Routine data generated in the course of NHS activity, rather than survey measures, are typically used to estimate health service utilisation and costs. In order to explore the validity of survey measures we compared estimates of secondary care utilisation from The European Health Interview Survey (EHIS) wave 2 (2013-4)1 and Understanding Society (US) Wave 7 (2015-2017)2 with estimates from NHS Digital in England (2016-2017)3. In addition we compared estimates of primary care utilisation from EHIS and US with GP electronic record based estimates of consultations from the work of Hobbs et al4 based on the Clinical Practice Research Datalink (CPRD), and with survey measures from the General Practice Patient Survey (GPPS) wave 10 (2015-2016)5. All survey estimates are weighted using the relevant cross-sectional survey weights.

Summary of findings

Comparisons of the percentage of the population reporting an inpatient admission in the past year were made on slightly different populations; NHS Digital; England, and including all ages from birth (~10.7%); EHIS (8.3%) and US (8.9%), considering only people age 16+, and including the whole of the UK. Estimates are none the less in the same order of magnitude. Survey measures of people reporting any inpatient or day case admission (EHIS 22.9%) are higher than estimates from NHS Digital (17.0%), suggesting that survey respondents may be including other health care contacts that are not strictly day case admissions in these responses. Our key finding is that survey data is not under-estimating health care utilisation, although differences between survey data and NHS data are greatest at older ages.

The differences between the data sources limits the strength of these comparisons, however there is nothing to suggest that survey measures are capturing entirely different constructs from routinely captured health service measures of utilisation.

In primary care, rates of GP utilisation from EHIS and CPRD records fell again in broadly similar ranges. 4.6 per person per year in women and 2.0 in men among 16-24 year olds to 13.1 in women and 13.3 in men among people age 85+ in CPRD; rising from 6.4 per person per year in women and 2.4 in men among 16-24 year olds to 7.8 in women and 8.1 in men among people age 85+ in EHIS. This suggests over all broad comparability between routine data and survey measures of primary care utilisation data.

However the variation consultation rates by age among women was lower in EHIS compared with CPRD; considering GP visits in the past year, this lack of variation by age among women was also seen in a further survey health services source (GPPS), and in US. Differences in the types of consultations that are captured between routine data and survey responses may explain some of these differences.

Conclusion

1 Office for National Statistics, Northern Ireland Statistics and Research Agency. (2016). European Health Interview Survey: United Kingdom Data, Wave 2, 2013-2014. [data collection]. UK Data Service. SN: 7881, http://doi.org/10.5255/UKDA-SN-7881-1
2 University of Essex. Institute for Social and Economic Research, NatCen Social Research, Kantar Public. (2018). Understanding Society: Waves 1-7, 2009-2016 and Harmonised BHPS: Waves 1-18, 1991-2009. [data collection]. 10th Edition. UK Data Service. SN: 6614, http://doi.org/10.5255/UKDA-SN-6614-11
3 NHS Digital Hospital Admitted Patient Care Activity 2016-17 https://files.digital.nhs.uk/pdf/0/8/hosp-epis-stat-admi-summ-rep-2016-17-rep.pdf
4 Hobbs, F.D.R., et al., Clinical workload in UK primary care: a retrospective analysis of 100 million consultations in England, 2007-14. Lancet, 2016. 387(10035): p. 2323-2330.
5 NHS England. (2016). The GP patient survey 2016. [data collection]. UK Data Service. SN: 852402, http://doi.org/10.5255/UKDA-SN-852402
Survey measures of utilisation appear to capture broadly similar measures compared with standard routine data measures; giving estimates that are within plausible ranges compared with standard sources, however there are differences, and caution, particularly for older age groups, is required in interpretation.
Supplement B. Secondary care utilisation – comparison of NHS Digital data, EHIS and US

In 2016/2017 NHS Digital reports that there were 9,419,571 patients in England, counting both inpatient and daycase admissions, out of a total population in England of 55,268,100 who had at least one hospital admission during the year; i.e. 17.0% of the population. In 2016-17 there were 19.7 million finished consultant episodes (FCE), and of these episodes, 16.5 million were admissions; of these FCEs 36.1% were daycase admissions and 63.9% were ordinary episodes.

