Income trajectories prior to alcohol-attributable death in Finland and Sweden

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Conflicting interests: None declared

Abstract

Background and aims: Mortality from alcohol-attributable causes is patterned by income. This retrospective cohort study analysed the income trajectories 17-19 years prior to death in order to determine: 1) whether income levels and trajectories differ between those who die of alcohol-attributable causes, survivors with similar sociodemographic characteristics, all survivors and those dying of other causes; 2) whether the income trajectories of these groups differ by education; and 3) whether there are differences in income trajectories between Finland and Sweden - two countries with differing levels of alcohol-attributable mortality but similar welfare-provision systems.

Methods: The study used individual-level longitudinal register data including information on income, cause of death and socioeconomic position. The subjects comprised an 11-percent sample of the Finnish population in 2006-07 and the total population of Sweden aged 45-64 in 2007-08. Median household income trajectories by educational group were calculated by cause of death and population alive during the respective years. Additionally, propensity score matching was used to match the surviving population to those dying from alcohol-attributable causes with regard to sociodemographic characteristics.

Results: The median income 17-19 years prior to death from alcohol-attributable causes was 92% (Finland) and 91% (Sweden) of survivor income: one year prior to death the respective figures were 47% and 57%. The trajectories differed substantially. Those dying of alcohol-attributable causes had lower and decreasing incomes for substantially longer periods than survivors and people dying from other causes. These differences were more modest among the highly educated. The baseline sociodemographic characteristics of those dying of alcohol causes did not explain the different trajectories.

Conclusions: Income declines substantially before alcohol-attributable death. Highly educated individuals were able to buffer the negative effects of extensive alcohol use on their income level. Income trajectories are similar in Finland and Sweden despite marked differences in the level of alcohol-attributable mortality.

Introduction

An inverse association between income and mortality has been observed in many high-income societies [1–5]. The magnitude of the association varies by cause of death and is particularly pronounced in alcohol-attributable mortality. The excess mortality from alcohol-related causes in 2007-2012 in Finland was found to be six-fold among men and eight-fold among women in the lowest compared to the highest income quintile. Although mortality from other causes declined over time, alcohol-related mortality increased particularly in the low-income groups, and therefore the disparity in mortality between income groups increasingly originated from alcohol-related causes. Half of the difference in mortality rates in the highest and lowest income quintiles between 2007 and 2012 was due to alcohol-related causes among men aged 35-64, versus over a quarter among women [6]. Although similar developments regarding educational disparity in mortality have been observed in Denmark, evidence of increasing alcohol-attributable mortality and the strengthening role of such causes with regard to the disparity in mortality by income is lacking in most other countries [7]. The overall aim in this paper was to go beyond the evidence on differential trends in alcohol-attributable mortality in Finland to better understand the mechanisms that underlie these differentials. To this end, we scrutinize and compare the income trajectories leading to alcohol-attributable deaths in Finland and Sweden. These two countries share many contextual properties, in particular with regard to welfare-state policies and changes thereof [8]. However, they differ significantly in that alcohol-attributable mortality is higher in Finland, it makes a stronger contribution to disparity in mortality and, to some extent, alcohol-control policies are weaker than in Sweden [9, 10]. Hence, we have an ideal situation for cross-national comparison between two countries that are similar in many respects, but that vary in a key factor of interest [11].

The origins and explanations of the income-mortality association reflect complex causal and selective processes [12], which may differ in relevance to alcohol-attributable deaths as opposed to other causes of death. Exposure to adverse psychosocial and material effects caused by low income before developing severe drinking problems would underline the social-causation explanation. On the other hand, the selection argument emphasizes the difficulty of becoming employed after severe drinking problems have developed, and of remaining employed with a stable income. Disentangling the contribution of causation and selection to the income-mortality association is generally very challenging. Analyses of events pre-dating alcohol-attributable death, such as the dynamics of exposure to a low income, could therefore provide valuable insights into the processes behind the association.

It was shown in an earlier study from Finland that 17 years before death at ages 45-64 the employment rate was roughly similar among those who died of alcohol-related causes and those dying of other causes. Although the former group were more likely to be non-employed as death came closer, the difference in employment rate from those dying of other causes was under 10 percentage points [13]. Despite this relatively small discrepancy 17 years before death, there may be substantial differences in other employment-related factors such as income. Income development during the years leading up to death may also be subject to diverging trajectories between the two above-mentioned groups. Those dying from alcohol-related causes may have had a low income despite being employed, and this exposure may have persisted and/or strengthened as death approached. There are no studies exploring

these income trajectories prior to alcohol-attributable death or the differences in trajectories by these causes. It was found in a Norwegian study that although employment income drops 6-7 years before death, particularly among those with a basic education, total income (both personal and household) declines only slightly [14].

It is also possible that the income trajectory prior to alcohol-attributable death is dependent on other socioeconomic resources, which may buffer the negative effects of excessive alcohol consumption on income. This possibility could be assessed in analyses of income trajectories by educational groups. The processes that determine individual income trajectories may also be dependent on macro-level factors such as the prevalence of excessive drinking habits and the generosity of welfare provisions aimed at protecting individuals from downward income shocks and combatting poverty. These characteristics differ by country and the system of welfare provision. To account for least to some of the differences in the level of alcohol-attributable mortality in the population, we analysed Finland and Sweden, two countries with similar welfare policies in international comparisons [8], but differing levels of alcohol-attributable mortality and its contribution to mortality differentials [15].

