Care Quality Commission

Equal measures

Equality information report for 2014

Annex 1: Analysis of hospital episode statistics by age, ethnicity and gender

March 2015

Contents

Introduction

We analysed approximately 14.5 million NHS hospital inpatient 'episodes'* in England where the age, gender and ethnicity of the patient were known, and where the patient was discharged from hospital at the end of the episode. Our analyses of inpatient activity included admissions* to both NHS acute and mental health trusts. We looked at elective (planned) admissions and emergency admissions, and also carried out analyses of hospital attendances* among patients with mental health conditions, and patients with cancer. To be able to look at hospital activity* among patients with mental health conditions, we flagged patients with previously diagnosed mental health conditions, regardless of the reason they were admitted to hospital.

We also analysed approximately 83.5 million outpatient appointment records where the age, gender and ethnicity of the patient were known. We looked at both first and follow-up attendances, including those that were cancelled or where the patient did not attend.

All work shown in this section uses full ONS age groups and HES ethnicity codes (see appendix 1 in this document). The date ranges of both datasets covered the most recent available full financial year (1 April 2013 to 30 March 2014).

Key findings are:

- **Inpatient care:** There is a pronounced upswing in elective and emergency admissions as people grow older, and there is also a high level of emergency admissions for babies and toddlers. There is also some other, more complex variation related to gender and ethnicity.
- **Outpatient care:** As with inpatient care, here we also see an increased use of services with increasing age, and some complex variation related to ethnicity. In addition, there is a marked difference between genders, with females in middle age (25-50) making more extensive use of outpatient services than males.
- **Outpatient cancellations:** Cancellations are only disproportionately high for some ethnicity groups. Where they are high, they are more common among children and older adults (40+) than among younger adults (20-40), and they are also more common among women than among men.
- **Outpatient "did not attend" (DNA):** DNAs are most common among young to middle-aged adults (18-50), and especially among men in this age range. They begin to tail off after age 50, but only for some ethnicity groups.
- **People with mental health conditions:** People with a mental health condition tend to stay longer in hospital than patients with similar characteristics without a mental health condition. The vast majority of people with mental health conditions, when not admitted specifically for a mental health condition, were admitted under one of three ICD-10 chapters:
  - G: Diseases of the nervous system
  - R: Symptoms, signs, and abnormal clinical findings
  - Z: Factors influencing health status and contact with health services
- **People with cancer:** There is a pronounced upswing in elective and emergency admissions as people grow older. For elective admissions (but not emergency admission), the upswing begins at an earlier age in females than in males. There is also some other, more complex variation related to ethnicity.

* See appendix 2 in this document for explanation of these terms.

Hospital admissions in relation to age, sex, and ethnicity

Figures 1 and 2 show the patterns of elective and emergency admissions – respectively – compared to ONS all-England population estimates. Populations are broken down according to gender, ethnicity, and age. Up to the age of about 24 years, all ethnicities and both sexes are under-represented among elective admissions. For emergency admissions, the 0-4 age group is over-represented among most ethnicities – this is not unexpected. However, there were two exceptions for emergency admissions, for which under-representation occurred:

- Three of the four Mixed ethnicity groups (D, E, F – both sexes), and
- Two of the three Black ethnicity groups (N, P – females only).

Among people older than four years, different ethnicities begin to become over-represented at different ages. This was true for both elective and emergency admissions. The observed variation may be in part the result of differences among ethnic groups and/or females and males with respect to the types of conditions leading to admission, or it may be due to variation in access to services, for example diagnostic testing, primary care, or community-based health and/or social care.

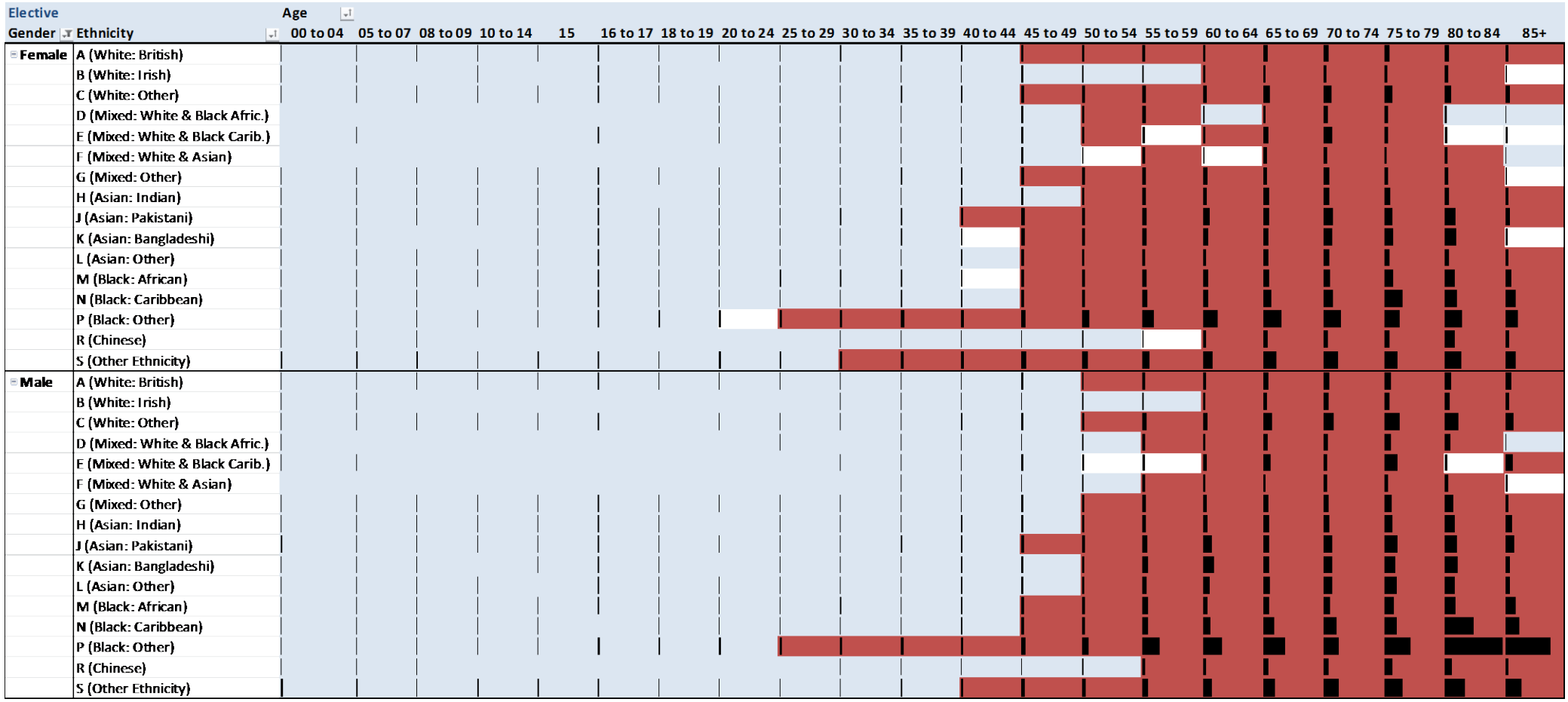
Despite this variation, across many ethnic groups, we see:

- A 'typical' pattern of elective admissions increasing at some point between age 40 and 59, with females tending to increase at an earlier age than males.
- A 'typical' pattern of emergency admissions that is the reverse, with men's admissions increasing at an earlier age than women's admissions (about 50-69 vs 60-79, respectively).