From EHIS 8.3% of people report an inpatient stay in the past year, responding yes to the question “In the past 12 months have you been in hospital as an inpatient, that is overnight or longer?” 18.2% reported a daycase admission (responding yes to the question “In the past 12 months have you been admitted to hospital as a day patient, that is admitted to a hospital for diagnostic, treatment or other types of health care, but not required to remain overnight?) and 22.9% reported yes to at least one of these questions.

From US 8.9% of people responded yes to the question “In the last 12 months, have you been in hospital or clinic as an in-patient overnight or longer?”

The figures from NHS Digital are not directly comparable with estimates from EHIS or US, as these sources only provide estimates for people age 16 and over. NHS Digital figures show that 10.6% of all 19.7 million finished consultant episodes were among people age 0-14 years old, and these numbers include babies born in hospital. In addition, EHIS and US are UK data sources, and estimates from NHS Digital are based on England alone. However they do provide a useful framework to check whether estimates are broadly comparable.

These comparisons suggest that all three sources do estimate broadly similar percentages of people reporting inpatient admissions. Estimates of inpatient admissions from EHIS of 8.3% and US of 8.9% are similar, suggesting that the questions perform consistently across surveys. They are also close to estimates from NHS Digital, which would be about 10.7% after reducing the total percentage of admissions by the percentage of day case FCEs. The slightly lower survey estimates can also be explained in part by the fact that NHS Digital counts admissions by babies at birth, and these admissions are not present in these survey populations.

The totals numbers of patients reporting either an inpatient or daycase admission from EHIS was 22.9%, and in NHS Digital data 17.0%. It is likely that survey questions about daycase admissions are being interpreted more broadly than definitions taken from NHS sources.

Primary care utilisation – comparison of CPRD, GPPS, EHIS and US

As part of their analysis of GP workload Hobbs et al presented consultation rates stratified by age and gender. In 2013/4 these rise from 4.6 per person per year in women and 2.0 in men among 16-24 year olds to 13.1 in women and 13.3 in men among people age 85+.

In response to the question in EHIS “During the past four weeks ending yesterday, how many times did you consult a GP (general practitioner) or family doctor on your own behalf?” we calculated similar rates per person per year from the EHIS data. These rise from 6.4 per person per year in women and 2.4 in men among 16-24 year olds to 7.8 in women and 8.1 in men among people age 85+ (Table 1)

Table 1: GP consultation rates per person per year

| GP appointments per person per year | CPRD | EHIS |
|------------------------------------|------|------|
|                                    | Women | Men  | Women | Men  |
| 16-24                              | 4.6   | 2.0  | 6.4   | 2.4  |
| 25-44                              | 5.5   | 2.5  | 6.3   | 3.3  |
| 45-64                              | 6.1   | 4.3  | 6.2   | 5.5  |
| 65-74                              | 8.2   | 7.7  | 6.7   | 5.7  |
| 75-84                              | 11.3  | 10.9 | 8.0   | 6.9  |
We also compared estimates from the General Practice Patient Survey, sent to a nationally representative sample of people registered with a GP in England. In GPPS respondents were asked: “In the last 12 months, approximately how many times have you talked to, or visited a GP or family doctor about your own health? Please do not include any visits to a hospital?” with response options: None; One or two; Three to five; Six to ten; More than ten. In EHIS respondents were asked: “When was the last time you consulted a GP (general practitioner) or family doctor on your own behalf?” with response options: Less than 12 months ago; 12 months ago or longer; Never. In US respondents were asked “In the last 12 months, approximately how many times have you talked to, or visited a GP or family doctor about your own health?” Please do not include any visits to a hospital, with response options: None; One or two; Three to five; Six to ten; More than ten.

The percentage of people reporting a GP visit in the last year ranged from 67.1-93.4% of men and 85.5-92.6% of women in GPPS, with lower estimates from EHIS and US. From all three surveys the proportion of men reporting a GP visit in the last 12 months rose with increasing age, but among women the increase with age was much flatter (Table 2).

