# Regional variations in quality of survival among men with prostate cancer across the United Kingdom

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# Abstract

## Purpose: Prostate cancer incidence, treatment and survival rates vary throughout the United Kingdom (UK) but little is known about regional differences in quality of survival.

## Objective: To investigate variations in patient-reported outcomes between UK countries and English Cancer Alliances.

## Design, setting and participants: A cross-sectional postal survey of prostate cancer survivors diagnosed 18-42 months previously.

## Outcome measurements and statistical analysis: Urinary, bowel, sexual problems and vitality were patient reported using the EPIC-26 questionnaire. General health was also self-assessed. Regional variations were identified using multivariable log-linear regression.

**Results and limitations:** 35,823 men responded; 60.8% of those invited. Self-assessed health was significantly lower than the UK average in Wales and Scotland. Respondents reported more urinary incontinence in Scotland, more urinary irritation/obstruction in Scotland and Northern Ireland (NI), poorer bowel function in Scotland and NI, worse sexual function in Scotland, and reduced vitality/hormonal function in Scotland, Wales and NI.

Self-assessed health was poorer than the English average in South Yorkshire and North-East & Cumbria, with more urinary incontinence in North-East & Cumbria and Peninsula, greater sexual problems in West Midlands and poorer vitality in North-East & Cumbria and West Midlands. Limitations include difficulty identifying clinically significant differences and limited information on pre-treatment conditions.

## Conclusions: Despite adjustment for treatment, clinical and socio-demographic factors, quality of survival among prostate cancer survivors varied by area of residence. Adoption of best practice from areas performing well could support enhanced survival quality in poorer performing areas, particularly with regards bowel problems and vitality, where clinically relevant differences were reported.

## Patient summary: We conducted a UK-wide survey of patient’s quality of life after treatment for prostate cancer. Outcomes were found to vary depending upon where patients live. Different service providers need to ensure that all prostate cancer patients receive the same follow up care.

# Introduction

Prostate cancer is one of the most commonly diagnosed male cancers in the United Kingdom (UK) [1], with incidence and survival rates varying between and within the UK's four constituent countries (England, Scotland, Wales, Northern Ireland (NI)) [1-3]. In particular, higher incidence and better survival is typically found in more affluent areas [1,4], possibly reflecting levels of active case finding through Prostate Specific Antigen (PSA) testing [5].

Treatment of prostate cancer also varies by NHS Hospital Trust within England [6], and between the four UK countries. Given that health-related quality of life [7] and urinary, bowel, sexual, and hormone-related problems [7-9] are treatment related, these patient-reported outcomes may also vary county-wide. Despite this, little is known about regional differences in quality of survival. The National Prostate Cancer Audit reported some variation in outcomes for radical prostatectomy and radiotherapy patients by care provider within England and Wales [6]. However, these results were for localised disease only, while case mix adjustment of results was not considered.

With many men living for long periods following their diagnosis, quality of survival has become increasingly important. Robust intelligence at regional and national level may help identify improvements achievable through wider application of practices adopted by the best performing areas. We have thus investigated variations in quality of survival between the four UK countries, and between Cancer Alliances within England.

# Patients and Methods

A cross-sectional postal survey of prostate cancer survivors was conducted as part of the Life After Prostate Cancer Diagnosis (LAPCD) study [10].

## Data collection

Men diagnosed with prostate cancer in the previous 18-42 months were identified from cancer registries in England, Wales and NI, and from cancer registry verified hospital activity data in Scotland.. All Health Boards/Trusts in Scotland, Wales and NI and 111 out of 136 English NHS Trusts participated. Overall, 82% of eligible prostate cancer survivors were posted a questionnaire between October 2015 and November 2016. Two reminders were sent and a Freephone helpline was available. Men were requested to return completed surveys to an external provider (Picker Institute Europe). Stage at diagnosis, area-based quintile of socio-economic deprivation (derived from the multiple deprivation measure for each nation [11-14]) and Cancer Alliance/Vanguard (CA) [15] of residence in England were added from cancer registration data.

## Survey

The survey (supplementary file) included questions on age, employment status, ethnicity, long-term conditions, height and weight (used to calculate Body Mass Index [BMI]), method of presentation and treatment type. Method of presentation was categorised as PSA-test only (available to men aged 50+ on request after they are made aware of its potential implications [16]), symptoms only (e.g. urinating frequently, blood in urine, back pain, joint pain), PSA with symptoms, and other. Treatment type(s) included: surgery, external-beam radiotherapy (EBRT), androgen deprivation therapy (ADT), brachytherapy, systemic (chemotherapy, abiraterone, enzalutamide) and other treatment. Absence of treatment along with reported active surveillance or watchful waiting was categorised as receiving monitoring only.

Health-related quality of life was evaluated using the EQ-5D-5L [17], with responses coded as "No problems" and "With problems". The EuroQol Visual Analogue Scale (EQ-VAS) [17] was used as a self-assessed health rating on a 0-100 scale, where higher scores represent better health.

Urinary, bowel, sexual and vitality/hormonal function was determined using the 26-item Expanded Prostate Cancer Index Composite (EPIC-26) [18]. Reported prevalence of specific problems was based upon the proportion of men reporting moderate/big problems (or equivalents such as poor/very poor) to individual questions. Summary scores for EPIC-26 domains were calculated by averaging standardised scores assigned to each question’s responses in that domain. The possible range of scores is 0-100, with 100 corresponding to no problems.

## Statistical analysis

Item completeness varied by region, thus to reduce bias resulting from only including cases with complete data [19] multiple imputation with chained equations [20] using all socio-demographic and clinical characteristics, and all EQ-5D-5L, EQ-VAS and EPIC-26 questions and scores was utilised. Ten separate imputations were completed, with results combined using Rubin’s rules [21].

The EPIC-26 and EQ-VAS scores were modelled using log-linear regression. Independent variables included CA/country, stage at diagnosis, method of presentation, treatment type, age, socio-economic deprivation quintile, employment status, ethnicity, history of mental health problems, BMI, and number of physical and neurological comorbidities. The models were used to predict a case mix adjusted score for each CA/country by applying the UK distribution for each independent variable to the model. Robust standard errors were used to calculate confidence intervals for the adjusted mean scores and to determine significant differences from the UK and English averages, which were derived by combining the results for the smaller geographic areas. Analysis was conducted using Stata version 14.0 (StataCorp, USA).

# Results

## Response rates and data completeness

35,823 prostate cancer survivors diagnosed in the previous 18-42 months responded to the survey; a response rate of 60.8% which ranged by country from 57.6% in NI to 64.4% in Wales. Within England response rates were lowest in London CAs (47.7%-48.6%) and highest in Thames Valley (65.0%) (Table 1). Response rates were higher for men aged 55-85, from white ethnic groups and for those living in more affluent areas. (Supplementary table S1)

Completeness of data items ranged from 81.7% for the urinary irritation/obstruction score to just under 100% for age. Completeness varied by CA/country, with the greatest variation for stage at diagnosis (Supplementary table S2). Data imputation had minimal impact on mean EQ-VAS and EPIC-26 scores. (Supplementary table S3)

## Respondent and clinical characteristics

Post imputation, mean age was 71.6 years, ranging from 70.1 (NI) to 73.0 (Peninsula). Further respondent characteristics are presented in table 1.

One third (33.9%) of respondents were PSA-detected, however this varied by country from 22.9% in Scotland to 37.0% in NI. Within England, North-West & South-West London (42.3%) and North-Central & North-East London (41.4%) had higher proportions of PSA-detected patients. (Table 2, Supplementary figure S1)

Almost two thirds (64.0%) of respondents were diagnosed at stage I/II. East of England (68.9%), East Midlands (68.8%) and Wales (68.8%) had the highest proportion of stage I/II prostate cancers, while Scotland had the greatest proportion of stage IV disease (21.1%). (Table 2, Supplementary figure S1)

Three in ten respondents (30.0%) reported having surgery. By country this proportion was lowest in NI (15.6%), whilst there was considerable variation in surgery use within England (24.9% in East Midlands, 42.1% in Kent & Medway). Use of EBRT was highest in NI (49.2%) and lowest in Kent & Medway (25.8%). Use of ADT was highest in East Midlands (48.0%) and lowest in Kent & Medway (31.6%). Proportions of ‘monitoring only’ ranged from 12.4% in Scotland to 20.7% in Kent & Medway. (Table 2, Supplementary figure S2)

## Unadjusted question responses

Among respondents 62.5% reported problems in at least one of mobility, self-care, usual activities, pain/discomfort or anxiety/depression, with this proportion ranging from 56.7% in Surrey & Sussex to 66.7% in North-East & Cumbria. Reporting of moderate/big urinary problems ranged from 10.9% (Somerset, Wiltshire, Avon & Gloucestershire, Surrey & Sussex) to 18.4% (North-East & Cumbria), while moderate/big bowel problems ranged from 6.2% (Kent & Medway) to 12.7% (NI). Very poor/poor ability to perform sexually was reported by 71.0% of South-East London respondents, increasing to 84.6% in Scotland. Moderate/big problems with lack of energy were reported by 18.4% of Kent & Medway respondents, rising to 31.6% in NI. (Supplementary table S5)

## Case-mix adjusted summary scores

## By country

Mean UK wide scores were 76.1 for self-assessed health, 81.1 for urinary incontinence, 84.1 for urinary irritation/obstruction, 87.5 for bowel function, 22.0 for sexual function and 78.4 for vitality/hormonal function (100 = no problems).

Compared to these averages, respondents reported significantly poorer self-assessed health in Wales (74.3, p<0.001) and Scotland (75.3, p=0.037), more urinary incontinence in Scotland (78.3, p<0.001), more urinary irritation/obstruction in Scotland (82.9, p=0.005) and NI (82.4, p=0.002), poorer bowel function in Scotland (86.2, p=0.002) and NI (84.8, p<0.001), worse sexual function in Scotland (19.9, p<0.001) and reduced vitality/hormonal function in Wales (76.6, p<0.001), Scotland (76.8, p<0.001) and NI (75.2, p<0.001). (Table 3)

* + 1. Within England

Within England, mean scores were 76.3 for self-assessed health, 81.3 for urinary incontinence, 84.3 for urinary irritation/obstruction, 87.7 for bowel function, 22.2 for sexual function and 78.7 for vitality/hormonal function.

Compared to the English average, poorer self-assessed health was reported in South-Yorkshire (75.2, p=0.015) and North-East & Cumbria (74.8, p=0.003). However, better than average health was reported in Kent & Medway (77.3, p=0.021) and South-East London (77.6, p=0.037). Respondents from North-East & Cumbria (79.4, p=0.006) and Peninsula (79.8, p=0.014) reported more urinary incontinence than in England, while below average levels of urinary incontinence were reported in Surrey & Sussex (83.1, p<0.001). Survivors from South-East London (85.5, p=0.048) reported better urinary irritation/obstruction compared to the English average, while those from West Yorkshire (89.5, p<0.001) and Kent & Medway (88.6, p=0.035) reported fewer bowel problems. Poorer than average sexual function was reported in West Midlands (20.8, p<0.001), while better functioning was reported in Surrey & Sussex (25.2, p<0.001), South-East London (24.3, p=0.017) and Kent & Medway (23.6, p=0.018). Respondents from North-East & Cumbria (77.3, p=0.020) and West Midlands (77.7, p=0.004) reported poorer vitality/hormonal function, while this was better than average in West Yorkshire (79.8, p=0.019) and Kent & Medway (79.8, p=0.009). (Figure 1, Supplementary table S6)

* + 1. Combined analysis

Including Wales, Scotland and NI along with the English CAs highlights similar regional variations. In general, men from Wales, Scotland and NI report similar or worse outcomes to those from CAs with below UK average outcome scores (Figure 2, Supplementary figure 3).

# Discussion

We report the largest, and to our knowledge first, evaluation of regional variations in prostate cancer patient-reported outcomes across the UK. Prostate cancer survivors living in England reported better quality of survival than those from Wales, Scotland or NI. Within England poorer than average self-assessed health was reported in South-Yorkshire and North-East & Cumbria, while those from North-East & Cumbria, Peninsula and West Midlands reported greater than average difficulties in one or more functional outcome. Given that regional variations were independent of clinical case-mix, treatment type and socio-demographic characteristics, these inequalities require explanation.

## Service implications

Cancer Alliances/Vanguards (CAs) were introduced in England in 2016 [15], with a principle objective to reduce inequalities in cancer outcomes. The regional inequalities identified in this study reinforce the pressing importance for this remit to not only address survival, but also quality of that survival.

A contributory cause of regional outcome variation may relate to regional differences in care provision. Detailed comparison of care pathways and packages of support, including availability and use of specific therapeutic modalities and support services such as access to specialist nurses, could identify factors linked to enhanced quality of survival.

Regional differences may also relate to variation in general population health, as the morbidities reported are common among older men [22]. Overall and healthy life expectancy among men aged 65 are lower in Scotland, Wales and NI than England [23-24], with the North of England also having lower overall and healthy life expectancy compared to the South (with some exceptions like Northumberland) [25]. Additionally, specific conditions (e.g. cardiovascular disease) are more prevalent in the North than South of England [26], in Scotland and NI than England [27], and vary by area-based socio-economic status [28]. While these issues have broader service and public health implications, prostate cancer patients reporting functional problems as a result of conditions other than prostate cancer, could still benefit from follow up care.

## Strengths and weaknesses

This study was population wide, thus participation was not influenced by recruitment bias. However, 39.2% of patients did not respond to the survey, with regional variation in response rates and data completeness. In addition, a different participant identification process was utilised in Scotland and not all of the English NHS Trusts managing prostate cancer participated. Cumulatively this may have resulted in variation in outcome reporting as non-responders may have different quality of life experiences than responders. However, given a response rate of over 60%, a sample size of approximately 35,800 and the utilisation of standardised/validated measures [29], this study has sufficient statistical power to allow meaningful interpretation and inter-country benchmarking.

The case mix adjustment applied indicates that differences are unlikely to be related to treatment type, comorbidity or socio-economic status. However, this should only be interpreted in a broad sense, as adjustments were based on self-reported treatment with no adjustment possible for treatment intensity (e.g. frequency, radiation fraction, ADT type) or when patients finished treatment. The latter may be of particular relevance, as while the 18-42 month time frame was chosen because it represents the period when initial treatment is complete and quality of life has begun to stabilise [9,10] a wide range of possible patient pathways and timelines exists. In addition to the above, information on quality of life before diagnosis or equivalent baseline population data was not available. Adjustments for background morbidity levels were thus limited to accounting for age, number of comorbidities and BMI, which reduces the ability to establish causal links. Finally, the use of area based socio-economic deprivation measures and employment status at a single time point may not fully reflect individual level socio-economic status.

