

Microreact and KlebNet Webinar

22nd November 2022

About:

Microreact (<https://microreact.org/>) is a web-based application for the provision of interactive data visualisations. It enables the rapid generation and linkage of trees, maps, networks, charts and timelines. This tutorial will walk you through (1) setting up a project and uploading data and a tree; (2) setting up new panels with new visualisations; (3) creating views and using data slicers; (4) sharing Microreact projects.

The tutorial data set:

The data we will be using for this tutorial comes from the BARNARDS study, specifically the paper [Sands et al \(2021\)](#). We will use a collection of the *Klebsiella pneumoniae* isolates, their genomes and associated metadata downloaded from [Pathogenwatch](#) and linked using Data-flo to create interactive visualisations in Microreact. To access the data, click on this publicly available [Microreact project](#).

Useful Links:

[Microreact](#)

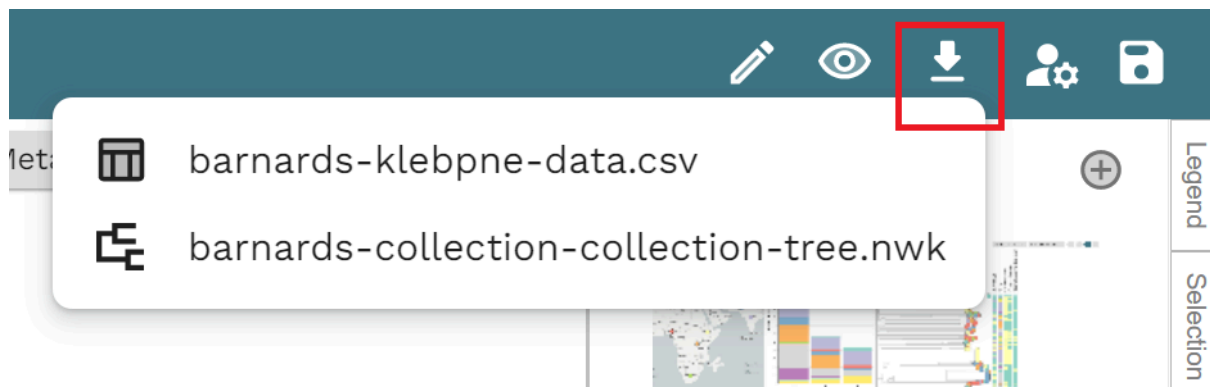
[Microreact Documentation](#)

[Pathogenwatch collection](#)

[Tutorial Data](#)

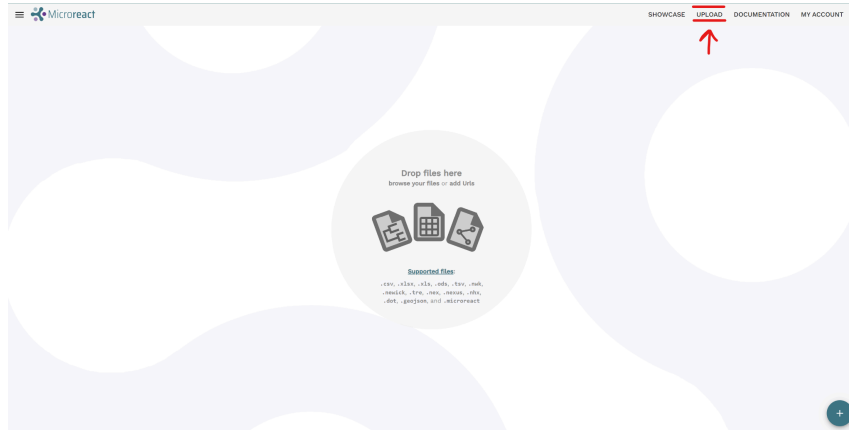
Before the tutorial:

Download the joined metadata and phylogenetic tree from the link provided. From the Microreact dashboard you can download the metadata file and tree associated with the project.

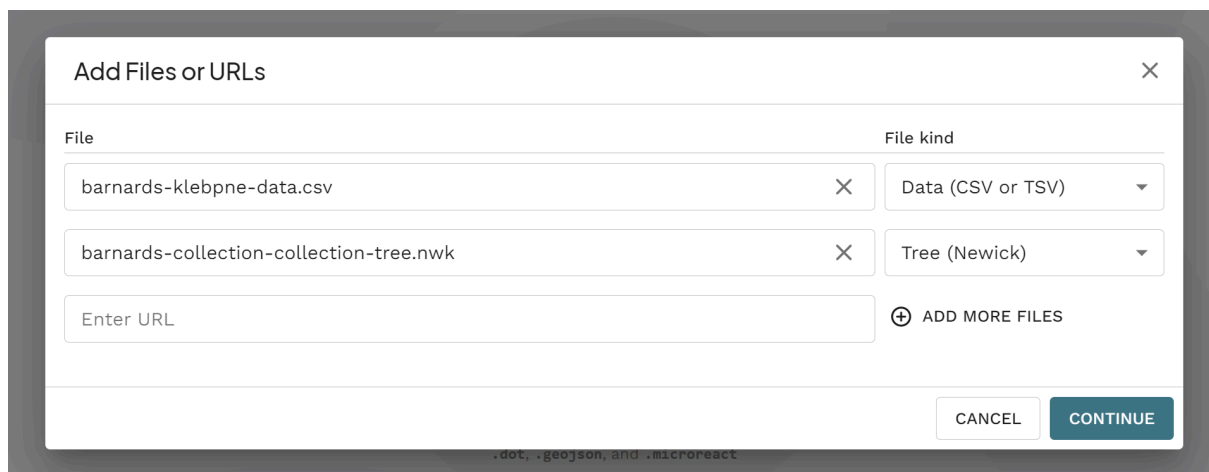


Uploading data and setting up a project:

From the Microreact home page click on Upload and it will bring you to this screen, from here you can drag and drop your files into Microreact.



