



Department  
of Health

# Formula for 0-5 children's public health

Department of Health seeking views on behalf of  
ACRA

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# Contents

Contents.....	4
Introduction .....	5
ACRA's initial proposals for the formula for 0-5 children's public health .....	7
Population base.....	7
Relative need per head .....	8
Unavoidable costs .....	12
Sparsity .....	12
Family Nurse Partnerships .....	13
Combining the component of the formula for 0-5 children's and the component for other public health duties .....	14
Summary of issues for feedback .....	14

# Introduction

The independent Advisory Committee on Resource Allocation (ACRA) has been commissioned by the Secretary of State to make recommendations on the formula for 2016-17 local authority public health grants, which will include a component for 0-5 children's public health services.

The Department of Health is facilitating on ACRA's behalf a request for views on ACRA's initial proposals on the methodology for the 0-5 children's component. As this is a new area of the public health grant, ACRA is keen to receive early feedback on its emerging thinking to help the further development of the formula during the year.

ACRA is an independent advisory group consisting of GPs, public health experts, NHS managers, local government officers and academics. ACRA makes recommendations on the preferred, relative distribution of health resources to the Secretary of State for Health and to NHS England, on public health and healthcare (including Clinical Commissioning Group) allocations respectively.

To place ACRA's work in context, there are a number of steps in setting the public health grants to local authorities for 2016-17. The key steps are:

- establishing the baseline for each local authority
- setting the preferred relative distribution of resources
- setting the total resources available
- deciding how quickly to move local authorities from their baseline position towards the level of resources implied by the preferred distribution (pace of change policy)

The Department recently published the 2015-16 allocations for children's public health in *Transfer of 0-5 children's public health commissioning to Local Authorities: Allocations 2015-16*, and in December the 2015-16 allocations for services commissioned by local authorities from April 2013 in *Local Authority Circular LAC(DH)(2014)2: public health ring-fenced grant conditions 2015 to 2016*. These will form the basis for establishing the baselines for 2016-17 allocations.

ACRA makes independent recommendations on the preferred, relative distribution of resources, which is also referred to as the target formula or fair shares formula. It is an assessment of relative need between different parts of the country, and also takes account of relative unavoidable differences in costs. ACRA is not responsible for pace of change policy, which is a matter for Ministers, nor the total resources available, which will be set following the outcome of the 2015 Spending Review.

There will be a single grant to local authorities in 2016-17, funding both 0-5 children's services and the public health functions which local authorities became responsible for commissioning from April 2013. Pace of change policy will operate at the level of the total grant to local authorities, not separately for 0-5 children's services and other public health functions. It is not possible to determine pace of change policy until we have ACRA's final recommendations for the preferred relative distribution and the outcome of the 2015 Spending Review.

The Department expects to facilitate for ACRA a public engagement over the summer on ACRA's interim recommendations on the whole formula for 2016-17 public health grants, including the component for 0-5 children's public health. Views received now on the formula for the 0-5 children's services will be fed back to ACRA in advance of that exercise.

ACRA's initial proposals on the methodology for the 0-5 children's public health component of the public health formula are set out in the next section of this document. Further information on the scope of 0-5 children's public health and the 0-5s baselines are available at:

<https://www.gov.uk/government/publications/transfer-of-0-5-childrens-public-health-commissioning-to-local-authorities>

A number of questions are raised in the next section of this document, however ACRA welcomes a broad range of feedback.

Please send views on the ACRA's initial proposals for the methodology for the 0-5 children's component to [PHformula2016/17@dh.gsi.gov.uk](mailto:PHformula2016/17@dh.gsi.gov.uk) by 27 March 2015.

# ACRA's initial proposals for the formula for 0-5 children's public health

1. ACRA propose that the formula for 0-5 children's public health has the following four elements:
  - the population base
  - an adjustment for relative need per head of the population base
  - an adjustment for unavoidably higher costs due to location
  - sparsity - subject to materiality
2. Each is discussed in turn below. There a number of questions on each of these below, but they are not meant to be exhaustive, and ACRA welcomes a broad range of feedback.