The purpose of this study was to analyse income trajectories prior to death. We examined the trajectories of four groups: those dying from alcohol-attributable causes, those dying from other causes, survivors and a sample of survivors matched on the characteristics of those that died from alcohol-attributable causes. We compared income trajectories with a view to answering the following questions. 1) Are there differences in income levels and trajectories among those who die of alcohol-attributable causes, of other causes, and survivors? 2) Do the income trajectories of these groups differ by education? 3) Are there differences in income trajectories between Finland and Sweden, two countries with differing levels of alcohol-attributable mortality but similar welfare-provision systems?

Methods

The Finnish dataset, constructed by Statistics Finland, is a nationally representative 11% random sample of all persons residing in Finland in at least one of the years between 1987 and 2007. A random oversample of all people who died during 1988–2007 and were not included in the 11% sample was added to increase the statistical power of the analyses because, for confidentiality reasons, Statistics Finland does not provide large samples of living persons. As a result, the data includes 80% of all people who died in 1988–2007. Probability weights were used to account for the unequal sampling probability among individuals in these two parts of the data. The Swedish dataset came from The Swedish Work and Mortality Database (HSIA), which is based on complete population registers of all persons residing in Sweden between the years 1990 and 2009. Both datasets consist of multiple national registers that are linked on the individual level using personal-identification codes.

The analysis was restricted to individuals aged 45-64 years and present in the population in 2006-07 in Finland and 2007-2008 in Sweden, which were the latest available years in the dataset. This age range was chosen because most of alcohol-attributable deaths (roughly

70% in 2007 in Finland) occur within this age bracket. The target population was divided into three groups, those who survived to the end of 2007 (Finland) or 2008 (Sweden), those who died of alcohol-attributable causes, and those who died of other causes. Death was defined as alcohol-attributable if the underlying cause on the death certificate was alcohol-attributable disease or accidental alcohol poisoning (ICD-10 codes: F10, G31.2, G40.51, G62.1, G72.1, I42.6, K29.2, K70, K86.0, and X45).

Disposable household income was used as the income measure in the Swedish data. Income in Finland was measured before taxes and therefore excludes some non-taxable benefits. In both countries the household structure was accounted for by dividing the total household income by the square root of the sum of household members [16]. Income information was available from the year 1987 for Finland and 1990 for Sweden. The Finnish data included information on disposable income only from the year 1995 and was therefore used for the sensitivity analysis. Inflation was accounted for by transforming income to its value in 2015 according to the consumer price index.

Median incomes were calculated yearly for three population groups: survivors, those who died from alcohol-attributable causes, and those who died from other causes. In addition, we calculated median incomes for the survivor group with similar sociodemographic characteristics as those whose death was alcohol-attributable. To do this we used the propensity score matching by the inverse probability of treatment weighting (IPTW) [17]. The weights we applied in calculating the median income of the matched survivors were the inverse of the probability of receiving the 'treatment' that the subject actually received. In other words, the weights in this analysis are the predicted probabilities of dying from an alcohol-attributable cause, which we obtained from a logistic regression with death from an alcohol-attributable cause as the dependent variable and including the covariates sex, age (yearly), education (coded as below), economic activity (employed, unemployed, early retired, other), marital status (married, single, divorced, widowed) and number of household members. The models were estimated separately by country (Supporting information Table S1).

In the analyses stratified for educational level we used the highest completed educational degree in 2006-08 classified into three categories, namely basic (International Standard Classification of Education 2011: 0-2), middle (ISCED 3-4) and high (ISCED 5-8). Given that the number of alcohol-attributable deaths was rather low among women we report the main analyses with both sexes combined, but we conducted analyses stratified by sex as sensitivity checks. We also analysed the sensitivity of the cause-of-death classification using the contributory causes stated on the death certificate.

Results

The number of persons who died from alcohol-attributable causes in the data was 2,331 (17% of all deaths) in Finland and 910 (5% of all deaths) in Sweden (Table 1). Although most of the deceased were on the lower educational level, there are enough observations to yield robust trajectories in all categories except the high-education group in Sweden, where only 82 persons died from alcohol-related causes. The yearly results of this group should be interpreted cautiously. The median income was already 8% lower in Finland and 9% lower in

Sweden 17-19 years before death from alcohol-attributable causes than it was among those who were present in 2006-08 and survived. The year preceding death the income of those dying from alcohol-attributable causes was roughly half that of the survivors in Finland, although it was somewhat higher in Sweden. In both countries, over the total follow-up period the income of those who died of alcohol-related causes was around 70% of the cumulative income of the survivors, compared with 83% and 89% among those who died of other causes in Finland and Sweden, respectively. The cumulative income levels of survivors who matched those who died of alcohol-attributable causes in terms of sociodemographic characteristics, and all survivors were very similar, with 9% and 10% lower cumulative incomes in Finland and Sweden, respectively.

There were educational differences in income proportions 17-19 years before death from alcohol-attributable causes. The income of the high-education group was even higher than that of the survivor group, whereas those with a low or intermediate educational level who died of alcohol-attributable causes had slightly lower incomes than the survivors. The educational difference widened in the Finnish data one year prior to death: among those dying from alcohol-attributable causes, the income of the highly educated was 63% and of those with a basic education 48% of the income of survivors. The differences between educational levels remained modest in the Swedish data, however, possibly due to randomness caused by the low numbers of highly educated persons dying of alcohol-attributable causes. However, more robust measures of cumulative income revealed educational differences in both countries. For example, those with a high education suffered only an 11% (Finland) and 16% (Sweden) cumulative income loss prior to alcohol-attributable death, compared to survivors, whereas the respective figures for those with a basic education were 31% and 24%. Although the exact numbers differed between the two countries, the overall pattern was consistent in both.

