

# Factors driving inequality in prostate cancer survival: A population-based study.

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## 1. Research Objectives

Prostate cancer provides the opportunity to examine what factors contribute to variations in survival, with relatively large numbers of men surviving over relatively long periods of time.

The aim of this study was to examine the role of a range of clinical and socio-demographic variables in explaining variations in survival after prostate cancer diagnosis, paying particular attention to the role of healthcare provider(s) (i.e. private versus public) and socio-economic status.

## 2. Background

Prostate cancer is now the most commonly diagnosed cancer in men in developed countries. [1] In Ireland, approximately 2,500 men are diagnosed annually with prostate cancer which is increasing because of widespread PSA testing. [2] Survival prospects for men are high: the mean European age and area-standardised 5-year survival for men diagnosed in 1995-99 was 76% and the 5-year relative survival in Ireland was 88% for patients diagnosed in 2004-07. [3-4] Consequently, men with prostate cancer make up a significant proportion of cancer survivors.

Previous research identified a role accorded socio-economic status and healthcare provider in uptake of PSA testing. [5-6]

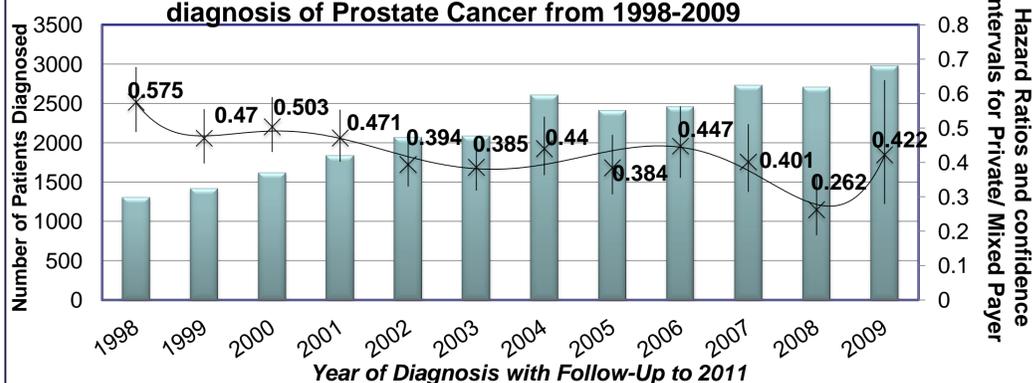
## 3. Data & Methods

Data were extracted from the National Cancer Registry Ireland (NCRI), for all patients diagnosed with prostate cancer (ICD10 C61) during 1998-2009 inclusive (N=26,938). For this study, information on deaths was complete until 31/12/2010 (thus, all patients had at least one year follow-up). Survival time was calculated in months and death from all causes was considered. Modelling techniques included:

1. Cox PH Regressions
2. Cox non-PH Stratified Regressions
3. Multivariate Logistic Regressions

## 4. Results

Crude Hazard Ratios for healthcare provide (private) for diagnosis of Prostate Cancer from 1998-2009



## 5. Key Findings

1. Socio-economic status and healthcare provider interacted to influence increased risk of mortality with prostate cancer in the Republic of Ireland.
2. Patients treated in a private healthcare setting in the Republic of Ireland had on average, a 40% reduced risk of mortality compared to those treated solely in a public setting, when adjusted for age and clinical variables.
3. Patients in the Republic of Ireland who accessed public healthcare provision from the lowest socio-economic group had an approximate 21-25% increased risk of death compared to those from the highest socio-economic group; this gradient was not evident for patients who were seen/treated by a private provider. These findings warrant further research.

Stratified interaction non-PH Cox regression model (36 month follow-up, HR's reported)

