Public Health England

Protecting and improving the nation's health

Quarterly epidemiological commentary

Mandatory MRSA, MSSA, Gram-negative bacteraemia and *C. difficile* infections data (up to April to June 2019)

September 2019

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing and reduce health inequalities. We do this through world-leading science, research, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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Contents

Data included in this quarterly epidemiological commentary

This document contains quarterly, national-level epidemiological commentaries for MRSA, MSSA, *E. coli*, *Klebsiella* spp. and *P. aeruginosa* bacteraemia and *C. difficile* infections. This includes analyses on counts and incidence rates of all cases and hospital-onset (previously referred to as trust-apportioned) cases of MRSA, MSSA, *E. coli*, *Klebsiella* spp. and *P. aeruginosa* bacteraemia and *C. difficile* infection.

The terminologies; ‘trust-apportioned’ and ‘not trust-apportioned’ have been updated to ‘hospital-onset’ and ‘community-onset’ respectively. Please note that this is only a change in the description and not a change in the methodology for apportionment.

All data tables associated with this report are included in an accompanying OpenDocument spreadsheet.

Revisions to data included are covered by a data-specific revisions and correction policy.

Citation

Citation to PHE division of HCAI & AMR is required. Citation: Public Health England. Quarterly epidemiology commentary: mandatory MRSA, MSSA and Gram-negative bacteraemia and *C. difficile* infection in England (up to April to June 2019) London: Public Health England, September 2019.

Further information

This publication forms part of the range of National Statistics outputs routinely published by Public Health England (PHE) which include monthly and annual reports on the mandatory surveillance of MRSA, MSSA and *E. coli, Klebsiella* spp. and *P. aeruginosa* bacteraemia and *C. difficile* infections (CDI).

Annual report output

Further epidemiological analyses by financial year can be found in PHE's annual epidemiological commentary.

Monthly report outputs

The following reports are produced by PHE monthly.

MRSA bacteraemia: counts of all reported, hospital and community-onset cases of MRSA bacteraemia by organisation

MSSA bacteraemia: counts of all reported, hospital and community-onset cases of MSSA bacteraemia by organisation

***E. coli* bacteraemia:** counts of all reported, hospital and community-onset cases of *E. coli* bacteraemia by organisation

***Klebsiella* spp.** bacteraemia: counts of all reported, hospital and community-onset cases of *Klebsiella* spp. bacteraemia by organisation

***P. aeruginosa* bacteraemia:** counts of all reported, hospital and community-onset cases of *P. aeruginosa* bacteraemia by organisation

CDI: counts of all reported, hospital and community-onset cases of CDI by organisation. Data for this report was extracted from PHE's healthcare associated infections data capture system (HCAI DCS) on 5 August 2019.

Epidemiological analyses of Gram-negative bacteraemia data

E. coli bacteraemia

The incidence rate of all reported *E. coli* bacteraemia continues to increase each year since the initiation of the mandatory surveillance of *E. coli* bacteraemia in July 2011 (figure 1a). This is primarily driven by the increase in the rate of community-onset cases (table S1a). In contrast, the incidence rate of hospital-onset cases has remained relatively stable within the same period (figure 1b).

Between July to September 2011 and April to June 2019, the count of cases and the incidence rate of all reported cases of *E. coli* bacteraemia increased by 32.3% from 8,275 cases to 10,948 and from 61.8 to 78.4 cases per 100,000 population. Similarly, over the same period, the count of community-onset cases increased by 43.8% from 6,279 to 9,028, while the incidence rate increased 37.9% from 46.9 cases per 100,000 population to 64.7.

The incidence rate of hospital-onset cases decreased 3.8% between July to September 2011 and April to June 2019 from 23.7 per 100,000 bed-days (n=1,996) to 22.5 per 100,000 bed-days (n=1,920).

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows a 2.2% increase in the count of all reported cases from 10,712 to 10,948, while the incidence rate increased 2.2% from 76.8 per 100,000 population to 78.4. Hospital-onset *E. coli* bacteraemia cases and rates remained stable at 1,920 cases and an incidence rate of 22.5 per 100,000 bed-days. Community-onset *E. coli* bacteraemia cases increased 2.6% from 8,801 to 9,028 per 100,000 bed-days, while the community-onset incidence rate increased 2.6% from 63.1 per 100,000 population to 64.7 (figure 1a and 1b, table S1).

There is a strong seasonality to the incidence of all-reported *E. coli* bacteraemia cases, with the highest rates observed between July to September of each year. There is less evidence of the same seasonality among hospital-onset cases, though a summer peak is observed between financial years 2015/16 and 2018/19.

Figure 1a: Quarterly rates of all reported *E. coli* bacteraemia: July to September 2011 to April to June 2019

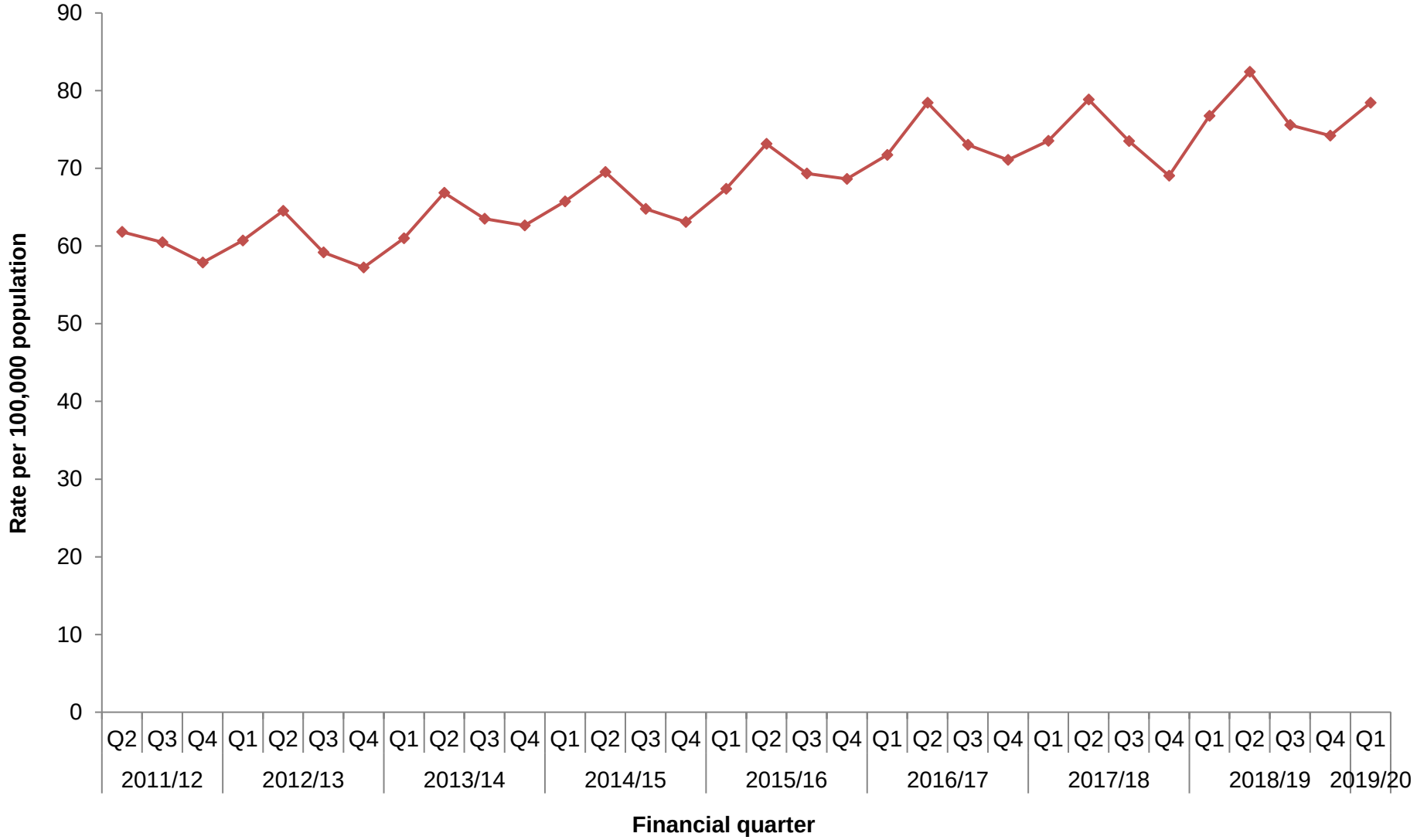
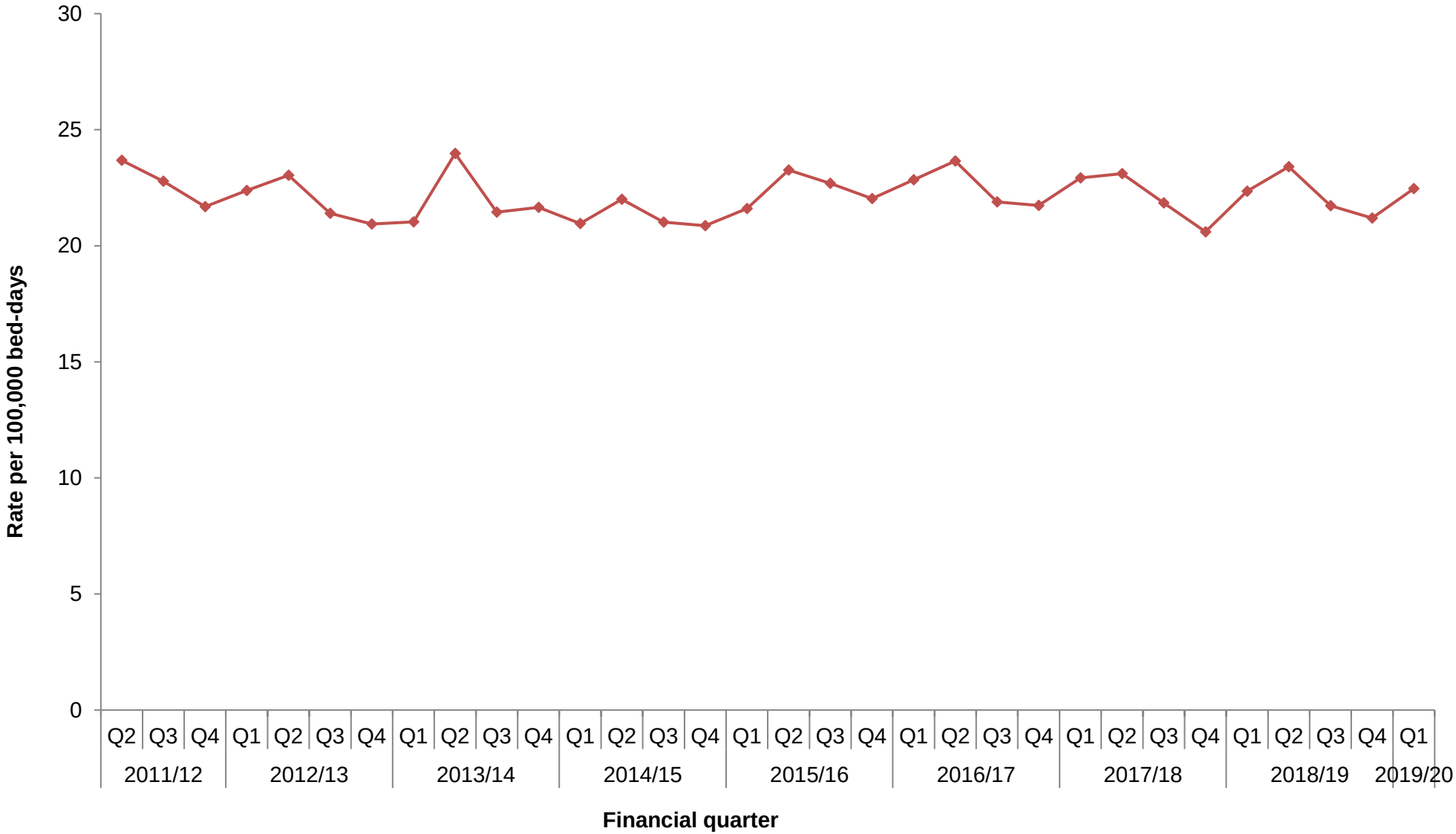


