Once were Farmers: Occupation, Social mobility, and Mortality during Industrialization in Saguenay-Lac-Saint-Jean, Quebec 1840-1971

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Abstract

We study men's adult mortality and longevity by socio-occupational status during industrialization in Saguenay-Lac-Saint-Jean, Quebec. Data were extracted from the BALSAC database (Université du Québec à Chicoutimi), which comprehensively traces the demographic history of the region since the beginning of the French Canadian settlement in 1840 up to the early 1970s. Using five occupational classes and controlling for year, age at marriage, urban-rural residence, and literacy, we found no evidence for the emergence of socioeconomic differentials in mortality. At least until the early 1970's, mortality in the region appears to be driven by 'occupational risk' rather than 'fundamental social causes'.

Introduction

If the late eighteen century saw in opulence a cause for precocious death (Moheau, 1778), the nineteen century deplored instead the misery of the poor and their higher mortality (Villermé, 1828). Later, when historical demographers, armed with the new tool of family reconstitution (Henry, 1967), began to unveil mortality conditions in rural areas from the past, they came with a third interpretation, arguing that preindustrial mortality resulted essentially from environmental factors such as climate or epidemics, and not from socioeconomic factors affecting standards of living (Hollingsworth, 1972). In these studies, social or occupational variations in fertility and nuptiality were expected, but not for mortality (Sharlin, 1978).

Switching again the pendulum in the previous direction – and probably ignoring earlier opposite assumptions - Link and Phelan (1995) argued more recently that a pervasive social gradient favoring the wealthiest has *always* existed in mortality in every historical context and time period. They theorized health disparities as a result of social processes which unequally distribute resources depending upon one's position in the social structure. Distal "fundamental causes" of disease, such as socioeconomic status, wealth, and beneficial social connections determine the extent to which people are able to adopt protective strategies and avoid risks that contribute to differences in mortality and morbidity. Stated differently, regardless of disease-type, people who hold greater levels of knowledge, money, power, prestige and social connections are less likely to be afflicted by disease.

Evidence from the late twentieth century does in fact suggest that among those in less-advantageous socioeconomic positions (whether measured by income, educational level, or occupational class), mortality rates have been higher in all countries where data exist (Kunst et

al., 1998; Mackenbach et al., 2003; Kunst et al., 2004). Further support for the theory comes from a recent study indicating that lower levels of socioeconomic statuses increase the odds of experiencing a highly preventable disease relative to a less preventable disease in the US (Willson, 2009). The historical evidence is however much less clear, as shown in the introduction to this special issue (Bengtsson and Van Poppel, p.__). The uncertainty has many sources. A great deal of the evidence supporting an association between poverty and adult mortality has been unreliable due to its flawed methodology and mostly cross-sectional in nature, with consideration of only short and specific time periods and environments (Van Poppel et al., 2009). Further, many recent findings that integrate a longer term perspective are contrary to the theory suggested by Link and Phelan (1995). It is clear that social inequalities in mortality have *not* remained constant over the past 200 years, and that upper classes were *not* always able to avoid premature mortality due to their greater access to resources.

Indeed, declaring that inequality always or "almost always" lead to socioeconomic gradients in mortality does not allow one to easily integrate and accommodate the vast movements of social transformations that took place in the past. The meaning and the consequences for health of a given occupation would be expected to change during major transitions such as the industrial revolution. Being a farmer on a frontier when almost everybody else is a farmer could not confer a decipherable advantage (if an advantage is indeed associated with this occupation). But as whole new sectors of the economy were created via the implantation of the industry, many could find a job outside the ancestral land, and the increase in division of labor could bring clear differentiations in health and mortality between occupational social classes, especially when the new created jobs were associated with new (usually unknown) health hazards.

Also, presenting the elements that are constitutive of a high socioeconomic status (SES), such as knowledge, money, power, prestige, or beneficial social connections as a bundle of characteristics that all the members of the higher social classes share in equal dose is rather problematic when analyzing historical transformations. During such transitions, the elements constitutive of a distinct social group may begin to stretch apart as individuals are moving upward or downward the social ladder. Thus, Link and Phelan's "constancy scenario" (see Bengtsson and Van Poppel in this issue, p.__) is in an organizing scheme that delineates rigid social groupings and that makes very little provision for temporal variations in the relationship between SES and mortality, not only at the aggregate level (historical transformations) but also at the individual level (social mobility).

The other two alternatives to the constancy scenario – convergence and divergence – can also be explored and tested at the individual level via social mobility. If mortality conditions between socioeconomic groups converged over time, then one should observe that a move from any socioeconomic group to any other is becoming with time less and less consequential for health and mortality. Supposing a preexisting gradient to the advantage of the higher social classes, a 19th century day laborer who managed to become a white collar should have benefited more from this move than another man accomplishing the same move upward the social ladder one century later. Conversely, the "divergence scenario" would find support if social mobility was more consequential nowadays than in the past.

This Study

Through the use of parish registers from the BALSAC database (see data below), we follow adult mortality and longevity along the line of occupational social status among men from

a population that rapidly transited from an agricultural to an industrial world[1]. More precisely, in a first study, we use event history analysis with a time-varying specification of occupation to study adult mortality from marriage to age 60. Three periods are considered separately (1840-1899, 1900-1939, and 1940-1971). Literacy and other control variables such as the year of the episode, age at marriage, and residence (rural, semi-urban, urban), specified as time-varying or time-constant, were also included in this analysis. In a second study, we selected all men born before 1875 and who survived to age 60 and followed these men from that age until complete cohort extinctions, using the same occupational classification and the same control variables as in the first study[2]. The modal values for these variables before age 60 were used as summary measures. Rather than tracing the impact of being on a given job at specific ages, the purpose of the second analysis is to assess the effect of cumulating experience in a given position on life chances over the long run. We also test several hypotheses regarding the impact of social mobility in both studies. The question is whether moving out from a given modal occupation immediately affects survival chances (first study on adult mortality) or has longer term consequence (second study on longevity).

From an agricultural to an industrial world

The Saguenay-Lac-Saint-Jean region (SLSJ; current population 273,000) is located approximately 200 km north of Quebec City (Figure 1). Settlement in this region began during

[1] A recent paper has addressed the biodemographic aspects of mortality and longevity in Saguenay-Lac-Saint-Jean Houde, L., M. Tremblay and H. Vézina. 2008. "Intergenerational and Genealogical Approaches for the Study of Longevity in the Saguenay-Lac-St-Jean Population." *Human Nature* 19(1): 70-86.. We focus here on socioeconomic aspects.

[2] As data collection stops in 1971 for the BALSAC database, it was not possible to study the fate of more recent cohorts in this analysis

the second quarter of the nineteenth century and, until the 1930s, the population was mainly rural, with fertility levels as high as 9.8 children in complete families (Roy et al., 1988). At the beginning, the region consisted almost exclusively of farmers, who mostly came from the nearby region of Charlevoix. Until the end of the 19th century, essentially all of these farmers worked on the family farm during the summers and logged the forests during the snowy winters in order to get much needed cash money. The lumber industry was under the monopoly of the Price Company and working conditions were harsh. Social structures developed throughout the nineteenth century with a growing preoccupation for education and, to a lesser extent, health services. Two hospitals were opened by the federal government: the first one was on the Indian reserve of Pointe-Bleue in 1876 and the second one was in the city of Chicoutimi. The latter was first a maritime hospital and later became the Hôtel-Dieu St-Vallier providing health care to the local population (Girard and Perron, 1989).

