

## Topic Area: Cancer

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### Introduction

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*Cancer is a disease in which abnormal cells divide in an uncontrolled way and eventually invade other tissues. The abnormal cells can form growths, called tumours, and spread to other parts of the body causing secondary tumours called metastases.*

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### Who's at risk and why?

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The risk of developing cancer depends on a combination of factors that cannot be changed, such as age, sex or genetic predisposition (family history) and 'modifiable' risks dictated by individual lifestyle choices or environmental influences.

Modifiable risks can be controlled (prevented) or treated, and addressing them is the most efficient way of reducing morbidity and mortality from a range of common conditions. It is estimated that at least 4 out of 10 cancers (42%) could be prevented by appropriate lifestyle changes<sup>1</sup>. For Leicester, this is equivalent to around 500 new cancer cases every year.

### Non-modifiable risk factors

#### Age

The risk of developing cancer increases significantly with advancing age and more than a third (36%) of all cancers in the UK are diagnosed in people over the age of 75<sup>2</sup>. The average age at diagnosis for most common cancers, such as lung, breast, colorectal or prostate is between 60 and 70 years.

However, cancer can occur at any age, even among children and adolescents (1% of all cancers). Some types of cancer, such as bone cancer, forms of leukaemia or neuroblastoma, are much more common in younger age groups.

#### Sex

Overall, men appear to be at higher risk of developing cancer than women, although this is not a universal finding.

#### Ethnicity

In the UK, cancer is about twice as common in white or black males than in Asian males; and about 1.5 times more common among White females than Asian or black females<sup>3</sup>.

### Socio-economic deprivation

With some exceptions, for example, breast cancer in women, prostate or malignant melanoma, most cancers are more common in populations with high levels of deprivation. This is particularly true for lung, larynx, liver and stomach cancers. It is estimated that around 4% of all cancer cases in England are linked to deprivation<sup>4</sup>.

### Modifiable risk factors

Except for prostate cancer, most common cancers have been linked to a number of modifiable risk factors<sup>5</sup>. Understanding the role of modifiable risk factors in developing cancer and their contribution to the overall risk of the disease, is important for informing appropriate preventive action.

### **Tobacco smoking**

Stopping smoking is by far the most significant way of reducing the risk of developing cancer. In the UK, one in every four cancer deaths and nearly 19% of all cancer cases are due to tobacco consumption. Tobacco smoke contains over 70 harmful chemicals proven to cause cancer, both in humans and in laboratory animals<sup>6</sup>, when subjects are exposed for long enough.

Smoking is the most important cause of lung cancer (80% of cases), although other respiratory organs (throat, larynx and mouth) and even more distant parts of the body (such as bowel, bladder or pancreas) can be affected. The risk is greatest among those who smoke the most cigarettes for longest period of time, particularly if starting at an early age. Long-term smokers are 24 times more likely to develop lung cancer, than those who never smoked.

### **Diet**

There is evidence that poor dietary choices have significant impact on cancer incidence, contributing to more than 10% of all cases. They include low fruit and vegetable consumption (5%), preference for processed or red meat (3%), low fibre (2%) and high salt (1%) choices. However, so far there is no hard evidence for any specific nutrients increasing (or reducing) risk cancer in humans.

### **Obesity**

It is estimated that obesity and overweight are linked to about 5% of all cancer cases in the UK. Although the effects of obesity cannot be easily separated from those of diet or lack of physical activity, they have been independently linked to cancer of breast in post-menopausal women, and colon, rectum, endometrium (four times higher risk), oesophagus, kidney, pancreas and gallbladder cancers. Fat tissue is known to produce some carcinogenic hormones – such as oestrogens, insulin, IGF, leptin - as well as inducing low-level inflammation involved in developing cancer and in cancer progression.

### **Alcohol**

Heavy or regular alcohol consumption is another established cause of cancer (and accounts for about 4% of all cancer in the UK)<sup>7</sup>. Although there is no truly safe level of consumption, the risk is much lower when drinking is kept within the recommended guidelines. The overall cancer risk rises rapidly with associated smoking.

Just under a third of cancers linked to alcohol are those of the mouth and throat, but alcohol is also related to developing breast carcinoma.

### **Overexposure to UV light**

Excessive exposure to strong sunlight or ultraviolet (UV) light from sun beds is the main cause of skin cancer and is linked to 3% of all cancers in the UK (equivalent to 36 cases in Leicester each year). UV radiation has significant potential to damage skin cells' DNA, leading to cancer growth.

Although some groups of people are at a much higher risk of skin cancers (those with fair skin, lots of moles or freckles, history of sunburn, light-coloured eyes or a family history of skin cancer), all individuals are at increased risk with high enough exposure levels.

### **Lack of physical activity**

A sedentary lifestyle has been implicated in about 1% of cancer cases in the UK. It is interconnected with many of the individual-level risk factors described above, particularly diet and obesity, and risk-reduction needs to include broad lifestyle changes.

### **Workplace and environment**

There are a number of cancer risk factors, which are not under individual control, but nevertheless can be affected by wider public health intervention or appropriate legislation.

#### **Chemicals**

Exposure to certain chemicals or substances has been implicated in 4% of cases of cancer in the UK. Common examples include asbestos, benzene, benzidine, cadmium, nickel and vinyl chloride.

#### **Infections**

Certain infections may cause cancer, such as HPV (Human Papilloma Virus), which is linked to 3% of cancer cases. Other examples include long-term infection with Hepatitis B and Hepatitis C viruses, which can lead to liver cancer or HIV infection, the latter of which can increase the risk of lymphoma.

#### **Radiation**

Radiation sources, including medical diagnostics (for example, unnecessary X-rays), have been linked to 2% of all cancer cases. Rays entering the Earth's atmosphere from outer space, radioactive fallout, radon gas and other sources can also cause cell damage that leads to cancer.

#### **Air pollution**

Outdoor air pollution contains small particulate matter (PM 2.5) which has been identified as a cause of lung cancer. However, in most populations this risk is relatively low when compared with the effect of smoking and it is unlikely that in the UK, the exposure would be high enough to be the single cause of lung cancer in any individual. However, at a population level, its effects cannot be ignored. Outdoor pollution contains many other substances, for example, sulphur dioxide, ozone gas, carbon monoxide or polycyclic aromatic hydrocarbons, linked to developing cancer. The risk caused by air pollution needs to be weighed against benefits of physical activity and reduction of obesity.

