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London Borough Fertility Rates 2005-07



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Introduction

As part of the production of the GLA population projections, there is a regular updating of smoothed fertility rates by single year of age of mother for each of the London boroughs, with equivalent statistics for borough groups and Greater London. The smoothed borough-level rates, based on the events of three years, give a better understanding of recent fertility patterns and allow future birth rates, and so births, to be projected more accurately.

The smoothing process was previously carried out by fitting a single-peak Hadwiger function to the raw data. However, over the last two decades, fertility rates across London have become increasingly bi-modal and the standard single peak Hadwiger function no longer adequately describes them.

The 2005-07 smoothed fertility rates are presented within this *Briefing*. They are based on births for calendar years 2005 to 2007 and the equivalent GLA population estimates for females. These results update the set of fertility rates produced using 2000 to 2002 data, and will be used in the GLA 2010 round of demographic projections.

The 2005-07 smoothed rates have been generated by fitting double-peak Hadwiger expressions to the raw data. Charts 1 and Chart 2 illustrate the improvements in the fit to the latest borough fertility rates afforded by this new methodology.

The results presented here are:

- age-specific fertility rates (ASFR); ie births to mothers aged x per resident population of women aged x , where x ranges from age 15 to 49, and
- total period fertility rates (TPFR); ie the sum of all the ASFRs over the 35-year age range, giving the average number of children a woman would expect to have in her lifetime if the annual rates of 2005-07 were to remain constant.

Data Sources

The data used in the Hadwiger model are:

- Births by single years of age of mother, 15 to 49 years, for calendar years 2005 to 2007, provided under license by the Office for National Statistics, and,
- Population by single years of age of woman, 15 to 49 years, for mid-2005 to mid-2007 from the GLA 2009 round of demographic projections.

Births to women aged below 15 are added to the number at age 15 and any births occurring at ages 50 and above are added to those for age 49.

Both the births and the populations were averaged over the three years to give the raw rate numerators and denominators.

Calculation Issues

Averaging three years of births data provides a larger sample and is more statistically reliable. At borough level the numbers of births, especially for the youngest and oldest mothers, are relatively low; therefore it is possible, with the probability of infrequent random events, for the number of actual births in one year to be very different to the numbers in adjacent years. Averaging helps to remove the effect of statistical fluctuations.

An average of the three years population estimates were used to supply the denominators.

For each set of fertility rates, the parameters of the double-peak Hadwiger expression are found by performing a least squares fit to the raw data. The double-peak Hadwiger (see Chandola et al, 1999)¹ is given by the expression:

$$f(x) = am \left(\frac{b_1}{c_1} \right) \left(\frac{c_1}{x} \right)^{\frac{3}{2}} \exp \left\{ -b_1^2 \left(\frac{c_1}{x} + \frac{x}{c_1} - 2 \right) \right\} + (1-m) \left(\frac{b_2}{c_2} \right) \left(\frac{c_2}{x} \right)^{\frac{3}{2}} \exp \left\{ -b_2^2 \left(\frac{c_2}{x} + \frac{x}{c_2} - 2 \right) \right\}$$

Where:

x is age of the mother at birth

f(x) is the fertility rate at age x

m is a mixture parameter that determines the relative sizes of the two component distributions

a, b₁, c₁, b₂, c₂ are other model parameters related to total fertility and the level and trend of the mean ages of fertility in the two component distributions.

¹ Chandola, T., Coleman, D.A., Horns, R.W. (1999) Recent European fertility patterns: fitting curves to 'distorted' distributions. *Population Studies*, 53, 3:317-329.

Chart 1: Lambeth – comparison of smoothing methodologies

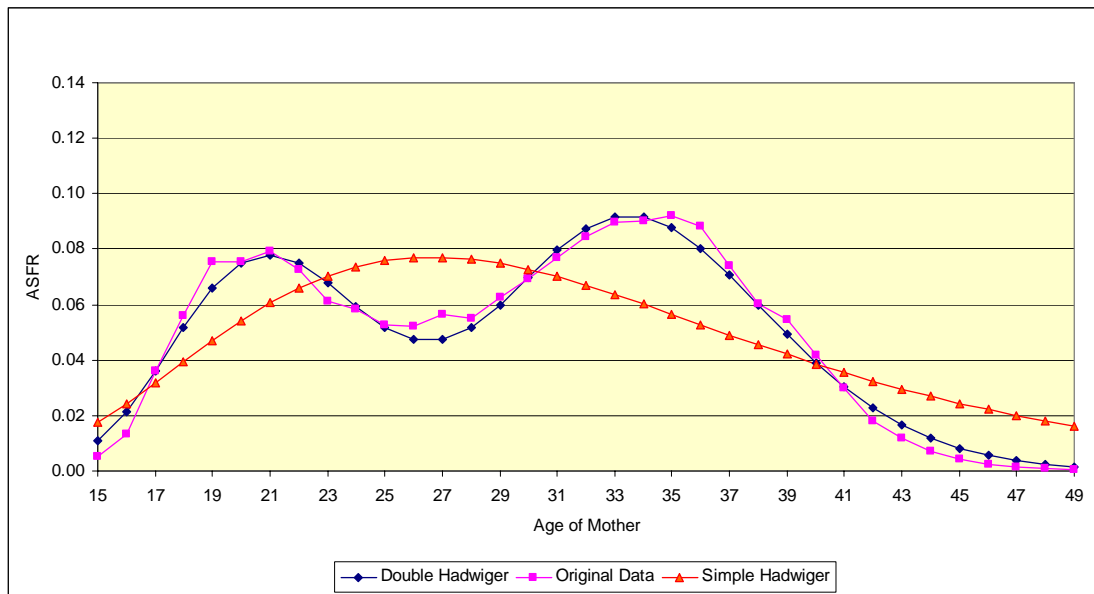
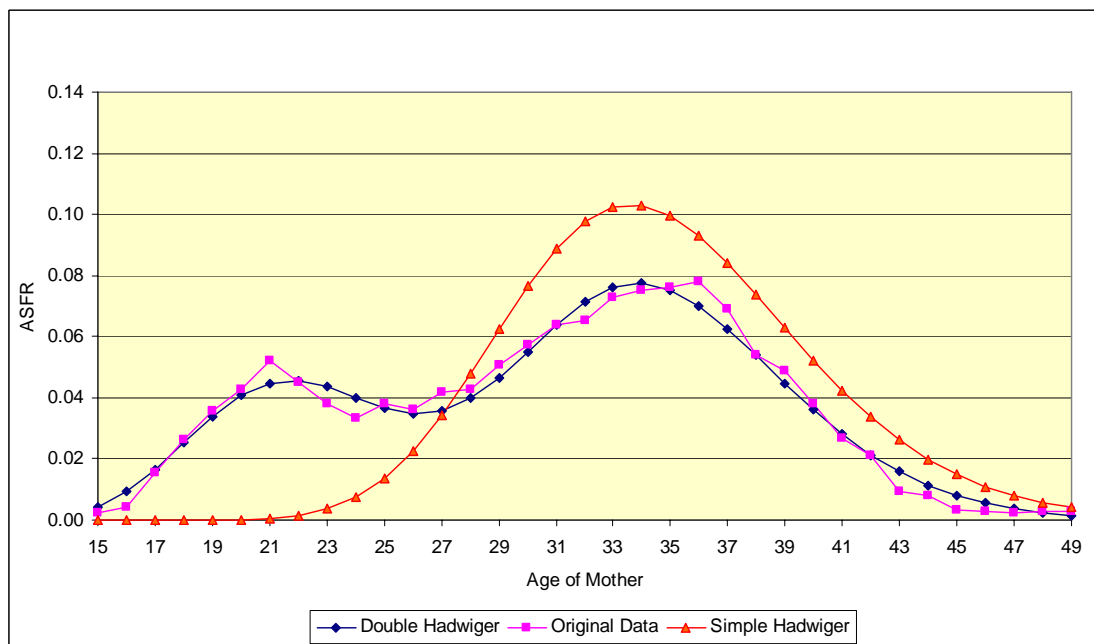


Chart 2: Westminster – comparison of smoothing methodologies



Projecting Borough Fertility Rates

GLA will use the smoothed 2005-07 borough rates in the 2010 round of demographic projections. The borough age-specific rates will be projected, first, by scaling then to match the actual borough births in 2008-09 and, second, by following the age-specific birth rate trends from 2008-09 to 2030-31 as assumed in the ONS 2008-based population projection for England.

Availability of Fertility Rates

All of the raw and smoothed borough, borough group and London fertility rates discussed in this *Briefing* will be available on the London Datastore (<http://data.london.gov.uk>) or on application to demography@london.gov.uk. Confidentiality agreements with ONS mean that the actual numbers of births by age of mother may not be passed on by the GLA.