Whilst statistically significant differences were identified, there is no consensus as to what magnitude of difference is clinically meaningful for the EQ-VAS and EPIC-26 scores when applied across populations. For individual level comparisons the work of Skolarus et al [30] for EPIC-26 and Pickard et al [31] for EQ-VAS suggests that only differences between the worst and best performing areas for bowel and vitality/hormonal function may qualify as being clinically relevant. In addition it is important to note that conclusions about variations at a regional level may not necessarily reflect the experience of every individual patient.

## Importance of patient-reported outcomes

There is a need to ensure patient reported outcomes are central and core components of cancer outcomes research in order to increase the probability that conclusions are appropriately “patient centred”. There are few examples of their use in national surveys that are comprehensive and adequately powered enough to provide robust data on regional variations. This study has tackled this issue in a common and complex cancer and has demonstrated that this is feasible and necessary, with the generation of useful intelligence regarding variations between and within countries. Identification of such variations can lead to enhanced care provision though identification of differences in patient pathways in the best and worst performing areas.

# Conclusions

Quality of survival among prostate cancer survivors varies across the UK with poorer outcomes reported by men from Scotland, Wales and NI compared to England, and regional variation also demonstrated within England. These findings highlight the need for further investigation to identify components of care pathways that predispose to good or poor outcomes,particularly with regards bowel problems and vitality, where clinically relevant differences were reported***.*** Action is required to ensure that outcomes are monitored and, where possible, improved so that the increasing number of men living with and beyond a diagnosis of prostate cancer are offered the best chance of achieving optimal quality of survival.

**Author contributors:** The corresponding author had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Digital map boundaries for Great Britain (source: Ordnance Survey) and Northern Ireland (source: Ordnance Survey Northern Ireland) were downloaded from the Office for National Statistics open geography portal under the Open Government License [http://geoportal.statistics.gov.uk].

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**Appendix A. Supplementary data**

**Appendix B. Supplementary file – copy of questionnaire**

Supplementary data associated with this article can be found, in the online version.

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### Table 1: Response rates and respondent characteristics at time of survey by area of residence

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Country & Cancer Alliances/ Vanguards (England)** | **Number of respondents** | **Response rate (%)** | **Mean age** | **Proportion of prostate cancer survivors** | | | | | | | | |
| **Affluent (a)** | **Deprived (a)** | **Married** | **Employed** | **Retired** | **Non-White** | **Overweight** | **Obese** | **With previous history of mental health problems** |
| **United Kingdom** | **35,823** | **60.8** | **71.6** | **26.9** | **10.4** | **80.3** | **19.8** | **77.3** | **3.0** | **47.8** | **21.0** | **17.2** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **England** | **30,463** | **60.5** | **71.7** | **26.9** | **10.0** | **80.3** | **19.8** | **77.5** | **3.4** | **48.1** | **20.6** | **17.1** |
| *North-East & Cumbria* | **1,114** | 61.5 | 72.0 | 24.7 | 19.2 | 80.5 | 15.0 | 81.0 | 0.9 | 48.7 | 23.1 | 18.0 |
| *Lancashire & South Cumbria* | **1,203** | 61.2 | 71.4 | 28.2 | 10.4 | 79.6 | 18.0 | 79.2 | 0.8 | 49.0 | 20.3 | 16.2 |
| *West Yorkshire* | **1,494** | 61.3 | 71.2 | 29.6 | 11.8 | 80.1 | 18.3 | 78.9 | 3.2 | 46.1 | 22.6 | 16.5 |
| *Humber, Coast & Vale* | **902** | 63.0 | 71.0 | 28.8 | 9.6 | 80.9 | 17.8 | 80.2 | 0.5 | 47.6 | 22.7 | 19.7 |
| *Cheshire & Merseyside* | **1,255** | 59.1 | 71.5 | 32.6 | 14.9 | 78.1 | 20.0 | 77.0 | 0.8 | 47.7 | 19.1 | 18.4 |
| *Greater Manchester* | **1,257** | 55.8 | 71.7 | 26.2 | 17.9 | 76.2 | 18.0 | 78.7 | 3.8 | 47.2 | 20.7 | 18.1 |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | **1,302** | 64.5 | 71.9 | 22.5 | 16.7 | 80.1 | 16.3 | 81.0 | 2.1 | 47.6 | 21.3 | 17.0 |
| *West Midlands* | **3,196** | 60.8 | 71.9 | 22.5 | 11.4 | 81.8 | 19.7 | 77.7 | 2.4 | 49.7 | 22.4 | 17.3 |
| *East Midlands* | **2,655** | 62.7 | 71.6 | 27.2 | 7.7 | 81.5 | 18.4 | 78.6 | 2.0 | 48.5 | 23.0 | 16.5 |
| *East of England* | **4,322** | 62.2 | 72.0 | 24.6 | 4.7 | 82.2 | 19.9 | 78.1 | 1.7 | 47.6 | 20.7 | 16.3 |
| *Somerset, Wiltshire, Avon & Gloucestershire* | **1,616** | 64.5 | 72.1 | 30.6 | 4.7 | 81.5 | 19.0 | 78.9 | 0.8 | 47.5 | 19.2 | 16.4 |
| *Thames Valley* | **1,561** | 65.0 | 71.5 | 53.9 | 2.0 | 83.6 | 25.7 | 71.9 | 3.2 | 47.1 | 17.7 | 15.1 |
| *North-West & South-West London* | **1,138** | 48.4 | 70.8 | 22.0 | 14.3 | 73.3 | 27.4 | 68.1 | 20.2 | 48.5 | 14.8 | 19.9 |
| *North-Central & North-East London* | **971** | 48.6 | 71.2 | 9.1 | 36.1 | 71.7 | 21.7 | 74.2 | 20.6 | 44.4 | 22.7 | 16.9 |
| *South-East London* | **702** | 47.7 | 70.4 | 20.3 | 20.4 | 72.2 | 24.1 | 70.0 | 18.1 | 46.8 | 19.4 | 20.2 |
| *Peninsula* | **1,184** | 63.5 | 73.0 | 8.9 | 5.3 | 82.1 | 17.6 | 80.6 | 0.3 | 47.1 | 20.9 | 17.2 |
| *Wessex* | **1,874** | 64.0 | 72.6 | 29.0 | 4.0 | 81.2 | 17.0 | 81.0 | 0.7 | 49.2 | 18.6 | 17.0 |
| *Surrey & Sussex* | **1,352** | 64.8 | 71.7 | 43.8 | 3.9 | 81.6 | 21.8 | 75.8 | 2.0 | 49.6 | 17.9 | 16.5 |
| *Kent & Medway* | **1,365** | 60.4 | 70.6 | 20.5 | 6.7 | 81.1 | 24.0 | 73.5 | 1.0 | 50.2 | 20.8 | 16.7 |
| **Wales** | **2,522** | **64.4** | **71.5** | **25.5** | **12.7** | **81.0** | **19.0** | **77.8** | **0.7** | **46.9** | **24.9** | **17.7** |
| **Scotland** | **1,819** | **62.8** | **71.0** | **27.4** | **12.7** | **78.9** | **18.2** | **76.8** | **0.3** | **47.3** | **23.4** | **19.5** |
| **Northern Ireland** | **1,019** | **57.6** | **70.1** | **28.6** | **11.0** | **80.5** | **23.5** | **70.6** | **0.3** | **44.6** | **20.8** | **16.7** |

*Notes:*

1. *Resident in the most affluent and deprived areas of that country.*

### Table 2: Proportion of prostate cancer survivors (a) with selected clinical characteristics by area of residence

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Country & Cancer Alliances/ Vanguards (England) (b)** | **Number of respondents** | **Proportion of prostate cancer survivors (c,d)** | | | | | | | |
| **Presented via**  **PSA test only** | **Presented with symptoms only** | **Diagnosed**  **at stage I/II** | **Diagnosed**  **at stage IV** | **Treated**  **with surgery** | **Treated**  **with EBRT** | **Treated**  **with ADT** | **Received monitoring only** |
| **United Kingdom** | **35,823** | **33.9** | **52.8** | **64.0** | **12.7** | **30.0** | **38.9** | **43.0** | **16.8** |
|  |  |  |  |  |  |  |  |  |  |
| **England** | **30,463** | **34.3** | **52.3** | **64.4** | **12.2** | **30.8** | **38.5** | **42.9** | **16.9** |
| *North-East & Cumbria* | **1,114** | 24.9 | 60.6 | 64.5 | 16.1 | 29.4 | 35.8 | 42.2 | 18.9 |
| *Lancashire & South Cumbria* | **1,203** | 31.8 | 55.0 | 60.1 | 14.8 | 32.1 | 41.9 | 46.0 | 13.8 |
| *West Yorkshire* | **1,494** | 28.9 | 58.5 | 53.5 | 14.4 | 33.7 | 35.3 | 39.4 | 18.7 |
| *Humber, Coast & Vale* | **902** | 30.1 | 57.2 | 61.9 | 11.6 | 30.2 | 42.9 | 47.0 | 16.4 |
| *Cheshire & Merseyside* | **1,255** | 34.0 | 52.0 | 62.7 | 10.2 | 26.9 | 40.5 | 42.4 | 18.6 |
| *Greater Manchester* | **1,257** | 34.3 | 53.1 | 67.5 | 12.1 | 28.9 | 40.5 | 42.3 | 14.8 |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | **1,302** | 27.2 | 57.9 | 62.6 | 12.4 | 28.7 | 40.0 | 38.4 | 18.6 |
| *West Midlands* | **3,196** | 35.6 | 50.6 | 64.2 | 12.7 | 30.6 | 41.0 | 45.6 | 16.5 |
| *East Midlands* | **2,655** | 33.0 | 53.3 | 68.8 | 11.8 | 24.9 | 40.5 | 48.0 | 18.0 |
| *East of England* | **4,322** | 34.6 | 52.3 | 68.9 | 10.9 | 27.4 | 39.9 | 45.6 | 17.3 |
| *Somerset, Wiltshire, Avon & Gloucestershire* | **1,616** | 34.1 | 53.4 | 58.5 | 13.3 | 31.5 | 38.2 | 44.3 | 14.9 |
| *Thames Valley* | **1,561** | 37.3 | 49.6 | 64.8 | 12.6 | 37.5 | 34.4 | 41.0 | 15.5 |
| *North-West & South-West London* | **1,138** | 42.3 | 42.1 | 67.2 | 11.4 | 35.0 | 39.0 | 37.8 | 16.9 |
| *North-Central & North-East London* | **971** | 41.4 | 44.5 | 66.4 | 11.1 | 37.5 | 35.8 | 36.2 | 13.6 |
| *South-East London* | **702** | 37.1 | 48.4 | 66.5 | 9.5 | 39.8 | 29.8 | 32.2 | 18.8 |
| *Peninsula* | **1,184** | 34.0 | 54.4 | 60.8 | 13.0 | 33.6 | 41.2 | 44.1 | 15.5 |
| *Wessex* | **1,874** | 34.5 | 52.1 | 65.4 | 11.4 | 27.2 | 40.6 | 46.4 | 15.6 |
| *Surrey & Sussex* | **1,352** | 40.0 | 48.6 | 61.7 | 14.9 | 28.8 | 37.3 | 42.6 | 17.0 |
| *Kent & Medway* | **1,365** | 37.4 | 48.7 | 65.1 | 9.6 | 42.1 | 25.8 | 31.6 | 20.7 |
| **Wales** | **2,522** | **35.1** | **51.3** | **68.8** | **11.4** | **26.0** | **42.8** | **42.4** | **19.3** |
| **Scotland** | **1,819** | **22.9** | **64.5** | **52.6** | **21.1** | **29.6** | **35.5** | **45.8** | **12.4** |
| **Northern Ireland** | **1,019** | **37.0** | **52.0** | **63.2** | **13.4** | **15.6** | **49.2** | **42.7** | **17.3** |

Notes:

1. Alive 18-42 months after diagnosis
2. n=35,823 (see table 1 for number of respondents by area).
3. EBRT - External Beam Radiotherapy, ADT - Androgen Deprivation Therapy.
4. Patients may receive more than one treatment type.

* Graphical versions of this data are available in supplementary figures S1 and S2, while confidence intervals for each proportion are available in supplementary table S4.

### Table 3: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/ hormonal function (EPIC-26) for prostate cancer survivors (a) by country of residence

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Country of residence (b)** | **Mean self-assessed health rating**  **(EQ-VAS)**  **(95% CI)** | **Mean functional outcome score (EPIC-26) (95% CI)** | | | | |
| **Urinary incontinence** | **Urinary irritation/ obstruction** | **Bowel function** | **Sexual function** | **Vitality/ hormonal function** |
| **United Kingdom** | 76.1  (76.0-76.3) | 81.1  (80.9-81.3) | 84.1  (83.9-84.3) | 87.5  (87.4-87.7) | 22.0  (21.8-22.3) | 78.4  (78.2-78.5) |
|  |  |  |  |  |  |  |
| **England** | 76.3  (76.2-76.5) | 81.3  (81.1-81.6) | 84.3  (84.1-84.5) | 87.7  (87.6-87.9) | 22.2  (22.0-22.5) | 78.7  (78.5-78.9)↑ |
| **Wales** | 74.3  (73.7-75.0)↓↓ | 81.2  (80.3-82.0) | 83.7  (83.1-84.4) | 86.9  (86.3-87.6) | 21.7  (20.9-22.5) | 76.6  (75.9-77.3)↓↓ |
| **Scotland** | 75.3  (74.6-76.1)↓ | 78.3  (77.2-79.3)↓↓ | 82.9  (82.1-83.7)↓ | 86.2  (85.4-87.0)↓ | 19.9  (18.9-20.9)↓↓ | 76.8  (76.0-77.7)↓↓ |
| **Northern Ireland** | 75.6  (74.7-76.6) | 80.0  (78.8-81.3) | 82.4  (81.4-83.5)↓ | 84.8  (83.6-85.9)↓↓ | 21.4  (20.3-22.6) | 75.2  (74.0-76.3)↓↓ |

Notes:

1. Alive 18-42 months after diagnosis
2. n=35,823 (see table 1 for number of respondents by area).

* CI - Confidence Interval. ↑↑ Higher than UK average (p<0.001), ↑ Higher than UK average (p<0.05), ↓ Lower than UK average (p<0.05), ↓↓ Lower than UK average (p<0.001).
* This area based comparison was conducted using log-linear regression, with results presented as adjusted predicted mean scores. Adjustments were made for age, socio-economic deprivation, employment status, marital status, ethnicity, comorbidities, history of mental health problems, body mass index, method of presentation, stage at diagnosis, and treatment types received. These scores differ from values determined directly from raw data. Higher mean scores represent better health or fewer difficulties in that domain.

