

PUBLIC HEALTH FORMULA – SMR WEIGHTS

INTRODUCTION AND ACTION FOR ACRA

1. At its 3 September meeting, ACRA asked that further consideration be given to how the SMR < 75 is applied to give weights per head in the public health formula, including the use of exponential based weights.
2. The SMR based weights are the prime focus of this paper. In addition, the paper asks whether ACRA wishes to reconsider its interim recommendation that DCLG's Area Cost Adjustment (ACA) is used to adjust for unavoidable differences in costs due to location, given it has now emerged that DCLG are unlikely to update the ACA for another seven or so years. The alternative is the MFF.

Action for ACRA

3. ACRA is asked for the 2013-14 public health formula:
 - if it agrees that grouping MSOAs into ten groups which each have an equal spread of SMR < 75, except for the highest and lowest groups on the grounds of limited number of MSOAs, is preferable to using deciles?
 - if it agrees with the use of the exponential weighting across these 'equal width' groups?
 - if it prefers the gradient should increase one-third or two-thirds more quickly than the SMR < 75, on the grounds that public health costs are likely to increase more quickly than the SMR < 75? These increase the gearing from 3 : 1 to 4: 1 and 5 : 1 respectively. Or is another gradient preferable?
 - if it agrees with the recommendation that the MFF is used in place of the ACA, given the latter may not be updated for some time?
4. At the end of the paper it is noted that we intend to introduce an age weighting for drugs misuse.

SMR < 75 WEIGHTS

5. At the 3 September meeting, ACRA requested that further consideration be given to how the SMR < 75 is applied to give weights per head in the formula. This was because:
 - a the gearing ratio of 3:1 between the decile of MSOAs with the highest SMRs and the decile with the lowest SMRs did not

sufficiently meet ACRA's intention of giving a weight increasing more quickly than the SMR across small areas, to reflect that public health costs are likely to increase more quickly than the SMR;

- b the linear approach for calculating weights for the intermediate deciles did not adequately meet ACRA's intention of taking account of inequality within as well as between local authorities;
 - c due to multiple and compounding public health issues in the areas with the highest SMRs, exponential weights should be explored so that the increase in the weights accelerate across small areas.
6. ACRA also agreed that the public health spend data was unlikely to be sufficiently robust as a measure of need for allocations, as they are likely to be affected by a range of factors. In addition these data are not available for areas below PCT and local authority level and if used it is not possible to control for supply effects.
 7. ACRA has also previously recognised that robust data to inform the gearing are not available. For this reason, it has not been possible to propose a clear preferred option in this paper.

