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Abstract

It is well established that there is a positive statistical relationship between socioeconomic status (SES) and health but identifying the direction of causation is difficult. This study exploits the longitudinal nature of two Canadian surveys, the Survey of Labour and Income Dynamics and the National Population Health Survey, to study the link from SES to health (as distinguished from the health-to-SES link). For people aged 50 and older who are initially in good health we examine whether changes in health status over the next two to four years are related to prior SES, as represented by income and education. Although the two surveys were designed for different purposes and had different questions for income and health, the evidence they yield with respect to the probability of remaining in good health is similar. Both suggest that SES does play a role and that the differences across SES groups are quantitatively significant, increase with age, and are much the same for men and women.

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1. INTRODUCTION

Much research has demonstrated that there is a strong positive relationship between socioeconomic status (SES) and health status. In the words of Fogel and Lee (2003, p.1), "individuals from different socioeconomic backgrounds face distressingly different prospects of living a healthy life". Understanding that relationship, and identifying the causality behind it, is difficult: Are people in poor health because they have low SES, or do they have low SES because of their poor health[1]? In the language of econometrics, is income an endogenous variable in a health determination equation and/or health an endogenous variable in an income determination equation? Establishing the direction of influence in this case is of research interest, but also of practical importance in the design of effective policies to improve population health.

In earlier work we proposed a framework of analysis for identifying the influences of income and education on health while working with Canadian panel data in the context of the older population (Buckley et al., 2004a). We adopt that framework here, and extend our work by analysing a second Canadian panel data set and comparing the results with those based on the first. Our concern continues to be with the socioeconomic determinants of health among the older population, in particular the effects of income and education. We ask whether the chances that older individuals would remain in good health were improved by having higher incomes and better education. As in our earlier work we focus on the population aged 50 and older[2], where we anticipate SES would generally have a greater potential impact on health[3].

There is a large international literature concerned with the income-health connection, dating back at least to the 1967 Whitehall Study (Marmot, Rose, Shipley and Hamilton, 1978). This and subsequent contributions to the literature are ably reviewed by Smith (1999), Benzeval and Judge (2001), Evans (2002), and Deaton (2002, 2003)[4]. Smith (1999), among others, emphasises the difficulty of assessing the direction of causation and cautiously notes, in his concluding remarks (p. 165), that "... economic resources also appear to impact health outcomes ... [and] innovative methods that help isolate economic and health shocks would be informative on this vexing issue of causality".

The Canadian literature on this topic that involves quantitative analysis is quite limited, reflecting the absence of suitable data, at least until recently. One study, that of Badley, Wang, Cott and Gignac (2000), used two years of longitudinal data (1994 and 1996) from the National Population Health Survey for the purpose of assessing the relationship between self-reported health, on the one hand, and chronic health conditions and other factors, on the other. While respondent income was not of central interest in that study, a variable indicating whether income was 'low' or 'not low' was included in the analysis, and 'low' income in 1994 appeared to have a statistically significant and negative association with self-reported health in 1996. However, the issue of the direction of causality was not addressed. So far as we are aware, that study and our own studies (Buckley et al., 2004a, 2004b) are the only ones that have used Canadian longitudinal survey data to assess health outcomes of older people in relation to income[5].

Addressing the issue of causality within our analytical framework does require longitudinal data, such that the health status of the same individuals can be observed at different times and related to other personal and household characteristics. The two Canadian surveys that have this feature are the National Population Health Survey (NPHS) and the Survey of Labour and Income Dynamics (SLID), both conducted by Statistics Canada[6]. In our previous work we relied entirely on SLID; we now consider NPHS as well, and compare the results. The comparison is of particular interest since the data sets have different strengths and have tended to be used by different sets of researchers. SLID was designed to provide good information about income and asked a health question only 'in passing' while the reverse was true of NPHS. The SLID question about health was age-conditioned (compare your health to others of a similar age) while the NPHS question was not. Our view was that if our earlier results could be replicated with NPHS data it would make the conclusions stronger as a basis for policy consideration and would give researchers a greater degree of confidence in using either data set. In fact, it turns out that the two data sets do provide similar estimates of the effects of income and education on health. We find evidence in both surveys of what appears to be a causal link between SES and changes in health status: the higher one's SES the better the chances of remaining in good health. That results based on the two surveys are similar is encouraging for anyone studying the SES/health connection, whether with Canadian data or data for other countries. Not surprisingly, though, while there is strong evidence that SES has a quantitatively important effect, differences in SES account for only a small fraction of overall differences in the probabilities of remaining healthy: most of the differences are left to be explained by genetic and other risk factors. (See section 6 for some further discussion of risk factors.)

2. COMPARISON OF THE TWO SURVEYS

Longitudinal surveys are designed to follow the same individuals through time. By comparing responses from one survey to the next one can learn how the circumstances of individual respondents changed, and try to gain an understanding of why. The names of the two surveys used here are suggestive of the matters with which they are most concerned. A major characteristic of NPHS is that it collects a large amount of information about specific health conditions, treatments sought and used, health care professionals seen, and so on, but only basic information about income. SLID, on the other hand, asks only a little about health but a great deal about income and labour force characteristics. However, for our purposes a key feature is that both asked a similar general health question in each of several years, thus allowing us to observe changes in reported categories of health status from one survey to another. Beyond that, both surveys asked generally similar questions relating to education and total household income, our two indicators of SES.

SLID provides a much larger sample than NPHS, and that was a major consideration for us in choosing to work with it initially. The earliest SLID survey was conducted in 1993, though health questions were not added until 1996. Those interviewed in 1993 formed the first panel, and they were followed year by year for six years. In 1996, year four for the first panel, a second panel was interviewed, effectively doubling the sample size, and it too was followed for six years. Hence for the three-year period 1996-98[7], for a rather large sample, we have information on two health transitions – 1996 to 1997 and 1997 to 1998. Another virtue of SLID is the quality of the information on income that it provides. Seventy-one percent of those in our extract from the SLID sample agreed to have Statistics Canada access the electronic administrative records of their personal tax returns, rather than responding at the time of the survey interview to a detailed set of questions relating to income. Even for those not granting access to income tax records, the facts that the interviews were conducted when people typically had recently prepared their income tax returns, that the questions were related to the tax forms, and that they dealt with the components of income (not just total income), likely enhanced the reliability of the totals.

NPHS was first conducted in 1994 with both cross-sectional and longitudinal components. In the longitudinal component, which is the basis of our work here, the same individuals have been contacted ever since (insofar as possible), at approximately two-year intervals. At the time that we carried out our analysis, data were available for survey years 1996, 1998, and 2000, as well as 1994. In what follows we ignore data from the 1994 survey and focus attention on the other three years in order to match the period of data availability from SLID. This means that for each survey we are able to consider two health transitions, though in the case of NPHS they are two-year transitions while for SLID they are single-year transitions. The income information in NPHS results from a single question asking respondents in which of 11 categories their total household income falls. The definition of income is unspecified, leaving the respondent to interpret what 'total household income' means. By contrast, in SLID the definition is related to income tax returns filed by household members. In consequence, one would expect the SLID income information to be of better quality.

Sample attrition is often a problem in longitudinal surveys. However, the attrition rates have been quite low in these two: only 6.3 percent of respondents to the 1996 NPHS survey and 0.8 percent of respondents to the 1996 SLID survey were unaccounted for in the corresponding 1998 surveys.

The health question asked in SLID was as follows: "Compared to other people your age, how would you describe your state of health? Would you say that it is excellent, very good, good, fair, or poor?". In NPHS the question did not specify a comparison group: "In general, would you say [your] health is excellent, very good, good, fair, or poor?". The conditioning of the SLID question might be expected to yield somewhat different responses as individuals age and, on average, their health deteriorates. (We return to this matter below.) In any event, the responses provide measures of what is usually referred to as 'self-reported' or 'self-assessed' health (as distinguished from an 'objective' measure, perhaps based on medical records or a physical examination).

In fact, not all responses are literally 'self-reported', since some reporting is by other household members – 'proxy reporting', as it is called. There was relatively little proxy reporting in the longitudinal panel of the NPHS, and that was by design: it was thought that the large number of specific health-related questions asked in that survey would need to be answered by the person to whom the information pertained. As shown in Table 1, only 1.3 percent of the NPHS responses relating to overall health status in 1996 were by proxy. That proportion rises somewhat in later years for the original 1996 respondents, reflecting perhaps the increased proportion of individuals unable to respond for themselves as they grew older. In contrast, more than one-third of all the 1996 responses in SLID were by proxy. We observe too that proxy reporting was much more prevalent among men than among women, no doubt reflecting differences in who was at home and willing to answer the questions when the survey was conducted. Proxy reporting raises some potential concerns about the validity of the responses, but in our earlier work with SLID data we were able to conclude that it makes little difference to the proportions in different health states (Buckley et al., 2004a, p. 1018).

How useful are self-reported measures of health? Certainly they are widely used in studies of this kind (for example, Benzeval and Judge, 2001, Bound, 1991). It has been found that they appear to be good predictors of subsequent health care utilization and mortality. (See, for example, McCallum et al., 1994, Idler and Benyamini, 1997, Bierman et al., 1999, and Badley et al., 2000; Badley et al. provide extensive references.) This is true even though there is much inaccuracy in the self-reporting of specific health conditions (Baker et al., Deri, 2004, Raina et al., 2002).

