Article:
Donnelly, DW, Donnelly, C, Kearney, T et al. (26 more authors) (2018) Urinary, bowel and sexual health in older men from Northern Ireland. BJU International, 122 (5). pp. 845-857. ISSN 1464-4096

https://doi.org/10.1111/bju.14182

DR. DAVID WILLIAM DONNELLY (Orcid ID : 0000-0003-0076-7685)

DR. PENNY WRIGHT (Orcid ID : 0000-0001-6129-4143)

Article type : Original Article

Article category: Upper Urinary Tract

Urinary, bowel and sexual health in older men from Northern Ireland

David W Donnelly,[1] Conan Donnelly,[2] Therese Kearney,[1] David Weller,[3] Linda Sharp,[4] Amy Downing,[5] Sarah Wilding,[5] Penny Wright,[5] Paul Kind,[6] James WF Catto,[7] William R Cross,[8] Malcolm D Mason,[9] Eilis McCaughan,[10] Richard Wagland,[11] Eila Watson,[12] Rebecca Mottram,[5] Majorie Allen,[5] Hugh Butcher,[13] Luke Hounsome,[14] Peter Selby,[5] Dyfed Huws,[15] David H Brewster,[16] Emma McNair,[16] Carol Rivas,[17] Johana Nayoan,[11] Mike Horton,[18] Lauren Matheson,[12] Adam W Glaser,[5*] Anna Gavin[1*]

**Anna Gavin and Adam Glaser are co-senior authors.*

1. Northern Ireland Cancer Registry. Centre for Public Health, Queen's University Belfast. Mulhouse Building, Grosvenor Road, BT12 6DP
2. National Cancer Registry Ireland. Building 6800, Cork Airport Business Park, Kinsale Road, Cork, T12 CDF7·
3. Centre for Population Health Sciences, University of Edinburgh, Edinburgh, EH8 9DX
4. Institute of Health & Society, Newcastle University, Richardson Road, Newcastle upon Tyne, NE2 4AX
5. Leeds Institute of Cancer and Pathology/Leeds Institute of Data Analytics, University of Leeds, Leeds, LS2 9JT
6. Institute of Health Sciences. University of Leeds, Clarendon Way, Leeds, LS2 9NL
7. Academic Urology Unit, University of Sheffield, Sheffield, S10 2RX
8. Department of Urology, St James's University Hospital, Leeds, LS9 7TF
9. Division of Cancer and Genetics, School of Medicine, Cardiff University, Velindre Hospital, Whitchurch, Cardiff, CF14 2TL
10. Institute of Nursing and Health Research, Ulster University, Coleraine, BT52 1SA
11. Faculty of Health Sciences, University of Southampton, Southampton, S017 1BJ
12. Faculty of Health and Life Sciences, Oxford Brookes University, Oxford, OX3 0BP
13. Yorkshire Cancer Patient Forum, c/o Strategic Clinical Network and Senate, Yorkshire and The Humber, Harrogate, UK
14. National Cancer Registration and Analysis Service, Public Health England, Bristol, BS1 6EH
15. Welsh Cancer Intelligence and Surveillance Unit, Cardiff, CF10 4BZ
16. Information Services Division, NHS National Services Scotland, Edinburgh, EH12 9EB
17. Department of Social Science, UCL Institute of Education, University College London, London WC1H 0AL
18. Psychometric Laboratory for Health Sciences, Academic Department of Rehabilitation Medicine, University of Leeds. Leeds, LS1 3EX

Correspondence: David Donnelly, Northern Ireland Cancer Registry, Centre for Public Health, Queen's University Belfast, Mulhouse Building, Grosvenor Road, Belfast BT12 6DP, Northern Ireland, UK.

e-mail: david.donnelly@qub.ac.uk

Abstract

Objectives

To provide intelligence on the prevalence of urinary, bowel and sexual dysfunction in Northern Ireland (NI) to act as a baseline for studies of prostate cancer (PCa) outcomes and to aid service provision within the general population.

Subjects and methods

A cross-sectional postal survey of 10,000 men aged 40 and over in NI, age-matched to the distribution of men living with PCa. The EQ-5D-5L and EPIC-26 instruments were used to enable comparisons with PCa outcome studies. While representative of the PCa survivor population, the age-distribution of the sample differs from the general population, thus data were generalised to the NI population by excluding 40-59 year olds and applying survey weights. Results are presented as proportions reporting problems along with mean composite scores, with differences by respondent characteristics assessed using chi-square tests, ANOVA and multivariable log-linear regression.

Results

Among men aged 60 plus, 32.8% reported sexual dysfunction, 9.3% urinary dysfunction and 6.5% bowel dysfunction. 38.1% reported at least one problem and 2.1% all three. Worse outcome was associated with increasing number of long-term conditions, low physical activity, and higher BMI. Urinary incontinence, urinary irritation/obstruction, and sexual dysfunction increased with age; while urinary incontinence, bowel, and sexual dysfunction were more common among the unemployed.

Conclusion

These data provide an insight into sensitive issues seldom reported by elderly men, which result in poor general health, but could be addressed given adequate service provision. The relationship between these problems, raised BMI and low physical activity offers the prospect of additional health gain by addressing public health issues such as obesity. The results provide essential contemporary population data against which outcomes for those living with PCa can be compared. They will facilitate greater understanding of the true impact of specific treatments such as surgical interventions, pelvic radiation or androgen deprivation therapy.

Keywords: urinary dysfunction, bowel dysfunction, sexual dysfunction, health-related quality of life, prostate cancer, LAPCD

Introduction

The prevalence of prostate cancer (PCa) has increased dramatically since the early 1990s [1,2]. Coupled with this there has been an increase in studies of patient reported outcomes and initiatives to support the morbidity burden associated with PCa diagnosis and its treatment [3]. However, the vast majority of studies do not have large matched control data or comparable general population data. Consequently, such studies may be overestimating the negative consequences of treatment.

Various surveys of urinary, bowel, and sexual symptoms in the general population of USA and Europe [4-14] have found these problems to be common among elderly men, with lower urinary tract symptoms (LUTS) ranging from 48-72% [4-6], moderate-to-severe urinary incontinence from 11-16% [5-8], severe/frequent erectile dysfunction from 5-10% [4,9-11], and faecal incontinence from 6-15% [12-14].

However comparing the results from these general population studies with those for current PCa survivors to assess the additional impact of PCa and its treatment is not straightforward. Not only are the majority of these studies dated, they are not specific to a particular population (e.g. they rarely report NI/UK specific results). In addition they typically use survey instruments not directly comparable with those used in assessments of PCa outcomes, while the age structure of men surveyed in general population surveys rarely match those of PCa survivors as more than half (54% in 2012-14) of PCa cases diagnosed in the UK are among males aged 70 and over [2].