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### **The level of need in the population**

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The population of Leicester is comparatively young and, unless standardised appropriately, cancer rates can be expected to be lower when compared to the national average. Other demographic characteristics, such as a proportionately large ethnic minority and deprived population, also have to be taken into account when interpreting local figures.

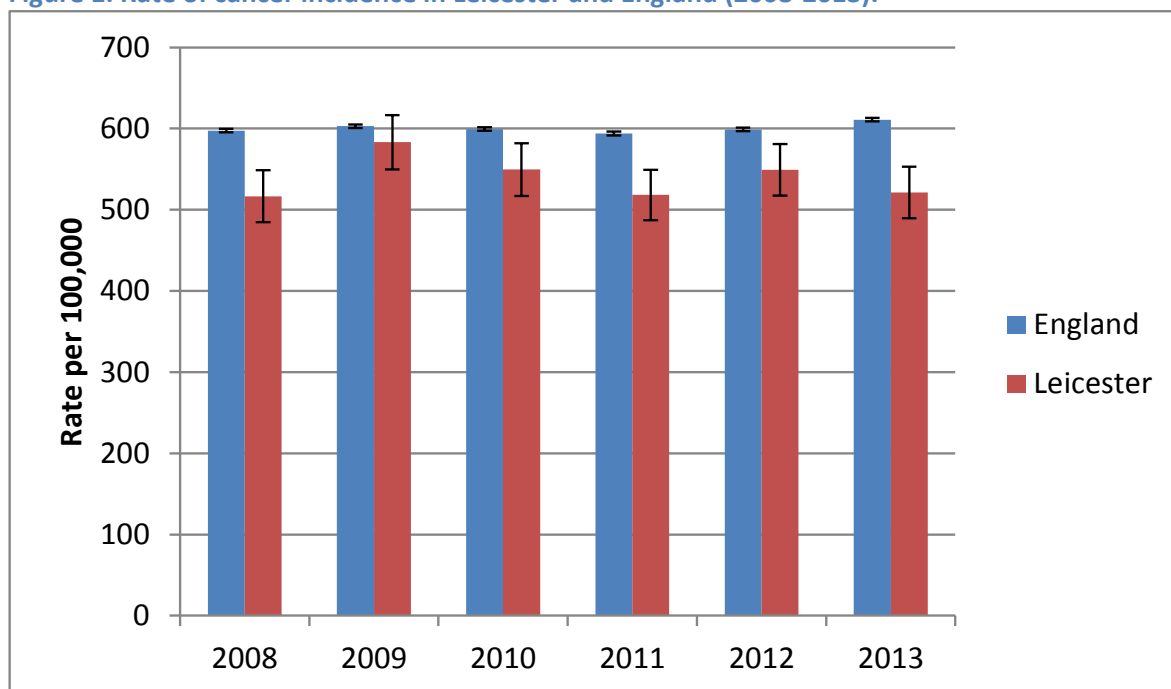
#### **Cancer Incidence and Prevalence**

Every year, over 1,100 people in Leicester are diagnosed with cancer (1,144 in 2013<sup>8</sup>) and there are currently (March 2015) over 4,800 cancer patients on a GP registers (which amounts to a prevalence of 1.3% of the total population)<sup>9</sup>.

Overall, the incidence of cancer in Leicester has been lower than the national average at 509 per 100,000 in 2013, compared to 601 per 100,000 national rate (

**Figure 1**). This is equivalent to around 200 cases less than would be predicted from national rates.

**Figure 1. Rate of cancer incidence in Leicester and England (2008-2013).**



Source: NCIN 2016

The rates of breast cancer, malignant melanoma and urological malignancy (including prostate cancer) were all significantly lower, while other cancer rates were similar to the national average.

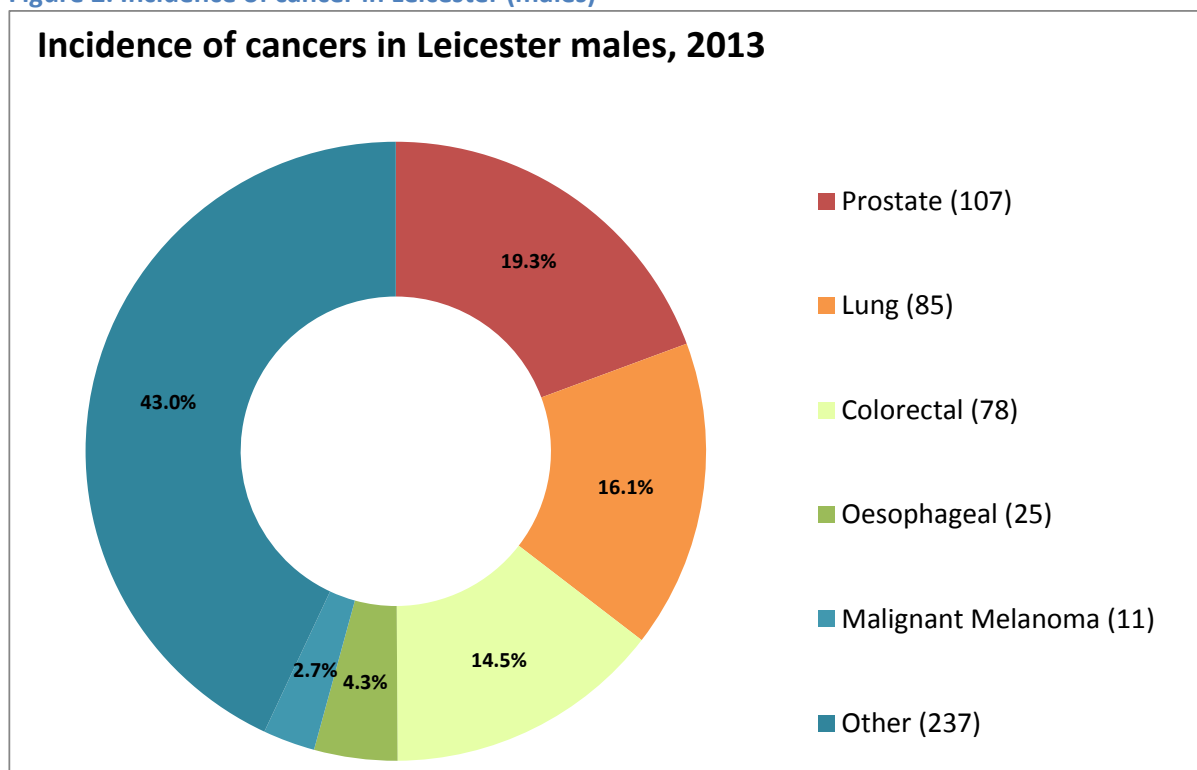
In 2013, there were 553 men with a new cancer diagnosis among men in Leicester and 589 new cancers in women (**Figures 2 and 3**). Breast (N=177), lung (N=162) and colorectal (N=146) were the three most commonly diagnosed cancer types in Leicester.