3. HOW HEALTH VARIES WITH SOCIOECONOMIC STATUS

We turn now to some basic tabulations showing how the distribution across health states varies with income, education and age. Results are shown for persons aged 50 or older in 1996.

Table 2 compares the distribution of health states within each income quartile, based on each of the two surveys. Reported household incomes are expressed (here and in the subsequent two tables) relative to the Statistics Canada Low-Income Cutoff (LICO) levels, before being assigned to quartiles. LICO values 'correct' for household size and cost differences associated with degree of urbanization and are often used in Canada as measures of poverty, although they are not recognized as such by Statistics Canada (see Statistics Canada, 2003)[8]. LICOs are included in the SLID master files, but not in those for the NPHS. For comparability, we assigned appropriate LICO values to NPHS respondents, based on household size and location, making use of Statistics Canada's Postal Code and Geographic Attribute File, which is described in Cunningham et al., (1997).

Turning to the health categories in Table 2, the top two, 'excellent' and 'very good', have been combined, as have the bottom two, 'fair' and 'poor'. Combining the categories in this way makes patterns more obvious. About half of all respondents reported being in excellent or very good health. That is true of both men and women, in both surveys. But what stands out are the differences across income categories: the proportions in excellent or very good health are almost twice as high in the top quartile, Q4, as in the bottom one, Q1. Obversely, the proportions in fair or poor health are three to four times higher in the lowest quartile than in the highest. The proportions derived from the two surveys are strikingly similar even though the health status questions are not the same, as noted earlier.

Similar comparisons within health status categories are provided in Table 3 (note that each column adds to 100 percent). Of all those in excellent or good health, the evidence from both surveys suggests that about a third are in the highest income quartile; of those in fair or poor health, more than a third are in the lowest quartile. As before, the results from the two surveys are quite similar.

Tables 4, 5 and 6 show how the distribution of health states varies from one survey year to the next for those interviewed in 1996, and then again one and two years later, in 1997 and 1998 in the case of SLID, or two and four years later, in 1998 and 2000 in the case of NPHS. Table 4 shows the distribution within income groups, where the groups are defined as 'below median' (first and second quartiles) and 'above median' (third and fourth), as well as for all income levels combined. Table 5 shows the distribution within education groups, defined as 'low' (less than postsecondary) and 'high' (postsecondary), as well as for all education levels combined. Finally, Table 6 shows the distribution within age groups for 'old' (70 and older) and 'young' (50-69) respondents, as well as for all ages combined. A column labelled I/D has been added to allow for those who became institutionalized[9] or died[10] after the 1996 survey. (All respondents in our sample were 'in the community' and, of course, alive in 1996.)

We observe in every year, and in both surveys, that the proportions in the better health states are about 50 percent greater for those above the median income than for those below (Table 4), for those with "high" education than for those with "low" education (Table 5), and for those who are "young" than for those who are "old" (Table 6). Consistent with that, the proportions in worse health are considerably lower. As expected, the proportions in better health generally decline, the longer are people in the survey, while those in worse health increase. Thus, for example, the proportion of males in better health decreases by 3.5 percentage points over two years (from 50.2 to 46.7 percent), according to SLID, and by 6.6 percentage points over four years (from 48.9 to 42.3 percent), according to NPHS.

Of some interest are the proportions that move into what may be regarded as the worst health group – the proportion of those living 'in the community' at the time of the first interview who, after one, two, or four years, have moved into an institution or died. In all cases these proportions are much higher for the low income and low education groups than for the corresponding high groups.

The tabulations are all suggestive of a relationship between health and SES but multivariate analysis is required to establish the direction of causation between income and health, and to disentangle the separate effects of education and income.

4. ANALYTICAL FRAMEWORK

We restrict analysis to those aged 50 and older in 1996 who were in what we define henceforth as *good health* – those reported in the surveys to be in 'good', 'very good', or 'excellent' health – and thus dropping from the sample those who in 1996 were in *poor health* – 'poor' or 'fair', in the surveys[11, 12]. The purpose of this restriction is to eliminate from further analysis those whose history of poor health might have affected their income position in 1996[13]. We then focus attention on the probability of still being in good health one, two, and four years later, and ask whether that probability is affected by socioeconomic factors, in particular income and education (as well as age, of course).

To the extent that command over resources has an effect on one's health, we would expect that household wealth or some measure of lifetime income would be more appropriate than current income. However, only current income is available from the two surveys, so we must make do with that. Our approach is to standardize or 'age-correct' income to obtain a rough estimate of what it would have been when a survey respondent was aged 50-54. This correction is intended to adjust for declines in income at older ages, and to compensate for the absence of wealth or lifetime income data. We express the 1996 household income for each respondent as a ratio to the household's LICO value, as in the earlier tables. The natural logarithm of the ratio is regressed on the natural logarithm of LICO and a set of dummy variables representing age, education, marital status, period of immigration or nonimmigrant status, province, and rural/urban category of respondent. (A separate equation is estimated for each of males and females and shown in Appendix Tables A1 and A2.) Income is then standardized to the age group 50-54 by subtracting the age coefficient corresponding to the individual's age in 1996[14]. The income variable thus standardized is 'quartiled', and it is this quartiled variable that we use in our health regression models[15].

The model we use to assess the health effects of income and other variables focuses on the maintenance or loss of good health by individuals reported to be in good health in year 0, the initial year for which we have health data. Letting H denote health state, *G* good health, and *P* poor health, we model the probability of transition from $H = G$ to $H = G$ and (by subtraction from 1) the probability of transition from $H = G$ to $H = P$. The model, in general form, is

(1) $Prob\ (H_{it} = G, t > 0 \mid H_{i0} = G) = f(R_i , A_{i0} , E_i\ ) + \boldsymbol{0}_i$

where H_{it} is the health status of individual *i* in year *t*, R_i is the (age-adjusted) income quartile of the individual, E_i is the education category, A_{i0} is age group in the initial year, and $\boldsymbol{0}_i$ is an individual-specific error term representing all effects on health transitions not captured elsewhere in the model. This leads naturally to a probit or logit formulation. The choice is arbitrary, as the two formulations are known generally to be almost indistinguishable in the probability estimates that they generate. We have chosen probit.

5. ESTIMATION RESULTS

Probit regression equations are displayed in Table 7. All statistical tests employ a bootstrap procedure to take account of the multistage sampling nature of the surveys[16]. The upper panel of the table is based on two transitions, in each case spanning three survey years (1996, 1997 and 1998 for SLID; 1996, 1998 and 2000 for NPHS); the lower panel is based on only one transition, using the two years that are common to both surveys, 1996 and 1998. The upper panel thus keeps the number of transitions the same, while spanning different numbers of years for SLID and NPHS, while the lower panel keeps the number of transitions and years spanned the same, while ignoring the data for 1997 in the case of SLID.

Consider the upper panel. Here the dependent variable indicates whether the respondent remained in good health throughout the entire sample period (value 1) or moved into poor health in either of the middle or end years (value 0). The explanatory variables are all specified as dummy variables to allow for flexibility in the patterns that emerge. Income (LICO-adjusted and age-standardized) is expressed as a series of four dummies, representing quartiles, education as four dummies, representing highest level of education completed, and age as eight dummies, representing five-year age groups from 50-54 through 80-84, together with an open-ended group 85 and older. One dummy is omitted from each set in estimation to avoid a well known problem of singularity. The estimated effects are then interpreted relative to the omitted or ‘reference’ categories.

The columns labelled **)** P show differential probabilities calculated from the estimated probit equations. For example, the 0.0303 reported in the quartile 2 row (the first numerical entry in Table 7) indicates that an individual in the second income quartile is approximately 3 percent more likely to remain in good health than one in the lowest quartile (the omitted category). The corresponding p-value, which is based on the bootstrap version of an asymptotic two-tailed t-test, is interpreted as the probability of getting the estimated coefficient value if the null hypothesis of zero effect were true, and thus is an indicator of statistical significance. The p-value for all income groups combined, which is based on the bootstrap version of a Wald test, is interpreted similarly, relative to the null hypothesis of zero effects for all variables in the group.

An important point to note in Table 7 is that relatively little of the variance in the dependent variable – at most about 12 percent – is accounted for by the estimated equations; much is left unexplained, as one would expect. The probability that one’s health status will remain good or worsen is influenced much more by factors that are unobservable (at least in these surveys) and individual heterogeneity than by age and our two indicators of SES. Even so, the Wald tests suggest that both age and the SES indicators generally have significant explanatory power. In the case of SLID, all p-values are less than 1 percent while for NPHS, with its smaller sample sizes, only the education effect for females fails to indicate strong statistical significance.

The estimated age effects exhibit a generally steady progression from the youngest group (50-54) to the oldest (85+) for both men and women, which is consistent with the (obvious) expectation that, other things equal, people are less likely to remain in good health as they age. The effects of age alone are (not surprisingly) large. For example, the estimate based on SLID suggests that (after taking account of income and education), a male aged 75-79 is about 23 percent less likely to remain in good health for the next two years than one aged 50-54, and the estimate based on NPHS suggests a difference of 41 percent in that probability, calculated over four years. The corresponding values are 20 and 26 percent for women.

