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SEASONAL AND SOCIO-DEMOGRAPHIC PREDICTORS OF SUICIDE IN IRELAND: A 22 YEAR STUDY

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Abstract

Background: Seasonal influences on suicide have been studied for many years with inconclusive and contradictory findings.

Methods: Data on suicide in Ireland from 1980 to 2002 was examined to ascertain the contribution of season and demographic variables to suicide. Using Poisson regression modeling and sinusoidal analysis a small seasonal effect (7% from peak to trough) was identified but age, gender, marital status and residence were much larger contributors. The seasonal contribution increased in the latter half of the period under study. There was also a small seasonal effect for method of suicide. The suicide rate was highest in the 40-44 age group after controlling for confounders.

Limitations: Because this was an ecological study, information on other possible contributors, such as mental illness was not available.

Conclusions: These findings are discussed in light of international studies. Continuing studies are required to confirm the trend in increasing seasonality in Ireland. Since suicide is highest in those who are middle aged, preventive strategies should be directed to this group.

SEASONAL AND SOCIO-DEMOGRAPHIC PREDICTORS OF SUICIDE IN IRELAND: A 22 YEAR STUDY

Seasonal variations in suicide were first recognized by the Italian physician Enrico Morselli (1881) who identified a summer peak, coinciding, he believed, with the time when severe mental illness was at its peak. In recent years suicide in countries such as Finland (Partonen et al 2004), Ireland (Corcoran et al 2004), Italy (Rocchi et al 2007; Preti and Miotto 1998) has continued to show a significant seasonal trend. In some, such as Italy (Rocchi et al 2007) and Slovenia (Oravec et al 2007) the seasonal effect is so marked that changes in the national suicide rates are reported as corresponding to changes in the seasonal rates of suicide. However other countries exhibit a diminishing or absent seasonal pattern, including England and Wales (Yip et al 2000), Australia and New Zealand (Yip et al 1998), Switzerland (Ajdacic-Gross et al 2007) and Singapore (Parker et al 2001).

The observation of a seasonal pattern in suicide has been refined and elaborated upon over the past 20 years with evidence indicating that seasonal patterns also apply to the method of suicide. However, the results are confusing and conflicting. In Belgium (Maes et al 1993) and Israel (Schreiber et al 1993), researchers have described a clear seasonal pattern to deaths by violent methods, although the December peak, during the colder months in the Israeli study differed from the summer peak in the Belgian study. In the Southern hemisphere, Yip et al (1998) found a seasonal trend for death by hanging in Australia but none in New Zealand.

While season is one variable influencing suicide rates others have also been identified including age (Bertelote and Fleischmann 2002), gender (Canetto and Sakinofsky 1998), residence (Middleton et al 2003) and marital status (Yip and Thorburn 2004). It is notable that many of the studies which have examined seasonality have considered it as a single variable rather than as one of many that might influence the suicide rate (Ho et al 1997; Yip et al 1998) although some studies have controlled for age and gender in the analysis (Corcoran et al 2004) or have stratified the data by age and gender for analysis (Preti and Miotto 1998).

This study has a number of aims, the first aim was to examine the magnitude of the contribution of season, along with other variables, such as age, gender, marital status, year

and residence (urban/rural), to suicide. The second was to ascertain if the suicide rate in Ireland among those aged 15 years and over exhibited a seasonal pattern. A third aim was to determine if the seasonal pattern changed over time and the fourth was to ascertain if a seasonal pattern existed for any particular method of suicide.

Method

Information on suicide occurring in Ireland between 1980 and 2002, along with the Irish census data, was obtained from the Central Statistics Office, Dublin. This data contained information on the dates and methods (coded using International Classification of Diseases version 9), age group (15 and over, grouped in 5 year intervals), gender, marital status and residence. With regard to residence rates were available for the five cities in Ireland, for the large conurbation outside Dublin (the capital) and for the remaining counties. A pragmatic decision was taken to combine the cities and conurbations to form the urban variable while data from the counties was combined to form the rural variable. Census data was available in 5 year intervals so that the 1981 census provided the data for years 1980-1984, 1986 for 1985-1989, etc. This was used to calculate suicide rates for each of the demographic variables. Data for those under the age of 15 was excluded from the analysis due to the small number of suicides.

