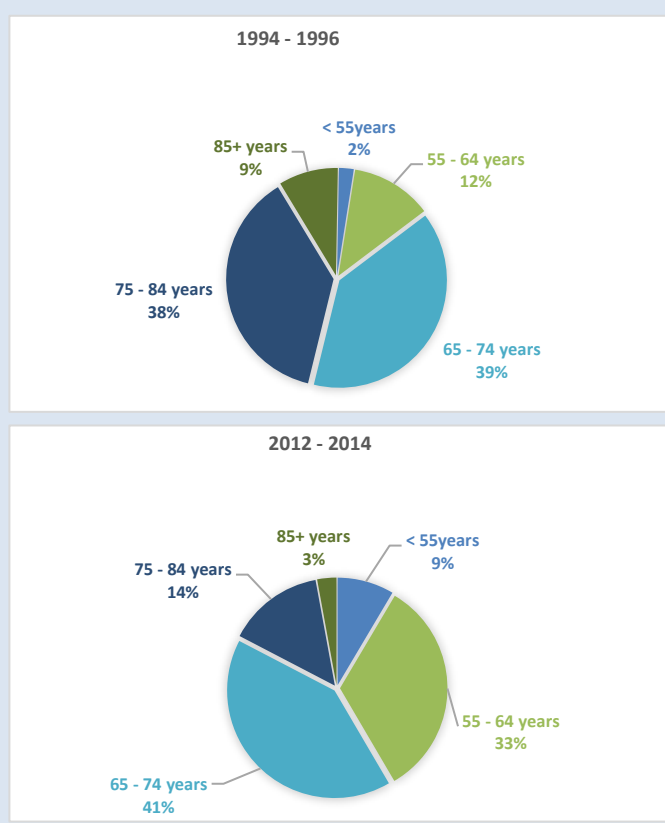# Cancer Trends

Prostate cancer

Incidence: case numbers and rate

In the period 2012-2014, cancer of the prostate (ICD10: C61) accounted for approximately 16% of all invasive cancers excluding non-melanoma skin cancer (NMSC) in Ireland and was the most common cancer for men and indeed overall. An annual average of 3,364 prostate cancer cases was diagnosed in the period 2012–2014. The age-standardised incidence rate (ASIR) for this period was 148.4 per 100,000 (1976 European Standard Population).

Age profile

Mean age at diagnosis has declined over time, from 74 years for patients diagnosed during 1994-1996 to 67 years for patients diagnosed in the most recent period, 2012-2014. The proportion of younger men (age less than 55 years) diagnosed with prostate cancer quadrupled in the later period compared to the earliest period (Figure 1). This change in age profile is likely to have been influenced by increases in screening of younger and middle aged men through PSA testing since the mid 1990's.

Figure 1. Age at diagnosis: prostate cancer

Incidence rates and case numbers were highest in the 65-69 year old age group (Figure 2).

Figure 2. Age-specific incidence rates 2012–2014
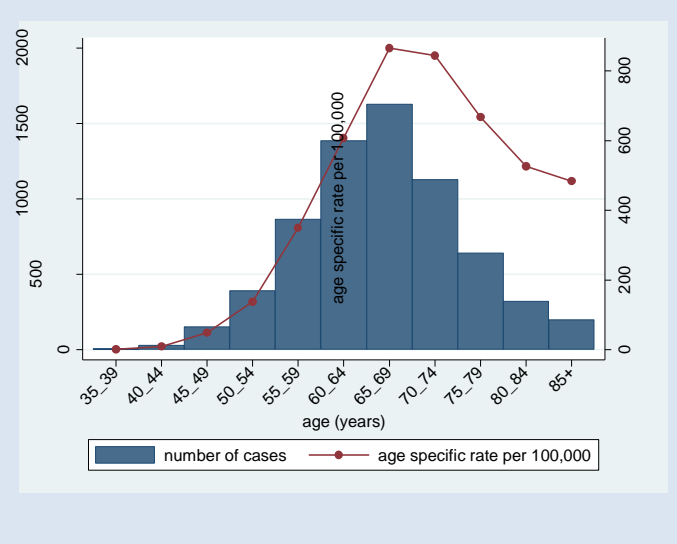
Time trends in incidence

