

Life Expectancy in Scottish Council Areas split by Deprivation (15% most deprived and 85% least deprived), 2003-2007

Purpose

This workbook contains life expectancy at birth for the most deprived (MD) areas and least deprived (LD) areas of each Council Area in Scotland. This piece of work came about after a request for such data from a Scottish Health Board who were working in conjunction with the Community Health Partnership and Councils within their Health Board area. Their intention was to use the estimates to monitor the inequality gap between those living in the most and least deprived parts of each of the Council areas, in the aim to improve the measurement of local level outcomes in support of Single Outcome Agreements. The General Register Office decided to produce the estimates as part of an investigation to see whether this sort of analysis was appropriate. It was agreed that if found to be suitable the estimates would be disseminated along with their confidence intervals.

Recommendations

Based on the results discussed below GROS advise that analysis of this type is unsuitable for Shetland, Orkney and Eilean Siar. East Lothian, Argyll & Bute, Perth & Kinross, and Angus Council should exercise caution when using female life expectancy as an indicator - users should bear in mind the confidence interval surrounding the estimate; and all Councils should concentrate on life expectancy at birth and refrain from using life expectancy at age 65 as a measure.

Important Points:

- Do not confuse a Council's 'most deprived' datazones with their share of the 15% most deprived nationally.
- Comparison across Councils is problematic and should be avoided
- Comparison within a Council can be problematic

Method

The life tables are constructed according to the Chiang (II) methodology, and is thereby consistent with the method used by GROS and ONS to calculate life expectancy at birth and 95% confidence intervals for National and other sub-national areas in the United Kingdom.

Geography

The Geography was constructed, by GROS, using the Scottish Index of Multiple Deprivation 2006 rank and data zones as building blocks. For example, the data zones within the City of Edinburgh Council area were ordered by SIMD 2006 rank (from most to least deprived). The top 15% were then assigned to "Edinburgh MD" (meaning Edinburgh's 15% Most Deprived) and the bottom 85% were assigned to "Edinburgh LD" (Edinburgh's 85% Least Deprived).

Input Data

Small Area Population Estimates for 2003-2007 and death counts at the data zone level (obtained from GROS Vital Events) were used as input data.

It was necessary to aggregate the population and death data over a five year period (as opposed to the normal 3 years used by GROS) in order to gain a higher level of statistical robustness, given that the geographies in question are small - the Chiang II method should not be used for small areas, particularly with populations below 5,000 and deaths counts lower than 40, due to lack of robustness in the results. Using aggregated 2003 to 2007 data gave reasonably good results.

The useful effects of increasing the size of the number of years used (n) needs to be weighed against the fact that the resultant life expectancy is an average (of 5 years) and assumes that the underlying Life Expectancy has not changed over the n years under investigation. For example, if n is equal to ten, then the implicit assumption is that life expectancy has not changed over those ten years. As n increases, the confidence interval decreases, but the validity of the assumption decreases too.

Results

Previous life expectancy (LE) figures - calculated by GROS for SIMD2006 deprivation deciles, quintiles and vigintiles - show a smooth trend of decreasing LE with increasing deprivation.

The results of this analysis show that for each Scottish Council area LE at birth is higher in the least deprived areas compared to the most deprived areas, this is true for males and females, and is what one would expect to see given the link between LE and deprivation. This, however, is not true for female LE at age 65 - for which 6 councils show the opposite pattern.

The gap between male and female LE is wider for those living in the most deprived parts when compared to those in the least deprived parts. This is true for all areas except the Island Councils and is particularly pronounced for those living in the most deprived parts of Argyll & Bute.

The gap between LE in the most deprived part of a given Council and LE the least deprived part of that same Council varies by Council area and gender. More often than not the inequality gap is most pronounced for males, however in West Lothian, Orkney and Shetland the inequality gap is wider for females.