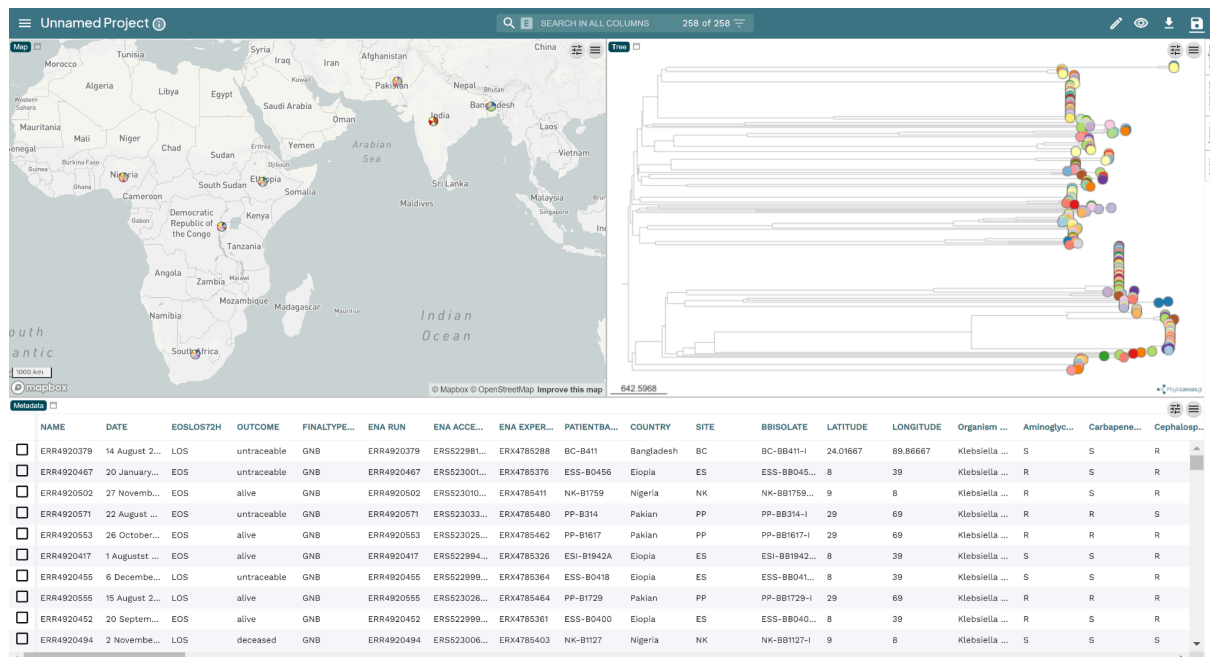
Drag in both your data file and tree file at the same time, if not you can select 'ADD MORE FILES' to add any additional files you might want.

A screenshot of the 'Add Files or URLs' dialog box in Microreact. The dialog box has a title bar with a close button (X). It contains two columns: 'File' and 'File kind'. Under 'File', there are two input fields: 'barnards-klebpne-data.csv' and 'barnards-collection-collection-tree.nwk', each with a delete button (X). Below these is an 'Enter URL' input field. Under 'File kind', there are two dropdown menus: 'Data (CSV or TSV)' and 'Tree (Newick)'. At the bottom right of the dialog box, there is a '+ ADD MORE FILES' button. At the bottom of the dialog box, there are two buttons: 'CANCEL' and 'CONTINUE'.

Click 'CONTINUE' and Microreact will automatically recognise an ID column and ask you to verify. This should be the identifier that links your data to your tree.

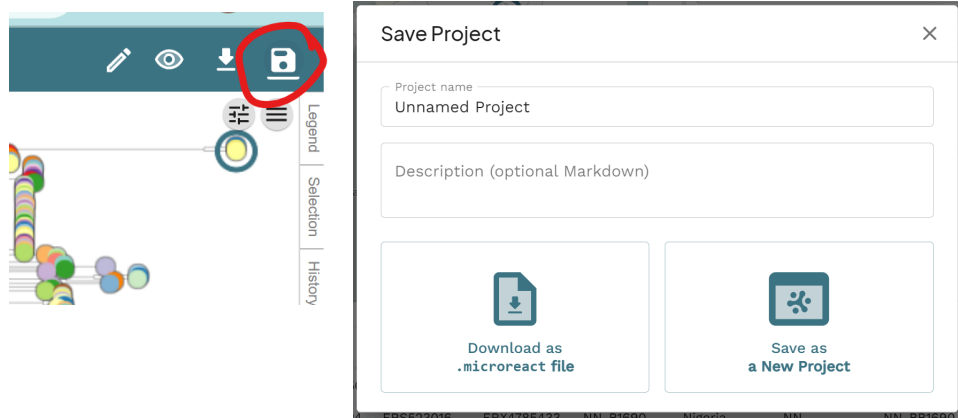
This column in our data is 'NAME'.

