Research Study

Impact of the COVID-19 pandemic on cancer surgery and cancer mortality

CANCER RESEARCH UK

Health UK

Executive summary

The impact of the COVID-19 pandemic on patients and the health service has been profound and sustained, but our research reveals that inequalities in cancer surgery and mortality have not been exacerbated over the short-term. But ongoing research is needed to understand the full implications over the longer-term and to help ensure that all patients can access the services and support they need.

This latest research report from Telstra Health UK and Cancer Research UK explores the potential impact of the COVID-19 pandemic on cancer surgery and cancer mortality, including place of death.

During the pandemic there has been an impact on the number of patients entering the cancer pathway, as a result of changes in patients presenting and GP referral behaviours. The aim was to understand whether different groups in our society have been disproportionately affected by the pandemic in terms of the care they have received for their cancer. This will help focus efforts and to ensure that all patients receive equitable care.

The analysis shows a general decrease in patients undergoing cancer surgery at the start of the pandemic for all demographic groups. At the start of the pandemic, the largest decreases for all cancers combined by ethnicity could be seen in White (42.6%) and Asian or Asian British (44.6%). While by age, the largest decrease was seen in women aged 40-49, with an initial decrease of 16.2% followed by a decrease of 1.2% in the recovery period (Q2 2020-Q4 2021).

For lung cancer surgery, there were differences by age in the recovery period for men, with younger men seeing continued decreases. Analysis by deprivation quintile found a difference in patients having surgery during the recovery period, showing a 42.0% increase in the least deprived compared to a 27.6% increase in the most deprived. However, changes at the beginning of the pandemic were similar across all quintiles, ranging from decreases of 26% to 33%.

Analysis of patients diagnosed with breast cancer undergoing surgery also showed significant changes by age and ethnicity throughout the pandemic. Women aged 40-49 saw a decrease in surgery of 12.3% at the start of the pandemic, and 13.8% during the recovery period.

Analysis by place of death revealed a 51.5% increase in deaths at home during Q2 2019 and Q2 2020, followed by an 11.0% drop in the recovery period. In-hospital deaths dropped by 35.0% at the start of the pandemic with a 42.2% increase during the recovery period. Age-standardised cancer mortality rates for all cancers combined were also affected by the pandemic, with an increase in in-hospital deaths observed following the start of the pandemic.

Our in-depth analysis reveals the impact that the COVID-19 pandemic had on cancer surgery and mortality. While we know that there are inequalities in access to cancer surgery, particularly by age, for the most part, the results of our analysis indicate that the recovery period of the COVID-19 pandemic has not exacerbated these inequalities.

Fundamentally however, it is difficult to understand the extent to which any variation in access to cancer services is unwarranted. The NHS must therefore undertake further research and facilitate access to data to enable trusted organisations to undertake research, to understand and address why certain patient groups are less likely to receive treatment, and to understand and mitigate any longer-term effects of the COVID-19 pandemic.

Introduction

The COVID-19 pandemic has challenged health and care services in an unprecedented manner, bringing intense pressures to the system and forcing rapid reorganisation. Balancing the care of COVID-19 patients with the care needed for other health conditions has been an obvious struggle, and the strain has been seen and felt right across the patient pathway, from initial presentation, through diagnostics, and treatment. Due to pressure on the NHS during the pandemic, some cancer treatments were delayed, cancelled or patients may have received different treatment to what they had expected or planned. The Cancer Research UK Patient Experience Survey 2020[1], reported that 33% of cancer patients had their treatment impacted in at least one way.

The scale of the disruption has also become starkly clear through cancer waiting times data published by NHS England. For example, over the first year of the pandemic it was estimated that there were more than 380,000 fewer urgent suspected cancer referrals in the UK, a reduction of 13% compared with the same time the previous year.[2] This impact on the number of patients entering the cancer pathway, which is a function of patient presenting behaviour as well as GPs making onward referral, indicates that in addition to reorganisation within the NHS, patients themselves changed their behaviour. This was perhaps due to not wanting to 'burden' the service in a time of such high demand, or fear of coming into medical spaces lest they contract COVID-19 or pass it on to their loved ones. For those who did come forward, there have been substantial delays to getting the diagnoses and treatments they might need. Waiting times for diagnostic tests have been particularly hard hit, in England alone there were 4.6m (22%) fewer diagnostic tests to detect cancer in the first year of the pandemic compared with the same months the previous year , and the number waiting 6 or more weeks for these tests increased to more than 215k by the end of March 2021.[3] And while cancer waiting times standards in England have proven difficult to meet prior to the pandemic, throughout the first year of COVID-19 standards for patients urgently referred starting cancer treatment have been consistently missed across the UK. Strikingly, nearly 45k fewer people started treatment for cancer in the first year of the pandemic in the UK, compared with the same months the previous year[4] - a figure which is indicative of the reduction in the number of people diagnosed with cancer. While it is too soon to be able to definitively understand the impact on outcomes, early data suggests that the number of patients diagnosed with cancer at an early stage was 27% lower than in the previous year, though there is not yet any evidence of a corresponding increase in the proportion of patients diagnosed at the latest stage.[5]

All of this paints a picture of a population and a health service struggling to cope with extraordinary circumstances, but what is less understood is how universal this experience is, and whether particular sections of our society have felt these hardships more keenly, or have felt a more sustained impact. Prior to the pandemic there was already clear evidence of inequalities right across the cancer pathway, and the possibility that the more vulnerable in our society have suffered more profoundly is deeply troubling.

Despite tackling inequalities in cancer care being an ambition of the UK's health services, the most deprived populations have higher risk, worse experiences, and poorer outcomes than the least deprived. It is estimated that in the UK there are more than 30,000 extra cases of cancer each year attributable to socio-economic deprivation in those cancer sites where incidence rates are higher in more deprived areas – that's more than 80 extra new diagnoses per day that could be avoided if all groups had the same incidence rate as the least deprived.[6] More deprived patients also have worse survival, with the five most common cancers in England all showing worse five-year net survival for the most deprived group compared with the least.[8] Understanding what is driving these differences is fundamental in ensuring that all cancer patients in the UK receive world-

class care. That these inequalities in health, access to care, and the quality of that care, may have in fact widened over the course of the pandemic is however a very real possibility. COVID-19 itself also disproportionately affects people who are older, people with more comorbidities, people from ethnic minority groups, and people who are more deprived so it would not be unexpected for there to be variation in the extent to which cancer services, care, and outcomes have been impacted across the population.

The aim of this report is to explore the potential impact of the COVID-19 pandemic on cancer surgery and cancer mortality, including place of death, in particular looking at whether inequalities exist across patient demographics. This will help us to understand whether different groups in our society have been disproportionately affected by the pandemic in terms of the care they have received for their cancer. Understanding this will help us to focus efforts to guard against this in future, ensuring that going forward all patients receive equitable care, no matter their, or the world's, circumstances.

[1]Cancer Research UK. Cancer Patient Experience Survey – The impact of COVID-19 on cancer patients in the UK. Available at: https://www.cancerresearchuk.org/sites/default/files/pes-covid_2020.pdf [accessed July 2021]

[2]CRUK estimates based on England and Wales trends from Cancer Waiting Times data, March 2020 – March 2021, compared with the same months in 2019, adjusted for working days; NHS E&I Cancer Waiting Times Statistics, available at: https://www.england.nhs.uk/statistics/statistical-work-areas/cancer-waiting-times/.Stats Wales Cancer Waiting Times data; https://statswales.gov.wales/Catalogue/Health-and-Social-Care/NHS-Hospital-Waiting-Times/Cancer-Waiting-Times

[3]7 key diagnostic tests which can be used to diagnose cancer, though available data does not confirm the reason for the test.

[4]April 2020-March 2021, compared with the same months in 2019, adjusted for working days

[5]National Disease Registration Service (NDRS). COVID-19 rapid registration and treatment data. Available at https://www.cancerdata.nhs.uk/covid-19/rcrd . Accessed September 2021. "Early stage" refers to stages 1 and 2, "latest stage" refers to stage 4. April-December 2020, England.

[6]Cancer Research UK. Cancer in the UK 2020: Socio-economic deprivation. Available at: https://www.cancerresearchuk.org/sites/default/files/cancer_inequalities_in_the_uk.pdf. Accessed May 2022.

Methodology

The analysis is comprised of Hospital Episode Statistics (HES) data and the Office of National Statistics (ONS) Mortality Data Set. This was used to investigate:

- The number of patients with an elective admission for cancer surgery over time,
- How place of death has changed over time for patients dying from cancer; and,
- Age-standardised in-hospital mortality rates over time for patients admitted with a primary diagnosis of cancer.

Cancer surgery

This section of analysis looks at patients who had an elective admission to hospital with a primary diagnosis of cancer and had a tumour resection with an OPCS procedure code as specified by the PHE framework. This surgery could occur at any point in the patient's cancer treatment timeline and was not limited to their first treatment or admission.

In order to assess the change over time in activity, percentage changes were calculated using the absolute number of patients between Q2 (April-June) 2019 and Q2 in 2020, as well as between Q2 2020 and Q4 (October-December) 2021 (start of the pandemic to the latest quarter of data available). This provides an understanding of potential immediate changes as the full impact of the COVID-19 pandemic hit the country. It also outlines how activity changed throughout the pandemic as health services reorganised and people became more adept at navigating the new circumstances.

Using HES data, the study looked specifically at elective admissions for all cancers combined and also separately for breast, bowel, lung, and prostate cancers.[7] OPCS codes from National Cancer Registration and Analysis Service (NCRAS)[9] were used to identify cancer surgery. Developed in close collaboration with clinicians, the list identifies all surgeries in which there is an attempt to

remove the primary tumour, rather than identifying all surgeries which might be related to cancer. The surgery could take place at any point in the patient's treatment and was not necessarily the first treatment received by the patient.

Chi-square tests, a statistical method for determining the difference between observed and expected data, were used to test if the distribution of each demographic variable had seen significant change. The variables were: age and sex, deprivation quintile based on the Index of Multiple Deprivation, ethnicity group (White, Black or Black British, Asian or Asian British, Mixed, Other Ethnic Groups, Unknown) and urban or rural breakdown.[8] A standard threshold of $p <= 0.05$ signified a statistically significant difference in the distribution in the numbers of cases across the demographic variable between the time periods of interest.

All cancer mortality – place of death

To investigate whether place of death had changed significantly during the pandemic, the study used the ONS mortality dataset to reveal whether patients who died from cancer had done so in hospital, hospice, nursing homes, at home or in the community. Percentage changes were calculated on the absolute number of deaths between the start of the pandemic (Q2 2019 vs Q2 2020) and during the recovery time period (Q2 2020 vs Q4 2021).

In-hospital mortality – age-standardised rates

In-hospital mortality rates were calculated and investigated to find out if there was a rise in in-hospital mortality during the pandemic. Deaths were defined as an in-hospital death for a patient admitted with a primary diagnosis of cancer.

Age-standardised mortality rates were created using 2019 HES cancer inpatients as a reference population and then compared by quarter for the last five years, broken down by cancer type (bowel, breast, lung and prostate), sex, and deprivation quintile.

Crude and adjusted mortality rates were calculated from HES data at admission level rather than patient level, creating a denominator of hospital admissions rather than patients.

Mortality rates are routinely adjusted for age to allow fairer comparisons. Populations with the same age-specific cancer mortality rates will have seemingly different overall rates of death if their underlying age distributions are different, for example a region with a much higher proportion of people aged over 70 than another area will not have the same rate of deaths even if performance is the same across the areas.

Only results with more than ten patients per time period are displayed throughout the report.

[7]Data is for: all cancers combined (ICD-10 C00-C97), breast (C50), bowel (C18-C20), lung (C33-34), and prostate (C61).

[8]Urban rural classification at LSOA level, https://www.gov.uk/government/statistics/2011-rural-urban-classification-lookup-tables-for-all-geographies

[9]**http://www.ncin.org.uk/cancer_type_and_topic_specific_work/topic_specific_work/main_cancer_treatments**

Results

See Appendices A – E for charts showing the absolute number of patients over time for each demographic breakdown for all cancers combined and each cancer type.

Cancer surgery

All cancers combined

The results for all cancers combined show (see Fig 1) that the extent to which the COVID-19 pandemic impacted the number of patients undergoing cancer surgery differed across age groups and ethnic background, with significant changes seen at the start of the pandemic (between Q2 2019 and Q2 2020) and during the recovery (between Q2 2020 and Q4 2021).

There was a general decrease in surgery at the start of the pandemic for all ethnic groups, except for unknown and other ethnic groups, the largest decreases could be seen in White (42.6%) and Asian or Asian British (44.6%). The recovery period saw an increase in all ethnicity groups, but the biggest increase was seen in Asian or Asian British at 74.0% and Black or Black British at 82.5%.

In terms of age, the largest total decrease in the number of patients undergoing cancer surgery across both time periods was seen in women aged 40-49 with an initial decrease of 16.2% (Q2 2019 to Q2 2020), and a decrease of 1.2% during the recovery period (see Fig 1). This compares to a smaller initial decrease of 4.6% for younger women (aged 30-39), followed by a decrease of 2.1% during the recovery period. Men of the same age group followed a different pattern to women, with a drop at the start of the pandemic, followed by an increase during the recovery time with no further decreases. There were larger increases during the recovery period for the older age groups (90+) for both male and female, but this is likely to be reflective of the small numbers within the age bracket.

The onset of the pandemic had the same affect across all deprivation quintiles (a decrease in the number of patients undergoing cancer surgery of between 37-40%), but the recovery period saw a larger increase in the least deprived (58.7%) compared to the most deprived (50.9%). A similar affect was seen between urban and rural areas with a 38% decrease in both areas at the beginning of the pandemic, followed by an increase of 53.7% for rural and 55.3% increase in urban areas during the recovery period.

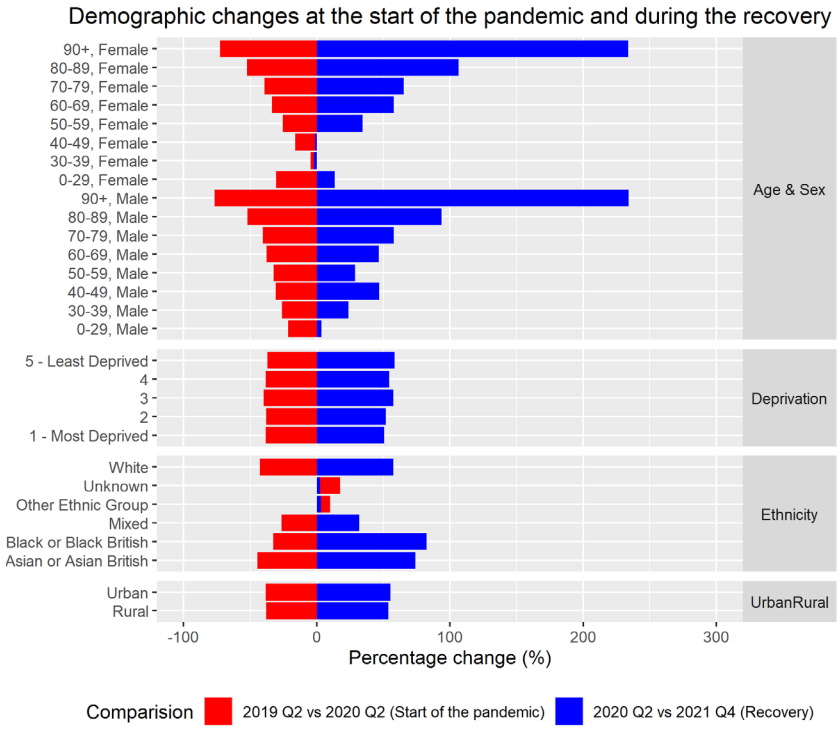


Figure 1: Percentage change in the number of elective admissions undergoing cancer surgery at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) for all cancers combined

Bowel cancer

Bowel cancer surgery saw significant changes by age for men at both the start of the pandemic and during the recovery period. There were also changes by ethnicity during the same periods (see Fig 2).

The analysis has revealed high percentage increases in the number of patients diagnosed with bowel cancer undergoing cancer surgery for older men and women (90+) during the recovery period, which relates to the small number of patients in these age groups. These age groups have returned to similar levels as seen before the pandemic. There was little difference between deprivation quintiles for bowel cancer surgery with a 40 to 44% decrease across the board, and a similar increase during the recovery period, at 80.3% in most deprived to 89.4% in the least deprived areas.

