In [220…
```
import pandas as pd
import matplotlib.pyplot as plt
```

In [221…
```
#watching data
cancer_data = pd.read_csv("lung cancer data.csv")
cancer_data.head(10)
```

Out[221…

	GENDER	AGE	SMOKING	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE	CH DI
0	M	69	1	2	2	1	
1	M	74	2	1	1	1	
2	F	59	1	1	1	2	
3	M	63	2	2	2	1	
4	F	63	1	2	1	1	
5	F	75	1	2	1	1	
6	M	52	2	1	1	1	
7	F	51	2	2	2	2	
8	F	68	2	1	2	1	
9	M	53	2	2	2	2	

In [222…
```
#Changing 1,2 to YES or NO
cancer_data.replace(1, "NO", inplace = True)
cancer_data.replace(2, "YES", inplace = True)
cancer_data
```

Out[222…

	GENDER	AGE	SMOKING	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE
0	M	69	NO	YES	YES	NO
1	M	74	YES	NO	NO	NO
2	F	59	NO	NO	NO	YES
3	M	63	YES	YES	YES	NO
4	F	63	NO	YES	NO	NO
...	...	...	...	...	...	...
304	F	56	NO	NO	NO	YES
305	M	70	YES	NO	NO	NO
306	M	58	YES	NO	NO	NO
307	M	67	YES	NO	YES	NO
308	M	62	NO	NO	NO	YES

309 rows × 16 columns

In [223…
```
cancer_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 309 entries, 0 to 308
Data columns (total 16 columns):
 #   Column                 Non-Null Count  Dtype 
---  ------                 --------------  ----- 
 0   GENDER                 309 non-null    object
 1   AGE                    309 non-null    int64 
 2   SMOKING                309 non-null    object
 3   YELLOW_FINGERS         309 non-null    object
 4   ANXIETY                309 non-null    object
 5   PEER_PRESSURE          309 non-null    object
 6   CHRONIC DISEASE        309 non-null    object
 7   FATIGUE                309 non-null    object
 8   ALLERGY                309 non-null    object
 9   WHEEZING               309 non-null    object
 10  ALCOHOL CONSUMING      309 non-null    object
 11  COUGHING               309 non-null    object
 12  SHORTNESS OF BREATH    309 non-null    object
 13  SWALLOWING DIFFICULTY  309 non-null    object
 14  CHEST PAIN             309 non-null    object
 15  LUNG_CANCER            309 non-null    object
dtypes: int64(1), object(15)
memory usage: 38.8+ KB
```

In [224…
```
#checking nulls
cancer_data.isnull().sum()
```

Out[224…
```
GENDER                    0
AGE                       0
SMOKING                   0
YELLOW_FINGERS            0
ANXIETY                   0
PEER_PRESSURE             0
CHRONIC DISEASE           0
FATIGUE                   0
ALLERGY                   0
WHEEZING                  0
ALCOHOL CONSUMING         0
COUGHING                  0
SHORTNESS OF BREATH       0
SWALLOWING DIFFICULTY     0
CHEST PAIN                0
LUNG_CANCER               0
dtype: int64
```

