Acta Oncologica, 2008; 47: 385–390

informa
healthcare

ORIGINAL ARTICLE

Cancer risk by education in Iceland; a census-based cohort study

HALLDORA VIDARSDOTTIR[1,2], HOLMFRIDUR K. GUNNARSDOTTIR[3], ELINBORG J. OLAFSDOTTIR[1], GUDRIDUR H. OLAFSDOTTIR[1], EERO PUKKALA[4] & LAUFEY TRYGGVADOTTIR[1,2]

[1]*Icelandic Cancer Registry, Icelandic Cancer Society, Reykjavik, Iceland,* [2]*Center of Public Health Sciences, University of Iceland, Reykjavík, Iceland,* [3]*Research Center for Occupational Health & Working Life, Reykjavik, Iceland and* [4]*Finnish Cancer Registry, Institute for Statistical and Epidemiological Cancer Research, Helsinki, Finland*

Abstract

Earlier studies have shown that cancer risk is related to educational level in many countries. The relationship between education and cancer risk has not been studied in the small, but ethnically homogenous, Icelandic population postulated to be outstanding as regards social equity. *Material and methods.* We conducted a follow-up study of a cohort of 60 194 males and 58 505 females aged 20–64 at census 1981 in Iceland. Information on education from the census was classified into three educational groups and linked with the population-based Icelandic Cancer Registry. Standardized incidence ratios (SIRs) were calculated for the period 1982 to 2004. *Results.* We found a significant association between educational level and cancer risk. Among males with academic education, the SIR was elevated for prostate cancer (SIR = 1.17, 95% CI 1.05–1.30) and melanoma (SIR = 1.41, 95% CI 1.00–1.93) and lowered for cancers of the lung (SIR = 0.72, 95% CI 0.59–0.87) and stomach (SIR = 0.67, 95% CI 0.48–0.90). Women with academic education had an increased risk of breast cancer (SIR = 1.19, 95% CI 1.07–1.33) and a decreased risk of lung cancer (SIR = 0.49, 95% CI 0.36–0.65). Increasing educational level was associated with a lowered risk of cervical cancer (p trend = 0.017). *Discussion.* The association between education and cancer incidence seen in this study resembles observations from other countries and probably reflects concordance between social status and certain risk factors for cancer. Our study confirms health-related socioeconomic differences in Iceland and must be taken into account when programmes for health promotion are planned.

Earlier studies have shown that cancer frequency varies between socio-economic groups in many countries. A rather consistent positive association has been found between increasing socio-economic status and the risk of cancers of the colon, prostate and breast, and skin melanoma whereas an inverse association has been found for cancers of the lung, stomach, oropharynx, esophagus, and cervix uteri [1–4].

The traditional measurements of socio-economic status have been education, occupation or income, that all have their advantages and disadvantages [5]. Education has been found to be the most reliable measure of social status in Iceland [6] but the relationship between education and cancer risk has not been studied before in this population. We used information on education from the Icelandic census from 1981 and our study is thus the first to link the Icelandic Cancer Registry with information from a census.

The aim of the study was to describe associations between cancer and education in Iceland. The Icelandic population is small and ethnically homogenous, and has been postulated to be outstanding as regards social equity [6]. This study is part of an ongoing co-operative study, the Nordic Occupational Cancer Study (NOCCA).

Material and methods

The study cohort comprised all individuals who were aged 20–64 years in the national census carried out by Statistics Iceland on January 31, 1981 (62 309 men; 60 120 women). Every individual living in Iceland on that day was expected to complete a questionnaire, which asked about education, among

Correspondence: Laufey Tryggvadottir, Icelandic Cancer Registry, Skogarhlid 8, PO Box 5420, IS-125 Reykjavík, Iceland. E-mail: laufeyt@krabb.is

(Received 3 July 2007; accepted 27 December 2007)

ISSN 0284-186X print/ISSN 1651-226X online
DOI: 10.1080/02841860801888773

other information. Persons with unknown educational status were excluded (2 115 men and 1 615 women). Education was classified into three categories. The "basic education" group includes individuals who had only elementary education (9–10 years), shorter courses or did not finish elementary education. This group consists mainly of male craft, agricultural or fishery workers and female service and shop workers. The "medium education" category includes individuals who had graduated from a junior college or had a comparable education and those who had vocational training. This group consists mainly of male craft workers and female service workers and clerks. The "academic education" group includes individuals who had graduated from traditional university faculties (doctors, lawyers etc.) and those who had graduated from special schools which at the time of census were not at university level but became so later (nursing, the fine arts, teaching etc.).