Once you press continue you will see this dashboard - The tree and map have been automatically rendered. This is your basic Microreact dashboard.



From here we can save the project in the top right of the screen, the save menu gives you the option of changing your project name, adding a description and either downloading the Microreact as a file or saving as a new project.

Click 'Save as a New Project' after renaming your project 'KlebNET_BARNARDS_demo':



At the point of saving, Microreact will give you the option of setting your project access and giving you the sharable link for your specific project. You can change these settings at any time but for now I have chosen this project to be 'Public Access'.

Share with People
×

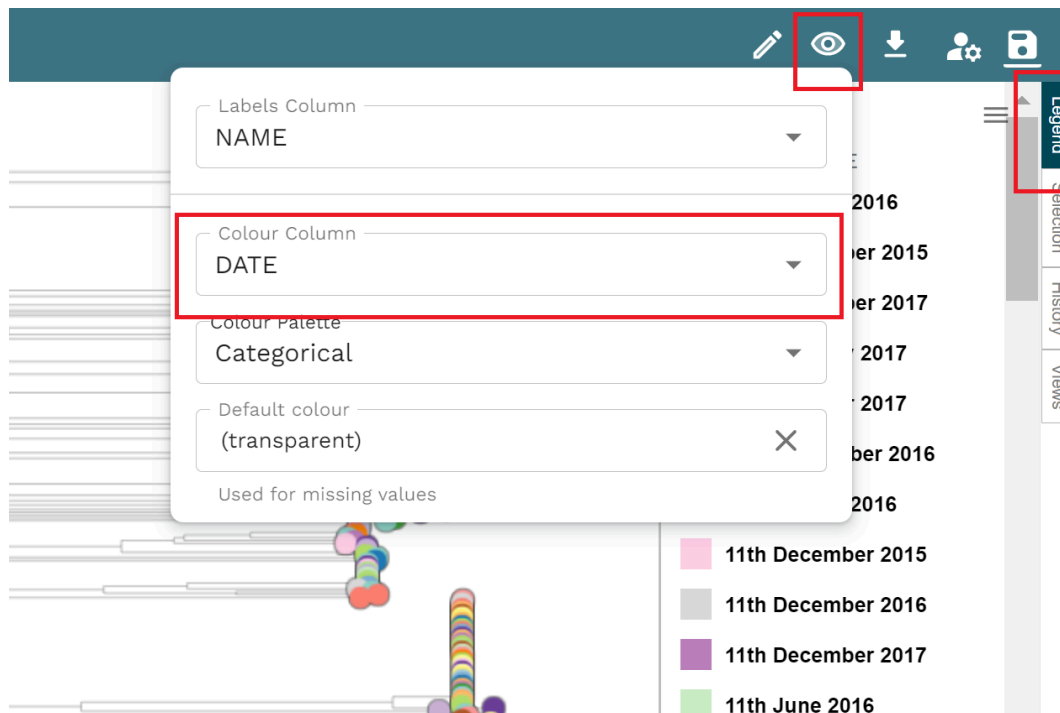
Project Link
<https://microreact.org/project/3XU1Bpcx1SE2d36NYT4ymz>

Access Control
Public Access
Anyone on the Internet with this link can view the project

Enter an email address to share then press enter

Creating data visualisations and interrogating the data:

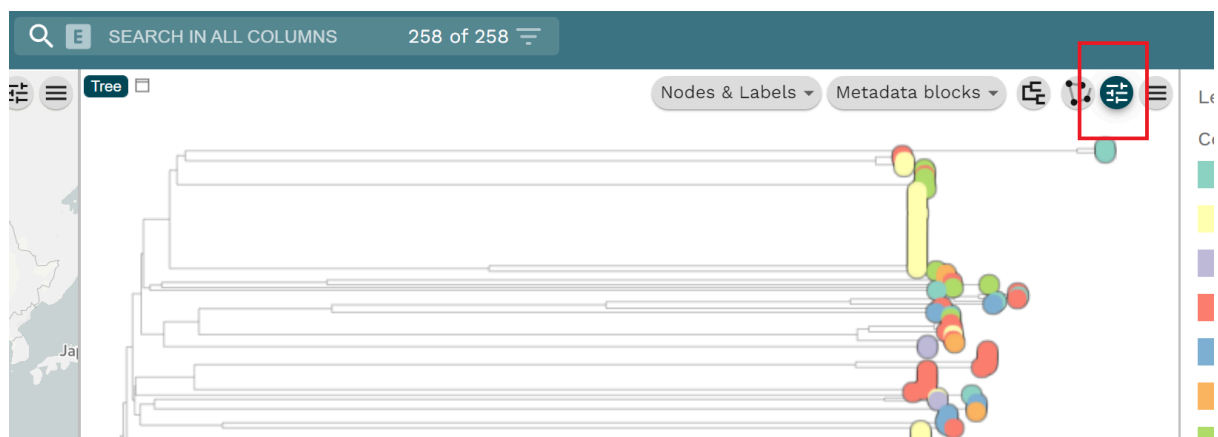
From here we can start to interrogate the data you have uploaded and explore the interactive nature of the panels.



Select the 'Legend' tab on the right of the screen. This shows you that the visualisations are currently coloured by the 'DATE' column.

To change the overall colour column, select the 'eye' icon along the top bar and from the drop down menu select 'COUNTRY'. You will see the legend and colours change to reflect your choice.