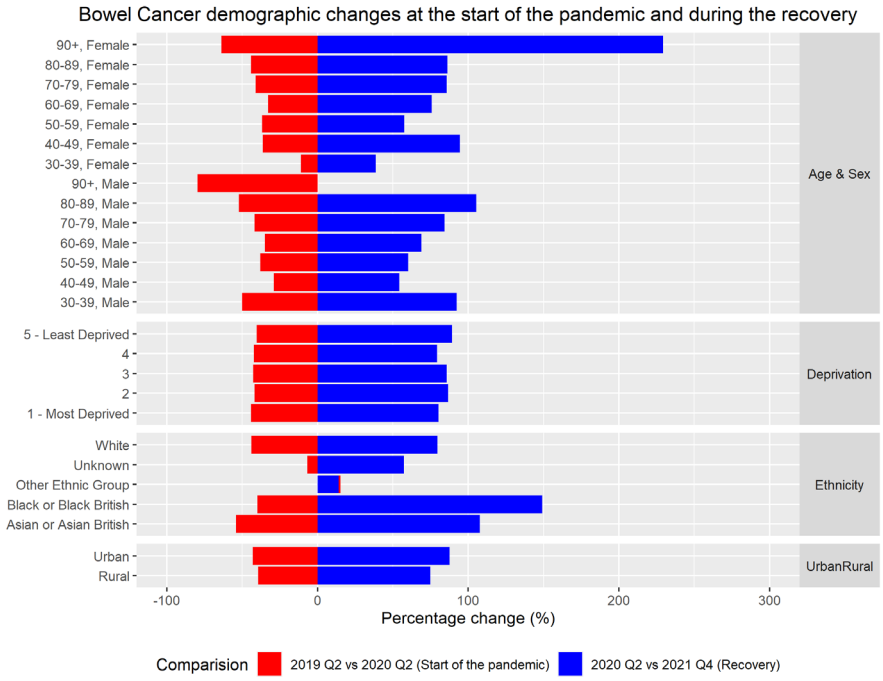


Figure 2: Percentage change in the number of elective admissions undergoing cancer surgery at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) for bowel cancer

Lung cancer

The recovery period saw a significant change by age for men undergoing lung cancer surgery, driven by changes in younger age groups. There were also significant changes by ethnicity for both time periodsa (See Fig 3).

Men aged 50-59 and 60-69 saw decreases in the first time period of 32.6% and 24.3% respectively, with a further smaller decrease during the recovery time of 6.8% and 4.8%. However, older age groups (70-79 and 80-89) saw an increase during the recovery period of 45.4% and 50.0% respectively, compared to an initial decrease at the beginning of the pandemic of 41.7% and 51.9%.

Analysis by deprivation quintile found a difference in patients having surgery for lung cancer during the recovery period, showing 42.0% increase in the least deprived compared to 27.6% in the most deprived. However, the changes at the beginning of the pandemic were similar, ranging from decreases of 26% to 33%.

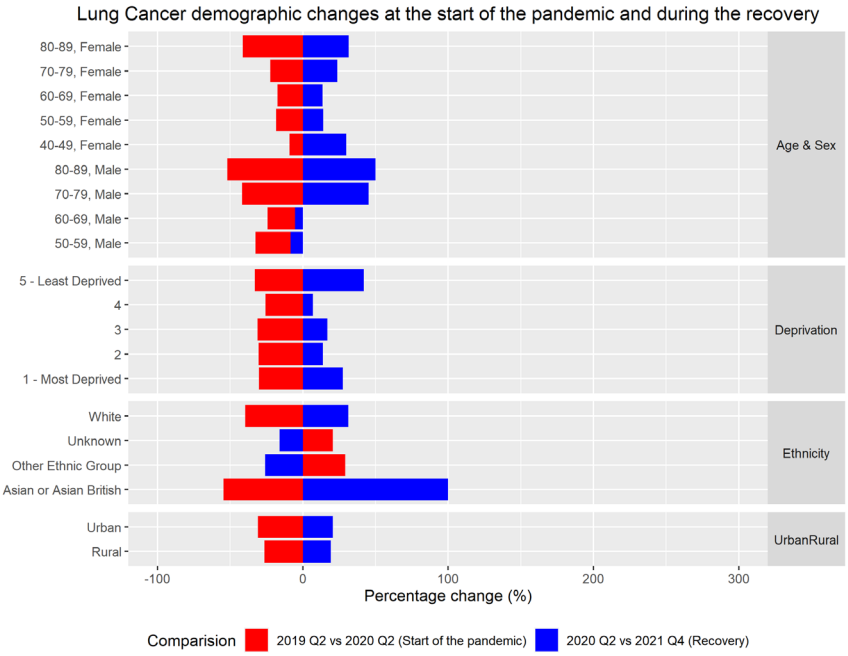
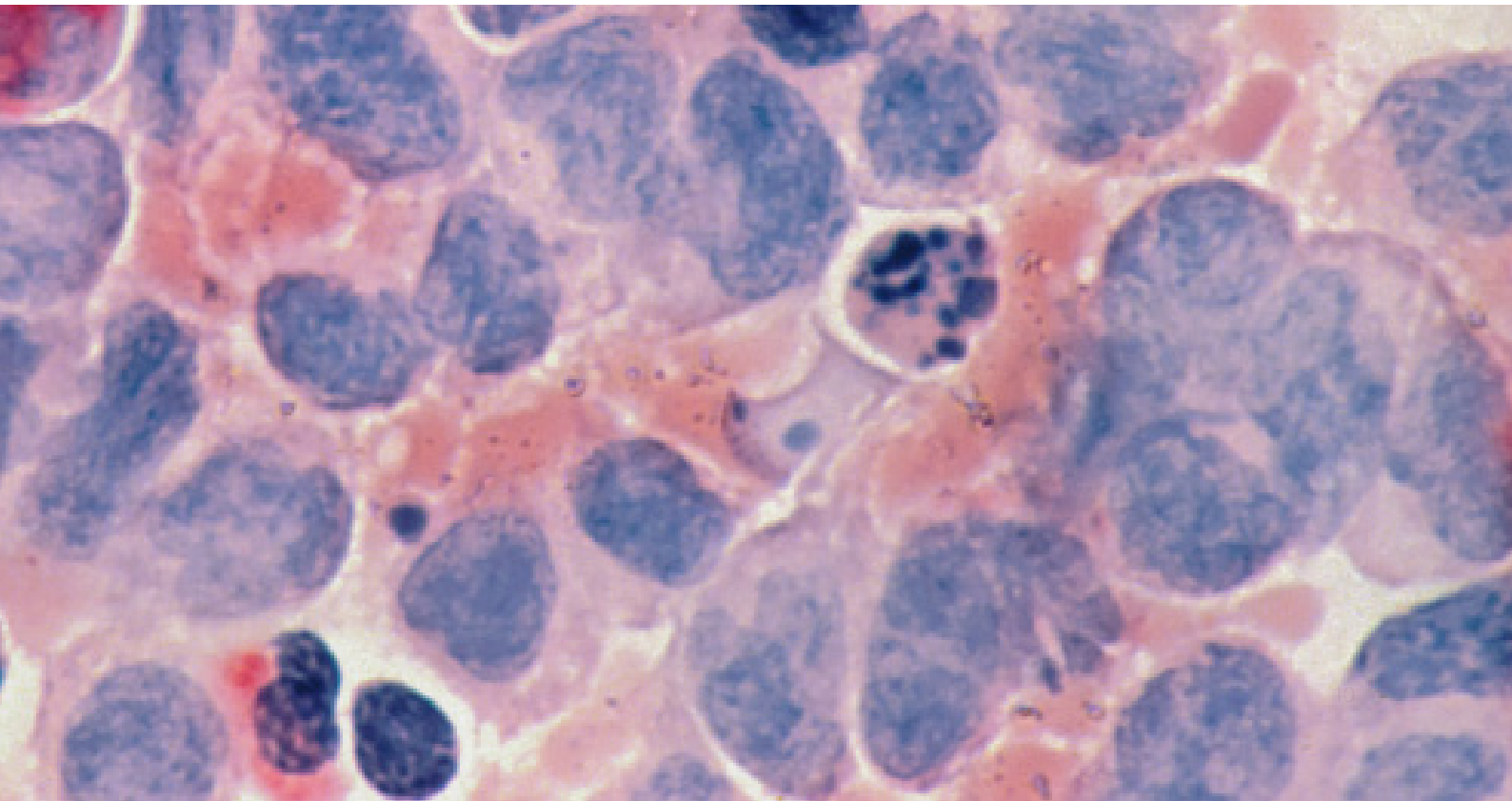


Figure 3: Percentage change in the number of elective admissions undergoing cancer surgery at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) for lung cancer



Breast cancer

Analysis of patients diagnosed with breast cancer undergoing surgery also showed significant changes by age and ethnicity across both time periods (see Fig 4).

At the beginning of the pandemic, younger women aged 0-29 and 30-39 saw an increase of 19.1% and 7.4% respectively, but during the recovery period the older age group saw a decrease of 8.8% while the younger age group remained at a similar level.

Women in the next age bracket of 40-49 saw a continued decrease across both time periods of 12.3% and 13.8%. This drop for 40-49 year old women was seen for all cancers combined in Fig 1. Other age groups saw an initial decrease followed by increases during the recovery time.

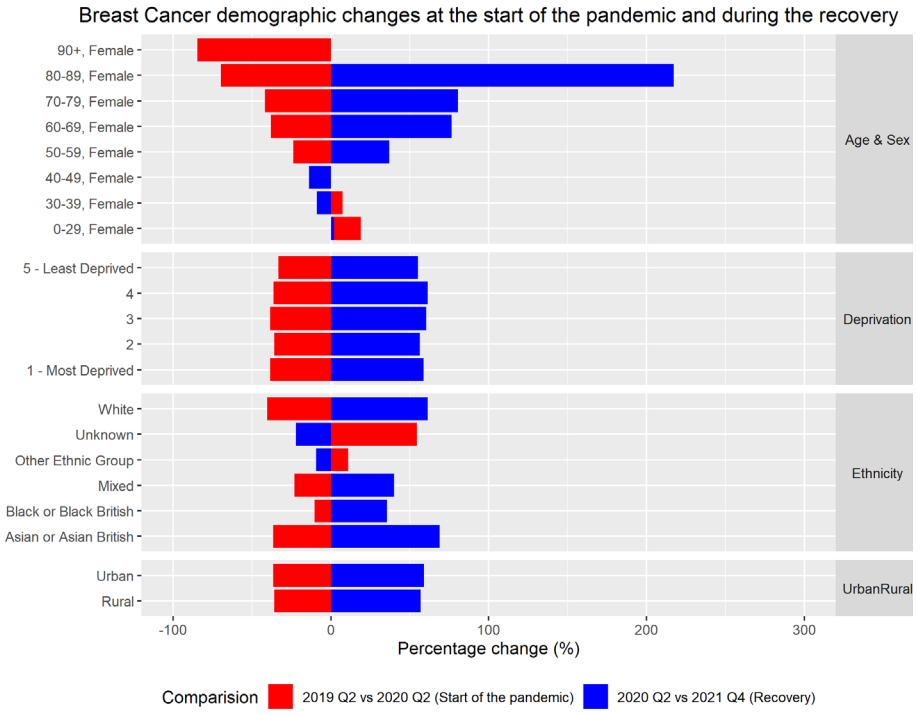


Figure 4: Percentage change in the number of elective admissions undergoing cancer surgery at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) for breast cancer

Prostate cancer

Analysis of patients diagnosed with prostate cancer undergoing surgery revealed significant changes by ethnicity over both time periods (See Fig 5). At the start of the pandemic, the biggest decrease was seen in Black or Black British groups, with a decrease of 63.9%. This was followed by a 207.8% increase in the recovery time period, which is reflective of the small numbers in this group. There was a decrease of 58.2% for the White ethnicity group during the start of the pandemic. During the recovery time period this increased by 55.7%.

The biggest change for age was seen in the 80-89 age group in the recovery time period, although this is due to small numbers (not shown). The oldest and youngest age groups (0-29, 30-39 and 90+) recorded no cases in the time periods under consideration.

Deprivation analysis found a slightly higher change in the number of patients in the most deprived quintile during the recovery period, at 72.0% compared to 53.2% in the least deprived group.

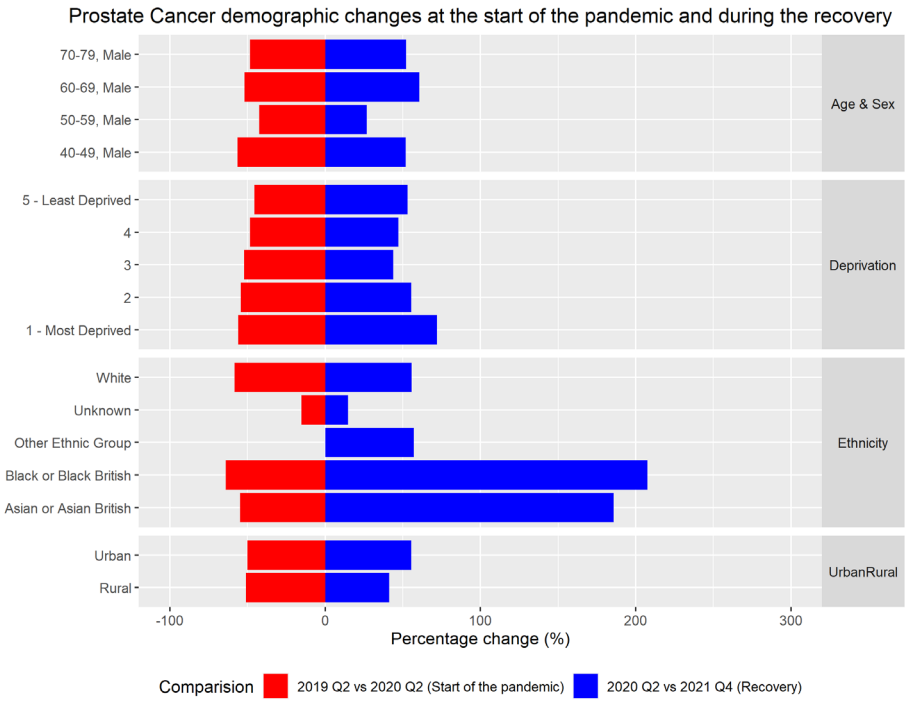
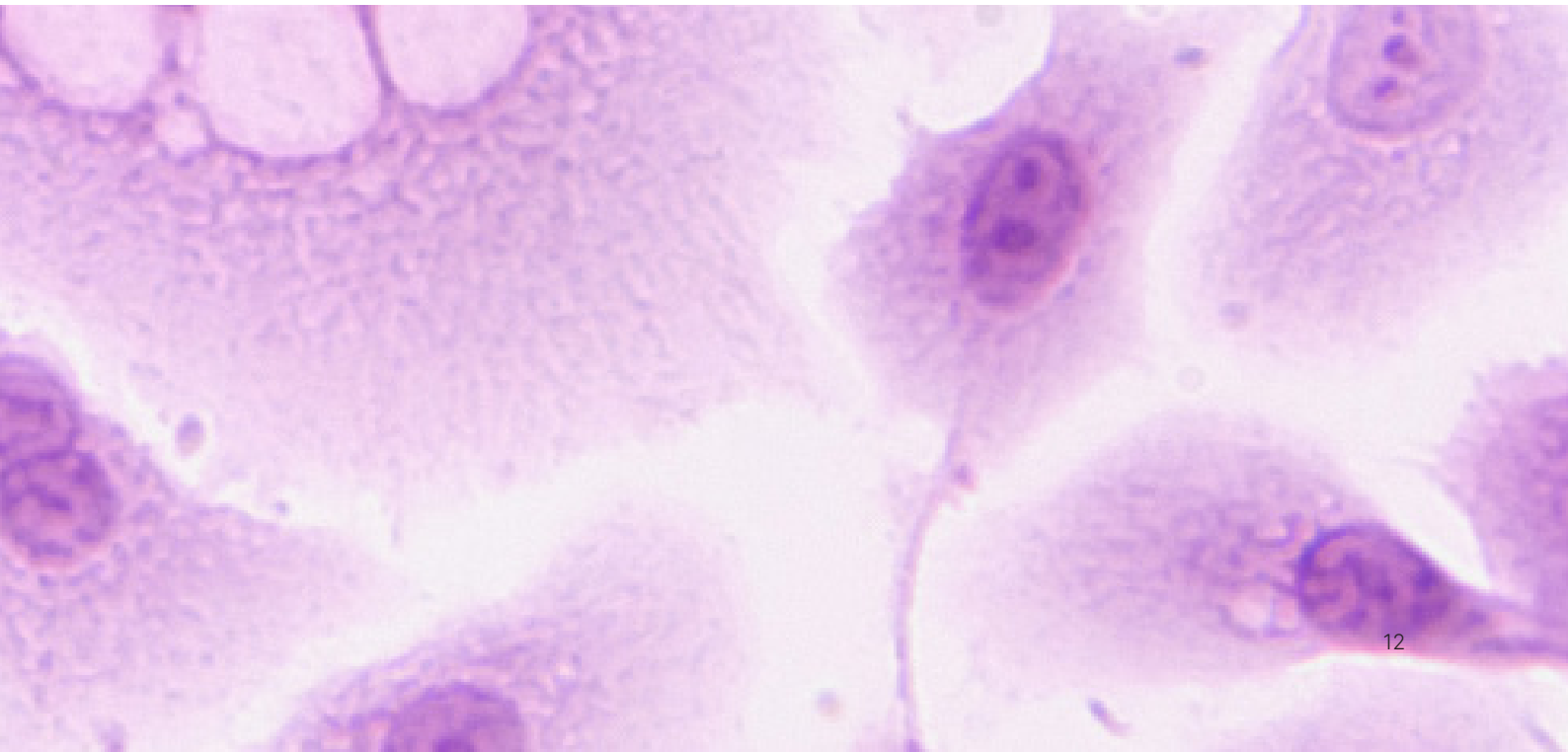


Figure 5: Percentage change in the number of elective admissions undergoing cancer surgery at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) for prostate cancer



Cancer mortality

Place of death

This analysis revealed a 51.5% increase in deaths at home during Q2 2019 and Q2 2020, followed by a 11.0% drop in the recovery period.