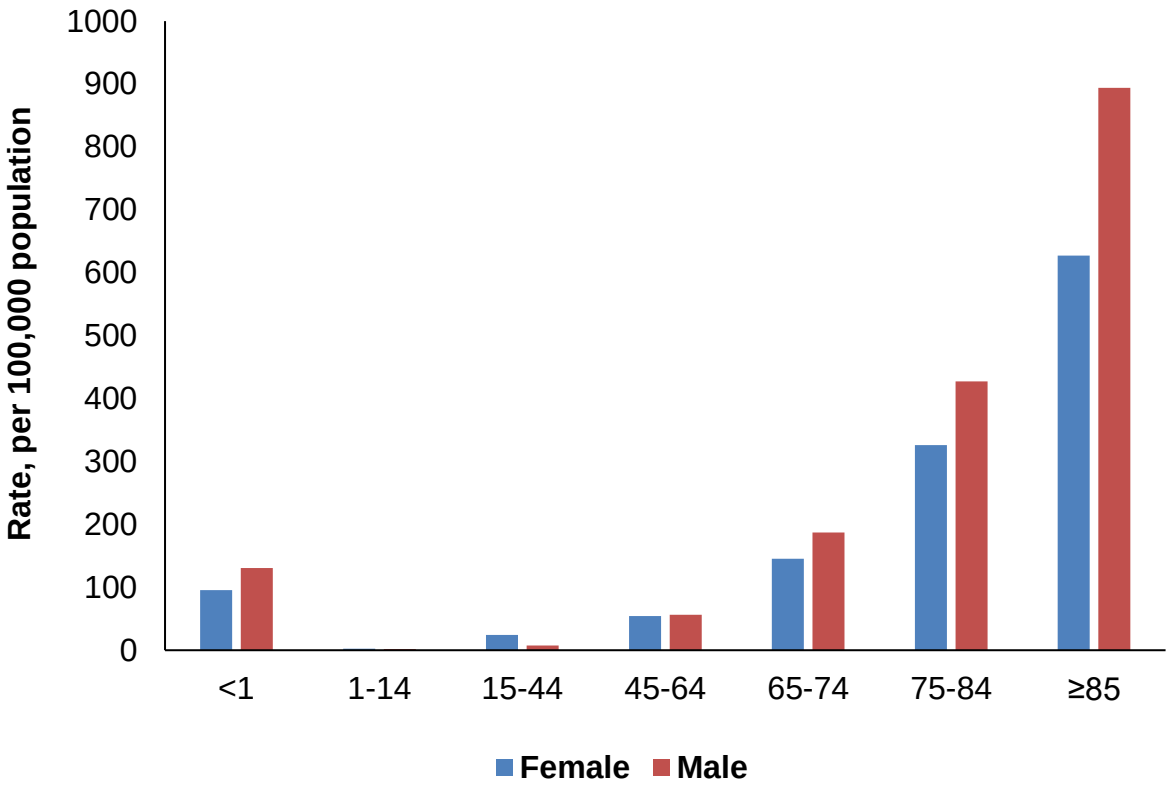
Figure 1b: Quarterly rates of hospital-onset E. coli bacteraemia: July to September 2011 to April to June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 1c depicts *E. coli* bacteraemia rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2019. The bacteraemia rate was high in the ≥85 and 75 to 84 years age groups. The rate of bacteraemia per 100,000 population in these age groups was higher amongst males in comparison to females (≥85 years: 894.1 vs. 627.3 and 75 to 84 years: 427.5 vs. 326.2 per 100,000 population).

Figure 1c. *E. coli* bacteraemia rates per 100,000 population by age and sex: 12 months up to and including June 2019



Klebsiella spp. bacteraemia

Between April to June 2017 and April to June 2019, there was an 8.1% increase in the count from 2,345 to 2,535 and a 7.4% increase in the incidence rate of all reported *Klebsiella* spp. bacteraemia cases from 16.9 to 18.2 cases per 100,000 population respectively (figure 2a). The count and the incidence rate of community-onset cases also increased by 7.0% from 1,675 to 1,792 cases and by 6.3% from 12.1 to 12.8 cases per 100,000 population respectively. Over the same period, the count and the incidence rate of hospital-onset cases increased by 10.9% from 670 to 743 cases and by 11.6% from 7.8 cases per 100,000 bed-days to 8.7 respectively (figure 2b).

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows no change in the count of all reported cases (2,533 to 2,535 respectively). Accordingly, there was no change in the incidence rate (18.1 and 18.2 respectively). Similiarly, hospital-onset *Klebsiella* spp. showed no change in the count or incident rate (736 to 743 and 8.6 to 8.7 per 100,000 bed-days respectively). Community-onset *Klebsiella* spp. cases also remained stable (1,797 to 1,792), thus the rate of community-onset remained the same at 12.8 per 100,000 population (table S2).

During April to June 2019, 73.3% (1,857/2,535) of all reported *Klebsiella* spp. bacteraemia were caused by *K. pneumoniae*, a decrease from 73.5% in the same quarter in the previous year (April to June 2018). Over the same period 16.2% (411/2,535) were caused by *K. oxytoca in* April to June 2019, a decrease from 17.4% in the same quarter in the previous year (April to June 2018).

Figure 2a: Quarterly rates of all reported *Klebsiella* spp. bacteraemia by species: April to June 2017 April to June 2019

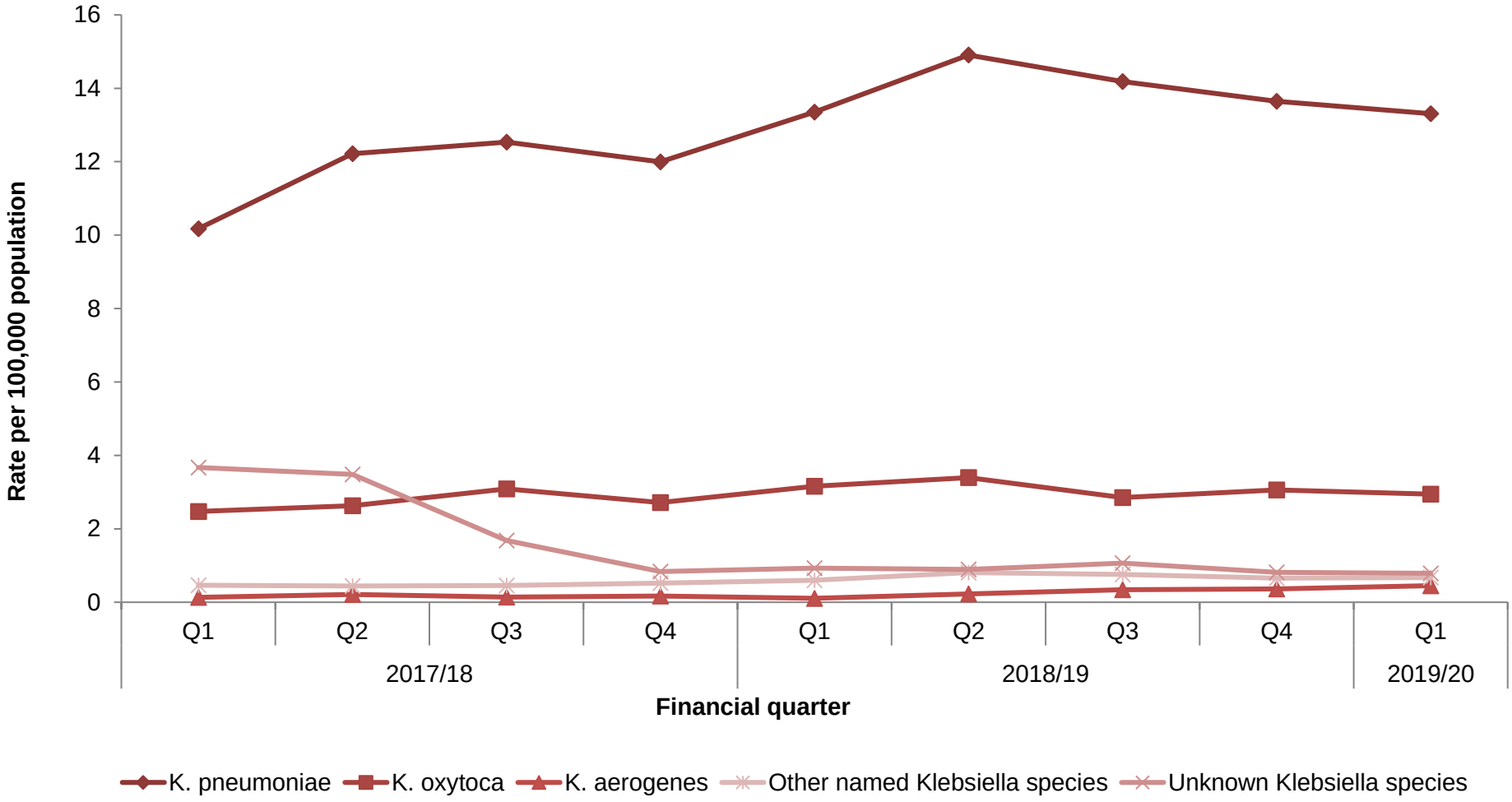
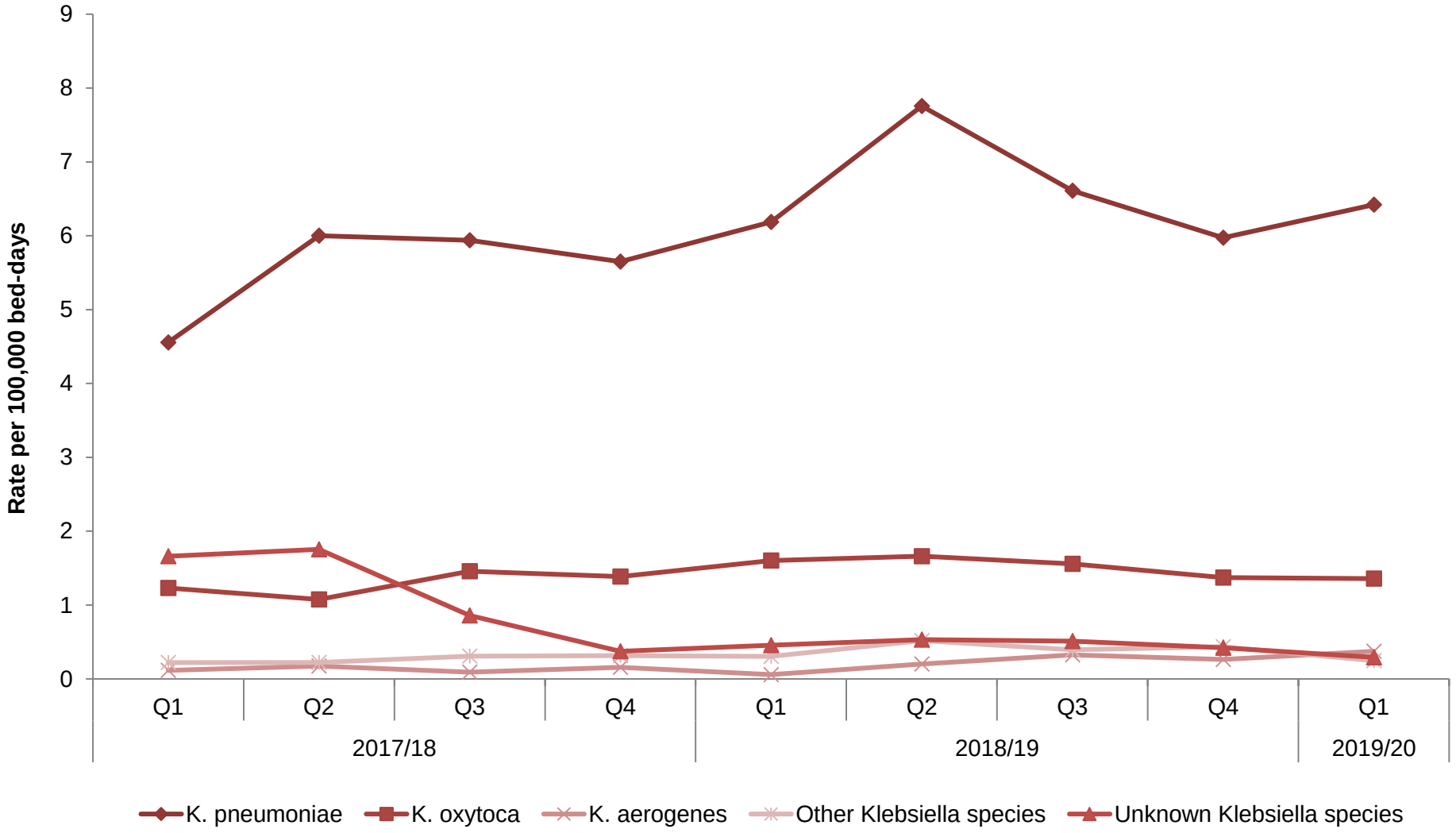