Table 1 here

The income trajectories for both countries were generally similar (Figure 1). The profound economic recession that hit them in the early 1990s was clearly visible in that median incomes dropped in all groups after an initial increase. There was a clear increase after the recession in all groups except for those who died of alcohol-attributable causes, among whom the decline continued in Finland, and increased slightly then stagnated in Sweden. There was a similar increase and stagnation among those dying of other causes in Finland. The income trajectory of survivors with similar sociodemographic characteristics as those who died of alcohol-attributable causes followed the survivor trajectory in both countries, albeit on a lower level.

Figure 1 here

As the median income trajectories by educational level (Figures 2 & 3) show, the income development of those dying of alcohol-attributable causes diverged from that of the other groups on all educational levels. The patterns for these causes are roughly similar for all educational groups, indicating that incomes stagnated or declined after the economic recession. However, the highly educated who died of alcohol-attributable cause, despite some income stagnation and decline, enjoyed a substantially higher absolute income level

until death than those in the other educational groups. This trend was consistent in Sweden, but with some volatility between the years due to the low number of observations.

Figures 2&3 here

Overall, the trajectories were similar in both countries, but in Sweden the income development among those dying of alcohol-attributable causes was rather stagnant and not as strongly negative as in Finland. However, the stagnation in this trajectory was very similar in Finland and Sweden when disposable income was analysed (see Supporting information Figures S1 & S2).

Discussion

The median income of those who died of alcohol-attributable causes in 2006-08 was 8% lower in Finland and 9% lower in Sweden 17-19 years prior to death than among those who were alive at the end of the period. In the Finnish data, moreover, the median income during the year preceding death was 47% of the survivors' income, compared with 69% for those dying of other causes. The respective figures for Sweden were somewhat higher at 57% and 79%. The income trajectories were largely similar in both countries, showing diverging median trends among those dying of alcohol-attributable causes. The different baseline sociodemographic characteristics of those whose death was alcohol-attributable did not explain the divergence. The income of those dying from other causes followed the trajectory of the survivors more closely, but on a lower level and with stagnation closer to death. The downward or stagnating median income trajectory in the alcohol-attributable cause-of-death group held for all educational levels, although the incomes of the highly educated remained at a significantly higher absolute level than in the other educational groups.

A wider income disparity in mortality from alcohol-related compared to other causes has been shown in previous research [6]. However, the magnitude of the differences in trajectories in our study was surprising given that, in Finland, the differences in employment rates between these cause-of-death groups remained stable at only 10 percentage points in the last ten years prior to death [13]. To our knowledge there have been no studies analysing income trajectories before alcohol-attributable death, although several have predicted drinking behaviour or alcohol-related harm by income level or trajectory (e.g. [18]). Our findings are not predictive of alcohol-related harm, but rather demonstrate the processes that lead to it. We have shown that income trajectories differ substantially between alcohol-attributable causes and other causes of death, but that the disparity in income was rather small 17-19 years before death. It was not possible to pinpoint the starting point of drinking problems in this analysis, therefore we could not feasibly assess the direction of causality in the association between income and excessive alcohol use. However, irrespective of the exact temporal order of income decline and initial drinking problems, our analysis showed that those who died of alcohol-attributable causes were exposed to lower and decreasing income levels for substantially longer periods than persons dying of other causes. Consequently, these individuals were also exposed for a longer period of time to the potential negative causal effects of low and declining income on their health and psychosocial wellbeing. On the other hand, matching the survivor group and those dying of alcohol-attributable causes on the basis of sociodemographic characteristics only explained

a small part of the differences in income level between these groups, leaving the adverse income development of those in the latter group unexplained. The implication is that those who eventually died of alcohol-attributable causes were selected on the basis of unobserved characteristics almost 20 years before their death. Although these characteristics may include personality traits, childhood conditions and genetic predisposition to alcohol-use disorders, the individuals concerned may have also encountered adverse life-events in adulthood, thereby increasing their propensity for excessive alcohol consumption.

This study was based on data from both Sweden and Finland: the two countries have similar welfare systems, but there seems to be roughly a threefold level of alcohol-attributable mortality in Finland compared to Sweden [19]. The similarity in pre-death income trajectories indicates that the processes behind income development are not attributable to changes or differences in the level of alcohol-attributable mortality. Instead, the results seem to indicate that there are robust processes that cause a loss of income before alcohol-attributable death even in countries with comparatively generous welfare systems. The recession in the early 1990s led to a loss of income for most people in both countries. Incomes then recovered, except for those who, much later, died of alcohol-attributable causes. This lack of income recovery may have resulted from the co-evolution of difficulties in re-employment after the economic crisis due to excessive alcohol use, and co-occurring structural changes in the economy that exacerbated the effect of the recession among manual workers. Among them, prolonged unemployment may have increased the risk of problem drinking among previously moderate drinkers. Changes in household composition could also have exacerbated the adverse income trajectories of those dying of alcohol-attributable causes, given that divorce and union dissolution (of which alcohol-use disorder is a risk factor [20]) also lower the household income level.

The results also show that highly educated individuals were, to some extent, able to buffer or safeguard themselves from the negative income effects of approaching alcohol-attributable death. It may be, for example, that severe drinking problems do not lead to dismissal in white-collar occupations as easily as in blue-collar occupations. Moreover, it has been shown in previous research that those in high socioeconomic positions are less vulnerable to the adverse health effects of alcohol use [21, 22]. The results of this study may partially explain these findings: even extensive alcohol use leading to death did not collapse the absolute median income level of the highly educated, whose remaining material resources may generally help them to avoid some of the adverse health effects of heavy drinking.