In-hospital deaths dropped by 35.0% at the start of the pandemic with a 42.2% increase during the recovery period. Deaths at home continue to be higher compared to pre-pandemic levels (see Table 1 and Fig 6).

Place of Death	2019 Q2 vs 2020 Q2	2020 Q2 vs 2021 Q4
Home	51.5%	-11.0%
Hospice	-20.1%	2.4%
Hospital	-35.0%	42.2%
Nursing Homes	-7.0%	3.4%
Other Community (incl. Elsewhere)	-18.2%	13.9%

Table 1: Percentage changes at the start of the pandemic (Q2 2019 vs. Q2 2020) and during the recovery time period (Q2 2020 vs. Q4 2021) by place of death

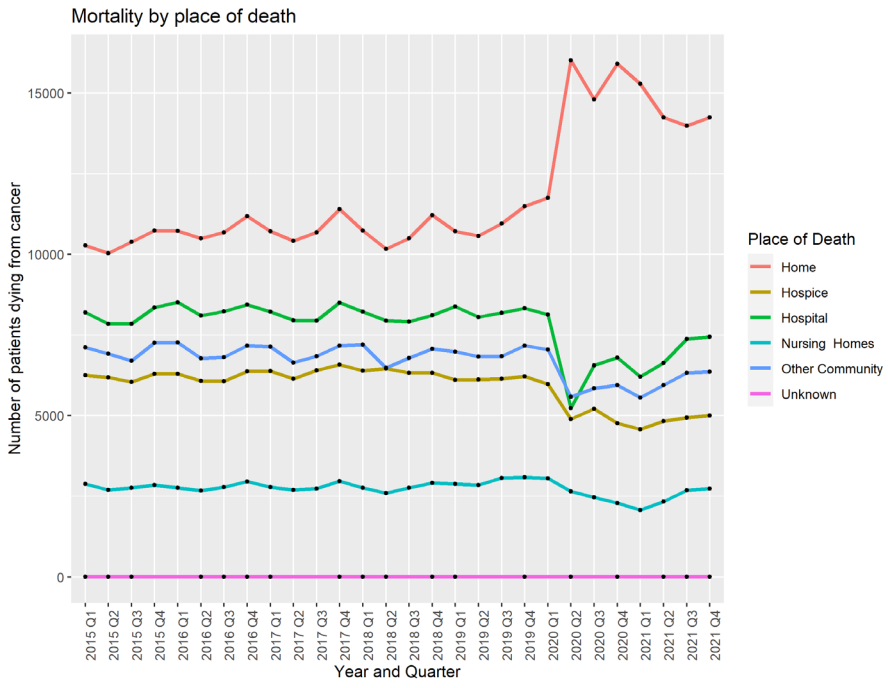


Figure 6: Absolute number of deaths over time by place of death

Crude and age-standardised mortality rates

This analysis looks at patients who were admitted to hospital with a primary diagnosis of cancer and died during the spell[10], however they may not have died from cancer during their hospital stay.

Despite a sharp increase in cancer patients dying in hospital at the start of the pandemic, trends are now showing that numbers are decreasing.

Crude and age-standardised mortality rates are similar over time up until the start of the pandemic in Q2 2020. Whereas before this date the two rates closely mirrored one another, at the start of the pandemic the age-adjusted mortality rate was substantially higher than the crude rate (See Fig 7), indicating that the age distribution of cancer patients dying in hospital during the pandemic was different to pre-pandemic.

In terms of deprivation (see Fig 8), age-standardised mortality rates were highest for the most deprived quintile over the whole time period, with an increase from 17 per 1,000 patients to 22 per 1,000 patients at the start of the pandemic in Q2 2020. However, all deprivation groups followed the same pattern overall, with an initial increase in Q2 2020, followed by a slow decrease, and a second smaller increase in Q3 2021.

Figure 9 reveals analysis of age-standardised mortality rates by cancer type which shows levels were decreasing for each cancer type before the pandemic. Specifically for lung cancer, rates were decreasing until Q3 2019 and have remained similar since then.

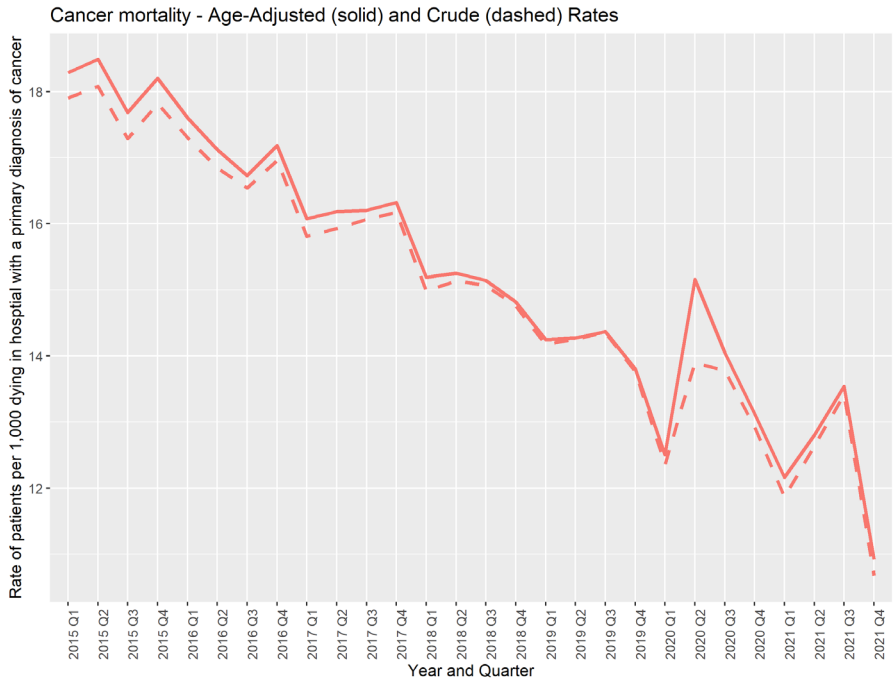


Figure 7: In-hospital mortality rate per 1,000 patients over time. (dashed line = crude rate, solid line = age-standardised rate)

[10]A 'spell' is defined as a continuous period of time spent as an inpatient within a trust and may include more than one episode.

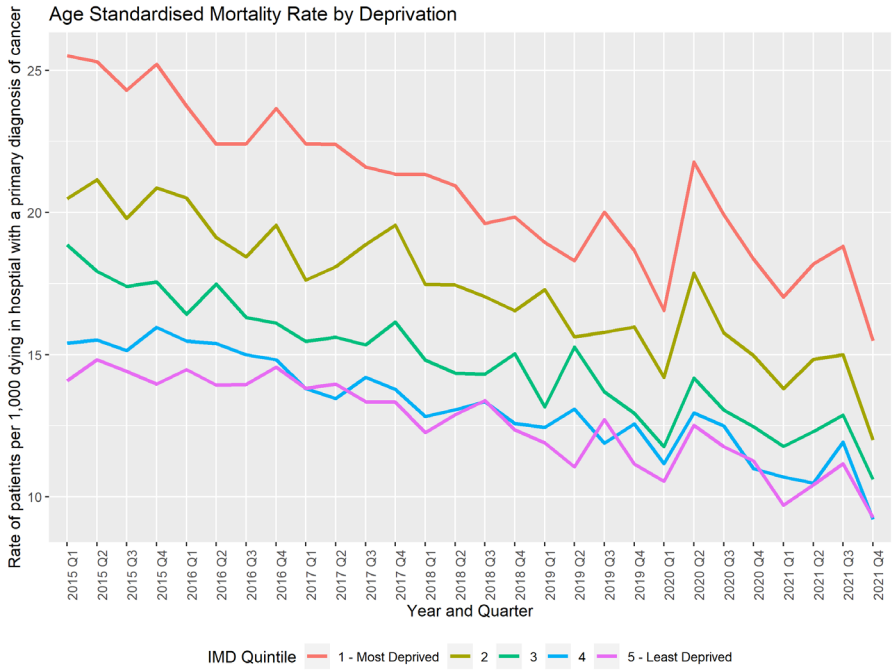


Figure 8: In-hospital mortality rate per 1,000 patients over time by IMD deprivation quintile

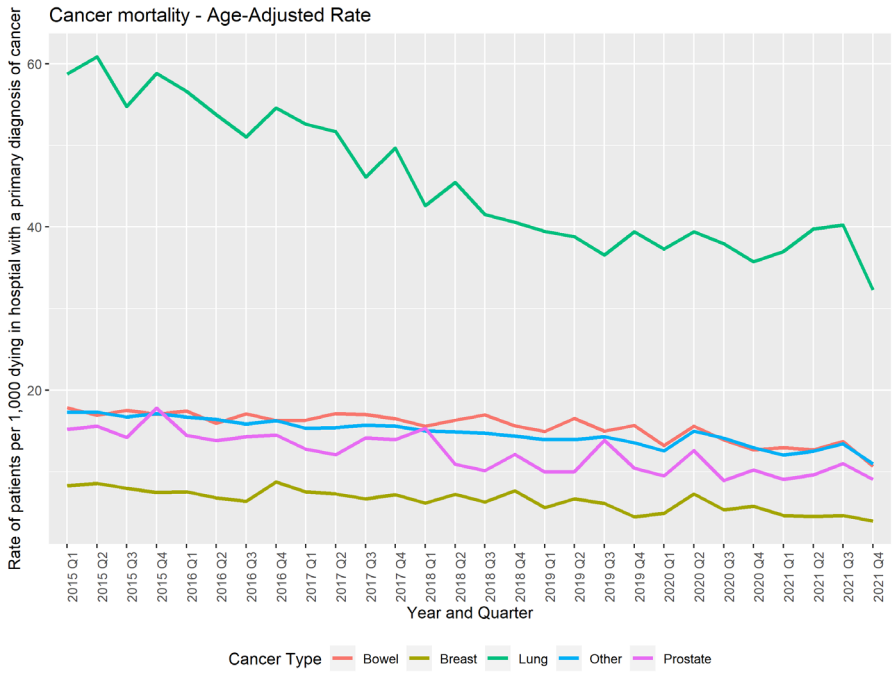


Figure 9: In-hospital mortality rate per 1,000 patients over time by cancer type

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Discussion

Overview

The results observed across surgery, mortality rate, and place of death, all indicate that the pandemic has had a significant and prolonged effect on cancer services and patients. The reduction in cancer surgery for all cancers combined can be seen in all age ranges with the impact increasing by age group. The recovery seen during the pandemic was more varied, indicating that some of the initial impact continued to be felt in some age groups more than others. Broadly this pattern was also observed for breast, prostate, lung, and bowel cancer surgeries. The pattern was similar for ethnicity where an initial decrease in surgery for all cancers combined was observed across all groups (Asian/Asian British, Black/Black British, Mixed, and White groups), followed by a more varied recovery during the pandemic. As with age, this pattern was broadly echoed across the individual cancer types studied. While there were no significant differences in the impact on surgery for all cancers combined between deprivation groups, or between rural and urban geographies, there was a larger increase in the number of lung cancer surgeries seen for the least deprived groups, compared to the most deprived group.

Age-standardised cancer mortality rates for all cancers combined were also affected by the pandemic, with an increase in in-hospital deaths observed following the start of the pandemic, with a second smaller peak in Q3 2021. For breast, bowel, lung, and prostate cancers there was also an initial increase in in-hospital mortality, followed by a decrease during the pandemic. Looking at place of death, again the impact can be seen right at the start of the pandemic, with an immediate increase in the number of deaths at home and a corresponding decrease in hospital, hospice, and nursing home deaths. An increase in patients dying at home at the start of the pandemic would be expected due to limitations on patients being admitted to hospital. This was followed by a decrease in deaths at home during the recovery period, and an increase in the number of deaths in hospitals, hospices and nursing homes. However, in terms of absolute numbers, these remain lower than pre-pandemic levels.

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Age

Our analysis shows that the pandemic has significantly impacted cancer surgery with decreases in activity across all age groups. Worryingly, at the start of the pandemic, this was more pronounced amongst older age groups who we know are already less likely to receive treatment for their cancer. For example, we know that, even before the pandemic, only 61% of patients aged 70-79 have surgery to remove their cancer when diagnosed at the earliest stage, which compares to 90% of those aged 49 and under, 83% of those aged 50-59, and 72% of those aged 60-69.[11]

Care for older people with cancer is undeniably more complex than for younger patients – older people tend to have poorer overall health, are more likely to be diagnosed as an emergency as opposed to a referral from a GP[12] and this tends to be associated with being diagnosed at a later stage. There might therefore be legitimate reasons why even before the pandemic, cancer treatment rates tended to be lower for older patients. Not only might older patients have poorer health and therefore might not be fit enough to undergo surgery, they might also choose not to have invasive treatment for various reasons, including perhaps having caring responsibilities for a loved one, or wanting to prioritise their quality of life, and independence. By 2035, we expect almost half (46%) of all cancer cases to be diagnosed in people aged 75 and over, because of the UK's ageing population – that's around 234,000 cases each year.[13] That makes the decreases we've observed here even more concerning because it is crucial that older people with cancer are able to access the optimal treatment for them, and are supported throughout their treatment to ensure their needs are met.

While the initial decreases in cancer surgery are seen across all age ranges, and more keenly felt amongst the older age groups, the findings across the younger groups are more varied for women and are sustained across the recovery period, with decreases not just in the initial period but also during the recovery period for women aged 30-39 and 40-49. This decrease in surgery amongst the younger female groups may reflect de-prioritisation of less urgent procedures in a group that is more likely to be otherwise in good health. The types of cancers these groups may be diagnosed with are likely to have affected the prioritisation of the associated surgery – the most common cancers diagnosed among women in these age groups that may be treated surgically include breast, skin (malignant melanoma), cervix and thyroid.[14] The pattern seen among women seems to be driven by surgery for breast cancer, with women aged 40-49 seeing an initial fall in numbers of breast cancer surgeries at the start of the pandemic, followed by a further

[11]NCRAS (2018) Chemotherapy, Radiotherapy, and Surgical Tumour Resections in England, 2013-2015 diagnoses. Available at: **http://www.ncin.org.uk/cancer_type_and_topic_specific_work/topic_specific_work/main_cancer_treatments** (Accessed October 2021)

[12]NCRAS (2020) Routes to Diagnosis: 2006-2017 route by age workbook Available at: **http://www.ncin.org.uk/publications/routes_to_diagnosis** (Accessed October 2021)

[13]Smittenaar CR, Petersen KA, and Stewart K., et al. (2016). Cancer incidence and mortality projections in the UK until 2035. Br J Cancer. 115(9):1147-1155. doi:10.1038/bjc.2016.304

[14]Cancer Research UK (2021). Cancer incidence by age – most common cancers by age in females. Available at: **https://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/age#heading-Two**. Accessed May 2022.

decrease during the recovery period. Women aged 0-29 and 30-39 show a different pattern, both with increases at the beginning of the pandemic which are not seen in the all cancers combined analysis, likely due to the smaller numbers of breast cancers diagnosed in these age groups.

While this observed decrease in the number of breast cancer surgeries throughout the pandemic is concerning, other research has shown that while clinical management of patients with breast cancer has been impacted by the COVID-19 pandemic, this has largely been done in line with pre-COVID guidelines, including the use of "bridging" endocrine therapy and the adoption of hypofractionated radiotherapy.[15] It is too early to understand what impact these changes may have on patient outcomes and survival, and if the decreases observed in the numbers of surgeries are mostly attributable to fewer people presenting, as well as the pausing of the breast cancer screening programme, rather than reduced access to treatment.

Additionally, we can see from our analysis that there has been a significant change in the age profile of patients with a diagnosis of cancer dying in hospital at the beginning of the pandemic. This can be seen in the difference between the crude and age-standardised mortality rates during Q2 2020, instead of the two measures mirroring each other as they do before and after this time. This does not mean that the overall age distribution of cancer deaths changed during this time as we are only able to look at patients who died in hospital, and not any other setting. These patients may also have died from other causes, including COVID-19, so again this might not be reflective of overall cancer mortality during the pandemic.

[15]Dave RV, Kim B, Courtney A. et al. (2021) Breast cancer management pathways during the COVID-19 pandemic: outcomes from the UK 'Alert Level 4" phase of the B-MaP-C study. Brit J Cancer 124, 1785-1794. https://doi.org/10.1038/s41416-020-01234-4

Deprivation

Our analysis shows that, at the start of the pandemic, there was a similar decrease in the number of cancer surgeries across all the deprivation quintiles, ranging from a 37.0% to a 39.9% reduction from Q2 2019 to Q2 2020. There was a bigger gap between the quintiles across the recovery period however, with a slightly greater increase in the number of cancer surgeries in the least deprived group (58.7%) compared to the most deprived group (50.9%), which suggests that there might be continued reduced access to cancer surgery amongst people from more deprived backgrounds. This could be driven by access to lung cancer surgery in particular, as we observed the biggest variation amongst patients diagnosed with lung cancer, with an increase of just 27.6% in the recovery period amongst the most deprived, compared to an increase of 42.0% amongst the least deprived. Before the COVID-19 pandemic, inequalities in access to cancer treatment were already evident and reflected in health ambitions across the UK.[16] In 2019, 21.8% of patients from the least deprived group underwent tumour resection surgery for their lung cancer in England, but amongst the most deprived this figure was just 16.3%.[17] We also know that even if they are diagnosed at the same stage, patients from more deprived areas receive different treatment for their cancer than those from the least deprived areas – and there is evidence that cancer treatment can vary between more and less deprived people who have similar patient and disease characteristics.[18 19] Ultimately, more deprived patients have worse outcomes than patients from less deprived areas[20 21], and while survival has improved in recent years, this has not closed the gap between the most and least deprived.[22]

[16]NHS England. Cancer Plan. 2000.
The Auditor General and the Accounts Commission. Health Inequalities in Scotland. 2012.
Department of Health (Northern Ireland). Making life better: A whole system strategic framework for public health 2013-2033. 2014.
Welsh Assembly Government. Fairer Health Outcomes For All – Reducing Health Inequalities. Health Strategic Action Plan. 2011.