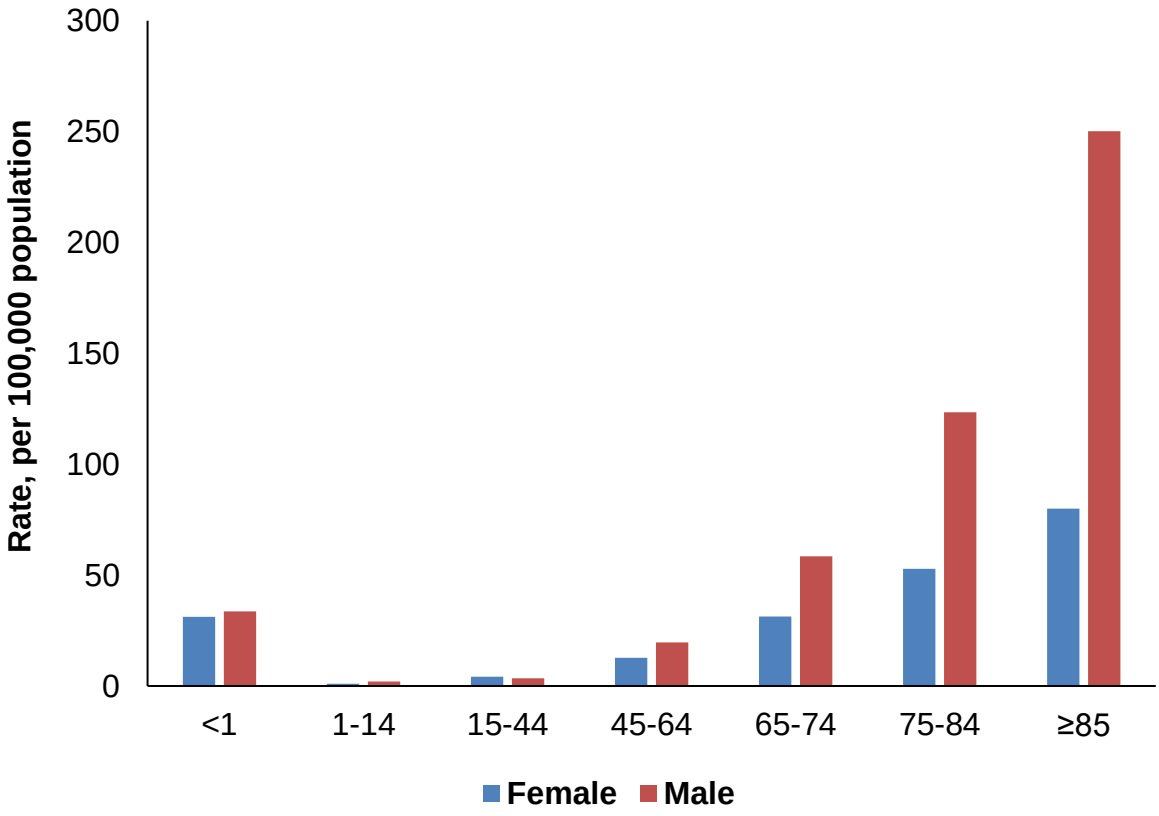
Figure 2b: Quarterly rates of hospital-onset *Klebsiella* spp. bacteraemia: April to June 2017 to April to June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 2c depicts *Klebsiella* spp. bacteraemia rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2019. The bacteraemia rate was high in the ≥85, 75 to 84 and 65 to 74 years age groups. The rate of bacteraemia per 100,000 population in these age groups was markedly higher amongst males in comparison to females (≥85 years: 250.2 vs. 79.9, 75 to 84 years: 123.5 vs. 52.8 and 65 to 74 years: 58.5 vs 31.4 per 100,000 population).

Figure 2c. *Klebsiella* spp. bacteraemia rates per 100,000 population by age and sex: 12 months up to and including June 2019



Pseudomonas aeruginosa bacteraemia

Between April to June 2017 and April to June 2019, there was a 5.2% increase in the count and a 4.6% increase in the incidence rate of all reported *P. aeruginosa* bacteraemia cases from 1,011 to 1,064 and from 7.3 to 7.6 cases per 100,000 population respectively (figure 3a). The count and the incidence rate of community-onset cases also increased by 5.0% from 637 to 669 cases and by 4.4% from 4.6 to 4.8 cases per 100,000 population respectively. Over the same period, the count and the incidence rate of hospital-onset cases increased by 5.6% from 374 to 395 cases and by 6.3% from 4.3 to 4.6 cases per 100,000 bed-days respectively (figure 3b).

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows a 9.6% increase in the count of all reported cases from 971 to 1,064, while the incidence rate increased 9.6% from 7.0 to 7.6. Hospital-onset *P. aeruginosa* cases increased 12.5% from 351 to 395 which corresponds to an increase in the incidence rate of 12.5% from 4.1 to 4.6 per 100,000 bed-days. Community-onset *P. aeruginosa* cases increased 7.9% from 620 to 669 per 100,000 population, while the community-onset incidence rate increased 7.9% from 4.4 to 4.8 per 100,000 population (table S3).

There is evidence of seasonality to the incidence of all-reported *P. aeruginosa* bacteraemia cases, with the highest rates observed in July to September of each year. Due to this seasonality, trends of *P. aeruginosa* and the limited data points available the results need to be interpreted with caution.

Figure 3a: Quarterly rates of all reported *P. aeruginosa* bacteraemia: April to June 2017 to April to June 2019

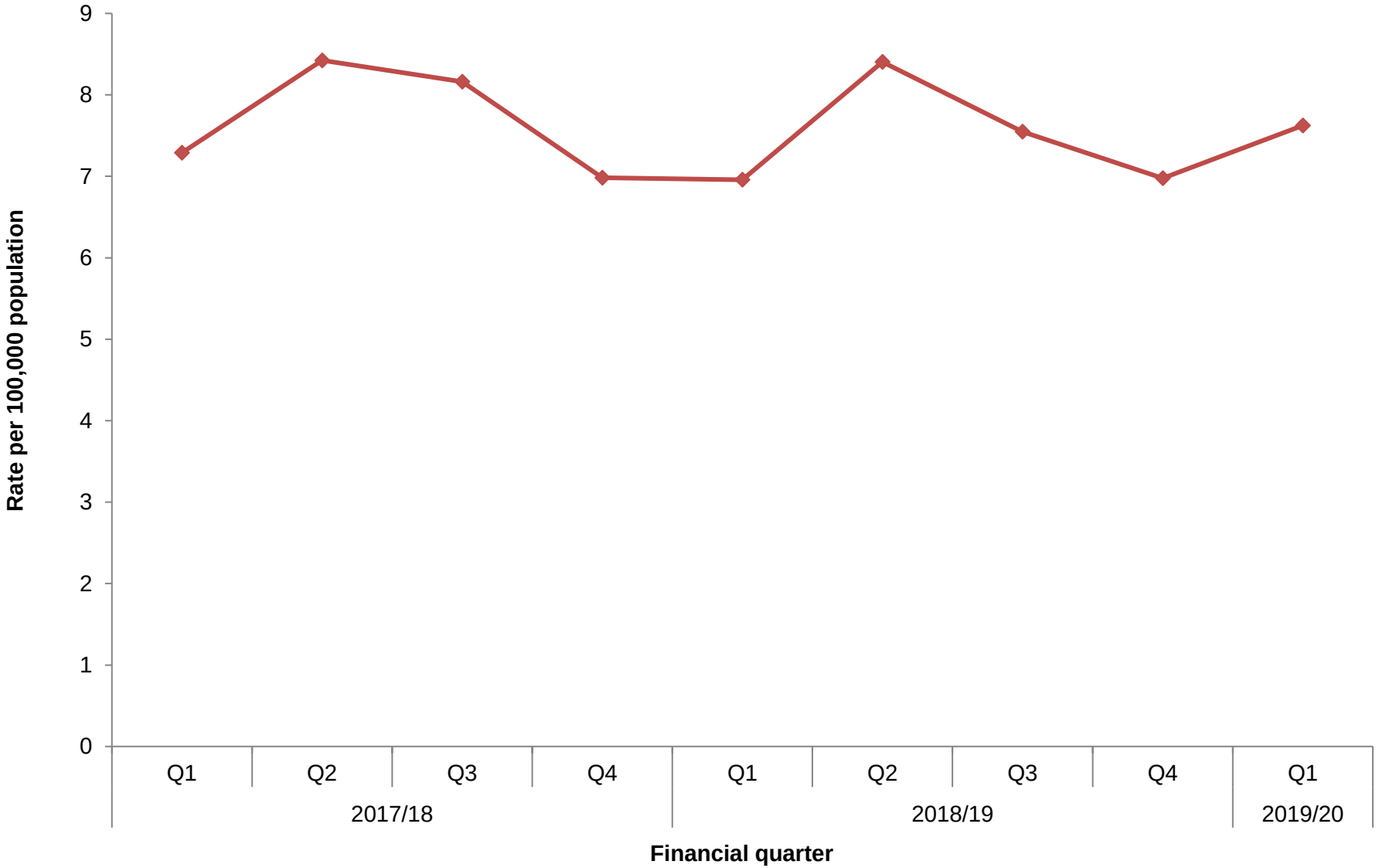
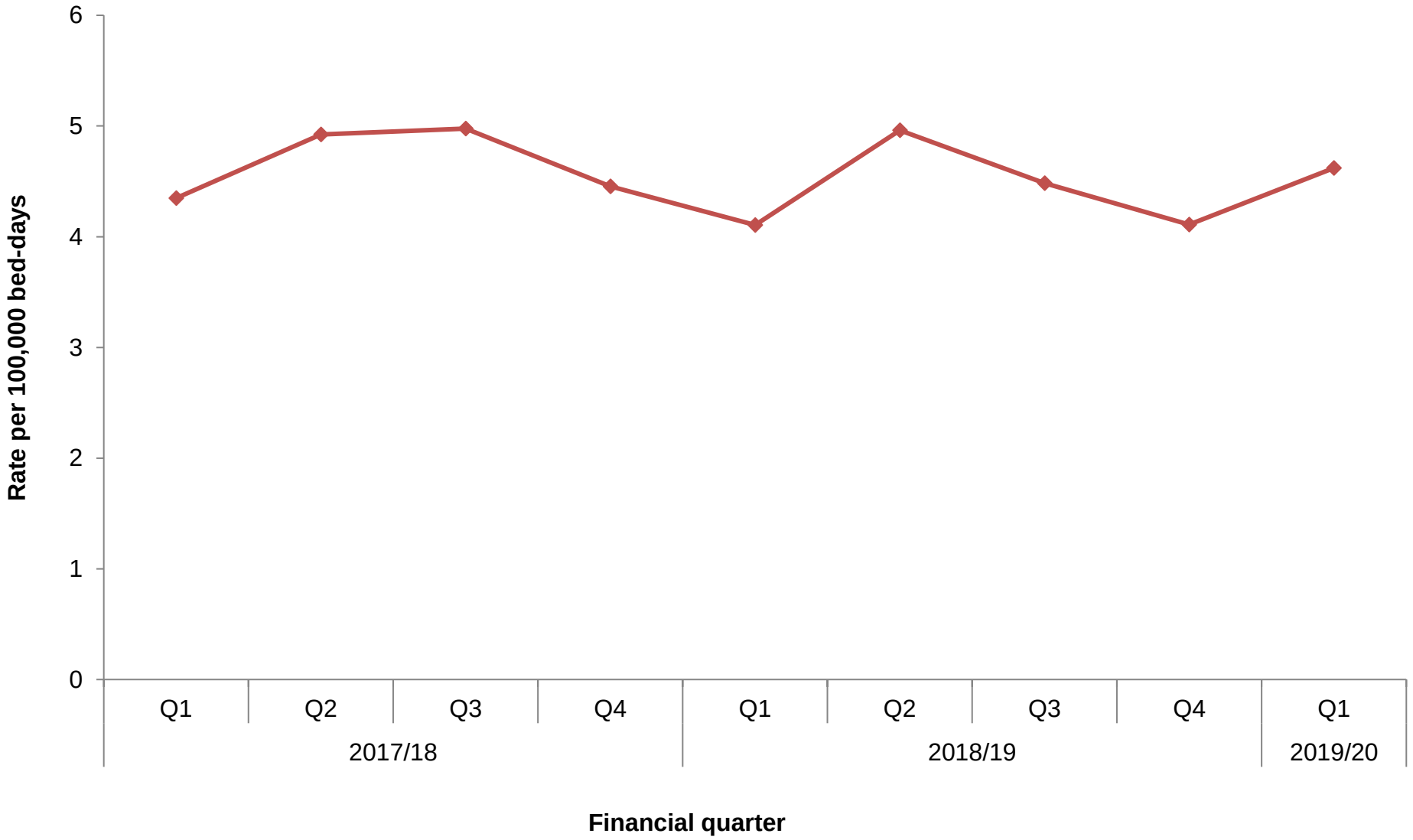