Results for London and the Borough Groups

Chart 3: Greater London

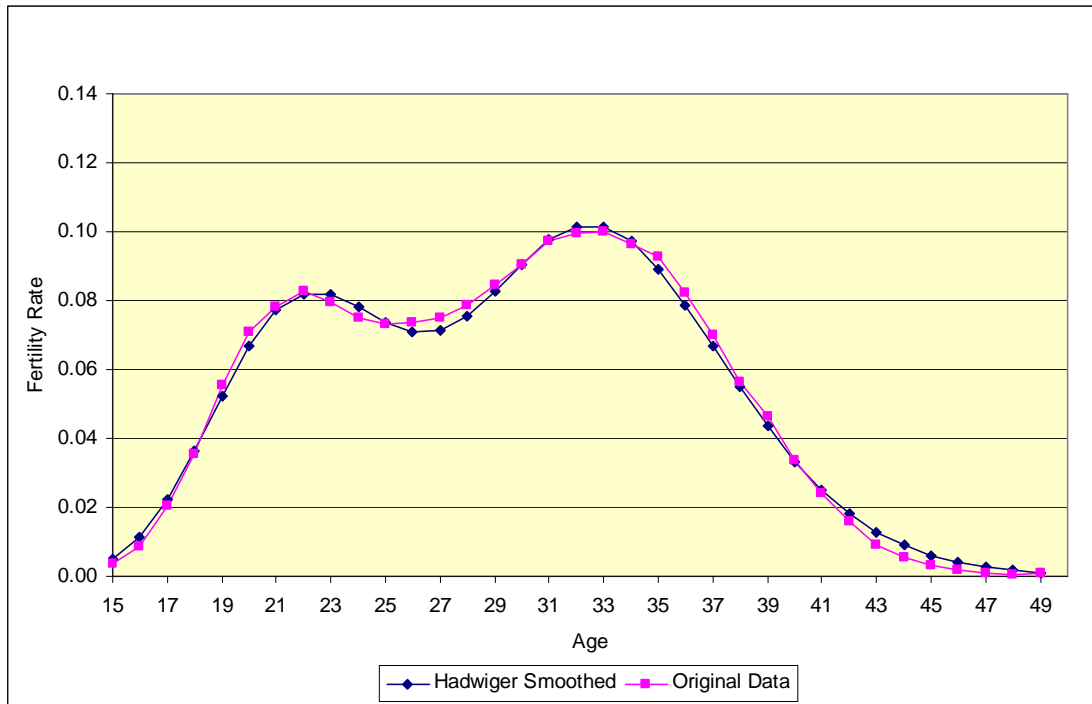


Chart 4: Inner London

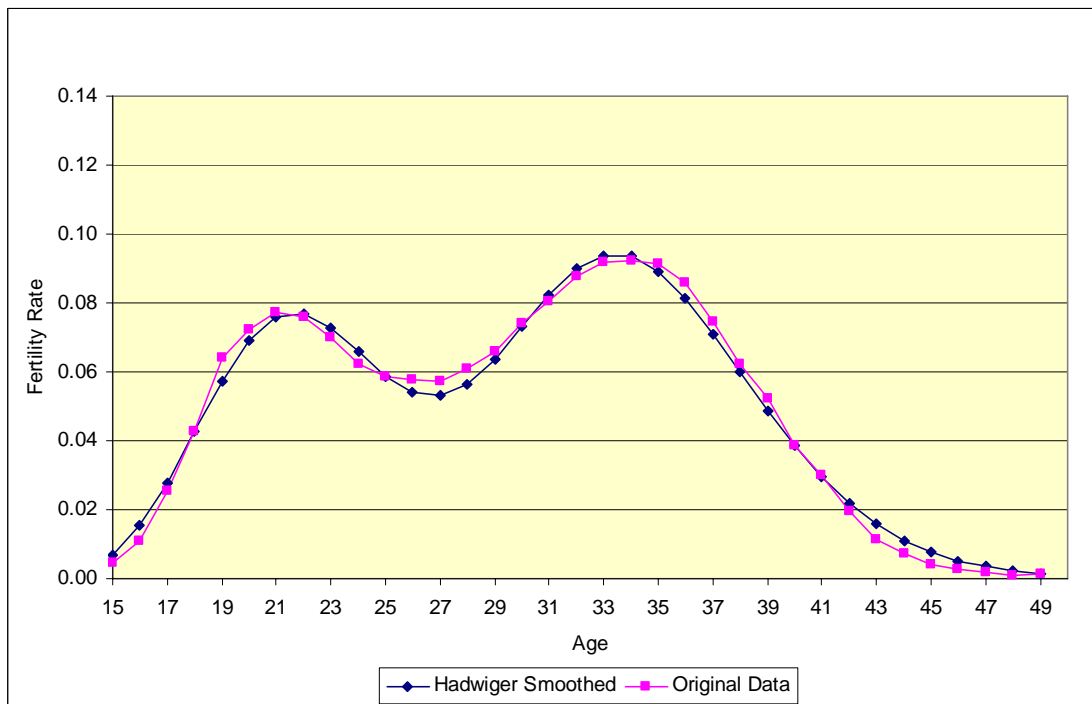


Chart 5: Outer London

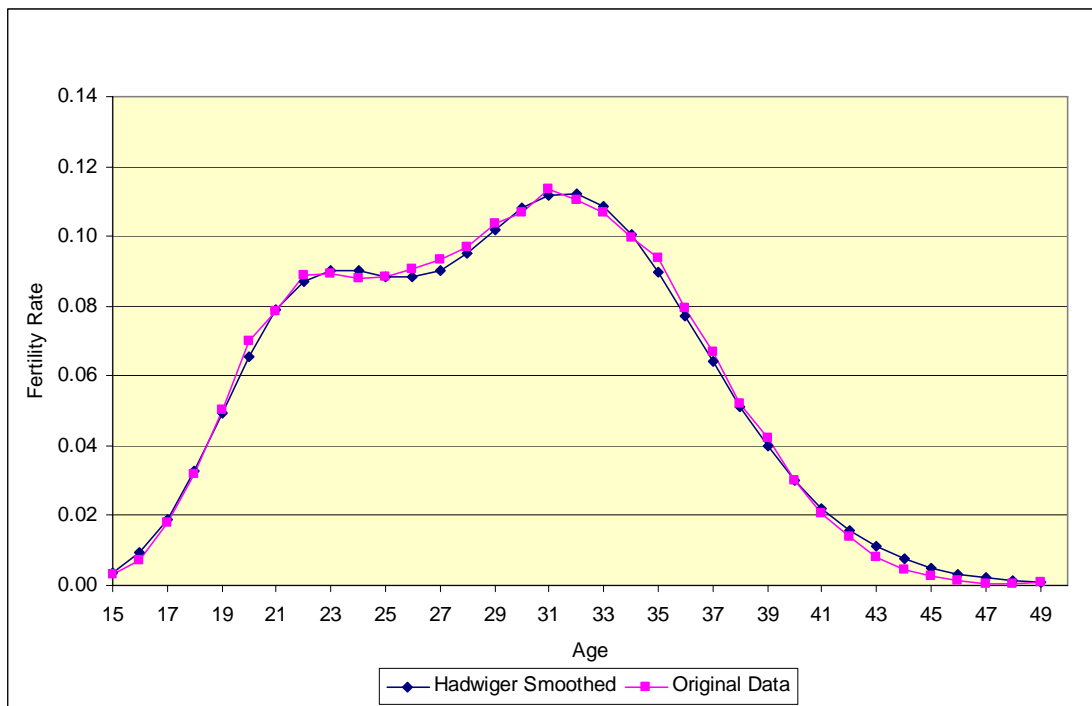


Chart 6: Central boroughs

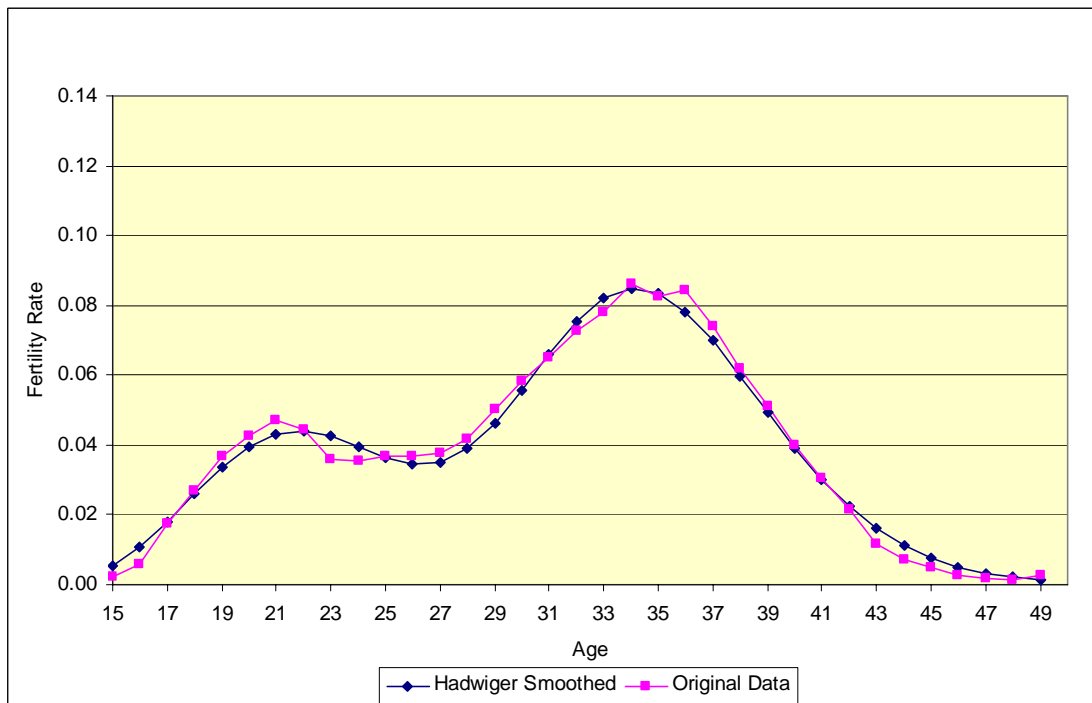


Chart 7: Rest of Inner London

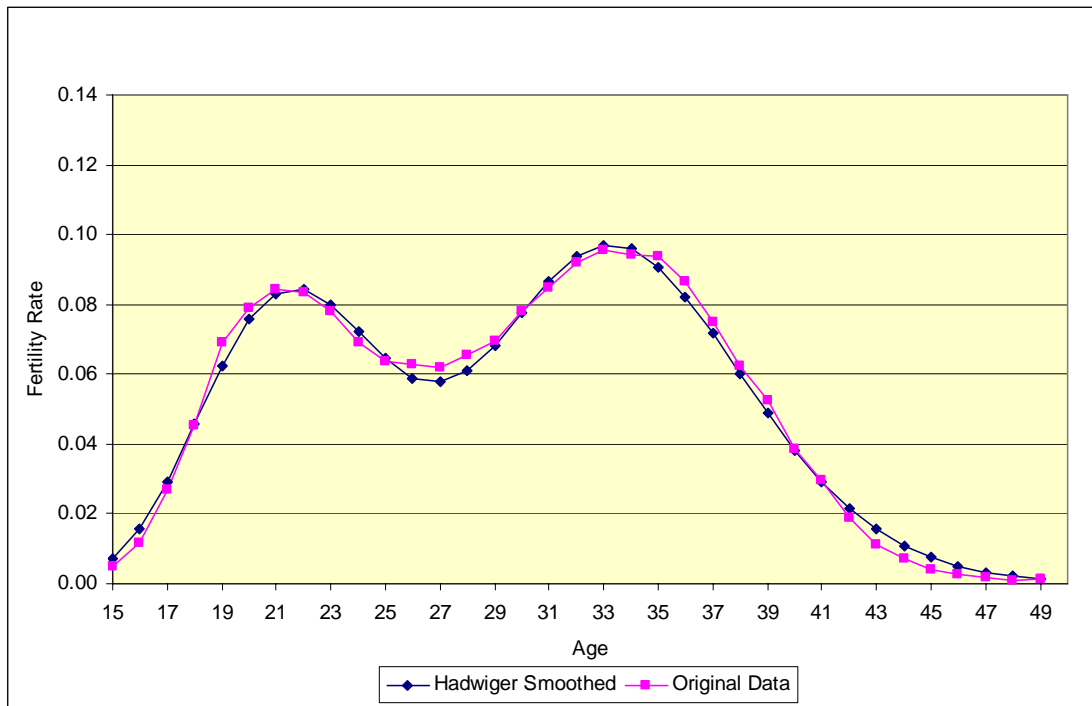
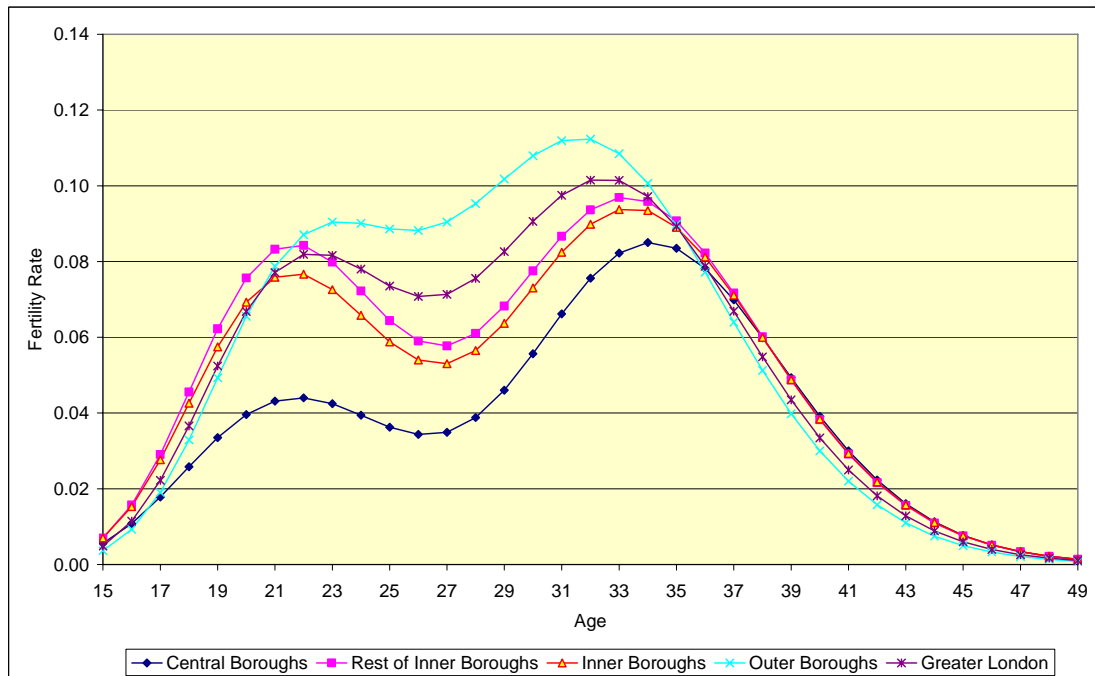


Chart 8: Comparison of all borough groups



Results for London Boroughs

Table 1: Characteristics of smoothed fertility rates for 2000-02 and 2005-07

	2000-02		2005-07		TPFR change
	TPFR	Mean age of mother	TPFR	Mean age of mother	
Barking and Dagenham	1.88	27.00	2.56	27.50	36.2%
Barnet	1.55	30.48	1.84	29.85	18.9%
Bexley	1.72	28.34	1.82	29.09	5.4%
Brent	1.69	29.12	2.05	28.95	21.3%
Bromley	1.59	29.49	1.77	30.07	10.9%
Camden	1.33	30.37	1.41	30.59	6.2%
Croydon	1.71	28.37	2.15	29.01	26.1%
Ealing	1.63	29.31	2.01	28.67	22.8%
Enfield	1.77	28.85	1.95	29.22	10.7%
Greenwich	1.78	28.31	2.11	28.72	18.3%
Hackney†	2.12	28.88	2.33	28.46	10.1%
Hammersmith and Fulham	1.40	30.88	1.48	30.75	5.7%
Haringey	1.77	29.07	1.87	29.51	5.8%
Harrow	1.56	30.30	1.72	29.73	10.2%
Havering	1.59	28.54	1.58	29.26	-0.7%
Hillingdon	1.67	28.59	1.89	28.64	12.9%
Hounslow	1.71	28.65	2.08	28.77	21.5%
Islington	1.40	29.61	1.44	30.12	2.9%
Kensington and Chelsea	1.28	31.82	1.29	32.10	0.8%
Kingston upon Thames	1.41	31.52	1.58	30.99	12.1%
Lambeth	1.65	28.87	1.71	29.44	3.4%
Lewisham	1.65	28.76	1.85	29.20	12.0%
Merton	1.53	29.76	1.85	29.81	21.2%
Newham	2.30	28.12	2.30	28.33	0.0%
Redbridge	1.75	29.24	2.01	28.90	14.6%
Richmond upon Thames	1.50	32.12	1.77	32.49	17.6%
Southwark	1.69	29.07	1.85	29.55	9.2%
Sutton	1.54	28.99	1.72	29.40	12.1%
Tower Hamlets	1.88	28.55	1.77	28.16	-6.1%
Waltham Forest	1.85	28.40	2.39	28.44	29.1%
Wandsworth	1.35	31.35	1.54	31.01	14.6%
Westminster	1.27	30.72	1.28	30.85	1.2%
Central boroughs	1.30	30.80	1.34	31.06	2.7%
Rest of Inner London	1.70	28.87	1.80	29.40	6.4%
Inner London	1.61	29.16	1.72	29.63	6.2%
Outer London	1.66	29.00	1.95	29.19	17.6%
Greater London	1.63	29.07	1.82	29.39	11.9%
Maximum	2.30	32.12	2.56	32.49	36.2%
Minimum	1.27	27.00	1.28	27.50	-6.1%

† 2005-2007 Hackney data incorporates figures for the City of London.

In the 2000-02 data, the City of London is included only in the grouped borough figures.

