Heart Disease Diagnostic Analysis

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
sns.set_style('whitegrid')
```

In [8]:
```
hrt_d=pd.read_csv('C:\\Users\\hp\\Downloads\\UNIFIED PROJECTS\\Heart Disease data\\Heart_Disease_data.csv')
```

In [9]:
```
hrt_d.head()
```

Out[9]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	52	1	0	125	212	0	1	168	0	1.0	2	2	3	0
1	53	1	0	140	203	1	0	155	1	3.1	0	0	3	0
2	70	1	0	145	174	0	1	125	1	2.6	0	0	3	0
3	61	1	0	148	203	0	1	161	0	0.0	2	1	3	0
4	62	0	0	138	294	1	1	106	0	1.9	1	3	2	0

In [10]:
```
hrt_d.shape
```

Out[10]:
```
(1025, 14)
```

In [11]:
```
hrt_d.isnull().any()
```

Out[11]:
```
age         False
sex         False
cp          False
trestbps    False
chol        False
fbs         False
restecg     False
thalach     False
exang       False
oldpeak     False
slope       False
ca          False
thal        False
target      False
dtype: bool
```

In [12]:
```
hrt_d.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       1025 non-null   int64  
 1   sex       1025 non-null   int64  
 2   cp        1025 non-null   int64  
 3   trestbps  1025 non-null   int64  
 4   chol      1025 non-null   int64  
 5   fbs       1025 non-null   int64  
 6   restecg   1025 non-null   int64  
 7   thalach   1025 non-null   int64  
 8   exang     1025 non-null   int64  
 9   oldpeak   1025 non-null   float64
 10  slope     1025 non-null   int64  
 11  ca        1025 non-null   int64  
 12  thal      1025 non-null   int64  
 13  target    1025 non-null   int64  
dtypes: float64(1), int64(13)
memory usage: 112.2 KB
```

In [15]:
```
hrt_d['sex'].replace(0,'F',inplace=True)
hrt_d['sex'].replace(1,'M',inplace=True)
```

In [16]:
```
hrt_d.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       1025 non-null   int64  
 1   sex       1025 non-null   object 
 2   cp        1025 non-null   int64  
 3   trestbps  1025 non-null   int64  
 4   chol      1025 non-null   int64  
 5   fbs       1025 non-null   int64  
 6   restecg   1025 non-null   int64  
 7   thalach   1025 non-null   int64  
 8   exang     1025 non-null   int64  
 9   oldpeak   1025 non-null   float64
