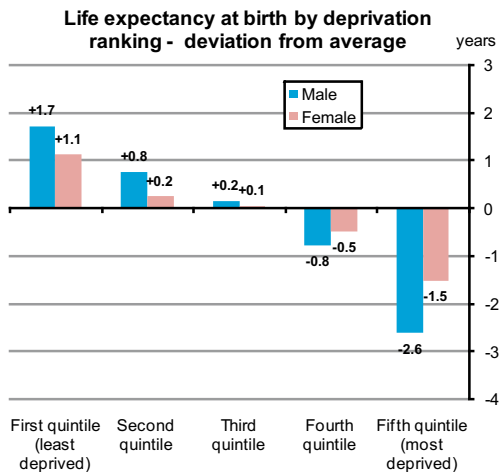




## Mortality Differentials in Ireland

Analysis based on the census characteristics of persons who died in the twelve month period after Census Day 23 April 2006



### Life expectancy at birth by area of deprivation (quintile)

	Males	Females
<b>First quintile (least deprived)</b>	78.0	82.7
<b>Second quintile</b>	77.1	81.8
<b>Third quintile</b>	76.4	81.6
<b>Fourth quintile</b>	75.5	81.1
<b>Fifth quintile (most deprived)</b>	73.7	80.0
<b>All</b>	<b>76.3</b>	<b>81.5</b>

### Persons in most deprived areas have lowest life expectancy

The life expectancy at birth of males living in the most deprived areas in the State was 73.7 years in 2006/2007 compared with 78 years for those living in the most affluent areas (see Background Notes for a description of the deprivation methodology used). The corresponding figures for females were 80 and 82.7. The differential between female and male life expectancy (6.3 years) was greatest in the most deprived areas.

Life expectancy at birth is greatest according to the affluence of the area in which the person lived at the time of the 2006 census. This relationship applied for both males and females at ages 0, 20, 35 and 65 years (see Table 1).

Social class was also a powerful predictor of life expectancy with male professional workers having a life expectancy at birth of 81.4 years, 6.1 years higher than their unskilled counterparts. Male managerial and technical workers had the second highest life expectancy (79.8 years) followed by skilled manual workers (78.7 years). The situation for females was broadly similar with professional workers having the highest life expectancy (86 years) and unskilled workers the lowest (81 years).

Life expectancy was also correlated with educational attainment. For a 35 year old male who had completed his full time education, life expectancy increased from 41.3 years for those educated to primary level only to 44.5 years for those with a secondary education to 46.9 years for those with a third level education. The corresponding figures for 35 year old females were 45.6, 48.5 and 50.4 years, respectively. The differential between female and male life expectancy was greatest for those educated to primary level only (4.3 years).

The results presented in this release are based on a data-matching exercise undertaken by the CSO of data from the Vital Statistics Deaths file and the 2006 Census of Population. The study was carried out in line with the Statistics Act 1993 and the CSO Data Protocol governing data matching exercises undertaken by the CSO. See the Background Notes for a description of the matching exercise and the method of compilation.

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## Religion

The age standardised mortality rate of Church of Ireland adherents was marginally lower than that of Roman Catholics in 2006 – 629 per 100,000 compared with 671 (see Table 4a).

## Disability and carers

Not surprisingly, persons who indicated that they had a long lasting disability or chronic health condition in the census experienced a mortality rate which was approximately 3.5 times the mortality rate of those without a disability (see Table 4a).

Carers had a significantly lower standardised death rate (548) than those who did not provide regular unpaid help for a friend or family member with a long-term illness, health problem or disability (855) (see Table 4b).