Figure 1 about here

Industrialization began slowly with the implantation of pulp industries at the turn of the twentieth century and progressed much faster with the arrival and expansion of important aluminum and hydro-electric plants before the Second World War (Igartua and de Freminville, 1983; Bouchard, 1996a). Cities entered a phase of rapid growth and industrial towns were created. In 1901, 13.7% of the regional population lived in towns and villages of more than 1,000 inhabitants and this proportion reached 45.2% in 1931. In fact, in 1931, 65% of the population lived in towns and cities in the Saguenay area where most industries were located and 23% in Lac St-Jean, which remained mostly rural (Girard and Perron, 1989). Alphabetization also

progressed fast. At the outset of settlement, very few parishioners would sign in the parish registers. Then, for about a century, through a process that has all the marks of a diffusion process (see Figure 2), the "capacity to sign" spread out and increased along logistic lines to culminate with proportions around 95-99% (see also Bouchard and Larouche, 1989).

During most of the latter half of the 19th century, crude annual death rates remained under 20 per thousand. Some fluctuations occurred, due to epidemics which sporadically touched the population until 1918. The first mortality crisis took place in 1848-1849 and was likely due to typhus (Pouyez and Lavoie, 1983). Other similar crises occurred in 1855, 1867, 1879 and 1895. Diseases such as scarlet fever, measles, diphtheria and pneumonia were mostly responsible for these mortality crises. The last crisis occurred during the last months of 1918 and was due to the Spanish flu which struck almost everywhere in Quebec and elsewhere in North America, following the return of soldiers after the end of the First World War. Young adults were among the most affected.

Despite relatively low life expectancies and high infant mortality, sanitary conditions during the second half of the 19th century were probably better in the newly settled region studied here than in most other regions of Quebec. This is especially true for child mortality, which was generally lower among rural populations than among urban populations at that time. Also, a certain selection may have taken place during the years of settlement, with immigrants being more robust than the rest of the population. This phenomenon has been observed among the Quebec population during the 17th century, when mortality was significantly lower among the French Canadians than among the population of France during the same period (Charbonneau et al., 2000). According to Pouyez and Lavoie (1983), life expectancy at birth around 1861 was 5 to 6 years higher in Saguenay-Lac-Saint-Jean than in the Quebec population:

46 years for males and 49 years for females, compared to 41 and 43 years, respectively, for males and females in Quebec. As urbanization and industrialization intensified, the situation changed rapidly. In 1931, life expectancy was 52 years for men and 55 for women in Saguenay-Lac-Saint-Jean, whereas it reached 56 and 58 respectively in Quebec. The development of health infrastructures (hospitals, medical personnel, etc.) was somewhat slower in region than in the most urbanized regions of Quebec (Pouyez and Lavoie, 1983). Mortality declined steadily after 1940, but remained slightly higher than in Quebec population as a whole until recently. Life expectancies for both sexes in the contemporary SLSJ and Quebec populations are now practically the same (Institut de la statistique du Québec, 2009).

Tracing the socioeconomic history of the region from the BALSAC database

All births, marriages, and deaths that occurred in the Saguenay-Lac-Saint-Jean since the beginning of settlement until 1971 were computerized and linked in the BALSAC Population Register (Bouchard, 1992; Bouchard et al., 1995). The register presently contains 431,500 births, 91,160 marriages, and 122,570 deaths records from the SLSJ population and more than 1.87 million records (mostly marriage records) from the other regional populations of the province of Quebec, covering the nineteenth and twentieth centuries (BALSAC Project, 2008).

Regarding the main focus of this study, the BALSAC database contains more than 4,000 different mentions of occupation declared in the parish registers and the Canadian censuses throughout the period of observation. Fortunately enough, a vast enterprise of standardization has already been undertaken by Gérard Bouchard in the 1990s, who regrouped these declarations in 25 occupational classes. His method, his basic assumptions, the problems he encountered and the solutions he proposed are fully described in his book *Tous les métiers du monde* (Bouchard,

1996). The grid gives priority to "internal criteria" related to the technical dispositions of the general division of labour (manual versus non manual task), the level of skills or qualifications, the degree of supervision, and the economic sector (and does not prioritize "external criteria" giving priority to the position in the social hierarchy). Van Leeuwen and Maas (2005) argue that "a suitable characteristic of social class construed along these lines is that it results in social classes familiar to historians". They used the same organizing criteria to construct their HISCLASS grid (ibid.). For convenience, the 25 categories of the original grid were regrouped in Table 1 into 5 categories that roughly parallel other groupings based on the HISCO and HISCLASS schemes (e.g., Bengtsson and Dribe in this issue, p.__).

Table 1 about here

As shown in Figure 2, farmers are by far the majority, especially in the earlier periods, although their proportion rapidly diminishes over time, while that of unskilled workers increases. The two series are inversely related and advantageously capture the history of industrialization in the region. The proportion of farmers began to decrease right at the outset, but as the pulp industry appears at the turn of the 20th century, it began to drop rapidly, while that of unskilled workers concomitantly increased (see arrows on the figure). The advent of the aluminum industry shortly before the Second World War produced a similar acceleration in the redistribution of occupations. During the War, "unskilled workers" even became the modal occupational class. The war effort certainly accelerated a longer term trend that was initiated with the advent of the industry and that was apparently irremediable. In the late 1950's, the proportion of unskilled workers began to level off, to the benefit of the other occupational categories. The proportion of white collars, whose numbers were relatively low until that point,

increased rapidly during those years. The part occupied by skilled workers and artisans also increased but at a lower rate. Only the proportion of semi-skilled workers remained more or less stable over time. Note that social mobility also accounts for the secular trend depicted in Figure 1. As time passed, more and more young men who were brought-up on the farm left the familial estate and engaged in the industry right at the beginning of their active life. But many also moved out of the farmer occupation later in life. In our data, they are declared "farmers" until a certain point and then "workers" or "white collars" in the following episodes.

Figure 2 about here

Another characteristic of interest for this study that sharply varied over time is the capacity to sign (Figure 3), which certainly denotes a parallel increase in alphabetization, if not in literacy[3].The equivalence between this ability and literacy, however, is not as simple and unambiguous as one might presume (Bouchard and Larouche, 1989). Apart from the important time variations showed in Figure 2, there are also important variations for the same individuals, depending on his/her age, or the type of celebration[4]. Many individuals would sign their marriage certificate, but not the birth certificate of their first or second child. After repeated passages without a single signature, the same individuals would again sign at the death of a second child, or at the death of their spouse.

[3] One may want to distinguish between the capacity to sign (i.e., "alphabetization") and the true capacity to read and write as a mean of communication (i.e., "literacy"). See Stone (1969).

[4] There were certainly variations originating from the priests themselves. A zealous priest could have insisted that a reluctant parishioner, careful to not expose his incapacity in front of witnesses, still sign the register, while another, more scrupulous, would to the contrary make sure that someone who, he knows, is not able to write does not deceive the ecclesiastic or civil authorities with a "faked" signature.

