

# NOTE ON THE METHOD USED TO CALCULATE THE NMSS 2019-BASED HOUSEHOLD PROJECTION FOR BRAINTREE

## 1. Introduction

1.1. This note explains how the NMSS 2019-based household projection has been calculated.

## 2. How household projections are produced

2.1. There are two main stages to the production of a household projection: first a population projection is produced and then household formation rates are applied to that projection to estimate the number of household that will be formed.

2.2. The NMSS 2019-based household projection uses the same household formation rates as the ONS's 2018-based household projection as there is no more recent data which can be used to update those rates. All of the differences between the ONS's 2018-based projection and the NMSS 2019-based one are therefore due to differences in the population projection used.

2.3. The ONS's population projection methodology takes as its starting point a base year population estimate disaggregated by single year of age and sex. It then estimates the births, deaths and migration flows which will occur in the first year of the projection period and uses these to produce an estimated population at the end of the first year. That process is then repeated for each year until the end of the projection period is reached. This takes account of the inter-relationships between factors that cause the population of an area to change. For example, if more women of child bearing age move into an area the number of births is likely to rise if it is assumed (as is the case) that there is no change in fertility rates.

## 3. Producing the 2019-based projection

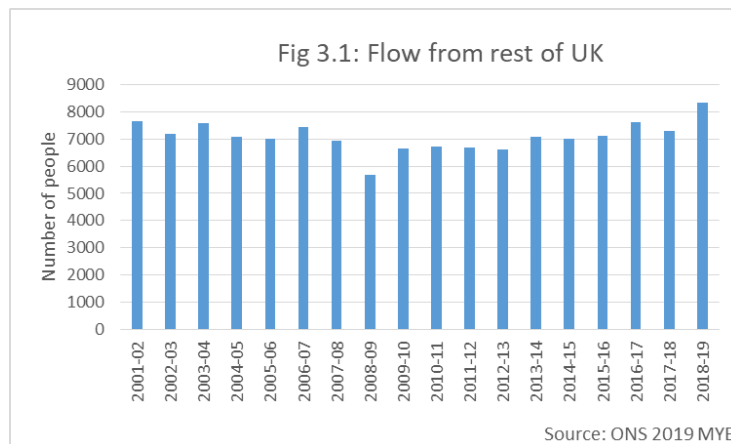
3.1. The population projection in the NMSS 2019-based household projection for Braintree has been produced by taking as its starting point the ONS's population estimate for 2019 (from the 2019 Mid-Year Estimates – '2019 MYE'). It then use data from the ONS's 2018-based projection (the '2018 SNPP') to estimate births, deaths and migration flows. In each case the method used follows the ONS's own method as closely as reasonably practicable.

3.2. Note that the 2019 MYE population estimate for Braintree (152,604) was higher than the population projected for 2019 in the 2018 SNPP (151,970). The fact that the 2019-based projection starts from a higher population than the 2018 SNPP projection for 2019 has the effect of setting it off on a higher trajectory.

3.3. For **births**, birth rates by age of mother derived from the 2018 SNPP are applied to the number of women of child bearing age at the beginning of a year to estimate the number of births in that year. This means that the change in the number of births between the ONS 2018 and NMSS 2019 projections is driven solely by the change in the number of women of child bearing age caused by the higher starting population and changes in the migration flows, which (see below) increase the population above that projected by the 2019 SNPP. The change in births is small, amounting to an average of an extra 10 births a year. This has no effect on the household projections during the study period as none of the additional children born in the period will form households before the end of the period.