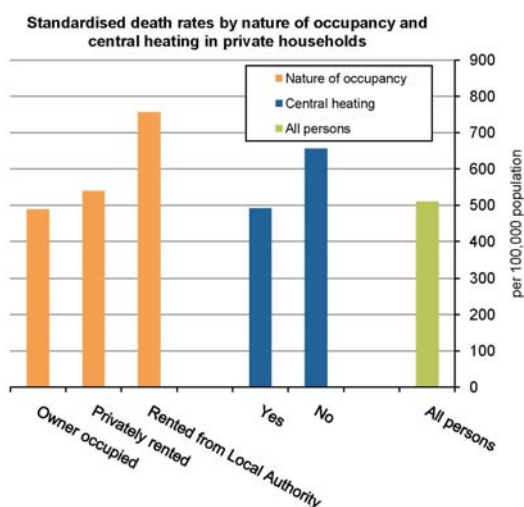
## Marked difference in mortality rates by marital status

Among those aged 15 years and over, married persons had the lowest mortality rate at 797 per 100,000 persons. Single persons had the highest rate (1,082) while widowed and divorced/separated persons also had relatively high mortality rates (see Table 4b).

## Urban dwellers have higher mortality rates

On average persons living in urban areas had a higher mortality rate than their rural counterparts in 2006 (see Table 4c). The standardised death rate for urban dwellers was 715 per 100,000 persons compared with 655 for those living in rural areas. Among the urban areas, those living in Limerick city including its suburbs had the highest mortality (785) while those living in Dublin city including its suburbs had the lowest (686).

The results of the area based analysis of mortality rates by deprivation ranking supplement the life expectancy data. The aged standardised mortality rate for males living in the least deprived areas was 624 per 100,000 males compared with 834 for those living in the most deprived areas. This translated into life expectancies at birth of 78 and 73.7 years, respectively – a difference of 4.3 years. Consistent with the life expectancy data quoted earlier, standardised death rates increased with increasing deprivation for both males and females (see Table 4c).



## Owner occupiers fare best

The mortality rate for persons living in owner occupied dwellings (489) was the lowest of all housing tenure categories (see Table 4d and graph opposite). Persons in private rented accommodation had a somewhat higher rate (539) while the mortality rate of those living in rented accommodation provided by Local Authorities or Voluntary Bodies was significantly higher at 757 per 100,000 persons.

Persons living in accommodation without central heating experienced a mortality rate which was significantly higher than that for persons living in centrally heated dwellings (656 compared with 492). Male mortality rates exceeded those for females for all categories of housing tenure and for the central heating variable.

**Table 1 Life expectancy by sex at various ages by area of deprivation (quintiles), 2006/2007**

Life expectancy at various ages	Males				Females			
	0	20	35	65	0	20	35	65
<b>Area of deprivation (quintiles)</b>								
First quintile (least deprived)	78.0	58.7	44.2	17.2	82.7	62.8	48.0	20.0
Second	77.1	57.8	43.5	16.7	81.8	62.0	47.4	19.5
Third	76.4	57.2	43.1	16.6	81.6	61.7	47.1	19.5
Fourth	75.5	56.4	42.5	16.4	81.1	61.2	46.6	19.1
Fifth quintile (most deprived)	73.7	54.6	40.9	15.4	80.0	60.2	45.6	18.9
All persons	76.3	57.1	42.9	16.5	81.5	61.7	47.0	19.4

**Table 2 Life expectancy by sex at various ages by social class, 2006/2007**

Life expectancy at various ages	Males				Females			
	0	20	35	65	0	20	35	65
<b>Social class</b>								
Professional workers	81.4	62.0	47.4	19.2	86.0	66.2	51.4	23.2
Managerial and technical	79.8	60.4	45.8	18.0	84.8	64.9	50.0	21.6
Non-manual	78.4	59.0	44.6	17.7	83.8	63.9	49.2	21.0
Skilled manual	78.7	59.0	44.8	17.3	82.1	62.3	47.6	20.0
Semi-skilled	77.5	58.0	43.9	17.0	81.8	62.0	47.3	19.5
Unskilled	75.3	55.8	42.0	15.6	81.0	61.2	46.4	19.3
Others including unknown	70.2	50.4	37.0	14.4	77.5	57.6	43.2	18.4
All persons	76.8	57.5	43.4	16.7	81.8	62.0	47.3	19.7