Methodological considerations

The individual-level register data from Finland and Sweden offer unique advantages in analysing income development before death given that the income information is not subject to misreporting or loss to follow-up. This is particularly relevant in the case of population groups susceptible to low income and alcohol-attributable health problems, members of which are likely to be survey non-responders. The cause-of-death information in our register data is robust and of good quality on the international level [23]. On the other hand, there are restrictions and caveats inherent in the data. It did not contain the complete income history of every person for various reasons, such as emigration. However, of all person years, 91.3% in Finland and 97.5% in Sweden had complete yearly income information. We conducted sensitivity analyses only on this population, the results of which were identical

with those of the initial analysis. We therefore have good reason to think that the small imbalance in our panel data did not affect the results. There may be differences between Finland and Sweden in defining alcohol-attributable death on the death certificate. However, given the similarity in income trajectories between the two countries it is unlikely that this affects our results substantially, but it may explain the differential level of alcohol-attributable mortality to some extent. Drinking behaviour is unobserved in register data. Thus, we cannot identify persons who drink excessively but not fatally: this group of people may still experience possible negative health and income consequences of excessive alcohol consumption that we were not able to capture. Our measurement of alcohol-attributable deaths as an underlying cause captured more extreme manifestations of excessive alcohol consumption: most of these (e.g. liver cirrhosis) result from prolonged heavy drinking. Alcohol may be a contributory cause of death in the absence of long periods of problem drinking (i.e. in accidents due to intoxication), and it may be in such cases that the pre-death income trajectories are closer to the trajectories for other causes given that the preceding incapacitating drinking behaviour is likely to be less prevalent. To assess this possibility we additionally analysed the cases in the Finnish data in which the underlying cause was not alcohol-attributable, but one of up to three contributory causes stated on the death certificate was alcohol poisoning, alcohol-attributable disease (as listed above) or alcohol intoxication (ICD-10: F10.0). This increased the number of cases by 85% (1,999 cases in addition to the 2,331 direct causes), but it should be noted that even with this addition cases of cancer attributable to alcohol use are not covered in this analysis if the conditions given above are not fulfilled. The trajectories closely resembled the initial results, but the income level was slightly higher as expected (Supporting information Figure S3). However, the median income in the year prior to death was 49% of the income of survivors, compared to 47% in the group in which alcohol was a direct underlying cause of death. We also conducted the initial analysis stratified by sex (results available from the authors upon request) but given that there were no major differences in the trajectories, and 80% of all alcohol-attributable deaths occurred among men, we only presented the combined analysis.

Conclusions

Our results have implications for research on socioeconomic disparities in mortality. It is sometimes posited that income falls prior to death, and that this reverse causal pathway explains the inverse association between income and mortality. However, it was found in a Norwegian study that household income did not fall prior to all-cause death [14]. Our results are somewhat in line with the Norwegian evidence in that the absolute median income stagnated with no apparent decrease before death when the cause of death was not related to alcohol consumption, although in relative terms the income gap from survivors increased. However, we observed a large and long-term decrease in absolute income before death attributable to alcohol, especially among those with a low educational level. These results indicate that the processes leading to social inequalities in alcohol-related mortality emerge several decades beforehand. Policy measures tackling alcohol-related harm and inequalities should aim at the early identification of drinking problems.

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Table 1. Numbers of cases and median income by cause of death or survival at age 45-64 in 2006-2007 (Finland) and 2007-08 (Sweden), both sexes

	Finland				Sweden			
		Educational level				Educational level		
Number of cases	Total	Basic	Mid	High	Total	Basic	Mid	High
Survivors	172068	49803	68839	53426	1876998	436971	964138	467853
Other cause	11467	5176	4214	2077	17654	6041	8582	2765
Alcohol-attributable cause	2331	1062	928	341	910	341	478	82
Percent of survivor median income 17 (Sweden) /19 (Finland) years prior to death								
Survivors	100	100	100	100	100	100	100	100
Survivors (matched)	93	93	98	103	95	94	98	104
Other cause	94	94	97	101	97	96	99	102
Alcohol- attributable cause	92	93	95	104	91	93	91	101
Percent of survivor median income 1 year prior to death								
Survivors	100	100	100	100	100	100	100	100
Survivors (matched)	89	92	93	102	85	87	89	98
Other cause	69	70	72	83	79	79	82	89
Alcohol- attributable cause	47	48	50	63	57	62	59	66
Percent of cumulative survivor median income over 17 (Sweden) /19 (Finland) years preceding death								
Survivors	100	100	100	100	100	100	100	100
Survivors (matched)	91	92	96	104	90	91	93	102
Other cause	83	82	86	94	89	88	91	96
Alcohol- attributable cause	70	69	74	89	74	76	76	84

Figure 1. Household-income trajectories by cause of death or survival at age 45-64 in 2006-2007 (Finland) and 2007-08 (Sweden), both sexes