Table 2: Percentage of people reporting having visited their GP in the last year

| Visited a GP in the last 12 months | GPPS (England) | EHIS (UK) | US (UK) |
|----------------------------------|----------------|-----------|---------|
|                                  | Men            | Women     | Men     | Women  | Men    | Women  |
| 16-24                            | 67.1           | 87.7      | 52.0    | 76.8   | 53.2   | 76.3   |
| 25-34                            | 71.6           | 91.5      | 56.9    | 82.9   | 56.6   | 76.5   |
| 35-44                            | 76.1           | 90.5      | 60.1    | 76.4   | 58.0   | 73.8   |
| 45-54                            | 77.5           | 87.3      | 65.0    | 77.4   | 65.0   | 75.0   |
| 55-64                            | 82.0           | 85.5      | 73.8    | 77.1   | 73.1   | 77.4   |
| 65-74                            | 87.8           | 88.2      | 81.2    | 84.8   | 81.8   | 79.8   |
| 75-84                            | 92.1           | 92.3      | 86.2    | 86.6   | 84.9   | 86.0   |
| 85+                              | 93.4           | 92.6      | 85.9    | 84.9   | 88.6   | 85.5   |

Estimates of utilisation are higher from GPPS compared with US and EHIS, and this is likely to reflect response bias in GPPS (and the fact that the sampling frame for GPPS only includes people who are registered with a GP). GPPS is a postal survey, and people are asked about their experiences with their GP; response rates are likely to be lower among people who have not attended their GP in the past 12 months. EHIS and US will also capture people who are not registered with a GP; although numbers here are low. However GPPS, EHIS and US all display the characteristic of substantially less variation in GP utilisation by age among women compared with men, which is a feature that is not seen in CPRD data.

There are several reasons why this may be. Younger people may be more likely to access community services and record them as primary care utilisation in a survey response, although they are not captured in electronic records. These could include out of hours primary care consultations, 111 phone calls, A&E GP visits, private GP services, including online pharmacies, sexual health clinics, drugs and alcohol or mental health services, or health visitor open access clinics. In the same way administrative primary care encounters around prescriptions, LTC clinic reminders, and results, seeing a health care assistant for dressings, INR readings, or phlebotomy etc., or attending other

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6 Saunders C. Taking an Interest: What Makes Someone Respond to a Survey (2016) Statistics Views, Wiley
http://www.statisticsviews.com/details/feature/8739491/Taking-an-Interest-What-Makes-Someone-Respond-to-a-Survey.html
community services will be more likely to be recorded in electronic patient records among older people, but may not appear in survey responses.
| Domain                  | Survey | Item                                                                                                                                 |
|------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------|
| **Primary care**       | US     | In the last 12 months, approximately how many times have you talked to, or visited a GP or family doctor about your own health? Please do not include any visits to a hospital.  
None; One or two; Three to five; Six to ten; More than ten  
Grouped for analysis: “One or two”, “Three to five”, “Six to ten”, and “More than ten” compared with “None” |
| **Outpatient**         | US     | In the last 12 months, approximately how many times have you attended a hospital or clinic as an out-patient or day patient?  
None; One or two; Three to five; Six to ten; More than ten  
Grouped for analysis: “One or two”, “Three to five”, “Six to ten”, and “More than ten” compared with “None” |
| **Inpatient**          | US     | In the last 12 months, have you been in hospital or clinic as an in-patient overnight or longer?  
Yes; No |
| **Inpatient maternity care** | US     | [asked to people responding yes to the question about about inpatient admissions] Was any of this for childbirth?  
Yes, all of it; Yes, some of it; No  
Grouped for analysis “Yes, all of it” and “Yes some of it” compared with “No” |
| **Mental health services** | EHIS   | In the past 12 months have you visited on your own behalf a psychologist, psychotherapist or psychiatrist  
Yes; No |
| **Dental care**        | EHIS   | When was the last time you visited a dentist or orthodontist on your own behalf (that is, not while only accompanying a child, spouse, etc.)?  
Less than 6 months; 6 to less than 12 months; 12 months or longer; Never  
Grouped for analysis “Less than 6 months” and “6 to less than 12 months” compared with “Never” and “12 months or longer” |
| **Physiotherapy**      | EHIS   | In the past 12 months have you visited on your own behalf a physiotherapist or kinesitherapist  
Yes; No |
### Supplement D: Survey responses flowchart