Within each visualisation panel there is a 'Panel Configuration' option which will allow you to tweak aspects of the visualisation.

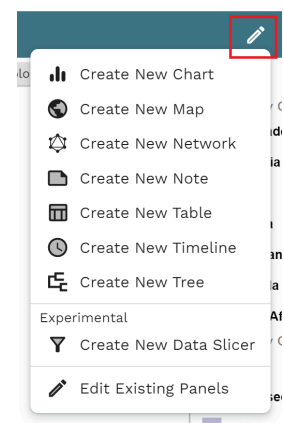


Select the panel configuration in the Tree panel and you will see options to change the layout of the tree and options for changing aspects of the Nodes & Labels.

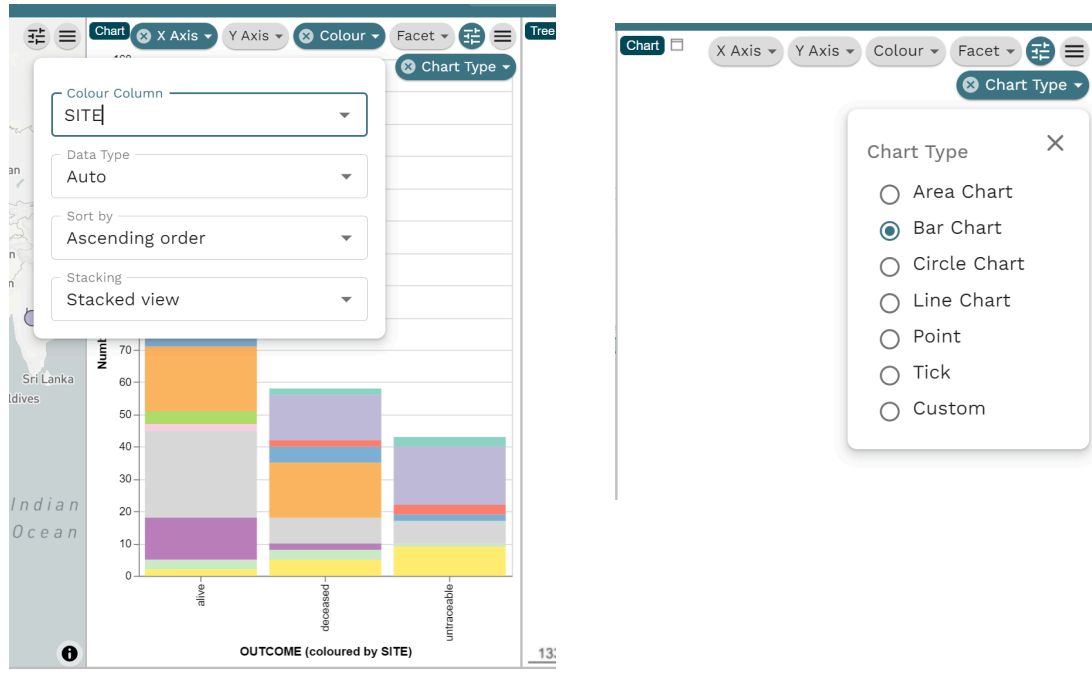
Select the option for Metadata blocks and begin to select some of your variables to visualise next to your Tree. Select 'OUTCOME', 'SITE', 'Carbapenems', 'Fluoroquinolones' and 'Cephalosporins'. You will see these added to the Legend sidebar.



You can start adding new charts using the pencil icon along the top bar. Select it and click 'Create New Chart'. Click an area of your dashboard to create the chart.

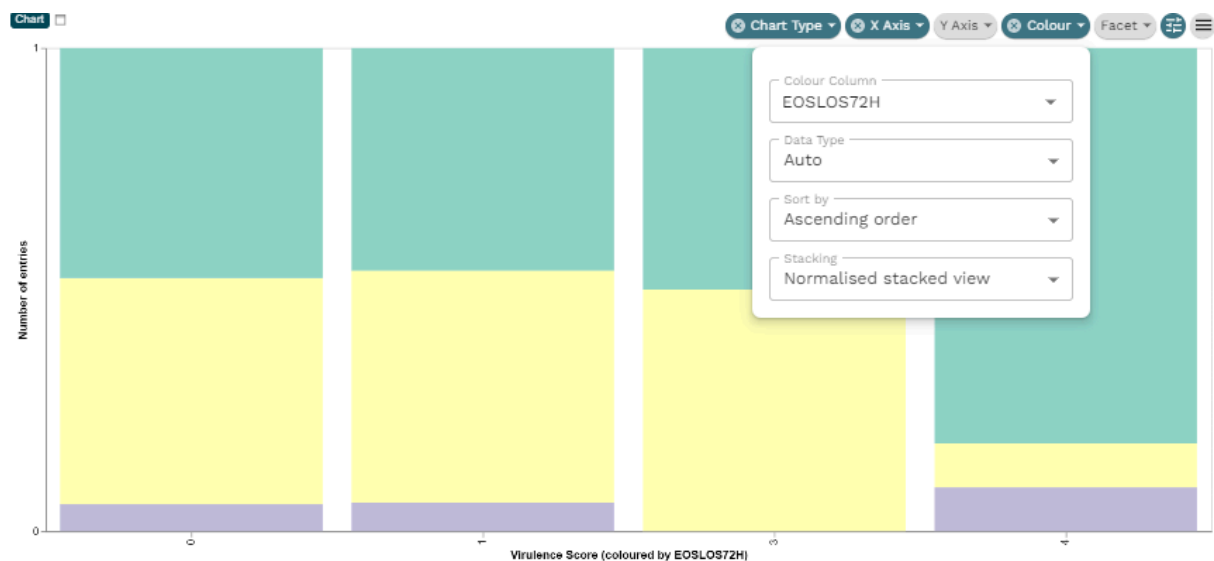


Select Bar Chart from the list of chart types. Select OUTCOME as your X-axis column. You can change what the chart is coloured by. Change the colour to SITE.