Data from the census was linked with the population-based Icelandic Cancer Registry, using the Icelandic personal identification number, which is allocated to individuals at birth. The Icelandic Cancer Registry (ICR) is a nationwide registry covering all cancer diagnoses in Iceland since 1955 [7]. The registry has a virtually complete coverage and over 95% of the cases are histologically confirmed. The topography codes used in the ICR are ICD-7, ICD-9, ICD-10 and ICD-O3. In this study we use ICD-7. In addition to the five cancers with highest incidence for each gender, we also included skin melanoma in the present study because the incidence of this disease has risen extremely fast in Iceland during the last two decades [8].

Person-years at risk were counted, starting January 1, 1982. The endpoint was the date of emigration, date of death or December 31, 2004, whichever came first. Standardized incidence ratios (SIRs) for each educational group were calculated as ratios of observed number of cancer cases to those expected from the national cancer incidence rates, by sex, 5-year birth cohorts and 1-year calendar periods [9]. The 95% confidence intervals (CIs) for the SIRs were calculated by method of Sahai and Khursid [10]. The test for trend over educational categories was based on the method of Breslow and Day [9].

Results

The numbers of men and women included in the study were 60 194 and 58 505, respectively. The majority of the males (55%) had medium level education, while 54% of women had only basic education (Table I). Individuals with basic education had the highest median age at the time of census (Table I).

We found that higher educational level was associated with an increased risk of prostate cancer (p trend <0.001) and melanoma (p trend <0.001) among men (Table II). The SIR for prostate cancer in the academic education category was 27% higher, and for skin melanoma 147% higher, than among men with basic education. We found associations between increasing educational level and a lower risk of cancers of the lung (p trend <0.001), stomach (p trend $=0.035$) and the urinary tract (p trend $=0.021$). The risk of lung cancer for men with academic education was only 63% of that of men with basic education, and similar variation was also seen for cancers of the urinary tract (Table II). There was a non-significant association between increasing educational level and an increased risk of colon cancer for men.

For women, breast cancer incidence increased along with increasing educational level (Table II). We found a statistically significant association between increasing educational level and a lowered risk of cancers of the lung (p trend <0.001) and cervix (p trend $=0.017$), and a non-significant trend for stomach cancer. The SIR for lung cancer for women with academic education was only 42% of that of women with basic education, whereas the SIR for melanoma for women in the academic education category was 45% higher than for women with basic education. The SIR for all cancer sites taken together was lowest for women with medium educational level.

Discussion

We found that a higher educational level was associated with an increased risk of prostate cancer and skin melanoma among men and an increased risk of breast cancer among women in Iceland. On the other hand, higher educational level was associated with a lower risk of cancers of the lung, stomach and the urinary tract among men and cancers of the lung and cervix among women. There was a positive non-significant association between increasing educational level and the risk of colon cancer for men, but not for women.

This historical cohort study was based on the Icelandic census and the population-based Icelandic Cancer Registry. The study covered 23 years of cancer incidence for the population born between 1916 and 1961 and living in Iceland in 1981. The SIR is a measure of relative difference between cancer incidence rate in a category of persons compared to the national incidence rate. In the younger categories the reference rate is lower and

Table I. Percentage distribution and median age (years) at entry by sex and educational group, of individuals aged 20–64 years who participated in the Icelandic census in 1981.

	Men			Women		
	n	%	Median age	n	%	Median age
Basic education	15 693	26.1	39	31 425	53.7	40
Medium education	33 056	54.9	35	17 397	29.7	33
Academic education	11 445	19.0	32	9 683	16.6	30
Total	60 194	100.0	35	58 505	100.0	36

therefore the same absolute difference translates to a higher relative difference. Because the age at follow-up decreased with increasing educational categories, the academic education category may show SIR estimates slightly more distant from unity than the basic educational category would show for similar absolute risk difference.

A potential weakness of this study could be misclassification of educational level. We included persons aged 20–25 in the study cohort and some of them may not have finished their education at the time of census. Also, there may have been inaccuracies when filling out the census form. This type of misclassification would bias our results towards null. However, as very similar results were obtained when excluding individuals under the age of 25 (data not shown), this inclusion of individuals aged 20–25 years did not seem to affect the SIR comparisons.