|                        | EHIS Number of responses (% of all responses) | US Number of responses (% of all responses) |
|------------------------|-----------------------------------------------|---------------------------------------------|
| All responses          | 20,161                                        | 42,217                                      |
| Sample size after …    |                                               |                                             |
| Excluding proxy responses | (not excluded for main analysis)             | 39,382 (93.3)                               |
| Sample size after additionally excluding responses with missing … |                                               |                                             |
| Country of birth       | 20,157 (100.0)                               | 38,706 (91.7)                               |
| Time since arrival in the UK | 38,609 (91.5)                               |                                             |
| Age                    | 20,144 (99.9)                                | 38,586 (91.4)                               |
| Sex                    | 20,144 (99.9)                                | 38,585 (91.4)                               |
| Information about long term health conditions | 20,072 (99.6)                               | 38,511 (91.2)                               |
| Final analysis sample size for multivariable analysis. Additional case-wise deletions by question for missing responses about health care utilisation | 20,072 (99.6)                               | 38,511 (91.2) |
Supplement E: Model coefficients for Figure 1

|                      | Adjusted for age and sex |                      | Additionally adjusted for the presence of a long term health condition or disability |
|----------------------|--------------------------|----------------------|--------------------------------------------------------------------------------------|
|                      | Being born abroad        | Linear year/         | Quadratic term/ squared-year                                                     |
|                      | (at 0 years since arrival in the UK) | year                |                                                                                     |
| OR (95% CI)          | OR (95% CI)              | OR (95% CI)         |                                                                                     |
| Primary care         | 0.69 (0.50 - 0.94)       | 1.03 (1.01 - 1.05)  | 1.00 (1.00 – 1.00)                                                                 |
| Outpatient / day patient | 0.80 (0.67 - 0.94)     | 1.00 (1.00 - 1.01)  |                                                                                     |
| Inpatient            | 0.71 (0.52 - 0.98)       | 1.01 (1.00 - 1.02)  |                                                                                     |
|                      |                          | 0.79 (0.57 - 1.10)  | 1.03 (1.00 - 1.05)                                                                 |
|                      |                          | 0.95 (0.80 - 1.14)  | 1.00 (1.00 - 1.01)                                                                 |
|                      |                          | 0.90 (0.65 - 1.24)  | 1.00 (1.00 - 1.01)                                                                 |

In these models we included both migrants and people born in the UK. We included a flag for whether or not someone was a migrant, and an additional continuous variable, coded 0 if someone was born in the UK and as the number of years since arrival in the UK for migrants. The estimates presented in figure 1 were calculated using the formula OR (being born abroad) multiplied by OR (linear year) to the power of (years since moving to the UK) multiplied by OR (squared-term) to the power of (years since moving to the UK, squared), and are the odds ratios for health care utilization among migrants compared with people born in the UK at year since arrival.
Supplement F: Additional adjustments

| Intervention                          | Adjusted for age and sex | Additionally adjusted for employment status | Additionally adjusted for household income | Additionally adjusted for ethnicity (US only) |
|---------------------------------------|--------------------------|--------------------------------------------|-------------------------------------------|---------------------------------------------|
|                                       | OR (95% CI) | p-value | OR (95% CI) | p-value | OR (95% CI) | p-value | OR (95% CI) | p-value |
| Primary care                          | 0.98 (0.88 - 1.09) | 0.739   | 0.98 (0.88 - 1.09) | 0.681   | 0.97 (0.87 - 1.09) | 0.648   | 0.92 (0.80 - 1.05) | 0.207   |
| Outpatient / day patient               | 0.90 (0.82 - 0.98) | 0.022   | 0.89 (0.81 - 0.98) | 0.013   | 0.90 (0.82 - 0.99) | 0.024   | 0.87 (0.78 - 0.98) | 0.021   |
| Inpatient                             | 0.91 (0.78 - 1.08) | 0.283   | 0.89 (0.76 - 1.05) | 0.183   | 0.92 (0.78 - 1.09) | 0.329   | 0.95 (0.76 - 1.19) | 0.648   |
| Inpatient maternity care              | 1.18 (0.85 - 1.64) | 0.325   | 1.00 (0.71 - 1.41) | 0.995   | 1.22 (0.88 - 1.70) | 0.227   | 1.11 (0.71 - 1.75) | 0.642   |
| Mental health services                | 0.57 (0.37 - 0.89) | 0.013   | 0.52 (0.33 - 0.81) | 0.004   | 0.54 (0.34 - 0.84) | 0.007   |                       |         |
| Dental care                           | 0.58 (0.50 - 0.67) | <0.001  | 0.58 (0.49 - 0.67) | <0.001  | 0.61 (0.52 - 0.71) | <0.001  |                       |         |
| Physiotherapy                         | 0.83 (0.69 - 1.00) | 0.053   | 0.84 (0.69 - 1.01) | 0.063   | 0.84 (0.70 - 1.02) | 0.073   |                       |         |

