SinShady / **phase-1-project-west-ds-082420**

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SinShady with final PDFs **History**

1 contributor

Raw Blame

```
1276 lines (1276 sloc)   443 KB
```

Oppurtunity Youth in King County

For this project we will be looking at data in South King County, Washington at the specific demographic of Opportunity Youth. We hope to find trends that shed light on the systematic difficulties Oppurtunity Youths face as barriers to education and employment.

In [1]:

```
#import libraries and data
import psycopg2
import pandas as pd
import numpy as np
import geopandas as gpd
import matplotlib.pyplot as plt
import os
```

Creating a map of King County

In [2]:

```
#WARNING: RUN THIS LINE ONLY ONCE. MOVES UP 2
PARENT DIRECTORIES TO IMPORT SOURCE DATA
#Note: Tried the method given in the data dow
nload and exploration file but could not get
 it to work
os.chdir("..\\..\\")
```

In [3]:

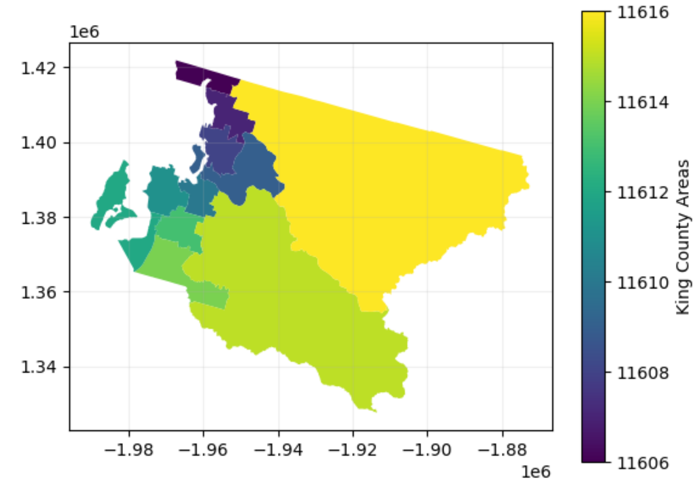
```
#Read in shape file for geo data
gdf = gpd.read_file("src/data/shapefiles/ipum
s_puma_2010.shp")
```

In [4]:

```
#Extract Washington, King County, and South K
ing County
gdf["PUMA"] = gdf["PUMA"].astype(str).astype(
int)
washington_map = gdf[(gdf['State']=='Washingt
on')]
greater_king_co_map= gdf[(gdf.PUMA >= 11606)
& (gdf.PUMA <= 11616)]
south_king_co_map=gdf[(gdf.PUMA >= 11612) & (
gdf.PUMA <= 11615)]
```

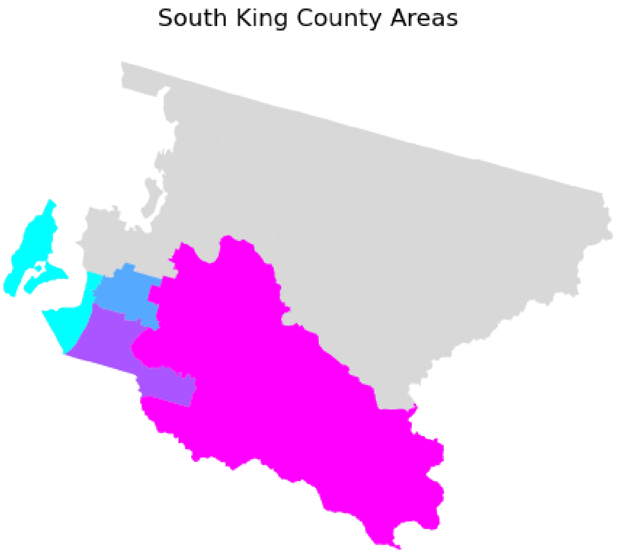
In [5]:

```
#Create a cloropeth of pumas in King County
plt.style.use('default')
fig, ax=plt.subplots()
plt.grid(alpha = 0.2)
greater_king_co_map.plot(column='PUMA',ax=ax,
legend = True, legend_kwds={'label': "King Co
unty Areas"})
plt.savefig('./reports/figures/project_one_ma
p_of_king_county.png')
plt.show()
```