**Table 3 Life expectancy by sex at various ages by highest level of education, 2006/2007**

Life expectancy at various ages	Males				Females			
	0	20	35	65	0	20	35	65
<b>Highest level of education</b>								
Primary	n.a.	53.3	41.3	16.3	n.a.	59.5	45.6	19.4
Secondary	n.a.	58.5	44.5	17.5	n.a.	63.2	48.5	20.8
Third level	n.a.	61.3	46.9	19.3	n.a.	65.2	50.4	22.1
Not stated	n.a.	51.9	38.2	13.4	n.a.	56.9	42.7	16.5
All persons who have ceased their education	n.a.	57.4	43.3	16.6	n.a.	62.0	47.3	19.7

**Table 4 Standardised death rates by sex for selected variables, 2006/2007**

	Standardised Death Rates (per 100,000 population)		
	Persons	Males	Females
<b>(a) Usually resident persons present in the State on Census Night</b>			
<b>All persons</b>	672	686	657
<b>Social class</b>			
Professional workers	456	449	402
Managerial and technical	524	540	478
Non-manual	530	609	518
Skilled manual	646	598	632
Semi-skilled	650	635	643
Unskilled	790	798	699
Others including unknown	997	1,112	951
<b>Religion</b>			
Roman Catholic	671	691	655
Church of Ireland	629	661	583
Other, including no religion and religion not stated	758	682	821
<b>Disability</b>			
Disability	1,578	1,550	1,616
No disability	434	461	399
<b>(b) Usually resident persons aged 15 years and over present in the State on Census Night</b>			
<b>All persons aged 15 years and over</b>	842	865	819
<b>Carers</b>			
Yes	548	613	506
No	855	875	835
<b>Marital status</b>			
Single (never married)	1,082	1,101	972
Married (including re-married)	797	824	691
Divorced/Separated (including Deserted)	914	962	818
Widowed	914	1,128	930
<b>Highest level of education</b>			
Primary	1,239	1,238	1,182
Secondary	833	882	813
Third level	624	626	629
Not stated	1,570	1,578	1,608
All persons who have ceased their education	973	992	954

**Table 4 (contd.) Standardised death rates by sex for selected variables, 2006/2007**

	Standardised Death Rates (per 100,000 population)		
	Persons	Males	Females
<b>(c) Usually resident persons present at their place of usual residence on Census Night</b>			
<b>All persons</b>	689	703	674
<b>Area type</b>			
Urban (incl. suburbs)	715	743	702
Greater Dublin Area	686	717	670
Cork City	777	785	778
Limerick City	785	752	832
Galway City	726	778	685
Waterford City	763	722	816
Towns 10,000 and over	696	729	677
Towns 1,500-9,999	759	795	739
Rural	655	660	636
<b>Area of deprivation (quintiles)</b>			
First quintile (least deprived)	608	624	605
Second	661	670	652
Third	686	690	674
Fourth	723	733	706
Fifth quintile (most deprived)	804	834	770
<b>(d) Usually resident persons present at their place of usual residence (private households only)</b>			
<b>All persons</b>	510	563	458
<b>Nature of occupancy of private households</b>			
Owner occupied	489	536	443
Privately rented (inc. rent free)	539	622	429
Rented from Local Authorities or Voluntary Bodies	757	840	667
Not stated	558	615	496
<b>Central heating</b>			
Yes	492	540	447
No	656	729	546
Not stated	592	660	506