The confidence interval (CI) surrounding each life expectancy at birth figure can be seen in table 1, Chart 1 and Chart 2. The average CI surrounding male LE is 1.8 years, with a maximum of 7.0 years; the average CI surrounding female LE is 1.6 years with a maximum of 6.5 years. The confidence intervals surrounding the Shetland-MD, Orkney-MD and Eilean Siar-MD life expectancy estimates are too large (illustrated in charts 1 and 2) for the data to be deemed fit for purpose. This is mainly a result of the small numbers involved in calculating LE at this level of geography. Chart 1 and 2 also show that, for the 3 Island Councils, the upper CI of the most deprived LE estimate overlaps with the lower CI of the least deprived LE estimate (for example, male LE in the most deprived parts of Shetland falls between 69.2 and 76.2 and male LE in the least deprived parts falls between 74.2 and 77.3, consequently LE in the most deprived parts could be higher than that in the

least deprived parts). This is true for both males and females and supports the decision that this type of analysis is unsuitable for the Island Councils.

Overlapping confidence intervals are also a problem for female LE in East Lothian, Argyll & Bute, Perth & Kinross and Angus. These findings suggest that either deprivation has little impact on female life expectancy in these areas or they could be a result of problems associated with using the SIMD in this way (see 'limitations associated with using the SIMD in this manner' section).

East Lothian, Argyll & Bute, Perth & Kinross and Angus experience the same problem when looking at female life expectancy at age 65, (which incidentally is higher in the most deprived parts of all 4 Councils - see chart 4). Female life expectancy at age 65 in the most deprived parts of Falkirk and Inverclyde is also higher than that in the least deprived parts. Again this may either be a problem associated with using the SIMD in this way - in which case the results may not reflect reality, or it may be associated with the way in which LE calculations work - in deprived areas people die younger so the detrimental effects (or negative impact) if you like of living in a deprived area is more prominent in LE at birth than in LE at older ages.

Limitations associated with using the SIMD in this manner

Firstly, care needs to be taken to not confuse a Council's 'most deprived' datazones with their share of the 15% most deprived nationally ie 50% of the data zones in Glasgow lie in the 15% most deprived data zones in Scotland.

Secondly, comparison across Councils is problematic and should be avoided. Glasgow 'most deprived' looks very bad but this is because we're looking at data zones that fall within the 3% most deprived nationally whereas North Ayrshire's most deprived data zones are split across the 15% most deprived nationally with 9 in vigintile 1, 2 in vigintile 2 and 3 in vigintile 3.

Lastly, comparison within a Council can be problematic. Given the way that the SIMD is constructed it works best at the most deprived end of the distribution as at the least deprived end it is measuring an absence of deprivation (e.g. low numbers of benefit claimants) rather than affluence so there is little differentiation (e.g. an area ranked 4,000 will not be much different to a rank of 5,000 but a rank of 100 will be very different to an area ranked 500) which is why analysis, funding etc has been focused on the most deprived 15% nationally. The 15% most deprived data zones in Glasgow fall within the most deprived 3% nationally and so will be areas with similar deprivation levels. For Perth & Kinross the 15% most deprived data zones in the Council includes data zones in the 33% most deprived nationally - the two data zones in the 5% most deprived nationally will be very different to those in the 30-35% band.

Population and Migration Statistics Branch
The General Register Office for Scotland

**Expectation of Life at Birth, by Sex for each Council Area within Scotland, split by level of deprivation
(where MD=most deprived 15% and LD = least deprived 85%), for the period 2003-2007**