However, there were also several unusual patterns of activity, including:

- A relatively young profile of:
  - Increasing elective admissions for People of "Other" ethnicity (30-34 for females, 40-44 for males).
  - Increasing emergency admissions for Pakistani males (45-49).
- A very young profile of:
  - Increasing emergency admissions for Pakistani females (age 25-29).
  - Increasing elective and emergency admissions for Other Black ethnicity (25-29 for both sexes for electives; 18-19 for females and 20-24 for males for emergencies).
  - People of "Other" ethnicity (15 for females, 20-24 for males).

Figure 1: Patterns of elective admissions according to gender, ethnicity, and age group



Key: Compared to ONS all-England population figures:

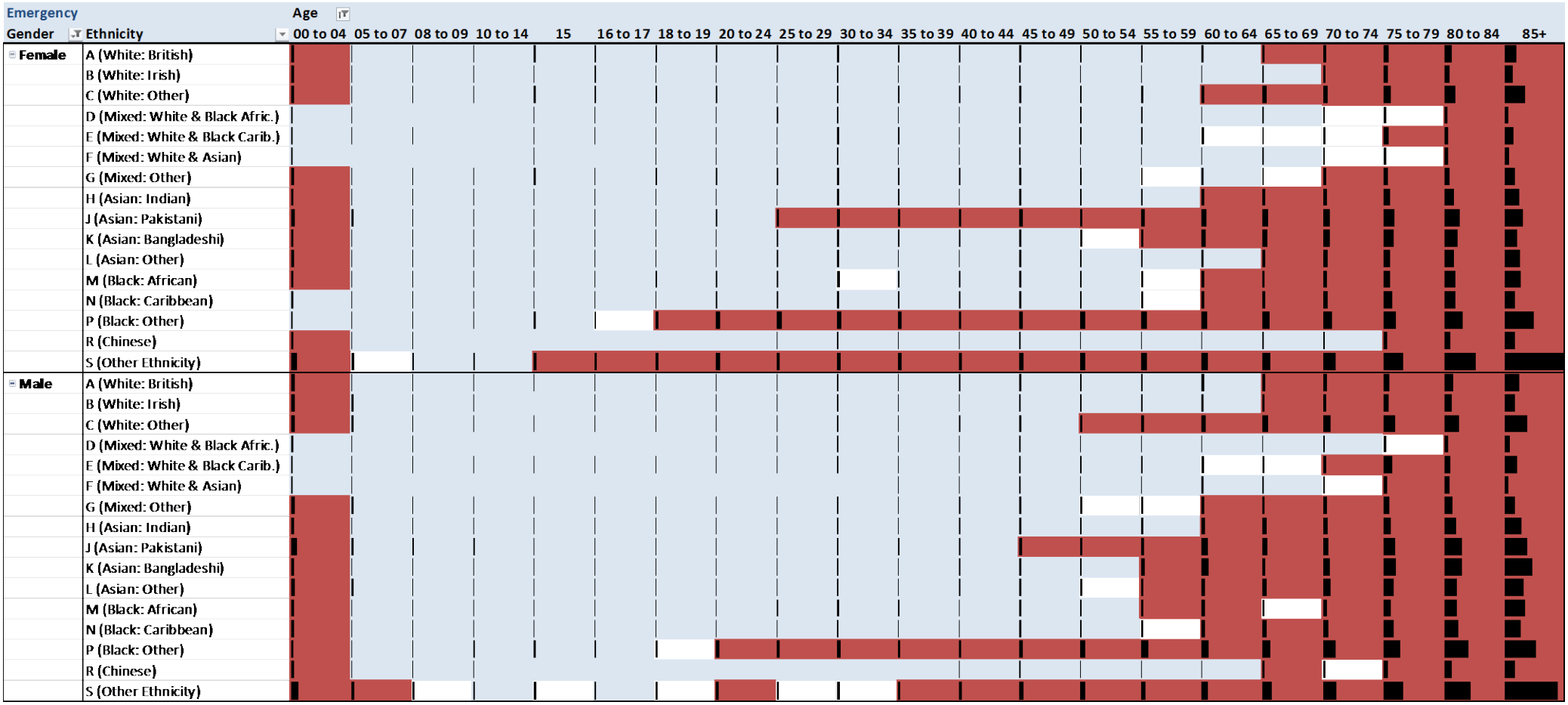
These groups have disproportionately low numbers of elective admissions.

These groups have proportionate numbers of elective admissions.

These groups have disproportionately high numbers of elective admissions.

The size of the black bars shows the number of admissions we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed admissions against expectations. This means that the group's share of elective admissions is higher than its share of the population.

Figure 2: Patterns of emergency admissions according to gender, ethnicity, and age group



Key: Compared to ONS all-England population figures:

These groups have disproportionately low numbers of emergency admissions.

These groups have proportionate numbers of emergency admissions.

These groups have disproportionately high numbers of emergency admissions.

The size of the black bars shows the number of admissions we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed admissions against expectations. This means that the group's share of emergency admissions is higher than its share of the population.

Outpatient appointments in relation to age, sex, and ethnicity

First attendances and follow-up appointments

To be able to better understand patterns of outpatient activity, we divided appointments into "first attendances" (the first appointment occurring after a patient has been referred to an outpatient service), and "follow-ups" (later appointments). This first analysis included all appointments made, irrespective of whether or not they were attended or later cancelled. Patterns of activity of these two types of appointments are shown in Figures 3 and 4, respectively.

Up to the age of about 20-24, the vast majority of age and ethnicity groups are under-represented among people who receive outpatient appointments, relative to their presence in the all-England population. The only exceptions to this are:

- Male and female children and teenagers of "Other" ethnicities (up to age 7 and between age 15 and 19 for females and up to age 15 for males).
- 18-19 year-old females of Other Black ethnicity.

These two exceptional groups appeared more prominently among first attendances than among follow-up appointments.