Multivariate Poisson regression modelling was used to estimate which variables were independently associated with suicide. Poisson regression modelling enables estimation of the independent effect of a set of predictor variables when the outcome variable is count data (Cameron 1998) and is particularly applicable when modelling aggregated ecological data. In this case the outcome variable is number of suicides aggregated by the predictor variables (gender, age group, marital status, residence, year and month). The method estimates the incidence rate ratio (IRR) for each category of the predictor variables compared with a baseline category (IRR 1.00).

Sinusoidal analysis involves fitting a cosine curve to data and can be used to assess the degree of seasonal variation in mortality and morbidity (Gemmell et al 2000). Here we used sinusoidal analysis to estimate the percentage change in IRR from the trough to the peak of the seasonal curve in the Poisson model after adjustment for gender, year, age group, marital

status and residence. This technique was also used to estimate whether there was a difference in seasonality according to method of suicide.

Data analysis was carried out using SPSS 14.0 and STATA version 9.

Results

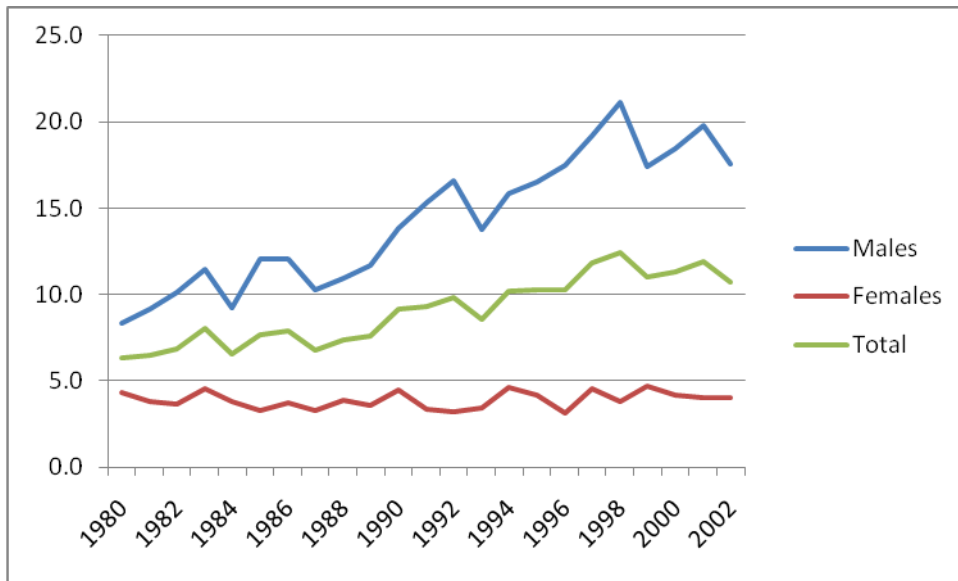
There were 7899 suicides in people aged 15 years and over between 1980 and 2002 in the Republic of Ireland and the numbers and crude rates are shown in Table 1.