[17]NCRAS (2022) Chemotherapy, Radiotherapy, and Surgical Tumour Resections in England, 2013-2019 diagnoses. Available at: **http://www.ncin.org.uk/cancer_type_and_topic_specific_work/topic_specific_work/main_cancer_treatments** (Accessed June 2022). Figures refer to Non-Small Cell Lung Cancer only.

[18]Lyratzopoulos, G. B. (2010). Population based time trends and sociodemographic variation in use of radiotherapy and radical surgery for prostate cancer in a UK region: continuous survey. British Medical Journal, doi: 10.1136/bmj.c1928.

[19]Henson, K. F. (2018). Sociodemographic variation in the use of chemotherapy and radiotherapy in patients with stage IV lung, oesophageal, stomach, and pancreatic cancer: evidence from population-based data in England during 2013-2014. British Journal of Cancer, **https://doi.org/10.1038/s41416-018-0028-7**

[20]Cancer Research UK and Public Health England. Cancer by Deprivation in England.
Incidence, 1996-2010, mortality, 1997-2011. 2014

[21]Welsh Cancer Intelligence and Surveillance Unit, Public Health Wales. Cancer Survival in Wales, 1995-2016. 2019.

[22]Cancer Research UK. Cancer in the UK 2020: Socio-economic deprivation. Available at: **https://www.cancerresearchuk.org/sites/default/files/cancer_inequalities_in_the_uk.pdf**. Accessed May 2022.

Our analysis also demonstrates this, with the highest age-standardised mortality rates for inpatients with a diagnosis of cancer being amongst the most deprived quintile over the whole time period, with an increase from 17 per 1,000 patients to 22 per 1,000 patients at the start of the pandemic in Q2 2020. This could reflect the greater impact of COVID-19 itself amongst people from more deprived backgrounds, as well as the greater burden of cancer, with incidence rates being 16% and 19% higher in the most deprived quintile compared to the least for women and men respectively.[23]

People from the most deprived group are less likely to recognise potential of signs and symptoms of cancer than people from the least deprived group[24], and people in 'routine and manual' occupations are also more likely to report more barriers to seeking help from their GP than those in 'managerial and professional occupations'.[25] These factors might have been exacerbated by the additional pressures presented by the COVID-19 pandemic, resulting in a greater proportion of people from more deprived backgrounds not coming through the system for cancer treatment.

Indeed, data published from the beginning of the pandemic to March 2022 show that those living in the most deprived areas recovered slightly more slowly than those in less deprived areas in terms of numbers of urgent suspected cancer referrals and in starting a first treatment for cancer.[26] However, for the most recent month available, there was no statistical difference in either the numbers of urgent referrals or the number starting first treatment for cancer across the deprivation quintiles compared to the baseline period, indicating that this widening of inequalities has not persisted beyond the first few months of 2022.

[23]Cancer Research UK. Cancer incidence by deprivation (2013-2017). Available at: **https://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/all-cancers-combined#heading-Three**. Accessed June 2022.

[24]Niksic M, Rachet B, Warburton F, et al. (2015). Cancer symptom awareness and barriers to symptomatic presentation in England—are we clear on cancer? Br J Cancer 113, 533– 542

[25]Moffat J, Hinchliffe R, Ironmonger L., et al. (2016). Identifying anticipated barriers to help-seeking to promote earlier diagnosis of cancer in Great Britain. Public Health; 141, 120-125.

[26]CADEAS. COVID-19 Cancer Equity Data Pack: Urgent referral and first treatment activity. **http://www.ncin.org.uk/local_cancer_intelligence/cadeas**. Accessed June 2022.

Ethnicity

Finally, the last patient demographic factor to show significant changes to rates of surgery during the pandemic is ethnicity. There were big falls in surgery rates at the beginning of the pandemic (Q2 2019 vs Q2 2020), with Asian/Asian British and White groups seeing reductions of 44.6% and 42.6% respectively. There were smaller decreases seen amongst Black/Black British and Mixed groups, but both the Other group and the Unknown group saw increases in surgery, of 10.1% and 17.4% respectively. The recovery period saw an increase in all ethnicity groups, but the biggest increase was seen in Asian or Asian British at 74.0% and Black or Black British at 82.5%.

There is likely to be an interaction with age in these findings as the age distribution across white and ethnic minority populations is markedly different. In England, 43% of people from Asian ethnic groups, and 45% of people from the "other" ethnic grouping are aged 20-39, and over half (53%) of people from Black ethnic groups are aged between 18 and 49.[27] This compares to 25% of people from White ethnic groups being aged 60 or over, the highest percentage in this age bracket across all ethnic groups.[27] Compounding this is an increase in the proportion of patients in the "unknown" or missing ethnicity group which likely reflects changes in coding practice. Additional analysis undertaken as part of this research revealed that there has been an increase of approximately 1% each year in the proportion of patients undergoing elective cancer surgeries being assigned to this group over the last 10 years. In 2020 this proportion jumped by a third to 21% from 16% in 2019 which indicates a decline in the quality of ethnicity coding during the pandemic which could be the result of coders working remotely and not having the same level of access to data. It could also reflect the pressures on the health system during the pandemic, with many workers being redeployed to other roles. Ultimately, this increase in the unknown/missing ethnic group makes it very difficult to interpret the impact of COVID-19 on access to surgery across patients from different ethnic backgrounds.

[27]Office for National Statistics, Ethnicity facts and figures, https://www.ethnicity-facts-figures.service.gov.uk/uk-population-by-ethnicity/demographics/age-groups/latest, accessed October 2021.

Summary

Tumour resection is a key curative treatment for most solid cancers and for many patients offers the best chance of survival. Reflecting this, procedures to remove cancer were prioritised over many other types of procedure during the pandemic. Despite this, many cancer patients experienced delays, cancellations and changes to their treatment. In the first three months of the pandemic (April-June 2020) the number of cancer resection procedures per month dropped to around two thirds of the previous levels.[28] This immediate drop in activity was unavoidable for several reasons. Intensive care and high dependency beds required for patients undergoing major procedures including several types of tumour resection were occupied by COVID-19 patients. Staff needed for surgery e.g., anaesthetists, were redeployed to help with the rapid influx of COVID-19 patients. COVID-19 testing was not yet in place and services were getting to grips with infection prevention and control procedures. This significant pressure on services coupled with a lack of understanding about transmission of COVID-19 and the risks in undertaking major procedures meant that many procedures were cancelled or delayed, potentially leaving patients at risk of poorer cancer outcome.

Even after the first few months of the COVID-19 pandemic, once new surgical hubs were established and infection control procedures in place, the volume of cancer surgery undertaken remained lower than in the previous year. Several factors could be contributing to this trend. Some patients may have chosen to delay or change their treatment to avoid coming into hospitals because of the risk of infection, fewer patients were presenting to their GP, resulting in fewer cancer diagnoses, and pressure on diagnostic services may have caused delays to starting treatment. By the end of February 2022 there were 14 times more patients waiting 6 weeks or more for key diagnostic tests in England, compared with pre-pandemic, and the number of people on the radiology waiting lists was the highest on record.[29]

The treatment figures presented only reflect tumour resection procedures, those which are attempting to remove the tumour itself, and so do not give any insight into potential

inequalities in accessing surgery for the management of symptoms or reconstructive procedures. These procedures can be of vital importance for patients and greatly improve quality of life and management of pain, and significant delays or changes to treatment can be profoundly upsetting. For example, there was increased use of open as opposed to laparoscopic techniques in colorectal cancer surgery during the first months of the pandemic, following guidance to avoid aerosol-generating procedures due to the increased risk of COVID-19 transmission.[29] While these changes followed the rapidly issued clinical guidance designed to protect both patients and NHS staff, they come with a higher likelihood of post-operative complications, longer in-patient stays, and longer healing times. There was also a greater use of stoma-forming procedures[30], which again will have had a clear impact on patient experience, quality of life, and return to normal activity. The longer-term effect of these changes, as well as other treatment changes, is not yet known.

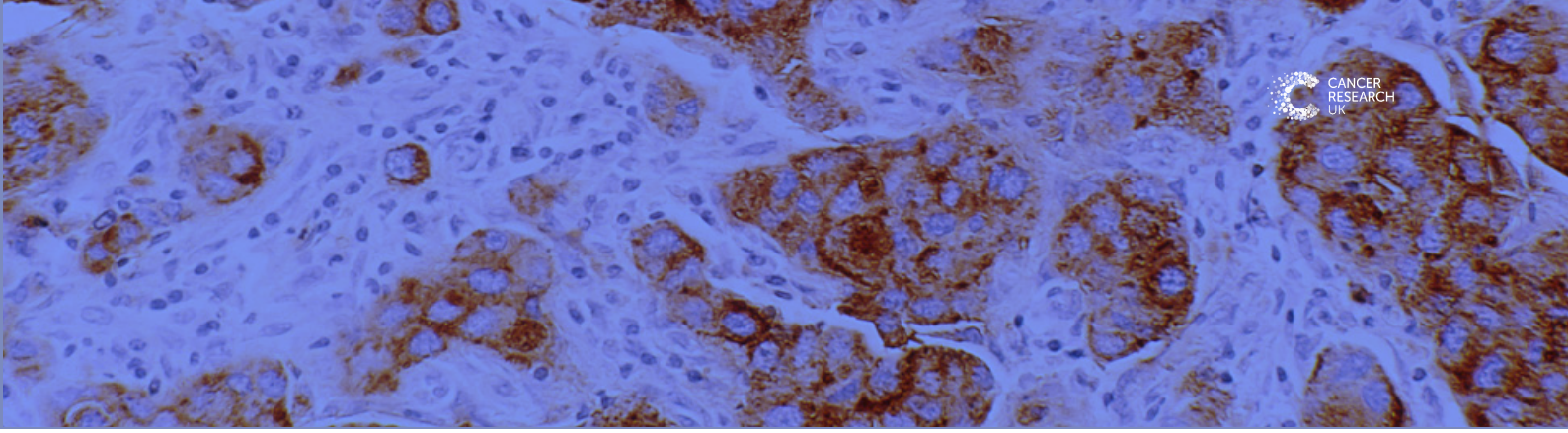
These data also do not provide any insight into the use of other treatments which could be used instead of surgery, or used as bridging treatments during the delay before surgery was possible. For example, for patients diagnosed with rectal cancer, it was found that the drop in the number of surgeries was offset by an increase in the use of short-course radiotherapy, which can be used as a first-line treatment with and without surgery.[30] This approach of delaying surgery and instead using a non-invasive treatment, minimised the risk to patients of being exposed to COVID-19[31], but the effects of delays to surgery on individual outcomes, irrespective of whether alternative or bridging treatments were used, is unknown as evidence on the association between the length of time from diagnosis to cancer surgery and the risk of disease progression is limited in quantity and quality[32].

COVID-19 has had a profound effect on the functioning of the health care service and this included end of life care for cancer patients. At the beginning of the pandemic there was an immediate increase in deaths at home, with a corresponding decrease in hospital, hospice, and nursing home deaths, compared to the previous year. This could have been for a number of reasons such as increased desire from patients to avoid hospital settings, including accessing acute care services, or conversely a push from clinicians and care givers to lessen the burden on hospitals and hospital staff as much as possible, as well as protecting vulnerable patients from potential infection. It also cannot be ignored that in many cases visitors were not allowed, even at end of life, and this will inevitably have played a large part in peoples' decisions at these very difficult times. The number of deaths at home has remained higher than pre-pandemic, indicating that perhaps changes made during the pandemic to avoid patients coming into hospitals, have facilitated greater choice for patients and clinicians and established ways in which people can be supported in their wish to stay in their own home.

[28]Cancer Data (NCRAS). (2021, October 01). Retrieved from COVID-19 Rapid Cancer Registration and Treatment Data: https://www.cancerdata.nhs.uk/covid-19/rcrd

[29]NHS England Diagnostic Waiting Times and Activity. Available at: https://www.england.nhs.uk/statistics/statistical-work-areas/diagnostics-waiting-times-and-activity/

Conclusion



The analyses presented here provide evidence for the impact that the COVID-19 pandemic had on cancer surgery and mortality, both at the very beginning and throughout 18 months of living with the disruption, fear, and strain. It is clear that there was a profound and sustained impact on cancer services and patients but the true extent of these effects is not yet fully understood. The stage distribution of cancers diagnosed could be impacted over the next few years by delayed patient presentation, and patient outcomes including quality of life and survival could be affected by delays and changes to treatment. And while for the most part, the results of our analysis indicate that the recovery period of the COVID-19 pandemic has not exacerbated inequalities in cancer surgery, we know that there are disparities in access to treatment particularly by age, as well as some evidence of variation by deprivation and region. However, it is difficult to identify the extent to which variation is unwarranted. The NHS must therefore undertake further research, and also facilitate access to data to enable trusted organisations to undertake research, to understand and address why certain patient groups are less likely to receive treatment, and to understand and mitigate any longer-term effects of the COVID-19 pandemic.

Cancer affects every family in the UK – one in two of us will get cancer in our lifetime[33], and by 2035 the number of new cancer cases is projected to increase to over half a million cases.[34] It is therefore imperative that there is sufficient investment in cancer services, ensuring that there is sufficient workforce, kit, and capacity so that everyone is equally able to access the diagnostic tests, treatment, and support that they need when they need it, regardless of other pressures on an increasingly stretched health service. Diagnosing cancer at an early stage and ensuring that the treatment offered is optimised for each patient, gives everyone the best chance to beat their cancer.

[30]Morris, E., Goldacre, R., and Spata, E., et al. (2020) Impact of the COVID-19 pandemic on the detection and management of colorectal cancer in England: a population-based study. The Lancet, 6(3): 199-208, https://doi.org/10.1016/S2468-1253(21)00005-4

[31]Marijnen, C., Peters, F., Rodel C, et al. (2020) International expert consensus statement regarding radiotherapy treatment options for rectal cancer during the COVID 19 pandemic. Radiotherapy Oncol, 148: 213–15, DOI: 10.1016/j.radonc.2020.03.039

[32]Turaga, K. K. (2020). Are We Harming Cancer Patients by Delaying Their Cancer Surgery During the COVID-19 Pandemic? Annals of surgery. DOI: 10.1097/SLA.0000000000003967

[33]Ahmad AS, Ormiston-Smith N, Sasieni PD. Trends in the lifetime risk of developing cancer in Great Britain: comparison of risk for those born from 1930 to 1960. Br J Cancer. 2015 Mar 3;112(5):943-7. doi: 10.1038/bjc.2014.606. Epub 2015 Feb 3. PMID: 25647015; PMCID: PMC4453943.