Chart 9: Total Period Fertility Rates (smoothed), London boroughs, 2005-07

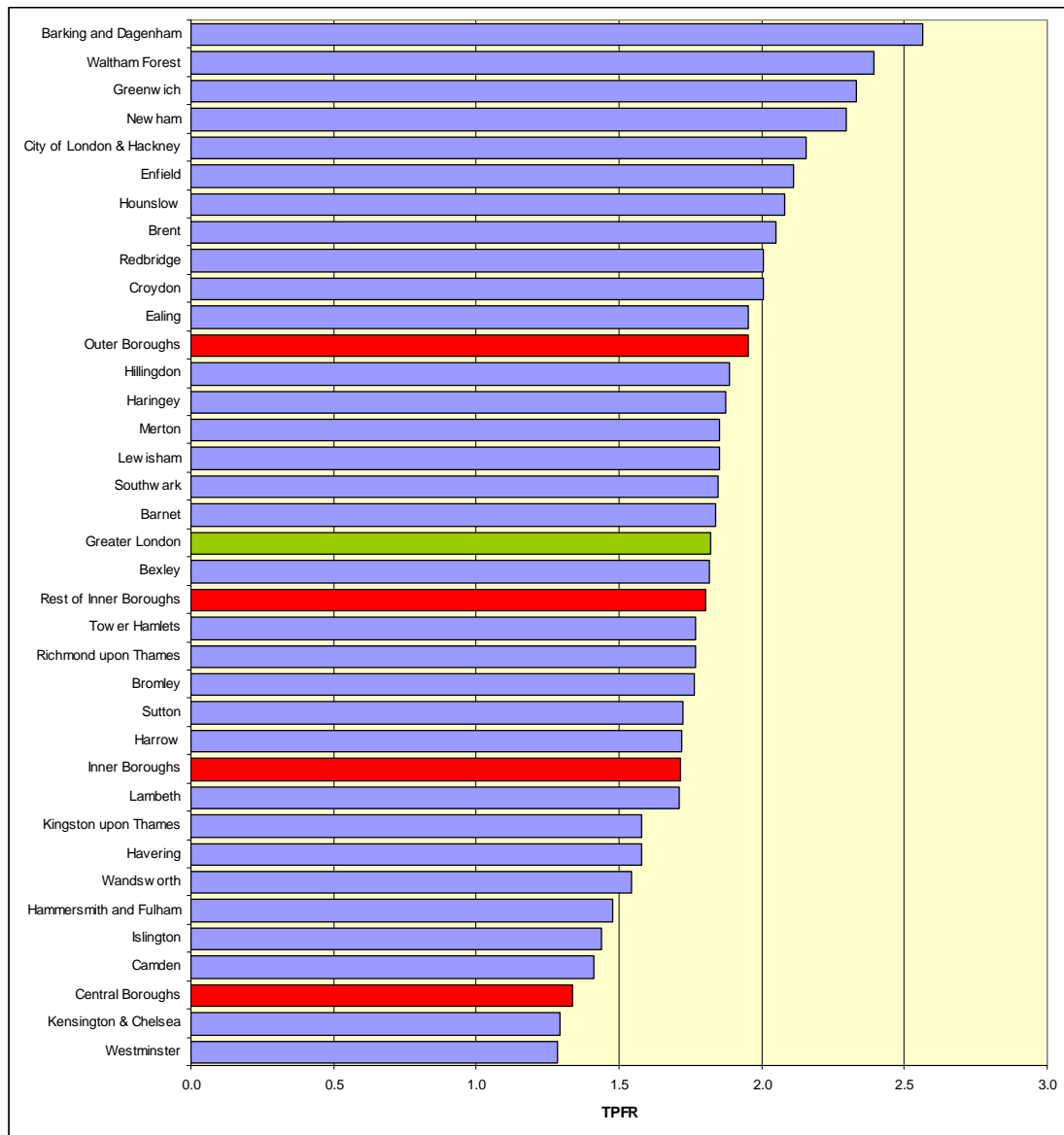


Chart 10: Mean Age of Mother, London boroughs, 2005-07

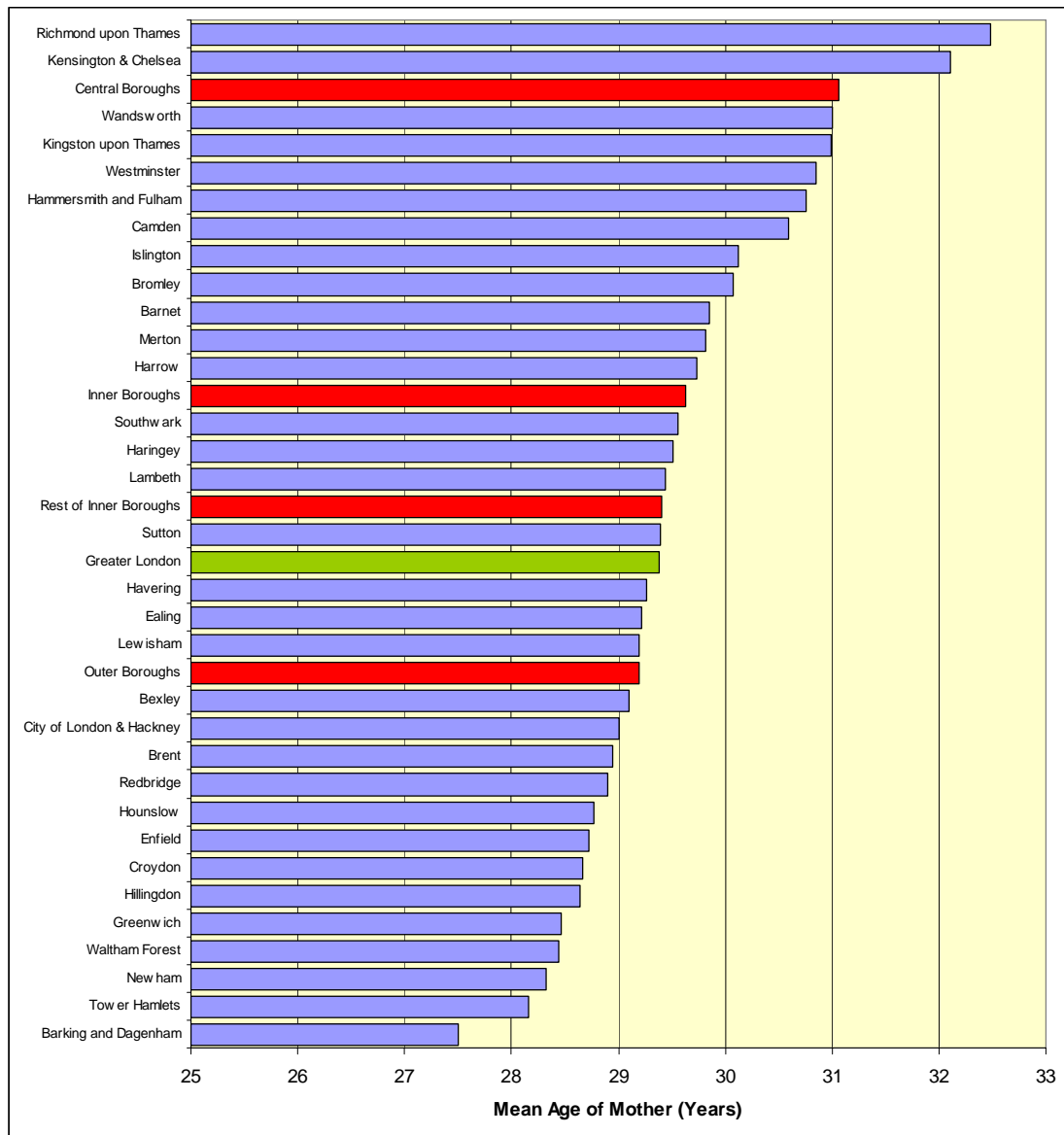


Chart 11: All Inner London borough fertility rates

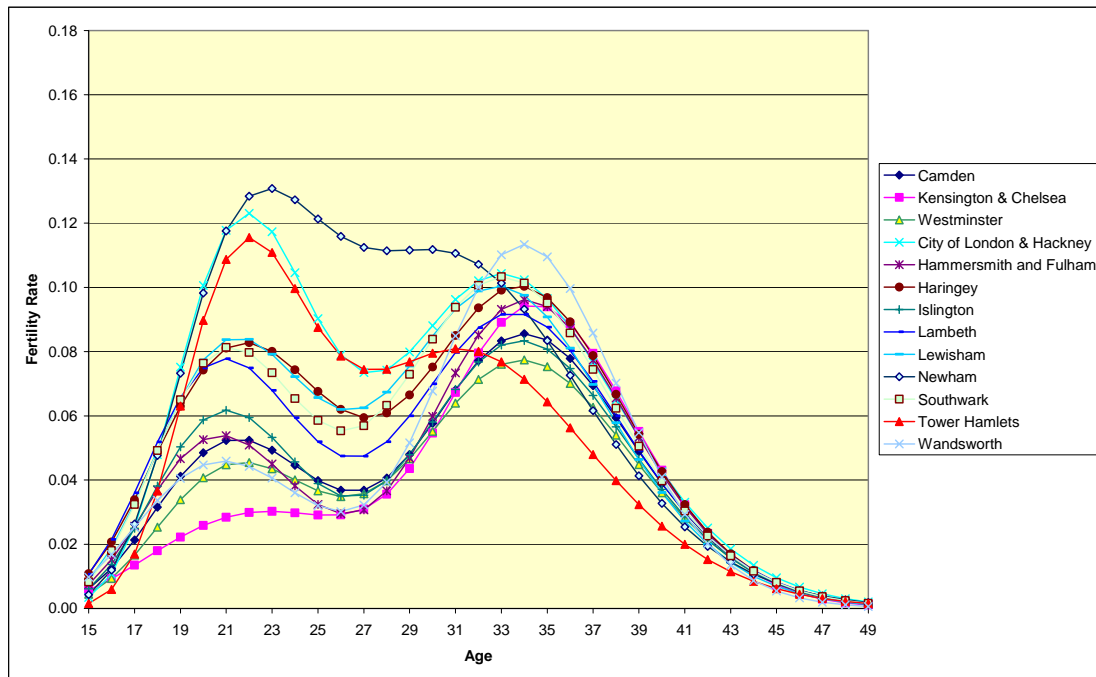


Chart 12: All Outer London borough fertility rates

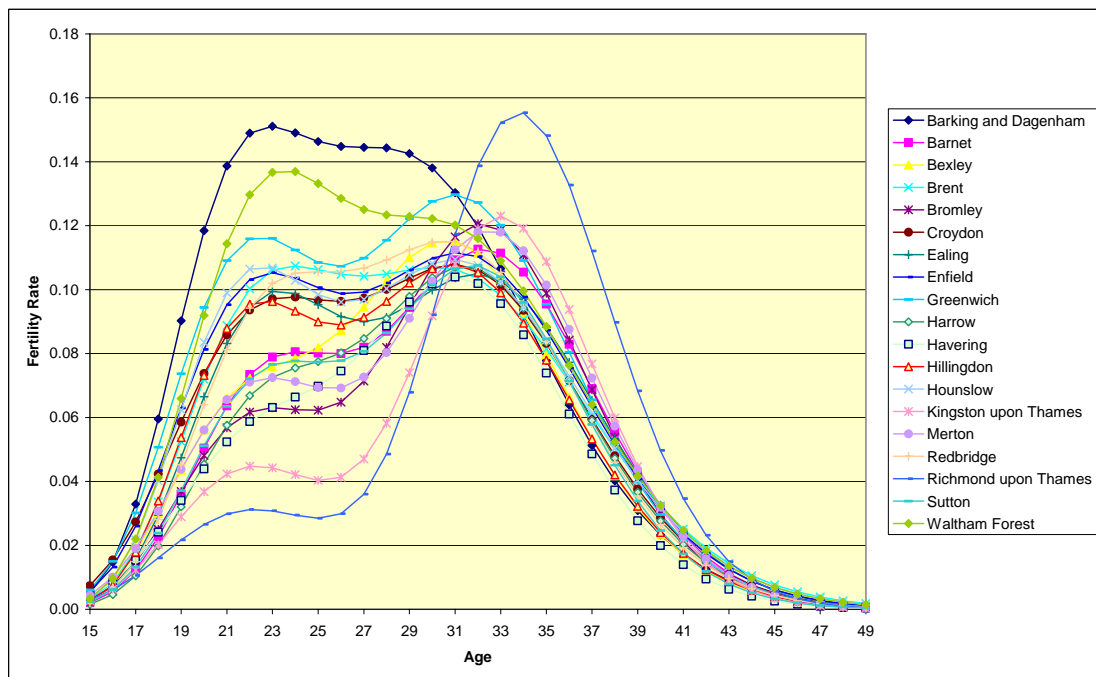


Chart 13: Camden

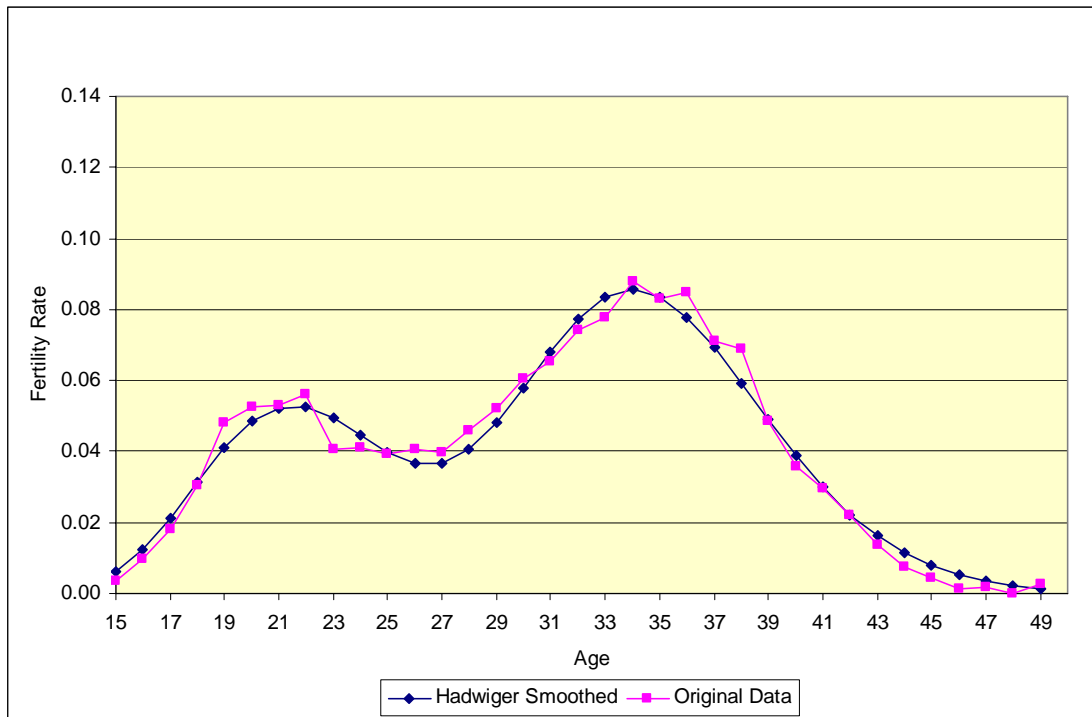