The estimates provide evidence that income matters. The estimates based on SLID yield a probability of remaining in good health over the next two years for someone in the highest quartile that is 8 percent greater in the case of males and 7 percent in the case of females than the probability for someone in the lowest quartile. The estimates based on NPHS suggest that those probabilities are approximately doubled when the period is four years rather than two.

It appears that education matters also, although the evidence is somewhat more difficult to interpret. Based on SLID there is a steady progression from the lowest education category to the highest, indicating that one's chances of remaining in good health over the next two years are enhanced if one is better educated. The differences are about 10 percent for men, 14 percent for women. The pattern is less clear and the level of statistical significance lower with NPHS, particularly for females. (The smaller sample size in the NPHS may account for this difference.)

Figures 1 through 4 are based on the probit equations. Each figure shows the implied probabilities of remaining in good health at different ages for different groups in the population. Figure 1 shows, for each age group, a plot of the implied probabilities of remaining in good health for a further *two* years (two transitions), based on SLID (left panel), and *four* years (two transitions), based on NPHS (right panel). The implied probabilities are shown separately for the highest socioeconomic group (income quartile 4, university degree) and the lowest (income quartile 1, less than grade 11); males are in the upper panel of Figure 1, females in the lower one. The probabilities decline with age, as expected, are similar for males and females, and are considerably higher for those in the highest SES group than for those in the lowest one. Wald tests confirm that the differences are strongly statistically significant [17]. It is somewhat surprising that the probabilities of remaining in good health are not notably lower when they relate to four years (based on NPHS) than when they relate to two (based on SLID). That may simply reflect differences between the two surveys, in particular, how and where the questions are asked in the survey (see Crossley and Kennedy, 2003)[18].

A direct comparison of male-female probabilities is provided by the graphs in Figure 2. The most striking feature of this figure is the similarity of the age profiles for the two sexes. While the male probabilities are generally lower, whether for high or low SES, the differences are small for most age groups, and not statistically significant [19].

The results reported so far are based on two survey-to-survey transitions, those for SLID being derived from surveys conducted over three years and those for NPHS from surveys conducted over five. A further comparison based only on the 1996 and 1998 survey years (the two years common to SLID and NPHS) is informative. The lower panel of Table 7 provides estimates that relate to the probability of reporting good health in 1998, conditional on having done so also in 1996. If the estimates in the lower panel were based on precisely the same individuals as those in the upper panel it is evident that a *smaller* proportion would make the transition to poor health. That is because the health information from one survey year is ignored in this case[20]. However, some additional observations now become available – namely those for which health information was missing for the year dropped – and those observations could potentially have affected the proportion in either direction, although in practice it seems unlikely that there was any appreciable effect[21].

The change in the scope of the dependent variable reduces somewhat the magnitudes of the estimated effects based on SLID but has no impact on the directions of effect. It has rather more effect on the NPHS results, reducing the p-values for both the income and education variables. Again, though, the directions of effect are unaltered. Figure 3 depicts the results in the same way as Figure 1, and Figure 4 in the same way as Figure 2, but for two-year transitions in both cases. While the estimated effects are less well determined, the implied age patterns based on NPHS are generally similar to those based on SLID, as before. Two other points to note are (1) that the implied probabilities of remaining in good health based on only one transition are somewhat higher than those based on two, suggesting some recovery among those who experienced poor health in the now-omitted middle year, and (2) that the implied probabilities are notably higher when based on a two-year transition using NPHS survey data rather than a four-year transition, as one would expect.

6. SENSITIVITY OF THE RESULTS

NPHS, but not SLID, asked respondents about a range of risk factors such as smoking behaviour, presence of a chronic condition, and body mass index (BMI). We had not considered those risk factors initially since our main objective had been to compare the results of estimates of the same model using both surveys. However, we added them as explanatory variables to see what impact they would have on the NPHS estimates[22]. We found that only 'chronic condition' was statistically significant, that the pseudo-R-squared value rose only slightly, and that the estimated effects of income changed very little[23]. For example, when we added the risk factors the estimated probability associated with being in the top income quartile rather than the lowest increased from 0.1609 to 0.1906 for males and decreased from 0.1386 to 0.1356 for females.

Concern was expressed also about the definition of 'good health'. Recall that we combined the three highest categories (excellent, very good and good) into one. However, we recognize that the jump from 'excellent' to 'poor' health might be quite different from the jump from, say, 'good' or 'very good' to 'poor'. Ideally we would analyze each transition separately, but the sample sizes are too small to yield reliable estimates. Our approach instead is to add dummy variables to reflect each of the three different starting health states. We find that they are statistically significant (at the 1 percent level) in both cases, and that though the pseudo-R-squared values increase by almost 50 percent, the estimates of the other coefficients reported in Table 7 are little affected.

There is a degree of arbitrariness in our choice of 50 and older as the age range of interest. To assess whether this cut-off affects our results we added to our sample all survey respondents aged 40 to 49 and in good health in 1996, and modified the specification of the model to include two more age group dummy variables. In all four models reported in Table 7, the coefficients for the age groups 40-44 and 45-49 were not significantly different from the ones for age group 50-54 and the income and education effects were essentially unchanged.

A second sensitivity analysis involving age allowed the income effects for those age 65 and older to differ from those under age 65. It was implemented by adding a dummy variable for those aged 65 and older and interacting it with the income quartile variables. With that specification the income effects appear to be moderated for the older group, suggesting that as one gets older income appears to play a smaller role in determining changes in health status. However, the estimates are generally not statistically significant. (The exception is males in the SLID sample.) Larger sample sizes of the older population would be needed to get more precise estimates.

We argued in section 4 that a measure of ‘lifetime’ rather than ‘current’ income is more appropriate when assessing the effect of income on transitions in health status. However we can report that while estimates based on the ‘current’ measure differ, the differences are generally small.

Finally, we tested whether proxy reporting of health status affects the results. For this purpose we used only SLID (since proxy reporting is rare in our NPHS sample). The four equations were re-estimated to include a dummy variable to indicate whether the health status response was reported by proxy. In no case was the estimated coefficient on the proxy dummy statistically significant.

7. CONCLUSION

The purpose of this paper has been to report and compare estimates of the socioeconomic determinants of health among older Canadians based on two longitudinal surveys, the Survey of Labour and Income Dynamics (SLID) and the National Population Health Survey (NPHS). The surveys have allowed us to work with similar definitions of self-reported health and both provide information about household income and respondent education, the two socioeconomic variables on which we focus. Each survey has its advantages but the much larger sample size and more reliable measure of household income associated with SLID are of particular benefit. (NPHS provides, in considerable detail, information about specific matters relating to the health characteristics of individuals but that information was not useful for our purposes in this paper.)

Our approach with both surveys has been to restrict the analysis to those who were reported in good health as of the interview date in 1996. While their health may change in later years their socioeconomic status (as we define it) does not: it is determined as of 1996, based on educational attainment and estimated LICO-adjusted, age-standardized income. Our question is whether the probability that an individual will remain in good health over the two or four years after 1996 is explained, in part, by his/her predetermined socioeconomic status.

The evidence from both surveys suggests that SES does play a role, and that the differences across SES groups are quantitatively significant. While the estimated probabilities of remaining in good health decline with age for both men and women, as one would expect, our findings indicate that the probabilities are notably higher for those with high SES than those with low SES (other things equal), that the gap approximately doubles between age groups 50-54 and 80-84, and that the results are similar for men and women. That two large, independently conducted household surveys should yield generally similar results provides strong additional support for the view that socioeconomic status matters and thereby contributes to a firmer understanding of the income-to-health connection.

The SES health gradient is observed in all industrial economies, but why it should persist even in countries that have long had public health plans with universal coverage remains a matter of dispute (Evans, 2002, Deaton, 2003). In the Canadian case we note that the public system covers only "essential services"; as of the late 1990s that meant that about 30 percent of total health expenditure was paid directly by consumers (Canadian Institute for Health Information, 2001). Perhaps those with low incomes are more likely to avoid visiting a medical practitioner if they feel they could not afford the cost of a prescription, or if the transportation or loss-of-work costs of such a visit are deemed too high (Williamson and Fast, 1998a, 1998b). They might also have poorer nutritional practices, in part because they spend less on food, or on food with good nutritional characteristics. There is also some evidence that those with better education are more likely to follow medical advice (that is, to have better 'treatment adherence'), and hence to benefit more from the advice received (Goldman and Smith, 2002). Finally, Dunlop et al. (2000) find that patients' utilization of specialist visits are greater for those in higher socioeconomic groups, and that may be an additional contributing factor.

ENDNOTES

1. Yet another possibility is that both low SES and poor health can be attributed to a common cause - low intelligence or a bad environment, for example.

2. The results reported below are not sensitive to variations in this age cut-off for defining the older population.

3. We note though that Currie and Stabile (2003) found some evidence of SES effects on the health of children.

4. Some additional recent contributions include Adams, Hurd, McFadden, Merrill and Ribeiro (2003), Buckley, Denton, Robb and Spencer (2004a, 2004b), Meer, Miller and Rosen (2003), and Van Ourti (2003).