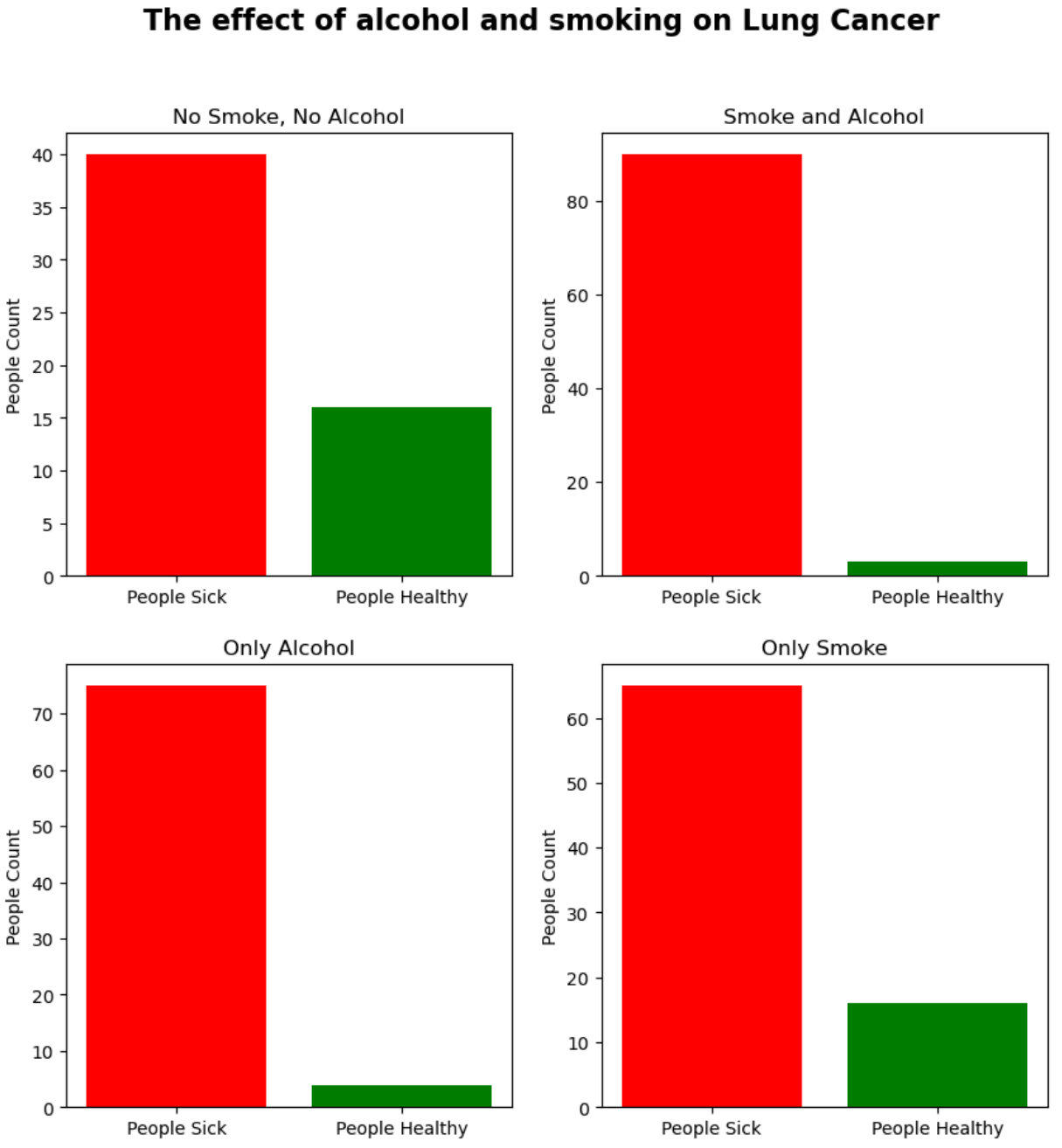
In [225…
```
#Smoke and Alcohol Inpact
cancer_yes = cancer_data[cancer_data['LUNG_CANCER'] == 'YES']
result = cancer_yes.groupby(['SMOKING', 'ALCOHOL CONSUMING']).size().reset_i

cancer_no = cancer_data[cancer_data['LUNG_CANCER'] == 'NO']
result2 = cancer_no.groupby(['SMOKING', 'ALCOHOL CONSUMING']).size().reset_i

result_df = result.merge(result2, on=['SMOKING', 'ALCOHOL CONSUMING'], how='
result_df['TOTAL PEOPLE COUNT'] = result_df['PEOPLE SICK COUNT'].fillna(0) +

result_df
```

Out[225…

	SMOKING	ALCOHOL CONSUMING	PEOPLE SICK COUNT	PEOPLE HEALTHY COUNT	TOTAL PEOPLE COUNT
0	NO	NO	40	16	56
1	NO	YES	75	4	79
2	YES	NO	65	16	81
3	YES	YES	90	3	93