 10  slope     1025 non-null   int64  
 11  ca        1025 non-null   int64  
 12  thal      1025 non-null   int64  
 13  target    1025 non-null   int64  
dtypes: float64(1), int64(12), object(1)
memory usage: 112.2+ KB
```

In [17]:
```
def heart_disease(row):
    if row==0:
        return 'Absence'
    elif row==1:
        return 'Presence'
```

In [19]:
```
hrt_d['Heart_Disease_occured']=hrt_d['target'].apply(heart_disease)
hrt_d.head()
```

Out[19]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target	Heart_Disease_occured
0	52	M	0	125	212	0	1	168	0	1.0	2	2	3	0	Absence
1	53	M	0	140	203	1	0	155	1	3.1	0	0	3	0	Absence
2	70	M	0	145	174	0	1	125	1	2.6	0	0	3	0	Absence
3	61	M	0	148	203	0	1	161	0	0.0	2	1	3	0	Absence
4	62	F	0	138	294	1	1	106	0	1.9	1	3	2	0	Absence

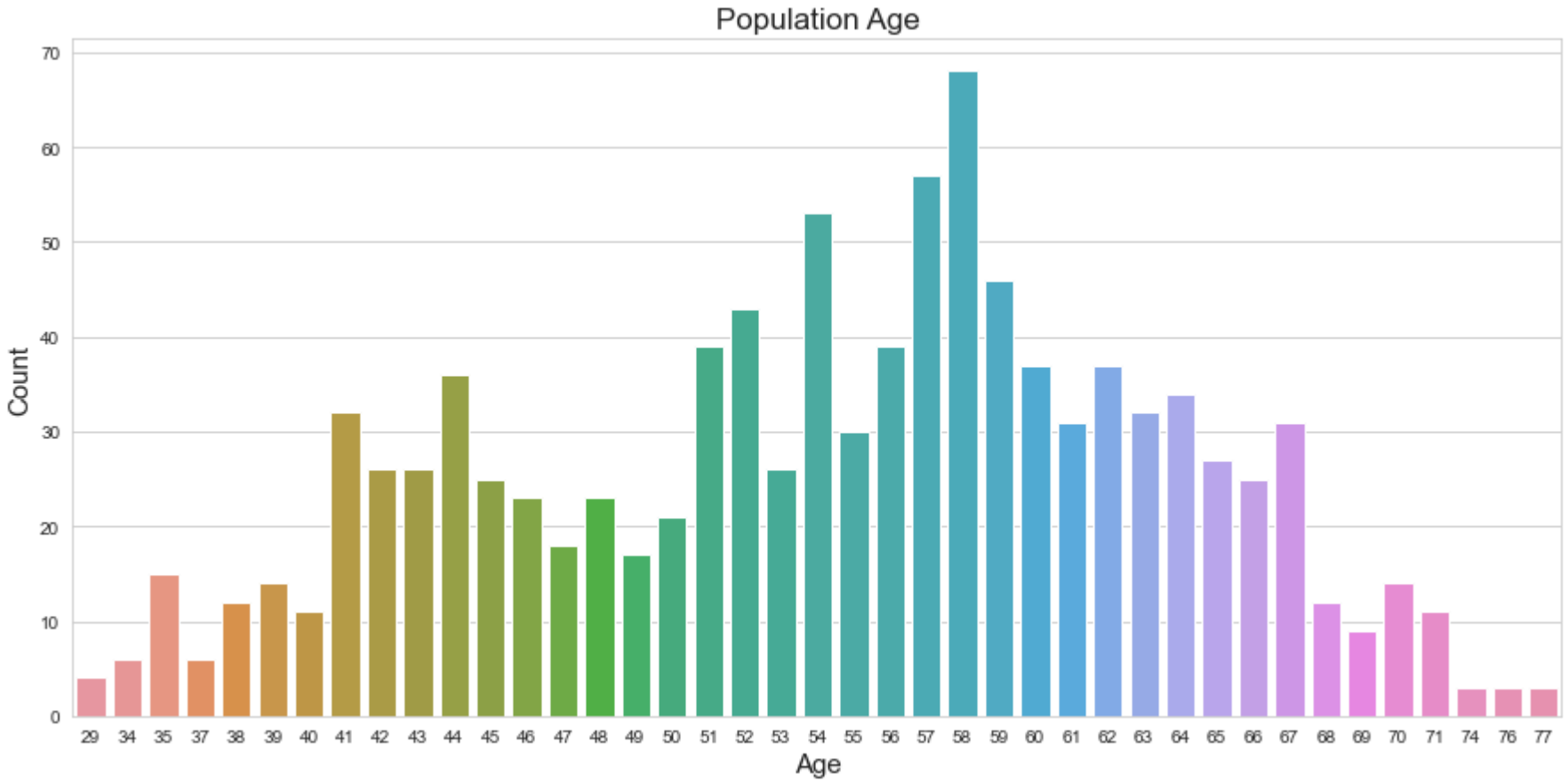
In [21]:
```
print(hrt_d.groupby('Heart_Disease_occured')['target'].count())
```

```
Heart_Disease_occured
Absence     499
Presence    526
Name: target, dtype: int64
```

In [26]:
```
print('Percentage of people having heart disease=',526*100/(499+526))