The measurement of problems of this nature is also relevant to the health of men who do not have PCa. However, with significant gains in life expectancy in recent years [15], changes in lifestyle factors (such as rising obesity levels) [16], and changes in prevalence of common health conditions (e.g. reductions in hypertension, increases in diabetes) [16], contemporary older men are likely to have different health outcomes than the more historical cohorts documented by previous studies. Consequently, there is a need to update population observations of these problems in order to allow differentiation between the impact of PCa and its treatment from the normal effects of ageing, and to provide health service planners with information on the prevalence of these conditions in the general population to ensure that the necessary support services are in place.

We report a comprehensive evaluation of self-reported urinary, bowel, and sexual dysfunction, alongside health-related quality of life (HRQL) and self-assessed health rating, in a population of men aged 40 and older in Northern Ireland (NI), a devolved nation of the UK. We utilise a sample that has been age-matched to the PCa survivor population and use survey instruments widely applied in the evaluation of PCa outcomes. In addition, we generalise these data to the NI population for men aged 60 and over in order to provide information necessary for public health purposes, including reporting prevalence of urinary, bowel, and sexual dysfunction and report how socio-demographic characteristics, health-related factors, and general health are associated with these conditions.

Subjects and methods

Background

A cross-sectional postal survey of the general NI population was conducted as part of the Life After Prostate Cancer Diagnosis (*LAPCD)* study [17]. Additional surveys involved PCa survivors, the results of which will be reported elsewhere.

Data collection

An age-stratified random sample of 10,000 men aged 40 years and over was prepared by the Health & Social Care Business Services Organisation (BSO) using the NI General Practice Register. To allow comparability with the PCa survivor survey, the sampling frame was based on the age distribution of PCa survivors in NI who were alive 18-42 months after diagnosis. Men identified by the NI Cancer Registry as having a previous PCa diagnosis were excluded.

Each member of the sample had a unique reference number (URN) assigned, thereby protecting the identity of participants. BSO posted surveys throughout September and October 2016, with instructions to return completed surveys to an external provider (Picker Institute Europe). On completion of data entry deprivation quintile, based on the NI multiple deprivation measure [18], and an urban/rural indicator, based upon the NI statistical classification of settlements [19], were added.

Survey

The survey (supplementary file 1) was adapted from the *LAPCD* survey of PCa survivors and included a wide range of respondent characteristics. HRQL was evaluated using the EQ-5D-5L which included a self-assessed health rating [20], while urinary, bowel, and sexual health was determined using the 26-item Expanded Prostate Cancer Composite (EPIC-26) questionnaire [21] in line with recommendations from the International Consortium for Health Outcomes Measurement (ICHOM) [22,23]. Adaptations to the survey for the general population included removing references to cancer and its treatment in the supporting text such as the introduction and completion guidance; however changes to the actual questions asked were minimal.

Service users participated in the study design and development of the questionnaire through the User Advisory Group (UAG) for the *LAPCD* study. Cognitive testing for user acceptability in terms of length, content and clarity of survey questions was performed with a focus group of older men from the general population accessed through a local ageing charity.

Outcome measures

Reported prevalence of men experiencing problems was based upon the proportion of men reporting moderate/big problems in response to specific questions from the EPIC-26 question set (urinary: q2.6, bowel: q2.8, sexual: q2.13; supplementary file 1). The individual EQ-5D-5L questions

on mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (q1.1-q1.5) were coded to "No problems" and "With problems".

Summary scores for each EPIC-26 domain were calculated by averaging standardised scores assigned to each question's responses in that domain (urinary incontinence: q2.2-q2.5a, urinary irritation/obstruction: q2.5b-q2.5f, bowel function: q2.7a-q2.8, sexual function: q2.9a-q2.13; supplementary file 1). For each domain the possible range of scores is 0-100, with 100 corresponding to no problems. The self-assessed health rating (q1.6) was used as a summary score of general health, with a higher score representing better general health.

Exclusions, weighting and missing data

The sample was designed to match the age structure of PCa survivors thereby allowing comparability of outcomes from this cohort with PCa studies. Rates of PCa increase with age [1], thus the proportion of respondents to the survey aged 40-49 is lower compared to older ages (12.1% aged 40-59, 45.0% aged 60-69, 42.9% aged 75 and over) (table 1). As planned this is similar to the age distribution of PCa survivors, however it is not representative of the general NI population where 59.6% of men aged 40 and over are aged 40-59 [24]. For the purposes of making comparisons with PCa survivors no further adjustments are required. When utilising these data to report on the general NI population, weights by age and deprivation need to be applied so that the sample distribution matches that of the NI population. The weights required to increase the representativeness of the 40-59 year olds from 12.1% to 59.6% would be large and need to be applied to a small number of respondents (358 men) resulting in less robust results. Thus respondents aged 40-59 were excluded prior to the calculation and application of survey weights, with analysis for the general population conducted for those aged 60 and over only.

Missing data were dealt with on a question-by-question basis; men with missing responses were excluded from the analysis, thus all proportions and mean values refer to the men who responded to that question.

Statistical analysis

Pairs of proportions were compared using z-tests, while chi-square tests were used to compare the distribution of responses across all categories in a variable. Weighted means (with standard deviation, median and interquartile range included as supplementary data) are reported for continuous data such as the summary EPIC-26 domains and self-assessed health rating, with ANOVA used to compare distributions. The Bonferroni correction was applied to compensate for multiple comparisons in all scenarios.

Multivariable analyses of the EPIC-26 domains and the self-assessed health rating were conducted using log-linear regression (backwards stepwise with cut off p=0.1) of the continuous scores. Respondent's age, deprivation indicator, urban/rural indicator, marital status, employment status, carer status, number of long-term conditions, physical activity level, and Body Mass Index (BMI) were investigated as independent variables. Regression residuals were not normally distributed while heteroscedasticity was also evident, thus standard errors were determined using bootstrapping. Results are presented as adjusted mean ratios relative to the baseline category. To

investigate the relationship between urinary, bowel, and sexual dysfunction and general health, the self-assessed health rating was grouped into quartiles and added separately to the log-linear models for each EPIC-26 domain.

To investigate the relationship between the same list of covariates and the individual EQ-5D dimensions (with the outcome as "With problems"), binary logistic regression with robust standard errors was utilised with results presented as odds ratios.

Analysis was conducted using SPSS v22 (IBM Corp, 2013, NY USA).