	Males				Females			
	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI
Aberdeen CityLD	76.0	75.6	76.4	0.8	80.8	80.4	81.1	0.7
Aberdeen CityMD	69.6	68.6	70.7	2.2	75.9	74.8	76.9	2.1
Aberdeen City	75.0	74.7	75.4	0.8	80.0	79.7	80.4	0.7
AberdeenshireLD	77.8	77.5	78.2	0.8	81.3	81.0	81.7	0.7
AberdeenshireMD	72.7	71.7	73.8	2.1	79.7	78.8	80.6	1.8
Aberdeenshire	77.0	76.6	77.3	0.7	81.1	80.8	81.4	0.6
AngusLD	76.8	76.2	77.4	1.1	80.1	79.6	80.6	1.0
AngusMD	71.7	70.1	73.3	3.2	78.6	77.3	80.0	2.7
Angus	76.0	75.5	76.6	1.1	80.0	79.5	80.4	1.0
Argyll & ButeLD	76.3	75.7	76.9	1.2	80.4	79.8	81.0	1.1
Argyll & ButeMD	70.8	69.2	72.5	3.3	79.6	78.2	81.0	2.8
Argyll & Bute	75.5	74.9	76.1	1.2	80.3	79.8	80.8	1.0
ClackmannanshireLD	75.1	74.2	76.0	1.8	80.5	79.7	81.3	1.6
ClackmannanshireMD	67.3	65.2	69.4	4.2	74.5	72.7	76.3	3.6
Clackmannanshire	73.7	72.9	74.6	1.6	79.4	78.7	80.2	1.4
Dumfries & GallowayLD	76.7	76.2	77.2	1.0	80.4	80.0	80.8	0.8
Dumfries & GallowayMD	71.3	70.0	72.5	2.6	77.2	76.1	78.3	2.3
Dumfries & Galloway	75.9	75.5	76.4	0.9	80.0	79.6	80.3	0.8
Dundee CityLD	74.3	73.8	74.8	1.0	79.7	79.2	80.2	0.9
Dundee CityMD	68.2	66.8	69.6	2.8	75.6	74.3	76.9	2.5
Dundee City	73.3	72.8	73.8	1.0	79.0	78.6	79.5	0.9
East AyrshireLD	74.7	74.1	75.2	1.1	78.4	77.9	78.9	1.0
East AyrshireMD	69.8	68.3	71.3	3.0	76.3	75.1	77.4	2.3
East Ayrshire	73.9	73.4	74.5	1.0	78.1	77.6	78.5	0.9

Note: The red text indicates where the upper CI of the MD area overlaps the lower CI of the least deprived area

(continued)

	Males				Females			
	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI
East DunbartonshireLD	78.8	78.2	79.3	1.1	82.7	82.1	83.2	1.1
East DunbartonshireMD	71.9	70.5	73.2	2.7	77.3	76.1	78.5	2.4
East Dunbartonshire	77.6	77.1	78.2	1.0	81.7	81.3	82.2	1.0
East LothianLD	76.4	75.8	77.0	1.2	80.7	80.1	81.2	1.1
East LothianMD	74.3	72.9	75.7	2.8	80.2	78.9	81.5	2.6
East Lothian	76.1	75.5	76.7	1.1	80.6	80.1	81.1	1.0
East RenfrewshireLD	78.2	77.6	78.8	1.2	82.1	81.6	82.7	1.1
East RenfrewshireMD	71.3	69.8	72.8	3.0	78.5	77.0	80.0	3.0
East Renfrewshire	77.0	76.5	77.6	1.1	81.5	81.0	82.0	1.0
Edinburgh, City ofLD	77.4	77.1	77.7	0.5	81.6	81.3	81.8	0.5
Edinburgh, City ofMD	68.4	67.7	69.1	1.4	77.2	76.4	77.9	1.4
Edinburgh, City of	75.9	75.6	76.1	0.5	80.8	80.6	81.1	0.5
Eilean SiarLD	73.3	72.1	74.5	2.4	80.3	79.1	81.4	2.3
Eilean SiarMD	69.1	65.7	72.4	6.7	78.3	75.7	81.0	5.3
Eilean Siar	72.7	71.5	73.8	2.3	80.0	79.0	81.1	2.1
FalkirkLD	75.7	75.2	76.1	0.9	79.5	79.1	79.9	0.8
FalkirkMD	69.2	68.0	70.5	2.5	77.7	76.6	78.7	2.1
Falkirk	74.7	74.3	75.1	0.9	79.2	78.9	79.6	0.7
FifeLD	76.4	76.1	76.7	0.6	80.5	80.2	80.8	0.6
FifeMD	71.0	70.1	71.8	1.6	77.7	77.0	78.5	1.5
Fife	75.6	75.3	75.9	0.6	80.1	79.8	80.4	0.5
Glasgow CityLD	71.1	70.9	71.4	0.5	77.4	77.2	77.7	0.5
Glasgow CityMD	64.9	64.3	65.5	1.2	73.5	72.9	74.1	1.2
Glasgow City	70.2	70.0	70.4	0.5	76.9	76.6	77.1	0.4

Note: The red text indicates where the upper CI of the MD area overlaps the lower CI of the least deprived area

(continued)