In [6]:

```
#Create a cloropeth of pumas in South King Co
unty
fig, ax=plt.subplots()
# washington_map.plot(ax=ax, color='grey',alp
ha = .1, zorder=1)
greater_king_co_map.plot(ax=ax, color='grey',
alpha = .3, zorder=1);
south_king_co_map.plot(ax=ax, column = 'PUMA'
, cmap='cool', zorder= 2)
plt.title('South King County Areas')
plt.axis('off')
plt.savefig('./reports/figures/project_one_ma
p_of_south_king_county.png')
plt.show()
```



Connecting to the Oppurtunity

Connecting to the Oppurtunity Youth Database

```
In [7]: #connect to database oppurtunity_youth and cr
        eate cursor. We are using psycopg2 and postgr
        es to obtain our data
        DBNAME = "opportunity_youth"
        conn = psycopg2.connect(dbname=DBNAME)
        cursor = conn.cursor()
```

```
In [8]: #create a list of the table names
        cursor.execute("""SELECT table_name FROM info
        rmation_schema.tables
               WHERE table_schema = 'public'""")
        tables = []
        for table in cursor.fetchall():
            tables.append(table[0])
        tables
```

```
Out[8]: ['pums_2017',
         'puma_names_2010',
         'wa_jobs_2017',
         'wa_geo_xwalk',
         'ct_puma_xwalk']
```

Querying the Data

```
In [9]: # Creating a filtered data fram for youth in
         South King County Washington
        # Filter puma_names_2010 to King County in Wa
        shington
        # Filter pums_2017 for ages between 16 and 25
        # Join pums_2017 with filtered puma_names_201
        0
        # SQL query with info for puma, person, age,
         education, and work
        # Column info:
            # PUMA          Public use microdata area
        code
            # puma_name     County, city, location
            # SERIALNO      Housing unit/GQ person se
        rial number
            # sporder       Which person in housing u
        nit
            # agep          Age
            # sch           school enrollment (1 = ha
        s not attended in last 3 months)
            # schl          Education level
            # esr           Employment status

        df_weight = pd.read_sql(""" SELECT puma, puma
        _name, serialno, sporder, agep, sch, schl, es
        r, pwgtp
                            FROM puma_names_2010 pn
                            JOIN pums_2017 pms
                            USING (puma)
                            WHERE state_name LIKE 'Wa
        shington%'
                            AND puma_name LIKE 'Kin
        g%'
                             AND puma_name LIKE '%Sou
        th%'
                            AND agep BETWEEN 15.9 AND
        25.0
                            ;""", conn)

        df_weight
```

Out[9]:

	puma	puma_name	serialno	sporder
0	11606	King County (Northwest)--Shoreline, Kenmore & ...	2013000003218	01
1	11606	King County (Northwest)--Shoreline, Kenmore & ...	2013000003218	02
2	11612	King County (Far Southwest)--Federal Way, Des ...	2013000007063	02
3	11613	King County (Southwest Central)--Kent City ...	2013000008046	02
4	11614	King County (Southwest)--Auburn City & Lakelan...	2013000011255	02
...	...	...	...	...
3177	11606	King County (Northwest)--Shoreline, Kenmore & ...	2017001491175	01
		King County		

3178	11606	(Northwest)-- Shoreline, Kenmore & ...	2017001511157	01
3179	11606	King County (Northwest)-- Shoreline, Kenmore & ...	2017001526134	01
3180	11606	King County (Northwest)-- Shoreline, Kenmore & ...	2017001530240	01
3181	11613	King County (Southwest Central)-- Kent City ...	2017001530818	01

