1 - Population pyramids

November 29, 2023

In this notebook I am going to load and clean the census data. I will remove any area which are not at the level of a Local Authority and indicate which region each Local Authority is in.

I will then reorganise the data into a form in which it is possible to produce population pyramids for each region in order to address the question: how much do the age profiles of different regions of England and Wales differ?

[1]:
```
#Import statements
import pandas as pd
import re
import seaborn as sns
import matplotlib.pyplot as plt
```

[2]:
```
#Generate pandas dataframe from excel sheet
census_demographic_df = pd.read_excel('Data/census2021firstresultsenglandwales1.
 ↪xlsx', sheet_name='P03', skiprows=lambda x: x in [0,1,2,3,4,5,6])
census_demographic_df.head()
```

[2]:
```
  Area code [note 2]          Area name  All persons  \
0          K04000001  England and Wales     59597300
1          E92000001            England     56489800
2          E12000001         North East      2647100
3          E06000047      County Durham       522100
4          E06000005         Darlington       107800

   Females:\nAged 4 years and under\n[note 12]  \
0                                      1577300
1                                      1501600
2                                        65600
3                                        12000
4                                         2700

   Females:\nAged 5 to 9 years\n[note 12]  \
0                                 1720400
1                                 1634400
2                                   73000
3                                   13800
4                                    3000
```

```
   Females:\nAged 10 to 14 years\n[note 12]  \
0                                   1753100   
1                                   1664100   
2                                     75300   
3                                     14400   
4                                      3300   

   Females:\nAged 15 to 19 years\n[note 12]  \
0                                   1653100   
1                                   1568100   
2                                     73600   
3                                     15300   
4                                      2800   

   Females:\nAged 20 to 24 years\n[note 12]  \
0                                   1793300   
1                                   1701500   
2                                     80500   
3                                     16400   
4                                      2800   

   Females:\nAged 25 to 29 years\n[note 12]  \
0                                   1991900   
1                                   1897400   
2                                     81800   
3                                     15000   
4                                      3300   

   Females:\nAged 30 to 34 years\n[note 12]  …  \
0                                   2145200  …   
1                                   2044400  …   
2                                     87100  …   
3                                     16000  …   
4                                      3600  …   

   Males:\nAged 45 to 49 years\n[note 12]  \
0                                 1867900   
1                                 1777100   
2                                   77800   
3                                   15400   
4                                    3300   

   Males:\nAged 50 to 54 years\n[note 12]  \
0                                 2027500   
1                                 1922800   
2                                   89600   
```

```
3                                  18600
4                                   3800

   Males:\nAged 55 to 59 years\n[note 12]  \
0                                1978300
1                                1869600
2                                  94100
3                                  19500
4                                   3900

   Males:\nAged 60 to 64 years\n[note 12]  \
0                                1699600
1                                1602000
2                                  85600
3                                  17200
4                                   3400

   Males:\nAged 65 to 69 years\n[note 12]  \
0                                1428200
1                                1341900
2                                  74200
3                                  15400
4                                   3000

   Males:\nAged 70 to 74 years\n[note 12]  \
0                                1419500
1                                1331800
2                                  71100
3                                  14800
4                                   2800

   Males:\nAged 75 to 79 years\n[note 12]  \
0                                1008900
1                                 947200
2                                  47300
3                                  10300
4                                   2000

   Males:\nAged 80 to 84 years\n[note 12]  \
0                                 668200
1                                 628600
2                                  31800
3                                   6700
4                                   1400

   Males:\nAged 85 to 89 years\n[note 12]  \
0                                 372700
```

```
1                                  351400
2                                   17100
3                                    3400
4                                     800

   Males:\nAged 90 years and over\n[note 12]
0                                     169200
1                                     159800
2                                       7100
3                                       1400
4                                        300

[5 rows x 41 columns]
```

[3]:
```
#Use regexes to clean column names
pattern = '\\n'
census_demographic_df.rename(columns=(lambda x : re.sub(pattern, '', x)),␣
 ↪inplace=True)
pattern2 = '\[note [1-9]+\]'
census_demographic_df.rename(columns=(lambda x : re.sub(pattern2, '', x)),␣
 ↪inplace=True)
census_demographic_df
```

[3]:
```
    Area code           Area name  All persons  \
0    K04000001  England and Wales     59597300
1    E92000001            England     56489800
2    E12000001         North East      2647100
3    E06000047      County Durham       522100
4    E06000005         Darlington       107800
..         …                …          …
370  W06000018         Caerphilly       175900
371  W06000019      Blaenau Gwent        66900
372  W06000020            Torfaen        92300
373  W06000021      Monmouthshire        93000
374  W06000022            Newport       159600

     Females:Aged 4 years and under  Females:Aged 5 to 9 years  \
0                           1577300                    1720400
1                           1501600                    1634400
2                             65600                      73000
3                             12000                      13800
4                              2700                       3000
..                              …                         …
370                            4600                       5100
371                            1700                       1800
372                            2400                       2600
373                            1900                       2200
```

```
374                             4800                       5000

     Females:Aged 10 to 14 years  Females:Aged 15 to 19 years  \
0                        1753100                      1653100   
1                        1664100                      1568100   
2                          75300                        73600   
3                          14400                        15300   
4                           3300                         2800   
..                           …                          …   
370                         5300                         4500   
371                         1900                         1600   
372                         2700                         2300   
373                         2500                         2200   
374                         5000                         4200   

     Females:Aged 20 to 24 years  Females:Aged 25 to 29 years  \
0                        1793300                      1991900   
1                        1701500                      1897400   
2                          80500                        81800   
3                          16400                        15000   
4                           2800                         3300   
..                           …                          …   
370                         4400                         5600   
371                         1800                         2300   
372                         2300                         3000   
373                         1800                         2200   
374                         4300                         5700   

     Females:Aged 30 to 34 years  …  Males:Aged 45 to 49 years  \
0                        2145200  …                    1867900   
1                        2044400  …                    1777100   
2                          87100  …                      77800   
3                          16000  …                      15400   
4                           3600  …                       3300   
..                           …  …                        …   
370                         6000  …                       5400   
371                         2400  …                       2100   
372                         3300  …                       2600   
373                         2400  …                       2800   
374                         6500  …                       4800   

     Males:Aged 50 to 54 years  Males:Aged 55 to 59 years  \
0                      2027500                    1978300   
1                      1922800                    1869600   
2                        89600                      94100   
3                        18600                      19500   
4                         3800                       3900   
```

```
..                         …                         …
370                     6200                      6300
371                     2400                      2600
372                     3100                      3300
373                     3500                      3800
374                     5300                      5200

     Males:Aged 60 to 64 years  Males:Aged 65 to 69 years  \
0                      1699600                    1428200
1                      1602000                    1341900
2                        85600                      74200
3                        17200                      15400
4                         3400                       3000
..                         …                         …
370                       5400                       4700
371                       2100                       1900
372                       2900                       2500
373                       3300                       3000
374                       4500                       3600

     Males:Aged 70 to 74 years  Males:Aged 75 to 79 years  \
0                      1419500                    1008900
1                      1331800                     947200
2                        71100                      47300
3                        14800                      10300
4                         2800                       2000
..                         …                         …
370                       4800                       3300
371                       1900                       1300
372                       2500                       1800
373                       3100                       2300
374                       3500                       2500

     Males:Aged 80 to 84 years  Males:Aged 85 to 89 years  \
0                       668200                     372700
1                       628600                     351400
2                        31800                      17100
3                         6700                       3400
4                         1400                        800
..                         …                         …
370                       2100                       1000
371                        800                        400
372                       1100                        600
373                       1500                        900
374                       1700                        900

     Males:Aged 90 years and over
```

```
0                              169200
1                              159800
2                                7100
3                                1400
4                                 300
..                                 …
370                               400
371                               100
372                               300
373                               400
374                               400

[375 rows x 41 columns]
```

[4]:
```
#Delete whitespace in 'Area code' column name
census_demographic_df=census_demographic_df.rename(columns = {'Area code ':
 ↪'Area code'})
```

In order to keep only a list of Local Authorities and remove the other categories which aggregate the Local Authorities (LAs) (so removing the Metropolitan Counties (E11), Counties (E10), Regions (E12), Inner and Outer London (E13), and countries) I shall keep only those rows where the Area Code is E06-E09 or W06 (the Welsh LAs). Before I do this I am going to extract the regions and Wales into a separate dataframe to use it to check totals later.

[5]:
```
#Keep only the regions of England and Wales as a whole and put in regions␣
 ↪dataframe
patternKeep = "^E12|W92"
keep = census_demographic_df['Area code'].str.contains(patternKeep)
regions_demographic_df = census_demographic_df[keep]

#Keep only the local authorities of England and Wales
patternKeep = "^E0[6-9]|W06"
keep = census_demographic_df['Area code'].str.contains(patternKeep)
census_demographic_df = census_demographic_df[keep]
```

[6]:
```
#Use regex to remove notes from Local Authority names
pattern_note = '\s\[note\s[0-9]+\]'
census_demographic_df['Area name'] = [re.sub(pattern_note, '', str(x)) for x in␣
 ↪census_demographic_df['Area name']]
```

I would like to indicate which region each Local Authority is in as I want to look at the data at both a regional and Local Authority level. For Wales there doesn't appear to be any regions but as the overall population of Wales (approximately 3 million) is on a similar par to the regions I am going to group the Welsh authorities together and indicate they are in Wales.