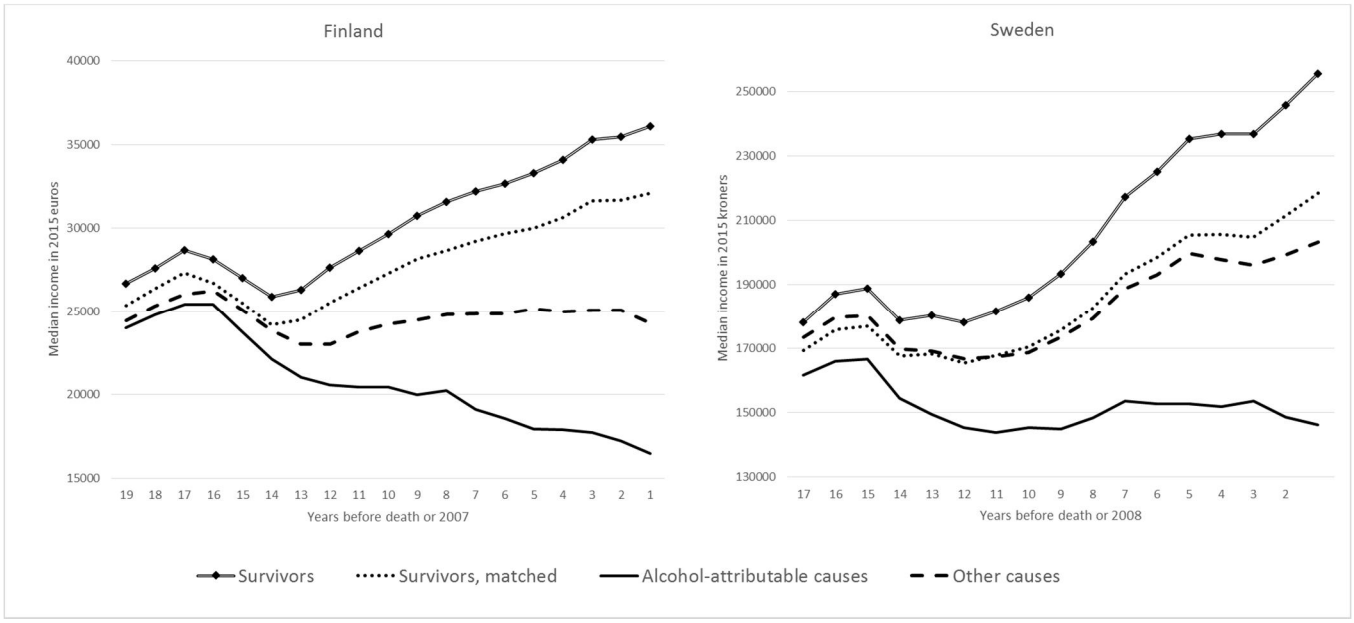


Figure 2. Household-income trajectories by educational level and cause of death or survival at age 45-64 in 2006-2007 in Finland, both sexes