	Males				Females			
	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI
HighlandLD	76.2	75.8	76.6	0.8	81.0	80.6	81.3	0.7
HighlandMD	70.3	69.2	71.3	2.1	77.3	76.4	78.2	1.9
Highland	75.3	74.9	75.6	0.7	80.4	80.1	80.8	0.7
InverclydeLD	72.6	71.9	73.3	1.4	78.5	77.9	79.2	1.3
InverclydeMD	66.4	64.7	68.1	3.4	76.0	74.3	77.6	3.3
Inverclyde	71.6	71.0	72.3	1.3	78.1	77.6	78.7	1.2
MidlothianLD	76.5	75.8	77.1	1.3	80.1	79.6	80.7	1.1
MidlothianMD	71.3	69.6	73.0	3.4	77.5	76.0	78.9	3.0
Midlothian	75.6	75.0	76.3	1.3	79.7	79.2	80.2	1.0
MorayLD	76.3	75.7	77.0	1.3	80.4	79.9	81.0	1.1
MorayMD	72.4	70.9	73.8	2.9	78.2	76.6	79.8	3.1
Moray	75.8	75.2	76.4	1.2	80.1	79.6	80.7	1.1
North AyrshireLD	74.4	73.8	74.9	1.1	79.7	79.3	80.2	0.9
North AyrshireMD	69.6	68.3	70.9	2.6	75.0	73.8	76.3	2.5
North Ayrshire	73.6	73.1	74.1	1.0	79.0	78.6	79.4	0.8
North LanarkshireLD	73.6	73.2	73.9	0.7	78.4	78.1	78.7	0.6
North LanarkshireMD	67.9	67.0	68.7	1.7	75.6	74.8	76.3	1.6
North Lanarkshire	72.7	72.4	73.0	0.6	78.0	77.7	78.2	0.6
Orkney IslandsLD	76.2	74.9	77.5	2.7	82.3	81.0	83.5	2.5
Orkney IslandsMD	73.0	70.3	75.6	5.3	78.4	75.6	81.2	5.6
Orkney Islands	75.4	74.3	76.6	2.4	81.1	80.0	82.2	2.3
Perth & KinrossLD	77.3	76.8	77.8	1.0	81.1	80.7	81.6	0.9
Perth & KinrossMD	73.1	71.7	74.6	2.9	79.7	78.4	81.1	2.7
Perth & Kinross	76.6	76.1	77.1	0.9	80.9	80.4	81.3	0.8

Note: The red text indicates where the upper CI of the MD area overlaps the lower CI of the least deprived area