Results

In total 10,000 men aged 40 and over were sampled, with a response rate of 29.6% (2,955 men). Response rates were highest for men aged 60-69 and those resident in the least deprived areas (table 1).

Completeness of data items was high, with 100% completeness for respondent characteristics provided by BSO (age, deprivation, urban/rural), while completeness of the self-reported characteristics ranged from 91.1% for both height and weight (used to create BMI) to 95.7% for employment status. Completeness of the composite EPIC-26 scores ranged from 73.3% for urinary irritation/obstruction to 91.0% for sexual function, while the self-assessed health rating was 97.8% complete.

Results for each question along with mean composite scores from the EPIC-26 and EQ-5D-5L survey instruments are presented in supplementary tables 1-3. Presented by age group (40-59, 60-69, 70-79 and 80+) this data provides a baseline against which PCa outcomes in similar populations can be measured.

Urinary, bowel and sexual dysfunction in the general population

Generalising the data to the NI population by excluding men aged 40-59 and applying survey weights, 2,597 men aged 60 and over were available for analysis (a response rate of 30.9% in this group). 53.3% of the study population were aged 60-69 (n=1,385) compared to 14.7% aged 80 and over (n=382). Twenty-two percent of the study population resided in the least deprived areas compared to 17.8% in the most deprived areas (table 1).

(a) Urinary incontinence

Almost one third (31.1%) of men aged 60 and over reported some degree of urinary leakage with 5.6% reporting moderate/big problems. 35.6% of men reported some urinary control difficulty, with 6.2% of men reporting no urinary control or frequent dribbling. One quarter of men reported leaking urine more than once a week (26.4%) with 14.9% reporting leaking urine daily or more. When specifically asked about urinary function 39.8% of men reported some level of difficulty, with 9.3% reporting moderate/big difficulties (figure 1, table 2).

In multivariable analyses urinary incontinence, based upon the EPIC-26 score (mean 89.0, median 100.0), increased with increasing age (p=0.048), deprivation (p=0.024), number of long-term conditions (p=0.001), higher BMI (p=0.045), and lower levels of physical activity (p<0.001). Unemployed men were more likely to report urinary incontinence compared to employed men (p=0.036) (table 3).

(b) Urinary irritation/obstruction/function

16.6% of men aged 60 and over reported needing to urinate frequently as a moderate/big problem. Incomplete emptying was reported by 9.1%, bleeding with urination by 0.3% and pain or burning on urination by 1.7% (figure 1).

Based upon multivariable analysis of the EPIC-26 score (mean 88.5, median 93.8) urinary irritation/obstruction problems were associated with increasing age (p=0.072), higher number of long-term conditions (p<0.001), BMI (overweight vs. obese, p=0.047) and low physical activity (none vs. 5-7 days per week, p=0.019) (table 3).

(c) Bowel function

Bowel problems were reported to some degree by 26.1% of men aged 60 and over, with 6.5% reporting moderate/big problems. Increased urgency (6.7%) and frequency of bowel movement (5.0%) were the most common problems, with abdominal, pelvic, rectal or back passage pain noted by 3.1%, and bloody stools reported by 0.6% of men (figure 1, table 2).

After multivariable adjustments poorer bowel function scores (mean 93.6, median 100.0) were more commonly reported by those resident in urban areas (p=0.040), unemployed (p=0.013), with three or more long-term conditions (p<0.001), no physical activity in the previous week (p=0.019), and high BMI (p=0.025) (table 3).

(d) Sexual function

Three out of five (57.9%) men reported some problem with sexual function with 32.8% of all men reporting the problem as moderate/big and a similar proportion (33.0%) reporting very poor sexual functioning (figure 1, table 2).

In multivariate analyses of the EPIC-26 score (mean 50.0, median 52.8) associations existed between sexual dysfunction and age, employment status, number of long-term conditions, physical activity, and BMI (all p<=0.001) (table 3).

(e) Combinations of urinary tract, bowel and sexual dysfunction

Two out of five men (38.1%) reported at least one of urinary, bowel, or sexual dysfunction, with 2.1% indicating they had all three issues (figure 2). Combinations of all three problems were more prevalent among men resident in deprived areas (p<0.001), with increasing number of long-term conditions (p<0.001) and with higher BMI (p=0.002) (table 2).

Health-related quality of life in the general population

61.5% of men aged 60 and over reported some degree of pain/discomfort, while problems with mobility were reported by 38.1%, performing usual activities by 37.8%, and anxiety/depression by 31.8%. One in five men (18.2%) had problems with self-care (figure 1).

Adjusted odd ratios for problems in all five domains increased with increasing number of long-term conditions, decreasing levels of physical activity and, except for anxiety/depression with increasing BMI. Mobility problems and difficulties performing usual activities were more frequent in older men, while anxiety/depression levels decreased with increasing age. Reported problems in each domain increased with deprivation with the exception of pain/discomfort, while living in an urban area was associated with reduced mobility and usual activities. Unemployed men reported more problems than employed or retired men. Married men reported fewer problems with mobility, self-care, and anxiety/depression than other marital status groups, while having carer responsibilities was not associated with any of the five dimensions (table 4).

(a) General health

In multivariate analyses, based upon self-assessed health rating (mean 77.2, median 80.0), poorer general health was associated with age (p=0.074), deprivation (p=0.001), marital status (p=0.071), urbanity (p=0.008), unemployment (p<0.001), higher numbers of long-term conditions (p<0.001), greater BMI (p=0.044), and lower physical activity levels (p<0.001) (table 4).

(b) Relationship between general health and urinary, bowel, and sexual dysfunction

Increasing urinary, bowel, and sexual dysfunction was associated with poorer general health in both univariable and multivariable analysis (all p<0.001). The relationship was greatest for sexual dysfunction, with the mean sexual function domain score decreasing from 62.2 among men reporting good general health (score 90 or over) to 29.7 for men reporting poorer general health (score under 70). The weakest relationship was between self-assessed health rating and bowel dysfunction (table 5).

Discussion

This study provides the most comprehensive description of urinary, bowel, and sexual function and their relationship to general health in elderly men resident in NI to date. It is specifically designed to provide a baseline to facilitate better estimation of the effects of PCa and its treatments compared to the general population.

The data also allows a detailed assessment of the prevalence of these conditions in the general population. Almost two out of five (38.1%) men reported at least one of sexual, urinary, and bowel function problems to a moderate/big degree. Sexual function issues were the most common with one third of men reporting moderate or big problems, while 9.3% reported urinary dysfunction and 6.5% bowel dysfunction. A considerable proportion of additional men reported these problems to a small/very small degree, while men often experience multiple problems.