[7]:
```
#Reset index
census_demographic_df.reset_index(level=None, inplace=True)
census_demographic_df.drop ('index', axis=1, inplace = True)
```

```
#Include a column with the region each local authority is in
census_demographic_df.loc[range(0,12),'Region'] = 'North East'
census_demographic_df.loc[range(12,51),'Region'] = 'North West'
census_demographic_df.loc[range(51,72),'Region'] = 'Yorkshire and the Humber'
census_demographic_df.loc[range(72,107),'Region'] = 'East Midlands'
census_demographic_df.loc[range(107,137),'Region'] = 'West Midlands'
census_demographic_df.loc[range(137,182),'Region'] = 'East of England'
census_demographic_df.loc[range(182,215),'Region'] = 'London'
census_demographic_df.loc[range(215,279),'Region'] = 'South East'
census_demographic_df.loc[range(279,309),'Region'] = 'South West'
census_demographic_df.loc[range(309,331),'Region'] = 'Wales'
```

Now to check if I have correctly assigned all the regions/Wales. I will do this by grouping according to the region column and then summing the 'All persons' column and manually checking this against the totals on the excel sheet.

[8]:

```
census_demographic_df.to_csv('cleaned_census_df.csv')
```

[9]:

```
#Groupby region and then sum the columns
regions_sum_df = census_demographic_df.groupby(['Region']).sum(numeric_only =␣
 ↪True)
regions_sum_df
```

[9]:

```
                          All persons  Females:Aged 4 years and under  \
Region
East Midlands                 4879800                          123400
East of England               6334500                          170000
London                        8800000                          258900
North East                    2647100                           65600
North West                    7417300                          199000
South East                    9278400                          241600
South West                    5701300                          133800
Wales                         3107700                           75800
West Midlands                 5950600                          163700
Yorkshire and the Humber      5480800                          145800

                          Females:Aged 5 to 9 years  \
Region
East Midlands                                138800
East of England                              185900
London                                       260200
North East                                    72900
North West                                   217600
South East                                   269200
South West                                   151800
Wales                                         86100
West Midlands                                179600
```

```
Yorkshire and the Humber                     159500

                          Females:Aged 10 to 14 years  \
Region
East Midlands                                  141500
East of England                                187700
London                                         262000
North East                                      75300
North West                                     219700
South East                                     277200
South West                                     156400
Wales                                           88900
West Midlands                                  182300
Yorkshire and the Humber                       162000

                          Females:Aged 15 to 19 years  \
Region
East Midlands                                  140000
East of England                                165900
London                                         240300
North East                                      73500
North West                                     211100
South East                                     253600
South West                                     152900
Wales                                           85200
West Midlands                                  173600
Yorkshire and the Humber                       157700

                          Females:Aged 20 to 24 years  \
Region
East Midlands                                  151400
East of England                                167300
London                                         304700
North East                                      80500
North West                                     227400
South East                                     254100
South West                                     162700
Wales                                           91700
West Midlands                                  178800
Yorkshire and the Humber                       174600

                          Females:Aged 25 to 29 years  \
Region
East Midlands                                  152400
East of England                                196800
London                                         412200
North East                                      82000
North West                                     243100
South East                                     277200
South West                                     166900
Wales                                           94500
West Midlands                                  189200
Yorkshire and the Humber                       178300

                          Females:Aged 30 to 34 years  \
Region
East Midlands                                  163600
East of England                                219300
London                                         422500
North East                                      86900
North West                                     261000
South East                                     312900
South West                                     182400
Wales                                          101000
West Midlands                                  206400
Yorkshire and the Humber                       189600

                          Females:Aged 35 to 39 years  \
Region
East Midlands                                  157400
East of England                                215800
London                                         382700
North East                                      84300
North West                                     248600
South East                                     314000
South West                                     175200
Wales                                           95900
West Midlands                                  197000
Yorkshire and the Humber                       178900

                          Females:Aged 40 to 44 years  …  \
Region                                                 …
East Midlands                                  147900  …
East of England                                206900  …
London                                         343000  …
North East                                      77900  …
North West                                     226200  …
South East                                     309300  …
South West                                     168200  …
Wales                                           89600  …
West Midlands                                  183800  …
Yorkshire and the Humber                       164100  …

                          Males:Aged 45 to 49 years  \
Region
East Midlands                                152100
East of England                              202500
London                                       292800
North East                                    77600
North West                                   227000
South East                                   302200
South West                                   171000
Wales                                         91000
West Midlands                                184400
Yorkshire and the Humber                     167200

                          Males:Aged 50 to 54 years  \
Region
East Midlands                                171200
East of England                              218300
London                                       280000
North East                                    89500
North West                                   254500
South East                                   322800
South West                                   194400
Wales                                        104700
West Midlands                                205100
Yorkshire and the Humber                     187700

                          Males:Aged 55 to 59 years  \
Region
East Midlands                                167800
East of England                              212800
London                                       247800
North East                                    94100
North West                                   252800
South East                                   315800
South West                                   199400
Wales                                        108600
West Midlands                                195100
Yorkshire and the Humber                     184500

                          Males:Aged 60 to 64 years  \
Region
East Midlands                                144600
East of England                              182500
London                                       197000
North East                                    85600
North West                                   219000
South East                                   266700
South West                                   176700
```

```
Wales                                         97600
West Midlands                                168300
Yorkshire and the Humber                     161600

                          Males:Aged 65 to 69 years  \
Region
East Midlands                                123500
East of England                              154200
London                                       145600
North East                                    74200
North West                                   184500
South East                                   223300
South West                                   155700
Wales                                         86400
West Midlands                                143700
Yorkshire and the Humber                     137700

                          Males:Aged 70 to 74 years  \
Region
East Midlands                                125800
East of England                              159600
London                                       124500
North East                                    71100
North West                                   182600
South East                                   227900
South West                                   164100
Wales                                         87800
West Midlands                                141000
Yorkshire and the Humber                     136300

                          Males:Aged 75 to 79 years  \
Region
East Midlands                                 90300
East of England                              115100
London                                        83900
North East                                    47400
North West                                   125500
South East                                   165200
South West                                   120700
Wales                                         61700
West Midlands                                105300
Yorkshire and the Humber                      93800

                          Males:Aged 80 to 84 years  \
Region
East Midlands                                 57000
East of England                               76700
```

```
London                                        60000
North East                                    32100
North West                                    83000
South East                                   110100
South West                                    78400
Wales                                         39600
West Midlands                                 69600
Yorkshire and the Humber                      62300

                          Males:Aged 85 to 89 years  \
Region
East Midlands                                 31300
East of England                               44300
London                                        34700
North East                                    17100
North West                                    44000
South East                                    63700
South West                                    44700
Wales                                         21500
West Midlands                                 37700
Yorkshire and the Humber                      34300

                          Males:Aged 90 years and over
Region
East Midlands                                    13500
East of England                                  20600
London                                           16000
North East                                        7100
North West                                       18600
South East                                       30700
South West                                       21600
Wales                                             9600
West Midlands                                    16800
Yorkshire and the Humber                         14400

[10 rows x 39 columns]
```

Now I will produce a dataframe which only includes the data for females and the total population for each region in order to get a dataframe in the right format to produce a population pyramid.

[10]:

```python
#Create list of columns with data on females only
females_cols = [col for col in regions_sum_df.columns if 'Females' in col]

#Append 'All persons' column
females_cols.append('All persons')

#Create new database with only female columns and 'All persons' column
```

```
female_regions_census_df = regions_sum_df[females_cols]
female_regions_census_df.head()
```

[10]:

```
                 Females:Aged 4 years and under  Females:Aged 5 to 9 years  \
Region
East Midlands                            123400                     138800
East of England                          170000                     185900
London                                   258900                     260200
North East                                65600                      72900
North West                               199000                     217600

                 Females:Aged 10 to 14 years  Females:Aged 15 to 19 years  \
Region
East Midlands                         141500                       140000
East of England                       187700                       165900
London                                262000                       240300
North East                             75300                        73500
North West                            219700                       211100

                 Females:Aged 20 to 24 years  Females:Aged 25 to 29 years  \
Region
East Midlands                         151400                       152400
East of England                       167300                       196800
London                                304700                       412200
North East                             80500                        82000
North West                            227400                       243100

                 Females:Aged 30 to 34 years  Females:Aged 35 to 39 years  \
Region
East Midlands                         163600                       157400
East of England                       219300                       215800
London                                422500                       382700
North East                             86900                        84300
North West                            261000                       248600

                 Females:Aged 40 to 44 years  Females:Aged 45 to 49 years  \
Region
East Midlands                         147900                       156400
East of England                       206900                       208500
London                                343000                       301400
North East                             77900                        81200
North West                            226200                       231400

                 Females:Aged 50 to 54 years  Females:Aged 55 to 59 years  \
Region
East Midlands                         175400                       172300
East of England                       224600                       219900
```

```
London                               293800                       263700
North East                            93700                        98400
North West                           259300                       260100

                 Females:Aged 60 to 64 years  Females:Aged 65 to 69 years  \
Region
East Midlands                        147700                       130200
East of England                      187000                       165500
London                               207700                       160700
North East                            89600                        77500
North West                           224800                       191700

                 Females:Aged 70 to 74 years  Females:Aged 75 to 79 years  \
Region
East Midlands                        135400                       100900
East of England                      176800                       131000
London                               144600                       105500
North East                            77300                        53900
North West                           197200                       144400

                 Females:Aged 80 to 84 years  Females:Aged 85 to 89 years  \
Region
East Midlands                         70400                        45200
East of England                       95000                        63700
London                                81200                        52300
North East                            41700                        26300
North West                           107500                        67100

                 Females:Aged 90 years and over  All persons
Region
East Midlands                             28800      4879800
East of England                           42100      6334500
London                                    34500      8800000
North East                                15500      2647100
North West                                40800      7417300
```

