KENTUCKY COMMUTING PATTERNS REPORT

Technical Notes

The Kentucky Commuting Patterns Report (KCPR) is produced by the Kentucky Center for Statistics (KYSTATS) utilizing the United States Census Longitudinal Household-Employer Dynamics Origin-Destination Employment Statistics (LODES) data set.

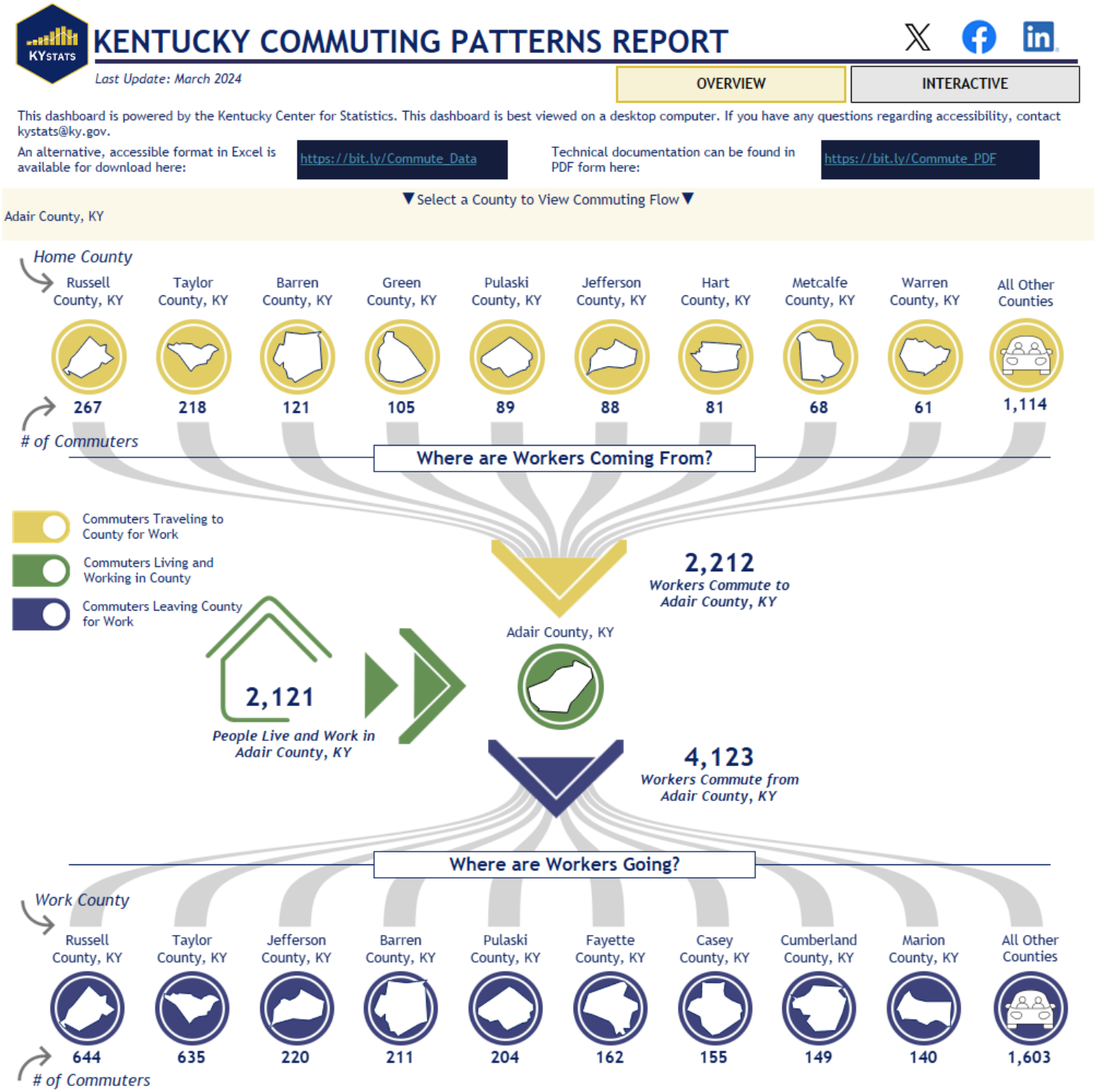
Occasionally, data from one source will not conform to data from another source because of differences in cohorts, how variables are defined, how variables are calculated, the treatment of missing data, and other factors. This means that data published in this report may not be comparable to data published in other reports.