This study adds information on socio-demographic, health-related factors, and general health and their associations with urinary, bowel, and sexual difficulties. With the exception of bowel dysfunction these problems increased with increasing age. The prevalence of these difficulties was higher among those with higher BMI, lower physical activity levels, greater number of long-term conditions, and poorer general health. However given the cross-sectional nature of the study these relationships are likely to be interrelated and we cannot draw conclusions about cause and effect. In addition, the lack of longitudinal data means that the results do not provide any information on reporting of how problems change over time with age. Nonetheless, these findings are of public health interest in light of the increasingly sedentary lifestyle and rising levels of obesity in the population [16].

Comparison with previous studies

Our findings on the prevalence of LUTS and faecal incontinence are in keeping with other studies [5,6,12]. However we found a lower prevalence of moderate-to-severe urinary incontinence (5.6% vs. 11-16% [5-8]) than previously reported, possibly a result of using a much shorter time period for symptom reporting (four weeks vs. 6-12 months). Conversely we have identified a greater proportion with poor/no ability to have an erection (27.8% vs. 5-10% [4,9-11]); the difference likely to be due to our cohort being slightly older (aged 60+ vs. 40-80). With the exception of the relationship to age [4,12,13] and some specific health conditions [25,26], the associations with health-related characteristics have not previously been reported. However, two North American studies specifically noted a lack of association that this study found: One identifying no relationship between erectile dysfunction and physical activity [10] and another showing no relationship between faecal incontinence and BMI, physical activity, or number of chronic conditions [13].

Implications for primary care

Primary care teams are well-placed initially to deal with problems relating to sexuality and urinary and bowel dysfunction; however, the extent of management in primary care appears limited [27]. A lack of proactivity in relation to problems around sexual activity exists [28] with GPs having a lack of

awareness, knowledge, and confidence in dealing with sexual problems [29,30]. Embarrassment, negative attitudes toward sexuality in elderly people, and health professional disinterest can all inhibit discussions about these issues [29].

There is variation in the ability of GPs to deal with LUTS, and often reluctance to treat such conditions [30,31]. Combined with patient factors such as unwillingness to acknowledge the problem [32,33] there are numerous barriers to the appropriate management of urinary symptoms in the elderly. Primary care needs to be more pro-active in identifying, managing and referring patients with these symptoms. If clinical contact is made, the majority of men with LUTS, bowel, and/or sexual dysfunction can potentially be managed effectively in primary care with lifestyle advice, counselling or medical therapy [34], and onward referral to urology services where necessary.

Study limitations

The response rate of 29.6% is lower than what would normally be expected from a general postal survey, but is similar to the 30-44% response rate of other postal surveys exploring detailed personal/sexual issues [11,35,36], including the widely used multinational survey of the ageing male [4]. This is possibly a consequence of the use of a postal only delivery method, the inclusion of very elderly men in the cohort, the length of time needed to complete the survey and the inclusion of highly personal sexual dysfunction questions. The less than optimal response rate could potentially result in response bias, with urinary, bowel and sexual dysfunction different among non-responders than for those who completed the survey. Similarly there may be a difference between men who partially and those who completely filled in the survey. The impact of these issues is difficult to quantify given the lack of information on this topic in NI. Nevertheless, a sample of almost 3,000 men was obtained with an age/deprivation distribution that only deviated slightly from that of the NI population. In addition the proportion of men classified as obese in this study is very similar to that in the NI health survey conducted in 2016/17 [37] (30.2% aged 60+ vs. 31.4% aged 65+), while results for the EQ-5D among 75+ year olds from the same survey conducted in 2012/13 [38] compare favourably to the current results for 80+ year olds (Mobility: 55% vs. 61%; Self-care: 25% vs. 27%, Usual activities: 50% vs. 59%, Pain/Discomfort: 65% vs. 62%, Anxiety/Depression: 30% vs. 25%). Both comparisons suggest that this study, aided by weighting adjustments, accurately represents the health of the NI population.

The study was specifically designed to provide baseline data against which PCa outcomes could be compared. Using the data for purposes other than this, such as generalising the data to the general population, has some limitations. Firstly, the exclusion of men with PCa may result in an underestimation of the magnitude of urinary, bowel, and sexual problems across the whole population. Secondly, the EPIC-26 question set provides respondent-rated symptoms rather than clinical assessment; they are thus subjective in that not all reported problems may require treatment or some men may have reported a problem as being small but would still benefit from health care intervention. Finally, this question set while validated for PCa survivors has not been validated in the general population.

NI is broadly similar in terms of age and healthcare provision to the rest of the UK, however, there are differences which must be recognised when generalising the data to the entire UK. In particular, NI has a lower representation of ethnic minorities [24], higher unemployment [39], and lower life expectancy than the UK average [15] meaning that reported levels of urinary, bowel, and sexual dysfunction in NI may be higher than in the UK overall. Similar differences are likely to be experienced if the data are used in other countries, thus in utilising the data outside of NI it may be beneficial to weight the presented results by age (to reflect the age distribution of the country being compared to), or to make any comparisons only for specific subgroups of the population (e.g. by excluding ethnic minorities or the most affluent from data from other countries).

Conclusions

Urinary tract, bowel, and sexual dysfunction are common among men aged 60 and over. The high population prevalence must be considered when evaluating the impact of specific diseases and their treatments on function, otherwise inappropriate advice and therapies may be provided.

With almost two out of five men aged over 60 reporting moderate/big problems in at least one of these areas of function, there are clear implications for service providers and a need to encourage men experiencing difficulties to seek assistance. The reported problems are associated with the presence of long-term conditions, lower physical activity levels, higher BMI, age, and lower socio-economic status with a strong relationship to general health also identified. This suggests that opportunities exist to reduce prevalence of these conditions through continued promotion of healthy lifestyles and by addressing health inequalities associated with socio-economic status.

Acknowledgements

The authors thank all the men who responded to the survey. We acknowledge the following people for their contribution to the development, setting up and running of the study: Heather Kinnear, Oonagh McSorley, Victoria Cairnduff, Linda Roberts, Adrian Slater, the LAPCD User Advisory Group and Clinical and Scientific Advisory Group, Picker Institute Europe and Business Services Organisation (NI). The authors also thank Age Concern in NI for providing feedback on the survey content and layout.

Funding

The Life After Prostate Cancer Diagnosis study was funded by the Movember Foundation, in partnership with Prostate Cancer UK, as part of the Prostate Cancer Outcomes programme, grant number BO26/MO.

Ethical approval:

Ethical approval was granted by The Office of Research Ethics Committees NI (ORECNI). Queen's University Belfast were study sponsors.