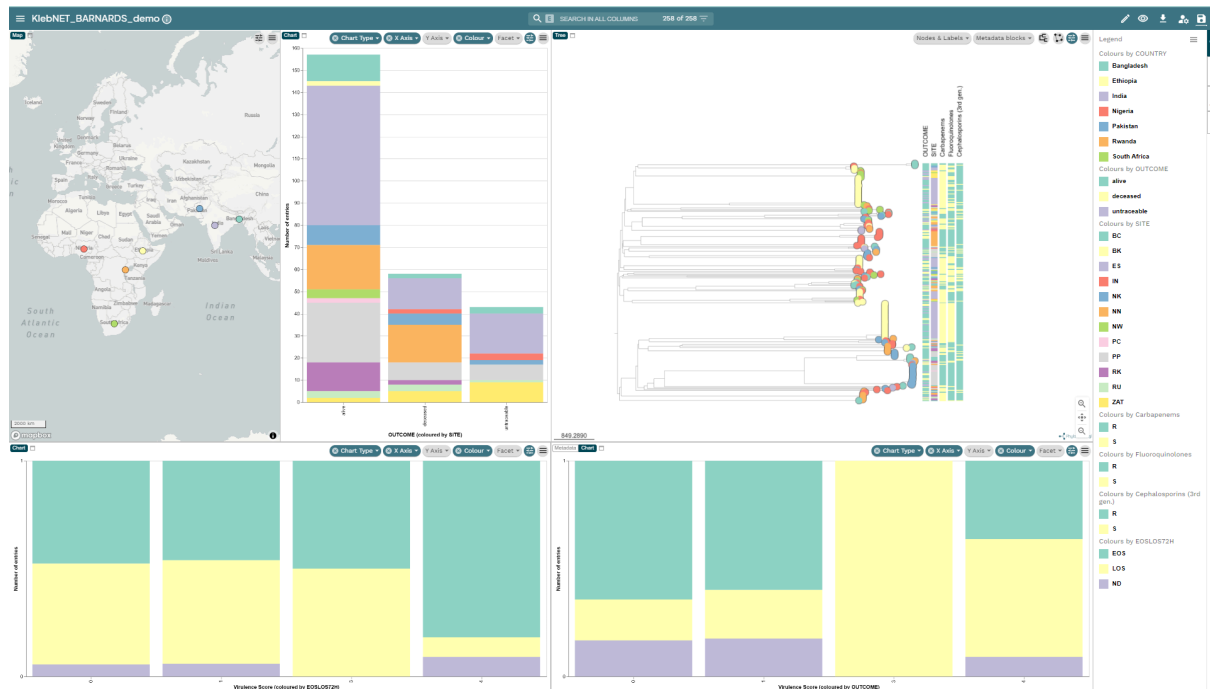
We are going to look at the virulence of the isolates. Create another new chart and place it in the bottom left corner of your dashboard.

Select Bar chart, choose 'Virulence Score' for your x-axis, you will need to select the Data Type within the x-axis dropdown menu as 'Ordinal' and choose 'EOSLOS72H' as the variable you are colouring by. Within the Colour drop down menu there is an option to choose Stacking - Select 'Normalised Stacked View'.



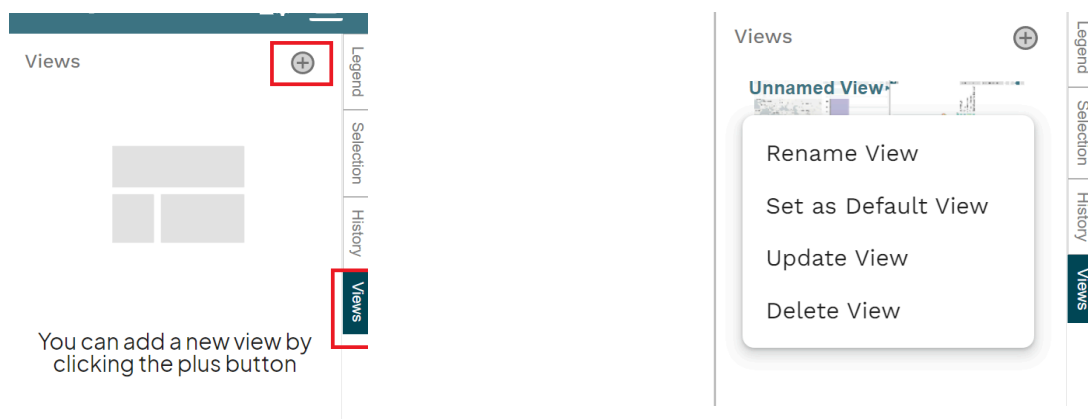
We are going to create another normalised bar chart of virulence score but this time coloured by 'OUTCOMES'. Place this chart over the top of your metadata panel. Select Bar chart, choose Virulence score as your x-axis, select the data type as Ordinal, colour by OUTCOMES and select Normalised Stacked View.

