In [10]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

In [11]:
```
#Load the data with pandas
df = pd.read_csv('../gapminder.csv', low_memory=False)
df.head()
```

Out[11]:

	id	continent	country	incomeperperson	alcconsumption	breastcancerper100th	co2em
0	1	Asia	Afghanistan	0.000000	0.03	26.8	7.5944
1	2	Europe	Albania	1914.996551	7.29	57.4	2.2374
2	3	Africa	Algeria	2231.993335	0.69	23.5	2.9321
3	4	Africa	Angola	1381.004268	5.57	23.1	2.4835
4	5	South America	Argentina	10749.419238	9.35	73.9	5.8721

In [12]:
```
# Convert columns from strings to numeric
columns = ['incomeperperson', 'alcconsumption', 'breastcancerper100th', 'co2e
df2 = df[columns].apply(pd.to_numeric, errors='coerce')
df2['country'] = df['country']
df2['continent'] = df['continent']
```

In [14]:
```
#Remove null values
df2= df2.replace(0, np.NaN)
df2 = df2.dropna()
```

In [16]:
```
#Categorical variable to label incomeperperson
df2['incomelabel'] = pd.cut(df2.incomeperperson,4,labels=['low','medium','hig

#Categorical variable to breastcancerper100th
df2['cancercaseslabel'] = pd.cut(df2.breastcancerper100th,4,labels=['low','me

#Categorical variable to breastcancerper100th
df2['lifeexpectlabel'] = pd.cut(df2.lifeexpectancy,4,labels=['low','medium','
```

In [17]:
```
data = df2[['continent', 'country', 'incomeperperson', 'incomelabel', 'breast
```

Frequencies

In [18]:
```
print("Values for incomeperperson:")
incomeperperson_freq = pd.concat(dict(counts = data["incomeperperson"].value_
print(incomeperperson_freq)
```

```
Values for incomeperperson:
                                counts  percentages
(51.577000000000005, 5323.557]     105     0.660377
(5323.557, 10543.338]               18     0.113208
(10543.338, 15763.119]              10     0.062893
(15763.119, 20982.9]                 4     0.025157
(20982.9, 26202.682]                 7     0.044025
(26202.682, 31422.463]               6     0.037736
(31422.463, 36642.244]               4     0.025157
(36642.244, 41862.025]               4     0.025157
(41862.025, 47081.806]               0     0.000000
(47081.806, 52301.587]               1     0.006289
```

In [19]:
```
print("Values for lifeexpectancy:")
lifeexpectancy_freq = pd.concat(dict(counts = data["lifeexpectancy"].value_co
print(lifeexpectancy_freq)
```

```
Values for lifeexpectancy:
                               counts  percentages
(47.757000000000005, 51.354]      11     0.069182
(51.354, 54.914]                  10     0.062893
(54.914, 58.474]                   9     0.056604
(58.474, 62.034]                   7     0.044025
(62.034, 65.594]                  10     0.062893
(65.594, 69.154]                  16     0.100629
(69.154, 72.714]                  13     0.081761
(72.714, 76.274]                  42     0.264151
(76.274, 79.834]                  18     0.113208
(79.834, 83.394]                  23     0.144654
```

In [20]:
```
print("Values for breastcancerper100th:")
breastcancerper100th_freq = pd.concat(dict(counts = data["breastcancerper100t
print(breastcancerper100th_freq)
```

```
Values for breastcancerper100th:
                counts  percentages
(3.802, 13.62]      13     0.081761
(13.62, 23.34]      37     0.232704
(23.34, 33.06]      42     0.264151
(33.06, 42.78]      14     0.088050
(42.78, 52.5]       19     0.119497
(52.5, 62.22]        8     0.050314
(62.22, 71.94]       4     0.025157
(71.94, 81.66]       6     0.037736
(81.66, 91.38]      12     0.075472
(91.38, 101.1]       4     0.025157
```

In [21]:
```
income_freq = pd.concat(dict(counts = df2["incomelabel"].value_counts(sort=Fa
                             percentages = data["incomelabel"].value_co

                           axis=1)
print("Frequency distribution income per person:\n", income_freq)
```

```
Frequency distribution income per person:
            counts  percentages
low            129     0.811321
medium          15     0.094340
high            12     0.075472
very high        3     0.018868
```