Figure 3 about here

As education and literacy increased over time in the region (Ouellet, 1984; Bouchard and Larouche, 1989), the probability that an individual would sign any type of certificate in the parish records increased with age. Further, marriage certificates were more likely to be signed than birth or death certificates, probably because the priests were simply following standard church rituals giving priorities to marriage certificates. The *Ordonnance de Saint-Germain-en-Laye* (edicted in 1667) and the later edicts from the *Conseil Supérieur de la Nouvelle-France* (in 1727) explicitly required the signatures of the subjects of a marriage (Bouchard and Larose, 1976). For this reason, marriage certificates are, we believe, less discriminating than birth or death certificates to delineate literate from illiterate individuals, or to identify partial levels of literacy.

Occupation, social mobility and adult mortality

The first analysis by period traces mortality conditions from the beginning of peopling up to the last year for which record linkage is systematic. Men who were married between 1842 and 1971 and had at least one child in the region were thus selected and followed through parish register entries from marriage until age 60, using event history analysis (Blossfeld et al., 2007). We divided the study into three time periods in order to minimize the impact of confounding factors originating from secular trends (1840-1899, 1900-1939, 1940-1971), which means that we had to split individual life courses into episodes falling within the specific periods defined therein. For example, an individual entering in observation with a marriage at age 20 in 1927 could be observed until the age of 33 in the period 1900-39 and up to the age of 60 (i.e., in 1957)

in the period 1940-71 if he survived to that age. The time delimitations were chosen to capture and reflect the historical transformations related to industrialization and urbanization. As noted above, farming and logging on the frontier were the main activities during the settlement phase of the region, which quite naturally delimits our first period. The occupational landscape was to be progressively altered with the implantation of the first pulp factories toward the end of the 19th century, justifying a first demarcation point to initiate our second period, and once again shortly before the Second World War with the advent of the aluminum industry, justifying a second demarcation point initiating our third period[5]. Modern industrial activities, indeed, only began to have an influence on the local culture and society during this period, "when the old traditional order was broken up by a number of factors like the shortage of agricultural lands and the Great Depression" (De Sève and Bouchard, 1998, p.351).

For each individual, there are as many observations as there are "returns" to the registers (mostly for baptism, marriage or death of children), sometimes as often as 45 times, with an average of 14.1 (this means that, on average, we have an observation approximately every 2.5 years, as the average age at marriage is 25 years). At each time point (age), the occupation, the literacy and the residence statuses are evaluated for their effect on the hazard of mortality until the next time point, which can be either death, right censoring, or the beginning of a new episode[6]. Since occupation would not be systematically declared or consigned, we imputed the

[5] The first aluminum plan was built in 1925, but production remained relatively marginal until the start of the War. The aluminum industry was supported by the development of vast hydro-electric complexes: between 1900 and 1950, about 50 hydro-electric centrals were built on the Saguenay river system (Girard and Perron, 1989).

[6] Most of the people recorded shortly before 1940 are seen alive again after that year (e.g., in 1940, 41, 42, etc.) and were thus right censored that year (i.e., in 1940). For the last period, however, we have no way of confirming whether someone last seen alive toward its end is still alive when it is terminated (after 1971) and so, while deaths keep on being recorded up to the very last year, a large fraction of people are right censored long before the end of the observation. This leads to an overestimation of mortality. To alleviate this problem, we supposed that all those who were right censored during the last period survived to the end of that period or to the age of 60 if they attained that age beforehand. Obviously, this may lead to the opposite problem of underestimating mortality as we may miss

missing cases with the values from the previous episodes[7]. We tested various literacy measures, including a fully time-varying specification and its value at the time of the first birth (time-constant). As the meaning and the consequences of "living in a town" has changed over time, we used specific population sizes for each period to define urban/rural statuses. In the first period, an urban area is defined as a locality that has more than 5,000 inhabitants, while the corresponding numbers for the second and third periods are, respectively, 10,000 and 15,000 inhabitants. In all three periods, a rural area has less than 1,000 inhabitants, leaving the sizes of the semi-urban areas varying from 1,000 and 5,000 in the first period, from 1,000 to 10,000 in the second, and 1,000 to 15,000 in the third. Population sizes were taken from Canadian censuses which began in 1851 in Canada (Atlas électronique du Saguenay-Lac-St-Jean, 2009).

Although we divided the study in three distinct periods, we entered the year of the episode under observation in order to capture secular trends that could still take place within each period. We also controlled for the age at marriage as those who married later had a smaller overall length of observation. This variable did not vary much over time or by any other variable of interest (Gauvreau and Bourque, 1990) and turned out to be not significant in most cases. We did not include immigrants (those who were born outside the region but who married inside) in the analyses of the second and third periods because information about their age comes from a declaration in their death certificate, leading to an overestimation of their mortality as we move forward in time.

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the death records of those who moved out of the region. However, based on analyses performed on the previous period of 1900-1940, we believe that this bias is relatively small. For instance, only about 5.7% (=827/14510) of the subjects who were observed in the period 1900-1939 were lost to follow-up and were not found alive or dead in the region after 1939; applying the same mortality rate to these emigrants as the rate observed in the region leaves a very small fraction of missed death records. Be that as it may, results for the last period were very similar when using the usual right censoring scheme, except for an "artificial" increase in mortality between 1960 and 1971.

[7] Results were practically unchanged when removing the imputed cases, although the individual life courses were cut in disjoined bouts where information on occupation was lacking and sample sizes were smaller.

Since the shape of mortality in adulthood before age 60 could not be satisfactorily approximated by a known parametric function, we used Cox proportional hazard models, which leaves the baseline hazard unspecified. Entries in Table 2 are hazard ratios with values over and below 1 representing, respectively, increased and decreased mortality rates (in relative terms). It can be seen for instance that, overall, mortality decreased by approximately 1 to 2 percent per year in the three periods (the hazard ratios, or HR, are between .98 and .99). Of course, just like a crude mortality rate, this measure may be influenced by the age structure of the population. Immigrants (only considered in the first period; see above) appeared to have an advantage over the native born, although the parameter is not significant (not shown here). We first envisioned that age at marriage would reflect, in the first period, a "first arrived – first serve" settlement effect whereby those settling earlier on the frontier would benefit from the best lands available. However, the parameter is in the opposite direction, with better outcomes for those who married later. Those who marry later were perhaps in better position to face the harsh conditions on the frontier when settling-up a new household. Be that as it may, results were not appreciably altered when removing individuals who married early (i.e., before age 20) or "late" (i.e., after age 30) from the analysis (not shown here).

The impact of urban/rural residence varies over time as it becomes much less important in the second and third period. It is clear that the higher prevalence of epidemic diseases during the 19th century accounts for this important difference (see above). For the more recent periods, finer grain analyses show that mortality is not the highest in the large industrial cities of the higher Saguenay (Chicoutimi, Jonquière, Arvida) but instead in the intermediary sized cities that are located around the Lac-Saint-Jean. Access to aqueduct and public sanitation systems as well as distance from hospital services could help explain the results. Concerning literacy, its impact

becomes significant in the second period and mostly in the third, with a large effect size. Those who did sign the register had a mortality rate that was divided by 5 (HR = 0.209 in the third period) in comparison with those who did not sign. There could be instances of reverse causality when an unhealthy condition would prevent an individual to sign and so we also tested the variable "signature at the time of the birth of the first child" and still obtained a highly significant result, although the effect size was appreciably smaller (HR=0.462 in the third period, not shown here). We now turn to our main variable of interest, i.e., occupational status.