5. Currie and Stabile (2003) used The National Longitudinal Survey of Children and Youth to examine child health outcomes and their links to SES. They found some links between SES and health and found also that these grew stronger as young children aged. Of related interest, Wolfson (1993) used administrative records from the Canada Pension Plan in a longitudinal analysis of male mortality after age 65. Of related interest, Wolfson et al. (1993) used administrative records from the Canada Pension Plan in a longitudinal analysis of male mortality after age 65. The records contain no direct information about health. However, among their findings are positive associations between post-65 survival duration, on the one hand, and on the other, increasing trends in pre-retirement earnings and retirement age (either of which might indicate reasonably good health status before age 65). Finally, we note that some researchers have studied the effects of income on other variables that could be regarded as using health-related, using longitudinal data (for example, Dooley and Stewart, 2004, have studied the effect of family income on cognition in children).

6. For further information about the surveys, see http://socserv.mcmaster.ca/rdc/survfile.htm.

7. We follow the Statistics Canada convention in referring to SLID. It was not until January 1997 that respondents in what we refer to as the '1996' survey were asked questions relating to their health, age, and education. Questions relating to income were asked in May 1997 but (in order to be consistent with tax reporting) pertained to the calendar year 1996. We follow a similar convention when referring to the survey years of the NPHS.

8. As noted, income was collected as a categorical variable in NPHS. We therefore assigned to each respondent a specific household income equal to the respondent's category midpoint. For the open-ended category we used the mean of the corresponding income range in the SLID sample extract. The assignments play only a minor role in our analysis after the LICO-adjusted incomes are sorted into quartile groups.

9. The category ‘institutionalized’ includes persons in jail as well as in long-term care facilities. The second category obviously dominates for the age group of concern here.

10. In some cases the numbers institutionalized were too small to allow them to be reported separately by Statistics Canada. In those cases most persons classified as I/D would have died.

11. The good health restriction reduced the size of the 50-and-older sample by about 20 percent. We note that the male-female ratio in the unweighted NPHS sample, thus restricted, is only 0.74, as compared to 0.85 in the unweighted SLID sample. However, after taking account of the survey weights the ratios are similar – 0.89 in NPHS, 0.87 in SLID.

12. Below we discuss estimates based on alternative definitions of good health.

13. Put differently, the restriction solves the endogeneity problem of the possible reverse causal link from health to income. Other researchers (see, for example, McDonald and Kennedy, 2004) use instrumental variables to control for the possible endogeneity.

14. An alternative way of thinking of this is that for each respondent, education, marital status, and all other variables except age (measured as of 1996), are ‘plugged into’ the income equation, while age is set at 50-54. The residual terms are then added to capture observation-specific characteristics, on the assumption that differences from predicted values of income in 1996 (given the respondent’s age at that time) were likely to be similar (proportionally) to differences when the individual was in the age group 50-54.

15. For more details on the income standardization procedure, see Buckley et al. (2004a).

16. The error variance-covariance matrix has been calculated using 1000 bootstrap weights for SLID and 500 bootstrap weights for NPHS supplied by Statistics Canada. For a discussion of this approach, see Yeo et al., (1999, 2001). We use an implementation developed for STATA by Piérard et al., (2004).

17. The tests (not shown here) are joint tests of the null hypothesis that the lowest and highest income quartiles have equal coefficients and that the lowest and highest education groups also have equal coefficients.

18. For more on the issue of how health questions are asked, see Baron-Epel and Kaplan (2001), Kaplan and Baron-Epel (2003), and Manderbacka et al., (2003).

19. The test here involves pooling male and female observations, allowing differing coefficients, and then testing for equivalence.

20. For SLID, in the upper panel any respondent who reported poor health in either 1997 or 1998 is deemed to have made a transition to poor health; the 1997 response is ignored in the lower panel. For NPHS, in the upper panel any respondent who reported poor health in either 1998 or 2000 is deemed to have made a transition to poor health; in the lower panel

only those who reported poor health in 1998 are deemed to have made that transition.

21. As it turned out, the number of observations increased by about one and one-half percent in SLID but there was virtually no change in the number in NPHS.

22. Using the body mass index (BMI) we generated dummy variables for obese (BMI of 30 or greater, based on the World Health Organization definition), not obese, and BMI unknown. For smoking we created dummy variables for non-smoker, occasional smoker and daily smoker. For chronic conditions, we created a dummy variable for having any chronic condition.

23. Reminder: Our sample consists only of people who reported themselves in good health initially. Thus someone who reported having a chronic condition would have reported being in good health in spite of that condition.

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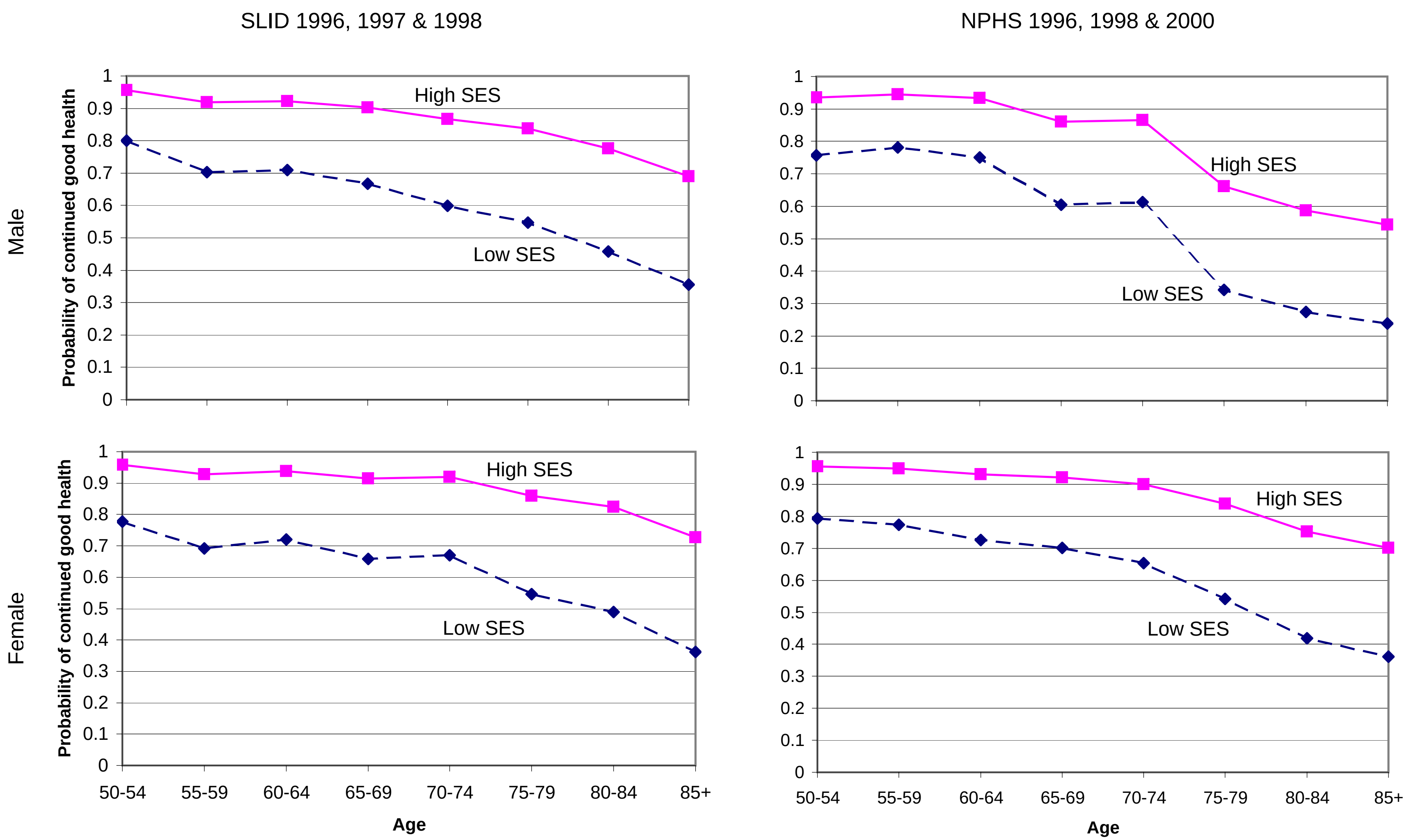
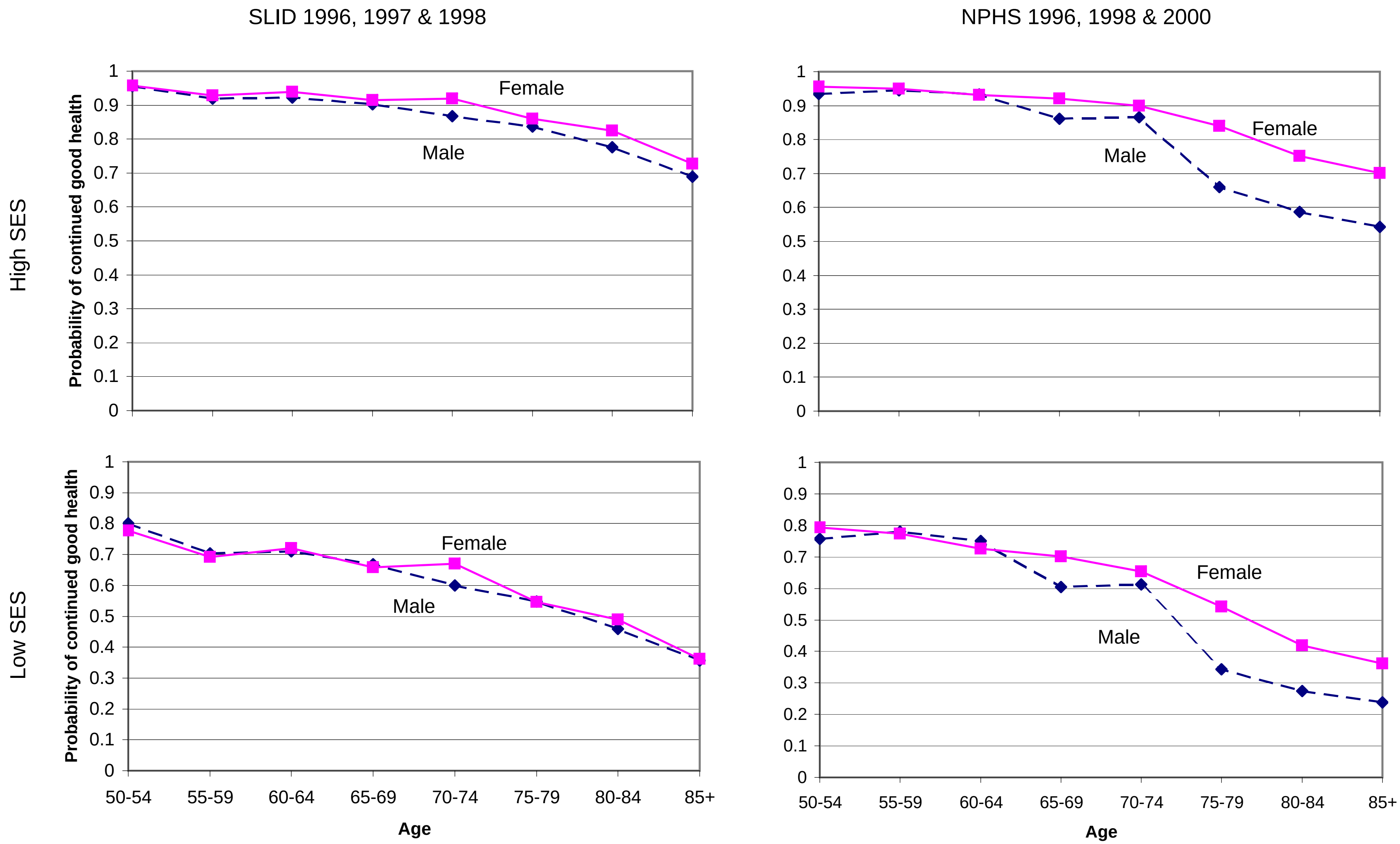
Figure 1. Probabilities of Continued Good Health -- Implied Age Profiles for Selected Socioeconomic Status Groups: Estimates Based on Two Transitions Using Data from SLID and NPHS Surveys