In [226…
```
fig, ax = plt.subplots(nrows=2,
                       ncols=2,
                       figsize=(10,10))

bar = ax[0, 0].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SIC

ax[0,0].set(title = "No Smoke, No Alcohol",
       ylabel = "People Count");

bar2 = ax[0, 1].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SI

ax[0,1].set(title = "Smoke and Alcohol",
       ylabel = "People Count");
```

```
bar3 = ax[1, 0].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SI

ax[1,0].set(title = "Only Alcohol",
       ylabel = "People Count");

bar4 = ax[1,1].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SIC

ax[1,1].set(title = "Only Smoke",
       ylabel = "People Count");


#add a title to a figure
fig.suptitle("The effect of alcohol and smoking on Lung Cancer", fontsize=16
```



In [227…

```
fig.savefig("effect-of-alcohol-and-smoking.png")
```

In [228…
```
cancer_data.columns
```

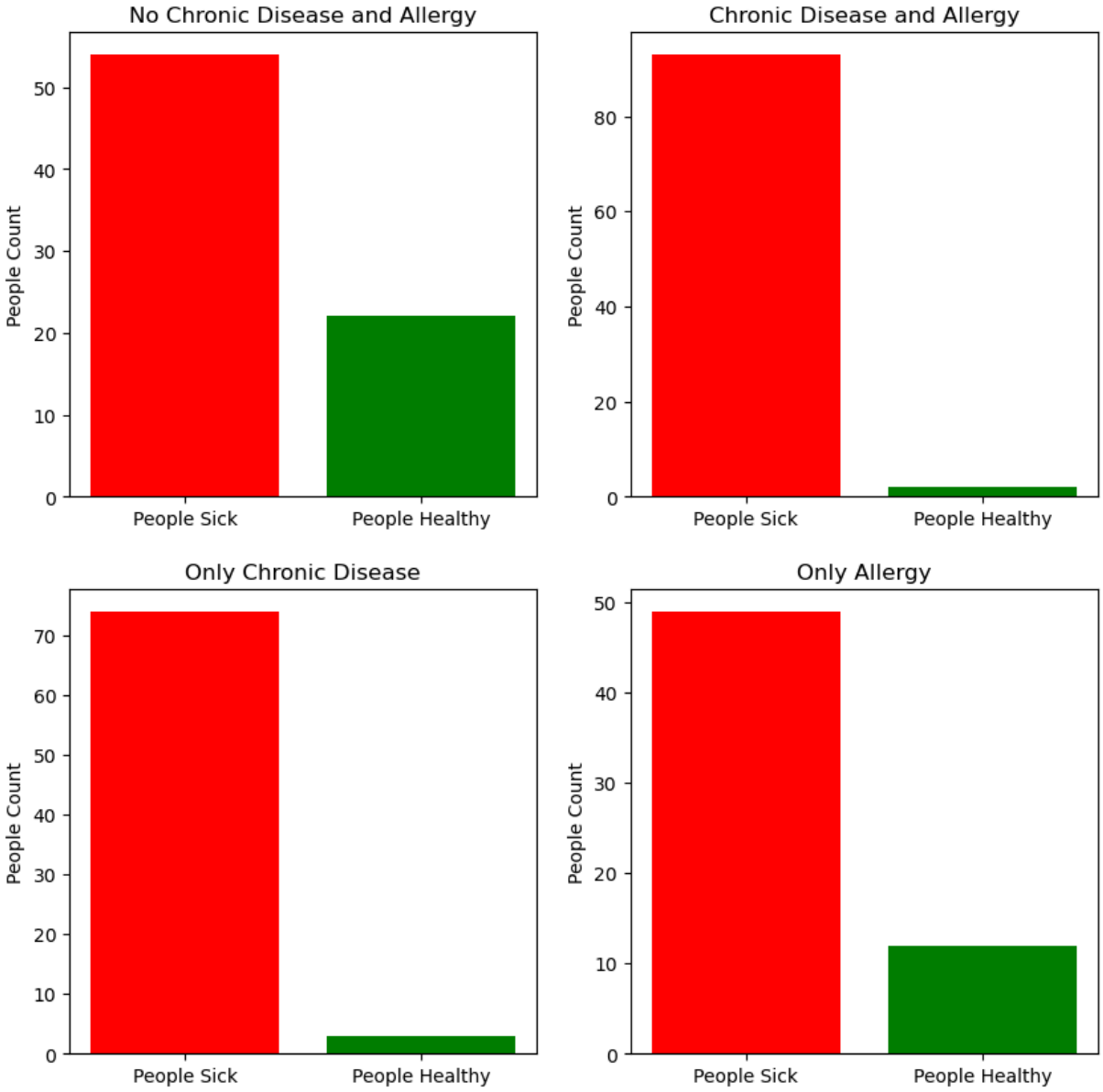
Out[228…
```
Index(['GENDER', 'AGE', 'SMOKING', 'YELLOW_FINGERS', 'ANXIETY',
       'PEER_PRESSURE', 'CHRONIC DISEASE', 'FATIGUE ', 'ALLERGY ', 'WHEEZIN
G',
       'ALCOHOL CONSUMING', 'COUGHING', 'SHORTNESS OF BREATH',
       'SWALLOWING DIFFICULTY', 'CHEST PAIN', 'LUNG_CANCER'],
      dtype='object')
```

