Data-Wrangling

September 5, 2019

0.1 Capstone #1

0.1.1 *File Descriptions*

- DATA_ELEMENT_DESCRIPTION.csv defines each data element and indicates where its description is found in Data Sources, Definitions, and Notes.
- DEFINED_DATA_VALUE.csv defines the meaning of specific values (such as missing or suppressed data).
- DEMOGRAPHICS.csv identifies the data elements and values in the Demographics indicator domain.
- HEALTHY_PEOPLE_2010.csv identifies the Healthy People 2010 Targets and the U.S. Percentages or Rates.
- LEADING_CAUSES_OF_DEATH.csv identifies the data elements and values in the Leading Causes of Death indicator domain.
- MEASURES_OF_BIRTH_AND_DEATH.csv identifies the data elements and values in the Measures of Birth and Death indicator domain.
- PREVENTIVE_SERVICES_USE.csv identifies the data elements and values in the Preventive Services indicator domain.
- RELATIVE_HEALTH_IMPORTANCE.csv identifies the data elements and values in the Relative Health Importance indicator domain.
- RISK_FACTORS_AND_ACCESS_TO_CARE.csv identifies the data elements and values in the Risk Factors and Access to Care indicator domain.
- SUMMARY_MEASURES_OF_HEALTH.csv identifies the data elements and values in the Summary Measures of Health indicator domain.
- VULNERABLE_POPS_AND_ENV_HEALTH.csv identifies the data elements and values in the Vulnerable Populations and Environmental Health indicator domain.

Data source can be found here

[1]:
```
import glob
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib as mpl
import matplotlib.cm as cm
from matplotlib.pyplot import figaspect
from mpl_toolkits.axes_grid1 import make_axes_locatable
import geopandas as gpd
import seaborn as sns
```

```
mpl.rcParams.update({'font.size': 14})
```

[2]:
```
#Reading all 11 csv files
files = sorted(glob.glob('../CHSI_dataset/*.csv'))
```

0.1.2 *File Initialization*

[3]:
```
DATA_ELEMENT_DESCRIPTION = pd.read_csv(files[0])
DEFINED_DATA_VALUE = pd.read_csv(files[1])
DEMOGRAPHICS = pd.read_csv(files[2])
HEALTHY_PEOPLE_2010 = pd.read_csv(files[3])
LEADING_CAUSES_OF_DEATH = pd.read_csv(files[4])
MEASURES_OF_BIRTH_AND_DEATH = pd.read_csv(files[5])
PREVENTIVE_SERVICES_USE = pd.read_csv(files[6])
RELATIVE_HEALTH_IMPORTANCE = pd.read_csv(files[7])
RISK_FACTORS_AND_ACCESS_TO_CARE = pd.read_csv(files[8])
SUMMARY_MEASURES_OF_HEALTH = pd.read_csv(files[9])
VULNERABLE_POPS_AND_ENV_HEALTH = pd.read_csv(files[10])
```

[4]:
```
#Auxiliary files
DATA_ELEMENT_DESCRIPTION
DEFINED_DATA_VALUE
HEALTHY_PEOPLE_2010
```

[4]:

	Categories	Elements
0	Birth Measures	Low Birth Wt. (<2500 g)
1	Birth Measures	Very Low Birth Wt. (<1500 g)
2	Birth Measures	Premature Births (<37 weeks)
3	Birth Measures	Births to Women under 18
4	Birth Measures	Births to Women over 40
5	Birth Measures	Births to Unmarried Women
6	Birth Measures	No Care in First Trimester
7	Infant Mortality	Infant Mortality
8	Infant Mortality	White non Hispanic Infant Mortality
9	Infant Mortality	Black non Hispanic Infant Mortality
10	Infant Mortality	Hispanic Infant Mortality
11	Infant Mortality	Neonatal Infant Mortality
12	Infant Mortality	Post-neonatal Infant Mortality
13	Death Measures	Breast Cancer (Female)
14	Death Measures	Colon Cancer
15	Death Measures	Coronary Heart Disease
16	Death Measures	Homicide
17	Death Measures	Lung Cancer
18	Death Measures	Motor Vehicle Injuries
19	Death Measures	Stroke
20	Death Measures	Suicide
21	Death Measures	Unintentional Injury

```
    US_Pct_or_Rate_2003  Healthy_People_2010_Target
0                   7.9                         5.0
1                   1.4                         0.9
2                  12.3                         7.6
3                   3.4                     -9998.9
4                   2.6                     -9998.9
5                  34.6                     -9998.9
6                  16.0                        10.0
7                   6.8                         4.5
8                   5.7                         4.5
9                  13.6                         4.5
10                  5.6                         4.5
11                  4.6                         2.9
12                  2.2                         1.2
13                 25.3                        21.3
14                 19.1                        13.7
15                172.0                       162.0
16                  6.0                         2.8
17                 54.1                        43.3
18                 14.8                         8.0
19                 53.0                        50.0
20                 10.8                         4.8
21                 37.3                        17.1
```