After many years of rising age-standardised incidence rates for prostate cancer, we see indications that this trend is beginning to change with rates peaking in 2011 (167 per 100,000) (Figure 3). Joinpoint regression was used to plot and calculate trends over time [1]. The incidence rate of prostate cancer increased sharply with an annual percentage change (APC) of 7.5% (95%CI 6.4%, 8.6%) in the period 1994-2004. This was followed by a more modest annual increase of 2.2% (95%CI 0.6%, 3.8%) in the period 2004 until 2011. The most recent period from 2011 to 2014 showed declining rates: APC -3.9 (95%CI -7.8%, 0.2%).

Figure 3. Fitted age-standardised rates, prostate cancer, 1994-2014
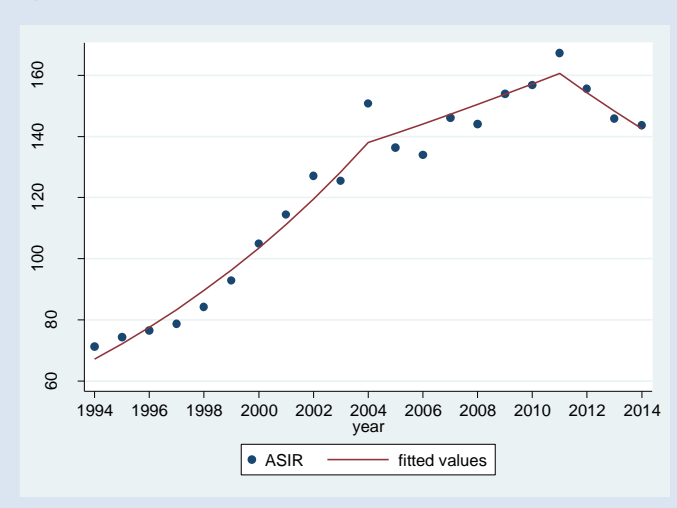
Comparing incidence rates between Ireland and Northern Ireland over the 20-year period (Figure 4), we see that in the mid 1990's the age-standardised incidence rates of the two countries were similar, but rates in Ireland increased earlier and faster. In later periods the incidence rates have started to decline in both

countries. This decrease appears to have started in Northern Ireland earlier (2007) compared to Ireland (2011).

Figure 4. Comparison of incidence rates, Ireland and Northern Ireland, 1994-2014
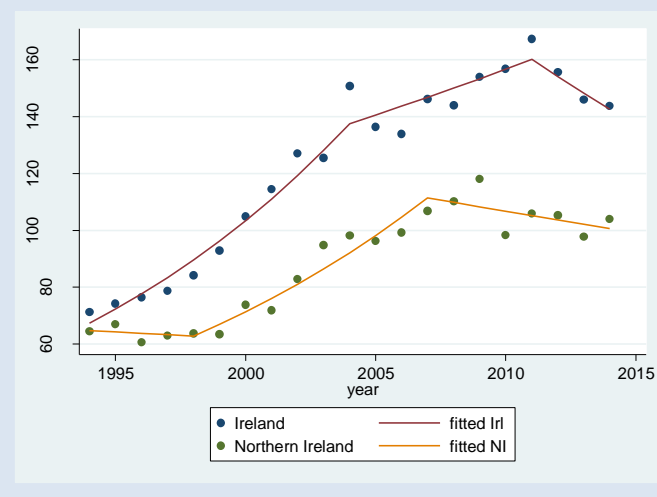
Screening

The number of cases first presenting asymptomatically via screening (prostate-specific antigen (PSA) test) continues to rise (Figure 5). Further diagnostic testing is required to ascertain whether a suspicious result from a PSA test is in fact prostate cancer. Some prostate cancers would not have presented symptomatically during the man's lifetime and many die of other causes. The number of men presenting with symptoms has remained largely unchanged, although numbers started declining in 2009, perhaps due to some cancers being picked up by screening, prior to symptoms occurring.