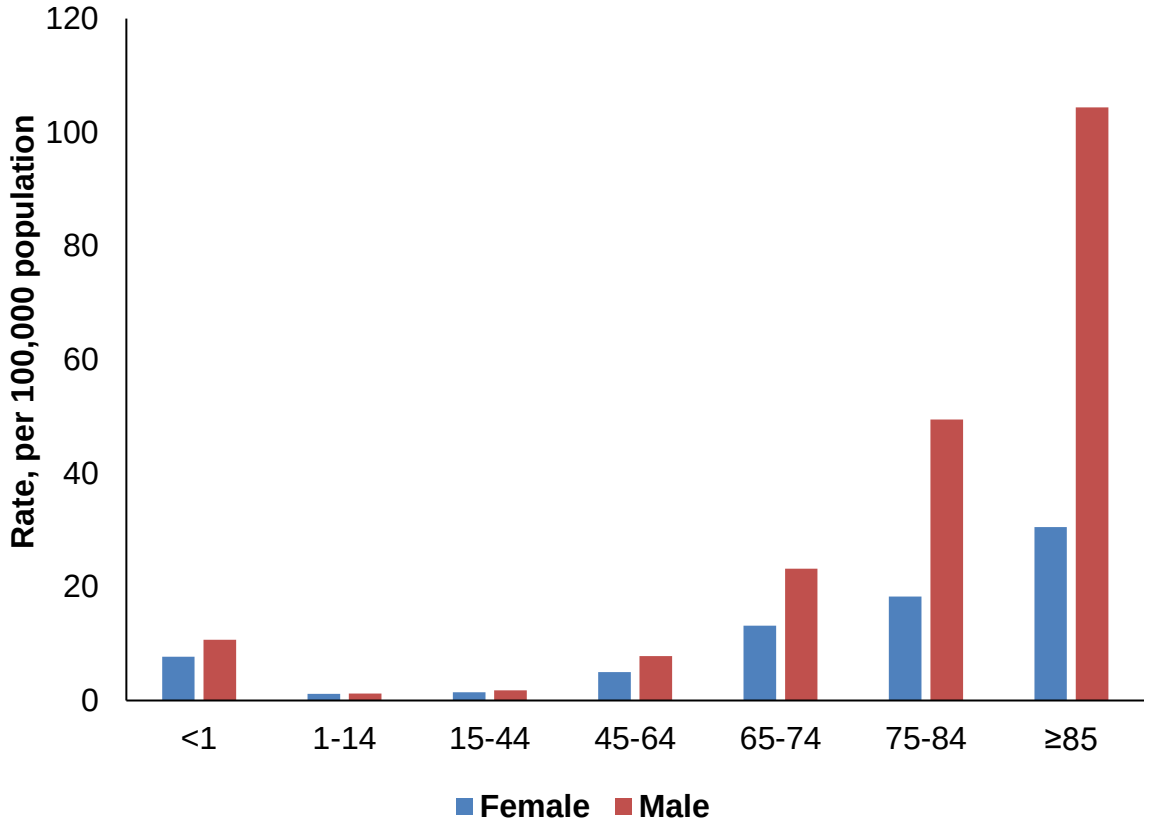
Figure 3b: Quarterly rates of hospital-onset *P. aeruginosa* bacteraemia: April to June 2017 to April to June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 3c depicts *P. aeruginosa* bacteraemia rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2019. The bacteraemia rate was high in the ≥85, 75 to 84 and 65 to 74 years age groups. The rate of bacteraemia per 100,000 population in these age groups was markedly higher amongst males in comparison to females (≥85 years: 104.4 vs. 30.5, 75 to 84 years: 49.4 vs. 18.3 and 65 to 74 years: 23.2 vs 13.2 per 100,000 population).

Figure 3c. *P. aeruginosa* bacteraemia rates per 100,000 population by age and sex: 12 months up to and including June 2019



Epidemiological analyses of *Staphylococcus aureus* bacteraemia data

MRSA bacteraemia

There has been a considerable decrease in the incidence rate of all reported MRSA bacteraemia since the enhanced mandatory surveillance of MRSA bacteraemia began in April 2007 (figures 4a, table S4a). The incidence rate of all reported cases fell by 85% from 10.2 cases per 100,000 population April to June 2007 to 1.5 cases per 100,000 in January to March 2014. The rate has subsequently decreased to 1.3 cases per 100,000 population between January to March 2014 and April to June 2019.

A similar trend was observed with the incidence rate of hospital-onset cases (figures 4b, table S4a). There was a steep decrease of 79% from 4.9 cases per 100,000 bed-days in April to June 2008 to 1.0 January to March 2014. Subsequently, between January to March 2014 and April to June 2019, the rate has decreased to 0.6 cases per 100,000 bed-days.

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows a 10.4% decrease in the count of all reported cases from 202 to 181, while the incidence rate decreased 10.4% from 1.4 to 1.3 cases per 100,000 population. The count of hospital-onset MRSA bacteraemia cases decreased 28.8% from 73 to 52 which corresponds to a decrease in the incidence rate of 28.8% from 0.9 to 0.6 per 100,000 bed-days. Community-onset MRSA bacteraemia cases (n=129) and incidence rate (0.9 cases per 100,000 population) showed no change in comparison to the same quarter in the previous year (table 4a).

Figure 4a: Quarterly rates of all reported MRSA bacteraemia: April to June 2007 to April to June 2019