This report provides an overview of commutes at the county level by number of commuters and distance traveled for all workers living and/or working in Kentucky in 2021. The report is divided into two dashboards. The first dashboard provides an overview of commuting based on the selection of a county. The second dashboard includes geographical commuting, number of commuters, and those living and working in the same county.

Dashboard 1: Overview

The first dashboard displays commuting flows based on the selection of a county. Once a county of interest has been selected, the dashboard presents the top counties commuters travel from for work, top counties commuters are leaving to for work, and the number of workers living and working in a selected county. The dashboard also includes commuting broken into subcategories, which include commuters by industry sectors and wage groups.

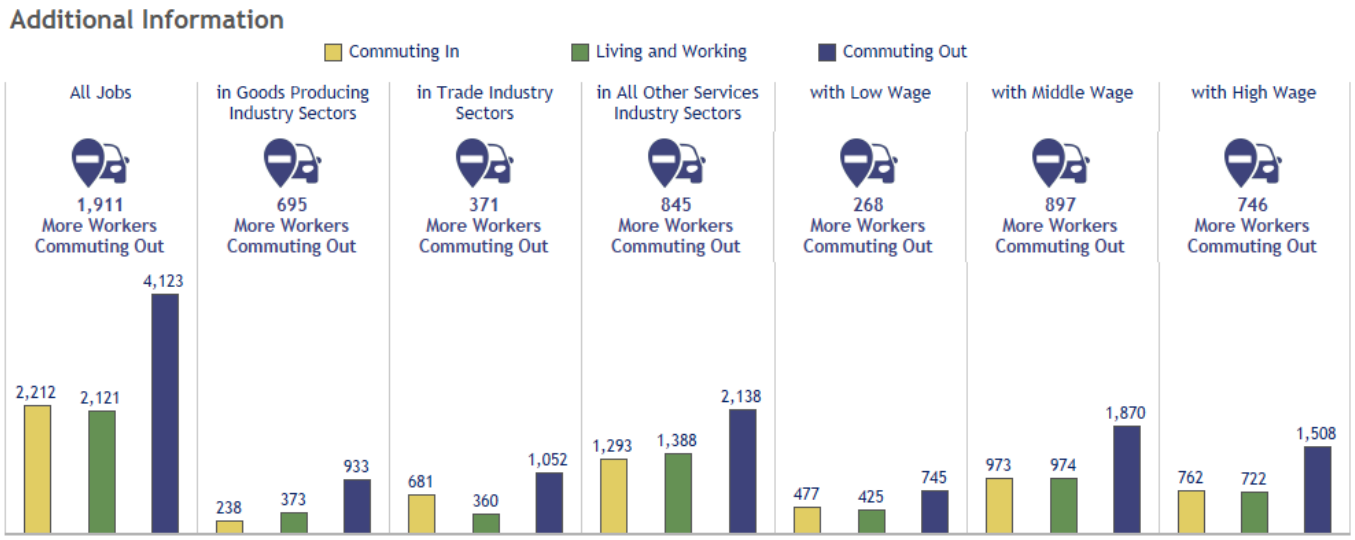
The user can interact with this dashboard by selecting their county of interest at the top of the dashboard.



This top section displays the number of workers commuting in, commuting out, and living and working in a selected county. The dashboard presents the top nine counties workers are commuting in from, with all remaining counties summed into “All Other Counties.” These counties are referred to as “Home County” due to these areas being the location that the workers live. The count for each county can be found below the corresponding county.

The middle of the dashboard will display the county selected in green with three numbers on display. The number within the house icon to the left displays the number of people living and working in the selected county. To the right, next to the yellow and blue arrows, displays the total number of workers commuting in and commuting out of the county.