In [22]:
```
#Countries with high and very high incomes
print('Countries with high and very high incomes')
highincome = data[(data['incomelabel'] == 'high') | (data['incomelabel'] == '
print(highincome.loc[:, ['country', 'incomeperperson', 'incomelabel']].sort_v
```

```
Countries with high and very high incomes
            country  incomeperperson incomelabel
81            Japan     39309.478859   very high
96       Luxembourg     52301.587179   very high
118          Norway     39972.352768   very high
7           Austria     26692.984107        high
44          Denmark     30532.277044        high
55          Finland     27110.731591        high
72          Iceland     33945.314422        high
77          Ireland     27595.091347        high
113     Netherlands     26551.844238        high
129           Qatar     33931.832079        high
138       Singapore     32535.832512        high
149          Sweden     32292.482984        high
150     Switzerland     37662.751250        high
163  United Kingdom     28033.489283        high
164   United States     37491.179523        high
```

In [23]:
```
#Countries with low incomes
print('Countries with low incomes')
highincome = data[(data['incomelabel'] == 'low')]
print(highincome.loc[:, ['country', 'incomeperperson', 'incomelabel']].sort_v
```

```
Countries with low incomes
            country  incomeperperson incomelabel
1           Albania      1914.996551         low
89             Laos       554.879840         low
125     Philippines      1383.401869         low
124            Peru      3180.430612         low
123        Paraguay      1621.177078         low
..              ...              ...         ...
48             Egypt      1975.551906         low
47           Ecuador      1728.020976         low
46   Dominican Rep.       4049.169629         low
43       Czech Rep.       7381.312751         low
172        Zimbabwe       320.771890         low

[129 rows x 3 columns]
```

In [24]:
```
breastcan_freq = pd.concat(dict(counts = data["cancercaseslabel"].value_count
                                percentages = data["cancercaseslabel"].val

                           axis=1)
print("Frequency distribution breast cancer:\n", breastcan_freq)
```

```
Frequency distribution breast cancer:
            counts  percentages
low             74     0.465409
medium          51     0.320755
high            17     0.106918
very high       17     0.106918
```

In [25]:
```
lifeexp_freq = pd.concat(dict(counts = data["lifeexpectlabel"].value_counts(s
                              percentages = data["lifeexpectlabel"].valu

                           axis=1)
print("Frequency distribution life expectancy:\n", lifeexp_freq)
```

```
Frequency distribution life expectancy:
            counts  percentages
low             25     0.157233
medium          22     0.138365
high            55     0.345912
very high       57     0.358491
```

In [26]:
```
#Countries with very high life expectancy
print('Countries with very high life expectancy')
highincome = data[(data['lifeexpectlabel'] == 'very high') ]
print(highincome.loc[:, ['country', 'lifeexpectancy', 'lifeexpectlabel']].sor
```

```
Countries with very high life expectancy
                   country  lifeexpectancy lifeexpectlabel
1                  Albania          76.918       very high
81                   Japan          83.394       very high
94                   Libya          74.788       very high
96              Luxembourg          79.963       very high
97          Macedonia FYR           74.847       very high
102                 Malta          79.634       very high
105                Mexico          76.954       very high
113           Netherlands          80.734       very high
114           New Zealand          80.654       very high
118                Norway          81.097       very high
121                Panama          76.128       very high
126                Poland          76.126       very high
127              Portugal          79.499       very high
129                 Qatar          78.371       very high
138             Singapore          81.126       very high
139       Slovak Republic          75.446       very high
140              Slovenia          79.341       very high
144                 Spain          81.404       very high
145             Sri Lanka          74.941       very high
149                Sweden          81.439       very high
150           Switzerland          82.338       very high
151                 Syria          75.850       very high
157               Tunisia          74.515       very high
162  United Arab Emirates          76.546       very high
163        United Kingdom          80.170       very high
164         United States          78.531       very high
165               Uruguay          77.005       very high
86             Korea Rep.          80.642       very high
79                 Italy          81.855       very high
```

```
4                  Argentina          75.901       very high
78                    Israel          81.618       very high
6                  Australia          81.907       very high
7                    Austria          80.854       very high
9                    Bahamas          75.620       very high
10                   Bahrain          75.057       very high
12                  Barbados          76.835       very high
14                   Belgium          80.009       very high
15                    Belize          76.072       very high
19   Bosnia and Herzegovina           75.670       very high
22                    Brunei          78.005       very high
28                    Canada          81.012       very high
32                     Chile          79.120       very high
38                Costa Rica          79.311       very high
40                   Croatia          76.640       very high
41                      Cuba          79.143       very high
42                    Cyprus          79.591       very high
43                Czech Rep.          77.685       very high
44                   Denmark          78.826       very high
47                   Ecuador          75.632       very high
52                   Estonia          74.825       very high
55                   Finland          79.977       very high
56                    France          81.539       very high
61                   Germany          80.414       very high
63                    Greece          79.915       very high
72                   Iceland          81.804       very high
77                   Ireland          80.557       very high
169                  Vietnam          75.181       very high
```