[11]:

```
#Create new dataframe to store percentages of females in each age group by␣
 ↪region
female_regions_proportions_df  = pd.DataFrame()
for i in females_cols:
    female_regions_proportions_df['%'+ i] = female_regions_census_df [i]/
 ↪female_regions_census_df ['All persons']*100

#Create list of columns of female percentages to sum
cols_to_sum = female_regions_proportions_df.columns[ :␣
 ↪female_regions_proportions_df.shape[1]-1]
```

```
#Create new column with sum of female percentages
female_regions_proportions_df['Total'] =␣
 ↪female_regions_proportions_df[cols_to_sum].sum(axis=1)




#Remove '%All persons' and 'Total' columns
female_regions_proportions_minus_totals_df = female_regions_proportions_df.
 ↪copy()
female_regions_proportions_minus_totals_df .drop(['%All persons', 'Total'],␣
 ↪axis=1, inplace = True)

#Remove % Females: from column names
female_regions_proportions_minus_totals_df.columns =␣
 ↪female_regions_proportions_minus_totals_df.columns.map(lambda x: x.
 ↪removeprefix("%Females:"))




female_regions_proportions_df.head()
```

```
[11]:                     %Females:Aged 4 years and under  %Females:Aged 5 to 9 years  \
      Region
      East Midlands                              2.528792                    2.844379
      East of England                            2.683716                    2.934723
      London                                     2.942045                    2.956818
      North East                                 2.478184                    2.753957
      North West                                 2.682917                    2.933682

                          %Females:Aged 10 to 14 years  %Females:Aged 15 to 19 years  \
      Region
      East Midlands                           2.899709                      2.868970
      East of England                         2.963138                      2.618991
      London                                  2.977273                      2.730682
      North East                              2.844622                      2.776623
      North West                              2.961994                      2.846049

                          %Females:Aged 20 to 24 years  %Females:Aged 25 to 29 years  \
      Region
      East Midlands                           3.102586                      3.123079
      East of England                         2.641092                      3.106796
      London                                  3.462500                      4.684091
      North East                              3.041064                      3.097730
      North West                              3.065806                      3.277473

                          %Females:Aged 30 to 34 years  %Females:Aged 35 to 39 years  \
      Region
```

```
East Midlands                        3.352596                      3.225542
East of England                      3.461994                      3.406741
London                               4.801136                      4.348864
North East                           3.282838                      3.184617
North West                           3.518801                      3.351624

                 %Females:Aged 40 to 44 years  %Females:Aged 45 to 49 years  \
Region
East Midlands                        3.030862                      3.205049
East of England                      3.266240                      3.291499
London                               3.897727                      3.425000
North East                           2.942843                      3.067508
North West                           3.049627                      3.119734

                 …  %Females:Aged 55 to 59 years  \
Region           …
East Midlands    …                      3.530882
East of England  …                      3.471466
London           …                      2.996591
North East       …                      3.717276
North West       …                      3.506667

                 %Females:Aged 60 to 64 years  %Females:Aged 65 to 69 years  \
Region
East Midlands                        3.026763                      2.668142
East of England                      2.952088                      2.612677
London                               2.360227                      1.826136
North East                           3.384836                      2.927732
North West                           3.030752                      2.584498

                 %Females:Aged 70 to 74 years  %Females:Aged 75 to 79 years  \
Region
East Midlands                        2.774704                      2.067708
East of England                      2.791065                      2.068040
London                               1.643182                      1.198864
North East                           2.920177                      2.036191
North West                           2.658649                      1.946800

                 %Females:Aged 80 to 84 years  %Females:Aged 85 to 89 years  \
Region
East Midlands                        1.442682                      0.926267
East of England                      1.499724                      1.005604
London                               0.922727                      0.594318
North East                           1.575309                      0.993540
North West                           1.449314                      0.904642

                 %Females:Aged 90 years and over  %All persons      Total
```

```
Region
East Midlands                           0.590188         100.0  50.803312
East of England                         0.664614         100.0  50.985871
London                                  0.392045         100.0  51.498864
North East                              0.585546         100.0  51.150315
North West                              0.550065         100.0  50.934976

[5 rows x 21 columns]
```

[12]:
```
#Create list of columns with data on males only
males_cols = [col for col in regions_sum_df.columns if 'Males' in col]

#Append 'All persons' column
males_cols.append('All persons')

#Create new database with only male columns and 'All persons' column
male_regions_census_df = regions_sum_df[males_cols]
male_regions_census_df.head()
```

[12]:
```
                 Males:Aged 4 years and under  Males:Aged 5 to 9 years  \
Region
East Midlands                          129700                   144600
East of England                        179000                   195000
London                                 270000                   271600
North East                              68700                    77700
North West                             208700                   227700

                 Males:Aged 10 to 14 years  Males:Aged 15 to 19 years  \
Region
East Midlands                       148700                     147700
East of England                     197400                     177300
London                              273700                     249100
North East                           79200                      76400
North West                          232500                     219900

                 Males:Aged 20 to 24 years  Males:Aged 25 to 29 years  \
Region
East Midlands                       155000                     149300
East of England                     175300                     191300
London                              284800                     374300
North East                           82300                      78700
North West                          226100                     233800

                 Males:Aged 30 to 34 years  Males:Aged 35 to 39 years  \
Region
East Midlands                       155400                     150300
East of England                     205100                     202400
```

```
London                         385800                     353000
North East                      80900                      79600
North West                     245400                     236900

                 Males:Aged 40 to 44 years  Males:Aged 45 to 49 years  \
Region
East Midlands                  144000                     152100
East of England                199700                     202500
London                         324000                     292800
North East                      74300                      77600
North West                     219100                     227000

                 Males:Aged 50 to 54 years  Males:Aged 55 to 59 years  \
Region
East Midlands                  171200                     167800
East of England                218300                     212800
London                         280000                     247800
North East                      89500                      94100
North West                     254500                     252800

                 Males:Aged 60 to 64 years  Males:Aged 65 to 69 years  \
Region
East Midlands                  144600                     123500
East of England                182500                     154200
London                         197000                     145600
North East                      85600                      74200
North West                     219000                     184500

                 Males:Aged 70 to 74 years  Males:Aged 75 to 79 years  \
Region
East Midlands                  125800                      90300
East of England                159600                     115100
London                         124500                      83900
North East                      71100                      47400
North West                     182600                     125500

                 Males:Aged 80 to 84 years  Males:Aged 85 to 89 years  \
Region
East Midlands                   57000                      31300
East of England                 76700                      44300
London                          60000                      34700
North East                      32100                      17100
North West                      83000                      44000

                 Males:Aged 90 years and over  All persons
Region
East Midlands                           13500      4879800
East of England                                    20600      6334500
London                                             16000      8800000
North East                                          7100      2647100
North West                                         18600      7417300
```

[13]:

```
#Create new dataframe to store percentages of males in each age group by region
male_regions_proportions_df  = pd.DataFrame()
for i in males_cols:
    male_regions_proportions_df['%'+ i] = male_regions_census_df [i]/
 ↪male_regions_census_df ['All persons']*100

#Create list of columns of male percentages to sum
cols_to_sum = male_regions_proportions_df.columns[ :␣
 ↪male_regions_proportions_df.shape[1]-1]

#Create new column with sum of male percentages
male_regions_proportions_df['Total'] = male_regions_proportions_df[cols_to_sum].
 ↪sum(axis=1)


#Remove '%All persons' and 'Total' columns
male_regions_proportions_minus_totals_df = male_regions_proportions_df.copy()
male_regions_proportions_minus_totals_df.drop(['%All persons', 'Total'],␣
 ↪axis=1, inplace = True)

#Remove % Males: from column names
male_regions_proportions_minus_totals_df.columns =␣
 ↪male_regions_proportions_minus_totals_df.columns.map(lambda x: x.
 ↪removeprefix("%Males:"))



male_regions_proportions_df.head()
```

[13]:

```
                 %Males:Aged 4 years and under  %Males:Aged 5 to 9 years  \
Region
East Midlands                         2.657896                  2.963236
East of England                       2.825795                  3.078380
London                                3.068182                  3.086364
North East                            2.595293                  2.935288
North West                            2.813692                  3.069850

                 %Males:Aged 10 to 14 years  %Males:Aged 15 to 19 years  \
Region
East Midlands                      3.047256                    3.026763
East of England                    3.116268                    2.798958
London                             3.110227                    2.830682
```

```
North East                          2.991953                    2.886177
North West                          3.134564                    2.964691

                  %Males:Aged 20 to 24 years  %Males:Aged 25 to 29 years  \
Region
East Midlands                       3.176360                    3.059552
East of England                     2.767385                    3.019970
London                              3.236364                    4.253409
North East                          3.109063                    2.973065
North West                          3.048279                    3.152090

                  %Males:Aged 30 to 34 years  %Males:Aged 35 to 39 years  \
Region
East Midlands                       3.184557                    3.080044
East of England                     3.237825                    3.195201
London                              4.384091                    4.011364
North East                          3.056175                    3.007064
North West                          3.308482                    3.193885

                  %Males:Aged 40 to 44 years  %Males:Aged 45 to 49 years  …  \
Region                                                                    …
East Midlands                       2.950941                    3.116931  …
East of England                     3.152577                    3.196780  …
London                              3.681818                    3.327273  …
North East                          2.806845                    2.931510  …
North West                          2.953905                    3.060413  …

                  %Males:Aged 55 to 59 years  %Males:Aged 60 to 64 years  \
Region
East Midlands                       3.438666                    2.963236
East of England                     3.359381                    2.881048
London                              2.815909                    2.238636
North East                          3.554834                    3.233727
North West                          3.408248                    2.952557

                  %Males:Aged 65 to 69 years  %Males:Aged 70 to 74 years  \
Region
East Midlands                       2.530841                    2.577975
East of England                     2.434288                    2.519536
London                              1.654545                    1.414773
North East                          2.803068                    2.685958
North West                          2.487428                    2.461812

                  %Males:Aged 75 to 79 years  %Males:Aged 80 to 84 years  \
Region
East Midlands                       1.850486                    1.168081
East of England                     1.817034                    1.210830
```

```
London                             0.953409                   0.681818
North East                         1.790639                   1.212648
North West                         1.691990                   1.119006

                 %Males:Aged 85 to 89 years  %Males:Aged 90 years and over  \
Region
East Midlands                      0.641420                       0.276651
East of England                    0.699345                       0.325203
London                             0.394318                       0.181818
North East                         0.645990                       0.268218
North West                         0.593208                       0.250765

                 %All persons      Total
Region
East Midlands           100.0  49.219230
East of England         100.0  49.082011
London                  100.0  48.506818
North East              100.0  48.868573
North West              100.0  49.096032

[5 rows x 21 columns]
```