For EHIS 20,061 and 20,064 out of 20,072 included respondents had non-missing responses for employment status and household income respectively. For US there were 38,500 responses with non-missing employment status, and 38,424 with non-missing ethnicity. Ethnicity was not recorded in EHIS. Although we don’t consider the relationship between ethnicity, migration, health and health care utilisation in full in this analysis, the findings of the analysis considering adjustment for ethnicity is important as there is evidence from the UK about variation in health care use by ethnicity.78

7 Katikireddi SV, Cezard G, Bhopal RS, Williams L, Douglas A, Millard A, et al. Assessment of health care, hospital admissions, and mortality by ethnicity: population-based cohort study of health-system performance in Scotland. The Lancet Public Health. 2018;3(5):e226-e36.

8 Gruer LD, Millard AD, Williams LJ, Bhopal RS, Katikireddi SV, Cézard GI, et al. Differences in all-cause hospitalisation by ethnic group: a data linkage cohort study of 4.62 million people in Scotland, 2001–2013. Public Health. 2018;161:5-11.
**Survey questions:**

### Primary care

**EHIS**
- When was the last time you consulted a GP (general practitioner) or family doctor on your own behalf? 
  - Less than 12 months ago; 12 months ago or longer; Never

**US**
- In the last 12 months, approximately how many times have you talked to, or visited a GP or family doctor about your own health? Please do not include any visits to a hospital.
  - None; One or two; Three to five; Six to ten; More than ten

### Outpatient / A&E

**EHIS**
- When was the last time you consulted a medical or surgical specialist on your own behalf? Include visits to doctors as outpatient or emergency departments only, but do not include contacts while in hospital as an in-patient or day-patient. 
  - Less than 12 months ago; 12 months ago or longer; Never

**US**
- In the last 12 months, approximately how many times have you attended a hospital or clinic as an out-patient or day patient?
  - None; One or two; Three to five; Six to ten; More than ten

### Day patient

**EHIS**
- In the past 12 months have you been admitted to hospital as a day patient, that is admitted to a hospital for diagnostic, treatment or other types of health care, but not required to remain overnight?
  - Yes; No

**US**
- In the past 12 months, have you been in hospital or clinic as an in-patient overnight or longer?
  - Yes; No

### Inpatient

**EHIS**
- In the past 12 months have you been in hospital as an inpatient, that is overnight or longer?
  - Yes; No

**US**
- In the past 12 months have you been in hospital as an inpatient, that is overnight or longer?
  - Yes; No

| Domain          | Unadjusted OR (95% CI) | p-value | Adjusted for age and sex OR (95% CI) | p-value | Additionally adjusted for the presence of a long term health condition or disability OR (95% CI) | p-value |
|-----------------|------------------------|---------|-------------------------------------|---------|------------------------------------------------------------------------------------------------|---------|
| Primary care    | 0.98 (0.83 - 1.15)     | 0.808   | 1.05 (0.89 - 1.24)                  | 0.564   | 1.17 (0.99 - 1.40)                                                                              | 0.068   |
| Outpatient / A&E| 0.87 (0.76 - 0.99)     | 0.040   | 0.98 (0.85 - 1.12)                  | 0.741   | 1.08 (0.94 - 1.25)                                                                              | 0.255   |
| Day patient     | 0.75 (0.64 - 0.88)     | <0.001  | 0.81 (0.69 - 0.95)                  | 0.012   | 0.87 (0.74 - 1.02)                                                                              | 0.094   |
| Inpatient       | 0.89 (0.71 - 1.11)     | 0.296   | 0.99 (0.78 - 1.24)                  | 0.902   | 1.08 (0.86 - 1.36)                                                                              | 0.516   |