In [27]:

```
#Countries with low life expectancy
print('Countries with very high life expectancy')
highincome = data[(data['lifeexpectlabel'] == 'low') ]
print(highincome.loc[:, ['country', 'lifeexpectancy', 'lifeexpectlabel']].sor
```

```
Countries with very high life expectancy
                  country  lifeexpectancy lifeexpectlabel
3                  Angola          51.093              low
99                 Malawi          54.210              low
171                Zambia          49.025              low
160                Uganda          54.116              low
148             Swaziland          48.718              low
143          South Africa          52.797              low
137          Sierra Leone          47.794              low
132                Rwanda          55.442              low
117               Nigeria          51.879              low
116                 Niger          54.675              low
109            Mozambique          50.239              low
101                  Mali          51.444              low
67          Guinea-Bissau          48.132              low
16                  Benin          56.081              low
66                 Guinea          54.097              low
50      Equatorial Guinea          51.088              low
39          Cote d'Ivoire          55.377              low
36        Congo Dem. Rep.          48.397              low
31                   Chad          49.553              low
30   Central African Rep.          48.398              low
27               Cameroon          51.610              low
25                Burundi          50.411              low
24           Burkina Faso          55.439              low
20               Botswana          53.183              low
172              Zimbabwe          51.384              low
```

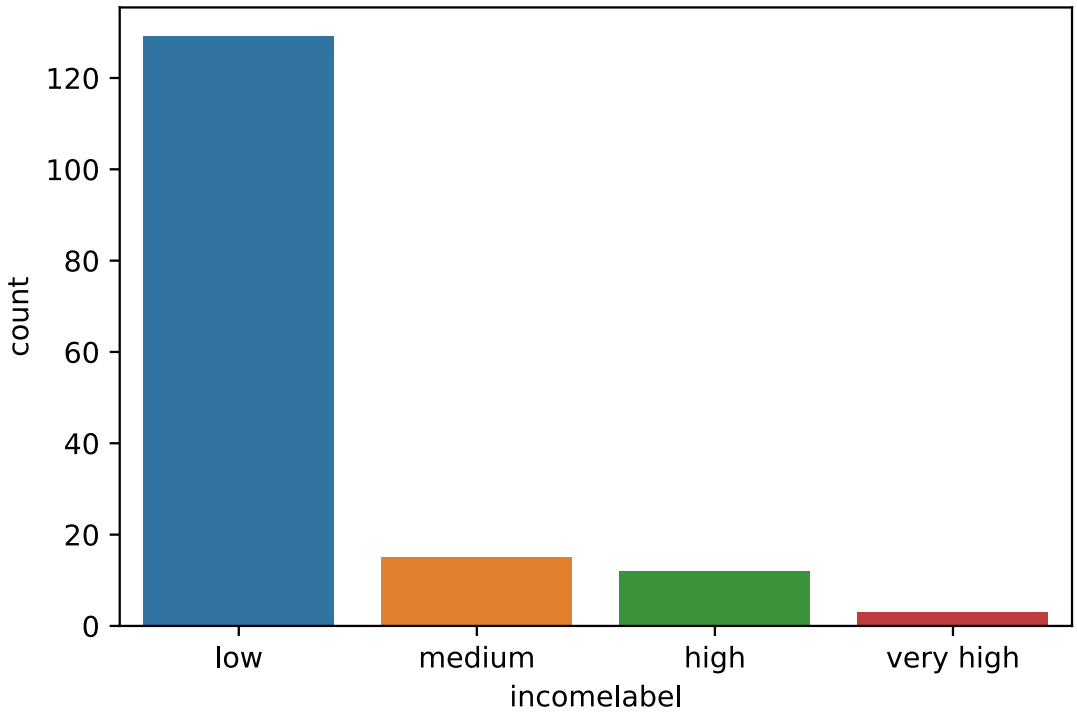
In [28]:
```
print('Incomes by Continent')
gdp_mean = data.groupby('continent')['incomeperperson'].agg([np.mean, np.medi
print(gdp_mean)
```

```
Incomes by Continent
                         mean         median   len
continent
Africa           1320.888223     421.863892  48.0
Asia             6969.661970    1525.780116  37.0
Europe          14950.175038   11066.784145  41.0
North America    8251.315894    4272.107945  16.0
Oceania          8829.433594    2230.676374   5.0
South America    4273.512102    3206.927196  12.0
```