'Equal width' groups

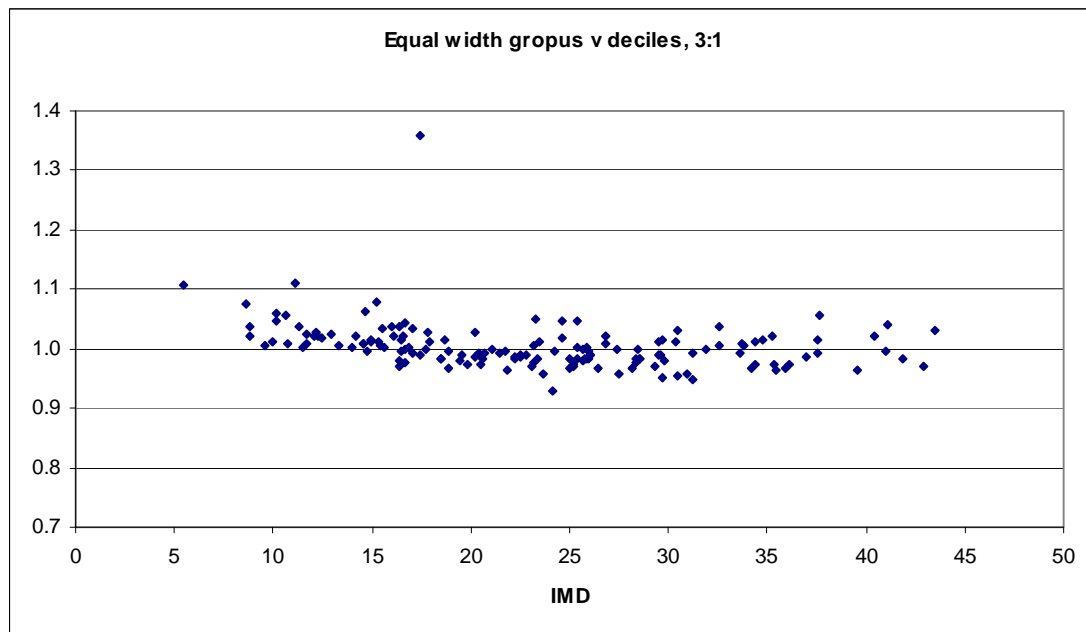
8. One concern raised in the engagement was that the range of SMR < 75 in many deciles is quite narrow, and therefore a small change in the SMR < 75 may too often lead to a move of the MSOA between deciles and thereby a significant change in the weight per head for that MSOA. The SMR value may be volatile in small areas due to an element of the randomness in death rates.
9. A second concern was that the first and tenth deciles covered a wide range of SMR < 75s, and therefore insufficient account is taken of the highest and lowest bands of SMR < 75s.
10. An alternative approach discussed at the last ACRA meeting was 10 groups of equal span of SMR < 75, except for imposing a minimum of 5% of MSOAs in the group with the highest SMR < 75s and 5% for the group with the lowest SMR < 75s. The restrictions of 5% are to avoid giving undue influence to outlining SMR < 75 values which may not be robust.
11. The current and alternative groupings are show in Table 1.

Table 1: SMR<75 groups

Current deciles			'Equal width' groups		
Decile	% of MSOAs	SMR<75 range	Group	% of MSOAs	SMR<75 range
1	10%	25.9 – 67.1	1	5%	25.9 – 61.9
2	10%	67.1 – 75.0	2	15%	61.9 – 74.9
3	10%	75.0 – 81.4	3	20%	74.9 – 87.9
4	10%	81.4 – 88.1	4	16%	87.9 – 100.9
5	10%	88.1 – 95.7	5	12%	100.9 – 113.9
6	10%	95.7 – 104.5	6	10%	113.9 – 126.9
7	10%	104.5 – 116.0	7	8%	126.9 – 139.9
8	10%	116.0 – 129.7	8	5%	139.9 – 152.9
9	10%	129.7 – 148.6	9	5%	152.9 – 165.9
10	10%	148.6 – 275.6	10	5%	165.9 – 275.6

12. The effect of this on fair shares is fairly limited. We have calculated for each local authority the ratio of the SMR weighted population to the unweighted population. Figure 1 shows on the vertical axis the ratio for 'equal width' groups divided by the ratio for the current deciles, and IMD 2010 is on the horizontal axis. The IMD increases as one moves to the right along the horizontal axis. In both cases gearing of 3:1 is used between the highest and lowest groups, and applied linearly. The outlier in Figure 1 is the Isles of Scilly, which has only one MSOA, and this MSOA moves from decile 1 to group 2 under 'equal widths'.

Figure 1: SMR ratio for 'equal width' groups divided by SMR ratio for current deciles



13. It is proposed that the 'equal width' groups are used for the formula and these have been used in the analysis in the rest of the paper, as they are likely to be less volatile and take more account of the range of SMR < 75s in the highest and lowest deciles.