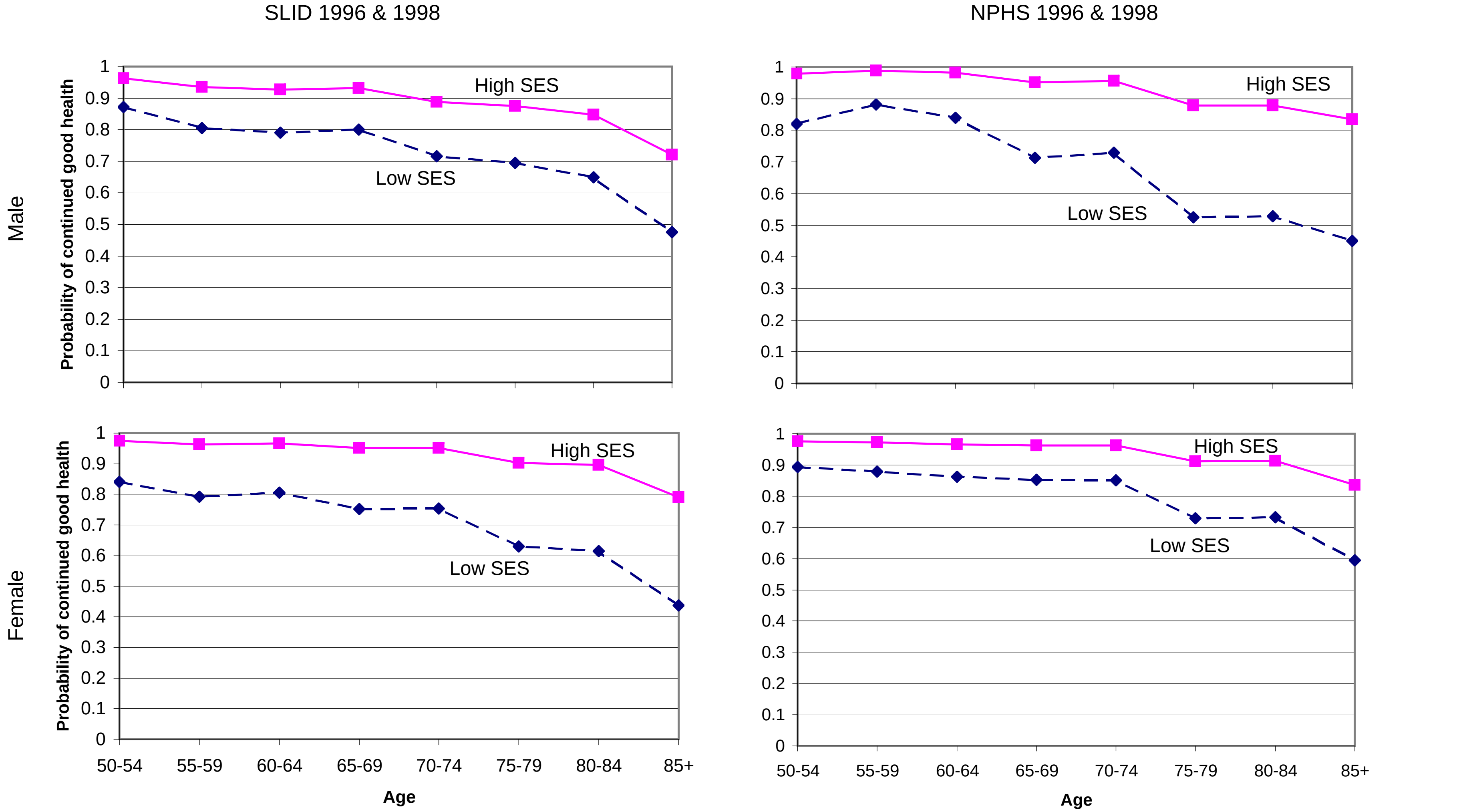
Note: Calculations are based on three years of survey data (successive years in the case of SLID, alternate years in the case of NPHS). They indicate the probabilities of remaining in good health for a period of two years (SLID) or four years (NPHS). 'High SES' refers to those in the highest income and education categories, 'Low SES' to those in the lowest.

Figure 2. Probabilities of Continued Good Health -- Implied Age Profiles for Males and Females in High and Low Socioeconomic Status Groups: Estimates Based on Two Transitions Using Data from SLID and NPHS Surveys



