Question1

May 3, 2019

1 What is the prevalence of different chronic conditions of interest by year?

Chronic conditions: - Hypertension - Diabetes (excluding gestational diabetes) - Cancers - Musculoskeletal - Cardiovascular - Hyperlipidemia - Asthma - COPD - Mental Health - Sleep Disorders (sleep apnea, insomnia, narcolepsy) - Chronic Kidney Disease.

Calculate percentage of unique HCAs with a condition of interest. Use all HCAs including those who have not generated a claim as the denominator

1.1 Notes about the included chronic conditions

The chronic conditions we have listed above do not correspond to what we have developed now. **Do you want to update this list on this question?** I will continue to answer this question with the conditions we have discussed and incorporated in the data.

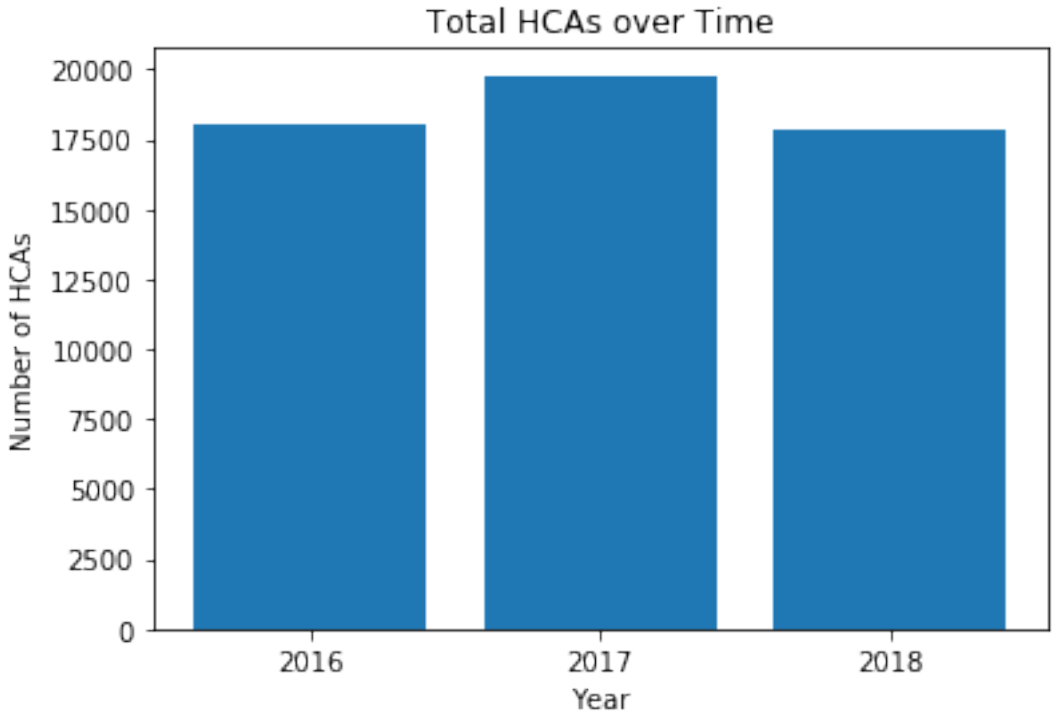
Chronic conditions listed above but not included as categories in our data: - Hypertension - Hyperlipidemia

```
In [1]: import pandas as pd
        import numpy as np
        import matplotlib.pyplot as plt

In [2]: med = pd.read_csv('../../data/reshaped_med.csv')
        enroll = pd.read_csv('../../data/enroll.csv')
```

1.1.1 Total number of HCAs each year

```
In [35]: years = enroll.groupby(['Incurred Year']).agg({'Member ID Encrypted': 'count', 'Membe
         years.reset_index(level=0, inplace=True)
         years.columns = ['year', 'total']
         years.loc[:, 'year'] = ['2016', '2017', '2018']
         years

Out[35]:    year  total
         0  2016  18009
         1  2017  19778
         2  2018  17862
```

```
In [28]: plt.bar(years['year'], years['total'])
         plt.title('Total HCAs over Time')
         plt.xlabel("Year")
         plt.ylabel("Number of HCAs")
         plt.show()
```

