



Rewarding Learning

# eGUIDE // Geography

Unit AS 2:

**Epidemiology: Investigating the Distribution of Disease**

Content  
Page

<a href="#"><u>Introduction</u></a>	<a href="#"><u>3</u></a>
<a href="#"><u>Background</u></a>	<a href="#"><u>3</u></a>
<a href="#"><u>Task 1: Setting up an ArcGIS Online account</u></a>	<a href="#"><u>4</u></a>
<a href="#"><u>Task 2: Find a map of Africa</u></a>	<a href="#"><u>6</u></a>
<a href="#"><u>Task 3: The distribution of Malaria in Africa</u></a>	<a href="#"><u>8</u></a>
<a href="#"><u>Task 4: Show HIV/AIDS on a map of Africa</u></a>	<a href="#"><u>12</u></a>
<a href="#"><u>Task 5: Investigating Ebola in West Africa</u></a>	<a href="#"><u>15</u></a>
<a href="#"><u>Task 6: Investigating the spread of Coronavirus in 2020</u></a>	<a href="#"><u>18</u></a>



## **DISCLAIMER**

External links are selected and reviewed when the page is published. However, CCEA is not responsible for the content of external websites. CCEA cannot guarantee the accuracy of the content in external sites. This is because:

- CCEA does not produce them or maintain/update them;
- CCEA cannot change them; and
- they can be changed without CCEA's knowledge or agreement.

Some of our external links may be to websites which also offer commercial services, such as online purchases.

The inclusion of a link to an external website from CCEA should not be understood to be an endorsement of that website or the site's owners (or their products/services).

Some of the content we link to on external sites is generated by members of the public (messageboards and photo-sharing sites for example). The views expressed are those of the public and unless specifically stated are not those of CCEA.



## Unit AS 2: Epidemiology: Investigating the Distribution of Disease

### Introduction

#### Specification link

This resource is related to AS Geography Unit 2 Human Geography Part 1(b) Population Change:

- (ii) demonstrate knowledge and understanding of the demographic transition model and the epidemiological transition.

Note: spatial context requirement: general reference to places for illustration.

### Background

Epidemiology is concerned with the causes, consequences and distribution of disease and death in human populations. There have been studies of disease occurrences through time and comparisons of the epidemiology of countries at different stages of economic development. The results of these studies have led many demographers to conclude that an epidemiological transition has paralleled the demographic transition. The theory suggests that as economic development takes place, pandemics (widespread epidemics) of infectious diseases such as tuberculosis and diarrhoea will be replaced by degenerative diseases of affluence such as cancer and heart disease.

### Aim

The aim of this activity is to enable you to investigate the distribution of disease in Africa. Many people think that all countries, or everyone within Africa has HIV/AIDS or Malaria or even Ebola. Through this activity you will be able to see the spread of disease across the continent of Africa and to consider why some areas are more affected than others.

In 2020 the world was gripped by the Covid-19 pandemic. This activity also investigates the global distribution of the Covid-19 pandemic.

#### Before you start

This activity uses **ArcGIS Online**. ArcGIS Online enables you to connect locations and data using interactive maps. You will create maps using data included in ArcGIS Online. You can use Smart Mapping styles to make your data visually stunning.

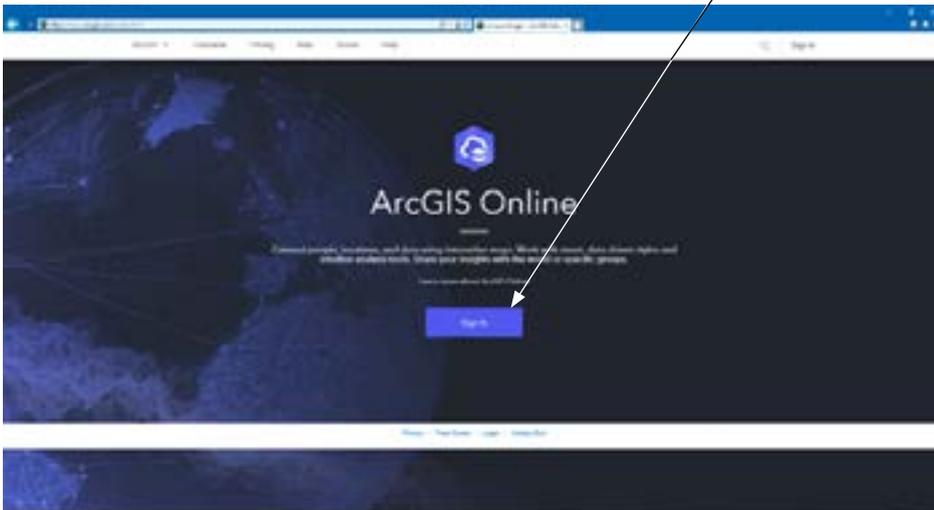
In order to do this work successfully you must complete each of the tasks in order. Work your way through each task step by step. Do not move onto another task until you have completed all sections of each task.

To get started you will need to set up an ArcGIS Online account.

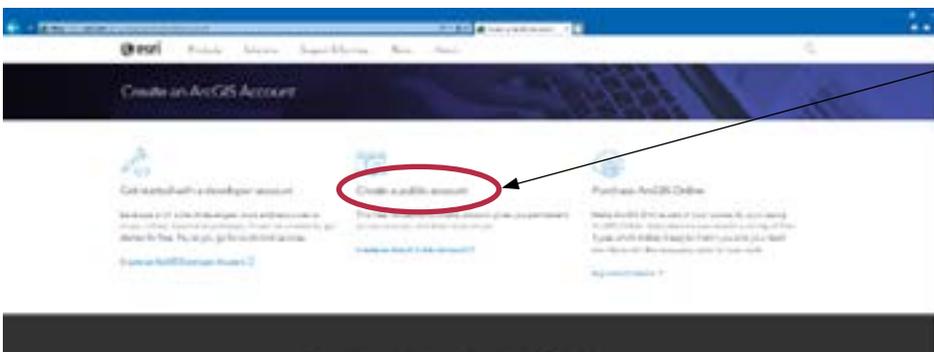


## TASK 1: Setting up an ArcGIS Online account

Log on to <https://www.arcgis.com/index.html> and click 'Sign In'.

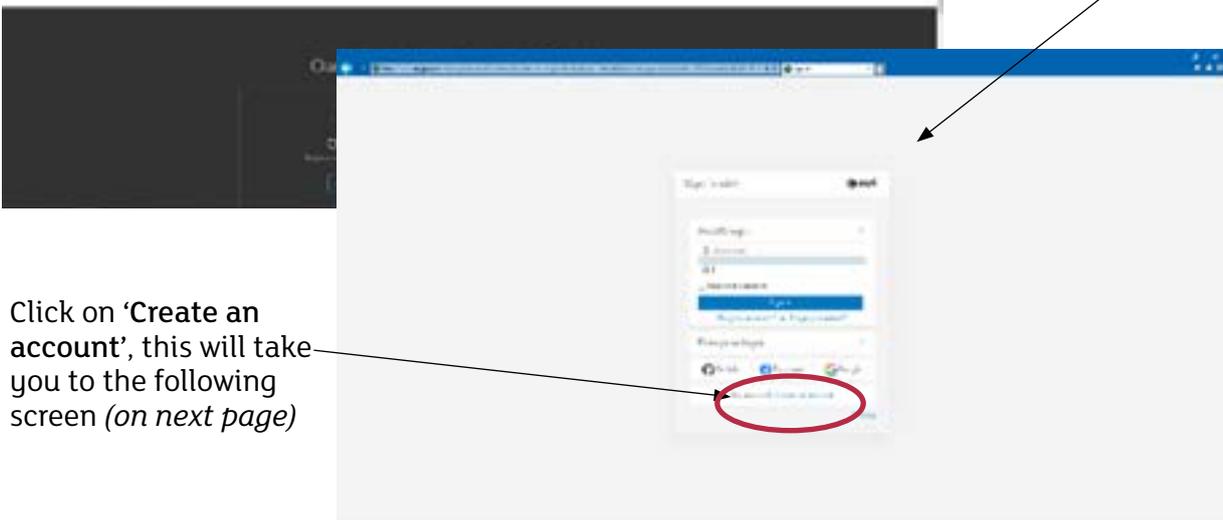


You need to create a **Public Account** – use your school username and a password that is easy to remember.