Graphs

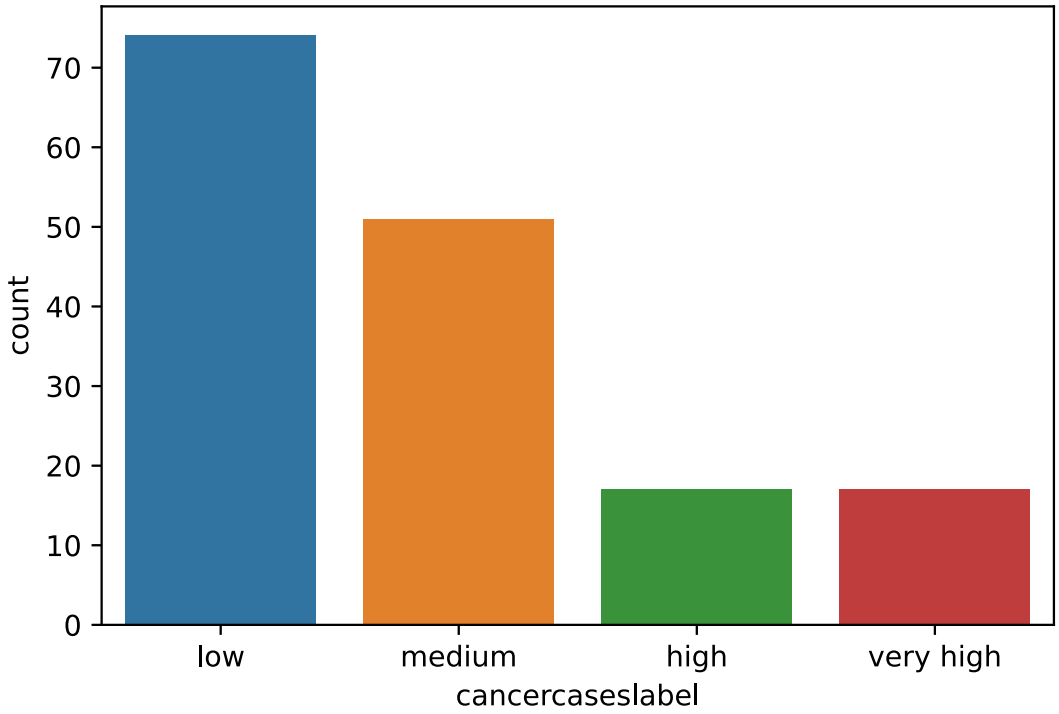
In [29]:
```
# Freq distribution incomelabel
sns.countplot(x='incomelabel', data=data)
```

Out[29]: <AxesSubplot:xlabel='incomelabel', ylabel='count'>



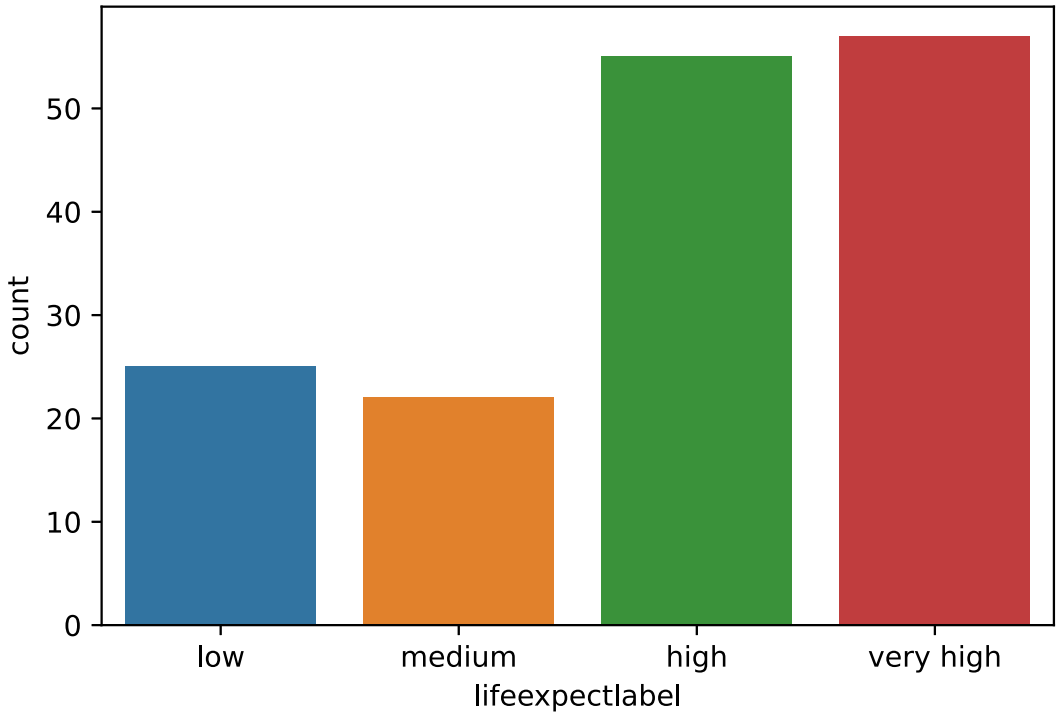
In [31]:
```
# Freq distribution cancer cases
sns.countplot(x='cancercaseslabel', data=data)
```

