



TUTORIAL: CHOROPLETH MAPS WITH EXCEL

This tutorial's aim is to show how to create a Choropleth map with Microsoft Excel. A choropleth map is a thematic map in which areas are shaded or patterned in proportion to the measurement of the statistical variable being displayed on the map, such as population density or per-capita income. *"The choropleth map provides an easy way to visualize how a measurement varies across a geographic area or it shows the level of variability within a region"* (Wikipedia). Excel choropleth maps can be an easy tool for non-advanced GIS users for regular updates of a specific situation in a given area (evolution of an epidemic for example). This tutorial shows how a GIS specialist can create an Excel mapping tools, that can then be managed independently by any user.

Requirements:

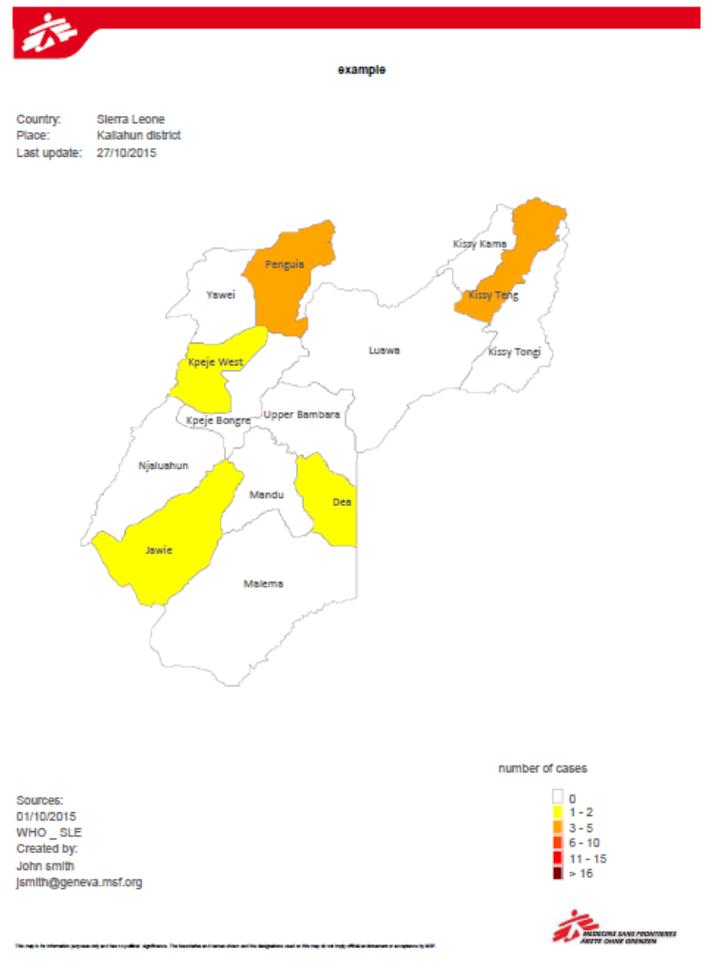
The Excel mapping tools work with Macros. To avoid compatibility issues prefer Microsoft Excel version 2007 or newer.

I. Principle

The principle is simple, we will insert a .emf (enhanced meta file) document in an Excel spreadsheet, separate the image and define a name for each form / label to link information in the Excel worksheet to forms. VBA script present in the template will vary the colors of each shape according to the set values.

II. Set up

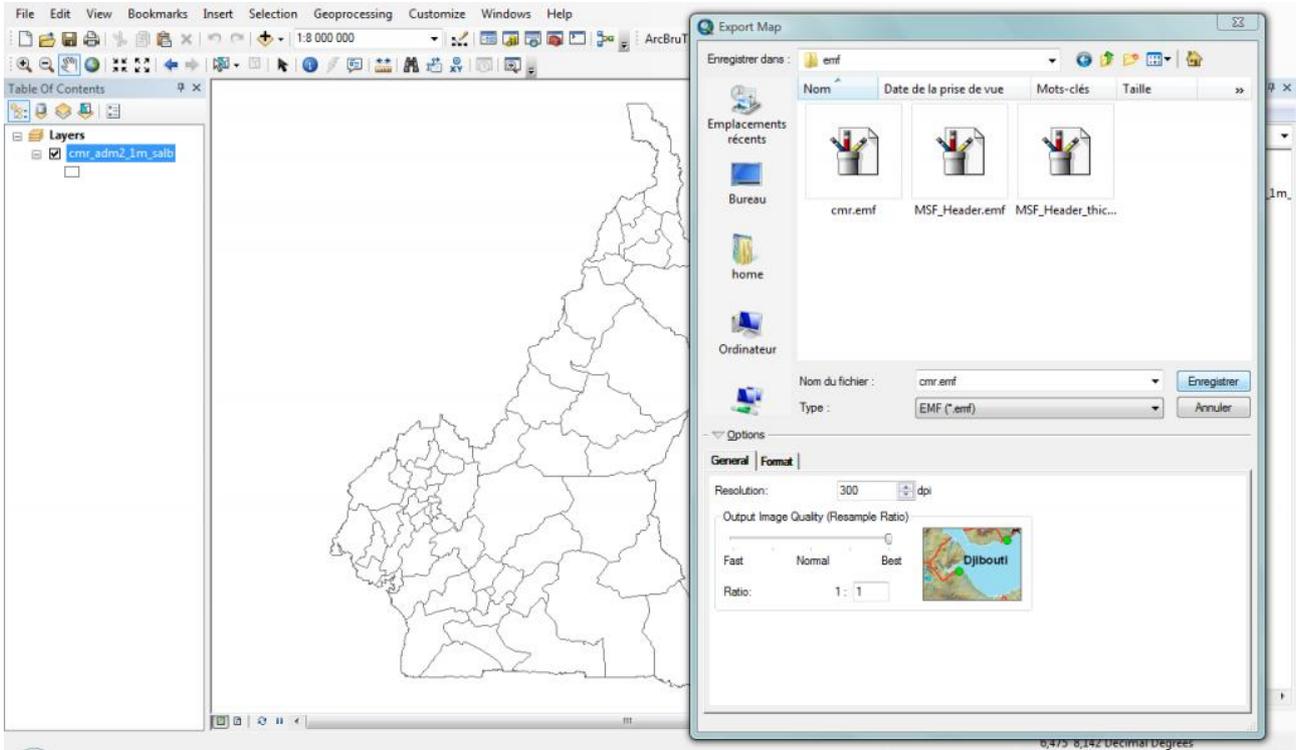
Use the attached xlsmaptools template and make sure to save the original template in the Source folder to retrieve it if necessary. Be careful not to add / remove lines into the document, copy and paste only the values. This template is made with an MSF style. To change the header, go to "page layout" and change the logo accordingly.