Prostate cancer is the most common cancer in Icelandic men. The age-standardized (world standard) incidence per 100 000 person years was 91.4 in the period of 2001–2005 and is currently the highest in the Nordic countries [10,11]. The findings of a higher risk of prostate cancer associated with higher education are in accordance with results from other Nordic countries. Higher rates in higher social strata have been described in Finland [3] and Sweden [12]. It is known that the incidence of prostate cancer is associated with diagnostic activity in each country at each time [13]. This has been especially pronounced since the 1990s after the strong introduction of testing for the prostate-specific antigen (PSA). Men with higher education are more likely to be diagnosed with prostate cancer than men with lower education. The established risk factors for prostate cancer include ethnic background and family history [14]. Ethnicity is not a probable confounding factor in this study, because until very recently, the population of Iceland has been virtually 100% Caucasian. Furthermore, the population has been found to be genetically homogenous [15].

Breast cancer is the most common cancer among Icelandic women, with an age standardized incidence of 90.4 per 100 000 person years in the period 2001–2005, a level similar to that in other Nordic countries [10,11]. According to our results, Icelandic women with academic education had 25% higher incidence of breast cancer than women with basic education only. The positive relationship between increasing educational level and breast cancer risk is well known [2]. In a Norwegian-Swedish study the educational gradient in breast cancer risk could be fully explained by established breast cancer risk factors [16]. On the other hand, in a Danish study, fertility patterns, did not explain the observed social gradient in breast cancer risk [17]. Among factors associated with an increased risk of breast cancer are low parity or nulliparity, high age at first birth, low age at menarche, high age at menopause and alcohol consumption, whereas breastfeeding and physical activity are associated with a decreased risk [18,19]. Higher education is usually associated with postponement and reduction of childbirths which in turn increase the risk of breast cancer. Furthermore, according to an unpublished Icelandic survey, Icelandic women with higher education tend to consume more alcohol than women with lower education.

Lung cancer is the second most frequent cancer among men and women in Iceland. The incidence per 100 000 person years was 31.3 among men and 29.4 among women in the period 2001–2005 [8]. Lower risk of lung cancer was associated with higher education and these findings are in accordance with results from other countries [4]. Cigarette smoking is the predominant risk factor for lung cancer, accounting for about 85% of all incident cases among men and 80% in women in the Nordic countries [20]. The Tobacco Control Board and The Public Health Institute of Iceland have conducted surveys on smoking habits and these surveys show a social gradient in smoking behavior in Iceland; smoking being more common among less-educated individuals (unpublished data). Also, certain occupational exposures, related to working environment of workers with lower educational level, seem to have an important role in lung cancer risk. A Danish

Table II. Numbers of observed (Obs) and expected (Exp) cases, standardized incidence ratios (SIRs) and p-values for trend, by sex and educational group for the five cancers with highest incidence in each gender in Iceland, plus melanoma.