```

```
Percentage of people having heart disease= 51.31707317073171
```

In [27]:
```
plt.figure(figsize=(15,7))
sns.countplot(x='age', data=hrt_d)
plt.title('Population Age', fontsize=17)
plt.xlabel('Age', fontsize=15)
plt.ylabel('Count', fontsize=15)
plt.show()
```



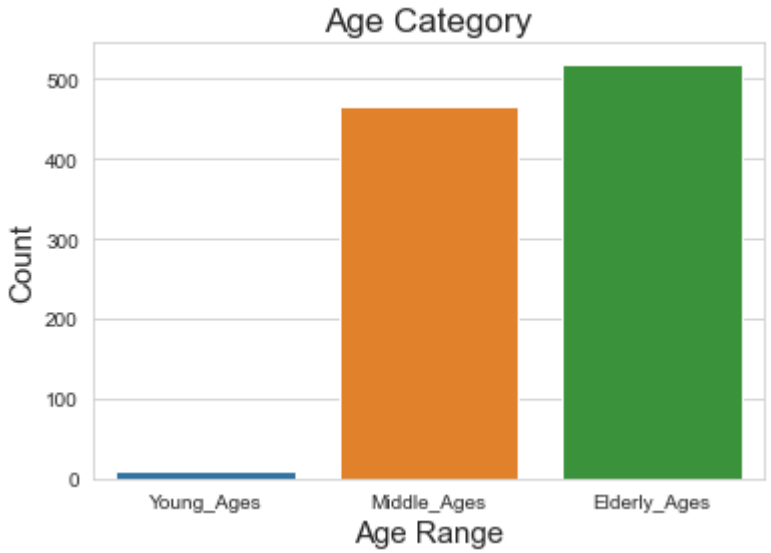
From the barplot we can tell that, people of ages 58 have highest count of suffering from heart diseases.

In [28]:
```
print('Minimum Age=',29);print('Maximum Age=',77)
```

```
Minimum Age= 29
Maximum Age= 77
```

In [30]:
```
Young_Ages=hrt_d[(hrt_d['age']>=29) & (hrt_d['age']<35)]
Middle_Ages=hrt_d[(hrt_d['age']>=35) & (hrt_d['age']<55)]
Elderly_Ages=hrt_d[(hrt_d['age']>55)]
```

In [31]:
```
sns.barplot(x=['Young_Ages','Middle_Ages','Elderly_Ages'], y=[len(Young_Ages), len(Middle_Ages), len(Elderly_Ages)])
plt.title('Age Category', fontsize=17)
plt.xlabel('Age Range', fontsize=15)
plt.ylabel('Count', fontsize=15)
plt.show()
```



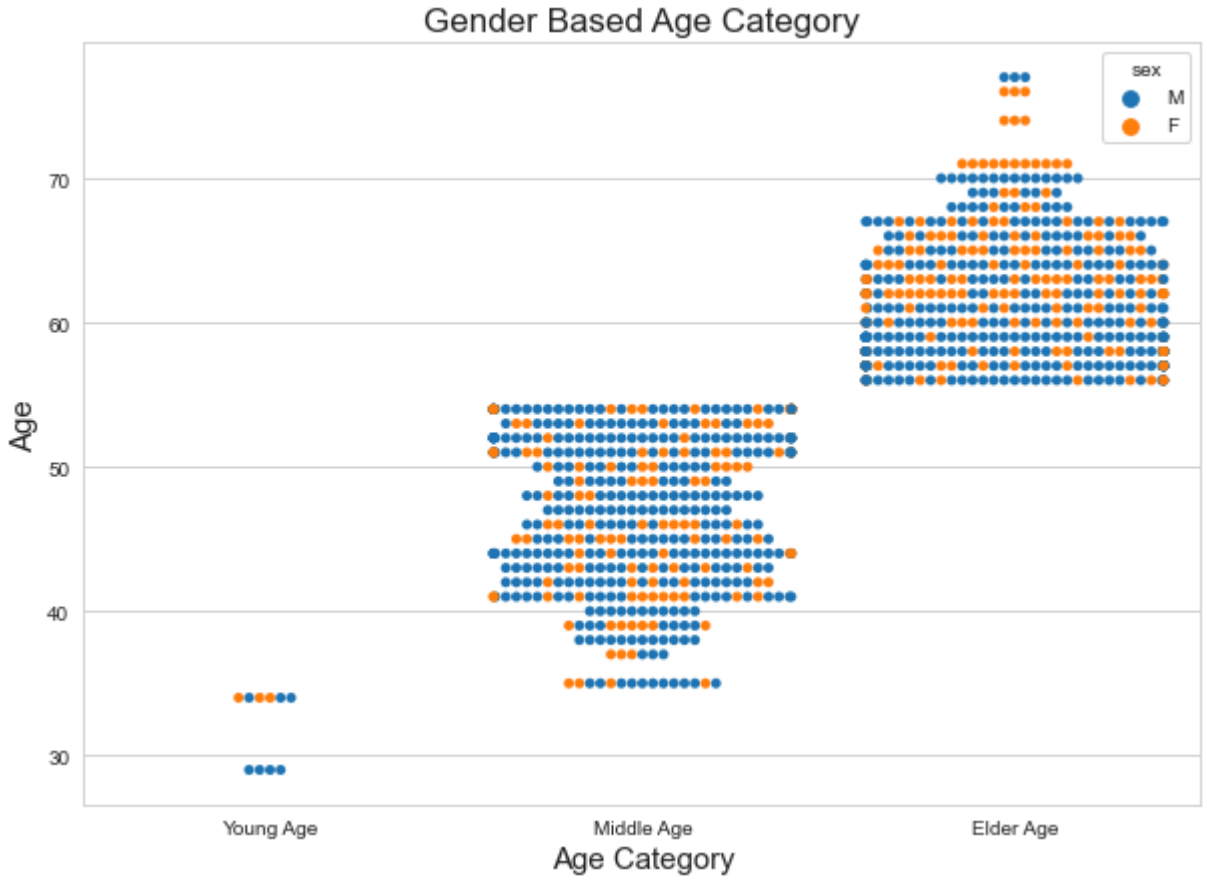
In [32]:
```
def age_range(row):
