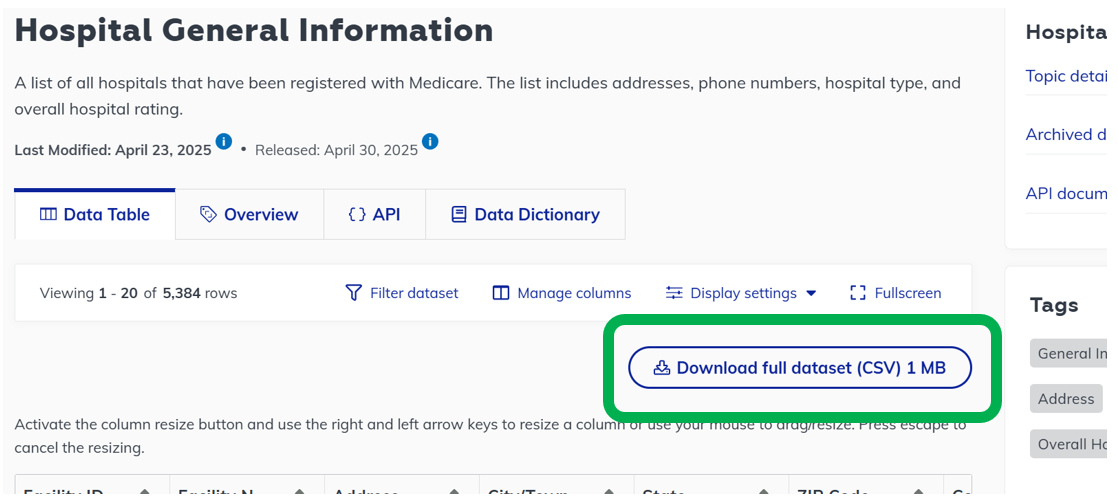
**Hospital (Emergency Room) Deserts Across Iowa**

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| Wiki: **Medical deserts in the United States** [ [Link](https://en.wikipedia.org/wiki/Medical_deserts_in_the_United_States) ]  The [United States](https://en.wikipedia.org/wiki/United_States) has many regions which have been described as [medical deserts](https://en.wikipedia.org/wiki/Medical_desert), with those locations featuring inadequate access to one or more kinds of medical services. [[1]](https://en.wikipedia.org/wiki/Medical_deserts_in_the_United_States#cite_note-1) An estimated thirty million Americans, many in [rural regions](https://en.wikipedia.org/wiki/Rural_area) of the country, live at least a sixty-minute drive from a [hospital](https://en.wikipedia.org/wiki/Hospital) with trauma care services. |

The goal of this problem is to investigate the hospital (or emergency room) deserts across the state of Iowa. Three data sources will be used for this investigation – hospital information data from the Centers for Medicare & Medicaid Services web portal, data obtained from the Geoapify.com app that returns latitude and longitude measurements for hospitals in Iowa, and the US Zip Codes Database that includes latitude and longitude measurements for all zip codes.

Dataset #1: Hospital Information

Source: <https://data.cms.gov/provider-data/dataset/xubh-q36u>



*Action*: Open this file in Tableau Prep. Apply the following filters to reduce the records to include the hospitals in Iowa that provide emergency room care.

* FILTER to State = IA
* FILTER to Hospital Type = Acute Care Hospitals OR Hospital Type = Critical Access Hospitals
* FILTER to Emergency Services = Yes

*Deep (Data) Thoughts:*

* Make note of the number of hospitals in Iowa that provide emergency room care
* Consider a SELECT action to minimize columns as a JOIN is forthcoming

Dataset #2: Hospital Location

A Hospital Location file will need to be created. This file needs to contain the latitude and longitude measurements for each hospital in Iowa. The latitude and longitude measurements will be obtaining using an app from Geoapify.com ( <https://www.geoapify.com/tools/geocoding-online/> ). This app allows you to submit a bulk set of addresses at once.