Table 2 about here

Contrary to expectations from the fundamental social cause theory, the elite or those occupying the highest occupational statuses (i.e., the white collars) do not appear to have the lowest mortality; if anything, their mortality is higher than that of any other groups, at least in the first two periods, which we describe first. White collars had a mortality rate that was 50% higher than farmers before 1900, and 57% higher than farmers between 1900 and 1939. Unskilled workers (i.e., day laborers, or "*journaliers*"), who were expected to have the highest mortality rate, had a lower hazard ratio in comparison (respectively 1.312 and 1.296 for the first and the second periods). Note, however, that many of the so-called "*journaliers*" were indeed former farmers who had previously passed the land to their sons; these individuals would not be "authentic" day laborers but ex-farmers caught-up at an older stage of the life cycle. When we created a special category for these individuals who were "once farmers", we saw that they had lower mortality than those who never were farmers. As for the skilled workers (mostly artisans in those years) and the lower skilled workers (crofters, carpenters, etc.), they seemed to share the

same levels of mortality than the farmers, a tendency that is apparent until 1940 (since the corresponding parameters are not significant in the first two periods).

The second phase of industrialization in the region, beginning in 1940 and initiating our third period, brought upon changes that markedly affected the distribution of risks among the socio-occupational classes. The strong communality of results from the first two periods is broken. Most notably, specialized and lower skilled workers, who previously had mortality rates similar to farmers, now have the highest mortality, with a hazard ratio of, respectively, 1.424 and 1.456. The reason behind this marked contrast for the specialized worker category is partly compositional. Separate analyses show that the bulk of the increase essentially comes from specialized workers engaged in the heavy industry ("*opérateurs*", "*chauffeurs*", etc.). Artisans (blacksmiths, shoemakers, etc.), who were in proportion more numerous in the earlier periods, are also included in the "specialized workers" category, but they essentially remained outside of the industry and continued to share a level of mortality similar to that of the farmers (not shown here). Although mortality among the white collars remains high relative to farmers (HR= 1.416), they no longer have the worst outcomes, while unskilled workers now have the second lowest mortality, after the farmers. Once again, the relative porosity between the two statuses, whereby a farmer becomes an unspecialized worker in a later stage of the life cycle, could partly account for this result.

We further investigated this issue by looking at the impacts of changes in job statuses, allowing for a test of the convergence and divergence hypotheses at the individual level (see introduction). Table 3 shows the effect on the hazard of moving from an occupational class to another one (or remaining in the same class) by comparing, prior entry into a spell, the modal occupation to the actual occupation. In order to prevent unnecessary confusion and without any

serious loss of information, we regrouped the skilled, lower skilled and unskilled workers together for this analysis and classified the concerned individuals as “manual workers”. We also left aside the other control variables, for which the results remain largely unaltered in this new analysis. The reference category is “farmer who remained farmer”.

Table 3 about here

None of the coefficients are significant in the first period, probably due to a lack of statistical power. Sample sizes are smaller than in the previous analysis because the first episode of an individual entering into observation at marriage cannot, by definition, contain information on social mobility[8]. Nevertheless, the trends that are only apparent in this first period are confirmed in the second period, which depicts similar results but with significance. We highlight a few noticeable results. In comparison with a farmer who remains farmer, a man whose modal occupation is white collar has a mortality rate that is 77.5% higher, whatever his last occupational position (which usually is “white collar” since very few moved out of this occupation). Leaving the farm is associated with contrasted outcomes. Unexpectedly, a farmer who becomes a white collar faces a mortality rate that is increased by 56.5% in comparison with a peer who remains farmer, while the same farmer who becomes a manual worker faces no decipherable increase in mortality. The latter trend is, perhaps ironically, not so surprising given the back and forth between the two occupational statuses. As for the manual workers, those who do not change occupation have a mortality rate that is about 20% higher than that of a farmer who also does not change his occupation. However, occupational mobility appears to benefit

[8] The reduction in sample size is however not drastic since changes in statuses for the first episode can still be traced for individuals who enter in observation at later stages of the life course.

manual workers as becoming either farmer or white collar leads to mortality rates that are not significantly different from the farmers.

Once again, the third period offers a contrasted picture. Social mobility is still beneficial for manual workers if they become farmers (as the risks are not significantly higher) but, contrary to what was seen before, not if they become white collars (HR=1.618). If white collars still endure high mortality rates (HR=1.601), farmers who join their rank no longer face significantly higher risks (HR=1.228; p=.316), in contrast with another move toward a manual occupation (HR=1.295). Although no formal test was performed, the comparison of the hazard ratios in the three periods gives no clear indication that mortality rates would have converged or diverged over time.

Longer term effects of occupational status on mortality: Longevity

We now turn to mortality at older age. Rather than tracing the impact of being in a given job at specific ages, the purpose of this second study is to assess the effect of cumulating experience in a given position on survival chances over the long run. Thus, instead of specifying occupational position as time-varying as above, we will take the modal values of this variable during the active life and set this variable as time-constant after entry in observation at age 60. Another reason for not using a time-varying specification for the study of longevity is that occupations at older ages are often not representative of the occupation a man had for most of his life. We already alluded to the problem above when pointing to those farmers who were declared "unskilled workers" at older ages; it is obvious that their health profile is not the same as those who were employed on an aluminum plant for most of their life. On the other hand, since residential patterns and literacy are mainly used here as control variables, we use both a time-

constant (modal) value and a time-varying specification for these two variables. Birth year and age at marriage are by definition time constant.

We follow until cohort extinction individuals born before 1875, immigrants or not, who married in the region, and who survived at least to age 60 (we have of course already seen many of these individuals in the previous analyses but at younger ages). Results are presented in Table 4. Apart from age at marriage, which shows a beneficial effect of marrying later, the results concerning the control variables (year of birth, urban/rural statuses and literacy) are somewhat different from the previous results of Table 2, which were based on adult mortality. For example, men born more recently did not live longer after the age of sixty than those born earlier. The hazard ratio is even in the opposite direction. Those born earlier were mostly immigrants to the region, and probably benefited from the 19th century equivalent of the "healthy immigrant effect" (they were selected)[9]. Literacy did not translate into longer life in old ages either, although the coefficients are in the expected direction. Finally, the modal residence prior to age 60 seems to have no influence on mortality after that age, but the place of residence at the beginning of the last episode of observation is relevant: living in an urban area at older ages reduces mortality by about 20%, even though it was shown to be detrimental at younger ages in previous analyses. It is likely that proximity to a hospital, particularly in the most recent periods, was a critical factor influencing mortality among the elderly.

Table 4 about here

[9] A model interacting the immigrant status with the year of birth reveals such advantage for those who arrived earlier into the region (not shown here).

In contrast, the new results for occupation largely parallel those of Table 2, at least for the first two periods, which covered the same individuals when they were younger (they were followed to age 60 until 1935). In other words, the occupational factors of adult mortality seem to retain their importance beyond the active life stage and influence longevity. As in the first two periods, farmers and skilled workers (artisans) have the lowest mortality, followed by lower skilled workers, unskilled workers, and, finally, white collars. The only exception concerns the lower skill workers, who now show significantly higher mortality than the farmers (HR=1.188, p=0.009). For the most part, however, the directions of the effects are remarkably similar, although the hazard ratios are slightly smaller in the longevity study.

It also appears that a *change* in occupation has short and long term consequences that are quite similar. This can be seen by comparing results from Table 3 to Table 5, which addresses the longer term influence of mobility from the modal occupation to the last occupation recorded prior to age 60. Once again, in order to ease the presentation, a few categories were regrouped in Table 5, but this time, artisans were regrouped with farmers (who have very similar mortality rates in the earlier periods and in this cohort) and lower-skilled workers with unskilled workers (also with largely similar outcomes).