Table 1: Count and crude rates of suicides by sex and 5 year age groups

Age Group	Males Count	%	Rate /1 000 000	Females Count	%	Rate /1 000 000	Total Count	%	Rate /1 000 000
15-19	464	7.49	9.61	96	5.63	2.08	560	7.09	5.94
20-24	873	14.10	21.05	157	9.20	3.89	1030	13.04	12.59
25-29	788	12.72	21.15	135	7.91	3.60	923	11.69	12.34
30-34	685	11.06	18.80	147	8.62	4.03	832	10.53	11.41
35-39	595	9.61	17.50	158	9.26	4.07	753	9.53	10.34
40-44	571	9.22	18.52	174	10.20	5.76	745	9.43	12.21
45-49	446	7.20	16.27	161	9.44	6.06	607	7.68	11.24
50-54	392	6.33	16.12	164	9.61	6.94	556	7.04	11.59
55-59	374	6.04	17.21	147	8.62	6.76	521	6.60	11.98
60-64	355	5.73	18.27	129	7.56	6.39	484	6.13	12.21
65+	650	10.50	13.26	238	13.95	3.76	888	11.24	7.91
Total	6193	100.00	16.73	1706	100.00	4.49	7899	100.00	10.53

Figure 1 presents the age standardized suicide rates for men and for women over the period studied. This shows an overall increase in suicide, especially for males, up to 1998 with a suggestion of a plateau thereafter.

Figure 1: Age standardized rates of suicide/100,000 (using 1980 as the base year) for men, women and the total population 1980-2002



Multivariate Poisson regression modelling was used to estimate which variables were significant predictors of the suicide rates over the study period. All variables in the model contributed significantly, however the smallest effect was for month of the year after the others had been controlled for. The results of the analyses are given in Table 2.

Table 2 provides a more detailed analysis of the multivariate Poisson regression results and shows the IRR for each variable thus allowing more meaningful comparisons between them.

Table 2: Multivariate Poisson regression analysis controlling for year and month of death, gender, age group, marital status and residence

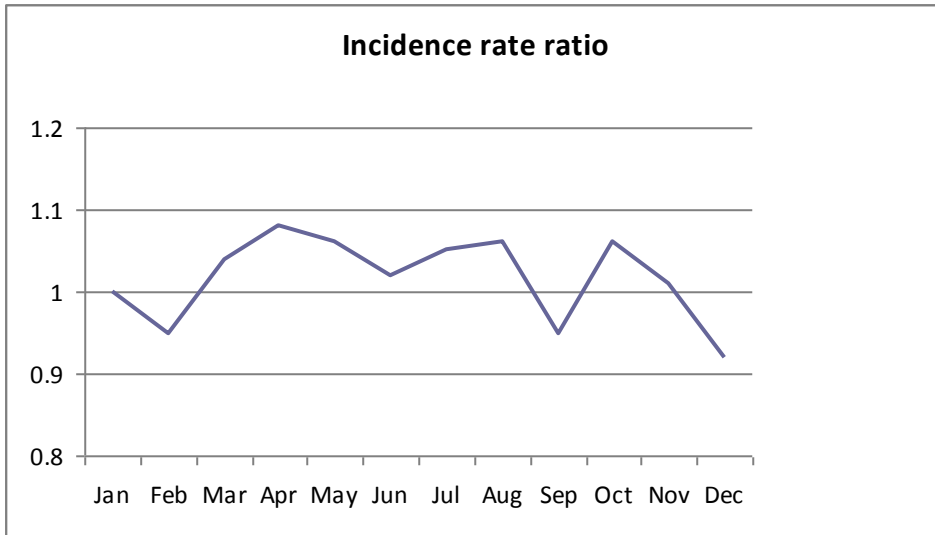
Predictor		IRR*	Std Err	Z	p-value	95% CI	
Gender	Male	1.00					
	Female	0.29	0.008	44.65	<0.001	0.27	0.30
Year		1.03	0.002	16.86	<0.001	1.03	1.03
Age group	<20	1.00					
	20-24	2.29	0.120	15.74	<0.001	2.06	2.53
	25-29	2.93	0.157	19.97	<0.001	2.64	3.26
	30-34	3.62	0.202	23.06	<0.001	3.24	4.04
	35-39	4.06	0.235	24.22	<0.001	3.62	4.55
	40-44	4.63	0.270	26.27	<0.001	4.13	5.19
	45-49	4.24	0.258	23.71	<0.001	3.76	4.78
	50-54	4.28	0.266	23.46	<0.001	3.79	4.84
	55-59	4.31	0.271	23.26	<0.001	3.81	4.88
	60-64	4.24	0.271	22.60	<0.001	3.74	4.81
	65+	2.55	0.149	16.31	<0.001	2.28	2.85
Marital status	Single	1.00					
	Married	0.32	0.009	41.57	<0.001	0.31	0.34
	Sep/div	0.16	0.021	13.98	<0.001	0.13	0.21