### Figure 1: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) for prostate cancer survivors (a) by area of residence: England only, with comparisons to English average



Notes:

1. *Alive* *18-42 months after diagnosis.*

* n=35,823 (see table 1 for number of respondents by area).
* *This area based comparison was conducted using log-linear regression, with results presented as adjusted predicted mean scores. Adjustments were made for age, socio-economic deprivation, employment status, marital status, ethnicity, comorbidities, history of mental health problems, body mass index, method of presentation, stage at diagnosis, and treatment types received. These scores differ from values determined directly from raw data. Higher mean scores represent better health or fewer difficulties in that domain.*
* *Area key: C&M: Cheshire & Merseyside, EE: East of England, EM: East Midlands, GM: Greater Manchester, HC&V: Humber, Coast & Vale, K&M: Kent & Medway, L-NC&NE: North-Central & North-East London, L-NW&SW: North-West & South-West London, L-SE: South-East London, L&SC: Lancashire & South Cumbria, NE&C: North-East & Cumbria, NI: Northern Ireland, P: Peninsula, S:Scotland, S&S: Surrey & Sussex, SWAG: Somerset, Wiltshire, Avon & Gloucestershire, SY: South Yorkshire, Bassetlaw, North Derbyshire & Hardwick, TV: Thames Valley, W: Wales, WE: Wessex, WM: West Midlands, WY: West Yorkshire. See Supplementary Figure S4 for a map of these areas.*

### Figure 2: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) for prostate cancer survivors (a) by area of residence: UK wide



Notes:

1. Alive 18-42 months after diagnosis

* n=35,823 (see table 1 for number of respondents by area).
* This area based comparison was conducted using log-linear regression, with results presented as adjusted predicted mean scores. Adjustments were made for age, socio-economic deprivation, employment status, marital status, ethnicity, comorbidities, history of mental health problems, body mass index, method of presentation, stage at diagnosis, and treatment types received. These scores differ from values determined directly from raw data. Higher mean scores represent better health or fewer difficulties in that domain.
* Funnel plots of this data are available in Supplementary Figure S3.
* Contains OS data (GB) & LPS Intellectual Property (NI) © Crown copyright and database right 2018.

# Supplementary data

### Table S1: Respondent characteristics compared to non-responders

### Table S2: Data item completeness by area of residence

### Table S3: Impact of data imputation on mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) by area of residence

### Table S4: Clinical characteristics of prostate cancer survivors by area of residence with 95% confidence intervals and comparisons with UK average

### Table S5: Unadjusted responses to individual items from the EQ-5D-5L and EPIC-26 question sets by area of residence with 95% confidence intervals and comparisons with UK average

### Table S6: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) for prostate cancer survivors by area of residence: UK wide with comparisons to UK average

### Figure S1: Proportion of prostate cancer survivors who presented via PSA test only and were diagnosed at stage IV by area of residence

### Figure S2: Treatment types received by prostate cancer survivors by area of residence

### Figure S3: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) for prostate cancer survivors by area of residence: UK wide, with comparisons to UK average

### Figure S4: Countries in the United Kingdom and Cancer Alliances/Vanguards in England

### Table S1: Comparison of responders and non-responders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristic** |  | **Non-responder** | **Responder** | **Total** | **Response rate** |
| **Age at diagnosis (a)** | **<55 years** | 1,293 | 1,392 | 2,685 | **51.8%** |
| **55-64 years** | 5,013 | 8,529 | 13,542 | **63.0%** |
| **65-74 years** | 8,886 | 16,992 | 25,878 | **65.7%** |
| **75-84 years** | 6,407 | 8,094 | 14,501 | **55.8%** |
| **85+ years** | 1,385 | 810 | 2,195 | **36.9%** |
| **Unknown** | 123 | 6 | 129 |  |
| **Total** | 23,107 | 35,823 | 58,930 | **60.8%** |
| **Ethnic group (a,b)** | **White** | 17,493 | 28,705 | 46,198 | **62.1%** |
| **Mixed** | 121 | 78 | 199 | **39.2%** |
| **Asian** | 536 | 333 | 869 | **38.3%** |
| **Black** | 1,040 | 586 | 1,626 | **36.0%** |
| **Other** | 210 | 173 | 383 | **45.2%** |
| **Unknown** | 481 | 590 | 1,071 | **55.1%** |
| **Total** | 19,881 | 30,465 | 50,346 | **60.5%** |
| **Stage of disease at diagnosis** | **1** | 7,606 | 10,880 | 18,486 | **58.9%** |
| **2** | 4,776 | 8,719 | 13,495 | **64.6%** |
| **3** | 3,761 | 7,209 | 10,970 | **65.7%** |
| **4** | 2,825 | 3,925 | 6,750 | **58.1%** |
| **Unknown** | 4,139 | 5,090 | 9,229 | **55.2%** |
| **Total** | 23,107 | 35,823 | 58,930 | **60.8%** |
| **Socio-economic deprivation quintile** | **1 - least deprived** | 4,446 | 9,408 | 13,854 | **67.9%** |
| **2** | 4,978 | 9,289 | 14,267 | **65.1%** |
| **3** | 4,782 | 7,381 | 12,163 | **60.7%** |
| **4** | 4,401 | 5,266 | 9,667 | **54.5%** |
| **5 - most deprived** | 3,881 | 3,620 | 7,501 | **48.3%** |
| **Unknown** | 619 | 859 | 1,478 | **58.1%** |
| **Total** | 23,107 | 35,823 | 58,930 | **60.8%** |

Notes:

(a) Registry-collected age at diagnosis and ethnic group. Figures here differ to those in Tables 1-3 which use self-reported age at time of survey and ethnic group.

(b) Registry-collected ethnic group data only available for England.

### Table S2: Data item completeness by area of residence

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation &**  **Cancer Alliances/Vanguards (England)** | **Number of**  **respondents** | **Socio-demographic characteristics**  **(% complete)** | | | | | | **Clinical characteristics**  **(% complete)** | | | **Health-related quality of life (EQ-5D-5L)**  **(% complete)** | | | | | |
| Age | Socio-economic deprivation indicator | Marital status | Employment status | Ethnicity | Body Mass Index | Method of presentation | Stage at diagnosis | Treatment type | Mobility | Usual activities | Self-care | Pain & discomfort | Anxiety & depression | Self-assessed health rating (EQ-VAS) |
| **United Kingdom** | **35,823** | **100.0** | **97.6** | **98.8** | **96.7** | **96.9** | **91.8** | **95.2** | **85.8** | **99.1** | **98.8** | **98.9** | **99.0** | **98.7** | **98.6** | **97.8** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **England** | **30,463** | **100.0** | **97.6** | **98.7** | **96.7** | **96.9** | **91.7** | **95.0** | **86.1** | **99.2** | **98.8** | **98.9** | **99.0** | **98.7** | **98.6** | **97.7** |
| *North-East & Cumbria* | **1,114** | 100.0 | 95.9 | 97.9 | 96.5 | 97.5 | 93.2 | 95.4 | 91.9 | 99.0 | 98.4 | 99.2 | 99.1 | 98.6 | 98.8 | 97.1 |
| *Lancashire & South Cumbria* | **1,203** | 99.9 | 98.8 | 98.8 | 96.8 | 96.8 | 92.4 | 96.8 | 89.4 | 99.3 | 99.2 | 98.9 | 99.1 | 98.8 | 98.8 | 97.8 |
| *West Yorkshire* | **1,494** | 100.0 | 98.5 | 99.1 | 96.7 | 96.7 | 91.0 | 95.5 | 92.2 | 98.6 | 99.2 | 99.0 | 99.3 | 98.8 | 98.5 | 97.5 |
| *Humber, Coast & Vale* | **902** | 100.0 | 99.1 | 98.7 | 97.2 | 98.4 | 94.1 | 97.1 | 94.5 | 99.4 | 99.6 | 99.3 | 99.6 | 99.0 | 99.2 | 99.0 |
| *Cheshire & Merseyside* | **1,255** | 100.0 | 98.0 | 98.9 | 97.1 | 97.6 | 92.1 | 96.5 | 92.7 | 99.5 | 98.8 | 98.6 | 99.1 | 99.0 | 98.8 | 97.8 |
| *Greater Manchester* | **1,257** | 100.0 | 98.5 | 98.6 | 96.1 | 96.7 | 90.1 | 96.3 | 92.2 | 99.5 | 98.6 | 98.9 | 99.0 | 98.7 | 98.6 | 95.7 |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | **1,302** | 100.0 | 98.4 | 99.1 | 96.7 | 96.6 | 91.5 | 94.4 | 75.7 | 98.9 | 98.2 | 98.2 | 98.6 | 98.2 | 97.9 | 97.6 |
| *West Midlands* | **3,196** | 100.0 | 98.4 | 99.0 | 97.2 | 97.0 | 91.5 | 93.9 | 84.7 | 98.9 | 98.6 | 98.8 | 98.9 | 98.9 | 98.7 | 97.2 |
| *East Midlands* | **2,655** | 100.0 | 96.9 | 98.6 | 96.3 | 96.8 | 91.7 | 95.2 | 73.6 | 99.2 | 98.8 | 98.8 | 98.9 | 98.5 | 98.3 | 97.8 |
| *East of England* | **4,322** | 100.0 | 97.3 | 98.7 | 97.2 | 97.3 | 92.8 | 94.5 | 95.5 | 99.3 | 98.9 | 99.0 | 99.1 | 98.7 | 98.6 | 97.9 |
| *Somerset, Wiltshire, Avon & Gloucestershire* | **1,616** | 100.0 | 96.6 | 98.7 | 96.6 | 96.2 | 91.8 | 94.1 | 95.7 | 99.0 | 98.9 | 99.0 | 98.9 | 98.5 | 98.0 | 97.8 |
| *Thames Valley* | **1,561** | 100.0 | 95.8 | 98.3 | 97.2 | 97.6 | 92.7 | 95.1 | 64.4 | 99.4 | 99.1 | 99.0 | 99.1 | 98.3 | 98.5 | 98.1 |
| *North-West & South-West London* | **1,138** | 100.0 | 97.6 | 98.1 | 95.8 | 93.9 | 87.8 | 95.4 | 80.8 | 98.8 | 98.6 | 98.8 | 98.9 | 98.7 | 98.5 | 97.2 |
| *North-Central & North-East London* | **971** | 100.0 | 98.6 | 98.0 | 96.3 | 94.3 | 87.2 | 91.3 | 84.7 | 99.3 | 98.2 | 98.5 | 98.6 | 98.6 | 98.6 | 97.0 |
| *South-East London* | **702** | 100.0 | 95.7 | 98.9 | 95.2 | 95.7 | 87.3 | 94.3 | 84.3 | 99.1 | 98.7 | 98.4 | 98.6 | 97.9 | 98.1 | 97.7 |
| *Peninsula* | **1,184** | 100.0 | 99.0 | 98.7 | 95.9 | 97.3 | 92.3 | 95.8 | 97.1 | 99.2 | 98.7 | 99.0 | 99.5 | 99.0 | 99.0 | 98.9 |
| *Wessex* | **1,874** | 100.0 | 96.5 | 99.1 | 96.9 | 97.5 | 92.8 | 95.8 | 90.4 | 99.1 | 99.1 | 98.9 | 99.2 | 98.7 | 98.7 | 98.1 |
| *Surrey & Sussex* | **1,352** | 100.0 | 98.7 | 99.1 | 97.2 | 97.5 | 92.7 | 96.1 | 67.2 | 99.2 | 99.2 | 99.3 | 99.3 | 98.8 | 99.3 | 98.4 |
| *Kent & Medway* | **1,365** | 100.0 | 96.6 | 99.2 | 96.9 | 97.3 | 92.2 | 93.8 | 85.5 | 99.2 | 99.2 | 99.4 | 99.2 | 99.0 | 99.0 | 98.0 |
| **Wales** | **2,522** | **100.0** | **99.9** | **98.8** | **95.9** | **96.6** | **92.5** | **96.0** | **83.1** | **99.1** | **98.8** | **98.6** | **98.9** | **98.6** | **98.1** | **97.9** |
| **Scotland** | **1,819** | **99.7** | **93.2** | **99.1** | **97.7** | **97.7** | **92.1** | **96.2** | **78.8** | **99.0** | **99.2** | **98.8** | **99.1** | **98.8** | **98.6** | **98.6** |
| **Northern Ireland** | **1,019** | **100.0** | **100.0** | **98.6** | **96.2** | **95.2** | **92.3** | **96.1** | **95.1** | **99.0** | **98.5** | **98.2** | **98.3** | **98.2** | **98.2** | **98.1** |