Click on 'Create a public account'.

This will open up the following screen.



Click on 'Create an account', this will take you to the following screen (on next page)



Complete the required fields.

Click to accept the terms of use and the privacy policy.

Click 'next'.

You will now be sent an email containing a link. You must open the email and click on the link to activate your account. **Note:** the link will expire in 24 hours.

From now on, each time you log in to ArcGIS Online you just need to:

- enter your username
- enter your password
- then click sign in.





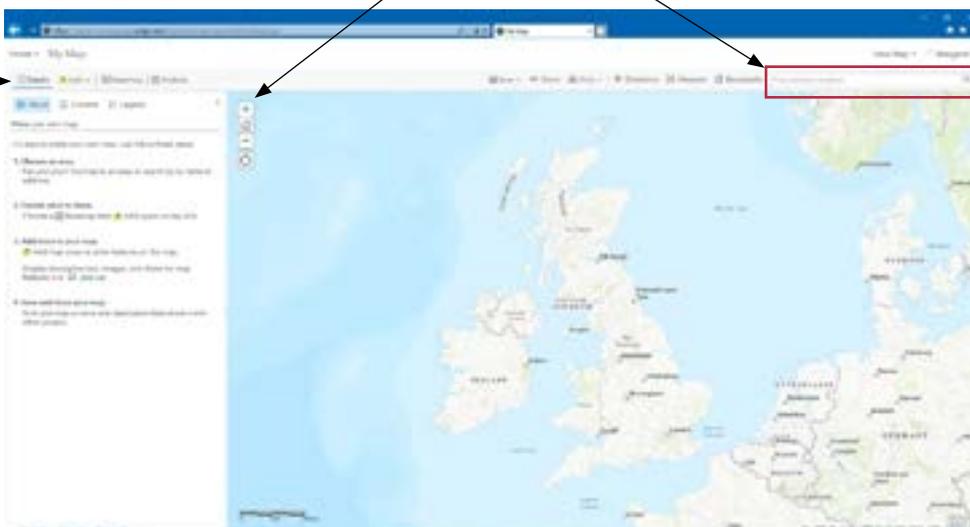
## TASK 2: Find a map of Africa

1. After you have signed in you will now see the following screen. Select **Map** from the top of the screen.



2. The map will automatically default to the British Isles. On the left of the screen under **'Details'** and **'About'** you will see a simple 4-step guide to creating a map, you can refer to this anytime when working in ArcGIS Online.

To navigate the map you can use the roll button on your mouse to zoom in/out, alternatively you can use the + and – buttons on the map to do the same. You can also use the search facility on the right of the screen.

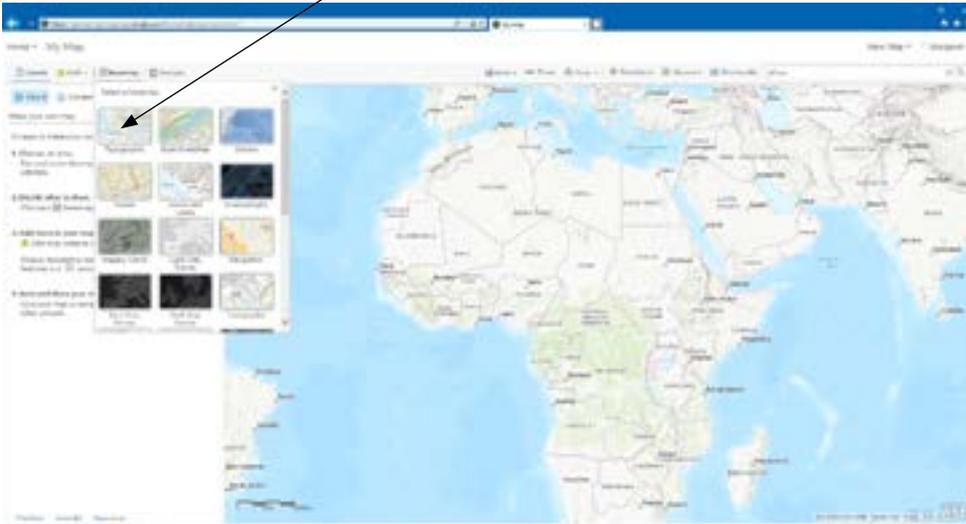




3. A map of Africa will form the basemap for this task. You need to navigate the online map until a map of Africa sits in the middle of your screen.

**Tip:** the easiest way to do this is to search 'Africa'.

The map defaults to a **topographic map** which you will use as the starting point for this investigation.



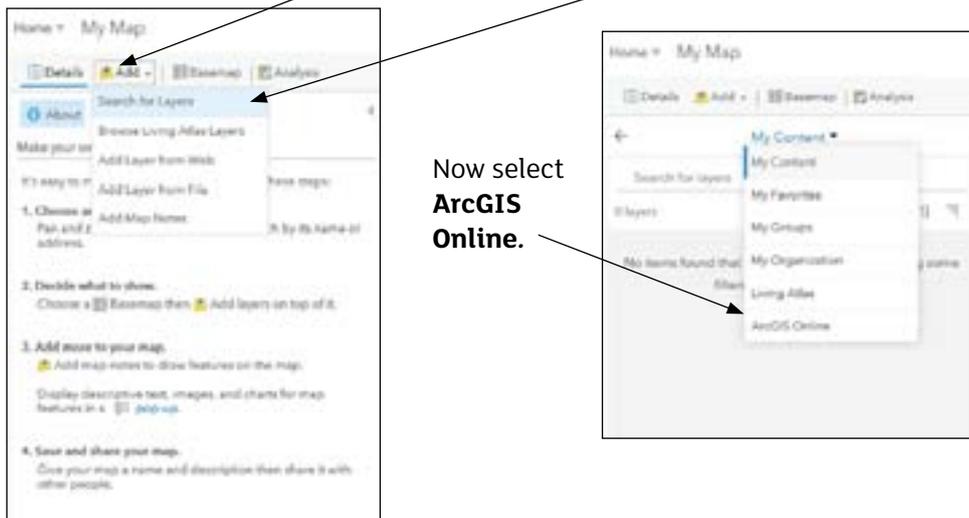
**Note:** you can explore alternative base maps by clicking on **Basemap** and selecting an alternative map style.



### Task 3: The distribution of Malaria in Africa

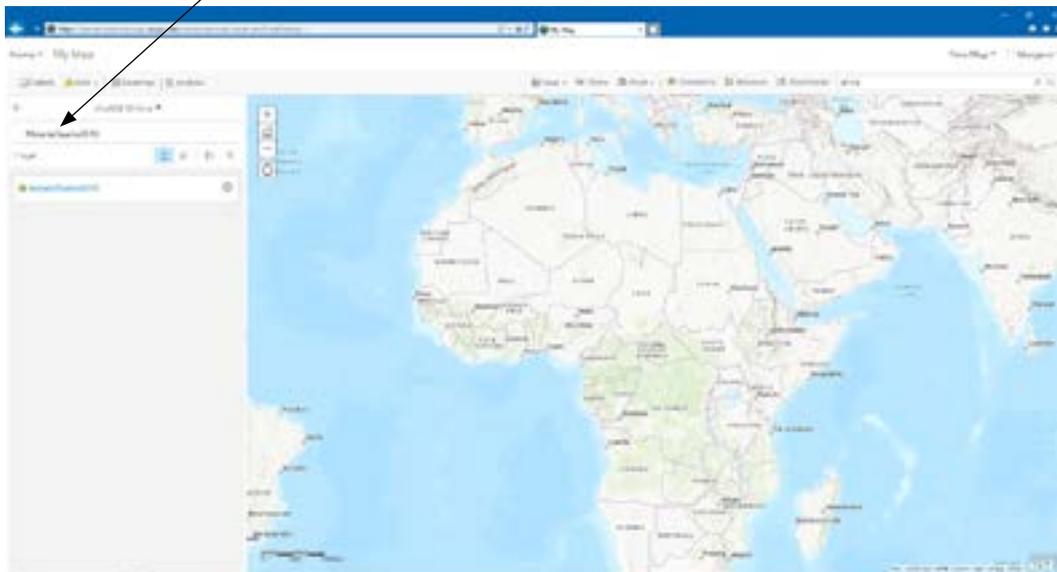
You are now ready to add information to your map – this is referred to as **adding layers**. Follow the next steps carefully. You are going to use data already included in ArcGIS Online.