- 3.4. The same approach is used for **deaths**, with mortality rates taken from the 2018 SNPP being applied to the higher population numbers. This produces a slightly larger impact, increasing the number of deaths by an average of 26 a year. The impact is larger than for births because the change in the population numbers to which the mortality rates are applied are larger for older age groups (which have higher mortality rates) than for women of child bearing age.
- 3.5. The ONS's method for projecting **international migration flows** shares out their international migration projections for England as a whole, based on the share of the international flows that went to or came from a given local authority during the trend period. In line with this the 2019-based projection adjusts the international migration flow projections in the 2018 SNPP in line with how Braintree's share of the international in and out flows changes between the trend period for the 2018-based projections (2013-2018) and that for the 2019-based projections (2014-19). The resulting changes are small: the projected international inflow falls by an average of 17 people a year during the study period and the outflow increases by 18 people. The net effect is to decrease the projected population growth.
- 3.6. The final components are the **flows from and to the rest of the UK**. The flow from the rest of the UK is projected by the ONS by calculating average outflow rates in the trend period for each year of age and sex group for each authority in the country and using those flow rates to project future outflows. The inflow to Braintree is the proportion of each of those outflows that has historically come to the district. Replicating that method in full is not practicable without the resources at the disposal of the ONS. A reasonable estimate can, however, be made by expressing the inflows to Braintree during the trend period as a proportion of the population of the rest of the UK. The impact of changing the trend period from the 2-year period used for 2018-based projections (2016-17 and 2017-18) to the 5-year period appropriate to a 2019-based projection (2014-15 to 2018-19) can be estimated by comparing the inflows in the two periods expressed as average proportions of the rest of the UK population and then scaling the inflows projected in the 2018 SNPP up or down by the ratio of the average in the 2019-based trend period to that in the 2018-based trend period.
- 3.7. There is a further complication in that there is not consistent data available for the trend period for the 2019-based projection because the ONS introduced a new method for estimating flows within the UK from 2016-17 onwards and has not produced a corrected back series on a comparable basis. However, when the new method was introduced for 2016-17 the ONS produced detailed datasets showing what the estimated flows would have been with and without the new methodology. Those datasets have been used to calculate the change by each year of age and sex group in that year. Those changes have then been used to adjust the flow estimates for 2014-15 and 2015-16 on the assumption that the adjustments in those years would have been similar. It is impossible to say how accurate that assumption is but it is highly likely that the adjusted flow estimates so produced are much closer to the figures that would have been produced had the ONS's new method been applied to those earlier years than the existing published figures.
- 3.8. The effect of updating the inflow projections using a 5-year trend period to 2019 in this way is to increase the projected inflow to Braintree by 208 a people a year. This is a much larger change than any of the other changes caused by updating to a 2019 base date, although it is only 2.7% of the inflow projected in the 2018 SNPP – not a large proportionate increase by any means.

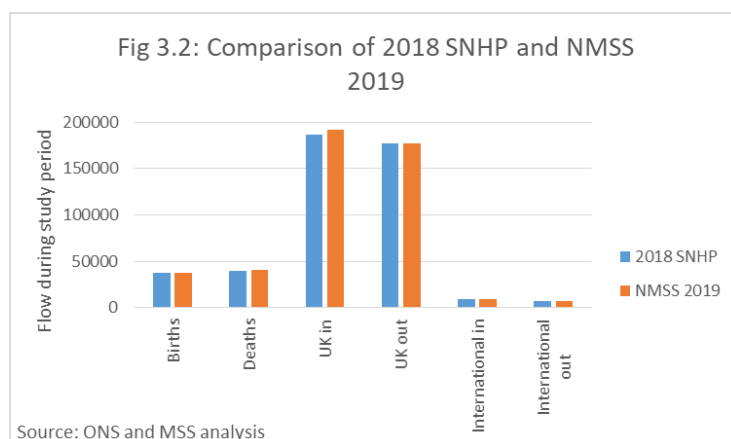
3.9. The main reason for the increase in the inflow is the sizeable jump in the inflow into Braintree estimated by the ONS for 2018-19, as shown in the following chart:



3.10. As can be seen, the flow in 2018-19 was noticeably higher than any inflow estimate since 2001-02. In particular it was 1010 people higher than in the previous year, an increase of nearly 14%. The methods used by the ONS to estimate flows within the UK are subject to significant uncertainties and these may be responsible for some of the increase between 2017-18 and 2018-19. However, it is equally likely that those same uncertainties may have caused the 2017-18 figure to be artificially low. The only sound way of allowing for these uncertainties is to use a reasonable length trend period and not rely of a single year or even two. Hence the decision to use a 5-year period even if a somewhat rough and ready method has to be used to produce broadly consistent figures for 2014-15 and 2015-16.