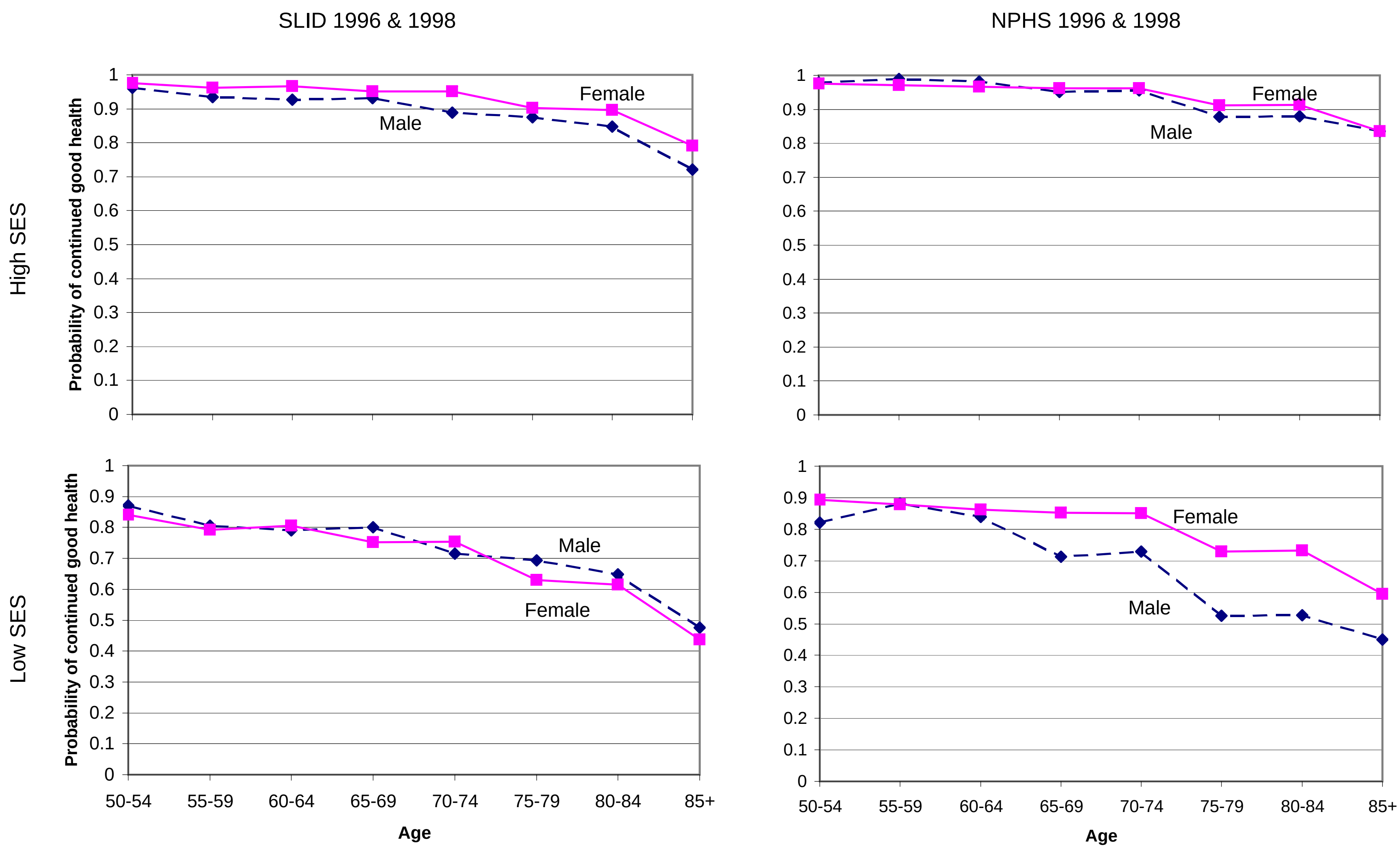
Note: See note to figure 1.

Figure 3. Probabilities of Continued Good Health -- Implied Age Profiles for Selected Socioeconomic Status Groups: Estimates Based on One Transition Using Data from SLID and NPHS Surveys



Note: Calculations for both SLID and NPHS are based on only two years of survey data, 1996 and 1998. They indicate the probabilities of remaining in good health for a period of two years. 'High SES' refers to those in the highest income and education categories, 'Low SES' to those in the lowest.

Figure 4. Probabilities of Continued Good Health -- Implied Age Profiles for Males and Females in High and Low Socioeconomic Status Groups: Estimates Based on One Transition Using Data from SLID and NPHS Surveys



Note: See note to figure 3.

Table 1. Proportion of Respondents whose Health Status was Reported by Proxy

Year	SLID				NPHS		
	Male	Female	Total		Male	Female	Total
				percent			
1996	46.3	23.3	34.0		1.5	1.2	1.3
1997	47.3	25.9	35.9		--	--	--
1998	--	--	--		3.8	1.5	2.6
2000	47.9	25.3	35.8		7.4	4.0	5.5

Note: Sample weights are used to derive estimated population proportions. Calculations by the authors.

Table 2. 1996 Distribution of Health Status within Income Quartiles: Population Aged 50 and Older

Sex	Income Quartile	SLID E/VG	SLID G	SLID F/P	SLID Total	NPHS E/VG	NPHS G	NPHS F/P	NPHS Total
					percent				
Male	Q1	36.1	28.8	35.1	100.0	33.4	39.8	26.8	100.0
	Q2	44.5	31.3	24.2	100.0	42.1	38.2	19.7	100.0
	Q3	53.3	29.8	16.9	100.0	56.3	29.8	14.0	100.0
	Q4	66.7	21.4	11.9	100.0	64.3	28.3	7.4	100.0
	All Males	50.2	27.8	22.0	100.0	48.9	34.0	17.0	100.0
Female	Q1	35.5	32.3	32.2	100.0	33.1	35.0	31.9	100.0
	Q2	40.6	32.2	27.3	100.0	47.7	37.0	15.3	100.0
	Q3	49.3	31.9	18.8	100.0	48.2	36.7	15.1	100.0
	Q4	61.7	26.6	11.7	100.0	66.2	27.2	6.7	100.0
	All Females	46.8	30.7	22.5	100.0	48.4	34.1	17.5	100.0

Note: Sample weights are used to derive estimated population proportions. The SLID sample consists of 7812 males and 9212 females; the NPHS sample consists of 1762 males and 2374 females. The symbols E, VG, G, F, and P refer to 'excellent', 'very good', 'good', 'fair', and 'poor' health states.

Table 3. 1996 Distributions of Income within Health Status Categories: Population Aged 50 and Older

Sex	Income Quartile	SLID E/VG	SLID G	SLID F/P	SLID Total	NPHS E/VG	NPHS G	NPHS F/P	NPHS Total
					percent				
Male	Q1	18.0	25.9	39.9	25.0	17.6	30.2	40.6	25.0
	Q2	22.2	28.1	27.5	25.0	21.0	27.4	28.2	25.0
	Q3	26.6	26.8	19.2	25.0	28.6	21.7	20.4	25.0
	Q4	33.2	19.2	13.5	25.0	32.9	20.8	10.9	25.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Female	Q1	19.0	26.3	35.9	25.0	17.9	26.9	47.5	25.0
	Q2	21.7	26.1	30.2	25.0	24.1	26.5	21.3	25.0
	Q3	26.4	25.9	20.9	25.0	25.5	27.6	22.1	25.0
	Q4	33.0	21.6	13.0	25.0	32.6	19.0	9.1	25.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: See note to Table 2.

Table 4. 1996-2000 Distributions of Health Status within Groups Below and Above the Median Income: Population Aged 50 and Older in 1996

	Income	SLID					NPHS				
Sex	and Year	E/VG	G	F/P	I/D	Total	E/VG	G	F/P	I/D	Total
						percent					
Male	Below Median Income										
	1996	40.3	30.0	29.7		100.0	37.6	39.0	23.4		100.0
	1997	38.8	28.3	29.7	3.2	100.0	--	--	--	--	
	1998	37.5	29.2	26.9	6.5	100.0	40.1	27.7	24.1	8.1	100.0
	2000	--	--	--	--		31.0	24.8	24.5	19.8	100.0
	Above Median Income										
	1996	60.0	25.6	14.4		100.0	60.3	29.0	10.7		100.0
	1997	57.4	26.8	14.5	1.4	100.0	--	--	--	--	
	1998	55.8	25.1	15.4	3.7	100.0	56.7	29.9	11.3	2.1	100.0
	2000	--	--	--	--		53.7	26.6	14.3	5.4	100.0
	All Income Levels										
	1996	50.2	27.8	22.0		100.0	48.9	34.0	17.0		100.0
	1997	48.1	27.6	22.1	2.3	100.0	--	--	--	--	
	1998	46.7	27.1	21.1	5.1	100.0	48.4	28.8	17.7	5.1	100.0
	2000	--	--	--	--		42.3	25.7	19.4	12.6	100.0
Female	Below Median Income										
	1996	38.0	32.2	29.7		100.0	40.2	36.0	23.9		100.0
	1997	34.8	31.7	30.9	2.6	100.0	--	--	--	--	
	1998	35.4	30.5	28.3	5.8	100.0	38.9	34.1	20.6	6.5	100.0
	2000	--	--	--	--		28.4	34.1	25.4	12.1	100.0
	Above Median Income										
	1996	55.5	29.2	15.3		100.0	56.9	32.1	11.0		100.0
	1997	52.6	29.9	16.1	1.3	100.0	--	--	--	--	
	1998	52.5	29.4	15.4	2.7	100.0	55.0	32.4	9.7	2.9	100.0
	2000	--	--	--	--		46.2	33.9	13.7	6.2	100.0
	All Income Levels										
	1996	46.8	30.7	22.5		100.0	48.4	34.1	17.5		100.0
	1997	43.7	30.8	23.5	2.0	100.0	--	--	--	--	
	1998	44.0	30.0	21.9	4.2	100.0	46.9	33.3	15.2	4.7	100.0
	2000	--	--	--	--		37.2	34.0	19.6	9.2	100.0

Note: For survey years after 1996 the symbol I/D refers to those who were resident in an institution or had died. See also note to Table 2.