1. To find relevant data click on **Add** then select **Search for Layers**.



2. To find the required data set you can simply scroll through the list of data held in ArcGIS Online. It is worthwhile taking a little time to scan the wide range of data available.

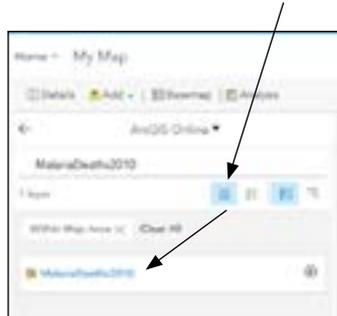
For this task, a quicker way is to search for the relevant data set, to do this key **MalariaDeaths2010**. You should now see the following screen.



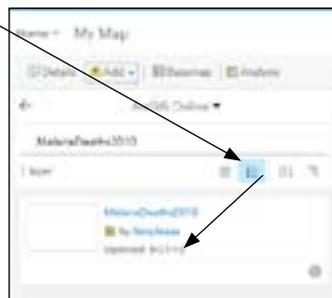


This is a good opportunity to familiarise yourself with the tools available on screen.

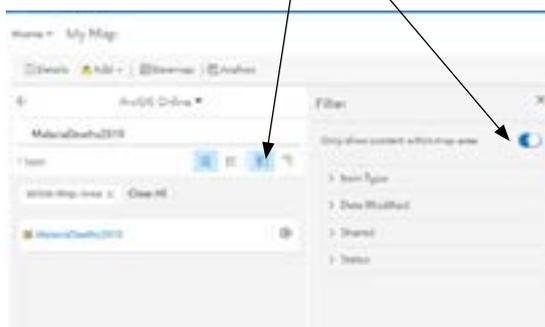
This icon lists the available layers in **compact view** as shown here.



This icon shows a detailed **list view** as shown below.

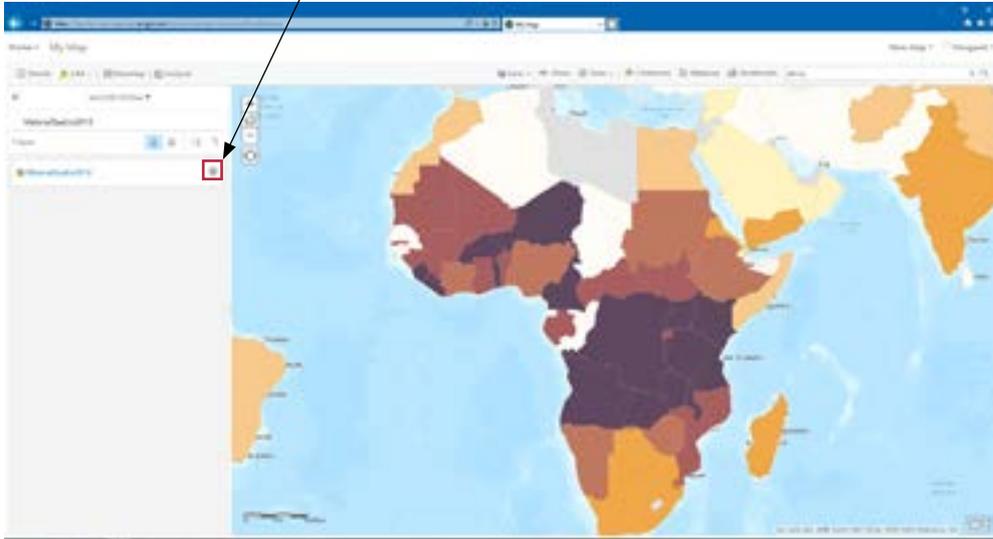


Finally, this icon allows you to apply **filters**; for example, as shown here, you can select '**only show content within map area**'.





3. You are now ready to add your chosen layer. To do this simply click on the + symbol alongside the name of the layer. This will generate a coloured map that will look like this.



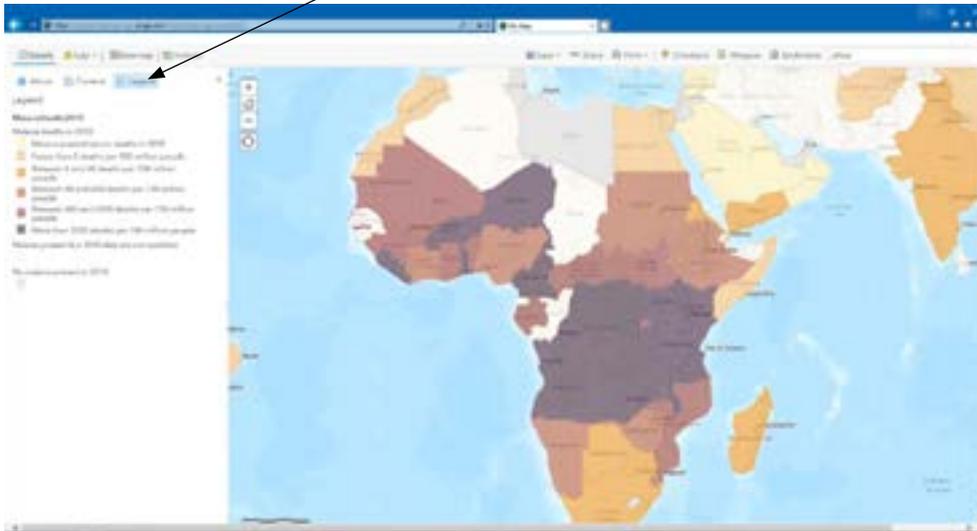
4. You will notice that the layer covers your base map and you will not be able to see the names of the individual countries. You can make the layer more transparent so that you can see what is underneath it. To do this:
  - (i) click on **Details**
  - (ii) then select **Content**
  - (iii) click on the dots under the name of the layer to bring up a menu
  - (iv) from the menu select **Transparency**
  - (v) move the slider along to approximately 30% and you should now be able to see clearly the names of each country.

The following screen shot shows you the steps you need to take.





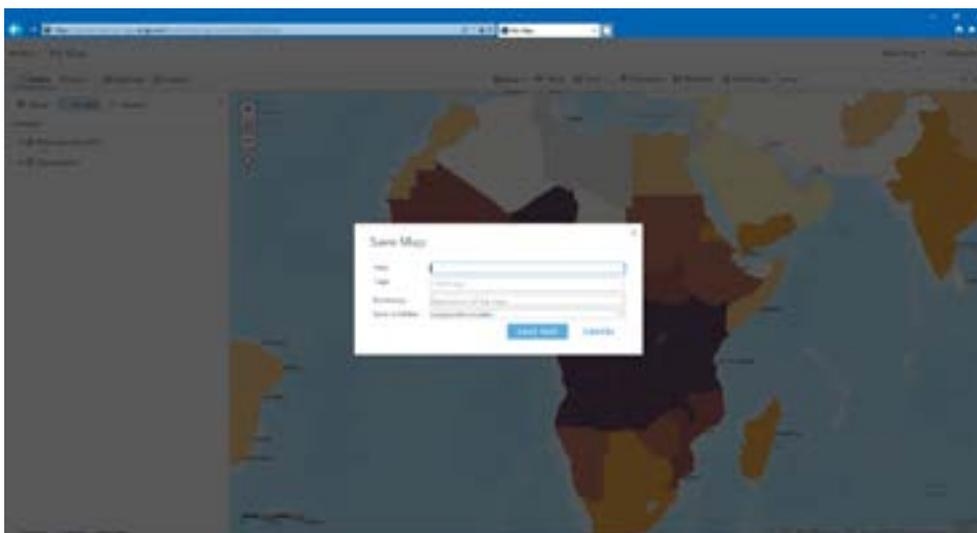
5. You have probably noticed that the map does not include a key which is required to help make sense of the pattern shown. In ArcGIS Online the key is referred to as a legend. Simply click on **Legend** to complete your map.