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| **Step 1**: Using the Hospital Information file, create a Hospital\_Addresses.csv file as shown here. | A screenshot of a phone  AI-generated content may be incorrect. |
| **Step 2:** Upload the Hospital\_Addresses.csv file to geoapify.com. The app will generate latitude and longitude outcomes for each hospital in this file. |  |
| **Step 3**: Download the file created by geoapify.com. This file, named Hospital\_Addresses\_with\_Lat\_Long.csv, will be joined with the Hospital Information data. |  |

*Action*: Using a JOIN, create a new table that includes the latitude and longitude measurement for each hospital in Iowa. A LEFT JOIN will be used here where Table A is the hospital information file and Table B is the Hospital Addresses with Lat and Long returned from geoapify.com. Table A should be retained.

*Deep (Data) Thoughts:*

* Verify that the number of records in the joined table make sense.

Dataset #3: Zipcode Information

Source: https://simplemaps.com/data/us-zips

A screenshot of a computer

AI-generated content may be incorrect.

Download and unzip the Zipcode file. Open this file in Tableau Prep.

The following variables are most relevant for our investigation.

* zip: five-digit zipcode
* lat: latitude of the centroid location of this zipcode
* lng: longitude of the centroid location of this zipcode
* city: Name of the city for that zipcode
* state\_id: State abbreviation for that zipcode

*Action*: Apply a filter on the Zipcode data to include only zip codes where state\_id = IA.

*Deep (Data) Thoughts:*

* Make note of the number of unique zip codes that are present for that state of Iowa.
* Consider a SELECT action to minimize columns as a JOIN is forthcoming

*Action*: If you have not already done so, create a table that includes zip, lat, lng, city, state\_id from the Zipcode data file. This file will be used for a JOIN with the Hospital Information file that includes Lat and Long for each hospital. Using a CARTESIAN JOIN, create a table that has all hospital locations crossed with all zipcodes/cities in IA. Using State as the key for JOIN will allow for a CARTESIAN JOIN to be done in Tableau Prep.

A screenshot of a computer

AI-generated content may be incorrect.

*Action*: After completing the cartesian JOIN, each record should include a latitude and longitude measurement for a particular hospital and a latitude and longitude measurement for a particular city. Using Haversine formula, compute the distance (in miles) between the hospital and the city for each record. The MUTATE action is provided here so that the formula can be copied directly into Prep.

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| Create Calculated Filed in Prep | Copy/Paste Haversine Formula |
| A screenshot of a computer  AI-generated content may be incorrect. | 3959\*ACOS(  SIN(RADIANS([Hospital\_Latitude]))\*  SIN(RADIANS([City\_Latitude]))  +  COS(RADIANS([Hospital\_Latitude]))\*  COS(RADIANS([City\_Latitude]))\*  COS(RADIANS([Hospital\_Longitude]) -  RADIANS([City\_Longitude])  )  ) |

*Deep (Data) Thoughts:*

* Using Google Maps, verify that your application of Haversine formula is correct.

*Action*: Next, create a new variable called ProximityRank. This WINDOW calculation will be used to rank the distances from smallest to largest between a city and all hospitals across Iowa. The MUTATE action is provided here for reference.

A close-up of a login

AI-generated content may be incorrect.

*Deep (Data) Thoughts:*

* Verify that your ProximityRank function has been correctly implemented.

***Final Deep Thoughts*…**

1. Apply a FILTER action for ProximityRank = 1. What information is gained by considering this list of records? Briefly explain.
2. Consider only records where ProximityRank = 1. Identify the record (or city) that has the maximum distance. What information is gained by considering this record? Briefly explain.
3. [Optional] Make a custom Google Map of all hospital locations across Iowa. Identify the city that has the maximum distance when ProximityRank = 1 on your custom map. Where is this city located?

[Link: CUSTOM MAP](https://www.google.com/maps/d/edit?mid=1Qnt9ZdtHcWxsCoLqimaicioKoDP0fdY&usp=sharing)  
  
A map with blue pins

AI-generated content may be incorrect.

1. Do you believe Iowa suffers from healthcare / emergency room deserts? Briefly discuss.
2. Finally, for our accident-prone friends - hospital for Ames, IA 😊

A screenshot of a medical center

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