In [229…
```
#Other diseases/problems Inpact
result = cancer_yes.groupby(['CHRONIC DISEASE', 'ALLERGY ']).size().reset_ir
result2 = cancer_no.groupby(['CHRONIC DISEASE', 'ALLERGY ']).size().reset_ir

result_df = result.merge(result2, on=['CHRONIC DISEASE', 'ALLERGY '], how='l
result_df['TOTAL PEOPLE COUNT'] = result_df['PEOPLE SICK COUNT'].fillna(0) +
result_df
```

Out[229…

	CHRONIC DISEASE	ALLERGY	PEOPLE SICK COUNT	PEOPLE HEALTHY COUNT	TOTAL PEOPLE COUNT
0	NO	NO	54	22	76
1	NO	YES	74	3	77
2	YES	NO	49	12	61
3	YES	YES	93	2	95

In [230…
```
fig, ax = plt.subplots(nrows=2,
                       ncols=2,
                       figsize=(10,10))

bar = ax[0, 0].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SIC

ax[0,0].set(title = "No Chronic Disease and Allergy",
       ylabel = "People Count");

bar2 = ax[0, 1].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SI

ax[0,1].set(title = "Chronic Disease and Allergy",
       ylabel = "People Count");

bar3 = ax[1, 0].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SI

ax[1,0].set(title = "Only Chronic Disease",
       ylabel = "People Count");

bar4 = ax[1,1].bar(['People Sick', 'People Healthy'], [result_df['PEOPLE SIC

ax[1,1].set(title = "Only Allergy",
       ylabel = "People Count");


#add a title to a figure
fig.suptitle("The effect of chronic disease and allergy on Lung Cancer", for
```



In [231…
```
fig.savefig("effect-of-chronic-disease-and-allergy.png")
```

In [232…
```
cancer_data
```

Out[232…

	GENDER	AGE	SMOKING	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE
0	M	69	NO	YES	YES	NO
1	M	74	YES	NO	NO	NO
2	F	59	NO	NO	NO	YES
3	M	63	YES	YES	YES	NO
4	F	63	NO	YES	NO	NO
...	...	...	...	...	...	...
304	F	56	NO	NO	NO	YES
305	M	70	YES	NO	NO	NO
306	M	58	YES	NO	NO	NO
307	M	67	YES	NO	YES	NO
308	M	62	NO	NO	NO	YES