III. .emf creation

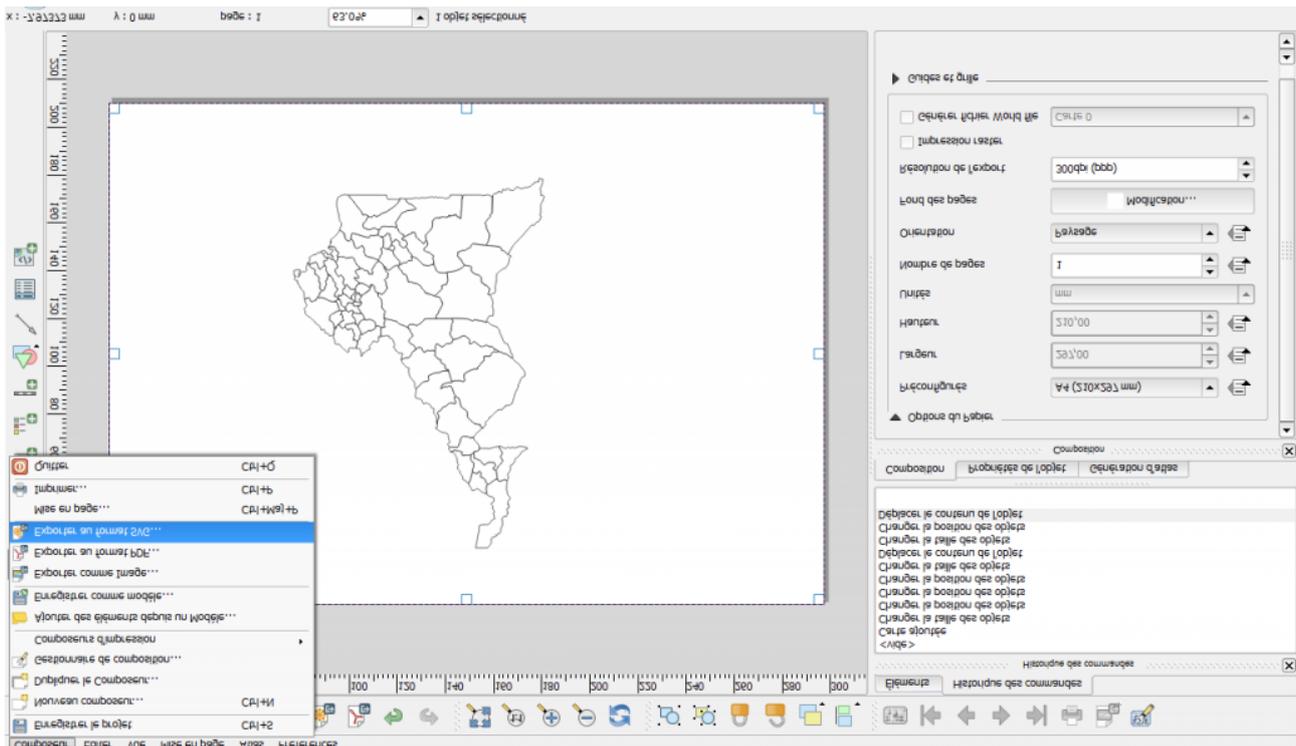
1. With ArcGIS

Make sure your map display doesn't contain any specific symbology (no filling) or any labels, then export your .emf file in your workspace:

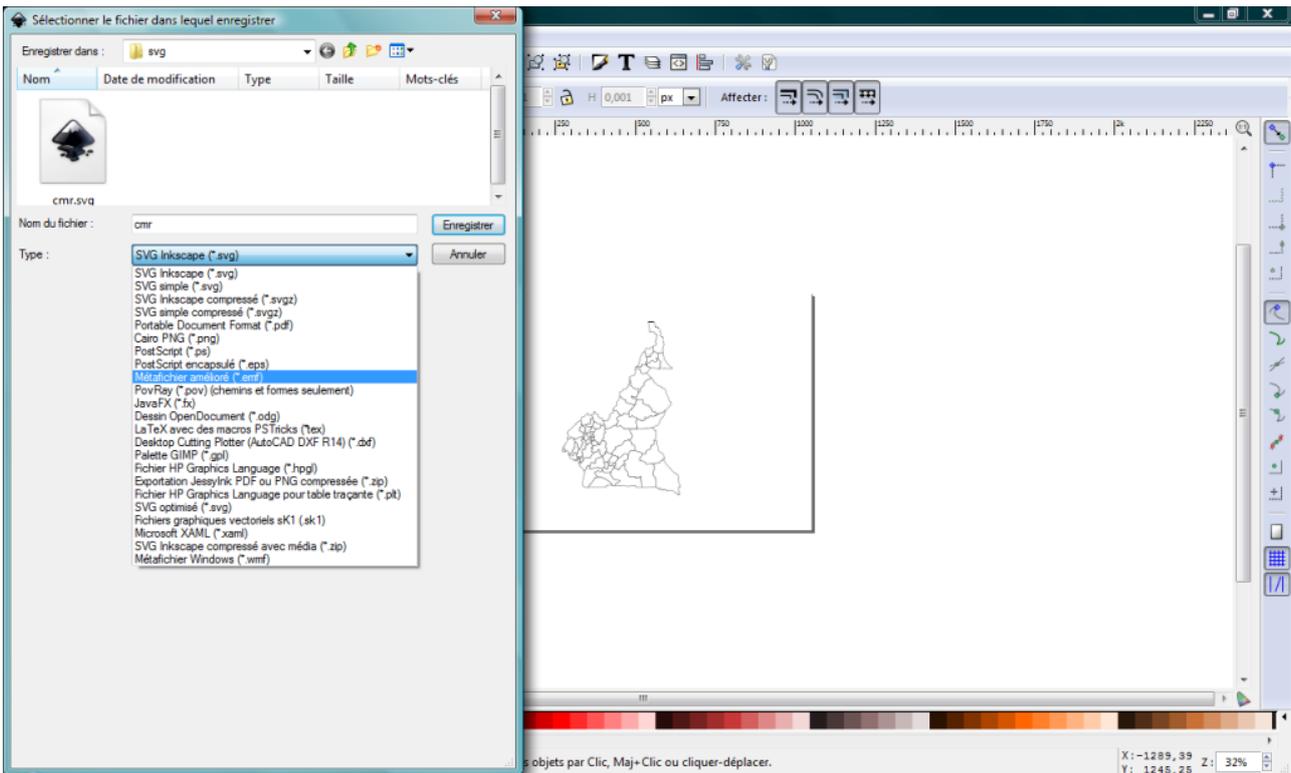


2. With QGIS

Make sure your map display doesn't contain any specific symbology (no filling) or any labels, then export your map as .svg in your workspace:



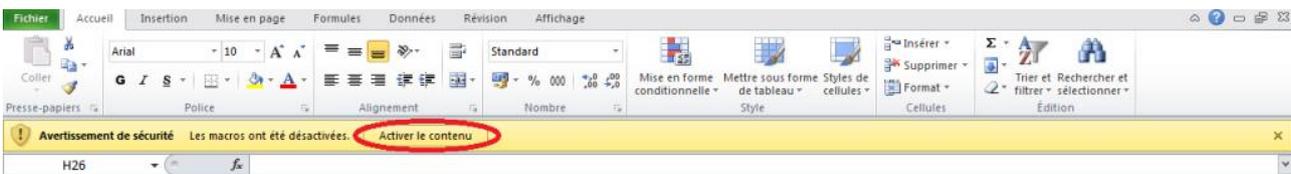
In Inkscape (download link: <https://inkscape.org/>), open the .svg file then save as .emf in your workspace.