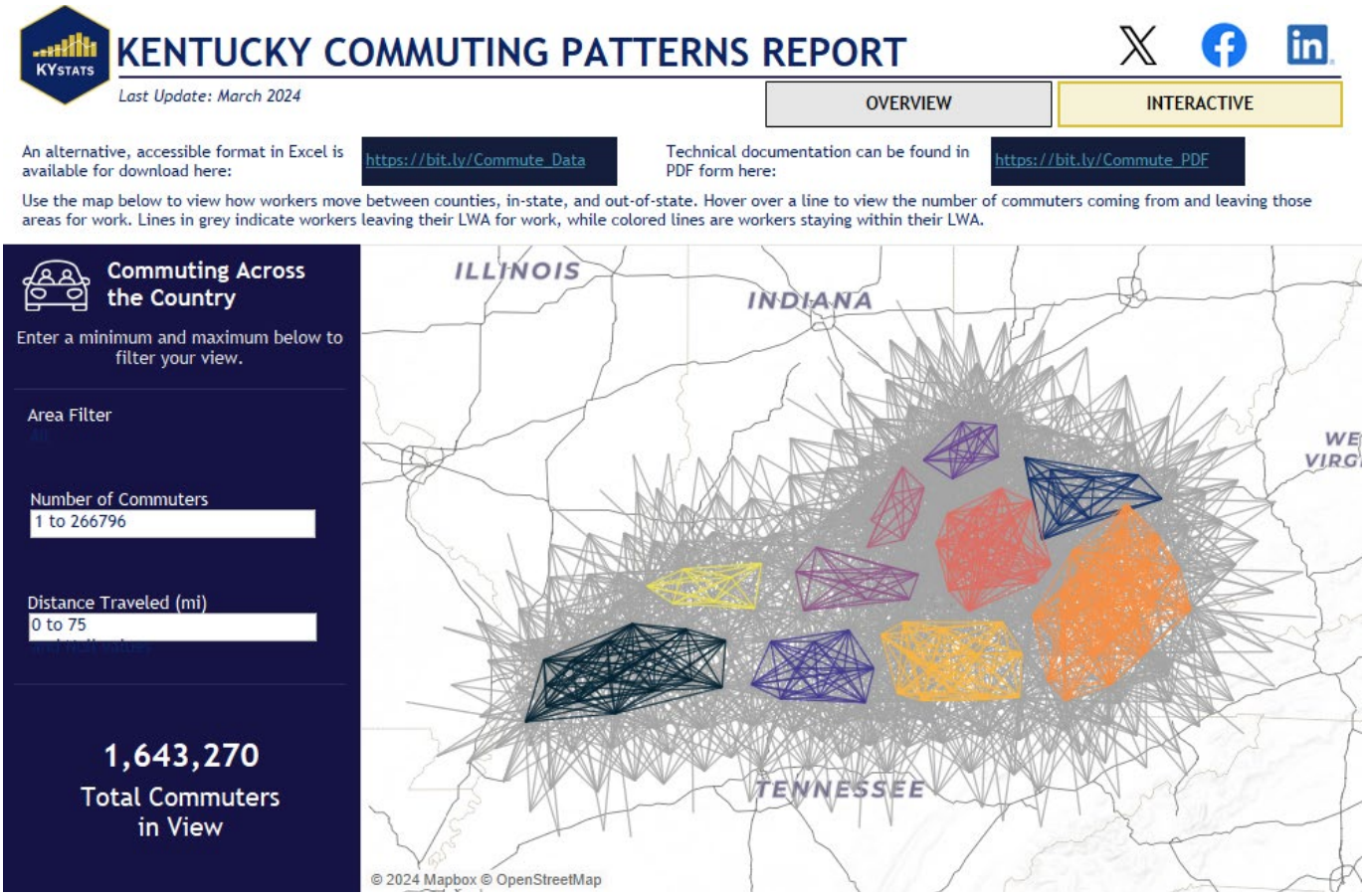
The bottom of this section displays the number of workers commuting out of the selected county to the top nine counties and “All Other Counties.” These counties are referred to as “Work County” since workers are leaving their home county to work elsewhere. The count for each county can be found below the corresponding county.