[34]Smittenaar CR, Petersen KA, and Stewart K., et al. (2016). Cancer incidence and mortality projections in the UK until 2035. Br J Cancer. 115(9):1147-1155. doi:10.1038/bjc.2016.304

Appendix A

All cancers combined

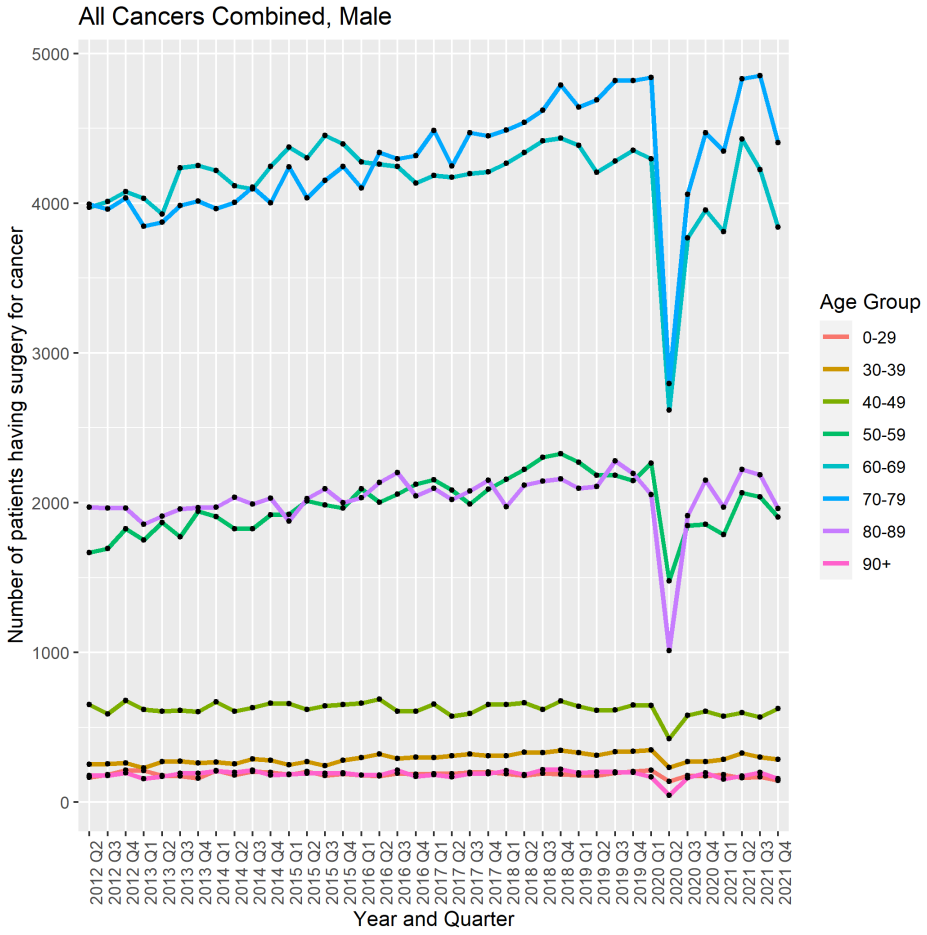


Figure 1a: Number of male patients having surgery for cancer by age group

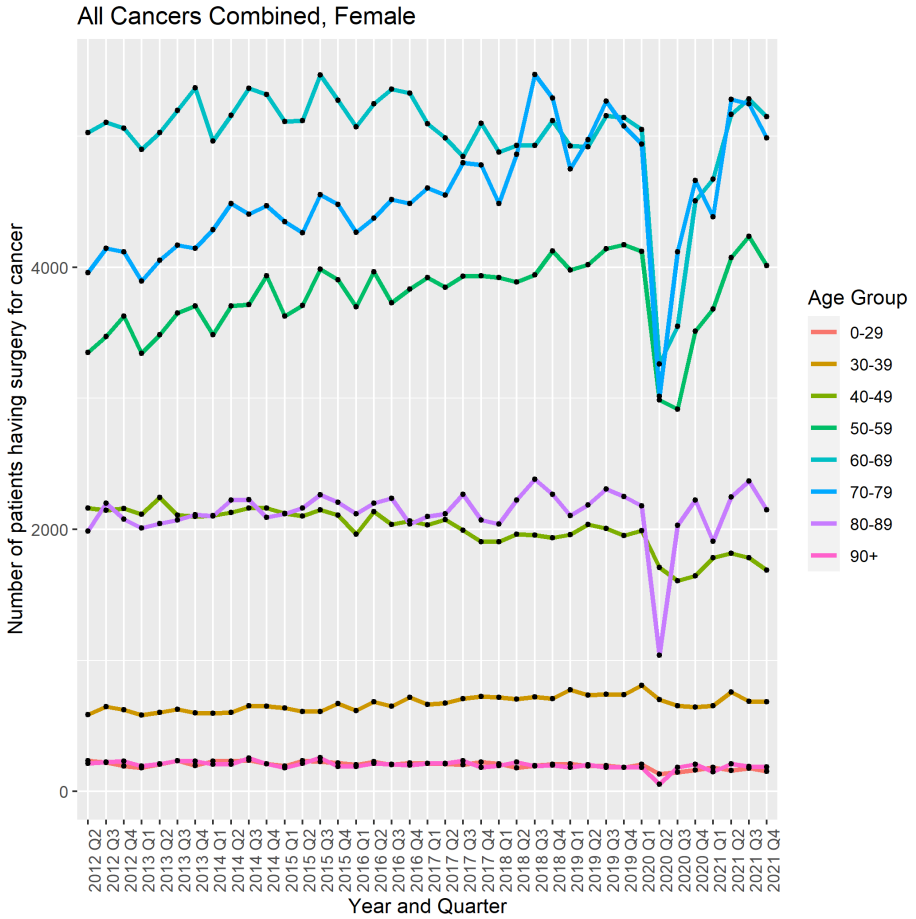


Figure 1b: Number of female patients having surgery for cancer by age group

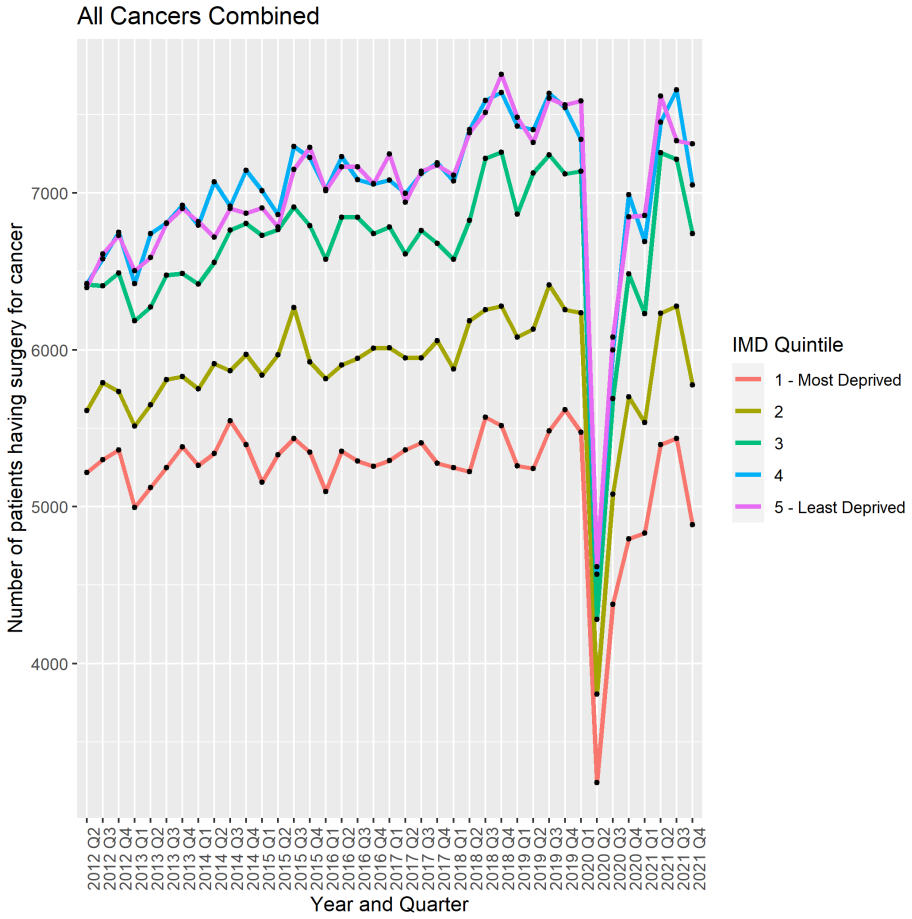


Figure 2: Number of patients having surgery for cancer by IMD deprivation quintile

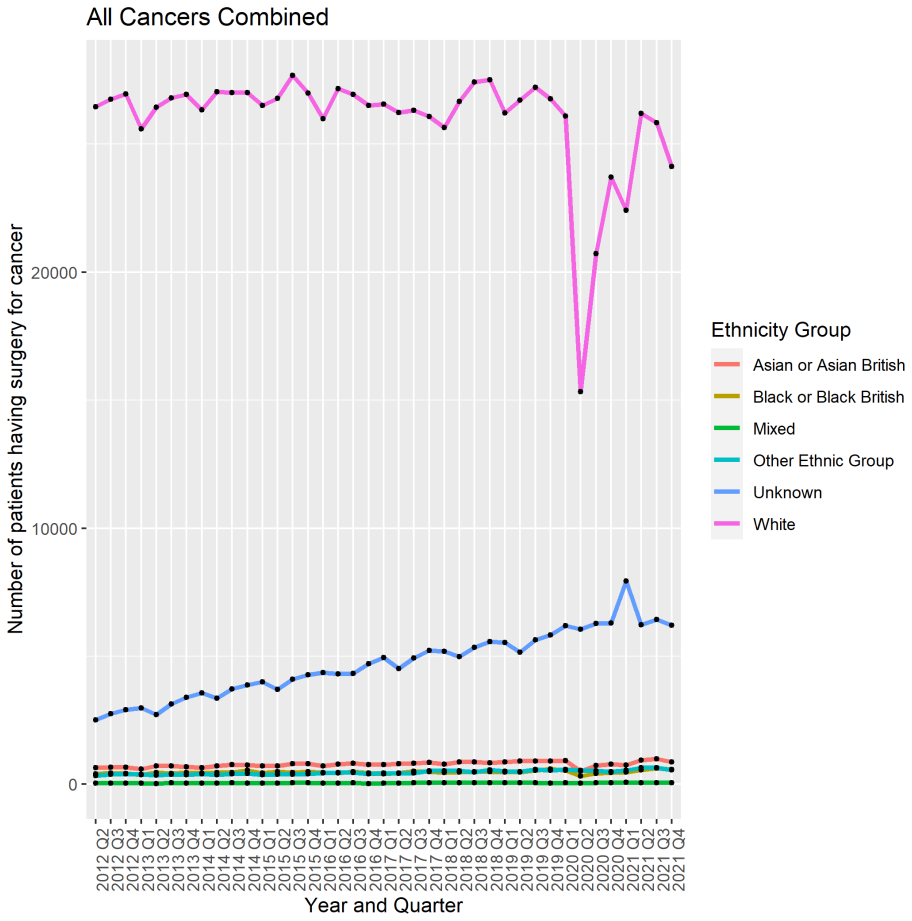


Figure 3: Number of patients having surgery for cancer by Ethnicity group

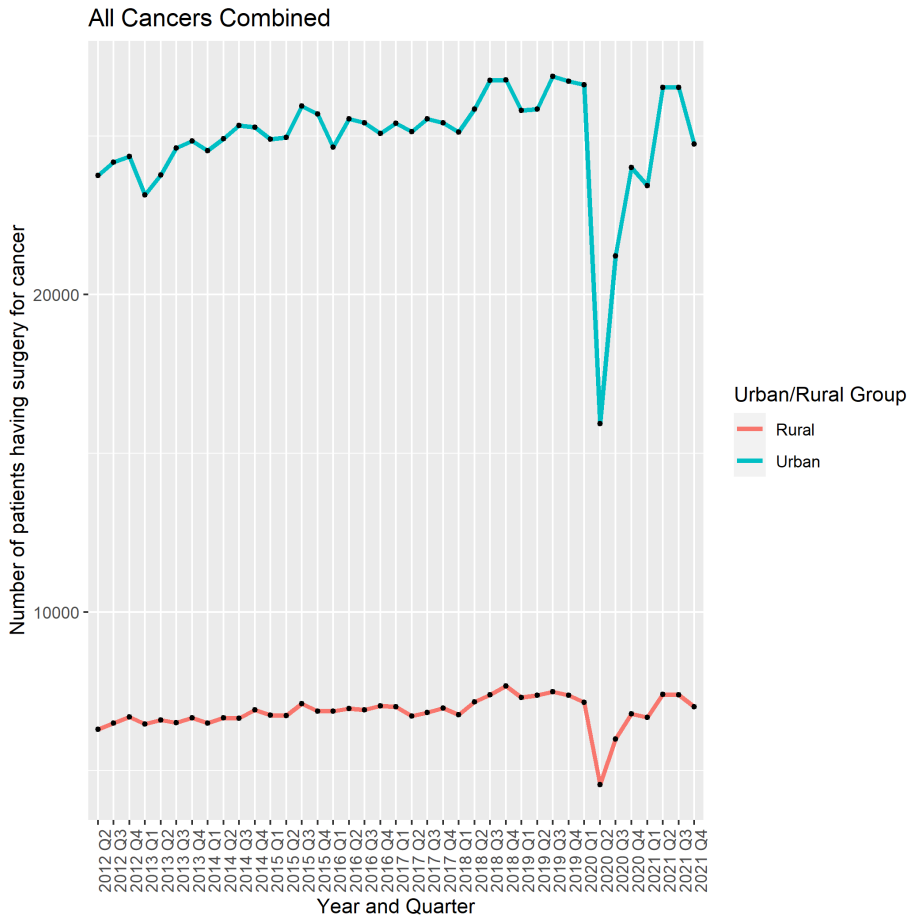


Figure 4: Number of patients having surgery for cancer by Urban/Rural group

Demographic Group	Demographic Breakdown	2019 Q2 vs 2020 Q2 (%)	2020 Q2 vs 2021 Q4 (%)	Statistical Significance
Age Group - Males	0-29	-21.4	3.6	P < 0.01 in both time periods
	30-39	-26.2	23.8	
	40-49	-30.8	46.8	
	50-59	-32.3	28.9	
	60-69	-37.8	46.6	
	70-79	-40.4	57.7	
	80-89	-52.0	93.8	
	90+	-76.7	234.0	
Age Group - Females	0-29	-30.6	13.4	P > 0.05 in both time periods
	30-39	-4.6	-2.1	
	40-49	-16.2	-1.2	
	50-59	-25.7	34.3	
	60-69	-33.7	57.9	
	70-79	-39.4	65.4	
	80-89	-52.5	106.5	
	90+	-72.7	233.9	
Deprivation	1 - Most Deprived	-38.2	50.8	P > 0.05 in both time periods
	2	-38.0	51.8	
	3	-39.9	57.5	
	4	-38.3	54.3	
	5 - Least Deprived	-37.0	58.5	
Ethnicity Group	Asian or Asian British	-44.6	74.0	P < 0.01 in both time periods
	Black or Black British	-32.6	82.5	
	Mixed	-26.5	32.0	
	Other Ethnic Group	10.1	3.3	
	Unknown	17.4	2.6	
	White	-42.6	57.4	
Urban/Rural Group	Rural	-38.1	53.7	P > 0.05 in both time periods
	Urban	-38.4	55.3	

Table 1: Percentage changes in the number of patients having surgery by demographic group at the start of the pandemic (2019 Q2 vs. 2020 Q2) and during the recovery period (2020 Q2 vs. 2021 Q4) for all cancers combined.

Appendix B

Bowel cancer

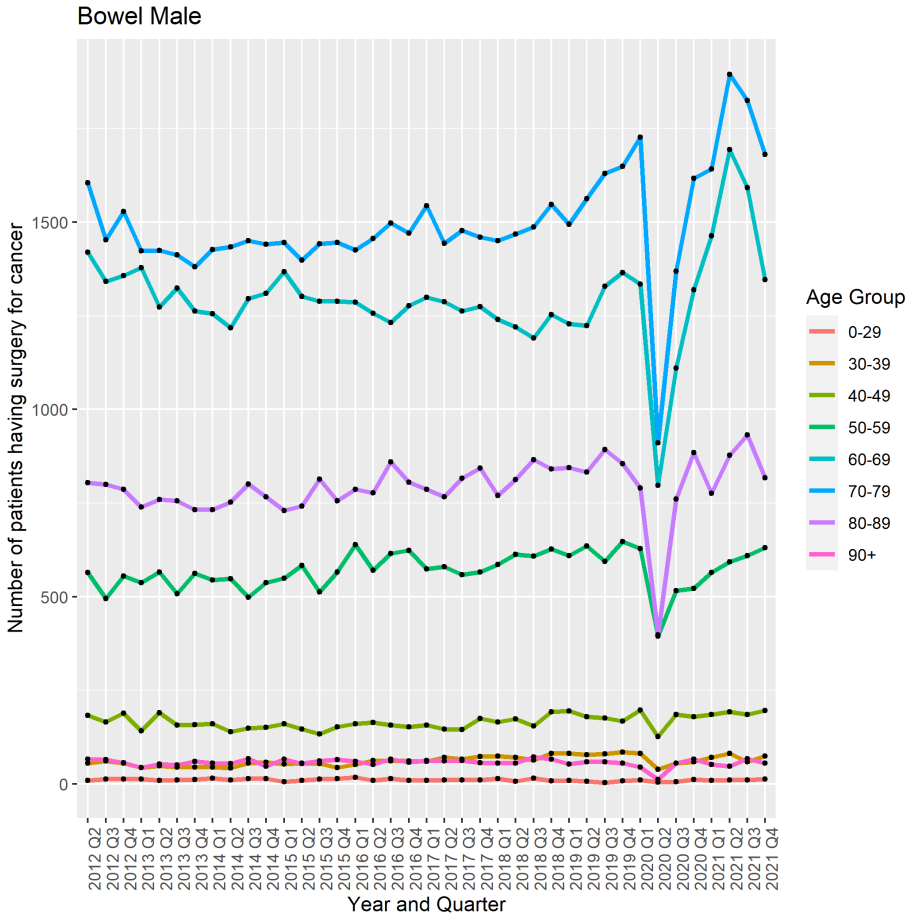


Figure 1a: Number of male patients having surgery for bowel cancer by Age group

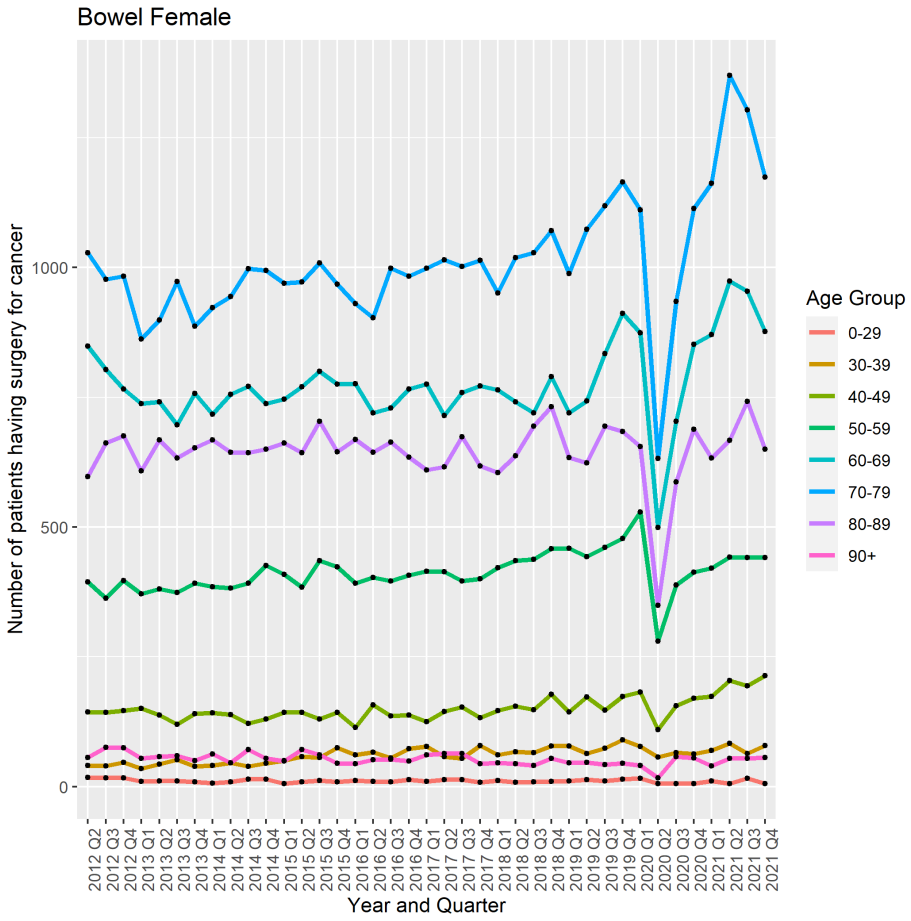


Figure 1b: Number of female patients having surgery for bowel cancer by Age group