6. You can now save your map. Click on **Save** and select **Save As** from the drop down menu. **Enter** the following details: Title, Tags and Summary; e.g.

- **Title:** Map to show Malaria, 2010
- **Tags:** Africa, Malaria.
- **Summary:** choropleth map showing distribution of deaths due to Malaria throughout the continent of Africa in 2010.

Your map will automatically save in your folder (your name).



*You can also print out a copy of your map; the drop down menu will give you the option of printing the map with the legend.*

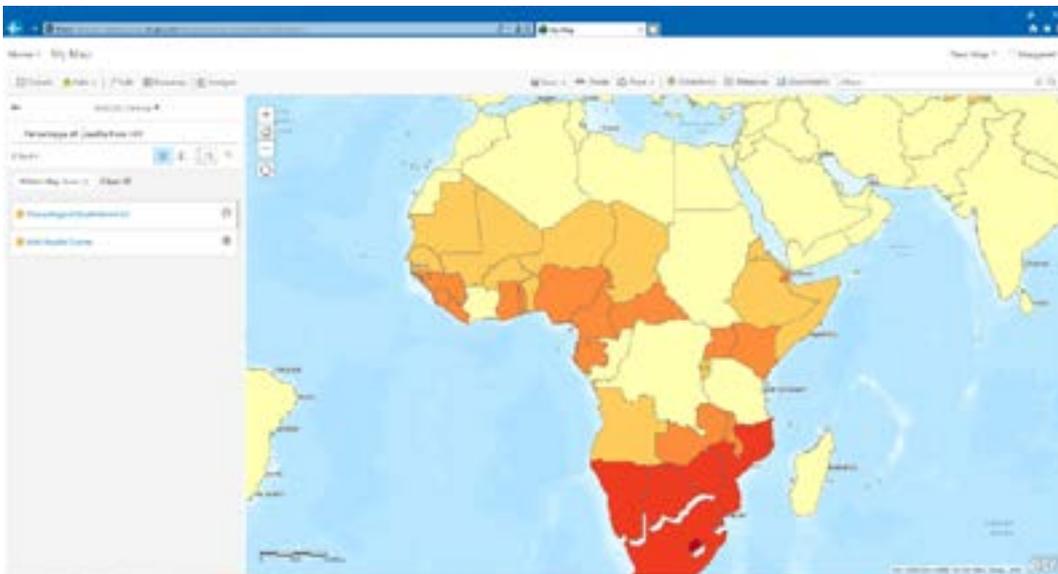


## Task 4: Show HIV/AIDS on a map of Africa

This is an advanced task building upon the skills you have now developed. The instructions will be less detailed as you should now be familiar with the main steps and tools involved in creating a map using ArcGIS Online. In this task you will focus on HIV/AIDS in Africa.

1. To begin this task you need to create a new map. Can you remember how to do this? Tip: click on **NEW MAP** at the top right of the screen.
2. Add a layer, search for **Percentage of Deaths from HIV**. You should now have a map looking like this.

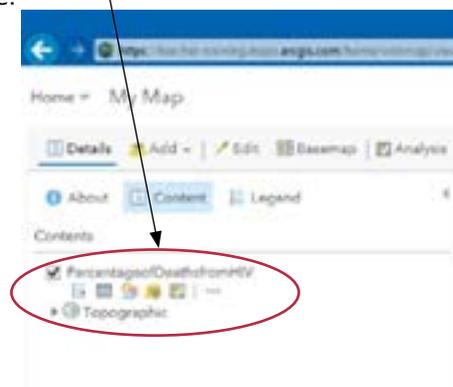
**Note:** Go back to Task 2 (Malaria map task) if you get stuck.



To bring up the key, remember to click on **Details** then **Legend**.

3. You are now going to change the colours on your map. To do this you need to click on **Details** then **Content**. You will see a number of icons under the name of the layer. From left to right the icons are:
  - Show legend (key)
  - Show table
  - Change Style
  - Filter
  - Perform Analysis
  - Drop down menu

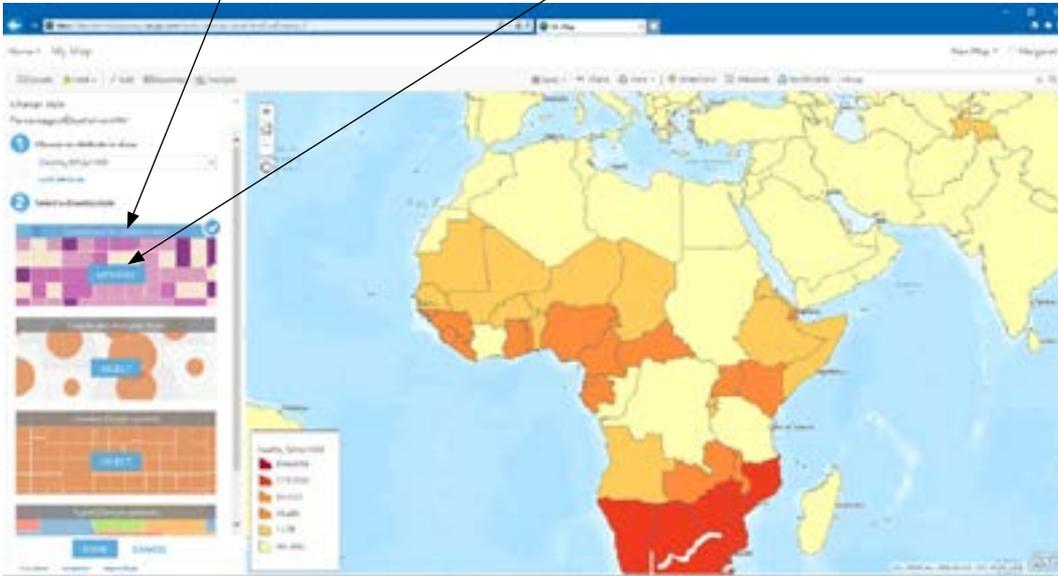
Click on the **Change Style** icon, it is the third icon from the left hand side and looks like this:



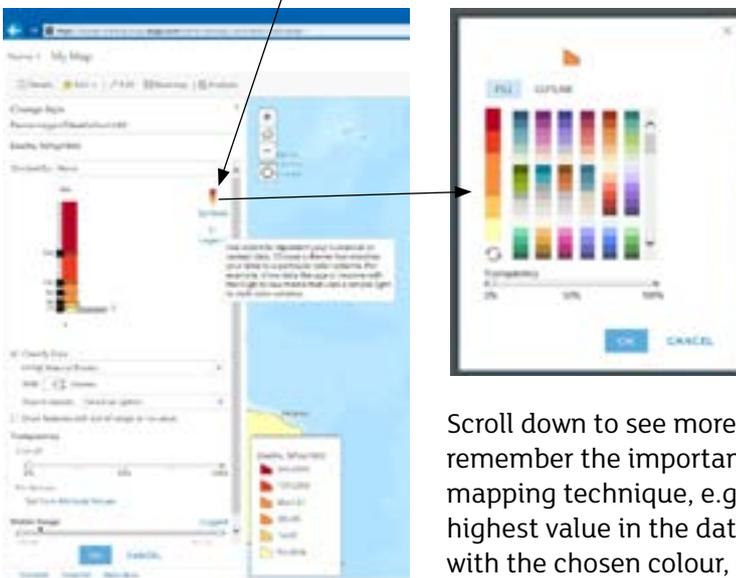


You should now see the following screen.