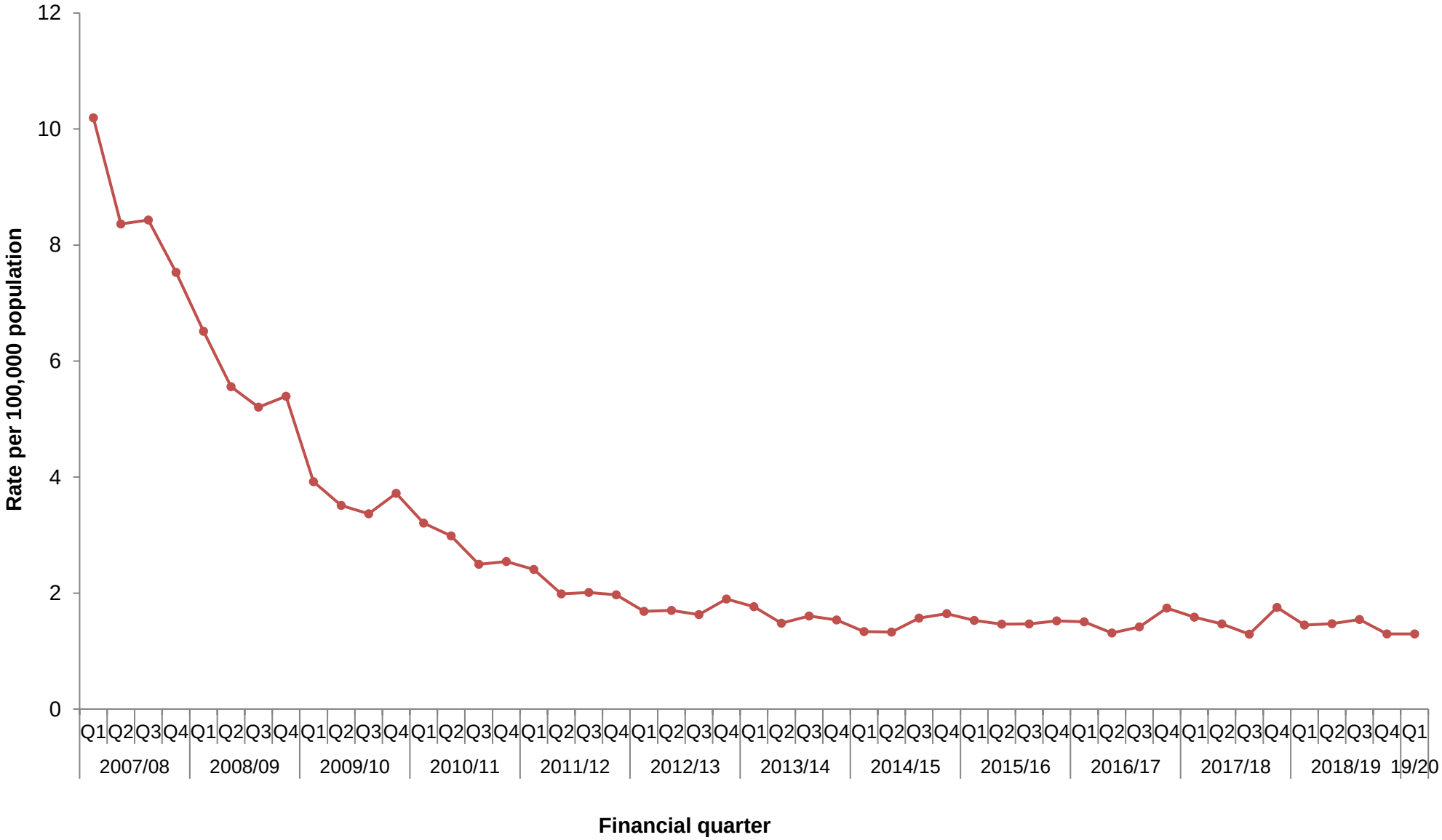
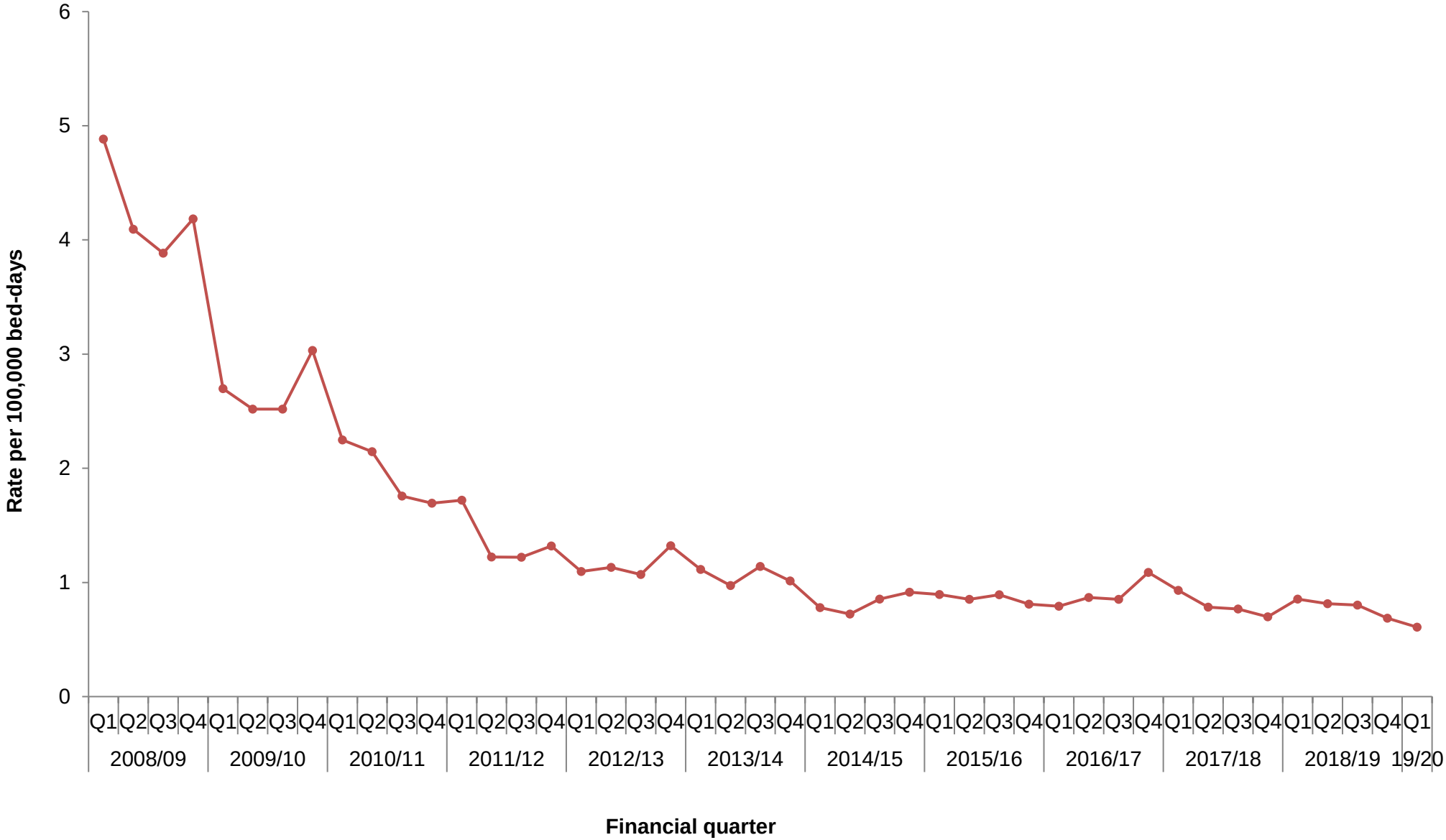


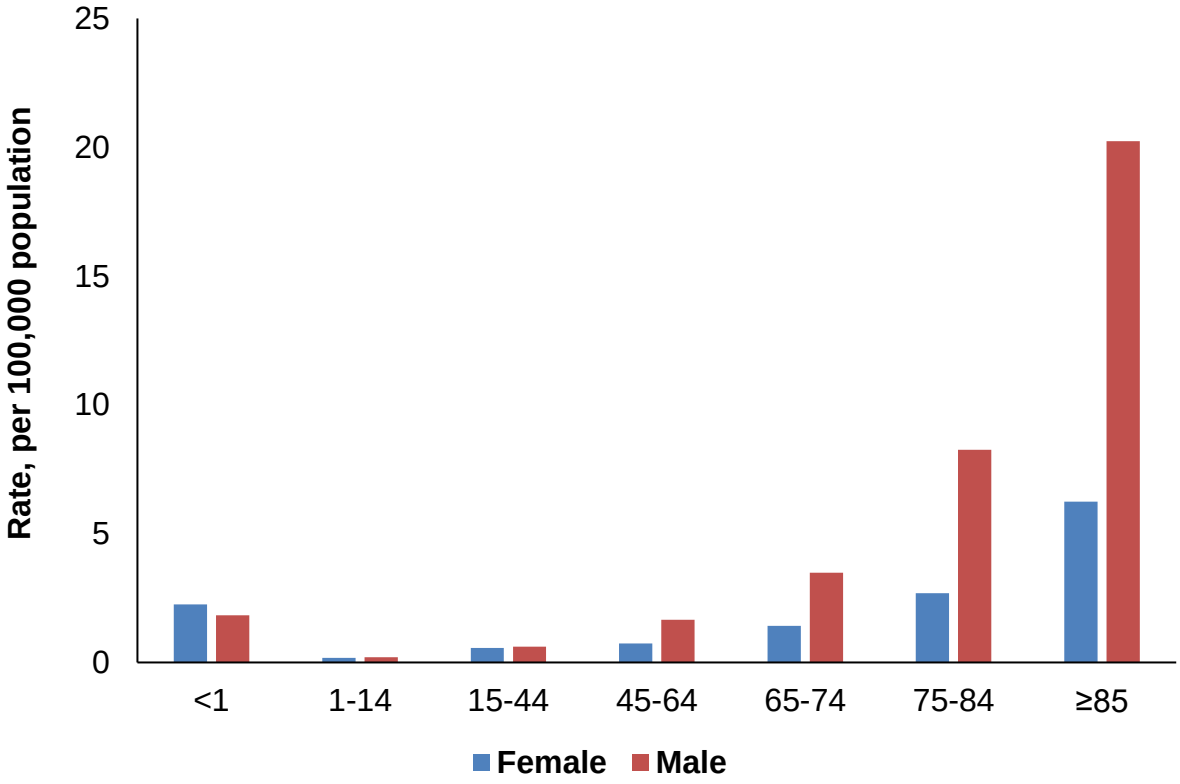
Figure 4b: Quarterly rates of hospital-onset MRSA bacteraemia: April to June 2008 to April to June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 4c depicts MRSA bacteraemia rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2018. The bacteraemia rate was high in the ≥85, 75 to 84 and 65 to 74 years age groups. The rate of bacteraemia per 100,000 population in these age groups was markedly higher amongst males in comparison to females (≥85 years: 20.2 vs. 6.2, 75 to 84 years: 8.3 vs. 2.7 and 65 to 74 years: 3.5 vs 1.4 per 100,000 population).

Figure 4c. MRSA bacteraemia rates per 100,000 population by age and sex: 12 months up to and including June 2019



MSSA bacteraemia

Since the mandatory reporting of MSSA bacteraemia began in January 2011 there has been a general trend of increasing counts and incidence rates. The count of all reported cases of MSSA bacteraemia increased by 38.5% from 2,199 to 3,045 between January to March 2011 and April to June 2019. This was accompanied by a 29.9% increase in incidence rate from 16.8 per 100,000 population to 21.8 (figure 5a, table S5).

These increases are primarily driven by the increase in community-onset cases. Between January 2011 to March 2019, the count and the incidence rate of community-onset cases increased by 50.0% and 40.8% respectively from 1,464 to 2,197 cases and from 11.2 to 15.7 cases per 100,000 population. Over the same period, the count of hospital-onset cases increased by 15.4% from 735 to 848 cases, while the incidence rate increased 18.6% from 8.4 to 9.9 cases per 100,000 bed-days (figure 5a and 5b, table S5a).

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows a 1.8% increase in the count of all reported cases from 2,992 to 3,045, while the incidence rate increased 1.8% from 21.4 to 21.8. Hospital-onset MSSA bacteraemia cases increased 3.8% from 817 to 848 which corresponds to an incidence rate increase of 3.8% from 9.6 to 9.9 per 100,000 bed-days. Community-onset MSSA bacteraemia cases remained stable at 2,197, while the community-onset incidence rate also remained stable at 15.7 per 100,000 population.