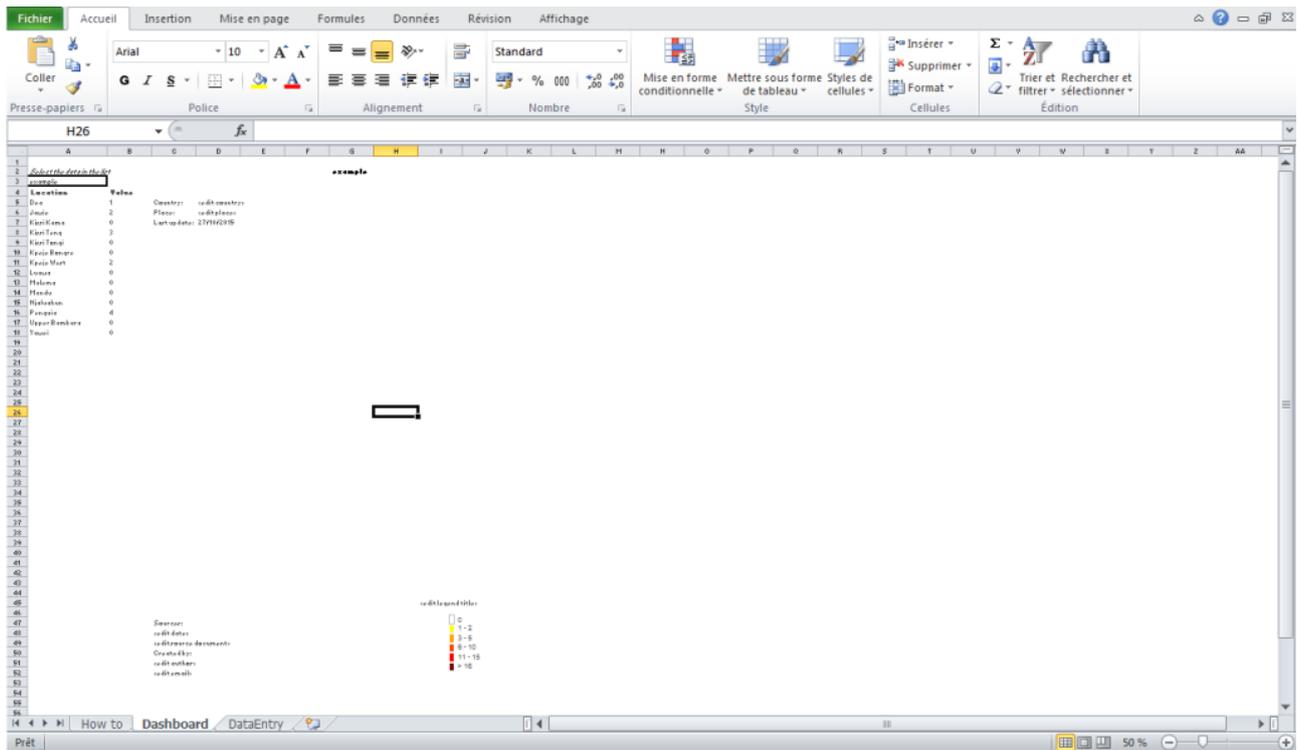
Note: If you only have a picture file (.png , .jpg , .bmp, etc.), online converters are also available to convert pictures into .emf.

IV. Choropleth maps

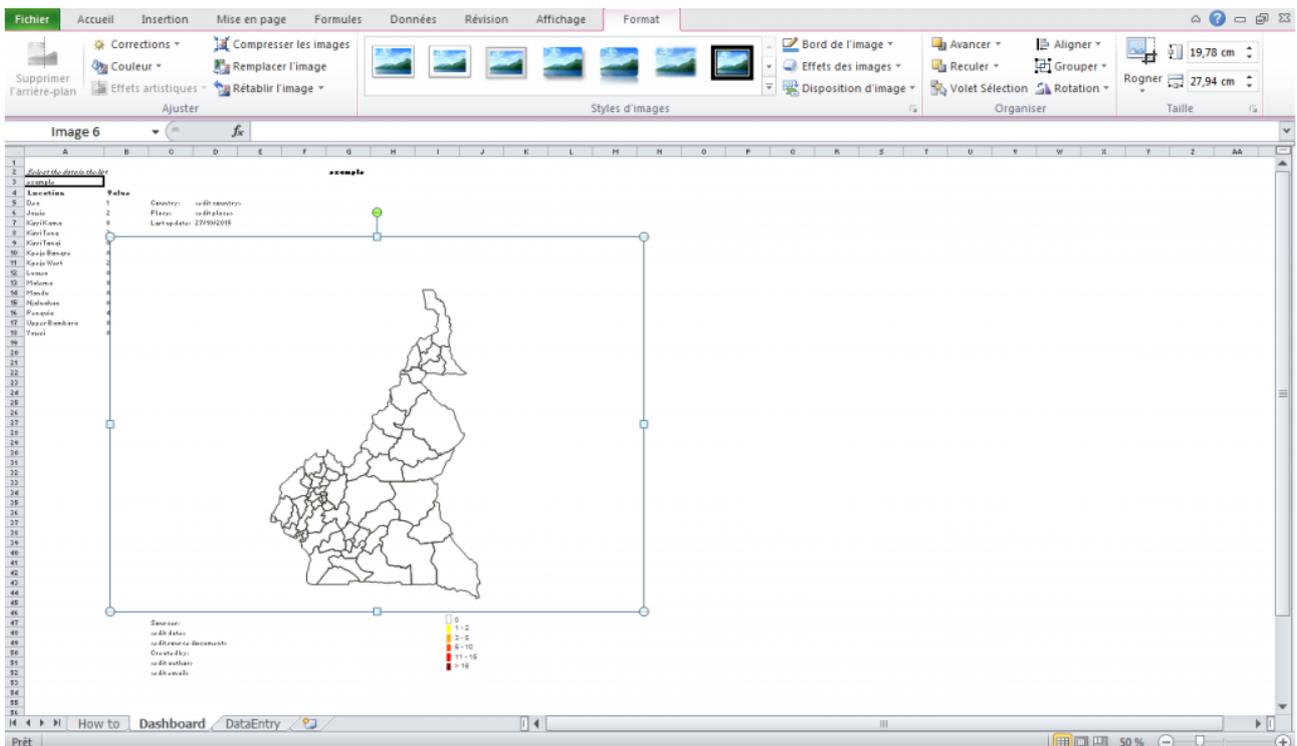
1. Copy the file named xlsmaptools_template.xls
2. Paste it in your workspace.
3. Rename it as the name of your new document.
4. Open your document and **enable the macros**:



5. In *Dashboard* worksheet, delete the map and all the labels. Keep the legend

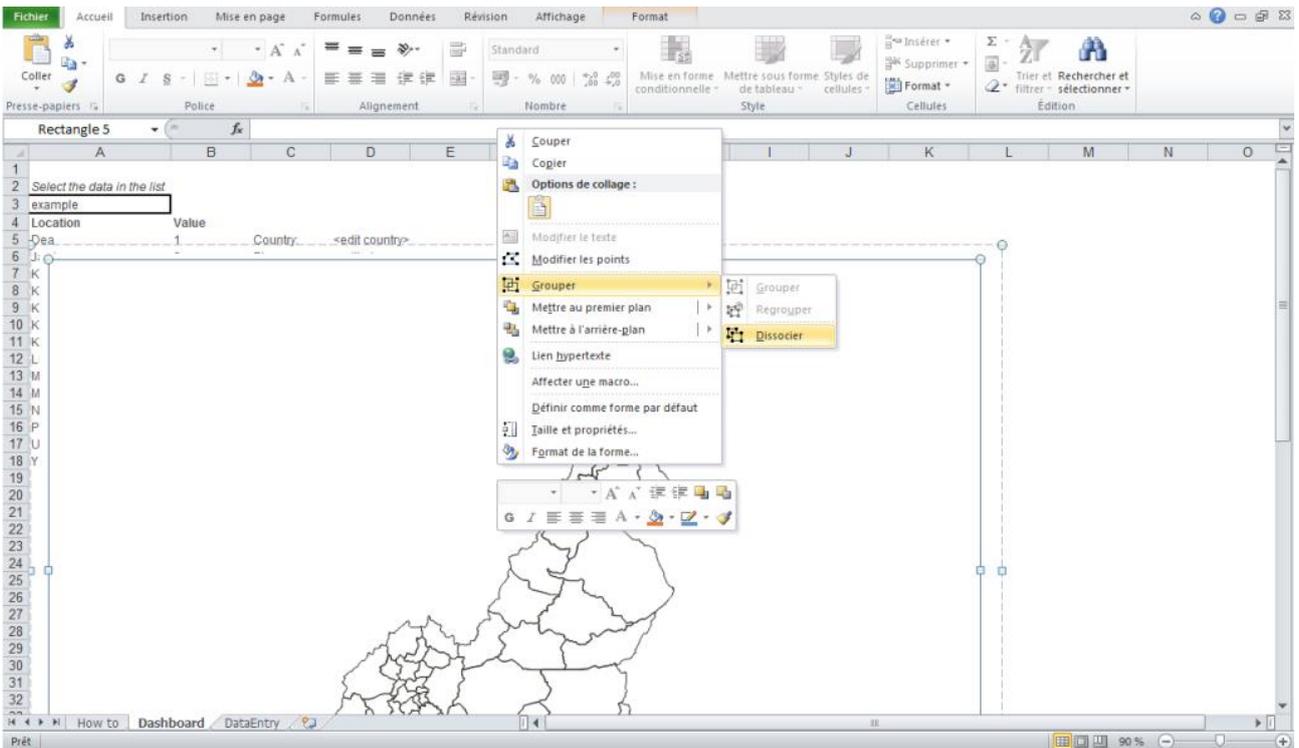


6. Insert your .emf image (Insert/Image/path of the .emf doc) in your Excel doc:



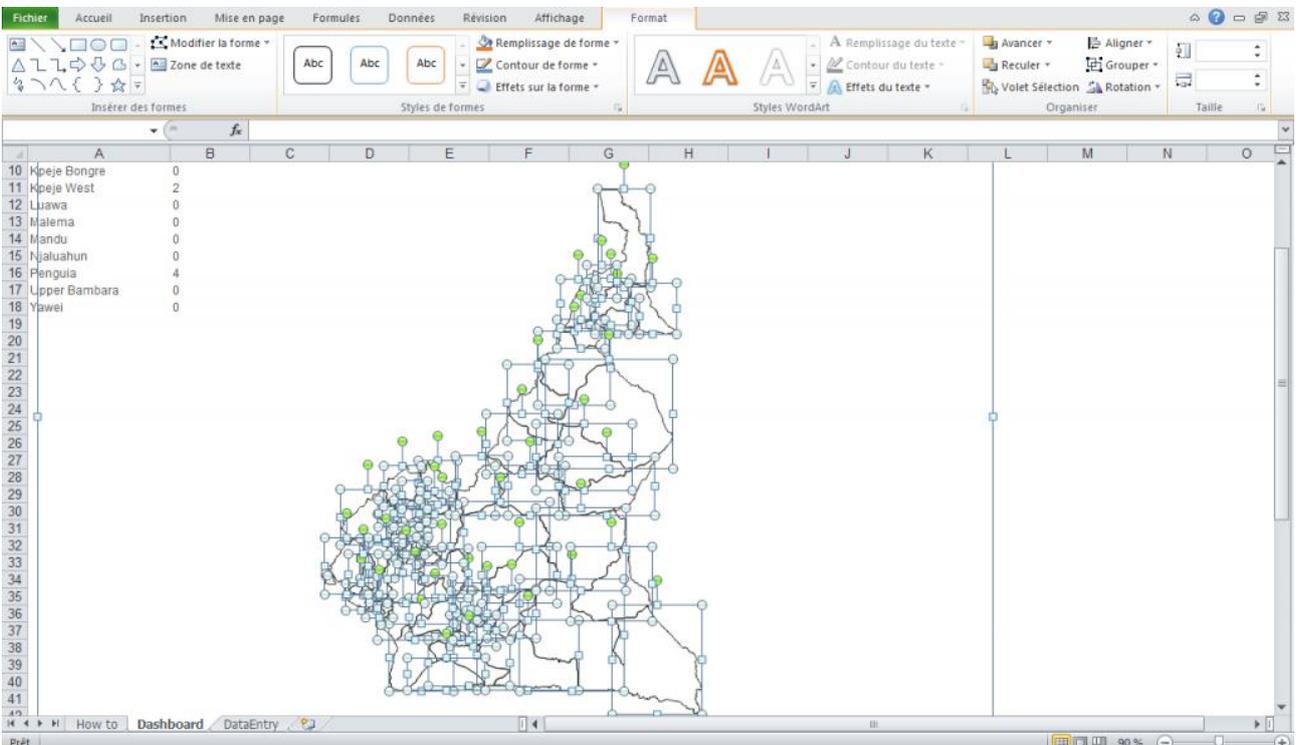
7. Delete the unnecessary Freeforms then adapt your image to the worksheet to obtain a good visual.