## Background Notes

- Data protocol** The results presented in this release are based on a data-matching exercise undertaken by the CSO of data from the Vital Statistics Deaths file and the 2006 Census of Population. The study was carried out in line with the Statistics Act 1993 and the CSO Data Protocol governing data matching exercises undertaken by the CSO (see <http://www.cso.ie/releasespublications/CSODataProtocol.htm>).
- Period covered** All deaths which occurred in the twelve-month period 24 April 2006 to 23 April 2007 were selected for matching against the census file. The analysis was confined to persons who were usually resident and present in the State on Census Day – 23 April 2006. Deaths which were registered on certificates issued by coroners as a result of an inquest or post-mortem examination were also included.
- Data matching exercise** A total of 28,016 records from the deaths file were selected as being in scope. As the first name and surname were not captured as part of the census processing operation, this meant that matching with the deaths file had to be undertaken clerically. The sex, date of birth, age and place of usual residence strings were used to generate likely candidates from the census file for clerical matching.
- The records for each of the 28,016 deceased persons were examined in turn. A first search was generated by visually examining the census forms which contained persons with the same date of birth, sex and county of usual residence as those of the deceased. This process was facilitated by a software solution developed by Census IT staff which allowed the operator to examine an extract from the scanned image of the short listed census forms on-screen and to record where a match had taken place. This first search normally resulted in a relatively small number of candidates for examination. If the first search was unsuccessful then a further match was attempted by examining all those records where there was an exact match on age, sex and county of usual residence. The focus on age rather than on date of birth allowed for the possible misreporting of date of birth on either the deaths file or the census file.
- Where necessary the sex and date of birth search was next extended to the entire census file. This clearly gave rise to a larger number of cases for examination. Failing a successful match at this stage age was allowed to vary by one year either side of the age on the deaths file at county level in order to allow for possible misreporting of age on either file.
- After all these steps were exhausted the remaining unmatched cases were matched against the Client Record System (CRS) of the Department of Social Protection using the date of death field. Where this generated a different date of birth from that indicated on the deaths file then the CRS date of birth was used to attempt to match with the census file.
- The overall match rate achieved was 85 per cent. While this fell short of the 94 per cent match rate achieved in the Northern Ireland Mortality Study (see <http://www.qub.ac.uk/research-centres/NILSResearchSupportUnit/>) it compares very favourably with similar exercises carried out in countries such as New Zealand where an 80 per cent match rate was achieved. It also has to be borne in mind that the Northern Ireland matching exercise used the names and addresses captured from both the census and the deaths file, which enabled 80 per cent of the deaths recorded in the four years since the NI census of 2001 to be matched electronically.
- Matched v unmatched records** Given that it was not possible to match 4,142 of the 28,016 death records against the census file it is of interest to know how representative the 23,874 matched records are of the total deaths under consideration. Figures 1 and 2 provide a summary of the unmatched records by age and sex in absolute terms and as a percentage of total deaths, respectively.