### Table S2 continued

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation &**  **Cancer Alliances/Vanguards (England)** | **Selected EPIC-26 questions**  **(% complete)** | | | | | | | | | | | | **Functional (EPIC-26) score**  **(% complete)** | | | | |
| Frequency of  leaking urine (q10) | Urinary control (q11) | Problems with urinary function (q14) | Problems with  bowel habit (q16) | Ability to have  an erection (q17a) | Ability to function  sexually (q20) | Problems with  sexual function (q21) | Hot flushes  (q22a) | Breast tenderness/  enlargement (q22b) | Feeling  depressed (q22c) | Lack of  energy (q22d) | Change in  body weight (q22e) | Urinary  incontinence | Urinary irritation/ obstruction | Bowel  function | Sexual  function | Vitality/hormonal  function |
| **United Kingdom** | **98.3** | **98.2** | **98.6** | **99.0** | **95.0** | **91.8** | **92.0** | **92.4** | **87.0** | **90.1** | **92.7** | **91.1** | **88.8** | **81.7** | **86.1** | **90.8** | **88.6** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **England** | **98.3** | **98.2** | **98.5** | **98.9** | **95.1** | **91.8** | **92.0** | **92.5** | **87.4** | **90.2** | **92.6** | **91.2** | **88.9** | **81.9** | **86.4** | **90.9** | **88.8** |
| *North-East & Cumbria* | 97.5 | 97.6 | 98.6 | 98.7 | 93.9 | 90.3 | 91.1 | 90.4 | 85.6 | 87.7 | 91.1 | 89.8 | 86.8 | 79.0 | 82.0 | 89.0 | 86.5 |
| *Lancashire & South Cumbria* | 98.3 | 98.7 | 98.4 | 99.3 | 95.4 | 91.6 | 91.4 | 93.2 | 87.5 | 90.9 | 93.7 | 91.5 | 88.7 | 81.5 | 86.3 | 90.4 | 89.7 |
| *West Yorkshire* | 98.8 | 98.5 | 98.8 | 98.7 | 95.4 | 92.3 | 92.4 | 92.4 | 87.4 | 89.6 | 92.9 | 91.4 | 89.2 | 81.7 | 85.9 | 91.9 | 88.8 |
| *Humber, Coast & Vale* | 98.6 | 98.2 | 98.3 | 99.1 | 96.6 | 93.3 | 93.9 | 94.3 | 88.7 | 91.6 | 94.1 | 93.0 | 90.4 | 82.7 | 86.7 | 93.2 | 90.7 |
| *Cheshire & Merseyside* | 98.9 | 98.9 | 99.0 | 99.2 | 94.7 | 91.6 | 92.2 | 91.9 | 87.0 | 90.4 | 91.8 | 90.7 | 89.2 | 80.8 | 85.7 | 90.7 | 88.1 |
| *Greater Manchester* | 97.8 | 97.9 | 98.9 | 98.9 | 93.9 | 90.4 | 90.9 | 89.9 | 83.9 | 88.2 | 90.5 | 89.2 | 87.2 | 80.3 | 84.4 | 88.9 | 86.2 |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 97.5 | 97.8 | 98.0 | 98.3 | 93.7 | 90.2 | 90.5 | 91.0 | 84.2 | 88.7 | 91.4 | 89.7 | 87.9 | 80.6 | 85.3 | 89.0 | 86.5 |
| *West Midlands* | 98.5 | 98.4 | 98.6 | 99.1 | 95.4 | 91.7 | 91.5 | 92.6 | 87.7 | 89.7 | 92.7 | 91.1 | 89.1 | 81.2 | 86.5 | 90.9 | 88.9 |
| *East Midlands* | 98.2 | 98.0 | 98.5 | 99.0 | 95.3 | 92.2 | 92.2 | 92.9 | 87.0 | 90.2 | 92.8 | 91.0 | 88.4 | 81.5 | 85.6 | 91.2 | 88.9 |
| *East of England* | 98.4 | 98.0 | 98.4 | 98.8 | 95.3 | 91.8 | 91.9 | 93.3 | 88.5 | 91.1 | 93.3 | 91.8 | 89.2 | 82.1 | 87.1 | 90.5 | 89.7 |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 97.5 | 98.0 | 97.9 | 99.0 | 95.5 | 92.3 | 92.1 | 93.2 | 87.6 | 90.6 | 92.4 | 91.9 | 88.6 | 82.7 | 86.9 | 91.6 | 89.1 |
| *Thames Valley* | 98.7 | 98.5 | 98.8 | 98.8 | 95.6 | 91.7 | 92.1 | 94.2 | 89.9 | 91.9 | 93.9 | 92.9 | 91.0 | 86.4 | 89.6 | 91.1 | 91.2 |
| *North-West & South-West London* | 98.6 | 98.6 | 98.9 | 99.0 | 94.6 | 91.4 | 91.8 | 90.8 | 85.8 | 89.1 | 91.0 | 89.6 | 88.0 | 80.8 | 84.4 | 90.2 | 87.2 |
| *North-Central & North-East London* | 98.2 | 98.2 | 98.9 | 99.3 | 95.1 | 90.9 | 90.7 | 88.6 | 81.4 | 85.4 | 88.2 | 86.0 | 86.1 | 78.0 | 82.7 | 89.4 | 83.4 |
| *South-East London* | 98.9 | 97.6 | 98.9 | 98.6 | 95.7 | 93.4 | 93.4 | 88.7 | 84.8 | 88.2 | 90.9 | 89.2 | 88.9 | 81.6 | 83.5 | 91.5 | 85.8 |
| *Peninsula* | 98.4 | 98.3 | 98.3 | 98.3 | 94.6 | 91.6 | 90.9 | 93.3 | 86.8 | 90.0 | 92.5 | 91.0 | 89.1 | 81.7 | 86.0 | 90.5 | 88.8 |
| *Wessex* | 98.4 | 98.3 | 98.5 | 99.1 | 94.8 | 92.3 | 93.2 | 94.2 | 90.1 | 92.3 | 93.9 | 92.7 | 89.0 | 83.3 | 87.9 | 91.9 | 91.1 |
| *Surrey & Sussex* | 99.2 | 98.5 | 98.7 | 99.3 | 95.1 | 93.0 | 93.4 | 94.5 | 90.1 | 91.7 | 94.6 | 93.2 | 91.1 | 85.2 | 89.9 | 92.4 | 91.3 |
| *Kent & Medway* | 98.2 | 97.9 | 98.2 | 98.5 | 94.6 | 92.0 | 92.7 | 92.5 | 89.4 | 91.0 | 93.8 | 91.9 | 90.4 | 83.5 | 88.6 | 91.6 | 89.7 |
| **Wales** | **98.1** | **98.3** | **98.8** | **99.2** | **95.0** | **92.0** | **92.3** | **91.6** | **85.4** | **90.2** | **93.3** | **91.1** | **87.9** | **81.5** | **85.8** | **91.1** | **88.1** |
| **Scotland** | **98.7** | **98.5** | **98.6** | **99.2** | **95.2** | **91.3** | **91.6** | **91.8** | **85.0** | **89.5** | **92.7** | **90.3** | **89.3** | **80.2** | **85.9** | **90.3** | **87.6** |
| **Northern Ireland** | **98.5** | **98.1** | **99.1** | **99.4** | **93.6** | **90.4** | **90.6** | **90.5** | **82.7** | **86.9** | **91.9** | **89.3** | **87.5** | **78.2** | **81.4** | **89.2** | **85.2** |

### Table S3: Impact of data imputation on mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) by area of residence

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation &**  **Cancer Alliances/Vanguards (England)** | **Self-assessed health rating (EQ-VAS)** | | **Functional score (EPIC-26)** | | | | | | | | | |
| **Urinary incontinence** | | **Urinary irritation/ obstruction** | | **Bowel function** | | **Sexual function** | | **Vitality/hormonal function** | |
|  | Without imputation | With imputation | Without imputation | With imputation | Without imputation | With imputation | Without imputation | With imputation | Without imputation | With imputation | Without imputation | With imputation |
| **United Kingdom** | **76.6** | **76.6** | **82.7** | **81.5** | **86.0** | **84.2** | **89.0** | **87.7** | **25.2** | **25.2** | **80.1** | **79.1** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **England** | **76.9** | **76.9** | **82.9** | **81.6** | **86.1** | **84.5** | **89.3** | **88.0** | **25.5** | **25.5** | **80.6** | **79.6** |
| *North-East & Cumbria* | 73.4 | 73.4 | 79.8 | 78.6 | 84.4 | 82.6 | 89.5 | 87.9 | 22.7 | 23.0 | 77.5 | 76.5 |
| *Lancashire & South Cumbria* | 75.4 | 75.5 | 81.4 | 80.1 | 86.2 | 84.5 | 89.3 | 87.6 | 23.5 | 23.4 | 79.1 | 78.3 |
| *West Yorkshire* | 76.3 | 76.2 | 82.5 | 81.4 | 86.4 | 84.8 | 91.5 | 89.9 | 24.5 | 24.5 | 81.3 | 80.3 |
| *Humber, Coast & Vale* | 77.1 | 77.1 | 84.0 | 82.5 | 86.7 | 85.0 | 88.9 | 87.7 | 24.4 | 24.5 | 79.9 | 79.0 |
| *Cheshire & Merseyside* | 76.2 | 76.2 | 84.1 | 82.9 | 85.2 | 83.7 | 89.8 | 88.3 | 28.9 | 28.5 | 81.3 | 80.1 |
| *Greater Manchester* | 75.9 | 75.7 | 82.6 | 81.1 | 84.9 | 83.2 | 89.1 | 87.4 | 24.5 | 24.5 | 80.4 | 78.9 |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 74.7 | 74.7 | 81.7 | 80.2 | 85.6 | 83.5 | 88.1 | 86.7 | 23.3 | 23.6 | 79.3 | 78.1 |
| *West Midlands* | 77.1 | 77.0 | 82.2 | 81.0 | 86.0 | 84.2 | 89.2 | 88.1 | 22.3 | 22.5 | 78.8 | 78.1 |
| *East Midlands* | 76.4 | 76.4 | 83.5 | 82.1 | 85.8 | 84.1 | 88.8 | 87.2 | 24.2 | 24.3 | 79.1 | 78.2 |
| *East of England* | 77.7 | 77.7 | 84.4 | 83.2 | 86.8 | 85.1 | 88.6 | 87.7 | 25.7 | 25.7 | 81.1 | 80.3 |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 77.8 | 77.8 | 83.5 | 82.2 | 86.8 | 85.3 | 88.8 | 87.7 | 25.7 | 25.6 | 81.6 | 80.6 |
| *Thames Valley* | 78.4 | 78.3 | 82.4 | 81.5 | 86.7 | 85.4 | 90.4 | 89.5 | 26.9 | 26.9 | 82.2 | 81.5 |
| *North-West & South-West London* | 77.3 | 77.2 | 81.9 | 80.7 | 84.9 | 83.8 | 88.5 | 87.4 | 28.9 | 29.0 | 81.2 | 80.2 |
| *North-Central & North-East London* | 75.4 | 75.4 | 79.1 | 78.0 | 84.8 | 83.0 | 88.1 | 86.4 | 24.9 | 25.0 | 79.5 | 78.5 |
| *South-East London* | 77.4 | 77.4 | 81.6 | 80.0 | 86.8 | 85.1 | 90.4 | 88.4 | 31.2 | 31.1 | 82.0 | 80.5 |
| *Peninsula* | 77.0 | 77.1 | 80.3 | 79.7 | 85.5 | 84.1 | 89.5 | 88.3 | 23.5 | 23.5 | 80.1 | 79.2 |
| *Wessex* | 78.0 | 78.0 | 84.6 | 83.1 | 86.5 | 84.8 | 89.2 | 88.1 | 24.9 | 25.0 | 80.9 | 80.2 |
| *Surrey & Sussex* | 78.1 | 78.1 | 85.7 | 84.6 | 86.7 | 85.2 | 89.5 | 88.6 | 30.9 | 30.5 | 82.4 | 81.5 |
| *Kent & Medway* | 78.9 | 78.8 | 82.7 | 81.7 | 87.7 | 85.8 | 91.1 | 90.1 | 29.9 | 29.4 | 84.0 | 83.1 |
| **Wales** | **74.2** | **74.2** | **83.2** | **81.7** | **85.8** | **83.7** | **88.4** | **87.0** | **24.5** | **24.6** | **77.9** | **76.8** |
| **Scotland** | **74.8** | **74.6** | **78.9** | **77.8** | **84.2** | **82.2** | **87.3** | **85.7** | **20.7** | **20.7** | **76.8** | **75.6** |
| **Northern Ireland** | **76.0** | **75.9** | **83.7** | **82.3** | **83.8** | **82.0** | **85.2** | **83.9** | **27.4** | **27.3** | **76.1** | **75.0** |

### Table S4: Clinical characteristics of prostate cancer survivors# by area of residence with 95% confidence intervals and comparisons with UK average