	Basic	Medium	Academic	P_{trend}
Men				
All sites				
Obs cases	2278	4214	1200	
Exp cases	2332.6	4155.2	1186.0	
SIR (95% CI)	0.98 (0.94–1.02)	1.01 (0.98–1.05)	1.01 (0.96–1.07)	0.218
Prostate				
Obs cases	589	1090	346	
Exp cases	642.9	1088.5	295.2	
SIR (95% CI)	0.92 (0.84–0.99)	1.00 (0.94–1.06)	1.17 (1.05–1.30)	<0.001
Lung				
Obs cases	341	536	106	
Exp cases	299.7	526.2	147.4	
SIR (95% CI)	1.14 (1.02–1.27)	1.02 (0.93–1.11)	0.72 (0.59–0.87)	<0.001
Colon				
Obs cases	157	332	96	
Exp cases	179.2	316.9	89.4	
SIR (95% CI)	0.88 (0.74–1.02)	1.05 (0.94–1.17)	1.07 (0.87–1.31)	0.072
Stomach				
Obs cases	146	231	42	
Exp cases	140.4	227.8	62.8	
SIR (95% CI)	1.04 (0.88–1.22)	1.01 (0.89–1.15)	0.67 (0.48–0.90)	0.035
Urinary tract				
Obs cases	191	324	66	
Exp cases	181.6	322.2	91.6	
SIR (95% CI)	1.05 (0.91–1.21)	1.01 (0.90–1.12)	0.72 (0.56–0.92)	0.021
Melanoma of the skin				
Obs cases	23	93	39	
Exp cases	40.6	85.7	27.6	
SIR (95% CI)	0.57 (0.36–0.85)	1.09 (0.88–1.33)	1.41 (1.00–1.93)	<0.001
Women				
All sites				
Obs cases	4491	1873	918	
Exp cases	4414.5	1984.7	899.3	
SIR (95% CI)	1.02 (0.99–1.05)	0.94 (0.90–0.99)	1.02 (0.96–1.09)	0.274
Breast				
Obs cases	1192	617	351	
Exp cases	1250.2	596.5	293.8	
SIR (95% CI)	0.95 (0.90–1.01)	1.03 (0.95–1.12)	1.19 (1.07–1.33)	<0.001
Lung				
Obs cases	639	159	46	
Exp cases	541.1	228.5	94.7	
SIR (95% CI)	1.18 (1.09–1.28)	0.70 (0.59–0.81)	0.49 (0.36–0.65)	<0.001
Colon				
Obs cases	295	114	46	
Exp cases	294.9	119.3	46.6	
SIR (95% CI)	1.00 (0.89–1.12)	0.96 (0.79–1.15)	0.99 (0.72–1.32)	0.789
Stomach				
Obs cases	143	50	14	
Exp cases	136.0	52.9	19.9	
SIR (95% CI)	1.05 (0.89–1.24)	0.95 (0.70–1.25)	0.70 (0.38–1.18)	0.144
Cervical				
Obs cases	130	50	26	
Exp cases	118.9	65.3	35.3	
SIR (95% CI)	1.09 (0.91–1.30)	0.77 (0.57–1.01)	0.74 (0.48–1.08)	0.017
Melanoma of the skin				
Obs cases	102	57	42	
Exp cases	112.2	60.2	31.7	
SIR (95% CI)	0.91 (0.74–1.10)	0.95 (0.72–1.23)	1.32 (0.95–1.79)	0.067

study showed that even after controlling for smoking, skilled workers, who spend their working life in more hazardous environment, had double the risk of lung cancer as compared with teachers and academics [21].

Our results show that men with the highest education have a lowered risk of cancer of the urinary tract. Earlier studies from other countries have been inconsistent [2]. Tobacco smoking is the major known risk factor for this type of cancer, and it is estimated that 30–40% of bladder cancers in the Nordic countries could be avoided if smoking were eliminated [20]. Occupational exposures may play a role in around 10% of bladder cancers [22].

Stomach cancer used to be the most common cancer in Icelandic men and the mortality was among the highest in the world [23]. However, the incidence has declined significantly, with the age-standardized incidence per 100 000 person years being currently 10.2 (in 2001–2005) or only 15% of what it was in the years 1956–1960 when it was 69.8 [8]. During the same period, the life standard has improved dramatically in Iceland. Our findings show that Icelandic men and women with academic education have a 30% lower risk of stomach cancer than the individuals with a lower education level. In other countries, low socioeconomic status has been a strong risk indicator for stomach cancer [24,25]. Dietary factors like salt intake and consumption of fruits and red meat, as well as prevalence of *Helicobacter pylori* bacteria, may play a role but the social gradient of these exposures has not been fully explained [26]. The Icelandic Nutrition Council has conducted surveys on diet and nutrition habits in Iceland. A small survey done in 1990, indicated variation in diet according to education, where males with higher education had lower energy intake, lower fat intake and higher intake of fiber and carbohydrates [27].

We did not find a statistically significant educational gradient in the risk of colon cancer. However, there was a positive non-significant association between increasing educational level and the risk of colon cancer for men, but not for women. Diet and possibly physical exercise are implicated as risk factors for colon cancer. Consumption of fruits and vegetables may be associated with a lower risk, while consumption of total and saturated fat, animal and total proteins and total energy has been found to be associated with an increased risk [28]. Our findings are in accordance with the above described educational difference in diet among Icelandic men [27]. A high consumption of fat and meat and a low consumption of cereals and fruits is common in the Nordic countries, where the incidence of colon cancer is high [20]. A relationship between increased physical activity and reduced risk of colon cancer is supported by several studies [29]. In Sweden and Finland a positive association has been reported between education and colon cancer for men but not for women [12,25].