Your final dashboard will look like this:

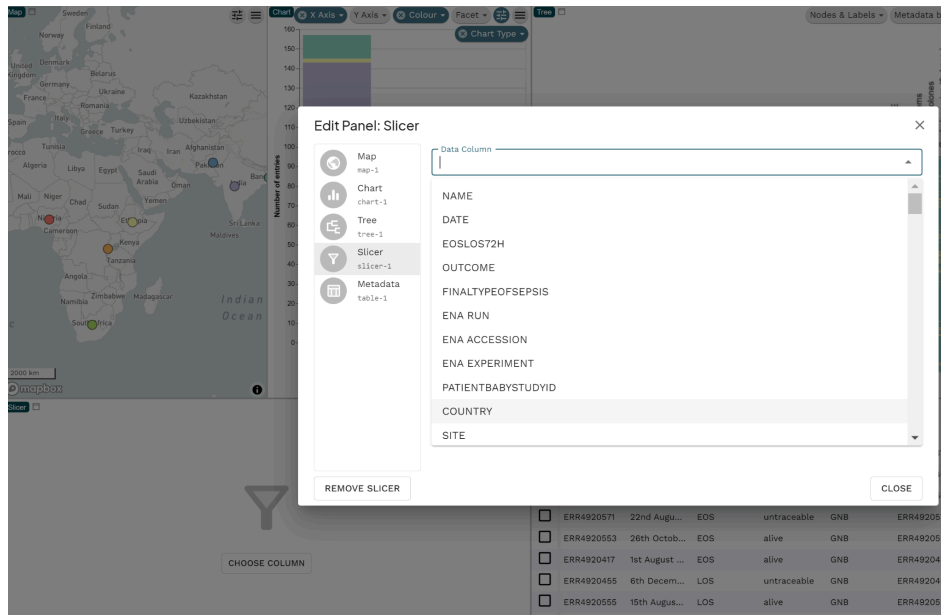


We are going to focus on a specific subset of the data. On the sidebar on the right of the screen select 'Views' and click on the + button to create a view of the current dashboard.

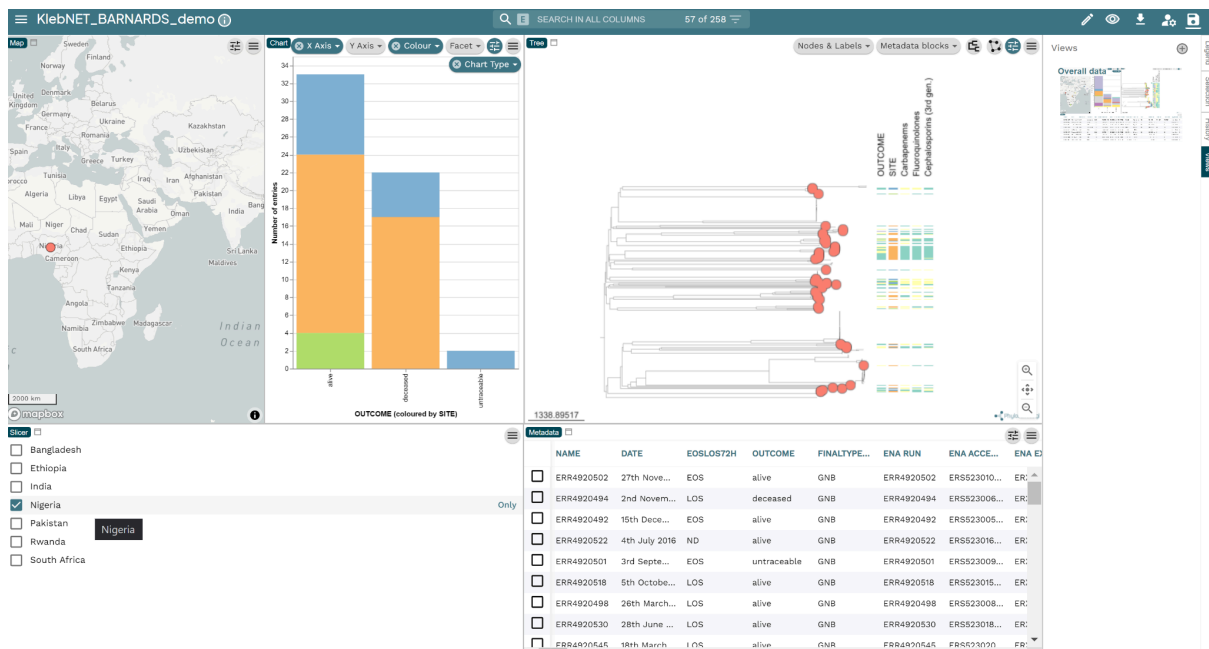
Click on the upper right corner of the View and you will be able to rename your view. Rename this current view - 'Overall data'. This is also where you will be able to save any changes to your view by clicking 'Update View'.