	Widowed	0.62	0.037	-8.10	<0.001	0.55	0.69
Residence	Rural	1.00					
	Urban	0.76	0.019	10.83	<0.001	0.72	0.80
Month	Jan	1.00					
	Feb	0.95	0.053	-0.99	0.323	0.85	1.05
	Mar	1.04	0.057	0.72	0.475	0.93	1.16
	Apr	1.08	0.059	1.39	0.165	0.97	1.20
	May	1.06	0.058	1.12	0.262	0.95	1.18
	Jun	1.02	0.057	0.44	0.659	0.92	1.14
	July	1.05	0.058	0.93	0.351	0.94	1.17
	Aug	1.06	0.058	1.07	0.286	0.95	1.18
	Sep	0.95	0.053	-0.93	0.353	0.85	1.06
	Oct	1.06	0.058	1.12	0.262	0.96	1.18
	Nov	1.01	0.056	0.25	0.804	0.91	1.13
	Dec	0.92	0.052	-1.53	0.125	0.82	1.02

***Incidence rate ratio**

Month of the year was a small but statistically significant predictor of suicide after controlling for other variables ($p=0.038$). Overall, the most significant predictor was gender, with female rates over 3 times lower than male rates (IRR 0.29, $p<0.001$). Age was also a significant factor in suicide, with a peak in those aged 40-44 years (IRR 4.63, $p<0.001$). The incidence rate of suicide was higher in those aged between 35 and 64 compared with those aged less than 35 and over 65 after controlling for other variables. Marital status was also a strong predictor; the suicide rates amongst those who were married, separated/divorced and widowed were significantly lower than those for who were single, when age and other variables were taken into account. Those who were separated or divorced had the lowest rates. Urban dwellers were also protected from suicide, with rates reduced by around 30% compared with those living in rural areas (IRR 0.76, $p<0.001$). Year of death was also significant, with indications of a general increase over the study period (Table 2). While month was a small contributor rates tended to be higher in late spring and early summer and lower in autumn (see figure 2).

Figure 2. Incidence rate ratio by month.



Sinusoidal analysis showed that the seasonal percentage increase in IRR for suicide from 1980 to 2002, adjusted for year, age, gender, marital status and residence, was 7.2% (95% CI 7.1-7.3) from an autumn trough to a spring peak. Among males and females the seasonal variations were 7.1% (95% CI 7.0-7.3) and 7.3% (95% CI 7.1-7.6) respectively. Among those who were single and were married the equivalent figures were 6.7% (95% CI 6.6-6.9) and 8.3% (95% CI 8.1-8.5) demonstrating that the seasonal variation in suicide was significantly greater in those who were married as compared to the single category. In the under 30 age group the figure was 6.9% (95% CI 6.7-7.1), for those aged 30-49 the variation was 7.5% (95% CI 7.3-7.7) and among those over 50, 7.1% (95% CI 6.9-7.4). For those living in rural and urban areas the figures were 7.1% (95% CI 6.8-7.4) and 7.4% (95% CI 7.2-7.6) respectively. The results therefore show that all of the above variables are significantly associated with some seasonal variation and that this is significantly greater in those who are married compared with single individuals.

Subgroup analysis

In order to examine our third hypothesis, the study period was divided into two parts. The sinusoidal analysis showed that the seasonal increase in suicide adjusted for year, age, gender, marital status and residence for the earlier years 1980-1991 was 6.8% (95% CI 6.7-7.0) while from 1992-2002 the seasonal increase was 7.5% (95% CI 7.3-7.6); thus the seasonal pattern was significantly greater in the later years although the overall contribution was still small.