8. Ungroup the image. **Right click on the image Group/ungroup:**

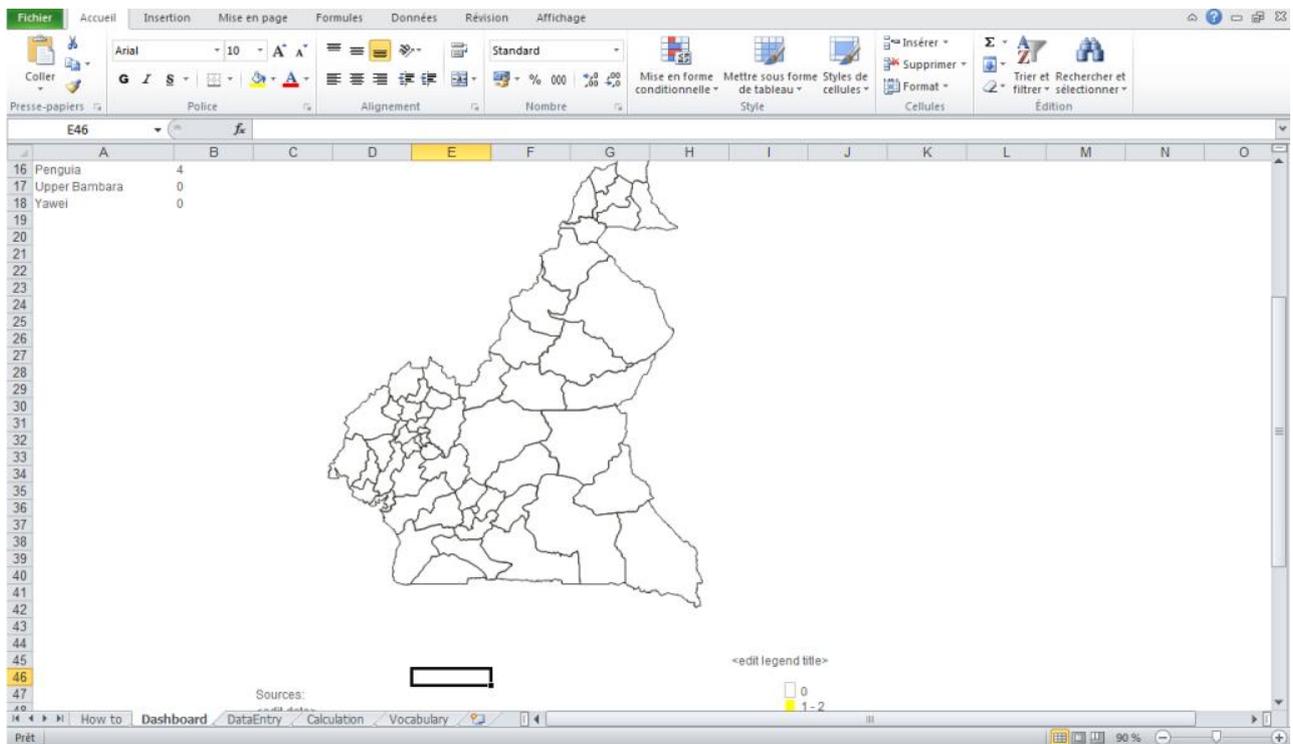
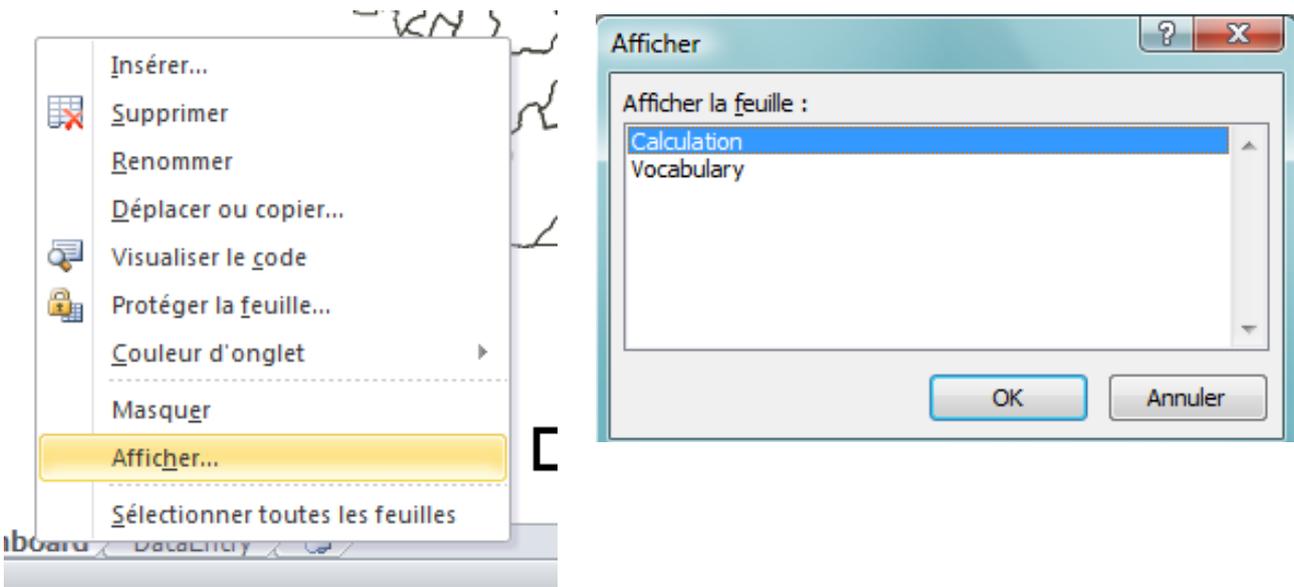


Note: In case of important problems of distortion of your image after ungrouping, insert the image into Microsoft PowerPoint, right click on the image/ Group/Ungroup and select all (Ctrl+A) and copy/paste objects in the Excel worksheet

- Click in one Freeform and select all (Ctrl+A) (Figure 9). In the *Menu toolbar/shape fill* select *no fill*.



- On the Excel file, display worksheets Calculation and Vocabulary (right-click a tab > Unhide):



- Retrieve field values and IDs in the attribute table of your initial shapefile (.dbf which also opened with Excel):

cmr_adm2_1m_salb.dbf - Microsoft Excel

Fichier Accueil Insertion Mise en page Formules Données Révision Affichage

Coller Presse-papiers Police Alignement Nombre Style Cellules Édition

E2 f_x Mayo-Louti

1	ADM2_NAME
2	Mayo-Louti
3	Benoue
4	Diamare
5	Faro
6	Mayo-Tsanaga
7	Lekie
8	Mayo-Kani
9	Vina
10	Djerem
11	Hauts-Plateaux
12	Nyong-et-Kelle
13	Nyong-et-Soo
14	Nyong-et-Mfoumou
15	Mefou-et-Akono
16	Mfoundi