Table 5 about here

Once again, individuals who had "white collar" as a modal occupation, regardless of their last occupation, had higher mortality. The rate is about 36% higher in comparison with individuals who were farmers or artisans during most of their active lives, the reference category. Unskilled or lower skilled workers who were still unskilled or lower-skilled workers at age 60 also had a higher mortality rate after that age (the hazard ratio is 1.319). On the other hand, those

who could secure a “white collar” occupation as their last occupation prior to age 60 did not have a significantly higher mortality rate than the farmers or artisans (the hazard ratio is 0.990; p=0.943).

Generally the hazard ratios for occupational statuses are larger for the adult mortality study than for the longevity study, supporting Antonovsky’s (1967) idea that differences are largest in the middle years of life. The differences before age 60, however, have less impact on life expectancy than difference after that age since mortality rates are smaller at younger than older ages. For example, the number of years lived between age 20 and 60 are 37.99 and 37.05, respectively for the farmers and the white collars, i.e., a one year difference. Although, the corresponding hazard ratio is smaller, the difference in life expectancy after age 60 is about two years (the figures are, 16.92 and 15.06, respectively). Overall, differences in life expectancy between occupational statuses are sizeable, but not very large when compared, for example, to gender differences (see above).

Discussion

The Saguenay-Lac-Saint-Jean region appeared as an ideal study population to trace the conditions under which socioeconomic differences in mortality emerge and, presumably, evolve toward a gradient advantaging the wealthiest and the elite. A small community of founders clearing the land and establishing farmsteads on a vast frontier is progressively turned into a prosperous industrial region during a period that largely covers the 19th and the 20th centuries. However, not a slight indication of a wealth gradient in mortality was found in this study. In fact, as late as the 1970’s, those who are supposed to have the best outcomes, the white collars, still

maintain a disadvantage that was prevalent right at the outset of settlement, at least in comparison with the farmers, who always had the lowest mortality.

Although the apparent disadvantage of the white collars began to fade out during the last period (relative to farmers, other groups had higher risks), it is not like if they finally began to use their assets (power, prestige, etc.) to benefit their health; they were simply "rejoined" and "overtaken" by other groups (i.e. the manual workers), who apparently faced the new risks associated with the industry. The only piece of information that could provide evidence that higher socioeconomic position can lead to better health in this region is the improvement seen for manual workers who became white collars, while those remaining in the manual occupations maintain a higher mortality (both in the first two periods of the adult mortality study and in the longevity study – see Table 3 and Table 5). Thus, one could argue that, if this study failed to reveal the emergence of socioeconomic differentials in mortality using longer time historical trends at the aggregate level, it would still offer some support at the individual level, through social mobility. Note, however, that the improvement for manual workers moving up the social ladder is not seen in the very last period (see Table 2). Further, the analysis does not allow us to declare whether upward social mobility itself acted as a protective factor (i.e., a causal effect) or whether upward mobility simply identifies or tracks exceptional individuals whose beneficial endowment and vitality were important in their social ascension and health (i.e., a selection effect). Consequently, our study provides little evidence that socioeconomic status was a determinant of health and mortality. Why?

We explore several possibilities. First, socioeconomic differences themselves were perhaps never pronounced enough in the region to induce decipherable health differentials. The Saguenay-Lac-Saint-Jean is a recently founded population and the social fabric of such a

population does not rest on generations of nepotism and intergenerational transfer of wealth and status. For a long period of time, the land belonged to those who were willing enough to clear it. It would not be surprising to find little socioeconomic differences in mortality or even none if there were relatively few socioeconomic differences to begin with. Interestingly, Perron and colleagues (1998) conducted a study on mortality for the 1979-83 period in the Chicoutimi-Jonquière urban area, dividing the territory in three socioeconomic zones. Their results indicate that the favoured zone had lower mortality than the less favoured zone. However comparing their results to those obtained for the Montreal area in 1970-72, they found that the less favoured group had mortality levels similar to those of the same group in Montreal whereas the advantage of the favoured group was much less marked in Chicoutimi and Jonquière.

Assuming that, if less important than elsewhere, socioeconomic differences nevertheless always existed in the region, these differences could still be not well measured by the imperfect instruments of the present study. For instance, there may be appreciable wealth variations among the farmers, but the data at hand would not allow us to size and express the influence of these variations on mortality. Matching the parish registers data used here with the Canadian censuses (which contains information on the size of the property and the land) could help clarifying this issue. But other problems would also surface. White collars, for example, were not always “true” members of the local elite and breaking down the category into many groups in order to treat “lower skilled” white collars (office employees, clerks, etc.) separately from those with higher professional skills reveals some contrasts within the category (not shown here). Yet, none of the several rearrangements of the occupational classes that we performed did result in a hierarchy of health favoring the higher socioeconomic position to the detriment of the lower classes, let alone the farmers.

It is clear that any classification is not without drawbacks and that results always partially depend on rather arbitrary choices. But there are reasons to believe that the disadvantage of the white collars was indeed real. Other North American studies also tell the same story. For instance, Ferrie's study (2003) of 19th century America found lower mortality in families in which the household head was a laborer in comparison with families in which the head was a white collar. He attributed this result to health selection processes: one would need to be in relative good shape to do manual work. Many white collars in Saguenay were perhaps too frail and unhealthy to accomplish the physical tasks necessarily involved on the farm. To these selection effects, we may add genuine life style effects or "vices" associated with the higher social classes in the past, as described in Razzel and Spence (2006). But it would be hard to believe that such factors, which can certainly help explain mortality differentials in a nineteenth century context, would have retained their importance for such a long time and very late into the twentieth century. The patterns reported here for the Saguenay-Lac-Saint-Jean population, especially in the third period, appear relatively unique and call for more specific explanations.

One way of accounting for the results for that period is to think in terms of occupational risks. The evolution of mortality differentials in the region, indeed, appears to be driven by such risks rather than by socioeconomic differences. We already showed how the second phase of industrialization was associated with important changes. It seems that the industry, which progressively took over the region, marked the frontier between higher and lower mortality risks. The critical factor could be the exposure to toxic environmental conditions that were shared by white collars and their employees during the active life stage. A large fraction of the white collars was indeed engaged in the industry as foremen or in other occupations. Workers with some skills had notorious high accidental hazards on the workplace, perhaps even more than

unskilled workers, who did not have to operate dangerous machinery. Away from the factories and industries, farmers and artisans did not have to face these new and often poorly understood risks and health hazards. They would have also benefited from a "better air." One way to test these hypotheses would be to perform the same analysis for women, who for the most part did not work in the industry. It is likely that, historically, high SES benefited women long before men for that reason, as well as for other lifestyle characteristics (see Edvinsson and Lindkvist, this issue, p.__).

Even though industrialization was responsible for the appearance of more marked differences in occupational risks, it would be inaccurate to argue that, on the balance, it contributed to deterioration of living conditions in the region. After all, mortality did decrease at a relatively fast pace over the years (see Table 2), and this, precisely when large fractions of the population were leaving the farm, thus moving out of the healthiest occupation. Some large scale mechanisms associated with modernization acted in parallel to curve down mortality trends. Alphabetization, literacy, and education certainly had an important role in this historical process. But a closer look at this issue highlights the inefficiency of conceptualizing mortality differentials through social differences in access to "health related knowledge" when using literacy as a proxy.