Among adults, as with inpatient activity, different ethnicities start to become over-represented at different ages. Among adult females, some Asian and Black groups become over-represented starting at age 20-24, while for White and Mixed groups this does not occur until age 25-29. Chinese females are over-represented only between age 30 and 39, and then again beyond the age of 60. For males, most Asian and Black groups, and the White Other group, become over-represented at about age 50 (and Pakistani males at age 45-49). By contrast, White British, White Irish, and Chinese males do not become over-represented until age 65-69. Adults of Other ethnicity seem to be over-represented in most age groups.

With outpatient appointments, there are also clear differences between females and males. For both first attendances and follow-up appointments, females start to become over-represented starting at about age 25, while males do not do so until around age 50. The difference between males and females may be related to the fact that women often begin to have children in their 20's, thus causing a surge of outpatient appointments related to antenatal and postnatal care, or other gynaecological or fertility-related treatments.

Figure 3: Patterns of first outpatient attendances according to gender, ethnicity, and age group

Key: Compared to ONS all-England population figures:

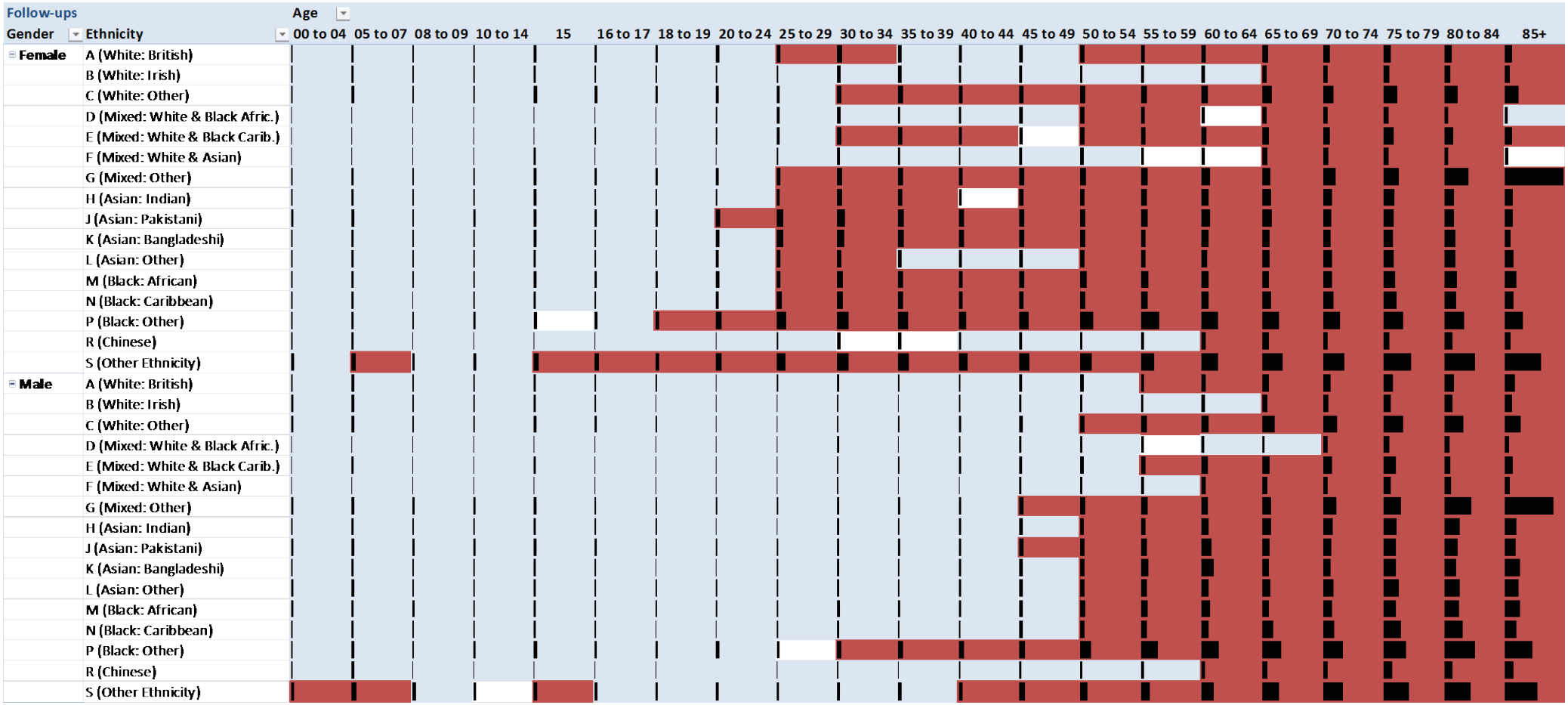
These groups have disproportionately low numbers of first outpatient attendances.

These groups have proportionate numbers of first outpatient attendances.

These groups have disproportionately high numbers of first outpatient attendances.

The size of the black bars shows the number of appointments we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed appointments against expectations. This means that the group's share of first outpatient attendances is higher than its share of the population.

Figure 4: Patterns of follow-up outpatient appointments according to gender, ethnicity, and age group



Key: Compared to ONS all-England population figures:

These groups have disproportionately low numbers of follow-up outpatient attendances.

These groups have proportionate numbers of follow-up outpatient attendances.

These groups have disproportionately high numbers of follow-up outpatient attendances.

The size of the black bars shows the number of appointments we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed appointments against expectations. This means that the group's share of follow-up outpatient attendances is higher than its share of the population.

Cancellations

We also looked specifically at patterns of cancellations relative to all appointments made (Figure 5). Appointments could be cancelled by either the patient or the service provider, and it was not possible to tell which was which. However, we can see that cancellations vary a lot across age and ethnic groups.

With respect to age and gender, cancellations were most common among children/adolescents of both sexes and among females over the age of 40. Adult males had cancellations far less often overall. This finding suggests either that some patients are prioritised on the basis of age when clinicians need to cancel outpatient appointments, or that patients vary with age in the likelihood of them cancelling appointments. Males and females also differ with respect to how often cancellation occurs, with women being more likely to cancel an outpatient appointment than men overall.