Chart 14: Kensington & Chelsea

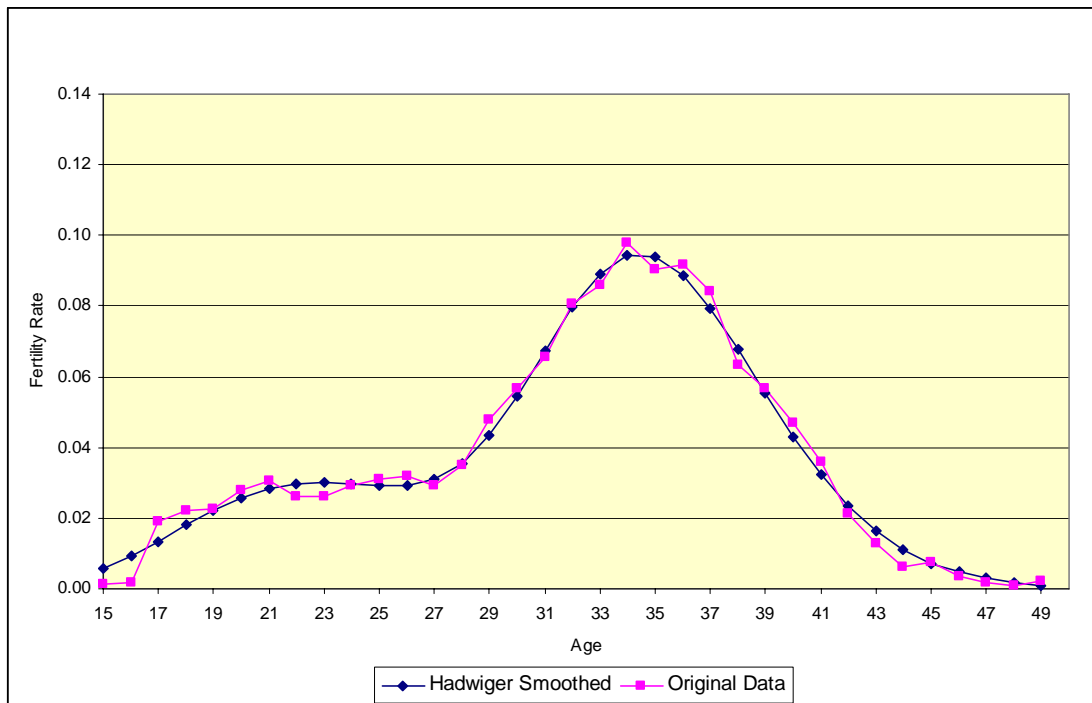


Chart 15: Westminster

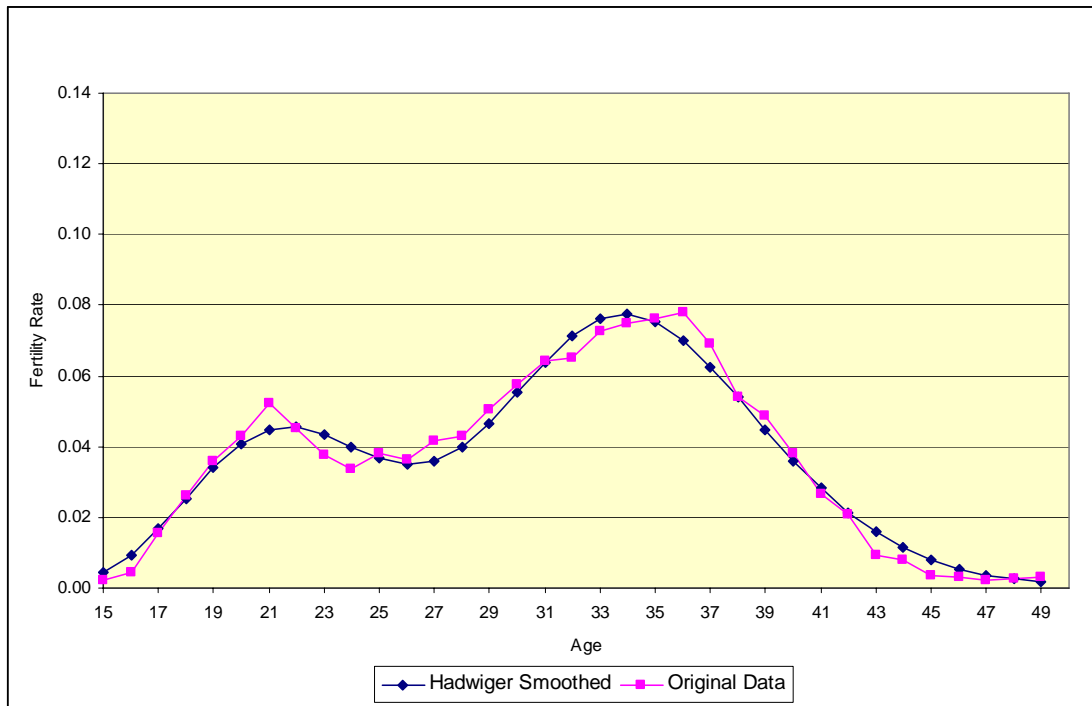


Chart 16: Hackney and City of London

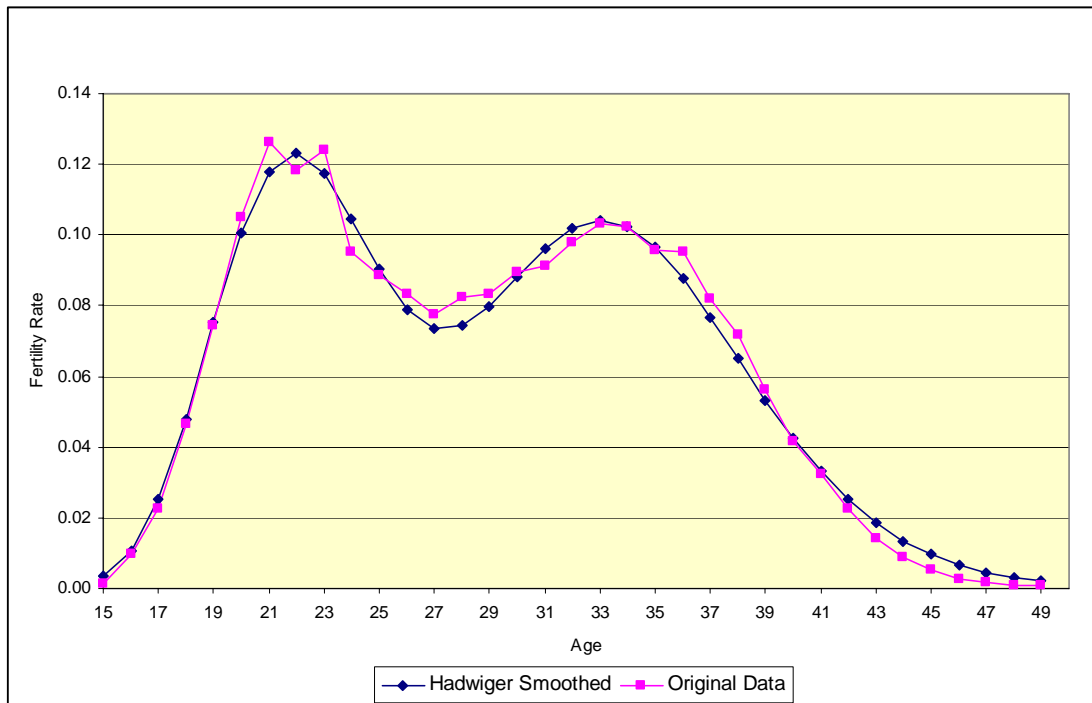


Chart 17: Hammersmith and Fulham

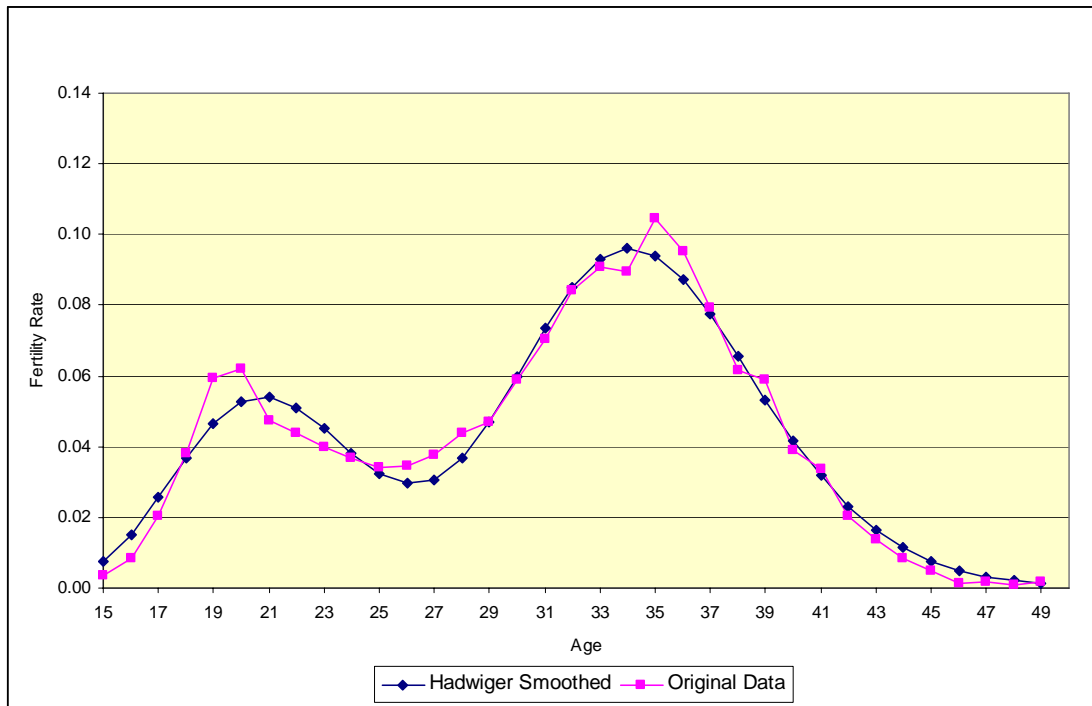


Chart 18: Haringey

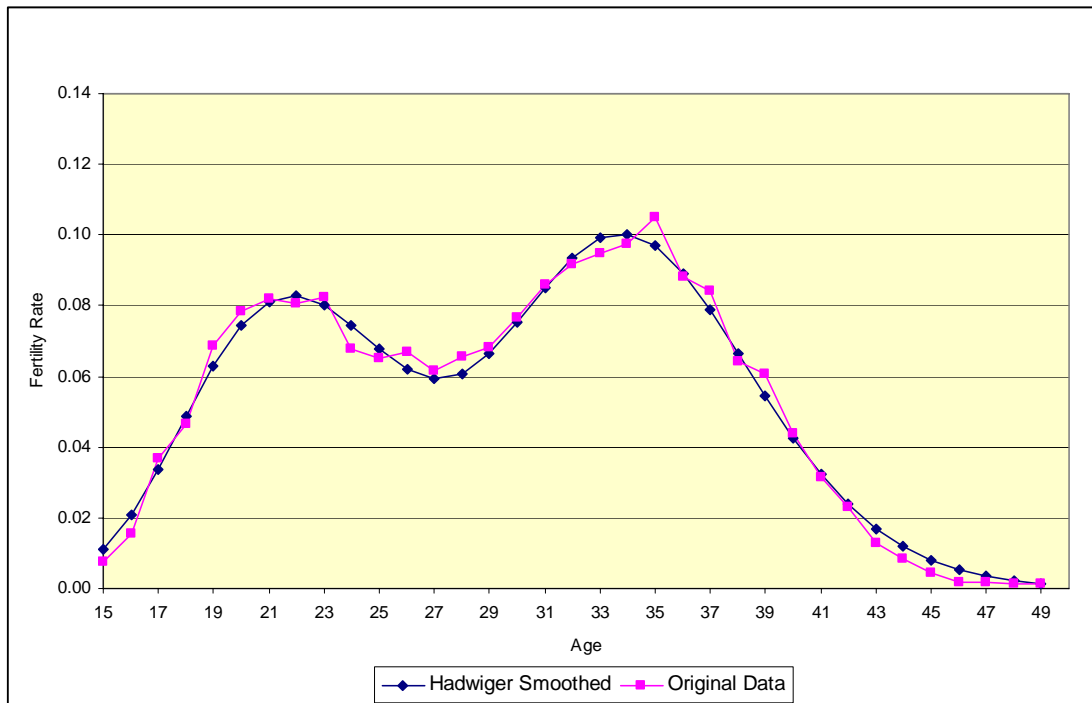


Chart 19: Islington

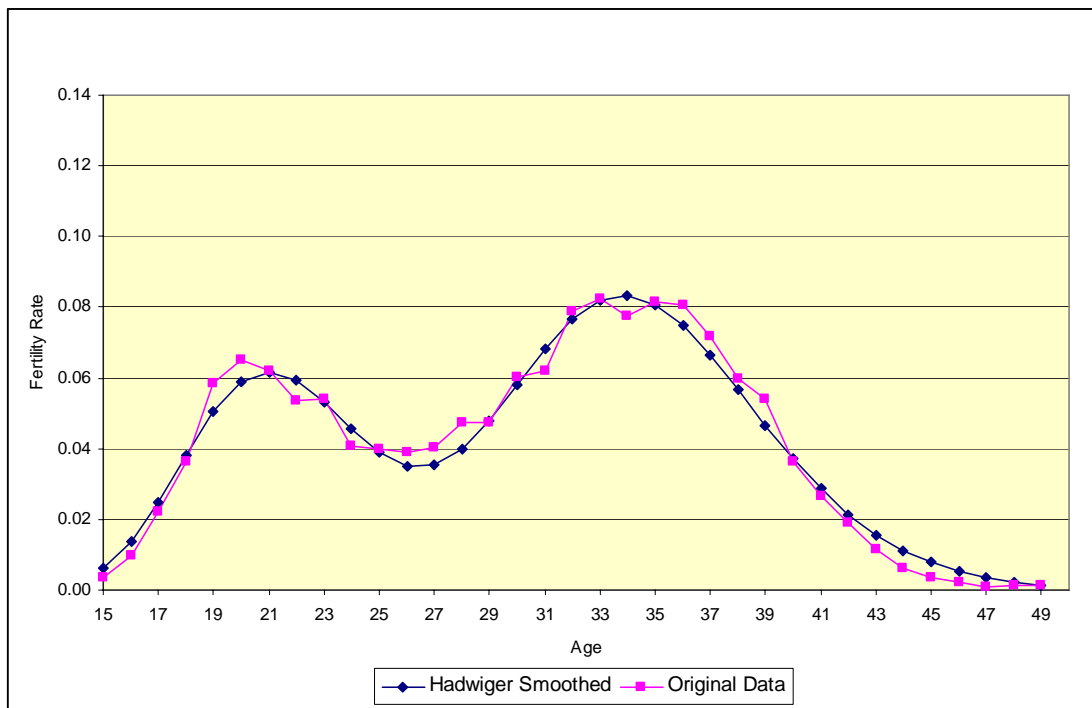


Chart 20: Lambeth