Out[31]: <AxesSubplot:xlabel='cancercaseslabel', ylabel='count'>

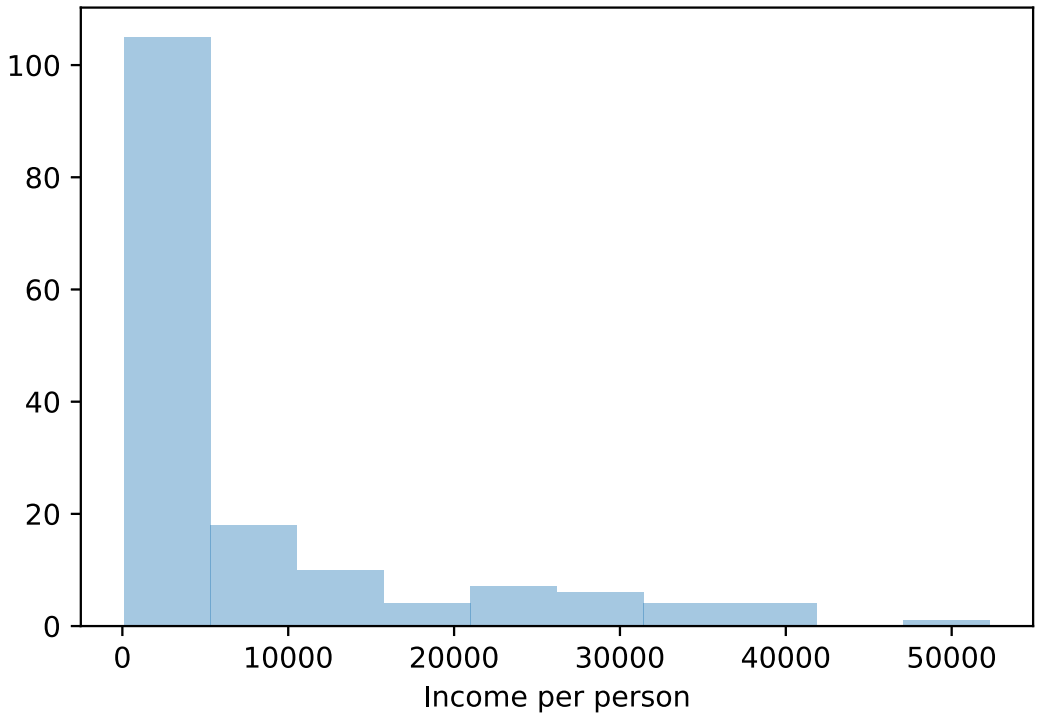


In [34]:
```
# Freq distribution life expectancy
sns.countplot(x='lifeexpectlabel', data=data)
```