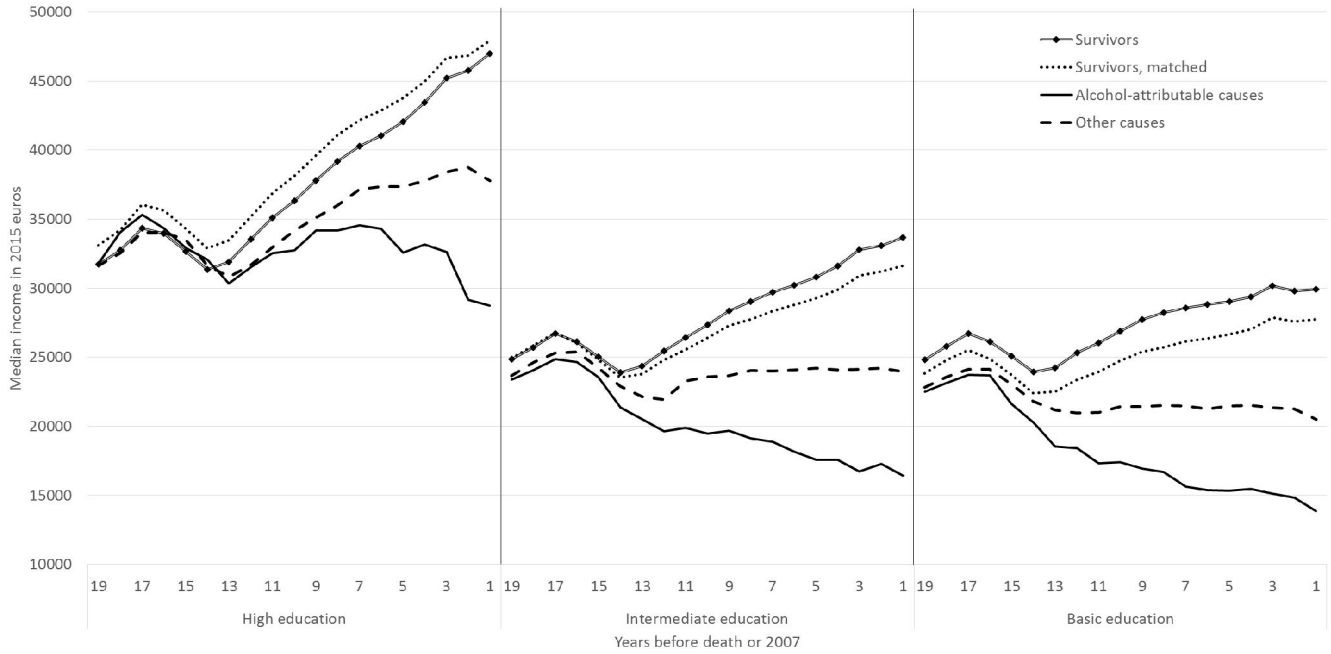
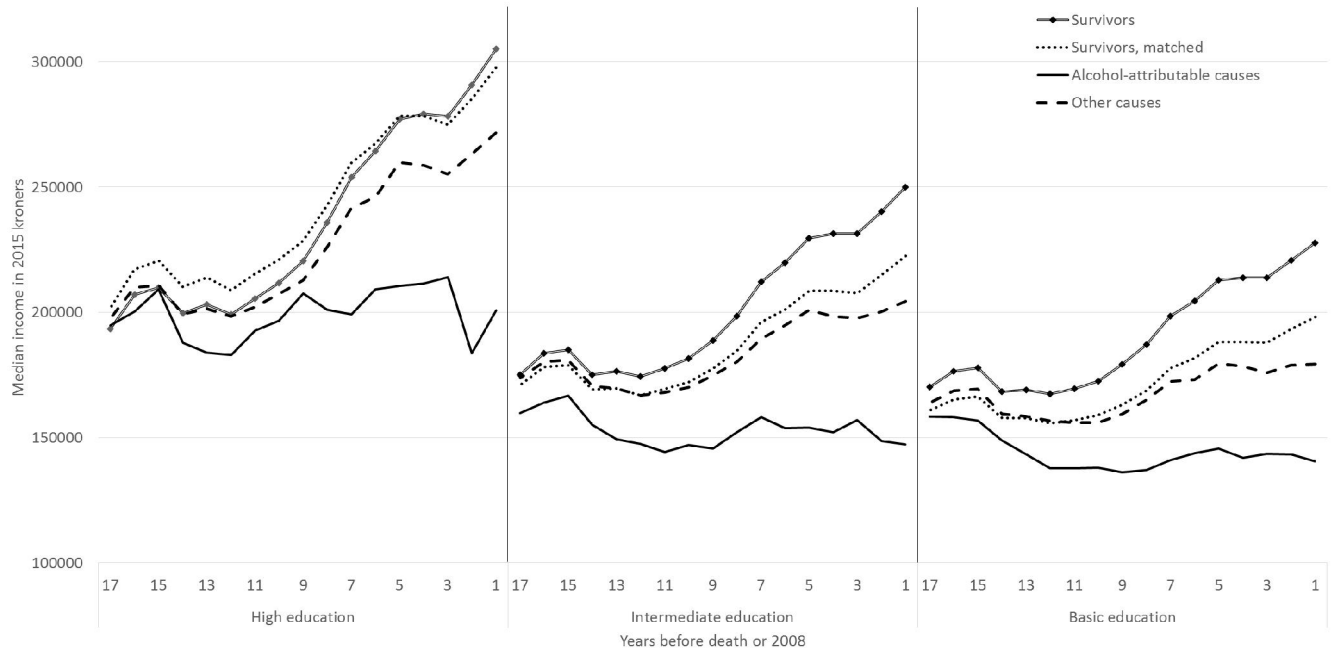
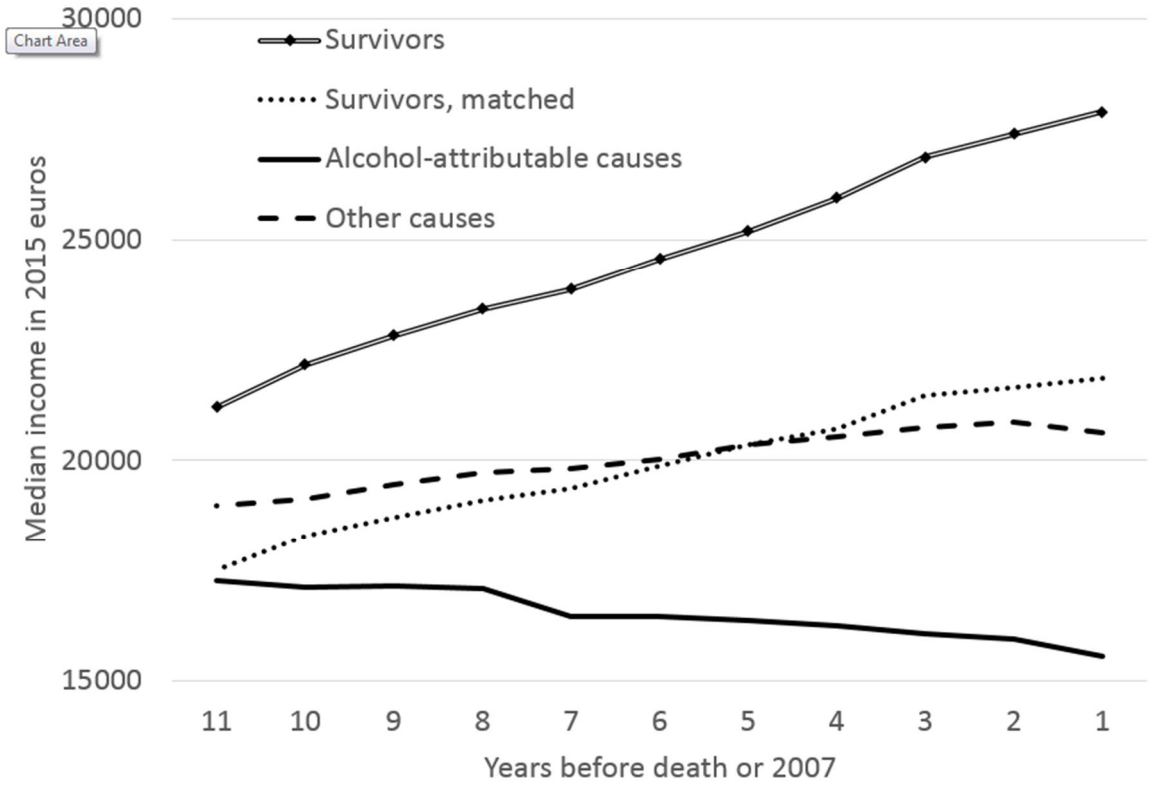