309 rows × 16 columns

In [233…

```
#symptoms of lung cancer
count_symptoms_yes = cancer_yes[["YELLOW_FINGERS", "ANXIETY", "PEER_PRESSURE
                                 "FATIGUE ", "WHEEZING", "COUGHING"
                                 "SHORTNESS OF BREATH", "SWALLOWING
                                 "CHEST PAIN"]].apply(lambda x: x.v
count_symptoms_no = cancer_no[["YELLOW_FINGERS", "ANXIETY", "PEER_PRESSURE",
                                 "FATIGUE ", "WHEEZING", "COUGHING"
                                 "SHORTNESS OF BREATH", "SWALLOWING
                                 "CHEST PAIN"]].apply(lambda x: x.v
```

In [234…

```
count_symptoms_no
```

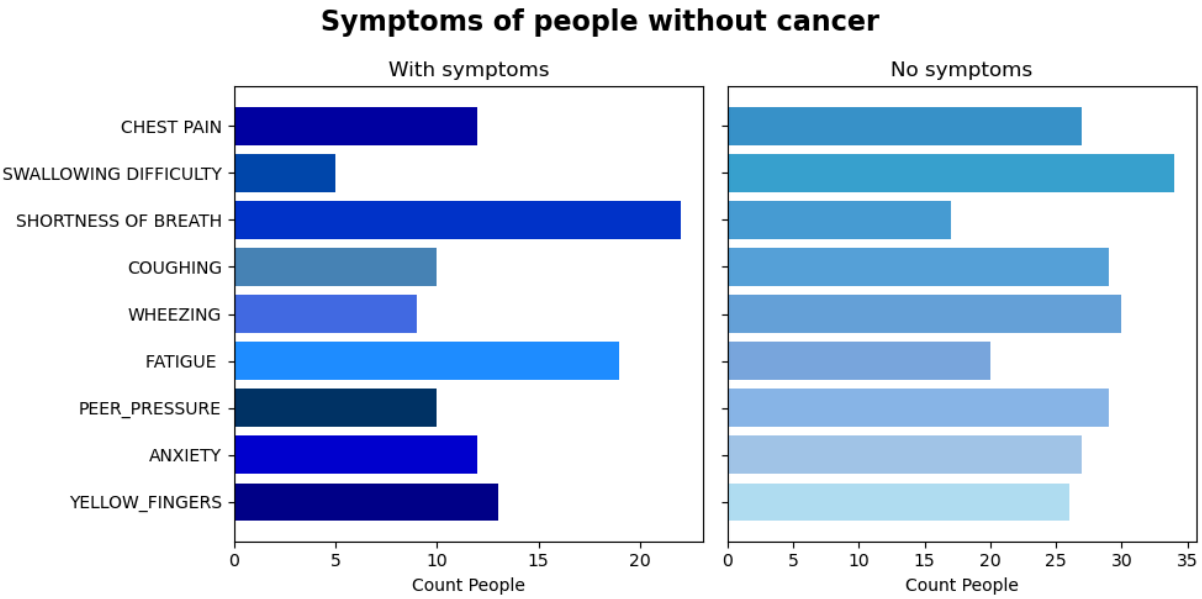
Out[234…

	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE	FATIGUE	WHEEZING	COU
NO	26	27	29	20	30	
YES	13	12	10	19	9	

In [235…

```
fig, ax = plt.subplots(nrows=1,
                       ncols=2,
                       figsize=(10,5),
                       sharey=True)
dark_blue_shades = ['#00008b', '#0000cd', '#003366', '#1e90ff','#4169e1', '#
pastel_blue_shades = ['#b2e0f4', '#a1c6ea', '#8ab8e7', '#79a6de', '#66a2d7',

barh1 = ax[0].barh(count_symptoms_no.columns, count_symptoms_no.values[1], c
ax[0].set(title="With symptoms", xlabel = "Count People");

barh1 = ax[1].barh(count_symptoms_no.columns, count_symptoms_no.values[0], c
ax[1].set(title="No symptoms", xlabel = "Count People");
```

```
fig.suptitle("Symptoms of people without cancer", fontsize=16, fontweight="b
plt.subplots_adjust(top=0.85)
plt.tight_layout()
```