## Population base

3. The proposed population base is the number of children aged under 5 in each local authority, as projected by ONS. While these services are commonly referred to as "0-5 services" they might be more properly referred to as "Under 5 services", or "0-4 inclusive services".
4. The aim is to improve the health and well-being of all children aged under 5 years. The logical population base therefore is the number of children aged under 5 in each local authority.
5. Other suggestions put forward include the number of children aged 0-2 as resources are focussed more on this age group, and the number of births.
6. The three population cohorts are highly correlated as shown in Figure 1.

Figure 1: Correlation between births, 0-2 and under 5 age cohorts

	Births	Age 0-2	Aged under 5
Births	1		
Age 0-2	0.9982*	1	
Age under 5	0.9963*	0.9995*	1

\* Indicates significance at the 95% level.

Births Data – ONS Live Births (2013)

Population Estimates – ONS Mid-Year Population Estimates (2013)

7. The difference between each local authority's percentage share of the 0-2 cohort and share of under 5 cohort is very small. The differences across local authorities are between a minimum of -0.04% to a maximum of +0.06%. The differences in the percentage shares of the under 5 cohort and births are also very small, between -0.15% and +0.14%. These differences are sufficiently small that the choice of population base should not have a material effect on relative preferred shares. ACRA's view is that the whole population aged

under 5 should be used to reflect that the aim is to improve the health and well-being of all children aged under 5.

8. There are two options for data on the number of children under 5 – the latest year for which 'actual' data are available (the mid-year estimates for 2014 should be available from ONS in summer 2015), or ONS projections for 2016 onwards for each local authority. ACRA propose to use the projected populations as these should be closer to the size of the cohort group in each year. The formula for public health allocations in 2013-14 and 2014-15 for the responsibilities which transferred to local authorities from April 2013 also used population projections.
9. Population churn has also been raised as a possible factor to take into account, as there may be additional costs for new children arriving in an area. ACRA is currently not aware of evidence on the size of such costs.

Question 1 : Should the population base be the projected number of under 5 year olds in each local authority?

Question 2 : Should population churn be taken into account, and if so what are the higher costs imposed?

## Relative need per head

10. In addition to universal services, resources for public health for 0-5 children are targeted towards families with higher need and vulnerable first time mothers. ACRA propose that there should be an adjustment for relatively higher need by some families for 0-5 children's public health services, and that this adjustment is likely to be higher in more deprived areas. ACRA wish to undertake further work on what the adjustment should be.
11. The four issues for an adjustment for relative need per head of the population base are:
  - what measure to use
  - how to scale the measure
  - whether the measure should be at small area level to take account of differences in need within as well as between local authorities
  - what relative weights to assign to those areas for which the measure is higher and lower
12. ACRA is not aware of any evidence pointing to one particular indicator. The choice of indicator is likely to be a matter of judgement. Options that have been suggested include:
  - child poverty
  - low birth weight births
  - the number of teenage mothers
13. The number of children in need of safeguarding and subject to a child protection plan have also been raised as having high need.
14. Child poverty and low weight births are included in the Public Health Outcomes Framework (PHOF) data set (available at: <https://www.gov.uk/government/statistics/public->



[health-outcomes-framework-february-2015-data-update](#)). ONS publish the number of births to those aged under 18 and under 20 (the latest data are for 2013).