14. On its own, however, 'equal width' groups do not generally increase the weights more quickly than the SMR < 75.

Questions for ACRA

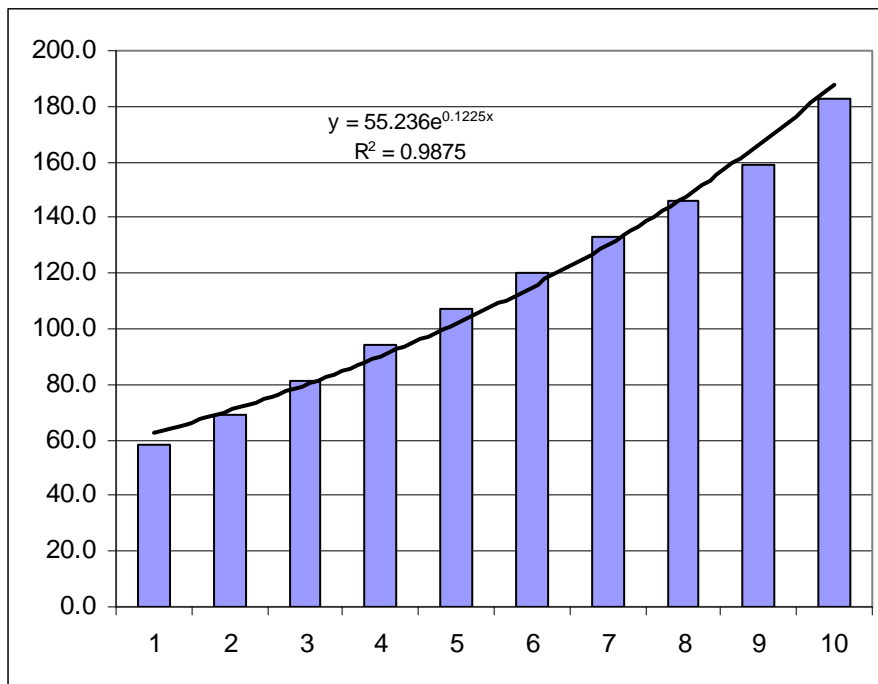
Q1: does ACRA agree that 'equal width' SMR groups are preferable to MSOA deciles?

Exponential weights

15. As noted previously, there needs to be a non-linear difference between the SMR < 75 based weight per head for MSOAs in the formula from the actual SMR < 75 at MSOA level. If this is not the case, the average for MSOAs in a local authority will be the same as the overall local authority figure, and no account is taken of inequality within local authorities. ACRA noted at its September meeting that the current 3:1 ratio and applying the weights linearly to the other deciles did not take account of inequality within local authorities to any great extent.
16. As requested by ACRA we have explored introducing exponential weights under which the weights accelerate across decile. We have obtained the best fit exponential across the medians of the 'equal width' groups. This gave a formula¹ for the weights for each group of $55.236e^{0.1225 \times \text{group number}}$. This is shown in Figure 2. By coincidence this exponential gives a gearing of 3.0 : 1.0 between the groups with the highest and lowest SMR < 75s.
17. The effect of this exponential on fair shares is fairly small, this is because the underlying data are reasonably linear except at each end of the distribution (see Annex A).

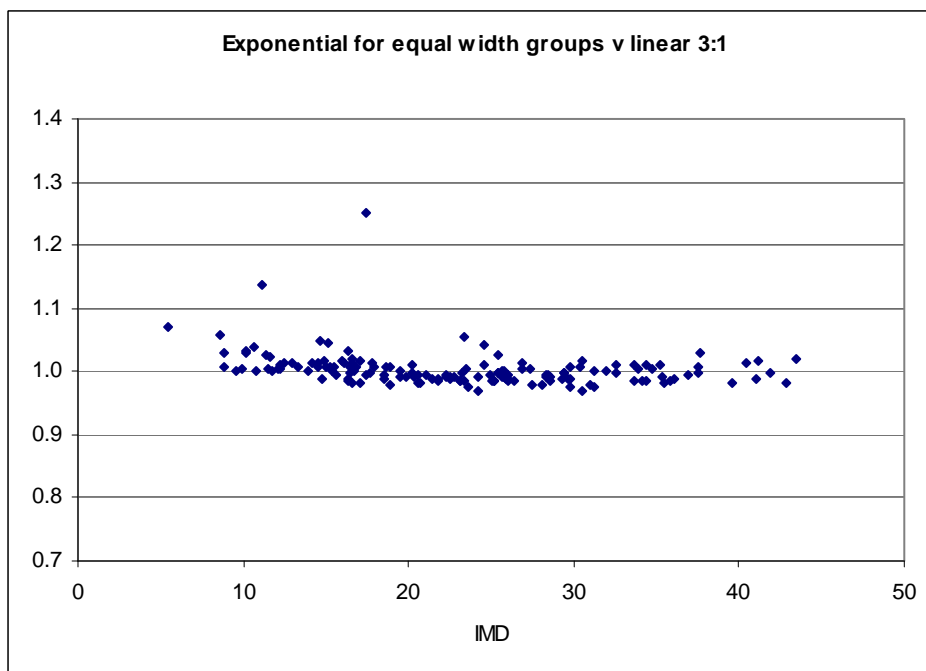
¹ The best fit exponential for the current deciles is $56.356e^{0.1008 \times \text{decile number}}$