Method of suicide

Examining the methods of suicide Table 3 shows the number of suicides in people aged 15 or over between 1980 and 2002 recorded by method according to ICD-9.

Table 3. Method of Suicide classified by ICD9 codes

ICD-9 code	Method	Number of cases	%
950	Poisoning	1290	16.3
953	Hanging	3056	38.7
954	Drowning	1959	24.8
951-952, 955-959	Other causes	1594	20.2
Total		7899	100

Adjusted for year, age, gender, marital status and residence, the seasonal percentage increase in IRR shown in the sinusoidal analysis was 6.81% (95% CI 6.5%-7.1%) for poisoning, 6.95% (95% CI 6.8%-7.2%) for hanging and 6.74% (95% CI 6.5%-6.9%) for drowning. Thus there is a small but significant contribution of season but this does not differ significantly between the three methods.

Discussion

The study of seasonal variations in suicide is important for a number of reasons. If a clear-cut seasonal pattern were identified this might guide service providers to enhance interventions during the periods of highest risk. In addition, understanding the role of season in determining suicide might assist in understanding its possible biological and sociological aetiology.

Despite its potential usefulness, the evidence for suicide seasonality has not been conclusive and many of the findings are conflicting and confusing. Possible reasons includes the short time span examined in some studies (Corcoran et al 2004; Parker et al 2001) raising the possibility that the findings are transient. Other studies have examined different time periods from a single country, during which the seasonal variation may have altered. For example, in

Britain a distinct seasonal pattern was found in a study of suicide data from 1958 to 1974 (Meares et al 1981), while a study (Yip et al 2000) of data from 1982 to 1996 showed a greatly diminished seasonal effect. In Ireland a study by Reid et al (1980) analysed suicide data from 1971-75 and found no seasonal trend for either sex while Corcoran et al (2004), using data from 1990-1998, found a seasonal variation for men. Thus some of the contradictory findings may relate to cohort effects in a particular jurisdiction.

A further concern is that studies have examined the contribution of season as a single variable (Ho et al 1997, Yip et al 1998) and not taken account of the relative contribution of other variables such as age, gender, marital status etc. The study reported here is unique in that it examined the role of season as a possible determinant of seasonal patterns along with other variables such as gender, age, marital status and residence to the suicide rate over time. By controlling for these confounders the relative magnitude of season as an independent predictor could be evaluated

A further strength of this study is that it spans a longer period (22 years) than many other studies of seasonality, which have ranged from 8 to 20 years (Corcoran et al 2004, Parker et al 2001, Preti and Miotto 1998, Ho et al 1997; Yip et al 1998, Yip et al 2000, Mears et al 1981), although some have covered longer periods of between 20 and 42 years (Partonen et al 2004, Bridges et al 2005, Rocchi et al 2007, Oravec et al 2007 and Fruehwald et al 2004). This study has reduced the possibility that the effects were temporary or had changed over time since it covered a relatively long period and it was also possible to compare recent with older time periods.

There are a number of limitations that should also be considered when interpreting the results. Because this is an ecological study the data available for analysis was limited. Therefore measures of psychiatric illness, social isolation or alcohol consumption were absent although these have been shown to be associated with suicide and with a seasonal pattern (Goodwin and Jamison 1990; Durkheim (1951; Uitenbroek 1996; Unemployment is also associated with suicide (Kposowa 2001) and exhibits a seasonal pattern but was excluded because of logistic problems with the data set for this variable.

Notwithstanding these considerations we believe that this study makes an important contribution to the international literature on seasonality and suicide.