For women, breast cancer had the highest incidence rate of 140 per 100,000, which was still significantly lower than the rate for England (170 per 100,000).

For men, prostate cancer was the most common, with incidence rate at 116 per 100,000, also significantly lower than the national average of 186 per 100,000.

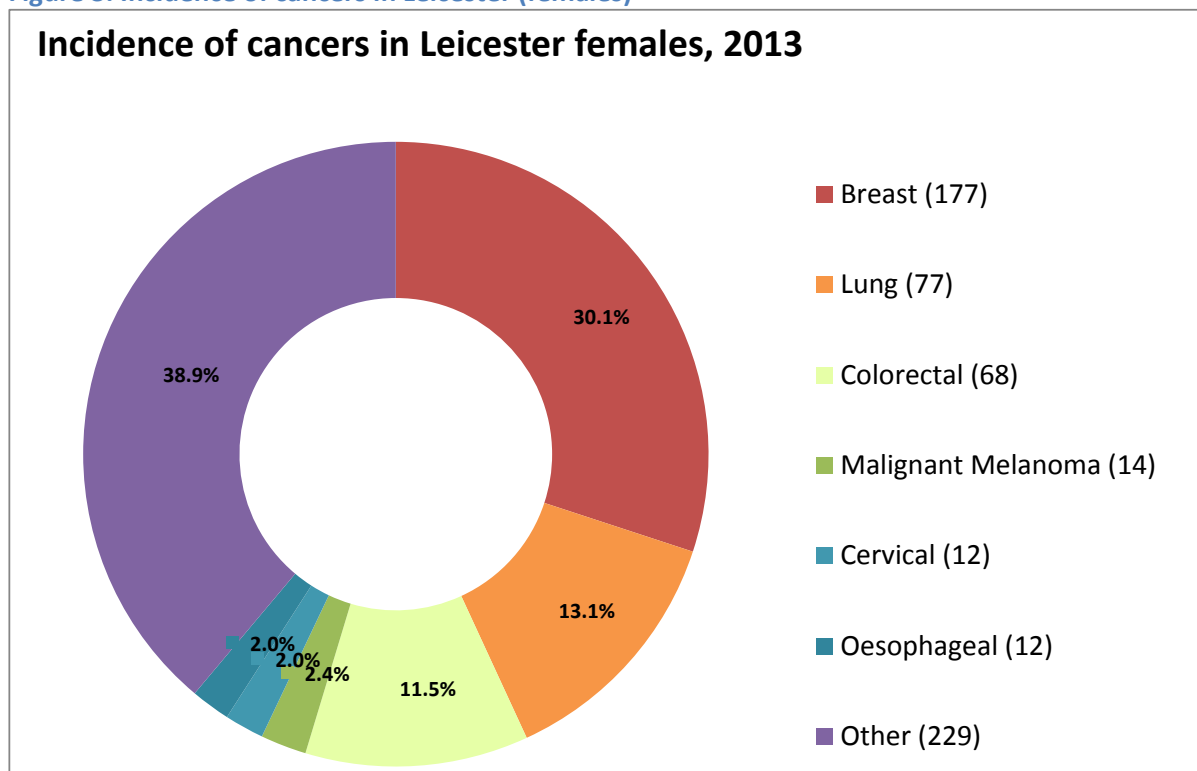
Lung cancer was the second most common cancer in men and women in 2013, with 162 cases, 85 in men and 77 in women. Lung cancer incidence was similar to the national average.

Figure 2. Incidence of cancer in Leicester (males)



Source: HSCIC indicator portal (<http://nww.indicators.ic.nhs.uk/webview/>)

Figure 3. Incidence of cancers in Leicester (females)



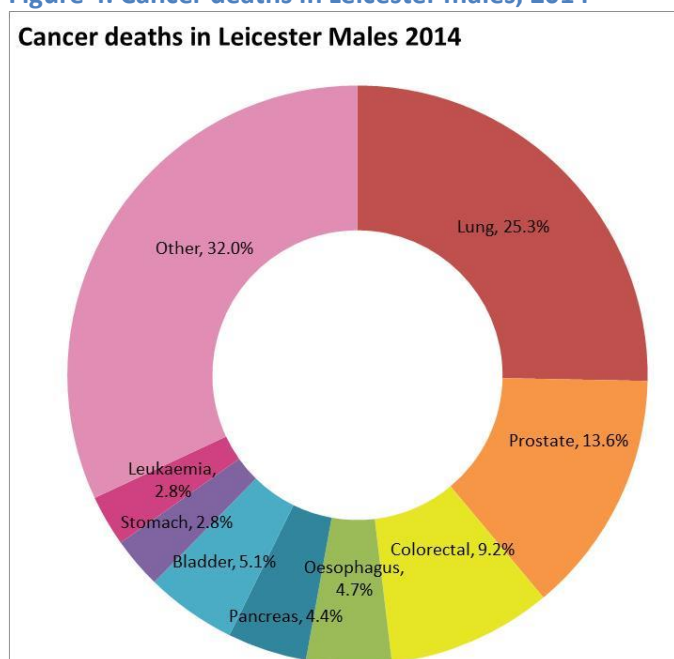
Source: HSCIC indicator portal: (<http://nww.indicators.ic.nhs.uk/webview/>)

**Cancer Mortality**

Cancer is the second most common cause of death, accounting for 25% of all deaths in Leicester (compared to the national average of 29%) and over a third of deaths in people under 75 years of age (compared to 41% nationally).