Figure 1 Number of unmatched deaths by age group and sex of deceased

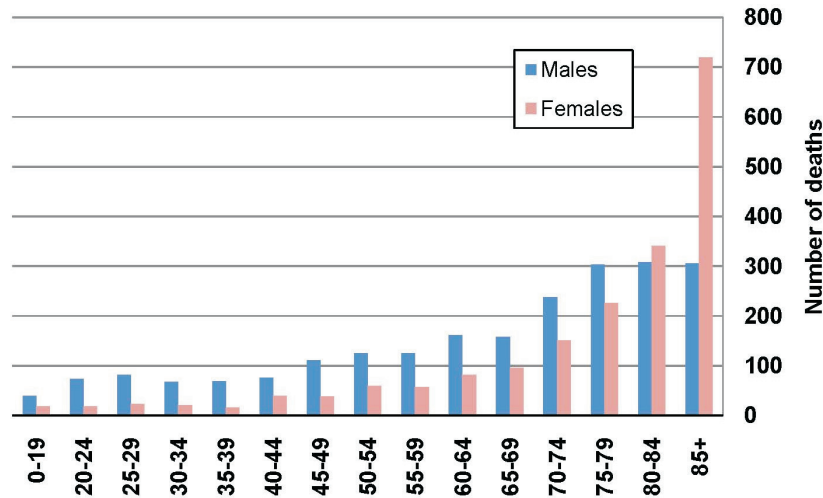
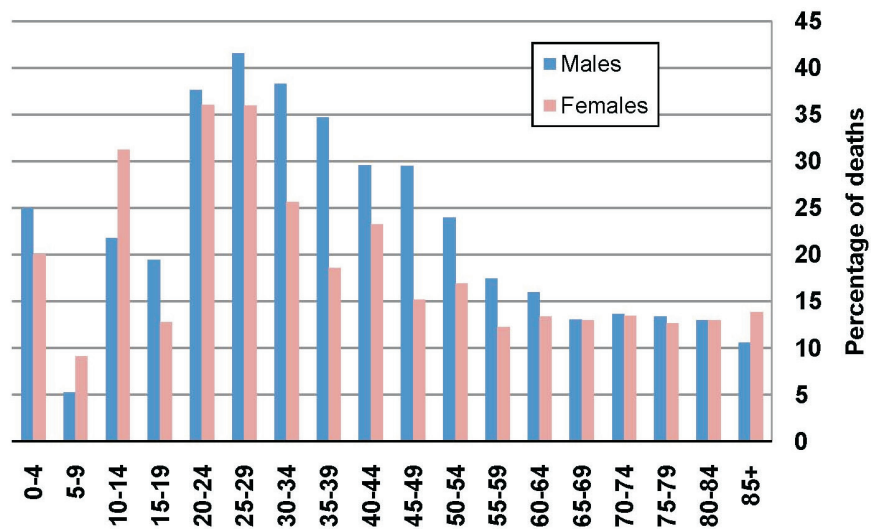


Figure 2 Proportion of unmatched deaths by age group and sex of deceased



The proportion of unmatched deaths was higher among males (15.6 per cent) than females (13.9 per cent) with the highest proportions occurring among young adults, particularly younger males. In absolute terms the number of unmatched deaths increased most rapidly with age for females. The proportion unmatched was higher in rural areas (16.2 per cent) than in the urban areas (13.7 per cent).

The fact that the unmatched deaths appear not to be randomly distributed has to be borne in mind in drawing inferences for the population as a whole based on the matched data only. The main reason why a higher match rate was not achieved was the fact that names were not captured from the census file thereby precluding electronic matching using name, sex, date of birth and place of usual residence.

The absence of a post code also hindered matching. However, even allowing for these drawbacks, factors such as:

- the quality of information on the death certificate being heavily dependent on how closely related the informant was to the deceased;
- misreporting of date of birth on either the deaths file or the census file;



- high geographical mobility of young adults; and
- possible under-reporting on the census

would have given rise to difficulties in achieving exact matches.

With a view to compiling death rates consistent with those published in the Vital Statistics Reports unmatched deaths were distributed pro-rata according to matched deaths for each category of a classification variable separately by broad age group and sex. The underlying assumption is that the distribution of unmatched deaths is the same as for matched deaths for each of the variables distinguished in the release.

### Causes of death

The classification of causes of death used to present the results of Irish mortality statistics in the Annual Report on Vital Statistics changed from ICD9 to ICD10 on 1 January 2007. The main changes arising from the application of the revised classification are set out in Chapter 3 of the 2007 report. A fuller description is given in <http://www.who.int/classifications/help/icdfaq/en/index.html>.

The main impact of the change in classification for the matching exercise was that deaths which occurred in the period 24 April 2006 to 31 December 2006 were coded using ICD9 while those which occurred in the period 1 January 2007 to 23 April 2007 were coded to ICD10. Because of the fairly significant changes which occurred in moving from ICD9 to ICD10 this implies that the complete matched file cannot be analysed using a consistent cause of death classification and consequently no cause of death analysis is included in this release.

