Format cells A3 through G10 as a table using a style of your choice. The table has headers.  

8. On the Healthcare Percentage sheet, we wish to calculate the percentage of GDP spent on healthcare.  
a.  In column B, write a formula to calculate, for each region, the annual percentage of GDP spent on healthcare. Reference the values on the Health Expenditures and GDP per Capita sheets in your formula.  

You can calculate the healthcare percentage using the formula:  
\[
\frac{[\text{Healthcare Expenditures per Capita for Year and Region}]}{[\text{GDP per Capita for Year and Region}]} 
\]

b.  In columns C through G, duplicate your healthcare percentage formula from column B.  

9. We must apply additional formatting to the Healthcare Percentage sheet.  
a.  Format the cells as indicated below:  
   i.  B4 through G10: percentage with 1 decimal place  
   b.  AutoFit the column width for columns A through G.  

10. On the Health Expenditures sheet, we wish to calculate healthcare expenditures statistics.  
a.  In column H, write a formula to calculate the minimum healthcare expenditures spent in each region.
b. In column I, write a formula to calculate the maximum healthcare expenditures spent in each region.

c. In column J, write a formula to determine if the region’s 2014 spending was at least 3 times its 1999 spending. If it was, display Yes; otherwise, display No.

11. We wish to add a sparkline to the Health Expenditures sheet to compare data.

In column K, insert a line-type sparkline based on the values in columns B through G.

12. We wish to create a chart to plot the healthcare percentage for each year and region.

   a. Create a 2-D line chart based on cells A3 through G10 of the Healthcare Percentage sheet. Move the chart to a new sheet named Healthcare Percentage Chart.

   Ensure the years are shown as labels for the horizontal (category) axis, not plotted as chart data. Specify appropriate chart and axis titles.

   b. Add a trendline based on the healthcare percentage for Europe & Central Asia. Use the trendline type that best fits the data and project the values forward 5 periods (through the year 2029). Display the $R^2$-squared value on the chart.

   **NOTE:** You cannot use the Moving Average type for your trendline.

13. We need to set up the Analysis Questions sheet so that it can store responses to the analysis questions.

   a. Enter text in the cells as indicated below:

   i. A1: Question Number
   
   ii. B1: Response

   b. Bold the contents of row 1.

   c. AutoFit the width of column A. Set the width of column B to 100 (8.39”).

   d. Set the height for rows 2 through 5 to 110 (1.53”).

   e. Change the vertical alignment setting for columns A and B so that text is displayed at the top of each row.

   f. Turn on text wrapping for column B.

14. Starting in row 2 of the Analysis Questions sheet, answer four of the five analysis questions below. Respond to one question per row.

   a. Which trendline type did you use on Healthcare Percentage Chart? Why did you choose this type of trendline?
b. Do you believe that your healthcare spending projection for 2029 is accurate? Why or why not?

c. The Gross Domestic Product (GDP) of a country obviously affects how much money it is able to spend on healthcare. How might the amount of money spent on healthcare affect a country’s GDP?

d. In 2014, the healthcare expenditures per capita in North America were about 100 times as much as in Sub-Saharan Africa. Does this mean that North Americans received 100 times the level of healthcare quality as those in Sub-Saharan Africa? Why or why not?

e. In 2014, $9,403 was spent per capita in the United States on healthcare yet the average life expectancy of the United States was below most western European countries [1], [3]. What sort of factors could be at work here?

Grading Rubric

This assignment is worth 50 points. It will be graded by your instructor using this rubric, with partial credit awarded as appropriate:

<table>
<thead>
<tr>
<th>Steps 3a-d</th>
<th>1.5 points total</th>
<th>Steps 9a-b</th>
<th>1.5 points total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 4</td>
<td>3 points</td>
<td>Steps 10a-c</td>
<td>4.5 points total</td>
</tr>
<tr>
<td>Steps 5a-g</td>
<td>3.5 points total</td>
<td>Step 11</td>
<td>3 points</td>
</tr>
<tr>
<td>Step 5h</td>
<td>2.5 points</td>
<td>Step 12a</td>
<td>4 points</td>
</tr>
<tr>
<td>Steps 6a-f</td>
<td>3 points total</td>
<td>Step 12b</td>
<td>3 points</td>
</tr>
<tr>
<td>Steps 7a-d</td>
<td>3 points total</td>
<td>Steps 13a-f</td>
<td>3 points total</td>
</tr>
<tr>
<td>Steps 8a-b</td>
<td>4.5 points total</td>
<td>Steps 14a-e (pick 4 of 5)</td>
<td>2.5 points each</td>
</tr>
</tbody>
</table>

The analysis questions in Steps 14a-e will be evaluated using this rubric:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Meets Requirements (1.25 points)</th>
<th>Does Not Meet Requirements (0 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer is reasonable.</td>
<td>Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.</td>
<td>Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.</td>
</tr>
<tr>
<td>Answer is supported.</td>
<td>Logical rationale is provided to support the given answer.</td>
<td>Logical rationale is not provided to support the given answer.</td>
</tr>
</tbody>
</table>

Acknowledgments

The image in the introduction appears courtesy of the National Cancer Institute [4].

References