Click on **Counts and Amounts** (Colour) then **Options**.

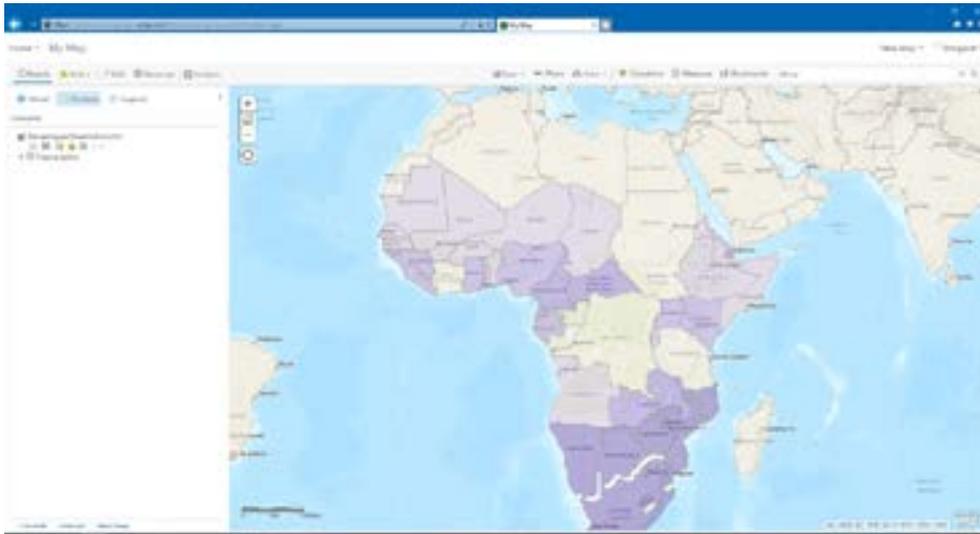


This will take you to a screen that allows you to change the colours used on your map. To do this click on **Symbols** and select a colour of your choice from the pop-up.

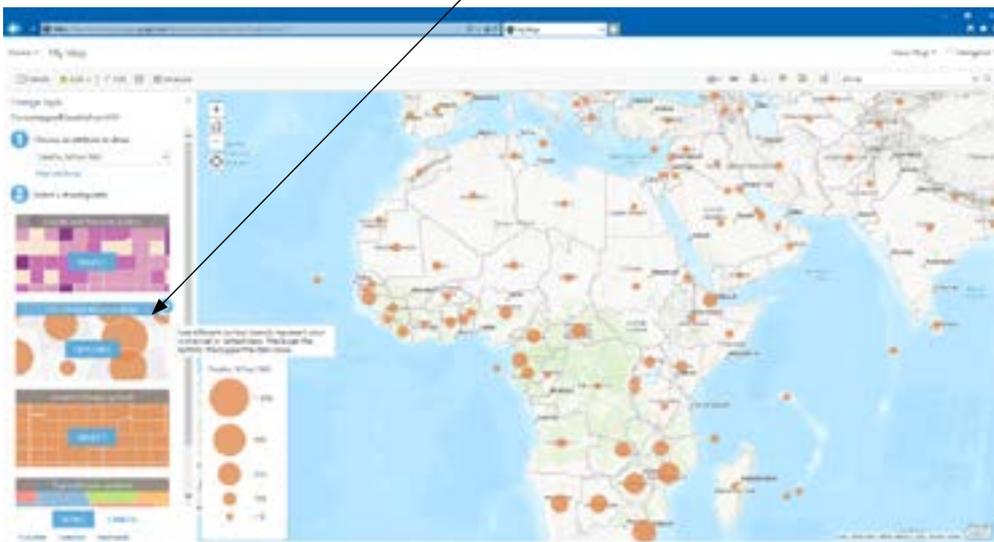


Scroll down to see more colour options. Tip: remember the importance of shading for this mapping technique, e.g. the darkest colour for the highest value in the data set. When you are happy with the chosen colour, click **OK**.

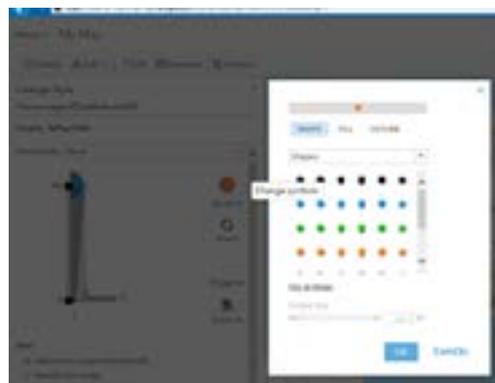
4. You will notice that the layer has completely covered the base map which means that you can no longer see the names of the individual countries. The **Change Style** menu allows you to change the **transparency**. Simply slide the pointer to the right until you can clearly see the country names; 50% is a good starting point. Finally, when you are happy with your choice of colour and level of transparency click **OK** and **Done** on the next screen to complete the changes and return to your map (see next screenshot).



5. You are now going to present this information using a different mapping technique. To do this click on **Counts and Amounts (Size)**, you will see circles appear on your map (see below).



You can change the symbol and colour by clicking on **Options** and selecting from the pop-up. Take the time to experiment with different symbols – some may be more effective than others. To make the changes and return to your map click **OK** then click **Done** on the next screen.



Finally, remember to **save** your map. **Tip:** check back to see how to do this if you are not sure.

Give your map a suitable title, bearing in mind what it is showing.



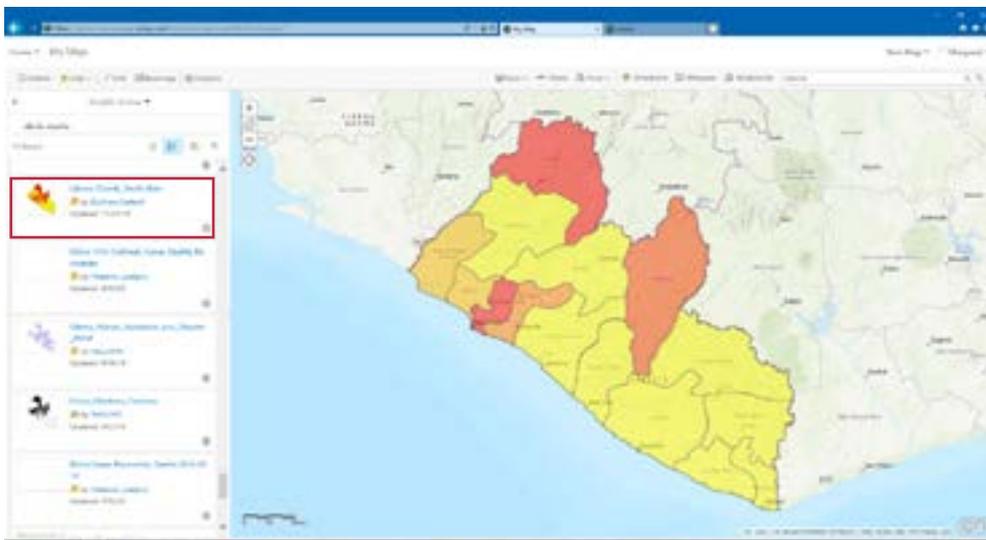
## Task 5: Investigating Ebola in West Africa

You will now be a competent user of ArcGIS Online. In this task you will investigate the occurrence of Ebola in West Africa.