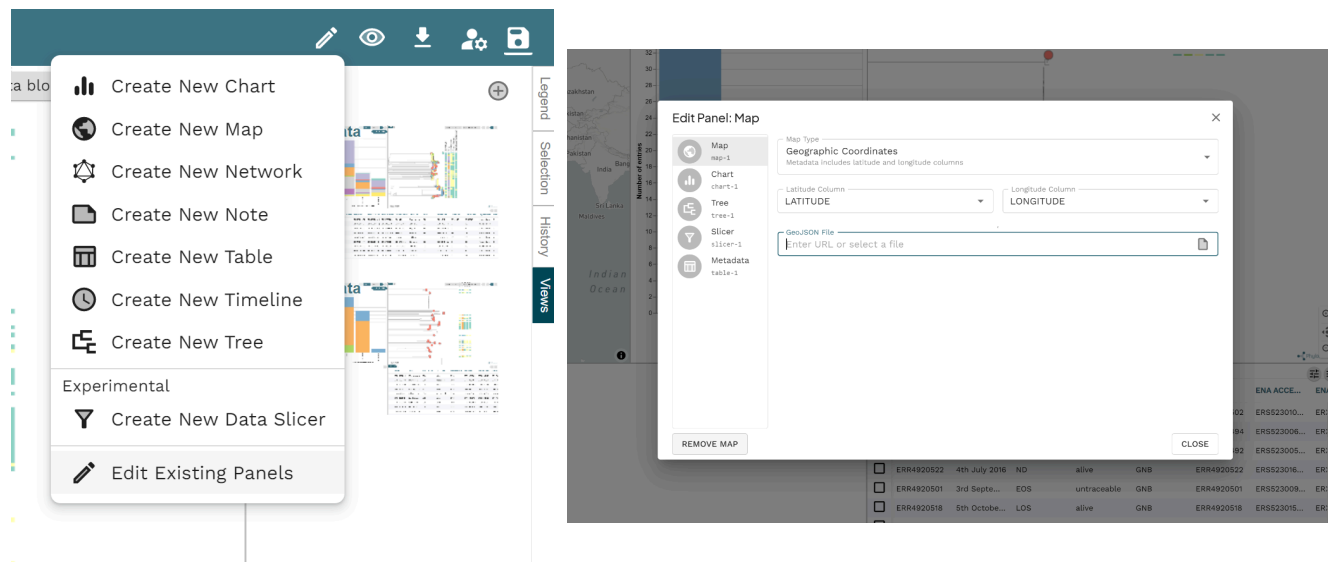
We are going to take a look at the isolates from Nigeria using the Data Slicer. Click on the pencil button and select 'Create New Data Slicer'. Drop this panel next to your Metadata panel.



Select 'Choose column'. For the 'Data Column' select COUNTRY. This will allow us to filter the data by country. Select 'Nigeria' and you will see that all of the panels update to only show the data by Nigeria. On the Views sidebar click the + button to create a new view. Name this view 'Nigeria data'.



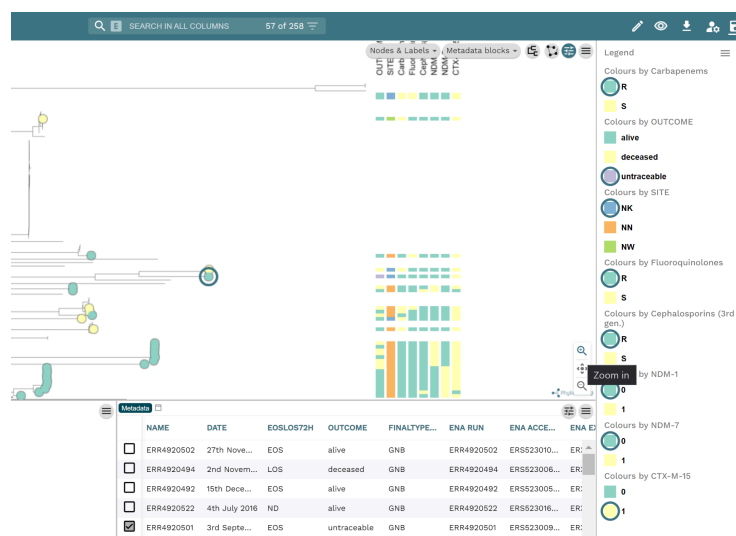
As we are only looking at Nigerian data we can now remove the map panel. Select the pencil icon and click on 'Edit Existing Panels'. Select the Map panel and click 'Remove Map'



On the Views sidebar, click in the top right corner of the Nigeria view and select 'Update View'. You will see the view now reflect these changes. It is important that after any changes you make you update the view so that you don't lose any progress.

Change the chart X-axis to 'SITE' and change the colour column to 'Outcome'. Update your view.

On the Tree panel add additional metadata blocks for 'NDM-1', 'NDM-7', 'CTX-M-15' and 'Virulence score'. Zoom in on the tree and select an isolate on the tree. Open the Legend from the side tab. You can see the characteristics of that isolate highlighted in the Legend tab.



Let's add another chart looking specifically at 'CTX-M-15'. Click on the pencil and 'Create New Chart'. Create another Bar Chart with the 'CTX-M-15' column chosen for the X-axis.

We will now Facet this chart. We are interested in the differences between sites in Nigeria. Select 'Facet' and choose 'SITE' as the column to facet by.

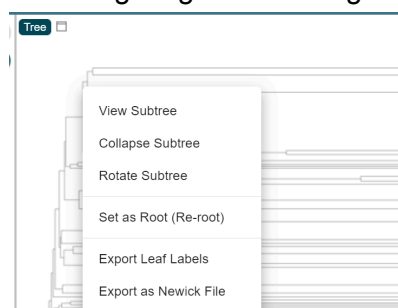


Update this view with your new panels and then click back on your view with all the data.