| Domain          | Unadjusted OR (95% CI) | p-value | Adjusted for age and sex OR (95% CI) | p-value | Additionally adjusted for the presence of a long term health condition or disability OR (95% CI) | p-value |
|-----------------|------------------------|---------|-------------------------------------|---------|------------------------------------------------------------------------------------------------|---------|
| Primary care    | 0.88 (0.78 - 0.98)     | 0.019   | 0.98 (0.88 - 1.09)                  | 0.739   | 1.07 (0.96 - 1.20)                                                                              | 0.232   |
| Outpatient / day patient | 0.79 (0.72 - 0.87)     | <0.001  | 0.90 (0.82 - 0.98)                  | 0.022   | 0.99 (0.90 - 1.09)                                                                              | 0.801   |
| Inpatient       | 0.89 (0.77 - 1.03)     | 0.122   | 0.96 (0.82 - 1.11)                  | 0.565   | 1.06 (0.91 - 1.23)                                                                              | 0.436   |

For this sensitivity analysis we do not exclude inpatient admissions for childbirth for comparability across the two surveys.
| Service                  | OR (95% CI) | p-value | OR (95% CI) | p-value |
|-------------------------|-------------|---------|-------------|---------|
| Mental health services  | 0.57 (0.37 - 0.89) | 0.013   | 0.59 (0.37 - 0.94) | 0.027   |
| Dental care             | 0.58 (0.50 - 0.67) | <0.001  | 0.59 (0.50 - 0.69) | <0.001  |
| Physiotherapy           | 0.83 (0.69 - 1.00) | 0.053   | 0.89 (0.73 - 1.09) | 0.261   |
|                                      | US (2016) All included responses | US (2016) Born outside the UK | US (2017) All included responses | US (2017) Born outside the UK |
|--------------------------------------|----------------------------------|--------------------------------|----------------------------------|-------------------------------|
| All                                  | 38511 (100)                      | 6477 (10.2)                    | 30908 (100)                      | 5904 (9.5)                    |
| Living in the UK > 10 years          |                                  |                                |                                  |                               |
| Yes                                  | 33198 (92.8)                     | 1164 (28.8)                    | 31656 (92.4)                     | 748 (20.0)                    |
| No                                   | 5313 (7.2)                       | 5313 (71.2)                    | 5156 (7.6)                       | 5156 (80.0)                   |
| Sex                                  |                                  |                                |                                  |                               |
| Women                                | 21407 (52.2)                     | 3712 (53.4)                    | 20401 (52.3)                     | 3381 (53.8)                   |
| Men                                  | 17104 (47.8)                     | 2765 (46.6)                    | 16411 (47.7)                     | 2523 (46.2)                   |
| Age                                  |                                  |                                |                                  |                               |
| 16-24                                | 4766 (12.7)                      | 525 (11.2)                     | 4453 (12.8)                      | 411 (9.5)                     |
| 25-34                                | 5058 (13.6)                      | 1029 (20.4)                    | 4641 (13.1)                      | 850 (17.4)                    |
| 35-44                                | 6568 (15.2)                      | 1669 (26.2)                    | 6083 (15.0)                      | 1483 (27.7)                   |
| 45-54                                | 7263 (18.2)                      | 1310 (18.4)                    | 6907 (17.9)                      | 1261 (19.9)                   |
| 55-64                                | 6125 (15.9)                      | 993 (11.5)                     | 6025 (16.4)                      | 955 (12.5)                    |
| 65-74                                | 5207 (13.9)                      | 562 (7.0)                      | 5216 (14.2)                      | 537 (7.3)                     |
| 75-84                                | 2759 (7.8)                       | 317 (4.0)                      | 2708 (7.8)                       | 338 (4.5)                     |
| 85+                                  | 765 (2.7)                        | 72 (1.2)                       | 779 (2.8)                        | 69 (1.2)                      |
| Grouped household income             |                                  |                                |                                  |                               |
| Lowest                               | 6630 (20.0)                      | 1181 (18.4)                    | 5832 (20.0)                      | 908 (17.2)                    |
| 2nd                                  | 6874 (20.1)                      | 1172 (18.3)                    | 6224 (20.1)                      | 983 (17.4)                    |
| 3rd                                  | 6957 (20.0)                      | 1138 (20.5)                    | 6408 (20.0)                      | 1015 (21.9)                   |
| 4th                                  | 7044 (19.9)                      | 1089 (19.0)                    | 6502 (19.9)                      | 1026 (21.2)                   |
| Highest                              | 6913 (20.0)                      | 1272 (23.9)                    | 6398 (20.0)                      | 1046 (22.3)                   |
| Employment status                    |                                  |                                |                                  |                               |
| In employment                        | 21214 (55.5)                     | 3661 (62.7)                    | 20325 (55.3)                     | 3364 (64.4)                   |
| Student                              | 2599 (6.4)                       | 378 (8.5)                      | 2355 (6.4)                       | 279 (6.6)                     |
| Retired                              | 9384 (26.0)                      | 1009 (13.0)                    | 9235 (26.2)                      | 984 (13.5)                    |
| Unemployed / otherwise not working   | 5303 (12.0)                      | 1422 (15.9)                    | 4864 (12.1)                      | 1269 (15.6)                   |
| Long term health condition / disability |                              |                                |                                  |                               |
| Yes                                  | 13062 (35.6)                     | 1733 (23.1)                    | 12916 (36.7)                     | 1688 (25.6)                   |
| No                                   | 25449 (64.4)                     | 4744 (76.9)                    | 23896 (63.3)                     | 4216 (74.4)                   |
### US 2017 data