Figure 2: Best fit exponential



18. We have calculated for each local authority the ratio of the SMR weighted population to the unweighted population, where the weighted population is based on 'equal width' groups plus the above exponential. Figure 3 shows on the vertical axis the ratio for 'equal width' groups plus exponential divided by the ratio for the current deciles with 3:1 applied linearly, and IMD 2010 on the horizontal axis.

Figure 3: SMR ratio for 'equal width' groups plus exponential divided by SMR ratio for current deciles



Questions for ACRA

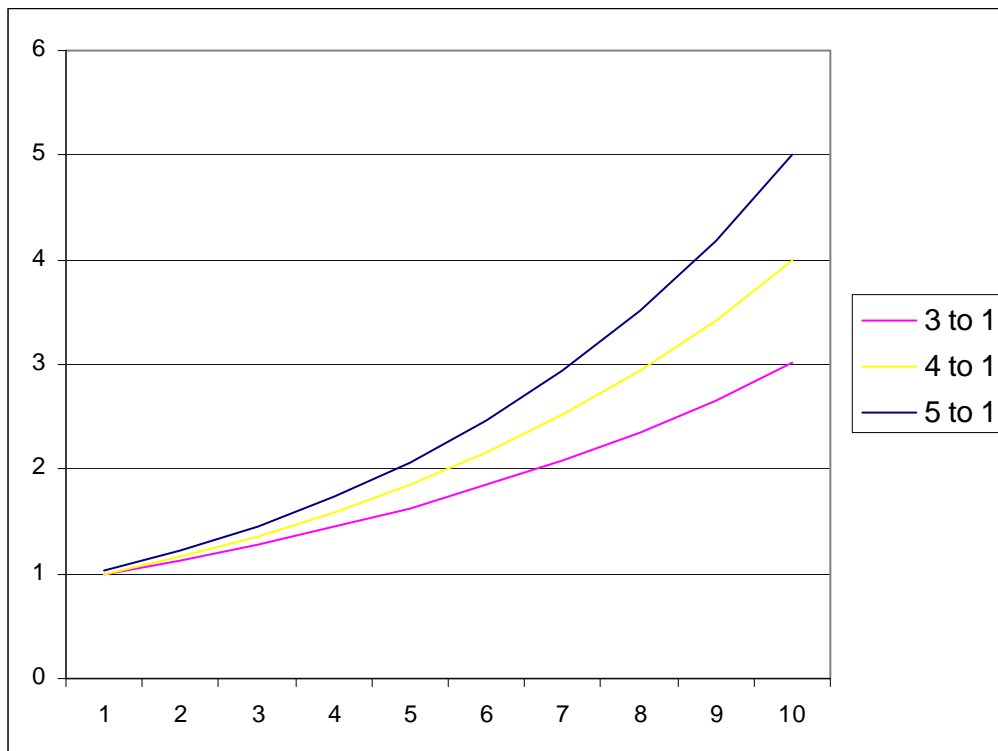
Q2: does ACRA agree that exponential weights are a step forward in taking greater account of within area inequality and increasing the gradient of the per capita weighting relative to the SMR?

Q3: does ACRA agree that the exponential used above only increases the gradient to a small extent and so does not adequately address ACRA's intent to take account of within area inequality and increasing the gradient of the per capita weighting relative to the SMR?