cmr_adm2_1m_salb Prêt 100%

cmr_adm2_1m_salb.dbf - Microsoft Excel

Fichier Accueil Insertion Mise en page Formules Données Révision Affichage

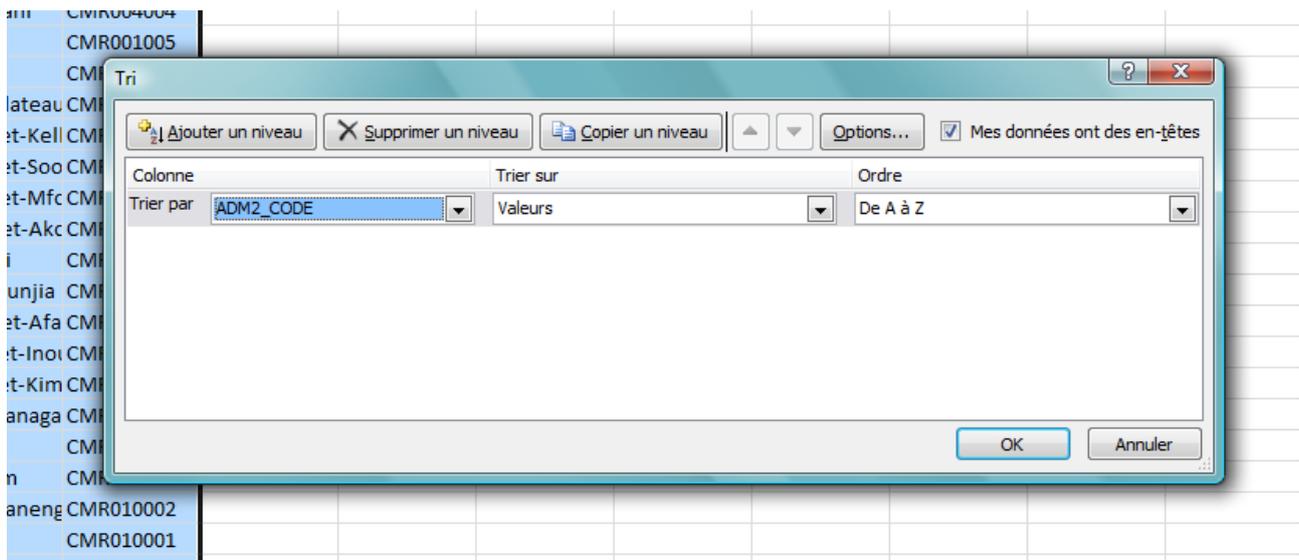
Coller Presse-papiers Police Alignement Nombre Style Cellules Édition

E2 f_x Mayo-Louti

1	ADM2_CODE
2	CMR006003
3	CMR006001
4	CMR004001
5	CMR006002
6	CMR004006
7	CMR002002
8	CMR004004
9	CMR001005
10	CMR001001
11	CMR008003
12	CMR002008
13	CMR002010
14	CMR002009
15	CMR002006
16	CMR002007

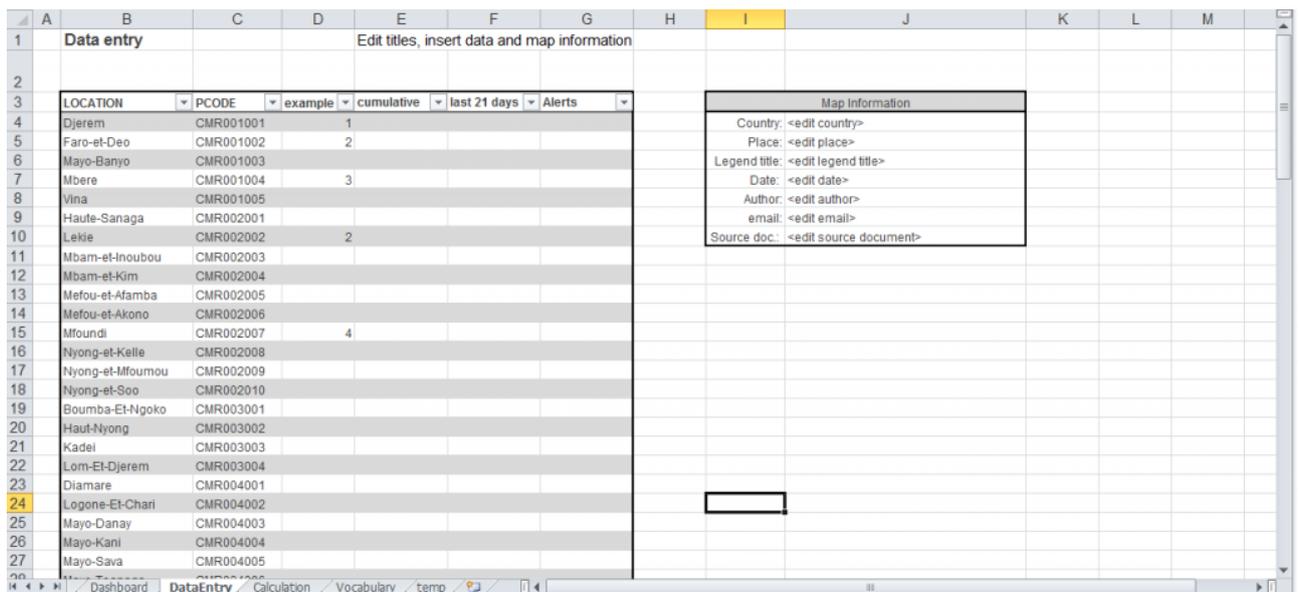
cmr_adm2_1m_salb Prêt 100%

Copy/paste in a temporary worksheet then sort them alphabetically or by PCODE:



Don't mix the PCODES by sorting them!

- **Copy/Paste values** for zones and IDs in Location and PCODE rows of Data entry, Calculation and Vocabulary worksheets:



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	R	G	B	Color	LOCATION	PCODE								
2	255	255	255	sample color	Djerem	CMR001001								
3	255	255	0	sample color	Faro-et-Deo	CMR001002								
4	255	165	0	sample color	Mayo-Banyo	CMR001003								
5	255	69	0	sample color	Mbere	CMR001004								
6	255	0	0	sample color	Vina	CMR001005								
7	128	0	0	sample color	Haute-Sanaga	CMR002001								
8	DO NOT ADD MORE ROWS TO THIS TABLE				Lekie	CMR002002								
9					Mbam-et-Inoubou	CMR002003								
10					Mbam-et-Kim	CMR002004								
11					Mefou-et-Afamba	CMR002005								
12					Mefou-et-Akono	CMR002006								
13					Mfoundi	CMR002007								
14					Nyong-et-Kelle	CMR002008								
15					Nyong-et-Mfoumou	CMR002009								
16					Nyong-et-Soo	CMR002010								
17					Boumba-Et-Ngoko	CMR003001								
18					Haut-Nyong	CMR003002								
19					Kadei	CMR003003								
20					Lom-Et-Djerem	CMR003004								
21					Diamare	CMR004001								
22					Logone-Et-Chari	CMR004002								
23					Mayo-Danay	CMR004003								
24					Mayo-Kani	CMR004004								
25					Mayo-Sava	CMR004005								
26					Mayo-Tsanaga	CMR004006								
27					Moungo	CMR005001								
28					Nikam	CMR005002								
29					Sanaga-Maritime	CMR005003								