The findings of a negative association between educational level and the risk of cervical cancer are in accordance with other studies [30]. The main explanations for the social gradient in cervical cancer risk are related to sexual behavior. Infection with carcinogenic human papillomaviruses (HPV) is necessary for the development of cervical cancer [31].

The risk of skin melanoma was highest among Icelanders with the highest education. This association was considerably more pronounced for men than for women, with a 147% and 45% higher SIR, respectively, when comparing the academic level category with the basic level category. The age-standardized incidence in Icelandic men is currently 12.0 (in 2001–2005) and in women 19.6, which is the highest in the Nordic countries [8,11]. Exposure to ultraviolet radiation is the major known risk factor for malignant melanoma, especially intermittent exposure. It has been estimated that in the Nordic countries up to 95% of the skin melanoma could be avoided if exposure to ultraviolet radiation would be avoided [20]. The reason for the observed association with education in Iceland is likely to be related to different holiday practices, with respect to traveling to sunny southern countries.

This study, which is based on census information in Iceland, provides important information about the society, indicating that the risk of cancer is dependent on the person's education and thereby social group. The popular belief in Iceland has been that the Icelandic society is characterized by a high degree of social equality [6]. A few studies have been done in Iceland on socioeconomic status and health outcome [32,33]. However, a study concerning education and cancer risk has not been done before in Iceland. Our findings confirm health-related socioeconomic differences in Iceland and must be taken into account when programmes for health promotion are planned. The associations between education and cancer incidence seen in this study resemble observations from other countries [2] and probably reflect concordance between social status and certain risk factors for cancer, such as smoking and parity.

Acknowledgements

We thank Statistics Iceland for the access to the census data and the director-general of Statistics Iceland, Hallgrimur Snorrason, for his support.

We also thank the Nordic Cancer Union, the Icelandic Cancer Society, the Icelandic Research

Fund for Graduate Students and the Ingibjorg Johnson Memorial Fund for financing this study.

References

[1] Andersen A, Barlow L, Engeland A, Kjaerheim K, Lynge E, Pukkala E. Work-related cancer in the Nordic countries. Scand J Work Environ Health 1999;25(Suppl 2):1–116.

[2] Faggiano F, Partanen T, Kogevinas M, Boffetta P. Socioeconomic differences in cancer incidence and mortality. IARC Sci Publ 1997;138:65–176.

[3] Pukkala E, Weiderpass E. Socio-economic differences in incidence rates of cancers of the male genital organs in Finland, 1971–95. Int J Cancer 2002;102:643–8.

[4] Pukkala E. Cancer risk by social class and occupation. A survey of 109,000 cancer cases among Finns of working age. Contributions to Epidemiology and Biostatistics, Vol. 7. Basel: Karger; 1995.

[5] Berkman L, Macintyre S. The measurement of social class in health studies: Old measures and new formulations. In: Kogevinas M, Pearce N, Susser M, Boffetta P, editors. Social Inequalities and Cancer. Lyon: International Agency for Research on Cancer; 1997. p. 51–64.

[6] Broddason T, Webb K. On the myth of social equality in Iceland. Acta Sociol 1975;18:49–61.

[7] Cancer incidence in five continents. Vol. VIII. IARC Sci Publ 2002;155:1–781.

[8] Icelandic Cancer Registry. Available at: http://www.krabbameinsskra.is/indexen.jsp?id=a.

[9] Breslow NE, Day NE. Statistical methods in cancer research. II. The design and analysis of cohort studies. IARC Sci Publ 1987;82:1–406.

[10] Sahai H, Khursid A. Confidence intervals for the mean of a poisson distribution: A review. Biometrical J 1993;35:857–67.

[11] Engholm G, Storm HH, Ferley J, Christensen N, Bray F, Olafsdottir E, et al. NORDCAN: Cancer incidence and mortality in the Nordic countries. Version 2.2. 2006.

[12] Hemminki K, Li X. Level of education and the risk of cancer in Sweden. Cancer Epidemiol Biomarkers Prev 2003;12:796–802.

[13] Tretli S, Engeland A, Haldorsen T, Hakulinen T, Horte LG, Luostarinen T, et al. Prostate cancer--look to Denmark? J Natl Cancer Inst 1996;88:128.