[5]:
```
LEADING_CAUSES_OF_DEATH.head()
```

[5]:
```
   State_FIPS_Code  County_FIPS_Code CHSI_County_Name CHSI_State_Name  \
0                1                 1          Autauga         Alabama
1                1                 3          Baldwin         Alabama
2                1                 5          Barbour         Alabama
3                1                 7             Bibb         Alabama
4                1                 9           Blount         Alabama

  CHSI_State_Abbr  Strata_ID_Number  A_Wh_Comp  CI_Min_A_Wh_Comp  \
0              AL                29      -1111             -1111
1              AL                16         57                39
2              AL                51      -1111             -1111
3              AL                42      -1111             -1111
4              AL                28         34                17

   CI_Max_A_Wh_Comp  A_Bl_Comp  ...  F_Bl_Cancer  CI_Min_F_Bl_Cancer  \
0             -1111      -1111  ...           19                  14
1                75      -1111  ...           20                  15
2             -1111      -1111  ...           26                  22
3             -1111      -1111  ...           20                  14
4                52      -1111  ...           28                  10

   CI_Max_F_Bl_Cancer  F_Ot_Cancer  CI_Min_F_Ot_Cancer  CI_Max_F_Ot_Cancer  \
```

```
0                  23        -1111                -1111                -1111
1                  25        -1111                -1111                -1111
2                  31        -1111                -1111                -1111
3                  25        -1111                -1111                -1111
4                  46        -1111                -1111                -1111

   F_Hi_Cancer  CI_Min_F_Hi_Cancer  CI_Max_F_Hi_Cancer  LCD_Time_Span
0        -1111               -1111               -1111      1999-2003
1        -1111               -1111               -1111      2001-2003
2        -1111               -1111               -1111      1999-2003
3        -1111               -1111               -1111      1994-2003
4        -1111               -1111               -1111      1999-2003

[5 rows x 235 columns]
```

[6]:
```
#Outlier column name
DATA_ELEMENT_DESCRIPTION.update(
    DATA_ELEMENT_DESCRIPTION.replace('C_Ot_homicide','C_Ot_Homicide'))
LEADING_CAUSES_OF_DEATH.rename(columns={'C_Ot_homicide':'C_Ot_Homicide'},␣
 ↪inplace=True)

#Functions to describe acronyms
def description(param):
    if param in list(DATA_ELEMENT_DESCRIPTION.COLUMN_NAME):
        description_value = DATA_ELEMENT_DESCRIPTION[DATA_ELEMENT_DESCRIPTION.
                                    COLUMN_NAME==param].DESCRIPTION.tolist()[0]
    else:
        description_value = ''
    return description_value

def short_description(param):
    list_of_removing = ['County data,', 'death measures,', 'birth measures,',␣
 ↪',']
    result = description(param)
    for i in list_of_removing:
        if result.__contains__(i):
            result = result.replace(i,'')
    return result

def short_race_description(param):
    list_of_removing = ['Black', 'Hispanic','White', 'other',
                        'County data,', 'death measures,', 'birth measures,',␣
 ↪',']
    result = description(param)
    for i in list_of_removing:
        if result.__contains__(i):
            result = result.replace(i,'')
```

```
    return result
```