### Age standardisation

Because mortality rates are strongly age-dependent it is necessary to age standardise (or age adjust) them in order to avoid drawing erroneous conclusions, especially when the results from two or more population sub-groups are being compared. In the present release age-specific mortality rates were calculated for the following broad age groups 0-19, 20-44, 45-64, 65-74, 75-84 and 85 years and over. The mortality rates compiled for these age groups were then weighted using the European Standard Population to yield overall age standardised mortality rates. The relevant weights are given in Table 1 of the World Health Organisation (WHO) discussion paper <http://www.who.int/healthinfo/paper31.pdf>.

Using five year age groups to compile the age specific mortality rates does not give rise to any significant change to the overall age standardised mortality rates compiled using the broad age groups described above. It was decided to use these broad age groups in the present release as they are more synoptic than the five year age groups and reasonably meaningful from a mortality perspective.

### Interpretation of standardised mortality rates

High standardised mortality rates can be observed for certain residual categories which contain 'not stated' such as religion, level of education and social class. The explanation is primarily due to the high number of persons on the census file matched to the deaths file who were enumerated in communal establishments such as nursing homes and hospitals. Census forms received from these establishments have a higher level of not stated across all variables, probably due to the form being completed by an assistant rather than the person themselves. In the case of social class this is compounded by persons who indicate a principal economic status of 'unable to work due to permanent sickness or disability' as they are assigned a social class of 'other' thus adding to the higher level in this residual category.

Care needs to be exercised in interpreting differences in quoted mortality rates. For example, the mortality rate for unskilled male workers (798 per 100,000 males) is significantly higher than the rate for a professional male worker (449) (see Table 4a). However, expressed as years of life expectancy at birth these rates translate into 75.3 years and 81.4 years, respectively – a difference of 8.1 per cent (see Table 2).

### Geographical classification

All of the matched records were geographically classified according to the place of usual residence identified on the census file. In the case of persons enumerated in communal establishments (mainly hospitals and nursing homes) it was decided to code them where possible to their place of usual residence as indicated on the death certificate. In addition it was decided to code all unmatched records to the place of usual residence of the deceased using the GeoDirectory national address database. This implies that the geographical analysis distinguished in the present release refers to all of the deaths which occurred during the year after census date.



**Analysis by deprivation**

As a result of the geographical coding mentioned in the previous section it is possible to classify deaths by Electoral Divisions (EDs). By then using the categorisation of EDs by deprivation score developed by Trutz Haase

(see <https://www.pobal.ie/WhatWeDo/Deprivation/Pages/DeprivationIndex.aspx>) it is possible to analyse deaths by the deprivation score of the ED in which the deceased person lived prior to his or her death. The results are presented by quintiles with the first quintile representing the least deprived areas and the fifth quintile representing the most deprived areas. The underlying assumption is that if a person's usual residence is in an area assigned a particular deprivation score then that person attracts that particular score.

The EDs are illustrated by quintile of deprivation in Figure 3. The relatively high proportion of EDs in certain urban areas classified to the most deprived quintiles is not fully captured in this Figure. Conversely, the large spatial dimensions of most rural EDs may tend to graphically overstate the extent of deprivation in rural areas.