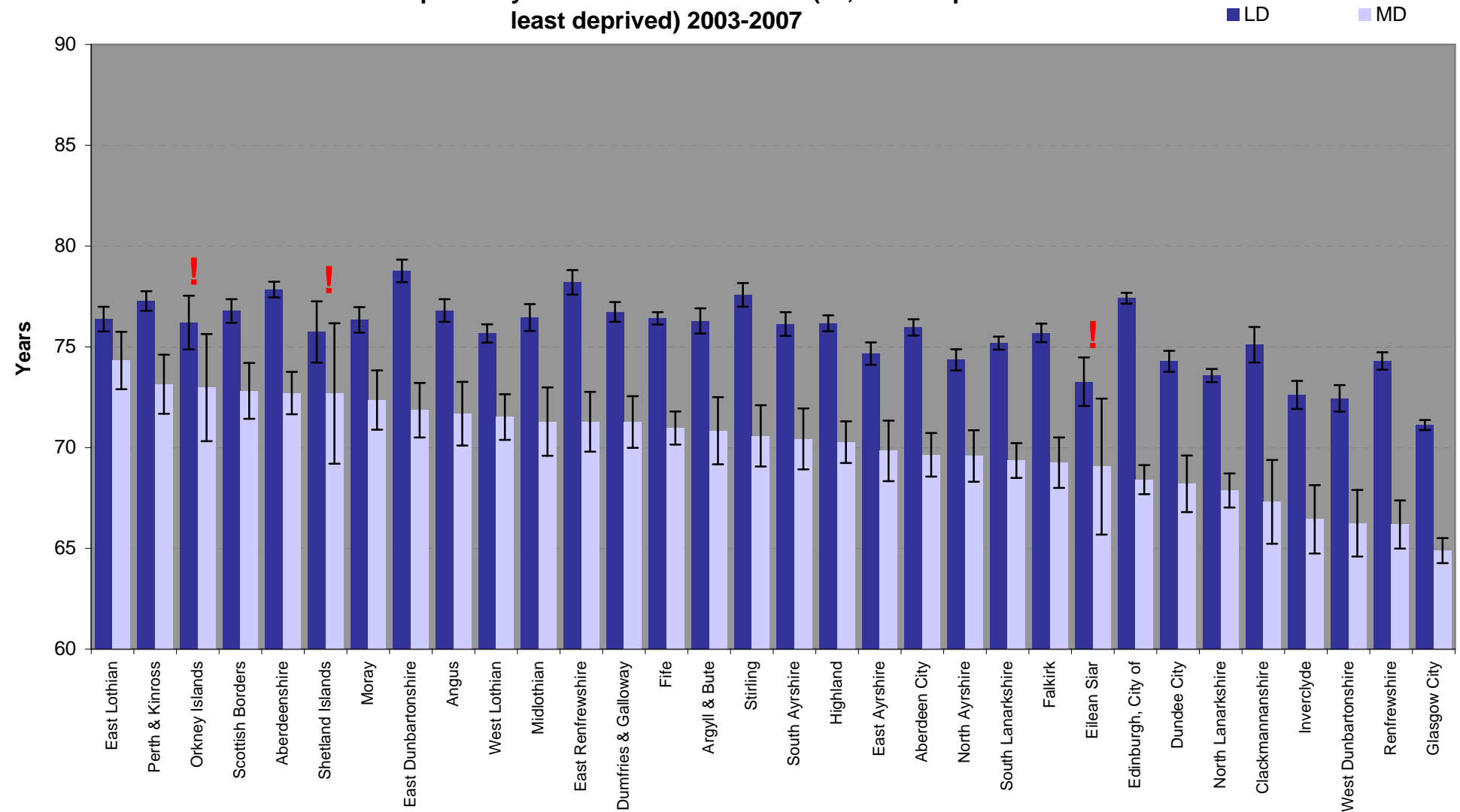
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	Males				Females			
	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI	Expectation of Life at birth	Lower 95% CI	Upper 95% CI	Length of CI
RenfrewshireLD	74.3	73.9	74.7	0.9	79.0	78.6	79.4	0.8
RenfrewshireMD	66.2	65.0	67.4	2.4	74.8	73.8	75.9	2.2
Renfrewshire	73.1	72.7	73.5	0.8	78.4	78.1	78.8	0.7
Scottish BordersLD	76.8	76.2	77.4	1.2	80.8	80.3	81.3	1.0
Scottish BordersMD	72.8	71.4	74.2	2.8	77.9	76.8	79.0	2.3
Scottish Borders	76.2	75.7	76.7	1.1	80.3	79.9	80.8	0.9
Shetland IslandsLD	75.7	74.2	77.3	3.0	82.1	80.9	83.4	2.5
Shetland IslandsMD	72.7	69.2	76.2	7.0	78.2	74.9	81.4	6.5
Shetland Islands	75.3	73.9	76.7	2.8	81.4	80.3	82.6	2.3
South AyrshireLD	76.1	75.5	76.7	1.2	80.6	80.1	81.1	1.0
South AyrshireMD	70.4	68.9	71.9	3.0	78.5	77.3	79.8	2.5
South Ayrshire	75.3	74.7	75.8	1.1	80.4	79.9	80.8	0.9
South LanarkshireLD	75.2	74.9	75.5	0.6	79.8	79.6	80.1	0.6
South LanarkshireMD	69.4	68.5	70.2	1.7	76.1	75.3	76.9	1.6
South Lanarkshire	74.3	74.0	74.6	0.6	79.2	79.0	79.5	0.5
StirlingLD	77.6	77.0	78.2	1.2	81.4	80.9	82.0	1.1
StirlingMD	70.6	69.1	72.1	3.0	76.2	74.9	77.5	2.6
Stirling	76.4	75.9	77.0	1.1	80.6	80.1	81.1	1.0
West DunbartonshireLD	72.4	71.8	73.1	1.3	78.3	77.8	78.9	1.2
West DunbartonshireMD	66.2	64.6	67.9	3.3	74.9	73.5	76.3	2.8
West Dunbartonshire	71.5	70.9	72.1	1.2	77.8	77.2	78.3	1.1
West LothianLD	75.7	75.2	76.1	0.9	79.5	79.1	79.9	0.8
West LothianMD	71.5	70.4	72.6	2.3	75.2	74.2	76.3	2.1
West Lothian	75.0	74.6	75.4	0.8	78.8	78.4	79.1	0.7