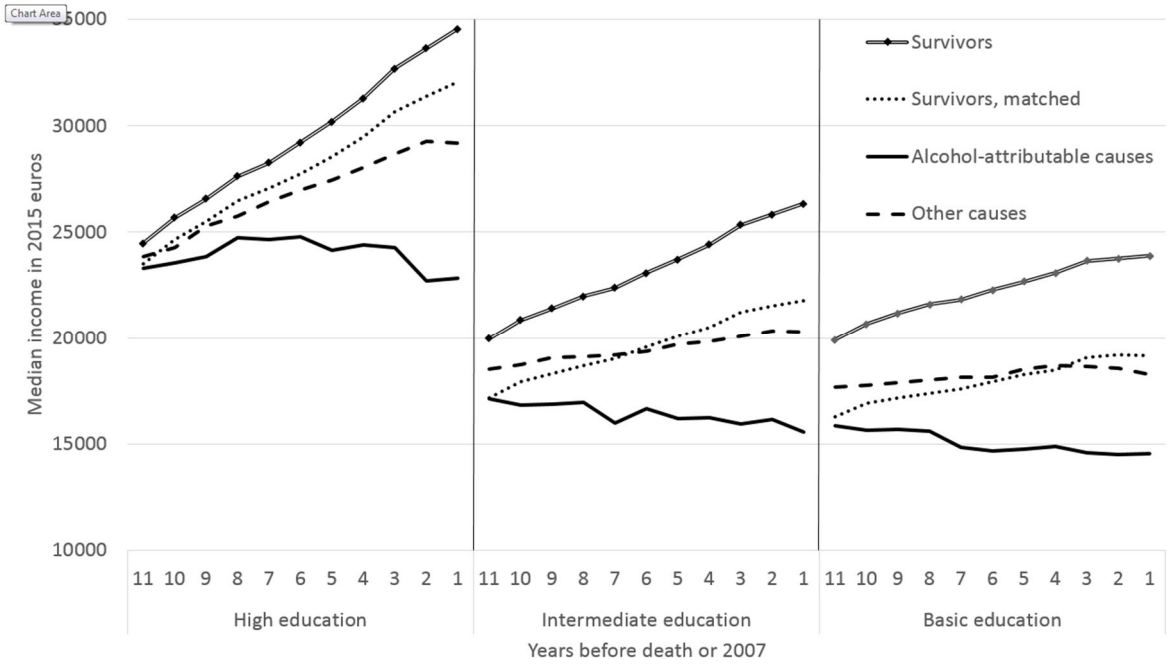
Figure 3. Household-income trajectories by educational level and cause of death or survival at age 45-64 in 2007-2008 in Sweden, both sexes



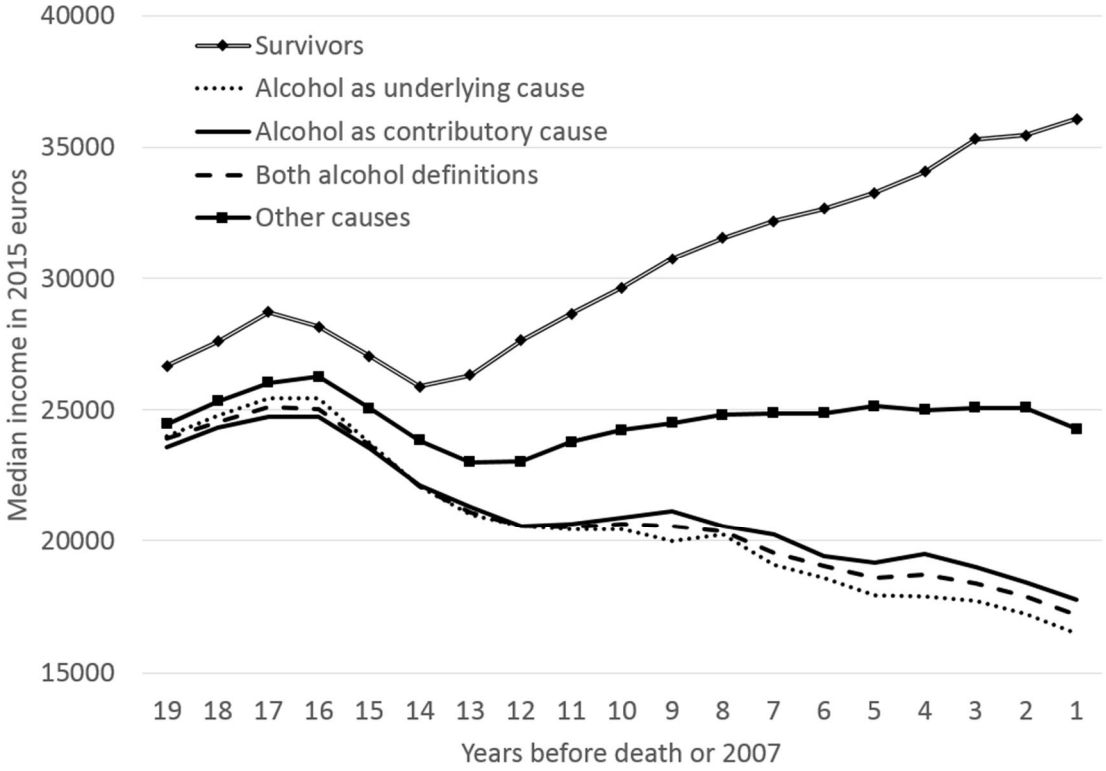
Supporting Information Figure S1 Disposable household-income trajectories by cause of death or survival at age 45-64 in 2006-2007 in Finland, both sexes