15. The PHOF data set includes the proportion of children aged under 16 in poverty. This is defined as the percentage of children living in families in receipt of out of work benefits or tax credits where their reported income is less than 60% of median income. The latest PHOF data for child poverty are for 2012. An indicator of the proportion of children aged under 5 in poverty is being developed and is understood not to vary significantly from child poverty for those aged under 16.
16. The low birth weight indicator in the PHOF is the percentage of all live births at term with low birth weight, where low birth weight is under 2500g and the gestational age is at least 37 complete weeks. Low weight births at full-term rather than all low weight births have been suggested as premature babies will generally be in neonatal care and are unlikely to be seen by a health visitor ante-natal, at 10 days or possibly 6-8 weeks.
17. The number of births to those aged under 20 is closely related to the need for Family Nurse Partnership services.
18. A preliminary analysis of the data for child poverty aged under 16, the percentage of births which are low weight at term, and the percentage of births to mothers aged under 20 is shown in Figures 2-5 at local authority level.
19. Data on low weight births are not available for the Isles of Scilly and the City of London due to the low numbers. The percentage of under 16s in poverty in the Isles of Scilly is recorded as zero in the PHOF data set. In the published ONS data set for the percentage of births to mothers aged under 20, the Isles of Scilly and Cornwall are combined, as are the City of London and Hackney.
20. Figure 2 shows basic descriptive statistics. The percentage of births to under 20 year old mothers has a wider range across local authorities, and the percentage of births which are low birth weight has the smallest range.

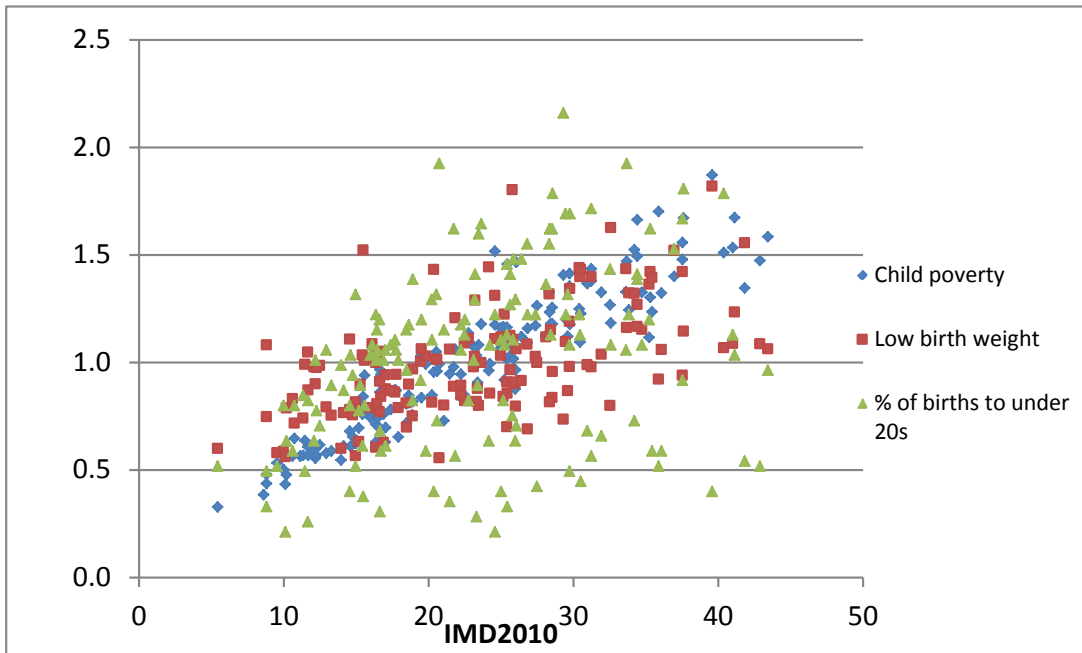
Figure 2: Descriptive statistics

	Children in poverty (under 16s)	Low birth weight of term babies	% births to under 20s
Max	37.9%	5.0%	9.2%
90 percentile	29.6%	3.9%	6.9%
Unweighted Mean	20.2%	2.8%	4.3%
Median	20.1%	2.7%	4.4%
10th percentile	11.7%	2.0%	2.1%
Min	6.6%	1.5%	0.9%
Ratio max to min	5.72	3.28	10.22
Ratio 90th to 10th percentile	2.53	1.91	3.27

21. An index value for each of the measures was created which has the England average set to 1.0. Figure 3 plots this against the IMD2010 for each local authority – deprivation increases from left to right on the horizontal axis. The graph shows that the child poverty

and low weight births increase with the Index of Multiple Deprivation 2010 (IMD2010), while the percentage of births to under 20s does not obviously do so.