We will now focus on a specific cluster on the tree. To select this you can click on the tree and the other panels will update to just show the selected data.



This allows you to start interrogating the tree. Right click on your selection and choose to view subtree.



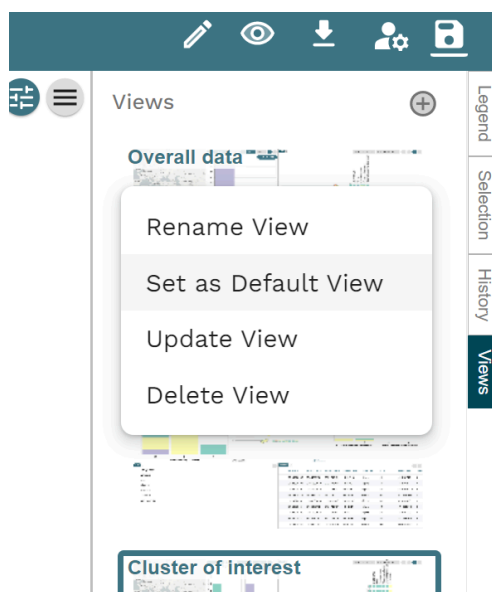
We will create another view using this data. Click the plus button on the Views side tab and name this view 'Cluster of interest'.

Within this view add the metadata blocks 'CTX-M-15' and 'Virulence Score'.

Edit the bar chart to facet by Country. Here we can specify the number of columns used for the facet. Update the view.

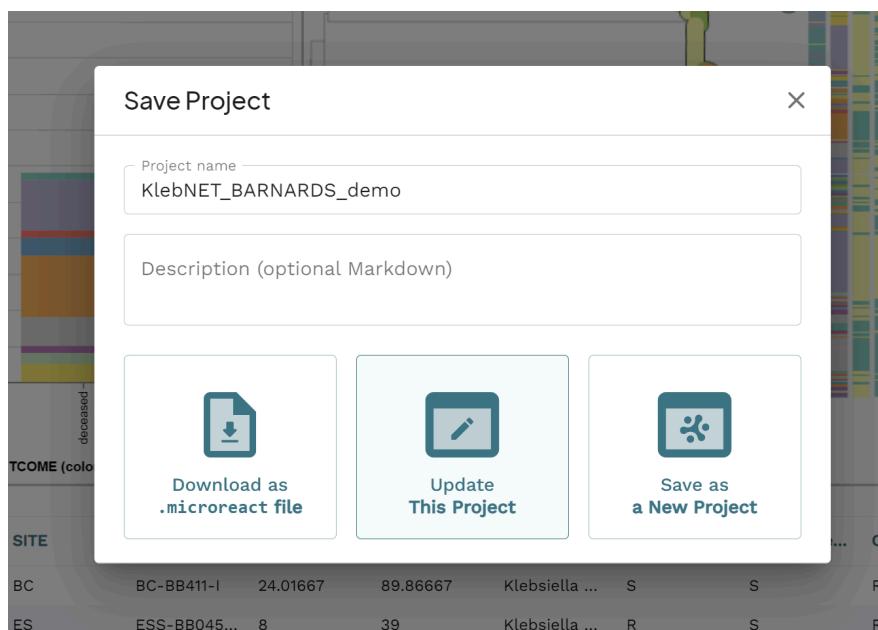


To reorder the views click and hold the view you want to move and drag and drop. Set the Overall data view as the default view by right clicking on the view and select 'Set as Default view'.

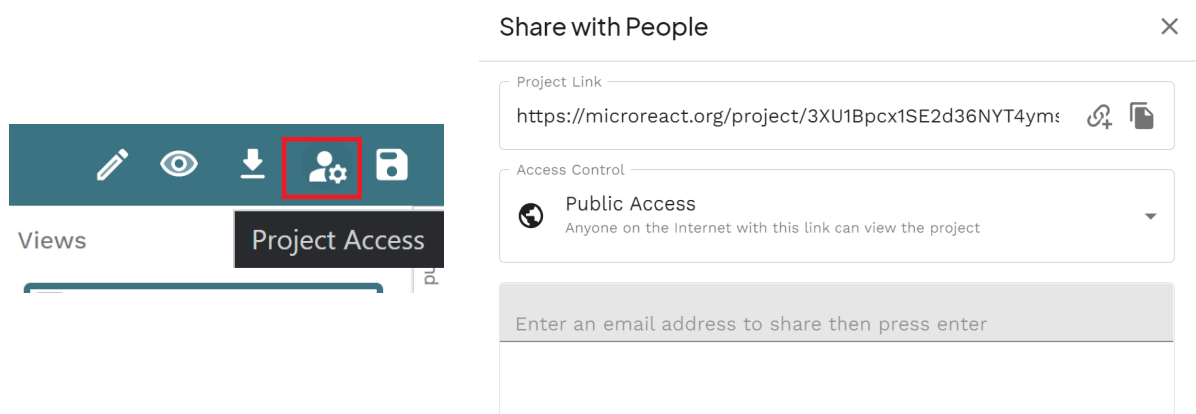


Saving the project:

Once you have all your views updated, click on the save button on the top bar.
Click 'Update this Project'



Once you have saved your project you can share the dashboard with others if you have set permissions as publicly available.



Extra projects:

Extra datasets are publically available as part of our showcase section on the Microreact homepage. Explore some of these datasets and play around with the functions to see what you can create.

