Impact of Covid-19 on incidence, survival and mortality of prostate cancer in Northern Ireland

(A comparison between April-December of 2020 and 2018-2019)

INCIDENCE

During the April-December period when Covid-19 was present the number of cases of prostate cancer diagnosed among males decreased by 14.5% (150 patients) from 1,035 per year in 2018 - 2019 to 885 in 2020.
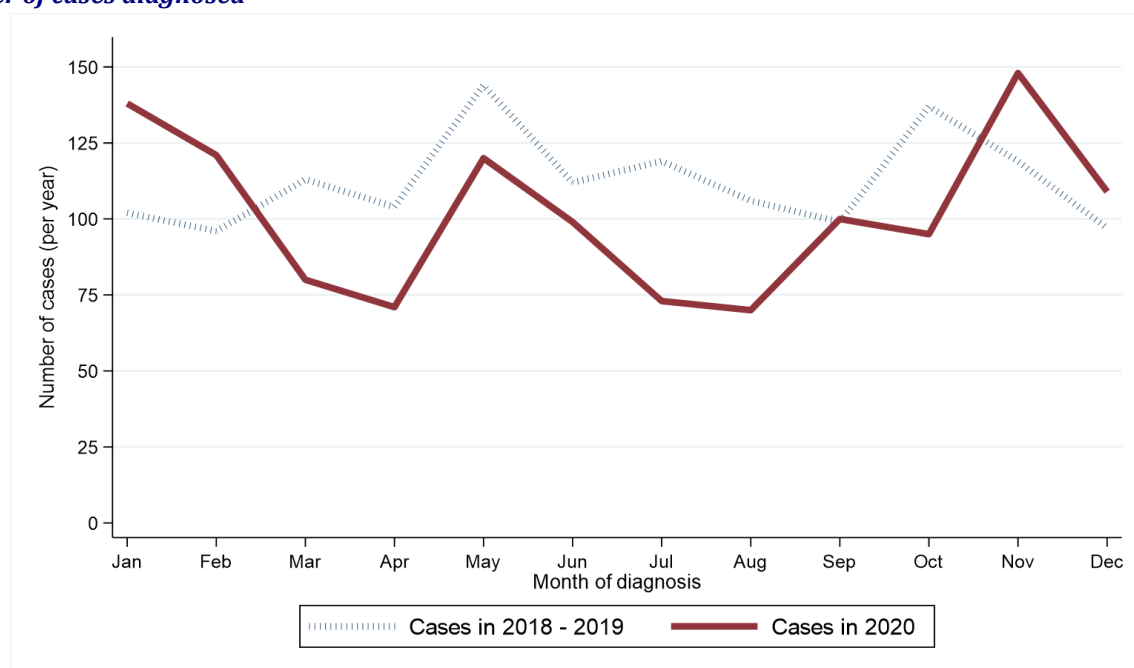
Table 1: Number of prostate cancer cases diagnosed in 2018-2020 by month and year of diagnosis

| Period of diagnosis	Annual total	Month diagnosed											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2018-2019*	1,346	102	96	113	104	144	112	119	106	99	137	119	97
2020	1,224	138	121	80	71	120	99	73	70	100	95	148	109

* Average cases per year rounded to the nearest integer. Row sums may thus differ slightly from the total.

Figure 1: Number of prostate cancer cases diagnosed in 2018-2020 by month and year of diagnosis
(a) Number of cases diagnosed

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by month of diagnosis

① **Impact of Covid-19 on incidence, survival and mortality of prostate cancer**
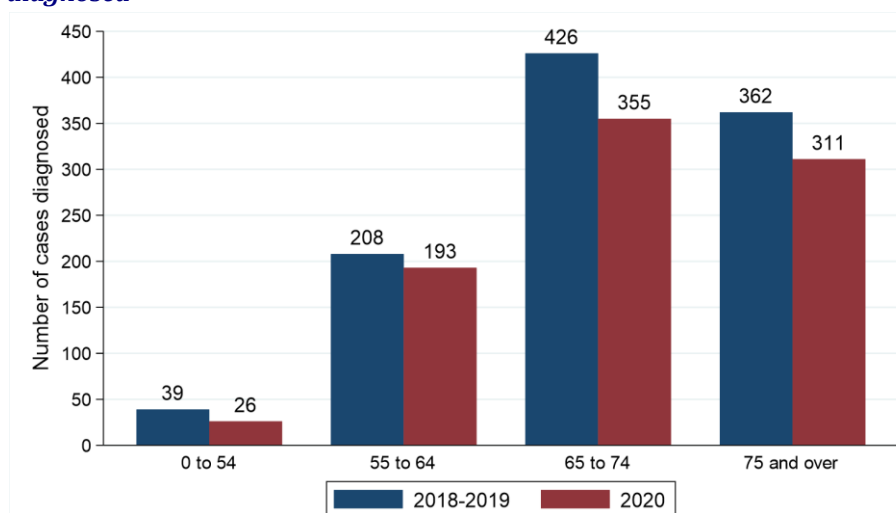
AGE
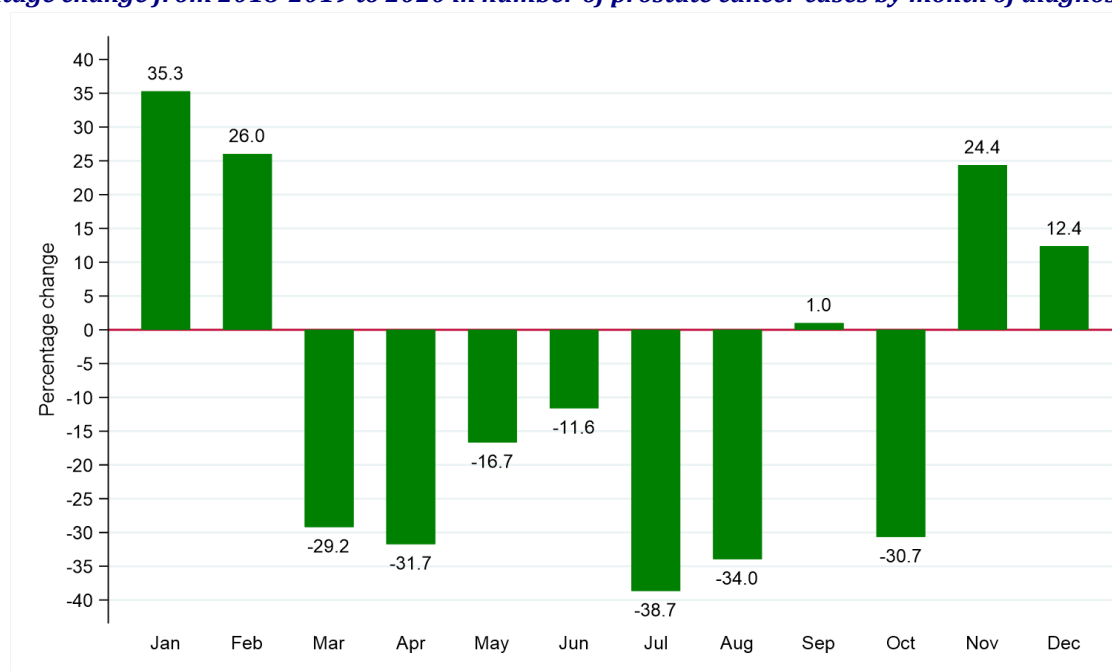
Excluding the first quarter of each year among people aged 0 to 54 the number of cases of prostate cancer diagnosed decreased by 33.3% from 39 per year in 2018 - 2019 to 26 in 2020. Between the same two time periods, the number of cases among people aged 55 to 64 decreased by 7.2% from 208 per year to 193. The change in case distribution by age between 2018 - 2019 and 2020 was not statistically significant.

Table 2: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by age and period of diagnosis

Age group	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
0 to 54	39 (3.8%)	26 (2.9%)	-33.3% (13 patients)
55 to 64	208 (20.1%)	193 (21.8%)	-7.2% (15 patients)
65 to 74	426 (41.2%)	355 (40.1%)	-16.7% (71 patients)
75 and over	362 (35.0%)	311 (35.1%)	-14.1% (51 patients)
All ages	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.

Figure 2: Prostate cancer cases diagnosed in April-December of 2018-2020 by age and period of diagnosis
(a) Number of cases diagnosed

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by age at diagnosis
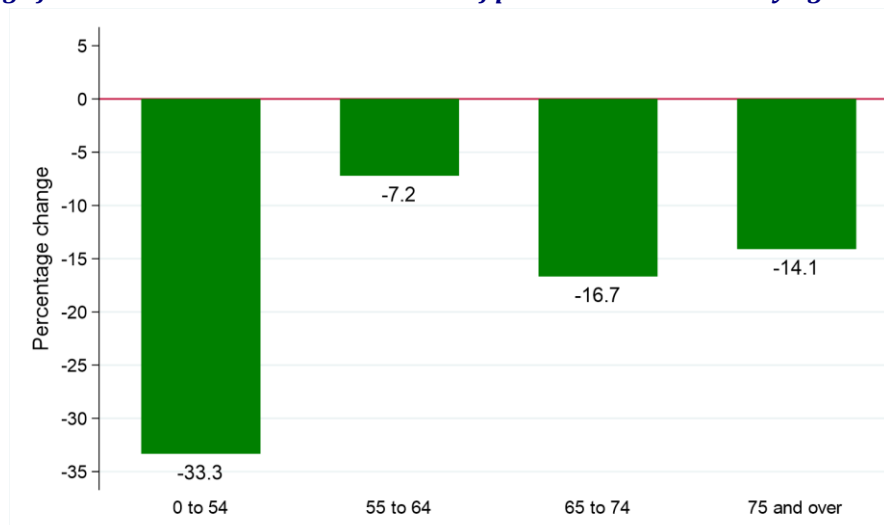
HEALTH AND SOCIAL CARE TRUST

Excluding the first quarter of each year among residents of Southern HSCT the number of cases of prostate cancer diagnosed decreased by 37.2% from 172 per year in 2018 - 2019 to 108 in 2020. Between the same two time periods the number of cases among residents of Belfast HSCT decreased by 1.8% from 165 per year to 162. The change in case distribution by HSCT between 2018 - 2019 and 2020 was statistically significant (p = 0.028).

Table 3: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by Health and Social Care Trust and period of diagnosis

Health and Social Care Trust	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
Belfast HSCT	165 (15.9%)	162 (18.3%)	-1.8% (3 patients)
Northern HSCT	294 (28.4%)	259 (29.3%)	-11.9% (35 patients)
South Eastern HSCT	228 (22.0%)	191 (21.6%)	-16.2% (37 patients)
Southern HSCT	172 (16.6%)	108 (12.2%)	-37.2% (64 patients)
Western HSCT	177 (17.1%)	164 (18.5%)	-7.3% (13 patients)
Northern Ireland	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.
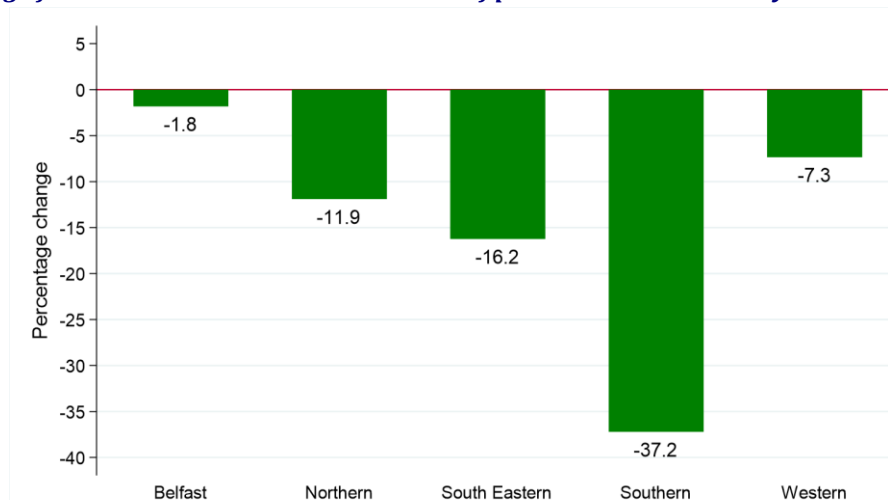*Note: Cases with unknown Health and Social Care Trust are included in totals*

Figure 3: Prostate cancer cases diagnosed in April-December of 2018-2020 by Health and Social Care Trust and period of diagnosis
(a) Number of cases diagnosed
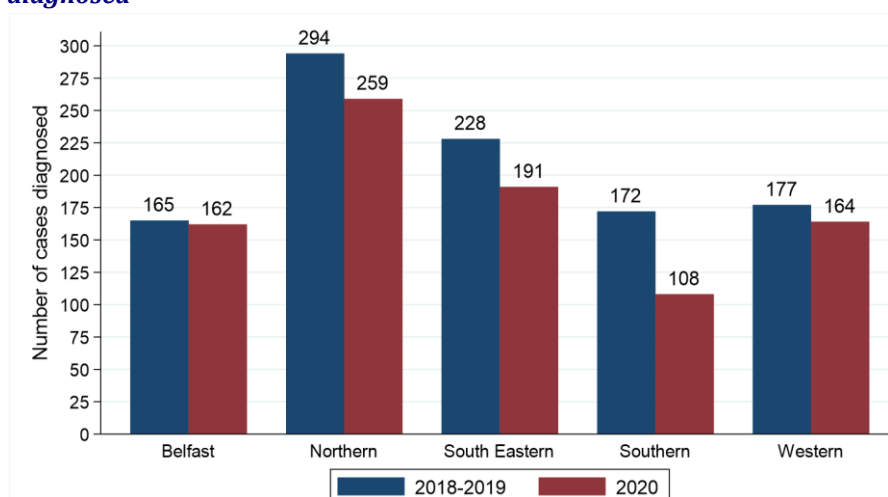
(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by Health and Social Care Trust

DEPRIVATION

Excluding the first quarter of each year among residents of the most deprived areas the number of cases of prostate cancer diagnosed decreased by 0.7% from 140 per year in 2018 - 2019 to 139 in 2020. Between the same two time periods the number of cases among residents of the least deprived areas decreased by 22.4% from 255 per year to 198. The change in case distribution by deprivation quintile between 2018 - 2019 and 2020 was not statistically significant.

Table 4: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by deprivation quintile and period of diagnosis
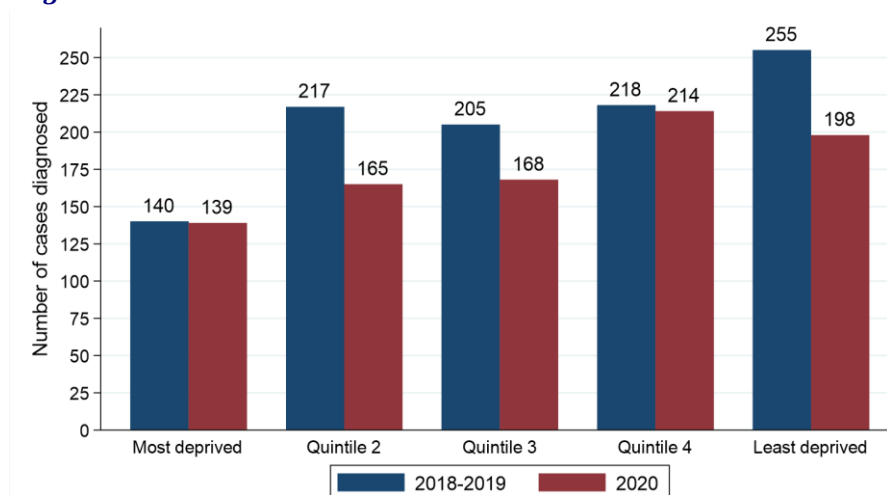
Deprivation quintile	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
Most deprived	140 (13.5%)	139 (15.7%)	-0.7% (1 patients)
Quintile 2	217 (21.0%)	165 (18.6%)	-24.0% (52 patients)
Quintile 3	205 (19.8%)	168 (19.0%)	-18.0% (37 patients)
Quintile 4	218 (21.1%)	214 (24.2%)	-1.8% (4 patients)
Least deprived	255 (24.6%)	198 (22.4%)	-22.4% (57 patients)
Northern Ireland	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.
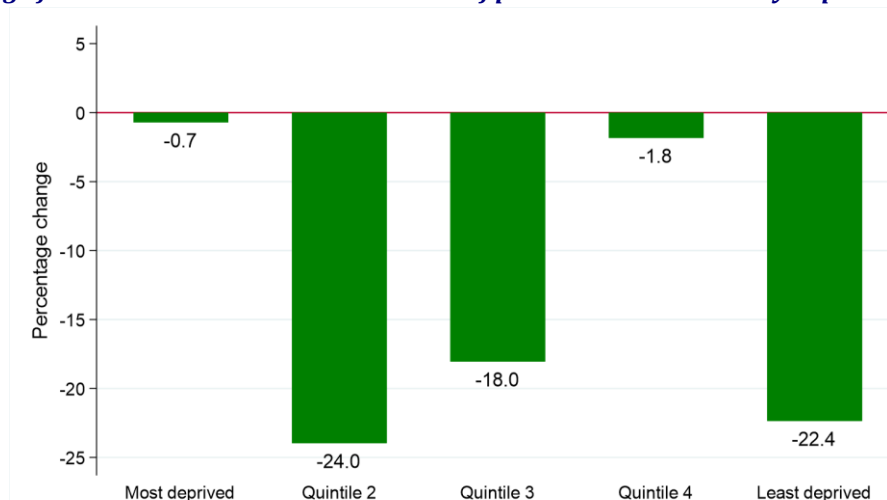*Note: Cases with unknown deprivation quintile are included in totals*

Figure 4: Prostate cancer cases diagnosed in April-December of 2018-2020 by deprivation quintile and period of diagnosis
(a) Number of cases diagnosed

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by deprivation quintile
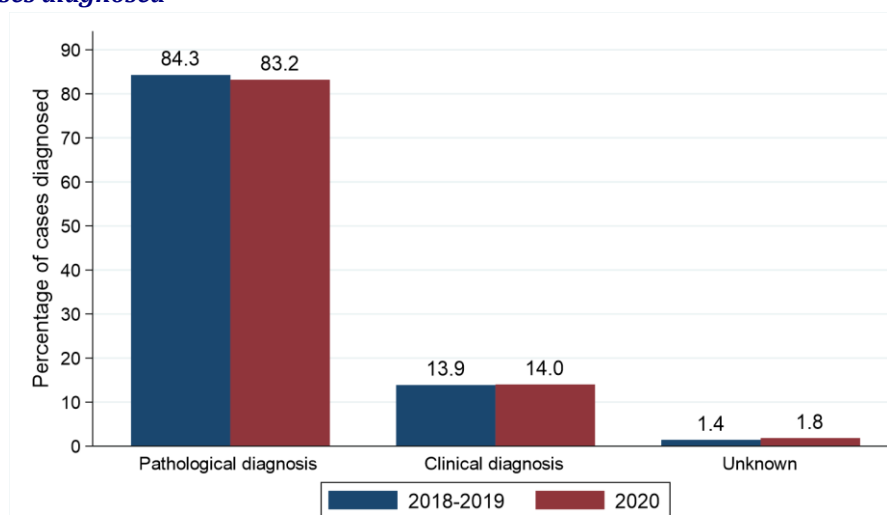
BASIS OF DIAGNOSIS

Excluding the first quarter of each year the number of prostate cancer cases diagnosed pathologically decreased by 15.7% from 873 per year in 2018 - 2019 to 736 in 2020, while the number of cases diagnosed clinically decreased by 13.9% from 144 per year to 124. The change in case distribution by basis of diagnosis between 2018 - 2019 and 2020 was not statistically significant.

Table 5: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by basis and period of diagnosis

Basis of diagnosis	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
Pathological diagnosis	873 (84.3%)	736 (83.2%)	-15.7% (137 patients)
Clinical diagnosis	144 (13.9%)	124 (14.0%)	-13.9% (20 patients)
Specific tumour marker	1 (0.1%)	0 (0.0%)	-100.0% (1 patients)
Death certificate only	4 (0.4%)	9 (1.0%)	+125.0% (5 patients)
Unknown	14 (1.4%)	16 (1.8%)	+14.3% (2 patients)
All groups	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.

Figure 5: Prostate cancer cases diagnosed in April-December of 2018-2020 by basis and period of diagnosis
(a) Proportion of cases diagnosed

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by basis of diagnosis
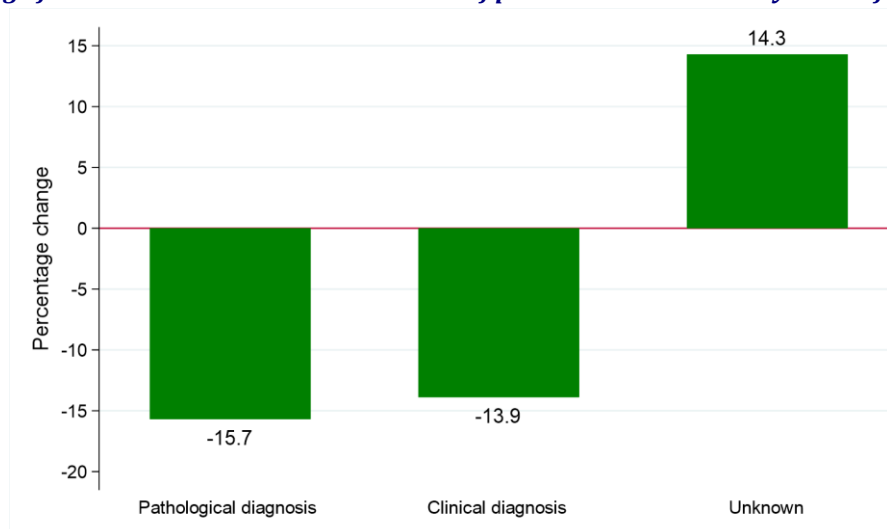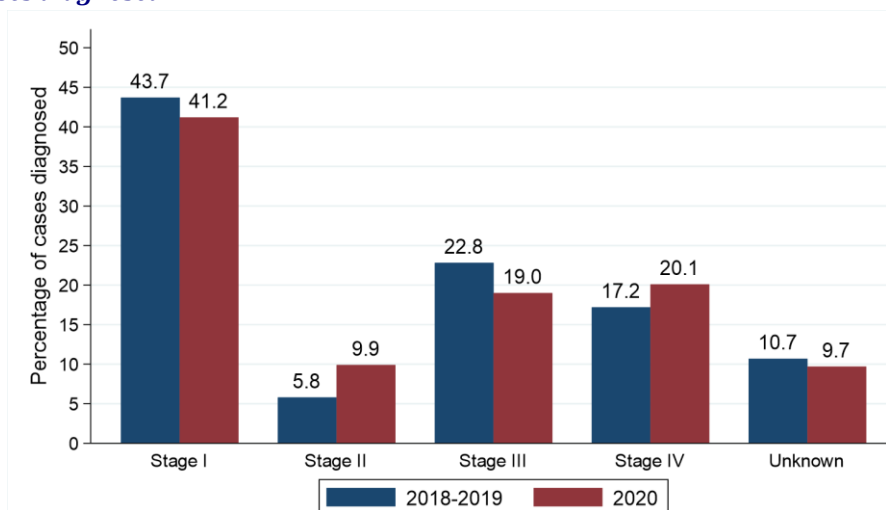
STAGE

Excluding the first quarter of each year the number of prostate cancer cases diagnosed at Stage I decreased by 19.2% from 452 per year in 2018 - 2019 to 365 in 2020. There was no change in the number of prostate cancer cases diagnosed at Stage IV each year between 2018 - 2019 and 2020, with an average of 178 cases each year. The change in case distribution by stage at diagnosis between 2018 - 2019 and 2020 was statistically significant (p < 0.001).

Table 6: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by stage at diagnosis and period of diagnosis

Stage at diagnosis	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
Stage I	452 (43.7%)	365 (41.2%)	-19.2% (87 patients)
Stage II	60 (5.8%)	88 (9.9%)	+46.7% (28 patients)
Stage III	236 (22.8%)	168 (19.0%)	-28.8% (68 patients)
Stage IV	178 (17.2%)	178 (20.1%)	0.0% (0 patients)
Unknown	111 (10.7%)	86 (9.7%)	-22.5% (25 patients)
All stages	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.

Figure 6: Prostate cancer cases diagnosed in April-December of 2018-2020 by stage and period of diagnosis
(a) Proportion of cases diagnosed

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by stage at diagnosis
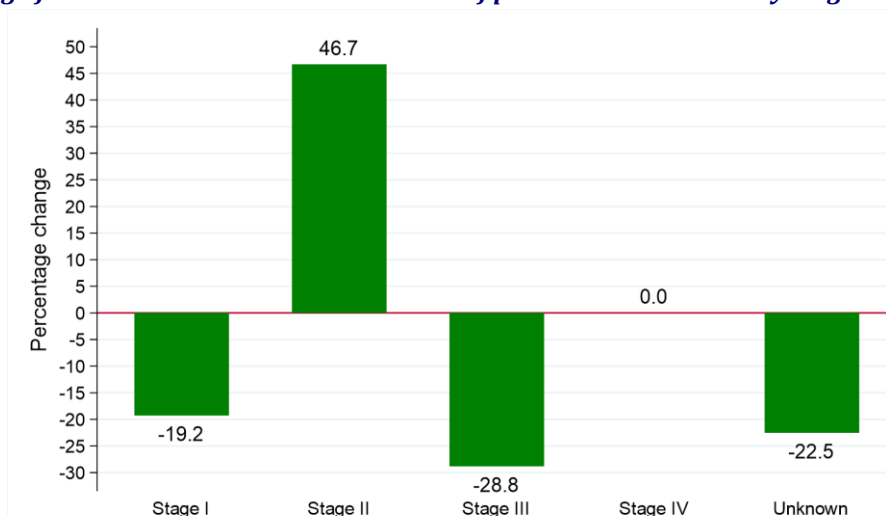
METHOD OF HOSPITAL ADMISSION

Excluding the first quarter of each year the number of cases of prostate cancer where the patient had an emergency admission recorded as the most recent hospital admission type up to 30 days prior to diagnosis increased by 8.6% from 58 per year in 2018 - 2019 to 63 in 2020. The change in case distribution by hospital admission type between 2018 - 2019 and 2020 was statistically significant (p < 0.001).

Table 7: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by method of admission to hospital and period of diagnosis

| Method of admission to hospital	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019*	2020	
Emergency admission	58 (5.6%)	63 (7.1%)	+8.6% (5 patients)
Elective admission	460 (44.4%)	617 (69.7%)	+34.1% (157 patients)
No emergency/elective admission recorded	518 (50.0%)	205 (23.2%)	-60.4% (313 patients)
All persons	1,035	885	-14.5% (150 patients)

* Average cases per year rounded to the nearest integer. Column sums may thus differ slightly from the total.

Figure 7: Prostate cancer cases diagnosed in April-December of 2018-2020 by method of admission to hospital and period of diagnosis
(a) Proportion of cases diagnosed
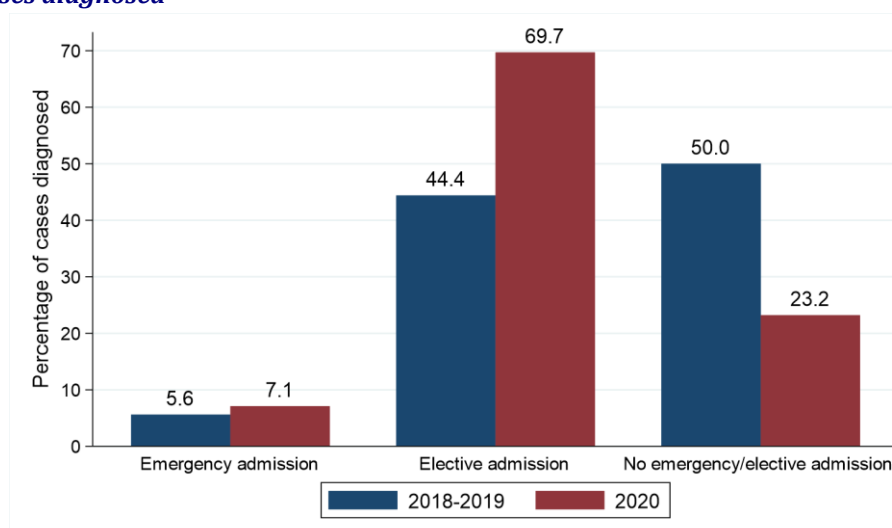
(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by method of admission to hospital
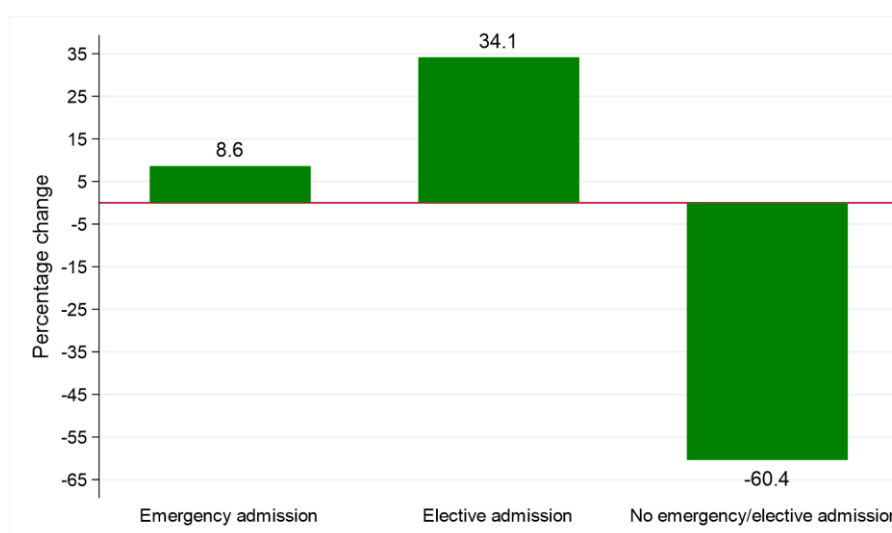
TREATMENT

Excluding the first quarter of each year the number of prostate cancer cases where the patient was treated with surgery (within six months of diagnosis) decreased by 40.6% from 96 per year for those diagnosed in 2018 - 2019 to 57 for those diagnosed in 2020. The resulting change in the proportion receiving surgery from 9.3% in 2018 - 2019 to 6.4% in 2020 was statistically significant (p = 0.012).

Between the same two time periods the number of cases where the patient was treated with chemotherapy (within six months) increased by 13.7% from 73 per year to 83. The resulting change in the proportion receiving chemotherapy from 7.1% in 2018 - 2019 to 9.4% in 2020 was statistically significant (p = 0.030).

The number of prostate cancer cases where the patient was treated with radiotherapy (within six months of diagnosis) decreased by 12.0% from 283 per year for those diagnosed in April-December of 2018 - 2019 to 249 for those diagnosed in April-December of 2020. The resulting change in the proportion receiving radiotherapy from 27.3% in 2018 - 2019 to 28.1% in 2020 was not statistically significant.

Between the same two time periods the number of cases where the patient was treated with hormone therapy (within six months) decreased by 25.7% from 657 per year to 488. The resulting change in the proportion receiving hormone therapy from 63.5% in 2018 - 2019 to 55.1% in 2020 was statistically significant (p < 0.001).

The proportion of patients receiving none of surgery, chemotherapy, radiotherapy or hormone therapy (within six months of diagnosis) who were diagnosed in April-December 2020 was 35.6%. This compared to 26.4% of those diagnosed in 2018 - 2019. This change was statistically significant (p < 0.001).

Table 8: Number and proportion of prostate cancer cases diagnosed in April-December of 2018-2020 by treatment type and period of diagnosis

| Treatment type	Period of diagnosis (Apr-Dec)		Percentage change
	2018-2019 average	2020	
Surgery	96 (9.3%)	57 (6.4%)*	-40.6% (39 patients)
Chemotherapy	73 (7.1%)	83 (9.4%)*	+13.7% (10 patients)
Radiotherapy	283 (27.3%)	249 (28.1%)	-12.0% (34 patients)
Hormone therapy	657 (63.5%)	488 (55.1%)*	-25.7% (169 patients)
None of these treatments	273 (26.4%)	315 (35.6%)*	+15.4% (42 patients)

Statistically significant change

Figure 8: Prostate cancer cases diagnosed in April-December of 2018-2020 by treatment received and period of diagnosis
(a) Proportion of cases diagnosed
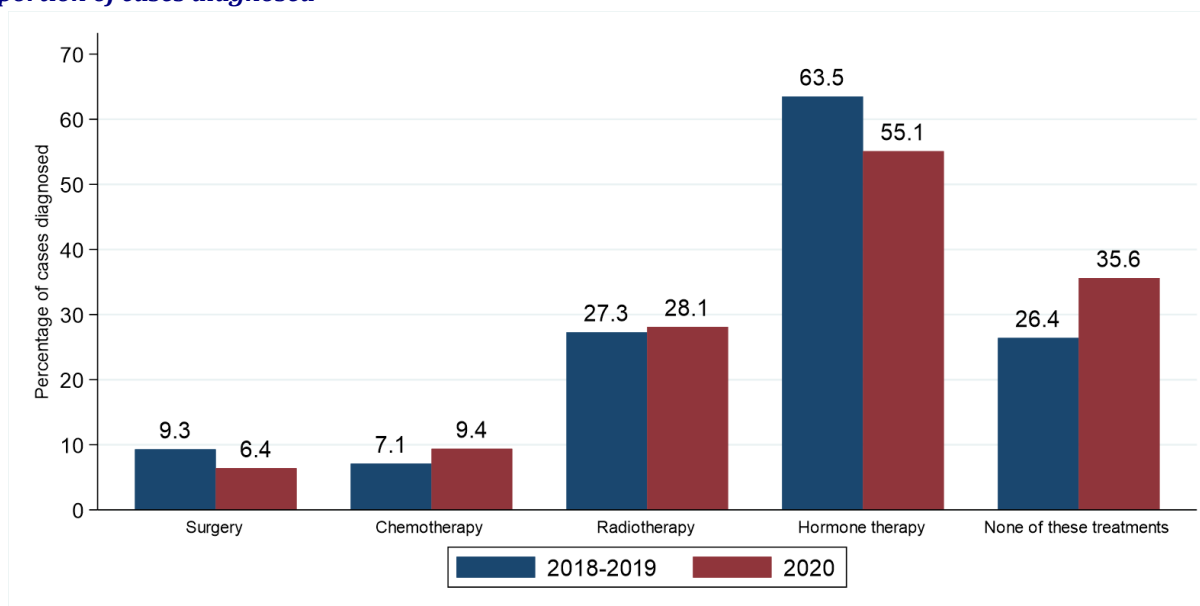
(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer cases by treatment received
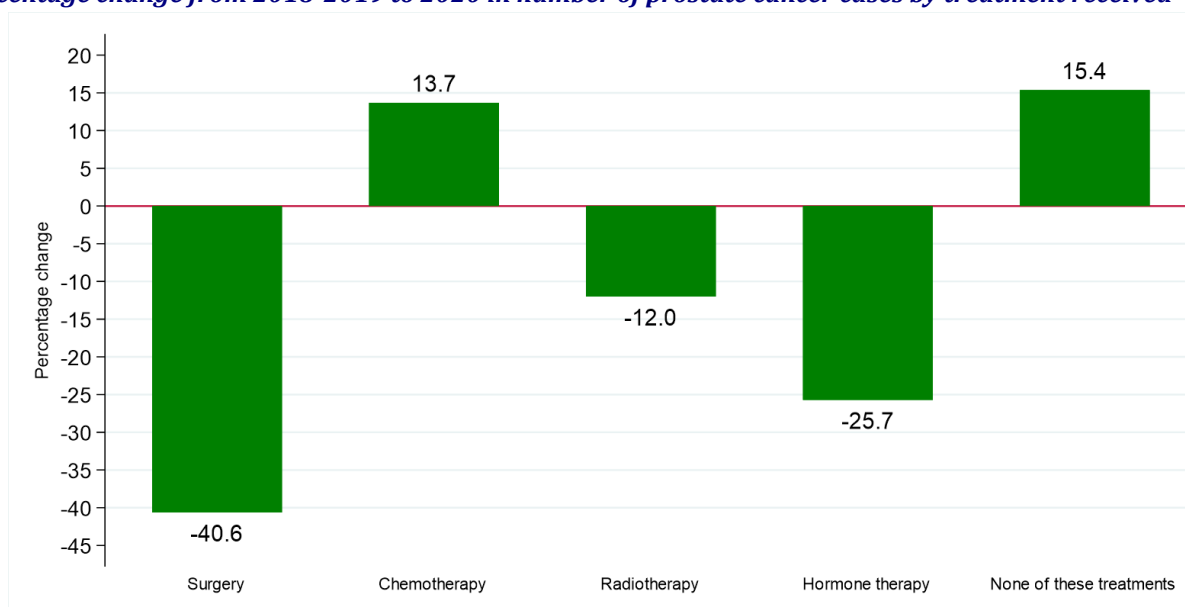
SURVIVAL

Changes in survival are evaluated using two measures. Observed survival examines the time between diagnosis and death from any cause. It thus represents what cancer patients experience, however, due to the inclusion of non-cancer deaths (e.g. heart disease), it may not reflect how changes in cancer care impact survival from cancer. Thus changes in age-standardised net survival are also examined. This measure provides an estimate of patient survival which has been adjusted to take account of deaths unrelated to cancer. It also assumes a standard age distribution thereby removing the impact of changes in the age distribution of cancer patients on changes in survival over time. While this measure is hypothetical, as it assumes patients can only die from cancer related factors, it is a better indicator of the impact of changes in cancer care on patient survival.
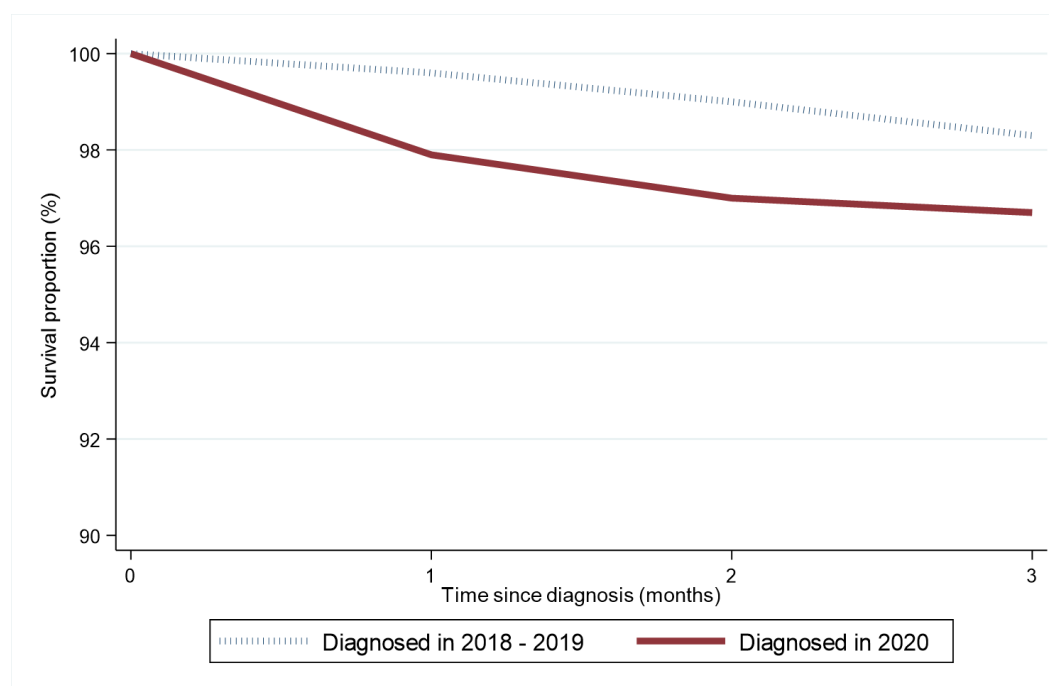
OBSERVED SURVIVAL

Survival among prostate cancer patients one month after diagnosis decreased from 99.6% among those diagnosed in April-December of 2018 - 2019 to 97.9% among those diagnosed in April-December of 2020. This change was statistically significant. Between the same two diagnosis periods, three-month survival decreased from 98.3% to 96.7%. This change was not statistically significant.

Table 9: Observed survival for patients with prostate cancer diagnosed in April-December of 2018-2020 by period of diagnosis

Survival time	Period of diagnosis (Apr-Dec)	
	2018-2019	**2020**
1 month	99.6% (99.2% - 99.8%)	97.9% (96.7% - 98.7%)*
2 months	99.0% (98.5% - 99.4%)	97.0% (95.7% - 98.0%)*
3 months	98.3% (97.6% - 98.8%)	96.7% (95.3% - 97.7%)

Statistically significant reduction

Figure 9: Observed survival for patients with prostate cancer diagnosed in April-December of 2018-2020 by period of diagnosis

DEATHS FROM COVID-19

During 2020 there were a total of 68 deaths from Covid-19 among prostate cancer patients diagnosed at any point since 1993. Among the patients who died of Covid-19, 9 were diagnosed with prostate cancer in 2020, while 2 were diagnosed in 2019.

NET SURVIVAL

Age-standardised net survival (which takes account of deaths from other causes such as Covid-19) among prostate cancer patients one month after diagnosis decreased from 99.8% among those diagnosed in April-December of 2018 - 2019 to 98.6% among those diagnosed in April-December of 2020. This change was statistically significant. Between the same two time periods, three-month age-standardised net survival decreased from 99.2% to 97.9%. This change was not statistically significant.

Table 10: Age-standardised net survival for patients with prostate cancer diagnosed in April-December of 2018-2020 by period of diagnosis

Survival time	Period of diagnosis (Apr-Dec)	
	2018-2019	2020
1 month	99.8% (99.6% - 100.0%)	98.6% (97.8% - 99.4%)*
2 months	99.6% (99.2% - 100.0%)	98.0% (97.0% - 99.0%)*
3 months	99.2% (98.6% - 99.8%)	97.9% (96.9% - 98.9%)

* Statistically significant reduction

Figure 10: Age-standardised net survival for patients with prostate cancer diagnosed in April-December of 2018-2020 by period of diagnosis
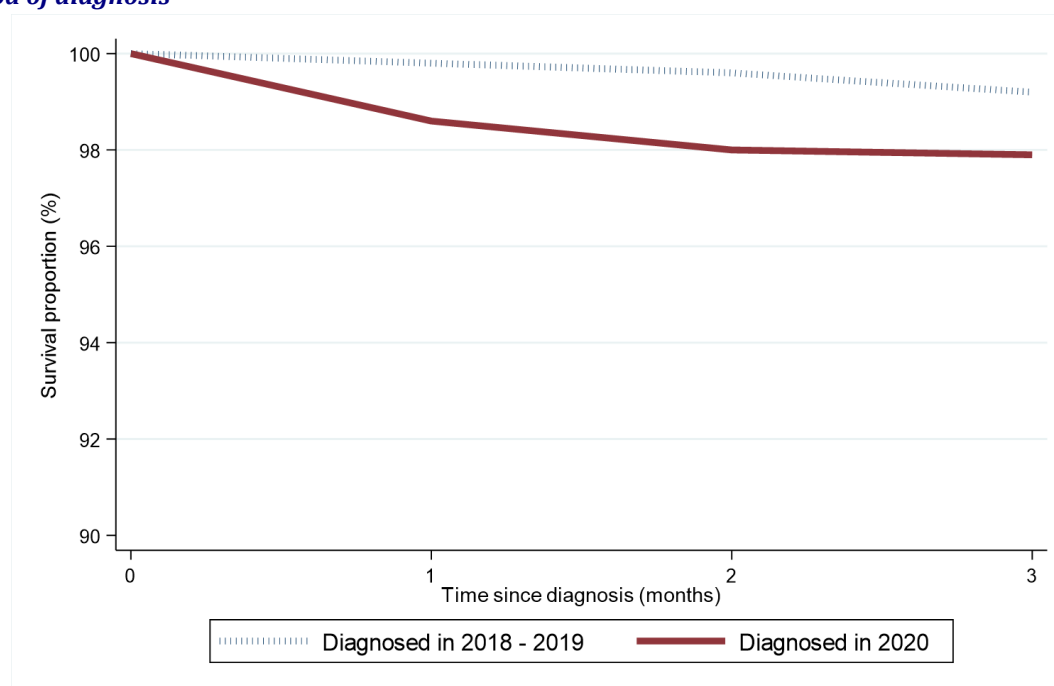
CANCER MORTALITY

During the April-December period when Covid-19 was present the number of deaths from prostate cancer among males decreased by 0.5% from 208 per year in 2018 - 2019 to 207 in 2020.
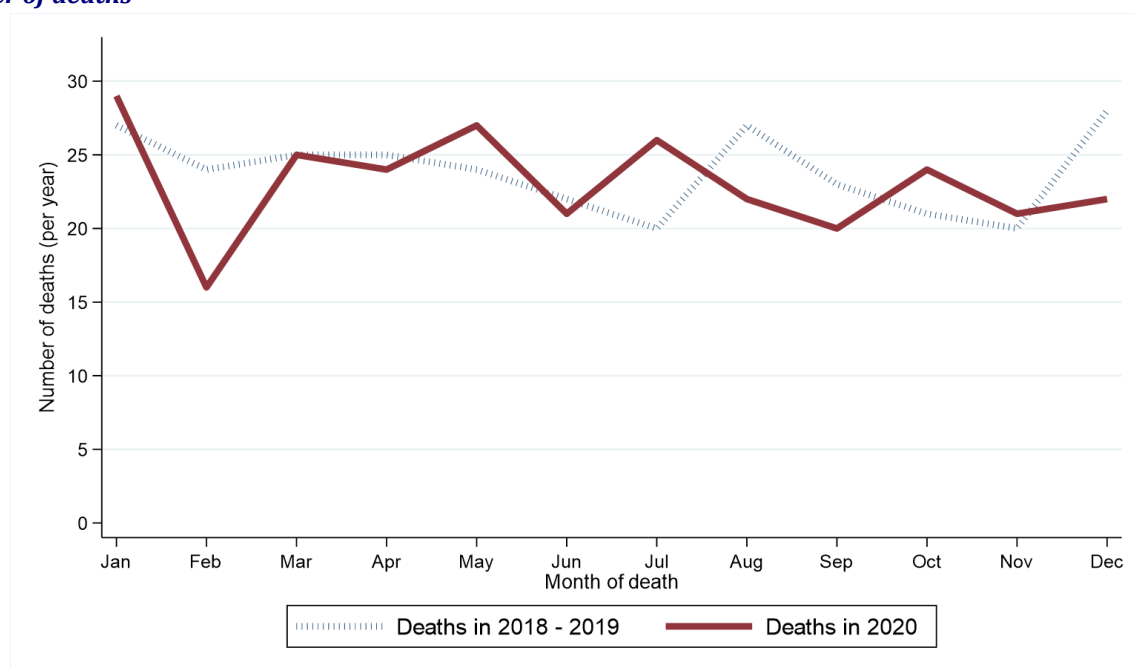
Table 11: Number of prostate cancer deaths in 2018-2020 by month and year of death

| Period of death	Annual total	Month death occurred											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2018-2019*	283	27	24	25	25	24	22	20	27	23	21	20	28
2020	277	29	16	25	24	27	21	26	22	20	24	21	22

* Average deaths per year rounded to the nearest integer. Row sums may thus differ slightly from the total.

Figure 11: Number of prostate cancer deaths in 2018-2020 by month and year of death
(a) Number of deaths

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer deaths by month of death
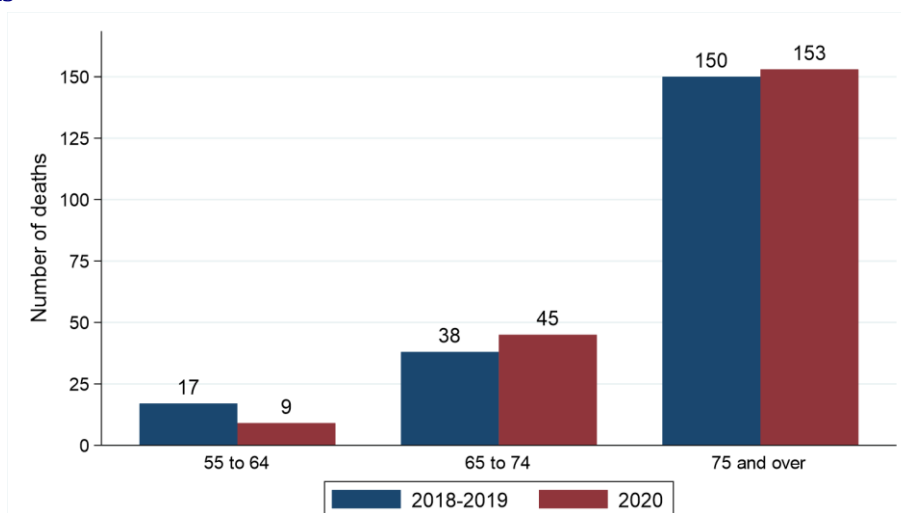
AGE
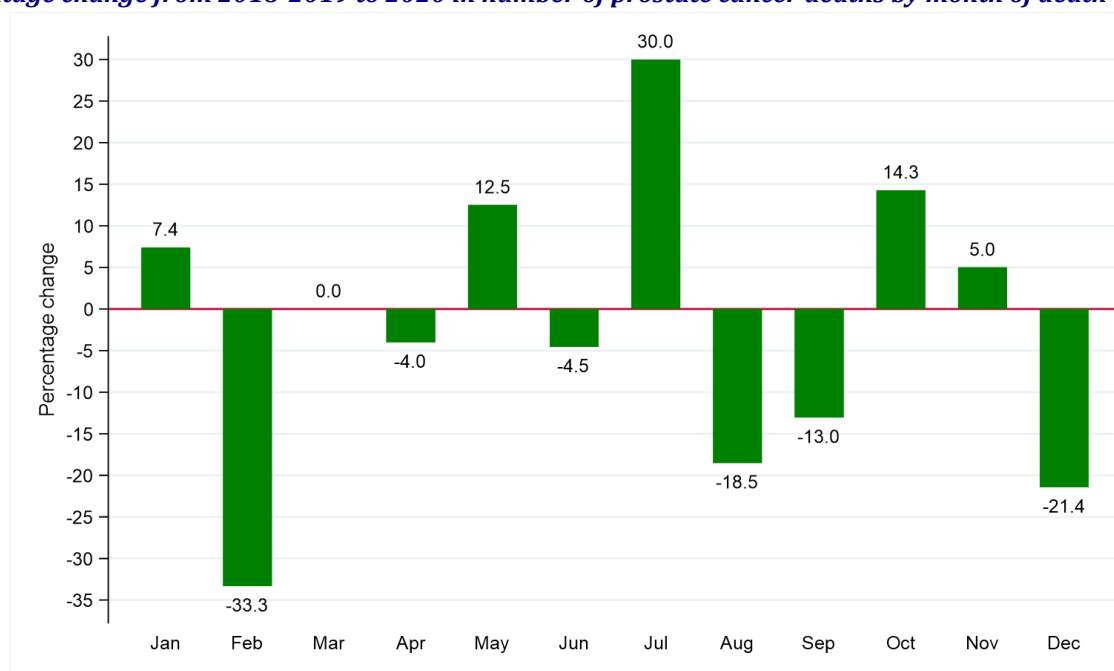
Excluding the first quarter of each year among people aged 0 to 54 the number of deaths from prostate cancer decreased by 100.0% from 4 per year in 2018 - 2019 to 0 in 2020. Between the same two time periods the number of deaths among people aged 65 to 74 increased by 18.4% from 38 per year to 45. The change in distribution of deaths by age between 2018 - 2019 and 2020 was not statistically significant.

Table 12: Number and proportion of prostate cancer deaths in April-December of 2018-2020 by age and period of death

Age group	Period of death (Apr-Dec)		Percentage change
	2018-2019*	2020	
0 to 54	4 (1.9%)	0 (0.0%)	-100.0%
55 to 64	17 (8.2%)	9 (4.3%)	-47.1%
65 to 74	38 (18.3%)	45 (21.7%)	+18.4%
75 and over	150 (72.1%)	153 (73.9%)	+2.0%
All ages	208	207	-0.5%

* Average deaths per year rounded to the nearest integer. Column sums may thus differ slightly from the total.

Figure 12: Prostate cancer deaths in April-December of 2018-2020 by age and period of death
(a) Number of deaths

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer deaths by age at death
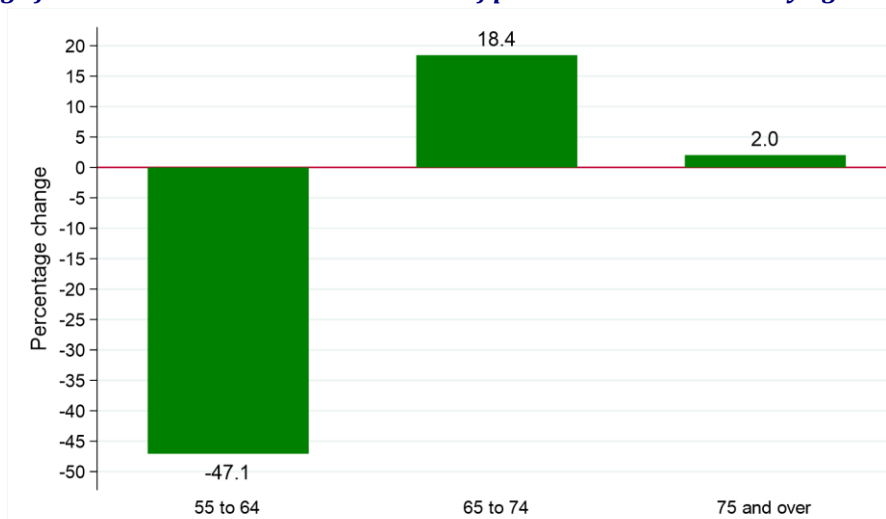
HEALTH AND SOCIAL CARE TRUST

Excluding the first quarter of each year among residents of Western HSCT the number of deaths from prostate cancer decreased by 40.0% from 35 per year in 2018 - 2019 to 21 in 2020. Between the same two time periods the number of deaths among residents of South Eastern HSCT increased by 45.9% from 37 per year to 54. The change in distribution of deaths by HSCT between 2018 - 2019 and 2020 was statistically significant (p = 0.022).

Table 13: Number and proportion of prostate cancer deaths in April-December of 2018-2020 by Health and Social Care Trust and period of death
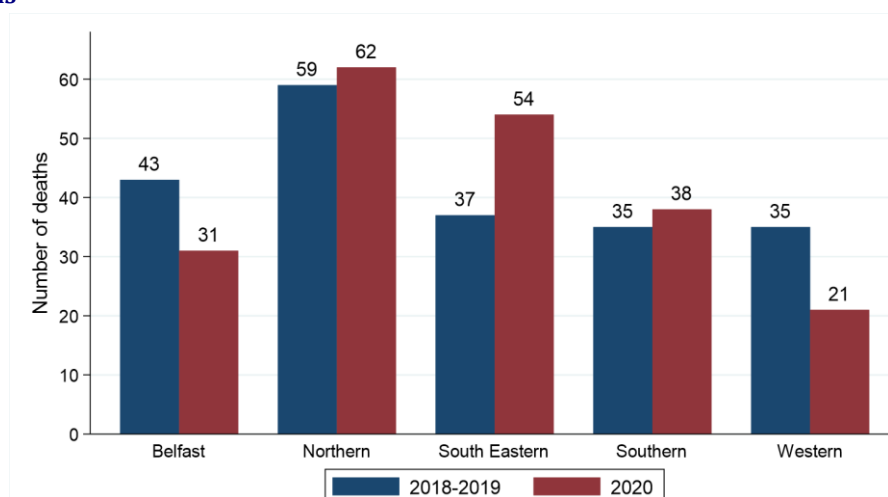
Health and Social Care Trust	Period of death (Apr-Dec)		Percentage change
	2018-2019*	2020	
Belfast HSCT	43 (20.7%)	31 (15.0%)	-27.9%
Northern HSCT	59 (28.4%)	62 (30.0%)	+5.1%
South Eastern HSCT	37 (17.8%)	54 (26.1%)	+45.9%
Southern HSCT	35 (16.8%)	38 (18.4%)	+8.6%
Western HSCT	35 (16.8%)	21 (10.1%)	-40.0%
All persons	208	207	-0.5%

* Average deaths per year rounded to the nearest integer. Column sums may thus differ slightly from the total.
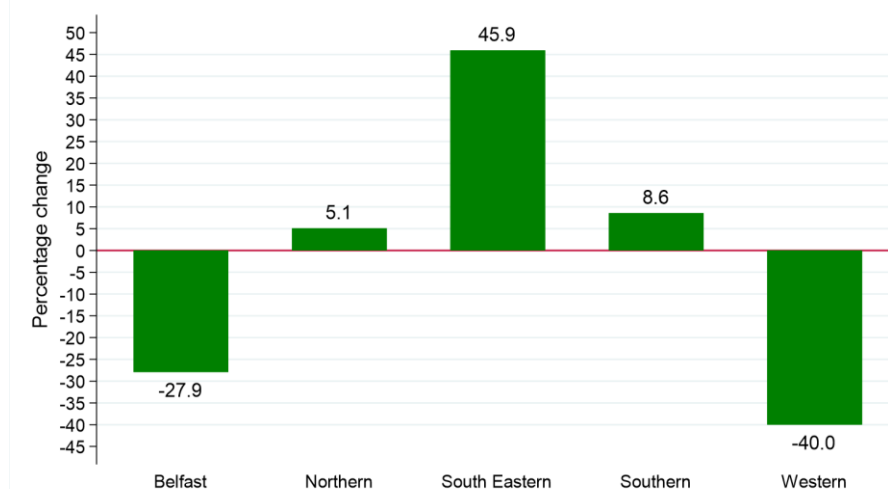*Note: Deaths with unknown Health and Social Care Trust are included in totals*

Figure 13: Prostate cancer deaths in April-December of 2018-2020 by Health and Social Care Trust and period of death
(a) Number of deaths

(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer deaths by Health and Social Care Trust

DEPRIVATION

Excluding the first quarter of each year among residents of the most deprived areas the number of deaths from prostate cancer decreased by 5.9% from 34 per year in 2018 - 2019 to 32 in 2020. Between the same two time periods the number of deaths among residents of the least deprived areas decreased by 24.1% from 54 per year to 41. The change in distribution of deaths by deprivation quintile between 2018 - 2019 and 2020 was not statistically significant.

Table 14: Number and proportion of prostate cancer deaths in April-December of 2018-2020 by deprivation quintile and period of death

Deprivation quintile	Period of death (Apr-Dec)		Percentage change
	2018-2019*	2020	
Most deprived	34 (16.3%)	32 (15.5%)	-5.9%
Quintile 2	45 (21.6%)	37 (17.9%)	-17.8%
Quintile 3	34 (16.3%)	48 (23.2%)	+41.2%
Quintile 4	41 (19.7%)	48 (23.2%)	+17.1%
Least deprived	54 (26.0%)	41 (19.8%)	-24.1%
Northern Ireland	208	207	-0.5%

* Average deaths per year rounded to the nearest integer. Column sums may thus differ slightly from the total.
Note: Deaths with unknown deprivation quintile are included in totals

Figure 14: Prostate cancer deaths in April-December of 2018-2020 by deprivation quintile and period of death
(a) Number of deaths
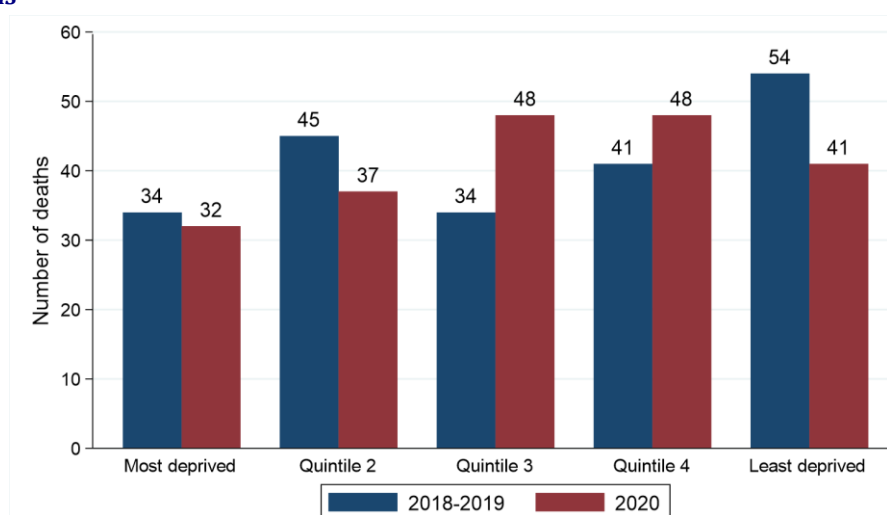
(b) Percentage change from 2018-2019 to 2020 in number of prostate cancer deaths by deprivation quintile