| Service                                      | Unadjusted (OR (95% CI)) | p-value | Adjusted for age and sex (OR (95% CI)) | p-value | Additionally adjusted for the presence of a long term health condition or disability (OR (95% CI)) | p-value |
|----------------------------------------------|--------------------------|---------|----------------------------------------|---------|--------------------------------------------------------------------------------------------------|---------|
| Primary care                                 | 0.96 (.86 - 1.07)        | 0.428   | 1.05 (.94 - 1.17)                      | 0.426   | 1.14 (1.02 - 1.28)                                                                                 | 0.021   |
| Outpatient / day patient                     | 0.81 (.74 - .89)         | <0.001  | 0.90 (.82 - 1.00)                      | 0.040   | 0.99 (.90 - 1.10)                                                                                 | 0.869   |
| Inpatient                                    | 0.82 (.69 - .97)         | 0.020   | 0.94 (.80 - 1.12)                      | 0.511   | 1.04 (0.88 - 1.24)                                                                                 | 0.652   |
| Inpatient maternity care                     | 1.45 (.98 - 2.16)        | 0.064   | 1.33 (.89 - 1.99)                      | 0.169   | 1.24 (.83 - 1.86)                                                                                 | 0.293   |

### US 2016 data (results presented in paper)

| Service                                      | Unadjusted (OR (95% CI)) | p-value | Adjusted for age and sex (OR (95% CI)) | p-value | Additionally adjusted for the presence of a long term health condition or disability (OR (95% CI)) | p-value |
|----------------------------------------------|--------------------------|---------|----------------------------------------|---------|--------------------------------------------------------------------------------------------------|---------|
| Primary care                                 | 0.88 (0.78 - 0.98)       | 0.019   | 0.98 (0.88 - 1.09)                      | 0.739   | 1.07 (0.96 - 1.20)                                                                                 | 0.232   |
| Outpatient / day patient                     | 0.79 (0.72 - 0.87)       | <0.001  | 0.90 (0.82 - 0.98)                      | 0.022   | 0.99 (0.90 - 1.09)                                                                                 | 0.801   |
| Inpatient                                    | 0.89 (0.77 - 1.03)       | 0.122   | 0.96 (0.82 - 1.11)                      | 0.565   | 1.06 (0.91 - 1.23)                                                                                 | 0.436   |
| Inpatient maternity care                     | 1.28 (0.92 - 1.79)       | 0.140   | 1.18 (0.85 - 1.64)                      | 0.325   | 1.14 (0.82 - 1.58)                                                                                 | 0.429   |
Supplement K. Health care utilisation in the past 12 months among people born outside the UK (migrants), compared with people born in the UK. England only (US, n=30,620; EHIS n=16,777)