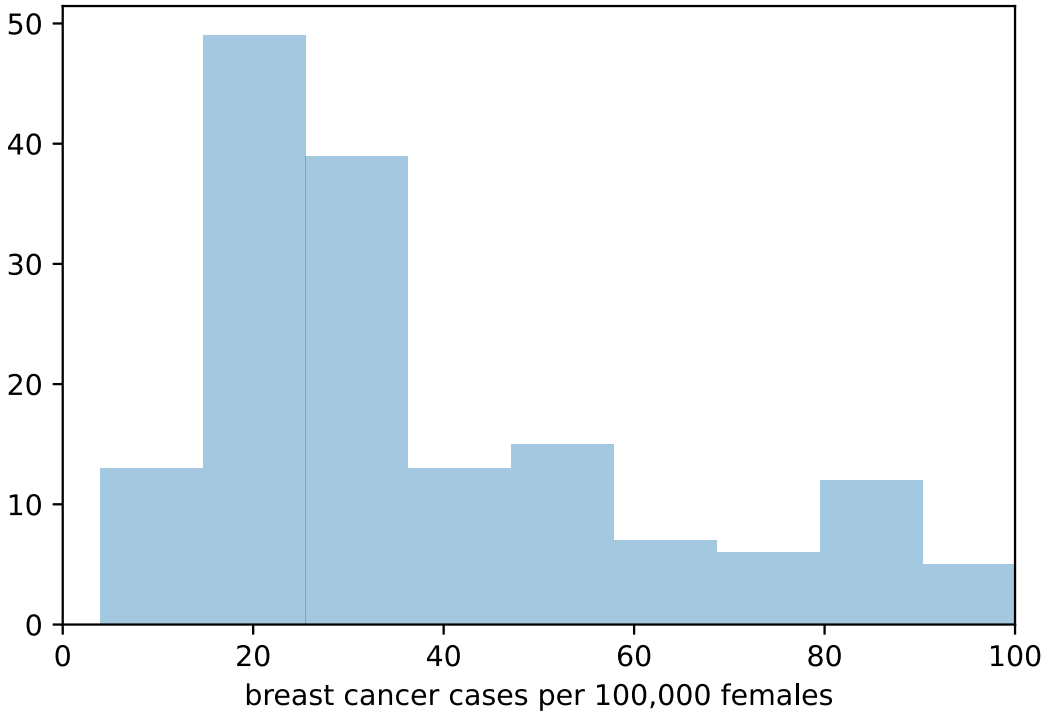
Out[34]: <AxesSubplot:xlabel='lifeexpectlabel', ylabel='count'>



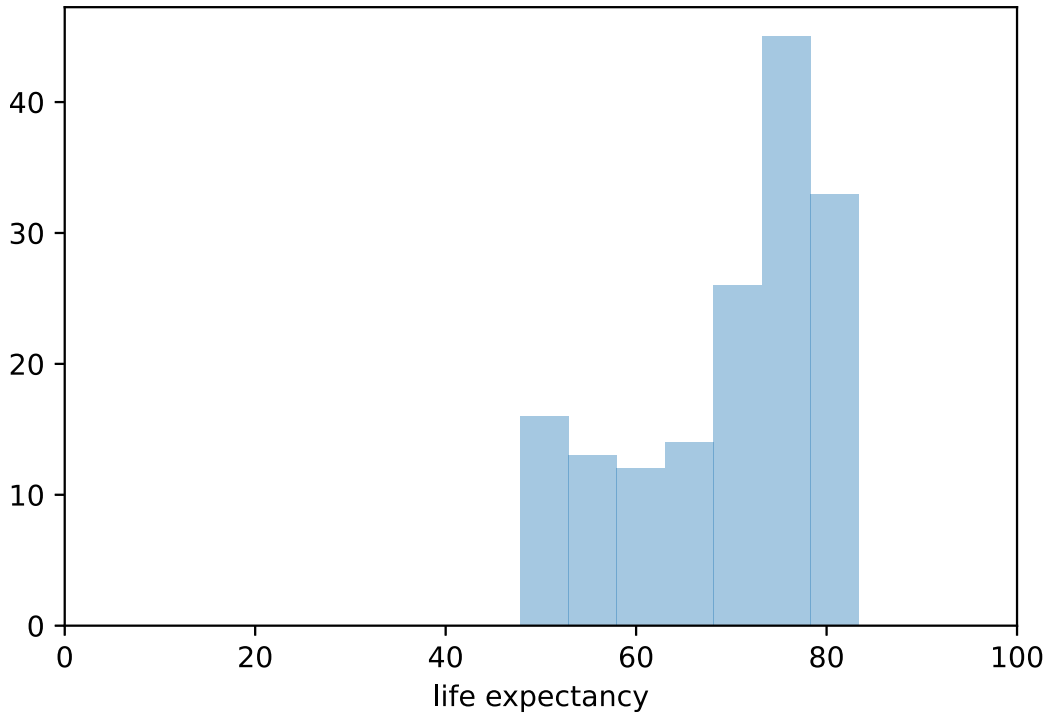
In [37]:
```
#Histogram income per person
sns.distplot(data['incomeperperson'], bins=10, kde=False)
plt.xlabel('Income per person')
plt.show()
```



In [38]:
```
#Histogram Breast Cancer Cases
sns.distplot(data["breastcancerper100th"], kde=False)
plt.xlabel('breast cancer cases per 100,000 females')
plt.xlim(0,100)
plt.show()
```