Figure 3: Indices by IMD



22. Figure 4 shows that the three measures are not closely correlated.

Figure 4: Correlation matrix

	Children in poverty (under 16s)	Low birth weight of term babies
Low birth weight of term babies	0.55	
% births to under 20s	0.26	-0.02

23. The PHOF data set includes 95% confidence intervals at local authority level. Descriptive statistics for these are shown in Figure 5 as a percentage of the data value. They are clearly wider for low birth weight births than children in poverty.

Figure 5: Descriptive statistics for 95% confidence interval

	<b>Max</b>	<b>90 percentile</b>	<b>Median</b>	<b>10th percentile</b>	<b>Min</b>
Children in poverty (under 16s)	41.3%	5.0%	3.3%	2.3%	1.2%
Low birth weight of term babies	91.2%	59.2%	39.3%	26.8%	15.2%

24. The above analysis suggests that children in poverty may have a number of advantages; it is correlated with deprivation (including by definition) and seems to be a more robust in statistical terms.
25. It is not clear how to weight any measure adopted. Should the allocations per head increase more quickly than the measure itself? Should the gradient be more or less steep than that for the current formula for other public health services?
26. Early engagement has suggested the use of child poverty and that there should be a weight of three times for families in poverty compared with that for other families.
27. The current PHOF data has a range for child poverty across local authorities of between 6.6% and 37.9%, with an England average of 19.2%. A ratio of weights of 3 : 1 would mean that the area with the highest value would receive a weight per head of 3 for 37.9% of its under 5 population and a weight of 1 per head for 62.1% of its under 5 population.
28. Applying these weights would give a range of weights per head of between 1.13 and 1.76, with 1.38 for England as whole. Dividing each of these by 1.38 so the England figure is 1.0, this gives a range of weights per under 5 population of between 0.82 to 1.27 across local authorities.
29. The current public health formula is mainly based on a population health measure (the SMR<75) at small area level (MSOAs) to take account of inequality in health within as well as between local authorities. This was widely welcomed and there seems to be merit in following the same approach if data are reliable for small areas.
30. The confidence intervals in Figure 5 at local authority level and ONS combining the data for the percentage of mothers aged under 20 for the Isles of Scilly and the City of London with their neighbouring local authorities suggest these indicators may not be reliable for small areas. It may be possible to pool data across years but this has not been investigated to date.
31. The use of data for small areas will give the same results as using aggregate local authority data if the mean for the small areas equals the aggregate data for local authorities. This will not be the case if the weights for small areas are non-linear, e.g. they rise exponentially as in the current formula. The reason for the exponential weights in the current formula is that it was felt that due to multiple needs costs increase more quickly than the measure itself.

Question 3 : What should be the measure of relative need per head and what are the relative merits of child poverty versus other measures?

Question 4 : How should the measure of relative need per head be weighted and what factors should be taken into account in the weights?

Question 5 : What evidence is there for a weight per head?

Question 6 : Is a weight per head of three times that for families in poverty compared with other families representative?

Question 7 : Should the measure for relative need be applied at small area level to take account of differences in need within local authorities as well as between local authorities, subject to the data being reliable for small areas?

## Unavoidable costs

32. ACRA propose to apply a Market Forces Factor (MFF) to take into account differences in unavoidable costs across the country.
33. The costs of providing services are likely to be higher in some parts of the country than others due to market forces affecting the cost of staff and premises. The formula for 2013-14 and 2014-15 public health allocations included a MFF based on the cost providing NHS services. This was preferred to the Area Cost Adjustment used in the local government formula as it is more likely to be updated. ACRA propose to use the MFF in the formula for 2013-14 and 2014-15 public health allocations (and any updates to this) for the component for the formula for 0-5 children's services.

Question 8 : Should differences in unavoidable costs across the country be taken into account using the MFF?