3:1 ratio

19. Other more steeply curved exponentials could be introduced. As noted above the 'fitted' exponential gives a ratio of 3 : 1 between the group with the highest SMR < 75 and the group with the lowest SMR < 75.
20. In order to increase the gradient of per capita weights above that of the SMR, we investigated increases in the steepness of the exponential so that the ratio between the group with the highest SMR < 75 and group with the lowest SMR < 75 is 4 : 1 or 5 : 1, rather than 3 : 1. The choice of 4 : 1 and 5 : 1 is simply on the basis that costs may rise one-third or two thirds more quickly than the SMR. We are not aware of clear evidence for these.
21. The exponential for 4 : 1 and 5 : 1 are respectively $55.236e^{0.154 \times \text{group number}}$ and $55.236e^{0.176 \times \text{group number}}$
22. The shape of these curves across the 'equal width' groups is shown in Figure 4.

Figure 4: Exponentials across 'equal width' groups



23. We have calculated for each local authority the ratio of the SMR weighted populations using, 4 : 1 or 5 : 1 to the unweighted population. These have been divided by the ratio for the original 3 : 1 ratio applied linearly across deciles. Figures 5 and 6 show the results.

Figure 5: SMR ratio for 'equal width' groups plus exponential set to give a 4 : 1 ratio divided by SMR ratio for current deciles