Figure 5. Numbers of cases by category over time
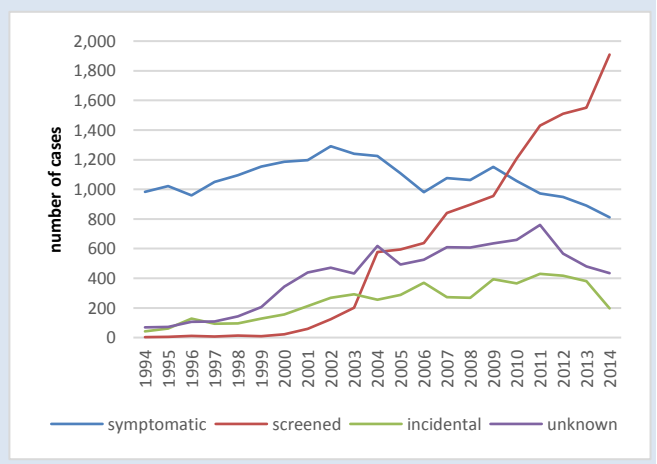
Stage at diagnosis

There has been an increase in the number and proportion of cases staged T1, T2 and T3 over time with an accompanying decline in numbers of un-staged cancers (Figures 6 and 7). A levelling off of case numbers of T1 and T3 has been observed since 2007 and 2011 respectively. A notable feature is that the number of T4 cases has remained relatively constant with an average of between 50 and 57 cases diagnosed per year.

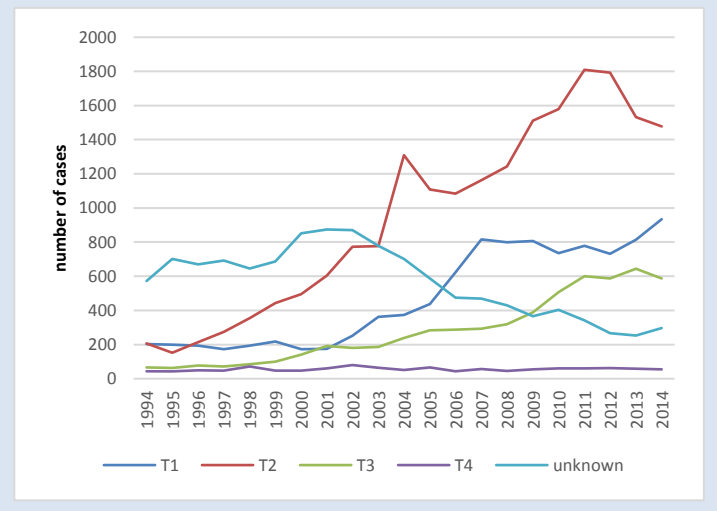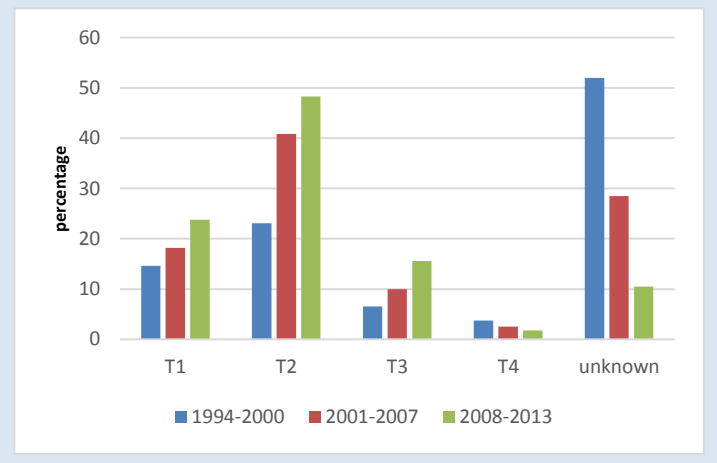### Figure 6. Numbers of cases by stage, over time