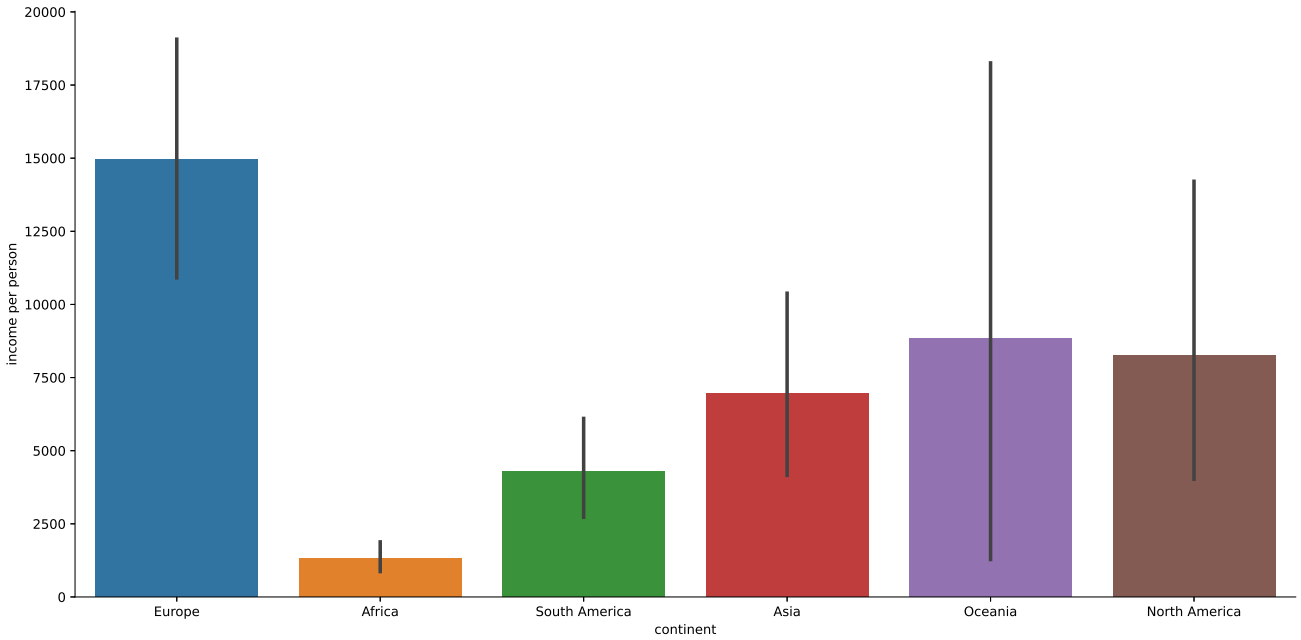


In [40]:
```
#Histogram Breast Cancer Cases
sns.distplot(data["lifeexpectancy"], kde=False)
plt.xlabel('life expectancy')
plt.xlim(0,100)
plt.show()
```



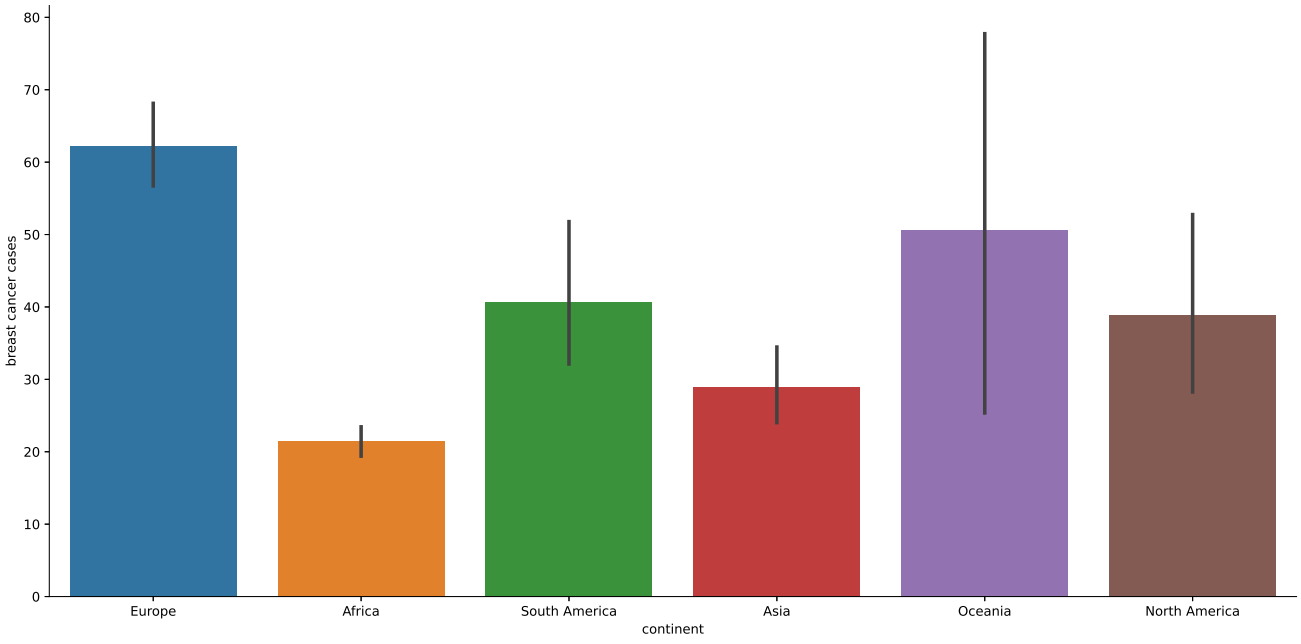
In [44]:
```
#Show income per person per continent
sns.factorplot(x='continent', y='incomeperperson', data=data, kind='bar', siz
plt.ylabel('income per person')
plt.xlabel('continent')
```