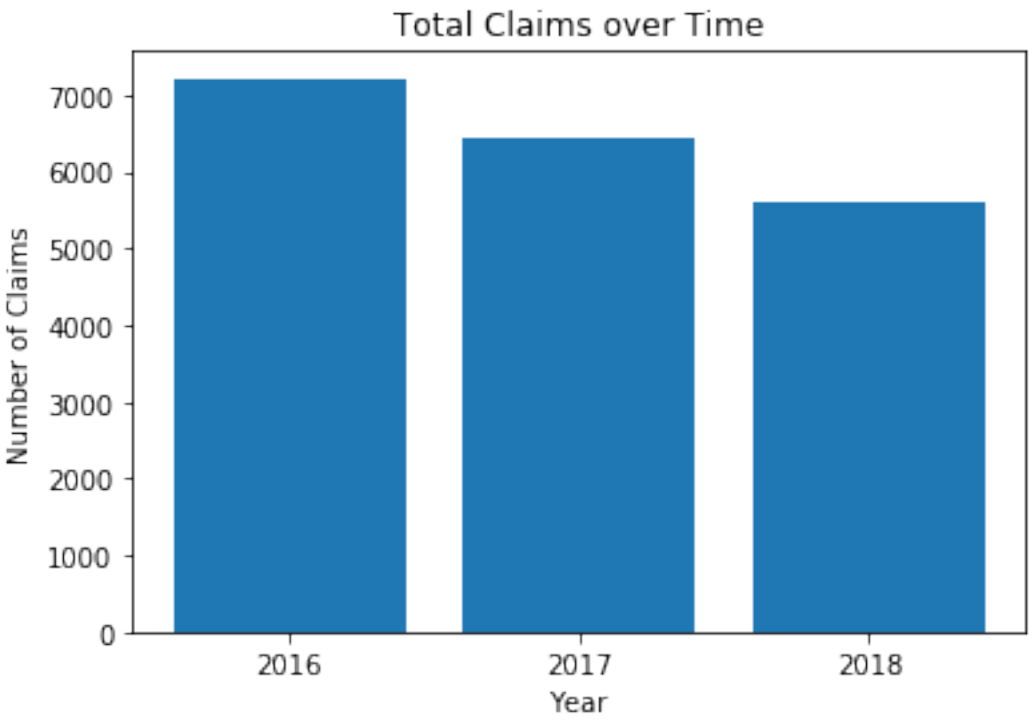


1.1.2 Total number of claims each year

```
In [29]: num_claims = med.groupby(['year']).size().reset_index(name='total')
         num_claims.loc[:, 'year'] = ['2016', '2017', '2018']
         num_claims
```

```
Out[29]:    year  total
         0  2016   7213
         1  2017   6449
         2  2018   5601
```

```
In [30]: plt.bar(num_claims['year'], num_claims['total'])
         plt.title('Total Claims over Time')
         plt.xlabel("Year")
         plt.ylabel("Number of Claims")
         plt.show()
```



1.1.3 Calculating percentage

```
In [36]: asthma = med.groupby(['year'])['binary_asthma'].sum().reset_index(name ='asthma').astl
         bp = med.groupby(['year'])['binary_bp'].sum().reset_index(name ='bp').bp
         cancer = med.groupby(['year'])['binary_cancer'].sum().reset_index(name = 'cancer').can
         cardiovascular = med.groupby(['year'])['binary_cardiovascular'].sum().reset_index(name
                                                                                           'can
         copd = med.groupby(['year'])['binary_copd'].sum().reset_index(name = 'copd').copd
         diabetes = med.groupby(['year'])['binary_diabetes'].sum().reset_index(name = 'diabetes
         kidney = med.groupby(['year'])['binary_kidney'].sum().reset_index(name = 'kidney').kid
         obesity = med.groupby(['year'])['binary_obesity'].sum().reset_index(name = 'obesity')
         musculoskeletal = med.groupby(['year'])['binary_musculoskeletal'].sum().reset_index(na
                                                                                           'm
         cholesterol = med.groupby(['year'])['binary_cholesterol'].sum().reset_index(name = 'ch
         mental_disorder = med.groupby(['year'])['binary_mental_disorder'].sum().reset_index(na
                                                                                           'm
```

Total claims for each chronic condition each year

```
In [37]: totals_by_year = pd.concat([years, asthma, bp, cancer, cardiovascular, copd, diabetes,
                    cholesterol, mental_disorder], axis=1)
         totals_by_year
```

Out[37]:

	year	total	asthma	bp	cancer	cardiovascular	copd	diabetes	kidney	\
0	2016	18009	356	1252	350	1099	247	928	138	

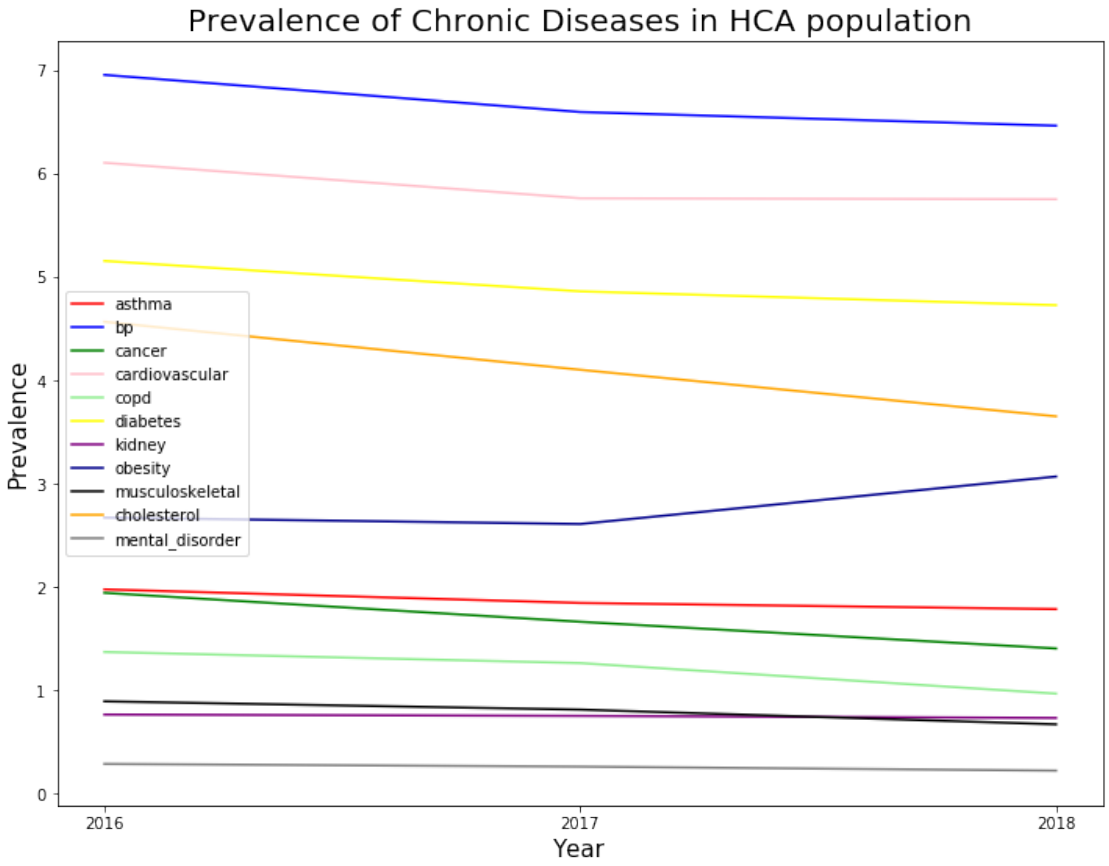
```
1  2017  19778     365  1304     329            1139   250       961     149
2  2018  17862     319  1154     251            1027   173       844     131

   obesity  musculoskeletal  cholesterol  mental_disorder
0      481              161          822               52
1      516              161          811               52
2      548              120          652               40
```