3.11. The projection of outflows is much more straightforward. For each year of age and sex group and outflow rate is calculated for the trend period. The 2019-based outflow projection is produced by multiplying by 2018 SNPP outflow by the average outflow in the 2019 trend period divided by the average outflow in the 2018 trend period. That scales the 2018 SNPP outflows by an appropriate factor. This produces another small adjustment which reduces the outflow projected in the 2018 SNPP by an average of 13 people a year.

3.12. Figures 3.2, 3.3 and 3.4 summarise the changes between the 2018 SNPP and the 2019-based projection during the study period. Note that Figure 3.3 shows the contribution each component makes to the change in the population projection. Thus, for example, an increase in deaths is shown as a negative figure as it reduces the population increase.



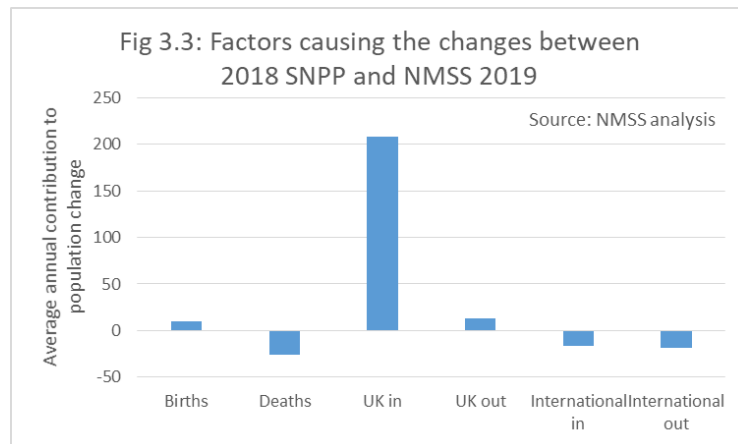


Figure 3.4: Components of change in study period (2013-37): 2018 SNPP and NMSS 2019				
	2018 SNHP	NMSS 2019	Difference	Difference/yr
Births	37770	38010	241	10
Deaths	39942	40571	629	26
UK in	186548	191546	4999	208
UK out	177243	176940	-304	-13
International in	9527	9120	-406	-17
International out	6925	7368	442	18
Adjustment	170	160	-10	0

- 3.13. Figure 3.3 shows very clearly that the dominant factor is the projected increase in the inflow from the rest of the UK. The other factors are an order of magnitude smaller and to some extent cancel each other out.
- 3.14. The net effect of the changes is to increase the population increase of 9,903 projected in the 2018 SNPP to 13,958 in the 2019-based projections. In the 2018 SNPP the population of Braintree increases from 149,150 in 2013 to 159,053 in 2037 whereas in the 2019-based projection the 2037 population is projected to be 163,108.
- 3.15. Having produced a 2019-based 5-year trend projection, the ONS's assumptions are used to remove the communal population (i.e. those living in care homes, boarding schools, halls of residence, prisons etc.) to leave the population living in households. The household formation rates from the 2018 SNHP are then used to turn that projection into a household projection. The result is a projection that suggests that the number of households in Braintree will grow from 61,945 in 2013 to 72,264 in 2037, an increase of 10,319 or 430 households a year. This compares with the 2018 SNHP which projects 70,516 households in 2037, an increase of 8571 or 357 a year.
- 3.16. The detailed numbers for births, deaths and migration flows for both the NMSS 2019-based 5-year trend projection and the ONS's 2018 SNHP are set out in the appendix to this note.

