The Children and Young People's Services Formula: Worked Examples

The Children and Young People's Services formula is the mechanism within the Local Government Finance Settlement for assessing the children's social care needs of each local authority relative to others. The formula predicts each local authority's relative share of total, national need. It does this by estimating a probability for each child in the country, assessing the likelihood that they will have an interaction with children's social care in the form of being a Child in Need, a Looked After Child, or a child ceasing care. The formula estimates each local authority's relative need; it does not estimate an absolute level of need for each authority, or the amount of money each authority needs to meet that need.

The children's formula is designed to be independent of local authority practice. The formula does not take into account local authorities' historic spending, or how many children they have in care. It aims to estimate underlying levels of need, and not how different local authorities respond to that need. This means that local authorities which have prioritised preventative services and have fewer children in care are not penalised financially.

The model uses granular, child-level data to make predictions about need at the level of each individual. The use of child-level data makes the formula more robust but means that it is not possible to publish all of the data used in the model. To help councils understand how their need-shares are derived, we have therefore included in this document three worked examples using hypothetical children. This is to demonstrate how a child's individual and neighbourhood characteristics are used by the formula to determine the probability of a child interacting with social care services, and how child-level probabilities are then combined to form local authority need-shares.

This builds on the detail set out in the annex to government response to the Fair Funding Review 2.0, and the technical note on the formula, being published alongside this at the provisional Local Government Finance Settlement.

Calculating probabilities of being a Looked After Child, a Child in Need or ceasing care

In this example we will be calculating the probability that Children A, B and C will be Looked After Children.

Table 1: Hypothetical children

	Child A	**Child B**	**Child C**
Gender	Female	Male	Female
Age	9	14	9
FSM eligible	Yes	Yes	Yes
Neighbourhood (LSOA)	Walsall 007B	Walsall 007B	Brighton and Hove 027E

The starting point of our calculations for each child is the model's parameter estimates, which are set out in the Children and Young People's Services Formula technical note. As detailed in that note, the model's parameter estimates were determined via a logistic regression analysis. This estimates the relationship between a dependent variable (being a Child Looked After, Child in Need, and having ceased care) and one or more independent variables (the drivers of need included in the model, such as age, deprivation and overcrowding).

To work out the probability of our hypothetical children being a Looked After Child, we multiply the Looked After Child model parameter estimates by the values for the child's characteristics. We then add up all the parameter values, giving us a single number for each child. We then transform this number into a probability using a formula known as a logistic transformation; a higher number translates into a higher probability of being a Looked After Child (for more detail on this please see the CYPS technical note). We work through this calculation in tables 2, 3 and 4.

Table 2: Probability estimate for Child A

Variable	**Factor/Description**	**Value for Child A**	**Model Parameter Estimates**	**Estimate Value × Model Parameter Estimate**
Constant	Model Intercept	1	-7.2105	-7.211
FSM	FSM	1	2.4190	2.419
Sex	Female	1	-0.0917	-0.092
Age	9	1	0.0952	0.095
LSOA	IDACI score	0.832	3.8912	3.238
	Proportion of children with poor health	0.004255319	5.0618	0.022
	Proportion overcrowded households	0.094202899	-0.3659	-0.034
	Population density (persons pe km2)	4930.529	0.0000	-0.002
	Travel Time to Town Centre (mins)	10.41351	-0.0135	-0.140
Interactions	Interaction: FSM * Age16-17	0	-0.3802	0.000
	Interaction: FSM * LSOA 2019 IDACI Score	0.832	-2.9115	-2.422
			Total	-4.128
			Probability[1]	**1.6%**

[1] See probability formula in CYPS technical note.

Table 3: Probability estimate for Child B

Variable	Factor/Description	Value for Child B	Model Parameter Estimates	Estimate Value × Model Parameter Estimate
Constant	Model Intercept	1	-7.2105	-7.211
FSM	FSM	1	2.4190	2.419
Sex	Male	0	-0.0917	0.000
Age	14-15	1	0.7264	0.726
LSOA	IDACI score	0.832	3.8912	3.238
	Proportion of children with poor health	0.004255319	5.0618	0.022
	Proportion overcrowded households	0.094202899	-0.3659	-0.034
	Population density (persons pe km2)	4930.529	0.0000	-0.002
	Travel Time to Town Centre (mins)	10.41351	-0.0135	-0.140
Interactions	Interaction: FSM * Age16-17	0	-0.3802	0.000
	Interaction: FSM * LSOA 2025 IDACI Score	0.832	-2.9115	-2.422
			Total	-3.405
			Probability	**3.2%**

Table 4: Probability estimate for Child C

Variable	Factor/Description	Value for Child C	Model Parameter Estimates	Estimate Value × Model Parameter Estimate
Constant	Model Intercept	1	-7.2105	-7.211
FSM	FSM	1	2.4190	2.419
Sex	Female	1	-0.0917	-0.092
Age	9	1	0.0952	0.095
LSOA	IDACI score	0.124	3.8912	0.483
	Proportion of children with poor health	0.0028011	5.0618	0.014
	Proportion overcrowded households	0.046511628	-0.3659	-0.017
	Population density (persons pe km2)	1147.191	0.0000	-0.001
	Travel Time to Town Centre (mins)	16.9912	-0.0135	-0.229
Interactions	Interaction: FSM * Age16-17	0	-0.3802	0.000

	Interaction: FSM * LSOA 2019 IDACI Score	0.124	-2.9115	-0.361
			Total	-4.899
			Probability	**0.7%**

In our hypothetical examples Child A and Child B live next door to each other in Walsall. As they live in the same neighbourhood all the neighbourhood measures will be the same, meaning neighbourhood factors do not influence their relative likelihoods of being Looked After Children. But because Child B is a boy and is older, and these individual characteristics are associated with increased risk of being a Looked After Child, Child B has a higher probability of being Looked After Child than Child A, at 3.2% vs 1.6%.

In table 4 we show the impact of neighbourhood characteristics on a child's probability of being a Looked After Child. We work out the probability of being a Looked After Child for a hypothetical girl, Child C. All her individual characteristics are the same as Child A, she is a girl, aged 9 and is eligible for Free School Meals. But because the neighbourhood she lives in is much less deprived compared to Child A the probability that Child B will be a Looked After Child is lower, at 0.7% in comparison to Child A's 1.6%.

Turning individual probabilities into local authority relative need shares

The model calculates the relative need share by adding up the probabilities of being a Looked After Child for all children in the country. This provides an estimate of the total number of Looked After Children in England. The model then does the same but for each local authority in the country. The model divides total number of Looked After Children in each authority by total estimated number of Looked After Children in England to get the relative need share for each local authority for Looked After Children.

The model then repeats this process for the Children in Need and Ceased care, and these three separate components are then combined to provide a single need-share. Further detail is set out in the Children and Young People's Services Formula technical note.

We then apply an area cost adjustment, providing us with final need-shares for each local authority.