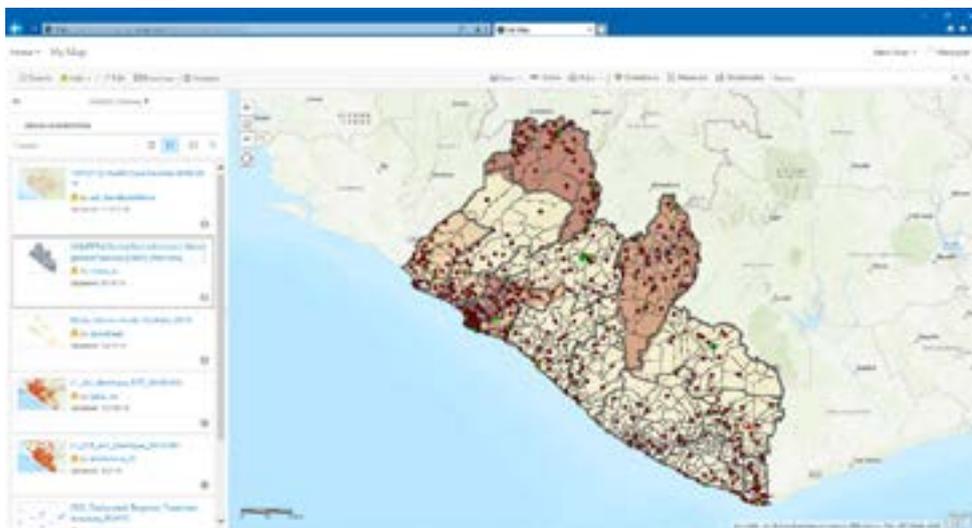
Tip: Go back to the previous tasks if you find that you cannot remember the steps. Play around with some of the functions on the GIS to see what changes you can make.

1. To start this task, zoom in to **Liberia** in West Africa.
2. Search for **Ebola Deaths** and then add **Liberia County Death Rate by JSullivan\_Federal**.

Your map should look like this.



3. Change the colours of this layer. Check back to Task 4 if you need some help.
4. Now search for **Ebola care facilities** and then choose **UNMEER (Liberia) Geo-Information Management Services (GIMS) Web Map** from the options given to you. When you add this layer your map should look like this.

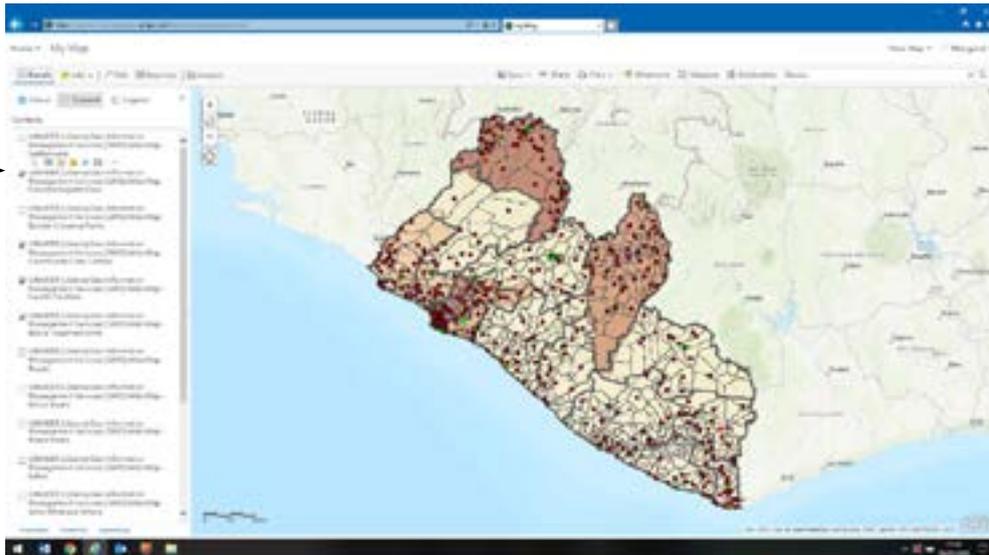




There is a lot of detailed information on this map. Therefore it is a good idea to remove unnecessary clutter from the map.

5. You will now remove the layers that you do not need. To do this click on **Details**, then **Content** and remove the tick from the layers that you do not want.

**Note:** You can tick and untick the titles of the content and it will remove and bring back that particular layer from your map. Try it out.



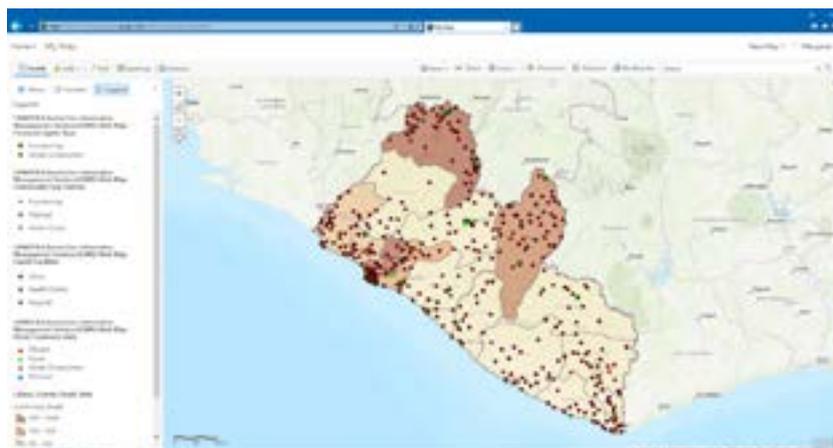
For the purpose of this task the layers retained are:

- UNMEER (Liberia) Geo-Information Management Services (GIMS) Web Map Forward Logistic Base
- UNMEER (Liberia) Geo-Information Management Services (GIMS) Web Map Community Care Centres
- UNMEER (Liberia) Geo-Information Management Services (GIMS) Web Map Health Facilities
- UNMEER (Liberia) Geo-Information Management Services (GIMS) Web Map Ebola Treatment Units

6. Click on **Legend** to access the key for the layers you have added. You will see a separate legend (key) for each layer.

**Note:** You may need to scroll down to view the full legend.

7. Finally don't forget to **Save** your map and **Print** a copy if required.





## Follow-up Work

Describe what your map shows in relation to Ebola in Liberia.

Explain why parts of Liberia have suffered more from Ebola than others areas of the country.

## Concluding Task: Group Discussion

Evaluate this GIS investigation - which parts of it worked well for you and which didn't?

What are the advantages of presenting this data in this format?

What are the limitations of presenting this data in this format?

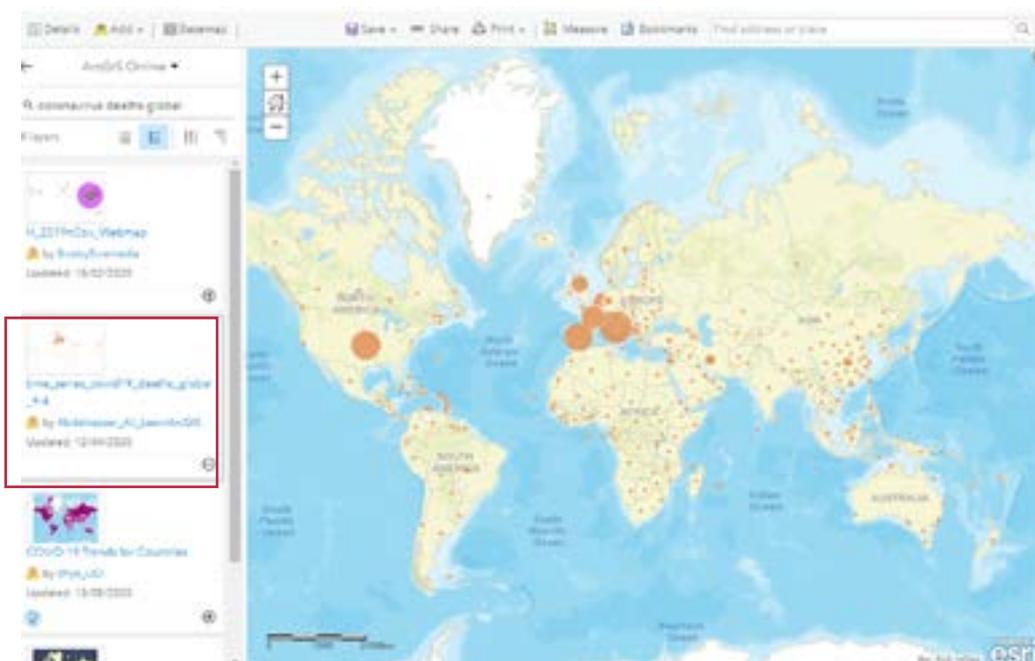


## Task 6: Investigating the spread of Coronavirus in 2020

At this point you should be a master of GIS and, as with the previous task on Ebola, you should refer to the instructions in previous sections if you are unsure how to do a particular aspect, e.g. adding layers.