    if row>=29 and row<35:
        return 'Young Age'
    elif row>=35 and row<55:
        return 'Middle Age'
    elif row>55:
        return 'Elder Age'
```

In [33]:
```
hrt_d['Age_Range']=hrt_d['age'].apply(age_range)
hrt_d.head()
```

Out[33]:

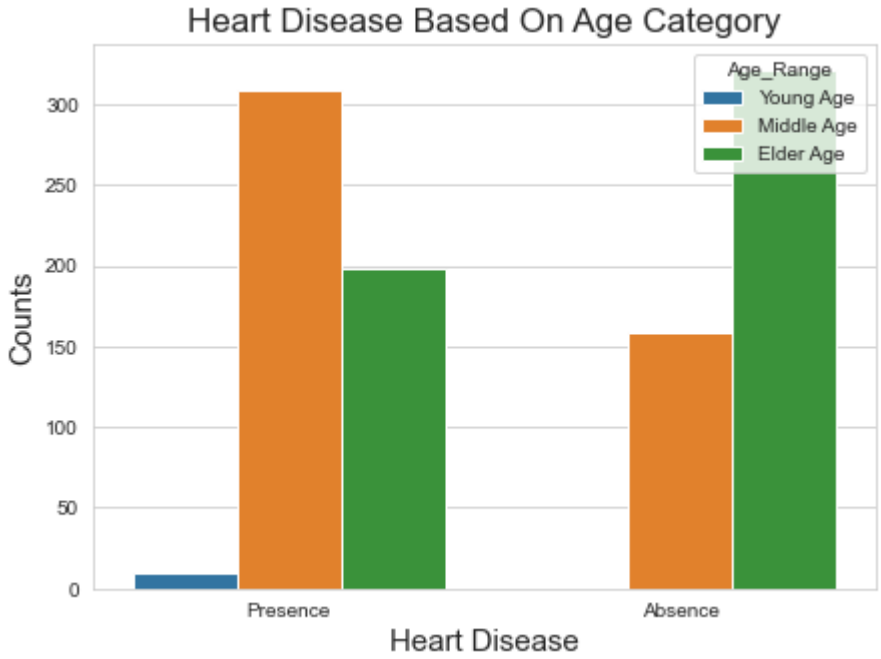
	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target	Heart_Disease_occured	Age_Range
0	52	M	0	125	212	0	1	168	0	1.0	2	2	3	0	Absence	Middle Age
1	53	M	0	140	203	1	0	155	1	3.1	0	0	3	0	Absence	Middle Age
2	70	M	0	145	174	0	1	125	1	2.6	0	0	3	0	Absence	Elder Age
3	61	M	0	148	203	0	1	161	0	0.0	2	1	3	0	Absence	Elder Age
4	62	F	0	138	294	1	1	106	0	1.9	1	3	2	0	Absence	Elder Age

In [34]:
```
plt.figure(figsize=(10,7))
sns.swarmplot(x='Age_Range', y='age', hue='sex', data=hrt_d, order=['Young Age','Middle Age','Elder Age'])
plt.title('Gender Based Age Category', fontsize=17)
plt.xlabel('Age Category', fontsize=15)
plt.ylabel('Age', fontsize=15)
plt.show()
```



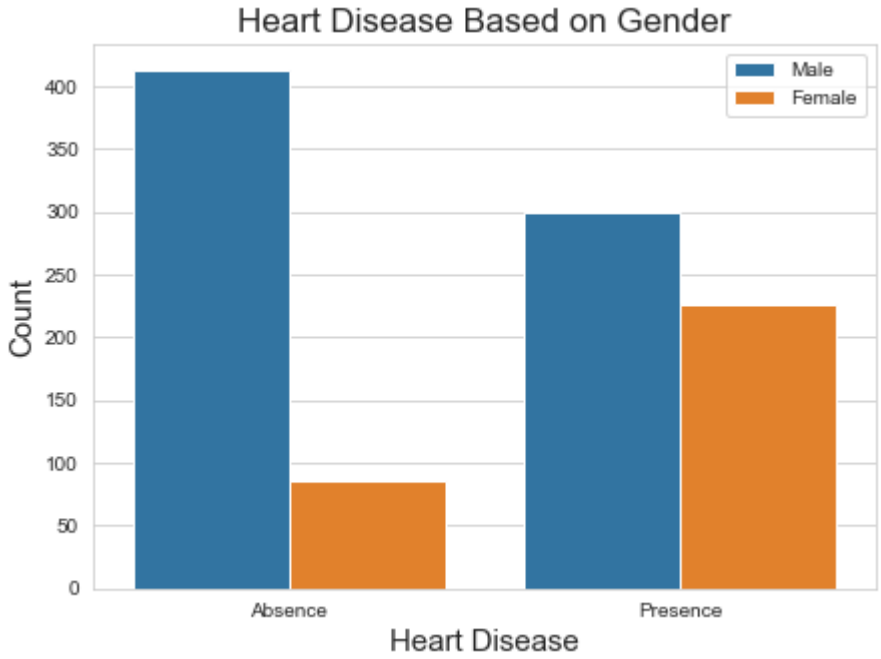
There are more males in middle age and females in elderly age category.