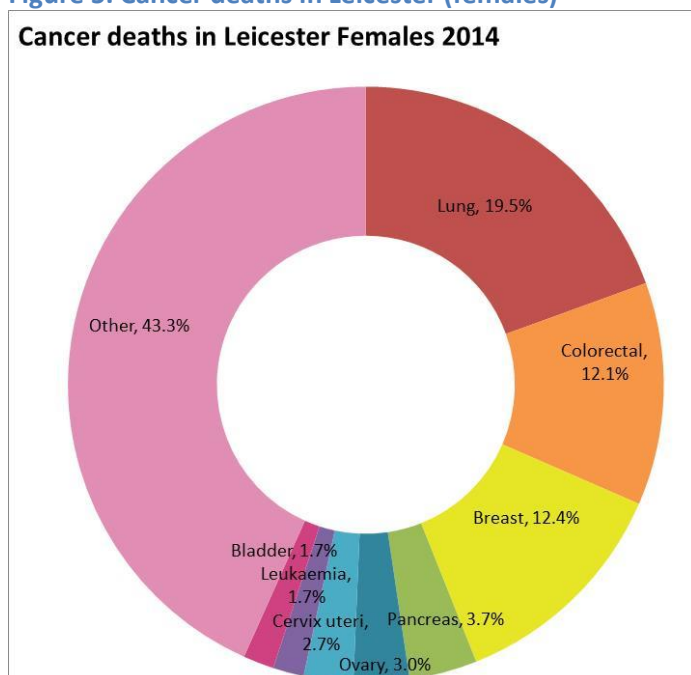
Among other cancers, lung cancer claims the highest number of lives per year in Leicester; 139 in 2014, of which 76 were under the age of 75. The next highest numbers of cancer deaths were from colorectal, breast, prostate and oesophageal cancers (**Figures 4 and 5**).

**Figure 4. Cancer deaths in Leicester males, 2014**



Source: ONS mortality data

**Figure 5. Cancer deaths in Leicester (females)**



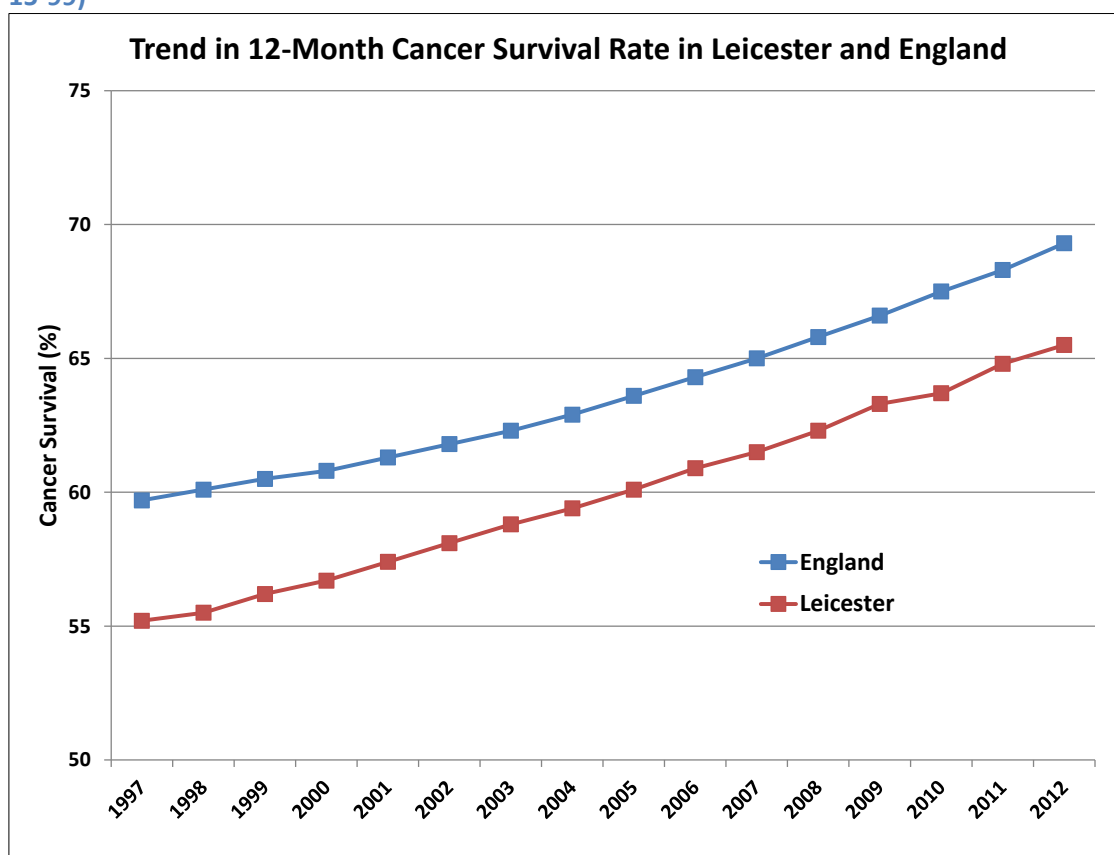
Source: ONS Mortality data

### Cancer Survival

Survival is measured from the time of diagnosis to the time of death. Disease-specific survival rates give an indication not only of how successful health services are in treating the diagnosed patients, but also how early the disease was diagnosed, and are very sensitive to delays in diagnosis.

Although improving, cancer survival rates in England and rest of the UK still lag behind the rest of Europe. Overall, survival rates for cancer improved by around 10% between 1997 and 2012 in England and in Leicester (**Figure 6**). However, survival remained poorer than average for local patients – in 2012, Leicester had one of the lowest survival rates in England – 14<sup>th</sup> lowest out of 211 CCG areas.

**Figure 6. One-year survival between 1997 and 2012 in Leicester and England (all cancer sites, ages 15-99)**



*Source: Public Health England (Local Cancer Intelligence)*

Relative to other areas in England, 1-year survival for women with breast cancer and 5-year survival for patients with lower gastrointestinal (bowel) cancer were especially low – in the lowest 10% of the country. Longer (5-year) survival in breast cancer and 1-year survival for bowel cancer were also relatively low (

**Table 1).** At least in relative terms, lung cancer survival does not appear to be worse in Leicester than elsewhere in England.