Note: The red text indicates where the upper CI of the MD area overlaps the lower CI of the least deprived area

Chart 1

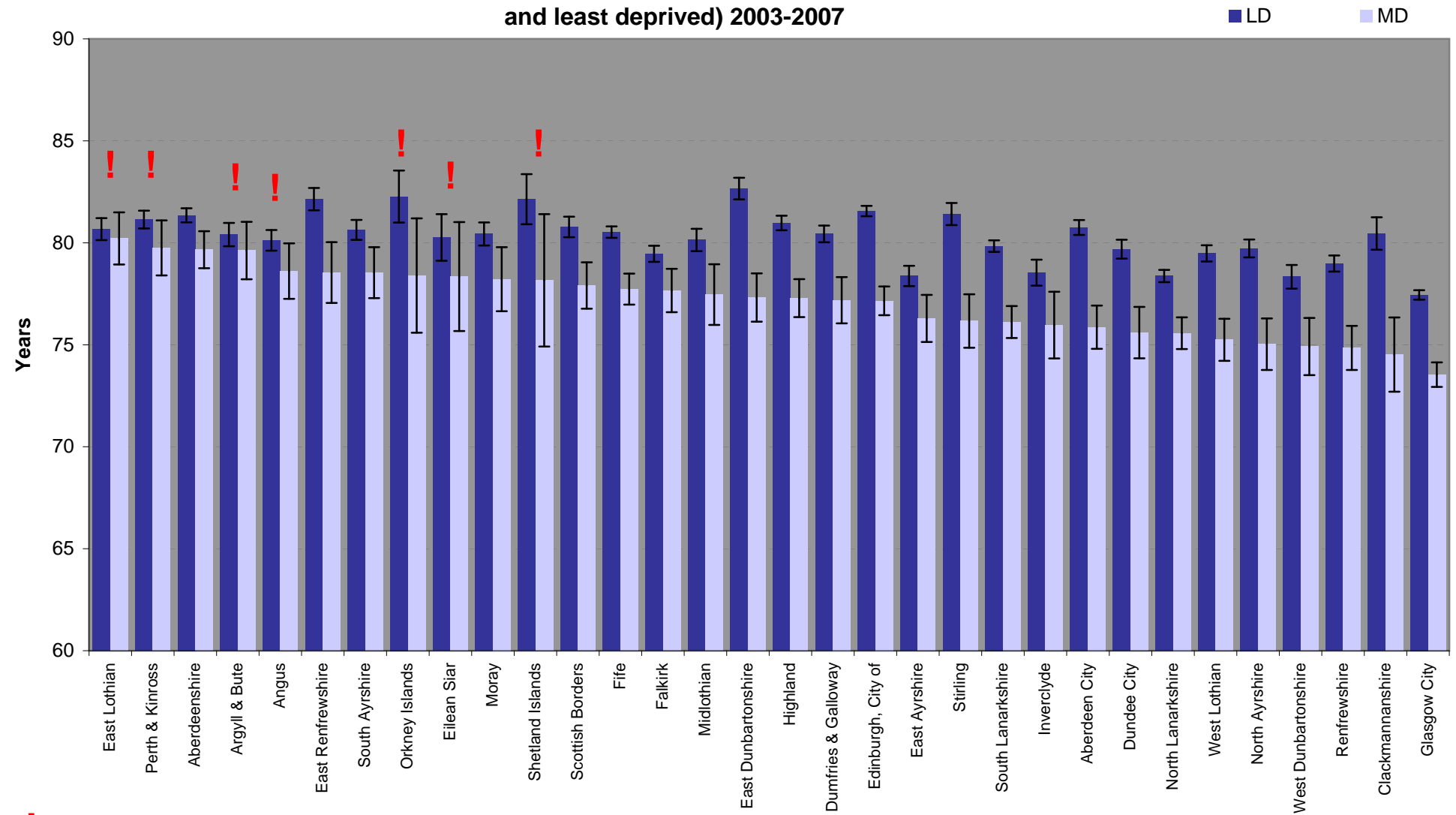
Male Life Expectancy at birth in Council areas (all, most deprived and least deprived) 2003-2007