Non-need Factors	Private	Public	Married	Not Married
Socioeconomic Group 1	1	1	1	1
SES2	1.02	1.19***	1.34***	1.09
SES3	0.95	1.01	1.10	1.03
SES4	1.00	1.16**	1.31***	1.08
SES5	1.05	1.21***	1.43***	1.15**
SES Unknown	0.85	1.15**	1.14	1.15
Global Test	8.22 (P=0.14)	4.88 (P=0.43)	7.09 (P=0.21)	8.88 (P=0.11)
Wald Test *SES group	Chi2(5)= 2.02 (P=0.85)	Chi2(5)= 21.31 (P=0.00)	Chi2(5)= 42.67 (P=0.00)	Chi2(5)= 5.54 (P=0.35)
Number of Obs	6191	14316	13929	6578
Clinical Factors	Gleason grade 5-7	Gleason grade >7	Stage II	Stage III
Socioeconomic Group 1	1	1	1	1
SES2	1.46***	1.16	1.58***	1.23
SES3	1.20**	1.05	1.24*	0.94
SES4	1.29**	1.20**	1.40***	1.02
SES5	1.58***	1.24***	1.51***	1.46*
SES Unknown	1.36***	1.19	1.35**	0.98
Global Test	6.98 (P=0.22)	4.36 (P=0.50)	12.03 (P=0.04)	6.07 (P=0.29)
Wald Test *SES group	Chi2(5)= 29.24 (P=0.00)	Chi2(5)= 9.01 (P=0.10)	Chi2(5)= 23.50 (P=0.00)	Chi2(5)= 6.08 (P=0.30)
Number of Obs	11105	3881	10306	1690
Geographical Region	Leinster	Connacht	Munster	Ulster
Socioeconomic Group 1	1	1	1	1
SES2	1.41***	1.21	1.00	0.75
SES3	1.16*	0.90	1.00	0.95
SES4	1.29***	1.27*	1.00	1.03
SES5	1.59***	1.17	1.17*	0.79
SES Unknown	1.30***	1.10	1.03	0.60
Global Test	5.18 (P=0.39)	9.89 (P=0.08)	4.09 (P=0.54)	3.88 (P=0.57)
Wald Test *SES group	Chi2(5)= 55.04 (P=0.00)	Chi2(5)= 9.39 (P=0.09)	Chi2(5)= 7.50 (P=0.19)	Chi2(5)= 7.03 (P=0.22)
Number of Obs	9598	3250	6125	1534

Stratified interaction non-PH Cox regression model (84 month follow-up, HR's reported)

Non-need Factors	Private	Public	Married	Not Married
Socioeconomic Group 1	1	1	1	1
SES2	1.15	1.24***	1.34***	1.19*
SES3	0.94	1.07	1.12*	1.11
SES4	0.97	1.18***	1.23***	1.17**
SES5	1.09	1.25***	1.39***	1.22***
SES Unknown	0.81	1.21***	1.16*	1.16
Global Test	2.22 (P=0.82)	3.26 (P=0.66)	6.29 (P=0.28)	6.72 (P=0.24)
Wald Test *SES group	Chi2(5)= 6.73 (P=0.24)	Chi2(5)= 24.17 (P=0.00)	Chi2(5)= 38.83 (P=0.00)	Chi2(5)= 8.36 (P=0.13)
Number of Obs	2902	7408	6875	3435
Clinical Factors	Gleason grade 5-7	Gleason grade >7	Stage II	Stage III
Socioeconomic Group 1	1	1	1	1
SES2	1.38***	1.25**	1.48***	1.64*
SES3	1.21**	1.05	1.28**	1.58*
SES4	1.19**	1.28***	1.27**	1.62**
SES5	1.58***	1.30***	1.50***	1.83***
SES Unknown	1.24*	1.15	1.24*	0.93
Global Test	4.29 (P=0.49)	2.13 (P=0.83)	4.56 (P=0.47)	4.94 (P=0.42)
Wald Test *SES group	Chi2(5)= 38.67 (P=0.00)	Chi2(5)= 13.92 (P=0.02)	Chi2(5)= 24.84 (P=0.00)	Chi2(5)= 10.43 (P=0.06)
Number of Obs	4753	2041	4119	748
Geographical Region	Leinster	Connacht	Munster	Ulster
Socioeconomic Group 1	1	1	1	1
SES2	1.35***	1.47**	1.06	0.80
SES3	1.15*	1.23	0.93	0.97
SES4	1.26***	1.35**	1.03	0.97
SES5	1.59***	1.31*	1.10	0.86
SES Unknown	1.28**	1.18	1.08	0.59
Global Test	0.78 (P=0.97)	4.47 (P=0.48)	2.45 (P=0.78)	5.59 (P=0.35)
Wald Test *SES group	Chi2(5)= 61.31 (P=0.00)	Chi2(5)= 7.96 (P=0.15)	Chi2(5)= 4.81 (P=0.44)	Chi2(5)= 4.24 (P=0.51)
Number of Obs	4901	1458	3118	833

## 6. Policy Implications

**Given the high incidence of prostate cancer in the Republic of Ireland and internationally, a better understanding of the determinants of survival will provide policy makers and healthcare professionals with much needed evidence to improve both access and delivery of care.**