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1										Keep always this column the latest one of the table			
2													
3	Location	PCODE	Value	Value+	Rank	Positor	Top Location	Top Val	%ofToti	Range Color			
4	Djerem	CMR001001	1	1	5	1 Mfoundi	4	#N/A	2				
5	Faro-et-Deo	CMR001002	2	2	4	2 Mbere	3	#N/A	2				
6	Mayo-Banyo	CMR001003	0	0	58	3 Lekie	2	#N/A	1				
7	Mbere	CMR001004	3	3	2	4 Faro-et-Deo	2	#N/A	3				
8	Vina	CMR001005	0	0	57	5 Djerem	1	#N/A	1				
9	Haute-Sanaga	CMR002001	0	0	56	6 Nyong-et-Mfoumou	0	#N/A	1				
10	Lekie	CMR002002	2	2	3	7	#N/A	#N/A	2				
11	Mbam-et-Inoubou	CMR002003	0	0	55	8 Meme	0	#N/A	1				
12	Mbam-et-Kim	CMR002004	0	0	54	9 Manyu	0	#N/A	1				
13	Mefou-et-Afamba	CMR002005	0	0	53	10 Lebialem	0	#N/A	1				
14	Mefou-et-Akono	CMR002006	0	0	52	11 Kupe-Manenguba	0	#N/A	1				
15	Mfoundi	CMR002007	4	4	1	12 Fako	0	#N/A	3				
16	Nyong-et-Kelle	CMR002008	0	0	51	13 Vallee-du-Ntem	0	#N/A	1				
17	Nyong-et-Mfoumou	CMR002009	0	0	6	14 Ocean	0	#N/A	1				
18	Nyong-et-Soo	CMR002010	0	0	50	#N/A	#N/A	#N/A	1				
19	Boumba-Et-Ngoko	CMR003001	0	0	49	#N/A	#N/A	#N/A	1				
20	Haut-Nyong	CMR003002	0	0	48	#N/A	#N/A	#N/A	1				
21	Kadei	CMR003003	0	0	47	#N/A	#N/A	#N/A	1				
22	Lom-Et-Djerem	CMR003004	0	0	46	#N/A	#N/A	#N/A	1				
23	Diamare	CMR004001	0	0	45	#N/A	#N/A	#N/A	1				
24	Logone-Et-Chari	CMR004002	0	0	44	#N/A	#N/A	#N/A	1				
25	Mayo-Danay	CMR004003	0	0	43	#N/A	#N/A	#N/A	1				
26	Mayo-Kani	CMR004004	0	0	42	#N/A	#N/A	#N/A	1				
27	Mayo-Sava	CMR004005	0	0	41	#N/A	#N/A	#N/A	1				

Bins calculation

Min : 1
 Max : 4
 Delta : 3
 Median : 0
 Key Option : 1

Intervals	Legend
0	
1	1
3	3
6	6
11	11
16	>

- If the number of rows of your new *Location* array exceeds the total number of rows of existing array, copy/paste the formula of previous lines on the *Dashboard* worksheet (Link to *Location* array in *Calculation* worksheet). Do the same on the *Value* column.
- If the number of lines of your new *Location* array is less than the total number of rows of existing array, clear the excess cells on the *Dashboard* worksheet (Link to *Location* array in *Calculation* worksheet)). Do the same on the *Value* column.
- Record the PCODES for each Freeform. Define a name for each Freeform (use your initial attribute table) using the following format: PCODE_1. In this example, CMR004002_1 for Logone et Chari. To determine the name of each Freeform, select a shape, go to *Format/Selection* pane. In the opened window, double click on the name of the Freeform, then rename it and press Enter. Use the **hide/Unhide** symbol to check then do the same for the next one.

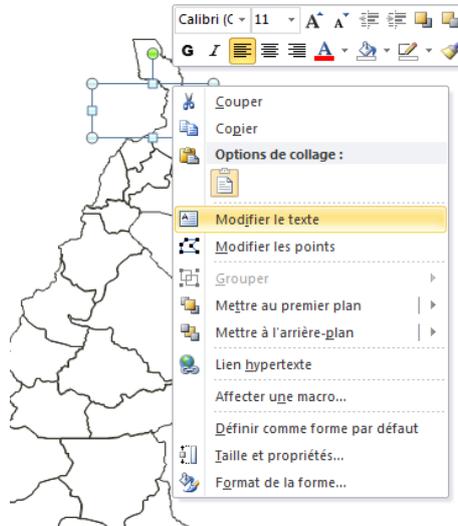
Location	PCODE	Value	Value+	Rank	Position	Top Location	Top Val	%ofTot	Range Color
Djerem	CMR001001	1	1	5	1	Mfoundi	4	#N/A	2
Faro-et-Deo	CMR001002	2	2	4	2	Mbere	3	#N/A	2
Mayo-Banyo	CMR001003	0	0	58	3	Lekie	2	#N/A	1
Mbere	CMR001004	3	3	2	4	Faro-et-Deo	2	#N/A	3
Vina	CMR001005	0	0	57	5	Djerem	1	#N/A	1
Haute-Sanaga	CMR002001	0	0	56	6	Nyong-et-Mfoumou	0	#N/A	1
Lekie	CMR002002	2	2	3	7	#N/A	#N/A	#N/A	2
Mbam-et-Inoubou	CMR002003	0	0	55	8	Meme	0	#N/A	1
Mbam-et-Kim	CMR002004	0	0	54	9	Manyu	0	#N/A	1
Mefou-et-Afamba	CMR002005	0	0	53	10	Lebialem	0	#N/A	1
Mefou-et-Akono	CMR002006	0	0	52	11	Kupe-Manenguba	0	#N/A	1
Mfoundi	CMR002007	4	4	1	12	Fako	0	#N/A	3
Nyong-et-Kelle	CMR002008	0	0	51	13	Vallee-du-Ntem	0	#N/A	1
Nyong-et-Mfoumou	CMR002009	0	0	6	14	Ocean	0	#N/A	1
Nyong-et-Soo	CMR002010	0	0	50		#N/A	#N/A	#N/A	1
Boumba-et-Ngoko	CMR003001	0	0	49		#N/A	#N/A	#N/A	1
Haut-Nyong	CMR003002	0	0	48		#N/A	#N/A	#N/A	1
Kadei	CMR003003	0	0	47		#N/A	#N/A	#N/A	1
Lom-Et-Djerem	CMR003004	0	0	46		#N/A	#N/A	#N/A	1
Diamare	CMR004001	0	0	45		#N/A	#N/A	#N/A	1
Logone-Et-Charl	CMR004002	0	0	44		#N/A	#N/A	#N/A	1
Mayo-Danay	CMR004003	0	0	43		#N/A	#N/A	#N/A	1
Mayo-Kani	CMR004004	0	0	42		#N/A	#N/A	#N/A	1
Mayo-Sava	CMR004005	0	0	41		#N/A	#N/A	#N/A	1

Min :	1
Max :	4
Delta	3
Median	0
Key Option	1

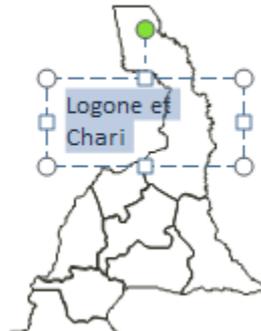
Bins	Legend
0	
1	1
3	3
6	6
11	11
16	>

Note: If you forget to press Enter, your new name will not be recorded!