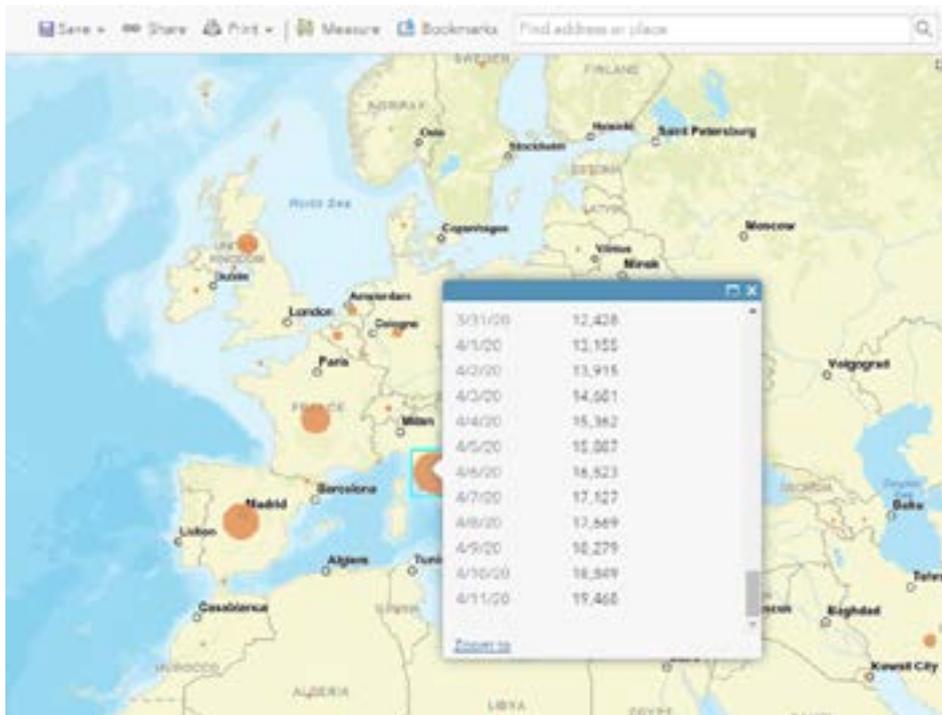
In this task you will investigate the global spread of the Coronavirus pandemic during 2020 to enable you to understand epidemiology transition with references to places for illustration.

1. Start with a base map of the world- make sure you can see most of the world on your screen. A **streets map** will enable you to see country boundaries as topography is not necessary here.
2. Add the following layer from ArcGIS Online: **time\_series\_covid19\_deaths\_global\_9-4** by **Abdelnasser\_Ali\_LearnArcGIS**. This will give you a map with proportional circles as shown below.



3. Zoom in to north-west Europe on your map and click on a country of your choice, this will give you a pop-up showing the death toll for your chosen country. The following screen shot shows the data for Italy up to the middle of April 2020.

**Note:** the data available in ArcGIS Online is constantly updated. By the time you undertake this task you will find that the data has been changed. The following format is used for the date: month/day/year so 4/11/20 represents 11th April 2020.



- Describe what the data shows with regard to the changes over time and the spread of Coronavirus across Europe.

So far the tasks included in this resource have been based on data accessed within ArcGIS Online. This is both convenient and allows the user to display the data easily as a map. However, there are many sources of reliable data online and you may find data elsewhere on the Internet that you would like to display in cartographic form. ArcGIS Online allows you to **import** data that you can then use to create a map.

You are going to import your own data and use it to create your own map.

- Go to the World Health Organisation website. This can be found at [https://covid19.who.int/?gclid=CjwKCAjwh472BRAGEiwAvHVfGrC1-3iCbc8j7sDzCwRZNsgELD1aHuv1w74ivCa9D-B\\_ukOlP6mpixoCkLIQAvD\\_BwE](https://covid19.who.int/?gclid=CjwKCAjwh472BRAGEiwAvHVfGrC1-3iCbc8j7sDzCwRZNsgELD1aHuv1w74ivCa9D-B_ukOlP6mpixoCkLIQAvD_BwE).

As this can be complicated to find you can search for the title: **WHO Coronavirus Disease (Covid-19) Dashboard**.

- Select **Download Map Data**. You may be prompted to open or save the spreadsheet, if so select **open**. You may also receive a security alert,





if so click **allow**. This will download the map data onto a **WHO Excel spreadsheet** in a CSV format. The spreadsheet will show the data relating to the number of deaths and the number of confirmed cases for every country over time. This is a huge document so you will not be able to import it all. It is best to simply import the most recent data. To do this you need to firstly apply filters to the WHO Excel worksheet by following these steps:

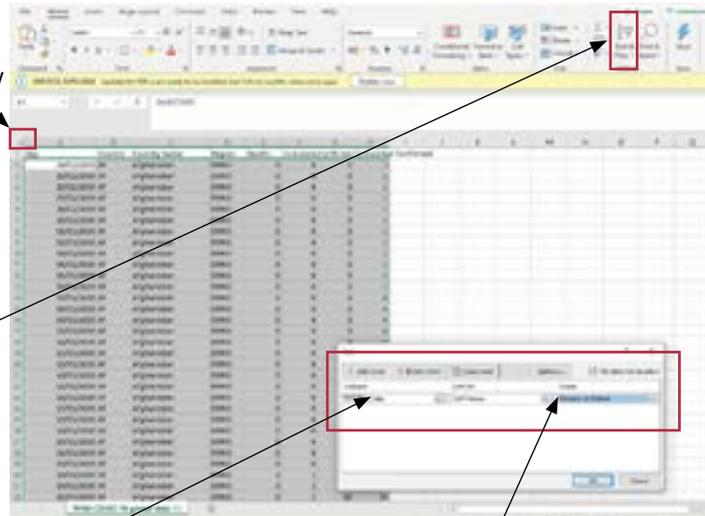
a. Select all of the worksheet by clicking on the arrow head at the top right hand corner of the spreadsheet. All cells should be highlighted.

b. Click on **Sort & Filter**, select **Custom sort** from the drop down menu. This will open a pop up window.

c. Select sort by: **day**

d. On the right hand side of the pop up click on the down arrow and select **Newest to Oldest**.

e. Now click OK.



**Note:** You may see a slightly different drop down menu when you click on Sort & Filter, you may have the option to sort from oldest to newest or newest to oldest. If this option is open to you select newest to oldest and the data will automatically be sorted to show the most recent data at the top.

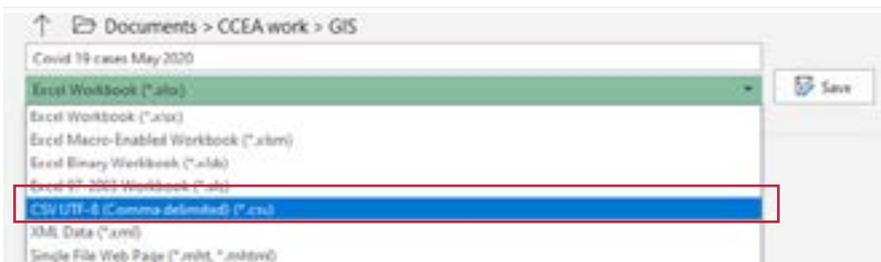
7. You now need to copy the data which is the most recent in your search (in this example it is 19th May 2020). Highlight the data for your chosen date and right button click on **Copy** in the pop up window as shown in the following screen shot. **Paste** this data into a new excel spreadsheet.