**Table 1. Survival estimates for main cancers in Leicester**

		<b>Survival Rate</b>	<b>95% Confidence Interval</b>	<b>Rank (of 151 PCTs)</b>
1-year	Breast	94.6%	92-97%	12
	Lower GI	75.4%	80-80%	53
	Lung	37.4%	33-42%	139
5-year	Breast	84.2%	79-88%	46
	Lower GI	45.9%	39-53%	5
	Lung	9.4%	6-12%	103

*Source: Public Health England (Local Cancer Intelligence)*

### **Current services in relation to need**

#### **Prevention**

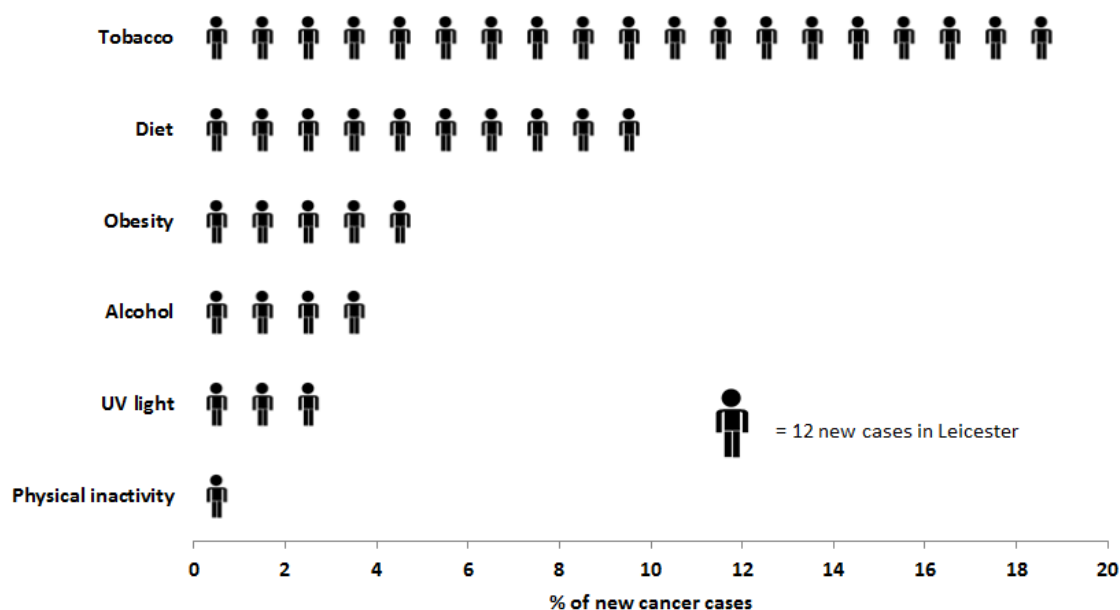
Tackling modifiable risks associated with cancers, such as smoking or obesity, underpins many public health initiatives including tobacco control, alcohol harm reduction, healthy living campaigns and other.

It is estimated that there would be a potential to prevent about 500 cancer cases per year in Leicester, if the main lifestyle risk factors were removed entirely. The most significant factor is tobacco control (nearly 230 potential reduction in incidence), followed by tackling poor diet and obesity (180 cases preventable) (**Figure 7**).

Developing awareness of non-modifiable risk factors, such as family history, also has a role in prevention, by increasing the perception of individual risk and improving acceptance rates of cancer screening.



Figure 7. Lifestyle risk factors and incidence of cancer in Leicester



Source: Cancer Research UK

### Detection and Diagnosis

For all unpreventable cases of cancer, the main objective is to detect the disease as early as possible, preferably before any symptoms or signs manifest themselves, and especially before the distant spread occurs. Both screening and early diagnosis are important in achieving this objective.

### Screening

Screening is a method of testing apparently healthy people (i.e. those without any symptoms or signs of the disease) who may be at increased risk. In principle, screening tests are not diagnostic (i.e. do not determine whether someone does have cancer), but indicate a very high probability that the disease is present. For all patients with positive screening results, further diagnostic investigation and treatment are offered to confirm, or exclude the condition. Screening can be opportunistic (done most often within a healthcare setting), but it is much more worthwhile done on a population-wide basis, through an organised and monitored programme. Such programmes need to cover a large enough proportion of the at risk population, to be effective; this is why one of the principal quality measures of any screening programme is its 'coverage' (or 'uptake' rate).

Although not appropriate for all types of cancer, screening is the most effective way of identifying cancer in its earliest stages. There are three NHS cancer population screening programmes for the early detection of cervical, breast and bowel cancers.

### Breast screening

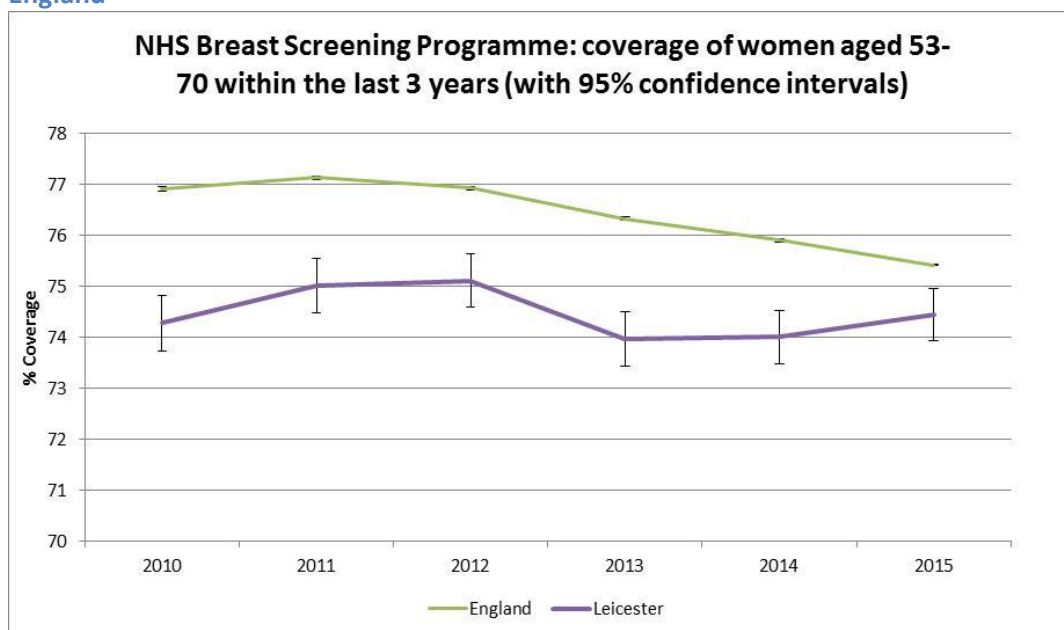
The NHS Breast Screening Programme provides free breast screening every three years for all women aged 50 and over. Breast screening uses a test known as a mammography, to look for cancers which are too small to be detected by examination.