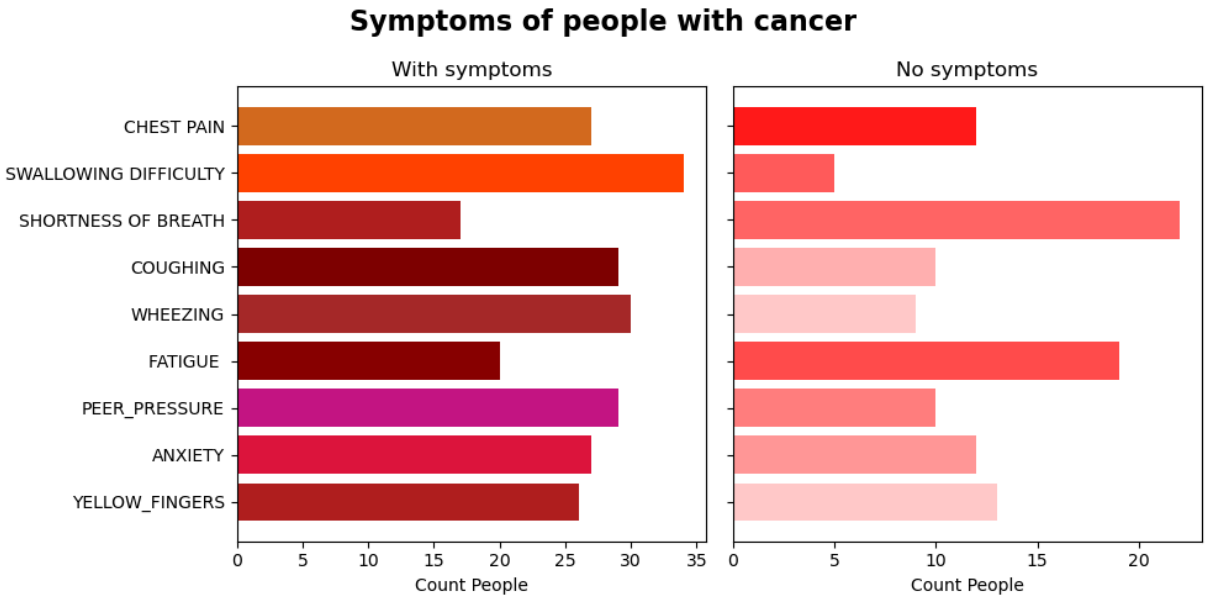
In [236…
```
fig.savefig("symptoms-of-people-without-cancer.png", bbox_inches='tight')
```

In [237…
```
count_symptoms_yes
```

Out[237…

	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE	FATIGUE	WHEEZING	COU
YES	163	142	145	189	163	
NO	107	128	125	81	107	

In [238…
```
fig, ax = plt.subplots(nrows=1,
                       ncols=2,
                       figsize=(10,5),
                       sharey=True)

pastel_red_shades = ['#ffcccb',  '#ff9999', '#ff7f7f',  '#ff4d4d','#ffcccc',
dark_red_shades = ['#b22222','#dc143c','#c71585', '#8b0000', '#a52a2a', '#80

barh1 = ax[0].barh(count_symptoms_yes.columns, count_symptoms_no.values[0],
ax[0].set(title="With symptoms", xlabel = "Count People");

barh1 = ax[1].barh(count_symptoms_yes.columns, count_symptoms_no.values[1],
ax[1].set(title="No symptoms", xlabel = "Count People");

fig.suptitle("Symptoms of people with cancer", fontsize=16, fontweight="bold
plt.subplots_adjust(top=0.85)
plt.tight_layout()
```



In [239…
```
fig.savefig("symptoms-of-people-with-cancer.png", bbox_inches='tight')
```