Out[44]: Text(0.5, 6.800000000000011, 'continent')



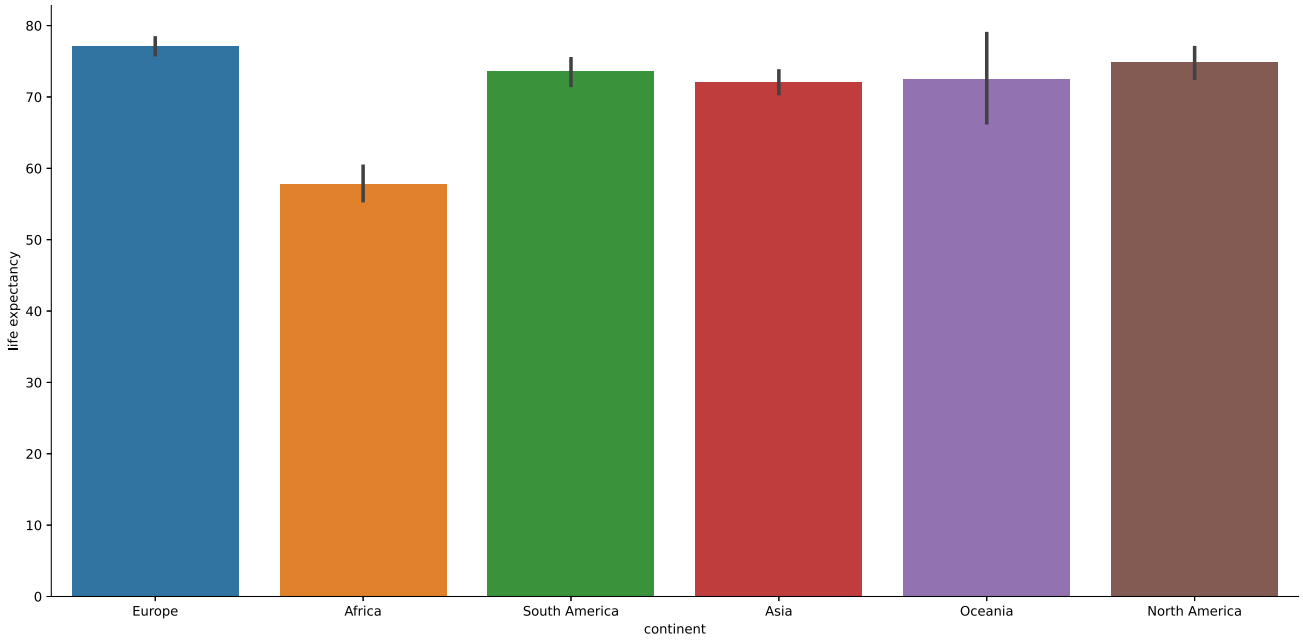
In [41]:
```
#Show breast cancer incidences per continent
sns.factorplot(x='continent', y='breastcancerper100th', data=data, kind='bar'
plt.ylabel('breast cancer cases')
plt.xlabel('continent')
```

Out[41]: Text(0.5, 6.800000000000011, 'continent')



In [45]:
```
#Show life expectancy per continent
sns.factorplot(x='continent', y='lifeexpectancy', data=data, kind='bar', size
plt.ylabel('life expectancy')
plt.xlabel('continent')
```

Out[45]: Text(0.5, 6.800000000000011, 'continent')



In [ ]: