Health inequalities briefing

Breast cancer

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Executive summary

Introduction

This briefing presents a pragmatic, targeted review of evidence exploring health inequalities in breast cancer. The purpose of this briefing is to support the full breadth of the guideline development process, from surveillance, through scoping and during the development stages to highlight key areas of health inequalities in breast cancer.

It is designed to support both the NICE internal team and the committee during guidance development when defining questions and making recommendations to target reducing health inequalities and avoid exacerbation of existing issues. This briefing also identifies key gaps, potential research questions and research recommendations not only to NICE but to the wider health and care system from a health inequalities perspective.

Health inequalities exist between groups across different and often overlapping dimensions, including deprivation, geography, protected characteristics and inclusion health groups. These inequalities can be seen throughout the course of the condition, from health status and behavioural risk factors to the wider determinants of health and access to, experience of, and quality of care.

Here are the key findings.

Deprivation

- The least-deprived groups are observed to have higher breast cancer incidence. This may be because of exposure to known risk factors (for example, higher rates of alcohol consumption, increased menopausal hormone therapy, and oral contraceptive use).

- Additionally, reproductive factors such as having fewer children, having children at a later stage in life, and reduced rates of breast feeding may also contribute to an increased breast cancer risk.
- Even though the observed breast cancer incidence is lower in more deprived groups, poorer health outcomes from breast cancer are seen in these groups, including a higher rate of mortality.
- People from deprived groups are less likely to participate in breast cancer screening and are less likely to be referred urgently for assessment of breast symptoms. This can contribute to a delay in diagnosis and result in a more advanced stage of breast cancer at the time of diagnosis.
- More advanced stages of breast cancer can mean more intensive combination treatment is needed, including surgery, radiotherapy, and drug therapies including chemotherapy.
- Delay in the timing of a breast cancer diagnosis is considered a major contributing factor to many inequalities in care and outcomes for people from deprived groups.
- There is an observed higher prevalence of factors that do not promote good health in people from more deprived groups, including diets which are considered unhealthy, physical inactivity and obesity.
- The higher likelihood of comorbidities could also contribute to worse outcomes in deprived groups.
- People from minority ethnic family backgrounds are over-represented in deprived communities, further exacerbating inequalities.
- People from deprived groups face additional barriers to diagnosis and treatment. For example, they are more likely to have uncertain work arrangements and higher personal costs when seeking healthcare, which may make participation in screening and treatment more challenging.

Geography

- There is geographical variation in breast cancer incidence.

- Several factors can influence these differences. For example, breast cancer is more common among people from white ethnic family backgrounds and is less common among people living in deprived groups. The risk also increases with age. Taken together this means that affluent regions such as south-east England, where these groups are more prevalent, have a higher incidence of breast cancer.
- More deprived and ethnically diverse areas have a lower breast cancer screening uptake and higher rates of patients referred urgently for assessment of symptoms. There is also higher use of more aggressive combination treatment, which includes tumour resection, radiotherapy, and chemotherapy. Taken together, this results in geographical variation in outcomes, with some areas having higher mortality rates.
- Geographical variation in breast cancer behavioural risk factors could also be contributing to breast cancer risk and worse outcomes in some regions. For example, obesity and physical inactivity are more prevalent in northern regions, whereas alcohol consumption in southern areas is higher.
- There is geographical variation in the provision of certain treatments for breast cancer, including bisphosphonate therapy, hormone therapies and reconstructive surgery, and support services, such as psychological support.

Age

- Age is the most important risk factor for breast cancer. Breast cancer risk increases with age, and outcomes, including survival, also vary with age.
- Outcomes are best for those within national screening age cut-offs (between the ages of 50 and 71) and are worse for those who are younger (people aged 15 to 39) and older (people aged 71 and over).
- Younger people who present with aggressive cancers are more likely to have delayed diagnoses and worse outcomes. However, the incidence in younger groups is low. For example, 80% of breast cancer diagnoses occur in women over the age of 50.
- People aged 71 and over, where breast cancer incidence is rising, have worse outcomes and experience many inequalities. This age group is not eligible for screening unless they self-refer or are referred by their GP. They are known to

present with more advanced stage disease at diagnosis and are more likely to present with higher-grade tumours compared with younger age groups.

- Also, in people aged 71 and over core breast cancer data (including HER2 status, grade and cancer stage) are recorded less frequently. This, means fewer people may get appropriate treatment, contributing to worse outcomes.
- Comorbidities and frailty in older groups are more prevalent and sometimes used as a justification for using less effective active treatments. However, there is evidence of ageist attitudes irrespective of comorbidities and frailty.
- Breast reconstruction is often not discussed with older women and they may also experience many other barriers that make it more challenging to participate in breast cancer care. For example, they may have mobility issues or caring responsibilities.

Ethnicity

- People from ethnic minority family backgrounds have lower observed breast cancer incidence rates because of a lower prevalence of known risk factors. These include less alcohol consumption, lower rates of menopausal hormone therapy and lower rates of hormonal contraceptive use. There is also lower obesity prevalence in people from some ethnic minority family backgrounds. However, evidence suggests that incidence in some ethnic minority groups is increasing because of changes in risk factor profiles as these communities change over time.
- Ethnic minority groups are younger on average compared with white groups, and as such will not be eligible for participation in the National Health Service Breast Screening Programme (NHSBSP). Because these groups are younger they are more likely to present through non-screening routes, and so healthcare professionals may not think it is breast cancer at initial presentation and they are more likely to present with later-stage breast cancers.
- Presenting by non-screening routes increases the risk of advanced-stage breast cancer. Also, time to treatment initiation is longer for some people from ethnic minority family backgrounds.
- Overall, people from ethnic minority family backgrounds have a lower screening uptake and more late-stage diagnoses, but mortality is lower.

- People from ethnic minority family backgrounds may have additional barriers to receiving healthcare, including different language needs and cultural expectations.
- There is also a lack of representative support groups and they generally report poorer care experiences.

Disability

- In disabled people, behavioural breast cancer risk factors, such as physical inactivity and obesity, are more prevalent.
- Fewer disabled people participate in screening because of various barriers, such as not receiving screening invitations, not accessible screening equipment and screening locations.
- Many have delayed diagnosis and present with advanced-stage breast cancers.

Gender reassignment and sexual orientation

- In people who identify as LGBTQ, certain breast cancer risk factors are more common, such as alcohol consumption and being physically inactive.
- Some trans people may also be at increased risk because of hormone treatment.
- Screening uptake in cis lesbian women and bisexual cis women is similar to cis women in general.
- The current NHSBSP fails to identify some eligible LGBTQ people because the system only invites people who are registered as female with their GPs.
- LGBTQ groups also have no representative support groups and may be intimidated by heterosexually-oriented cancer support groups, which contributes to their poorer care experience.

Inclusion health groups

- Many inclusion health groups are at an increased risk of breast cancer because behavioural risk factors are more prevalent in these groups, and many also come from deprived communities.
- There is no systematic way for breast screening services to identify eligible people from inclusion health groups.

- Many face barriers to registering with a GP practice and may not be invited for breast cancer screening.
- Many migrants are deterred from seeking care because of NHS charges and fear of medical information being shared with immigration enforcement.
- Many people in inclusion health groups face financial challenges and may not be able to afford travel costs to receive breast cancer screening or cancer care.
- All the above can lead to extremely delayed care-seeking and presentation with advanced breast cancer by emergency routes, resulting in worse outcomes.

Health literacy

- Lower levels of health literacy is an issue across many groups and can affect people from deprived groups and ethnic minority family backgrounds, disabled people, older people, and many inclusion health groups.
- Low levels of health literacy can mean people are less aware about breast health and are less likely to recognise common breast cancer symptoms.
- Lower levels of health literacy can contribute to delays in seeking help for health problems and poor screening uptake, which can lead to late-stage presentation and worse outcomes in these groups.

Comorbidities

- The in-house analysis of Hospital Episode Statistics (HES) data regarding women undergoing their first-time breast cancer surgery in England shows notable disparities in pre-existing health conditions by deprivation and family background. For example, people from deprived groups and some family backgrounds tend to have a higher prevalence of multiple prescriptions alongside their breast cancer treatment.
- These disparities suggest that certain groups may experience more complex and challenging decisions regarding their breast cancer treatment. Furthermore, these disparities could contribute to health inequalities, as some people may potentially be not eligible for effective breast cancer treatments due to their complex comorbidity profiles.

Conclusion

In developing guidelines and recommendations, consideration should be given to the underlying potential drivers of breast cancer inequalities, such as deprivation, to ensure guidance does not inadvertently widen inequalities.

For example, recommendations can be tailored to help aid early breast cancer diagnosis in people from deprived groups, who have low breast cancer screening uptake and have a higher prevalence of factors that do not promote good health that contribute to breast cancer risk.

Services need to be co-designed with people in these high burden groups so they are relevant to the demographics and needs of the specific population, and are realistic about the underlying problems they face.

Lastly, continued advocacy is needed with partners across the system to tackle the causes of breast cancer inequalities, such as low screening uptake and low health literacy across many disadvantaged groups.

For a more detailed discussion of implications and examples of how the findings of this report could be used, including some key sample review questions and recommendations, see the considerations for NICE section.

1 Introduction

Health inequalities are systematic, unfair, and avoidable differences in health across the population and between different groups within society (see also the section on health inequalities in developing NICE guidelines: the manual). Health inequalities arise because of the conditions in which we are born, grow, live, work and age. These conditions influence our opportunities for good mental and physical health and wellbeing.

This health inequalities briefing describes the key inequalities faced by populations in England in relation to the incidence of breast cancer, the prevalence of known risk factors for the disease and wider determinants of health. It also describes patients' access to, and experience of, breast cancer services.

This briefing presents a pragmatic, targeted review of evidence exploring the key health inequalities concerning breast cancer and related services. In general, data availability on measures of health inequalities can be poor or absent. The briefing uses routinely available data sources but also includes quantitative and qualitative research findings and published reports on inequalities where gaps in data exist. The briefing uses data analyses and groupings, for example ethnicity categories, as presented in the original data sources.

The briefing has been structured to include data and evidence across the 4 dimensions of inequality: socioeconomic status and deprivation, protected characteristics, geography and vulnerable groups of society (inclusion health groups), and across the 5 levels of outcomes (health status, behavioural risks to health, wider determinants of health, access to care, and quality and experience of care).

For a fuller description of methods see Appendix 1: Methods.

The briefing also includes 2 supplementary in-house analyses using real-world evidence:

- One analysis explored the usage of physiotherapy and occupational therapy outpatient appointments after breast cancer surgery (see Appendix 3: In-house analysis on outpatient physiotherapy and occupational therapy use after breast cancer surgery,

- The other analysis explored comorbidity profiles in women before breast cancer surgery (see Appendix 4: In-house analysis on comorbidities).

2 Behavioural risk factors

According to Cancer Research UK's International Agency for Research on Cancer/World Cancer Research Fund classifications, many behavioural risk factors are linked to an increased breast cancer risk, including diet and obesity, alcohol consumption, and physical inactivity. Exogenous hormones such as the oral contraceptive pill and hormone replacement therapy (HRT) are also linked to an increased breast cancer risk.

There is emerging evidence that smoking might increase the risk of breast cancer. However, there is not enough evidence to draw firm conclusions (Fakhri, et al., 2022; Macacu, et al., 2015).

The evidence on the relationship between different diets and breast cancer is also is weak (Dandamudi, et al., 2018). However, a healthy diet can help people to keep a healthy body weight, and there is strong evidence that being overweight or obese can increase the risk of breast cancer.

Behavioural risk factors contribute to poor outcomes and clustering of these behaviours is more prevalent in people from deprived and ethnic minority groups. This is supported by the in-house analysis which found important differences in comorbidity profiles in people from deprived and ethnic minority groups when compared with more affluent groups and people from a white family background (see Appendix 4: In-house analysis on comorbidities).

Also, reproductive factors such as the age at which a woman has her first child, number of children, and whether they breastfeed affect breast cancer risk (Macmillan cancer support, 2014).

Information from Macmillan Cancer Support shows that the risk factors for secondary breast cancer (when cancer cells from a cancer that started in the breast spread to other parts of the body) are the same as those for primary breast cancer.

For a summary of behavioural risk factors for breast cancer see Table 1 and for a fuller description of risk factors and associated evidence see Appendix 2: Behavioural risk factors for breast cancer.

Table 1: Behavioural risk factors for breast cancer

	Deprivation	**Geography**	**Protected characteristics**
Obesity **Strong evidence**	There is higher prevalence of obesity in deprived groups.	There is geographical variation in the prevalence of obesity, for example, higher prevalence in north east compared with the south west.	**Age:** The obesity prevalence increases with age. **Disability:** The obesity prevalence is higher for people with a disability. **Ethnicity:** There is lower obesity prevalence in people from some ethnic minority family backgrounds.
Alcohol **Strong evidence**	There is higher alcohol consumption at harmful levels in deprived groups. However, this is changing with more women in the least-deprived groups drinking at harmful levels.	There is geographical variation in alcohol use, for example, south east and the east of England have half the rate of alcohol-related admissions compared with the northern England. However, the south west, one of the least-deprived regions, ranks third in admissions for alcohol-related conditions.	**Ethnicity:** There is lower consumption of alcohol at harmful levels in people from ethnic minority family backgrounds. **Sexual orientation:** People who identify as LGBTQ are more likely to consume alcohol at harmful levels.
Physical inactivity **Strong evidence**	There is higher prevalence of physical inactivity in individuals from the deprived groups.	There is geographical variation in physical inactivity, for example, less affluent regions report greater physical inactivity.	**Age:** Physical inactivity increases with age. **Disability:** Disabled people or people with a long-term health condition are more likely to be physically inactive. **Ethnicity:** Physical activity levels differ between ethnic groups. Statistically, people from Asian and black ethnic family backgrounds are more likely to be physically inactive. **Sexual orientation:** People who identify as LGBTQ are

			more likely to be classed as physically inactive. Physical inactivity is even greater for LGBTQ people who do not identify as male or female.
Hormone therapy (HRT) and contraceptive use **Strong evidence**	There is lower HRT prescribing for menopause in practices from the most deprived quintile.	No evidence identified.	**Ethnicity:** People from South Asian and black ethnic family backgrounds are less likely to use HRT for the menopause. However, because of the changing lifestyles, there is an increased use of menopausal HRT and contraceptives in some people from ethnic minority communities. **Sexual orientation:** Lesbian women have a lower use of oral contraceptives. **Gender reassignment:** Trans women who take hormone therapy may have an increased breast cancer risk.
Smoking **Emerging evidence**	There is higher smoking prevalence in deprived groups.	No evidence identified.	**Ethnicity:** There is lower smoking prevalence in most ethnic groups.
Unhealthy diet **Unclear evidence**	Unhealthy diet is more prevalent in deprived groups.	No evidence identified.	**Ethnicity:** The proportion of people who eat recommended daily portions of fruits or vegetables is lower in people from ethnic minority family backgrounds.

3 Wider determinants of health

The wider determinants of health shape the opportunities people have to be healthy, and can protect people from, or drive the onset and progression of, diseases such as breast cancer. These factors include income and work, sick leave and financial support, access to healthy diets and physical activity, education and health literacy.

Income

Wealth indicators are important determinants of breast cancer screening uptake. For example, people who live in their own homes (as opposed to rented properties) and households with cars (as opposed to no cars) are more likely to participate in breast cancer screening (Institute of Health Equity [IHE], 2015).

People may be unable to work after their diagnosis, and so concerns about being able to cover personal costs, such as having to pay for fuel and for hospital parking, may discourage engagement with care (Macmillan cancer support, 2019).

Work

Most people diagnosed with breast cancer are of working age, and many are working at the time of diagnosis. The number of people diagnosed with breast cancer who are of working age is expected to increase because of policies to extend working lives in many western countries. Those aged 65 to 70 could be impacted most, because of a higher breast cancer incidence than in younger age groups (Sietske et al., 2022).

Returning to work after breast cancer may be problematic for some people. They may have uncertain work arrangements such as zero hours contracts, agency, self-employment or part-time work and may be afraid to speak out about their needs not being met from fear of losing their jobs after a long sickness absence (Dowling, 2016).

Deprived groups, people from minority ethnic family backgrounds, and inclusion health groups, such as migrants, are more likely to have insecure employment and less likely to have sick leave entitlement. There is evidence from the Trades Union Congress' report that disproportionate numbers of people from minority ethnic family backgrounds are on zero-hours contracts. In the UK, as many as 47% of adults living with cancer do not have sick pay entitlement or access to flexible working or workplace adjustments (Crawford et al., 2017).

Additionally, the Institution of Occupational Safety and Health's return to work after cancer report says that many people returning to work after cancer need practical help, for example, from occupational health services. Low paid workers and those with insecure employment contracts are less likely to have access to such practical help and may experience additional stress.

A systematic review of people's experiences of breast screening (Pulman and Newell, 2021) shows that there are conflicting views about attending screening during work time. Some people do not see this as a problem and find it more convenient to attend breast cancer screening near their workplace. Others report fear of taking time off work, or not being able to arrange cover for their responsibilities.

There was conflicting evidence about night shift working and increased breast cancer risk in a review by Breast Cancer UK in 2016 with more recent evidence showing that night shift work, including long-term shift work, has little or no effect on breast cancer incidence.

Education and health literacy

People with lower levels of education and those from minority ethnic family backgrounds are less aware of cancer warning signs, such as breast changes (Race Equality Foundation, 2018). One study found that 43% of women from minority ethnic family backgrounds never practise breast awareness, compared with 11% in the general population (IHE, 2015).

There is evidence that language and literacy problems may contribute to low levels of breast cancer screening uptake (IHE, 2015). Some ethnic groups and people from deprived groups may encounter communication problems with health professionals. These groups may also report emotional barriers, including fear, embarrassment and anticipated shame. Their perception of their risk of breast cancer as being low may also contribute to a lower level of screening uptake.

Similarly, compared with the general population, fewer older women are aware of breast cancer signs and symptoms, including non-lump breast cancer symptoms (ICLUK, 2019). They are also less aware of the importance of self-checking, even though a breast symptom in an older woman is highly indicative of cancer.

Compared with the general population, fewer older women with cancer seek additional information to that provided by their healthcare professionals, and most prefer face-to-face information (Macmillan cancer support, 2014). Lack of health literacy in older women may explain delays in presentation and diagnosis, leading to poorer outcomes.

According to the Government Equalities Office report fewer lesbian women do breast self-examination than heterosexual women.

Population groups identified as experiencing disproportionately low or inadequate health literacy include deprived groups, migrants and people from minority ethnic family backgrounds, older people, people with long-term health conditions and disabled people (including those who have long-term physical, mental, intellectual, or sensory impairment) (see Public Health England's [PHE] guidance on local action on health inequalities: improving health literacy, 2015) .

Low health literacy in these groups may explain poor cancer screening uptake, difficulty making treatment choices and reduced quality of life after a cancer diagnosis (Humphyrs et al., 2017). The delay in health-seeking behaviour also may explain late-stage presentation and diagnosis in these groups and worse outcomes, according to The King's Fund report in 2011 on how to improve cancer survival.

4 Health status

4.1 Inequalities in incidence and prevalence

Breast cancer is the most common cancer in England. According to NHS cancer incidence data there were 40,192 new breast cancer cases registered in 2020, 99% of which were diagnosed in women. However, the COVID-19 pandemic had a significant impact on breast cancer diagnoses. For example, there were 48,433 new breast cancer cases registered in 2019.

Statistical complete prevalence modelling estimated that in 2020, in England, there were 640,000 women living with breast cancer; this is predicted to rise to 1.3 million by 2040 (MacMillan Cancer Support, 2020).

Deprivation

In England, cancer registration statistics for 2017 show breast cancer incidence rates are lower in the most deprived Index of Multiple Deprivation (IMD) quintile (IMD 1) compared with the least deprived (IMD 5). In 2019, the age-standardised breast cancer incidence rates were 157.0 for IMD 1 and 179.3 for IMD 5 per 100,000 population. In 2019, in England, NHS cancer prevalence data for 2019 shows most women living with breast cancer were in the least deprived (IMD 5) quintile.

Higher incidence in less deprived groups could be partly explained by differences in breast cancer risk factors. For example, research on socioeconomic status and HRT prescribing has shown more affluent groups are more likely to use menopausal hormone therapy. There is also evidence that alcohol consumption at harmful levels is more prevalent in less deprived groups (NHS Digital, 2020).

Geography

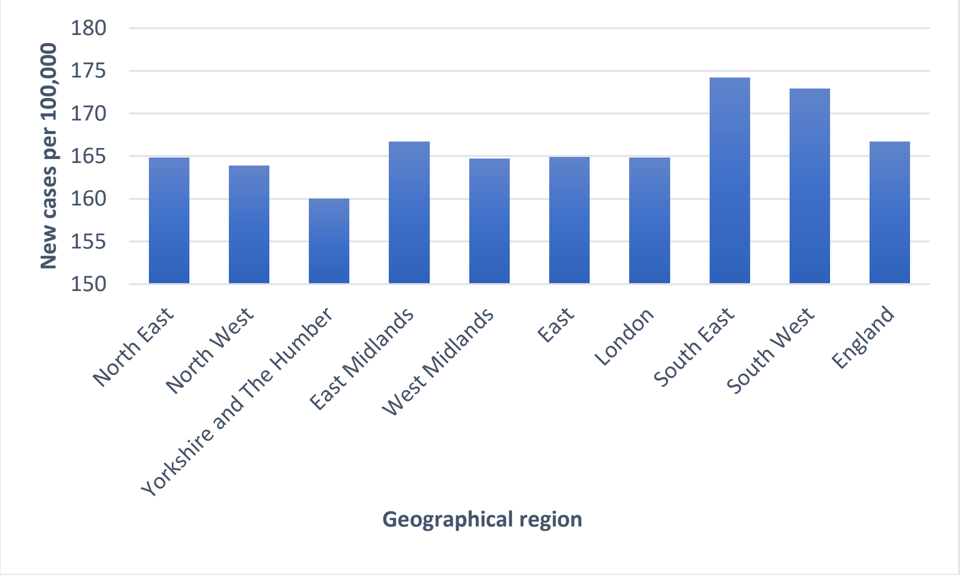
Across England, there is geographical variation in breast cancer incidence (Behavioural risk factors, such as levels of obesity, alcohol consumption and physical inactivity, menopausal hormone therapy prescribing may explain some of the geographical variations. The Office for Health Improvement & Disparities' Local Alcohol Profiles for England show that alcohol consumption at more harmful levels is more prevalent in the south. However, obesity and physical inactivity are more prevalent in the north. Also, NHS Breast Screening Programme (NHSBSB) Statistics show higher levels of breast cancer screening uptake observed in more affluent areas which may explain why people living in the south are more likely to have screen-detected rather than symptomatic cancers.

Figure 1). The affluent south has the highest breast cancer incidence. Regional differences are likely to be the result of several factors.

Breast cancer is most common among people from white ethnic family backgrounds and least common among people living in deprived groups. The risk of breast cancer increases with age. The affluent regions in the south where these populations are most prevalent have more breast cancers.

Behavioural risk factors, such as levels of obesity, alcohol consumption and physical inactivity, menopausal hormone therapy prescribing may explain some of the geographical variations. The Office for Health Improvement & Disparities' Local Alcohol Profiles for England show that alcohol consumption at more harmful levels is more prevalent in the south. However, obesity and physical inactivity are more prevalent in the north. Also, NHS Breast Screening Programme (NHSBSB) Statistics show higher levels of breast cancer screening uptake observed in more affluent areas which may explain why people living in the south are more likely to have screen-detected rather than symptomatic cancers.

Figure 1 Regional age-sex-standardised incidence rates per 100,000 women (Office for National Statistics (ONS) cancer registration statistics, England 2017)



Protected characteristics

Age

Cancer Research UK states that breast cancer risk increases with age (Figure 2 Average number of new breast cancer cases per year and age-specific incidence rates per 100,000 women, 2016 to 2018 (Cancer Research UK 2022). Most new breast cancers occur in women aged over 50 and one-third in women aged over 70. Breast cancer incidence rates are highest in women aged 90 and over.

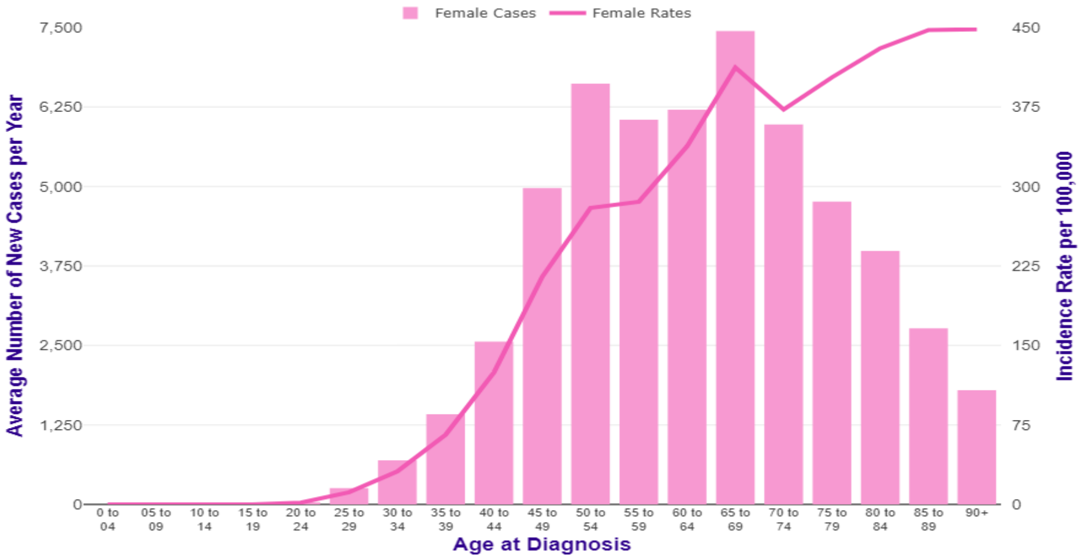
In the UK, in women, breast cancer incidence rates are increasing in all adult age groups. This could be due to some behavioural risk factors being more prevalent, including obesity (see the Office for Health Improvement Disparities (OHID) obesity profile) and physical inactivity (see the GOV.UK ethnicity facts and figures).

The greatest increase in incidence rates is in the 65 to 69 age group. This increase could be explained by more people living longer and the NHSBSP bringing forward breast cancer diagnoses in older age groups (people aged 70 years and over), in whom breast cancer risk is increasing mainly due to ageing.

In 2019, most women with cancer were in the 45 to 64 age group (N=85,582), followed by 65 to 74 (N=52,183), 75 to 84 (N=31,968), and 85 and over (N=15,406) (see the CancerData NHS England Cancer Prevalence Statistics, 2019). Breast cancer was least prevalent in women aged 15 to 24 (N=47) and 25 to 44 (N=13,731).

In the UK, around 340,000 older women (aged 65 and over) live with breast cancer. By 2040, this is projected to increase substantially (Breakthrough Breast Cancer, 2013).

Figure 2 Average number of new breast cancer cases per year and age-specific incidence rates per 100,000 women, 2016 to 2018 (Cancer Research UK 2022)



Ethnicity

Data for differences in cancer incidence by broad ethnic group in England, 2013 to 2017 shows that breast cancer incidence is lower in people from minority ethnic family backgrounds compared with those from a white ethnic family background.

Lower breast cancer rates in people from minority ethnic family backgrounds could be explained by the lower prevalence of breast cancer risk factors. For example, GOV.UK Ethnicity facts and figures shows that they are less likely to drink alcohol at a harmful level. There is also lower obesity prevalence in people from some ethnic minority family backgrounds, such as Indian and Chinese, compared with people from white family backgrounds (OHID, obesity profile).

However, it should be noted that even though obesity prevalence may be lower in some ethnic groups, there is evidence that people from non-white family backgrounds are at an increased risk of chronic health conditions at a lower BMI than people from white family backgrounds (Caleyachetty, et al., 2021).

The use of exogenous hormones such as the oral contraceptive pill and HRT increase breast cancer risk. There is evidence that people from South Asian and black ethnic family backgrounds are less likely to use hormone therapy for the menopause (Gathani, et al., 2014).

However, according to The King's Fund report 2021, some lifestyles of people in ethnic minority groups change over time and there is a higher prevalence of breast cancer risk factors such as alcohol consumption, obesity and increased use of menopausal hormone therapy and contraceptives as well as reduced parity and lower rates of breastfeeding. These factors could be contributing to a rising incidence of breast cancer in some ethnic groups whose populations are more associated with recent or ongoing immigration (Race Equality Foundation, Cancer and Black and minority ethnic communities, 2018).

While ethnic minority groups have a younger demographic profile, the evidence does not show an increased risk of breast cancer at younger ages in, for example, black Caribbean and black African groups (Jack, et al., 2012).

The median age for breast cancer diagnosis in people from black ethnic family backgrounds is 50 years, compared with 62 years for people from white ethnic family backgrounds (Race Equality Foundation, 2018). Similarly, in the Black Women Rising Survey of people from black ethnic family backgrounds with breast cancer most diagnosed were in the aged 35 to 59 group, with the least in the 60 and over group.

Also, an in-house analysis found that black women, as well as Indian, Pakistani and Bangladeshi women were younger on average at time of first admission for breast surgery (see Appendix 4: In-house analysis on comorbidities). Similarly, women from the most deprived groups were younger at time of admission for breast cancer surgery. This could be because people from minority ethnic family backgrounds are over-represented in deprived communities (GOV.UK, statistics on people living in deprived neighbourhoods, 2020).

All the above supports the finding that currently, women from some ethnic minority groups have an average younger age at diagnosis and are more likely to present by non-screening routes, such as emergency or 2-week wait routes.

Also, the Black Women Rising Survey of people from black ethnic family backgrounds found that nearly half reported that their healthcare professional did not think it was breast cancer at the initial presentation. This indicates the need for more awareness among healthcare professionals about the differences in presentation of breast cancer in different ethnic groups.

Sex

Breast cancer is rare in men, according to Cancer Research UK. There are about 350 men diagnosed each year in the UK and only about 1 in 100 (about 1%) of breast cancer cases in the UK are diagnosed in men. Also, most breast cancers are diagnosed in men aged between 60 and 70, and age is the most significant risk factor.

Even though men have a higher prevalence of some behavioural breast cancer risk factors, such as being overweight (OHID obesity profile) and obese, being a woman is the biggest risk factor for developing breast cancer.

Gender reassignment and sexual orientation

Trans women may receive hormone therapy which helps breast tissue development. Since cis women (aged 50 to 79) who receive HRT and those taking oral contraceptives are at an increased breast cancer risk, trans women who take hormone therapy may also have an increased breast cancer risk (Breast Cancer UK, 2023).

Also, trans men who undergo hormone treatment or a double mastectomy are at a decreased breast cancer risk when compared with cis women but are at higher risk than cis men (Breast Cancer UK resource for transgender people, 2022).

There is some evidence to suggest that, compared with heterosexual cis women, more lesbian women and bisexual people develop breast cancer (Prescription for change: lesbian and bisexual women's health check 2008). This observed higher breast cancer risk in lesbian women and bisexual people could be partially explained by higher prevalence of behavioural risk factors that increase cancer risk, for example, higher rates of alcohol consumption.

According to Cancer Research UK, there are other factors also contribute to their higher breast cancer risk, such as not having children and lower breastfeeding rates. However, lesbian women have a lower use of oral contraceptives, which may reduce their breast cancer risk (The International Longevity Centre, 2008).

Also, more people who identify as LGBTQ are classed as physically inactive, according to the British Medical Association briefing.

Inclusion health groups

In general, data was lacking for inclusion health groups. There is evidence that migrant populations are younger. Given that age is the main risk factor for breast cancer, it may explain lower rates of breast cancer incidence and differences in presentation in these communities (Gathani, et al., 2021).

Nuffield Trust analysis shows that breast cancer is prevalent in prison populations. For example, in 2019 to 2020 breast cancer surgery was one of the most common treatment specialties for female prisoners attending outpatient appointments. This could be because people in prison in general are often at a higher risk of conditions identified through screening and may also come from deprived communities where breast cancer behavioural risk factors are more prevalent.

Cancer risk factors, such as poor diet and increased alcohol consumption are also more prevalent among Gypsy and Traveller communities. Similarly, among Roma women, cancer is a frequent cause of death and risk factors include alcohol consumption, poor oral care and obesity (Condon, et al., 2021). This implies that breast cancer incidence is likely to be higher in these groups.

4.2 Inequalities in outcomes

The gains in breast cancer survival observed over the last few decades are largely attributed to early detection through population-based screening, early diagnosis with clear pathways for referral of patients with breast symptoms, and the development of and access to effective treatments.

Breast cancer outcomes are strongly associated with stage at diagnosis. For example, for stage 1, the 5-year survival is 90%. However, for stage 4, it is only 13%. Also, the prevalence of comorbidities is high in the breast cancer population at 67%, which may impact outcomes (Macmillan cancer support, 2014).

Deprivation

There is an association between breast cancer mortality and deprivation (Cancer Research UK Breast cancer mortality statistics). England-wide data for 2007 to 2011 shows that European age-standardised mortality rates are 6% higher for women living in the most deprived groups than in the least deprived. This means there would have been around 350 fewer breast cancer deaths annually if all women experienced the same mortality rates as the least-deprived groups.

There is also evidence that any stage breast cancer survival is lower in more deprived groups (Macmillan cancer support, 2014). This could be because of a higher prevalence of behavioural risk factors such as physical inactivity (Public Health England, 2021), obesity (OHID, obesity profile) and smoking (ONS, Smoking inequalities in England, 2016). There is also the higher likelihood of comorbidities, particularly in older people. The higher rate of comorbidities in people from more deprived groups is supported by the findings of the in-house analysis (see Appendix 4: In-house analysis on comorbidities).

The in-house analysis showed that despite being younger on average, polypharmacy was greater among women from the most deprived groups. Lipid modifying drugs, proton pump inhibitors, blood pressure lowering drugs, analgesics and antidepressants were the most common regular prescriptions. All were more commonly taken by women from the most deprived groups. Prescribed concomitant medications could potentially contribute to health inequalities, as they may increase the risk of breast cancer, trigger adverse effects or interact with breast cancer treatments.

Similarly, a recent study found reduced mortality risk for the highest income quintile compared with the lowest, adjusted for education and occupation (Ingleby et al., 2022). Another study (McKenzie et al., 2012) in the south west of England showed that the most deprived groups were much less likely to survive than the least-deprived groups, and a further study in the west midlands found that 5-year net survival was lower in the more deprived group (86.7%) than in the least-deprived group (90%) (Morris, et al., 2015).

The British Medical Association study in cancer in women shows that lower screening uptake in more deprived groups is likely to contribute to the difference in the mortality rate by deprivation, potentially indicating a later-stage diagnosis. For example, it was suggested that there is a 20% reduction in breast cancer mortality in people participating in screening (Marmot, et al., 2013).

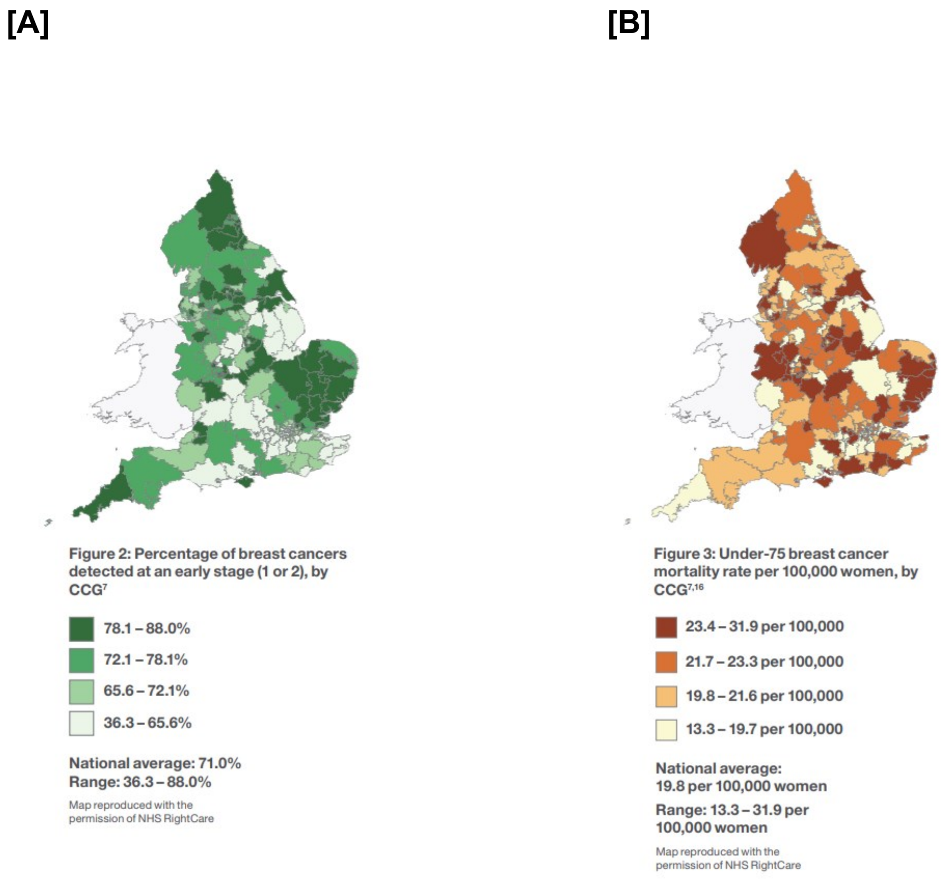
The deprivation survival gap also applied to breast cancers detected through the screening process, but to a lesser extent (McKenzie, et al., 2012). This suggests that improved access to screening may help diagnose breast cancer earlier, improve the likelihood of successful treatment and reduce the survival gap in deprived groups.

The above provides evidence for a relationship between health and deprivation, with more deprived groups experiencing worse health and a shorter life expectancy than the least-deprived groups. In other words, women from more deprived groups are less likely to get breast cancer but are more likely to die from it when they do.

Geography

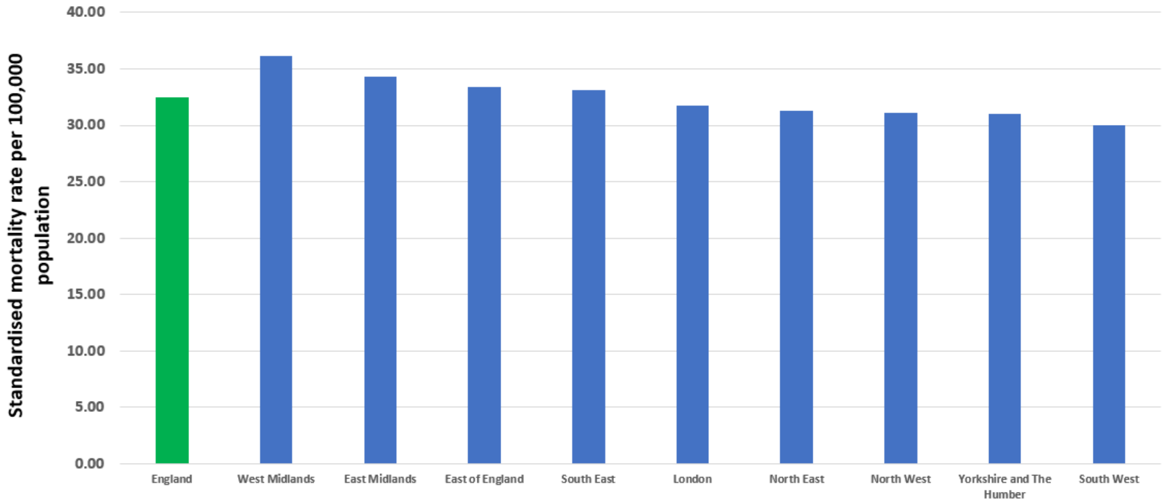
There is geographical variation in the proportion of breast cancers that are diagnosed early in the disease progress (Figure 3 A). In 2013, the percentage of early breast cancers diagnosed was 88% and 62% for NHS Rushcliffe and NHS Gloucestershire Clinical Commissioning Groups, respectively. Such differences have implications for outcomes. For example, the mortality rate among women aged under 75 in the worst performing area, in terms of breast cancers detected at an early stage, was more than double that of the best performing area (Figure 3 B).

Figure 3: (A) Percentage of breast cancers detected at an early stage (1 or 2) (in 2013), and (B) under-75 breast cancer mortality rate per 100,000 women (in 2011 to 2013) by Clinical Commissioning Group (Breast Cancer Now 2018)



Most recent NHS mortality data (Figure 4) and NHS cancer survival data show similar geographical variations. For example, the standardised mortality rate in 2017 to 2019 was higher in the midlands than in the south west.

Figure 4 Female breast cancer mortality, directly standardised rates per 100,000 population, all ages, 3-year average (2017 to 2019) stratified by region (NHS Digital 2021)

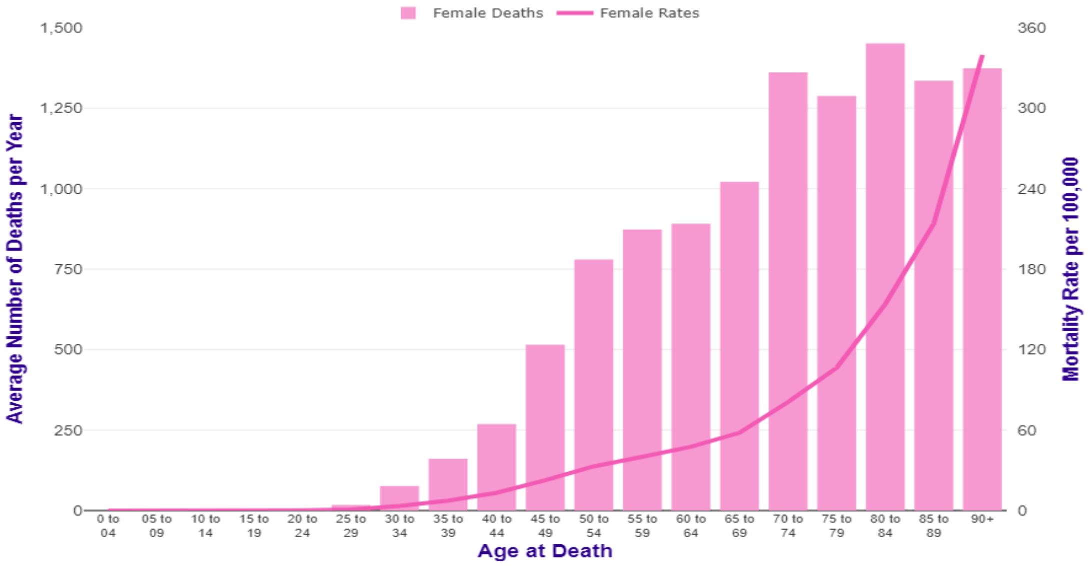


Protected characteristics

Age

Breast cancer mortality is strongly related to age, and the highest rates are in older age groups (Figure 5). Age-specific mortality rates rise steadily from around 30 to 34 years and more steeply from around 70 to 74 years. The highest rates are in the 90 and over age group.

Figure 5 Average number of deaths per year and age-specific mortality rates per 100,000 female population, UK, 2017 to 2019 (Cancer Research UK 2022)



The International Longevity Centre UK (ILCUK) ageism in breast cancer 2019 report states that breast cancer mortality rates have decreased over time in all age groups except for the oldest women (aged 80 and over), whose rate has increased by 6% since the 1970s.

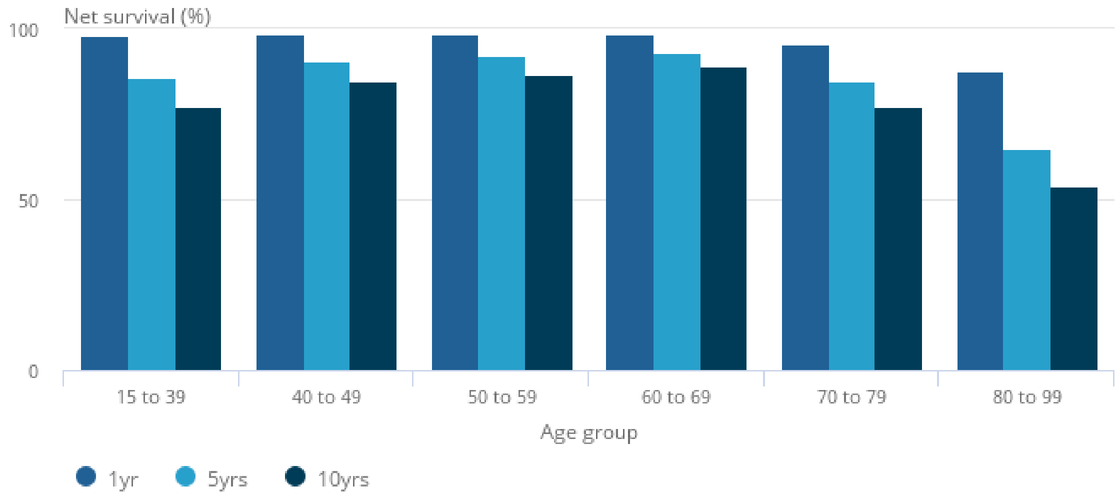
Late diagnosis is an issue in older women, according to the All-Party Parliamentary Group (APPG) on Breast Cancer report. Older women take more time to identify breast cancer signs or symptoms, seek advice, receive diagnosis and be referred to specialist services (Breakthrough Breast Cancer, 2013). This contributes to a later diagnosis and start of treatment.

Also, older women have a lower breast screening uptake and there is evidence that as age increases, the use of active treatments involving a combination of chemotherapy, tumour resection and radiotherapy declines (CancerData NHS, Treatment breakdown 2013-2019). Such differences in treatment partly explain poorer outcomes in older women. However, it must be noted that for some older people chemotherapy is not an option because of the significant risks, such as toxicity and serious side effects, and also poor toleration of the treatment.

Breast cancer survival is highest for women diagnosed aged 60 to 69 (Figure 6). This age group is eligible for a NHSBSP. Generally, breast cancers diagnosed by screening tend to be detected at an earlier stage when successful treatment is more likely, leading to better outcomes, including survival.

Survival is also higher for those aged 40 to 69 than for their younger peers (those aged 15 to 39). Breast cancer in young people is associated with aggressive characteristics. It spreads quicker, is more likely to be diagnosed at advanced stages, and is consequently harder to treat. This could explain poorer survival in the 15 to 39- age group.

Figure 6 Age-standardised 1-year, 5-year and 10-year predicted net survival (%) for women (aged 15 to 99) who would be diagnosed in 2015 with breast cancer, England ([Office for National Statistics 2016])



There is also an interaction between age and deprivation. The gap in 1-year survival between the most- and least-deprived communities widens with increasing age at breast cancer diagnosis. The 1-year survival deprivation gap is widest for women between the ages of 75 to 99 (the difference between the most- and least-deprived women being –4.8%) (Nur, et al., 2015).

Comorbidities also increase with age. For example, the percentage of women who are free of post-diagnosis inpatient morbidities is 41% in the 18 to 64 age group and 16% in those aged 75 and over (Macmillan cancer support, 2014). These increased comorbidities may in part explain the deprivation gap in survival in older aged groups. Older people who are more deprived also tend to have more comorbidities, which results in worse breast cancer prognosis including poorer survival outcomes.

The latest NHS data from the Cancer Quality of Life Survey suggests that quality of life varies by age at breast cancer diagnosis. For example, the lowest EQ-5D and EORTC QLQ-C30 scores are in those aged 50 or under and 80 or over, and the highest ratings are in those aged 60 to 79.

The ILCUK 2019 report shows lower quality of life scores in older people could be explained by higher rate of comorbidities. Also, older people may be more affected by cancer symptoms or treatment side effects.

Anyone registered with a GP as a female is eligible for NHS breast screening every 3 years between the ages of 50 and 71. According to ILCUK 2019 report there is little evidence the value of screening for people aged 71 and over, but this could be the result of screening trials excluding older people. Hence, there is little evidence on screening outcomes for older age groups.

There is an AgeX research trial which includes a broader age range as part of the NHSBSP and should provide evidence on screening outcomes for older age groups. Also, there is modelling evidence showing that extending the UK NHSBSP to older age groups could be potentially cost-effective (Rafia et al., 2016).

Disability

According to the LeDeR 2021 report the average age at which females with a learning disability died from breast cancer between 2018 and 2021 was 62.8 years. In comparison, the average age of death for females in the general population with breast cancer was approximately 71.3 years between 2017 and 2019 (Cancer Research UK 2022). This indicates important disparities in outcomes and is consistent with other findings in this briefing showing that people with learning disabilities face barriers in accessing healthcare services, including breast cancer screening, which may lead to delays in diagnosis. Additionally, people with learning disabilities may have lower health literacy and are more likely to also experience socioeconomic disadvantages, which could further impact their overall health and access to healthcare services.

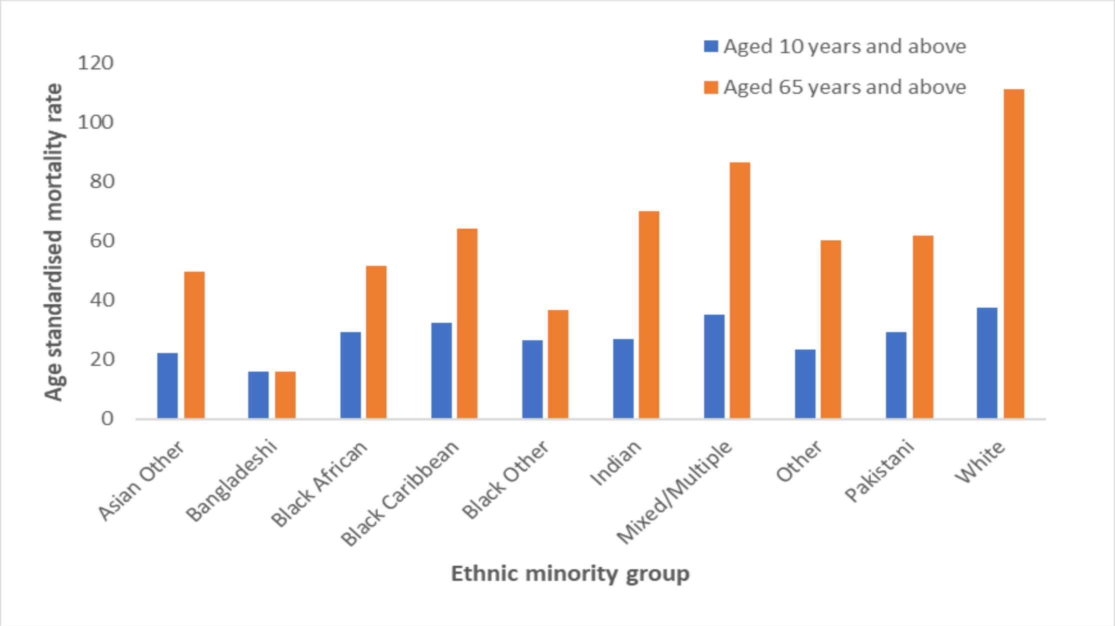
It is also worth noting that people with learning disabilities face broader health inequalities. For example, females with a learning disability have a life expectancy of 67 years, which is 17 years lower than that of females in the general population, based on 2018-19 data from the NHS Digital on Health and Care of People with Learning Disabilities.

Ethnicity

In England and Wales, 2017 to 2019 data from Cancer Research UK shows that breast cancer mortality rates are lower in people from minority ethnic family backgrounds compared with those from a white family background (Figure 7Figure 7). However, this data should be interpreted with caution since ethnicity is not recorded on death certificates and these data use experimental statistics to assign ethnicity based on the 2011 census.

Also, GOV.UK ethnicity facts and figures shows that people from minority ethnic family backgrounds are over-represented in deprived communities, and these communities tend to have worse outcomes.

Figure 7 Age-standardised mortality rates per 100,000 population for malignant neoplasms of breast: by age and ethnic group, deaths registered in England and Wales between 2017 to 2019 (ONS 2021)



Young people from black ethnic family backgrounds also are more likely to present with later-stage breast cancers. This is possibly the result of people from these groups having an overall younger age demographic and not being eligible for the NHSBSP. Also, evidence on the health of people from ethnic minority groups in

England from The King’s Fund shows that even if eligible people from these groups generally have lower screening uptake.

Breast cancer survival is directly related to the tumour type, breast cancer stage and access to appropriate and effective treatments. A later-stage presentation means that people need intensive combination treatment comprising tumour resection, radiotherapy, and chemotherapy (Cancer Data NHS). These factors may impact other outcomes, such as quality of life.

Given the delays in diagnosis and more late-stage breast cancers it is unclear why breast cancer mortality rates are lower in people from ethnic minority family backgrounds compared with people from a white family background.

Sex

In women in the UK, breast cancer statistics from Cancer Research UK for 2017 to 2019 shows that breast cancer is the 2nd most common cause of cancer death, with around 11,400 deaths yearly. In men, breast cancer is not even among the 20 most common causes of cancer death, with approximately 85 deaths yearly.

The Cancer Research UK mortality rate data shows breast cancer mortality rates are significantly higher in women than men in many age groups. The gap is widest in the 35 to 39 age group, when the age-specific mortality rate is 475 times higher in women than males.

Inclusion health groups

The NHS does not routinely collect data for many inclusion health groups. The absence of data for these groups makes it unclear whether breast cancer services fully meet their needs. There is some evidence that cancer is one of the leading causes of death in people in prisons (Nuffield Trust, 2021) and people experiencing homelessness (Aldridge et al., 2019). Many people in these groups have complex needs that may impact breast cancer management and outcomes.

Overall, data is absent on people’s needs in custodial environments and it is also unclear whether their needs are fully met in these settings (House of Commons Justice Committee, 2022).

The charity organisation Pathway published Homeless and Inclusion Health Standards for Commissioners and Service Providers, which show that chronic homelessness is a marker for physical and mental ill health, drug or alcohol misuse, other complex needs and premature death. Such complex needs may impact cancer management and outcomes.

The NHS does not routinely collect data for Gypsy, Roma and Traveller populations, which is a barrier to knowledge about their health status and how their needs are met (Condon, 2021).

5 Access to care

5.1 Inequalities in access to screening

Breast cancer screening is for anyone who has breasts. This includes: cis women, trans women and people assigned female at birth (non-binary people and trans men) who have not had an operation to remove the breasts (bilateral mastectomy), and may also include people assigned male at birth and people who have taken or are taking feminising hormones (Cancer Research UK information on breast cancer screening for those who are trans and non-binary).

In England, anyone registered with a GP as a female is invited for NHSBSP every 3 years between the ages of 50 and 71 (NHS breast cancer screening advice).

Screening data make a distinction between coverage and uptake. Screening coverage is defined as the percentage of women in a population eligible for screening at a specific point in time who have had a test result recorded in the last 3 years. Screening uptake is defined as the percentage of eligible women invited for screening in the year who were screened adequately within 6 months of invitation (NHS Digital Breast Screening Programme England Provisional Statistics 2018-19).

The UK National Screening Committee (UK NSC) makes screening recommendations and advice for breast cancer. However, even though screening decisions fall outside NICE's remit, data on inequalities in access to screening could help form recommendations around case identification and joint working with system partners, such as local screening teams. This could improve uptake in population groups where screening uptake is particularly low.

Deprivation

There are inequalities by deprivation in the uptake of NHSBSP (Macmillan cancer support, 2019). A study in London assessed the relationship between screening uptake and deprivation for women aged 50 to 52 invited to their first routine screening appointment between 2006 and 2009 (Jack, et al., 2016). Overall, 61% of all women attended within 6 months of their invitation. However, this percentage decreased to 56% in the most deprived quintile. The figure for the 2 most affluent socioeconomic quintiles was 66% and 67%.

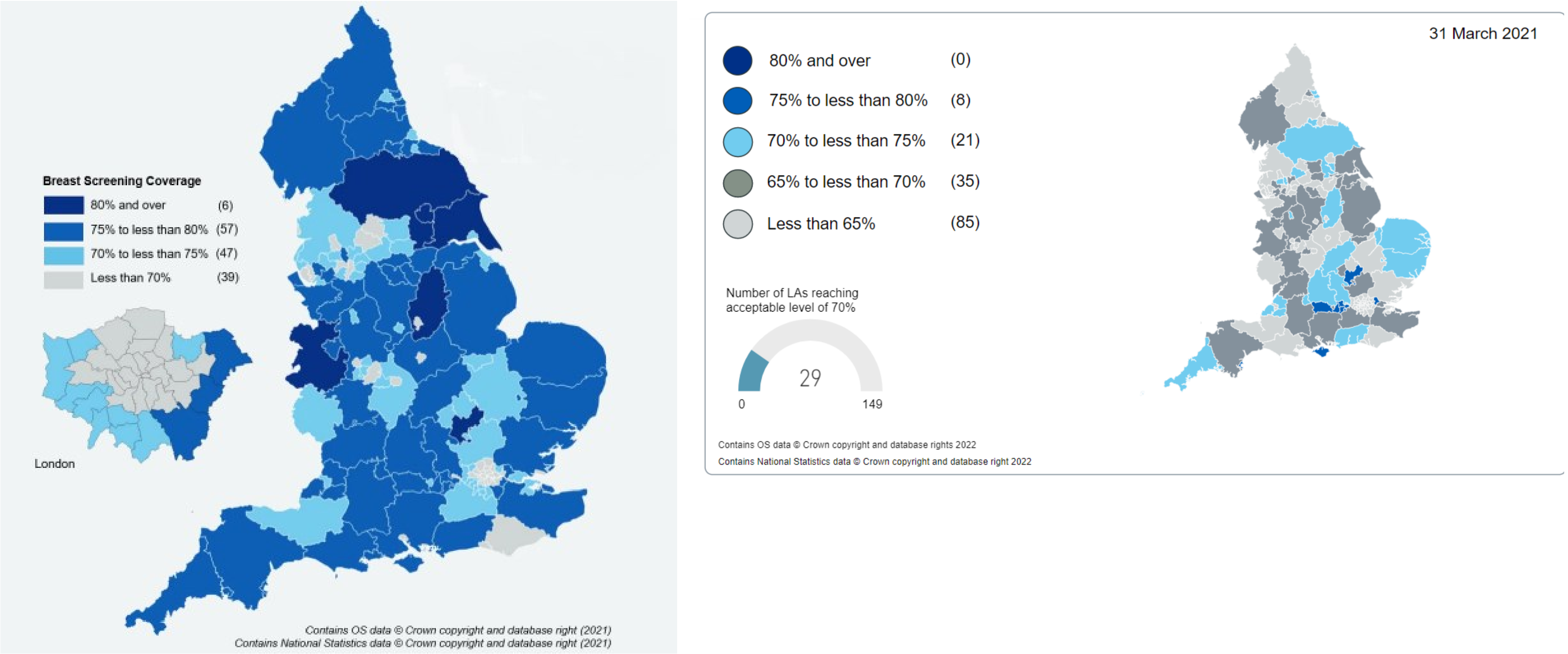
Similarly, another study in the north west using the index of multiple deprivation showed that the more deprived an area, the lower the breast screening uptake was (Bhola, et al., 2015).

Geography

There is variation in breast cancer screening coverage across England. In 2019 to 2020, the coverage was 74.2% (ages 53 to less than 71) and ranged from 54.1% in Camden (London) to 81.2% in Shropshire (west midlands) (Figure 8).

There was a reduction in breast cancer screening coverage among eligible women in 2020 to 2021 because of the COVID-19 pandemic, as this caused screening to be paused. In 2020 to 2021 the coverage was 64.2%, and similar geographical variations were observed (Figure 8B). For example, screening coverage ranged from 41.8% in Westminster (London) to 78.2% in west Berkshire.

Figure 8 Breast cancer screening coverage among eligible women aged 53 to less than 71 (%) for [A] 2019 to 2020 and [B] 2020 to 2021 by Local Authority (NHS Digital 2022)



[A]

[B]

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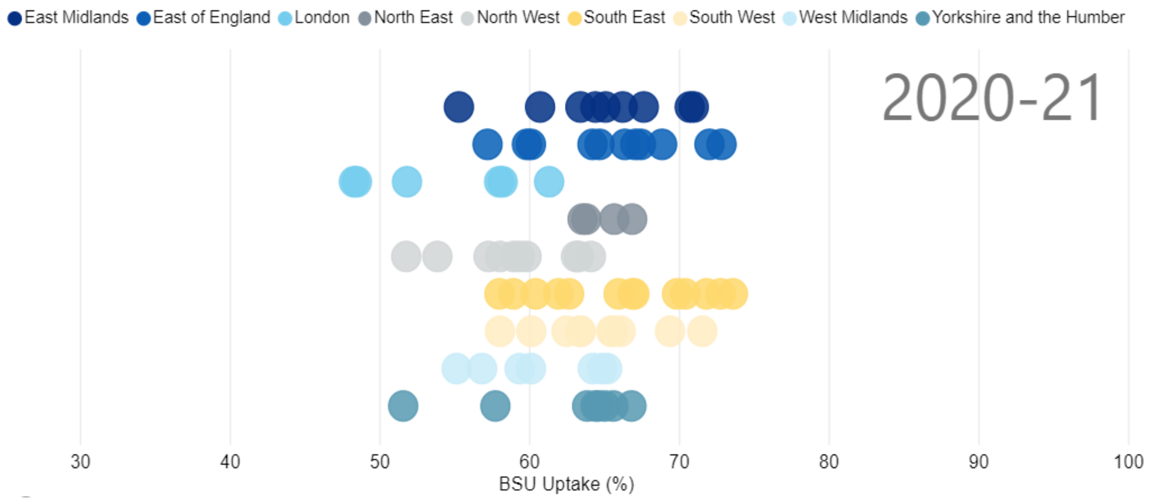
In the 2020 to 2021 data for the NHS Digital breast cancer screening uptake, among invited women (ages 53 to less than 71) for first and all routine invitations similar trends are seen (Figure 9). For example, the uptake ranged from 48.3% in London (central and east London) to 73.6% in the south east (Isle of Wight).

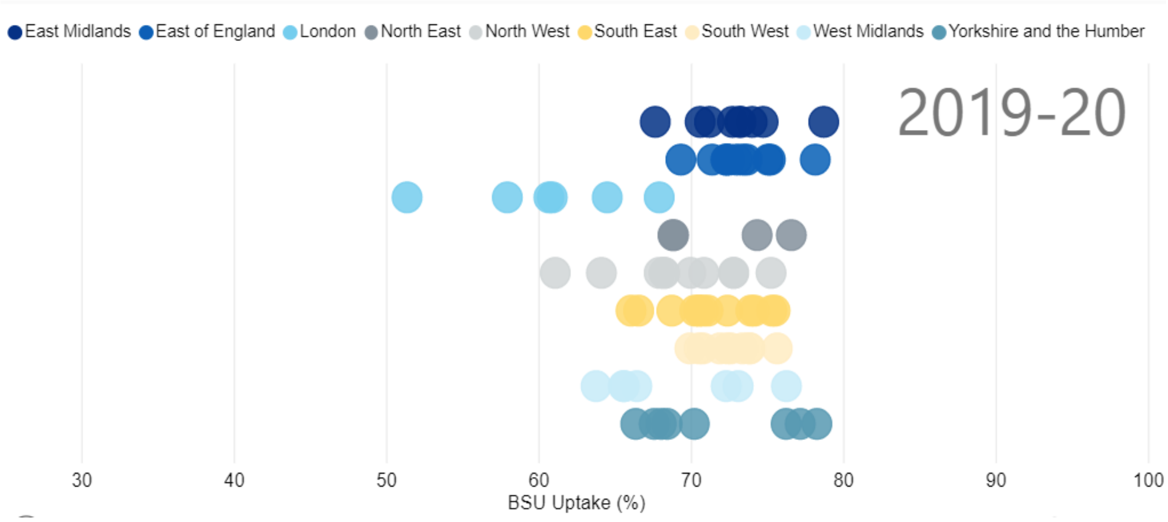
However, there was also variation within each region. For example, breast screening uptake in London ranged from 48.3% in central and east London to 61.3% in outer north east London. Similarly, in the south east the uptake differed. For example, uptake was 71.6% in west Devon and east Cornwall, but only 63.5% in Somerset.

Overall, screening uptake data is in line with breast cancer incidence data, showing that screening uptake is greater in areas with higher breast cancer diagnoses. It is also lower in ethnically diverse areas with greater deprivation levels, such as London (particularly east London), Birmingham, and Coventry, and is in line with the literature reporting lower uptake rates in these communities.

In 2019 to 2020, before the COVID pandemic, uptake was greater across the country, with less variation within regions (**Error! Not a valid bookmark self-reference.**).

Figure 9 Breast cancer screening uptake among invited women between the ages of 50 and 71, percentage first and all routine invitations for 2020 to 2021 and 2019 to 2020 (each bubble represents different Breast Screening Unit) (NHS Digital 2022)





In 2009, the NHSBSP began to include a broader age range as part of the AgeX research trial, 47 to 49 years at the lower end and 71 to 73 years at the upper end. By 2020, 65 of the 78 Breast Screening Units implemented the trial, according to the NHS Breast Screening Programme, indicating that there is some geographical variation.

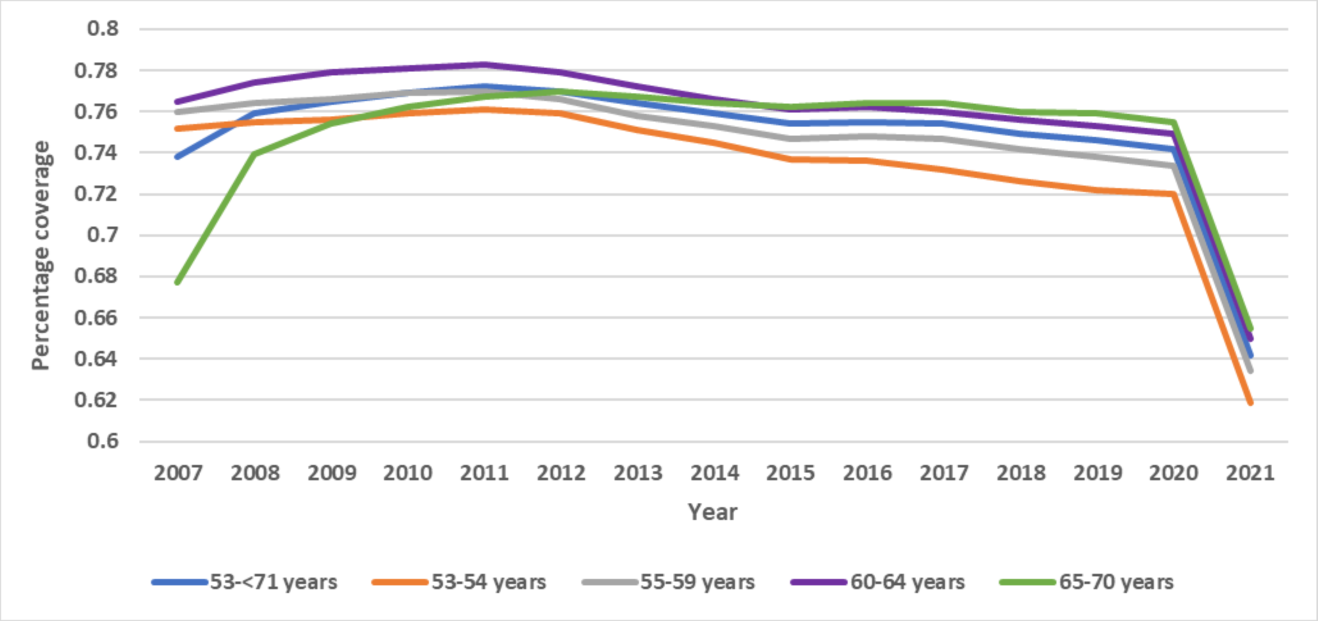
Also, people not participating in the research trial must make their appointments, representing an additional obstacle (Breakthrough Breast Cancer, 2013).

Protected characteristics

Age

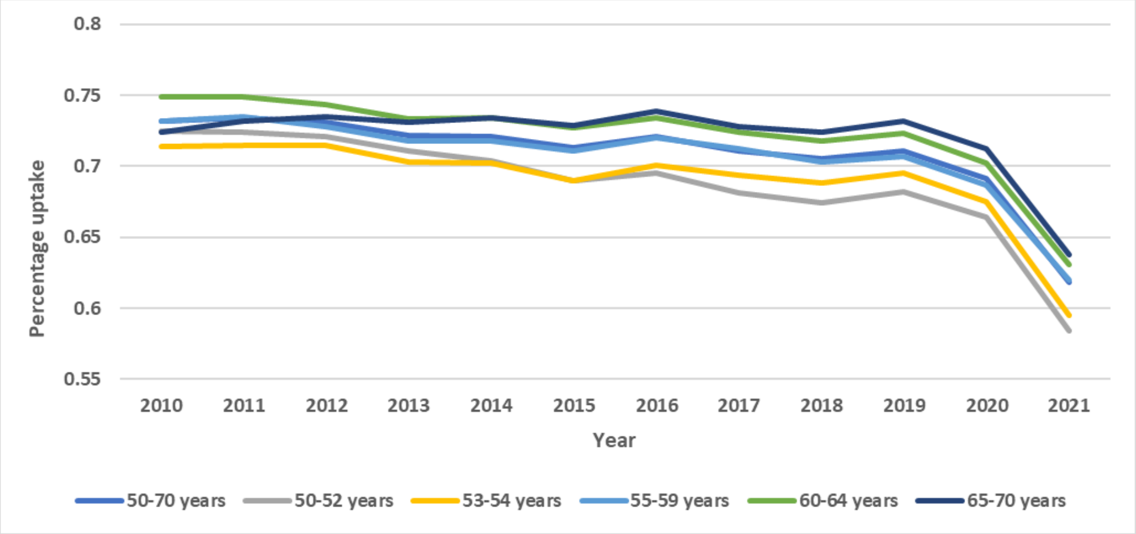
Breast cancer screening coverage increases with age. In 2020 to 2021, for those aged 53 to 54, it was 61.9%, while for those aged 65 to 70, it was 65.5% (Figure 10). Data for 2019 to 2020 shows similar trends.

Figure 10 Breast screening coverage among eligible women, England (%) by age and year (screened within the last 3 years) (NHS Digital 2022)



Similarly, uptake of first and all routine invitations increases with age (Figure 11). For example, in 2020 to 2021, the uptake was lowest in age groups 50 to 52 and highest in the 65 to 70 age group.

Figure 11 Breast screening uptake (first and all routine invitations for screening) among invited women by age and year, England (%) (NHS Digital 2022)



Between 2019 and 2020, according to the Breast Screening Programme, 17,771 women had cancers detected by the screening programme, a rate of 8.4 cases per 1,000 women screened.

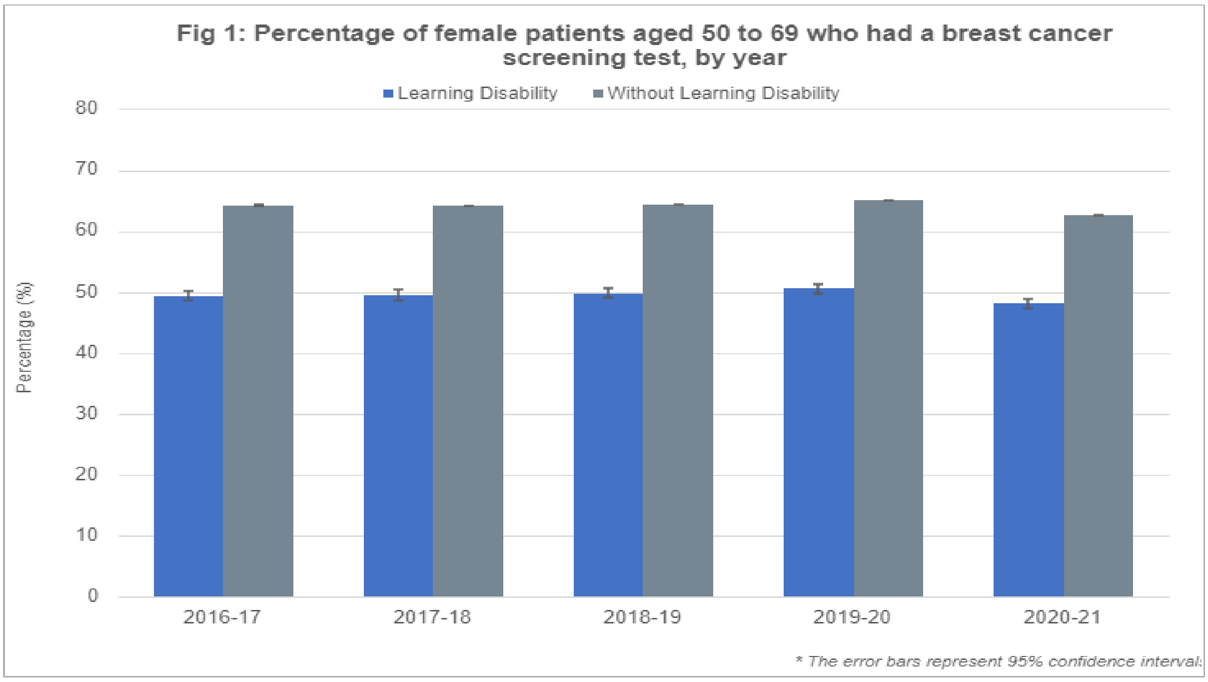
The detection rate (the proportion of affected individuals with a positive test result) was highest for women aged 75 and over at 18.1 per 1,000 women screened compared with 8.0 per 1,000 in the core programme (people between the ages of 50 and 71). This is due an increasing breast cancer incidence in older age groups. These women either participated in AgeX extension trial, were self or GP referred for breast cancer screening, or had a second invitation to attend assessment after an abnormal initial mammogram.

Higher detection in older age groups should be balanced against risks and benefits, for example, the potential for over-diagnosis, false positives, and improved outcomes. However, the UK modelling evidence shows that extending the UK NHSBSP to older age groups could be cost-effective (Rafia et al., 2016).

Disability

Data for 2020 to 2021 indicates that a smaller proportion of women with a learning disability had a breast cancer screening test between 2016 to 2017 to 2020 to 2021 compared with women without a learning disability (Figure 12). The difference between the 2 cohorts has remained steady at 14.6%.

Figure 12: Percentage of women with and without a learning disability aged 50 to 69 who had a breast cancer screening test by year (NHS Digital 2021)



Evidence also shows that breast cancer screening uptake may be even lower for people with impaired vision, any disability which impacts self-care, or those with 3 or more disabilities (Floud, et al., 2017).

The presence of mental health problems may impact screening uptake too. For example, people with a schizophrenia diagnosis and depot injectable antipsychotic prescriptions have reduced breast screening uptake (Woodhead, et al., 2016).

The barriers to attending breast cancer screening for women with a learning disability include not receiving an invitation, not being able to engage with care and accept the invitation because of their disability, or lack of access to information about screening in an appropriate format to enable informed decisions about attendance. Further barriers include screening unit staff not being trained to adequately obtain consent, and lack of appropriate support by screening unit staff (Breast Cancer Care, 2011; Floud et al., 2017).

Ethnicity

Breast cancer screening uptake varies by family background. For example, women with Asian family backgrounds, particularly Pakistani and Bangladeshi groups, have lower breast cancer screening uptake (Bhola, Jain and Foden, 2015).

In London, more people from a white British family background attend their first (67%) and routine recall (78%) breast screening invitations than people from Indian (61% and 74%, respectively), Bangladeshi (43% and 61%, respectively), black Caribbean (63% and 74%, respectively) and black African (49% and 64%, respectively) family backgrounds (Jack, et al., 2014).

Similarly, data from a systematic review of people's experiences of breast screening (Pulman and Newell, 2021) shows that breast cancer screening uptake is lower in some Asian groups, particularly Muslim women, compared with non-Asian groups.

Generally, these differences are not solely explained by socioeconomic deprivation or place of residence because geographical variations in screening uptake within the same ethnic groups are reported (Jack et al., 2014). For example, differences in attendance are found in the south east and north London, where people from Bangladeshi family background have low uptake levels compared with other ethnic groups. However, the uptake is similar to other ethnic groups in central and east London, where a significant population of people with a Bangladeshi family background reside.

Nevertheless, many ethnic communities live in some of the most deprived areas (GOV.UK, 2020) and there are multiple barriers to screening, including language and cultural barriers, accessibility to information in their preferred language, and misunderstandings around the terminology and purpose of screening (National Institute for Health and Care Research Breast Cancer Screening [NIHR BCS], 2020).

Also, there are differences in the age distribution of women in the English population in the main ethnic groups (Gathani et al., 2021). Generally, many ethnic minority populations are younger, which means that many women from minority ethnic family backgrounds are excluded from early diagnosis through the NHSBSP.

Gender reassignment and sexual orientation

Breast cancer screening uptake in lesbian women is similar to that women in general. However, there is some evidence that fewer older lesbian women seek breast cancer screening (LGBT Foundation, 2020).

Screening uptake is lower in trans people compared with cis women (Pulman and Newell, 2021). Pink News, an LGBTQ+ online newspaper in 2022, said that trans people face barriers in accessing screening services and so there is a need for trans-inclusive breast cancer screening services. Barriers that prevent trans and non-binary people from attending breast cancer screening include a lack of information about eligibility, lack of invitation and gender dysphoria (Cancer Research UK, 2021). Negative attitudes towards trans people in screening services also contribute to lower screening uptake (Pulman and Newell, 2021).

Anybody registered with their GP as a male must request breast cancer screening, meaning trans men and non-binary people assigned female at birth and registered as male with their GP will not be automatically invited for breast screening (Pink News, 2022). As such, they must take on an administrative burden others do not have to face. Trans and non-binary people registered as women with their GP are automatically called for breast cancer screening (Cancer Research UK, 2019).

Inclusion health groups

There is no routine way for breast screening services to identify eligible people from many inclusion health groups, such as Gypsy, Roma and Traveller communities (UK Parliament, 2019) and people experiencing homelessness (GOV.UK, 2022).

These communities face barriers to registering with a GP practice and people not registered are not routinely invited for breast cancer screening. These groups may also not have regular access to correspondence and may not be near their local breast screening service when they are invited for breast cancer screening.

For Gypsy, Roma and Traveller communities barriers to general cancer screening services include language difficulties, low literacy levels, poor knowledge of the health system and distrust in authority (Condon et al., 2021). For some people, screening also contravenes their cultural values of modesty and privacy.

Generally, migrants are deterred from seeking timely care because of NHS charges and fear of medical information being shared with immigration enforcement (Asif, et al., 2022). As a result, they may not present to healthcare services when finding a breast lump or until a more advanced stage of the disease is reached (British Medical Association, 2019). There is evidence that among some groups, there is confusion about screening timing and age cut-offs because more frequent screening is available in their countries of origin (Pulman and Newell, 2021).

Screening and health promotion programmes tend to have a particularly low uptake among refugees (Pulman and Newell, 2021). In one study, only 5% of refugees aged over 50 had attended breast screening.

A Public Health England guidance from 2021 on NHS population screening shows that in prison populations, in most cases, breast cancer screening is undertaken at the prison itself by holding a screening clinic for all eligible individuals in a mobile screening unit at an agreed frequency. The Public Health England guidance suggests that this should be a minimum of once every 3 years. However, this would only capture eligible people who reside in the secure setting at the time of the mobile unit's scheduled visit, which may result in the exclusion of some people from breast cancer screening.

5.2 Inequalities in access to diagnostic services

Access to diagnostic services influences the stage at which cancer is diagnosed and has consequences on the success of treatment and outcomes.

Deprivation

Fewer people from the most deprived quintile (IMD 1) are referred as urgent cases, and fewer of these urgent referrals are confirmed as breast cancers. For example, in data on cancer waiting times between 2020 and 2021 shows that in the most deprived quintile (IMD 1) the rate was 870 per 100,000 of the population compared with 976 in the least-deprived quintile (IMD 5) (Cancer Data, 2022). Lower confirmation rate in urgent referrals could potentially indicate missed opportunities for early diagnosis and intervention.

In 2019 there were more stage 1 diagnoses in the least-deprived quintile (IMD 5), 47.8% compared with 42.3% in the most deprived quintile (IMD 1). However, staging data in England shows the most deprived quintile (IMD 1) had more stage 4 diagnoses, 5.9%, compared with 4.4% in the least-deprived quintile (IMD 5).

In 2014 to 2015, secondary care diagnostic interval data for patients in England shows there were some differences in the diagnostic interval depending on the route to diagnosis. People presenting by the outpatient route had a median diagnostic interval of 21 days. However, it was 10 days for the screening route and 8 days for the emergency presentation route. It is unclear whether these differences are clinically meaningful.

Geography

In 2020 to 2021, there was variation in urgent suspected referrals (Cancer Data, 2022). The rate was the lowest in the midlands (814 per 100,000 of the population), whereas in all the other regions it was above 900. London had the highest rate of urgent suspected referrals at 948 per 100,000 of the population.

Notably, even though London had one of the highest urgent referral rates, only 4% of these referrals resulted in breast cancer diagnoses (compared with 6% for all other regions). It seems that the rate is generally higher in areas with greater levels of deprivation, such as London and the north east.

Protected characteristics

Age

There are differences by age in how women with breast cancer present in clinical settings. Women who are past the routine screening age cut-offs are more likely to be diagnosed by GP referral (2-week wait) and those with a metastatic disease are more likely to present by emergency presentation and by referral by other specialists (National Audit of Breast Cancer in Older Patients [NABCOP] annual report, 2022).

However, the prognosis for women diagnosed through emergency presentation and 2-week wait is much poorer than for those detected by screening. This may partly explain a late-stage diagnosis being more common in women aged 70 and over (ILCUK, 2019).

It was estimated in the Centre for Ageing Better 2017 report that for England, within 5 years of breast cancer diagnosis, over 280 early deaths could be prevented if an earlier cancer stage at diagnosis was achieved in women aged 75 and over.

Disability

Diagnosis of breast cancer can be delayed in women with a learning disability, and evidence shows cancers are often only found when at a more advanced stage than in the general population. This could be because of difficulties in recognising and communicating symptoms, or because changes in behaviour are attributed to the learning disability rather than being seen as a possible sign of physical ill health (Breast Cancer Care, 2011).

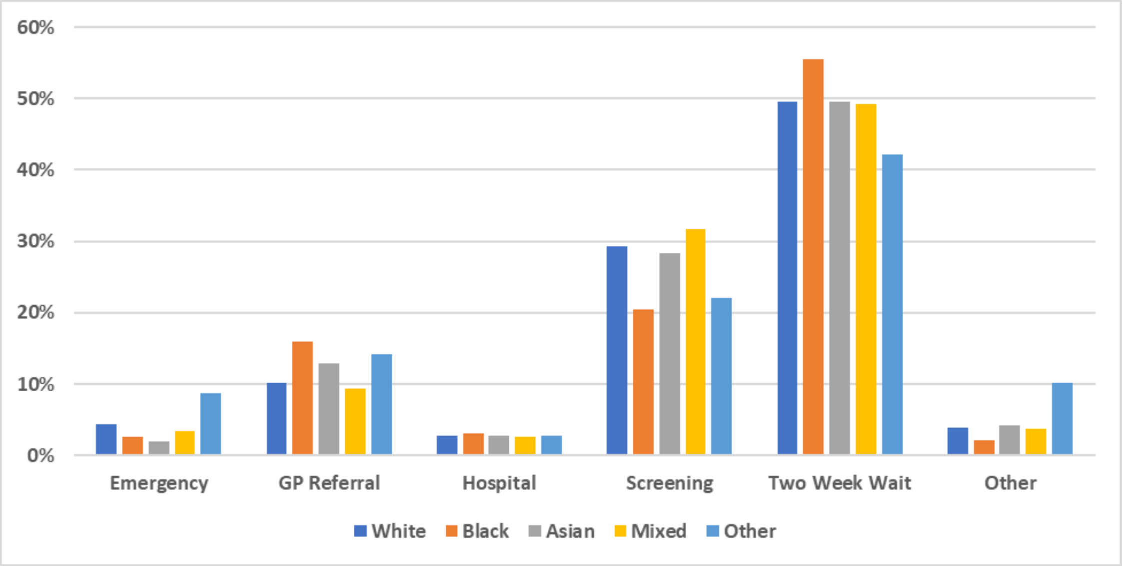
Ethnicity

There is variation by family background in the route to diagnosis (Figure 13) (Martins, et al., 2022). For example, the emergency route is more common in people from white and mixed family backgrounds and GP referral, and 2-week wait routes are most common in people from black family backgrounds. The screening route is lowest in people from a black family background and highest in people from mixed and white ethnic family backgrounds.

The emergency route to diagnosis, which might be a marker of poorer access to diagnostic services, is actually more common in people from white family backgrounds than in people from Asian and black ethnic family backgrounds.

These findings are consistent with reported greater use of primary care among people from Asian and black family backgrounds, and may account for the differences in emergency diagnoses.

Figure 13 Ethnic differences in routes to breast cancer diagnosis, 2006 to 2016, N=57,056 (Martins et al., 2022)



Public Health England 2018 guidance on health inequalities shows that there is variation by family background in late-stage diagnosis (stage 3 or 4). For example, people from black ethnic groups are more likely to be diagnosed late than people from white family backgrounds. This aligns with the routes to diagnosis data and potentially explains worse outcomes in people from ethnic minority family backgrounds. People identified by routes other than screening are more likely to have advanced-stage breast cancers.

There are differences by family background in mean age at breast cancer diagnosis. For example, women from Indian, black Caribbean and Pakistani family backgrounds are younger at diagnosis, by a mean of 3 to 6 years, than people from a white family background. Similarly, people from a black African family background are on average a decade younger at diagnosis than those from a white family background (Gathani et al., 2021).

Also, women from ethnic minority groups are generally also in more deprived populations (GOV.UK, 2020). This affects their access to healthcare services, such as diagnostic services. For example, there is some evidence suggesting that younger women have more aggressive tumours and are also more likely to experience delay by healthcare providers, leading to worse outcomes (Breast Cancer Care, 2011).

5.3 Inequalities in access to treatment services

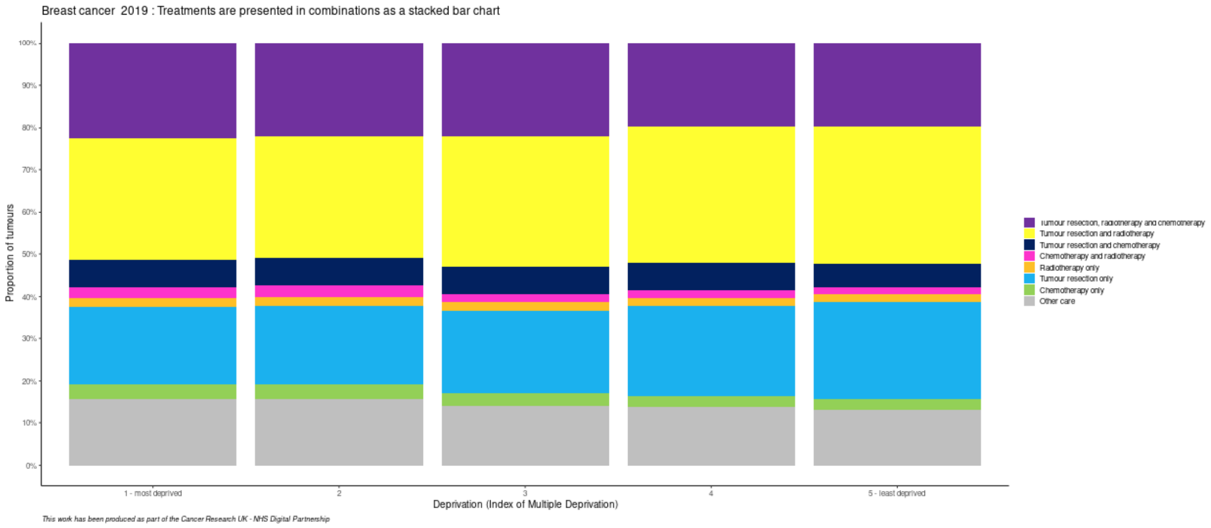
NICE guidance sets the standard of care delivered by the NHS that everyone should expect to receive. The NICE guideline on early and locally advanced breast cancer: diagnosis and management states, ‘Treat patients with early invasive breast cancer, irrespective of age, with surgery and appropriate systemic therapy, rather than endocrine therapy alone, unless significant comorbidity precludes surgery’.

Surgery is the mainstay of breast cancer treatment. Management is influenced by several factors, including stage at presentation, which in turn is influenced by screening uptake.

Deprivation

There are slightly more tumours managed using the combination of tumour resection, radiotherapy and chemotherapy in more deprived groups (Figure 14). But, overall, there was little variation by deprivation in breast cancer treatments.

Figure 14 Breast cancer treatments in 2019 by deprivation (NHS Digital, 2022)



Geography

There is some geographical variation in treatments. For example, the use of an intensive combination treatment comprising tumour resection, radiotherapy and chemotherapy was 26% in London compared with, for example, in Humber, Coast and Vale where use was 21%. In the east of England – North, Peninsula and Humber, and Coast and Vale Cancer Alliances, more tumours were managed using the combination of resection and radiotherapy only (36%) than compared with London (28%) (NHS Digital, 2022).

London is ethnically diverse, has lower screening uptake and more urgent referrals. This results in a higher use of combination treatment comprising chemotherapy, which could indicate that more people are presenting with invasive breast cancers.

There are regional variations in other treatments too. For example, the NICE guideline on early and locally advanced breast cancer recommends bisphosphonates as adjuvant therapy to postmenopausal women. However, the All-Party Parliamentary Group (2018) reported that only around 50% of hospitals were offering bisphosphonates. This varied by region, for example, two-thirds of Clinical Commissioning Groups in the Yorkshire and Humber region were offering bisphosphonates, whereas no Clinical Commissioning Groups were offering bisphosphonates in the north east.

The All-Party Parliamentary Group (2018) also identified geographical variations in spending on primary care prescribing for breast cancer and availability of hormone therapies to prevent cancer recurrence. There was also variation in whether people were informed about the breast cancer treatment implications on fertility, availability of reconstructive surgery and access to support services such as clinical nurse specialists and palliative care.

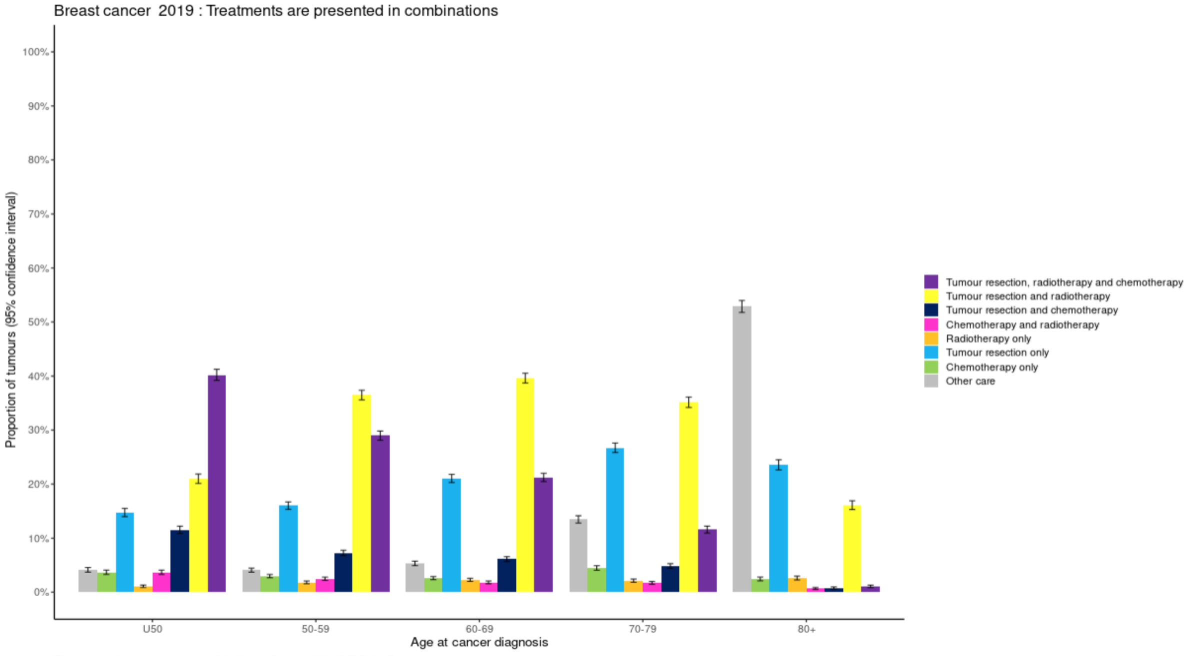
Protected characteristics

Age

There is variation in treatment by age, some of which may be explained by tumour biology. The latest NHS data shows that in those aged under 50 the most common treatment is a combination of tumour resection, radiotherapy and chemotherapy (Figure 15). But as age increases, the use of treatments involving a combination of chemotherapy, tumour resection and radiotherapy declines.

The most common treatment in those aged 80 and over is ‘other care’ which may include hormonal therapy or symptom management. Also, as age increases there is a higher use of tumour resection only plus or minus radiotherapy.

Figure 15 Breast cancer treatments in combinations by age at diagnosis in 2019 (NHS Digital, 2022)



Surgery is widely accepted as the most clinically effective treatment for breast cancer. However, the NHS data suggests that fewer older women receive surgery for their breast cancer. This is particularly the case for women aged 80 and over (Figure 15). This means that older women may not always get the most clinically effective treatment (The King's Fund, 2011). There is further evidence that every additional year of age after 70 is associated with an increase of 3.1% in the proportion of women not having surgery (Centre for Ageing Better, 2017).

The latest NHS data shows that the utilisation of treatment strategies comprising radiotherapy declines with age too (Figure 15) and that there is variation across the NHS (NABCOP, 2022). Chemotherapy use also declines with age (NHS Digital, 2022). This is particularly the case in women aged 80 and over and is in line with the 2018 national breast cancer audit which found that chemotherapy use declines with age regardless of tumour characteristics.

As age increases, clinicians are more likely to state comorbidities and frailty as reasons that chemotherapy is not offered, even though these factors are not recorded in a third of cases. Similarly, clinicians may avoid offering older women surgery because of the higher risk of comorbidities. However, there is some research showing that surgery rates are lower independent of comorbidities (ILCUK, 2018).

There is evidence that older women are more likely to be diagnosed with advanced breast cancer by which time fewer curative treatment options are available. This may explain why fewer older women have chemotherapy and radiation to treat their disease (ILCUK, 2018).

Reconstruction is rarely raised as a possibility for older people by either clinicians or individuals themselves, although there is evidence indicating that women would like to discuss this as an option (ILCUK, 2018). This is supported by the latest national audit showing that older women were less likely to have reconstructive surgery (NABCOP, 2022).

There is evidence that national guidance is not always followed. For example, there is variation by age in the recording and availability of core data in older women, including HER2 status, cancer grade and stage. This means that once diagnosed, potentially fewer older women receive effective treatment (NABCOP, 2022).

Ethnicity

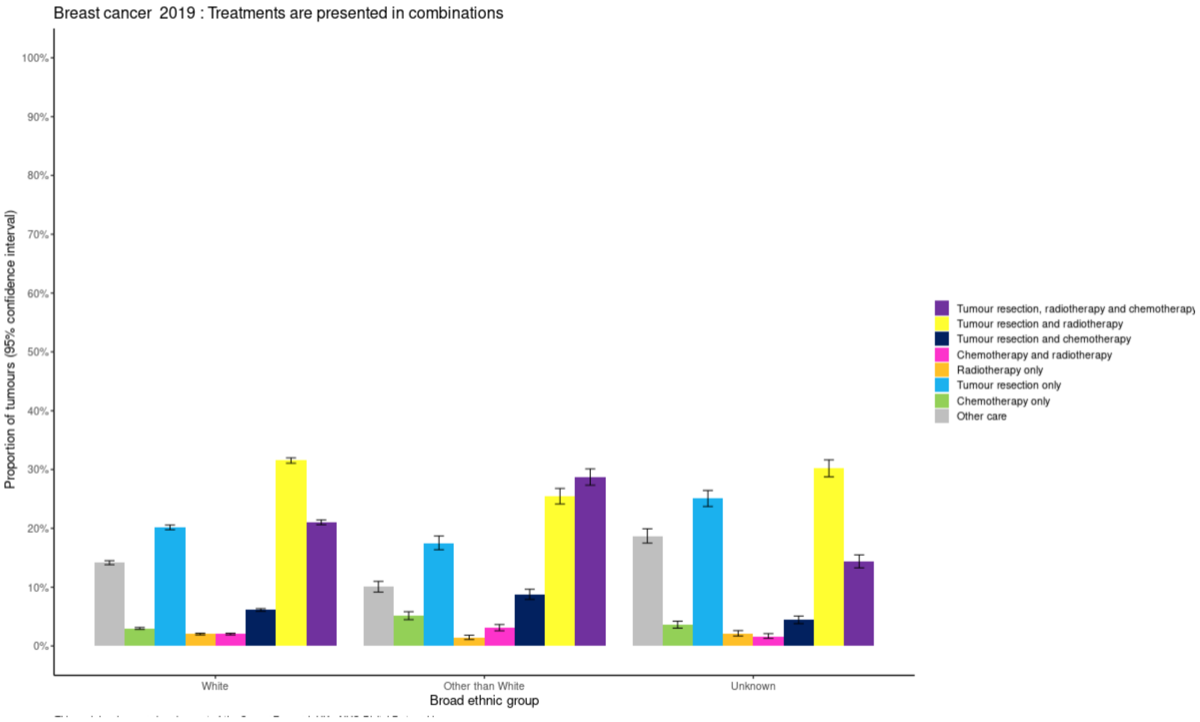
NHS Cancer Data median pathway analysis shows there is variation by family background in time to breast cancer treatment initiation within Cancer Alliances. For example, in 2018, for Humber, Coast and Vale the time to treatment was 125 days for people from a black family background but it was only 43 days for people from a white family background.

There were other less pronounced examples where the time to treatment was longer; mainly for people from black family backgrounds. Given that people from ethnic minority family backgrounds have lower screening uptake and present with more advanced-stage disease, a longer time to treatment initiation may even further disadvantage these groups.

It is unclear why the time to treatment was longer for some groups. However, international evidence on time to treatment shows that race, geography, insurance access, and other socioeconomic factors all are implicated in treatment delays (Reeder-Hayeset al., 2019)

There was some variation in treatments by family background (Figure 16). For example, more people in other than white family background groups received a combination of tumour resection, radiotherapy plus or minus chemotherapy. This supports the view that people from these groups present with more invasive breast cancers.

Figure 16 Breast cancer treatments stratified by family background in 2019 ([NHS Digital 2022](#))



Higher deprivation rates in people from ethnic minority family backgrounds may affect access to healthcare services. This may result in delayed presentation and a greater likelihood of mastectomy. However, it has been shown that surgical management is similar in people from ethnic minority family backgrounds when considering differences in presentation (Gathani, et al., 2021).

Recent NHS data shows that tumour resection rates are similar across broad ethnic groups and only the use of chemotherapy is slightly higher. It could be that considering all ethnic groups in one broad group (that is, other than the white family background group) could mask differences between ethnic groups (NHS Digital 2022).

There is evidence of a U-shaped relationship between the proportion of women undergoing mastectomy and age at diagnosis in all ethnic groups. The lowest rates of mastectomy (less than 35%) are seen in women between the ages of 50 and 71 who are invited routinely to the NHSBSP. In comparison, at least half of all women aged under 47 and over 70 at diagnosis in all ethnic groups have mastectomy (Gathani, Chiuri, Broggio, Reeves and Barnes, 2021).

This is likely to be related to tumour type and grade at diagnosis. In younger women, breast cancer tends to be diagnosed in its later stages, is more aggressive and needs more extensive treatment. Similarly, older women are more likely to present through emergency routes with more advanced-stage breast cancers.

There are also important differences in comorbidity profiles in people from ethnic minority groups which may influence their treatment (see Appendix 4: In-house analysis on comorbidities). Prescribed concomitant medications may potentially increase the risk of breast cancer, trigger adverse effects or interact with breast cancer treatments. For example, prescribing proton pump inhibitors (PPIs) alongside oral SACT like neratinib may reduce the effectiveness of the latter by preventing the absorption of neratinib (Joint Formulary Committee 2023, Pierre Fabre Limited 2022). As people from Indian, Pakistani or Bangladeshi family backgrounds have higher rates of PPI prescribed, there is a risk of worse outcomes for these people as breast cancer treatment is likely to be less effective.

Sex

The same breast cancer treatments are often used in men and women. However, 2019 NHS data shows that more women (40%) receive tumour resection only, compared with males (20%). Males are also more likely to receive a combination of tumour resection and radiotherapy, and in addition, tumour resection and a combination of radiotherapy and chemotherapy (NHS Digital 2022).

6 Inequalities as measured in quality and experience of care

The national Cancer Patient Experience Survey shows that people with primary breast cancer generally have a good cancer care experience. However, experiences are less favourable for women with secondary breast cancer (All-Party Parliamentary Group on Breast Cancer, 2018).

Geography

Recent NHS cancer quality of life survey data shows geographical variation. For example, the EQ-5D and EORTC QLQ-C30 scores in people with breast cancer were lowest in London and the north west and highest in the south of England.

These ratings are consistent with NHS Digital data on mortality from breast cancer, where affluent regions with high screening uptake, more stage 1 and 2 diagnoses and less aggressive tumours report better outcomes, including survival. Also, regions with lower ratings have a higher prevalence of behavioural risk factors which may contribute to poorer ratings, such as obesity and physical inactivity.

Two-thirds (64%) of women with secondary breast cancer in the UK rated the quality of their care as excellent or very good but this varied from 45% in the east midlands to 73% in the east of England (All-Party Parliamentary Group on Breast Cancer, 2018). Moreover, there is a big variation in women reporting whether they felt that their healthcare professionals listened to concerns they had about secondary breast cancer. For example, this varied from 100% in the north east to just 47% in the east midlands.

There is variation in whether women are told about emotional and psychological support services, including peer support groups and counselling. Only 34% of women with secondary breast cancer were aware of counselling across the UK (All-Party Parliamentary Group on Breast Cancer, 2018). This ranged from 48% in the north west to 29% in the west midlands and Yorkshire and Humber. Similarly, only 36% of women were aware of opportunities to speak to other people with secondary breast cancer. This ranged from 47% in the south west to 17% in the east midlands.

Also, GP's knowledge of secondary breast cancer varies. For example, 29% of women with secondary breast cancer in the Yorkshire and Humber region were initially treated for another condition before being diagnosed correctly compared with 11% in the south west (All-Party Parliamentary Group on Breast Cancer, 2018).

Protected characteristics

Age

Older women may be more prone to or affected by specific cancer symptoms or treatment side effects (ILCUK, 2019). It is estimated that one-third of older carers in the UK have delayed or cancelled treatment for a health condition because of the demands of their caring responsibilities. Many studies report a disparity in levels of support between older and younger age groups, with fewer older women with cancer receiving social and practical support.

Many older women with breast cancer are not offered information about body image, prosthetics after surgery and intimacy and relationship issues (Breakthrough Breast Cancer, 2013). It is assumed that older women are not as concerned as younger women about these issues.

Even though most women who get breast cancer are older, healthcare services often fail to meet older women's needs (ILCUK, 2013). Older women are diagnosed later and fewer receive effective treatments. Also, they are more likely to have their preferences honoured when they want to avoid life-prolonging care but not when they want life-prolonging care.

Older women represent a diverse group and have different preferences about surgical management. Discussions about breast cancer treatment need to be patient-centred and adapted to different priorities (Sowerbutts, 2015).

Disability

A systematic review (Pulman and Newell, 2021) of people's experiences of breast screening found that screening programmes are not reaching women with a learning disability because of a lack of understanding, embarrassment or fear. A lack of an available carer is also highlighted as an issue. Carers are often not allowed to go into the screening room, making the screening process distressing for women with a learning disability as the carer can provide reassurance and help with communication.

Similarly, screening uptake for women with mental illness is lower than in the general population, indicating a lack of support. Attendance is particularly low for women prescribed antipsychotics, anxiolytics and hypnotics.

In some cases, carers might need to be persuaded that it is a good idea for their cared for person to attend breast cancer screening. Otherwise, carers and relatives may feel that it is not what an individual they care for needs. Motivation and the carer's age are significant factors affecting the decision to undergo breast cancer screening. For example, fewer older carers see the benefit of attending from a generational perspective.

Engagement work with women with disabilities found that some screening equipment is not accessible (Manchester Clinical Commissioning Group, 2020). For example, the person cannot sit up long enough in the position needed to use the equipment, chairs are not height adjustable, and there are no wheelchair ramps to access mobile screening units. Other barriers for people with disabilities include locations that are less accessible because of long walking distances needed to reach them. Mobile units may also be too small to accommodate people who need a personal assistant or carer.

Women with disabilities also report a lack of flexibility in accessing the screening test. For example, women with disabilities need more accessible units or alternative breast cancer screening options and flexible appointments to allow for health or impairment-related challenges.

Ethnicity

Poorer cancer care experience is consistently reported in ethnic groups, but the reasons for this are poorly understood (Gathani, Chaudhry, Chagla, Chopra, Copson, Purushotham, Vidya and Cutress, 2021).

Many people from ethnic minority family backgrounds are younger on average compared with the general population and may have their breast cancer concerns dismissed because of their age when presenting to services (Macmillan cancer support, 2019). The Black Women Rising Survey of people from black ethnic family backgrounds found that nearly half reported that their healthcare professional did not think their healthcare issue was breast cancer at initial presentation.

The necessity to reveal breasts to a stranger is a deterrent to attending breast screening for British-Pakistani women, and a female radiographer is preferable across all ethnicities (Pulman and Newell, 2021). Other barriers for people from ethnic minority family backgrounds include lack of knowledge about breast cancer, who is at risk, how to identify it, what the screening programme is, and the available treatment options.

People from ethnic minority family backgrounds also report a lack of support from family and community, including representative peer support groups and counselling (Black Women Rising Survey, 2022).

Inequity in access presented by language difficulties is a challenge for people from minority ethnic family backgrounds (Pulman and Newell, 2021). Also, some NHS materials are inaccessible because of translation inconsistencies and use of complex medical terminology. This causes some people to be uncertain about what would happen during appointments.

Most women prefer the screening invitation letter to be written in their first language. Otherwise, women have to rely on family members or people in their community to explain letters to them. This raises privacy concerns, as letters may contain test results and women may worry about the impact on their translators, especially if those translating are other family members.

Sex

There is a lack of gender-specific information on breast cancer for men (Breast Cancer Care, 2011). For example, men would like information on what chest reconstruction surgery would mean for them, or what are gender-specific chemotherapy or radiotherapy side effects.

Gender reassignment and sexual orientation

The Government Equalities Office report shows that generally, LGBTQ people are less satisfied with services than heterosexual people.

Lesbian women often feel unable to be open about their sexual orientation to their GP, which contributes to their negative experiences (Stonewall, 2008). Also, fewer lesbian women and bisexual people with cancer report positive experiences about communication with professionals and the respect and dignity with which they are treated (Breast Cancer Care, 2011).

The main issue for people within the trans community is fear of negative attitudes from screening staff (Pulman and Newell, 2021). There are also concerns about poor breast cancer screening uptake because of ignorance of the risks among frontline staff and worries about how trans people with breast cancer may sometimes not be treated with the same dignity as others (Sam, et al., 2010).

There is no automated call–recall system because binary genders of male or female still define the current system. Also, there is no national gender identity data collection, which makes an automated call–recall system for trans women almost impossible (Pulman and Newell, 2021).

Some LGBTQ people find attending breast cancer screening intimidating because services are predominantly aimed at heterosexual people (Pulman and Newell, 2021). Also, mastectomy support groups discuss intimacy with partners, which makes participation for people who identify as LGBTQ difficult (Stonewall, 2008).

Inclusion health groups

There is considerable confusion, for both individuals and healthcare providers, about who should be charged for what services under the NHS visitor and migrant cost recovery programme in England (Equality and Human Rights Commission, 2018). This confusion may contribute to healthcare providers giving inconsistent and inaccurate information.

Such uncertainty and lack of clarity about eligibility contributes to the low uptake of breast cancer screening in refugees (Aspinall, 2014). For example, many vulnerable groups are put off accessing healthcare because they are concerned that medical information could be used in immigration enforcement (Equality and Human Rights Commission, 2018).

Some inclusion health groups face difficulties registering with GPs (All Party Parliamentary Group on Refugees, 2017), and may have financial difficulties and so be unable to afford public transport to get to appointments (Equality and Human Rights Commission, 2018).

There is evidence from Nuffield Trust on prison health care in England (2021) that existing health inequalities may be exacerbated for people in prisons who are not always listened to or believed when they raise breast cancer concerns or ask for help (APPG on Women in the Penal System's inquiry into women's health and well-being in prisons, 2022). Prison staff may act as gatekeepers, controlling womens' access to families, external support, medication and hospital appointments.

Furthermore, prison officer gender may determine whether prisoners feel comfortable sharing certain information or asking questions about their health. Many women can find it difficult to talk about sensitive issues with men (APPG, 2022).

The above can lead to severely delayed care-seeking and consequently people being diagnosed with advanced-stage breast cancers, resulting in worse outcomes.

7 Other specific inequalities considerations with respect to breast cancer

Arm and shoulder symptoms and lymphoedema

Lymphoedema is the most common complication related to mastectomy or lumpectomy, with an incidence of between 10% and 60%. Other common complications, according to Cancer Research UK on possible problems after mastectomy, include bleeding, infection and pain. Risk factors for developing lymphoedema can be treatment related (number of nodes removed and radiation to axilla) and disease related (stage and location of the tumour). There are also patient-related risk factors such as younger age, obesity and comorbid conditions (Quirion, 2010). Some of these risk factors are discussed below.

Women with obesity (BMI more than 30) are at 3 times the risk of lymphoedema than women without obesity (Meeske, et al., 2008).There is an even greater risk if weight gain occurs after breast cancer surgery rather than having a high BMI as a pre-existing condition (Petrek, et al., 2001). However, a conflicting study did not find body weight as a risk factor for arm swelling (Geller, et al., 2004).

Also, younger women with breast cancer more frequently report impaired arm movement and lymphoedema. However, objective measurements show that arm function is more affected in older women and that older age is a risk factor (Bentzen, et al., 2000).

There is some mixed research on the effects of hypertension on the risk of developing lymphoedema (Quirion, et al., 2010).

There is evidence that lymphoedema incidence after combined therapy in the axilla is greater than surgery or radiotherapy alone. Also, arm oedema is more common after combined chemotherapy and radiotherapy (as an adjuvant after breast cancer surgery) than after radiotherapy alone.

Impaired shoulder movement is more common after mastectomy than after wide excision. Axillary irradiation is also a risk factor to impaired shoulder movement. Moreover, women with breast cancer and shoulder problems before radiotherapy have a greater chance of developing persistent movement problems (Bentzen and Dische, 2000).

In a small US study (N = 116), post-breast cancer treatment symptoms were examined by family background. The study found that people from minority ethnic family backgrounds had a much higher lymphoedema rate (between 71% and 77% compared with 39% for people from the white family background) (Eversley, et al., 2005). However, another US study found no difference in the risk for lymphoedema between people from white and black family backgrounds (Meeske, Sullivan-Halley, Smith, McTiernan, Baumgartner, Harlan and Bernstein, 2008).

A scoping review on the care and support needs of older women with breast cancer found that problems with arm use affected tasks such as lifting objects and dressing (Abdi, et al., 2019).

According to the report by the Institution of Occupational Safety and Health the presence of breast cancer disability, such as lymphoedema, may disrupt returning to work after cancer and people may need additional support. This may significantly impact people from disadvantaged groups because they are more likely to be in insecure employment and less likely to have sick leave entitlement.

All the above are significant findings. For example, more deprived groups have a higher prevalence of being overweight, have higher rates of hypertension and may be more susceptible to developing lymphoedema. Also, people from ethnic minority family backgrounds and deprived groups are more likely to present with advanced-stage breast cancer, which is more likely to need combination treatment. All of this makes them more susceptible to developing lymphoedema.

In-house analysis

The NICE guideline on early and locally advanced breast cancer: diagnosis and treatment includes recommendations on arm mobility. In-house analysis was done in 2022 to explore the uptake of a recommendation around physiotherapy: “Refer people to the physiotherapy department if they report a persistent reduction in arm and shoulder mobility after breast cancer treatment”.(Note that the exact recommendation wording may change in future guideline updates.)

The in-house analysis was done using the Hospital Episode Statistics (1 April 2020 to 31 March 2022) to examine the proportions of people who received outpatient physiotherapy and occupational therapy after breast cancer surgery. For detailed methods, see Appendix 3: In-house analysis on outpatient physiotherapy and occupational therapy use after breast cancer surgery.

The analysis showed that there were few physiotherapy and occupational therapy outpatient appointments, but physiotherapy appointments were more common.

Physiotherapy and occupational therapy outpatient appointments were more common in those aged 41 to 60 and less likely in younger and older age groups.

There were very few male patients having breast cancer surgery, but among those that did, physiotherapy and occupational therapy outpatient appointments were less common than for female patients.

Occupational therapy outpatient appointments were more common among more deprived groups, though overall numbers were low. Physiotherapy outpatient appointment use was not notably different across socioeconomic groups.

Also, people from black family ethnic backgrounds had more physiotherapy appointments compared with other groups.

Overall, the findings align with the previous results in section 5.3, which showed that older people are less likely to undergo tumour resection. Also, in general, postoperative physiotherapy and occupational therapy use would be expected to be higher in working-age adults, which this analysis supports.

The findings in section 5.3 showed that surgery rates were similar in people from ethnic minority family backgrounds and people from a white family background. So, it is unclear why people from black family ethnic backgrounds had more physiotherapy appointments in this analysis. However, in section 5.3 surgery rates reported by the NHS grouped all ethnic minority groups together into one other than white ethnic category, which could have masked differences between ethnic minority groups.

The analysis did not include home exercises or where a physiotherapist or occupational therapist was present in a postoperative outpatient follow up. The closure of many services during the COVID pandemic may also explain the overall low numbers.

8 COVID pandemic

According to the report by the Care Quality Commission on the provision of cancer services, COVID-19 presented a greater risk for people from ethnic minority family backgrounds, disabled people and older people living in deprived areas. It also exposed existing challenges, including communication and language barriers and engaging people at risk of not accessing care.

For example, there was a rapid increase in the use of digital technology to provide cancer care, and there was a decline in cancer referral rates and the number of people attending appointments because of COVID-19 fears. All the above changes could have disadvantaged people from deprived groups, people from ethnic minority family backgrounds and people from inclusion health groups who were less likely to have had the necessary infrastructure for digital healthcare and generally lacked the skills needed.

The COVID-19 pandemic substantially impacted screening uptake (NHS Digital, 2022), reduced 2-week wait referrals (Care Quality Commission, 2022) and new cancer diagnoses. Again, this may have disproportionally affected deprived groups and people from ethnic minority family backgrounds as they were more likely to present through screening and use other routes, such as 2-week waits.

In some services, virtual meetings improved attendance (Care Quality Commission, 2022). For example, the Dorset Cancer Partnership Programme (South West) reported that services could effectively manage their breast cancer backlog using virtual multidisciplinary teams. Given the existing geographical inequalities, regional disparities are more likely to have become even more significant.

According to the report by Nuffield Trust prison health care in England, the COVID-19 pandemic not only put extensive pressure on healthcare services but also affected the services people in prison have been able to receive as well as their long-term healthcare needs. For example, Howard League for Penal Reform an inquiry into women's health and well-being in prisons reported that prison regimes became even more restrictive, with reduced support services and restrictions on access to health services.

According to the report by the Care Quality Commission on the provision of cancer services, some cancer services started or were planning ways to address these issues, but some providers had no plans to tackle health inequalities presented by COVID-19.

9 Key gaps in the literature and limitations

This is a pragmatic, targeted review of the literature rather than a systematic review which comprehensively captures all of the inequalities that exist for breast cancer care services. As such, it is in part subjective, based on evidence available and retrieved by the lead authors, and can only provide examples of where inequalities have been measured.

The briefing has focused on where data has been recorded and was readily available to analyse. Therefore, it is important to note that data was not always available for all dimensions of inequalities for each measurement of inequality sought.

Data was most readily available for those from deprived populations, for ethnic minority groups and older women. However, the briefing is limited by significant gaps in the evidence base and often out-of-date data. Even some data routinely collected by the NHS Digital and the Office for National Statistics (ONS) was slightly out of date because of disruption caused by the COVID pandemic. Most of these data sources are likely to be updated in 2023.

Some examples of gaps in the evidence base include:

- Data on ethnicity was incomplete, poorly reported and groupings were inconsistent or grouped into one unhelpful category. For example, all people from non-white family backgrounds were grouped into one ‘Other than white’ category.
- Data was limited on disabled people across many health inequality domains.
- Data on gender identity and inequalities between LGBTQ groups was lacking and often dated. Often, different LGBTQ identities were grouped together and data was particularly underreported in trans and non-binary people.
- Data was even more lacking for inclusion health groups, such as Gypsy, Roma and Traveller communities, people experiencing homelessness, people in prisons and migrants.

Data on the interaction between different inequality dimensions was lacking too. For example, deprivation is the major driver of health inequalities. However, the available data and evidence is not sufficient to lead to conclusions on how far other inequalities, such as differences between people of different ethnic family backgrounds or geographic variation, overlap with deprivation. Unpicking this further would enable more targeted approaches to reducing health inequalities.

Some findings were contradictory and would benefit from further research. For example, people from ethnic minority family backgrounds are more likely to have a late-stage breast cancer diagnosis. However, they have lower breast cancer mortality rates compared with people from a white family background.

10 Considerations for NICE

In developing and updating NICE guidelines and recommendations, consideration should be given to the main health inequalities highlighted in this report and to the key drivers, such as deprivation. This will ensure that health inequalities are not widened and that the actions needed are identified.

The findings of this report could be used in many ways. For example, it could help to design review questions that consider the identified health inequalities and enable making recommendations that are based on principles for reducing inequalities. The findings could also be helpful when drafting the equality and health inequalities assessment (EHIA) form, informing committee constituency and informing wider system prioritisation.

More detail on each of the above is provided below.

Review questions

Even though the evidence base may be limited for various groups or dimensions of inequality, asking review questions that consider key health inequalities, as identified in this report, would allow for making research recommendations.

Research recommendations could subsequently be passed to the National Institute for Health and Care Research (NIHR) and the research addressing key health inequalities could be commissioned. If review questions are not asked in a way that addresses health inequalities, guideline committees will not be able to make research recommendations and research will not be commissioned.

Some possible review questions informed by specific health inequalities identified by the findings of this report are suggested below.

Late-stage diagnosis is a key problem for deprived groups, people from ethnic minority family backgrounds and people who fall outside national breast cancer screening age cut-offs:

- What combined health, screening and other system partner arrangements best contribute to breast cancer early identification?
- What are the most acceptable, effective and cost-effective approaches to early diagnosis of breast cancer in people from deprived groups/ethnic minority family backgrounds who do not meet the lower/upper national breast cancer screening age cut-off of 50/70 years?
- What interventions are effective in improving access to diagnosis and treatment services and referral, from first to secondary and tertiary levels of care in populations or groups with low screening uptake, such as deprived groups/people from ethnic minority family backgrounds?

Low health literacy is an issue across many groups including deprived groups, people from ethnic minority family backgrounds, disabled people, older people and many inclusion health groups:

- What are the most effective and acceptable interventions to increase awareness of first breast cancer signs/younger age demographic of some groups presenting with breast cancer/knowledge of secondary breast cancer, among physicians, nurses and other healthcare providers [as well as among the general public]?
- What are the effective and acceptable approaches for healthcare/breast cancer services which will reach groups with low health literacy?
- What is the effectiveness, acceptability and cost effectiveness of breast cancer health literacy interventions to promote screening uptake/making treatment decisions/understanding cancer related information in people from deprived groups/ethnic minority family backgrounds/LGBTQ people?

Active treatments that include surgery, radiotherapy, and chemotherapy decline with age, sometimes with little justification**:**

- What is the effectiveness, acceptability and cost effectiveness of breast cancer treatments, such as, surgery, radiotherapy, and chemotherapy, and various combinations of these, in older women (aged 70 and over) with varying levels of comorbidities and frailty?

Many inclusion health groups have greater difficulty in accessing and engaging with breast cancer services because of various barriers, such as travel costs, employment insecurity and difficulties taking time off, caring responsibilities and physical limitations:

- What information and support is valued by people from inclusion health groups, such as people experiencing homelessness, to engage with breast cancer care?
- What are the most effective joined up working practices between healthcare, community sector and social services, to reach inclusion health groups and to overcome some of the barriers, for example, fear of immigration controls, that they may face in seeking breast cancer care?

The National Screening Committee makes screening recommendations and advice for breast cancer. However, sample questions in this area could aid committee discussions around case identification in population groups where screening uptake is particularly low and prompt thinking as to what healthcare services could do in this area:

- What is effectiveness and cost effectiveness of breast cancer screening at various age cut-offs?
- What factors lead to an improved uptake of breast cancer screening in people from deprived groups/ethnic minority family backgrounds/disabled people /people from inclusion health groups?
- What is the effectiveness, acceptability and cost effectiveness of breast cancer health literacy interventions to improve breast cancer screening uptake in people from deprived groups/ethnic minority family backgrounds/LGBTQ people?
- What information and support is valued by people from deprived groups/ethnic minority family backgrounds/disabled people/people from inclusion health groups to uptake screening?

The risk of arm **shoulder problems and lymphoedema** after breast cancer surgery is influenced by many factors:

- What is the risk of arm shoulder problems/lymphoedema in people from ethnic family backgrounds/those receiving single versus combination treatment/people with obesity versus normal body mass index?

Evidence-based principles and recommendations

Recommendations could be based on evidence-based principles for reducing inequalities (see the Promoting Equality, Reducing Health Inequalities guidance support document) which include:

- **Proportionate universalism** – actions must be universal for the whole population, but with a scale and intensity that is proportionate to the level of disadvantage. Action may also be needed to address a particular barrier in a specific population group experiencing inequality.
- **Co-design, co-production, and community engagement** – which includes diverse voices and perspectives.
- **Recommendations can be formulated to advance equality and reduce inequalities** – for example, by improving access for certain groups, or by tailoring the intervention to specific groups.

The committee was provided with examples of potential recommendations that considered key health inequalities identified in this report. These examples aimed to show the committee how health inequalities could be captured when formulating recommendations.

The examples were around a younger age demographic and the increasing breast cancer incidence in some groups, joint working to improve case identification and promote screening uptake in populations with low screening uptake and recording of data on, for example, ethnicity, sexual orientation, so that services are designed to meet peoples' needs.

Other examples included recommendations on establishing preferences for reconstructive surgery, discussing the benefits and risks of surgery/chemotherapy/radiotherapy in older women, and collecting core breast cancer indicators, such as ER, HER2, PR, overall stage, and tumour size, irrespective of age.

Equality and Health Inequalities Assessment, committee constituency and stakeholder engagement

The equality and health inequalities assessment (EHIA) is used to demonstrate due regard for equality and health inequalities issues throughout each stage of the guideline development process. This briefing can be used to support the completion of this assessment.

This briefing can also highlight considerations for committee constituency and stakeholder engagement with respect to dimensions of health inequalities affected by breast cancer. For example, to make impactful recommendations for case identification of people that have low screening uptake, such as deprived groups, it may be helpful to have representation from other partner organisations, such as local screening teams.

Wider NICE and system prioritisation

Taken together with the NICE surveillance work, the health inequalities identified in this report could inform wider prioritisation work at NICE. For example, the potential impact of addressing the health inequalities identified, such as late diagnosis in people from deprived groups and ethnic minority family backgrounds who have low screening uptake or do not meet national breast cancer screening age cut-offs, together with other prioritisation criteria could influence whether NICE develops further guidance in this area.

This briefing also identifies key gaps, potential research questions and research recommendations from the health inequalities perspective which could be taken up not only by NICE but also by wider system partners.

Appendix 1: Methods

This briefing is a pragmatic, targeted review of evidence exploring health inequalities with respect to breast cancer and related services. In general, data availability on measures of health inequalities can be poor or absent. As a result, this briefing based on evidence available and can only provide examples of where inequalities have been measured, rather than a comprehensive picture.

It has been done as a pragmatic, targeted review of literature with support from an information specialist. It has used largely real-world evidence, including routinely available data sources, quantitative and qualitative research findings and published reports on inequalities.

Data for inclusion health groups is often not routinely collected and so this briefing explores grey literature and small-scale studies for any findings relevant to health inequalities in these groups. As a result of the general lack of data, in most cases, only single relevant data sources were available and there was little scope for selection bias.

This briefing has been structured to include data and evidence across the 4 dimensions of inequality (socioeconomic groups and deprivation, protected characteristics, geographical and inclusion health) and across the 5 levels of outcomes (health status, behavioural risks to health, wider determinants of health and, access to care, and quality and experience of care).

The quality assurance was completed by 2 Public Health registrars during drafting of the briefing and after the final draft has been completed. The quality assurance focused on the quality of the evidence presented and information sources used. It also reviewed any decisions to exclude / include evidence, whether there were any significant unexplained gaps, that the limitations of the briefing were clearly set out and that the briefing met its proposed objectives. The quality assurance also checked whether key conclusions/recommendations of the briefing aligned with the content.

Appendix 2: Behavioural risk factors for breast cancer

Risk factor	Deprivation	Geography	Protected characteristics
Obesity **Strong evidence**	Higher prevalence in the deprived groups (OHID obesity profile).	For example, there is a north–south divide in obesity rates with more adults classified as overweight or obese in north east compared with the south west (OHID obesity profile).	**Age:** The prevalence of being overweight or having obesity is increasing with age (OHID's obesity profile). **Disability:** The prevalence of being overweight and obese is higher for people with a disability (House of Commons obesity statistics for 2019 to 2020). **Ethnicity:** There is lower obesity prevalence in people from some ethnic minority family backgrounds, such as Indian and Chinese, compared with people from white family backgrounds (OHID, obesity profile). However, there is evidence that people from non-white family backgrounds are at an increased risk of chronic health conditions at a lower BMI than people from white family backgrounds (Caleyachetty, Barber, Mohammed, Cappuccio, Hardy, Mathur, Banerjee and Gill, 2021).
Alcohol **Strong evidence**	People in more deprived groups are statistically more likely to drink heavily or binge drink (Institute of Health Equity, Older people: independence and mental wellbeing, 2015). However, this is changing. NHS Digital 2018 data on alcohol consumption in England found that more women in the least-deprived groups drank at harmful levels.	For example, the south east and the east of England have half the rate of alcohol-related admissions compared with the northern England. However, the south west, one of the least-deprived regions, ranks third in admissions for alcohol-related conditions (OHID local alcohol profiles for England).	**Ethnicity:** People from ethnic minority groups are less likely to drink alcohol at harmful levels (GOV.UK, 2018). **Sexual orientation:** People who identify as LGBTQ are more likely to consume alcohol at harmful levels, compared with the general population (LGBT Foundation, 2020).
Physical inactivity **Strong evidence**	Public Health England (PHE) guidance for addressing inequalities in physical activity locally between 2015 to 2016 and 2018 to 2019 shows that physical activity levels increased in people from middle and higher socioeconomic status	More affluent regions in the south report greater physical activity levels. The lowest rates of physical activity are in the north and the west midlands, which also have higher deprivation levels (Public Health England, Physical activity:	**Age:** Physical inactivity increases with age (GOV.UK Physical inactivity 2019). **Disability:** For example, in 2018, only 45% of disabled people or people with a long-term health condition were physically active compared with 68% of people without a disability or a long-term health condition (PHE, physical activity guidance).

	but decreased in individuals from the deprived groups.	understanding and addressing inequalities 2021).	**Ethnicity:** Physical activity levels differ between ethnic groups (GOV.UK, 2019). Statistically, people from Asian and black ethnic family backgrounds are more likely to be physically inactive. **Sexual orientation:** More people who identify as LGBTQ are classed as physically inactive (British Medical Association briefing). A survey by Pride Sports found that physical inactivity is even greater for LGBTQ people who do not identify as male or female.
Hormone therapy (HRT) and contraceptive use **Strong evidence**	In 2018 the overall prescribing rate of HRT was 29% lower in practices from the most deprived quintile compared with the least-deprived quintile Hillman et al. (2020)		**Ethnicity:** People from South Asian and black ethnic family backgrounds are less likely to use hormone therapy for the menopause (Gathani, Ali, Balkwill, Green, Reeves, Beral and Moser, 2014). However, according to The King's Fund report 2021, because of the changing lifestyles, for example, increased use of menopausal hormone therapy and contraceptives, the breast cancer risk in some people from ethnic minority communities is increasing. **Sexual orientation:** Lesbian women have a lower use of oral contraceptives (The International Longevity Centre, 2008). **Gender reassignment:** Trans women may receive hormone therapy which helps breast tissue development. Since cis women (aged 50 to 79) who receive HRT and those taking oral contraceptives are at an increased breast cancer risk, trans women who take hormone therapy may also have an increased breast cancer risk (Breast Cancer UK, 2023).
Smoking **Emerging evidence**	More common in deprived groups (Institute of Health Equity, 2015).		**Ethnicity:** The smoking prevalence is lower in most ethnic groups (Action on Smoking and Health, 2019).
Unhealthy diet **Unclear evidence**	More common in deprived groups (Institute of Health Equity, 2015).		**Ethnicity:** The proportion of people who eat recommended daily portions of fruits or vegetables is lower in people from ethnic minority family backgrounds (The King's Fund report 2021)

Appendix 3: In-house analysis on outpatient physiotherapy and occupational therapy use after breast cancer surgery

In 2023, the recommendations on complications of local treatment – specifically arm mobility – in NICE Guidance on Early and Locally Advanced Breast Cancer: Diagnosis and Management, NICE guideline [NG101], were updated. The review question investigated effective strategies in reducing arm and shoulder problems after breast cancer surgery, including physiotherapy. The technical team working on the health inequalities for breast cancer supported this work by exploring any inequalities in the use of physiotherapy and occupational therapy post-breast cancer surgery by deprivation and ethnicity.

Methods

The Hospital Episode Statistics (HES) dataset was accessed through NHS Digital's Trusted Research Environment (TRE). A cohort of women was identified using a code for surgical breast procedure in patient records.

Breast cancer surgery was identified from the inpatient tables, which detail episodes of admitted care under a lead clinician. Episodes involving breast cancer surgery were identified using relevant OPCS (version 4.8) procedure codes (B27* - Total mastectomy, B28* - Other excision of breast, and B41* Excision of breast in any position) observed in any position in the record, between 1 April 2020 and 31 March 2022.

Subsequent outpatient physiotherapy (PT) and occupational therapy (OT) appointments for these people were obtained from the outpatient tables, which detail outpatient appointments and which clinical speciality the clinic is classified under. It is not possible to identify the reason for the referral, so we assume that outpatient appointments soon after breast cancer surgery are likely to relate to surgery, but there is a possibility that some of these are unrelated.

Data on healthcare usage was grouped by socioeconomic deprivation, age, ethnicity, and gender. Socioeconomic deprivation data was taken from the inpatient tables as Indices of Multiple Deprivation (IMD). IMD maps socioeconomic deprivation to areas ultimately derived from the patient postcode. Ethnicity, age and gender data were also taken from the inpatient and outpatient tables. Ethnicity categories are based on the 2001 census question.

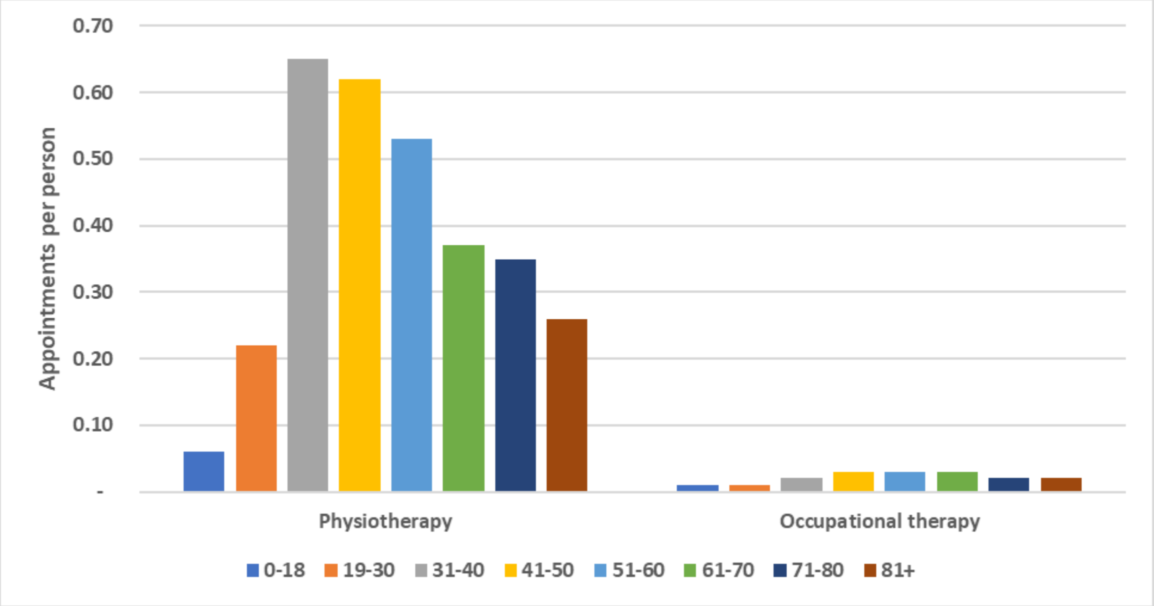
Counts of postoperative outpatient PT and OT appointments were made where these were observed, and average PT per patient were calculated and split by IMD deprivation, age, ethnicity, and gender categories.

Results

During the 1st of April 2020 and 31st of March 2022 there were 95,254 individuals who underwent surgery, and 113,954 admitted inpatient care episodes.

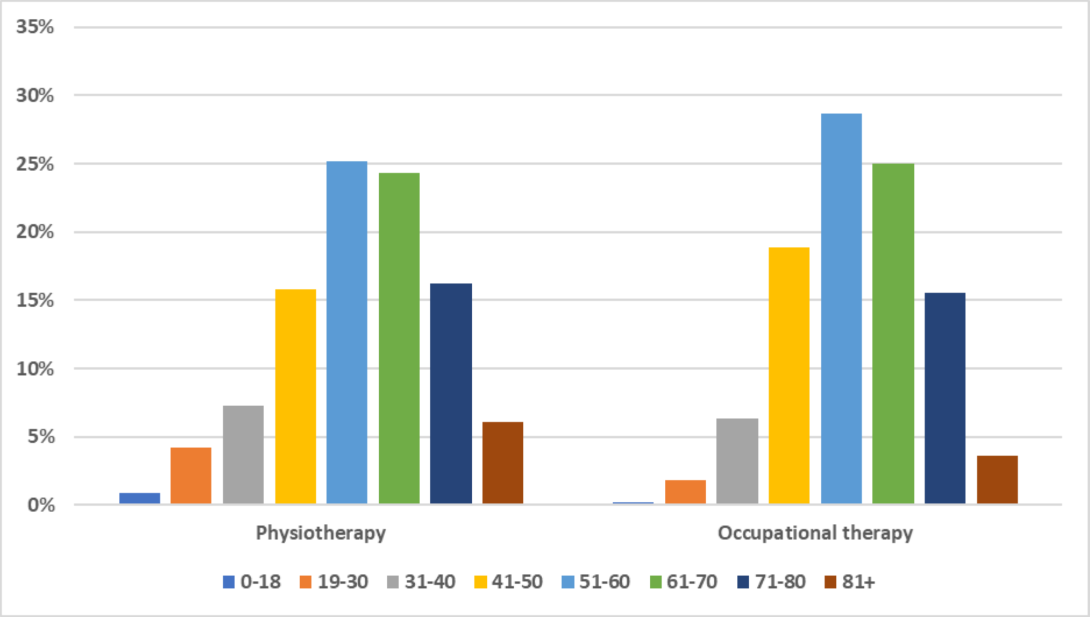
Surgery was most frequent in the aged 51 to 60 and 61 to 70 age groups. Few patients had a subsequent outpatient OT appointment. PT appointments were more common than outpatient OT appointments, but most patients did not attend an outpatient PT appointment in the period. OT and PT outpatient appointments per patient are summarised in Figure 17.

Figure 17 Number of physiotherapy and occupational therapy outpatient appointments per person after breast cancer surgery by age group (during 1st of April 2020 and 31st of March 2022)



Outpatient OT and PT appointments were more common among those aged 41 to 60, and less likely among the younger and older age groups (Figure 18).

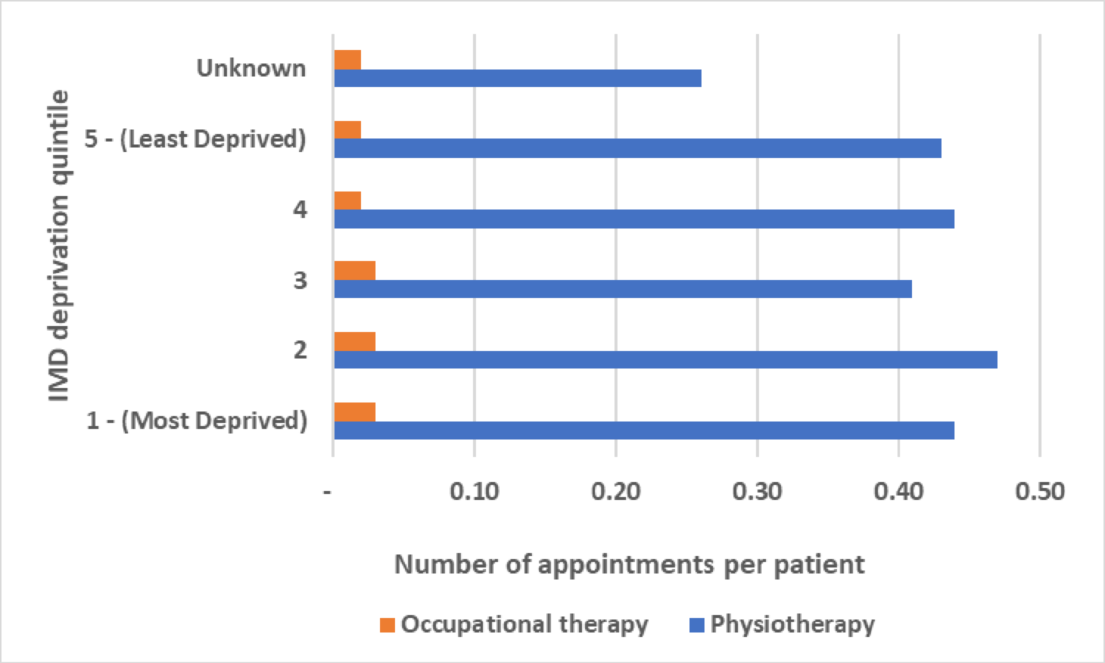
Figure 18 The distribution of physiotherapy and occupational therapy outpatient appointments after breast cancer surgery by age group (during 1st of April 2020 and 31st of March 2022)



Breast cancer surgery was carried out more often for higher IMD quintiles. Among the least socioeconomically deprived IMD quintile 22,152 people received surgery, compared with 14,129 among the most deprived quintile. This aligns with the incidence data by deprivation.

There was little difference in PT and OT outpatient appointments per patient. OT outpatient appointments were slightly more common among more deprived quintiles, though overall numbers of OT outpatient appointments were very low. PT outpatient appointment utilisation did not show a clear trend across different socioeconomic groups.

Figure 19 Number of physiotherapy and occupational therapy outpatient appointments after breast cancer surgery by IMD deprivation quintile (during 1st of April 2020 and 31st of March 2022)



In the dataset approximately two-thirds of recorded ethnicities were white British, with large numbers of 'Not Stated' and 'Non-Known' ethnicity codes. People from black family backgrounds had proportionally higher numbers of outpatient PT and OT appointments than other groups, though low numbers and poor data quality was noted (Figure 20 and Figure 21).

Figure 20 Physiotherapy outpatient appointments after breast cancer surgery by family background (during 1st of April 2020 and 31st of March 2022)

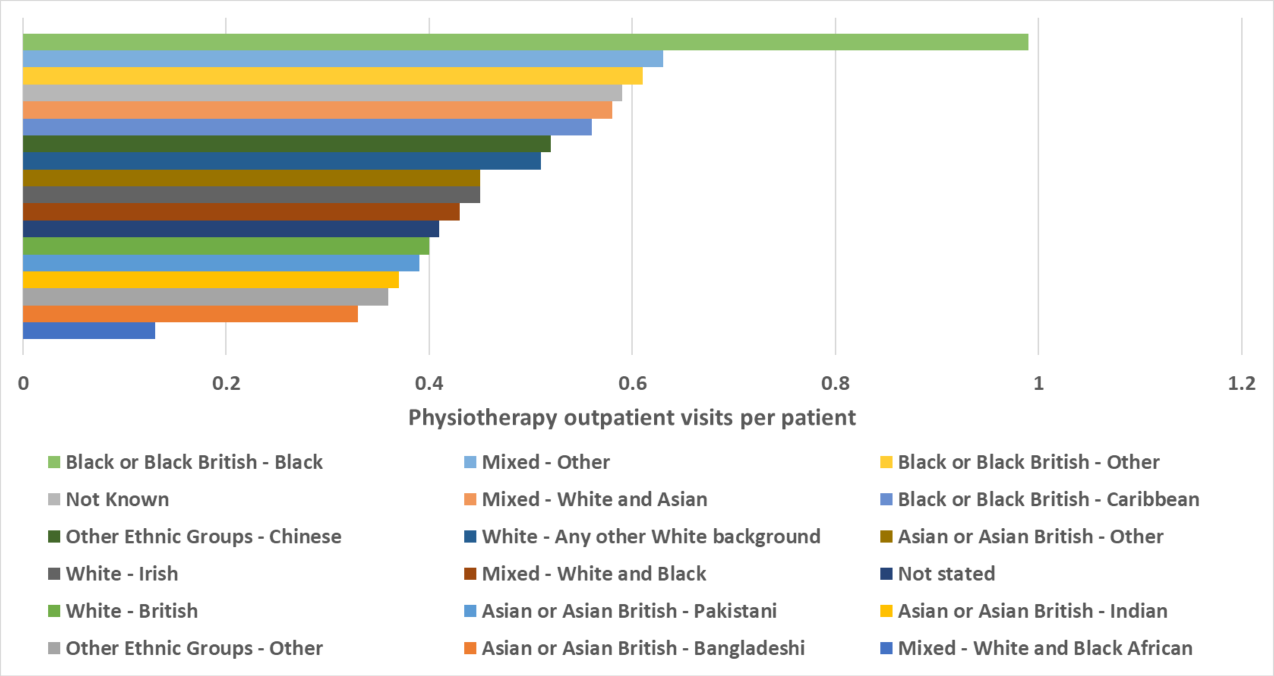
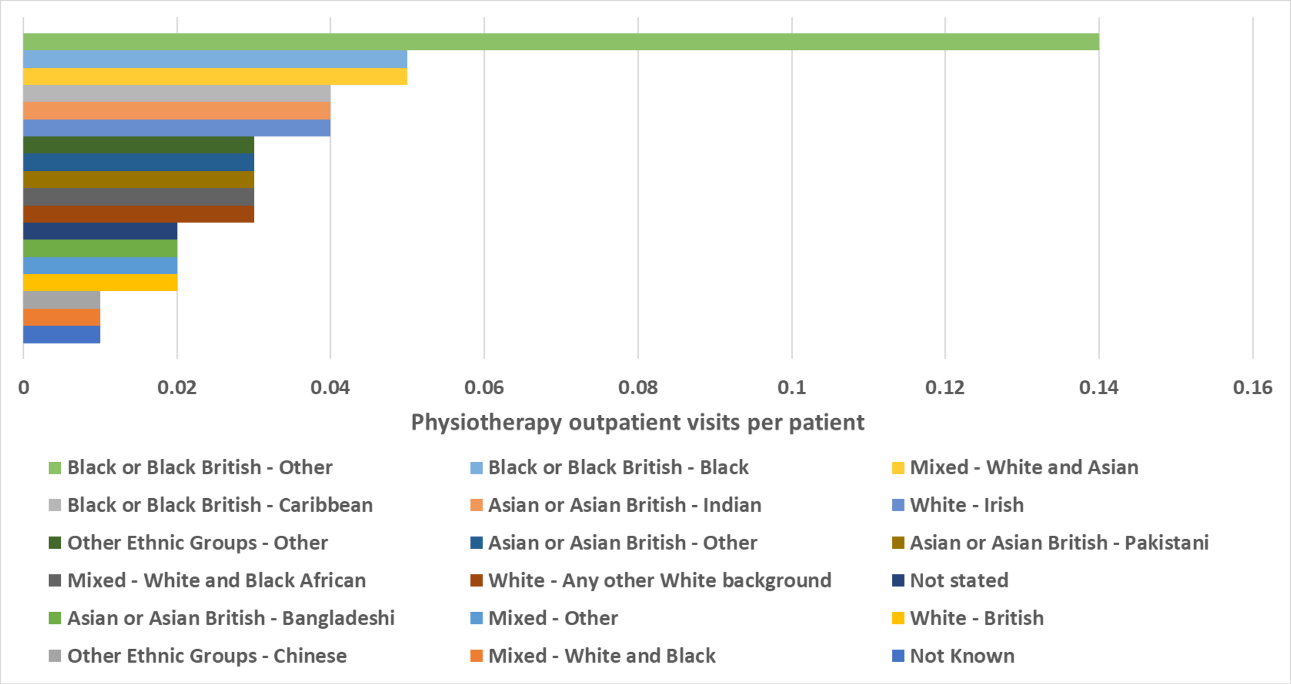


Figure 21 Occupational therapy outpatient appointments after breast cancer surgery by family background (during 1st of April 2020 and 31st of March 2022)



There were very few (less than 2%) male patients having breast cancer surgery, but among those that did, PT and OT outpatient appointments were less common than among female patients.

Pre-COVID data

An additional analysis was undertaken to explore whether the conclusions on PT and OT outpatient appointment usage after breast cancer surgery was the same as that for pre-COVID years.

As in the primary analysis, the relevant cohort was identified using the same procedure codes but the dates between 1 April 2018 and 31 March 2020 were used. This was an earlier cohort to check whether the pandemic affected PT and OT outpatient appointments usage.

As in the main analysis, surgery was most frequent in the 51 to 70 years age group.

Few people had a subsequent OT outpatient appointment. PT outpatient appointments were more common than OT outpatient appointments. However, most people did not attend PT outpatient appointments during this period.

OT and PT outpatient appointments were more common among those aged 30 to 80 and attendance was relatively less likely among the younger and highest age bands (Figure 22 and Figure 23).

Figure 22 Number of physiotherapy and occupational therapy outpatient appointments per person after breast cancer surgery by age group (during 1 April 2018 and 31 March 2020)

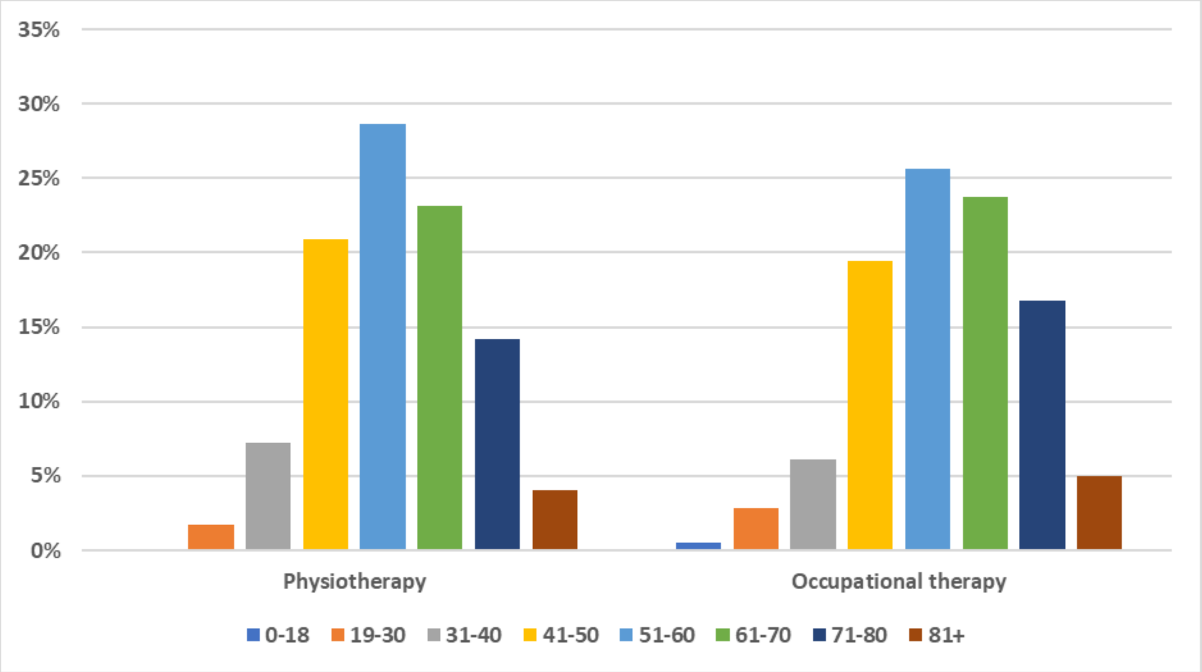
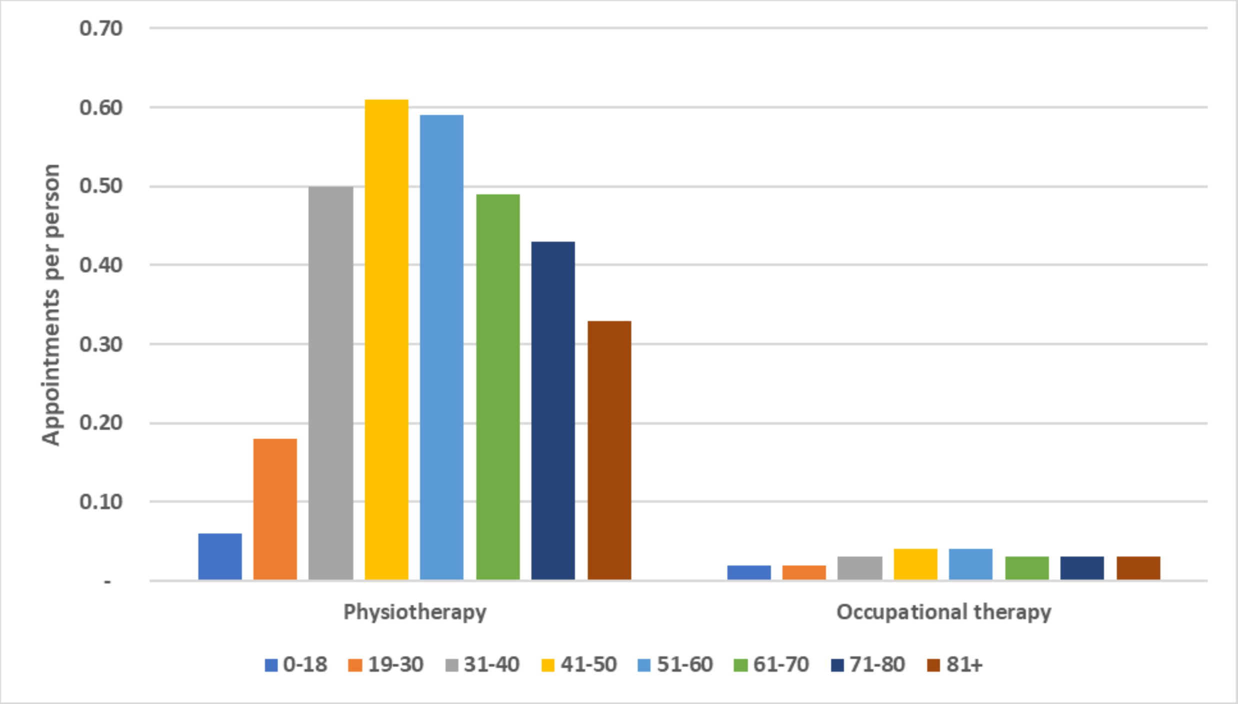


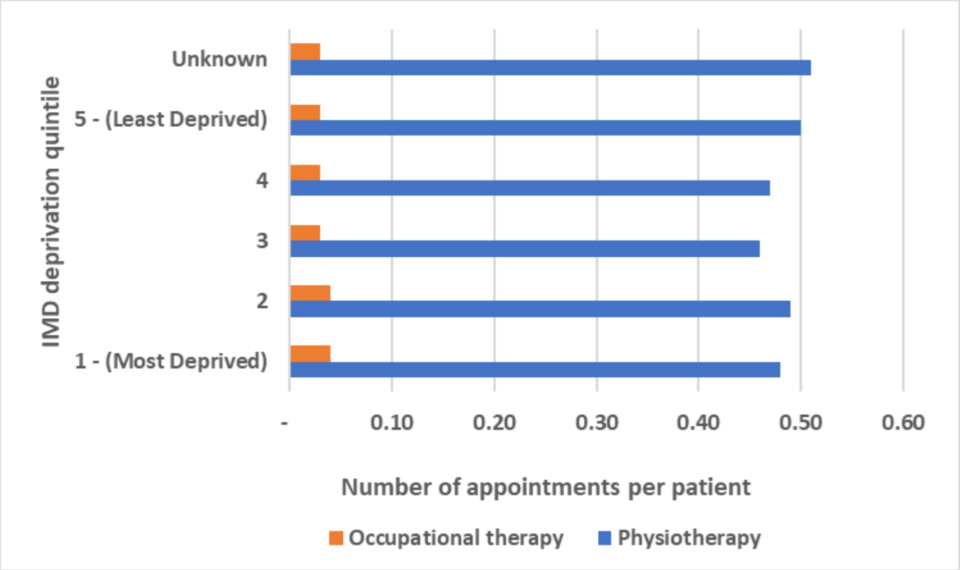
Figure 23 The distribution of physiotherapy and occupational therapy outpatient appointments after breast cancer surgery by age group (during 1 April 2018 and 31 March 2020)



Breast cancer surgery was carried out more often for higher IMD quintiles. Among the least socioeconomically deprived IMD quintile, 23,355 patients received surgery, compared with 17,360 among the most deprived quintile.

OT outpatient appointments were roughly equally likely across different socioeconomic groups but overall numbers for OT appointments were low. PT outpatient appointment utilisation was also not notably different across socioeconomic groups (Figure 24).

Figure 24 Number of physiotherapy and occupational therapy outpatient appointments after breast cancer surgery by IMD deprivation quintile (during 1 April 2018 and 31 March 2020)



Approx two-thirds of recorded ethnicities were white British, with large numbers of 'Not Stated' and 'Non Known' ethnicity codes. However, black Caribbean ('M'), black African ('N'), white Irish ('B') and mixed White and black African ('E') categories had proportionally higher numbers of PT outpatient appointments than other groups (Figure 25 and Figure 26). However, low numbers and poor data quality should be borne in mind when interpreting these figures.

Figure 25 Physiotherapy outpatient appointments after breast cancer surgery by family background (during 1 April 2018 and 31 March 2020)

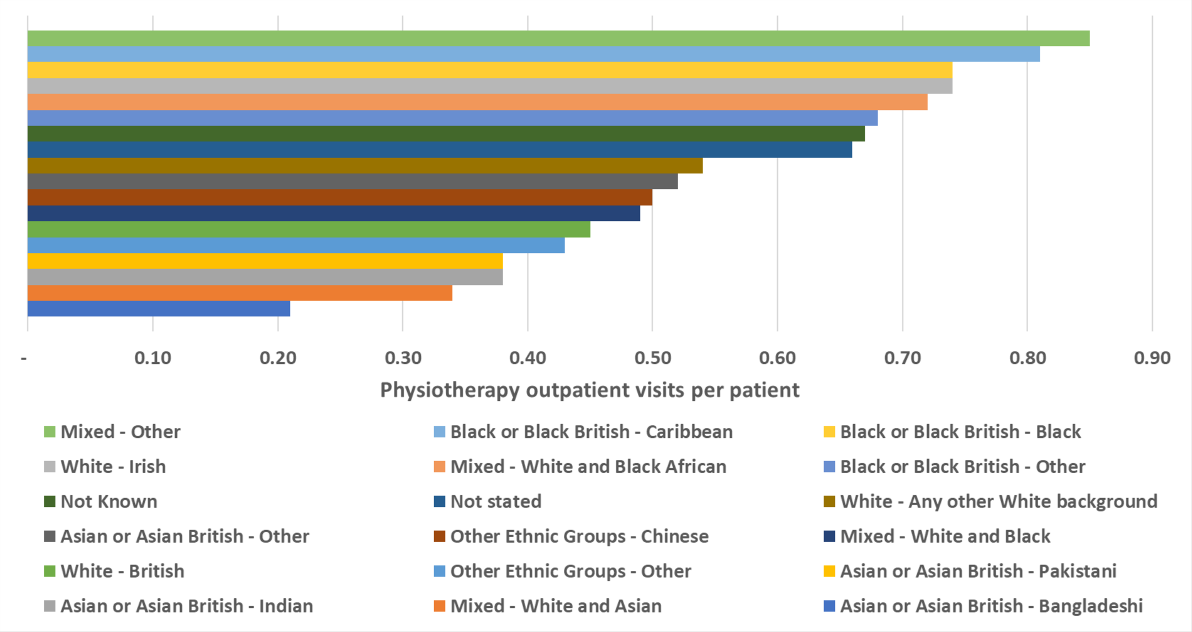
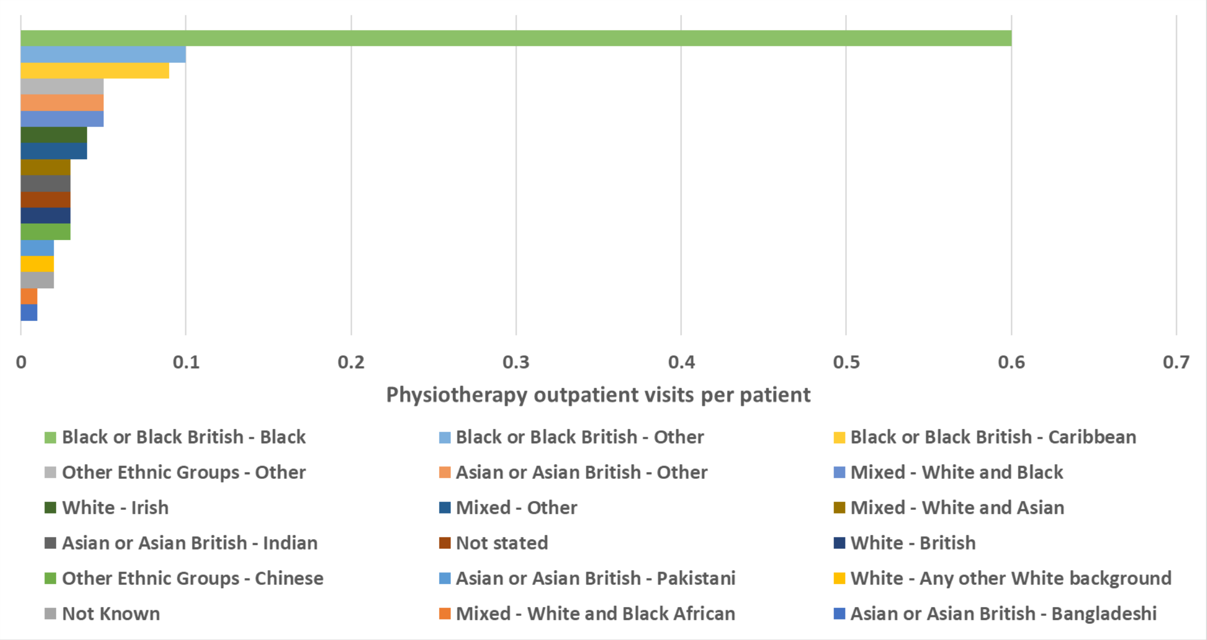


Figure 26 Occupational therapy outpatient appointments after breast cancer surgery by family background (during 1 April 2018 and 31 March 2020)



There were very few (~2%) male patients having breast cancer surgery but in those that did, PT and OT outpatient appointments were less common than in female patients.

Conclusion

As expected, breast cancer surgery was more common in less deprived people and age groups eligible for the NHSBSP. Overall, outpatient physiotherapy and occupational therapy visits were low, but there seemed to be more physiotherapy than occupational therapy visits, and these were more common in working-age adults. There was not much variation by deprivation and people from black family backgrounds had more physiotherapy and occupational therapy visits, which may reflect their higher likelihood of presenting with late-stage breast cancers requiring more extensive treatment and potentially more arm mobility problems.

Appendix 4: In-house analysis on comorbidities

Introduction

This analysis reports on the characteristics and previous activity in the NHS of women undergoing first-time breast cancer surgery in England.

The most common regular prescriptions in the community of these women, prevalence of polypharmacy, most common reasons for previous hospital admission and most common outpatient clinic types previously attended are all reported.

The results are presented for the whole cohort, separately for women living in the most- and least-deprived areas and by family background.

The above should provide useful proxy measures of pre-existing morbidity and variation in this by deprivation and family background.

The analysis is limited because of the exclusion of women with a breast cancer diagnosis who did not undergo a surgical treatment.

Methods

The analysis was done using Hospital Episode Statistics (HES) inpatient admissions records, linked to HES outpatients and NHS Business Services Authority (NHSBSA) primary care prescribing data, in NHS Digital’s Trusted Research Environment (TRE).

All women with a diagnosis indicating possible breast cancer and a record of admission for first-time breast surgery (OPCS-4 codes B27, B28, or B41) between 10/2019 and 03/2020 were included.

Previous activity in the NHS was reported with a buffer period before surgery to exclude any NHS activity related to the breast cancer diagnosis. The buffer periods were as follows:

- 04/2018 and 09/2018 for drug types regularly dispensed in community pharmacies
- 10/2008 and 09/2018 for the primary diagnosis associated with previous inpatient admissions
- 10/2013 and 09/2018 for outpatient clinics previously attended

The number of women with at least one instance of each activity type and the percentage of the cohort this represents was reported. Regular prescription dispensation was defined as at least 2 dispensations on separate dates within the 6-month window. Polypharmacy was measured as the count of indications the patient had a regular prescription dispensed for: analgesia, blood pressure, control of epilepsy, diabetes, hypothyroidism, lipid lowering drugs, mental health (for example, SSRIs, tricyclic antidepressants, antipsychotics), respiratory conditions (for example, bronchodilators or corticosteroids) and thrombosis prevention.

An additional analysis restricted to women aged 50 to 59 was reported for the prescription results. This allowed the impact of any age differences in explaining observed ethnic and socioeconomic inequalities to be assessed.

Summary of key findings

There were greater differences between ethnic and socioeconomic groups in community prescribing than in patterns of previous secondary care admissions and attendances.

Deprivation

Women from the most deprived groups were younger at time of admission for breast surgery. The mode age range was 50 to 54 years, compared with 65 to 59 years for women in the least-deprived areas.

Despite being younger on average, polypharmacy was greater among women from the most deprived groups. For example, 15% had more than 3 regular prescriptions compared with 5% of women in the least-deprived groups.

Lipid modifying drugs, proton pump inhibitors, blood pressure lowering drugs, analgesics and antidepressants were the most common regular prescriptions. All were more commonly taken by women from the most deprived groups. In the most deprived groups 25% of women had lipid modification, compared with only 16% in the least deprived.

Ethnicity

Black women, and Indian, Pakistani, or Bangladeshi women were younger on average at time of first admission for breast surgery.

Calcium channel blockers were more commonly being taken by black (20%) and Indian, Pakistani, or Bangladeshi (16%) women than white British women (11%) before breast cancer treatment. Biguanides were also more commonly taken by black women (9%) and Indian, Pakistani or Bangladeshi women (19%) compared with white British women (less than 7%).

Polypharmacy was considerably more common for Indian, Pakistani, or Bangladeshi women (18%) compared with white British (9%) or black (6%) women.

Review by a Pharmacy Clinical Fellow of prescribing analyses

A large part of the analysis was around prescriptions given prior to breast cancer surgery. Therefore, the team sought additional views from a Pharmacy Clinical Fellow, whose review of the findings is summarised below.

The examples below only illustrate potential interactions and adverse effects between treatments for breast cancer and prescribed medications for various other health conditions. It was beyond the scope of this review to undertake a comprehensive systematic review of such interactions and potential adverse effects.

Also, it has to be noted that individuals from deprived areas and certain familial backgrounds are more likely to receive multiple prescriptions for various health conditions in addition to their breast cancer treatment.

Breast cancer risk factors can be categorised into modifiable and non-modifiable types (Table 1) (Cancer Research UK, 2023).

Comparison of prescribing by deprivation

The analysis of comorbidities highlighted disparities in prescribing between populations in the least and most deprived areas. Generally, prescribing for many conditions was higher in the more deprived areas when compared with that of the least deprived. This provides some insight on the modifiable risk factors (see Table 1: Behavioural risk factors for breast cancer), for example:

- The most deprived cohort showed higher incidence of prescriptions for gastrointestinal problems, depression, cardiac problems, analgesics, epilepsy and diabetes. This may suggest a higher prevalence of modifiable risk factors such as decreased physical activity, overweight or obesity among these people.
- The least deprived cohorts displayed a higher rate of hormone replacement therapy (HRT) prescriptions. This aligns with a higher incidence of breast cancer observed within these groups.

Comparison of prescribing by family background

Overall, the prescribing data stratified by family background was limited and there were small numbers of people in each group. However, the analysis indicated that:

- White British populations: Showed increased prescribing rate for SSRI, proton pump inhibitors (PPIs), oestrogens, HRT, hantiepileptics, tricyclic antidepressants and a decrease in prescribing rate for calcium channel blockers.
- White Other populations: Showed increased prescribing rate for oestrogens and HRT, antidepressants, thyroid hormones and opioid analgesics. There was also

lower prescribing rate for PPIs, lipid-regulating drugs and for antihypertensives (ACE inhibitors and calcium channel blockers).

- Black populations: Showed higher rates of antihypertensive treatment prescriptions, particularly calcium channel blockers, ACE inhibitors and diuretics. PPI prescriptions were slightly below the average. The increased calcium channel blocker prescribing rate aligns with NICE guidance, recommending it as a first line treatment for hypertension.
- Indian, Pakistani and Bangladeshi populations: Showed increased prescribing rates for PPIs, lipid-regulating drugs, thyroid hormones, antidiabetic drugs, antihypertensives, vitamin D, antihistamines, corticosteroids and non-opioid analgesics. The higher prescription rates indicate increased treatment of diabetes and cardiac disease. It is unknown if this could also indicate a higher breast cancer risk.

Medication and impact on breast cancer treatment

Prescribed concomitant medications could potentially contribute to health inequalities, as they may increase the risk of breast cancer, trigger adverse effects or interact with breast cancer treatments. Such issues could contribute to inferior outcomes for some populations.

Risk of breast cancer

People on HRT have an increased risk of developing breast cancer. For example, guidance from MHRA/CHM on HRT, is based on meta-analysis which found that all systemic HRT, excluding vaginal oestrogens, increased breast cancer risk when used for longer than a year (Medicines and Healthcare products Regulatory Agency, 2019). This risk can persist for more than 10 years after discontinuing HRT. The analysis of the data showed that there was increased prescribing rate for oestrogens and HRT in people from white family backgrounds.

Interactions

SSRIs can interact with treatments used in breast cancer. For example, SSRIs can diminish the metabolism of tamoxifen and reduce its effectiveness. They could also increase the risk of breast cancer recurrence (Aurobindo Pharma-Milpharm Ltd, 2020; Joint Formulary Committee, 2023).

SSRIs may also increase the risk of adverse effects from Systemic Anti-Cancer Therapies (SACT), such as paclitaxel. Populations from more deprived areas have a higher rate of antidepressant prescriptions (13.6% versus 8.5%). This could lead to reduced effectiveness of breast cancer treatments as well as an elevated risk of adverse effects in people from deprived areas (Bristol Myers Squibb Pharmaceuticals Limited, 2021; Limited, 2021).

Additionally, tricyclic antidepressants can increase the risk of QT prolongation when used with SACT such as ribociclib (Joint Formulary Committee, 2023; Novartis Pharmaceutical UK Ltd, 2023).

The above risks could be reduced by, for example, switching to a different antidepressant or considering dose adjustments.

Prescribing proton pump inhibitors (PPIs) alongside oral SACT like neratinib may also reduce the effectiveness of breast cancer treatment by preventing the absorption of the medication (Joint Formulary Committee, 2023; Pierre Fabre Limited, 2022). As people from deprived areas and those from Indian, Pakistani or Bangladeshi family backgrounds have higher rates of PPI prescribed, there is a risk of worse outcomes for these populations as breast cancer treatment is likely to be less effective.

Similarly, multiple antiepileptics (such as phenytoin and phenobarbital) increase the metabolism of breast cancer treatments such as abemaciclib, Palbociclib (Joint Formulary Committee, 2023). Tricyclic antidepressants can increase the risk of QT prolongation when used with certain SACT therapies like ribociclib. Additionally, ACE inhibitors can increase the risk of angioedema when used with breast cancer medications such as everolimus (Joint Formulary Committee, 2023; Novartis Pharmaceutical UK Ltd, 2023).

All these interactions could affect the effectiveness of breast cancer treatments and may have a more significant impact on certain populations, such as people from deprived areas.

Also, HRT interacts with tamoxifen. However, following a diagnosis of breast cancer, HRT would typically be contraindicated and thus not administered (Eli Lilly and Company Limited, 2022).

Adverse effects

Corticosteroids can increase the risk of infections via immunosuppression, potentially leading to neutropenic sepsis in individuals undergoing breast cancer treatment (Joint Formulary Committee, 2023).

Trastuzumab and pertuzumab can raise the risk of heart failure and are advised to be used cautiously in people with uncontrolled hypertension, recent myocardial infarction and severe cardiac arrhythmias. Prescribing of these breast cancer treatments could result in poorer outcomes, for example, for the Indian, Pakistani, and Bangladeshi populations, which show an increased rate of cardiac prescriptions (Joint Formulary Committee, 2023; Roche Products Ltd, 2021; Roche Products Ltd, 2022).

Also, this may mean that individuals with pre-existing conditions like high blood pressure, predominantly from deprived groups, along with some people from non-White family backgrounds, may not be eligible to effective breast cancer treatments, potentially resulting in poorer outcomes.

The above considerations are summarised in Table 2, which also includes the rates of prescriptions in all groups combined and separately for the least and most deprived groups.

It should be noted that most of these drug interactions and adverse effects could be mitigated through a thorough medicines review. For example, in practice, concomitant medication could be substituted, reducing any inequalities in access to effective breast cancer treatments. Nevertheless, these differences indicate that some groups may face more complex and challenging breast cancer treatment decisions which may contribute to health inequalities.

Table 2 Examples of interactions between various medicines and breast cancer treatments, and the associated prescription rates by deprivation.

Concomitant medication	All	Most Deprived	Least deprived	Considerations
SSRI	11.1%	13.6% ↑	8.5% ↓	Some SSRIs can potentially interfere with the metabolism of drugs like tamoxifen, thus reducing their effectiveness and raising the risk of breast cancer recurrence. Some SSRIs can increase the risk of adverse effects of certain chemotherapy agents, such as paclitaxel.
PPI	10.3%	14.5% ↑	7.4% ↓	Prescription of some PPIs with SACTs like neratinib can impact the absorption of SACT therapies, thereby reducing its effectiveness.
ACE Inhibitors	7.2%	8.9% ↑	6.7% ↓	Increased risk of angioedema reported with everolimus.
Oestrogens and HRT	5.6%		6.8% ↑	HRT interacts with tamoxifen by opposing it's action. However, post breast cancer diagnosis, HRT is typically contraindicated and therefore not used.
Calcium Chanel Blockers	5.6%	8.7% ↑	4.4% ↓	Calcium channel blockers can impact the metabolism of drugs used to treat breast cancer, e.g., tamoxifen, potentially reducing the effectiveness of tamoxifen.
Antiepileptics	4.7%	8.6%↑		Certain antiepileptic medications (including phenytoin and phenobarbital) can increase the metabolism of specific breast cancer treatments like abemaciclib and palbociclib. This could potentially reduce their efficacy.

Abbreviations: ACE: Angiotensin-Converting Enzyme; HRT: Hormone Replacement Therapy; PPI: Proton Pump Inhibitor; SACT: Systemic Anti-Cancer Therapy; SSRI: Selective Serotonin Reuptake Inhibitor.

The supplements to this appendix present data on the most common outpatient clinic types and regular medications by deprivation and family background.

The supporting tables and figures are presented below and include:

- Figure 1. Percentage of women admitted for breast cancer surgery by age and deprivation
- Figure 2. Percentage of women admitted for breast cancer surgery by age and family background
- Table 1. Regular medications in women admitted for breast cancer surgery
- Table 2 (a-b). Regular medications in women admitted for breast cancer surgery by deprivation
- Table 3 (a-f). Regular medications in women admitted for breast cancer surgery by family background
- Figure 3. Differences in the proportion of women taking common regular medications by deprivation
- Figure 4. Differences in the proportion taking common regular medications by family background
- Table 4. Polypharmacy in women admitted for breast cancer surgery, by deprivation and family background
- Table 5. Most common reasons for inpatient admissions in women later admitted for breast cancer surgery
- Table 6 (a-b). Most common reasons for previous inpatient admissions in women later admitted for breast cancer surgery, by deprivation
- Table 7 (a-f). Most common reasons for previous inpatient admissions in women later admitted for breast cancer surgery, by family background
- Supplement 1, Table 1. Most common outpatient clinic types in women later admitted for breast cancer surgery
- Supplement 1, Table 2 (a-b). Most common outpatient clinic types in women later admitted for breast cancer surgery, by deprivation
- Supplement 1, Table 3 (a-f). Most common outpatient clinic types in women later admitted for breast cancer surgery, by family background
- Supplement 2, Table 1. Regular medications in women (aged 50 to 59 only) later admitted for breast cancer surgery

- Supplement 2, Table 2 (a-b). Regular medications in women (aged 50 to 59) later admitted for breast cancer surgery, by deprivation
- Supplement 2, Table 3 (a-f). Regular medications in women (aged 50 to 59) later admitted for breast cancer surgery, by family background

Figure 1. Percentage of women admitted for breast cancer surgery in England between 10/2019 and 04/2020, by age and deprivation

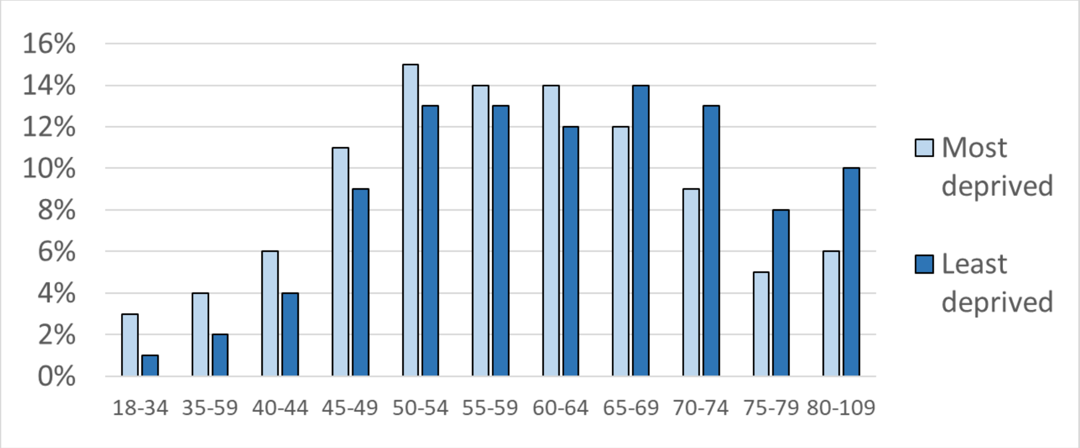


Figure 2. Percentage of women admitted for breast cancer surgery in England between 10/2019 and 04/2020, by age and family background

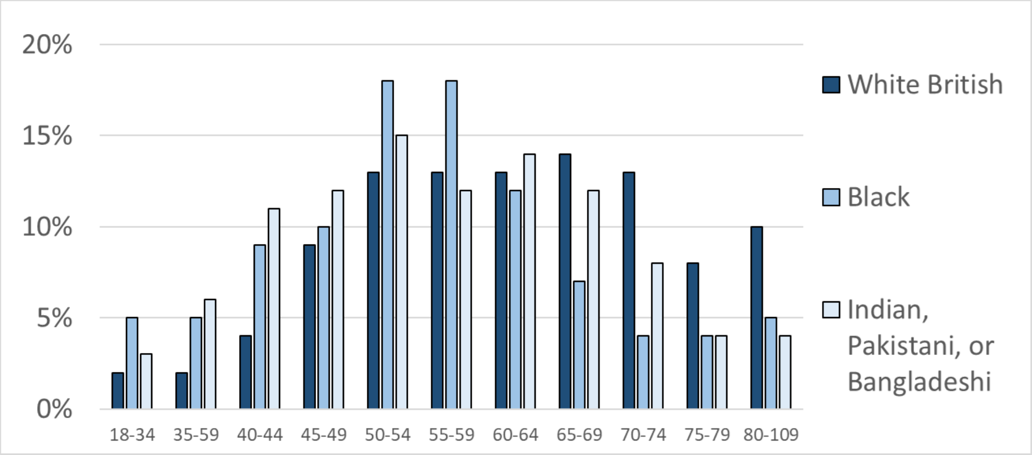


Table 1. Regular medications during 04/2018 to 09/2018 of women admitted for breast cancer surgery in England between 10/2019 and 04/2020

All patients (N = 19,564)	**N (%)**
Lipid-regulating drugs	3,708 (19.0%)
Proton pump inhibitors	3,140 (16.0%)
Calcium channel blockers	2,190 (11.2%)

Angiotensin-converting enzyme inhibitors	2,147 (11.0%)
Selective serotonin re-uptake inhibitors	1,872 (9.6%)
Non-opioid analgesics and compound prep	1,786 (9.1%)
Thyroid hormones	1,784 (9.1%)
Beta-adrenoceptor blocking drugs	1,664 (8.5%)
Angiotensin-II receptor antagonists	1,405 (7.2%)
Vitamin D	1,304 (6.7%)

Table 2 (a-b). Regular medications during 04/2018 to 09/2018 of women in the most deprived group admitted for breast cancer surgery in England between 10/2019 and 04/2020, by deprivation

a)

Most deprived (N = 2,954)	**N (%)**
Lipid-regulating drugs	726 (24.6%)
Proton pump inhibitors	572 (19.4%)
Non-opioid analgesics and compound prep	432 (14.6%)
Calcium channel blockers	400 (13.5%)
Angiotensin-converting enzyme inhibitors	375 (12.7%)
Selective serotonin re-uptake inhibitors	368 (12.5%)
Beta-adrenoceptor blocking drugs	273 (9.2%)
Thyroid hormones	259 (8.8%)
Corticosteroids (respiratory)	256 (8.7%)
Selective beta(2)-agonists	250 (8.5%)

b)

Least deprived (N = 4,612)	**N (%)**
Lipid-regulating drugs	746 (16.2%)
Proton pump inhibitors	623 (13.5%)
Angiotensin-converting enzyme inhibitors	488 (10.6%)
Calcium channel blockers	454 (9.8%)
Thyroid hormones	409 (8.9%)
Selective serotonin re-uptake inhibitors	375 (8.1%)
Beta-adrenoceptor blocking drugs	342 (7.4%)
Angiotensin-II receptor antagonists	286 (6.2%)
Thiazides and related diuretics	272 (5.9%)
Vitamin D	271 (5.9%)

Table 3 (a-f). Regular medications during 04/2018 to 09/2018 of women admitted for breast cancer surgery in England between 10/2019 and 04/2020, by family background

a)

White (British) (N = 13,821)	**N (%)**
Lipid-regulating drugs	2,814 (20.4%)
Proton pump inhibitors	2,483 (18.0%)
Angiotensin-converting enzyme inhibitors	1,650 (11.9%)
Calcium channel blockers	1,574 (11.4%)
Selective serotonin re-uptake inhibitors	1,487 (10.8%)
Non-opioid analgesics and compound prep	1,415 (10.2%)
Thyroid hormones	1,373 (9.9%)
Beta-adrenoceptor blocking drugs	1,320 (9.6%)
Angiotensin-II receptor antagonists	1,014 (7.3%)
Vitamin D	975 (7.1%)

b)

White (other) (N = 907)	**N (%)**
Lipid-regulating drugs	122 (13.5%)
Proton pump inhibitors	103 (11.4%)
Angiotensin-converting enzyme inhibitors	83 (9.2%)
Calcium channel blockers	66 (7.3%)
Selective serotonin re-uptake inhibitors	66 (7.3%)
Thyroid hormones	64 (7.1%)
Beta-adrenoceptor blocking drugs	64 (7.1%)
Non-opioid analgesics and compound prep	57 (6.3%)
Vitamin D	46 (5.1%)
Corticosteroids (respiratory)	45 (5.0%)

c)

Black (N = 398)	**N (%)**
Calcium channel blockers	81 (20.4%)
Lipid-regulating drugs	61 (15.3%)
Biguanides	36 (9.0%)
Angiotensin-II receptor antagonists	34 (8.5%)
Proton pump inhibitors	33 (8.3%)
Angiotensin-converting enzyme inhibitors	33 (8.3%)
Thiazides and related diuretics	30 (7.5%)

Non-opioid analgesics and compound prep	26 (6.5%)
Antihistamines	21 (5.3%)
Corticosteroids (respiratory)	17 (4.3%)

d)

Indian, Pakistani, or Bangladeshi (N = 534)	**N (%)**
Lipid-regulating drugs	150 (28.1%)
Proton pump inhibitors	105 (19.7%)
Biguanides	103 (19.3%)
Vitamin D	91 (17.0%)
Non-opioid analgesics and compound prep	85 (15.9%)
Calcium channel blockers	84 (15.7%)
Angiotensin-II receptor antagonists	67 (12.5%)
Angiotensin-converting enzyme inhibitors	55 (10.3%)
Thyroid hormones	53 (9.9%)
Corticosteroids (respiratory)	48 (9.0%)

e)

Family background not known (N = 3,155)	**N (%)**
Lipid-regulating drugs	450 (14.3%)
Proton pump inhibitors	342 (10.8%)
Calcium channel blockers	305 (9.7%)
Angiotensin-converting enzyme inhibitors	274 (8.7%)
Selective serotonin re-uptake inhibitors	252 (8.0%)
Thyroid hormones	242 (7.7%)
Angiotensin-II receptor antagonists	189 (6.0%)
Thiazides and related diuretics	182 (5.8%)
Beta-adrenoceptor blocking drugs	181 (5.7%)
Non-opioid analgesics and compound prep	161 (5.1%)

f)

Other family background (N = 641)	**N (%)**
Lipid-regulating drugs	97 (15.1%)
Calcium channel blockers	66 (10.3%)
Proton pump inhibitors	64 (10.0%)
Angiotensin-II receptor antagonists	51 (8.0%)
Biguanides	47 (7.3%)
Angiotensin-converting enzyme inhibitors	42 (6.6%)
Vitamin D	42 (6.6%)

Beta-adrenoceptor blocking drugs	40 (6.2%)
Thyroid hormones	38 (5.9%)
Non-opioid analgesics and compound prep	33 (5.1%)

Figure 3. Differences in the proportion of women taking common regular medications, by deprivation

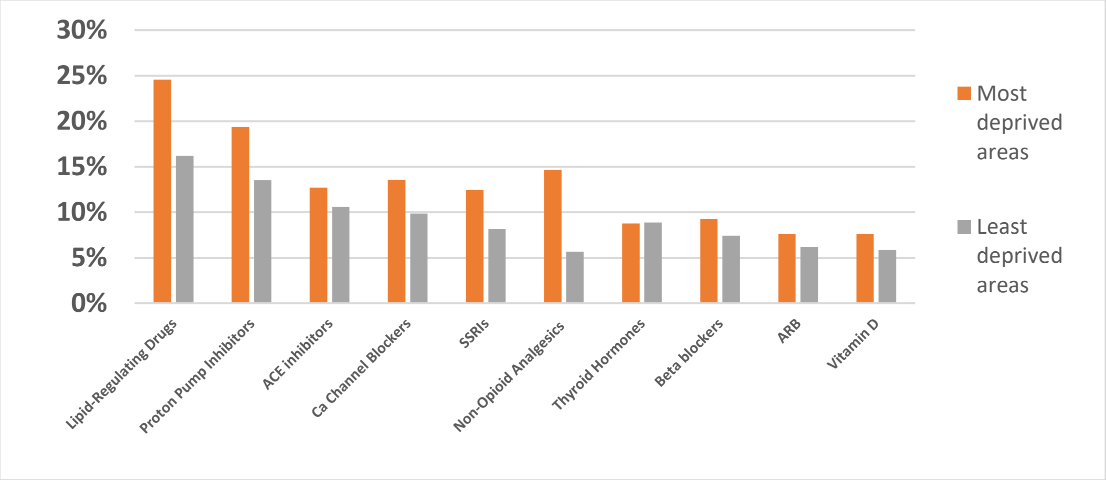


Figure 4. Differences in the proportion taking common regular medications between white women, black women, and Indian, Pakistani, or Bangladeshi women

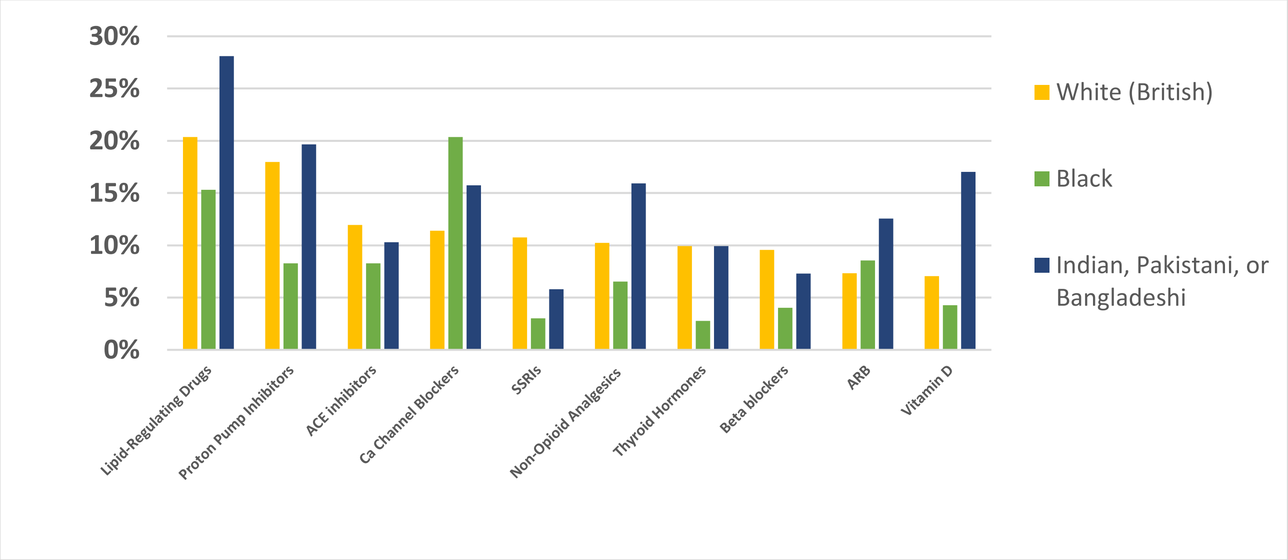


Table 4. Polypharmacy during 04/2018 to 09/2018 of women admitted for breast cancer surgery in England between 10/2019 and 04/2020, by deprivation and family background

	0 regular prescriptions	**1 regular prescriptions**	**2 regular prescriptions**	**3 regular prescriptions**	**More than 3 regular prescriptions**
All women	9,775 (50.0%)	3,780 (19.3%)	2,615 (13.4%)	1,725 (8.8%)	1,670 (8.5%)
Most deprived	1,325 (44.8%)	485 (16.4%)	375 (12.7%)	320 (10.8%)	450 (15.2%)
Least deprived	2,440 (52.9%)	1,015 (22.0%)	565 (12.3%)	350 (7.6%)	240 (5.2%)
White (British)	6,365 (46.1%)	2,830 (20.5%)	1,990 (14.4%)	1,345 (9.7%)	1,290 (9.3%)
White (other)	575 (63.6%)	125 (13.8%)	95 (10.5%)	50 (5.5%)	60 (6.6%)
Black	240 (59.8%)	70 (17.6%)	40 (10.1%)	25 (6.3%)	25 (6.3%)
Indian, Pakistani, or Bangladeshi	250 (46.6%)	70 (13.1%)	60 (11.2%)	60 (11.2%)	95 (17.8%)
Ethnicity not known	1,855 (58.8%)	580 (18.4%)	360 (11.4%)	190 (6.0%)	170 (5.4%)
Other ethnicity	420 (65.7%)	90 (14.0%)	60 (9.4%)	45 (7.0%)	25 (3.9%)

Note that the number of regular prescriptions counts only distinct prescriptions for the following separate indications: analgesia, blood pressure, control of epilepsy, diabetes, hypothyroidism, lipid lowering drugs, mental health, respiratory conditions, thrombosis prevention.
Numbers of patients are rounded to the nearest 5

Table 5. Most common reasons for inpatient admissions during 10/2008 to 09/2018 of women later admitted for breast cancer surgery in England between 10/2019 and 04/2020

All patients (N = 19,564)	**N (%)**
Abdominal and pelvic pain	909 (4.6%)
Pain in throat and chest	884 (4.5%)
Other cataract	712 (3.6%)
Gonarthrosis [arthrosis of knee]	621 (3.2%)
Diverticular disease of intestine	600 (3.1%)
Gastritis and duodenitis	566 (2.9%)

Cholelithiasis	554 (2.8%)
Senile cataract	546 (2.8%)
Dorsalgia	471 (2.4%)
Other disorders of urinary system	424 (2.2%)

Table 6 (a-b). Most common reasons for previous inpatient admissions during 10/2008 to 09/2018 of women later admitted for breast cancer surgery in England between 10/2019 and 04/2020, by deprivation

a)

Most deprived (N = 2,954)	**N (%)**
Pain in throat and chest	176 (6.0%)
Abdominal and pelvic pain	175 (5.9%)
Gonarthrosis [arthrosis of knee]	114 (3.9%)
Other cataract	113 (3.8%)
Gastritis and duodenitis	107 (3.6%)
Dorsalgia	88 (3.0%)
Diverticular disease of intestine	85 (2.9%)
Cholelithiasis	81 (2.7%)
Senile cataract	78 (2.6%)
Other disorders of urinary system	75 (2.5%)

b)

Least deprived (N = 4,612)	**N (%)**
Other cataract	166 (3.6%)
Abdominal and pelvic pain	163 (3.5%)
Pain in throat and chest	162 (3.5%)
Diverticular disease of intestine	150 (3.3%)
Gonarthrosis [arthrosis of knee]	140 (3.0%)
Cholelithiasis	117 (2.5%)
Senile cataract	116 (2.5%)
Perineal laceration during delivery	115 (2.5%)
Gastritis and duodenitis	115 (2.5%)
Coxarthrosis [arthrosis of hip]	112 (2.4%)

Table 7 (a-f). Most common reasons for previous inpatient admissions during 10/2008 to 09/2018 of women later admitted for breast cancer surgery in England between 10/2019 and 04/2020, by family background

a)

White (British) (N = 13,821)	**N (%)**
Abdominal and pelvic pain	701 (5.1%)
Pain in throat and chest	662 (4.8%)
Other cataract	532 (3.8%)
Gonarthrosis [arthrosis of knee]	502 (3.6%)
Diverticular disease of intestine	493 (3.6%)
Cholelithiasis	443 (3.2%)
Gastritis and duodenitis	430 (3.1%)
Senile cataract	423 (3.1%)
Dorsalgia	374 (2.7%)
Coxarthrosis [arthrosis of hip]	359 (2.6%)

b)

White (other) (N = 907)	**N (%)**
Perineal laceration during delivery	47 (5.2%)
Abdominal and pelvic pain	38 (4.2%)
Pain in throat and chest	26 (2.9%)
Labour and delivery complicated by fetal stress [distress]	25 (2.8%)
Gastritis and duodenitis	25 (2.8%)
Diverticular disease of intestine	24 (2.6%)
Dorsalgia	22 (2.4%)
Maternal care for other conditions predominantly related to pregnancy	22 (2.4%)
Cholelithiasis	21 (2.3%)
Other cataract	21 (2.3%)

c)

Black (N = 398)	**N (%)**
Leiomyoma of uterus	31 (7.8%)
Pain in throat and chest	22 (5.5%)
Labour and delivery complicated by fetal stress [distress]	22 (5.5%)
Gastritis and duodenitis	19 (4.8%)
Other cataract	17 (4.3%)
Abdominal and pelvic pain	14 (3.5%)
Perineal laceration during delivery	13 (3.3%)

Maternal care for other conditions predominantly related to pregnancy	12 (3.0%)
Dental caries	12 (3.0%)
Maternal care for known or suspected abnormality of pelvic organs	11 (2.8%)

d)

Indian, Pakistani, or Bangladeshi (N = 534)	**N (%)**
Pain in throat and chest	53 (9.9%)
Abdominal and pelvic pain	45 (8.4%)
Other cataract	35 (6.6%)
Perineal laceration during delivery	27 (5.1%)
Gastritis and duodenitis	25 (4.7%)
Gonarthrosis [arthrosis of knee]	24 (4.5%)
Senile cataract	20 (3.7%)
Cholelithiasis	20 (3.7%)
Labour and delivery complicated by fetal stress [distress]	18 (3.4%)
Supervision of normal pregnancy	17 (3.2%)

e)

Not known (N = 3,155)	**N (%)**
Pain in throat and chest	85 (2.7%)
Abdominal and pelvic pain	81 (2.6%)
Other cataract	81 (2.6%)
Senile cataract	69 (2.2%)
Diverticular disease of intestine	69 (2.2%)
Gonarthrosis [arthrosis of knee]	52 (1.6%)
Cholelithiasis	51 (1.6%)
Excessive, frequent and irregular menstruation	47 (1.5%)
Other diseases of intestine	47 (1.5%)
Gastro-oesophageal reflux disease	46 (1.5%)

f)