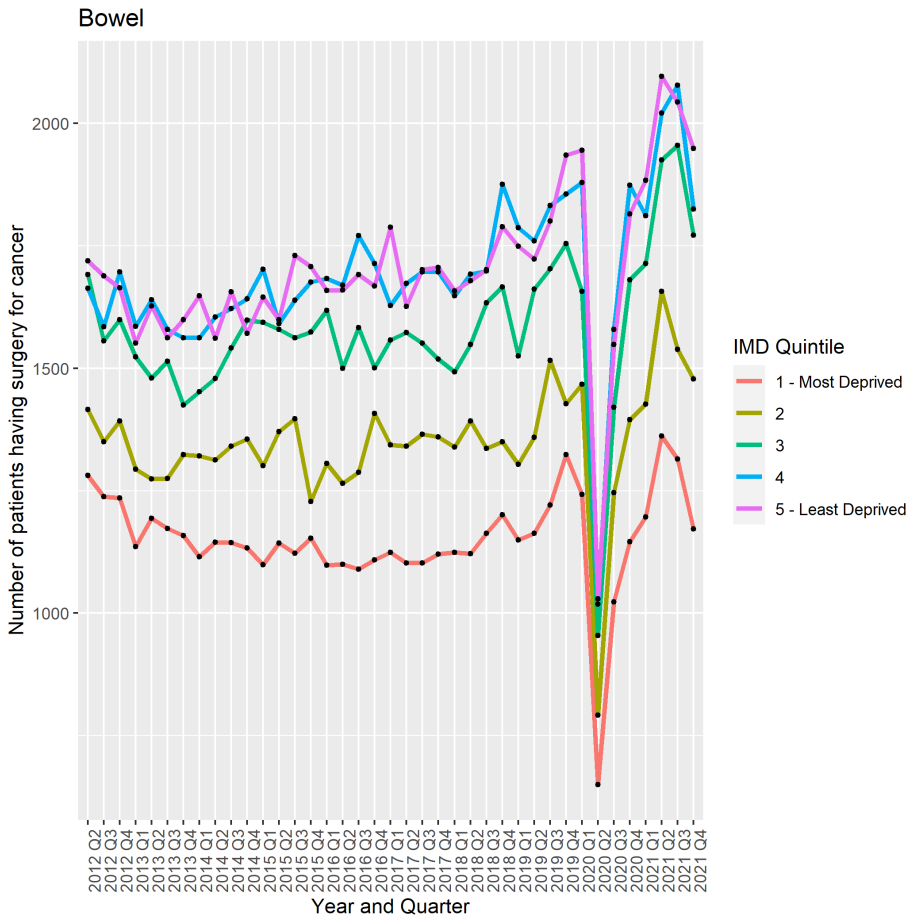


Figure 2: Number of patients having surgery for bowel cancer by IMD Deprivation quintile

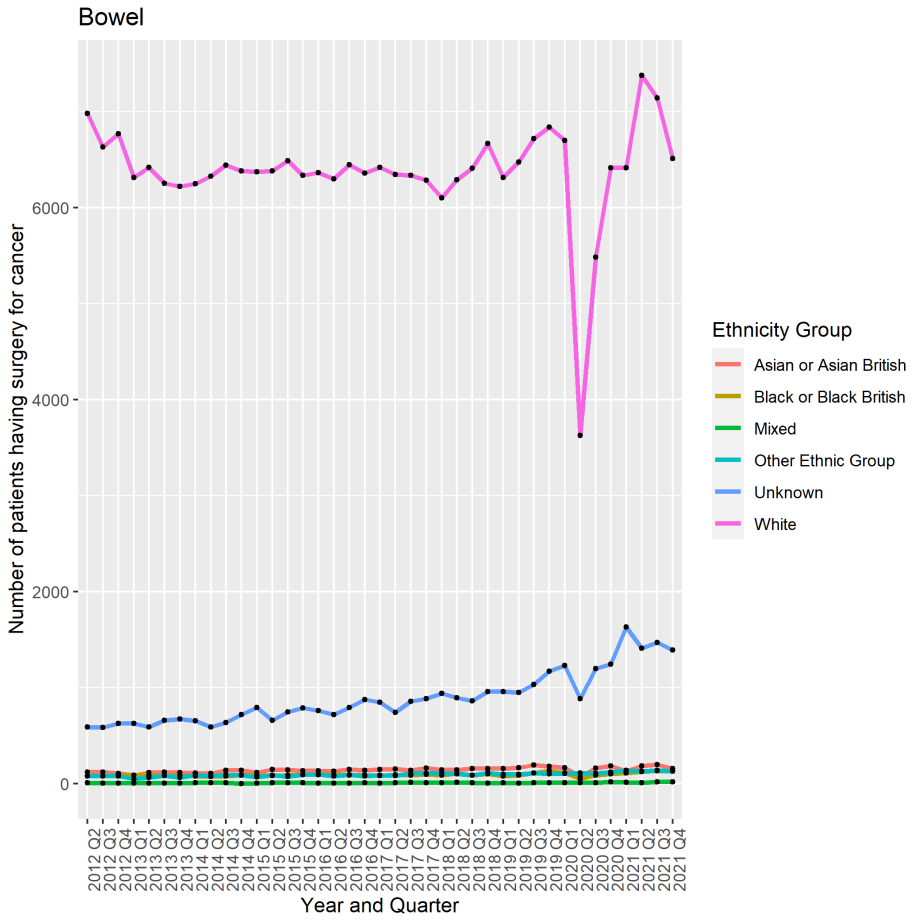


Figure 3: Number of patients having surgery for bowel cancer by Ethnicity group

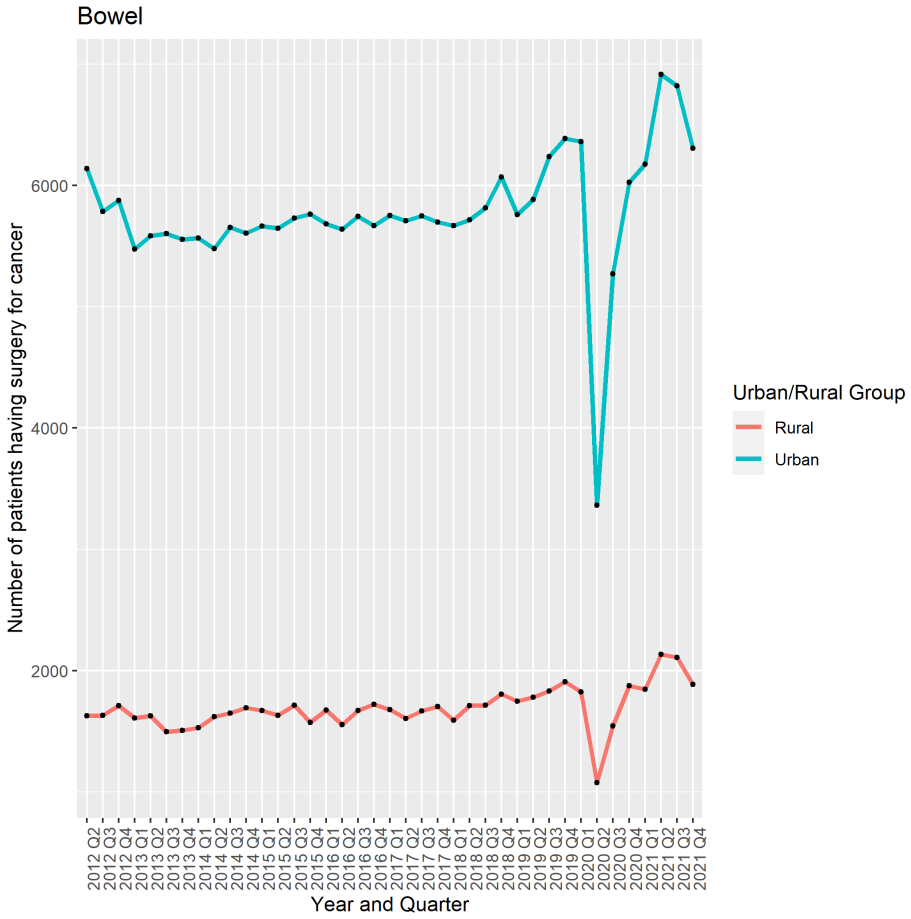


Figure 4: Number of patients having surgery for bowel cancer by Urban/ Rural group

Demographic Group	Demographic Breakdown	2019 Q2 vs 2020 Q2 (%)	2020 Q2 vs 2021 Q4 (%)	Statistical Significance
Age Group - Males	0-29	-	-	P < 0.01 in both time periods
	30-39	-50.0	92.3	
	40-49	-29.1	54.3	
	50-59	-38.0	60.2	
	60-69	-34.8	68.9	
	70-79	-41.7	84.4	
	80-89	-52.2	105.3	
	90+	-79.7	358.3	
Age Group - Females	0-29	-	-	P > 0.05 in both time periods
	30-39	-10.9	38.6	
	40-49	-36.4	94.6	
	50-59	-36.8	57.5	
	60-69	-32.8	75.8	
	70-79	-41.2	85.8	
	80-89	-44.1	86.3	
	90+	-63.8	229.4	
Deprivation	1 - Most Deprived	-44.1	80.3	P > 0.05 in both time periods
	2	-41.7	86.6	
	3	-42.6	85.7	
	4	-42.2	79.3	
	5 - Least Deprived	-40.3	89.4	
Ethnicity Group	Asian or Asian British	-54.2	107.8	P < 0.01 in both time periods
	Black or Black British	-39.8	149.1	
	Mixed	-	-	
	Other Ethnic Group	15.3	14.2	
	Unknown	-6.7	57.4	
	White	-44.0	79.5	
Urban/Rural Group	Rural	-39.4	75.0	P > 0.05 in both time periods
	Urban	-42.9	87.6	

Table 1: Percentage changes in the number of patients having surgery by demographic group at the start of the pandemic (2019 Q2 vs. 2020 Q2) and during the recovery period (2020 Q2 vs. 2021 Q4) for bowel cancer.