[14]:

```
#Extract index values to list
index_list = female_regions_proportions_df.index.values.tolist()


index_list
```

[14]:

```
['East Midlands',
 'East of England',
 'London',
 'North East',
 'North West',
 'South East',
 'South West',
 'Wales',
 'West Midlands',
 'Yorkshire and the Humber']
```

[15]:

```
def create_dfs(regions):
    """Creates a dictionary of empty dataframes from list of regions in␣
 ↪index_list
    with region as key"""
    dfs = {}
    for x in regions:
        dfs[x] = pd.DataFrame()
    return dfs
```

```
dfs = create_dfs(index_list)
```

[16]:
```
def generate_dataframes(dfs):
    """Iterates through items in dfs dictionary to generate dataframes with␣
 ↪females and males columns by age group as
    % of overall population for each region as dictionary value."""
    for key,val in dfs.items():
        dfs[key] = pd.concat([female_regions_proportions_minus_totals_df.
 ↪loc[key], male_regions_proportions_minus_totals_df.loc[key]],axis =1)
        dfs[key] = dfs[key].reset_index()
        dfs[key].columns = ['Ages','Females', 'Males']
        dfs[key]['Males'] = dfs[key]['Males'] * -1
        dfs[key] = dfs[key].iloc[::-1]

    return dfs


dfs_dict = generate_dataframes(dfs)


print(dfs_dict.values())
```

```
dict_values([                      Ages   Females     Males
18  Aged 90 years and over  0.590188 -0.276651
17     Aged 85 to 89 years  0.926267 -0.641420
16     Aged 80 to 84 years  1.442682 -1.168081
15     Aged 75 to 79 years  2.067708 -1.850486
14     Aged 70 to 74 years  2.774704 -2.577975
13     Aged 65 to 69 years  2.668142 -2.530841
12     Aged 60 to 64 years  3.026763 -2.963236
11     Aged 55 to 59 years  3.530882 -3.438666
10     Aged 50 to 54 years  3.594410 -3.508341
9      Aged 45 to 49 years  3.205049 -3.116931
8      Aged 40 to 44 years  3.030862 -2.950941
7      Aged 35 to 39 years  3.225542 -3.080044
6      Aged 30 to 34 years  3.352596 -3.184557
5      Aged 25 to 29 years  3.123079 -3.059552
4      Aged 20 to 24 years  3.102586 -3.176360
3      Aged 15 to 19 years  2.868970 -3.026763
2      Aged 10 to 14 years  2.899709 -3.047256
1        Aged 5 to 9 years  2.844379 -2.963236
0   Aged 4 years and under  2.528792 -2.657896,                       Ages
Females     Males
18  Aged 90 years and over  0.664614 -0.325203
17     Aged 85 to 89 years  1.005604 -0.699345
16     Aged 80 to 84 years  1.499724 -1.210830
15     Aged 75 to 79 years  2.068040 -1.817034
```

```
14     Aged 70 to 74 years  2.791065 -2.519536
13     Aged 65 to 69 years  2.612677 -2.434288
12     Aged 60 to 64 years  2.952088 -2.881048
11     Aged 55 to 59 years  3.471466 -3.359381
10     Aged 50 to 54 years  3.545663 -3.446207
9      Aged 45 to 49 years  3.291499 -3.196780
8      Aged 40 to 44 years  3.266240 -3.152577
7      Aged 35 to 39 years  3.406741 -3.195201
6      Aged 30 to 34 years  3.461994 -3.237825
5      Aged 25 to 29 years  3.106796 -3.019970
4      Aged 20 to 24 years  2.641092 -2.767385
3      Aged 15 to 19 years  2.618991 -2.798958
2      Aged 10 to 14 years  2.963138 -3.116268
1        Aged 5 to 9 years  2.934723 -3.078380
0   Aged 4 years and under  2.683716 -2.825795,                       Ages
Females     Males
18  Aged 90 years and over  0.392045 -0.181818
17     Aged 85 to 89 years  0.594318 -0.394318
16     Aged 80 to 84 years  0.922727 -0.681818
15     Aged 75 to 79 years  1.198864 -0.953409
14     Aged 70 to 74 years  1.643182 -1.414773
13     Aged 65 to 69 years  1.826136 -1.654545
12     Aged 60 to 64 years  2.360227 -2.238636
11     Aged 55 to 59 years  2.996591 -2.815909
10     Aged 50 to 54 years  3.338636 -3.181818
9      Aged 45 to 49 years  3.425000 -3.327273
8      Aged 40 to 44 years  3.897727 -3.681818
7      Aged 35 to 39 years  4.348864 -4.011364
6      Aged 30 to 34 years  4.801136 -4.384091
5      Aged 25 to 29 years  4.684091 -4.253409
4      Aged 20 to 24 years  3.462500 -3.236364
3      Aged 15 to 19 years  2.730682 -2.830682
2      Aged 10 to 14 years  2.977273 -3.110227
1        Aged 5 to 9 years  2.956818 -3.086364
0   Aged 4 years and under  2.942045 -3.068182,                       Ages
Females     Males
18  Aged 90 years and over  0.585546 -0.268218
17     Aged 85 to 89 years  0.993540 -0.645990
16     Aged 80 to 84 years  1.575309 -1.212648
15     Aged 75 to 79 years  2.036191 -1.790639
14     Aged 70 to 74 years  2.920177 -2.685958
13     Aged 65 to 69 years  2.927732 -2.803068
12     Aged 60 to 64 years  3.384836 -3.233727
11     Aged 55 to 59 years  3.717276 -3.554834
10     Aged 50 to 54 years  3.539723 -3.381059
9      Aged 45 to 49 years  3.067508 -2.931510
8      Aged 40 to 44 years  2.942843 -2.806845
7      Aged 35 to 39 years  3.184617 -3.007064
```

```
6      Aged 30 to 34 years  3.282838 -3.056175
5      Aged 25 to 29 years  3.097730 -2.973065
4      Aged 20 to 24 years  3.041064 -3.109063
3      Aged 15 to 19 years  2.776623 -2.886177
2      Aged 10 to 14 years  2.844622 -2.991953
1        Aged 5 to 9 years  2.753957 -2.935288
0   Aged 4 years and under  2.478184 -2.595293,                       Ages
Females     Males
18  Aged 90 years and over  0.550065 -0.250765
17     Aged 85 to 89 years  0.904642 -0.593208
16     Aged 80 to 84 years  1.449314 -1.119006
15     Aged 75 to 79 years  1.946800 -1.691990
14     Aged 70 to 74 years  2.658649 -2.461812
13     Aged 65 to 69 years  2.584498 -2.487428
12     Aged 60 to 64 years  3.030752 -2.952557
11     Aged 55 to 59 years  3.506667 -3.408248
10     Aged 50 to 54 years  3.495881 -3.431168
9      Aged 45 to 49 years  3.119734 -3.060413
8      Aged 40 to 44 years  3.049627 -2.953905
7      Aged 35 to 39 years  3.351624 -3.193885
6      Aged 30 to 34 years  3.518801 -3.308482
5      Aged 25 to 29 years  3.277473 -3.152090
4      Aged 20 to 24 years  3.065806 -3.048279
3      Aged 15 to 19 years  2.846049 -2.964691
2      Aged 10 to 14 years  2.961994 -3.134564
1        Aged 5 to 9 years  2.933682 -3.069850
0   Aged 4 years and under  2.682917 -2.813692,                       Ages
Females     Males
18  Aged 90 years and over  0.696241 -0.330876
17     Aged 85 to 89 years  1.014183 -0.686541
16     Aged 80 to 84 years  1.501336 -1.186627
15     Aged 75 to 79 years  2.075789 -1.780479
14     Aged 70 to 74 years  2.741852 -2.456242
13     Aged 65 to 69 years  2.573720 -2.406665
12     Aged 60 to 64 years  2.969262 -2.874418
11     Aged 55 to 59 years  3.500604 -3.403604
10     Aged 50 to 54 years  3.612692 -3.479048
9      Aged 45 to 49 years  3.370193 -3.257027
8      Aged 40 to 44 years  3.333549 -3.179427
7      Aged 35 to 39 years  3.384204 -3.166494
6      Aged 30 to 34 years  3.372349 -3.132006
5      Aged 25 to 29 years  2.987584 -2.897051
4      Aged 20 to 24 years  2.738619 -2.822685
3      Aged 15 to 19 years  2.733230 -2.912140
2      Aged 10 to 14 years  2.987584 -3.151405
1        Aged 5 to 9 years  2.901362 -3.054406
0   Aged 4 years and under  2.603897 -2.742930,                       Ages
Females     Males
```

```
18  Aged 90 years and over  0.791048 -0.378861
17     Aged 85 to 89 years  1.127813 -0.784032
16     Aged 80 to 84 years  1.683826 -1.375125
15     Aged 75 to 79 years  2.383667 -2.117061
14     Aged 70 to 74 years  3.137881 -2.878291
13     Aged 65 to 69 years  2.948450 -2.730956
12     Aged 60 to 64 years  3.246628 -3.099293
11     Aged 55 to 59 years  3.646537 -3.497448
10     Aged 50 to 54 years  3.564099 -3.409749
9      Aged 45 to 49 years  3.127357 -2.999316
8      Aged 40 to 44 years  2.950204 -2.837949
7      Aged 35 to 39 years  3.072983 -2.962482
6      Aged 30 to 34 years  3.199270 -3.048428
5      Aged 25 to 29 years  2.927403 -2.902847
4      Aged 20 to 24 years  2.853735 -2.974760
3      Aged 15 to 19 years  2.681844 -2.816901
2      Aged 10 to 14 years  2.743234 -2.862505
1        Aged 5 to 9 years  2.662551 -2.795854
0   Aged 4 years and under  2.346833 -2.469612,                       Ages
Females     Males
18  Aged 90 years and over  0.649998 -0.308910
17     Aged 85 to 89 years  1.023265 -0.691830
16     Aged 80 to 84 years  1.579947 -1.274254
15     Aged 75 to 79 years  2.249252 -1.985391
14     Aged 70 to 74 years  3.008656 -2.825241
13     Aged 65 to 69 years  2.941082 -2.780191
12     Aged 60 to 64 years  3.285388 -3.140586
11     Aged 55 to 59 years  3.677961 -3.494546
10     Aged 50 to 54 years  3.565338 -3.369051
9      Aged 45 to 49 years  3.066577 -2.928211
8      Aged 40 to 44 years  2.883161 -2.770538
7      Aged 35 to 39 years  3.085883 -2.905686
6      Aged 30 to 34 years  3.249992 -3.073012
5      Aged 25 to 29 years  3.040834 -2.963607
4      Aged 20 to 24 years  2.950735 -3.092319
3      Aged 15 to 19 years  2.741577 -2.921775
2      Aged 10 to 14 years  2.860636 -3.018309
1        Aged 5 to 9 years  2.770538 -2.896032
0   Aged 4 years and under  2.439103 -2.561380,                       Ages
Females     Males
18  Aged 90 years and over  0.603301 -0.282324
17     Aged 85 to 89 years  0.946123 -0.633550
16     Aged 80 to 84 years  1.468759 -1.169630
15     Aged 75 to 79 years  2.023325 -1.769569
14     Aged 70 to 74 years  2.576211 -2.369509
13     Aged 65 to 69 years  2.524115 -2.414883
12     Aged 60 to 64 years  2.877021 -2.828286
11     Aged 55 to 59 years  3.366047 -3.278661
```

```
10     Aged 50 to 54 years  3.488724 -3.446711
9      Aged 45 to 49 years  3.120694 -3.098847
8      Aged 40 to 44 years  3.088764 -2.976170
7      Aged 35 to 39 years  3.310591 -3.125735
6      Aged 30 to 34 years  3.468558 -3.256814
5      Aged 25 to 29 years  3.179511 -3.092125
4      Aged 20 to 24 years  3.004739 -3.098847
3      Aged 15 to 19 years  2.917353 -3.090445
2      Aged 10 to 14 years  3.063557 -3.228246
1         Aged 5 to 9 years  3.018183 -3.174470
0   Aged 4 years and under  2.750983 -2.885423,                       Ages
Females     Males
18  Aged 90 years and over  0.576558 -0.262735
17     Aged 85 to 89 years  0.941468 -0.625821
16     Aged 80 to 84 years  1.466939 -1.136695
15     Aged 75 to 79 years  1.957743 -1.711429
14     Aged 70 to 74 years  2.705809 -2.486863
13     Aged 65 to 69 years  2.603635 -2.512407
12     Aged 60 to 64 years  3.028755 -2.948475
11     Aged 55 to 59 years  3.461174 -3.366297
10     Aged 50 to 54 years  3.519559 -3.424683
9      Aged 45 to 49 years  3.114509 -3.050650
8      Aged 40 to 44 years  2.994088 -2.913808
7      Aged 35 to 39 years  3.264122 -3.119982
6      Aged 30 to 34 years  3.459349 -3.242227
5      Aged 25 to 29 years  3.253175 -3.145526
4      Aged 20 to 24 years  3.185666 -3.156474
3      Aged 15 to 19 years  2.877317 -3.017808
2      Aged 10 to 14 years  2.955773 -3.112684
1         Aged 5 to 9 years  2.910159 -3.045176
0   Aged 4 years and under  2.660196 -2.786090])
```