Figure 7. Percentage of cases by stage and period of diagnosis

The majority (61%) of tumours were moderately differentiated in the period 2008-2013 (Figure 8). This compared with approximately 23% of tumours being poorly differentiated and only 5% being well differentiated. The percentage of tumours with unknown grade has halved in the period 2008-2013 compared to 1994-2000.

Figure 8. Percentage of cases by grade and period of diagnosis
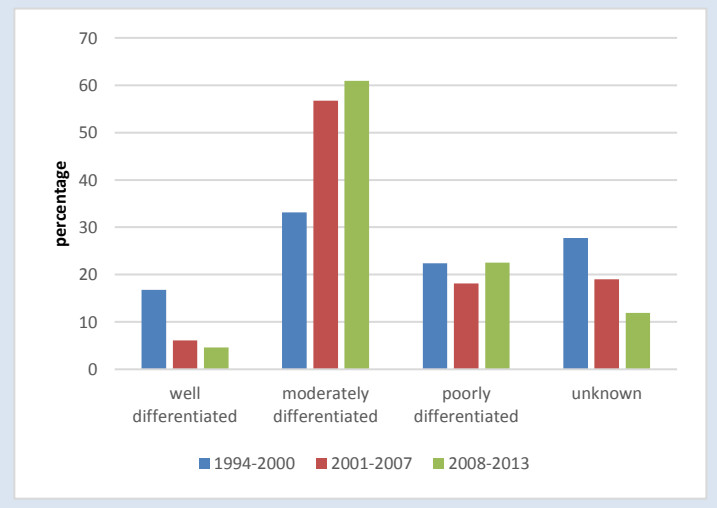
Treatment

During the 20-year period 1994-2013, the percentage of cancer patients having tumour-directed treatment within one year of diagnosis was almost 80% (Figure 9). Some of those that did not have treatment were on "watchful waiting" or "active surveillance". Half of all patients had surgery in the period 1994-2000 compared to 31% in the period 2001-2007 and 27% in the latest period 2008-2013. The decline in surgery may be due to a greater proportion of patients having biopsy only (and the biopsy removing all of the cancer tissue – this is more likely with smaller tumours). Conversely, 11% of patients received radiotherapy treatment in the period 1994-2000 and this increased to 33% and 43%, in 2001-2007 and 2008-2013 respectively. There was a small decrease in the proportion receiving hormone therapy in the most recent period - this may be due to an increase in watchful waiting/active surveillance, but under-recording of outpatient hormonal treatments is also possible.

Figure 9. Variation in prostate cancer treatment (percentage of patients) by diagnosis period
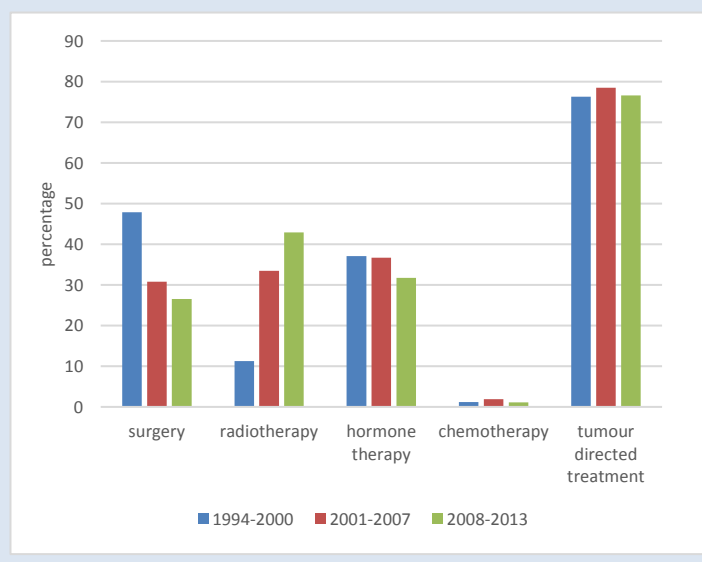
Social class and incidence rates

Patients with a prostate cancer diagnosis were assigned to a deprivation category as a result of an area–based deprivation index derived from 2006 census variables [3].