3182 rows × 9 columns

Accounting for the weights in the data

In [10]:

```
#Function that expands the table from 2878 rows to 68347 using pwgtp to account for the weights
def duplicate_rows(df, countcol):
    for _, row in df.iterrows():
        for i in range(int(row[countcol])-1):
            # Append this row at the end of the DataFrame
            df = df.append(row)

    # Remove countcol (could do a drop too to do that...)
    notcountcols = [x for x in df.columns if x != countcol]
    df = df[notcountcols]
    # optional: sort it by index
    df.sort_index(inplace=True)
    return df
```

In [11]:

```
#**WARNING: THIS CELL MAY TAKE 15 MIN TO RUN**
#Runs the function that expands the table
```

```
df_dup = duplicate_rows(df_weight, 'pwgtp')
df_dup = df_dup.reset_index()
```

Filtering and Grouping the Data

In [12]:

```
#Code to filter Educational Groups
def school_range (schl):
    if int(schl) < 15: return "No diploma"
    elif int(schl) < 17: return "HS diploma or GED"
    elif int(schl) < 19: return "Some College, no degree"
    elif int(schl) < 25: return "Degree (Associate or higher)"
    else: return "Unknown"
df_dup["School_Level"]= df_dup.schl.apply(school_range)
```

In [13]:

```
#Code to filter Oppurtunity Youth Status
def Y_Status (esr, sch):
    if (int(esr) == 3 or int(esr) == 6) and int(sch) == 1: return "Opportunity Youth"
    elif (int(esr) == 1 or int(esr) == 2 or int(esr) == 4 or int(esr) == 5) and int(sch) <= 15: return "Working without Diploma"
    else: return "Not Opportunity Youth"
df_dup["OY_Status"] = df_dup.apply(lambda x: Y_Status(x["esr"], x["sch"]), axis=1)
```

In [14]:

```
#Code to filter Opportunity Youth Status
def Y_Status (esr, sch):
    if (int(esr) == 3 or int(esr) == 6) and int(sch) == 1: return "Opportunity Youth"
    else: return "Not Opportunity Youth"
df_dup["Is_OY"] = df_dup.apply(lambda x: Y_Status(x["esr"], x["sch"]), axis=1)
```

In [15]:

```
#Code that adds Age_Group and groups ages into bins
df_dup['Age_Group'] = pd.cut(x=df_dup['agep'], bins=[16, 18, 21, 24], labels=['16-18', '19-21', '21-24'])
```

In [16]:

```
#adds Total_Population column that takes the total population of each age group
df_dup["Total_Populations"]=df_dup.groupby("Age_Group")["Age_Group"].transform("count")
df_dup["OY_Status_Counts"]=df_dup.groupby("OY_Status")["OY_Status"].transform("count")
```

In [17]:
```
#Sets up a new dataframe to filter for Oppurtinuty Youth
df_chart = df_dup
df_chart['schl'] = df_chart['schl'].astype(float)

#Creates a dataframe of df_dup that is only Opportunity Youth
oy_chart = df_dup.loc[df_dup["Is_OY"] == "Opportunity Youth"]

#Creates a dataframe of df_dup that is everyone not an Opportunity Youth
noy_chart = df_dup.loc[df_dup["Is_OY"] == "Not Opportunity Youth"]
```

In [18]:
```
#function that adds percentage of total to column
def add_perc_to_column(df, column_n, total):
    df[column_n] = (round(df[column_n]/total*100)).astype(str) + "% : " + (df[column_n]).astype(str)
```

In [19]:
```
#Level of Education by Age
#Group by and count by age group and education level
oy_chart.sort_values(["School_Level"])
totals = oy_chart.groupby(["School_Level"])["Total_Populations"].count()
grouper = oy_chart.groupby(["Age_Group", "School_Level"], as_index=False).count()
total_pop = totals.sum()
```