[14] Signorello LB, Adami HO. Prostate cancer. In: Adami HO, Hunter D, Trichopoulos D, editors. Textbook of Cancer Epidemiology. New York: Oxford University Press; 2002. p. 400–28.

[15] Helgason A, Nicholson G, Stefansson K, Donnelly P. A reassessment of genetic diversity in Icelanders: Strong evidence from multiple loci for relative homogeneity caused by genetic drift. Ann Hum Genet 2003;67(Pt 4):281–97.

[16] Braaten T, Weiderpass E, Kumle M, Adami HO, Lund E. Education and risk of breast cancer in the Norwegian-Swedish women's lifestyle and health cohort study. Int J Cancer 2004;110:579–83.

[17] Dano H, Hansen KD, Jensen P, Petersen JH, Jacobsen R, Ewertz M, et al. Fertility pattern does not explain social gradient in breast cancer in Denmark. Int J Cancer 2004;111:451–6.

[18] Hankinson S, Hunter D. Breast cancer. In: Adami HO, Hunter D, Trichopoulos D, editors. Textbook of Cancer Epidemiology. New York: Oxford University Press; 2002. p. 301–39.

[19] Tryggvadottir L, Tulinius H, Eyfjord JE, Sigurvinsson T. Breastfeeding and reduced risk of breast cancer in an Icelandic cohort study. Am J Epidemiol 2001;154:37–42.

[20] Olsen JH, Andersen A, Dreyer L, Pukkala E, Tryggvadottir L, Gerhardsson de Verdier M, et al. Summary of avoidable cancers in the Nordic countries. APMIS Suppl 1997;76:141–6.

[21] Engholm G, Palmgren F, Lynge E. Lung cancer, smoking, and environment: A cohort study of the Danish population. BMJ 1996;312(7041):1259–63.

[22] Kogevinas M, Trichopoulos D. Urinary bladder cancer. In: Adami HO, Hunter D, Trichopoulos D, editors. Textbook of Cancer Epidemiology. New York: Oxford University Press; 2002. p. 446–66.

[23] Wynder EL, Kmet J, Dungal N, Segi M. An epidemiological investigation of gastric cancer. Cancer 1963;16:1461–96.

[24] Nyrén O, Adami HO. Stomach cancer. In: Adami HO, Hunter D, Trichopoulos D, editors. Textbook of Cancer Epidemiology. New York: Oxford University Press; 2002. p. 162–87.

[25] Weiderpass E, Pukkala E. Time trends in socioeconomic differences in incidence rates of cancers of gastro-intestinal tract in Finland. BMC Gastroenterol 2006;6:41.

[26] Nagel G, Linseisen J, Boshuizen HC, Pera G, Del Giudice G, Westert GP, et al. Socioeconomic position and the risk of gastric and oesophageal cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC-EURGAST). Int J Epidemiol 2007;36:66–76.

[27] Steingrimsdottir L, Thorgeirsdottir H, Aegisdottir S. The diet of Icelanders 1990. I. Main findings. 1991.

[28] Winther JF, Dreyer L, Overvad K, Tjonneland A, Gerhardsson de Verdier M. Avoidable cancers in the Nordic countries. Diet, obesity and low physical activity. APMIS Suppl 1997;76:100–19.

[29] Friedenreich C, Norat T, Steindorf K, Boutron-Ruault MC, Pischon T, Mazuir M, et al. Physical activity and risk of colon and rectal cancers: The European prospective investigation into cancer and nutrition. Cancer Epidemiol Biomarkers Prev 2006;15:2398–407.

[30] Parikh S, Brennan P, Boffetta P. Meta-analysis of social inequality and the risk of cervical cancer. Int J Cancer 2003;105:687–91.

[31] Stuver S, Adami HO. Cervical cancer. In: Adami HO, Hunter D, Trichopoulos D, editors. Textbook of Cancer Epidemiology. New York: Oxford University Press; 2002. p. 340–58.

[32] Hardarson T, Gardarsdottir M, Gudmundsson KT, Thorgeirsson G, Sigvaldason H, Sigfusson N. The relationship between educational level and mortality. The Reykjavik Study. J Intern Med 2001;249:495–502.

[33] Gunnarsdottir H, Rafnsson V. Cancer incidence among Icelandic nurses. J Occup Environ Med 1995;37:307–12.