In 2008-2011, the age-standardised incidence rates ranged from 128 per 100,000 in the two least deprived groups compared with approximately 153 per 100,000 in the three most deprived groups (Figure 10). The distribution of incidence rates across the five deprivation groups remained fairly constant across the two periods, 2004-2007 and 2008-2011.

In both periods, urban areas had higher incidence rates, though this difference decreased from 11% in 2004-2007 to 8% in 2008-2011.


Figure 10. Age-standardised incidence rates by deprivation class.
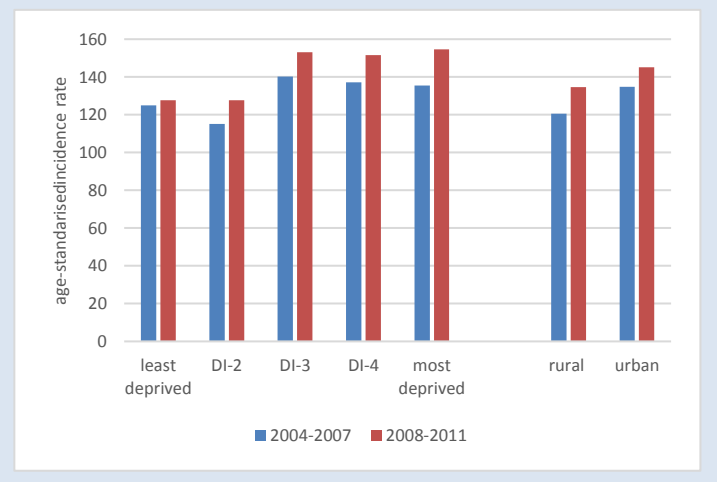
Trends in Irish mortality rates

Apart from a slight decline in the late 1970's, mortality rates in Ireland increased steadily from <8 deaths per 100,000 per year in the early 1950's to approximately 19 deaths per 100,000 per year in the mid 1990's (Figure 11). Most recently, since 1995, the mortality rates have been decreasing, APC – 2.7% (95%CI -3.2, -2.1). This reduction in mortality is likely due to improvements in treatment.
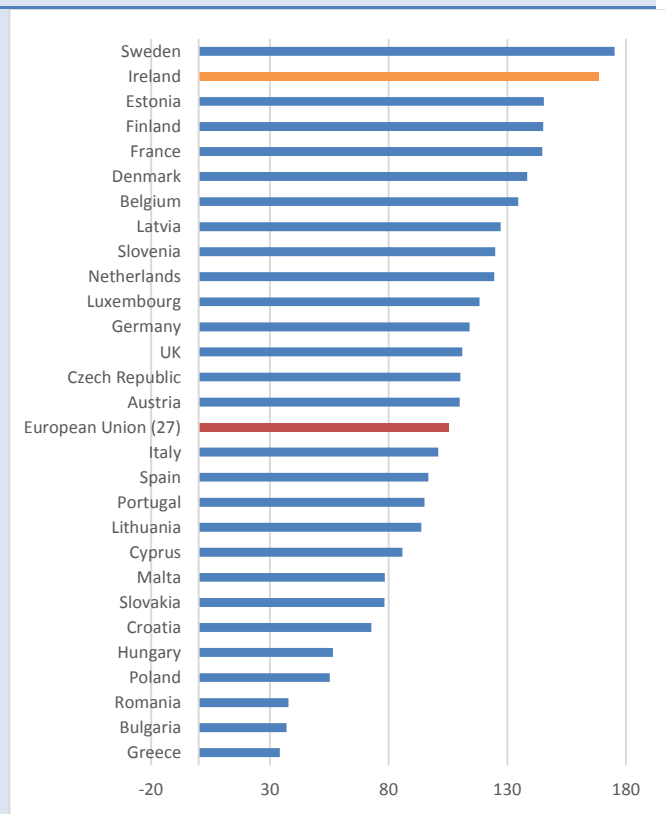