Finding meaning in the data

In [20]:
```
#Creates School Level Pivot
#Cannot find a way to add percentage of population without doing pivot table in excel
sch_piv= pd.pivot_table(data = grouper, index="School_Level", columns="Age_Group", values="Total_Populations",
                              aggfunc = "sum", margins_name="Total", margins=True)
sch_piv
```

Out[20]:

Age_Group	16-18	19-21	21-24	Total
School_Level				
Degree (Associate or higher)	19	341	812	1172

HS diploma or GED	621	1737	1461	3819
No diploma	464	560	531	1555
Some College, no degree	13	131	567	711
Total	1117	2769	3371	7257

In [21]:

```
#Converts to Data Frame and adds percent of population
sch_piv_df = pd.DataFrame(sch_piv.to_records()).set_index('School_Level')
sch_piv_perc_df = sch_piv_df.copy()
[add_perc_to_column(sch_piv_perc_df, c, total_pop) for c in sch_piv_perc_df.columns]
sch_piv_perc_df
```

Out[21]:

	16-18	19-21	21-24	Total
School_Level				
Degree (Associate or higher)	0.0% : 19	5.0% : 341	11.0% : 812	16.0% : 1172
HS diploma or GED	9.0% : 621	24.0% : 1737	20.0% : 1461	53.0% : 3819
No diploma	6.0% : 464	8.0% : 560	7.0% : 531	21.0% : 1555
Some College, no degree	0.0% : 13	2.0% : 131	8.0% : 567	10.0% : 711
Total	15.0% : 1117	38.0% : 2769	46.0% : 3371	100.0% : 7257

In [22]:

```
##Opportunity Youth Status by Age
#Group by and count by age group and OY Status
df_dup.sort_values(["Age_Group"])
totals_by_group = df_dup.groupby(["OY_Status"])["Total_Populations"].count()
grouper_oy = df_dup.groupby(["Age_Group", "OY_Status"], as_index=False).count()
total_pop = totals_by_group.sum()

#Creates OY_Status Pivot Table with Totals
#Cannot find a way to add percentage of population without doing pivot table in excel
oy_piv=pd.pivot_table(data=grouper_oy, index="OY_Status", columns="Age_Group", values="Total_Populations",
                             aggfunc = "sum", margins_name="Total", margins=True)
oy_piv
```

```
oy_piv
```

Out[22]:

Age_Group	16-18	19-21	21-24	Total
OY_Status				
Not Opportunity Youth	10298	5592	2363	18253
Opportunity Youth	1117	2769	3371	7257
Working without Diploma	4895	12349	17253	34497
Total	16310	20710	22987	60007

In [23]:

```
#Converts to Data Frame and adds percent of population
oy_piv_df = pd.DataFrame(oy_piv.to_records()).set_index('OY_Status')
oy_piv_perc_df = oy_piv_df.copy()
[add_perc_to_column(oy_piv_perc_df, c, total_pop) for c in oy_piv_perc_df.columns]
oy_piv_perc_df
```

Out[23]:

	16-18	19-21	21-24	Total
OY_Status				
Not Opportunity Youth	17.0% : 10298	9.0% : 5592	4.0% : 2363	30.0% : 18253
Opportunity Youth	2.0% : 1117	5.0% : 2769	6.0% : 3371	12.0% : 7257
Working without Diploma	8.0% : 4895	21.0% : 12349	29.0% : 17253	57.0% : 34497
Total	27.0% : 16310	35.0% : 20710	38.0% : 22987	100.0% : 60007

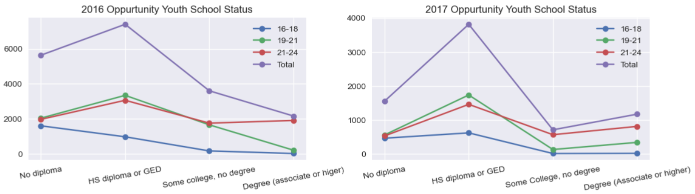
In [24]:

```
#Create data fram from csv of 2016 data
#Add Opportunity row
old_oy = pd.read_csv('src/data/csv_files/oy_csv.csv')
old_oy = pd.DataFrame(old_oy)
old_oy = old_oy.set_index('op_youth', drop=True)

#Prepping the the 2017 data for comparison
sch_oy_df=sch_piv_df.append(oy_piv_df[1:2]).reindex(["Opportunity Youth", "No diploma", "HS diploma or GED", "Some College, no degree", "Degree (Associate or higher)"])
```