As shown in Table 2, the impact of literacy increased over time. There are a few possible interpretations for this result. First, the capacity to sign the registers could genuinely be tracing the beneficial effect of literacy and education in general (those who are more educated make better health choices, have better life style characteristics with regards to health, etc.). In this scenario, literacy is increasing over time and its increasingly beneficial effect would be traced when using the "capacity to sign" as a proxy (as the corresponding parameter estimates depict a

smaller effect size in earlier periods). However, since the vast majority could sign, especially in the last period (the proportion is approximately 90%), the variable most likely captures a selection effect, i.e., the detrimental effect of *illiteracy*. In other words, by using the capacity to sign the register, we did not really trace the increasingly beneficial effect of literacy on health but rather the increasingly detrimental effect of illiteracy. This second interpretation is preferable because if literacy was truly capturing improvements, we would expect to see white collars, who were always the most literate, benefiting from it.

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References

Antonovsky, A., 1967. Social class, life expectancy and overall mortality. Milbank Memorial Fund Quarterly, 45, 31-76.

Atlas électronique du Saguenay-Lac-Saint-Jean (2009), Laboratoire d'expertise et de recherche en géographie appliquée (LERGA), Université du Québec à Chicoutimi, www.uqac.ca/atlas.

Bengtsson, T, and F. van Poppel, 2010. Socio-economic differences in mortality: the need for a historical approach, this issue, p. __.

Bengtsson T., and M. Dribe, 2010. Socioeconomic status and Mortality during the mortality transition: a micro-level study of age-specific mortality in rural southern Sweden 1815-1894, this issue, p.__

Blossfield, H-P., Golsch, K., Rohwer, G., 2007. Event history analysis with stata. Lawrence Erlbaum Associates.

Bouchard, G. and A. Larose, 1976. La réglementation du contenu des actes de baptême, mariage, sépulture, au Québec, des origines à nos jours. Revue d'histoire de l'Amérique française 30, 67-84.

Bouchard, G. and J. Larouche, 1989. Nouvelles mesures de l'alphabétisation à l'aide de la reconstitution automatique des familles. Histoire sociale - Social History 22, 91-119.

Bouchard G, 1992. Current issues and new prospects for computerized record linkage in the province of Quebec. Hist. Method 25, 67-73.

Bouchard G, Roy R, Casgrain B, Hubert M, 1995. Computer in human sciences: from family reconstruction to population reconstruction. In: Nissan E, Schmidt KM, (Eds). From information to knowledge: conceptual and content analysis by computer. Oxford, England: Intellect, pp. 201-227.

Bouchard G., 1996a. Quelques Arpents d'Amérique. Population, économie, famille au Saguenay, 1838-1971. Montréal, Boréal, 635 pages.Bouchard, G., 1996b. Tous les métiers du monde. Le traitement des données professionnelles en histoire sociale. Quebec City.

Charbonneau, H., B. Desjardins, J. Légaré et al., 2000. The population of the St-Lawrence Valley, 1608-1760. In A population history of North America, M.R. Haines and R.H. Steckel, (Eds) Cambridge: Cambridge University Press, Pp. 99-142.

De Sève M., Bouchard G., 1998. Long-term intergenerational mobility in Quebec (1851-1951): the emergence of a new social fluidity regime. Canadian Journal of Sociology, 23-7, 349-367.

Edvinssson, S., and M. Lindkvist, 2010. Wealth and Health in 19th century Sweden: a study of social differences in adult mortality in the Sundsvall region, this issue, p.__.

Ferrie, J. P., 2003. The rich and the dead: socioeconomic status and mortality in the United States, 1850, 1860. Health and Labor Force Participation over the Life Cycle: Evidence from the Past. D. L. Costa. Chicago, Chicago University Press, Pp. 11-50.

Gauvreau, D., Bourque, M., 1990. Jusqu'à ce que la mort nous sépare: Le destin des femmes et des hommes mariés au Saguenay avant 1930. Canadian Historical Review/Revue d'histoire canadienne LXXI 4, 441-461.

Girard C., Perron N., 1989. Histoire du Saguenay-Lac-St-Jean. Québec, Institut québécois de recherche sur la culture, 665 pages.

Henry, L., 1967. Manuel de démographie historique. Paris, Droz.

Hollingsworth, J. R., 1972. Rapport préliminaire. Annales de démographie historique 1972: 16.

Houde, L., Tremblay, M., Vézina, H., 2008. Intergenerational and genealogical approaches for the study of longevity in the Saguenay-Lac-St-Jean Population. Human Nature 19(1): 70-86.

Institut de la statistique du Québec, 2009. www.stat.gouv.qc.ca

Kunst, A. E., Bos, V., Andersen. O., Cardano, M., Costa, G., Harding, S., et al., 2004. Monitoring trends in socioeconomic inequalities in mortality: experiences from a European project. Demographic Research Special Collection 2, 229-254.

Kunst, A. E., Groenhof, F., Mackenbach, J.P., Health, E.W., 1998. Occupational class and cause specific mortality in middle aged men in 11 European countries: comparison of population based studies. EU Working Group on Socioeconomic Inequalities in Health. British Medical Journal 316, 1636-1642.

Link, B. G., Phelan, J., 1995. Social conditions as fundamental causes of disease. Journal of Health and Social Behavior Spec No, 80-94.

Mackenbach, J. P., Bos, V., Andersen, O., Cardano, M., Costa, G., Harding, S., et al., 2003. Widening socioeconomic inequalities in mortality in six Western European countries. International Journal of Epidemiology 32, 830-837.

Moheau, J.-B., 1778. Recherches et considérations sur la population de la France. Paris, Geuthner.

Ouellet, J., 1984. L'instruction publique au Saguenay à travers les rapports du Surintendant de l'instruction publique, 1876-1966: Une étude exploratoire. Études régionales. Chicoutimi, Université du Québec à Chicoutimi. Master: 224.

Perron M., 1997. Sociogéographie de la santé à micro-échelle. Un modèle de différenciation spatiale au Saguenay-Lac-St-Jean. Thèse de doctorat. Université paul Valéry - Montpellier III. 470 pages.

Pouyez C., Lavoie Y., Bouchard G., Roy R., 1983. Les Saguenayens. Introduction à l'histoire des populations du Saguenay, XVIe XXe siècles. Presses de l'Université du Québec.

Razzell P., Spence C., 2006. The hazards of wealth: adult mortality in pre-twentieth-century England. Social History of Medicine 19, 381-405.

Roy R., Bouchard G., Declos M., 1988. La première génération de Saguenayens : provenance, apparentement, enracinement. Cahiers québécois de démographie 17, 113-133.

Sharlin, A., 1978. Methods for estimating population total, age distribution and vital rates in family reconstitutions studies. Population Studies 32, 511-521.

Stone, L., 1969. Literacy and education in England, 1640-1900. Past and Present 42, 69-139.

Van Leeuwen, M., Maas, I., 2005. A short note on HISCLASS.

Villermé, L.-R. 1828. Mémoire sur la mortalité dans la classe aisée et dans la classe indigeante.

Willson, A., 2009. Fundamental cause of health disparities: a comparative analysis of Canada and the United States. International Sociology 24, 93-113.