Figure 5a: Quarterly rates of all reported MSSA bacteraemia: January to April 2011 to April to June 2019

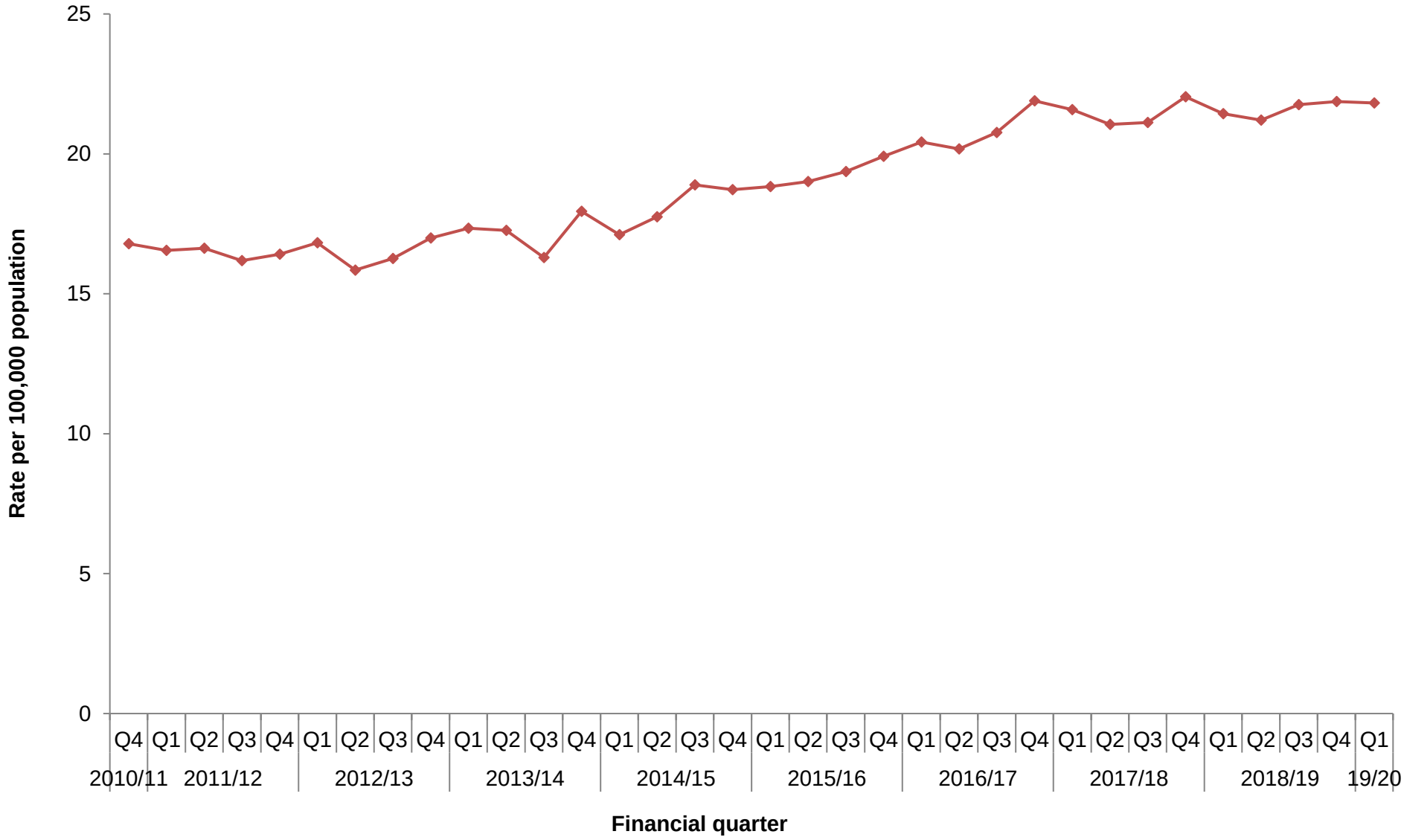
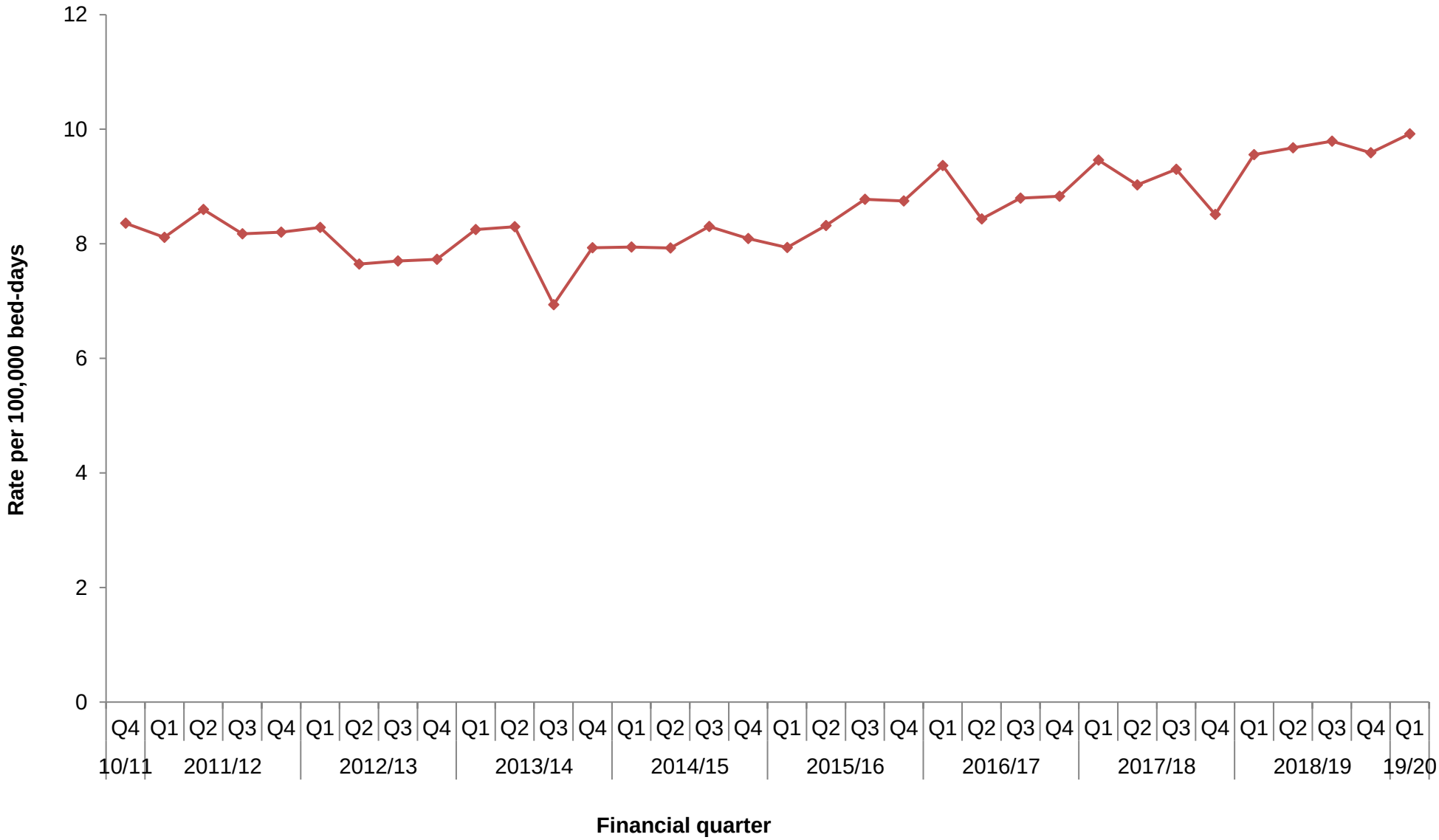


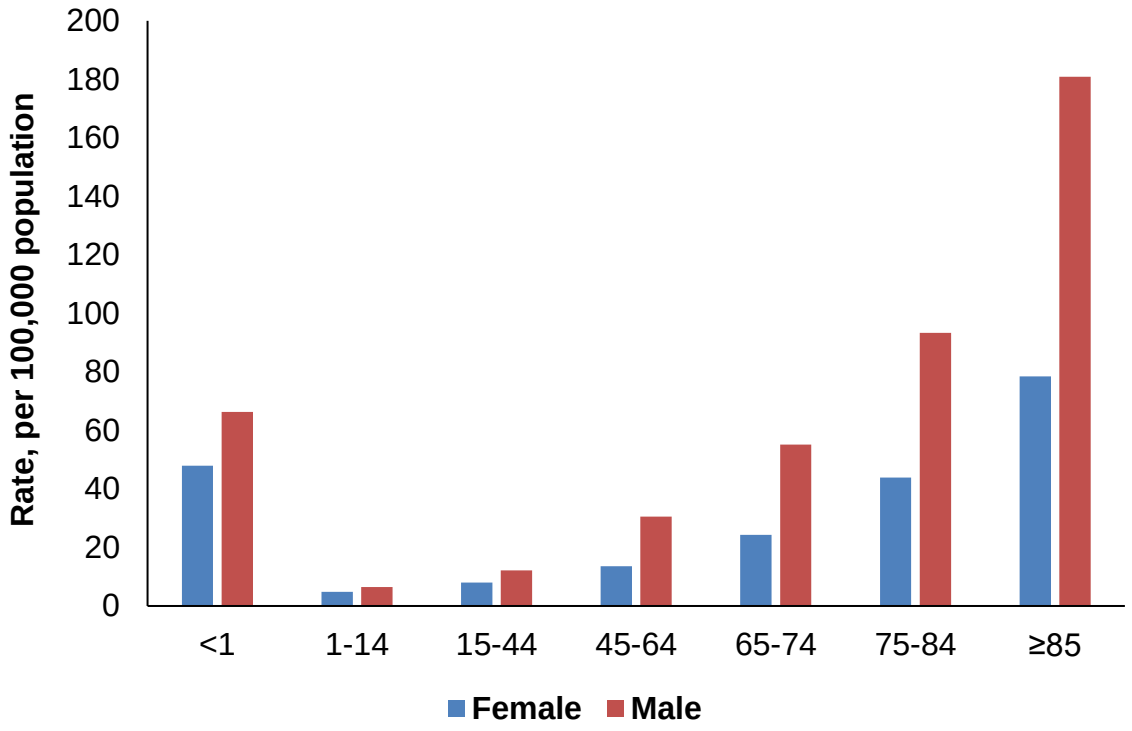
Figure 5b: Quarterly rates of hospital-onset MSSA bacteraemia: January to April 2011 to April to June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 5c depicts MSSA bacteraemia rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2018. The bacteraemia rate was the highest in the ≥85, 75 to 84 and <1 years age groups. The rate of bacteraemia per 100,000 population in these age groups was markedly higher amongst males in comparison to females (≥85 years: 180.9 vs. 78.4, 75 to 84 years: 93.3 vs. 43.9 and <1 years: 66.3 vs 48.0 per 100,000 population).

Figure 5c. MSSA bacteraemia rates per 100,000 population by age and sex: 12 months up to and including June 2019



Epidemiological analyses of *Clostridiodies difficile* infection data

Since the initiation of *C. difficile* (CDI) surveillance in April 2007, there has been an overall decrease in the count and associated incidence rate of both all-reported and hospital-onset cases of CDI (figure 6a, 6b and table S6).

Most of the decrease in the incidence rate occurred between April to June 2007 and January to March 2012 with a 78% decrease in all-reported cases of CDI from 16,864 to 3,711 cases and an associated 79% reduction in incidence rate from 131.6 cases per 100,000 population to 27.9. Subsequently, between January to March 2012 and April to June 2019, the count of all-reported cases decreased 16.7% from 3,711 to 3,090 cases and the incidence rate reduced by 20.6% from 27.9 cases per 100,000 population to 22.1.

There were similar, but greater, reductions among hospital-onset CDI cases with an 85% reduction in count of cases between April to June 2007 and January to March 2012 from 10,436 to 1,613 cases and 84% reduction in the incidence rate from 112.5 per 100,000 bed-days to 18.2. This was followed by a further 33.0% decrease in the count of cases from 1,613 to 1,080 cases and a decrease of 30.5% in the incidence rate from 18.2 cases per 100,000 bed-days to 12.6 between January to March 2012 and April to June 2019.

Comparing the most recent quarter (April to June 2019) to the same period in the previous year (April to June 2018) shows a 4.3% decrease in the count of all reported cases from 3,228 to 3,090, while the incidence rate decreased 4.3% from 23.1 cases per 100,000 population to 22.1. Hospital-onset CDI cases remained stable at 1,080 which corresponds to an incidence rate of 12.6 cases per 100,000 bed-days. Community-onset CDI cases decreased 6.3% from 2,146 to 2,010, while the community-onset incidence rate decreased 6.3% from 15.4 per 100,000 population to 14.4.