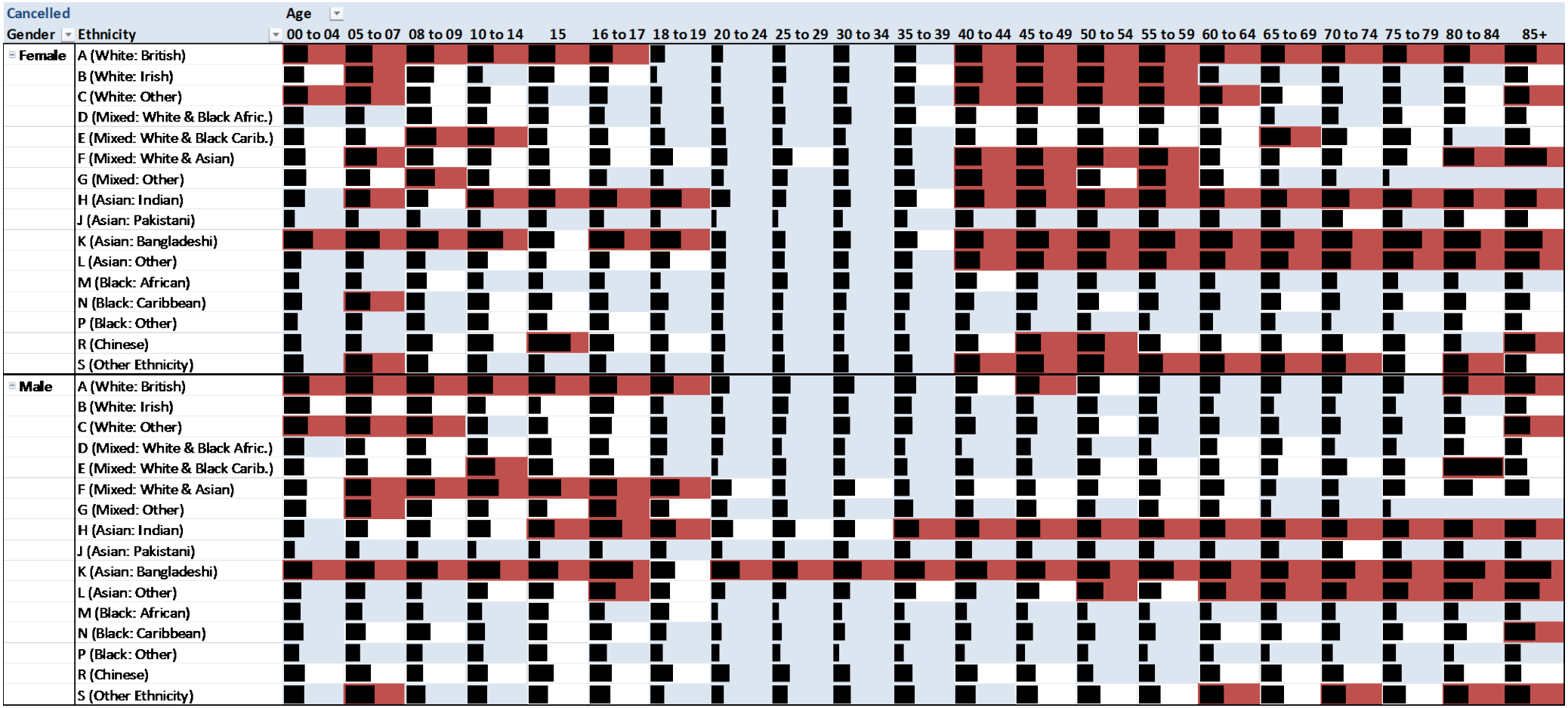
With respect to ethnicity, the groups with disproportionately high levels of cancellations vary by gender. Among children and adolescents, females of Pakistani, Other Asian, Black (all groups) and Chinese ethnicity are less likely to have cancellations than other groups. The highest levels of cancellations in this younger female age group are among people of White British and Bangladeshi ethnicity. For males we see a similar pattern.

Among adults, the females least likely to have cancellations were from Black and Mixed (White and Black) ethnicity groups. Females of White British, Indian, Bangladeshi, and Other Asian ethnicity were the most likely to have cancellations (over the age of 40). For males, those of Indian and Bangladeshi ethnicity were most likely to have cancellations, while for most other ethnicities cancellations were disproportionately low.

DNA appointments

Finally, we looked at how frequently different demographic groups failed to attend appointments, again relative to the number of appointments made (Figure 6). We can see that some groups have disproportionately high levels of DNAs. They are highest between the ages of 18 and around 54 (i.e. in working-age adults) and for the youngest children. The only exceptions to this were people of Chinese ethnicity, who across many age groups and in both sexes, seemed to have good outpatient attendance, and older people of White, Mixed, or Indian ethnicity, who beyond the age of 55 (women) or 60 (men) also attended appointments.

Figure 5: Patterns of outpatient appointment cancellations according to gender, ethnicity, and age group



Key: Compared to the numbers of appointments made by each group:

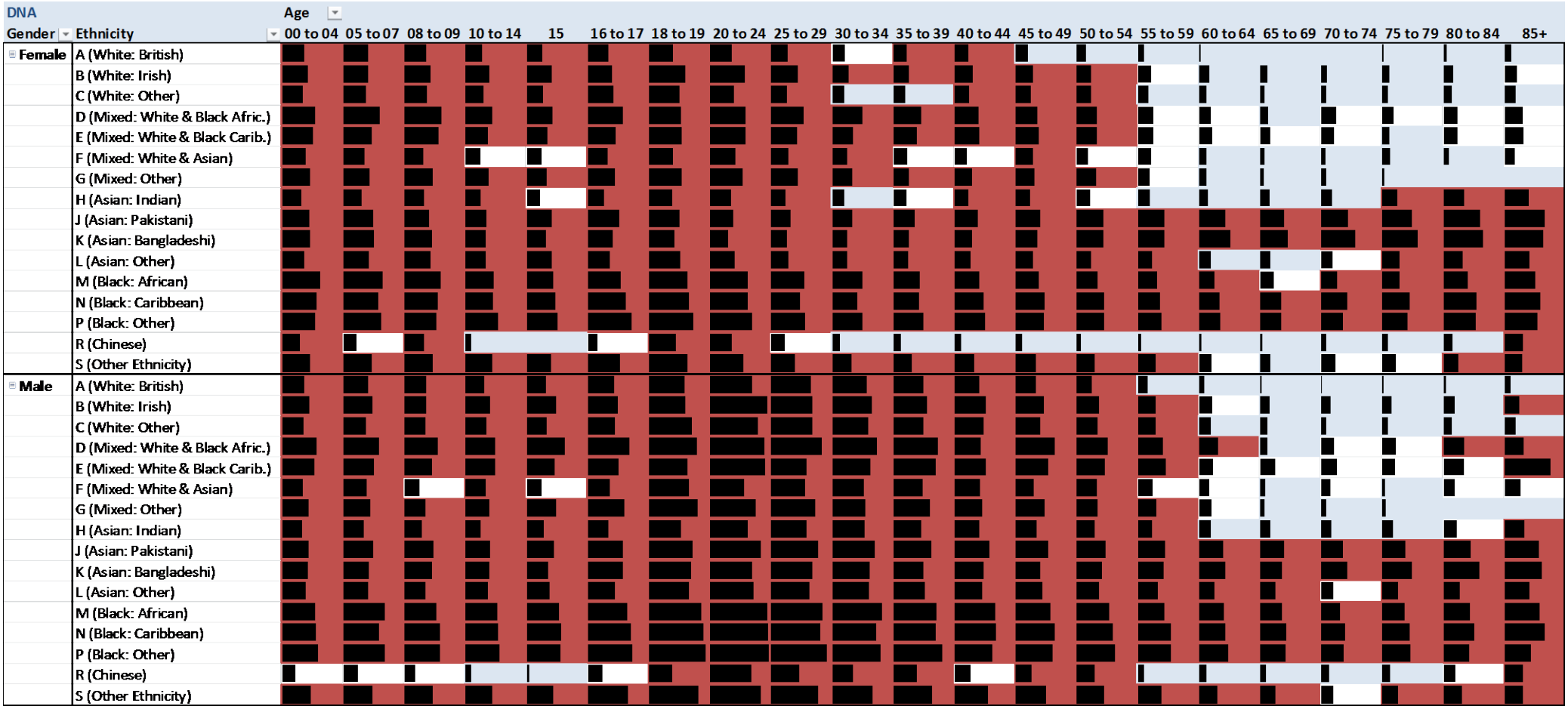
These groups have disproportionately low numbers of cancellations.