! indicates where the MD upper Confidence Interval overlaps with the LD lower Confidence Interval

Chart 2

Female Life Expectancy at birth in Council areas (all, most deprived and least deprived) 2003-2007

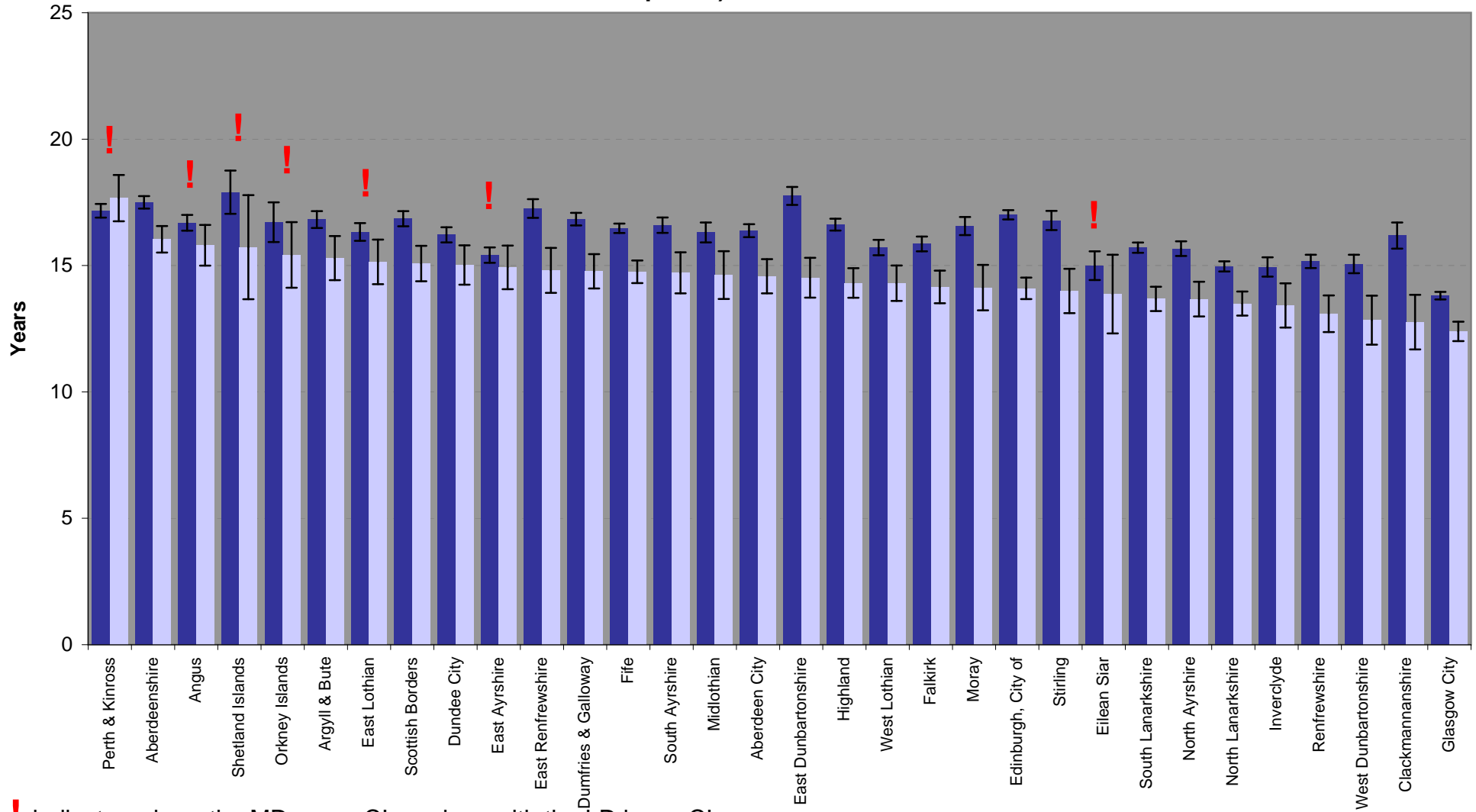


! indicates where the MD upper CI overlaps with the LD lower CI

Chart 3

Male Life Expectancy at age 65 in Council areas (all, most deprived and least deprived) 2003-2007