Figure 6a: Quarterly rates of all reported *C. difficile:* April to June 2007 to April to June 2019

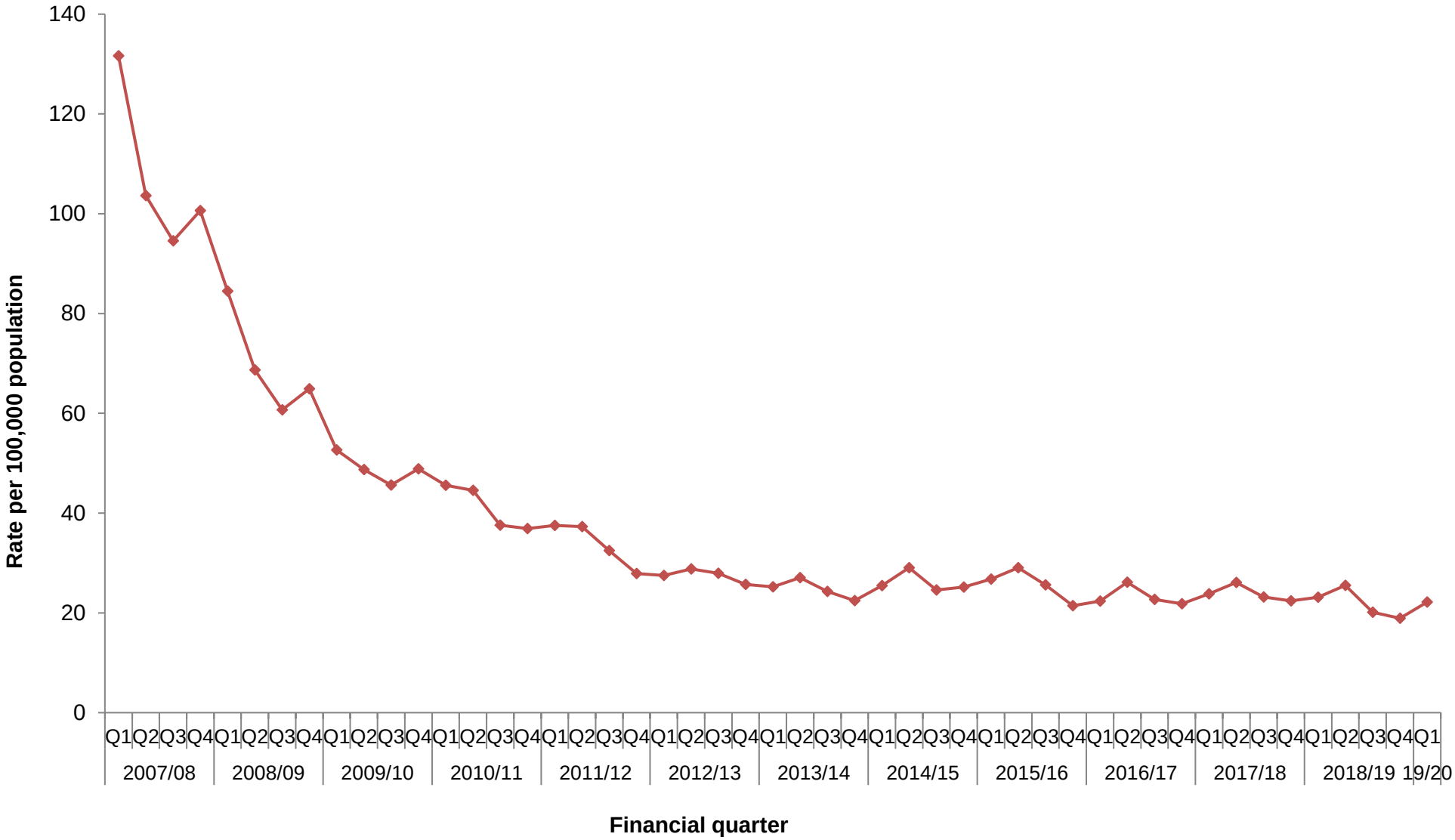
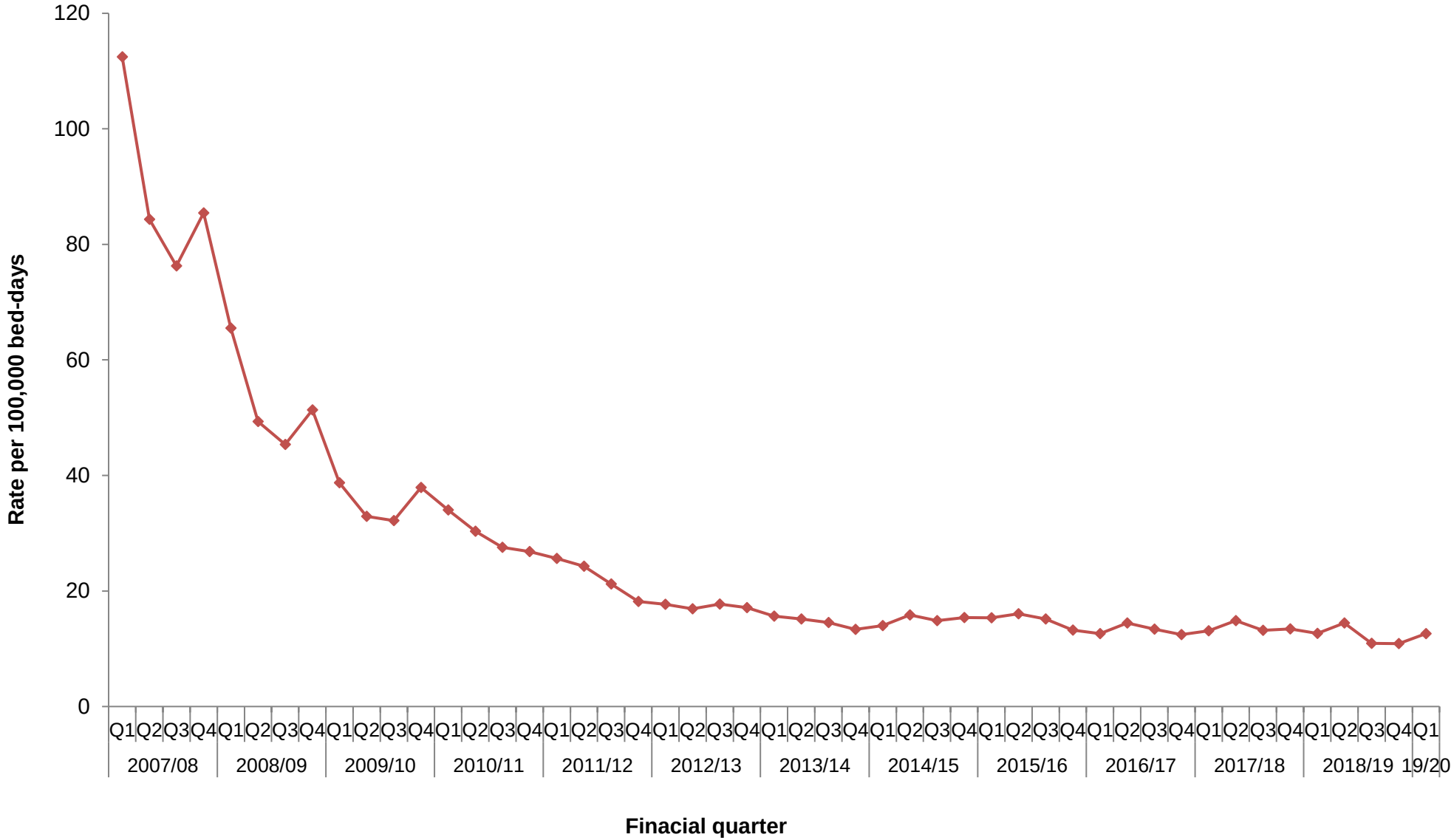


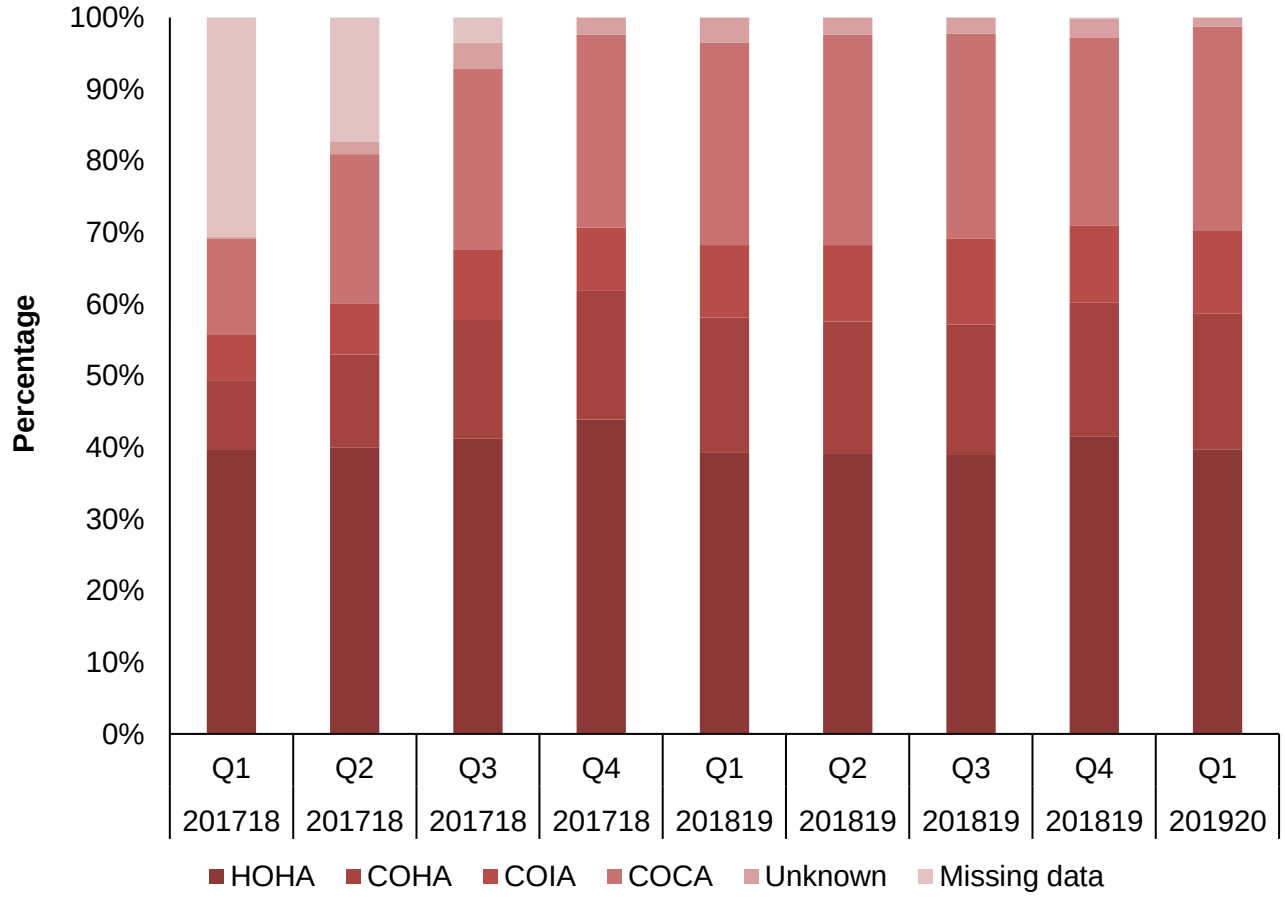
Figure 6b: Quarterly rates of hospital-onset *C. difficile*: April to June 2007 to April to June 2019



From April 2017, the HCAI DCS has included questions relating to prior admissions to the same acute trust reporting the CDI case. These additional, mandatory, items will help align English CDI surveillance with definitions used by the European Centre for Disease Prevention and Control (ECDC) and Centers for Disease Control and Prevention (CDC) in the USA. Cases are now catagorised as; Healthcare-Onset, Healthcare Associated (HOHA), Community-Onset, Healthcare Associated (COHA), Community-Onset, Indeterminate Association (COIA) or Community-Onset, Community Associated (COCA). Cases where prior admission details were recorded as 'Don't know', are assigned as 'Unknown' and those with missing information as 'missing information'.