Variables influencing suicide

In accordance with our first aim, we identified the magnitude of the contribution of a number of variables other than season to the suicide rate. The finding that the most important predictor was gender, followed by marital status, year, age group, residence (rurality) then month, was not surprising given what is already known about suicide in Ireland (National Office for Suicide Prevention 2009). With regard to marital status, two aspects of our findings are worthy of comment. Firstly, our finding that rates of suicide were lowest in those who are divorced, rather than amongst those who are married as described in other studies (Corcoran and Nagar 2010), was surprising as the divorced have generally been shown to have the highest suicide rates in most studies (Kposowa 2000). One possible explanation is that divorce was only introduced in Ireland in 1994 and so the beneficial effects of marriage may be continuing as the data collection covered a period before and shortly after this change in Irish law. Another possible explanation is that the trend in Ireland is following the trend in Britain in which the suicide rate in the divorced has been reducing for several decades (Yip and Thorburn 2004) possibly as divorce becomes less stigmatised and less associated with psychopathology. Our results were consistent with studies finding that being single increases the risk (Masocco et al 2008).

The finding that the risk of suicide was highest in those in the middle years of life was surprising since National data shows that it is those under 25 who are at highest risk (National Office for Suicide Prevention Report 2009). However, the current study controlled for a number of possible confounder variables that national reports do not control for and so this effect may not be apparent. Finally the possible impact of the national suicide prevention programme needs to be considered although this was not introduced until 1998 (1998) and any effect would be unlikely to be evident between that date and 2002, the final year for which data was analysed.

Season and suicide

Our second goal, of examining the contribution of season to suicide resulted in the identification of a small but statistically significant seasonal variation in suicide rates in multivariate analysis, with a 7% increase in the rate of suicide from an autumn trough to a

spring peak in the sinusoidal analysis. Unlike Corcoran et al (2004) who only found a seasonal contribution to male suicide, this study identified a seasonal effect for both genders. The results of this study are similar to those in a number of other studies which have confirmed a seasonal effect in several countries including Hong Kong and Taiwan, Italy, Finland and Slovenia (Ho et al 1997; Preti and Miotto 1998; Rocchi et al 2007, Partonen et al 2004, Oravec et al 2007) although studies from others, such as Australia and New Zealand and England and Wales have shown a diminishing effect or absence of seasonal influences (Yip et al 2000; Yip et al 1998).

Subgroup analysis

It is now accepted that the reduction in the seasonal effect began in the early part of the 20th century (Dreyer 1959; Ajdacic-Gross et al 2005) and that in some countries this is continuing (Parker et al 2001; Yip et al 1998; Ho et al 1997; Yip et al 2000).

Thus our third aim was explored in the current study against the background of a previous Irish study (Reid 1980) which found no seasonal variation. Dividing the study period in two parts covering the earlier and later years respectively, we failed to find any statistically significant loss of seasonal effect and on the contrary there was a slight but significant increase in the percentage difference between peak and trough from 6.8% during 1980-1992 to 7.5% during 1992-2000. One possible explanation for the seeming emergence of an increasing seasonal pattern is that the reliability of the data has improved in recent years in comparison to the earlier years before suicide was decriminalized (Kelleher et al 1997) making it now possible to capture a slightly larger seasonal effect. Combined with the findings of Corcoran et al (2005) of a seasonal effect for men only, the results presented in the study reported here of a seasonal effect for both men and women and of an increase over time since the earlier study (Reid 1980) suggests that it may be a true findings and that the role of season is increasing in both sexes albeit still only making a small contribution. Such an evolving pattern was identified in the United States also (Bridges et al 2005). Clearly further studies over time are warranted to explore this changing pattern in Ireland and to examine possible causes, should it continue.

Method of suicide

In exploring our fourth aim concerning the contribution of season to method of suicide we found a small seasonal increase from peak to trough for the three major methods i.e poisoning, hanging and drowning after controlling for all the available variables. Unlike other studies (Lester and Frank 1988, Yip et al 1998, Preti and Miotto 1998; Maes et al 1993; Linkowski et al 1992) the seasonal effect in our study was not limited to violent methods. As in those studies the peak was identified in the warmer months and differing from a study of an Israeli sample which identified a peak during the colder months (Schreiber, et al 1993).