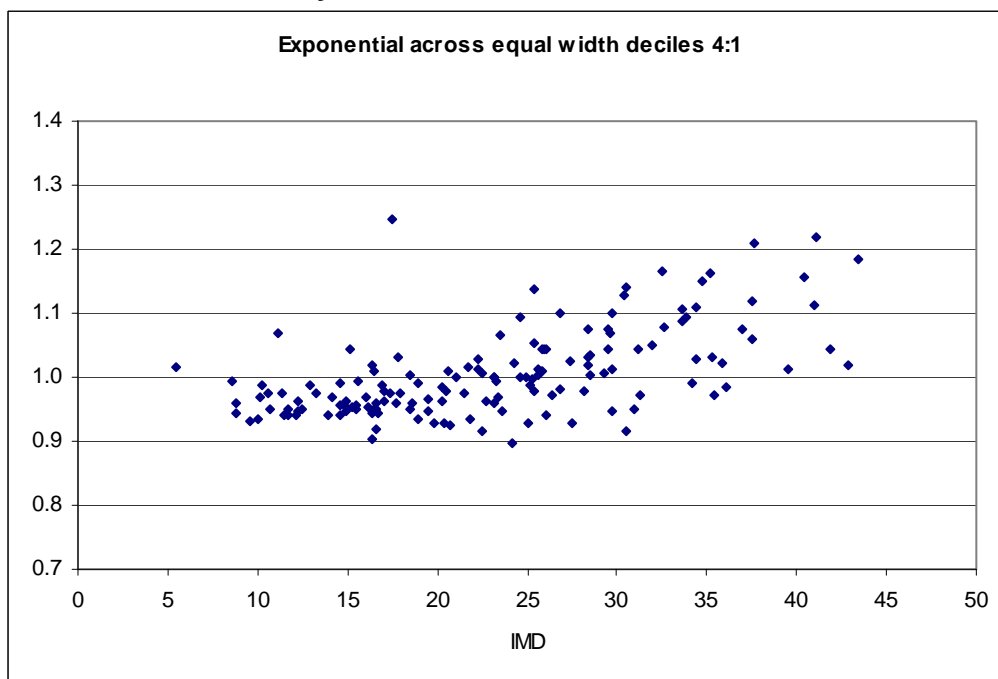
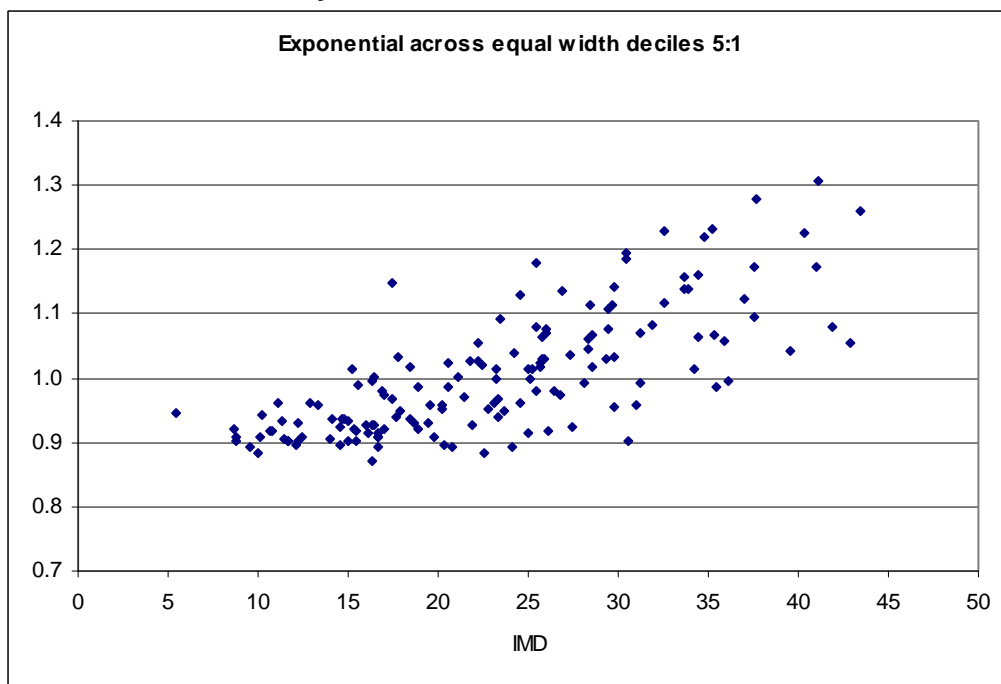
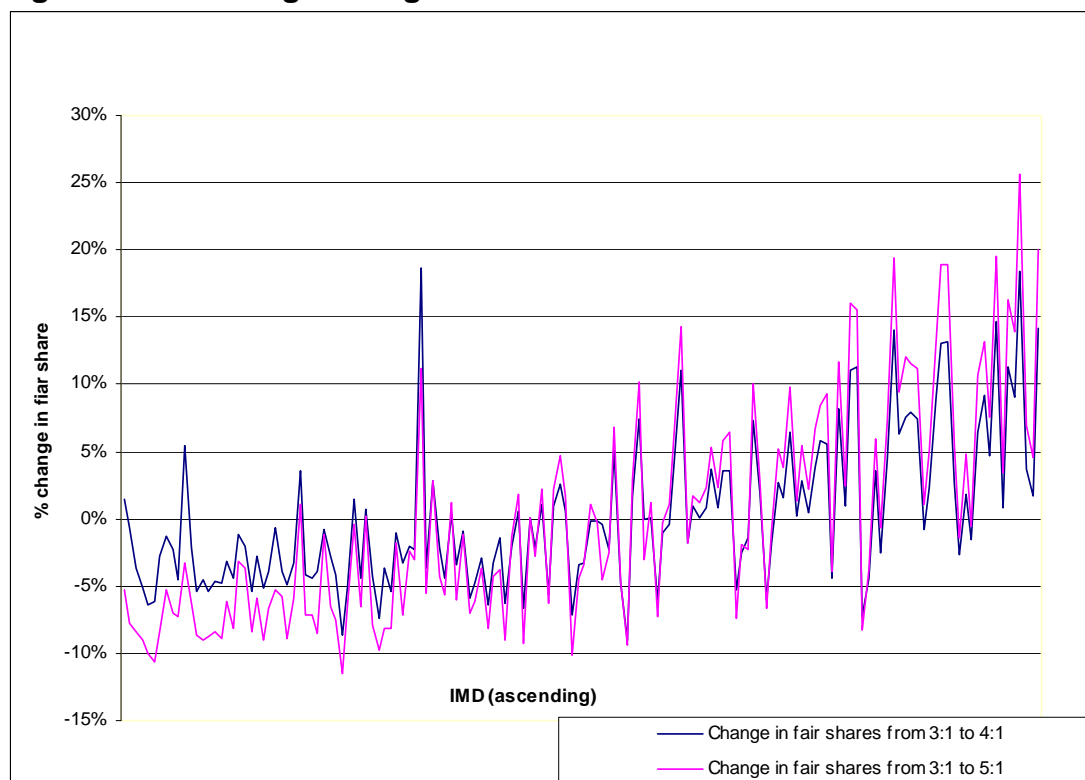