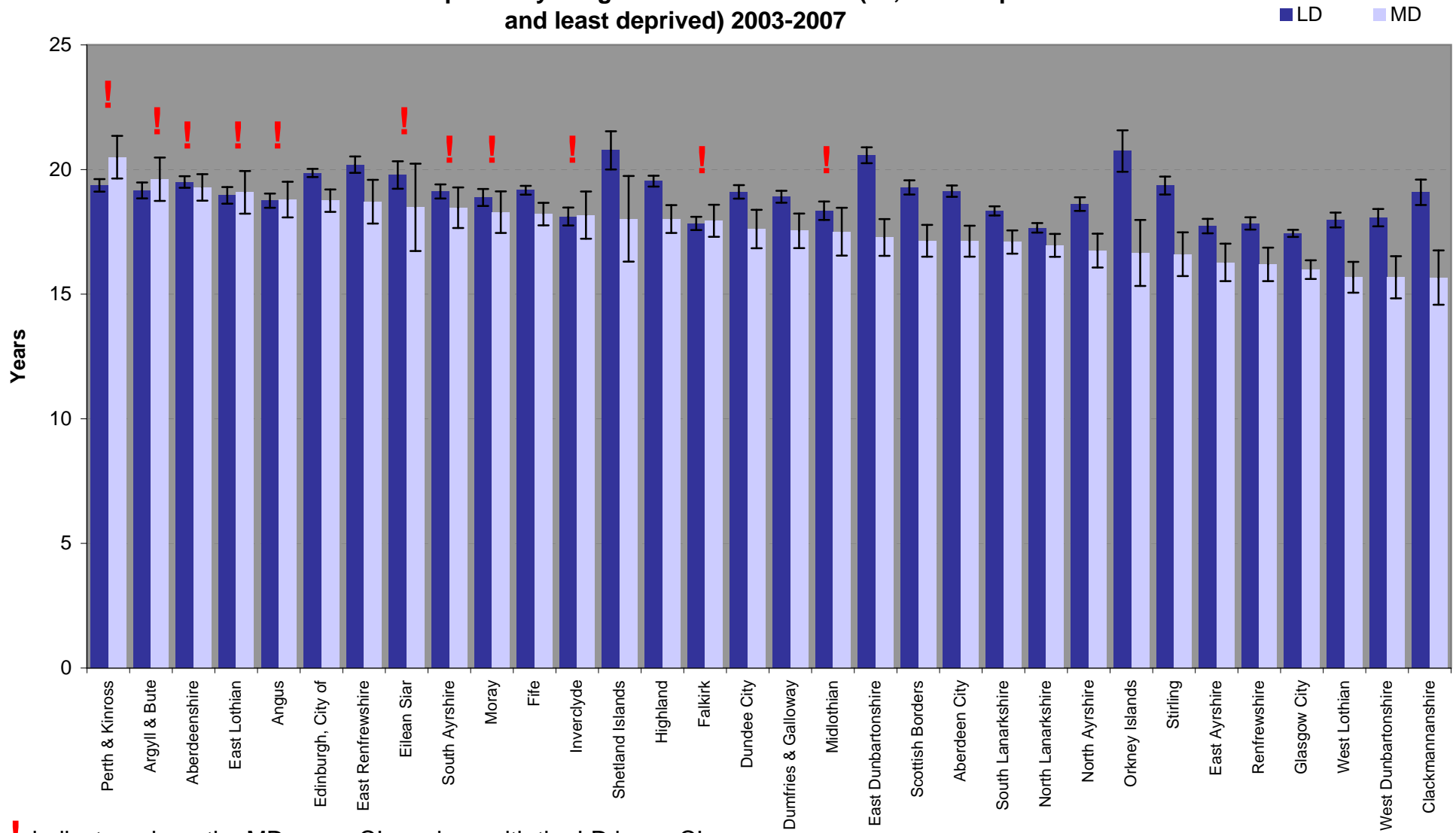
LD MD



! indicates where the MD upper CI overlaps with the LD lower CI

Chart 4

Female Life Expectancy at age 65 in Council areas (all, most deprived and least deprived) 2003-2007



! indicates where the MD upper CI overlaps with the LD lower CI