Figures

Figure 1. Location of the Saguenay-Lac-Saint-Jean region (Quebec, Canada)

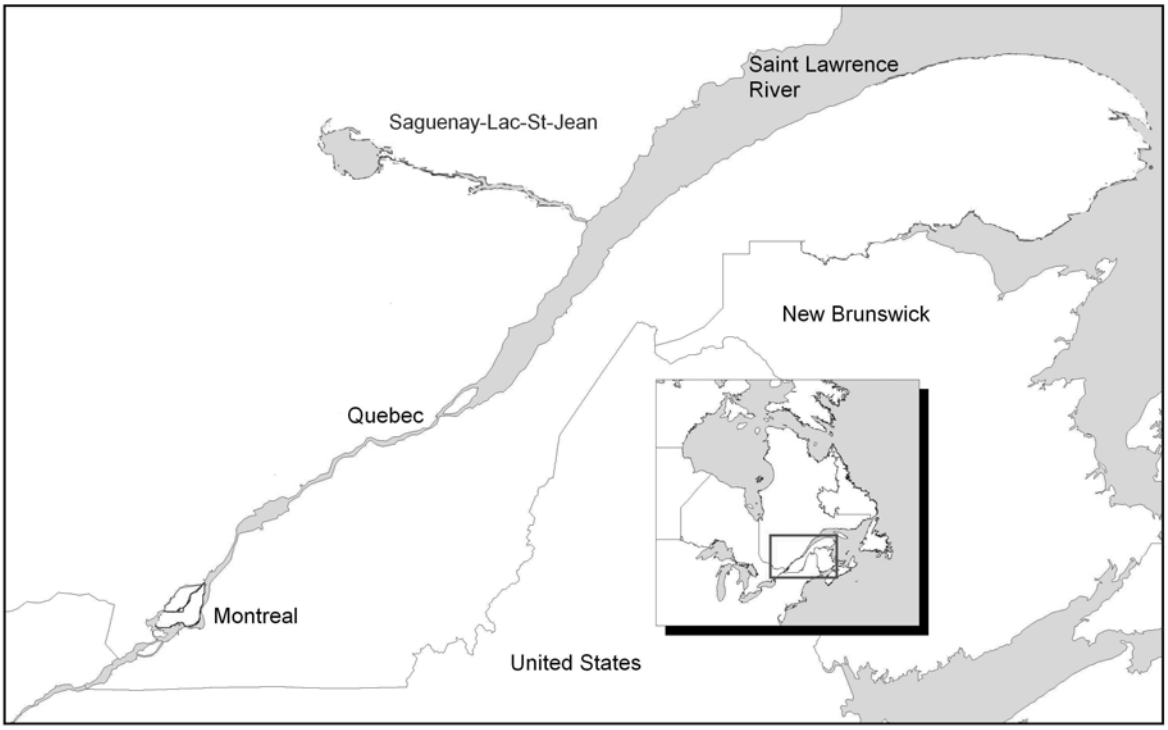


Figure 2. Occupational class distribution (%) per year in the Saguenay-Lac-Saint-Jean parish registers (1940-1971)

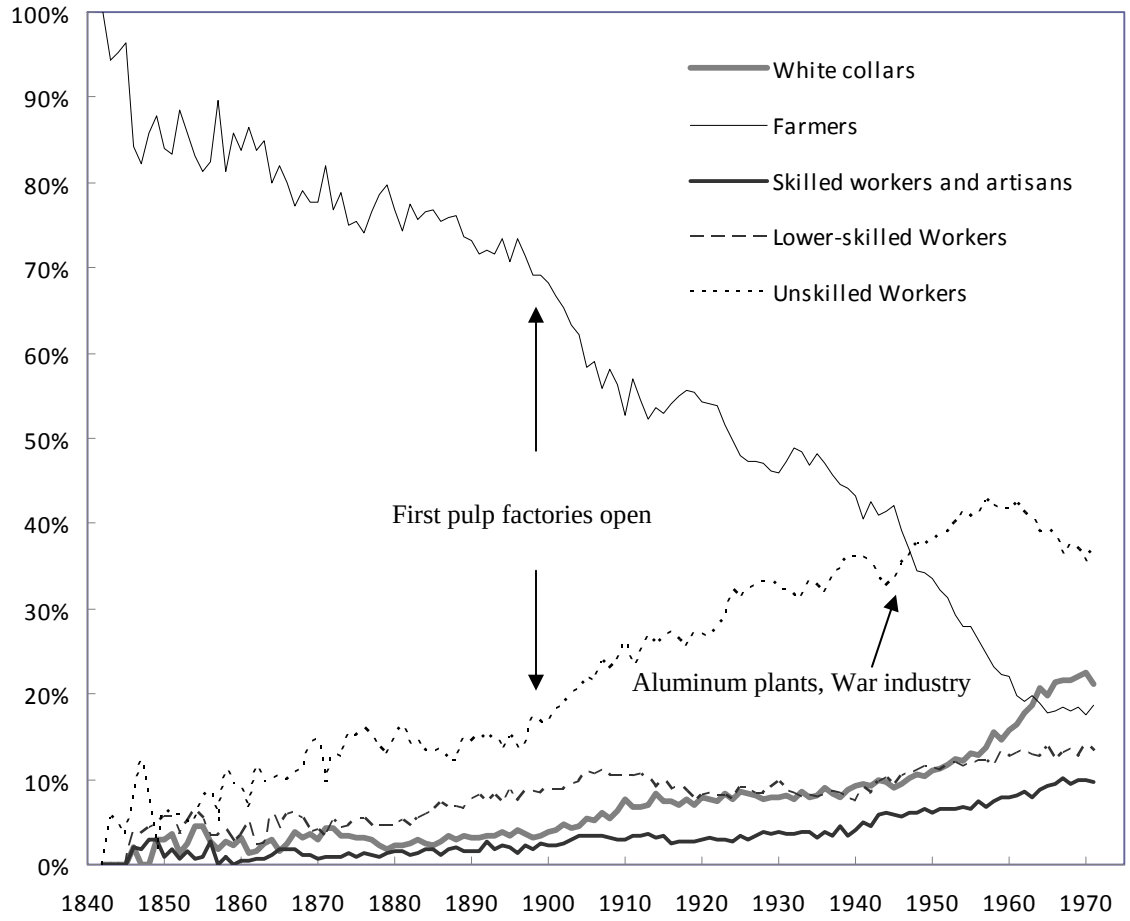
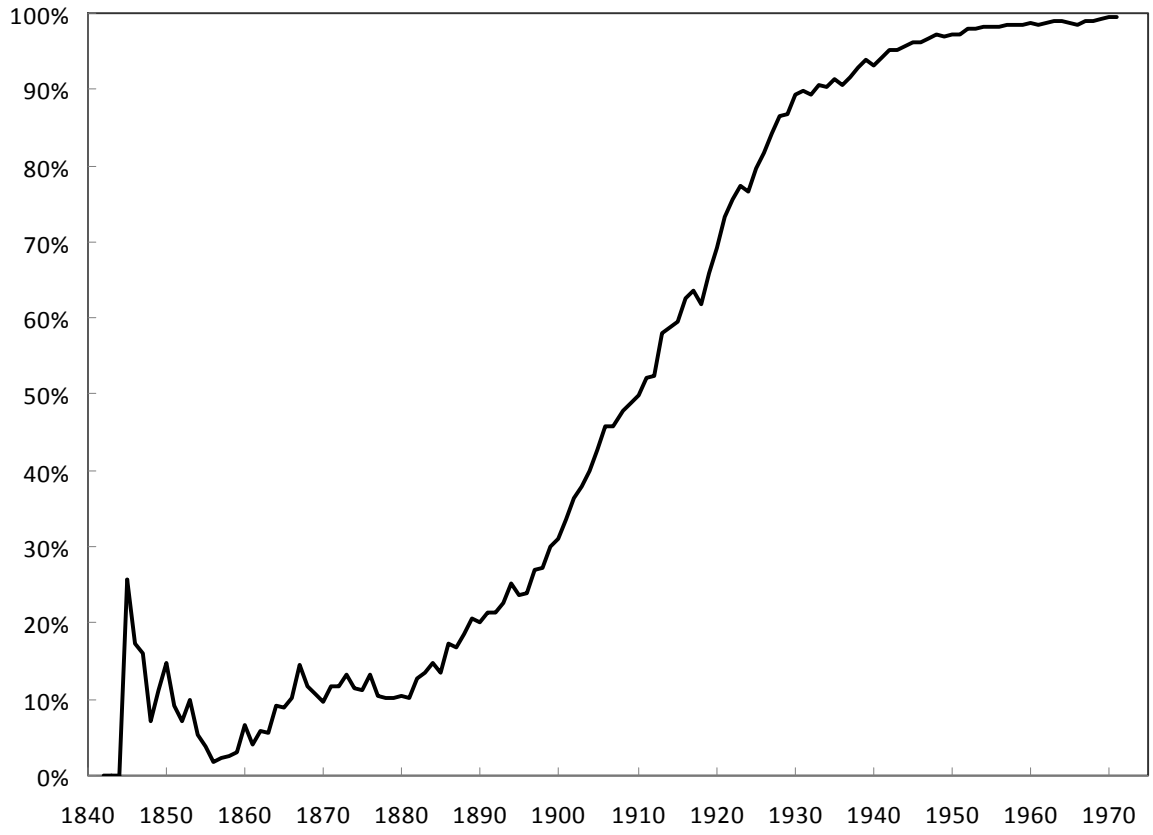