Percentages for each chronic condition each year

In [38]:
```
percentages = totals_by_year.iloc[:,2:].div(totals_by_year['total'], axis=0) * 100
percentages.loc[:, 'year'] = ['2016', '2017', '2018']
percentages
```

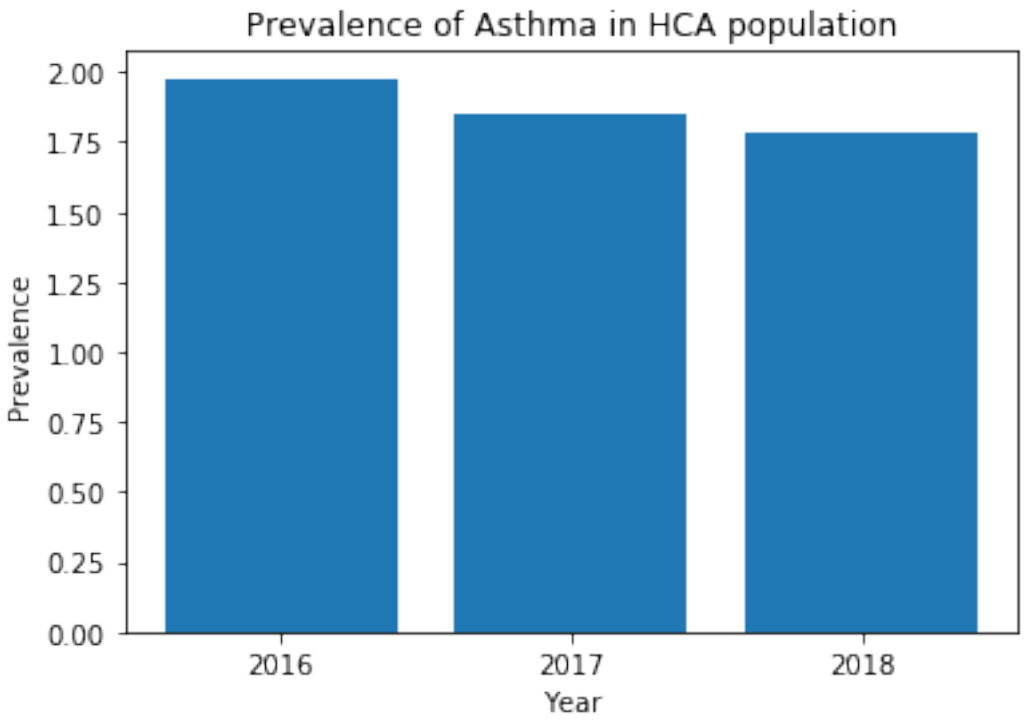
Out[38]:
```
     asthma        bp    cancer  cardiovascular      copd  diabetes    kidney  \
0  1.976789  6.952080  1.943473        6.102504  1.371536  5.152979  0.766284
1  1.845485  6.593184  1.663464        5.758924  1.264031  4.858934  0.753362
2  1.785914  6.460643  1.405218        5.749636  0.968537  4.725115  0.733401

    obesity  musculoskeletal  cholesterol  mental_disorder  year
0  2.670887         0.893997     4.564384         0.288745  2016
1  2.608959         0.814036     4.100516         0.262918  2017
2  3.067966         0.671817     3.650207         0.223939  2018
```

In [39]:
```
fig = plt.figure(figsize = (12, 9))

plt.plot(percentages['year'], percentages['asthma'], label = 'asthma', c = 'red')
plt.plot(percentages['year'], percentages['bp'], label = 'bp', c = 'blue')
plt.plot(percentages['year'], percentages['cancer'], label = 'cancer', c = 'green')
plt.plot(percentages['year'], percentages['cardiovascular'], label = 'cardiovascular'
plt.plot(percentages['year'], percentages['copd'], label = 'copd', c = 'lightgreen')
plt.plot(percentages['year'], percentages['diabetes'], label = 'diabetes', c = 'yellow
plt.plot(percentages['year'], percentages['kidney'], label = 'kidney', c = 'purple')
plt.plot(percentages['year'], percentages['obesity'], label = 'obesity', c = 'darkblue
plt.plot(percentages['year'], percentages['musculoskeletal'], label = 'musculoskeletal
plt.plot(percentages['year'], percentages['cholesterol'], label = 'cholesterol', c =
plt.plot(percentages['year'], percentages['mental_disorder'], label = 'mental_disorder

# labels
plt.title('Prevalence of Chronic Diseases in HCA population', size = 20)
plt.xlabel("Year", size = 15)
plt.ylabel("Prevalence", size = 15)
plt.legend(['asthma', 'bp', 'cancer', 'cardiovascular', 'copd', 'diabetes', 'kidney',
           'cholesterol', 'mental_disorder'])


plt.show()
```



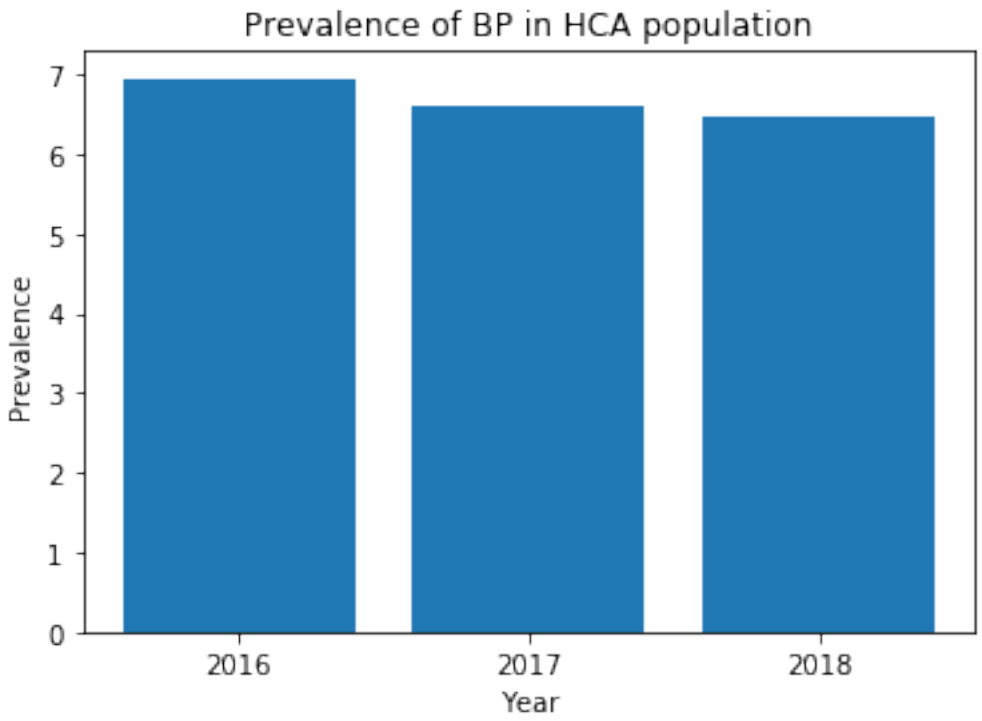
1.1.4 asthma

```
In [47]: plt.bar(percentages['year'], percentages['asthma'], align='center', color='tab:blue')
         plt.title('Prevalence of Asthma in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



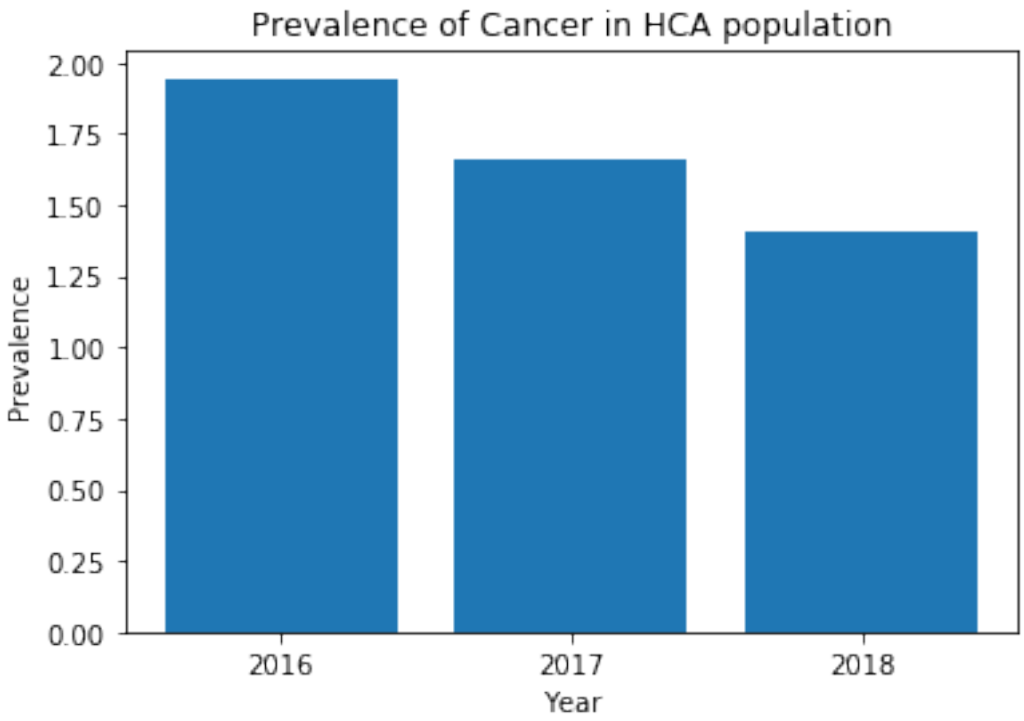
1.1.5 bp

```
In [48]: plt.bar(percentages['year'], percentages['bp'], align='center', color='tab:blue')
         plt.title('Prevalence of BP in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



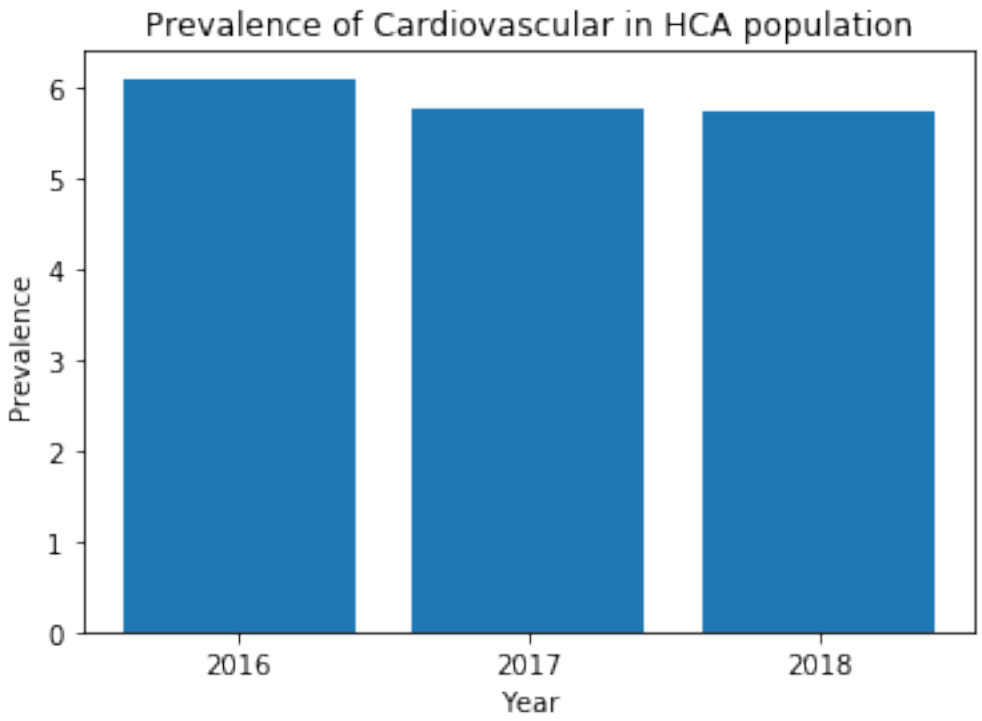
1.1.6 cancer

```
In [49]: plt.bar(percentages['year'], percentages['cancer'], align='center', color='tab:blue')
         plt.title('Prevalence of Cancer in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



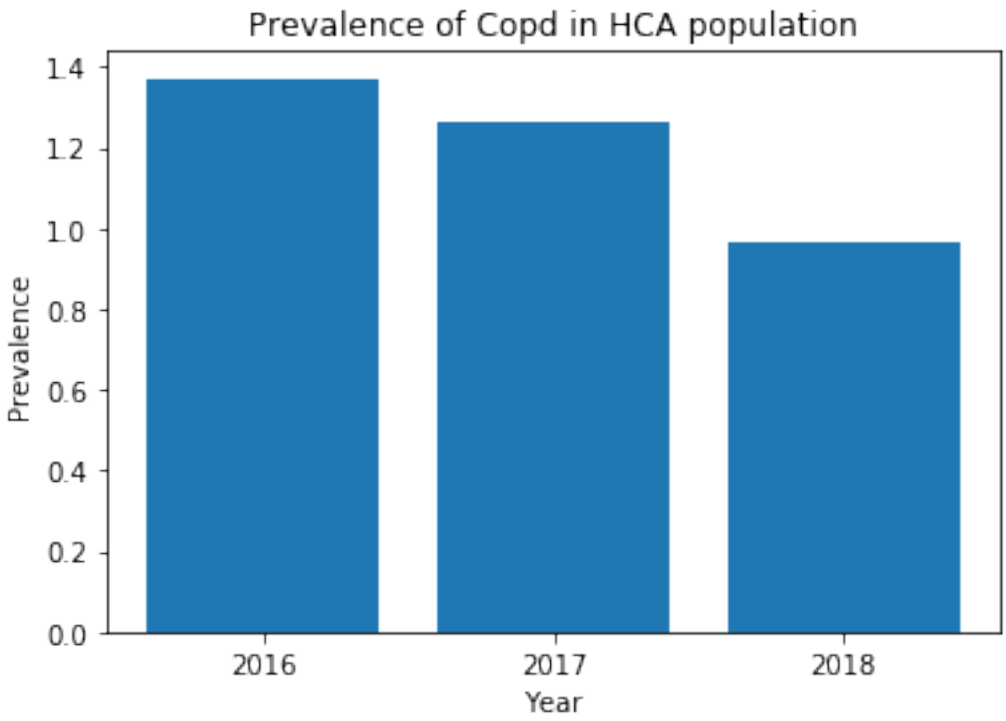
1.1.7 cardiovascular

```
In [50]: plt.bar(percentages['year'], percentages['cardiovascular'], align='center', color='tal
         plt.title('Prevalence of Cardiovascular in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



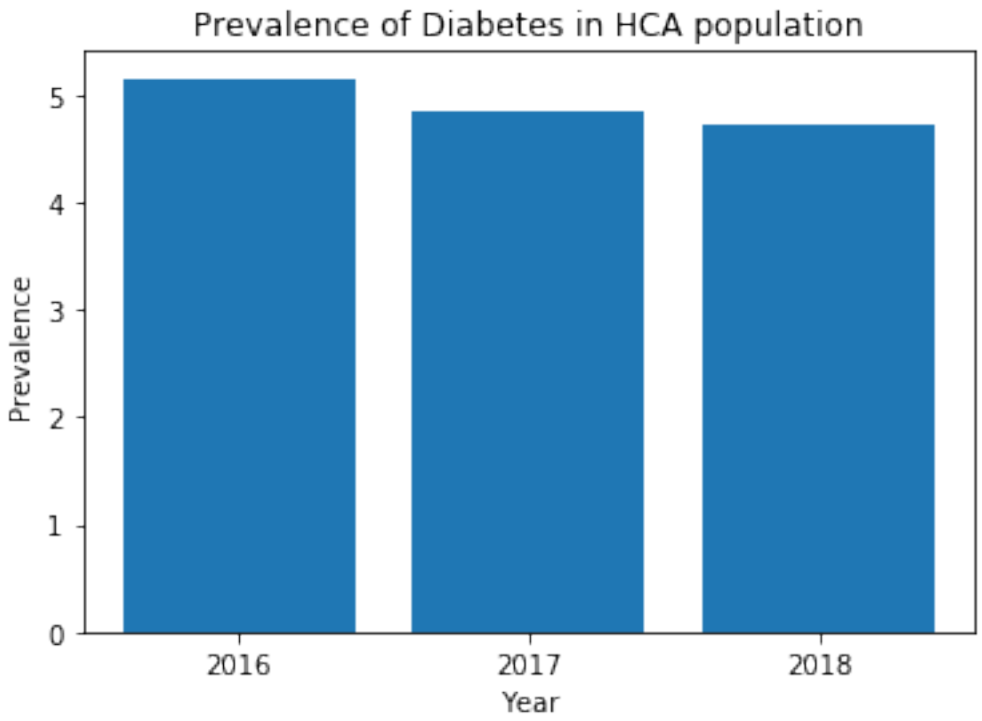
1.1.8 copd

```
In [51]: plt.bar(percentages['year'], percentages['copd'], align='center', color='tab:blue')
         plt.title('Prevalence of Copd in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



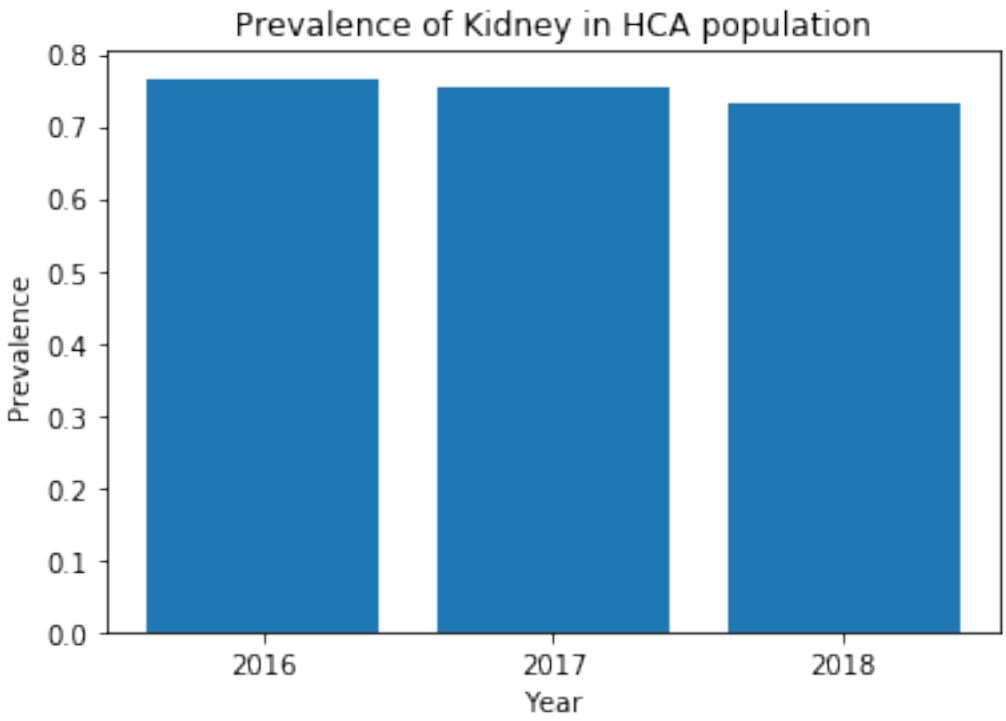
1.1.9 diabetes