Supporting Information figure S2. Disposable household-income trajectories by educational level and cause of death or survival at age 45-64 in 2006-2007 in Finland, both sexes



Supporting Information figure S3. Household-income trajectories by cause of death or survival at age 45-64 in 2006-2007 in Finland, both sexes



Supporting information Table S1. Logit regressions of odds of dying from alcohol-attributable cause in 2006-07 in Finland by socioeconomic characteristics 17-19 years prior to death. Reference categories in parentheses. These models were used for constructing weights for propensity score matching in figures 1 & 2

	Figure 1			Figure 2								
				Basic education			Intermediate education			High education		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
Sex (male)												
Female	0.28	0.26	0.31	0.37	0.32	0.43	0.25	0.21	0.30	0.23	0.18	0.31
Age	1.01	1.00	1.02	0.98	0.97	0.99	1.02	1.01	1.04	1.04	1.02	1.06
Education (basic)												
Middle	0.65	0.59	0.72									
High	0.38	0.34	0.44									
Economic activity (employed)												
Unemployed	3.38	2.84	4.02	3.47	2.72	4.44	2.89	2.22	3.77	5.28	2.83	9.85
Retired	0.94	0.73	1.21	0.86	0.63	1.18	0.99	0.62	1.55	1.54	0.48	4.89
Other	1.70	1.48	1.96	2.01	1.65	2.46	1.64	1.31	2.06	1.34	0.87	2.08
Household size (1)												
2	1.03	0.89	1.19	0.89	0.72	1.11	1.20	0.96	1.50	0.91	0.60	1.39
3	0.88	0.76	1.03	0.76	0.61	0.94	1.04	0.82	1.31	0.67	0.42	1.07
4	0.79	0.67	0.93	0.69	0.55	0.88	0.90	0.69	1.17	0.58	0.36	0.93
5	0.72	0.59	0.89	0.58	0.43	0.78	0.89	0.64	1.22	0.57	0.33	1.00
6	0.55	0.40	0.76	0.46	0.29	0.74	0.65	0.39	1.11	0.43	0.17	1.10
7	1.11	0.73	1.67	0.61	0.31	1.23	1.75	0.98	3.14	1.08	0.36	3.23
8	0.89	0.45	1.76	0.45	0.14	1.44	1.74	0.70	4.37	0.68	0.09	5.02
9	0.52	0.21	1.28	0.34	0.08	1.40	0.35	0.05	2.55	0.96	0.22	4.26
Marital status (Single)												
Married	0.71	0.63	0.81	0.74	0.62	0.88	0.59	0.49	0.72	1.24	0.85	1.81
Divorced	1.71	1.49	1.96	1.58	1.30	1.92	1.72	1.40	2.12	2.06	1.34	3.15
Widowed	0.77	0.42	1.42	0.71	0.31	1.63	0.60	0.19	1.91	2.19	0.53	9.05
N	168077			47374			68314			52389		
C-statistic	0.73			0.69			0.72			0.71		

Probability weights were used in logit models to account for the unequal sampling probability of individuals in the two parts of the data, 11% sample and 80% oversample of deaths. This is because those who died in 1988-2007 had higher probability to be included in the data. Therefore in the regression analyses these sampling probabilities are used to give less weight to dead persons.

Supporting information Table S2. Logit regressions of odds of dying from alcohol-attributable cause in 2007-08 in Sweden by socioeconomic characteristics 17-19 years prior to death. Reference categories in parentheses. These models were used for constructing weights for propensity score matching in figures 1 & 2

	Figure 1			Figure 2								
				Basic education			Intermediate education			High education		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
Sex (male)												
Female	0.35	0.30	0.41	0.39	0.30	0.51	0.32	0.26	0.40	0.36	0.22	0.58
Age	1.06	1.05	1.08	1.04	1.02	1.07	1.07	1.05	1.09	1.10	1.05	1.16
Education (basic)												
Middle	0.79	0.69	0.91									
High	0.32	0.25	0.41									
Economic activity (employed)												
Unemployed	2.51	2.13	2.95	2.43	1.89	3.11	2.81	2.25	3.52	0.64	0.20	2.04
Retired	0.79	0.19	3.39	-	-	-	2.42	0.57	10.32	-	-	-
Other	- *	-	-	-	-	-	-	-	-	-	-	-
Household size **	0.71	0.66	0.76	0.71	0.64	0.79	0.70	0.64	0.77	0.73	0.59	0.92
Marital status (Single)												
Married	0.66	0.54	0.80	0.65	0.47	0.90	0.65	0.49	0.85	0.76	0.38	1.53
Divorced	1.22	1.02	1.46	1.29	0.96	1.72	1.12	0.87	1.43	1.52	0.80	2.88
Widowed	1.10	0.50	2.41	2.40	1.04	5.53	0.23	0.03	1.81	-	-	-
N	1871093			436178			964138			467493		
C-statistic	0.78			0.75			0.77			0.74		

* No cases of alcohol-attributable death in cells with dash

** Household size as continuous variable due to low number of alcohol-attributable deaths in Sweden