In [36]:
```
plt.figure(figsize=(7,5))
hue_order=['Young Age', 'Middle Age', 'Elder Age']
sns.countplot(x='Heart_Disease_occured', hue='Age_Range', data=hrt_d, order=['Presence','Absence'], hue_order=hue_orde
plt.title('Heart Disease Based On Age Category', fontsize=17)
plt.xlabel('Heart Disease', fontsize=15)
plt.ylabel('Counts', fontsize=15)
plt.show()
```



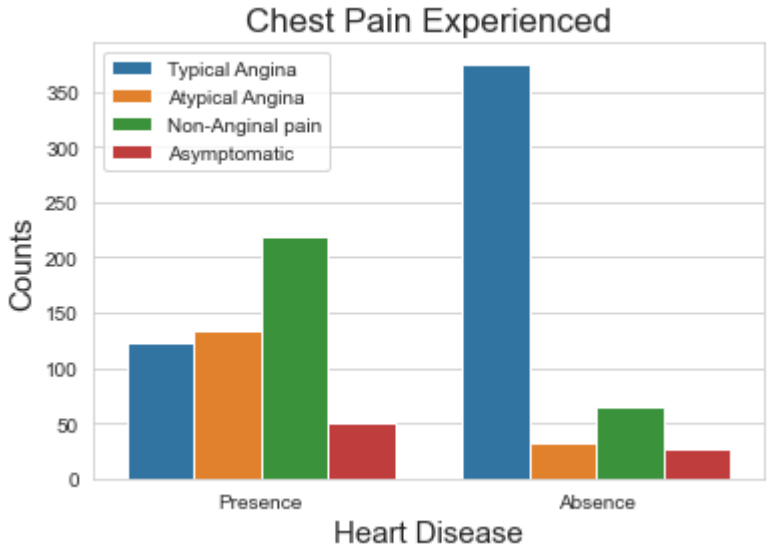
Middle ages are more prone to heart diseases.

In [40]:
```
plt.figure(figsize=(7,5))
sns.countplot(x=hrt_d['Heart_Disease_occured'], hue='sex', data=hrt_d)
plt.xlabel('Heart Disease', fontsize=15)
plt.ylabel('Count',fontsize=15)
plt.legend(labels=['Male','Female'])
plt.title('Heart Disease Based on Gender',fontsize=17)
plt.show()
```



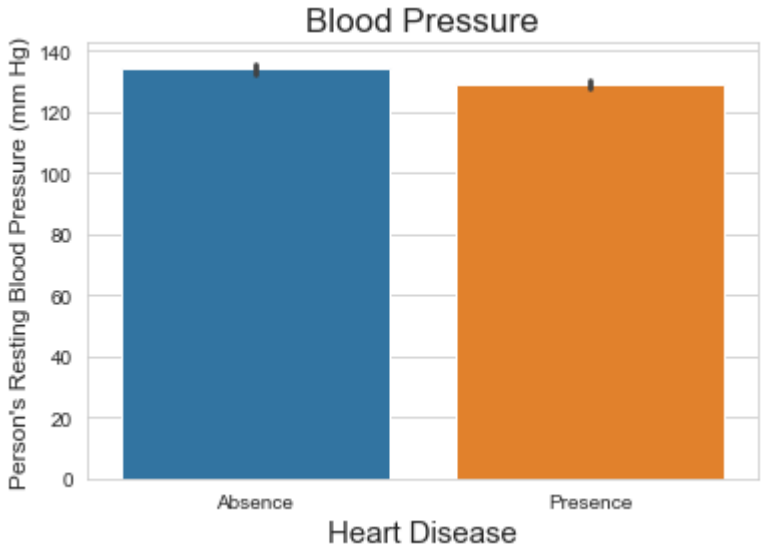
There are more males in whom heart diseases occur.