Figure 11. Fitted age-standardised mortality rates in Ireland: 1950-2013
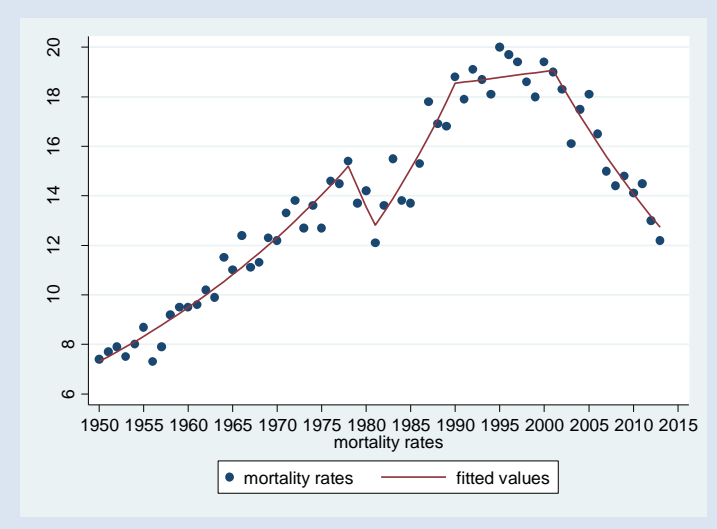
International variation in incidence and mortality

In comparison with other European Union countries in 2012, Ireland had the second highest incidence rate after Sweden (Figure 12). Indeed, the incidence was 60% higher than the European (EU-27) average (the average excludes Croatia which joined the EU in 2013).

Figure 12. Estimated incidence (European age-standardised), 2012

The mortality rate for Ireland was 22.1 per 100,000 compared to the EU-27 average of 19 per 100,000.

Figure 13. Estimated mortality (European age-standardised), 2012
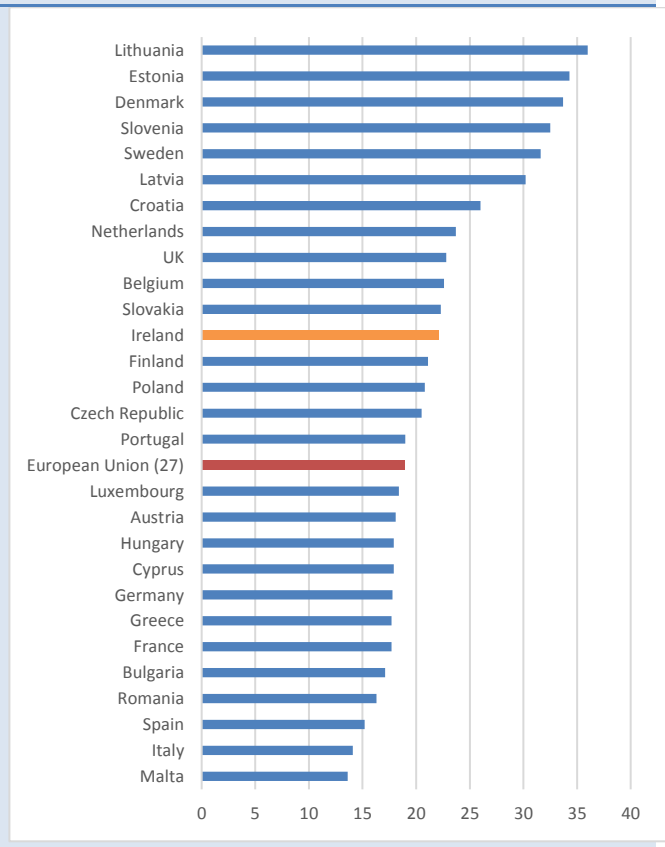