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## APPENDIX: DETAILED MODELLING RESULTS

### NMSS 2019-based 5-year trend projection

Projections	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Population	149150	150076	150530	151233	151677	151561	152604	153273	153990	154701	155386	156028	156625	157202	157758	158301	158817	159335	159859	160385	160926	161475	162007	162551	163108
Households	61945	62485	62921	63354	63764	63872	64347	64813	65273	65814	66310	66815	67269	67730	68198	68638	69068	69477	69898	70296	70687	71080	71467	71871	72264

Components of change	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37
Births	1621	1636	1678	1667	1701	1591	1563	1565	1563	1561	1547	1550	1550	1548	1546	1544	1547	1551	1556	1563	1572	1583	1596	1612
Deaths	1291	1496	1452	1455	1583	1521	1525	1546	1571	1605	1619	1648	1680	1712	1744	1769	1807	1840	1875	1907	1936	1968	1996	2023
England in	6986	6932	7036	7515	7215	8215	7794	7830	7859	7881	7899	7923	7953	7986	8026	8062	8105	8144	8186	8232	8282	8323	8363	8403
England out	6622	6838	6702	7327	7311	7207	7190	7153	7154	7158	7184	7219	7238	7256	7276	7311	7318	7320	7332	7339	7360	7398	7411	7426
Cross border in	97	91	92	98	97	107	101	101	101	100	100	99	100	100	100	101	101	101	101	102	102	102	102	101
Cross border out	150	152	152	164	164	164	164	163	162	163	162	163	163	164	164	164	164	164	165	164	164	164	164	163
International in	451	494	488	439	369	361	410	399	387	376	364	352	352	352	352	352	352	352	352	352	352	352	352	352
International out	203	219	290	306	443	339	328	323	319	314	309	304	304	305	305	305	306	306	307	307	307	307	307	307
Adjustment	37	6	5	-23	3	0	8	7	7	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8

### ONS's 2018 Sub-national household projection (2018 SNHP)

Projections	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Population	149150	150076	150530	151233	151677	151561	151970	152370	152818	153266	153699	154094	154464	154833	155181	155533	155866	156216	156582	156958	157360	157773	158179	158606	159053
Households	61945	62485	62921	63354	63764	63872	64294	64629	64971	65391	65785	66184	66534	66895	67263	67614	67954	68275	68608	68923	69240	69555	69867	70193	70516

Components of change	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33	2033-34	2034-35	2035-36	2036-37
Births	1621	1636	1678	1667	1701	1533	1554	1556	1553	1552	1537	1540	1540	1538	1536	1534	1537	1540	1545	1552	1561	1572	1585	1600
Deaths	1291	1496	1452	1455	1583	1444	1522	1539	1561	1590	1602	1628	1656	1688	1714	1739	1772	1803	1835	1862	1888	1916	1941	1965
England in	6986	6932	7036	7515	7215	7533	7565	7600	7631	7650	7666	7687	7715	7746	7786	7825	7866	7904	7949	7998	8043	8083	8122	8161
England out	6622	6838	6702	7327	7311	7289	7263	7227	7227	7223	7244	7258	7260	7277	7285	7315	7312	7305	7314	7318	7336	7365	7372	7384
Cross border in	97	91	92	98	97	99	99	98	98	98	97	97	97	97	97	97	98	98	98	99	99	99	99	99
Cross border out	150	152	152	164	164	164	164	163	163	162	162	162	162	162	163	163	163	163	163	162	162	161	161	160
International in	451	494	488	439	369	443	431	419	407	395	382	370	370	370	370	370	370	370	370	370	370	370	370	370
International out	203	219	290	306	443	311	306	302	297	292	287	282	282	282	282	282	282	282	282	282	282	282	282	282
Adjustment	37	6	5	-23	3	10	8	7	7	6	7	7	7	7	7	7	7	7	8	8	8	8	8	8