[7]:
```
#Common columns in all worksheets
county_info = ['State_FIPS_Code', 'County_FIPS_Code', 'CHSI_County_Name',
               'CHSI_State_Name', 'CHSI_State_Abbr', 'Strata_ID_Number']
```

[8]:
```
#Joining files
worksheets = [DEMOGRAPHICS,
LEADING_CAUSES_OF_DEATH,
MEASURES_OF_BIRTH_AND_DEATH,
PREVENTIVE_SERVICES_USE,
RELATIVE_HEALTH_IMPORTANCE,
RISK_FACTORS_AND_ACCESS_TO_CARE,
SUMMARY_MEASURES_OF_HEALTH,
VULNERABLE_POPS_AND_ENV_HEALTH]
```

[9]:
```
#Replacing not available/reported data by zeros
nan_values = [-1111, -1111.1, -1, -9999, -2222, -2222.2, -2]
for worksheet in worksheets:
    nda =[]
    for i,nan_value in enumerate(nan_values):
        nda.append(worksheet.loc[:,:]!=nan_value)
        worksheet.update(worksheet.where(nda[i]).fillna(0))
```

[10]:
```
#Time dependent data should be identified and normalized
time_dependent_worksheets = [LEADING_CAUSES_OF_DEATH,
MEASURES_OF_BIRTH_AND_DEATH,
PREVENTIVE_SERVICES_USE,
VULNERABLE_POPS_AND_ENV_HEALTH]


time_spans = ['1994-2003', '1999-2003', '2001-2003']
time_span_convert = [7,4,2]
for worksheet in time_dependent_worksheets:
    for i in list(worksheet.columns):
        if i.__contains__('Time_Span'):
            worksheet[i].replace(time_spans, time_span_convert, inplace=True)
            worksheet.rename(columns={i: 'Time'}, inplace=True)

for worksheet in time_dependent_worksheets:
    for i in list(worksheet.columns):
        if worksheet.columns.get_loc(i) < worksheet.columns.get_loc('Time') and␣
 ↪i not in county_info:
            worksheet[i]=worksheet[i]/worksheet['Time']
```

[11]:
```
#Merging all clean data files
df = worksheets[0]
for name in worksheets[1:]:
```

```
    df = df.merge(name, on=county_info.append('Time'), how='outer', sort=True).
↪fillna(0)
```

[12]:
```
df.head()
```

[12]:
```
   State_FIPS_Code  County_FIPS_Code CHSI_County_Name CHSI_State_Name  \
0                1                 1          Autauga         Alabama
1                1                 3          Baldwin         Alabama
2                1                 5          Barbour         Alabama
3                1                 7             Bibb         Alabama
4                1                 9           Blount         Alabama

  CHSI_State_Abbr  Strata_ID_Number  \
0              AL                29
1              AL                16
2              AL                51
3              AL                42
4              AL                28

                        Strata_Determining_Factors  Number_Counties  \
0    frontier status, population size, poverty, age              37
1    frontier status, population size, poverty, age              27
2 frontier status, population size, poverty, age...              33
3    frontier status, population size, poverty, age              53
4    frontier status, population size, poverty, age              39

   Population_Size  Min_Population_Size  ...   Shig_Rpt  Shig_Rpt_Ind  \
0            48612                28447  ...   1.000000      0.750000
1           162586               118395  ...  20.500000      2.000000
2            28414                27269  ...   0.250000      0.750000
3            21516                 8134  ...   0.428571      0.428571
4            55725                29009  ...   2.750000      1.000000

   Shig_Exp     Toxic_Chem  Carbon_Monoxide_Ind  Nitrogen_Dioxide_Ind  \
0  2.750000  720799.250000             0.250000              0.250000
1  6.500000   17832.000000             0.500000              0.500000
2  4.000000   12468.500000             0.250000              0.250000
3  2.285714    1043.142857             0.142857              0.142857
4  1.250000  222255.000000             0.250000              0.250000

   Sulfur_Dioxide_Ind  Ozone_Ind  Particulate_Matter_Ind  Lead_Ind
0            0.250000   0.250000                0.250000  0.250000
1            0.500000   1.000000                0.500000  0.500000
2            0.250000   0.250000                0.250000  0.250000
3            0.142857   0.142857                0.142857  0.142857
4            0.250000   0.250000                0.250000  0.250000

[5 rows x 533 columns]
```