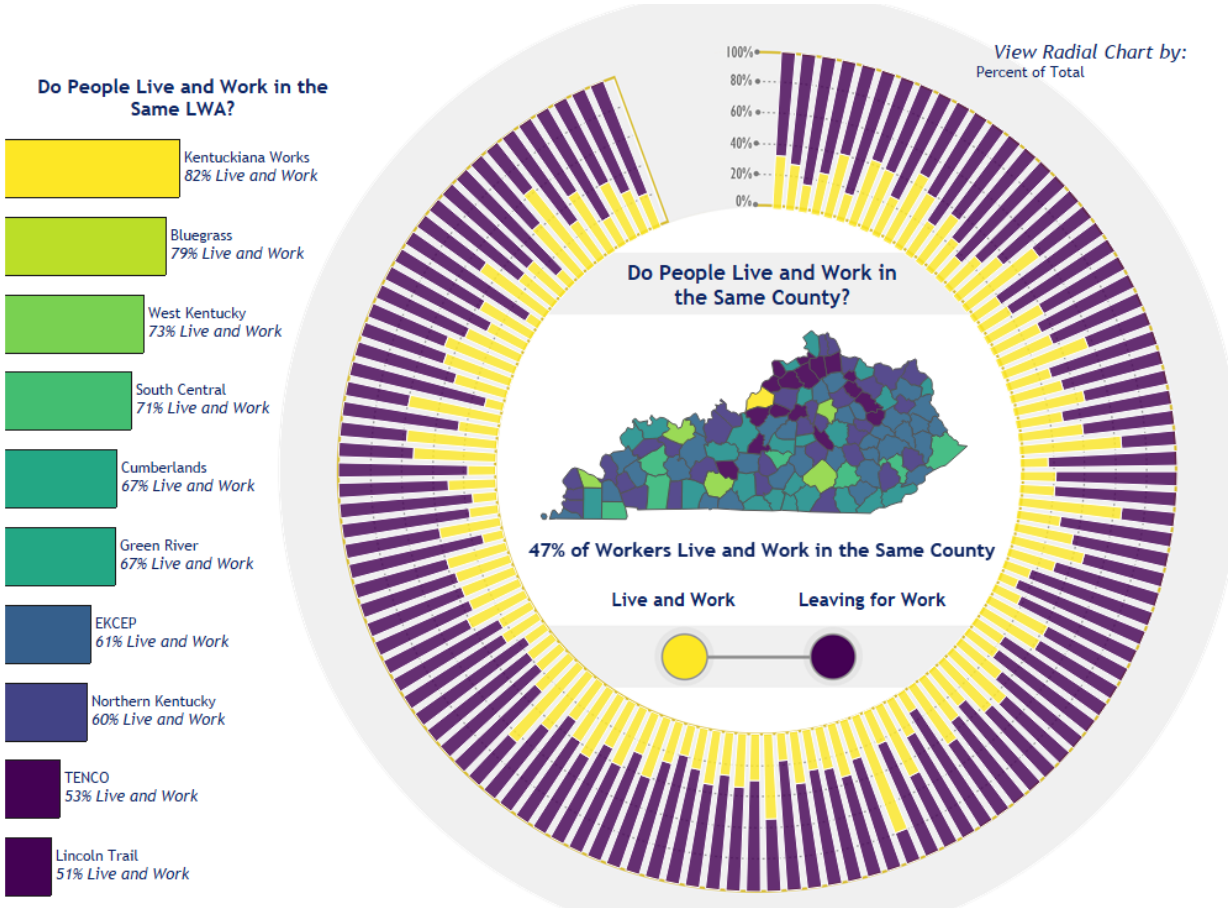
Additional Information includes the flow of commuters broken into categories. These categories include commuters by industry sector and wages. The section is then broken into six categories. These sections present the number of workers commuting in, commuting out, and living and working in bar charts. An icon will appear at the top to display if the county has more workers entering or leaving with the numeric net flow of commuters.

Dashboard 2: Interactive

The second dashboard provides users an interactive view of workers commuting in and out of Kentucky. The map allows users an exploratory geographical perspective of commuting in Kentucky. The bottom section of the dashboard provides perspective of the proportion of workers staying for work vs leaving.



Users can filter by LWA, county, number of commuters, and distance traveled for a more detailed view of commuting. Each line represents the commute between two counties across the United States. Hovering over the line will display the number of commuters in each direction. If there are no commuters, the tooltip will read none.



There are two sections at the bottom of the dashboard: Do People Live and Work in the Same LWA? And Do People Live and Work in the Same County? These two sections display similar data aggregated at different levels.

These sections display the percentage of people living and working in the same area. The bar chart displays these distributions at the LWA level. The radial bar chart displays these distributions by county. Hovering over one of the bars will display the county, the number of workers inside the county, and the number of people staying and leaving for work. The top right of the section includes a dropdown that allows users to select how the radial bar chart is visualized. The options include Percent of Total and Absolute Value. The absolute value option has been normalized by applying the square root to commuting counts within each county.

Within the radial bar chart there is a map and banner that displays the same distribution but displayed as a map.