**Tip:** the alphabetical list of countries should extend over 217 rows.

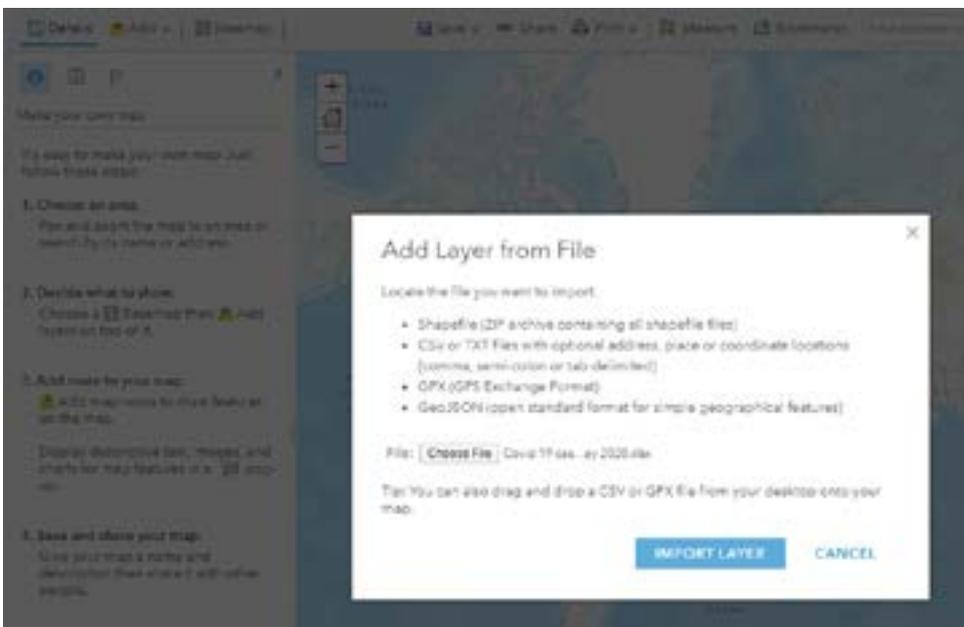
**Name** the spreadsheet and remember to **Save** it as a **csv (Comma delimited) file**, not an excel workbook, otherwise the data will not import. Saving the spreadsheet to your desktop will make it easier to find at the next step.



day	Country	Country Name	Region	Deaths	Cumulative Confirmed	Cumulative Confirmed
15/05/2020	AF	Afghanistan	EMRO	4	177	583
15/05/2020	Al	Albania	EURO			7655
15/05/2020	DZ	Algeria	AFRO			1448
15/05/2020	AD	Andorra	EURO			
15/05/2020	AO	Angola	AFRO			20
15/05/2020	AI	Anguilla	AMRO			3
15/05/2020	AG	Antigua and Barbuda	AMRO			5
15/05/2020	AR	Argentina	AMRO			8
15/05/2020	AM	Armenia	EURO			1
15/05/2020	AW	Aruba	AMRO			11

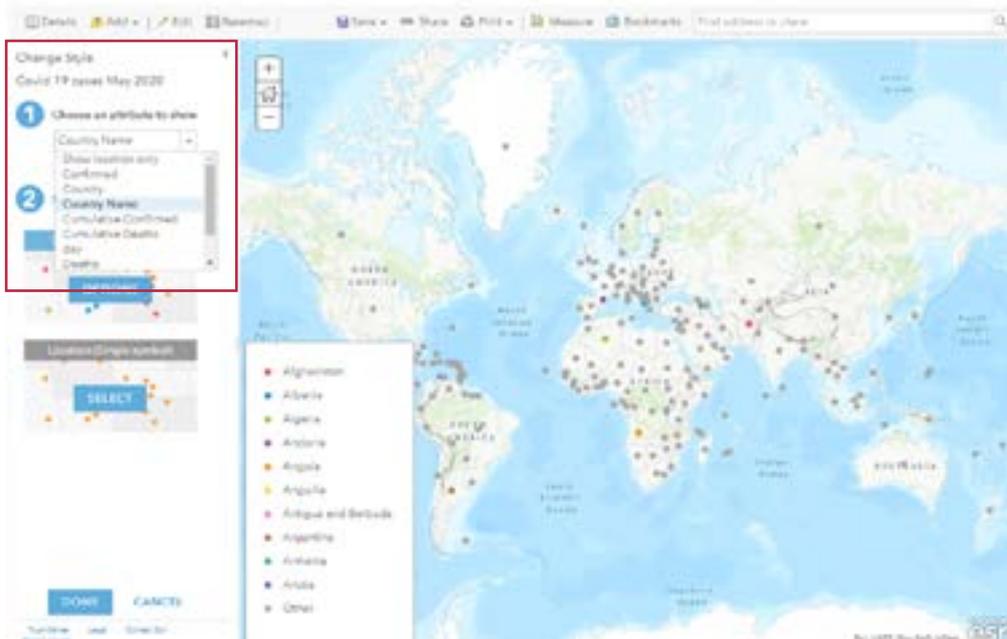


- You are now ready to import this data into ArcGIS Online. Go back to ArcGIS Online and select **add layer from file**, you will find this is under the Add heading. **Browse (search)** for your saved CSV file in the **Choose File** area and then click **Import Layer**. You might receive a message stating that not all points could be imported, but that is OK.



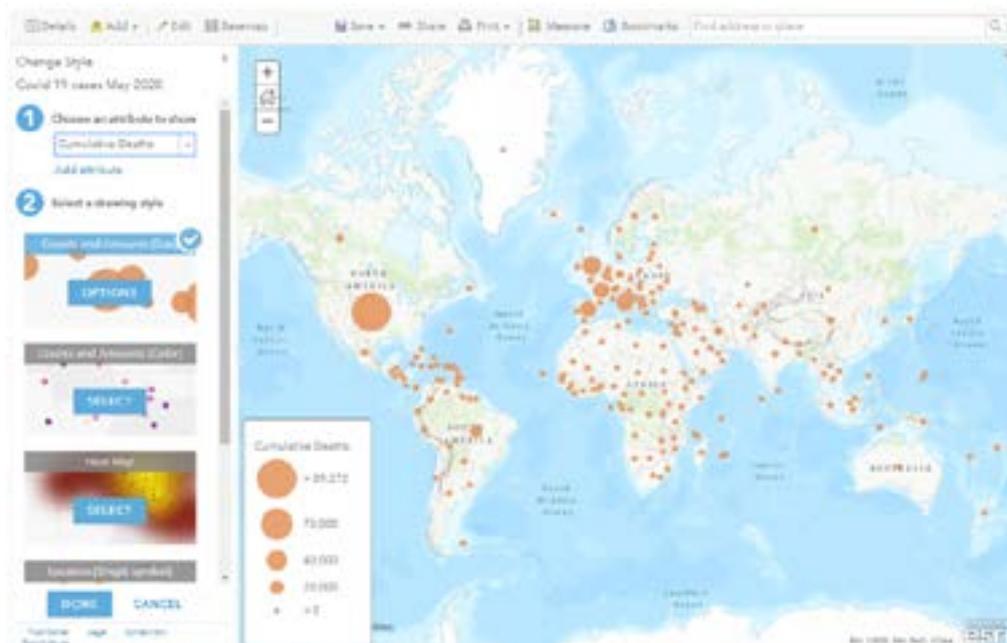


9. The default map will look like the one shown below.



But it would be better to select the **cumulative deaths** so that the data is plotted as proportional circles. This will provide a better visual impression of the impact of Covid-19 worldwide.

Now that you are more confident with GIS you can play around with the styles, choosing different attributes to map. You can save each map separately, but don't forget to click **DONE** to ensure that your layer has been added. You can experiment with a different key to your map. Don't be afraid to experiment with the data.



This same technique can be used to map any global or regional data that exists as a csv file and is linked to place (co-ordinates or latitude and longitude).



## **Follow up work for discussion:**

What do your maps demonstrate about the global impact of a pandemic?

Why do you think some countries suffered greater losses than others?

Can you see any difference between LEDC/MEDC deaths due to pandemics? Why might this be the case?

How does Globalisation impact the spread of disease as well as ideas across the world?