[17]:

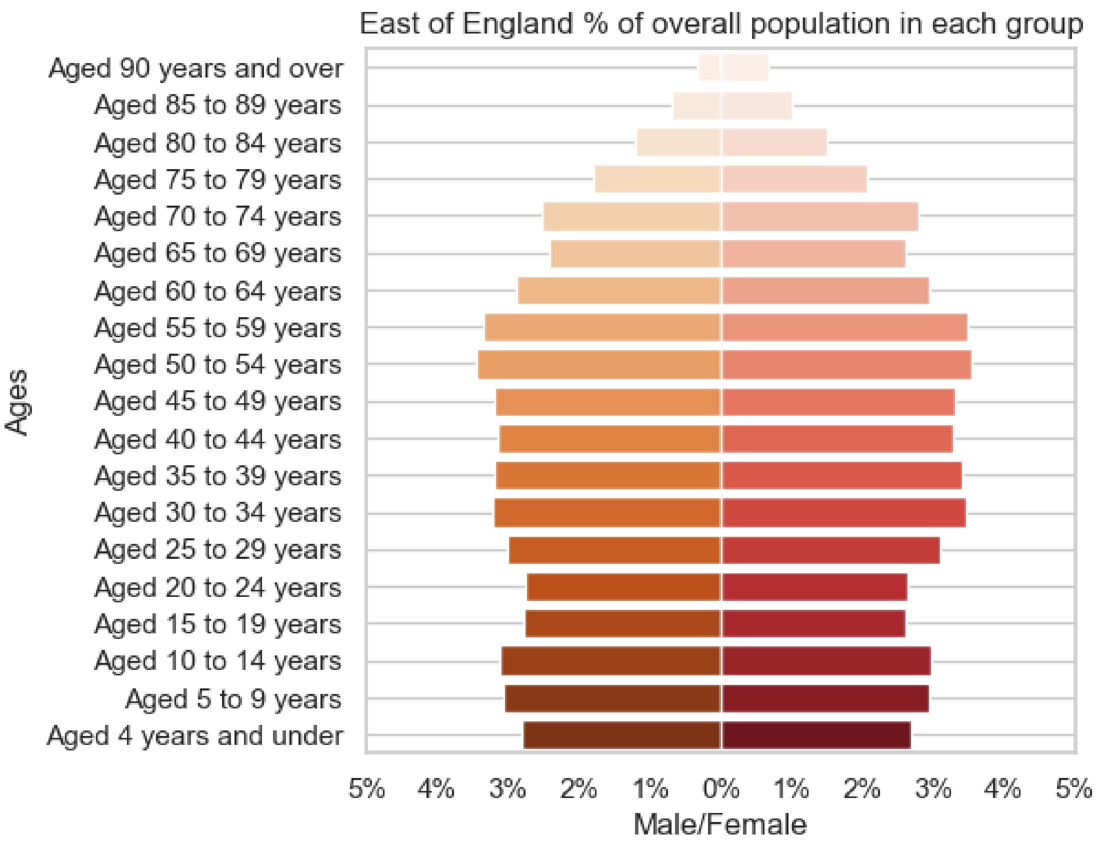
```python
east_of_england = dfs_dict['East of England']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')



ax1 = sns.barplot(x='Males', y='Ages', data=east_of_england, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=east_of_england, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('East of England % of overall population in each group');
```