Figure 6: SMR ratio for 'equal width' groups plus exponential set to give a 5 : 1 ratio divided by SMR ratio for current deciles



24. Figure 7 shows for the 4 : 1 and 5 : 1 ratios the percentage change in the fair share of the available resources compared with the original 3 : 1 applied linearly across deciles.

Figure 7: Percentage change in fair share



Questions for ACRA

Q4: does ACRA have a preference for the weight increasing one-third or two-thirds more quickly than the SMR < 75, on the basis that public health costs likely to increase more quickly than the SMR < 75? Or at some other rate?

UNAVOIDABLE COSTS DUE TO LOCATION

25. In its interim recommendations ACRA proposed using the Area Cost Adjustment (ACA) for unavoidable costs due to location. This was mainly on the grounds of consistency with the local government formula.
26. As local government funding is moving to a long, multi-year settlement, DCLG have said that they are unlikely to update the ACA for another seven or so years. It may be that other Departments which use the ACA may decide to update it, but this is far from certain.
27. The ACA and MFF are based on similar approaches, mainly using the distribution of private sector wages across the country as an indicator of the geographical differences in indirect costs such as vacancy rates experienced by public sector. The two main differences are i) unlike the MFF, the ACA does not include smoothing of cliff edges – the process by which large differences in the index between adjacent areas are reduced, and ii) unlike the MFF, implementation the ACA includes a floor below which the ACA used does not fall.
28. Given, the strong likelihood that the ACA will not be updated for some time, while the MFF almost certainly will be, it is recommended that the MFF is used in the public health formula. ACRA may wish to consider if it wants in the medium term to develop an unavoidable cost index more specific to public health than either the MFF or ACA.

