



LEVEL

2

Black Death Cities

from the Geolnquiries™ collection for World History

Target audience – World history learners

Time required – 25 minutes

Activity

Use the Center And Distribution tool to determine where two-thirds of the cities in Europe were struck by the Black Death in the mid-1300s.

Social studies Standards

C3:D2.His.1.9-12. Evaluate how historical events and developments were shaped by unique circumstances of time and place as well as broader historical contexts.
C3:D2.Geo.7.9-12. Analyze the reciprocal nature of how historical events and the spatial diffusion of ideas, technologies, and cultural practices have influenced migration patterns and the distribution of human population.

Learning Outcomes

- Analyze the distribution by year of cities in Europe struck by the Black Plague.
- Infer how disease follows patterns of migration and trade.

Level 2 Geolnquiry Requirements

- A free school ArcGIS Online organization account.
- Instructors or students must be signed in to the account to complete this activity.
- Approximately 0.066 credits will be used per person in this activity as scripted.

Map URL: <http://esriurl.com/worldHistoryGeolnquiry12>

 **Ask**

Where were the major cities affected by the Black Plague in the mid-1300s?

- Click the link above to launch the map.
- In the upper-right corner, click Sign In, and then use your ArcGIS Online organizational account to sign in.
- To the left of the map, widen the Details pane until you see the names of the buttons and click Content.
- Turn off all the layers by unchecking all the boxes except for Black Death Cities: Europe Animation.
- Click the tab above April 30, 1347 on the slider, and then slide it all the way to the right so that all cities are displayed.
- ? Where were the major cities affected by the Black Plague in the mid-1300s located? [*Europe*]

 **Explore**

How can you show the extent of a disease outbreak across an area?

- You will now create a map layer that will summarize and calculate the dispersion of the cities in Europe that were struck by the Black Plague. The dispersion method is helpful when the spatial pattern of features (in this case, cities where there was Black Plague) are concentrated toward the center with features thinning out toward the periphery. A one-standard-of-deviation ellipse contains approximately 63 percent (or two-thirds) of the cities.
 - See the Summarize Center And Dispersion ToolTip on the next page, and then use the first bullet to navigate to the appropriate tool.
 - Use the following information to set the tool parameters:
 - 1 For the layer, choose Black Death Cities: Europe Animation.
 - 2 For Summary Types, check the Ellipse box, accept the default of 1SD (which means 1 standard deviation), and uncheck any other boxes, if necessary.
 - 4 For Group By, choose Year.
 - 5 For Result Layer Name, name your new layer **Distribution of Black Death Cities by Year** and include the unique student code.Uncheck the Use Current Map Extent box so that in this case, you will compute population for all European Black Death Cities.
- Always click Show Credits to ensure acceptable credit usage, and then click Run Analysis.
- ? What do you now see displayed on the map? [*Three ellipses encircling some but not all the Black Death cities*]

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Acquire

What happens to the heart of the distribution of Black Plague cities over time?

- Click the bottom ellipse and look at the pop-up.
- ? What is the final field in the pop-up? [*The Year field for 1347*]
- Click the remaining two ellipses and look at those pop-ups.
- ? What is the Year in that field in the pop-ups? [*1348 and 1349*]
- ? Describe how you think the disease spread through Europe. [*It arrived early in 1347 in port towns in the Mediterranean, spread northeast toward Great Britain in 1348, and then swung east and north toward the Baltics.*]

Analyze

What happened to the disease after 1349?

- This analysis tool took into consideration the Black Death cities and drew a circle around 66 percent (or two-thirds) of those cities. We can now tell how the data is distributed.
- Click the three medium-to-dark-orange city dots and view the Year field in the pop-ups.
- ? What years did those cities experience the Black Plague? [*1350, 1351, and 1352*]

Act

Why are there no centers of distribution around the final three years of the Black Plague outbreak?

- ? How many cities were newly infected in 1350, 1351, and 1352? [*Only one city represents each year where the city experienced the Black Plague.*]
- ? Why are there no large circles around the distributions of the cities in 1350–1352? [*You need multiple cities to compute the standard ellipse showing distribution of cities. The disease spreads but more slowly because the major cities are much farther apart.*]
- ? If this is how disease spreads, what can you infer about valuable trade items and technologies? [*They should follow the same basic pattern described by the disease spread.*]

IDENTIFY DISPERSION PATTERNS

- Click outside the dispersion circle not overlapping with the other dispersion circles.

SUMMARIZE CENTER AND DISPERSION

- Above the Contents pane, click Analysis, expand Summarize Data, and then click Summarize Center And Dispersion.
- Choose a layer, set the tool to the appropriate parameters, include a Result Layer Name, and then click Run Analysis.

Next Steps

DID YOU KNOW? ArcGIS Online is a mapping platform freely available to public, private, and home schools. A school subscription provides additional security, privacy, and content features. Learn more about ArcGIS Online and how to get a school subscription at <http://www.esri.com/schools>. THEN TRY THIS...

- Complete the Summarize And Center Distribution again.
- Choose the Method Of Arrival of the Black Plague to the cities and explore the distributions of different modes of arrival.

TEXT REFERENCES

This GIS map has been cross-referenced to material in sections of chapters from these high school texts.

- *Name of book by Author*
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