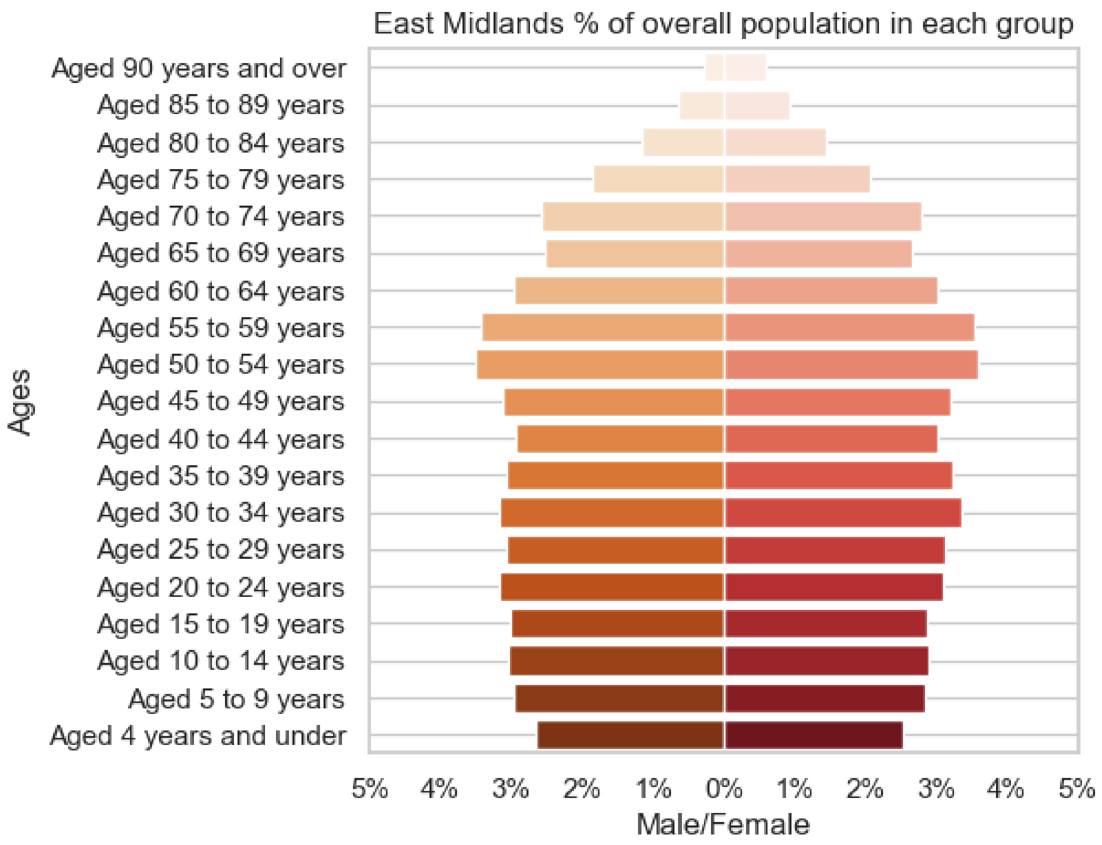
[18]:

```
east_midlands = dfs_dict['East Midlands']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=east_midlands, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=east_midlands, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('East Midlands % of overall population in each group');
```

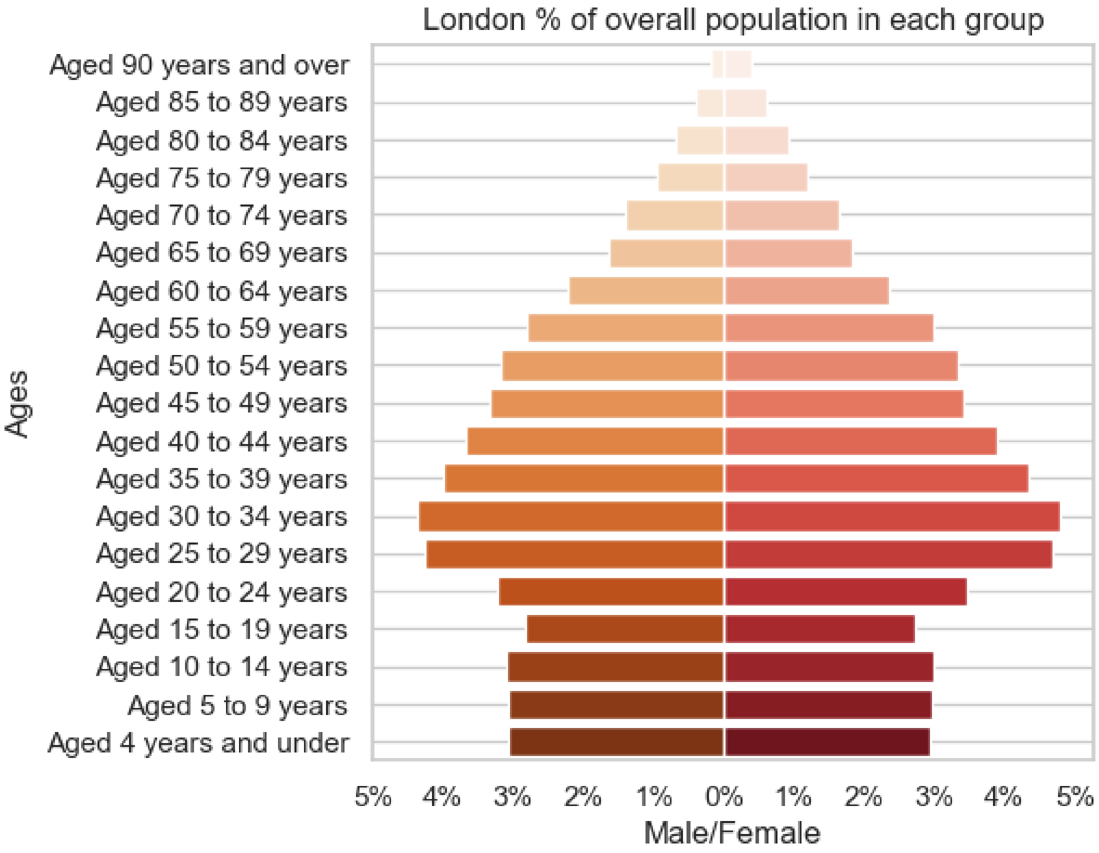


[19]:
```
london = dfs_dict['London']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=london, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=london, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('London % of overall population in each group');
```



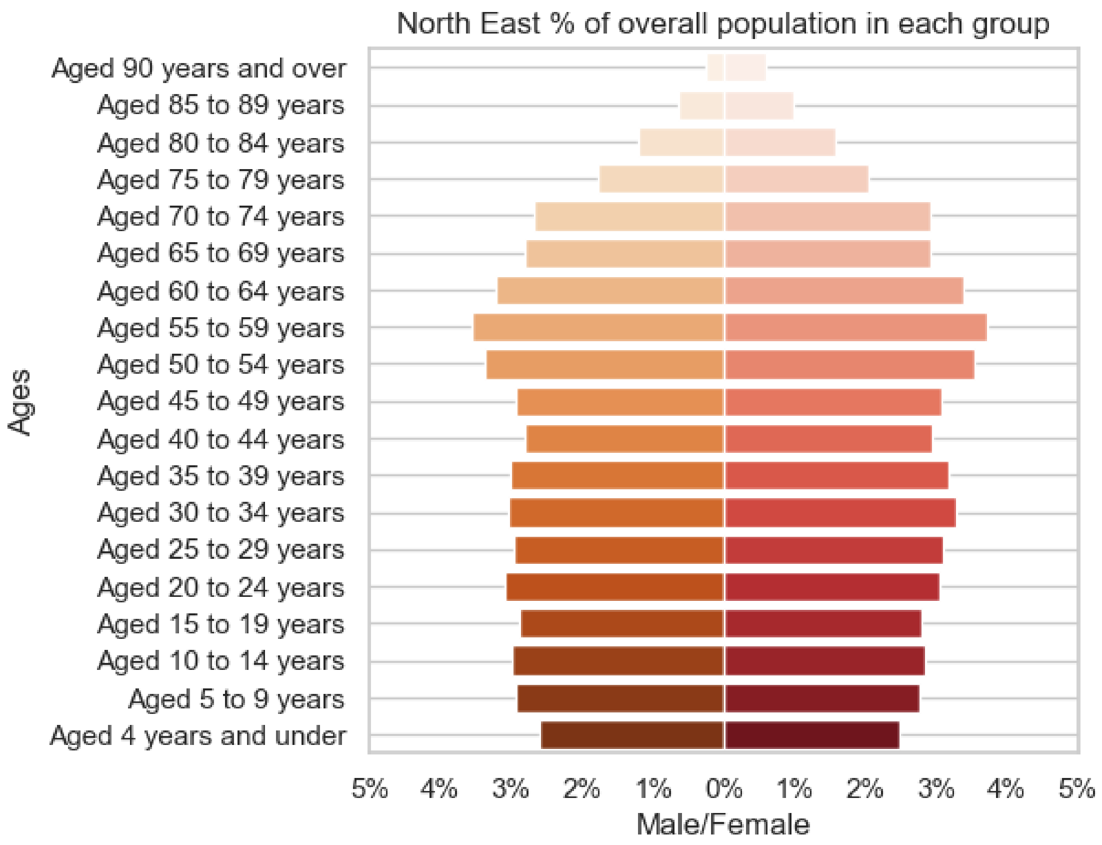
[20]:

```
north_east = dfs_dict['North East']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=north_east, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=north_east, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('North East % of overall population in each group');
```