In [42]:
```
sns.countplot(x=hrt_d['Heart_Disease_occured'], hue='cp', data=hrt_d, order=['Presence','Absence'])
plt.title('Chest Pain Experienced', fontsize=17)
plt.xlabel('Heart Disease',fontsize=15)
plt.ylabel('Counts',fontsize=15)
plt.legend(labels=['Typical Angina','Atypical Angina','Non-Anginal pain','Asymptomatic'])
plt.show()
```



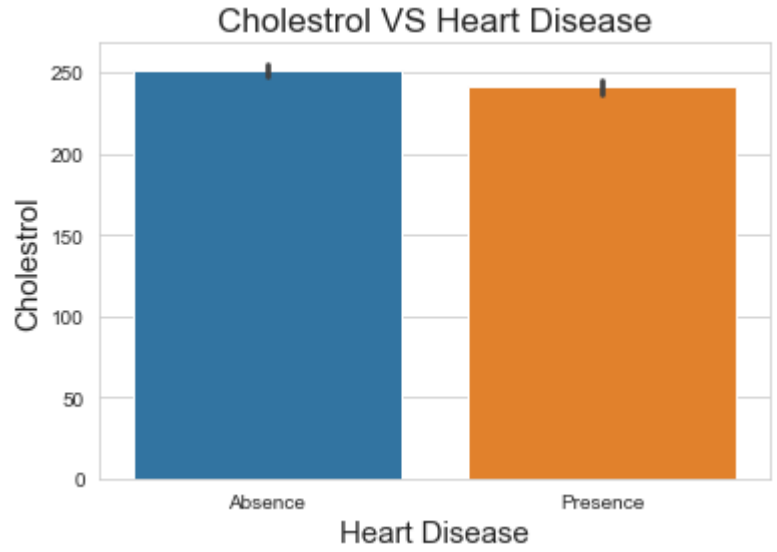
Those with Typical Angina are seen to have no occurrence of any heart disease.

In [43]:
```
sns.barplot(x='Heart_Disease_occured', y='trestbps', data=hrt_d)
plt.title("Blood Pressure", fontsize=17)
plt.xlabel('Heart Disease',fontsize=15)
plt.ylabel("Person's Resting Blood Pressure (mm Hg)", fontsize=12)
plt.show()
```



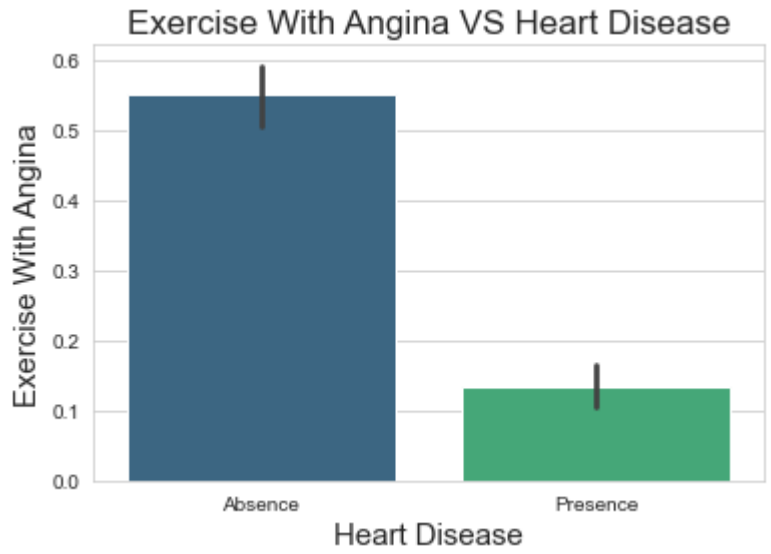
It seems a person's resting blood pressure has no relation to heart diseases in the given sample population.

In [44]:
```
sns.barplot(x='Heart_Disease_occured', y='chol', data=hrt_d)
plt.title('Cholestrol VS Heart Disease', fontsize=17)
plt.xlabel('Heart Disease', fontsize=15)
plt.ylabel('Cholestrol', fontsize=15)
plt.show()
```



There seems to no relation to cholestrol and heart disease too in the sample population.

In [45]:
```
sns.barplot(x='Heart_Disease_occured', y='exang', data=hrt_d, palette='viridis')
plt.title('Exercise With Angina VS Heart Disease', fontsize=17)
plt.xlabel('Heart Disease', fontsize=15)
plt.ylabel('Exercise With Angina', fontsize=15)
plt.show()
```



Apparently people who suffering from Angina due to exercise are not likely to not get any heart diseases in the given dataset.