These groups have proportionate numbers of cancellations.

These groups have disproportionately high numbers of cancellations.

The size of the black bars shows the number of cancellations we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed cancellations against expectations. This means that the group's share of cancellations is higher than its share of the total appointments made.

Figure 6: Patterns of outpatient appointment "did not attends" according to gender, ethnicity, and age group



Key: Compared to the numbers of appointments made by each group:

These groups have disproportionately low numbers of "did not attends".

These groups have proportionate numbers of "did not attends".

These groups have disproportionately high numbers of "did not attends".

The size of the black bars shows the number of "did not attends" we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed "did not attends" against expectations. This means that the group's share of "did not attends" is higher than its share of the total appointments made.

Special groups 1: Mental health admissions in relation to primary diagnosis group

Patterns of diagnosis on admission

In our dataset, patients with a mental health condition were flagged, regardless of the reason why they were admitted to hospital. To be able to look at patterns of inpatient admissions among people with and without a mental health condition, we had to remove patients admitted *for* a mental health condition from the dataset (i.e. primary diagnosis was in International Classification of Disease version 10 (ICD-10) Chapter F – Mental and behavioural disorders). These patients were excluded because by definition they *all* had a mental health condition – hence there would be no Chapter F patients *without* a mental health condition to enable a statistical comparison. Filtering out such patients left approximately 14.1 million records to be analysed.

We hypothesised that the proportions of patients with and without a mental health condition admitted under the remaining ICD-10 chapters should be similar. We therefore calculated the proportion of all patients *without* a mental health condition admitted under each ICD-10 chapter, and used it to try to predict how many patients *with* a mental health condition would be admitted under that chapter if the proportions were equal. The standardised ratio (SR) is the observed number of patients with a mental health condition over the expected number, multiplied by 100. The expected number was calculated by multiplying the expected proportion by the total number of patients with mental health conditions (Table 3).

Patients flagged as having a mental health condition were significantly more likely to be admitted for conditions in three chapters:

G – Diseases of the nervous system:

- 10.4% of admissions among mental health patients, but only 2.2% of admissions among others.
- Includes a lot of patients with dementia and other degenerative disorders that may either comprise or cause mental health conditions, so this is not unexpected.

R – Symptoms, signs, and abnormal clinical findings:

- 59.2% of admissions among mental health patients, but only 10.5% of admissions among others.
- In previous work for the thematic review of mental health crisis care, CQC found that people who were frequent attenders at A&E with codes in this ICD-10 grouping often had a history of mental ill health. And there were other frequent attenders with this same coding pattern who had no known mental health history – these are possibly people who are undiagnosed and who may have problems accessing services.

Z – Factors influencing health status and/or contact with health services:

- 28.3% of all admissions among mental health patients, but only 4.5% of admissions among others.
- Chapter Z is a set of categories for occasions when circumstances other than a disease, injury or external cause classifiable to categories A00-Y89 are recorded as "diagnoses" or "problems".
- This can arise when a person who may or may not be sick encounters health services for some specific purpose, such as to receive limited care or service for a current condition, to donate an organ or tissue, to receive a vaccination or to discuss a problem which is in itself not a disease or injury.
- It can also occur when some circumstance or problem is present which influences the person's health status but is not in itself a current illness or injury. Such circumstances can include family or personal history of medical conditions, treatments or interventions, past or present socio-economic problems, or issues related to upbringing or family situation.

In most other ICD-10 chapters, inpatient admissions among people with a mental health condition were lower than expected. In two chapters (X and Y), there were only eight admissions over the full year, and the only admitted patients were people flagged as having a mental health condition. These did not come out as being significantly different from expected due to the small sample sizes available.

Chapter X can record instances of self-harm and assault, and chapter Y can record instances where self-harm or assault were suspected. In analysing data relevant to mental health conditions, it is therefore important to explain why there are so few patients with primary diagnoses in these ICD-10 chapters. ICD-10 guidelines state: *"Where a code from this section is applicable, it is intended that it shall be used in addition to a code from another chapter of the Classification indicating the nature of the condition."* In other words, it is extremely rare for a code from chapter X or Y to be used as a primary diagnosis because typically the injury itself (often chapter S or T) is used as the primary diagnosis, with the X- or Y-coding appearing among the secondary diagnosis fields.

Table 3: Comparison of the proportions of all patients without and with mental health conditions admitted under a range of ICD-10 primary diagnosis groups. Shading of cells is described in the key below. For several chapters (*), either all patients (X and Y), or no patients (P and U), had a mental health condition.

ICD-10 Chapter	ICD-10 Name	Percentage of total patients		Standardised ratios and confidence limits		
		Without MH	With MH	SR	Lower 95% CL	Upper 95% CL
A	Infectious diseases (mostly bacterial or STDs)	1.39	0.03	1.89	0.82	3.73
B	Infectious diseases (mostly viral, parasitic, or fungal)	0.72	0.01	1.84	0.50	4.71
C	Neoplasms	11.08	0.05	0.45	0.25	0.74
D	Solid and benign neoplasms and diseases of the blood	4.39	0.04	0.83	0.41	1.48
E	Diseases of endocrine system/metabolism	1.59	0.18	11.18	8.40	14.58
G	Diseases of nervous system	2.20	10.44	475.05	458.64	491.74
H	Diseases of eye/adnexa/ear/mastoid process	4.56	6.59E-03	0.14	0.02	0.52
I	Diseases of circulatory system	6.06	0.27	4.46	3.54	5.53
J	Diseases of respiratory system	5.50	0.11	1.92	1.31	2.71
K	Diseases of digestive system	11.44	0.11	0.95	0.6	1.34
L	Diseases of skin/subcutaneous tissue	1.89	0.03	1.57	0.72	2.97
M	Diseases of musculoskeletal system/connective tissue	8.01	0.13	1.56	1.11	2.15
N	Diseases of genitourinary system	10.86	0.13	1.18	0.84	1.62
O	Pregnancy/childbirth/puerperium	7.95	0.03	0.33	0.14	0.65
P*	Conditions of perinatal period	0.47	0	No patients with mental health conditions.		
Q	Congenital abnormalities	0.56	0.15	27.53	20.23	36.61
R	Symptoms/signs/abnormal clinical findings	10.48	59.17	564.40	556.17	572.69
S	Injury (single part of body)	3.96	0.43	10.83	9.05	12.78
T	Injury/poisoning (multiple parts of body)	2.37	0.36	15.03	12.33	18.00
U*	New/anti-biotic resistant pathogens	4.20E-05	0	No patients with mental health conditions.		
X*	Intentional self-harm/assault, and some accidents	0	0.02	All patients with mental health conditions.		
Y*	Other events, including those of undetermined intent	0	3.30E-03	All patients with mental health conditions.		
Z	Factors influencing health status and contact w. services	1.00	28.32	626.69	613.51	640.02