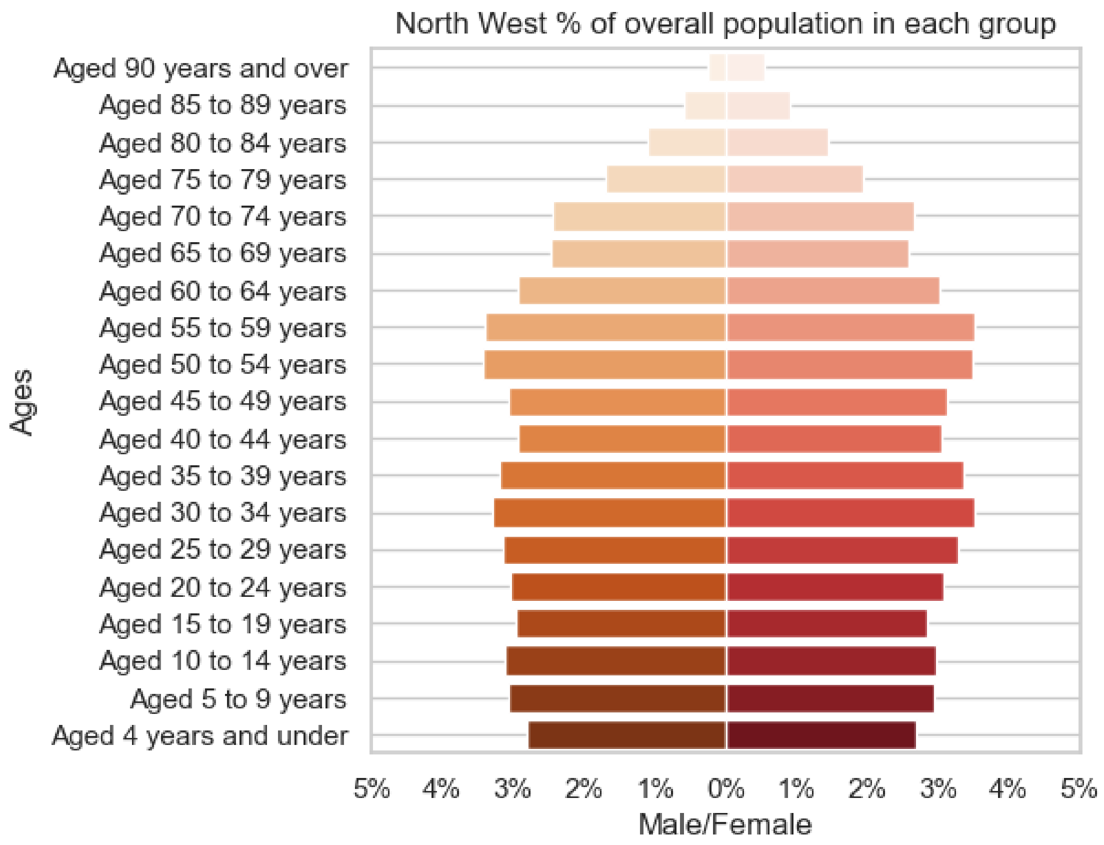
[21]:

```
north_west = dfs_dict['North West']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=north_west, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=north_west, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('North West % of overall population in each group');
```



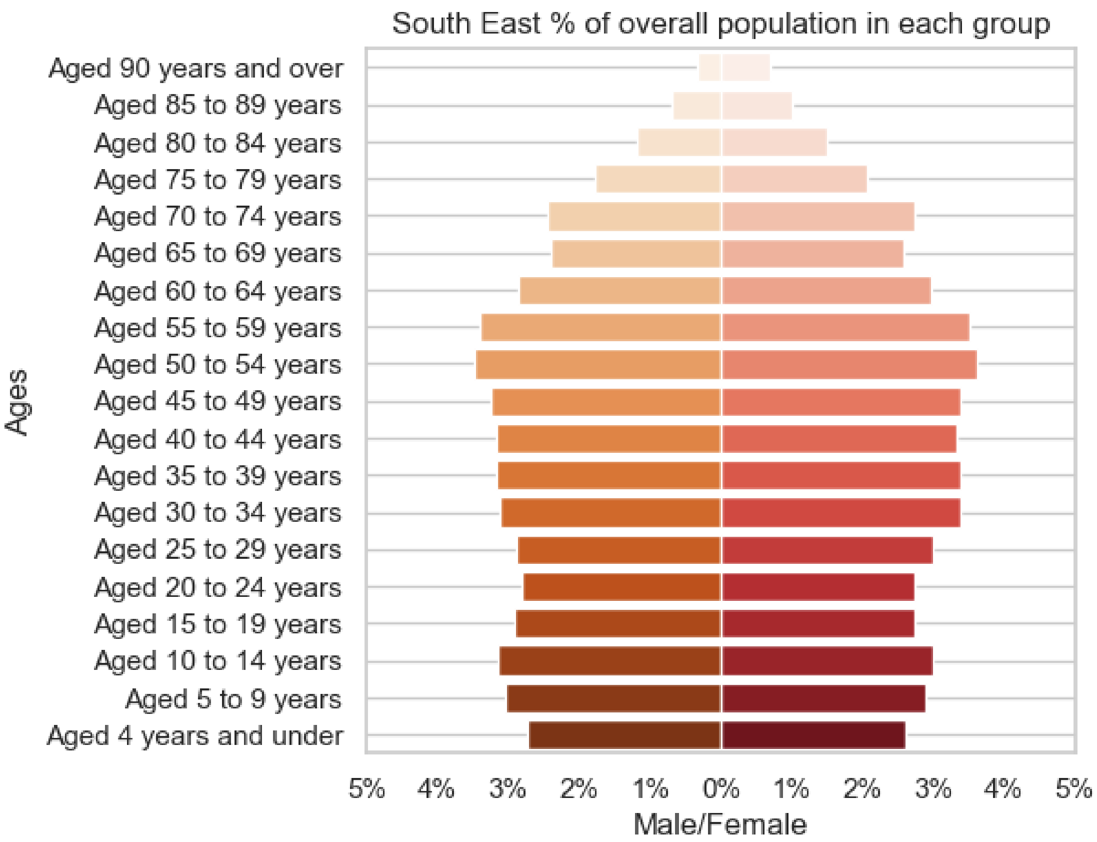
[22]:

```
south_east = dfs_dict['South East']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=south_east, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=south_east, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('South East % of overall population in each group');
```



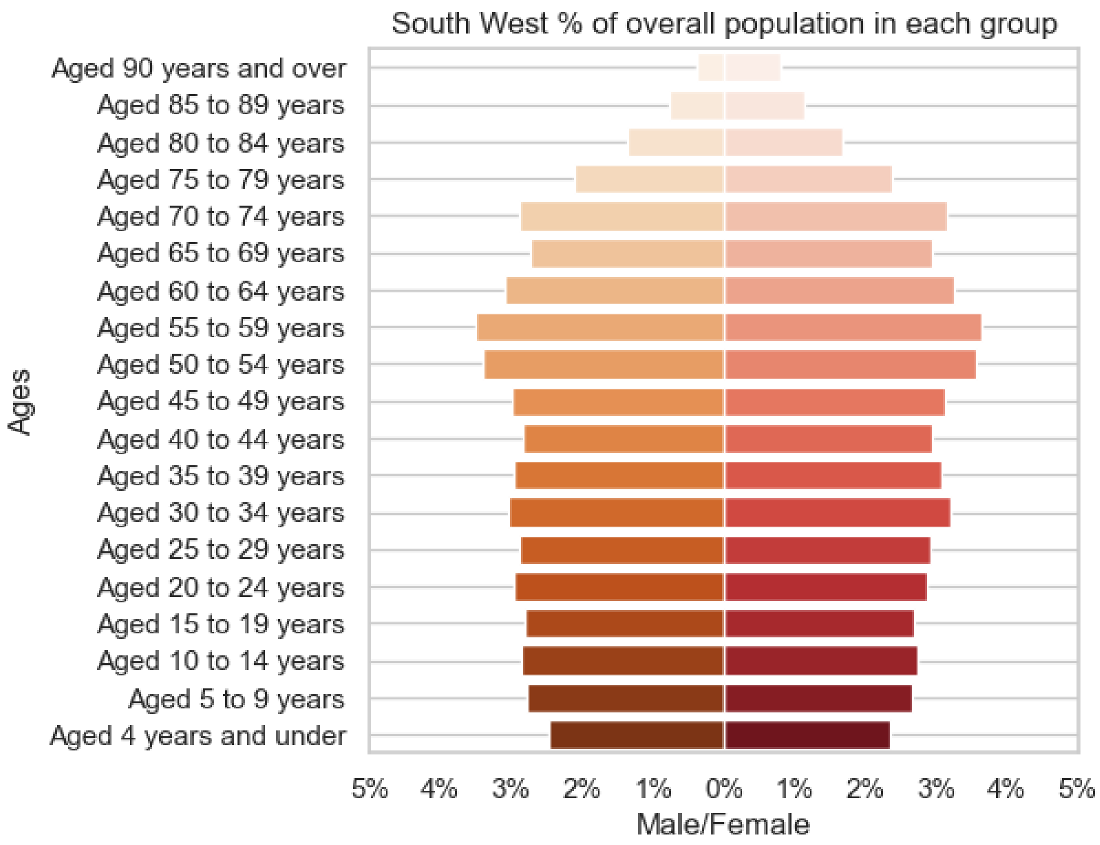
[23]:

```
south_west = dfs_dict['South West']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=south_west, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=south_west, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('South West % of overall population in each group');
```