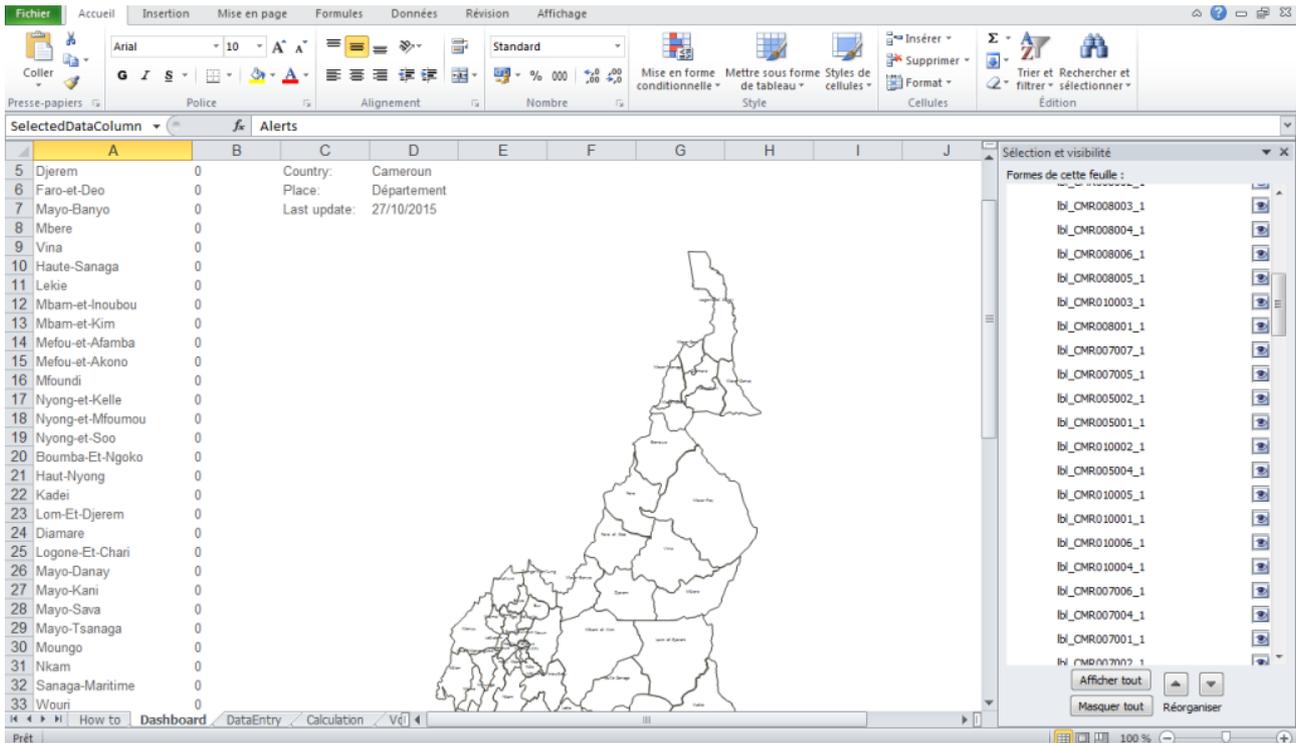
- Create a label for each Freeform. **Insert/Shape**, select a rectangle then in the drawing tools (click on the shape) Format/shape fill/no fill; Shape Outline/No Outline. **Right click on the shape** then **Modify text** to rename your text:



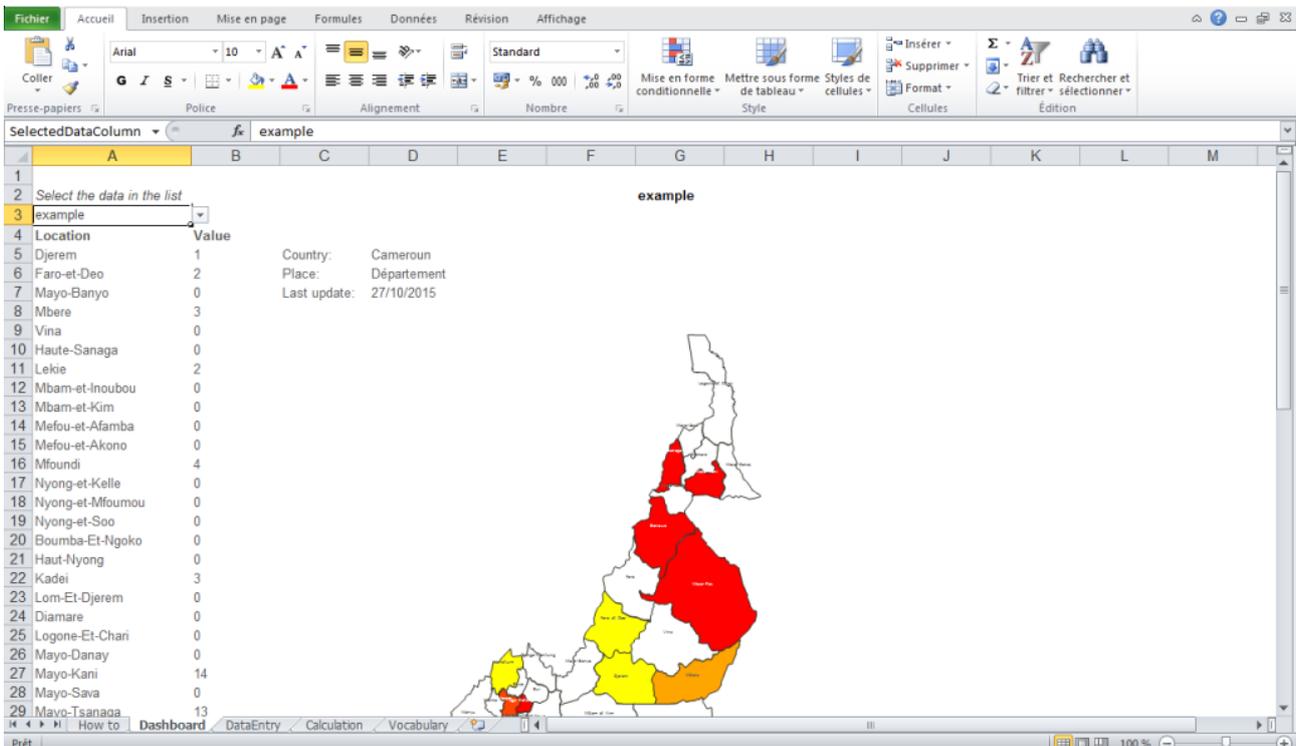
- Define a name for each label using the following format: lbl_PCODE_1 (using one ID for each Freeform).
- To determine the name of each label, select a label (or a shape) , go to Format / Selection pane. In the opened window, click the label name, rename it and press Enter:



Use the same way to rename all the shapes:



- Fill your map information in Data entry worksheet.
- Hide *Calculation* and *Vocabulary* worksheets.
- Save the document.
- The VBA script, present in the template will assign the color which corresponds to the defined values:



Your choropleth map is now ready! MSF Headers and logos are saved in the Excel workbook, you just need to print your map.

V. If you need to change the values intervals

1. **Display** the Calculation work sheet.
2. **Modify** the values in *Bin* column of the *intervals* array and modify the Legend from Legend column.
3. **Hide** *Calculation* worksheet.
4. **Save** the document.

Be sure that the Values Inputs in the legend match with the desired values!

VI. To go forward...

This method can be binding on a map with a large number of entities due to manual recording shapes and labels. However, you can visit the following links for more information:

<http://www.hypergeo.eu/spip.php?article274>

<http://robbiewilson.hubpages.com/hub/How-to-create-a-thematic-or-Choropleth-map-in-Excel-2007-and-Excel-2010>

http://www.clearlyandsimply.com/clearly_and_simply/2009/08/build-your-own-choropleth-maps-with-excel.html

http://www.tushar-mehta.com/publish_train/xl_vba_cases/0301-dashboard-conditional_shape_colors.htm