0.1.3 *Redundant columns*

[13]:
```
observation = list(df.columns)
description_list = [description(i) for i in observation]
def observ_keyword(variable):
    results = []
    for i, j in enumerate(description_list):
        if variable in str(j):
            results.append(observation[i])
    return results
```

[14]:
```
filter_percentile = list(description(i) for i in␣
 ↪list(observ_keyword('percentile')))
filter_CI = list(description(i) for i in list(observ_keyword('Confidence␣
 ↪interval')))
filter_fav = list(description(i) for i in list(observ_keyword('Favorable␣
 ↪indicator')))

filters = list(observ_keyword('Favorable indicator')
               + observ_keyword('Confidence interval')
               + observ_keyword('percentile'))
df = df.drop(columns=filters)
```

[15]:
```
#Neutral columns
for i in list(df.columns):
    if len(np.unique(df[i]))==1 and i!='D_Ot_HIV':
        df=df.drop(columns=i)
df.head()
```

[15]:

	State_FIPS_Code	County_FIPS_Code	CHSI_County_Name	CHSI_State_Name	CHSI_State_Abbr	Strata_ID_Number	Strata_Determining_Factors	Number_Counties
0	1	1	Autauga	Alabama	AL	29	frontier status, population size, poverty, age	37
1	1	3	Baldwin	Alabama	AL	16	frontier status, population size, poverty, age	27
2	1	5	Barbour	Alabama	AL	51	frontier status, population size, poverty, age...	33
3	1	7	Bibb	Alabama	AL	42	frontier status, population size, poverty, age	53
4	1	9	Blount	Alabama	AL	28	frontier status, population size, poverty, age	39

```
   Population_Size  Population_Density  ...   Salm_Exp   Shig_Rpt  Shig_Exp  \
0            48612                82.0  ...   7.750000   1.000000  2.750000
1           162586               102.0  ...  33.500000  20.500000  6.500000
2            28414                32.0  ...   7.250000   0.250000  4.000000
3            21516                35.0  ...   4.571429   0.428571  2.285714
4            55725                86.0  ...   7.750000   2.750000  1.250000

      Toxic_Chem  Carbon_Monoxide_Ind  Nitrogen_Dioxide_Ind  \
0  720799.250000             0.250000              0.250000
1   17832.000000             0.500000              0.500000
2   12468.500000             0.250000              0.250000
3    1043.142857             0.142857              0.142857
4  222255.000000             0.250000              0.250000

   Sulfur_Dioxide_Ind  Ozone_Ind  Particulate_Matter_Ind  Lead_Ind
0            0.250000   0.250000                0.250000  0.250000
1            0.500000   1.000000                0.500000  0.500000
2            0.250000   0.250000                0.250000  0.250000
3            0.142857   0.142857                0.142857  0.142857
4            0.250000   0.250000                0.250000  0.250000

[5 rows x 198 columns]
```

[16]:
```
df.describe().transpose()
```

[16]:
```
                        count          mean            std        min  \
State_FIPS_Code        3141.0     30.304680      15.134423   1.000000
County_FIPS_Code       3141.0    103.716651     107.999484   1.000000
Strata_ID_Number       3141.0     44.696275      25.118434   1.000000
Number_Counties        3141.0     38.486151      10.290195  15.000000
Population_Size        3141.0  94368.164279  306431.655763  62.000000
...                       ...           ...            ...        ...
Nitrogen_Dioxide_Ind   3141.0      0.235275       0.125723   0.142857
Sulfur_Dioxide_Ind     3141.0      0.235275       0.125723   0.142857
Ozone_Ind              3141.0      0.263565       0.202474   0.142857
Particulate_Matter_Ind 3141.0      0.237595       0.134062   0.142857
Lead_Ind               3141.0      0.235435       0.126373   0.142857

                              25%           50%       75%        max
State_FIPS_Code         18.000000     29.000000     45.00       56.0
County_FIPS_Code        35.000000     79.000000    133.00      840.0
Strata_ID_Number        23.000000     44.000000     66.00       88.0
Number_Counties         32.000000     37.000000     45.00       62.0
Population_Size      11211.000000  25235.000000  64040.00  9935475.0
...                           ...           ...       ...        ...
Nitrogen_Dioxide_Ind     0.142857      0.142857      0.25        0.5
Sulfur_Dioxide_Ind       0.142857      0.142857      0.25        0.5
```

```
Ozone_Ind                  0.142857      0.142857      0.25        1.0
Particulate_Matter_Ind     0.142857      0.142857      0.25        1.0
Lead_Ind                   0.142857      0.142857      0.25        1.0

[194 rows x 8 columns]
```