Between April to June 2017 and April to June 2019 the largest proportion of cases are HOHA and this has remained stable at around 40% of all cases. Over the same period COCA increased from 13.4% to 28.5% of all CDI, although most of this increase was observed during 2017/18. Similiarly COHA cases have increased from 9.7% to 19.0% of all CDI, with most of the increase being observed during 2017/18. COIA cases have increased from 6.3% to 11.5% of all CDI. It should be noted much of the increase observed is likely due to an increase in data quality as shown by the sharp decline of cases with missing data (figure 6b Table S6b).

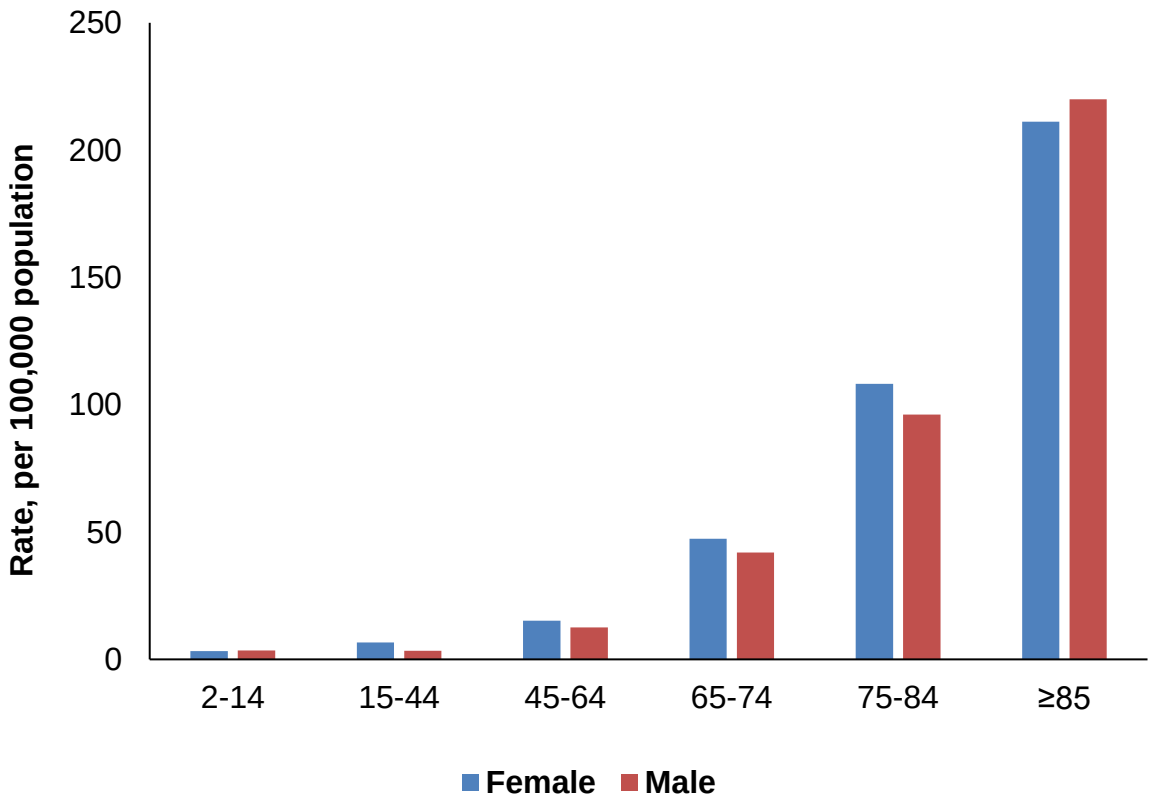
Table S6b: CDI rates by prior trust exposure April 2017 - June 2019



Age and Sex rates: 12-month up to and including June 2019

Figure 6c depicts CDI rates per 100,000 population amongst both sexes and across different age groups in England in the 12 months leading up to and including June 2018. The rate was high in the ≥85, 75 to 84 and 65 to 74 years age groups. In general, the rate of infection was slightly higher among females than males (65 to 74 years: 42.0 vs 47.3 per 100,000 population and 75 to 84 years: 96.2 vs. 108.2). The exception to this is the ≥85 age group, where males had a slightly higher infection rate than females (220.0 vs. 211.1).

Figure 6c. CDI rates per 100,000 population by age and sex: 12 months up to and including June 2019



Appendix

Bed-day data

For bacteraemia and CDI, the average bed-day activity reported by acute trusts via KH03 returns is used to derive the bed-day denominator for acute trust incidence rate rates (assigned and apportioned). As of Q1 2011/12, bed-day data has been available on a quarterly basis and has been used as such for Q2 2011/12 to Q4 2018/19. This data is available at: www.england.nhs.uk/statistics/statistical-work-areas/bed-availability-and- occupancy/bed-data-overnight/

Amendments to the published figures on KH03 included the following.

Q1 2019/20 bed-day data was not available at the time of writing this report; therefore, bed-day data for the same quarter of the previous year (Q1 2018/19) was used as a proxy for this quarter.

In Quarterly Epidemiological Commentaries published prior to 1 December 2015, April to June 2014 to October to December 2014 quarterly KH03 figures for one acute trust (RWD) had a percentage change of more than 20% compared with the previous quarter and the same quarter in the previous year. As a result, it was replaced with the KH03 data of the same quarter in the previous year (April to June 2013 to October to December 2013).

However, PHE has reviewed its policy for processing KH03 data. Data irregularities identified have been flagged with colleagues at NHS England (data owners of the KH03 dataset). Until we receive confirmation that any identified change in the occupied overnight bed-days for an acute trust is anomalous, PHE now uses the data as published in the KH03 dataset. This affects all reports published since 1 December 2015 and incidence rate rates published prior that time will differ slightly as a result. For the KH03 data used to calculate rates included in this report to be consistent over the full-time period, previously amended KH03 data for trust United Lincolnshire Hospitals (RWD) for FY 2014/2015 has been altered to reflect that published in the KH03 dataset. Please note that this could lead to slight differences in hospital- onset/assigned rates when compared with publications prior to 1 December 2015.

Missing data for acute trusts in the KH03 returns will continue to be processed as before, where the KH03 return for the same quarter from the previous year will be used as a proxy. Trusts thus affected were:

- Moorfields Eye Hospital NHS Foundation Trust (RP6) 2007/08 and 2008/09 KH03 figures: replaced with 2006/07 KH03 figure
- Rotherham NHS Foundation Trust (RFR): 2009/10 and April-June 2010 to April-June 2011 KH03 figures: replaced with 2008/09 KH03 figure
- Sheffield Teaching Hospitals NHS Foundation Trust (RHQ) April-June 2010 to April-June 2011 KH03 figures: replaced with 2009/10 KH03 data
- The Princess Alexandra Hospital NHS Trust (RQW) April-June 2014 and October-December 2014 KH03 figures: replaced with April-June 2013 to October- December 2013 KH03 figures, respectively
- Ipswich Hospital NHS Trust (RGQ) January-March 2016 KH03 figure: replaced with January-March 2015 figures
- West Suffolk NHS Foundation Trust (RGR) April-June 2016 to October-December 2016 and April-June 2017 KH03 figures: replaced with April-June 2015 to October-December 2015 KH03 figures
- Gloucestershire Hospitals NHS Foundation Trust (RTE) October-December 2016 to January-March 2017 KH03 figures: replaced with October-December 2015 to January-March 2016 KH03 figures

The KH03 data used for this report was published on 23 May 2019. This includes revisions of previously published KH03 data and so these data may differ from those used in earlier reports.

Population data

National incidence rates are calculated using 2007 to 2018 mid-year resident population estimates which are based on the 2011 census for England (2019 estimates are based on 2018 mid-year estimates).

Definitions

Bacteraemia hospital-onset (trust-apportioned) cases:
Include patients who are (i) in-patients, day-patients, emergency assessment patients or not known; AND (ii) have had their specimen taken at an acute trust or not known; AND (iii) specimen was taken on or after day 3 of the admission (admission date is considered day ‘one’). Cases that do not meet these criteria are categorised as community-onset (not-trust apportioned).

CDI hospital-onset (trust-apportioned) cases:
Include patients who are (i) in-patients, day-patients, emergency assessment patients or not known; AND (ii) have had their specimen taken at an acute trust or not known; AND (iii) specimen was taken on or after day 4 of the admission (admission date is

considered day ‘one’). Cases that do not meet these criteria are categorised as community-onset (not-trust apportioned).

Historically, report published before September 2017 have used the term ‘trust-apportioned’ to describe cases meeting the above conditions for apportionment and ‘not trust-apportioned’ for those that do not. Moving forward, these terminologies have been updated to ‘hospital-onset’ and ‘community-onset’ respectively. Please note that this is simply a change in terminology and does not constitute a change in the methodology for apportionment.

Total reported cases:
This is the total count of infections for each organism as of the date of extraction. Please note that for *C. difficile*, this count excludes those from patients less than 2 years old.

Episode duration:
The length of an infection episode is defined as 14 days for MRSA, MSSA and *E. coli* bacteraemia and 28 days for CDI, with the date of specimen being considered day ‘one’.

Incidence rate calculations

MRSA, MSSA and *E. coli, Klebsiella* spp., *P. aeruginosa* bacteraemia, and CDI population incidence rate (episodes per 100,000)

This incidence rate is calculated using the mid-year England population and is

$$= \frac{\text{n episodes}}{\left(\frac{\text{mid-year population for England}}{\text{days in quarter}}\right)} \times 100{,}000$$

MRSA, MSSA and *E. coli, Klebsiella* spp., *P. aeruginosa* and CDI hospital-onset incidence

This incidence rate is calculated using KH03 average bed-day activity (see bed-day data above) and is calculated as follows:

$$= \frac{\text{n episodes}}{\text{average KH03 beds per day} \times \text{days in quarter}} \times 100{,}000$$

Graphs and percentage change calculation

Please note that percentage changes in rate have been calculated using raw rate figures while those presented in the tables and commentary have been rounded to one decimal place. Similarly, graphs included in this report were plotted using raw rates figures. The raw rate figures are included in the accompanying Quarterly Epidemiological Commentary's accompanying data.

Quarters

In publications prior to March 2016, all references to quarterly data are based on calendar year definitions and NOT financial year definitions, that is:

- Q1 2014: January to March 2014
- Q2 2014: April to June 2014
- Q3 2014: July to September 2014
- Q4 2014: October to December 2014

However, for all subsequent publications, including this one, all references to quarterly data are based on financial year definitions and NOT calendar year definitions, that is:

- Q1 2014/15: April to June 2014
- Q2 2014/15: July to September 2014
- Q3 2014/15: October to December 2014
- Q4 2014/15: January to March 2015