Key: Compared to the proportion of all patients *without* a mental health condition:

The proportion of all patients *with* a mental health condition was significantly lower.

The proportion of all patients *with* a mental health condition was significantly higher.

Length of stay of mental health patients versus other patients, in relation to age and clinical factors

To determine whether or patients flagged as having a mental health condition were likely to differ in length of stay from other patients, we applied a technique called *offset logistic regression* to the dataset. This technique uses all of what would ordinarily be predictor variables (e.g. age, diagnosis, etc) except the main one of interest as offsets, which are controls that aren't directly included in the model. It therefore allows one to isolate the main effect that you are examining (length of stay), while controlling for other known factors. The goal of this model is therefore to try to predict who did and did not have a mental health condition on the basis of length of stay, while controlling for other aspects known to affect length of stay.

For this analysis, we omitted the most extreme 1% of lengths of stay from the dataset, which in this case was any patient in hospital for 36 days or longer. These extreme lengths of stay were omitted because some may have been erroneous, and others may have represented very atypical patients.

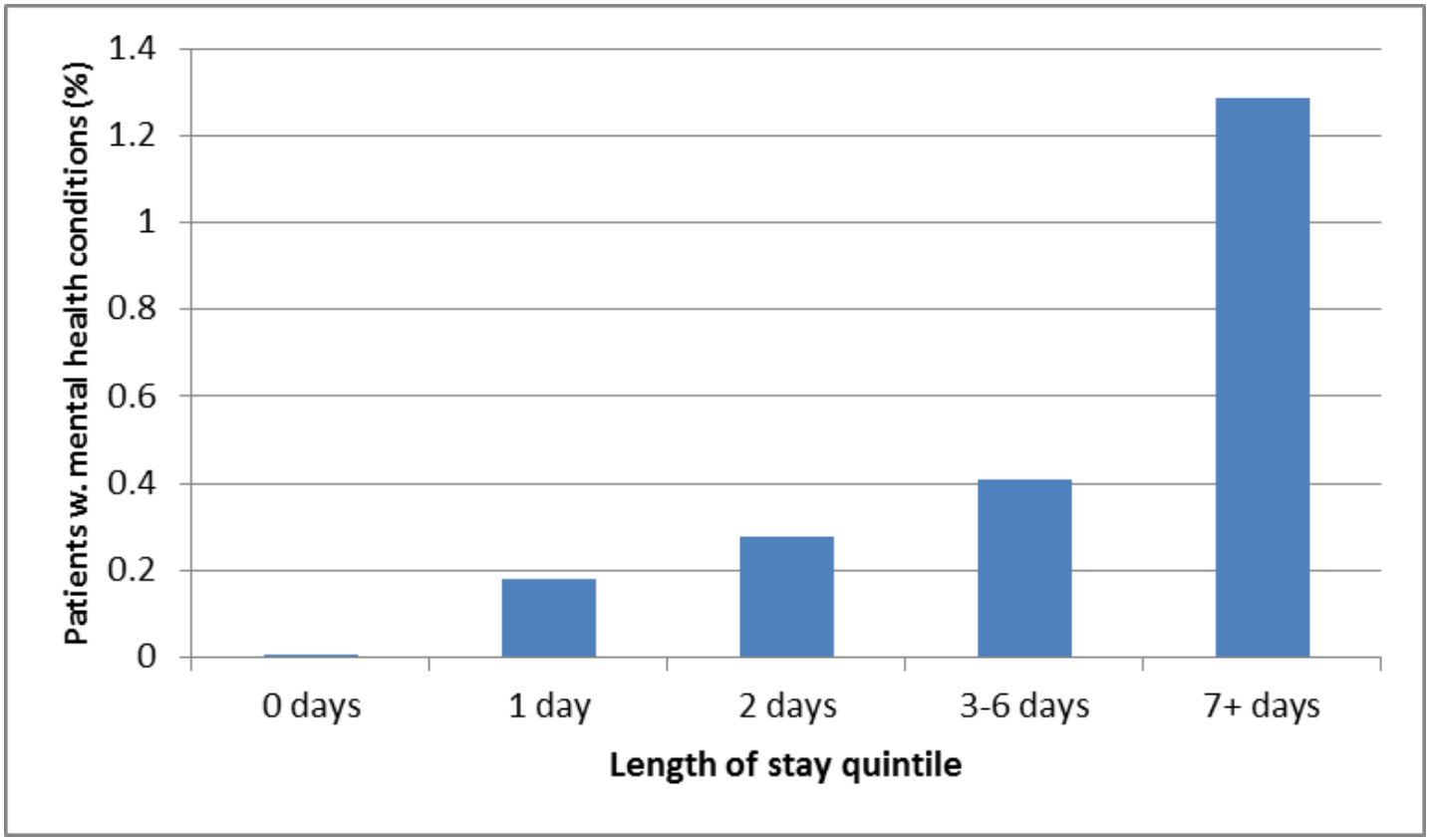
The model included:

- The two-category variable distinguishing between patients with mental health conditions ("M") and those without ("A") as the response variable (the category that we are trying to predict).
- Length of stay as the predictor variable (the measure we are using to try to predict whether a patient is in category "M" or "A").
- Age in years, admission method (elective, emergency, or other), primary diagnosis group (ICD-10 chapter), and whether the patient had a procedure (yes or no), as offsets.

The combination of patient age, admission method, primary diagnosis, and procedure flag explained much of the variation between patients with and without a mental health condition (c = 0.96, concordance = 94.1%), with very few false negatives but many false positives. After controlling for these, we found a significant relationship between length of stay and mental health patient status, with slightly improved association statistics (c = 0.98, concordance = 96.4%), with somewhat less false positives. The odds ratio for length of stay was 1.153 (with lower and upper confidence limits of 1.152 and 1.155, respectively). Among comparable patients, for every one-day increase in length of stay, the odds of being flagged as having a mental health condition increased by a factor of roughly 15%.