```
In [52]: plt.bar(percentages['year'], percentages['diabetes'], align='center', color='tab:blue
         plt.title('Prevalence of Diabetes in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



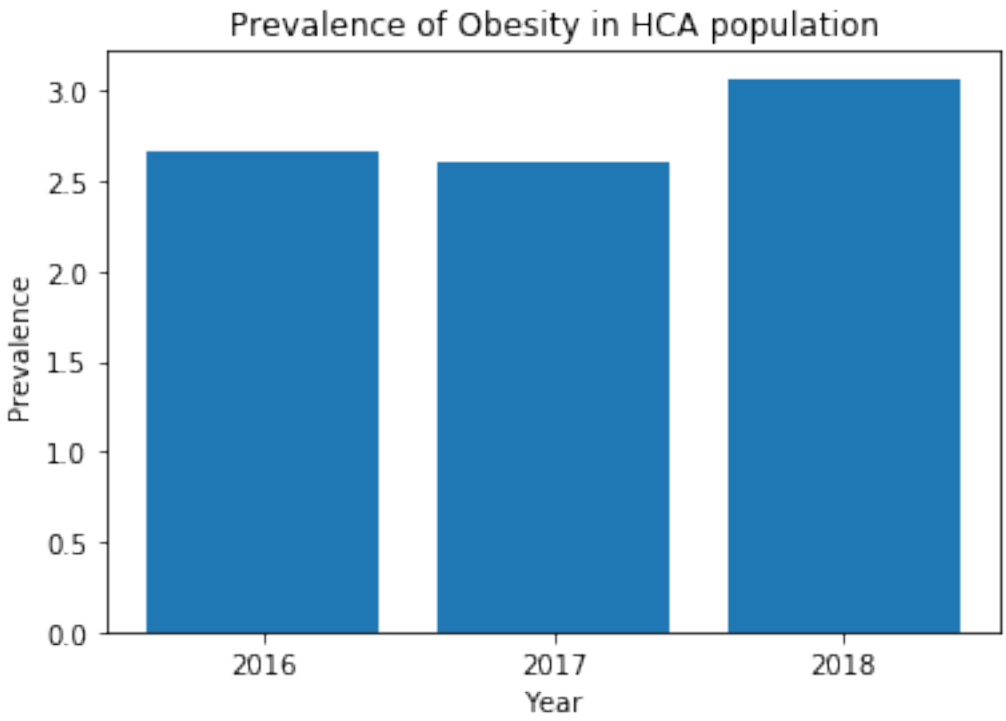
1.1.10 kidney

```
In [53]: plt.bar(percentages['year'], percentages['kidney'], align='center', color='tab:blue')
         plt.title('Prevalence of Kidney in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



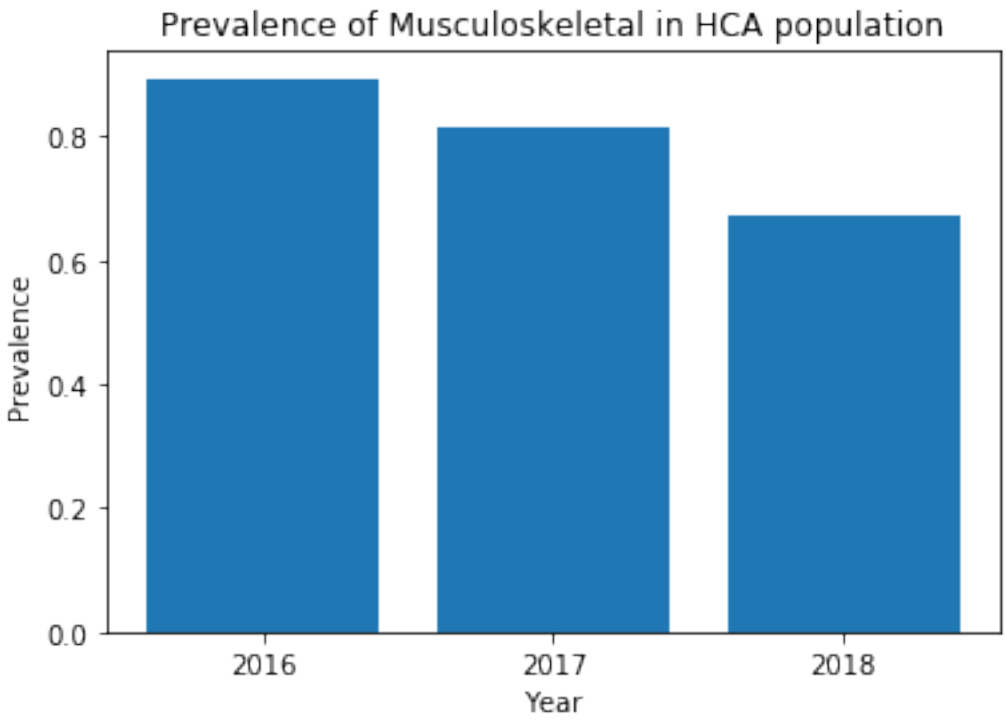
1.1.11 obesity

```
In [54]: plt.bar(percentages['year'], percentages['obesity'], align='center', color='tab:blue'
         plt.title('Prevalence of Obesity in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