Between 2006 and 2013 in England, 28% of all breast cancers and 60% of those 'in situ' (an early, localized form of cancer with good prognosis) were identified through screening. In Leicester, a

significantly higher proportion of breast cancer was identified through screening (32%, 95% CI: 29-36%).

In 2015, 74.4% of all eligible women in Leicester (aged between 53 and 70) were screened, which is significantly below the national average (75.4%). Following a decline in breast screening uptake in Leicester, there has been an improvement in 2015 (**Figure 8**).

**Figure 8. Trend in uptake of breast cancer screening programme in Leicester compared with England**



*Source: Public Health Outcomes Framework: Health and Social Care Information Centre*

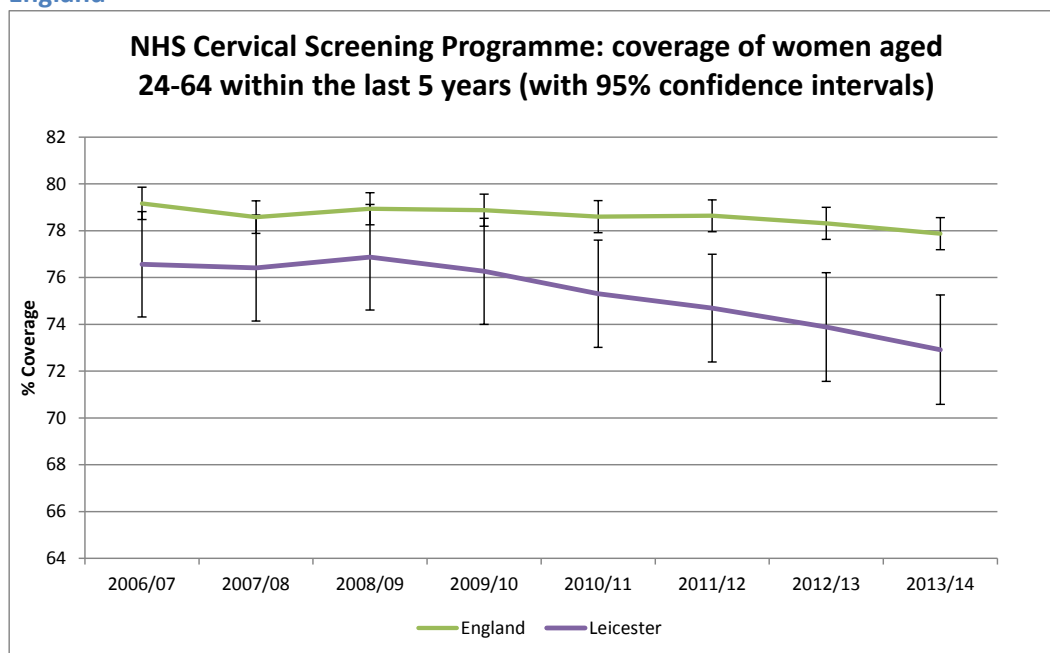
### **Cervical screening**

The cervical screening programme involves a cervical test (formerly known as ‘cervical smear’) offered to all women aged between 25 and 64 years, which is designed to ascertain the health of the cervix and give an assessment of the risk of developing cancer.

About a quarter (24%) of all cervical cancers were detected by screening between 2006 and 2013 in England and across the East Midlands.

Uptake of cervical screening in Leicester is statistically lower than in England (73.5%), with 67.7% of eligible women aged 25-64 having an adequate smear (within the last 5 years to March 2015). There has been a decline in the uptake of cervical smears since 2010 both nationally and in Leicester, particularly among younger women (under 30 years of age) (**Figure 9**).

**Figure 9. Trend in uptake of cervical cancer screening programme in Leicester compared with England**



*Source: Public Health Outcomes Framework: Health and Social Care Information Centre*

### **Bowel screening**

The population-based screening programme to detect bowel cancer was introduced in Leicester in 2008. Since its inception, the uptake of bowel cancer screening in Leicester remained low (44% in 2015), compared with the minimum national standard of 52% (the minimum uptake required for the programme to be effective). This screening involves a self-administered, faecal occult blood test.

The low uptake rates in Leicester are influenced by a number of factors, including high deprivation and ethnicity of the local population. In 2009/10 the uptake in the most deprived areas of the city was only half of that in the most affluent areas (30% vs. 60%). Some of the lowest rates were also seen in ethnic minority populations. The Public Health team in Leicester has undertaken community interventions aimed at improving uptake in targeted areas in the city and has been working with healthcare providers, including GPs and pharmacists to improve awareness of the programme.

Only 5% of colorectal cancers in England between 2006-2013 were detected through screening, with a similar proportion in Leicester (4%, 95% CI: 3-6%); this is equivalent to about 250 bowel cancer cases detected through screening in Leicester since the beginning of the programme.

### **Other Routes to Diagnosis**

Despite the undoubted potential of screening programmes to pick up cancer in its pre-clinical stages, the national data for 2006-2010<sup>10</sup> indicate that only about 5% of all cancer cases are diagnosed through screening. For the remaining 95% of cancer cases, the objective is to encourage early referral, diagnosis and treatment to ensure best possible outcomes.

### **Elective Referrals – the ‘Managed Route’**

Preferably, patients presenting with symptoms suggestive of cancer should be referred by their GPs to a specialist urgently (within 2 weeks). There are now well established national evidence-based guidelines<sup>11</sup> and performance targets for this referral pathway in the NHS, as it ensures an early

diagnosis. In England, between 2006 and 2010, only 27% of all cancer patients had been referred urgently by their GPs.

Other non-urgent referral routes (by either GPs or hospital consultants) do not guarantee early outpatient appointments or diagnosis. National data for 2006-10 indicate a relatively high proportion (40% of all cancer patients) of such referrals.