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Country & Cancer Alliances/Vanguards (England)** | **Proportion of prostate cancer survivors (95 CI)** | | | | | | | |
| **Presented via**  **PSA test only** | **Presented with symptoms only** | **Diagnosed**  **at stage I/II** | **Diagnosed**  **at stage IV** | **Treated**  **with surgery** | **Treated**  **with EBRT** | **Treated**  **with ADT** | **Received monitoring only** |
| **United Kingdom** | **33.9 (33.4-34.4)** | **52.8 (52.3-53.3)** | **64.0 (63.5-64.6)** | **12.7 (12.3-13.0)** | **30.0 (29.5-30.5)** | **38.9 (38.4-39.4)** | **43.0 (42.5-43.5)** | **16.8 (16.5-17.2)** |
|  |  |  |  |  |  |  |  |  |
| **England** | **34.3 (33.8-34.9)** | **52.3 (51.7-52.9)** | **64.4 (63.8-64.9)** | **12.2 (11.8-12.6)** | **30.8 (30.3-31.4)↑** | **38.5 (37.9-39.0)** | **42.9 (42.3-43.5)** | **16.9 (16.5-17.3)** |
| *North-East & Cumbria* | 24.9 (22.3-27.5)↓↓ | 60.6 (57.7-63.5)↑↑ | 64.5 (61.6-67.4) | 16.1 (13.9-18.3)↑↑ | 29.4 (26.7-32.1) | 35.8 (33.0-38.6)↓ | 42.2 (39.3-45.1) | 18.9 (16.5-21.2) |
| *Lancashire & South Cumbria* | 31.8 (29.1-34.5) | 55.0 (52.1-57.9) | 60.1 (57.2-63.0)↓ | 14.8 (12.7-16.9)↑ | 32.1 (29.4-34.7) | 41.9 (39.1-44.6)↑ | 46.0 (43.1-48.8)↑ | 13.8 (11.8-15.7)↓ |
| *West Yorkshire* | 28.9 (26.5-31.3)↓↓ | 58.5 (56.0-61.1)↑↑ | 53.5 (50.8-56.1)↓↓ | 14.4 (12.6-16.2)↑ | 33.7 (31.3-36.1)↑ | 35.3 (32.8-37.7)↓ | 39.4 (36.9-41.9)↓ | 18.7 (16.7-20.7) |
| *Humber, Coast & Vale* | 30.1 (27.1-33.2)↓ | 57.2 (53.9-60.5)↑ | 61.9 (58.6-65.2) | 11.6 (9.5-13.7) | 30.2 (27.2-33.2) | 42.9 (39.7-46.2)↑ | 47.0 (43.8-50.3)↑ | 16.4 (13.9-18.8) |
| *Cheshire & Merseyside* | 34.0 (31.4-36.7) | 52.0 (49.2-54.8) | 62.7 (59.9-65.4) | 10.2 (8.5-12.0)↓ | 26.9 (24.5-29.4)↓ | 40.5 (37.8-43.2) | 42.4 (39.6-45.1) | 18.6 (16.4-20.8) |
| *Greater Manchester* | 34.3 (31.6-37.0) | 53.1 (50.2-55.9) | 67.5 (64.8-70.2)↑ | 12.1 (10.2-14.0) | 28.9 (26.4-31.4) | 40.5 (37.8-43.2) | 42.3 (39.5-45.0) | 14.8 (12.8-16.7) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 27.2 (24.7-29.7)↓↓ | 57.9 (55.2-60.7)↑↑ | 62.6 (59.8-65.4) | 12.4 (10.4-14.3) | 28.7 (26.2-31.2) | 40.0 (37.3-42.7) | 38.4 (35.7-41.0)↓↓ | 18.6 (16.5-20.8) |
| *West Midlands* | 35.6 (33.9-37.3) | 50.6 (48.8-52.3)↓ | 64.2 (62.5-65.9) | 12.7 (11.4-13.9) | 30.6 (29.0-32.2) | 41.0 (39.3-42.7)↑ | 45.6 (43.9-47.4)↑ | 16.5 (15.3-17.8) |
| *East Midlands* | 33.0 (31.2-34.9) | 53.3 (51.3-55.3) | 68.8 (66.8-70.8)↑↑ | 11.8 (10.5-13.1) | 24.9 (23.3-26.6)↓↓ | 40.5 (38.6-42.4) | 48.0 (46.1-49.9)↑↑ | 18.0 (16.6-19.5) |
| *East of England* | 34.6 (33.1-36.0) | 52.3 (50.8-53.9) | 68.9 (67.5-70.3)↑↑ | 10.9 (10.0-11.9)↓ | 27.4 (26.0-28.7)↓↓ | 39.9 (38.4-41.3) | 45.6 (44.2-47.1)↑↑ | 17.3 (16.1-18.4) |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 34.1 (31.7-36.4) | 53.4 (50.9-55.9) | 58.5 (56.1-61.0)↓↓ | 13.3 (11.6-15.1) | 31.5 (29.2-33.8) | 38.2 (35.8-40.6) | 44.3 (41.9-46.8) | 14.9 (13.2-16.7)↓ |
| *Thames Valley* | 37.3 (34.8-39.8)↑ | 49.6 (47.0-52.2)↓ | 64.8 (62.0-67.6) | 12.6 (10.6-14.6) | 37.5 (35.1-39.9)↑↑ | 34.4 (32.0-36.7)↓↓ | 41.0 (38.6-43.5) | 15.5 (13.7-17.3) |
| *North-West & South-West London* | 42.3 (39.3-45.3)↑↑ | 42.1 (39.1-45.0)↓↓ | 67.2 (64.2-70.1)↑ | 11.4 (9.5-13.4) | 35.0 (32.2-37.8)↑↑ | 39.0 (36.1-41.8) | 37.8 (34.9-40.6)↓↓ | 16.9 (14.7-19.0) |
| *North-Central & North-East London* | 41.4 (38.2-44.7)↑↑ | 44.5 (41.1-48.0)↓↓ | 66.4 (63.2-69.5) | 11.1 (9.0-13.2) | 37.5 (34.4-40.5)↑↑ | 35.8 (32.8-38.9) | 36.2 (33.2-39.3)↓↓ | 13.6 (11.4-15.8)↓ |
| *South-East London* | 37.1 (33.4-40.8) | 48.4 (44.5-52.2)↓ | 66.5 (62.8-70.2) | 9.5 (7.2-11.8)↓ | 39.8 (36.2-43.5)↑↑ | 29.8 (26.4-33.2)↓↓ | 32.2 (28.7-35.7)↓↓ | 18.8 (15.9-21.8) |
| *Peninsula* | 34.0 (31.3-36.8) | 54.4 (51.5-57.3) | 60.8 (58.0-63.6)↓ | 13.0 (11.1-15.0) | 33.6 (30.9-36.3)↑ | 41.2 (38.4-44.0) | 44.1 (41.3-47.0) | 15.5 (13.4-17.6) |
| *Wessex* | 34.5 (32.3-36.7) | 52.1 (49.8-54.4) | 65.4 (63.1-67.6) | 11.4 (9.8-12.9) | 27.2 (25.2-29.3)↓ | 40.6 (38.4-42.9) | 46.4 (44.1-48.6)↑ | 15.6 (13.9-17.2) |
| *Surrey & Sussex* | 40.0 (37.3-42.7)↑↑ | 48.6 (45.9-51.4)↓ | 61.7 (58.6-64.7) | 14.9 (12.8-17.0)↑ | 28.8 (26.3-31.2) | 37.3 (34.7-39.9) | 42.6 (39.9-45.2) | 17.0 (15.0-19.0) |
| *Kent & Medway* | 37.4 (34.7-40.0)↑ | 48.7 (46.0-51.5)↓ | 65.1 (62.4-67.8) | 9.6 (7.9-11.3)↓↓ | 42.1 (39.5-44.7)↑↑ | 25.8 (23.4-28.1)↓↓ | 31.6 (29.1-34.1)↓↓ | 20.7 (18.6-22.9)↑↑ |
| **Wales** | **35.1 (33.2-37.0)** | **51.3 (49.3-53.3)** | **68.8 (66.9-70.7)↑↑** | **11.4 (10.0-12.7)** | **26.0 (24.3-27.7)↓↓** | **42.8 (40.9-44.8)↑↑** | **42.4 (40.5-44.3)** | **19.3 (17.8-20.9)↑** |
| **Scotland** | **22.9 (21.0-24.9)↓↓** | **64.5 (62.2-66.7)↑↑** | **52.6 (50.2-55.1)↓↓** | **21.1 (19.2-23.1)↑↑** | **29.6 (27.5-31.7)** | **35.5 (33.2-37.7)↓** | **45.8 (43.5-48.1)↑** | **12.4 (10.9-14.0)↓↓** |
| **Northern Ireland** | **37.0 (34.0-40.0)↑** | **52.0 (48.9-55.2)** | **63.2 (60.1-66.2)** | **13.4 (11.2-15.5)** | **15.6 (13.4-17.9)↓↓** | **49.2 (46.2-52.3)↑↑** | **42.7 (39.7-45.8)** | **17.3 (14.9-19.6)** |

Notes:

n=35,823 (see table 1 for number of respondents by area). # Alive 18-42 months after diagnosis.

Patients may receive more than one treatment type.

CI - Confidence Interval, EBRT - External Beam Radiotherapy, ADT - Androgen Deprivation Therapy.

↑↑ Higher than UK average (p<0.001), ↑ Higher than UK average (p<0.05), ↓ Lower than UK average (p<0.05), ↓↓ Lower than UK average (p<0.001).

### Table S5: Unadjusted responses to individual items from the EQ-5D-5L and EPIC-26 question sets by area of residence with 95% confidence intervals and comparisons with UK average

### Health-related quality of life (EQ-5D-5L) and self-assessed health (EQ-VAS)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting any level of problem for each EQ-5D-5L dimension (95% CI)** | | | | | | **Unadjusted mean self-assessed health rating**  **(EQ-VAS)** |
| **Mobility** | **Usual activities** | **Self-care** | **Pain/discomfort** | **Anxiety/ depression** | **Problem in more than one dimension** |
| **United Kingdom** | **36.1 (35.6-36.6)** | **37.8 (37.3-38.3)** | **14.4 (14.0-14.8)** | **42.2 (41.7-42.7)** | **33.6 (33.1-34.1)** | **62.5 (62.0-63.0)** | **76.6 (76.4-76.8)** |
|  |  |  |  |  |  |  |  |
| **England** | **35.2 (34.6-35.7)↓** | **36.6 (36.0-37.1)↓↓** | **13.5 (13.1-13.9)↓** | **41.3 (40.8-41.9)↓** | **33.1 (32.5-33.6)** | **61.8 (61.2-62.3)** | **76.9 (76.7-77.1)↑** |
| *North-East & Cumbria* | 41.8 (38.9-44.7)↑↑ | 44.2 (41.2-47.1)↑↑ | 18.8 (16.5-21.1)↑↑ | 48.9 (45.9-51.8)↑↑ | 38.3 (35.5-41.2)↑ | 66.7 (63.9-69.5)↑ | 73.4 (72.3-74.6)↓↓ |
| *Lancashire & South Cumbria* | 37.4 (34.7-40.2) | 39.6 (36.8-42.4) | 14.9 (12.8-16.9) | 43.1 (40.3-45.9) | 35.5 (32.8-38.2) | 64.1 (61.4-66.8) | 75.5 (74.4-76.5)↓ |
| *West Yorkshire* | 36.2 (33.8-38.6) | 37.4 (35.0-39.9) | 13.8 (12.1-15.6) | 41.0 (38.5-43.5) | 32.2 (29.8-34.5) | 62.3 (59.8-64.8) | 76.2 (75.3-77.2) |
| *Humber, Coast & Vale* | 34.7 (31.6-37.8) | 36.2 (33.0-39.3) | 13.6 (11.3-15.8) | 43.4 (40.2-46.7) | 30.1 (27.1-33.1)↓ | 61.5 (58.3-64.7) | 77.1 (75.9-78.3) |
| *Cheshire & Merseyside* | 35.8 (33.2-38.5) | 37.3 (34.6-40.0) | 14.4 (12.4-16.3) | 42.2 (39.5-45.0) | 35.0 (32.3-37.6) | 63.8 (61.2-66.5) | 76.2 (75.2-77.2) |
| *Greater Manchester* | 36.9 (34.3-39.6) | 38.1 (35.4-40.8) | 15.8 (13.7-17.8) | 43.2 (40.4-45.9) | 34.5 (31.8-37.1) | 62.6 (59.9-65.3) | 75.7 (74.7-76.8) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 41.2 (38.5-43.9)↑↑ | 42.2 (39.5-44.9)↑ | 18.2 (16.1-20.3)↑↑ | 45.7 (43.0-48.4)↑ | 36.7 (34.1-39.4)↑ | 66.2 (63.6-68.8)↑ | 74.7 (73.6-75.8)↓↓ |
| *West Midlands* | 35.9 (34.2-37.6) | 38.7 (37.0-40.4) | 14.4 (13.1-15.6) | 44.0 (42.3-45.7)↑ | 34.8 (33.1-36.5) | 64.2 (62.6-65.9)↑ | 77.0 (76.3-77.6) |
| *East Midlands* | 37.5 (35.7-39.4) | 38.6 (36.7-40.4) | 13.5 (12.2-14.8) | 42.4 (40.5-44.3) | 34.4 (32.6-36.2) | 64.2 (62.3-66.0) | 76.4 (75.7-77.1) |
| *East of England* | 33.4 (32.0-34.9)↓↓ | 35.2 (33.7-36.6)↓↓ | 12.9 (11.9-13.9)↓ | 40.7 (39.2-42.1) | 31.7 (30.3-33.1)↓ | 60.3 (58.9-61.8)↓ | 77.7 (77.2-78.2)↑↑ |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 32.9 (30.6-35.2)↓ | 33.6 (31.2-35.9)↓↓ | 11.0 (9.5-12.6)↓↓ | 38.4 (36.0-40.8)↓ | 28.7 (26.5-31.0)↓↓ | 58.4 (56.0-60.8)↓ | 77.8 (76.9-78.7)↑ |
| *Thames Valley* | 32.1 (29.7-34.4)↓ | 34.2 (31.8-36.5)↓ | 10.8 (9.2-12.3)↓↓ | 38.0 (35.6-40.4)↓ | 31.5 (29.2-33.8) | 60.4 (57.9-62.8) | 78.3 (77.5-79.2)↑↑ |
| *North-West & South-West London* | 30.8 (28.1-33.5)↓↓ | 31.2 (28.5-33.9)↓↓ | 13.0 (11.0-15.0) | 38.8 (36.0-41.7)↓ | 33.9 (31.2-36.7) | 59.0 (56.1-61.9)↓ | 77.2 (76.2-78.2) |
| *North-Central & North-East London* | 38.2 (35.2-41.3) | 38.9 (35.8-42.0) | 16.6 (14.2-18.9) | 44.2 (41.0-47.4) | 35.6 (32.6-38.6) | 63.6 (60.6-66.7) | 75.4 (74.2-76.6) |
| *South-East London* | 32.7 (29.2-36.1) | 33.2 (29.7-36.7)↓ | 14.9 (12.2-17.5) | 39.9 (36.2-43.5) | 35.1 (31.5-38.6) | 58.8 (55.1-62.5)↓ | 77.4 (76.0-78.7) |
| *Peninsula* | 36.7 (34.0-39.5) | 37.8 (35.0-40.5) | 12.4 (10.5-14.3) | 39.3 (36.6-42.1) | 32.5 (29.8-35.1) | 62.2 (59.4-65.0) | 77.1 (76.0-78.1) |
| *Wessex* | 34.6 (32.4-36.7) | 35.0 (32.8-37.2)↓ | 11.2 (9.7-12.6)↓↓ | 38.5 (36.3-40.7)↓ | 31.3 (29.2-33.4)↓ | 60.5 (58.2-62.7) | 78.0 (77.2-78.8)↑↑ |
| *Surrey & Sussex* | 30.0 (27.5-32.4)↓↓ | 31.0 (28.5-33.5)↓↓ | 10.1 (8.5-11.8)↓↓ | 36.4 (33.8-38.9)↓↓ | 29.5 (27.1-32.0)↓ | 56.7 (54.0-59.3)↓↓ | 78.1 (77.2-79.0)↑ |
| *Kent & Medway* | 31.9 (29.5-34.4)↓ | 32.2 (29.8-34.7)↓↓ | 11.4 (9.7-13.1)↓ | 38.0 (35.4-40.6)↓ | 30.3 (27.8-32.7)↓ | 57.3 (54.7-60.0)↓↓ | 78.8 (77.9-79.7)↑↑ |
| **Wales** | **42.0 (40.0-43.9)↑↑** | **45.1 (43.1-47.0)↑↑** | **19.7 (18.1-21.2)↑↑** | **47.1 (45.1-49.0)↑↑** | **37.4 (35.5-39.3)↑↑** | **66.2 (64.3-68.1)↑↑** | **74.2 (73.4-75.0)↓↓** |
| **Scotland** | **42.8 (40.5-45.1)↑↑** | **46.3 (44.0-48.6)↑↑** | **18.7 (16.9-20.5)↑↑** | **46.9 (44.6-49.2)↑↑** | **37.0 (34.8-39.3)↑** | **66.4 (64.3-68.6)↑↑** | **74.6 (73.8-75.5)↓↓** |
| **Northern Ireland** | **38.3 (35.3-41.3)** | **42.2 (39.1-45.2)↑** | **19.9 (17.4-22.3)↑↑** | **47.0 (43.9-50.1)↑** | **35.6 (32.7-38.6)** | **66.3 (63.4-69.2)↑** | **75.9 (74.8-77.1)** |