0.1.4 *Demographic Map*

To visualize the health indices throughout the country, I merge the map shapefile and data to us_merge dataframes. Because Alaska and Hawaii are further away and out of proportion I merged them separately. US_plot function creates the US map with any numeric variables in the data –default color is blue.

[17]:
```
us_map = gpd.read_file('../US-map/UScounties.shp')
us_map_land = us_map[ (us_map['STATE_NAME']!='Alaska')
                     &(us_map['STATE_NAME']!='Hawaii')]
us_map_Alaska = us_map[us_map['STATE_NAME']=='Alaska']
us_map_Hawaii = us_map[us_map['STATE_NAME']=='Hawaii']

#Merging map and data:
df_land = us_map_land.set_index('NAME').join(df.set_index('CHSI_County_Name'))
df_Alaska = us_map_Alaska.set_index('NAME').join(df.
 ↪set_index('CHSI_County_Name'))
df_Hawaii = us_map_Hawaii.set_index('NAME').join(df.
 ↪set_index('CHSI_County_Name'))
```

[18]:
```
def min_max_col(variable):
    minimum = min(df_land[variable].min(),
              df_Alaska[variable].min(), df_Hawaii[variable].min())
    maximum = max(df_land[variable].max(),
              df_Alaska[variable].max(), df_Hawaii[variable].max())
    return minimum, maximum

def US_plot(variable, color='Blues'):
    h, w = figaspect(1.)
    mn, mx = min_max_col(variable)
    fig, ax1 = plt.subplots(1, figsize=(w*10, h*10))
    ax1.axis('off')
    ax1.set_title(description(variable), fontsize=40)
    divider = make_axes_locatable(ax1)
    cax = divider.append_axes('right', size='2%', pad=0.1)
    cax.tick_params(labelsize=25)
    df_land.plot(column=variable, cmap=color,
                         linewidth=0.8, ax=ax1,
                         edgecolor='0.8', vmin=mn ,vmax=mx,
                         legend=True, cax=cax)
```

```
    left, bottom, width, height = [0.15, 0.22, 0.24, 0.3]
    ax2 = fig.add_axes([left, bottom, width, height])
    ax2.axis('off')
    ax2.set_title('Alaska', fontsize=25)
    df_Alaska.plot(column=variable, cmap=color, vmin=mn ,vmax=mx,
                           linewidth=0.8, ax=ax2, edgecolor='0.6')

    left, bottom, width, height = [0.35, 0.3, 0.2, 0.05]
    ax3 = fig.add_axes([left, bottom, width, height])
    ax3.axis('off')
    ax3.set_title('Hawaii', fontsize=25)
    df_Hawaii.plot(column =variable, cmap=color, vmin=mn ,vmax=mx,
                           linewidth=0.8, ax=ax3, edgecolor='0.6')
```