APPENDIX A: DATA SOURCE AND METRIC INFORMATION

Data Sources:

U.S. Census Bureau TIGER/Line Shapefiles - The TIGER/Line Shapefiles are the fully supported, core geographic product from the U.S. Census Bureau. They are extracts of selected geographic and cartographic information from the U.S. Census Bureau's Master Address File/Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) database.
https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html

Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) - The LEHD program is part of the Center for Economic Studies at the U.S. Census Bureau. The LEHD program produces new, cost effective, public-use information combining federal, state, and Census Bureau data on employers and employees under the Local Employment Dynamics (LED) Partnership. State and local authorities increasingly need detailed local information about their economies to make informed decisions. The LED Partnership works to fill critical data gaps and provide indicators needed by state and local authorities. LEHD makes available several data products that may be used to research and characterize workforce dynamics for specific groups. These data products include online applications, public-use data, and restricted-use microdata. The Quarterly Workforce Indicators (QWI), LEHD LODES, Job-to-Job Flows (J2J), and Post-Secondary Employment Outcomes (PSEO) are available online for public use.
https://lehd.ces.census.gov/data/lodes/LODES8/LODESTechDoc8.1.pdf
Data Files: The CSV data files are released at the state level and are organized into three groups within each state. The three groups of files are named as follows, according to their contents:
OD – Origin-Destination data, job totals are associated with both a home Census Block and a work Census Block
RAC – Residence Area Characteristic data, jobs are totaled by home Census Block
WAC – Workplace Area Characteristic data, jobs are totaled by work Census Block

Characteristics:

LODES data are provided for all U.S. states and major U.S. territories at the Census Block level. LODES data are split into three parts: Origin-Destination (OD), Residence Area Characteristics and Workplace Area Characteristics. Residence and Workplace Area Characteristics *are not* mappable to commuting flows. LODES data are based on a combination of Federal Office of Personnel Management, State Unemployment Insurance (UI), and Quarterly Census of Employment and Wages (QCEW) data. LODES data are partially synthetic, using a variety of sophisticated imputation strategies when a reliable workplace, residence, or categorical variable is unavailable. This report uses only OD "primary job" data, defined as the job at which the worker earned the most income in the period.[1] The most recent year of data available are used for all fifty states and the D.C. area. All states use 2021 commuting data except Alaska which uses 2016, and Arkansas and Mississippi which uses 2018, the next available year.[2]

Collection and Aggregation:

State LODES files contain information for all workers living within that state. Data on workers residing outside of Kentucky but working in Kentucky are included in those respective states' LODES files. Similarly, crosswalks linking census block, tract, and county and state are available for each

[1] For detailed explanations of how the LODES datasets are constructed and their limitations, see the following Census technical documents:
1) An Overview on the LEHD Origin-Destination Employment Statistics (LODES)
2) Design Comparison of LODES and ACS Commuting Data Products
3) LODES 8 Tech Doc

[2] See LODES 8 Tech Doc, p.4 for state-year combinations without OD data.

state. In order to create a comprehensive dataset, all LODES files and crosswalks must be collected, merged and then subset down to the OD combinations involving the state in question. This procedure was completed[3], and any OD combination involving Kentucky was kept. The block level data was then aggregated to the county level, accounting for both origin and destination.

Distance Calculation:

LODES data do not include explicit geolocation. The data are purely tabular, with categorical variables representing census blocks. Because of this, a geographic information system step must be taken to calculate commuting distance, and to allow a visualization suite (in this case, Tableau) to show OD paths.
In order to get explicit geolocations, a comprehensive US Census Tract Shapefile was collected from the Census TIGER data sets and aggregated using the tigris[4] package in R. The centroids of the tracts were computed using the rgeos[5] package in R. The latitude and longitude of these centroids were then merged into the census-tract-aggregate data from LODES and the OD distance between centroids computed for every pairwise combination using the distGeo() function from the geosphere[6] package in R with the default WGS84 ellipsoid.

Metrics:

All Data Elements needed to construct a metric are provided with the data table name first followed by the elements pulled from that particular table.