| Service                      | Unadjusted OR (95% CI) | p-value | Adjusted for age and sex OR (95% CI) | p-value | Additionally adjusted for the presence of a long term health condition or disability OR (95% CI) | p-value |
|------------------------------|------------------------|---------|------------------------------------|---------|------------------------------------------------------------------------------------------------|---------|
| Primary care                 | 0.90 (0.80 - 1.01)     | 0.072   | 1.01 (0.90 - 1.13)                 | 0.908   | 1.09 (0.97 - 1.23)                                                                                   | 0.127   |
| Outpatient                   | 0.80 (0.73 - 0.88)     | <0.001  | 0.90 (0.82 - 1.00)                 | 0.042   | 0.99 (0.89 - 1.10)                                                                                   | 0.841   |
| Inpatient                    | 0.81 (0.68 - 0.96)     | 0.015   | 0.97 (0.81 - 1.15)                 | 0.708   | 1.08 (0.90 - 1.28)                                                                                   | 0.416   |
| Inpatient maternity care     | 1.30 (0.92 - 1.83)     | 0.134   | 1.20 (0.85 - 1.68)                 | 0.301   | 1.16 (0.83 - 1.62)                                                                                   | 0.390   |
| Mental health services       | 0.65 (0.41 - 1.01)     | 0.054   | 0.59 (0.38 - 0.92)                 | 0.198   | 0.72 (0.46 - 1.13)                                                                                   | 0.157   |
| Dental care                  | 0.60 (0.51 - 0.70)     | <0.001  | 0.60 (0.51 - 0.71)                 | <0.001  | 0.60 (0.51 - 0.70)                                                                                   | <0.001  |
| Physiotherapy                | 0.82 (0.67 – 1.00)     | 0.052   | 0.82 (0.67 – 1.00)                 | 0.056   | 0.87 (0.71 - 1.07)                                                                                   | 0.183   |
Supplement L. Health care utilisation in the past 12 months among people born outside the UK (migrants), compared with people born in the UK. All UK. Comparison of EU and Non-EU migrants

|                          | Unadjusted | Interaction p-value | Adjusted for age and sex | Interaction p-value | Additionally adjusted for the presence of a long term health condition or disability | Interaction p-value |
|--------------------------|------------|---------------------|--------------------------|---------------------|-------------------------------------------------------------------------------------|---------------------|
|                          | OR (95% CI)|                     | OR (95% CI)              |                     | OR (95% CI)                                                                          |                     |
| Primary care             |            |                      |                          |                     |                                                                                     |                     |
| Non-EU                   | 0.93 (0.82 - 1.06) | (stratified)          | 1.05 (0.93 - 1.19)       | (stratified)        | 1.16 (1.02 - 1.31)                                                                 | (stratified)        |
| EU                       | 0.69 (0.55 - 0.87) | (stratified)          | 0.76 (0.61 - 0.95)       | (stratified)        | 0.80 (0.63 - 1.01)                                                                 | (stratified)        |
| Outpatient               | 0.469                      | 0.392                | 0.321                    | 0.204               |                                                                                     |                     |
| Inpatient                | 0.432                      | 0.662                | 0.321                    | 0.227               |                                                                                     |                     |
| Inpatient maternity care | 0.712                      | 0.662                | 0.662                    | 0.683               |                                                                                     |                     |
| Mental health services   | 0.909                      | 0.982                | 0.982                    | 0.994               |                                                                                     |                     |
| Dental care              | 0.359                      | 0.077                | 0.077                    | 0.076               |                                                                                     |                     |
| Physiotherapy            | 0.003                      | <0.001               | <0.001                   |                     |                                                                                     |                     |
| Non-EU                   | 0.67 (0.53 - 0.83)         | (stratified)          | 0.66 (0.53 - 0.82)       | (stratified)        | 0.70 (0.56 - 0.87)                                                                 | (stratified)        |
| EU                       | 1.12 (0.85 - 1.48)         | (stratified)          | 1.19 (0.9 - 1.58)        | (stratified)        | 1.27 (0.96 - 1.68)                                                                 | (stratified)        |

The “interaction” p-value in this analysis comes from a test of heterogeneity in utilisation among EU compared with non-EU migrants, compared with non-migrants. Where p<0.05, stratified OR for EU and non-EU migrants are presented.