## Sparsity

34. Sparsity may create unavoidable differences in the costs of providing some 0-5 children's public health services between local authorities, in particular where health visitors travel for home visits. Travel time is likely to be longer in sparsely populated areas, and possibly major conurbations. The MFF does not take account unavoidable costs due to sparsity.
35. ACRA would like to test the materiality of an adjustment for sparsity, and, if material the size the adjustment should be.
36. Data on health visitors' travel times are not held centrally. A standard approach for simulating travel times is the 'travelling salesman' methodology, which provides an estimate of the minimum travel time within small areas (MSOAs) based on the road network rather than distance as the crow flies.
37. There are a number of available software packages which include 'travelling salesman' algorithms. Combined with data on the number of children by age in each very small area (ONS Output Areas), a number of assumptions are required to run the 'travelling salesman' model. These include the proportion of time spent in clinics versus home visits, duration of contact time with families, and average speeds for different types of roads.
38. Early engagement suggests that contact time is of the order of: ante-natal review 1 hour, new baby review 2 hours, 6-8 weeks check 1 hour, 1 year review 1 hour, and 2 to 2.5 years review 2 hours. Early advice is that estimated current practice for home visits is as set out in the Figure 6 below. It would also be helpful to know if practice systematically differs across the country for reasons of need.

Figure 6: Health visitors home visits and clinic

	Estimated percentage at home	Estimated percentage at clinic
Ante-natal	50%	50%
New birth visit	0%	100%
6-8 week	30%	70%
9 to 15 month	80%	20%
2-2.5 year	80%	20%

39. To calculate the route, the software takes the population-weighted centroid of the MSOA as the starting point, and then calculates the total minimum time to drive around all the relevant OAs using an optimised travelling salesman algorithm. To calculate the time to travel Routefinder for Mapinfo software with Ordnance Surveys' Meridian 2 road network has different average speeds for different road types as in Figure 7.

Figure 7: Average road speeds

Road type	Average speed (mph)
Motorway	65
Trunk road	50
A road	40
B road	35
Minor road	25
Urban Motorway	50
Urban trunk road	40
Urban A road	30
Urban B road	20
Urban minor road	15
Ferry	10

Question 9 : Are longer travel times for home visits by health visitors a significant higher unavoidable cost for some areas?

Question 10 : Is the travelling salesman model a suitable methodology and what should be the parameters required for the model?

## Family Nurse Partnerships

40. In the baseline collection, expenditure on the FNP was 6% of the 0-5 funding being transferred, or around £50m per annum. This represents 1.4% of the total of 2015-16 public grants to local authorities and the full-year 2015-16 budgets for 0-5 children's services. The small share suggests there should not be a separate component in the formula for FNPs on the grounds of materiality, and that the funds are targeted in the same way as for health visiting.

Question 11 : Is it appropriate not to have a separate formula for the FNP on the grounds of materiality in the context of the size of the combined budgets for 0-5s and other public health duties?

## Combining the component of the formula for 0-5 children's and the component for other public health duties

41. The formula for 0-5 children's public health will need to be combined with that for the public health services currently funded through the public health grant in order to give a single overall formula. This is expected to be based on relative spend on the two components.

### Summary of issues for feedback

- Question 1 : Should the population base be the projected number of under 5 year olds in each local authority?
- Question 2 : Should population churn be taken into account, and if so what are the higher costs imposed?
- Question 3 : What should be the measure of relative need per head and what are the relative merits of child poverty versus other measures?
- Question 4 : How should the measure of relative need per head be weighted, and what factors should be taken into account in the weights?
- Question 5 : What evidence is there for a weight per head?
- Question 6 : Is a weight per head of three times that for families in poverty compared with other families representative?
- Question 7 : Should the measure for relative need be applied at small area level to take account of differences in need within local authorities as well as between local authorities, subject to the data being reliable for small areas?
- Question 8 : Should differences in unavoidable costs across the country be taken into account using the MFF?
- Question 9 : Are longer travel times for home visits by health visitors a significant higher unavoidable cost for some areas?
- Question 10 : Is the travelling salesman model a suitable methodology and what should be the parameters required for the model?
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