Number of Commuters Home/Residence County: The total employed people who reside in this county.
Data Source: LODES
Data Elements: ky_od_main_JT01_2021.csv.gz: *h_geocode – Residence Census Block Code, S000 – Total Number of Jobs;* Kyxwalk.csv.gz:

Number of Commuters Work County: The total people commuting to work in this county.
Data Source: LODES
Data Elements: ky_od_main_JT01_2021.csv.gz: W-geocode – *Workplace Census Block Code, S000Total Number of Jobs;* Kyxwalk.csv.gz:

Key Sectors of Employment: Shows the number employed by industry sector – Key sectors of employment were assigned by using the sector in which each completer earned their highest wage during their highest earning quarter in the Federal Fiscal Year.
Data Source: LODES
Data Elements: ky_od_main_JT01_2021.csv.gz: W-geocode – *Workplace Census Block Code, SI01 -Number of Jobs in Good Producing industry sectors, SI02 – Number of jobs in Trade, Transportation, and Utilities industry sectors, SI03 – Number of jobs in All Other Services industry sectors;* Kyxwalk.csv.gz:

Wage Level: The earning level of the employed. Identified as low, middle, or high wages.
Low are those with earnings $1,250/month or less, middle are those with earnings $1,251/month to $3,333/month, and high are those with earnings greater than $3,333/month.
Data Source: LODES
Data Elements: ky_od_main_JT01_2021.csv.gz: W-geocode - *Workplace Census Block Code, SE01- Number of jobs with earnings $1250/month or less(Low wage), SE02 - Number of jobs with earnings $1251/month to $3333/month (Middle Wage), SE03 - Number of jobs with earnings greater than $3333/month (High Wage);* KYxwalk.csv.gz:

[3] See LODES 8 Tech Doc , p. 2 for basic instructions on how to complete this collection process
[4] tigris can be found at https://cran.r-project.org/web/packages/tigris/index.html
[5] rgeos can be found at https://cran.r-project.org/web/packages/rgeos/index.html
[6] geosphere can be found at https://cran.r-project.org/web/packages/geosphere/index.html

Distance Traveled: The distance traveled during commute. A comprehensive US Census Tract shapefile was collected from the Census TIGER data sets and aggregated using the tigris package in R. The centroids of the tracts were computed using the rgeos package in R. The latitude and longitude of these centroids were then merged into the census-tract-aggregate data from LODES and the OD distance between centroids computed for every pairwise combination using the distGeo() function from the geosphere package in R with the default WGS84 ellipsoid.
tigris can be found at https://cran.r-project.org/web/packages/tigris/index.html
rgeos can be found at https://cran.r-project.org/web/packages/rgeos/index.html
geosphere can be found at https://cran.r-project.org/web/packages/geosphere/index.html
Data Source: U.S. Census Bureau TIGER/Line Shapefiles
Data Element: census tract

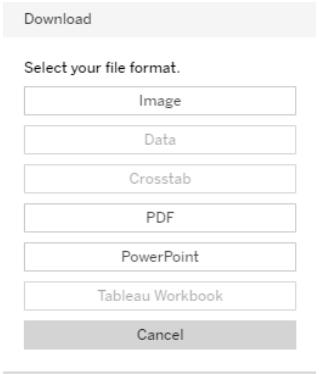
Geographical Area - LWA and Out of State: Local Workforce Areas are defined by the Kentucky Workforce Investment Board and are comprised of Kentucky communities. Ten LWAs have been defined. Commutes whose origin and destination nodes were both within the same identified community were assigned to that community.
Data Source: U.S. Census Bureau TIGER/Line Shapefiles
Data Element: census tract

Percentage of Total: The percentage of employed persons working in the geographic area. The total employed divided by the total people residing in the geographic area.
Data Source: LODES
Data Elements: ky_od_main_JT01_2021.csv.gz: *h_geocode - Residence Census Block Code*, W-geocode - *Workplace Census Block Code, S000 - Total Number of Jobs;* KYxwalk.csv.gz:

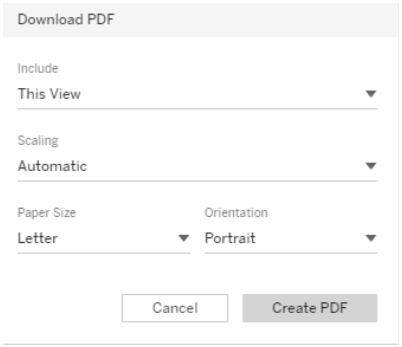
APPENDIX B: PRINTING

Printing - Download a dashboard to PDF

1. Click Download
2. On the Download screen – click PDF



3. On the Download PDF screen. Set what you want to include, the scaling paper size, and orientation, **then click create PDF.**
   This View under Include, prints the current page.
   Specific sheets from this dashboard (the displayed page) allows you to select specific sheets
   Specific sheets from this workbook (select from all dashboards) allows you to select specific workbooks.



4. Once your PDF has been generated. Click **Download.**