What are the implications of these findings? The finding of a small but statistically significant effect from season might suggest that, for certain months of the year, services for those at risk of suicide should be increased. However, since season was a much smaller contributor to the overall suicide rate than other variables, these, rather than season, should be prioritised for a targeted approach to prevention. In particular our findings that suicide risk is highest in the middle years of life lends weight to a view that the preventive focus should specifically target those in this age category of life (Reach Out 2006). Such an approach would include psychological autopsy studies to better understand the aetiology of suicide in this age group.

There should also be continuing research into the seasonal influences on suicide in Ireland, as this may be increasing rather than diminishing as in other countries. It should also explore possible reasons for the seasonal effect should its contribution continue to grow.

Reference

- Ajdacic-Gross V, Bopp M, Sansossio R et al (2005). Diversity and change in suicide seasonality over 125 years. *Journal of Epidemiology and Community Health*. 59, 967-72.
- Ajdacic-Gross V, Lauber C, Sansossio R et al (2007). Seasonal associations between weather conditions and suicide – evidence against a classic hypothesis. *American Journal of Epidemiology*. 165. 561-69.
- Bertolote JM and Fleischmann A. (2002). A global perspective in the epidemiology of suicide. *Suicidologi*. 2,3. 6-8.
- Bridges FS, Yip PS and Yang KC.(2005). Seasonal changes in suicide in the United States, 1971-2000. *Percept Motor Skills*. 100. 920-24.
- Cameron AC, Trivedi PK. (1998) Regression analysis of count data. Econometrics Society Monographs No. 30. Cambridge University Press. Cambridge (UK)Canetto SS and Sakinofsky I (1998) The gender paradox in suicide. *Suicide and Life Threatening Behaviour*. 28,(1) . 1-23.
- Corcoran P, Reilly M, SALim A et al (2004). Temporal variation in Irish suicide rates. *Suicide and Life-Threatening Behaviour*. 34, (4). 429-438.
- Corcoran P and Nagar A. (2010). Suicide and marital status in Northern Ireland. *Social Psychiatry and Psychiatric Epidemiology*. 45, (8). 795-800.
- Department of Health and Children (1998). Report of the National Taskforce on Suicide. Stationery Office, Government Publications, Dublin.
- Dreyer K. (1959). Comparative suicide statistics II: death rates from suicide in Denmark since 1921, and seasonal variations since 1835. *Dan Med Bull*. 6:75–81
- Durkheim E. (1951). Suicide. The Free Press.
- Fruehwald S, Frottier P, Matschnig T et al (2004). Do monthly or seasonal variations exist in suicides in a high risk setting? *Psychiatry Research*. 112,(3). 263-69.
- Gemmell I, McLoone P, Boddy FA, Dickinson G, Watt GCM. (2000). Seasonal variation in mortality in Scotland. *International Journal of Epidemiology* 29:274-279.
- Goodwin FK and Jamison KR. (1990). Manic-depressive Illness. Oxford University Press: Oxford.
- Ho TP, Chao A and Yip P. (1997). Seasonal variation in suicides re-examined: no sex differences in Hong Kong and Taiwan. *Acta Psychiatrica Scandinavica*. 95.(1). 26-31.
- Kelleher, MJ, Corcoran, P and Keeley HS. (1997). Suicide in Ireland: Statistical, social and clinical considerations. *Archives of Suicide Research*. 3, 13-24.

Kevan SM.(1980). Perspectives on season of suicide: a review. *Social Science and Medicine*. 14. 369-78.

Kposowa AJ 2000. Marital status and suicide in the National Longitudinal Mortality Study. *Journal of Epidemiology and Community Health* 54. 254-6.

Kposowa AJ 2001. Unemployment and suicide: a cohort analysis of social factors predicting suicide in the US National Longitudinal Mortality Study. *Psychological Medicine*. 31. 127-138.