Figure 3. Proportion of signed records by the subjects of this study in the Saguenay-Lac-Saint-Jean parish registers (1840-1971)



Tables

Table 1. Classification of social classes and HISCLASS correspondences

HISCLASS	This study		
	Bouchard's Code	***SES***	*Examples*
1-6	*1-15*	***1 - White collars***	Higher managers, higher professionals, lower managers, lower professionals, clerical and sales, lower clerical and sales, foremen, etc.
8	*16*	***2- Farmers***	*All declared "cultivateurs"*
7	*17, 19*	***3- Specialized workers and Artisans***	*Craftsmen, Blacksmiths, , etc.*
9-10	*20*	***4-Lower skilled workers***	*Crofters, carpenters, etc.*
11-12	*21*	***5-Unskilled workers***	*Day laborers (« journaliers »),etc.*

Table 2. Cox hazard models of mortality between marriage and age 60 per period

	Period					
Variable	1840-1899		1900-1939		1940-1971	
	HR	p	HR	p	HR	p
Year of episode	0.979	0.000	0.982	0.000	0.987	0.000
Age at marriage	0.965	0.002	0.991	0.224	0.996	0.417
Occupation						
Farmer	REF					
White Collar	1.502	0.078	1.567	0.000	1.416	0.000
Skilled worker	0.714	0.505	1.001	0.996	1.424	0.000
Lower skilled worker	1.098	0.633	0.978	0.835	1.456	0.000
Unskilled worker	1.312	0.022	1.296	0.000	1.311	0.000
Residence						
Rural	REF					
Semi-Urban	1.315	0.043	0.936	0.383	1.130	0.142
Urban	2.700	0.000	1.341	0.002	1.382	0.000
Signed the register	0.834	0.206	0.768	0.000	0.209	0.000
Number of observations	44,279		119,118		186,962	
Number of subjects	5,322		14,510		36,097	
Number of deaths	497		1,361		2,475	

Notes: HR: Hazard ratio; p: p-value

Population sizes:

Rural: <1,000 for the three periods;

Semi-Urban: 1,000-4,999 (<1900); 1,000-10,000 (1900-39), 1,000-15,000 (1940-71);

Urban: >5,000 (<1900); >10,000 (1900-39); >15,000 (1940-71).

Table 3. Cox hazard models of mortality between marriage and age 60 per period according to social mobility

		Period					
Occupation		1840-1899		1900-1939		1940-1971	
Modal	Last	HR	p	HR	p	HR	p
White collar	Any	1.524	0.107	1.775	0.000	1.601	0.000
Farmer	White collar	1.640	0.276	1.565	0.049	1.228	0.316
Farmer	Farmer	REF					
Farmer	Manual Worker	1.264	0.168	1.129	0.235	1.295	0.009
Manual worker	Farmer	0.872	0.741	1.012	0.952	1.080	0.651
Manual worker	White collar	1.413	0.627	1.021	0.930	1.618	0.000
Manual worker	Manual worker	1.168	0.222	1.203	0.004	1.547	0.000
Number of observations		42,753		113,853		173,836	
Number of subjects		5,210		13,807		33,871	
Number of deaths		482		1,326		2,408	

Notes: HR: Hazard ratio; p: p-value

The first column represents the modal occupation of the individual until the beginning of an episode, while the second represents the last occupation prior that episode. For example, entries in the second line refer to individuals who were farmers for the most part but who had “white collar” as their occupation at the beginning of the episode. Parameters were adjusted for the same control variables as in Table 2.

Table 4. Cox hazard models for mortality after age 60 according to the modal occupation prior to that age (men born before 1875)

Variable	HR	p
Year of birth	1.002	0.123
Age at marriage	0.990	0.005
Occupation		
White collar	1.343	0.000
Farmer	REF	
Skilled worker	1.093	0.480
Lower skilled worker	1.188	0.009
Unskilled worker	1.258	0.000
Residence (modal value prior to age 60)		
Rural		
Semi-Urban	1.068	0.210
Urban	0.982	0.888
Residence (last value)		
Rural		
Semi-Urban	1.077	0.154
Urban	0.822	0.001
Sign the register (modal value prior to age 60)	0.974	0.529
Sign the register (last value)	0.969	0.403

Notes: HR: Hazard ratio; p: p-value

Number of subjects: 3851; number of deaths: 3676

Population sizes:

Rural: <1,000 for the three periods;

Semi-Urban: 1,000-4,999 (<1900); 1,000-10,000 (1900-39), 1,000-15,000 (1940-71);

Urban: >5,000 (<1900); >10,000 (1900-39); >15,000 (1940-71).

Table 5. Cox hazard models of mortality after age 60 according to social mobility (men born before 1875)

Modal occupation	Last occupation (<60)	HR	P
White collar	Any	1.359	0.000
Farmer/artisan	White collar	0.919	0.473
Farmer/artisan	Farmer/artisan	REF	
Farmer	Low/No skill worker	1.176	0.007
Low/no skill worker	Farmer/artisan	1.106	0.296
Low/No skill worker	White collar	0.990	0.943
Low/No skill worker	Low/No skill worker	1.319	0.000

Notes: HR: Hazard ratio; p: p-value

Number of subjects: 3851; number of deaths: 3676

The first column represents the modal occupation of the individual, while the second represents the last occupation prior age 60. For example, entries in the second line refer to individuals who were farmers or artisans for the most part but who had “white collar” as their last occupation prior to age 60. Parameters were adjusted for the same control variables as in Table 4.