Appendix C

Lung cancer

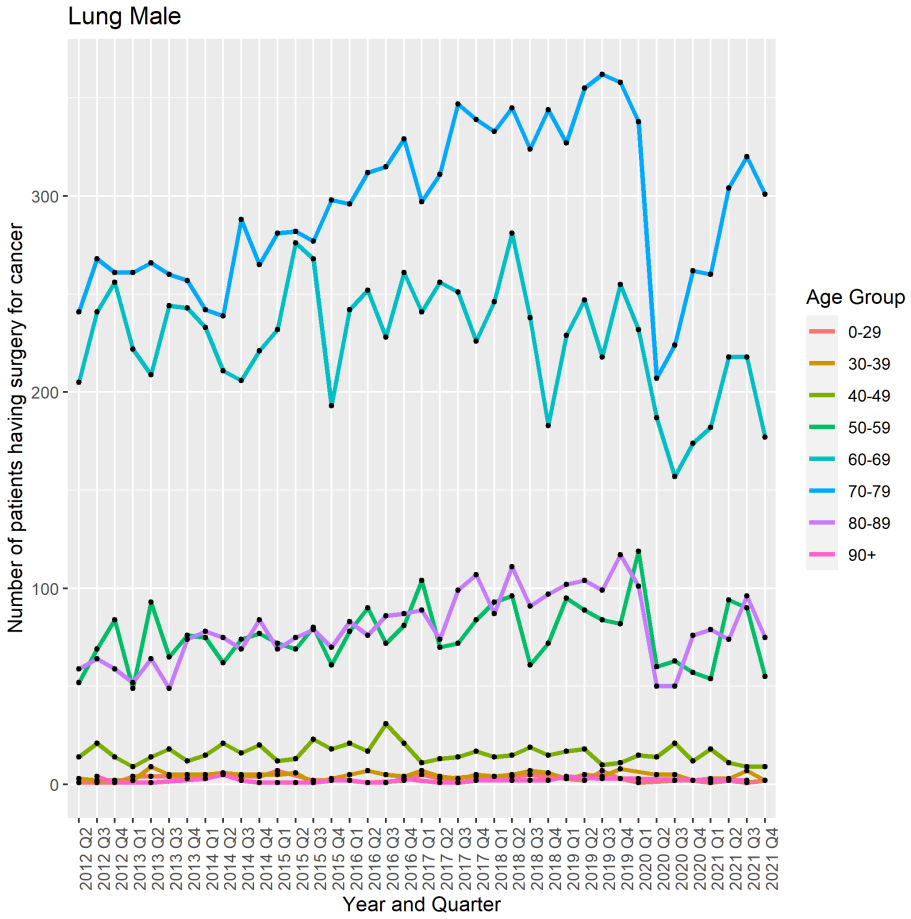


Figure 1a: Number of male patients having surgery for lung cancer by Age group

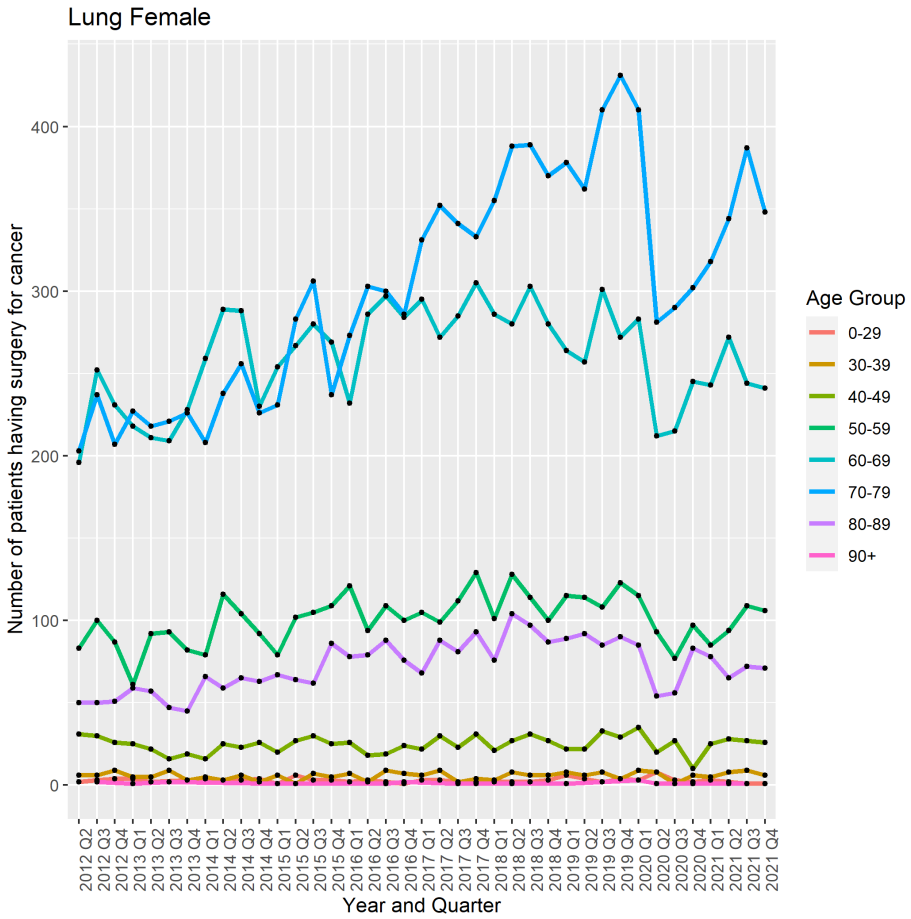


Figure 1b: Number of female patients having surgery for lung cancer by Age group

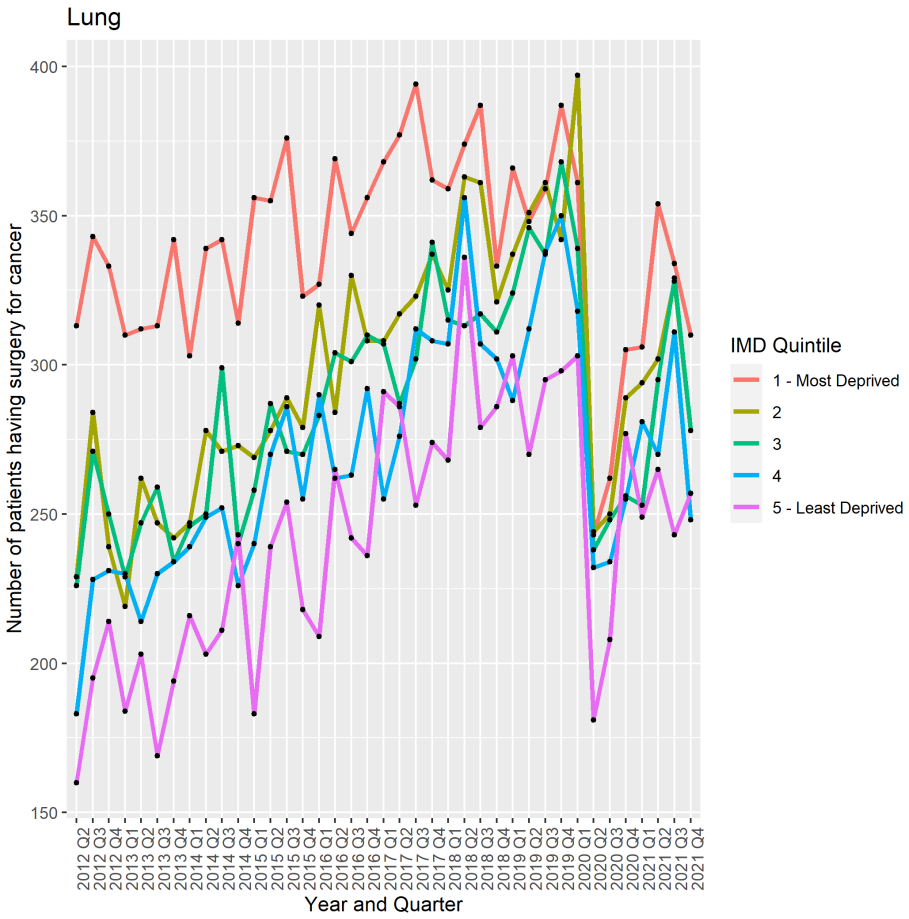


Figure 2: Number of patients having surgery for lung cancer by IMD Deprivation quintile

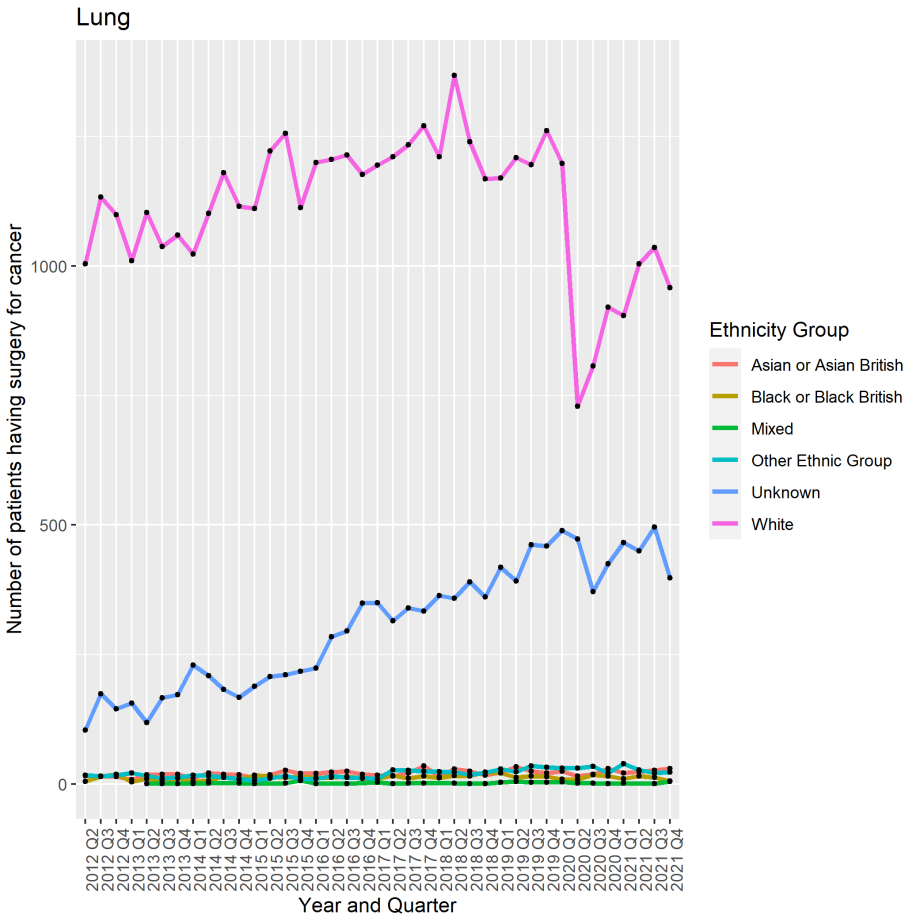


Figure 3: Number of patients having surgery for lung cancer by Ethnicity group

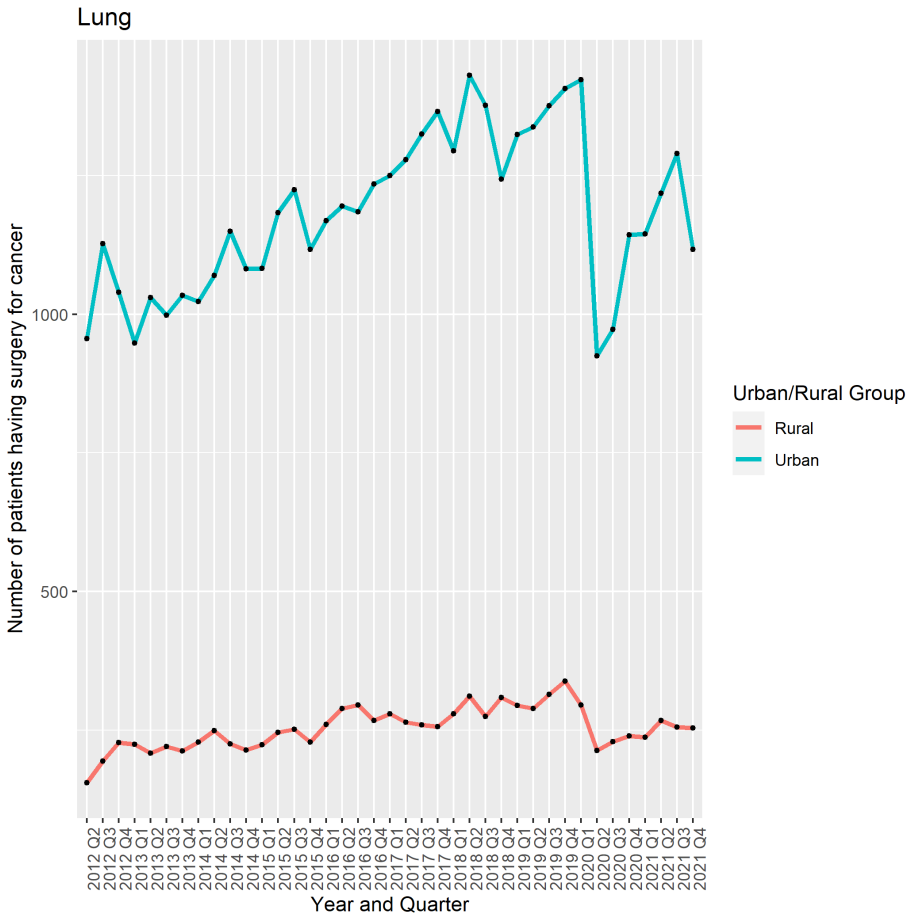


Figure 4: Number of patients having surgery for lung cancer by Urban/ Rural group

Demographic Group	Demographic Breakdown	2019 Q2 vs 2020 Q2 (%)	2020 Q2 vs 2021 Q4 (%)	Statistical Significance
Age Group - Males	0-29	-	-	P < 0.01 between 2020 Q2 vs 2021 Q4
	30-39	-	-	
	40-49	-	-	
	50-59	-32.6	-8.3	
	60-69	-24.3	-5.4	
	70-79	-41.7	45.4	
	80-89	-51.9	50.0	
	90+	-	-	
Age Group - Females	0-29	-	-	P > 0.05 in both time periods
	30-39	-	-	
	40-49	-9.1	30.0	
	50-59	-18.4	14.0	
	60-69	-17.5	13.7	
	70-79	-22.4	23.8	
	80-89	-41.3	31.5	
	90+	-	-	
Deprivation	1 - Most Deprived	-30.2	27.6	P > 0.05 in both time periods
	2	-30.5	13.9	
	3	-31.2	16.8	
	4	-25.6	6.9	
	5 - Least Deprived	-33.0	42.0	
Ethnicity Group	Asian or Asian British	-54.6	100.0	P < 0.01 in both time periods
	Black or Black British	-	-	
	Mixed	-	-	
	Other Ethnic Group	29.2	-25.8	
	Unknown	20.7	-15.9	
	White	-39.7	31.4	
Urban/Rural Group	Rural	-26.3	19.3	P > 0.05 in both time periods
	Urban	-30.9	20.8	

Table 1: Percentage changes in the number of patients having surgery by demographic group at the start of the pandemic (2019 Q2 vs. 2020 Q2) and during the recovery period (2020 Q2 vs. 2021 Q4) for lung cancer.

Appendix D

Breast cancer

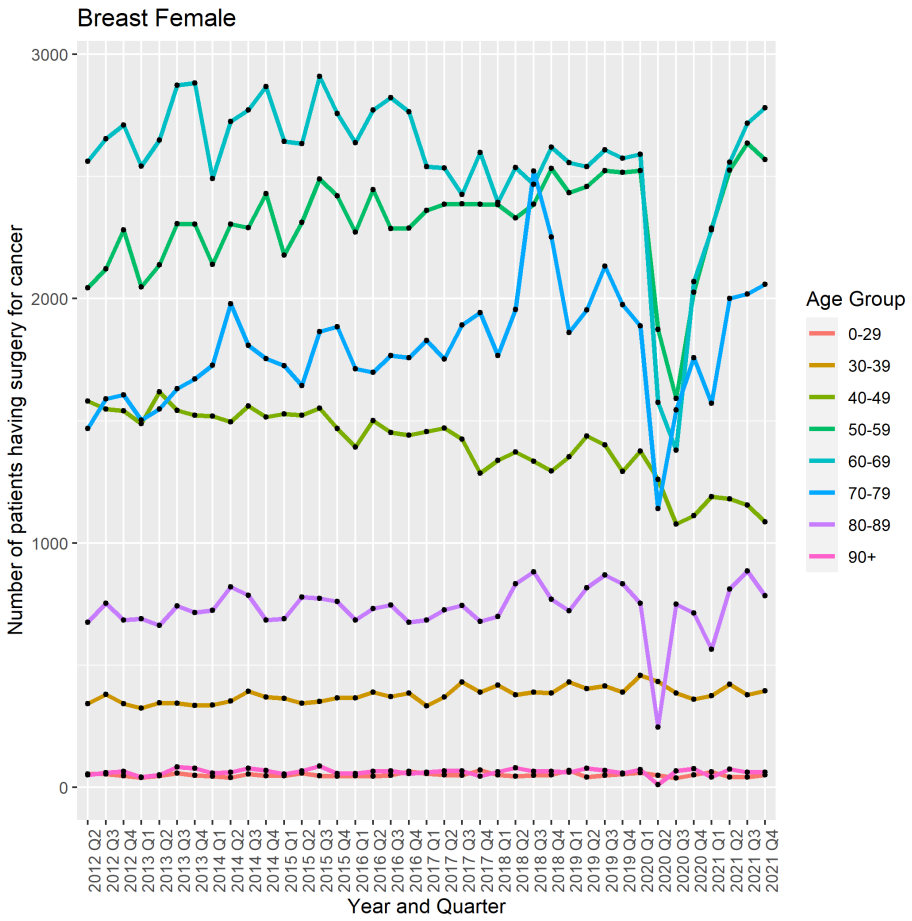


Figure 1: Number of female patients having surgery for breast cancer by Age group

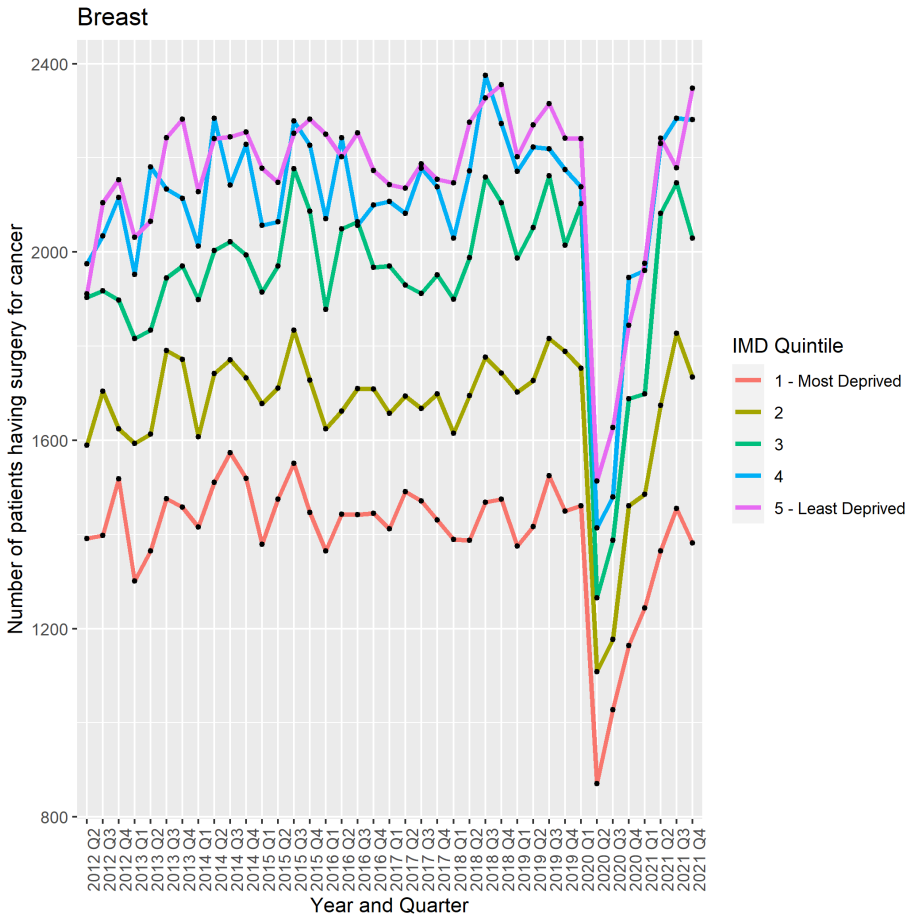


Figure 2: Number of patients having surgery for breast cancer by IMD Deprivation quintile