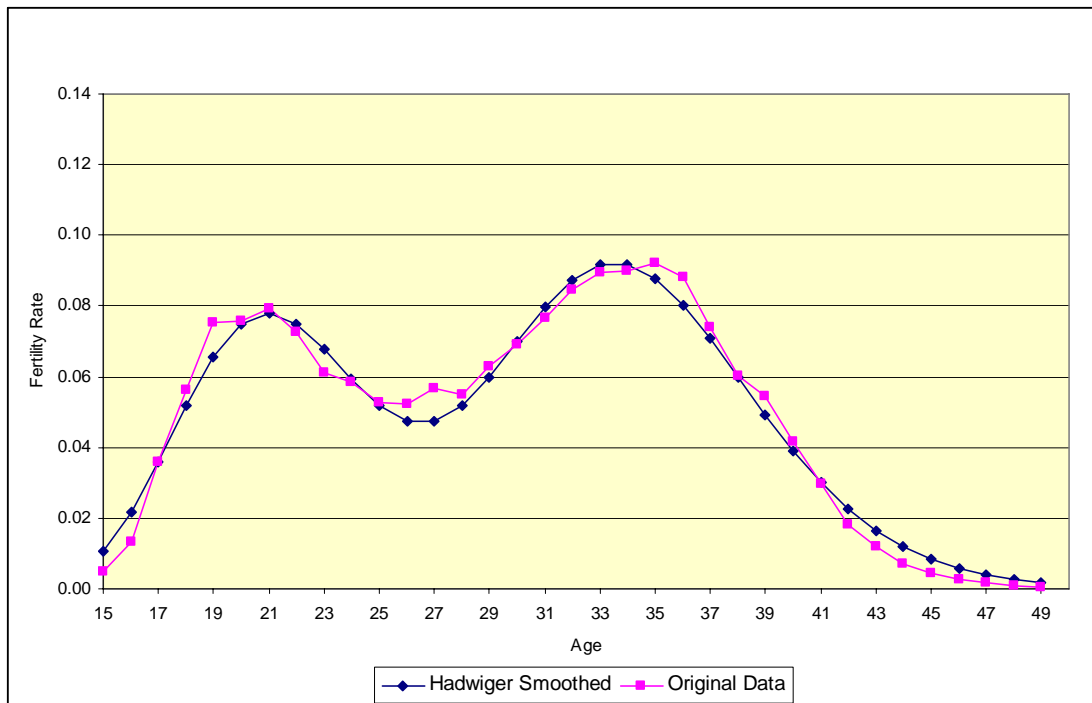


Chart 21: Lewisham

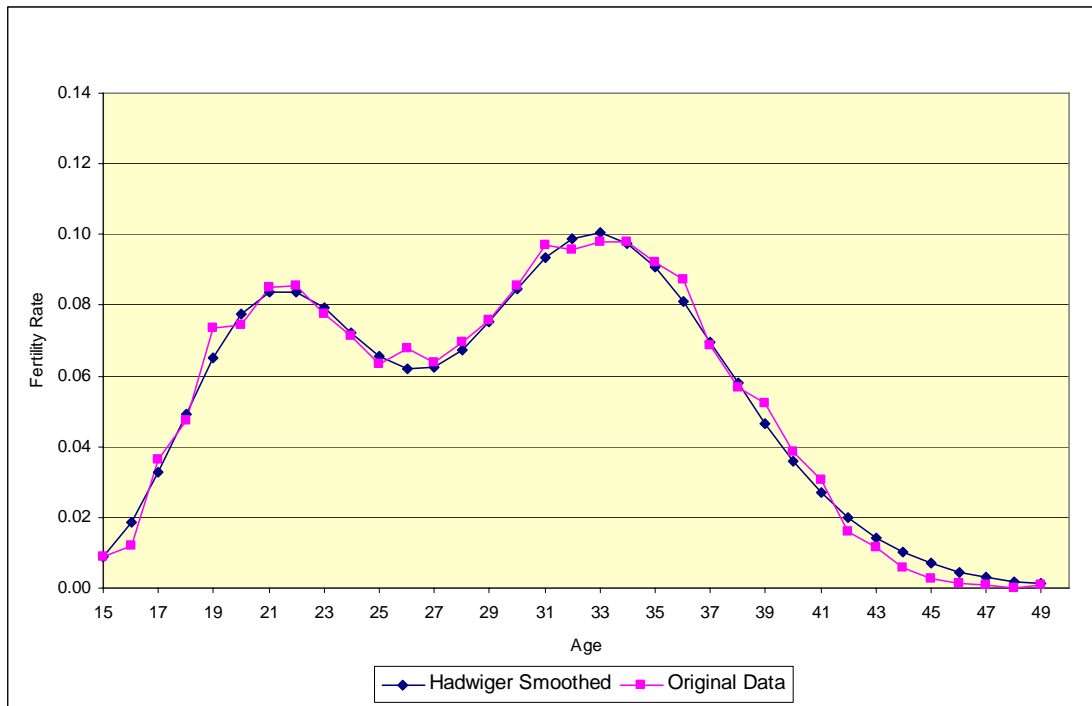


Chart 22: Newham

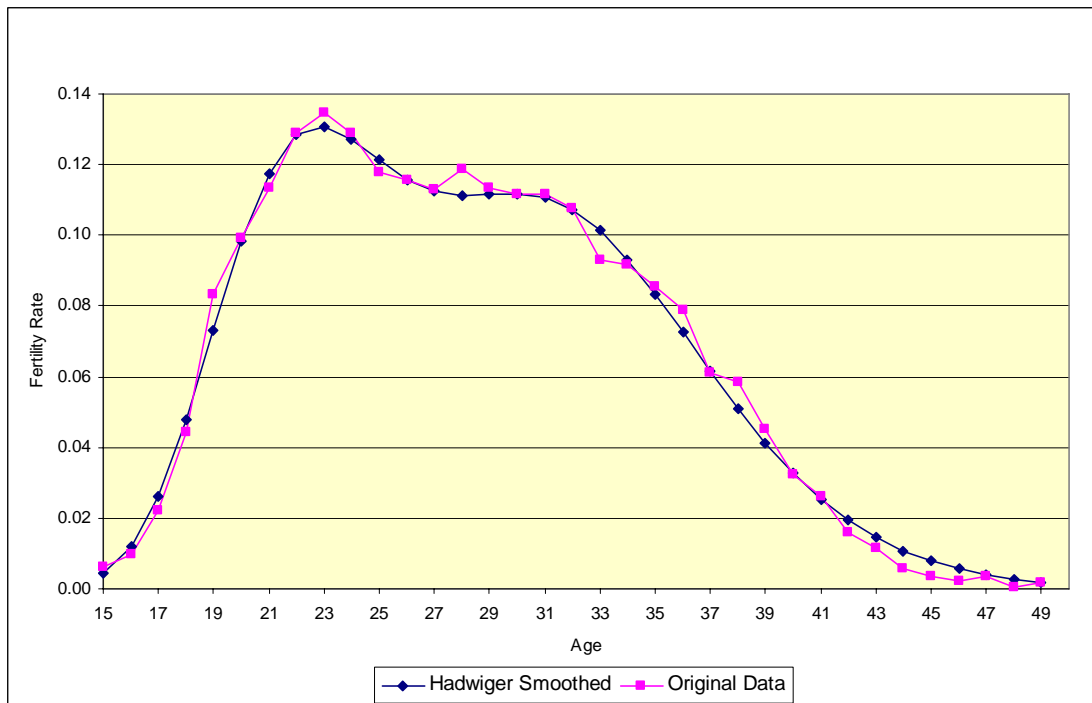


Chart 23: Southwark

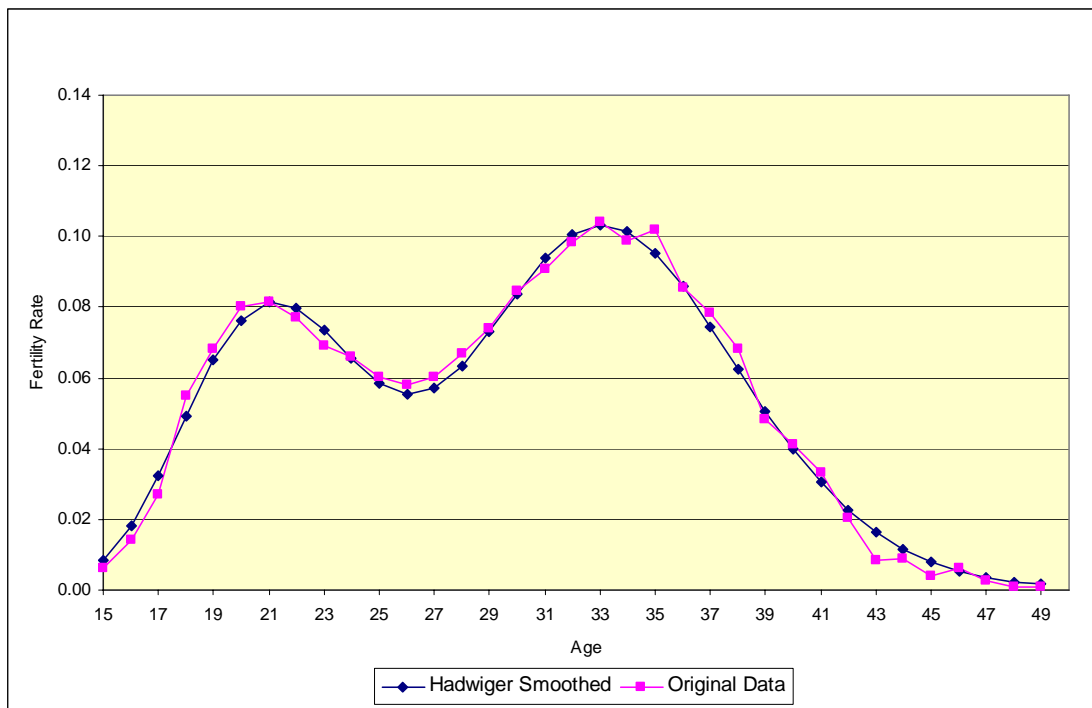


Chart 24: Tower Hamlets

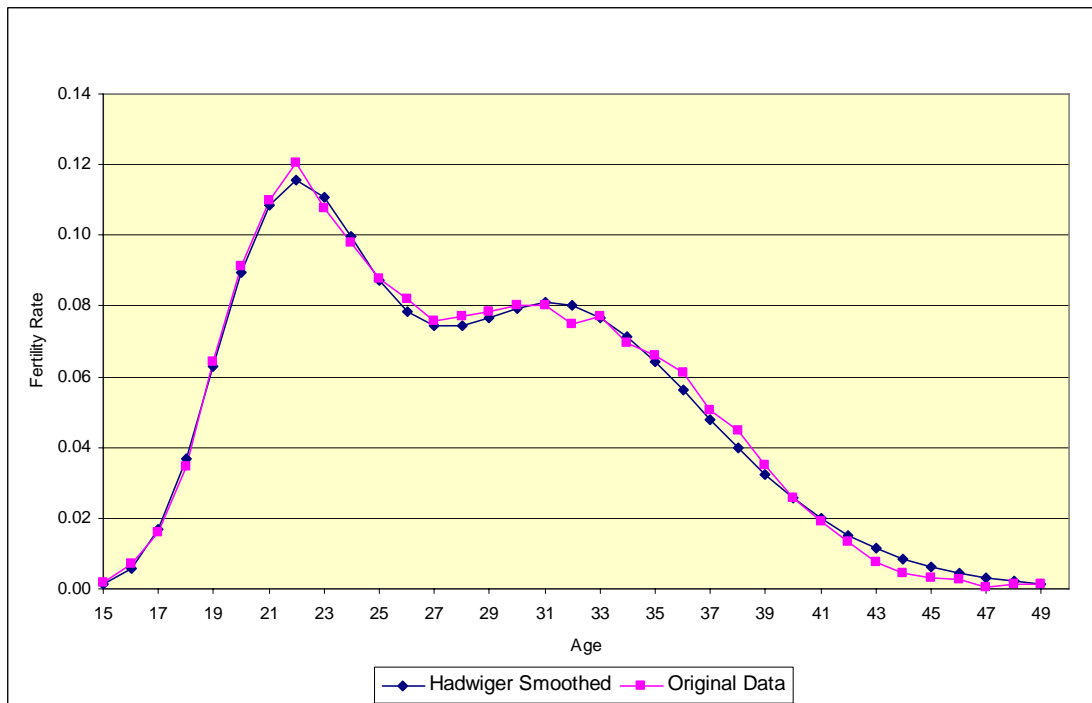


Chart 25: Wandsworth

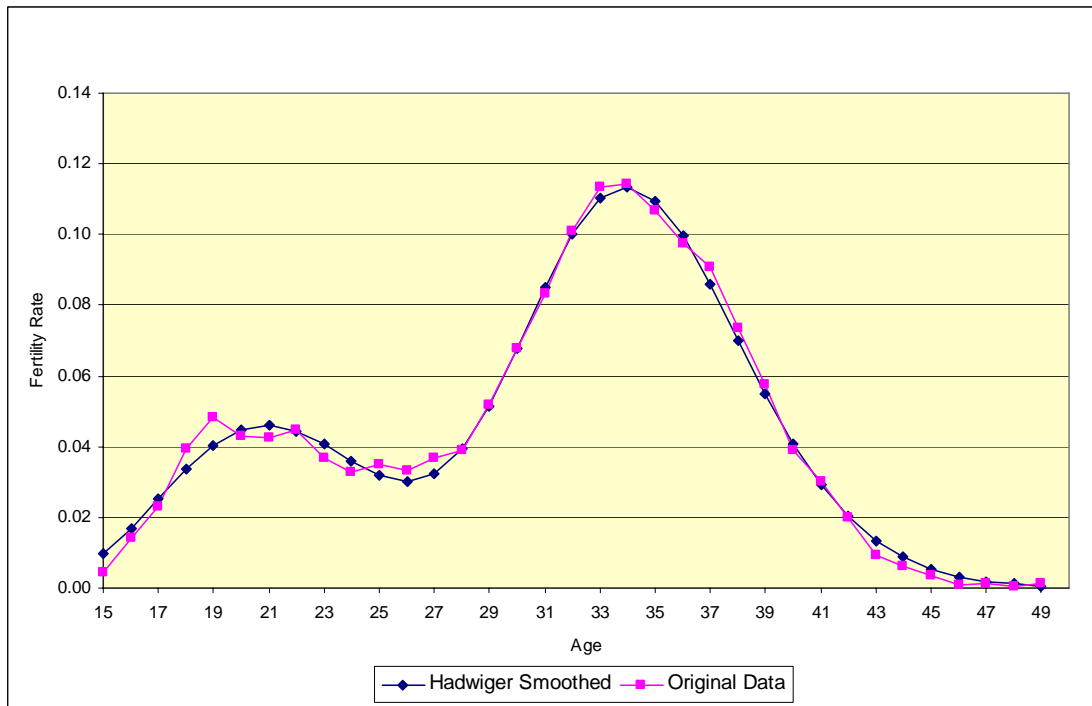


Chart 26: Barking and Dagenham

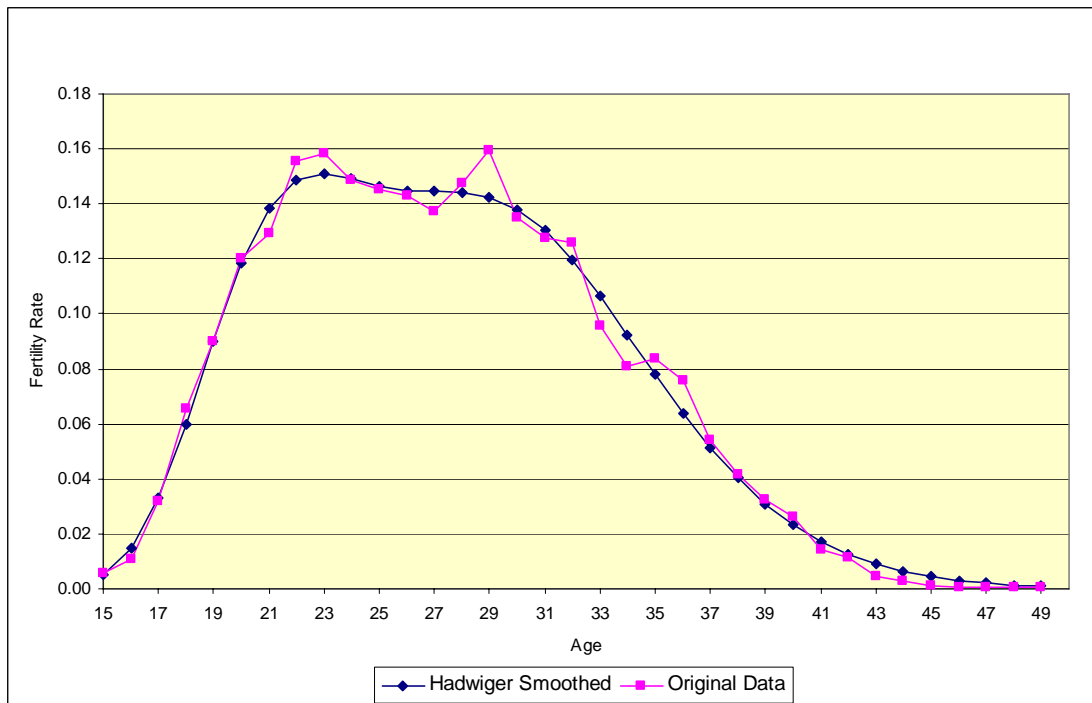


Chart 27: Barnet