[19]:
```
list(description(i) for i in df.columns)
```

[19]:
```
['Two-digit state identifier, developed by the National Bureau of Standards',
 'Three-digit county identifier, developed by the National Bureau of Standards',
 'Name of county',
 'Name of State or District of Columbia',
 'Two-character postal abbreviation for state name',
 'CHSI Peer County Stratum Number',
 'Listing of strata factors',
 'Number of peer counties',
 'County data, population size',
 'County data, population density (people per square mile)',
 'County data, individuals living below poverty level',
 'County data, population under age 19',
 'County data, population age 19-64',
 'County data, population age 65-84',
 'County data, population age 85+',
 'County data, White',
 'County data, Black',
 'County data, American Indian',
 'County data, Asian/Pacific Islander',
 'County data, Hispanic origin',
 'County data, under age 1, complications of pregnancy/birth, White',
 'County data, under age 1, complications of pregnancy/birth, Black',
 'County data, under age 1, complications of pregnancy/birth, other',
 'County data, under age 1, complications of pregnancy/birth, Hispanic',
 'County data, under age 1, birth defects, White',
 'County data, under age 1, birth defects, Black',
 'County data, under age 1, birth defects, other',
 'County data, under age 1, birth defects, Hispanic',
 'County data, ages 1-14, injuries, White',
 'County data, ages 1-14, injuries, Black',
 'County data, ages 1-14, injuries, other',
 'County data, ages 1-14, injuries, Hispanic',
```

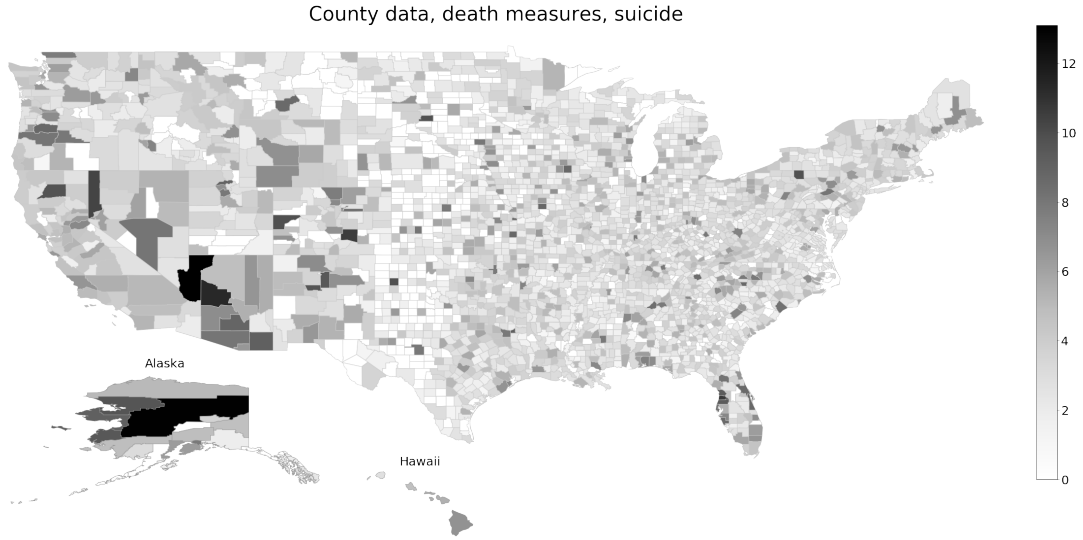
```
'County data, ages 1-14, cancer, White',
'County data, ages 1-14, cancer, Black',
'County data, ages 1-14, cancer, other',
'County data, ages 1-14, cancer, Hispanic',
'County data, ages 1-14, homicide, White',
'County data, ages 1-14, homicide, Black',
'County data, ages 1-14, homicide, other',
'County data, ages 1-14, homicide, Hispanic',
'County data, ages 15-24, injuries, White',
'County data, ages 15-24, injuries, Black',
'County data, ages 15-24, injuries, other',
'County data, ages 15-24, injuries, Hispanic',
'County data, ages 15-24, homicide, White',
'County data, ages 15-24, homicide, Black',
'County data, ages 15-24, homicide, other',
'County data, ages 15-24, homicide, Hispanic',
'County data, ages 15-24, suicide, White',
'County data, ages 15-24, suicide, Black',
'County data, ages 15-24, suicide, other',
'County data, ages 15-24, suicide, Hispanic',
'County data, ages 15-24, cancer, White',
'County data, ages 15-24, cancer, Black',
'County data, ages 15-24, cancer, other',
'County data, ages 15-24, cancer, Hispanic',
'County data, ages 25-44, injuries, White',
'County data, ages 25-44, injuries, Black',
'County data, ages 25-44, injuries, other',
'County data, ages 25-44, injuries, Hispanic',
'County data, ages 25-44, cancer, White',
'County data, ages 25-44, cancer, Black',
'County data, ages 25-44, cancer, other',