In [240…
```
#Checking if Age
cancer_no.groupby(['GENDER', "AGE"]).count()
```

Out[240…

GENDER	AGE	SMOKING	YELLOW_FINGERS	ANXIETY	PEER_PRESSURE	CHRO DISE
F	21	1	1	1	1	
	55	1	1	1	1	
	56	1	1	1	1	
	57	3	3	3	3	
	58	1	1	1	1	
	59	2	2	2	2	
	60	2	2	2	2	
	61	1	1	1	1	
	62	1	1	1	1	
	63	3	3	3	3	
	64	1	1	1	1	
	67	1	1	1	1	
	68	1	1	1	1	
	70	1	1	1	1	
	71	1	1	1	1	
	87	1	1	1	1	
M	46	1	1	1	1	
	47	1	1	1	1	
	55	2	2	2	2	
	56	1	1	1	1	
	59	2	2	2	2	
	60	1	1	1	1	
	61	1	1	1	1	
	63	2	2	2	2	
	64	1	1	1	1	
	68	2	2	2	2	
	69	3	3	3	3	

In [241…

```
cancer_no = cancer_no.assign(AGE_BRACKETS=cancer_no["AGE"].apply(
    lambda age: "YOUNG" if age <= 30 else ("MIDDLE" if age < 60 else "OLD")
))
cancer_yes = cancer_yes.assign(AGE_BRACKETS=cancer_yes["AGE"].apply(
```

```
    lambda age: "YOUNG" if age <= 30 else ("MIDDLE" if age < 60 else "OLD")
))
```

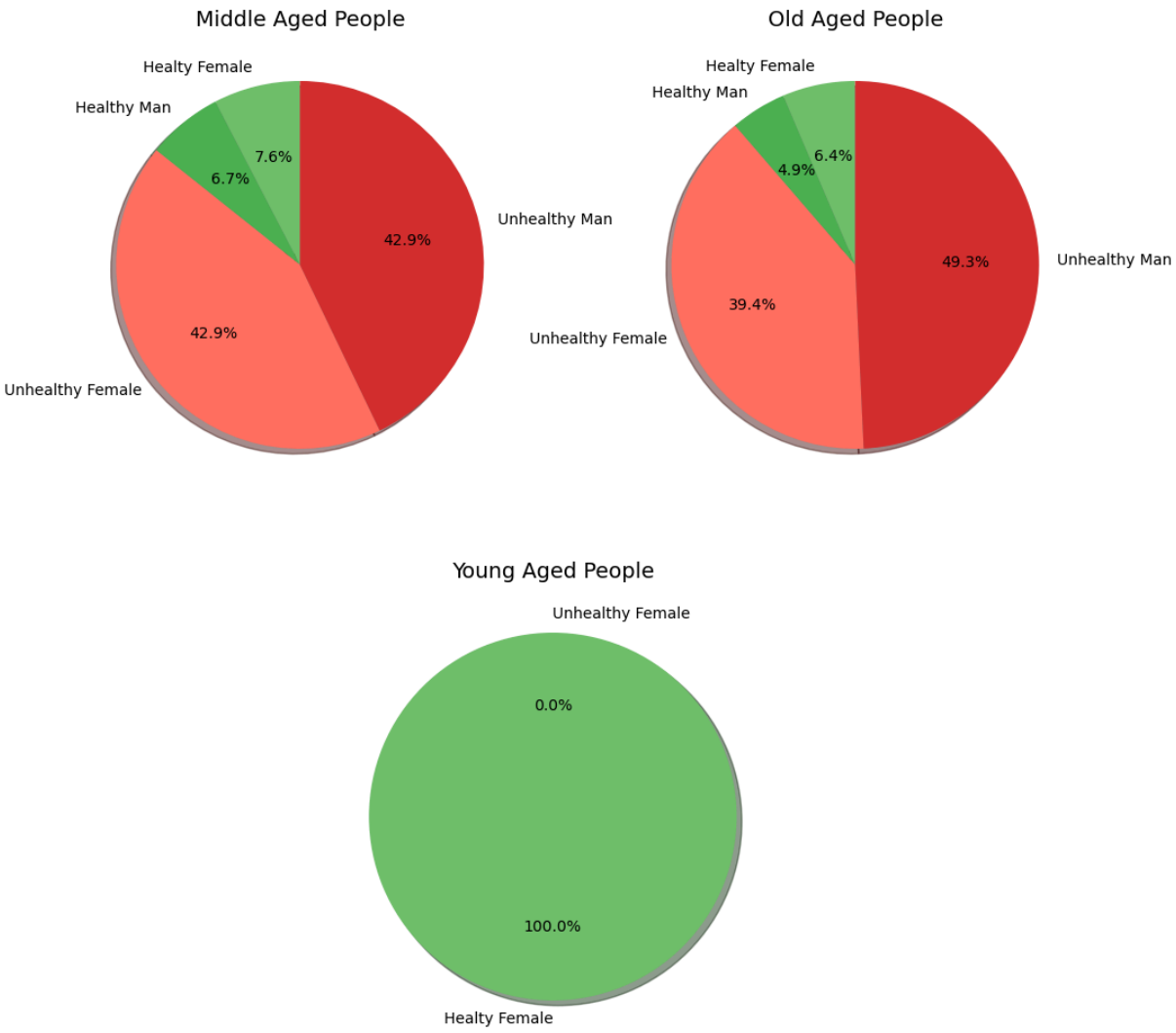
In [242…
```
result = cancer_no.groupby(["AGE_BRACKETS", "GENDER"]).size().reset_index(na
result2 = cancer_yes.groupby(["AGE_BRACKETS", "GENDER"]).size().reset_index(
result_df = result.merge(result2, on=["AGE_BRACKETS", "GENDER"], how='outer'
result_df['PEOPLE SICK COUNT'] = result_df['PEOPLE SICK COUNT'].fillna(0)
```