Other (N = 641)	**N (%)**
Pain in throat and chest	32 (5.0%)
Abdominal and pelvic pain	27 (4.2%)
Other cataract	25 (3.9%)
Gastritis and duodenitis	21 (3.3%)
Polyp of female genital tract	20 (3.1%)
Leiomyoma of uterus	17 (2.7%)
Gonarthrosis [arthrosis of knee]	17 (2.7%)
Perineal laceration during delivery	15 (2.3%)

Maternal care for other known or suspected fetal problems	15 (2.3%)
Dorsalgia	14 (2.2%)

Supplement 1 - Most common outpatient clinic types

Supplement 1, Table 1. Most common outpatient clinic types attended between 10/2013 and 09/2018 of women later admitted for breast cancer surgery in England between 10/2019 and 04/2020

All patients (N = 19,564)	**N (%)**
Trauma & orthopaedics	4,697 (24.0%)
Diagnostic imaging	3,559 (18.2%)
Ophthalmology	3,527 (18.0%)
Gynaecology	3,440 (17.6%)
Physiotherapy	2,822 (14.4%)
Breast Surgery	2,487 (12.7%)
Ear, nose & throat (ENT)	2,371 (12.1%)
Cardiology	2,366 (12.1%)
General surgery	2,351 (12.0%)
Dermatology	2,260 (11.6%)

Supplement 1, Table 2 (a-b). Most common outpatient clinic types between 10/2013 and 09/2018 in women later admitted for breast cancer surgery in England between 10/2019 and 04/2020, by deprivation

a)

Most deprived (N = 2,954)	**N (%)**
Trauma & orthopaedics	726 (24.6%)
Gynaecology	575 (19.5%)
Diagnostic imaging	546 (18.5%)
Ophthalmology	524 (17.7%)
Physiotherapy	447 (15.1%)
General surgery	410 (13.9%)
Cardiology	387 (13.1%)
Breast Surgery	380 (12.9%)
Ear, nose & throat (ENT)	380 (12.9%)
Gastroenterology	293 (9.9%)

b)

Least deprived (N = 4,612)	**N (%)**
Trauma & orthopaedics	1,098 (23.8%)
Diagnostic imaging	873 (18.9%)
Ophthalmology	856 (18.6%)
Gynaecology	764 (16.6%)
Physiotherapy	659 (14.3%)
Dermatology	576 (12.5%)
Breast surgery	575 (12.5%)
Cardiology	544 (11.8%)
Ear, nose & throat (ENT)	514 (11.1%)
General surgery	509 (11.0%)

Supplement 1, Table 3 (a-f). Most common outpatient clinic types between 10/2013 and 09/2018 in women later admitted for breast cancer surgery in England between 10/2019 and 04/2020, by family background

a)

White (British) (N = 13,821)	**N (%)**
Trauma & orthopaedics	3,696 (26.7%)
Ophthalmology	2,632 (19.0%)
Gynaecology	2,458 (17.8%)
Diagnostic imaging	2,386 (17.3%)
Physiotherapy	2,127 (15.4%)
Breast surgery	1,865 (13.5%)
General surgery	1,829 (13.2%)
Ear, nose & throat (ENT)	1,792 (13.0%)
Cardiology	1,762 (12.7%)
Dermatology	1,760 (12.7%)

b)

White (other) (N = 907)	**N (%)**
Diagnostic imaging	232 (25.6%)
Trauma & orthopaedics	181 (20.0%)
Gynaecology	164 (18.1%)
Physiotherapy	125 (13.8%)
Ophthalmology	122 (13.5%)
Breast surgery	116 (12.8%)

General surgery	92 (10.1%)
Dermatology	92 (10.1%)
Cardiology	88 (9.7%)
Ear, nose & throat (ENT)	85 (9.4%)

c)

Black (N = 398)	**N (%)**
Diagnostic imaging	124 (31.2%)
Gynaecology	110 (27.6%)
Ophthalmology	74 (18.6%)
Trauma & orthopaedics	73 (18.3%)
Cardiology	62 (15.6%)
Physiotherapy	61 (15.3%)
Breast surgery	60 (15.1%)
General surgery	42 (10.6%)
Ear, nose & throat (ENT)	38 (9.5%)
Rheumatology	34 (8.5%)

d)

Indian, Pakistani, or Bangladeshi (N = 534)	**N (%)**
Diagnostic imaging	150 (28.1%)
Ophthalmology	127 (23.8%)
Trauma & orthopaedics	118 (22.1%)
Gynaecology	110 (20.6%)
Cardiology	89 (16.7%)
Ear, nose & throat (ENT)	85 (15.9%)
General surgery	70 (13.1%)
Physiotherapy	69 (12.9%)
Gastroenterology	59 (11.0%)
Breast surgery	58 (10.9%)

e)

Not known (N = 3,155)	**N (%)**
Trauma & orthopaedics	524 (16.6%)
Diagnostic imaging	476 (15.1%)
Ophthalmology	449 (14.2%)
Gynaecology	443 (14.0%)
Physiotherapy	361 (11.4%)
Breast surgery	301 (9.5%)
Ear, nose & throat (ENT)	285 (9.0%)

Dermatology	284 (9.0%)
Cardiology	275 (8.7%)
General surgery	248 (7.9%)

f)

Other (N = 641)	**N (%)**
Diagnostic imaging	161 (25.1%)
Gynaecology	123 (19.2%)
Ophthalmology	102 (15.9%)
Trauma & orthopaedics	89 (13.9%)
Cardiology	78 (12.2%)
Ear, nose & throat (ENT)	72 (11.2%)
Breast surgery	69 (10.8%)
Physiotherapy	67 (10.5%)
General surgery	57 (8.9%)
Gastroenterology	43 (6.7%)

Supplement 2 - Regular medications of women (aged 50 to 59) admitted for breast cancer surgery

Supplement 2, Table 1. Regular medications between 04/2018 and 09/2018 of women (aged 50 to 59) admitted for breast cancer surgery in England between 10/2019 and 04/2020

All patients (N = 5,247)	**N (%)**
Selective serotonin re-uptake inhibitors	581 (11.1%)
Proton pump inhibitors	543 (10.3%)
Lipid-regulating drugs	380 (7.2%)
Angiotensin-converting enzyme inhibitors	376 (7.2%)
Thyroid hormones	373 (7.1%)
Oestrogens and hormone replacement therapy	294 (5.6%)
Calcium channel blockers	293 (5.6%)
Non-opioid analgesics and compound prep	262 (5.0%)
Control of epilepsy	249 (4.7%)
Tricyclic & related antidepressant drugs	248 (4.7%)

Supplement 2, Table 2 (a-b). Regular medications between 04/2018 and 09/2018 of women (aged 50 to 59) admitted for breast cancer surgery in England between 10/2019 and 04/2020, by deprivation

a)

Most deprived (N = 840)	**N (%)**
Proton pump inhibitors	122 (14.5%)
Selective serotonin re-uptake inhibitors	114 (13.6%)
Lipid-regulating drugs	102 (12.1%)
Non-opioid analgesics and compound prep	85 (10.1%)
Angiotensin-converting enzyme inhibitors	75 (8.9%)
Calcium channel blockers	73 (8.7%)
Control of epilepsy	72 (8.6%)
Thyroid hormones	62 (7.4%)
Selective beta(2)-agonists	59 (7.0%)
Biguanides	55 (6.5%)

b)

Least deprived (N = 1,217)	**N (%)**
Selective serotonin re-uptake inhibitors	103 (8.5%)
Proton pump inhibitors	90 (7.4%)
Oestrogens and hormone replacement therapy	83 (6.8%)
Angiotensin-converting enzyme inhibitors	81 (6.7%)
Thyroid hormones	77 (6.3%)
Calcium channel blockers	54 (4.4%)
Lipid-regulating drugs	47 (3.9%)
Corticosteroids (respiratory)	44 (3.6%)
Tricyclic & related antidepressant drugs	44 (3.6%)
Selective beta(2)-agonists	36 (3.0%)

Supplement 2, Table 3 (a-f). Regular medications between 04/2018 and 09/2018 in women (aged 50 to 59) admitted for breast cancer surgery in England between 10/2019 and 04/2020, by family background

a)

White British (N = 3,525)	**N (%)**
Selective serotonin re-uptake inhibitors	445 (12.6%)

Proton pump inhibitors	403 (11.4%)
Angiotensin-converting enzyme inhibitors	275 (7.8%)
Lipid-regulating drugs	267 (7.6%)
Thyroid hormones	264 (7.5%)
Oestrogens and hormone replacement therapy	219 (6.2%)
Tricyclic & related antidepressant drugs	198 (5.6%)
Control of epilepsy	189 (5.4%)
Non-opioid analgesics and compound prep	185 (5.2%)
Calcium channel blockers	174 (4.9%)

b)

White other (N= 250)	**N (%)**
Selective serotonin re-uptake inhibitors	29 (11.6%)
Proton pump inhibitors	23 (9.2%)
Thyroid hormones	21 (8.4%)
Angiotensin-converting enzyme inhibitors	15 (6.0%)
Lipid-regulating drugs	15 (6.0%)
Non-opioid analgesics and compound prep	12 (4.8%)
Opioid analgesics	12 (4.8%)
Oestrogens and hormone replacement therapy	12 (4.8%)
Calcium channel blockers	11 (4.4%)
Other antidepressant drugs	10 (4.0%)

c)

Black (N= 142)	**N (%)**
Calcium channel blockers	35 (24.6%)
Proton pump inhibitors	13 (9.2%)
Angiotensin-converting enzyme inhibitors	13 (9.2%)
Thiazides and related diuretics	10 (7.0%)
[all numbers less than 10 suppressed]	

d)

Indian, Pakistani, or Bangladeshi (N = 142)	**N (%)**
Lipid-regulating drugs	25 (17.6%)
Proton pump inhibitors	22 (15.5%)
Biguanides	20 (14.1%)
Thyroid hormones	17 (12.0%)
Non-opioid analgesics and compound prep	17 (12.0%)
Vitamin D	14 (9.9%)
Corticosteroids (respiratory)	11 (7.7%)

Antihistamines	11 (7.7%)
Angiotensin-II receptor antagonists	11 (7.7%)
Other antidiabetic drugs	11 (7.7%)

e)

Not known (N = 970)	**N (%)**
Selective serotonin re-uptake inhibitors	89 (9.2%)
Proton pump inhibitors	62 (6.4%)
Thyroid hormones	60 (6.2%)
Oestrogens and hormone replacement therapy	53 (5.5%)
Angiotensin-converting enzyme inhibitors	52 (5.4%)
Calcium channel blockers	51 (5.3%)
Lipid-regulating drugs	46 (4.7%)
Corticosteroids (respiratory)	42 (4.3%)
Selective beta(2)-agonists	33 (3.4%)
Control of epilepsy	29 (3.0%)

f)

Other (N = 185)	**N (%)**
Proton pump inhibitors	18 (9.7%)
Lipid-regulating drugs	15 (8.1%)
Biguanides	13 (7.0%)
Calcium channel blockers	11 (5.9%)
Angiotensin-II receptor antagonists	11 (5.9%)
Vitamin D	10 (5.4%)
[all numbers less than 10 suppressed]	

References

Abdi S, Spann A, Borilovic J, et al. (2019) Understanding the care and support needs of older people: A scoping review and categorisation using the WHO international classification of functioning, disability and health framework (ICF) *BMC Geriatrics* 19 (1): 1-15.

Asif Z and Kienzler H (2022) Structural barriers to refugee, asylum seeker and undocumented migrant healthcare access. Perceptions of Doctors of the World caseworkers in the UK. *SSM-Mental Health* 2: 1-10.

Aspinall PJ (2014) Hidden needs identifying key vulnerable groups in data collections: vulnerable migrants, Gypsies and Travellers, homeless people, and sex workers.

Aurobindo Pharma-Milpharm Ltd (2020) Fluoxetine 20mg Capsules summary of product of characteristics. Electronic Medicines Compendium Available
Bentzen SM and Dische S (2000) Morbidity related to axillary irradiation in the treatment of breast cancer *Acta Oncologica* 39 (3): 337-347.

Bhola J, Jain A and Foden P (2015) Impact of index of multiple deprivation and ethnicity on breast screening uptake in the North West of England *Breast Cancer Research 2015 17:1* 17 (1): 1-13.

Breakthrough Breast Cancer (2013) The report of the parliamentary inquiry into older age and breast cancer.

Breast Cancer Care (2011) Breast cancer and inequalities: a review of the evidence Summary personal experience professional support.

Bristol Myers Squibb Pharmaceuticals Limited (2021) Abraxane 5mg/mL powder for dispersion for infusion summary of product of characteristics. Electronic Medicines Compendium. .

British Medical Association (2019) Delayed, deterred, and distressed: The impact of NHS overseas charging regulations on patients and the doctors who care for them Delayed, deterred, and distressed: The impact of NHS overseas charging regulations on patients and the doctors who care for them.

Caleyachetty R, Barber TM, Mohammed NI, et al. (2021) Ethnicity-specific BMI cutoffs for obesity based on type 2 diabetes risk in England: a population-based cohort study *Lancet Diabetes Endocrinol* 9 (7): 419-426.

Cancer Research UK (2023) Risk factors for breast cancer.

Condon L, Curejova J, Morgan DL, et al. (2021) Knowledge and experience of cancer prevention and screening among Gypsies, Roma and Travellers: a participatory qualitative study *BMC Public Health* 21 (1): 1-11.

Dandamudi A, Tommie J, Nommsen-Rivers L, et al. (2018) Dietary Patterns and Breast Cancer Risk: A Systematic Review *Anticancer Res* 38 (6): 3209-3222.

Eli Lilly and Company Limited (2022) Verzenios 100mg film-coated tablets, Summary of Product of Characteristics. Electronic Medicines Compendium.

Eversley R, Estrin D, Dibble S, et al. (2005) Post-Treatment Symptoms Among Ethnic Minority Breast Cancer Survivors - ProQuest *Oncology Nursing Forum*: 250-256.

Fakhri N, Chad MA, Lahkim M, et al. (2022) Risk factors for breast cancer in women: an update review *Med Oncol* 39 (12): 197.

Floud S, Barnes I, Verfurden M, et al. (2017) Disability and participation in breast and bowel cancer screening in England: a large prospective study *Br J Cancer* 117 (11): 1711-1714.

Gathani T, Ali R, Balkwill A, et al. (2014) Ethnic differences in breast cancer incidence in England are due to differences in known risk factors for the disease: Prospective study *British Journal of Cancer* 110 (1): 224-229.

Gathani T, Chaudhry A, Chagla L, et al. (2021) Ethnicity and breast cancer in the UK: Where are we now? *European Journal of Surgical Oncology* 47 (12): 2978-2981.

Gathani T, Chiuri K, Broggio J, et al. (2021) Ethnicity and the surgical management of early invasive breast cancer in over 164 000 women *British Journal of Surgery* 108 (5): 528-533.

Geller BM, Vacek PM, O'Brien P, et al. (2004) Factors Associated with Arm Swelling after Breast Cancer Surgery *Journal of women's health* 12 (9): 921-930.

House of Commons Justice Committee (2022) Women in Prison. First Report of Session 2022–23.

Jack RH, Davies EA and Møller H (2012) Breast cancer and age in Black and White women in South East England *UICC International Journal of Cancer IJC* 130: 1227-1229.

Jack RH, Møller H, Robson T, et al. (2014) Breast cancer screening uptake among women from different ethnic groups in London: a population-based cohort study *bmjopen.bmj.com*.

Jack RH, Robson T and Davies EA (2016) The varying influence of socioeconomic deprivation on breast cancer screening uptake in London *Journal of public health (Oxford, England)* 38 (2): 330-334.

Joint Formulary Committee (2023) British National Formulary (Online) (10/02/2023).

LGBT Foundation (2020) Hidden Figures: LGBT Health Inequalities in the UK.

Limited BMSP (2021) Abraxane 5mg/mL powder for dispersion for infusion summary of product of characteristics. Electronic Medicines Compendium. .

Macacu A, Autier P, Boniol M, et al. (2015) Active and passive smoking and risk of breast cancer: a meta-analysis *Breast Cancer Res Treat* 154 (2): 213-24.

Macmillan cancer support (2019) Health Inequalities: Time to Talk.

MacMillan Cancer Support (2020) Prevalence by cancer type, nation, sex and year.

Macmillan cancer support (2014) The Rich Picture on people with cancer.

Manchester Clinical Commissioning Group (2020) Engaging with Disabled People on Experiences of-and Barriers to-Accessing NHS Screening Programmes Final Project Report.

Marmot MG, Altman DG, Cameron DA, et al. (2013) The benefits and harms of breast cancer screening: an independent review *British Journal of Cancer 2013 108:11* 108 (11): 2205-2240.

McKenzie F, Ives A and Jeffreys M (2012) Socio-economic inequalities in survival from screen-detected breast cancer in South West England: population-based cohort study *European journal of public health* 22 (3): 418-422.

Medicines and Healthcare products Regulatory Agency (2019) Hormone replacement therapy (HRT): further information on the known increased risk of breast cancer with HRT and its persistence after stopping. (21/07/2023).

Meeske KA, Sullivan-Halley J, Smith AW, et al. (2008) Risk factors for arm lymphedema following breast cancer diagnosis in Black women and White women *Breast Cancer Research and Treatment 2008 113:2* 113 (2): 383-391.

Morris M, Woods LM, Rogers N, et al. (2015) Ethnicity, deprivation and screening: survival from breast cancer among screening-eligible women in the West Midlands diagnosed from 1989 to 2011 *British journal of cancer* 113 (3): 548-555.

NHS Digital (2022) NHS Breast Screening Programme Statistics 2020-21.

NHS Digital (2020) Statistics on Alcohol, England.

Novartis Pharmaceutical UK Ltd (2023) Kisquali 200mg film-coated tablets, Summary of Product of Characteristics. Electronic Medicines Compendium. (10/02/2023).

Petrek JA, Senie RT, Peters M, et al. (2001) Lymphedema in a Cohort of Breast Carcinoma Survivors 20 Years after Diagnosis.

Pierre Fabre Limited (2022) Nerlynx 40mg film coated tablets, summary of product of characteristics. Electronic Medicines Compendium. (10/02/2023).

Quirion E (2010) CE ARTICLE: Recognizing and treating upper extremity lymphedema in postmastectomy/lumpectomy patients: A guide for primary care providers *Journal of the American Academy of Nurse Practitioners* 22 (9): 450-459.

Roche Products Ltd (2021) Herceptin 150mg Powder for concentrate for solution for infusion, Summary of Product of Characteristics. Electronic Medicines Compendium. (10/02/2023).

Roche Products Ltd (2022) Perjeta 420mg Concentrate for solution for infusion, Summary of Product of Characteristics. Electronic Medicines Compendium. (10/02/2023).

The International Longevity Centre (2008) Health Issues Affecting Older Gay, Lesbian and Bisexual People in the UK A Policy Brief

Woodhead C, Cunningham R, Ashworth M, et al. (2016) Cervical and breast cancer screening uptake among women with serious mental illness: a data linkage study *BMC Cancer* 16 (1): 819.

Other resources

Action on smoking and health (2019) Tobacco and Ethnic Minorities.

Aldridge RW, Menezes D, Lewer D, et al. (2019) Causes of death among homeless people: a population-based cross-sectional study of linked hospitalisation and mortality data in England. *Wellcome open research*, 4.

All Party Parliamentary Group on Refugees (2017) Refugees Welcome? The Experience of New Refugees in the UK.

All-Party Parliamentary Group on Breast Cancer (2018) A Mixed Picture: An Inquiry into Geographical Inequalities and Breast Cancer.

Aurobindo Pharma-Milpharm Ltd (2020), Fluoxetine 20mg capsules summary of product of characteristics. Electronic Medicines Compendium.

Black Women Rising (2020) The 100 Women Survey.

Breakthrough Breast Cancer (2013) Age is just a number. The report of the parliamentary inquiry into older age and breast cancer.

Breakthrough UK (2020) Engaging with disabled people on experiences of and barriers to accessing NHS screening programmes.

Breast Cancer UK (2016) Does night shift work increase your risk of breast cancer?

Breast Cancer UK (2022) Breast cancer resource: Transgender and non-binary people.

British Medical Association (2018) Cancer in women – addressing unmet needs.

British Medical Association (2021) Steps to increase physical activity levels in the UK.

Cancer Research UK (2016) Breast cancer mortality statistics (21 September 2022).

Cancer Research UK (2016) Breast cancer survival statistics (21 September 2022).

Cancer Research UK (2018) Breast cancer risk (21 September 2022).

Cancer Research UK (2019) I’m trans or non-binary, does this affect my cancer screening? (21 September 2022).

Cancer Research UK (2020) Breast cancer in men (17 October 2022).

Cancer Research UK (2020) Possible problems after mastectomy (07 October 2022).

Cancer Research UK (2020) Risk factors (21 September 2022).

Cancer Research UK (2021) Breast cancer incidence (invasive) statistics (21 September 2022).

Cancer Research UK (2021) Improving cancer care for the LGBTQ+ community (21 September 2022).

Cancer Research UK (2022) Breast cancer statistics (14 December 2023).

Care Quality Commission (2022) Provider collaboration review: ensuring the provision of cancer services.

Centre for Ageing Better (2017) Inequalities in later life.

Delon C, Brown KF, Payne NW, et al. (2022) Differences in cancer incidence by broad ethnic group in England, 2013–2017 *British Journal of Cancer*: 1-9.

Department for Digital, Culture, Media and Sport (2019) Ethnicity facts and figures. Physical inactivity.

Dowling D (2016) Narratives of women’s breast cancer experience and how this impacts on their working lives (Doctoral dissertation, London Metropolitan University).

Equalities and Human Rights Commission (2018) Access to healthcare for people seeking and refused asylum in Great Britain: a review of evidence.

Government Equalities Office (2016) Inequality among LGB&T groups in the UK: a review of evidence.

Hillman S, Shantikumar S, Ridha A, et al. (2020) Socioeconomic status and HRT prescribing: a study of practice-level data in England *British Journal of General Practice* 70 (700): e772-777.

House of Commons Justice Committee (2022) Women in Prison. First Report of Session 2022–23.

Howard League for Penal Reform (2022) Inquiry into women's health and well-being in prisons. Briefing one.

Humphrys E, Burt J, Rubin G, et al. (2019) The influence of health literacy on the timely diagnosis of symptomatic cancer: A systematic review *European Journal of Cancer Care* 28(1), p.e12920.

Institute of Health Equity (2015) Social Inequalities in the Leading Causes of Early Death: A Life Course Approach.

Institution of Occupational Safety and Health (2017) Return to work after cancer. Occupational safety and health considerations.

International Longevity Centre UK (2008) Health Issues Affecting Older Gay, Lesbian and Bisexual People in the UK. A Policy Brief.

International Longevity Centre UK (2013) Has the Sisterhood forgotten older women?

International Longevity Centre UK (2019) Ageism in breast cancer.

Joint Formulary Committee (2023). British National Formulary (Online). London: BMJ Group and Pharmaceutical Press.

LGBT Foundation (2013) Beyond Babies and Breast Cancer.

LeDer (Learning from Lives and Deaths - People with a learning disability and autistic people, 2021). Autism and learning disability partnership, King's College, London

MacMillan Cancer Support (2018) Secondary breast cancer.

Ministry of Housing, Communities and Local Government (2020) Ethnicity facts and figures. People living in deprived neighbourhoods.

National Audit of Breast Cancer in Older Patients (2022) National Audit of Breast Cancer in Older Patients 2022 Annual Report. Summary of findings for the public and patients.

National Institute for Health and Care Excellence (2018) Early and locally advanced breast cancer: diagnosis and management (NG101).

National Institute for Health and Care Excellence (2022) Developing NICE guidelines: the manual. Glossary.

NHS (2021) When you'll be invited for breast screening and who should go (21 September 2022).

NHS Digital (2019) Breast Screening Programme, England Provisional Statistics 2018-19 (21 September 2022).

NHS Digital (2020). Health and Care of People with Learning Disabilities, Experimental Statistics: 2018 to 2019 [PAS] (14 December 2023).

NHS Digital (2021) Breast Screening Programme, England 2019-20 (21 September 2022).

NHS Digital (2021) Ethnicity facts and figures. Harmful and probable dependent drinking in adults (21 September 2022).

NHS Digital (2021) Health and Care of People with Learning Disabilities Experimental Statistics (21 September 2022).

NHS Digital (2022) Mortality from breast cancer: directly standardised rate, all ages, 3-year average (2018-20) (21 September 2022).

NHS Digital and National Disease Registration Service (2022) Cancer Data (21 September 2022).

NHS England (2022) Guidance Breast screening: reducing inequalities (21 September 2022).

NIHR Manchester Biomedical Research Centre (2020) Addressing inequalities – personalised breast cancer screening and views from British-Pakistani women (21 September 2022).

Nuffield Trust (2021) How prison health care in England works.

Nuffield Trust (2022) Inequality on the inside: Using hospital data to understand the key health care issues for women in prison.

Office for Health Improvement and Disparities (2022) Local Alcohol Profiles for England. Fingertips Public health data 2020-21 (21 September 2022).

Office for Health Improvement and Disparities (2022) Local Tobacco Control Profiles for England. Fingertips Public health data 2020-21 (17 October 2022).

Office for Health Improvement and Disparities (2022) Obesity Profile. Fingertips Public health data 2020-21 (21 September 2022).

Office for Health Improvement and Disparities (2022) Patterns and trends in adult excess weight. Fingertips Public health data 2020-21 (21 September 2022).

Office for National Statistics (2016) Cancer survival in England: Patients diagnosed between 2010 and 2014 and followed up to 2015 (21 September 2022).

Office for National Statistics (2018) Smoking inequalities in England, 2016 (28 September 2022).

Office for National Statistics (2021) Cancer registration statistics, England: 2017 (21 September 2022).

Office for National Statistics (2021) Mortality from leading causes of death by ethnic group, England and Wales (21 September 2022).

Pathway and Faculty for Homeless and Inclusion Health (2018) Faculty Standards. Homeless and Inclusion Health standards for commissioners and service providers.

Pierre Fabre Limited (2022). Nerlynx 40mg film coated tablets, summary of product characteristics. Electronic Medicines Compendium.

PinkNews (2022) Government ignored evidence on trans women’s needs when drafting landmark health strategy (21 September 2022).

Public Health England (2015) Guidance. Local action on health inequalities: improving health literacy (21 September 2022).

Public Health England (2018) Breast screening performance report shows we are detecting cancers early but uptake is falling.

Public Health England (2018) Health inequalities: reducing ethnic inequalities. Guidance to support local and national action on ethnic inequalities in health.

Public Health England (2019) Which population groups are more likely to delay presentation with cancer symptoms and are more frequently diagnosed with late stage cancer, and why?

Public Health England (2021) Guidance. NHS population screening: improving access for people in secure and detained settings.

Public Health England (2021) Guidance. Physical activity: understanding and addressing inequalities.

Race Equality Foundation (2018) Cancer and black and minority ethnic communities.

Rafia R, Brennan A, Madan J, et al. (2016) Modeling the cost-effectiveness of alternative upper age limits for breast cancer screening in England and Wales *Value in Health* 19:404-12.

Roche Products Ltd (2021). Herceptin 150mg Powder for concentrate for solution for infusion, summary of product characteristics. Electronic Medicines Compendium.

Roche Products Ltd (2022). Perjeta 420mg Concentrate for solution for infusion, summary of product characteristics. Electronic Medicines Compendium.

The King's Fund (2011) How to improve cancer survival: Explaining England's relatively poor rates.

The King's Fund (2021) The health of people from ethnic minority groups in England.

TUC (2021) BME workers on zero-hours contracts.

UK National Screening Committee (2019) Adult screening programme. Breast Cancer (21 September 2022).

UK Parliament (2019) Tackling inequalities faced by Gypsy, Roma and Traveller communities.

UK Parliament (2022) Research Briefing. Obesity Statistics.

Wessex Voices (2021) A systematic review of people’s experiences of breast screening - A rich and diverse picture.