Survival in Ireland

Net survival due to prostate cancer (the ratio of observed survival for prostate cancer patients to the expected survival of individuals of the same age and sex) [5] is relatively high compared to many other cancers. Age-standardised 5-year survival averaged 91% in the most recent period, 2009-2013. Survival in the period 2004-2008 was similar, and was an improvement on previous periods (82% 1999-2003 and 66% 1994-1998). This is likely to reflect a combination of improved treatment and earlier detection, though some of the latter could involve lead-time bias (earlier diagnosis producing an artificial extension of survival time for some patients).

Figure 14. Net survival curve by period, age-standardised.
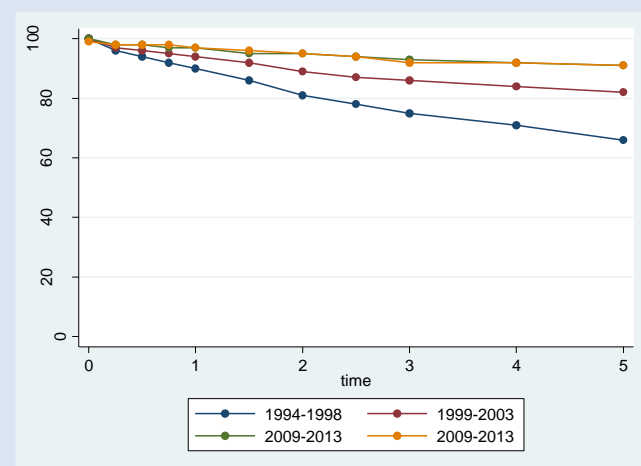
Cancer survival varies considerably by stage at diagnosis; in the period 2008-2012, the 5-year survival for stage II and III cancers averaged 98% and 96% respectively, while stage IV cancer had a 5-year survival of 43%.

Figure 15. Net survival by stage ,2008-2012, age-standardised
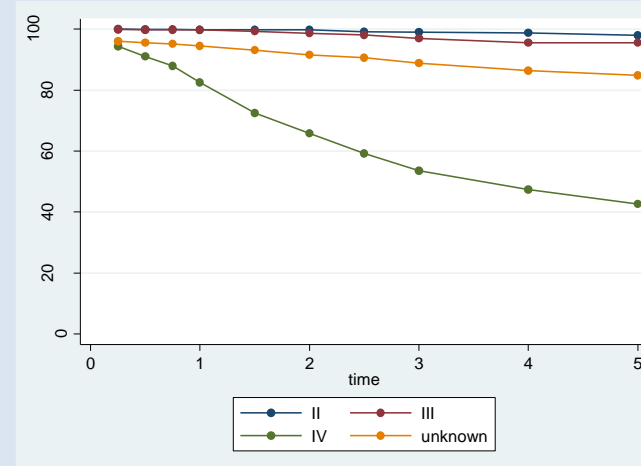
REFERENCES

[1] H. J. Kim, M. P. Fay, E. J. Feuer, and D. N. Midthune, "Permutation tests for joinpoint regression with applications to cancer rates," *Stat. Med.*, vol. 19, no. 3, pp. 335–351, Feb. 2000.

[2] European Cancer Observatory (ECO), http://eco.iarc.fr.

[3] Deprivation index as per 2006 census. SAHRU (www.sahru.tcd.ie).

[4] Central Statistics Office, "Number of Births, Deaths and Marriages," *http://www.cso.ie/en/statistics/birthsdeathsandmarriages /numberofbirthsdeathsandmarriages/*.[Online]

[5] Pohar Perme M, Stare J, Estève J. On estimation in relative survival. *Biometrics*. 2012; 68: 113-120.