#### *Waiting Times for Urgent Referrals*

The urgent GP referral rate (two week wait, or TWW) for suspected cancers in Leicester is significantly lower than the national average. Between April 2013 and September 2015, 92.4% of TWW referrals were achieved within 14 days, compared to 94.4% national average and the 93% standard. There are about 7-8,000 such referrals in Leicester each year, so up to 160 patients could have had a delayed diagnosis as a result. The proportion of urgent GP referrals which result in a diagnosis of cancer (conversion rate) is also significantly lower than nationally.

#### **Emergency Presentation**

Nearly a quarter (23%) of all cancer patients diagnosed in England 2006 and 2010 were referred as emergency presentations, often via hospital A&E departments.

For the majority of cancers, emergency presentation correlates with a particularly poor prognosis, as most such patients are in later stages of the disease, with limited therapeutic options. The 12-month survival figures for England between 2006 and 2013 indicate that, while cancers picked up in screening have nearly 100% annual survival rates (100% , 99% and 97% for breast, cervical and colorectal, respectively) and urgent GP referrals also result in good survival rates (for example, 98%, 97%, 83% and 82% for prostate, breast, cervical or colorectal cancer, respectively), emergency diagnosis offers a much reduced prognosis. Thus, emergency referrals result in only 45% survival in cervical cancer, 49% in bowel cancer, 53% in breast and 57% in prostate cancer. In lung cancer, with its generally poor outcome, 43% of patients survive for over one year following an urgent GP referral, but only 13% survive following an emergency admission.

#### **Staging**

In Leicester, the proportion of cancers diagnosed in stages I or II was significantly lower than for England as a whole – 30.5% (95% CI: 26.1-31.4%) vs 37.3% nationally (data for 2013). This means that potentially in 7% of 1,144 cases that year (about 80) the diagnosis was delayed when compared to the national average, and this is likely to be reflected in poorer than average survival rates in Leicester.

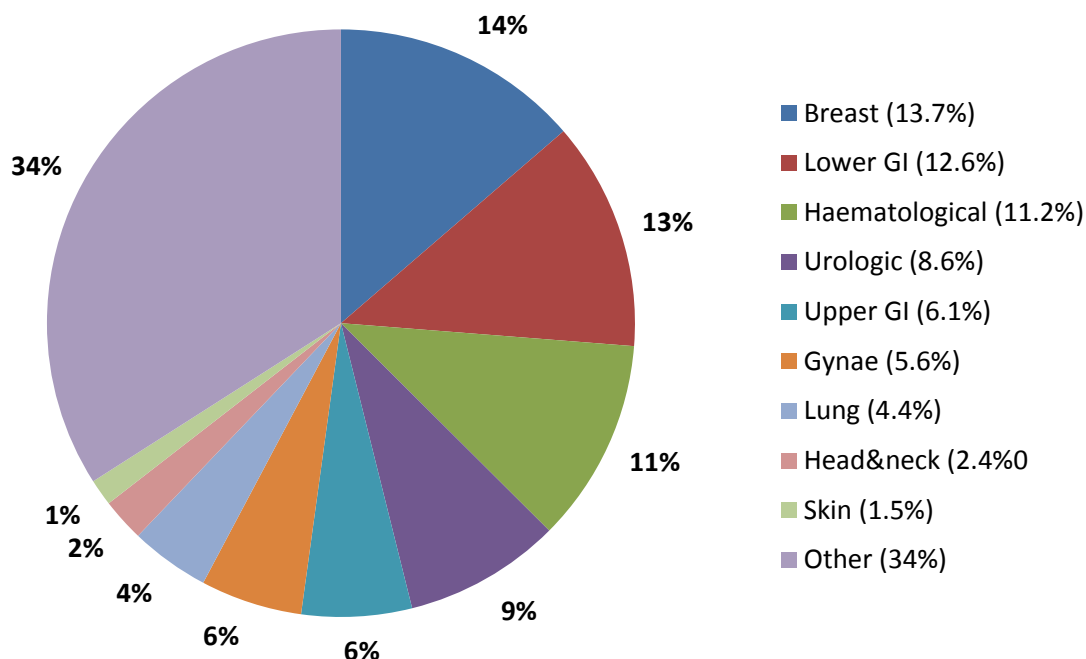
#### **Treatment**

Depending on the type of cancer, patients have a number of treatment options, including surgery, radiotherapy, variants of chemotherapy, as well as other treatments.

Overall, cancer care in Leicester cost just under £9.5m in 2013/14<sup>12</sup>. When compared to other areas in the country, this figure (£26 per head of population) was significantly lower than the national average of £49. Furthermore, within the cluster of Clinical Commissioning Groups (CCGs) used for comparative benchmarking, cancer spend varied between £22 and £60 per head of population, without any correlation to cancer incidence or mortality.

Figure 10 below shows relative spend on cancer care by site. While for most cancers types, the spend is largely proportionate to its incidence, for lung cancer (second highest incidence and the highest cause of death among cancers) the spend was only 4.4% of the total (versus 16% and 13% incidence proportion for men and women, respectively). Late presentation, poor prognosis and limited therapeutic options could all contribute to this low spend on lung cancer.