After reincorporating patients with the top 1% of lengths of stay, we compared the proportion of patients flagged as having a mental health condition between that top 1%, and all other lengths of stay. We found that patients with mental health conditions make up only 0.15% of admissions where the length of stay was less than 36 days, but 5.9% of admissions where the length of stay was 36 days or more. Dividing up the length of stay across all patients into quintiles (Figure 7), we can also see that the percentage of patients with a mental health condition increases as length of stay increases.

Figure 7: Change in percentage of patients with a mental health condition with increasing length of stay. The range of lengths of stay is shown for each of the five quintiles (groups each roughly equivalent to 20% of patients in the dataset). Median length of stay for the highest quintile (7+ days) was 13 days



Special groups 2: Cancer patients

A recent BBC article (http://www.bbc.co.uk/news/health-29847644) highlighted the interesting finding that people of Black and South Asian ethnicity have low awareness of cancer symptoms compared to other people. We used the HES data to examine the hypothesis that – if this is a real phenomenon – we would see ethnic variation in inpatient admissions for cancer. We might also expect to see differences in outpatient activity, but the outpatient data did not include a field describing the reason for the appointments. In this section, therefore, we discuss only the findings for inpatients, split into elective and emergency admissions.

As expected, both elective and emergency cancer admissions occur predominantly among older people (Figures 8 and 9). Wide-scale increases in cancer admissions tend to occur in older age groups for emergency than for elective admissions.

For elective admissions, the highest values (relative to the all-England population) are for women aged 45 and over, and for men aged 55 and over (Figure 8). However, there is some variation among ethnicities as well:

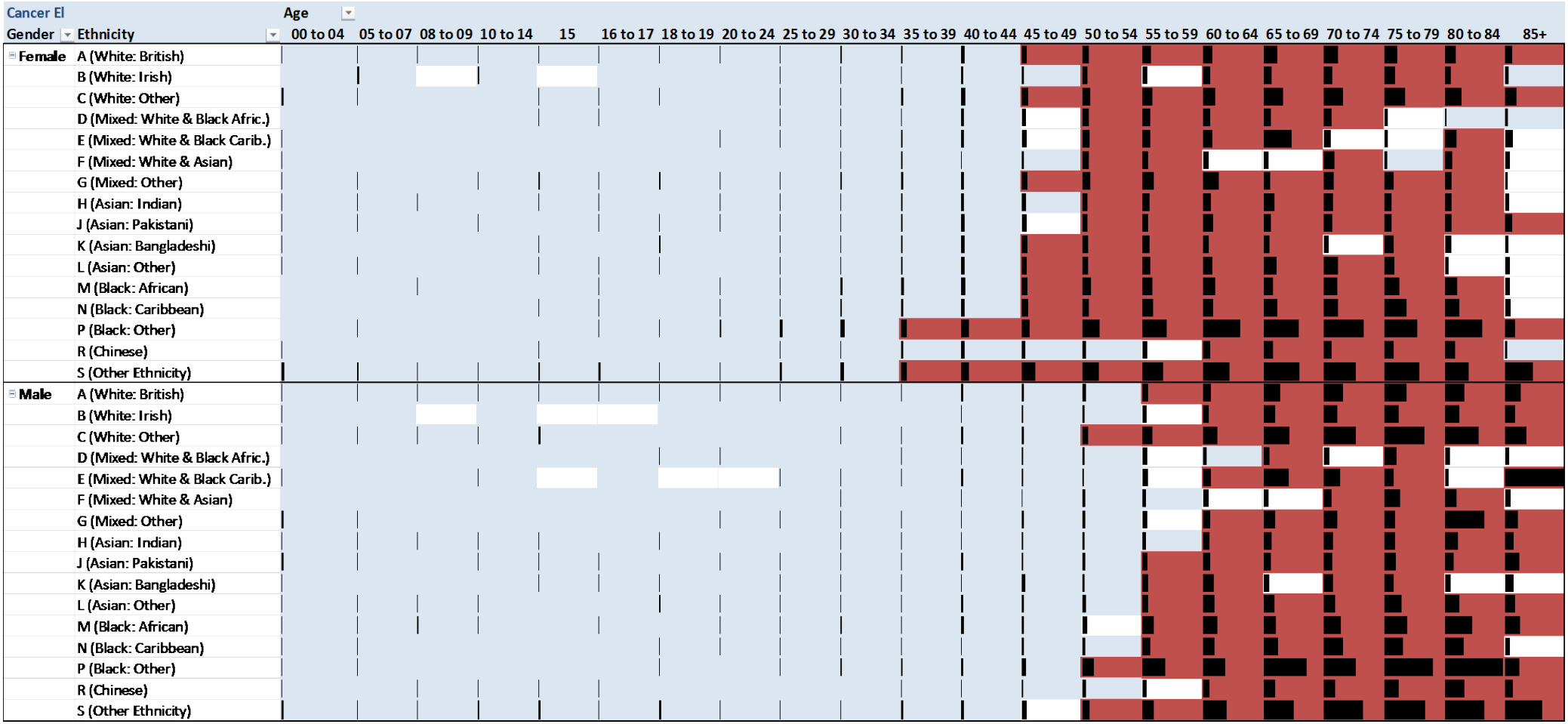
Among women:

- Most ethnicities fit the typical pattern described above.
- Those of White Irish, three of the four Mixed ethnicity groups, Indian and Pakistani ethnicity do not become over-represented until age 50, and those of Chinese ethnicity not until the age of 60.
- Those of Black (Other) and Other ethnicity become over-represented earlier, at age 35.

Among men:

- Most ethnicities fit the typical pattern described above.
- Those of White Irish, all Mixed ethnicity groups, Indian and Chinese ethnicity do not become over-represented until at least the age of 60.
- Those of White (Other), Black (Other) and Other ethnicity become over-represented somewhat earlier, at age 50.

Figure 8: Patterns of elective cancer admissions according to gender, ethnicity, and age group



Key: Compared to ONS all-England population figures:

These groups have disproportionately low numbers of elective cancer admissions.

These groups have proportionate numbers of elective cancer admissions.

These groups have disproportionately high numbers of elective cancer admissions.

The size of the black bars shows the number of admissions we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed elective cancer admissions against expectations. This means that the group's share of elective cancer admissions is higher than its share of the population.