Conflicts of interest

Eila Watson reports grants from Oxford Brookes University during the conduct of the study. All other authors declare no completing interests.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1: Responses to EPIC-26 questions by age group

Table S2: Urinary, bowel and sexual function scores (EPIC-26) for men aged 60 and over by demographic, socio-economic and health-related characteristics

Table S3: Urinary, bowel and sexual function scores (EPIC-26) for men aged 60 and over in Northern Ireland by demographic, socio-economic and health-related characteristics - Detailed descriptive statistics

Table S4: Health-related quality of life (EQ-5D-5L) and self-assessed health rating (EQ-VAS) in men aged 60 and over by demographic, socio-economic and health-related characteristics

Table S5: Self-assessed health rating (EQ-VAS) for men aged 60 and over in Northern Ireland by demographic, socio-economic and health-related characteristics - Detailed descriptive statistics

Figure S1: Urinary, bowel and sexual function scores (EPIC-26) for men aged 60 and over in Northern Ireland

Figure S2: Self-assessed health rating (EQ-VAS) for men aged 60 and over in Northern Ireland

References

1 **Northern Ireland Cancer Registry.** Prostate cancer. Available at http://www.qub.ac.uk/research-centres/nicr/cancerinformation/official-statistics/bysite/prostate.html. Accessed Dec 2017

2 **Cancer Research UK.** Prostate cancer incidence statistics. Available at http://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/prostate-cancer/incidence. Accessed Dec 2017

3 **Glaser AW, Corner JL.** Prostate cancer outcomes: The three questions. *Eur Urol* 2015; 67: 357-8. doi:10.1016/j.eururo.2014.10.023

4 **Rosen R, Altwein J, Boyle P, et al.** Lower urinary tract symptoms and male sexual dysfunction: the multinational survey of the ageing male (MSAM-7). *Eur Urol* 2003; 44: 637-49.

5 **Coyne KS, Sexton CC, Thompson CL.** The prevalence of lower urinary tract symptoms (LUTS) in the USA, the UK and Sweden: results from the Epidemiology of LUTS (EpiLUTS) study. *BJU Int* 2009; 104: 352-60. doi:10.1111/j.1464-410X.2009.08427.x.

6 **Irwin DE, Milson I, Hunskaar S, et al.** Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. *Eur Urol* 2006; 50: 1306-15.

7 **Markland AD, Goode PS, Redden DT, Borrud LG, Burgio KL.** Prevalence of urinary incontinence in men: results from the National Health and Nutrition Examination Survey. *J Urol* 2010; 184: 1022-7.

doi:10.1016/j.juro.2010.05.025.
8 **White AJ, Reeve BB, Chen RC, Stover AM, Irwin DE.** Urinary incontinence and health-related quality of life among older Americans with and without cancer: a cross-sectional study. *BMC cancer* 2013; 13: 377. doi:10.1186/1471-2407-13-377.
9 **Moreira ED, Glasser DB, Nicolosit A, Duarte FG, Gingell C, GSSAB Investigators' Group.** Sexual problems and help seeking behavior in adults in the United Kingdom and continental Europe. *BJU Int* 2008; 101: 1005-11. doi:10.1111/j.1464-410X.2008.07453.x.
10 **Laumann EO, Glasser DB, Neves RC, Moreira ED, GSSAB Investigators' Group.** A population-based survey of sexual activity, sexual problems and associated help-seeking behavior patterns in mature adults in the United States of America. *Int J Impot Res* 2009; 21: 171-8. doi:10.1038/ijir.2009.7.
11 **Quilter M, Hodges L, von Hurst P, Borman B, Coad J.** Male sexual function in New Zealand: A population-based cross-sectional survey of the prevalence of erectile dysfunction in men aged 40-70 years. *J Sex Med* 2017; 14: 928-36. doi:10.1016/j.jsxm.2017.05.011.
12 **Perry S, Shaw C, McGrother C, et al.** Prevalence of faecal incontinence in adults aged 40 years or more living in the community. *Gut* 2002; 50: 480-4.
13 **Whitehead WE, Borrud L, Goode PS, et al.** Fecal incontinence in US adults: Epidemiology and risk factors. *Gastroenterology* 2009; 137: 512-7. doi:10.1053/j.gastro.2009.04.054.
14 **Meinds RJ, van Meegdenburg MM, Trzpis M, Broens PM.** On the prevalence of constipation and fecal incontinence, and their co-occurrence, in the Netherlands. *Int J Colorectal Dis* 2017: 32: 475-83. doi:10.1007/s00384-016-2722-3.
15 **Office of National Statistics.** National Lifetables, UK: 2013-2015. Available at https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/nationallifetablesunitedkingdomreferencetables. Accessed July 2017.
16 **NHS Digital.** Health survey for England 2015: Trend tables. Available at https://content.digital.nhs.uk/catalogue/PUB22616· Accessed August 2017.
17 **Downing A, Wright P, Wagland R, et al.** Life after prostate cancer diagnosis: protocol for a UK-wide patient-reported outcomes study. *BMJ open* 2016; 6: e013555. doi:10.1136/bmjopen-2016-013555
18 **Northern Ireland Statistics and Research Agency.** NI Multiple Deprivation Measure. Available at https://www.nisra.gov.uk/statistics/deprivation/northern-ireland-multiple-deprivation-measure-2010-nimdm2010. Accessed July 2017
19 **Northern Ireland Statistics and Research Agency.** Urban-Rural Classification. Available at https://www.nisra.gov.uk/support/geography/urban-rural-classification. Accessed July 2017
20 **Herdman M, Gudex C, Lloyd A, et al.** Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qual Life Res* 2011; 20: 1727-36. doi:10.1007/s11136-011-9903-x
21 **Szymanski KM, Wei JT, Dunn RL, Sanda MG.** Development and validation of an abbreviated version of the expanded prostate cancer index composite instrument for measuring health-related quality of life among prostate cancer survivors. *Urology* 2010; 76: 1245-50. doi:10.1016/j.urology.2010.01.027
22 **Martin NE, Massey L, Stowell C, et al.** Defining a standard set of patient-centered outcomes for men with localized prostate cancer. *Eur Urol* 2015; 67:460-7. doi:10.1016/j.eururo.2014.08.075.
23 **Morgans AK, van Bommel ACM, Stowell C, et al.** Development of a Standardized Set of Patient-centered Outcomes for Advanced Prostate Cancer: An International Effort for a Unified Approach. *Eur Urol* 2015; 68:891-8. doi:10.1016/j.eururo.2015.06.007.
24 **Northern Ireland Statistics and Research Agency.** 2011 Census. Available at https://www.nisra.gov.uk/statistics/census. Accessed July 2017
25 **Gandaglia G, Briganti A, Jackson G, et al.** A systematic review of the association between erectile dysfunction and cardiovascular disease. *Eur Urol* 2014; 65: 968–78. doi:10.1016/j.eururo.2013.08.023.
26 **Kouidrat Y, Pizzol D, Cosco T, et al.** High prevalence of erectile dysfunction in diabetes: a systematic review and meta-analysis of 145 studies. *Diabet Med* 2017; 34: 1185–92. doi:10.1111/dme.13403.
27 **Watson EK, O'Brien R, Campbell C, et al.** Views of health professionals on the role of primary care in the follow-up of men with prostate cancer. *Fam Pract* 2011; 28: 647–54.
28 **Gott M, Hinchliff S.** Barriers to seeking treatment for sexual problems in primary care: a qualitative study with older people. *Fam Pract* 2003; 20: 690-5.
29 **Bauer M, Haesler E, Fetherstonhaugh D.** Let's talk about sex: older people's views on the recognition of s**Error! Reference source not found.Error! Reference source not found.**exuality and sexual health in the health-care setting. *Health Expect* 2016; 19: 1237–50. doi:10.1111/hex.12418.
30 **Nguyen K, Hunter KF, Wagg A.** Knowledge and understanding of urinary incontinence: survey of family practitioners in northern Alberta. *Can Fam Physician* 2013; 59: e330–7.

31 **Teunissen D, van den Bosch W, van Weel C, Lagro-Janssen T.** Urinary incontinence in the elderly: attitudes and experiences of general practitioners. A focus group study. *Scand J Prim Health Care* 2006; 24: 56–61.

32 **Whitaker KL, Macleod U, Winstanley K, Scott SE, Wardle J.** Help seeking for cancer 'alarm' symptoms: a qualitative interview study of primary care patients in the UK. *Br J Gen Pract* 2015; 65: e96–105. doi:10.3399/bjgp15X683533.

33 **Forbes LJ, Simon AE, Warburton F, et al.** Differences in cancer awareness and beliefs between Australia, Canada, Denmark, Norway, Sweden and the UK (the International Cancer Benchmarking Partnership): so they contribute to cancer survival? *Br J Cancer* 2013; 108: 292–300. doi:10.1038/bjc.2012.542.

34 **Rees J, Bultitude M, Challacombe B.** The management of lower urinary tract symptoms in men. *BMJ* 2014; 348: g3861. doi:10.1136/bmj.g3861.

35 **Dunn KM, Croft PR, Hackett GI.** Sexual problems: a study of the prevalence and need for health care in the general population. *Fam Pract* 1998; 15: 519-24.

36 **Chew KK, Stuckey B, Bremner A, et al.** Male erectile dysfunction: its prevalence in Western Australia and associated sociodemographic factors. *J Sex Med* 2008; 5: 60-9.

37 **Department of Health.** Health Survey Northern Ireland: First results 2015/16· https://www.health-ni.gov.uk/sites/default/files/publications/health/hsni-first-results-15-16.pdf. Accessed Dec 2017.

38 **Department of Health.** Health Survey Northern Ireland: First results 2012/13· https://www.health-ni.gov.uk/sites/default/files/publications/health/hsni-first-results-15-16.pdf. Accessed Dec 2017.

39 **Office of National Statistics.** Regional labour market statistics in the UK: August 2017. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/regionallabourmarket/august2017#unemployment. Accessed August 2017.

Figure 1: Urinary, bowel and sexual dysfunction and health-related quality of life for men aged 60 in Northern Ireland

Notes:

Data are weighted to the NI population by age and deprivation.

*Responses to individual EPIC-26 and EQ-5D-5L questions, with * representing moderate/big problems.*

Complete responses to questions including a breakdown by age are available in supplementary table 1.

Figure 2: Combinations of reported urinary, bowel and sexual dysfunction* among men aged 60 and over in Northern Ireland

Notes:

Data are weighted to the NI population by age and deprivation.

Venn diagram is based upon the proportion of men reporting moderate/big problems in response to specific questions from the EPIC-26 question set (urinary: q2.6, bowel: q2.8, sexual: q2.13; supplementary file 1).

Table 1: Response rates and characteristics of survey respondents

	Study response rate	Respondents*			Northern Ireland population**		Survey data generalised to NI population***	
		Number	Proportion		Proportion		Number	Proportion
			Ages 40+	Ages 60+	Ages 40+	Ages 60+		
Total	29.6%	2,955	2,955	2,597	397,977	160,818	2,597	100.0%
Age group								
40-59	22.6%	358	12.1%		59.6%			
60-69	34.7%	1,331	45.0%	51.3%	21.6%	53.3%	1,385	53.3%
70-79	29.9%	1,045	35.4%	40.2%	12.9%	32.0%	830	32.0%
80+	20.3%	221	7.5%	8.5%	5.9%	14.7%	382	14.7%
Deprivation indicator								
Least deprived	40.1%	482	16.3%	18.6%	21.6%	22.0%	571	22.0%
Quintile 2	33.1%	538	18.2%	20.7%	20.6%	20.0%	519	20.0%
Quintile 3	29.2%	592	20.0%	22.8%	19.9%	20.3%	527	20.3%
Quintile 4	27.5%	480	16.2%	18.5%	19.9%	20.0%	519	20.0%
Most deprived	22.9%	505	17.1%	19.4%	18.0%	17.8%	461	17.8%

Notes:

** Age distribution matched to PCa survivors.*

*** Source: Northern Ireland Statistics and Research Agency [24].*

**** By excluding 40-59 year olds and weighting to the NI population by age and deprivation.*

Table 2: Urinary, bowel and sexual dysfunction among men aged 60 and over in Northern Ireland by age, deprivation, number of long-term conditions, physical activity and body mass index

		Proportion of men aged 60 and over reporting problems[#]							
		Individual conditions			**Combinations of conditions (n=2,281)**				**At least one of urinary, bowel & sexual dysfunction (n=2,281)**
	All respondents	**Urinary dysfunction (n=2,515)**	**Bowel dysfunction (n=2,547)**	**Sexual dysfunction (n=2,364)**	**Urinary & bowel dysfunction**	**Urinary & sexual dysfunction**	**Bowel & sexual dysfunction**	**Urinary, bowel & sexual dysfunction**	
Total	2,597	9.3%	6.5%	32.8%	2.9%	5.4%	4.0%	2.1%	38.1%
Age group		p<0.001*	p=0.081	p<0.001*	p=0.316	p=0.155	p=0.230	p=0.766	p<0.001*
60-69	1,385	7.3%	6.0%	27.2%	2.6%	4.7%	3.6%	1.9%	31.5%
70-79	830	10.1%	6.2%	36.6%	2.8%	6.8%	4.0%	2.3%	41.9%
80+	382	15.1%	9.0%	47.4%	4.4%	5.2%	6.0%	2.4%	58.5%
Deprivation indicator		p=0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*
Least deprived	571	6.7%	3.8%	26.4%	0.5%	1.8%	2.0%	0.0%	32.1%
Quintile 2	519	8.0%	5.2%	28.4%	1.4%	4.4%	1.9%	0.8%	33.5%
Quintile 3	527	8.4%	4.7%	30.6%	1.6%	4.6%	2.1%	0.9%	36.6%
Quintile 4	519	10.1%	9.0%	38.0%	4.7%	8.3%	6.4%	4.1%	41.8%
Most deprived	461	14.3%	10.6%	42.1%	7.1%	9.1%	8.5%	5.5%	48.2%
Number of long-term conditions		p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*
No conditions	747	5.3%	0.9%	19.3%	0.4%	1.8%	0.5%	0.4%	22.7%

1-2 conditions	1,311	7.0%	4.9%	32.5%	1.7%	4.2%	2.7%	1.2%	37.7%
3+ conditions	540	20.4%	18.2%	52.4%	9.5%	13.8%	12.3%	6.8%	60.5%
Physical activity		p<0.001*	p<0.001*	p<0.001*	p<0.001*	p=0.001*	p<0.001*	p=0.015	p<0.001*
None	717	13.5%	11.5%	44.9%	4.9%	8.0%	7.8%	3.5%	51.7%
1-4 days of 30mins per day	1,164	6.9%	5.3%	28.6%	2.0%	4.6%	3.0%	1.6%	33.2%
5-7 days of 30mins per day	486	7.0%	3.5%	27.2%	2.2%	3.6%	2.3%	1.4%	31.5%
BMI		p=0.003*	p=0.002*	p<0.001*	p=0.004*	p<0.001*	p=0.001*	p=0.002*	p<0.001*
Under & healthy weight (0-25)	671	9.4%	6.5%	27.6%	2.5%	5.1%	3.3%	1.9%	34.5%
Overweight (25-30)	1,060	7.2%	5.1%	31.3%	2.3%	4.3%	3.2%	1.5%	35.4%
Obese (30+)	749	12.4%	9.7%	44.1%	5.4%	9.6%	7.1%	4.2%	49.1%

Notes:

Data are weighted to the NI population by age and deprivation.

Men can have multiple problems and thus may appear in more than one table column.

[#] *Moderate or big problems.*

** Significant at p<0.05 after Bonferroni correction for multiple comparisons.*

Table 3: Adjusted urinary, bowel and sexual function mean score ratios (EPIC-26) for men aged 60 and over in Northern Ireland by demographic, socio-economic and health-related characteristics

	Adjusted mean ratio (95% confidence interval)			
	Urinary incontinence (n=1,691)	**Urinary irritation/ obstructive (n=1,668)**	**Bowel function (n=1,821)**	**Sexual function (n=2,007)**
Age group				
60-69	1.00	1.00		1.00
70-79	0.98 (0.96,1.00)	0.99 (0.97,1.00)	N/S	0.78 (0.73,0.82)
80+	0.96 (0.92,1.00)	0.96 (0.92,1.00)		0.42 (0.35,0.50)
Deprivation indicator				
Least deprived	1.00	N/S	N/S	N/S
Quintile 2	0.99 (0.96,1.01)			
Quintile 3	0.98 (0.96,1.01)			
Quintile 4	1.00 (0.98,1.03)			
Most deprived	0.95 (0.92,0.98)			
Urban/rural indicator				
Urban	N/S	N/S	1.00	N/S
Rural			1.01 (1.00,1.02)	
Employment status				
Employed/Self-employed	1.00		1.00	1.00
Unemployed	0.91 (0.83,0.98)	N/S	0.91 (0.86,0.97)	0.76 (0.63,0.89)

Retired	0.98 (0.96,1.00)		1.00 (0.99,1.02)	0.90 (0.86,0.95)
Other	0.98 (0.90,1.04)		0.99 (0.94,1.04)	0.88 (0.72,1.01)
Number of long-term conditions				
No conditions	1.00	1.00	1.00	1.00
1-2 conditions	0.98 (0.96,1.00)	0.96 (0.95,0.98)	0.98 (0.97,0.99)	0.84 (0.79,0.88)
3+ conditions	0.90 (0.87,0.93)	0.89 (0.87,0.91)	0.90 (0.88,0.92)	0.58 (0.52,0.64)
Physical activity				
None	1.00	1.00	1.00	1.00
1-4 days of 30mins per day	1.04 (1.01,1.07)	1.02 (0.99,1.04)	1.01 (1.00,1.03)	1.23 (1.14,1.32)
5-7 days of 30mins per day	1.07 (1.04,1.10)	1.03 (1.00,1.05)	1.03 (1.01,1.04)	1.31 (1.21,1.41)
BMI				
Under & healthy weight (0-25)	1.00	1.00	1.00	1.00
Overweight (25-30)	1.01 (0.99,1.04)	1.01 (0.99,1.02)	1.01 (1.00,1.03)	0.99 (0.95,1.04)
Obese (30+)	0.98 (0.95,1.01)	0.98 (0.96,1.01)	0.99 (0.97,1.01)	0.83 (0.77,0.91)

Notes:

Data are weighted to the NI population by age and deprivation.

The adjusted mean score ratio was determined using a log-linear regression model with other significant variables as covariates. A value less than 1 can be interpreted as poorer functioning compared to the baseline category, while a value greater than 1 can be interpreted as better functioning compared to the baseline category.

N/S: Not significant. Carer and marital status were not significant for any score.

Unadjusted Epic-26 scores by socio-demographic factors along with further descriptive data are available in supplementary tables 2&3 and supplementary figure 1.

Table 4: Adjusted health-related quality of life odds ratios (EQ-5D-5L) and adjusted self-assessed health rating mean score ratios (EQ-VAS) for men aged 60 and over in Northern Ireland by demographic, socio-economic and health-related characteristics

	Odds ratio (95% Confidence interval)					**Mean ratio (95% CI)**
	Mobility (n=2,117)	**Self-care (n=2,120)**	**Usual activities (n=2,153)**	**Pain / Discomfort (n=2,153)**	**Anxiety / Depression (n=2,278)**	**Self-assessed health rating (EQ-VAS) (n=2,120)**
Age group						
60-69	1.00		1.00	N/S	1.00	1.00
70-79	1.37 (1.08,1.73)	N/S	1.14 (0.91,1.43)		0.63 (0.51,0.79)	1.01 (0.99,1.03)
80+	2.64 (1.71,4.08)		1.98 (1.33,2.94)		0.63 (0.43,0.92)	0.97 (0.93,1.00)
Deprivation indicator						
Least deprived	1.00	1.00	1.00	N/S	1.00	1.00
Quintile 2	1.28 (0.90,1.82)	1.68 (0.96,2.95)	1.51 (1.08,2.12)		0.86 (0.61,1.19)	0.99 (0.97,1.02)
Quintile 3	1.52 (1.06,2.18)	1.84 (1.05,3.23)	1.43 (1.01,2.02)		0.99 (0.72,1.36)	0.97 (0.95,0.99)
Quintile 4	1.60 (1.10,2.35)	2.66 (1.53,4.62)	1.62 (1.13,2.33)		1.23 (0.88,1.71)	0.97 (0.95,1.00)
Most deprived	1.75 (1.21,2.52)	2.65 (1.55,4.56)	1.62 (1.13,2.32)		1.51 (1.10,2.08)	0.95 (0.92,0.98)
Urban/rural indicator						
Urban	1.00	N/S	1.00	N/S	N/S	1.00
Rural	0.68 (0.53,0.88)		0.78 (0.62,0.99)			1.02 (1.01,1.04)
Marital status*						
Married	1.00	1.00	N/S	N/S	1.00	1.00
Separated/Divorced	1.51 (1.06,2.16)	1.40 (0.87,2.25)			1.37 (1.00,1.89)	0.96 (0.93,1.00)
Widowed	1.68 (1.10,2.57)	1.97 (1.24,3.12)			1.42 (0.98,2.05)	0.98 (0.94,1.01)
Single	1.14 (0.72,1.82)	1.65 (0.95,2.89)			1.28 (0.85,1.91)	1.02 (0.98,1.06)
Employment status						
Employed/Self-employed	1.00	1.00	1.00	1.00	1.00	1.00
Unemployed	7.92 (4.28,14.65)	14.64 (7.83,27.39)	11.18 (5.87,21.28)	2.84 (1.53,5.30)	6.26 (3.55,11.03)	0.71 (0.65,0.78)
Retired	1.55 (1.16,2.07)	2.53 (1.66,3.86)	1.68 (1.27,2.21)	1.34 (1.07,1.67)	1.28 (0.99,1.66)	0.96 (0.94,0.98)
Other	2.43 (1.03,5.71)	1.87 (0.45,7.76)	1.78 (0.69,4.59)	1.63 (0.74,3.60)	2.36 (1.11,5.04)	0.88 (0.78,0.97)
Number of long-term conditions						

No conditions	1.00	1.00	1.00	1.00	1.00	1.00
1-2 conditions	2.41 (1.78,3.27)	2.71 (1.56,4.71)	2.36 (1.77,3.15)	2.15 (1.72,2.68)	1.44 (1.12,1.85)	0.93 (0.92,0.95)
3+ conditions	7.75 (5.41,11.10)	9.51 (5.37,16.84)	7.36 (5.21,10.39)	5.30 (3.84,7.33)	3.78 (2.78,5.12)	0.78 (0.75,0.80)
Physical activity						
None	1.00	1.00	1.00	1.00	1.00	1.00
1-4 days of 30mins per day	0.38 (0.30,0.50)	0.28 (0.20,0.38)	0.39 (0.30,0.50)	0.60 (0.46,0.77)	0.57 (0.45,0.72)	1.12 (1.09,1.15)
5-7 days of 30mins per day	0.18 (0.13,0.25)	0.18 (0.12,0.27)	0.22 (0.16,0.30)	0.48 (0.37,0.63)	0.41 (0.31,0.53)	1.17 (1.14,1.21)
BMI						
Under & healthy weight (0-25)	1.00	1.00	1.00	1.00	N/S	1.00
Overweight (25-30)	1.11 (0.86,1.44)	0.82 (0.58,1.16)	1.03 (0.80,1.33)	1.06 (0.85,1.32)		1.01 (0.99,1.03)
Obese (30+)	1.77 (1.29,2.42)	1.38 (0.93,2.03)	1.55 (1.15,2.10)	1.71 (1.29,2.28)		0.98 (0.96,1.01)

Notes:

Data is weighted to the NI population by age and deprivation

The adjusted odds ratios were determined using a logistic regression model with other significant variables as covariates.

The adjusted mean score ratio was determined using a log-linear regression model with other significant variables as covariates. A value less than 1 can be interpreted as poorer health compared to the baseline category, while a value greater than 1 can be interpreted as better health compared to the baseline category.

N/S: Not significant. Carer status was not significant for any score.

** Includes civil partnership equivalents.*

Unadjusted HRQL data by socio-demographic factors along with further descriptive data are available in supplementary tables 4&5 and supplementary figure 2

Table 5: Relationship between urinary, bowel and sexual function (EPIC-26) and general health (self-assessed health rating) for men aged 60 and over in Northern Ireland

	Mean urinary, bowel and sexual function scores (EPIC-26)							
	Urinary incontinence (n=1,949)		**Urinary irritation/obstructive (n=1,847)**		**Bowel function (n=2,089)**		**Sexual function (n=2,323)**	
	Unadjusted mean	**Adjusted mean ratio**	**Unadjusted mean**	**Adjusted mean ratio**	**Unadjusted mean**	**Adjusted mean ratio**	**Unadjusted mean**	**Adjusted mean ratio**
Total	89.0	-	88.5	-	93.6	-	50.0	-
Self-assessed health rating	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*	p<0.001*
90 and over (better health)	94.5	1.00	93.2	1.00	97.4	1.00	62.2	1.00
80-89.9	90.7	0.97	89.2	0.95	94.3	0.98	52.7	0.90
70-79.9	88.4	0.95	86.6	0.93	93.2	0.98	44.4	0.88
Under 70 (poorer health)	77.8	0.88	80.2	0.86	86.3	0.94	29.7	0.66

Notes:

Data are weighted to the NI population by age and deprivation.

The adjusted mean score ratio was determined using a log-linear regression model with significant variables from table 3 used as covariates. A value less than 1 can be interpreted as poorer functioning compared to the baseline category, while a value greater than 1 can be interpreted as better functioning compared to the baseline category.

** Significant at p<0.05 after Bonferroni correction for multiple comparisons (correction applies to unadjusted results only).*