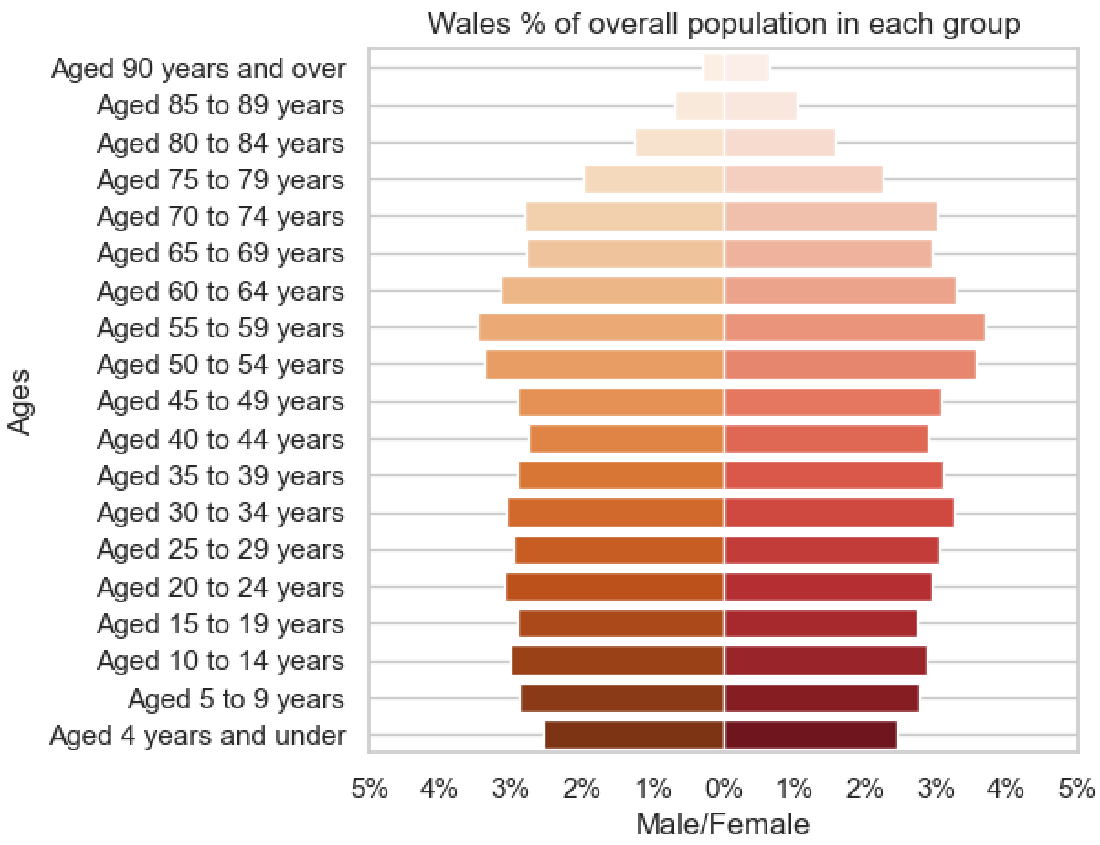


[24]:
```
wales = dfs_dict['Wales']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=wales, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=wales, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('Wales % of overall population in each group');
```



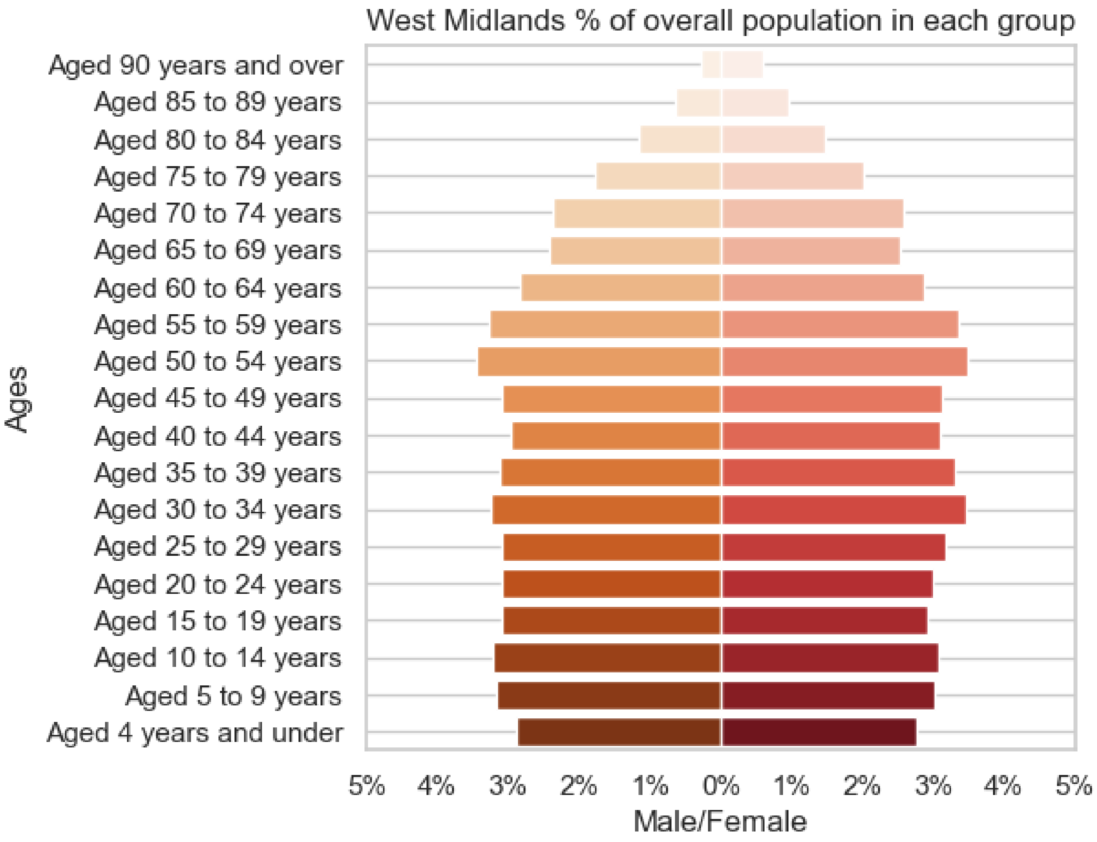
[25]:

```
west_midlands = dfs_dict['West Midlands']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=west_midlands, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=west_midlands, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('West Midlands % of overall population in each group');
```



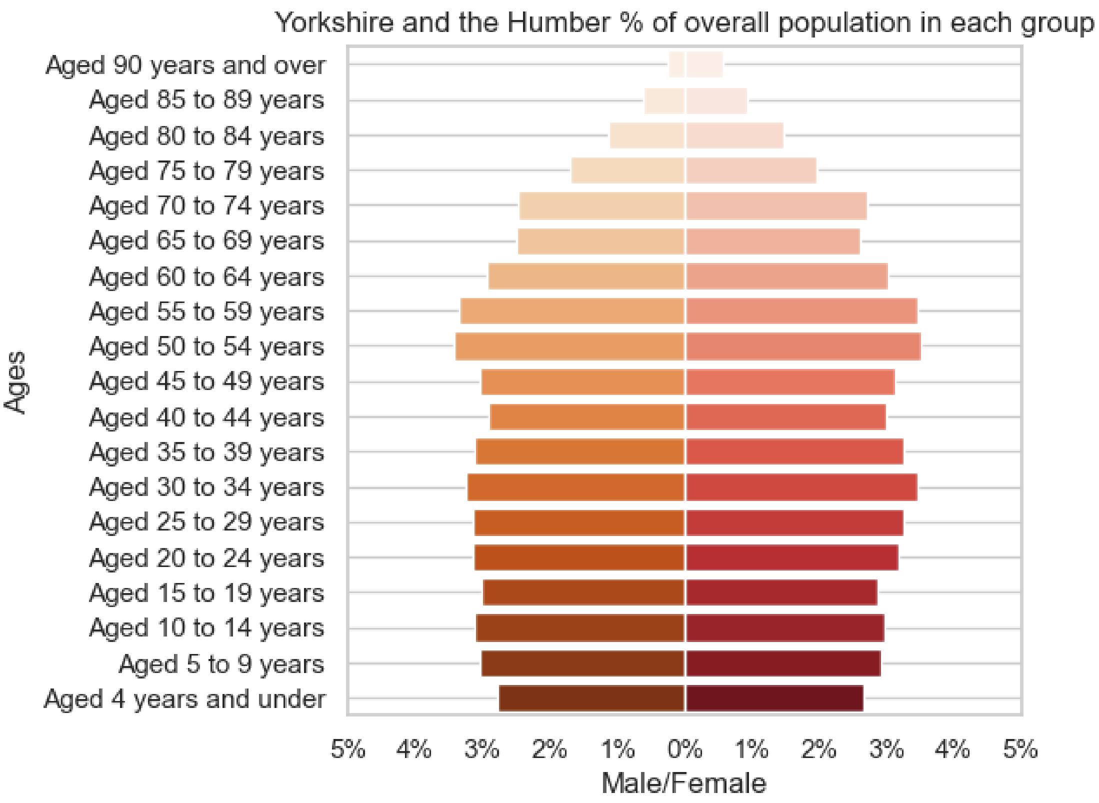
[26]:

```
yorkshire = dfs_dict['Yorkshire and the Humber']

# Reset the chart plot size
sns.set(rc={"figure.figsize":(5, 5)},
        style='whitegrid')


ax1 = sns.barplot(x='Males', y='Ages', data=yorkshire, palette="Oranges")
ax2 = sns.barplot(x='Females', y='Ages', data=yorkshire, palette="Reds")

plt.xlabel("Male/Female")
plt.grid()
plt.xticks(ticks=[ -5, -4, -3, -2, -1 ,  0,  1,  2, 3, 4,5],
labels=['5%', '4%',  '3%', '2%', '1%',  '0%', '1%', '2%', '3%','4%', '5%'])
plt.title('Yorkshire and the Humber % of overall population in each group');
```



The population pyramids for much of the regions are quite similar apart from London. They show the proportions of children seems to be between 4 and 6% of the overall population. There is often a small bulge around ages 10-14 presumably reflecting a small "baby boom". Some regions show a small dip in proportion of people aged 40-49. There is a bulge for all regions except London at either age 50-54 or 55-59 before the proportions steadily decline as the age groups increase.

The population pyramids for the East Midlands, North East, South West and Wales all show a more pronounced "arrowhead" shape at the top of the population pyramids for ages 50-90+. This shows they have a larger proportion of the population over 50 compared with the other regions.

London with its "Christmas tree" shape is different from the other regions. There is fairly large proportion of children then a big jump in the proportions of 25-34 years old (presumably reflecting people moving to London for work or studying) which then declines quite quickly as the age groups increase. Thus, London looks to have a younger population on average compared to the other regions.

Overall it seems there is some difference between the age profiles in different regions of England and Wales, however there is a big difference between the age profile of London and the other regions of England and Wales. If I had more time and different data it would be interesting to see if this difference was also reflected in other large UK cities.

```
[ ]:
```