**Life expectancy**

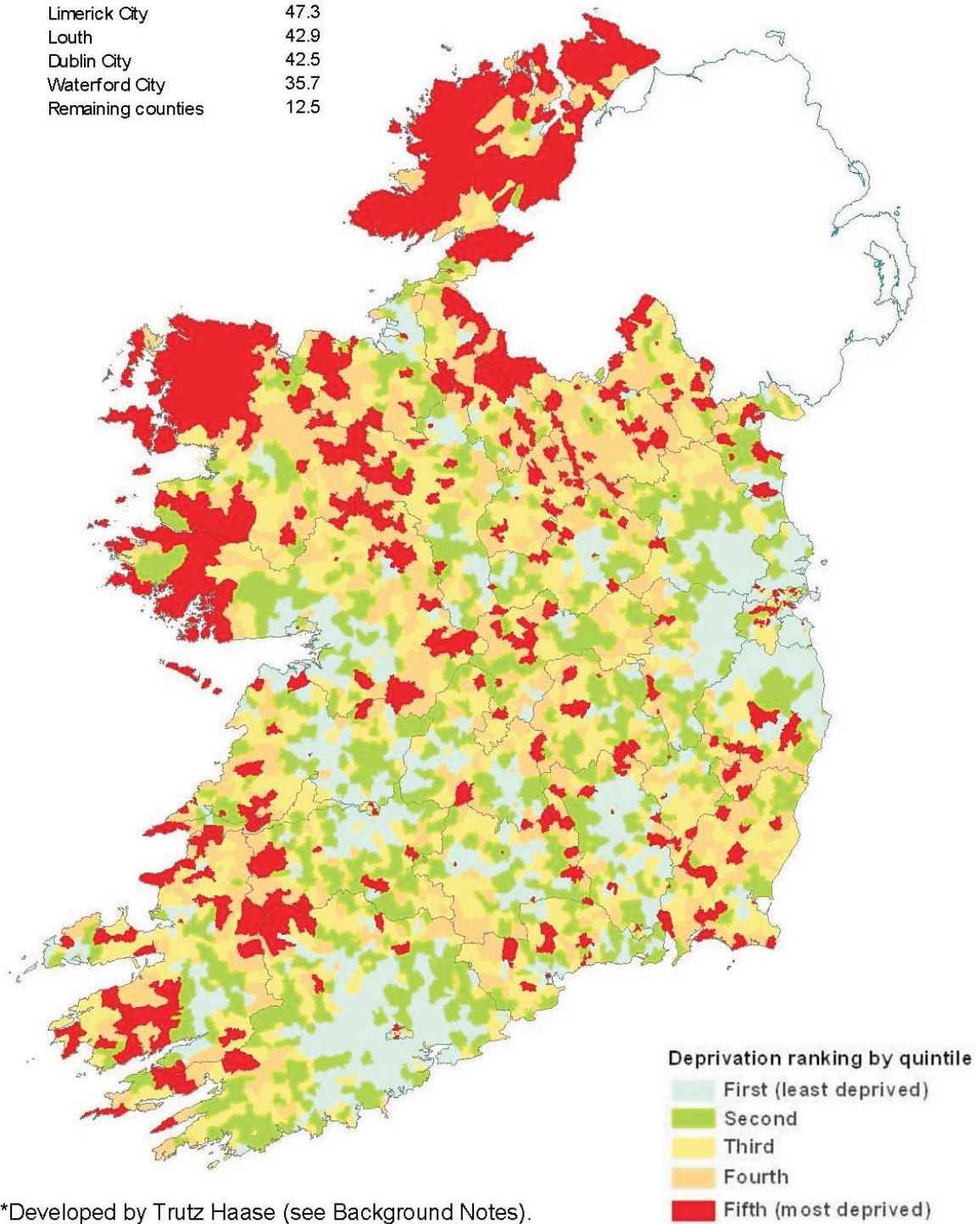
Life tables were compiled for males and females which distinguished the area of deprivation in which the deceased person lived as well as his/her social class and highest level of education attained. The minor discrepancies between the results shown in this release and those in Irish Life Tables No. 15 published by the CSO are mainly due to the different coverage of the two series. The Irish Life Tables No. 15 are based on deaths registered in the three calendar years 2005, 2006 and 2007 while the current release covers deaths which occurred in the twelve-month period 24 April 2006 to 23 April 2007 i.e. the twelve months after Census Day 2006.

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<sup>1</sup>The CSO is grateful to Dr Shane Whelan, Actuary, School of Mathematical Sciences, University College Dublin for his assistance in compiling the life tables in this release.

**Figure 3 Deprivation ranking in quintiles of Electoral Divisions\***

Fifth quintile as a % of total population	
Donegal	65.9
Limerick City	47.3
Louth	42.9
Dublin City	42.5
Waterford City	35.7
Remaining counties	12.5



\*Developed by Trutz Haase (see Background Notes).

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