Table 5. 1996-2000 Distributions of Health Status within 'Low' and 'High' Education Groups: Population Aged 50 and Older in 1996

Sex	Education and Year	SLID					NPHS				
		E/VG	G	F/P	I/D	Total	E/VG	G	F/P	I/D	Total
						percent					
Male	'Low' Education										
	1996	44.2	29.3	26.5		100.0	41.8	35.7	22.5		100.0
	1997	41.0	28.9	27.2	2.9	100.0	--	--	--	--	
	1998	41.1	27.6	25.0	6.3	100.0	41.7	27.5	24.2	6.6	100.0
	2000	--	--	--	--		34.5	26.0	22.5	17.0	100.0
	'High' Education										
	1996	58.1	25.8	16.1		100.0	56.3	32.3	11.4		100.0
	1997	57.4	25.8	15.4	1.5	100.0	--	--	--	--	
	1998	54.0	26.5	16.0	3.5	100.0	55.2	30.2	11.1	3.6	100.0
	2000	--	--	--	--		50.3	25.4	16.2	8.1	100.0
	All Education Levels										
	1996	50.2	27.8	22.0		100.0	48.9	34.0	17.0		100.0
	1997	48.1	27.6	22.1	2.3	100.0	--	--	--	--	
	1998	46.7	27.1	21.1	5.1	100.0	48.4	28.8	17.7	5.1	100.0
	2000	--	--	--	--		42.3	25.7	19.4	12.6	100.0
Female	'Low' Education										
	1996	40.4	33.0	26.6		100.0	40.1	37.3	22.5		100.0
	1997	37.6	32.5	27.5	2.4	100.0	--	--	--	--	
	1998	38.1	31.4	25.6	5.0	100.0	40.2	35.7	17.9	6.3	100.0
	2000	--	--	--	--		29.1	35.8	23.8	11.4	100.0
	'High' Education										
	1996	58.1	26.6	15.3		100.0	58.6	30.0	11.4		100.0
	1997	54.7	27.7	16.4	1.3	100.0	--	--	--	--	
	1998	54.4	27.4	15.3	2.9	100.0	55.1	30.3	11.9	2.8	100.0
	2000	--	--	--	--		47.2	31.9	14.5	6.5	100.0
	All Education Levels										
	1996	46.8	30.7	22.5		100.0	48.4	34.1	17.5		100.0
	1997	43.7	30.8	23.5	2.0	100.0	--	--	--	--	
	1998	44.0	30.0	21.9	4.2	100.0	46.9	33.3	15.2	4.7	100.0
	2000	--	--	--	--		37.2	34.0	19.6	9.2	100.0

Note: See note to Table 4.

Table 6. 1996-2000 Distributions of Health Status within 'Young' and 'Old' Age Groups: Population Aged 50 and Older in 1996

Sex	Age and Year	SLID E/VG	SLID G	SLID F/P	SLID I/D	SLID Total	NPHS E/VG	NPHS G	NPHS F/P	NPHS I/D	NPHS Total
						percent					
Male	'Old' (Ages 70+)										
	1996	37.9	31.3	30.8		100.0	38.6	39.0	22.5		100.0
	1997	34.2	30.9	29.4	5.5	100.0	--	--	--	--	
	1998	30.6	30.5	26.4	12.6	100.0	35.8	25.8	24.8	13.6	100.0
	2000	--	--	--	--		24.4	20.6	23.2	31.8	100.0
	'Young' (Ages 50-69)										
	1996	54.8	26.5	18.7		100.0	52.7	32.3	15.1		100.0
	1997	53.3	26.3	19.3	1.1	100.0	--	--	--	--	
	1998	52.7	25.9	19.2	2.2	100.0	52.9	29.9	15.2	2.1	100.0
	2000	--	--	--	--		48.8	27.5	18.0	5.7	100.0
	All Ages										
	1996	50.2	27.8	22.0		100.0	48.9	34.0	17.0		100.0
	1997	48.1	27.6	22.1	2.3	100.0	--	--	--	--	
	1998	46.7	27.1	21.1	5.1	100.0	48.4	28.8	17.7	5.1	100.0
	2000	--	--	--	--		42.3	25.7	19.4	12.6	100.0
Female	'Old' (Ages 70+)										
	1996	38.0	35.3	26.8		100.0	39.1	37.4	23.5		100.0
	1997	34.3	33.6	27.8	4.4	100.0	--	--	--	--	
	1998	32.3	32.2	26.1	9.5	100.0	35.2	36.1	18.2	10.5	100.0
	2000	--	--	--	--		22.8	32.5	24.3	20.5	100.0
	'Young' (Ages 50-69)										
	1996	51.6	28.3	20.2		100.0	53.0	32.4	14.6		100.0
	1997	48.9	29.3	21.2	0.7	100.0	--	--	--	--	
	1998	50.3	28.7	19.6	1.4	100.0	52.5	31.9	13.7	1.9	100.0
	2000	--	--	--	--		44.2	34.8	17.4	3.7	100.0
	All Ages										
	1996	46.8	30.7	22.5		100.0	48.4	34.1	17.5		100.0
	1997	43.7	30.8	23.5	2.0	100.0	--	--	--	--	
	1998	44.0	30.0	21.9	4.2	100.0	46.9	33.3	15.2	4.7	100.0
	2000	--	--	--	--		37.2	34.0	19.6	9.2	100.0

Note: See note to Table 4.

Table 7. Probabilities of Remaining in Good Health and p-Value Test Statistics Based on Probit Regression Models

	SLID 1996, 1997 & 1998				NPHS 1996, 1998 & 2000			
	Male		Female		Male		Female	
Independent Variable	ΔP	p-value	ΔP	p-value	ΔP	p-value	ΔP	p-value
Income quartile: 1	--	--	--	--	--	--	--	--
2	0.0303	*0.060*	0.0207	*0.222*	0.0289	*0.602*	0.0692	*0.054*
3	0.0414	*0.009*	0.0488	*0.004*	0.1156	*0.022*	0.0334	*0.368*
4	0.0770	*0.000*	0.0708	*0.000*	0.1609	*0.002*	0.1386	*0.000*
All income categories (Wald test)		*0.000*		*0.000*		*0.006*		*0.002*
Education: Less than grade 11	-0.0499	*0.016*	-0.0655	*0.000*	0.1120	*0.119*	0.0413	*0.335*
High school 11+	--	--	--	--	--	--	--	--
Some postsecondary	0.0070	*0.721*	0.0186	*0.255*	0.1078	*0.137*	0.0643	*0.120*
University degree	0.0507	*0.025*	0.0721	*0.008*	0.2026	*0.007*	0.1236	*0.018*
All education categories (Wald test)		*0.000*		*0.000*		*0.047*		*0.081*
Age group: 50-54	--	--	--	--	--	--	--	--
55-59	-0.0839	*0.001*	-0.0700	*0.004*	0.0291	*0.678*	-0.0218	*0.684*
60-64	-0.0776	*0.002*	-0.0465	*0.070*	-0.0064	*0.924*	-0.0746	*0.177*
65-69	-0.1150	*0.000*	-0.0993	*0.000*	-0.1677	*0.015*	-0.1005	*0.061*
70-74	-0.1781	*0.000*	-0.0899	*0.001*	-0.1596	*0.022*	-0.1504	*0.010*
75-79	-0.2269	*0.000*	-0.2020	*0.000*	-0.4117	*0.000*	-0.2645	*0.000*
80-84	-0.3146	*0.000*	-0.2572	*0.000*	-0.4667	*0.000*	-0.3865	*0.000*
85+	-0.4194	*0.000*	-0.3871	*0.000*	-0.4945	*0.000*	-0.4415	*0.000*
All age categories (Wald test)		*0.000*		*0.000*		*0.000*		*0.000*
No. of observations		5992		7027		1431		1924
Pseudo R-squared		0.0741		0.0775		0.1238		0.0900

	SLID 1996 & 1998				NPHS 1996 & 1998			
	Male		Female		Male		Female	
Independent Variable	ΔP	p-value	ΔP	p-value	ΔP	p-value	ΔP	p-value
Income quartile: 1	--	--	--	--	--	--	--	--
2	0.0130	*0.323*	0.0323	*0.011*	0.0755	*0.137*	0.0090	*0.578*
3	0.0217	*0.084*	0.0413	*0.001*	0.1008	*0.043*	0.0160	*0.346*
4	0.0474	*0.000*	0.0590	*0.000*	0.1638	*0.001*	0.0417	*0.003*
All income categories (Wald test)		*0.001*		*0.000*		*0.009*		*0.030*
Education: Less than grade 11	-0.0304	*0.060*	-0.0472	*0.003*	0.0908	*0.267*	-0.0375	*0.185*
High school 11+	--	--	--	--	--	--	--	--
Some postsecondary	0.0026	*0.864*	0.0036	*0.808*	0.1401	*0.068*	-0.0180	*0.485*
University degree	0.0225	*0.227*	0.0541	*0.013*	0.1870	*0.027*	0.0081	*0.789*
All education categories (Wald test)		*0.011*		*0.000*		*0.050*		*0.234*
Age group: 50-54	--	--	--	--	--	--	--	--
55-59	-0.0549	*0.004*	-0.0390	*0.067*	0.0803	*0.279*	-0.0110	*0.655*
60-64	-0.0682	*0.001*	-0.0276	*0.220*	0.0238	*0.744*	-0.0233	*0.410*
65-69	-0.0591	*0.002*	-0.0714	*0.002*	-0.1282	*0.102*	-0.0304	*0.252*
70-74	-0.1343	*0.000*	-0.0700	*0.002*	-0.1101	*0.151*	-0.0319	*0.273*
75-79	-0.1539	*0.000*	-0.1790	*0.000*	-0.3249	*0.001*	-0.1287	*0.001*
80-84	-0.1956	*0.000*	-0.1924	*0.000*	-0.3228	*0.001*	-0.1261	*0.002*
85+	-0.3626	*0.000*	-0.3634	*0.000*	-0.3967	*0.010*	-0.2472	*0.000*
All age categories (Wald test)		*0.000*		*0.000*		*0.000*		*0.000*
No. of observations		6092		7162		1431		1925
Pseudo R-squared		0.0567		0.0800		0.1292		0.0683

Note: ΔP values are differential probabilities (differences from reference category probabilities). The p-value for an individual variable corresponds to a two-tailed test of the null hypothesis that the variable's coefficient is zero and is calculated using bootstrap weights provided by Statistics Canada. See Yeo et al. (1999) for details of the procedure.