Visuals Comparing 2016 to 2017

In [25]:

```
#A plot to compare the 2016 vs 2017 data
#Note: We can see that our population sample
 is significantly smaller. This is because we
did not include Renton City
#From the data we can see a greater percent o
f people have finished highschool 2017 but no
t beyond that
plt.style.use('seaborn')
fig, ax = plt.subplots(1,2, figsize = (12,4))
fig.tight_layout(pad=5)
old_oy2=old_oy[1:]
ax[0].plot(old_oy2.index, old_oy2.values, mar
ker = 'o')
ax[0].set_title('2016 Oppurtunity Youth Schoo
l Status');
sch_oy2=sch_oy_df[1:]
ax[1].plot(sch_oy2.index, sch_oy2.values, mar
ker = 'o')
ax[1].set_title('2017 Oppurtunity Youth Schoo
l Status');

for ax in fig.axes:
    plt.sca(ax)
    plt.xticks(rotation=10)
    plt.legend(['16-18', '19-21', '21-24', 'T
otal'])

plt.savefig('./reports/figures/project_2016vs
2017_oy_education_level.png', dpi=300, bbox_i
nches='tight')
```



Graphs that further demonstrate educational trend in Oppurtunity Youth

In [26]:

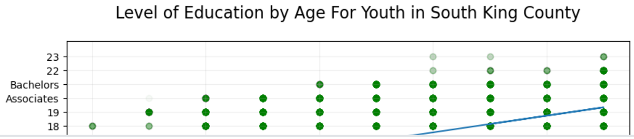
```
#Sets up a new dataframe to draw our graphs d
rom
df_chart = df_dup
```

```
df_chart['schl'] = df_chart['schl'].astype(fl
oat)
#
#Creates a dataframe of df_dup2 that is only
 Opportunity Youth
oy_chart = df_dup.loc[df_dup["Is_OY"] == "Opp
ortunity Youth"]
#Creates a dataframe of df_dp2 that is everyo
ne not an Opportunity You
noy_chart = df_dup.loc[df_dup["Is_OY"] == "No
t Opportunity Youth"]
```

In [27]:

```
#Builds, labels, titles, the scatter
plt.style.use("default")
fig, ax = plt.subplots(figsize=(10, 6))
ax_scatter = plt.scatter(df_dup.agep, df_dup.
schl, alpha=.01, c='green')
plt.title('Level of Education by Age For Yout
h in South King County', fontsize=16, y=1.05)
plt.xlabel('Age (in years)', fontsize=12)
plt.ylabel('Level of Education', fontsize=12)
plt.yticks([1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
23], [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,
13, 14, 'High School Degree',16, 17, 18, 19,
'Associates', 'Bachelors', 22, 23])
plt.grid(alpha=.2)

#best fit line
plt.plot(noy_chart.agep, np.poly1d(np.polyfit
(noy_chart.agep, noy_chart.schl, 1))(noy_char
t.agep))

#Finding best fit M and B
acx = df_dup.agep
acy = df_dup.schl
acy.to_numpy(dtype="float32")
acx.to_numpy(dtype="float32")
m, b = np.polyfit(acx, acy, 1)

#Saves Graph
plt.savefig('./reports/figures/project_one_sc
atter_all.png', dpi=300, bbox_inches='tight')

#Prints m, then b, then plots the graph
print(m)
print(b)
plt.show()
```

```
0.5578685984084439
5.036902861584741
```


Level of Education by Age For Youth in South King County
Bachelors
Associates