For emergency admissions, there was more proportionality, particularly among the younger age groups (Figure 9). The highest values (relative to the all-England population) are most often for people aged 55 and over in both sexes. But here too there is some variation among ethnicities:

Among women:

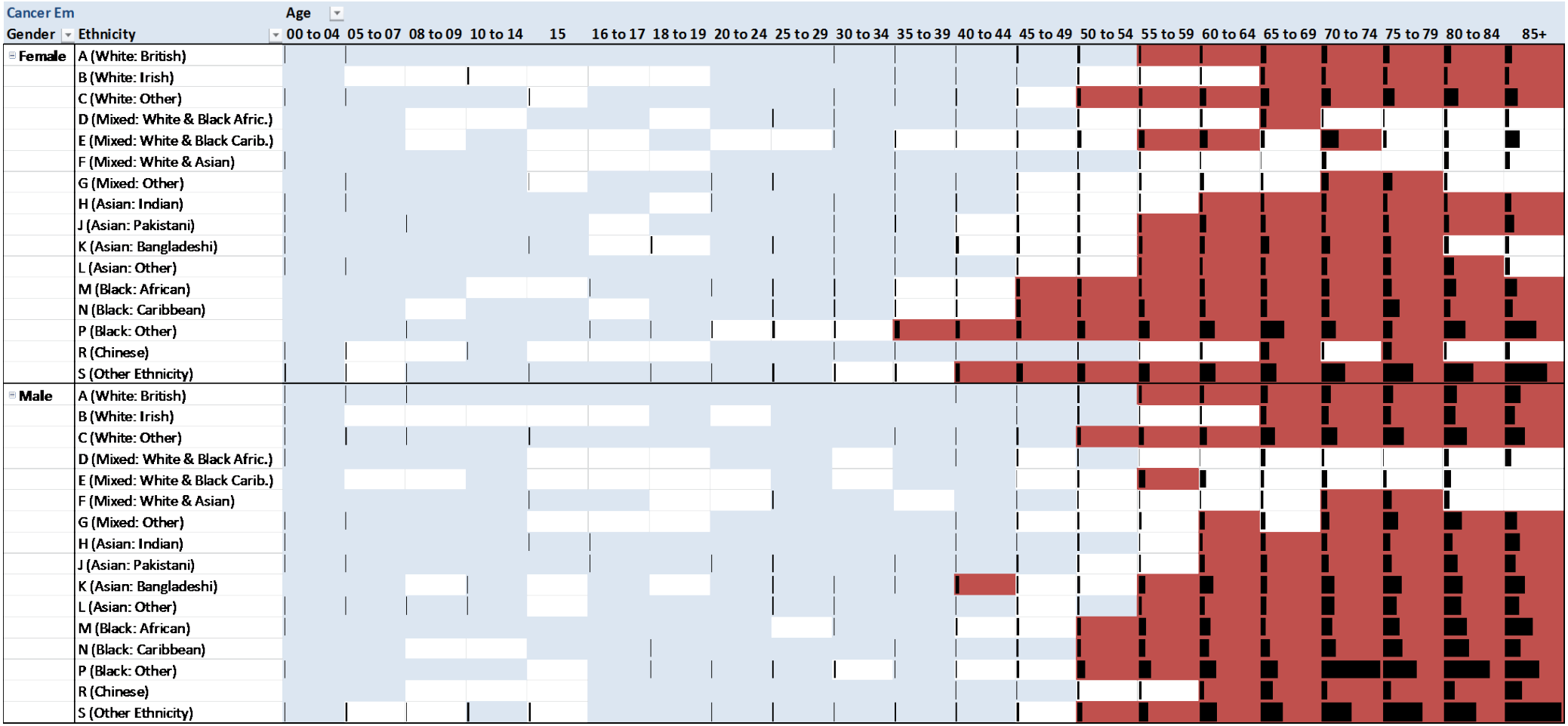
- Most ethnicities fit the typical pattern described above.
- Some ethnicities become over-represented only at older ages (White Irish, Indian).
- Some ethnicities become over-represented earlier than is typical (White (Other), all Black ethnicity groups, Other ethnicity).
- Some ethnicities have a peak of over-representation that drops off in the oldest age groups (Mixed Black and White – both groups, Mixed (Other), Pakistani, Bangladeshi, Chinese).
- Mixed (White and Asian) are never over-represented.

Among men:

- Most ethnicities fit the typical pattern described above.
- Some ethnicities become over-represented only at older ages (White Irish, Indian, Pakistani, Bangladeshi, Chinese).
- Some ethnicities become over-represented earlier than is typical (White (Other), all Black groups, Other ethnicity).
- Some ethnicities have a peak of over-representation that drops off in the oldest age groups (Mixed White and Black (Caribbean), Mixed (Other)).
- Mixed (White and Black (African)) are never over-represented.

We can conclude from this analysis that, even if South Asian ethnicity groups have lower awareness of cancer symptoms, they do not appear to be admitted to hospital at any earlier an age than other groups – in fact, the opposite seems to be true for at least some South Asian ethnicities. For Black ethnicity groups, we see a different pattern. Most black ethnicities do not differ from other groups with respect to the age at which elective admissions start to increase – (Black (Other)) is the only exception). However, all Black ethnicities begin to have emergency cancer-related admissions at a younger age than other groups. There may be many reasons for this finding, but it may also provide support for the hypothesis that Black ethnic groups have lower awareness of cancer symptoms.

Figure 9: Patterns of emergency cancer admissions according to gender, ethnicity, and age group



Key: Compared to ONS all-England population figures:

These groups have disproportionately low numbers of emergency cancer admissions.

These groups have proportionate numbers of emergency cancer admissions.

These groups have disproportionately high numbers of emergency cancer admissions.

The size of the black bars shows the number of admissions we observe against the number we expect (known as the standardised ratio). A bigger black bar indicates a high number of observed emergency cancer admissions against expectations. This means that the group's share of emergency cancer admissions is higher than its share of the population.

Appendix 1: ONS age groups and HES ethnicity codes used in this analysis

Table 1: ONS age groups

ONS age groups
0-4
5-7
8-9
10-14
15
16-17
18-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85 and over

Table 2: HES ethnicity codes

Ethnicity (HES)
A (White: British)
B (White: Irish)
C (White: Other)
D (Mixed: White & Black African)
E (Mixed: White & Black Caribbean)
F (Mixed: White & Asian)
G (Mixed: Other)
H (Asian: Indian)
J (Asian: Pakistani)
K (Asian: Bangladeshi)
L (Asian: Other)
M (Black: African)
N (Black: Caribbean)
P (Black: Other)
R (Chinese)
S (Other ethnicity)

Appendix 2: Glossary of terms pertaining to hospital usage

Activity: a generic term used to describe any and all of the above (admitting, treating, and discharging in patients, and having appointments for treatment or consultation with outpatients).

Admission: the act of admitting someone to the hospital.

Attendance: the act of going to a hospital for an appointment, but without being admitted (i.e. being an outpatient).

Episode: a full stay in hospital (admission through discharge).