### Urinary incontinence (EPIC-26)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting problems for each EPIC-26 question (95% CI)** | | | | **Unadjusted mean**  **urinary incontinence score** |
| **Leaked urine daily (or more)** | **Frequent dribbling/no urinary control** | **Pads used for urinary leakage** | **Moderate/big problems with dripping or leaking urine** |
| **United Kingdom** | **13.2 (12.9-13.6)** | **8.0 (7.7-8.2)** | **13.1 (12.7-13.4)** | **8.3 (8.0-8.6)** | **81.5 (81.2-81.7)** |
|  |  |  |  |  |  |
| **England** | **13.1 (12.7-13.5)** | **7.7 (7.4-8.0)** | **13.0 (12.7-13.4)** | **8.0 (7.6-8.3)** | **81.6 (81.4-81.9)** |
| *North-East & Cumbria* | 17.6 (15.4-19.9)↑↑ | 12.7 (10.7-14.7)↑↑ | 15.6 (13.4-17.7)↑ | 11.4 (9.5-13.4)↑↑ | 78.6 (77.1-80.1)↓↓ |
| *Lancashire & South Cumbria* | 15.3 (13.2-17.3)↑ | 8.7 (7.1-10.3) | 13.9 (11.9-15.9) | 8.5 (6.9-10.1) | 80.1 (78.8-81.4)↓ |
| *West Yorkshire* | 11.8 (10.2-13.5) | 6.8 (5.5-8.1) | 14.7 (12.9-16.6) | 6.7 (5.4-8.1)↓ | 81.4 (80.3-82.5) |
| *Humber, Coast & Vale* | 13.4 (11.1-15.6) | 7.3 (5.6-9.0) | 10.6 (8.5-12.6)↓ | 7.8 (6.0-9.6) | 82.5 (81.1-84.0) |
| *Cheshire & Merseyside* | 11.8 (10.0-13.6) | 7.4 (5.9-8.8) | 10.4 (8.7-12.1)↓ | 7.2 (5.7-8.7) | 82.9 (81.7-84.1)↑ |
| *Greater Manchester* | 12.7 (10.9-14.6) | 7.1 (5.6-8.5) | 11.7 (9.9-13.5) | 8.1 (6.5-9.6) | 81.1 (79.9-82.3) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 15.1 (13.1-17.0) | 9.5 (7.9-11.2)↑ | 14.9 (13.0-16.9) | 9.9 (8.2-11.5)↑ | 80.2 (78.9-81.5) |
| *West Midlands* | 14.0 (12.8-15.3) | 8.0 (7.0-8.9) | 13.9 (12.7-15.1) | 8.2 (7.2-9.2) | 81.0 (80.2-81.8) |
| *East Midlands* | 12.6 (11.3-13.8) | 7.1 (6.2-8.1) | 11.3 (10.1-12.5)↓ | 7.2 (6.2-8.3) | 82.1 (81.3-83.0) |
| *East of England* | 11.1 (10.1-12.0)↓↓ | 6.7 (5.9-7.4)↓ | 11.2 (10.3-12.2)↓↓ | 6.9 (6.1-7.7)↓ | 83.2 (82.5-83.8)↑↑ |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 11.3 (9.7-12.9)↓ | 6.5 (5.3-7.8)↓ | 13.4 (11.7-15.1) | 7.1 (5.8-8.5) | 82.2 (81.1-83.2) |
| *Thames Valley* | 13.4 (11.6-15.1) | 7.5 (6.2-8.8) | 13.8 (12.1-15.6) | 8.3 (6.9-9.7) | 81.5 (80.3-82.6) |
| *North-West & South-West London* | 14.1 (12.1-16.2) | 9.5 (7.7-11.2) | 14.0 (11.9-16.1) | 10.1 (8.3-11.8)↑ | 80.7 (79.4-82.1) |
| *North-Central & North-East London* | 17.2 (14.8-19.6)↑↑ | 10.5 (8.6-12.5)↑ | 17.0 (14.6-19.4)↑↑ | 10.6 (8.6-12.6)↑ | 78.0 (76.5-79.5)↓↓ |
| *South-East London* | 16.1 (13.4-18.9)↑ | 8.8 (6.6-10.9) | 15.7 (13.0-18.4)↑ | 8.3 (6.2-10.4) | 80.0 (78.3-81.7) |
| *Peninsula* | 14.6 (12.6-16.7) | 8.8 (7.1-10.5) | 16.2 (14.1-18.3)↑ | 8.3 (6.7-9.9) | 79.7 (78.3-81.0)↓ |
| *Wessex* | 11.8 (10.3-13.2) | 6.3 (5.2-7.4)↓ | 12.2 (10.7-13.7) | 7.3 (6.1-8.5) | 83.1 (82.2-84.1)↑ |
| *Surrey & Sussex* | 9.2 (7.6-10.7)↓↓ | 5.2 (4.0-6.4)↓↓ | 9.5 (7.9-11.1)↓↓ | 6.7 (5.3-8.0)↓ | 84.6 (83.6-85.7)↑↑ |
| *Kent & Medway* | 14.3 (12.4-16.2) | 7.6 (6.1-9.0) | 14.5 (12.6-16.4) | 7.9 (6.4-9.3) | 81.7 (80.4-82.9) |
| **Wales** | **11.7 (10.5-13.0)↓** | **8.4 (7.3-9.5)** | **12.1 (10.8-13.4)** | **9.0 (7.8-10.1)** | **81.7 (80.8-82.6)** |
| **Scotland** | **17.5 (15.8-19.3)↑↑** | **11.6 (10.1-13.1)↑↑** | **17.4 (15.6-19.1)↑↑** | **12.4 (10.8-14.0)↑↑** | **77.8 (76.7-79.0)↓↓** |
| **Northern Ireland** | **12.4 (10.4-14.5)** | **8.5 (6.8-10.3)** | **8.7 (7.0-10.4)↓↓** | **8.2 (6.5-10.0)** | **82.3 (81.0-83.7)** |

### Urinary irritation/obstruction (EPIC-26)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting problems for each EPIC-26 question (95% CI)** | | | | | **Unadjusted mean urinary irritation/ obstruction score** |
| **Moderate/big problems with pain or burning on urination** | **Moderate/big problems with bleeding with urination** | **Moderate/big problems with weak urine stream or incomplete emptying** | **Moderate/big problems with need to urinate frequently during the day** | **Moderate/big problems with urinary function** |
| **United Kingdom** | **3.2 (3.0-3.4)** | **1.0 (0.9-1.1)** | **13.1 (12.7-13.5)** | **19.8 (19.4-20.2)** | **13.3 (12.9-13.6)** | **84.2 (84.1-84.4)** |
|  |  |  |  |  |  |  |
| **England** | **3.0 (2.8-3.2)** | **1.0 (0.9-1.1)** | **12.7 (12.3-13.1)** | **19.4 (18.9-19.8)** | **12.8 (12.5-13.2)** | **84.5 (84.3-84.7)** |
| *North-East & Cumbria* | 4.2 (2.9-5.5) | 1.3 (0.6-2.0) | 15.1 (12.8-17.4) | 24.8 (22.2-27.4)↑↑ | 18.4 (16.1-20.7)↑↑ | 82.6 (81.5-83.7)↓ |
| *Lancashire & South Cumbria* | 3.1 (2.0-4.3) | 0.7 (0.1-1.3) | 12.2 (10.1-14.3) | 21.0 (18.4-23.5) | 13.4 (11.5-15.4) | 84.5 (83.6-85.5) |
| *West Yorkshire* | 3.4 (2.4-4.3) | 0.9 (0.4-1.5) | 11.1 (9.4-12.8)↓ | 18.6 (16.5-20.7) | 12.1 (10.5-13.8) | 84.8 (84.0-85.7) |
| *Humber, Coast & Vale* | 2.2 (1.1-3.3) | 1.0 (0.2-1.7) | 11.9 (9.5-14.3) | 17.7 (15.1-20.3) | 11.5 (9.4-13.6) | 85.0 (84.0-86.1) |
| *Cheshire & Merseyside* | 3.1 (2.1-4.2) | 1.0 (0.4-1.6) | 13.1 (11.2-15.0) | 20.0 (17.7-22.3) | 12.8 (10.9-14.6) | 83.7 (82.8-84.6) |
| *Greater Manchester* | 4.0 (2.8-5.2) | 2.1 (1.2-2.9)↑↑ | 13.6 (11.5-15.8) | 21.7 (19.3-24.0) | 14.3 (12.3-16.2) | 83.2 (82.2-84.2) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 4.0 (2.8-5.1) | 1.1 (0.4-1.9) | 13.3 (11.3-15.2) | 21.1 (18.8-23.4) | 14.7 (12.8-16.6) | 83.5 (82.6-84.4) |
| *West Midlands* | 2.8 (2.1-3.5) | 0.8 (0.5-1.1) | 14.1 (12.8-15.4) | 20.4 (18.9-21.9) | 13.6 (12.4-14.8) | 84.2 (83.6-84.8) |
| *East Midlands* | 3.2 (2.4-3.9) | 0.8 (0.4-1.2) | 13.2 (11.8-14.5) | 19.8 (18.2-21.5) | 12.1 (10.9-13.4) | 84.1 (83.4-84.7) |
| *East of England* | 2.6 (2.1-3.1)↓ | 1.0 (0.7-1.3) | 11.8 (10.8-12.8)↓ | 17.9 (16.7-19.1)↓ | 11.4 (10.4-12.4)↓↓ | 85.1 (84.6-85.6)↑↑ |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 2.0 (1.3-2.8)↓ | 0.9 (0.3-1.4) | 12.3 (10.6-14.0) | 16.9 (15.0-18.8)↓ | 10.9 (9.4-12.5)↓ | 85.3 (84.5-86.0)↑ |
| *Thames Valley* | 2.8 (1.9-3.6) | 0.6 (0.1-1.0) | 12.0 (10.3-13.7) | 18.2 (16.2-20.1) | 11.5 (9.9-13.1)↓ | 85.4 (84.6-86.2)↑ |
| *North-West & South-West London* | 3.3 (2.1-4.4) | 1.3 (0.6-2.0) | 12.1 (9.9-14.2) | 20.6 (18.2-23.0) | 14.9 (12.8-17.0) | 83.8 (82.8-84.8) |
| *North-Central & North-East London* | 3.7 (2.4-5.0) | 1.2 (0.4-2.1) | 15.1 (12.6-17.7) | 23.6 (20.8-26.4)↑ | 16.8 (14.4-19.2)↑ | 83.0 (81.9-84.2)↓ |
| *South-East London* | 4.3 (2.7-6.0) | 1.2 (0.4-2.1) | 11.3 (8.7-13.9) | 17.1 (14.2-20.0) | 12.3 (9.8-14.7) | 85.1 (83.8-86.4) |
| *Peninsula* | 3.1 (2.0-4.3) | 0.6 (0.1-1.0) | 13.0 (10.8-15.3) | 20.3 (17.9-22.8) | 14.6 (12.6-16.7) | 84.1 (83.1-85.0) |
| *Wessex* | 2.5 (1.8-3.3) | 0.7 (0.2-1.1) | 13.2 (11.6-14.8) | 18.3 (16.5-20.2) | 12.5 (11.0-14.0) | 84.8 (84.1-85.6) |
| *Surrey & Sussex* | 2.7 (1.7-3.6) | 1.0 (0.4-1.6) | 12.1 (10.2-13.9) | 16.8 (14.7-18.9)↓ | 10.9 (9.2-12.6)↓ | 85.2 (84.4-86.1)↑ |
| *Kent & Medway* | 2.8 (1.9-3.8) | 1.0 (0.4-1.6) | 11.0 (9.1-12.9)↓ | 16.8 (14.7-18.9)↓ | 11.2 (9.5-12.9)↓ | 85.8 (84.9-86.7)↑↑ |
| **Wales** | **3.5 (2.7-4.3)** | **1.1 (0.6-1.6)** | **14.5 (13.0-16.0)↑** | **22.3 (20.6-24.0)↑** | **14.1 (12.7-15.4)** | **83.7 (83.0-84.4)** |
| **Scotland** | **4.3 (3.2-5.4)↑** | **1.3 (0.7-1.9)** | **16.6 (14.8-18.5)↑↑** | **22.2 (20.3-24.2)↑** | **17.8 (16.1-19.6)↑↑** | **82.2 (81.3-83.1)↓↓** |
| **Northern Ireland** | **5.2 (3.7-6.7)↑↑** | **1.1 (0.3-1.8)** | **15.6 (13.2-18.0)↑** | **22.5 (19.8-25.2)↑** | **15.4 (13.2-17.6)↑** | **82.0 (80.9-83.1)↓↓** |