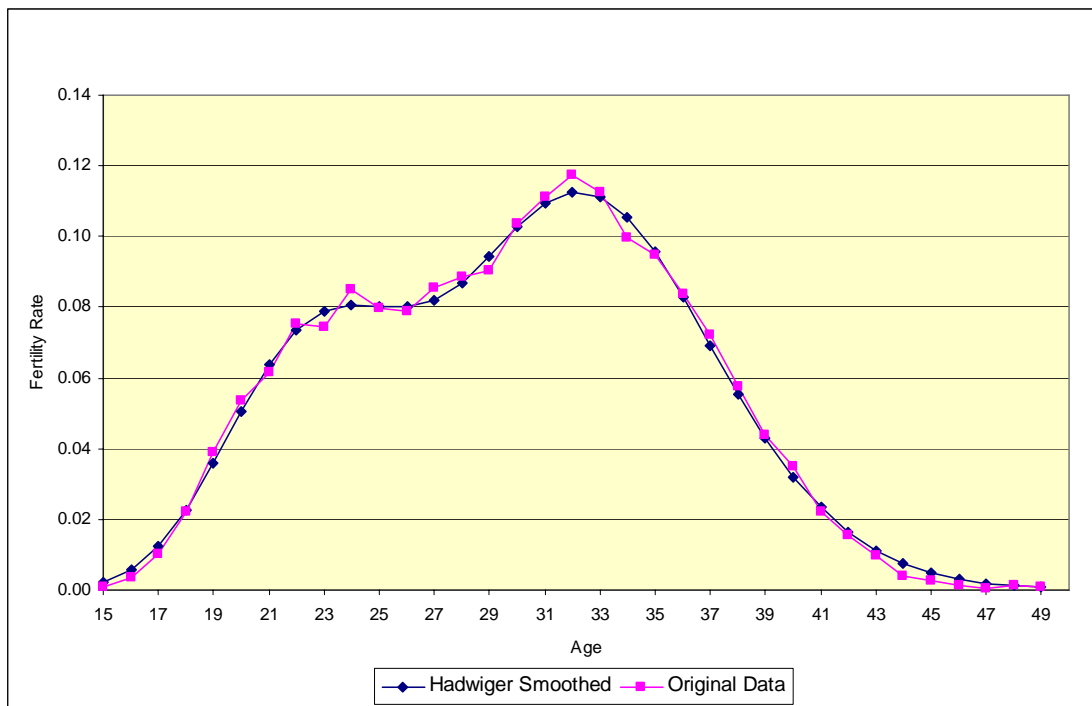


Chart 28: Bexley

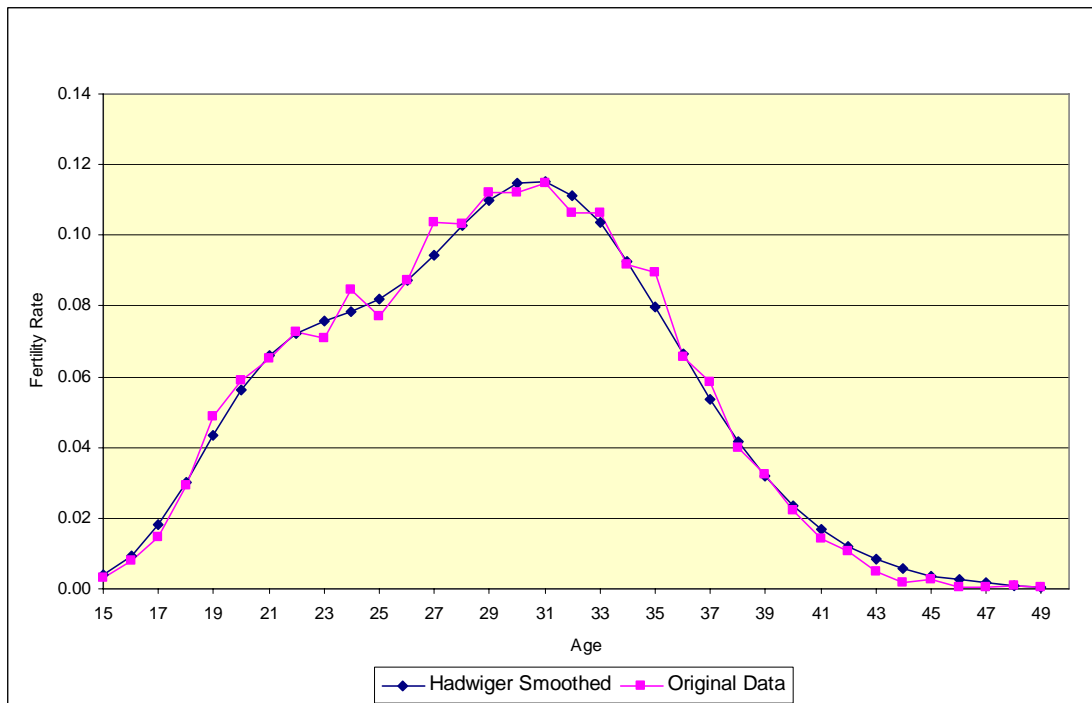


Chart 29: Brent

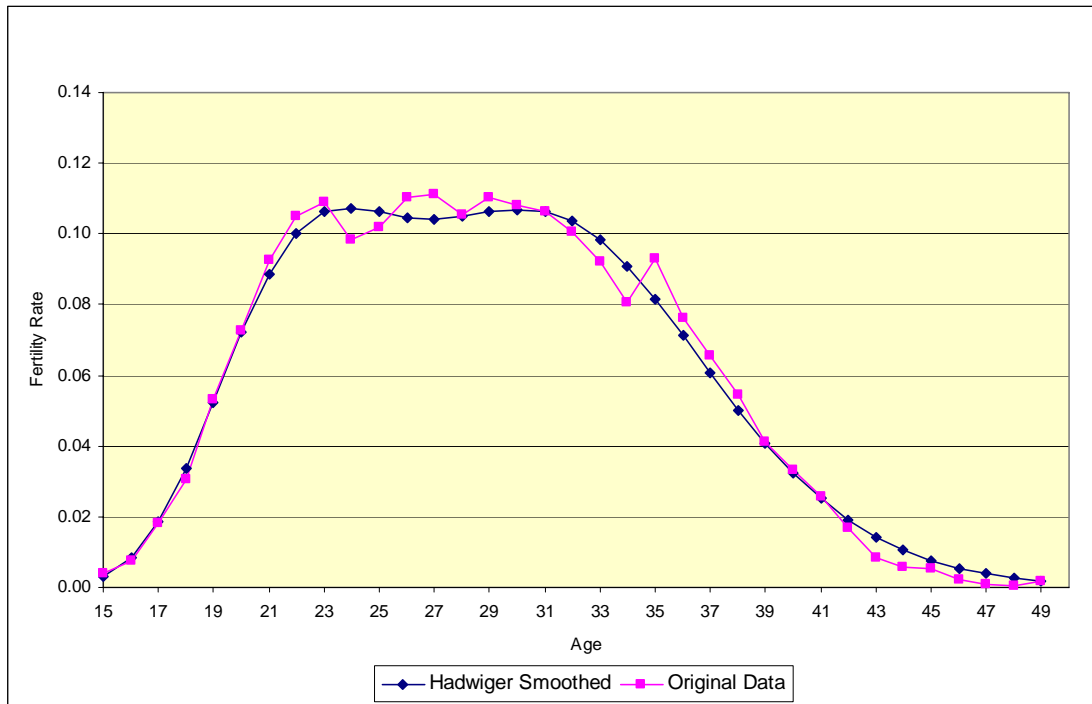


Chart 30: Bromley

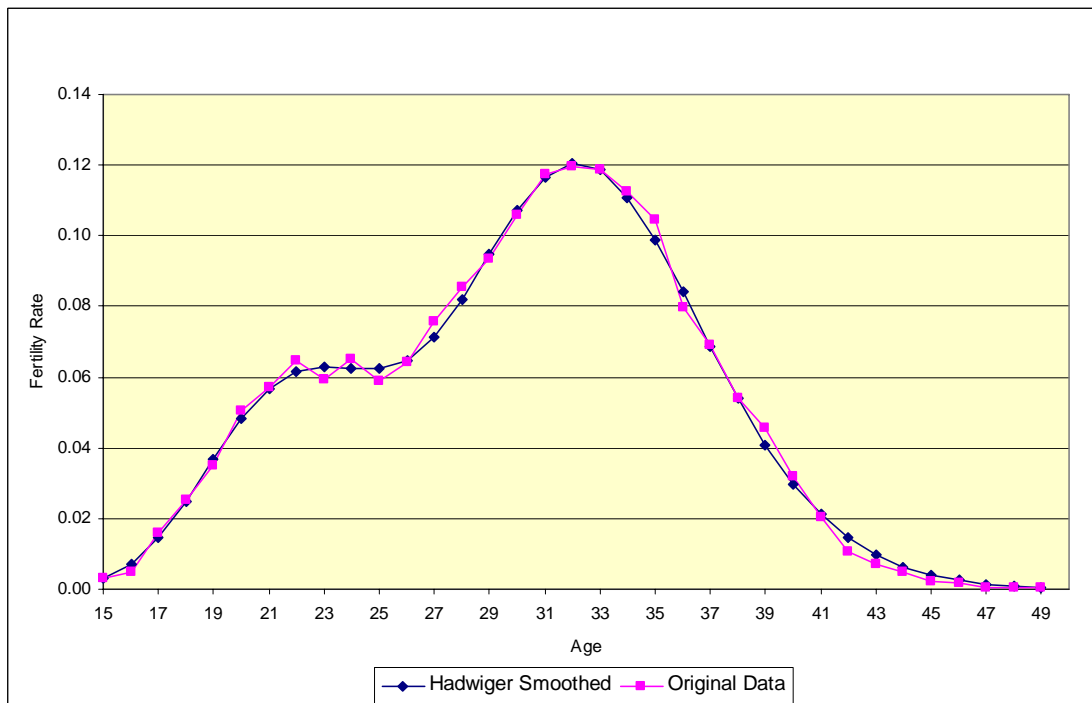


Chart 31: Croydon

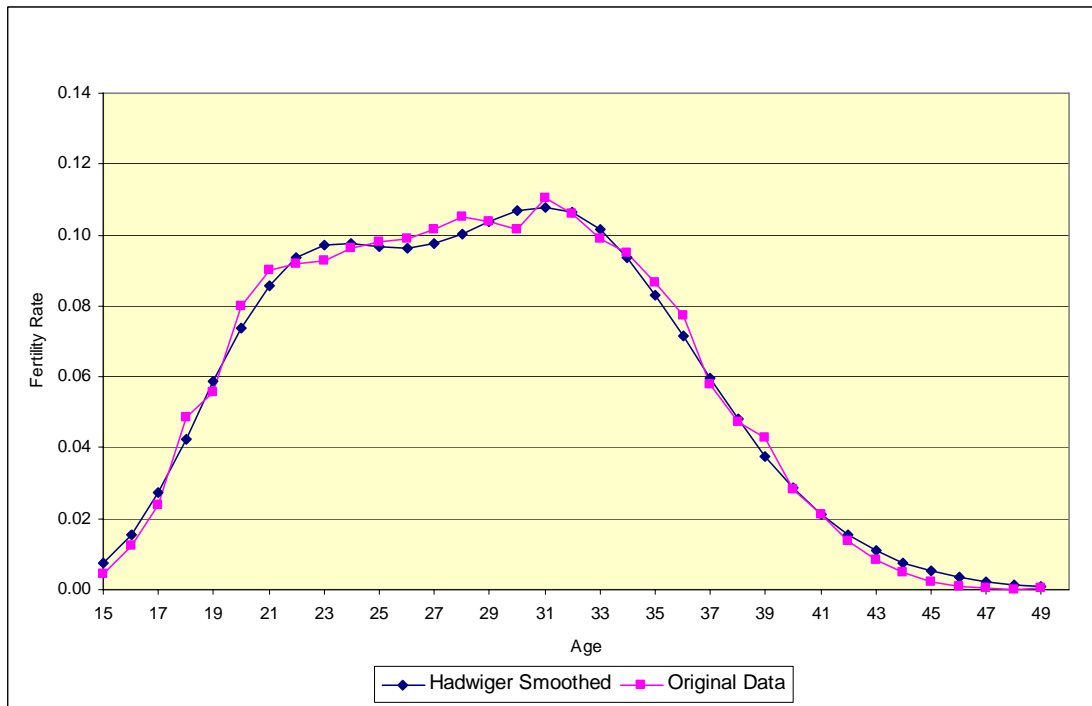


Chart 32: Ealing

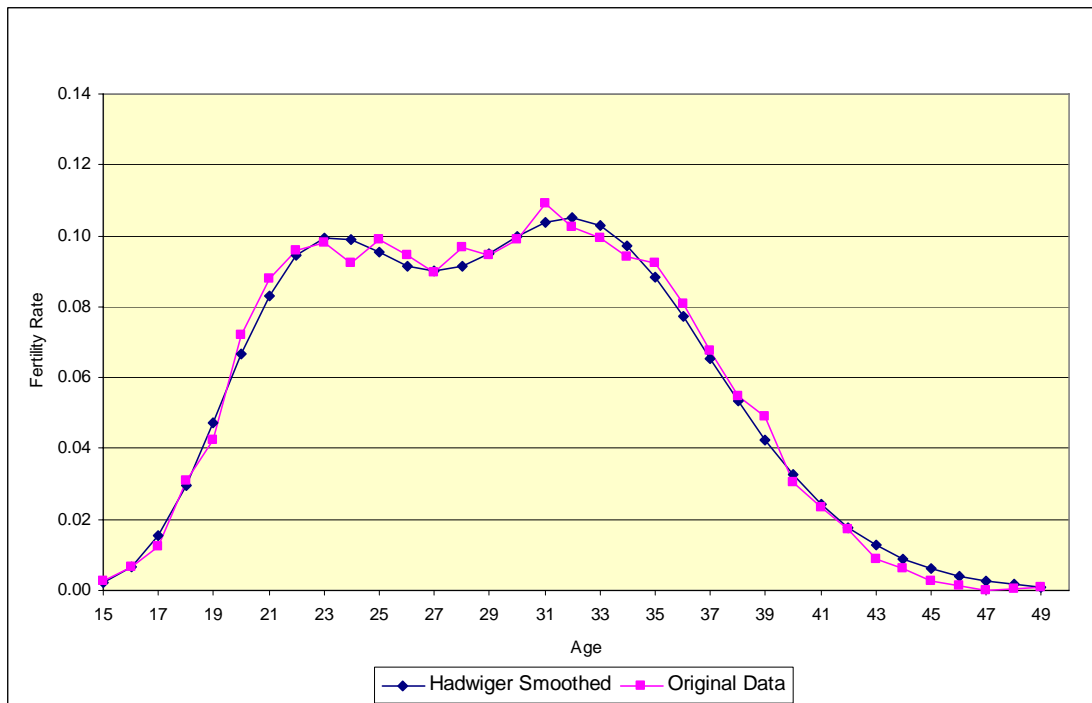


Chart 33: Enfield

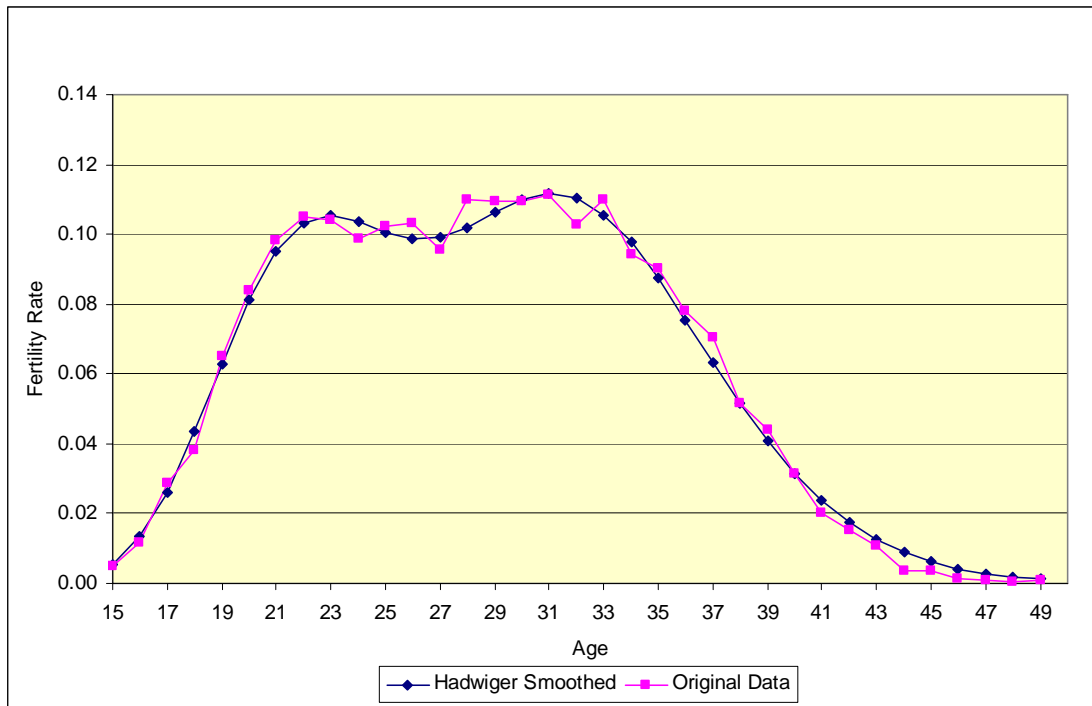


Chart 34: Greenwich

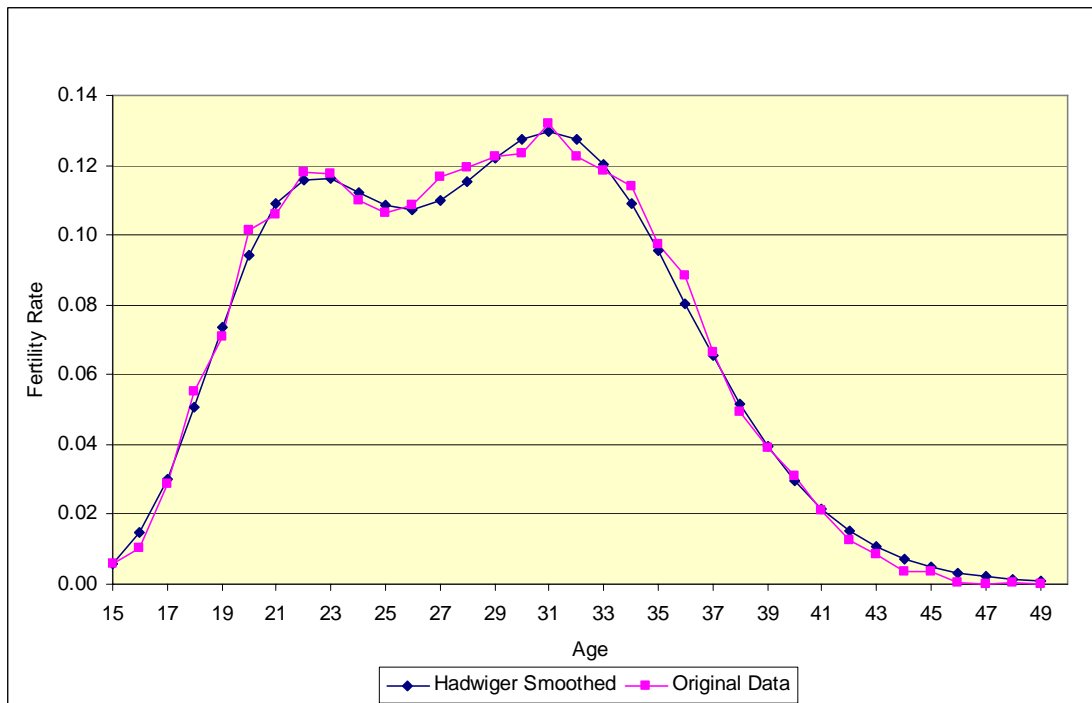