In [243…
```
result_df
```

Out[243…

	AGE_BRACKETS	GENDER	PEOPLE HEALTHY COUNT	PEOPLE SICK COUNT
0	MIDDLE	F	8	45.0
1	MIDDLE	M	7	45.0
2	OLD	F	13	80.0
3	OLD	M	10	100.0
4	YOUNG	F	1	0.0

In [244…
```
fig, ax = plt.subplots(
    nrows=2,
    ncols=2,
    figsize=(12, 12))

labels = ["Healty Female", "Healthy Man", "Unhealthy Female", "Unhealthy Mar
sizes = [result_df['PEOPLE HEALTHY COUNT'][0], result_df['PEOPLE HEALTHY COU
colors = ['#6fbf6b', '#4caf50', '#ff6f61', '#d32f2f']

pie1 = ax[0,0].pie(sizes, labels=labels, colors=colors,
        autopct='%1.1f%%', shadow=True, startangle=90)

ax[0,0].set_title("Middle Aged People", fontsize=14);

sizes = [result_df['PEOPLE HEALTHY COUNT'][2], result_df['PEOPLE HEALTHY COU
pie2 = ax[0,1].pie(sizes, labels=labels, colors=colors,
        autopct='%1.1f%%', shadow=True, startangle=90)

ax[0,1].set_title("Old Aged People", fontsize=14);

sizes = [result_df['PEOPLE HEALTHY COUNT'][4],result_df['PEOPLE SICK COUNT']
labels = ["Healty Female", "Unhealthy Female"]
colors = ['#6fbf6b', '#ff6f61']
pie3 = ax[1,0].pie(sizes, labels=labels, colors=colors,
        autopct='%1.1f%%', shadow=True, startangle=90)

ax[1,0].set_title("Young Aged People", fontsize=14, x=6);
ax[1,0].set_xlim(left=1.5)
ax[1, 1].axis('off');

fig.suptitle("Age and Gender Impact on Lung Cancer", fontsize=16);
```



In [245…

```
fig.savefig("age-gender-inpact.png")
```