Lester D and Frank ML. 1988. Seasonal variation in suicide rates in the United States. *British Journal of Psychiatry*. 153. 115-17.

Linkowski P, Martin F and de Maertelaer V. (1992). Effect of some climatic factors on violent and non-violent suicides in Belgium. *Journal of Affective Disorders*. 25. 161-66.

Linnoila M and Virkkunen M. (1992). Aggression, suicidality and serotonin. *Journal of Clinical Psychiatry*. 53. 46-51.

Maes M, Cosyns P, Meltzer HY et al (1993). Seasonality in violent suicide but not in non-violent suicide or homicide. *American Journal of Psychiatry*. 150.1380-5.

Meaers R, Mendelsohn FA and Milgrom-Friedman J. (1981). A sex difference in the seasonal variation of suicide rate : a single cycle for men, two cycles for women. *British Journal of Psychiatry*. 138. 321-25.

Masocco M, Pompili M, Vichi M et al 2008. Suicide and marital status in Italy. *The Psychiatric Quarterly*. 79, (4.) 275-85.

Micciolo R, Williams P, Zimmermann-Tansella Ch et al 1991. Geographical and urban-rural variation in the seasonality of suicide: some further evidence. *Journal of Affective Disorders*. 21. 39-43.

Middleton N, Gunnell D, Frankl S et al (2003). Urban-rural differences in suicide trends in young adults: England and Wales 1981-1998. *Social Science and Medicine*. 57, (7).1183-1194.

Morselli E. (1981). *Suicide: An Essay on Comparative Moral Statistics*. Paul and Co.

National Office for Suicide Prevention Report (2009). Health Service Executive: Dublin.

Oravec R, Sisti D, Rocchi MB, Preti A. (2007). Changes in the seasonality of suicide over time in Slovenia, 1971-2002. Amplitude is only positively related to suicide rates among females. *Journal of Affective Disorders*. 104, (1-3). 211-5.

Page LA, Hajat S and Kovats S, (2007). Relationship between daily suicide counts and temperature in England and Wales. *British Journal of Psychiatry*. 191, 106-12.

Parker G, Gao F, and Machin D. (2001). Seasonality of suicide in Singapore; data from the Equator. *Psychological Medicine*. 31. 549-553.

Partonen T, Haukka J, Nevanlinna H et al (2004). Analysis of the seasonal pattern in suicide. *Journal of Affective Disorders*. 81, (2). 133-39.

Preti A and Miotto P. (1998). Seasonality in suicides: the influence of suicide method, gender and age on suicide distribution in Italy. *Psychiatry Research*. 81, (2). 219-31.

Reach Out (2006). National Strategy for Action on Suicide Prevention. Health Services Executive, National Suicide Review Group and the Department of Health.

Reid P, Smith H and Greene S. (1980). Seasonal variation in Irish suicide deaths. *Psychological Reports*. 46, (1). 30

Rocchi MB, Sisti D, Cascio MT et al (2007). Seasonality and suicide in Italy: amplitude is positively related to rates. *Journal of Affective Disorders*. 100. (1-3). 12-36.

Schreiber D, Dycian A, Kaplan Z et al (1993). A unique monthly distribution of suicide and parasuicide through firearms among Israeli soldiers. *Acta Psychiatrica Scandinavica*. 87. 110-13.

Uitenbroek DG. 1996. Seasonal variation in alcohol use. *Journal of Studies on Alcohol and Drugs*. 57,(1). 47-52.

Yip P, Chao A and Ho TP. (1998). A re-examination of seasonal variation in suicides in Australia and New Zealand. *Journal of Affective disorders*. 47. 141-50.

Yip P, Chao A and Chiu C. (2000). Seasonal variation in suicides; diminished or vanished. Experience from England and Wales, 1982-1996. *British Journal of Psychiatry*. 177. 366-69.

Yip P and Thorburn J. 2004. Marital status and the risk of suicide: experience from England and Wales, 1982-1986. *Psychological Rep* 94,(2). 401-7