Chart 35: Harrow

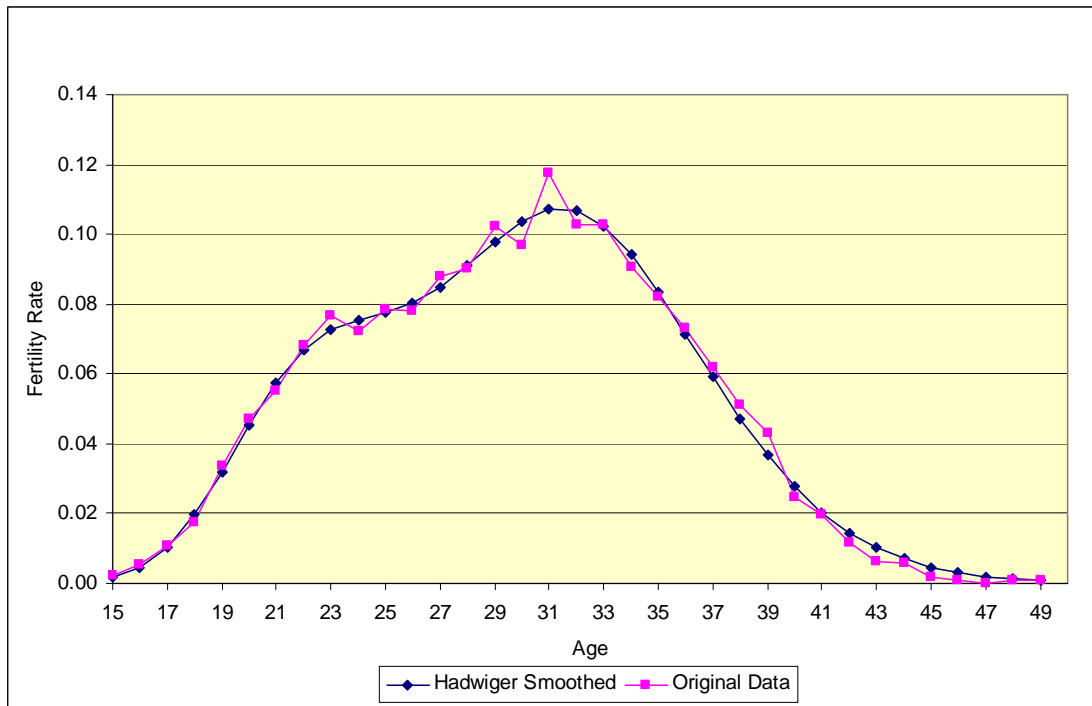


Chart 36: Havering

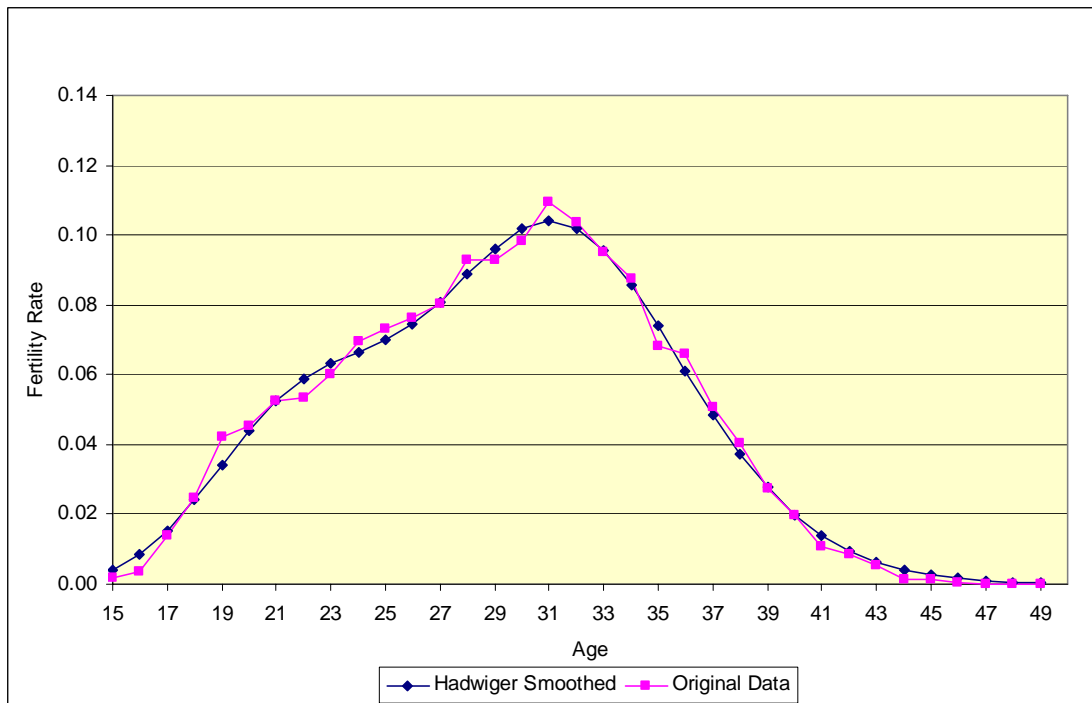


Chart 37: Hillingdon

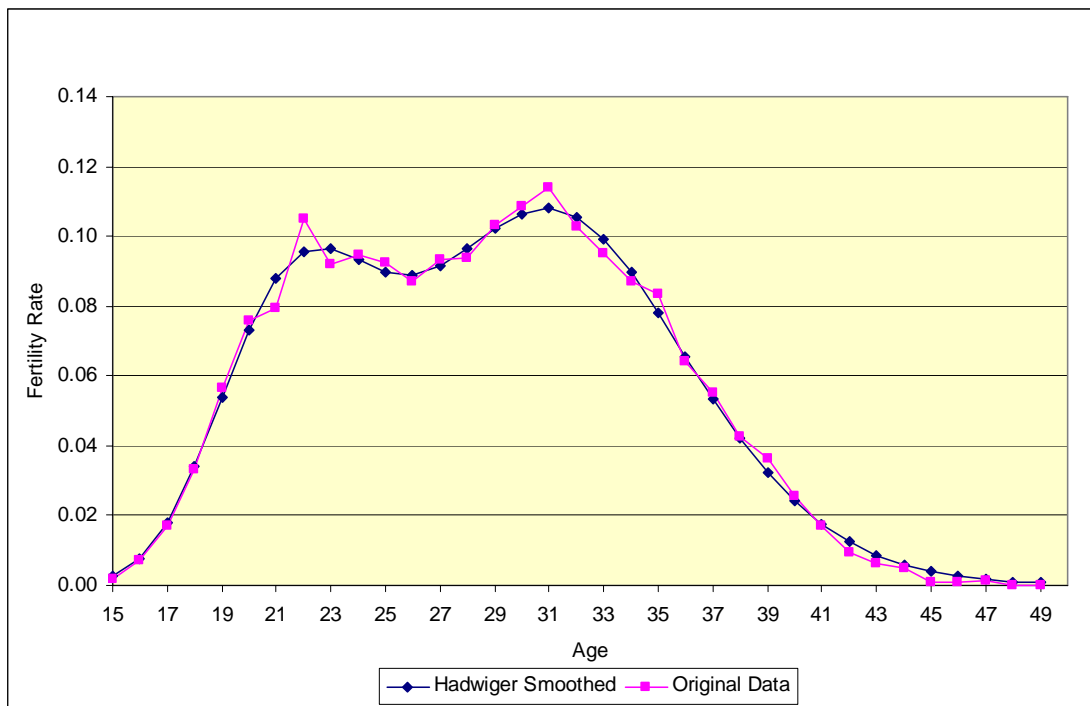


Chart 38: Hounslow

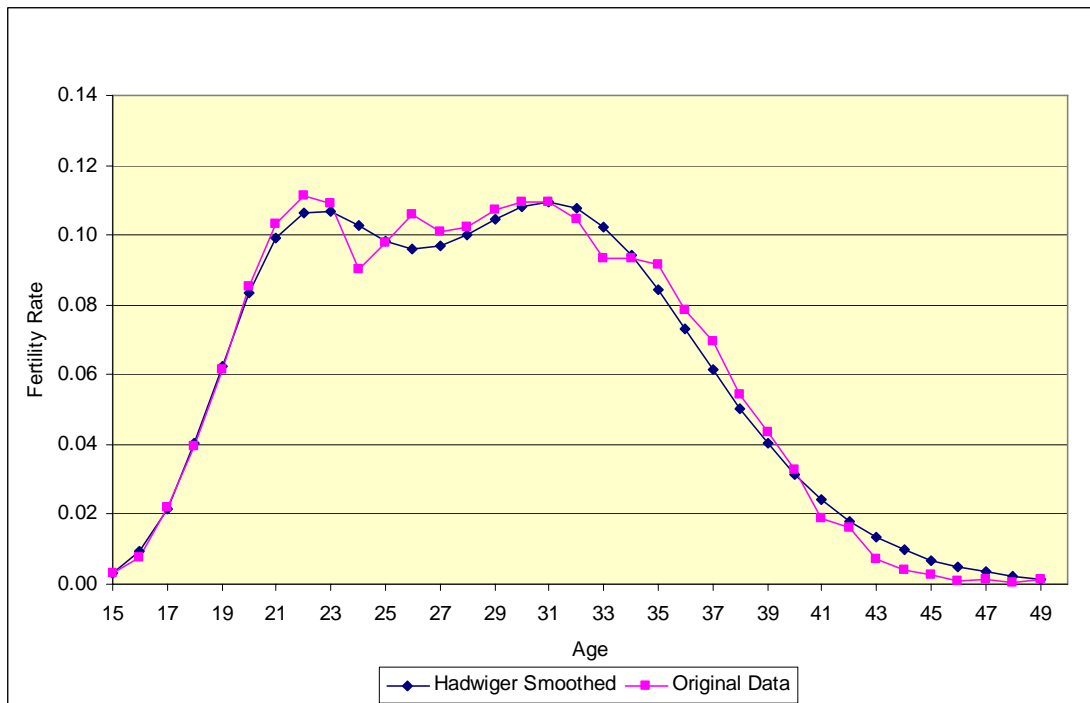


Chart 39: Kingston upon Thames

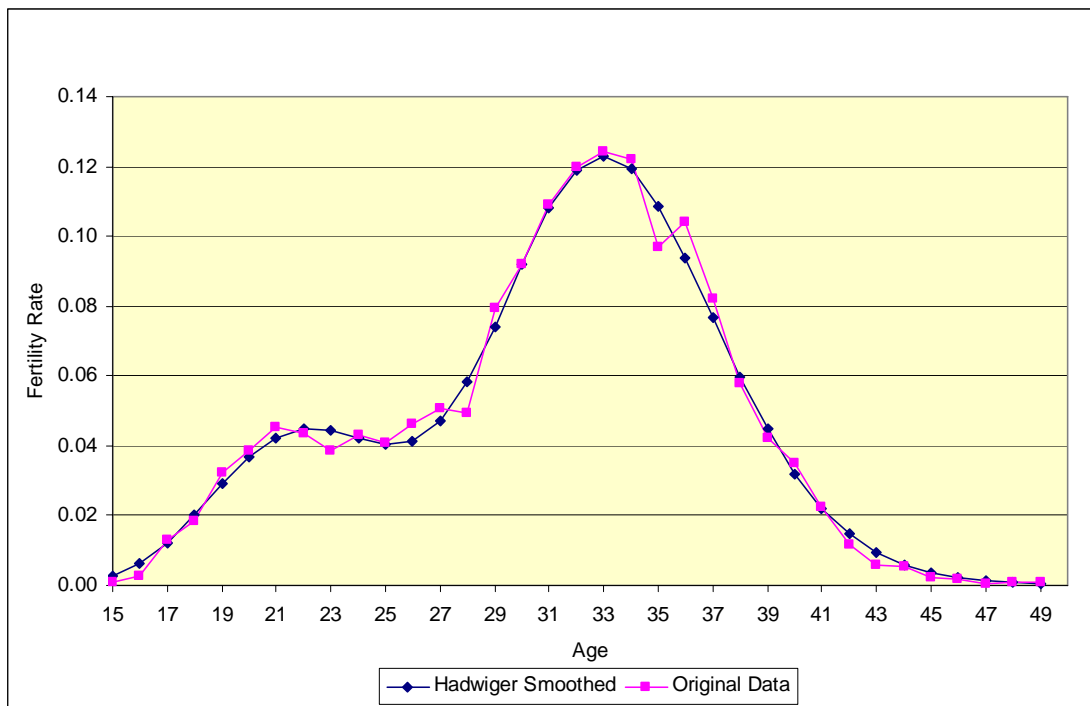


Chart 40: Merton

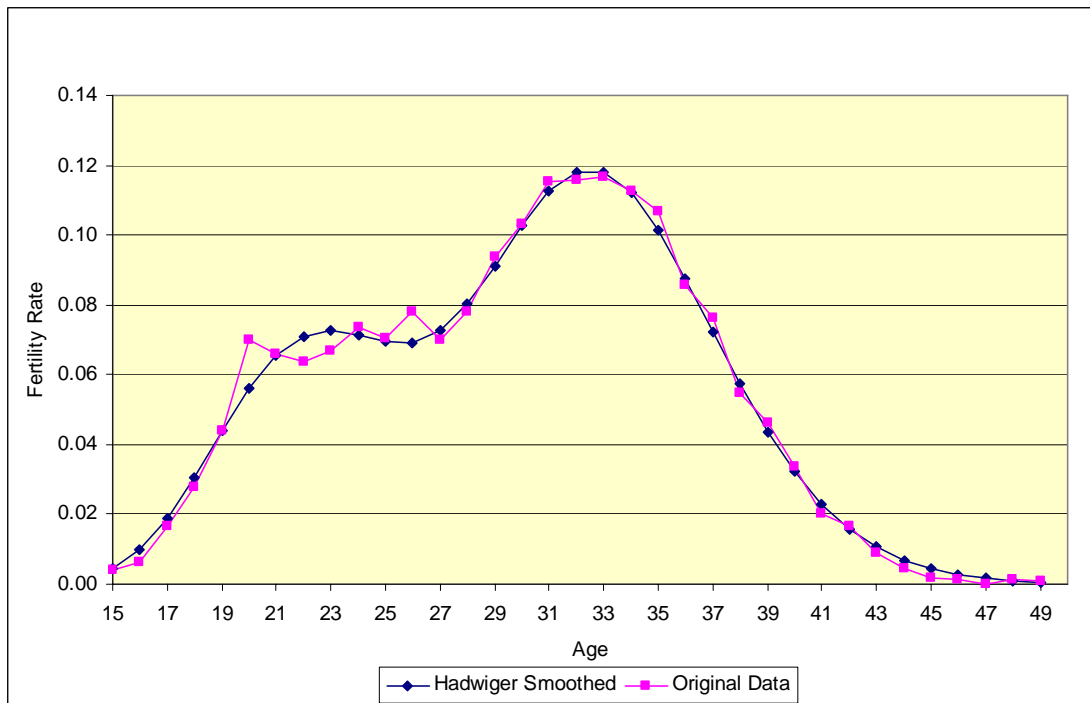


Chart 41: Redbridge

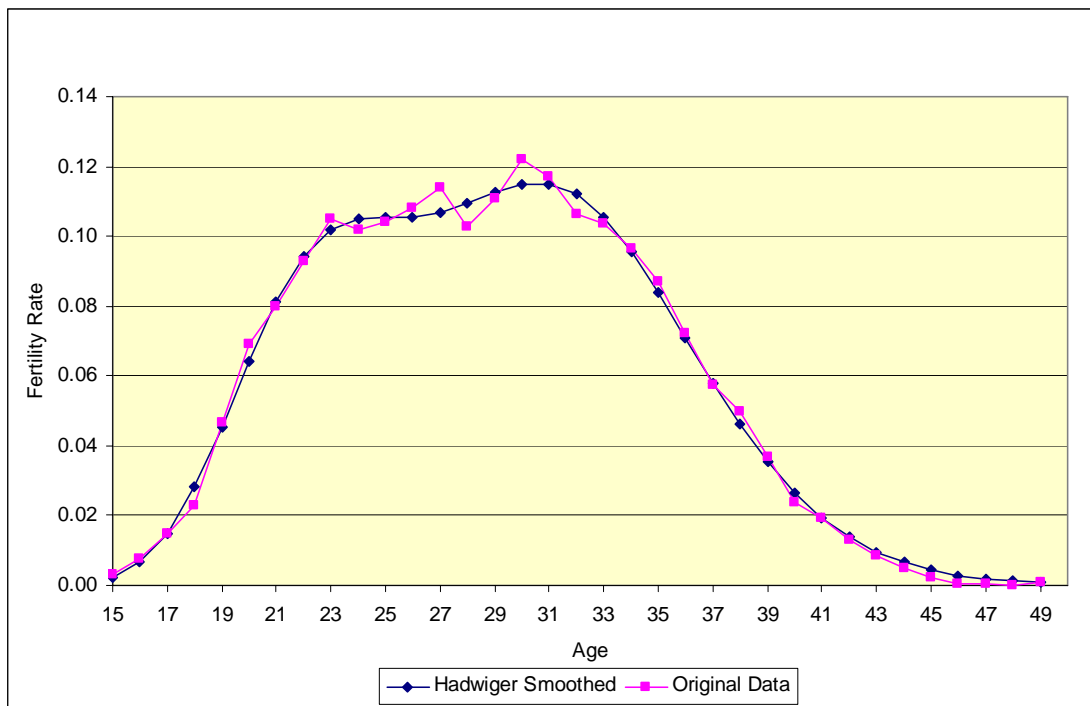