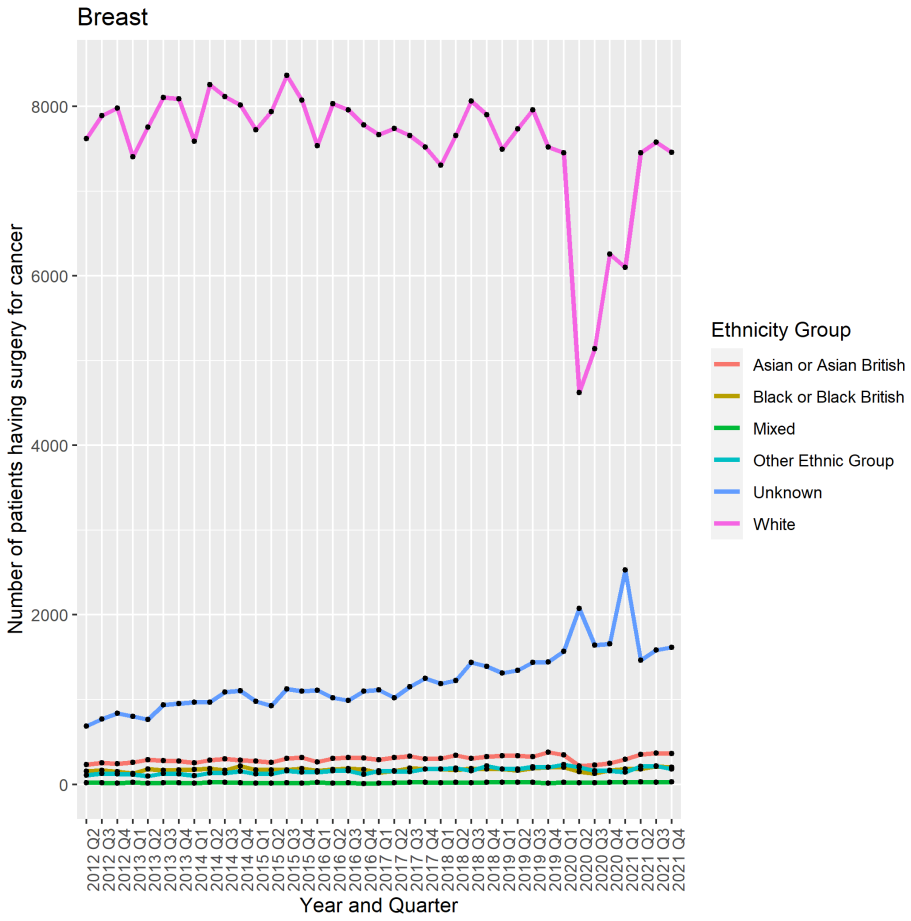


Figure 3: Number of patients having surgery for breast cancer by Ethnicity group

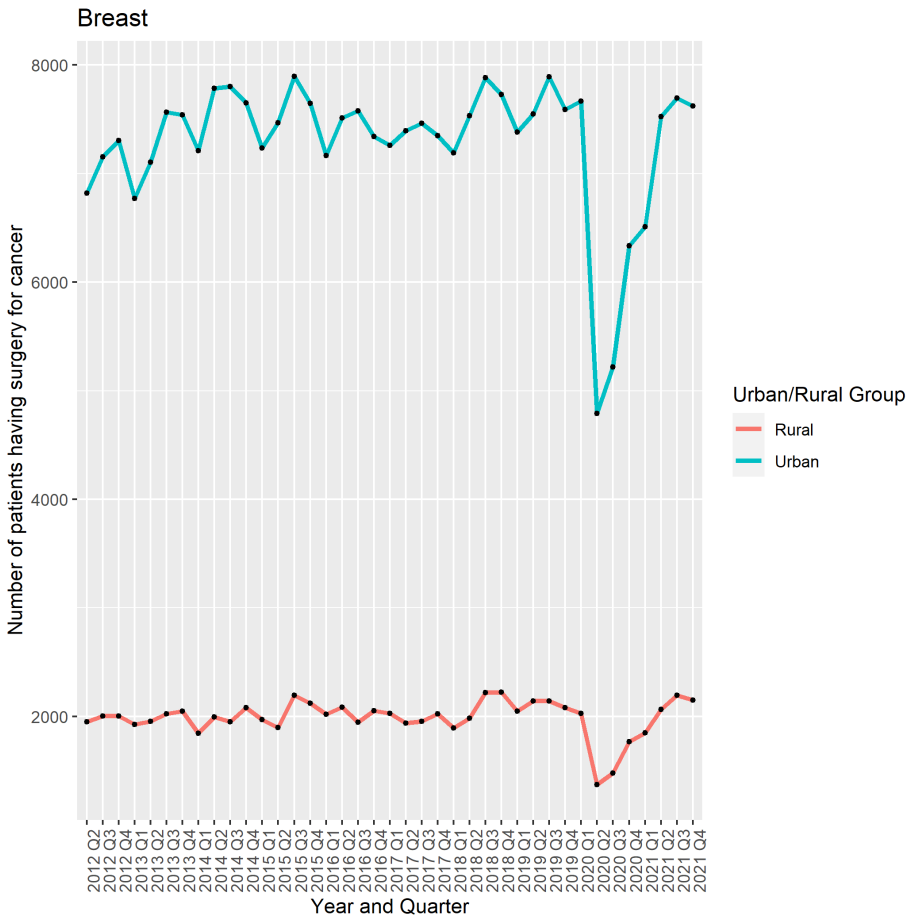


Figure 4: Number of patients having surgery for breast cancer by Urban/ Rural group

Demographic Group	Demographic Breakdown	2019 Q2 vs 2020 Q2 (%)	2020 Q2 vs 2021 Q4 (%)	Statistical Significance
Age Group - Females	0-29	19.1	2.0	**P < 0.05 in both time periods**
	30-39	7.4	-9.0	
	40-49	-12.3	-13.8	
	50-59	-23.8	37.1	
	60-69	-38.0	76.6	
	70-79	-41.7	80.6	
	80-89	-69.7	217.4	
	90+	-84.6	425.0	
Deprivation	1 - Most Deprived	-38.5	58.7	**P > 0.05 in both time periods**
	2	-35.8	56.5	
	3	-38.4	60.4	
	4	-36.4	61.3	
	5 - Least Deprived	-33.4	55.2	
Ethnicity Group	Asian or Asian British	-36.6	68.8	**P < 0.01 in both time periods**
	Black or Black British	-10.2	35.6	
	Mixed	-23.1	40.0	
	Other Ethnic Group	11.0	-9.4	
	Unknown	54.5	-22.1	
	White	-40.2	61.4	
Urban/Rural Group	Rural	-35.9	56.8	**P > 0.05 in both time periods**
	Urban	-36.5	59.1	

Table 1: Percentage changes in the number of patients having surgery by demographic group at the start of the pandemic (2019 Q2 vs. 2020 Q2) and during the recovery period (2020 Q2 vs. 2021 Q4) for breast cancer.

Appendix E

Prostate cancer

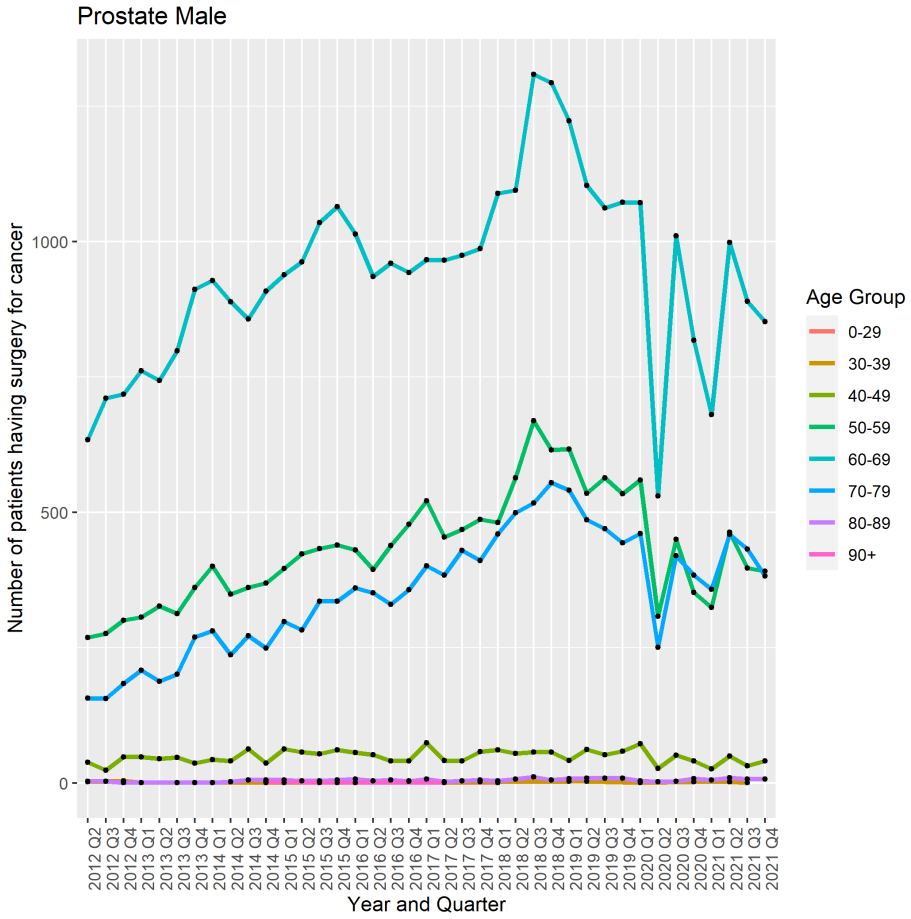


Figure 1: Number of male patients having surgery for prostate cancer by Age group

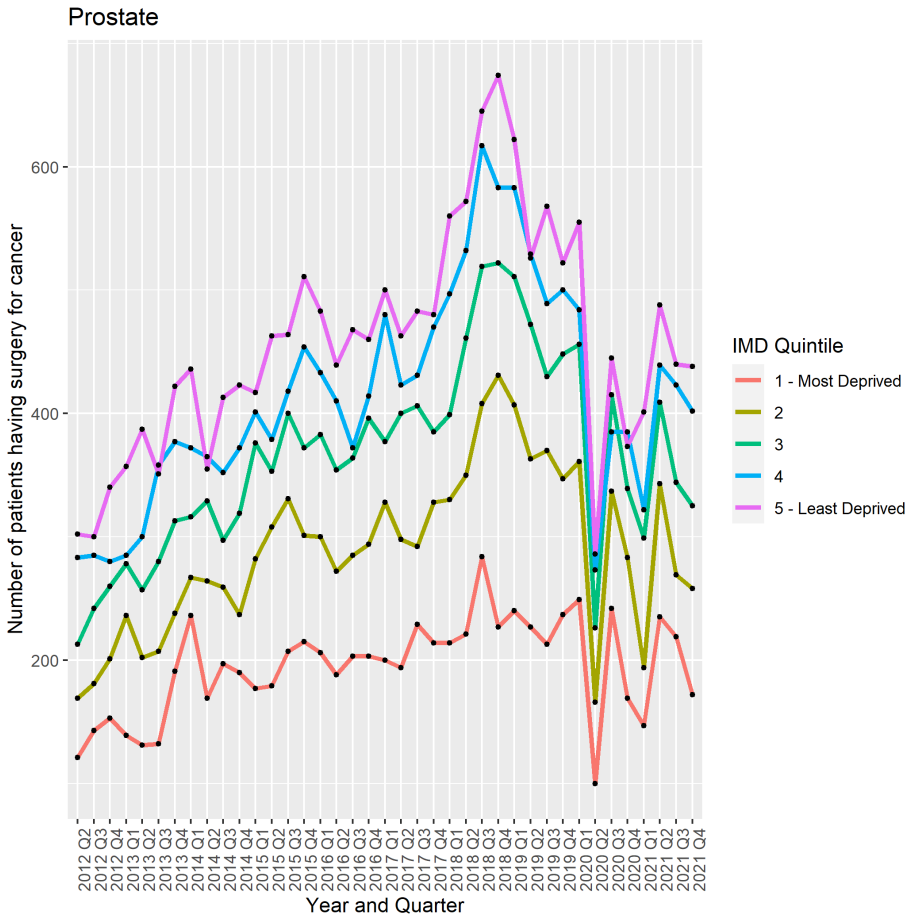


Figure 2: Number of patients having surgery for prostate cancer by IMD Deprivation quintile

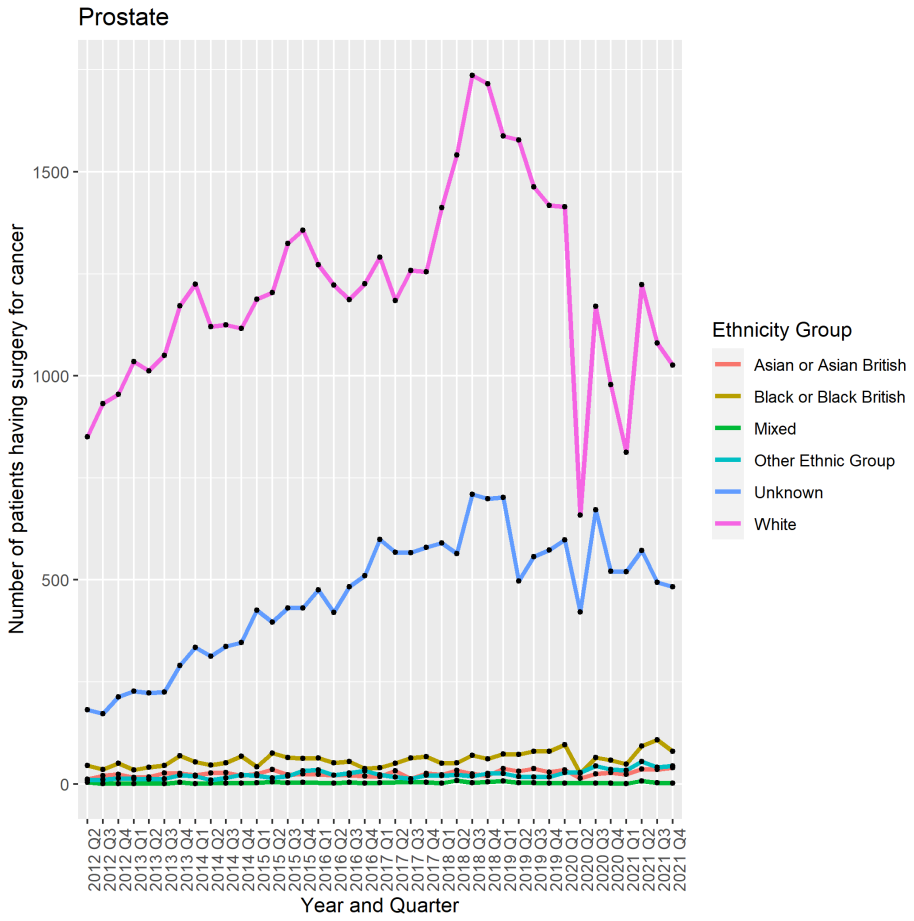


Figure 3: Number of patients having surgery for prostate cancer by Ethnicity group

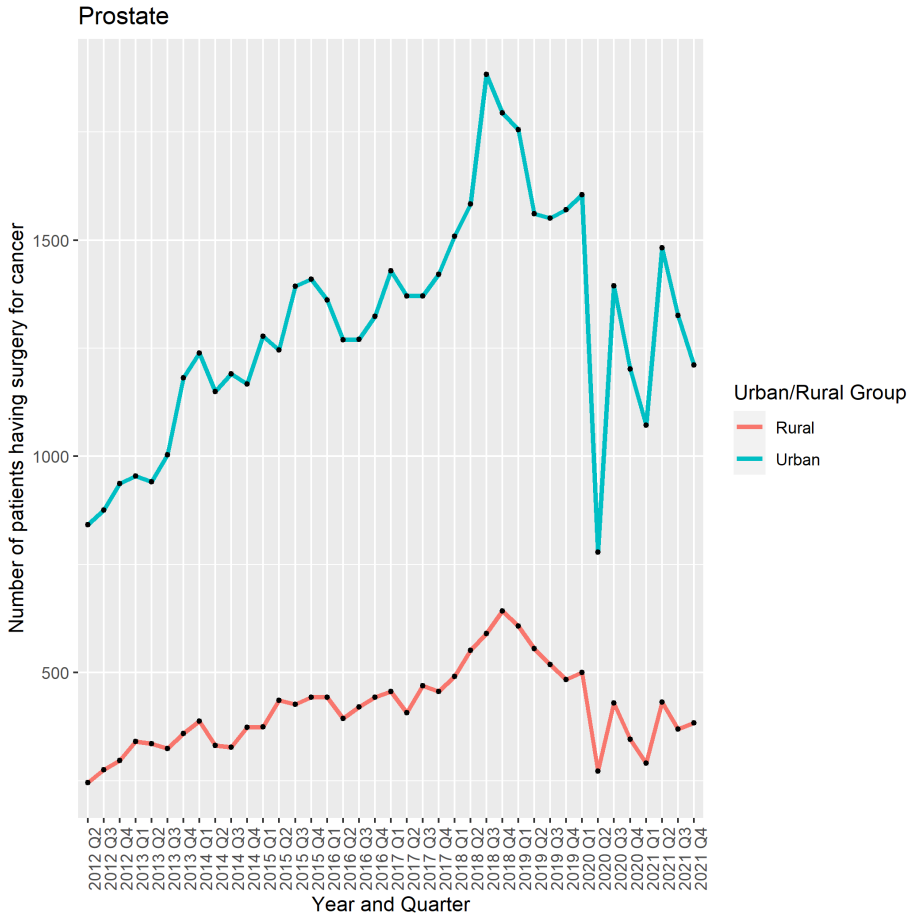


Figure 4: Number of patients having surgery for prostate cancer by Urban/ Rural group

Demographic Group	Demographic Breakdown	2019 Q2 vs 2020 Q2 (%)	2020 Q2 vs 2021 Q4 (%)	Statistical Significance
Age Group - Males	0-29	-	-	P > 0.05 in both time periods
	30-39	-	-	
	40-49	-56.5	51.9	
	50-59	-42.4	27.0	
	60-69	-52.0	60.8	
	70-79	-48.4	52.2	
	80-89	-	-	
	90+	-	-	
Deprivation	1 - Most Deprived	-56.0	72.0	P > 0.05 in both time periods
	2	-54.3	55.4	
	3	-52.1	43.8	
	4	-48.4	47.3	
	5 - Least Deprived	-45.6	53.2	
Ethnicity Group	Asian or Asian British	-54.8	185.7	P < 0.01 in both time periods
	Black or Black British	-63.9	207.7	
	Mixed	-	-	
	Other Ethnic Group	55.6	57.1	
	Unknown	-15.3	14.7	
	White	-58.2	55.7	

Table 1: Percentage changes in the number of patients having surgery by demographic group at the start of the pandemic (2019 Q2 vs. 2020 Q2) and during the recovery period (2020 Q2 vs. 2021 Q4) for prostate cancer.

Contact us

Online telstrahealth.co.uk
Phone +44 (0) 20 7332 8800

CANCER RESEARCH UK

Health UK