'County data, ages 25-44, cancer, Hispanic',
'County data, ages 25-44, heart disease, White',
'County data, ages 25-44, heart disease, Black',
'County data, ages 25-44, heart disease, other',
'County data, ages 25-44, heart disease, Hispanic',
'County data, ages 25-44, suicide, White',
'County data, ages 25-44, suicide, Black',
'County data, ages 25-44, suicide, other',
'County data, ages 25-44, suicide, Hispanic',
'County data, ages 25-44, hiv/aids, White',
'County data, ages 25-44, hiv/aids, Black',
'County data, ages 25-44, hiv/aids, other',
'County data, ages 25-44, hiv/aids, Hispanic',
'County data, ages 25-44, homicide, White',
'County data, ages 25-44, homicide, Black',
'County data, ages 25-44, homicide, other',
```

```
'County data, ages 25-44, homicide, Hispanic',
'County data, ages 45-64, cancer, White',
'County data, ages 45-64, cancer, Black',
'County data, ages 45-64, cancer, other',
'County data, ages 45-64, cancer, Hispanic',
'County data, ages 45-64, heart disease, White',
'County data, ages 45-64, heart disease, Black',
'County data, ages 45-64, heart disease, other',
'County data, ages 45-64, heart disease, Hispanic',
'County data, ages 65+, heart disease, White',
'County data, ages 65+, heart disease, Black',
'County data, ages 65+, heart disease, other',
'County data, ages 65+, heart disease, Hispanic',
'County data, ages 65+, cancer, White',
'County data, ages 65+, cancer, Black',
'County data, ages 65+, cancer, other',
'County data, ages 65+, cancer, Hispanic',
'',
'County data, birth measures, low birth wt. (<2500 g)',
'County data, birth measures, very low birth wt. (<1500 g)',
'County data, birth measures, premature births (<37 weeks)',
'County data, birth measures, births to women under 18',
'County data, birth measures, births to women over 40',
'County data, birth measures, births to unmarried women',
'County data, birth measures, no care in first trimester',
'County data, infant mortality',
'County data, infant mortality, White non Hispanic',
'County data, infant mortality, Black non Hispanic',
'County data, infant mortality, Hispanic',
'County data, infant mortality, neonatal',
'County data, infant mortality, post-neonatal',
'County data, death measures, breast cancer (female)',
'County data, death measures, colon cancer',
'County data, death measures, coronary heart disease',
'County data, death measures, homicide',
'County data, death measures, lung cancer',
'County data, death measures, motor vehicle injuries',
'County data, death measures, stroke',
'County data, death measures, suicide',
'County data, death measures, unintentional injury',
'County data, total number of births',
'County data, total number of deaths',
'County data, Haemophilus Influenzae B reported cases',
'County data, Haemophilus Influenzae B expected cases',
'County data, Hepatitis A reported cases',
'County data, Hepatitis A expected cases',
'County data, Hepatitis B reported cases',
```