Figure 10. Expenditure on cancer care in Leicester (2013/14), by cancer site

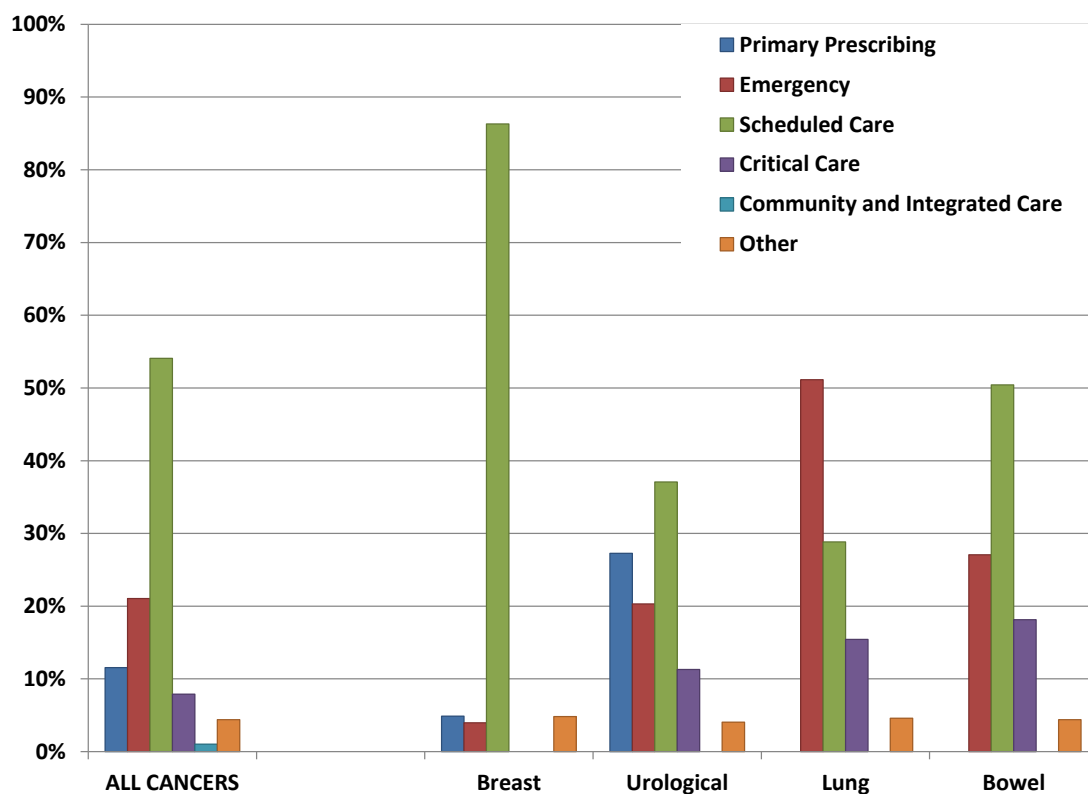


Source: NHS CCG Programme Budgeting Benchmarking Tool 2015

Figure 11 shows that the majority of this cost<sup>13</sup> (54%) was for scheduled (elective) care, but a substantial proportion (21%) constituted emergency care.

However, the pattern of spend varied for the most common cancers. For breast cancer (the most prevalent cancer among women), scheduled care, such as elective and day case hospital admissions and outpatient treatment, contributed the vast majority of cost (85%), with a smaller contribution from other care settings. More than half of lung cancer (the second most common cancer for both men and women) care (51%) is delivered on an emergency basis.

**Figure 11: Expenditure on Cancer Care in Leicester in 2013/14, by health budget category**



Source: NHS CCG Programme Budgeting Benchmarking Tool 2015

### Projected services use and outcomes in 3-5 years and 5-10 years

Based on the current general practice cancer registration rate (1.2%) and population projections, the projected number of people with cancer is likely to grow by over 200 over the next 10 years (Table 2).

**Table 2. Cancer prevalence projections, 2014 to 2025**

Disease prevalence projections	Prevalence Mar 2014	2015	2020	2025
Cancer (all ages)	1.18%	3979	4091	4193

Source: Quality Outcomes Framework 2014, Office for National Statistics population projections based on 2012

The National Cancer Intelligence Network estimated that in 2015, around 6,900 people in Leicester were living up to 20 years following a cancer diagnosis and this figure could rise to 7,800 by 2020 and 8,500 by 2025 (23% increase).

### Unmet needs and service gaps

Unmet needs and service gaps in cancer services are primarily linked to the late presentation by patients and lower than expected screening uptake.

Patients in Leicester tend to present at later stages of the disease and the local survival rates are also lower than expected. Late diagnosis is of particular concern in lung cancer, with as many as

50% of Leicester patients presenting in stage IV of the disease and only 20% of those patients surviving more than one year.

Screening coverage is relatively low in Leicester, particularly for cervical screening in the younger age groups of women, rates of which have been falling in the recent years. Similarly, the level of bowel screening is the lowest in the East Midlands, with only 47% of eligible people taking up the offer in 2014/15.

Expenditure on care for cancer patients is lower than expected for Leicester.

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### Recommendations for consideration by commissioners

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Commissioners are recommended to consider:

- Focusing on cancer prevention, including smoking cessation and other lifestyle health improvement initiatives and promoting awareness of modifiable risk factors.
- Targeting action to improve coverage of cancer screening programmes, particularly for cervical and bowel screening. Particular focus should be given to those groups and/or communities in the city where uptake has been low and/or where there are inequalities in the disease burden.
- Promoting cancer symptom awareness to encourage early presentation.
- Working with the health services to improve pathways of referral, particularly urgent elective referrals, in order to improve outcomes.
- Reducing late presentation of cancer through emergency admission routes.

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### Key contacts

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<sup>2</sup> <http://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence>

<sup>3</sup> National Cancer Intelligence Network and Cancer Research UK. Cancer Incidence and Survival by Major Ethnic Group, England, 2002-2006 (link is external). 2009. (<http://www.cancerresearchuk.org/health-professional/cancer-statistics/incidence/ethnicity#ref-0> )

<sup>4</sup> [http://www.cancerresearchuk.org/sites/default/files/cstream-node/cs\\_inc\\_deprivation.pdf](http://www.cancerresearchuk.org/sites/default/files/cstream-node/cs_inc_deprivation.pdf)

<sup>5</sup> <http://www.cancerresearchuk.org/health-professional/cancer-statistics/risk/preventable-cancers>

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<sup>7</sup> Parkin, DM, et al., Cancers attributable to the consumption of alcohol in the UK in 2010. Br J Cancer, 2011. 106 (S2) p. S14- S18.

<sup>8</sup> NCIN – National Cancer Intelligence Network 2016. [www.ncin.org.uk](http://www.ncin.org.uk)

<sup>9</sup> Health and Social Care Information Centre 2015

<sup>10</sup> NCIN – Routes to Diagnosis, March 2014

<sup>11</sup> NICE <https://www.nice.org.uk/guidance/indevelopment/gid-cgwave0618>

<sup>12</sup> CCG Programme Budgeting Benchmarking Tool (<https://www.england.nhs.uk/resources/resources-for-ccgs/prog-budgeting/> )

<sup>13</sup> CCG Programme Budgeting Benchmarking Tool (<https://www.england.nhs.uk/resources/resources-for-ccgs/prog-budgeting/> )