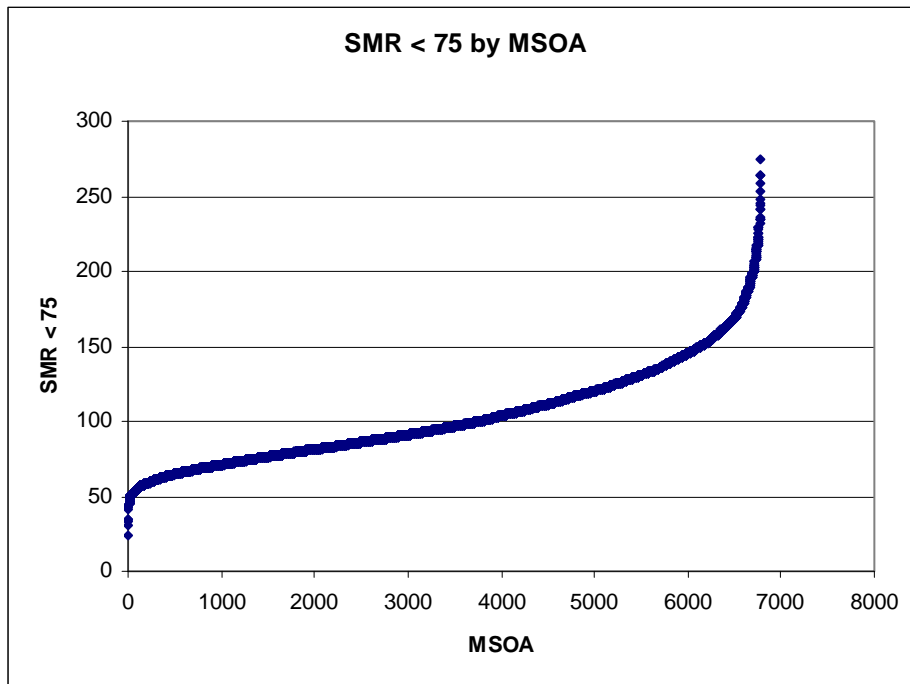
DRUGS MISUSE AGE WEIGHTING

29. It was previously proposed that there would be no age weighting for drugs misuse as there is already a component in the formula for the Pooled Treatment Budget (PTB). This largely follows the current PTB formula which includes a weighting for activity and hence age. The weighting for activity in the PTB formula fell from 74% in 2011-12 to 54% in 2012-13, and the PTB budget accounts for around three-quarters of total drugs misuse spend. As such it is felt there is no longer a sufficient weighting for age for drugs misuse. We therefore intend to introduce a weighting for age and gender for drugs misuse based on treatment rates by age-gender.

ANNEX A: Distribution of SMR < 75 by MSOA

Figure A shows the distribution of the SMR < 75 across MSOAs. The distribution is close to linear for the large middle section and steep at the tails.

Figure A: SMR < 75 by MSOA



Figures B and C present the best fit exponential and best fit cubic equation to these data. For very large parts of the distribution, the predicted and actual SMR < 75 are very similar, due to the almost linear stretch of the data.

The predicted and actual SMR < 75 are very different at the tails, but we do not know to what extent the very high and very low SMR < 75s are due to random noise: we cannot tell if they are true outliers or whether there is a data issue.

Using best fit of the SMR < 75 across MSOAs does not yield a gradient for the per capita weights rising materially more steeply than the SMR < 75.

Figure B: Best fit exponential

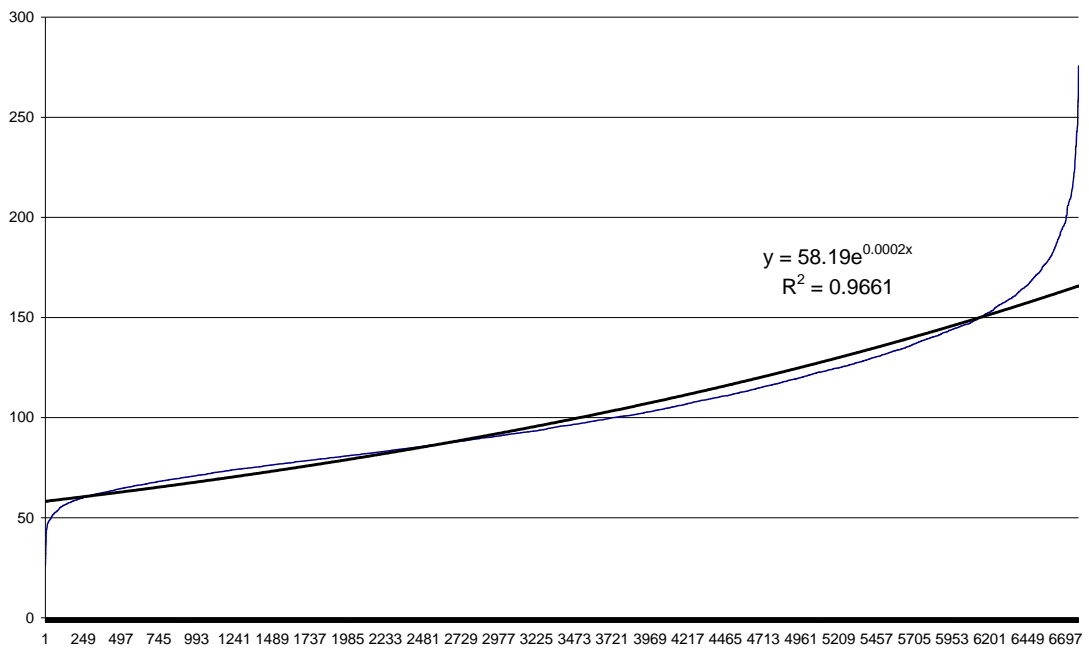


Figure C: Best fit cubic equation