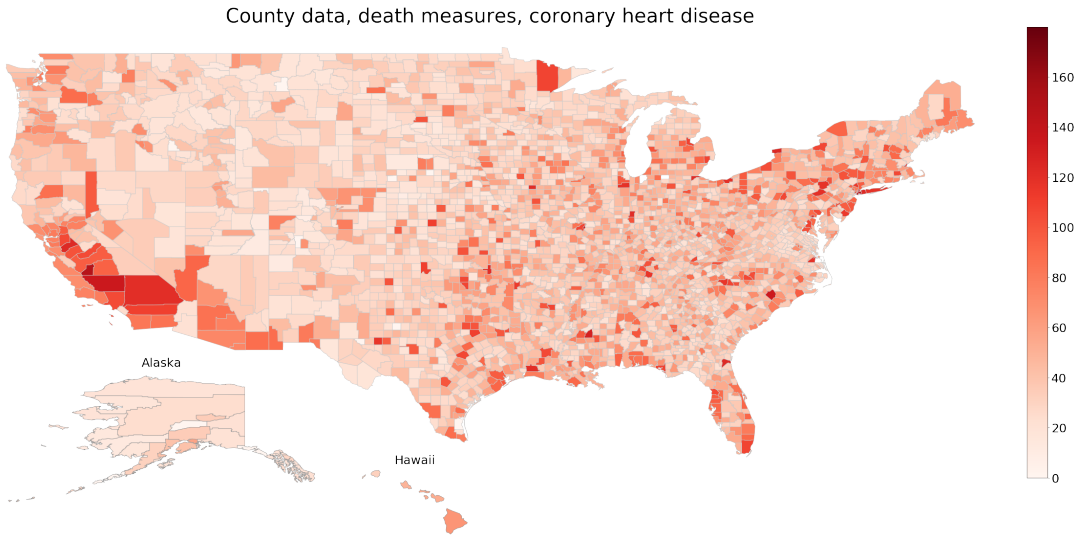
```
'County data, Hepatitis B expected cases',
'County data, Measles reported cases',
'County data, Measles expected cases',
'County data, Pertussis reported cases',
'County data, Pertussis expected cases',
'County data, Congenital Rubella Syndrome reported cases',
'County data, Syphilis reported cases',
'County data, Syphilis expected cases',
'County data, pap smears (18+)',
'County data, mammography (50+)',
'County data, sigmoidoscopy (50+)',
'County data, pneumonia vaccine (65+)',
'County data, flu vaccine (65+)',
'Relative health indicator, low birth wt. (<2500 g)',
'Relative health indicator, very low birth wt. (<1500 g)',
'Relative health indicator, premature births (<37 weeks)',
'Relative health indicator,  births to women under 18',
'Relative health indicator, births to women over 40',
'Relative health indicator, births to unmarried women',
'Relative health indicator, no care in first trimester',
'Relative health indicator, infant mortality',
'Relative health indicator, White non Hispanic infant mortality',
'Relative health indicator, Black non Hispanic infant mortality',
'Relative health indicator, Hispanic infant mortality',
'Relative health indicator, neonatal infant mortality',
'Relative health indicator, post-neonatal infant mortality',
'Relative health indicator, breast cancer (female)',
'Relative health indicator, colon cancer',
'Relative health indicator, coronary heart disease',
'Relative health indicator, homicide',
'Relative health indicator, lung cancer',
'Relative health indicator, motor vehicle injuries',
'Relative health indicator, stroke',
'Relative health indicator, suicide',
'Relative health indicator, unintentional injury',
'County data, no exercise',
'County data, few fruits/vegetables',
'County data, obesity',
'County data, high blood pressure',
'County data, smoker',
'County data, diabetes',
'County data, uninsured individuals',
'County data, medicare beneficiaries, elderly (age 65+)',
'County data, medicare beneficiaries, disabled',
'County data, primary care physicians per 100,000 pop.',
'County data, dentists per 100,000 pop.',
'Indicator for any Community/Migrant Health Centers located in the county',
```

```
'Indicator for single county designated Health Professional Shortage Area',
'County data, average life expectancy',
'Medium for all U.S. counties, average life expectancy',
'County data, all causes of death',
'Medium for all U.S. counties, all causes of death',
'County data, self-rated health status',
'County data, average number of unhealthy days in past month',
'County data, no high school diploma (among adults age 25 and older)',
'County data, unemployed',
'County data, severely work disabled',
'County data, major depression',
'County data, recent drug users (within past month)',
'County data, E.coli reported cases',
'County data, E.coli expected cases',
'County data, Salmonella reported cases',
'County data, Salmonella expected cases',
'County data, Shigella reported cases',
'County data, Shigella expected cases',
'County data, toxic chemicals released annually',
'Air quality standard indicator, carbon monoxide',
'Air quality standard indicator, nitrogen dioxide',
'Air quality standard indicator, sulfur dioxide',
'Air quality standard indicator, ozone',
'Air quality standard indicator, particulate matter',
'Air quality standard indicator, lead']
```

[20]:
```
US_plot('Suicide', 'Greys')
```



[21]:
```
US_plot('CHD', 'Reds')
```


County data, death measures, coronary heart disease
Alaska
Hawaii
160
140
120
100
80
60
40
20
0