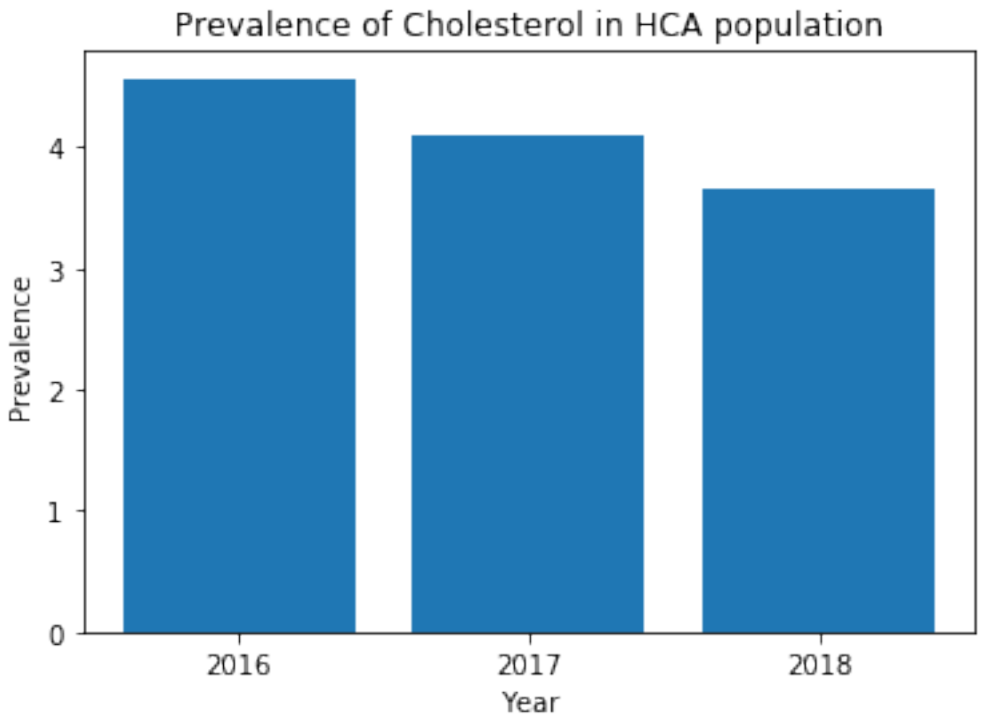
1.1.12 musculoskeletal

```
In [55]: plt.bar(percentages['year'], percentages['musculoskeletal'], align='center', color='ta
         plt.title('Prevalence of Musculoskeletal in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



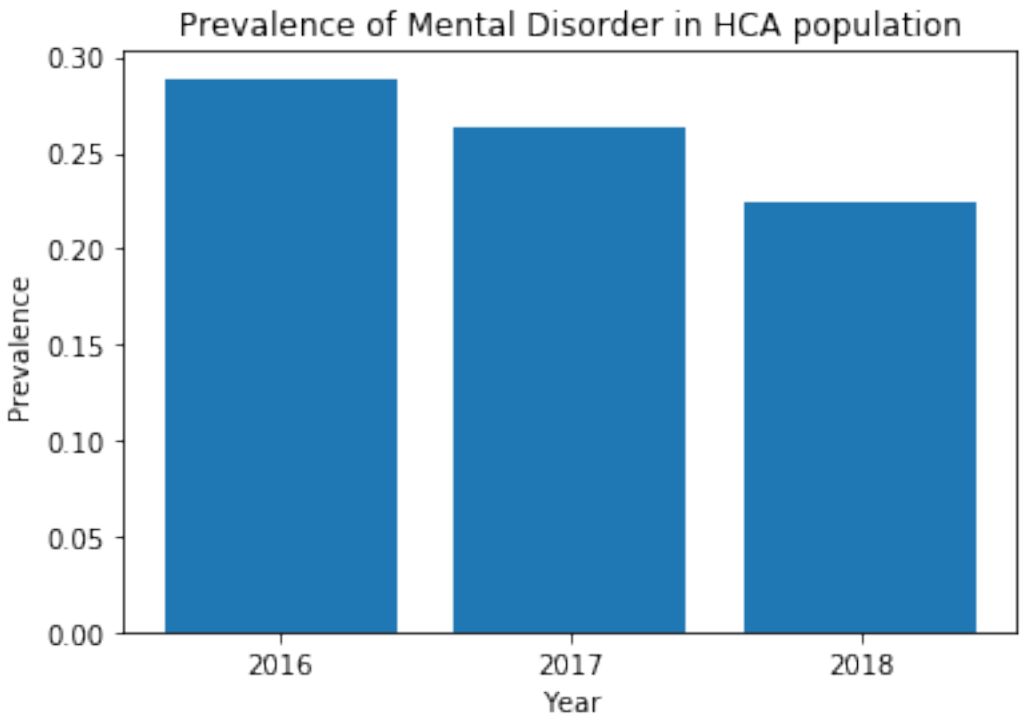
1.1.13 cholesterol

```
In [56]: plt.bar(percentages['year'], percentages['cholesterol'], align='center', color='tab:bl
         plt.title('Prevalence of Cholesterol in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```



1.1.14 mental_disorder

```
In [57]: plt.bar(percentages['year'], percentages['mental_disorder'], align='center', color='ta
         plt.title('Prevalence of Mental Disorder in HCA population')
         plt.xlabel("Year")
         plt.ylabel("Prevalence")
         plt.show()
```


Prevalence of Mental Disorder in HCA population
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Prevalence
2016
2017
2018
Year