### Bowel function (EPIC-26)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting problems for each EPIC-26 question (95% CI)** | | | | | | **Unadjusted mean bowel function score** |
| **Moderate/big problems with urgency to have a bowel movement** | **Moderate/big problems with increased frequency of bowel movements** | **Moderate/big problems with losing control of bowel movements** | **Moderate/big problems with bloody stools** | **Moderate/big problems with abdominal, pelvic, rectal or back passage pain** | **Moderate/big problems with bowel habits** |
| **United Kingdom** | **10.3 (10.0-10.6)** | **7.8 (7.5-8.2)** | **4.8 (4.5-5.0)** | **3.1 (2.9-3.3)** | **4.9 (4.7-5.2)** | **9.1 (8.8-9.4)** | **87.7 (87.5-87.9)** |
|  |  |  |  |  |  |  |  |
| **England** | **9.9 (9.5-10.2)** | **7.4 (7.1-7.8)↓** | **4.5 (4.3-4.8)** | **3.0 (2.8-3.2)** | **4.7 (4.4-5.0)** | **8.6 (8.3-8.9)↓** | **88.0 (87.8-88.2)↑** |
| *North-East & Cumbria* | 9.5 (7.7-11.3) | 7.1 (5.5-8.7) | 4.9 (3.5-6.3) | 2.2 (1.2-3.2) | 6.8 (5.3-8.3)↑ | 10.6 (8.7-12.4) | 87.9 (86.8-88.9) |
| *Lancashire & South Cumbria* | 11.6 (9.7-13.4) | 8.7 (7.1-10.4) | 4.9 (3.6-6.1) | 2.4 (1.4-3.4) | 5.5 (4.1-6.9) | 9.7 (8.1-11.4) | 87.6 (86.6-88.6) |
| *West Yorkshire* | 7.1 (5.8-8.5)↓↓ | 4.8 (3.7-6.0)↓↓ | 3.1 (2.1-4.1)↓ | 1.4 (0.7-2.1)↓↓ | 5.1 (3.9-6.3) | 6.5 (5.2-7.8)↓↓ | 89.9 (89.2-90.7)↑↑ |
| *Humber, Coast & Vale* | 9.6 (7.6-11.6) | 8.2 (6.3-10.1) | 4.2 (2.8-5.7) | 3.7 (2.4-5.1) | 5.3 (3.7-6.8) | 9.3 (7.4-11.2) | 87.7 (86.5-88.8) |
| *Cheshire & Merseyside* | 10.2 (8.5-11.9) | 7.3 (5.7-8.9) | 4.1 (3.0-5.2) | 2.4 (1.4-3.4) | 5.1 (3.8-6.3) | 8.6 (7.0-10.1) | 88.3 (87.3-89.2) |
| *Greater Manchester* | 9.7 (8.0-11.4) | 7.8 (6.2-9.4) | 4.7 (3.4-6.0) | 4.3 (3.1-5.6)↑ | 5.6 (4.2-6.9) | 10.6 (8.9-12.3) | 87.4 (86.3-88.4) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 11.3 (9.5-13.1) | 8.6 (7.1-10.2) | 5.8 (4.5-7.1) | 3.4 (2.3-4.5) | 5.3 (3.9-6.7) | 10.4 (8.8-12.1) | 86.7 (85.7-87.7)↓ |
| *West Midlands* | 9.8 (8.8-10.9) | 6.7 (5.8-7.6)↓ | 4.5 (3.7-5.3) | 2.9 (2.3-3.6) | 4.6 (3.9-5.4) | 7.8 (6.8-8.7)↓ | 88.1 (87.5-88.7) |
| *East Midlands* | 11.1 (9.9-12.4) | 8.9 (7.8-10.1)↑ | 5.2 (4.2-6.1) | 3.2 (2.5-4.0) | 4.7 (3.8-5.6) | 9.0 (7.9-10.1) | 87.2 (86.5-87.9) |
| *East of England* | 10.2 (9.2-11.1) | 7.4 (6.6-8.3) | 4.7 (4.0-5.4) | 3.8 (3.2-4.4)↑ | 4.2 (3.6-4.9)↓ | 8.5 (7.7-9.4) | 87.7 (87.1-88.2) |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 10.2 (8.7-11.7) | 8.0 (6.7-9.4) | 4.8 (3.7-5.8) | 2.8 (1.9-3.6) | 4.9 (3.8-5.9) | 8.1 (6.7-9.4) | 87.7 (86.8-88.5) |
| *Thames Valley* | 8.5 (7.1-9.9)↓ | 6.1 (4.9-7.3)↓ | 3.5 (2.5-4.5)↓ | 1.9 (1.1-2.7)↓ | 3.6 (2.6-4.7)↓ | 6.6 (5.3-7.8)↓↓ | 89.5 (88.8-90.3)↑↑ |
| *North-West & South-West London* | 11.8 (9.8-13.7) | 8.5 (6.8-10.1) | 4.9 (3.5-6.2) | 3.0 (1.9-4.2) | 4.7 (3.3-6.1) | 8.5 (6.9-10.1) | 87.4 (86.4-88.5) |
| *North-Central & North-East London* | 12.7 (10.6-14.9)↑ | 10.4 (8.3-12.4)↑ | 6.8 (5.1-8.5)↑ | 3.5 (2.2-4.8) | 6.0 (4.4-7.7) | 11.6 (9.6-13.6)↑ | 86.4 (85.2-87.7)↓ |
| *South-East London* | 10.0 (7.8-12.3) | 8.2 (6.0-10.3) | 4.5 (2.8-6.2) | 3.3 (1.8-4.9) | 5.5 (3.7-7.2) | 9.0 (6.9-11.2) | 88.4 (87.1-89.7) |
| *Peninsula* | 8.6 (6.9-10.3) | 6.5 (5.0-7.9) | 4.5 (3.2-5.7) | 2.0 (1.1-2.9)↓ | 4.4 (3.2-5.6) | 8.1 (6.5-9.6) | 88.3 (87.4-89.3) |
| *Wessex* | 9.9 (8.5-11.3) | 6.7 (5.5-7.9) | 4.1 (3.1-5.0) | 3.9 (3.0-4.8) | 4.3 (3.4-5.3) | 9.0 (7.7-10.3) | 88.1 (87.3-88.8) |
| *Surrey & Sussex* | 8.6 (7.1-10.1)↓ | 7.3 (5.8-8.7) | 4.4 (3.3-5.5) | 2.9 (2.0-3.8) | 3.2 (2.2-4.2)↓ | 8.6 (7.1-10.1) | 88.6 (87.7-89.5) |
| *Kent & Medway* | 7.3 (5.8-8.7)↓↓ | 5.7 (4.4-7.0)↓ | 3.3 (2.3-4.3)↓ | 1.6 (0.9-2.4)↓ | 3.5 (2.4-4.5)↓ | 6.2 (4.9-7.5)↓↓ | 90.1 (89.2-90.9)↑↑ |
| **Wales** | **12.2 (10.9-13.5)↑** | **9.6 (8.4-10.8)↑** | **5.6 (4.7-6.6)** | **3.3 (2.5-4.0)** | **5.5 (4.5-6.5)** | **11.3 (10.0-12.5)↑↑** | **87.0 (86.2-87.7)** |
| **Scotland** | **12.1 (10.6-13.6)↑** | **9.5 (8.0-10.9)↑** | **6.0 (4.8-7.2)↑** | **4.6 (3.5-5.7)↑↑** | **6.9 (5.6-8.1)↑↑** | **11.7 (10.3-13.2)↑↑** | **85.7 (84.8-86.6)↓↓** |
| **Northern Ireland** | **14.1 (11.9-16.3)↑↑** | **13.0 (10.8-15.2)↑↑** | **7.6 (5.9-9.3)↑↑** | **3.5 (2.3-4.8)** | **6.9 (5.2-8.5)↑** | **12.7 (10.6-14.7)↑↑** | **83.9 (82.7-85.2)↓↓** |

### Sexual function (EPIC-26)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting problems for each EPIC-26 question (95% CI)** | | | | | | **Unadjusted mean sexual function score** |
| **Poor ability to have an erection** | **Poor ability to reach orgasm** | **Erections not firm** | **Erections unreliable** | **Poor ability to function sexually** | **Moderate/big problems with sexual function** |
| **United Kingdom** | **79.7 (79.3-80.1)** | **74.5 (74.0-75.0)** | **87.2 (86.9-87.6)** | **84.5 (84.1-84.9)** | **79.4 (78.9-79.8)** | **44.7 (44.2-45.3)** | **25.2 (24.9-25.5)** |
|  |  |  |  |  |  |  |  |
| **England** | **79.6 (79.2-80.1)** | **74.2 (73.7-74.7)** | **87.1 (86.8-87.5)** | **84.2 (83.8-84.7)** | **79.2 (78.8-79.7)** | **44.0 (43.4-44.5)↓** | **25.5 (25.2-25.8)** |
| *North-East & Cumbria* | 81.8 (79.5-84.1) | 77.3 (74.9-79.8)↑ | 88.8 (86.9-90.7) | 86.3 (84.2-88.3) | 81.1 (78.8-83.5) | 47.6 (44.5-50.7) | 23.0 (21.5-24.6)↓ |
| *Lancashire & South Cumbria* | 82.0 (79.8-84.2) | 75.9 (73.4-78.4) | 89.2 (87.4-91.0)↑ | 85.9 (83.9-87.9) | 81.4 (79.2-83.7) | 46.7 (43.9-49.6) | 23.4 (22.0-24.9)↓ |
| *West Yorkshire* | 81.1 (79.0-83.1) | 76.0 (73.8-78.3) | 87.9 (86.2-89.5) | 84.8 (82.9-86.6) | 81.1 (79.1-83.1) | 44.3 (41.7-46.9) | 24.5 (23.2-25.9) |
| *Humber, Coast & Vale* | 80.5 (77.9-83.1) | 74.5 (71.6-77.4) | 87.1 (84.9-89.3) | 84.6 (82.2-86.9) | 80.6 (77.9-83.2) | 46.7 (43.4-50.0) | 24.5 (22.7-26.3) |
| *Cheshire & Merseyside* | 75.7 (73.2-78.1)↓↓ | 70.7 (68.1-73.3)↓ | 85.7 (83.8-87.7) | 81.6 (79.4-83.9)↓ | 75.4 (72.9-77.9)↓↓ | 43.9 (41.1-46.8) | 28.5 (26.9-30.0)↑↑ |
| *Greater Manchester* | 81.4 (79.2-83.6) | 75.2 (72.8-77.7) | 88.8 (87.0-90.6) | 86.1 (84.2-88.1) | 80.8 (78.6-83.1) | 45.1 (42.2-48.0) | 24.5 (23.1-25.9) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 81.1 (79.0-83.3) | 75.8 (73.4-78.2) | 88.2 (86.5-90.0) | 86.3 (84.3-88.2) | 80.6 (78.4-82.7) | 47.4 (44.6-50.2) | 23.6 (22.2-25.0)↓ |
| *West Midlands* | 82.7 (81.4-84.0)↑↑ | 78.5 (77.0-79.9)↑↑ | 89.8 (88.7-90.8)↑↑ | 86.7 (85.5-87.9)↑↑ | 82.7 (81.3-84.0)↑↑ | 47.1 (45.4-48.9)↑ | 22.5 (21.7-23.4)↓↓ |
| *East Midlands* | 81.1 (79.6-82.7) | 76.1 (74.4-77.7) | 87.6 (86.3-88.8) | 85.0 (83.6-86.4) | 80.9 (79.4-82.4) | 45.4 (43.4-47.3) | 24.3 (23.2-25.3) |
| *East of England* | 79.1 (77.8-80.3) | 74.2 (72.9-75.6) | 86.7 (85.6-87.7) | 84.1 (83.0-85.2) | 79.4 (78.2-80.7) | 42.7 (41.2-44.2)↓ | 25.7 (24.9-26.5) |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 80.3 (78.3-82.3) | 75.4 (73.2-77.5) | 87.5 (85.8-89.1) | 84.8 (83.0-86.6) | 80.0 (78.0-82.0) | 41.0 (38.5-43.4)↓ | 25.6 (24.3-26.9) |
| *Thames Valley* | 80.1 (78.0-82.1) | 71.5 (69.2-73.7)↓ | 86.4 (84.7-88.1) | 83.2 (81.3-85.0) | 78.4 (76.3-80.4) | 39.9 (37.4-42.4)↓↓ | 26.9 (25.5-28.2)↑ |
| *North-West & South-West London* | 73.7 (71.1-76.4)↓↓ | 68.2 (65.4-71.1)↓↓ | 85.2 (83.1-87.3)↓ | 80.7 (78.3-83.1)↓↓ | 72.9 (70.3-75.6)↓↓ | 43.8 (40.8-46.7) | 29.0 (27.4-30.7)↑↑ |
| *North-Central & North-East London* | 81.1 (78.7-83.6) | 73.7 (70.9-76.6) | 87.6 (85.4-89.7) | 84.8 (82.5-87.1) | 79.2 (76.6-81.8) | 48.9 (45.5-52.3)↑ | 25.0 (23.3-26.6) |
| *South-East London* | 72.5 (69.2-75.9)↓↓ | 67.4 (63.9-71.0)↓↓ | 82.8 (79.9-85.7)↓↓ | 78.2 (75.0-81.3)↓↓ | 71.0 (67.6-74.5)↓↓ | 41.5 (37.8-45.2) | 31.1 (28.9-33.2)↑↑ |
| *Peninsula* | 82.6 (80.4-84.8)↑ | 78.0 (75.6-80.4)↑ | 88.0 (86.1-89.9) | 85.9 (83.8-87.9) | 81.6 (79.4-83.9) | 44.2 (41.3-47.2) | 23.5 (22.1-25.0)↓ |
| *Wessex* | 80.5 (78.7-82.4) | 75.7 (73.7-77.7) | 88.3 (86.8-89.7) | 85.4 (83.8-87.1) | 80.5 (78.7-82.4) | 41.2 (39.0-43.5)↓ | 25.0 (23.9-26.2) |
| *Surrey & Sussex* | 73.3 (70.9-75.6)↓↓ | 66.8 (64.3-69.3)↓↓ | 82.3 (80.3-84.4)↓↓ | 78.9 (76.7-81.1)↓↓ | 72.6 (70.2-75.0)↓↓ | 38.0 (35.4-40.6)↓↓ | 30.5 (29.0-32.1)↑↑ |
| *Kent & Medway* | 74.5 (72.1-76.8)↓↓ | 67.6 (65.0-70.2)↓↓ | 82.8 (80.8-84.9)↓↓ | 80.9 (78.8-83.0)↓↓ | 74.1 (71.8-76.4)↓↓ | 41.6 (38.8-44.3)↓ | 29.4 (27.9-31.0)↑↑ |
| **Wales** | **78.7 (77.1-80.3)** | **74.9 (73.2-76.7)** | **87.1 (85.8-88.5)** | **85.2 (83.8-86.6)** | **78.7 (77.1-80.3)** | **50.3 (48.3-52.4)↑↑** | **24.6 (23.6-25.7)** |
| **Scotland** | **84.7 (83.0-86.4)↑↑** | **80.1 (78.2-82.0)↑↑** | **91.8 (90.5-93.1)↑↑** | **88.7 (87.2-90.2)↑↑** | **84.6 (82.9-86.3)↑↑** | **49.3 (46.9-51.8)↑↑** | **20.7 (19.6-21.8)↓↓** |
| **Northern Ireland** | **76.2 (73.5-78.8)↓** | **72.6 (69.8-75.3)** | **82.4 (80.0-84.8)↓↓** | **81.9 (79.5-84.3)↓** | **75.2 (72.5-77.9)↓** | **45.8 (42.5-49.1)** | **27.3 (25.5-29.0)↑** |