Table A1. SLID OLS Regressions for ln(Y/LICO) Based on SLID Data

Independent Variable	SLID 1996, 1997 & 1998				SLID 1996 & 1998			
	Males		Females		Males		Females	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Constant	0.4745	0.446	-4.6595	0.000	0.5386	0.380	-4.5361	0.000
Age group: 50-54	–	–	–	–	–	–	–	–
55-59	-0.0776	0.022	-0.1169	0.005	-0.0660	0.054	-0.1244	0.002
60-64	-0.1941	0.000	-0.1780	0.000	-0.1846	0.000	-0.1880	0.000
65-69	-0.2024	0.000	-0.1012	0.002	-0.1966	0.000	-0.1110	0.001
70-74	-0.2477	0.000	-0.1139	0.001	-0.2405	0.000	-0.1174	0.000
75-79	-0.2837	0.000	-0.1649	0.000	-0.2720	0.000	-0.1676	0.000
80-84	-0.3885	0.000	-0.2110	0.000	-0.3753	0.000	-0.2127	0.000
85-89	-0.3028	0.001	-0.2468	0.000	-0.2799	0.003	-0.2391	0.000
Edn: Less than gr. 11	-0.1942	0.000	-0.2637	0.000	-0.1807	0.000	-0.2620	0.000
High school 11 +	–	–	–	–	–	–	–	–
Some postsec.	0.0198	0.505	0.0597	0.031	0.0348	0.270	0.0622	0.023
Univ. degree	0.3816	0.000	0.2767	0.000	0.3977	0.000	0.2835	0.000
Marital Status: Single	-0.5111	0.000	-0.2807	0.001	-0.5079	0.000	-0.3061	0.000
Married	–	–	–	–	–	–	–	–
Separated	-0.3524	0.000	-0.6460	0.000	-0.3342	0.000	-0.6395	0.000
Divorced	-0.2699	0.000	-0.4905	0.000	-0.2701	0.000	-0.5029	0.000
Widowed	-0.0818	0.134	-0.2715	0.000	-0.1198	0.069	-0.2788	0.000
Immigrated: Not immigrant	–	–	–	–	–	–	–	–
0-10 yrs. ago	-0.2676	0.352	-0.5653	0.000	-0.2763	0.323	-0.5582	0.000
11-14 yrs. ago	-0.5341	0.000	-0.4509	0.000	-0.5409	0.000	-0.4577	0.000
15+ yrs. ago	-0.0623	0.028	-0.0870	0.015	-0.0621	0.026	-0.0840	0.018
Location: CMA	–	–	–	–	–	–	–	–
CA	0.0393	0.137	0.1060	0.000	0.0376	0.154	0.1060	0.000
Other urban	0.0644	0.026	0.1641	0.000	0.0613	0.034	0.1599	0.000
Rural	0.1109	0.001	0.2976	0.000	0.1047	0.001	0.2951	0.000
Province: NF	-0.3326	0.000	-0.3513	0.000	-0.3306	0.000	-0.3541	0.000
PEI	-0.2139	0.000	-0.1636	0.000	-0.2232	0.000	-0.1691	0.000
NS	-0.1868	0.000	-0.2262	0.000	-0.1843	0.000	-0.2208	0.000
NB	-0.1878	0.000	-0.2282	0.000	-0.1864	0.000	-0.2269	0.000
QC	-0.2758	0.000	-0.2698	0.000	-0.2834	0.000	-0.2665	0.000
ON	–	–	–	–	–	–	–	–
MB	-0.2400	0.000	-0.2275	0.000	-0.2413	0.000	-0.2290	0.000
SK	-0.1250	0.002	-0.0990	0.004	-0.1242	0.002	-0.1084	0.003
AB	-0.1773	0.000	-0.1764	0.000	-0.1766	0.000	-0.1687	0.000
BC	-0.1040	0.006	-0.1029	0.004	-0.1034	0.005	-0.0989	0.005
ln(LICO)	0.0660	0.281	0.5741	0.000	0.0581	0.337	0.5622	0.000
No. of observations	5983		7015		6083		7149	
R-squared	0.2182		0.2770		0.2185		0.2789	

Note: p-values correspond to two-tailed tests of the null hypothesis that a coefficient is zero. White's robust estimator of variance is used in all tests (White, 1980). Variables are defined in the text.

Table A2. OLS Regressions for ln(Y/LICO) Based on NPHS Data

Independent Variable	NPHS 1996, 1998 & 2000				NPHS 1996 & 1998			
	Males		Females		Males		Females	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Constant	4.7882	0.000	3.1751	0.009	4.7882	0.000	3.1751	0.009
Age group: 50-54	–	–	–	–	–	–	–	–
55-59	-0.0975	0.065	-0.2112	0.000	-0.0975	0.065	-0.2112	0.000
60-64	-0.2474	0.000	-0.2485	0.000	-0.2474	0.000	-0.2485	0.000
65-69	-0.3778	0.000	-0.2798	0.000	-0.3778	0.000	-0.2798	0.000
70-74	-0.3664	0.000	-0.3411	0.000	-0.3664	0.000	-0.3411	0.000
75-79	-0.5043	0.000	-0.3268	0.000	-0.5043	0.000	-0.3268	0.000
80-84	-0.5066	0.000	-0.3424	0.000	-0.5066	0.000	-0.3424	0.000
85-89	-0.1400	0.393	-0.3438	0.000	-0.1400	0.393	-0.3438	0.000
Edn: Less than gr. 11	-0.2749	0.000	-0.1999	0.000	-0.2749	0.000	-0.1999	0.000
High school 11 +	–	–	–	–	–	–	–	–
Some postsec.	-0.0956	0.123	0.0551	0.241	-0.0956	0.123	0.0551	0.241
Univ. degree	0.1980	0.004	0.3712	0.000	0.1980	0.004	0.3712	0.000
Marital Status: Single	-0.2359	0.007	-0.3540	0.007	-0.2359	0.007	-0.3540	0.007
Married	–	–	–	–	–	–	–	–
Separated	-0.3593	0.000	-0.6126	0.000	-0.3593	0.000	-0.6126	0.000
Divorced	-0.1134	0.227	-0.4822	0.000	-0.1134	0.227	-0.4822	0.000
Widowed	-0.2131	0.005	-0.3728	0.000	-0.2131	0.005	-0.3728	0.000
Immigrated: Not immigrant	–	–	–	–	–	–	–	–
0-10 yrs. ago	-1.1957	0.000	-0.1275	0.596	-1.1957	0.000	-0.1275	0.596
11-14 yrs. ago	-0.7438	0.000	-0.2680	0.039	-0.7438	0.000	-0.2680	0.039
15+ yrs. ago	-0.1258	0.003	-0.0899	0.029	-0.1258	0.003	-0.0899	0.029
Location: Urban	–	–	–	–	–	–	–	–
Rural	-0.0032	0.940	0.0521	0.255	-0.0032	0.940	0.0521	0.255
Province: NF	-0.3856	0.000	-0.2308	0.000	-0.3856	0.000	-0.2308	0.000
PEI	-0.1400	0.034	-0.1862	0.006	-0.1400	0.034	-0.1862	0.006
NS	-0.0973	0.111	-0.0746	0.249	-0.0973	0.111	-0.0746	0.249
NB	-0.1678	0.005	-0.0686	0.216	-0.1678	0.005	-0.0686	0.216
QC	-0.2163	0.000	-0.2045	0.000	-0.2163	0.000	-0.2045	0.000
ON	–	–	–	–	–	–	–	–
MB	-0.1796	0.009	-0.1761	0.000	-0.1796	0.009	-0.1761	0.000
SK	-0.1899	0.003	-0.0899	0.125	-0.1899	0.003	-0.0899	0.125
AB	-0.2206	0.004	-0.0638	0.281	-0.2206	0.004	-0.0638	0.279
BC	-0.0343	0.506	-0.0891	0.079	-0.0343	0.506	-0.0891	0.079
ln(LICO)	-0.3674	0.001	-0.2248	0.063	-0.3674	0.001	-0.2248	0.063
No. of observations	1425		1920		1425		1921	
R-squared	0.3218		0.3163		0.3218		0.3164	

Note: See note to Table A1.

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