Chart 42: Richmond upon Thames

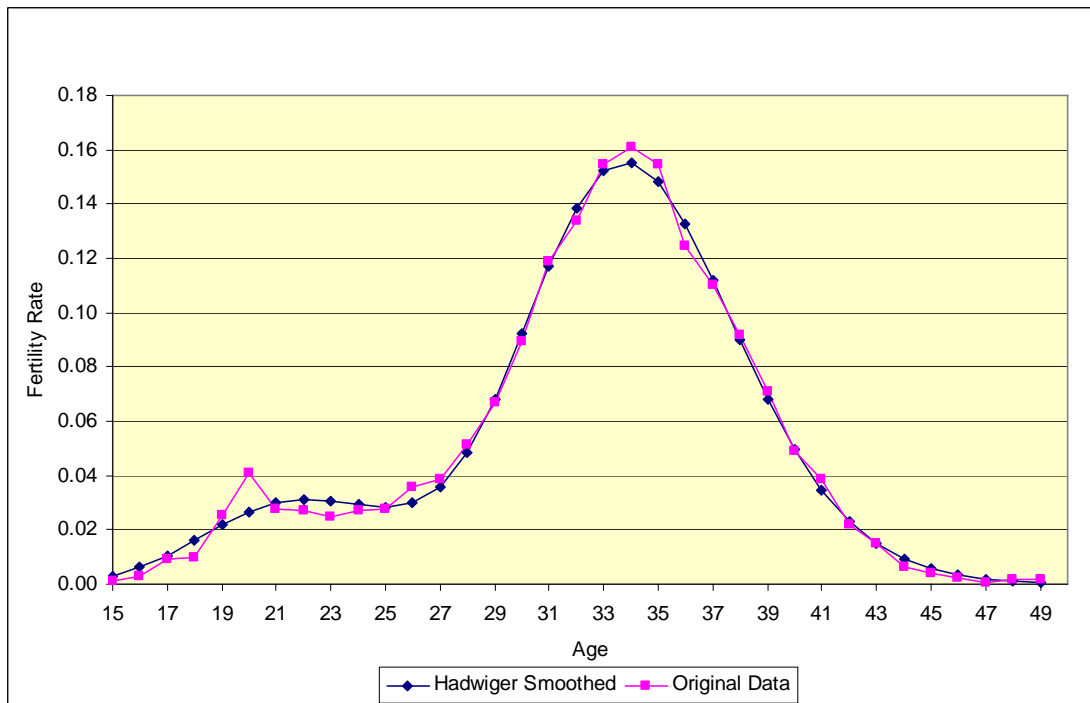


Chart 43: Sutton

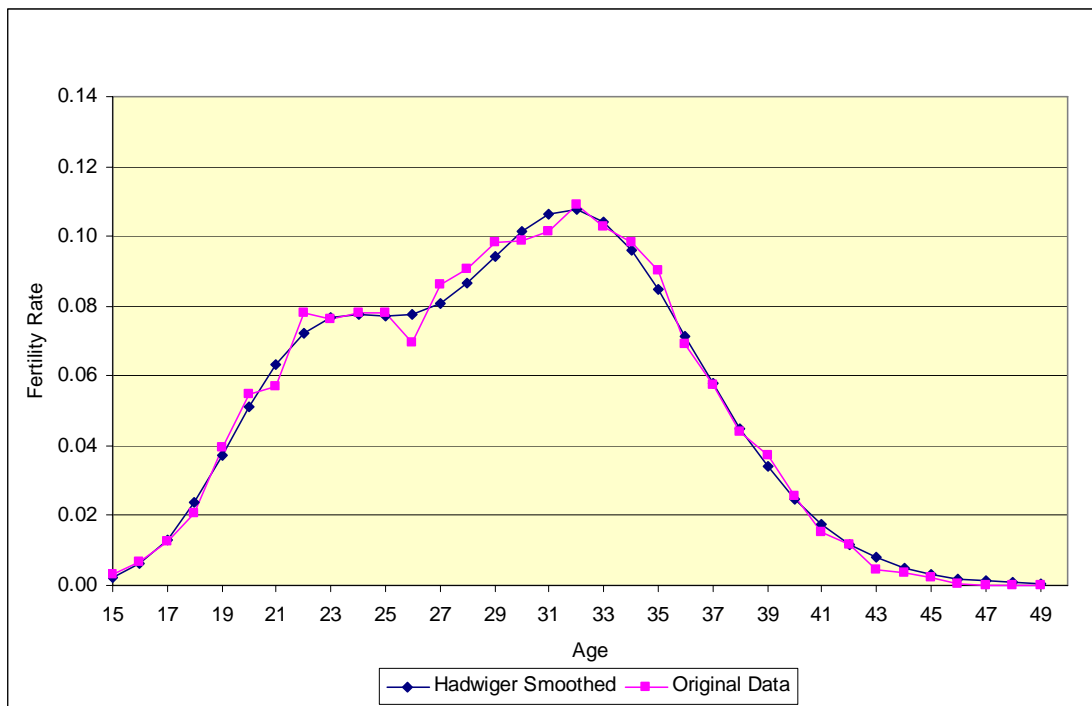
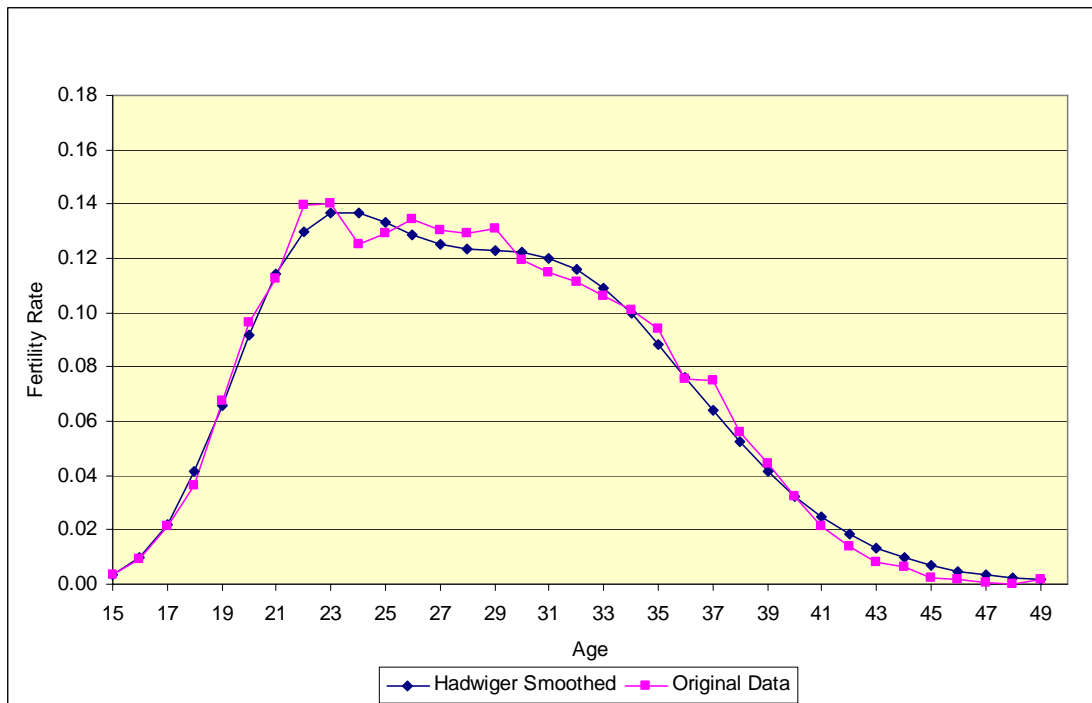


Chart 44: Waltham Forest



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Ben Corr (020 7983 4613) is responsible for redevelopment of the demographic models. ben.corr@london.gov.uk

Please use the above descriptions in deciding whom to contact to assist you with your information needs.