### Vitality/hormonal function (EPIC-26)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area of residence - Nation & Cancer Alliances/Vanguards (England)** | **Unadjusted proportion reporting problems for each EPIC-26 question (95% CI)** | | | | | **Unadjusted mean vitality/hormonal function score** |
| **Moderate/big problems with hot flushes** | **Moderate/big problems with breast tenderness/ enlargement** | **Moderate/big problems with feeling depressed** | **Moderate/big problems with lack of energy** | **Moderate/big problems with change in body weight** |
| **United Kingdom** | **17·7 (17.3-18.1)** | **6.1 (5.8-6.4)** | **10.2 (9.9-10.6)** | **23.6 (23.1-24.0)** | **15.1 (14.7-15.5)** | **79.1 (78.9-79.3)** |
|  |  |  |  |  |  |  |
| **England** | **17.1 (16.7-17.5)** | **5.9 (5.6-6.2)** | **9.8 (9.5-10.2)** | **22.3 (21.8-22.8)↓↓** | **14.5 (14.1-14.9)↓** | **79.6 (79.4-79.9)↑** |
| *North-East & Cumbria* | 18.0 (15.5-20.5) | 10.1 (8.2-12.0)↑↑ | 13.6 (11.5-15.6)↑↑ | 28.6 (25.9-31.3)↑↑ | 18.6 (16.3-21.0)↑ | 76.5 (75.1-78.0)↓↓ |
| *Lancashire & South Cumbria* | 19.7 (17.4-22.0) | 6.3 (4.9-7.7) | 10.9 (9.1-12.7) | 24.4 (21.9-27.0) | 14.7 (12.7-16.8) | 78.3 (77.1-79.6) |
| *West Yorkshire* | 14.7 (12.8-16.5)↓ | 5.7 (4.4-6.9) | 10.3 (8.7-11.9) | 21.2 (19.1-23.4)↓ | 15.0 (13.1-17.0) | 80.3 (79.2-81.3)↑ |
| *Humber, Coast & Vale* | 18.4 (15.8-20.9) | 5.6 (4.0-7.2) | 9.3 (7.4-11.3) | 22.6 (19.8-25.4) | 16.3 (13.7-18.8) | 79.0 (77.6-80.4) |
| *Cheshire & Merseyside* | 13.7 (11.8-15.6)↓↓ | 6.5 (4.9-8.0) | 9.7 (8.0-11.4) | 20.5 (18.3-22.8)↓ | 13.2 (11.2-15.1) | 80.1 (79.0-81.3) |
| *Greater Manchester* | 18.0 (15.8-20.3) | 5.9 (4.5-7.4) | 11.7 (9.8-13.5) | 23.5 (21.1-25.9) | 14.2 (12.1-16.2) | 78.9 (77.7-80.2) |
| *South Yorkshire, Bassetlaw, North Derbyshire & Hardwick* | 18.2 (16.0-20.4) | 6.5 (5.0-7.9) | 10.9 (9.2-12.6) | 27.0 (24.5-29.5)↑ | 15.7 (13.6-17.8) | 78.1 (76.9-79.3) |
| *West Midlands* | 19.9 (18.5-21.3)↑ | 6.9 (5.9-7.8) | 10.2 (9.1-11.3) | 22.9 (21.4-24.4) | 16.5 (15.1-17.8)↑ | 78.1 (77.4-78.9)↓ |
| *East Midlands* | 19.9 (18.4-21.5)↑ | 6.3 (5.3-7.2) | 10.3 (9.1-11.5) | 23.5 (21.9-25.2) | 15.3 (13.9-16.7) | 78.2 (77.4-79.0)↓ |
| *East of England* | 16.6 (15.5-17.8) | 5.7 (4.9-6.5) | 9.0 (8.1-9.9)↓ | 21.4 (20.1-22.6)↓ | 13.6 (12.5-14.7)↓ | 80.3 (79.7-81.0)↑↑ |
| *Somerset, Wiltshire, Avon & Gloucestershire* | 18.0 (16.1-19.9) | 3.9 (2.8-5.0)↓↓ | 7.5 (6.2-8.9)↓↓ | 22.3 (20.2-24.5) | 12.6 (10.9-14.3)↓ | 80.6 (79.7-81.6)↑ |
| *Thames Valley* | 14.3 (12.5-16.1)↓↓ | 5.3 (4.1-6.5) | 8.0 (6.6-9.4)↓ | 19.2 (17.1-21.2)↓↓ | 12.5 (10.8-14.2)↓ | 81.5 (80.5-82.5)↑↑ |
| *North-West & South-West London* | 15.6 (13.4-17.8) | 5.5 (4.0-7.0) | 10.4 (8.6-12.3) | 20.5 (18.1-23.0)↓ | 14.5 (12.4-16.7) | 80.2 (79.0-81.5) |
| *North-Central & North-East London* | 17.6 (15.1-20.1) | 6.3 (4.6-8.0) | 13.4 (11.1-15.6)↑ | 22.9 (20.1-25.6) | 17.2 (14.6-19.7) | 78.5 (77.1-80.0) |
| *South-East London* | 14.5 (11.7-17.2)↓ | 6.0 (4.1-7.9) | 12.4 (9.9-14.8) | 21.0 (17.9-24.0) | 14.2 (11.5-17.0) | 80.5 (79.0-82.1) |
| *Peninsula* | 18.6 (16.3-20.9) | 5.3 (4.0-6.6) | 9.8 (8.1-11.5) | 24.1 (21.5-26.8) | 13.3 (11.3-15.3) | 79.2 (78.1-80.4) |
| *Wessex* | 17.5 (15.7-19.2) | 5.6 (4.5-6.7) | 7.8 (6.5-9.0)↓↓ | 21.0 (19.1-22.8)↓ | 13.8 (12.2-15.4) | 80.2 (79.3-81.1)↑ |
| *Surrey & Sussex* | 15.0 (13.1-16.9)↓ | 4.6 (3.4-5.8)↓ | 8.5 (7.0-10.1)↓ | 20.5 (18.3-22.7)↓ | 14.5 (12.6-16.4) | 81.5 (80.4-82.6)↑↑ |
| *Kent & Medway* | 11.4 (9.6-13.2)↓↓ | 5.1 (3.9-6.4) | 8.4 (6.9-10.0)↓ | 18.4 (16.3-20.5)↓↓ | 11.2 (9.5-12.9)↓↓ | 83.1 (82.0-84.1)↑↑ |
| **Wales** | **20.3 (18.6-22.0)↑↑** | **6.2 (5.0-7.3)** | **12.5 (11.1-13.8)↑↑** | **30.9 (29.1-32.7)↑↑** | **17.3 (15.8-18.9)↑** | **76.8 (75.9-77.7)↓↓** |
| **Scotland** | **21.2 (19.3-23.1)↑↑** | **7.3 (6.1-8.6)↑** | **12.5 (10.9-14.1)↑** | **30.6 (28.4-32.8)↑↑** | **19.0 (17.2-20.9)↑↑** | **75.6 (74.5-76.6)↓↓** |
| **Northern Ireland** | **21.7 (19.1-24.4)↑↑** | **8.0 (6.1-10.0)↑** | **12.1 (10.0-14.3)↑** | **31.6 (28.6-34.6)↑↑** | **20.2 (17.7-22.8)↑↑** | **75.0 (73.6-76.5)↓↓** |

Notes:

n=35,823 (see table 1 for number of respondents by area). CI - Confidence Interval.

↑↑ Higher than UK average (p<0.001), ↑ Higher than UK average (p<0.05), ↓ Lower than UK average (p<0.05), ↓↓ Lower than UK average (p<0.001)

Higher mean scores represent better health or fewer difficulties in that domain.

### Table S6: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/ hormonal function (EPIC-26) for prostate cancer survivors# by area of residence: England only with comparisons to English average

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cancer Alliances/Vanguards of residence** | **Mean self-assessed health rating**  **(EQ-VAS) (95 CI)** | **Mean functional outcome score (EPIC-26) (95 CI)** | | | | |
| **Urinary incontinence** | **Urinary irritation/ obstruction** | **Bowel function** | **Sexual function** | **Vitality/hormonal function** |
| **England** | **76.3 (76.2-76.5)** | **81.3 (81.1-81.6)** | **84.3 (84.1-84.5)** | **87.7 (87.6-87.9)** | **22.2 (22.0-22.5)** | **78.7 (78.5-78.9)** |
|  |  |  |  |  |  |  |
| North-East & Cumbria | 74.8 (73.8-75.8)↓ | 79.4 (78.0-80.8)↓ | 83.3 (82.2-84.3) | 88.1 (87.2-89.1) | 21.4 (20.1-22.8) | 77.3 (76.2-78.5)↓ |
| Lancashire & South Cumbria | 75.5 (74.5-76.4) | 80.2 (79.0-81.4) | 84.4 (83.5-85.3) | 87.6 (86.6-88.5) | 21.5 (20.2-22.8) | 78.3 (77.3-79.4) |
| West Yorkshire | 76.2 (75.4-77.0) | 81.9 (80.9-82.9) | 84.8 (84.0-85.6) | 89.5 (88.8-90.2)↑↑ | 21.9 (20.7-23.0) | 79.8 (78.9-80.6)↑ |
| Humber, Coast & Vale | 76.5 (75.5-77.5) | 82.0 (80.7-83.3) | 84.8 (83.9-85.8) | 87.5 (86.5-88.6) | 22.2 (20.8-23.7) | 78.9 (77.8-80.0) |
| Cheshire & Merseyside | 75.7 (74.8-76.5) | 82.0 (81.0-83.1) | 83.8 (83.0-84.7) | 88.3 (87.4-89.1) | 23.4 (22.2-24.6) | 79.2 (78.3-80.1) |
| Greater Manchester | 76.1 (75.2-76.9) | 81.2 (80.1-82.3) | 83.7 (82.7-84.6) | 87.8 (86.9-88.8) | 21.3 (20.2-22.5) | 78.7 (77.6-79.7) |
| South Yorkshire, Bassetlaw, North Derbyshire & Hardwick | 75.2 (74.3-76.1)↓ | 80.6 (79.4-81.7) | 84.0 (83.1-84.8) | 86.9 (86.0-87.8) | 21.5 (20.3-22.7) | 77.8 (76.9-78.8) |
| West Midlands | 76.5 (76.0-77.1) | 80.8 (80.1-81.5) | 83.9 (83.3-84.5) | 87.8 (87.2-88.3) | 20.8 (20.1-21.6)↓↓ | 77.7 (77.1-78.4)↓ |
| East Midlands | 76.5 (75.9-77.1) | 81.3 (80.5-82.0) | 84.3 (83.7-84.9) | 87.4 (86.8-88.1) | 21.5 (20.7-22.4) | 78.1 (77.4-78.7) |
| East of England | 76.7 (76.2-77.1) | 81.9 (81.3-82.5) | 84.8 (84.3-85.2) | 87.3 (86.8-87.8) | 21.9 (21.3-22.6) | 79.0 (78.5-79.5) |
| Somerset, Wiltshire, Avon & Gloucestershire | 76.8 (76.0-77.5) | 81.4 (80.4-82.3) | 84.6 (83.8-85.3) | 87.0 (86.2-87.8) | 23.1 (22.0-24.2) | 79.1 (78.3-79.9) |
| Thames Valley | 75.9 (75.1-76.6) | 80.8 (79.7-81.8) | 84.0 (83.2-84.7) | 88.1 (87.4-88.8) | 22.2 (21.2-23.2) | 78.3 (77.6-79.1) |
| North-West & South-West London | 76.2 (75.3-77.1) | 81.4 (80.2-82.7) | 83.7 (82.7-84.6) | 87.6 (86.6-88.5) | 23.4 (22.1-24.6) | 79.3 (78.3-80.3) |
| North-Central & North-East London | 76.4 (75.3-77.4) | 80.5 (79.0-81.9) | 83.9 (82.7-85.0) | 87.1 (85.9-88.2) | 22.5 (21.1-23.9) | 79.2 (78.0-80.5) |
| South-East London | 77.6 (76.4-78.9)↑ | 82.1 (80.4-83.7) | 85.5 (84.3-86.7)↑ | 88.4 (87.2-89.6) | 24.3 (22.6-26.0)↑ | 80.0 (78.7-81.3) |
| Peninsula | 76.2 (75.3-77.1) | 79.8 (78.5-81.0)↓ | 83.6 (82.7-84.6) | 87.9 (87.0-88.8) | 22.5 (21.2-23.8) | 78.2 (77.3-79.1) |
| Wessex | 76.7 (76.1-77.4) | 81.8 (80.9-82.7) | 84.3 (83.6-85.0) | 87.6 (86.8-88.3) | 21.8 (20.8-22.7) | 78.7 (78.0-79.5) |
| Surrey & Sussex | 76.7 (75.8-77.5) | 83.1 (82.1-84.1)↑↑ | 84.5 (83.7-85.4) | 88.1 (87.2-88.9) | 25.2 (24.0-26.3)↑↑ | 79.5 (78.7-80.4) |
| Kent & Medway | 77.3 (76.5-78.0)↑ | 82.4 (81.2-83.5) | 84.9 (84.1-85.8) | 88.6 (87.8-89.4)↑ | 23.6 (22.5-24.8)↑ | 79.8 (79.0-80.7)↑ |

Notes:

n=30,463 (see table 1 for number of respondents by area). # Alive 18-42 months after diagnosis, CI - Confidence Interval.

↑↑ Higher than English average (p<0.001), ↑ Higher than English average (p<0.05), ↓ Lower than English average (p<0.05), ↓↓ Lower than English average (p<0.001).

This area based comparison was conducted using log-linear regression, with results presented as adjusted predicted mean scores. Adjustments were made for age, socio-economic deprivation, employment status, marital status, ethnicity, comorbidities, history of mental health problems, body mass index, method of presentation, stage at diagnosis, and treatment types received. These scores differ from values determined directly from raw data. Higher mean scores represent better health or fewer difficulties in that domain.

### Figure S1: Proportion of prostate cancer survivors who presented via PSA test only or were diagnosed at stage IV by area of residence

|  |  |
| --- | --- |
| 1. **Presented via PSA test only** | 1. **Diagnosed at stage IV** |
|  |  |

Notes:

n=35,823 (see table 1 for number of respondents by area)

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### Figure S2: Treatment types received by prostate cancer survivors by area of residence

|  |  |
| --- | --- |
| 1. **Treated with surgery** | 1. **Treated with EBRT** |
|  |  |
|  |  |

### Figure S2 continued

|  |  |
| --- | --- |
| 1. **Treated with ADT** | 1. **Received monitoring only** |
|  |  |

Notes:

n=35,823 (see table 1 or number of respondents by area)

# Alive 18-42 months after diagnosis, EBRT - External Beam Radiotherapy, ADT - Androgen Deprivation Therapy

See supplementary figure 4 for area key.

### Figure S3: Case mix adjusted predicted mean self-assessed health (EQ-VAS) and urinary, bowel, sexual and vitality/hormonal function (EPIC-26) for prostate cancer survivors by area of residence: UK wide, with comparisons to UK average

|  |  |
| --- | --- |
| 1. **Self-assessed health** | 1. **Urinary incontinence** |
|  |  |

### Figure S3 continued

|  |  |
| --- | --- |
| 1. **Urinary irritation/obstruction** | 1. **Bowel function** |
|  |  |

### Figure S3 continued

|  |  |
| --- | --- |
| 1. **Sexual function** | 1. **Vitality/hormonal function** |
|  |  |

Notes:

n=35,823 (see table 1 for number of respondents by area)

# Alive 18-42 months after diagnosis

This area based comparison was conducted using log-linear regression, with results presented as adjusted predicted mean scores. Adjustments were made for age, socio-economic deprivation, employment status, marital status, ethnicity, comorbidities, history of mental health problems, body mass index, method of presentation, stage at diagnosis, and treatment types received. These scores differ from values determined directly from raw data. Higher mean scores represent better health or fewer difficulties in that domain.

See supplementary figure 4 for area key.

### Figure S4: Countries in the United Kingdom and Cancer Alliances/Vanguards in England



Notes:

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