Canadian Public Policy

Canada Needs Better Data for Evidence-Based Policy: Inconsistencies between Administrative and Survey Data on Welfare Dependence and Education

Author(s): Rebecca N. Warburton and William P. Warburton

Source: *Canadian Public Policy / Analyse de Politiques*, Vol. 30, No. 3 (Sep., 2004), pp. 241-255
Published by: University of Toronto Press on behalf of Canadian Public Policy
Stable URL: http://www.jstor.org/stable/3552301
Accessed: 09-01-2018 08:31 UTC

Canada Needs Better Data for Evidence-Based Policy: Inconsistencies Between Administrative and Survey Data on Welfare Dependence and Education

REBECCA N. WARBURTON
School of Public Administration
University of Victoria
Victoria, British Columbia

WILLIAM P. WARBURTON
Department of Finance and Management Science
University of Alberta
Edmonton, Alberta

Cette étude compare les données administratives à celles de l'enquête sur les bénéficiaires de l'aide sociale en Colombie Britannique, afin de voir si les données de l'enquête sont suffisamment exactes pour être utilisées dans la recherche orientée vers la mise en place de politiques. Nous comparons les données relatives à l'aide sociale et à l'éducation en Colombie Britannique avec les microdonnées de 1994 à l'usage du public (échantillon de C.B.) de l'Enquête sur la Dynamique du Travail et du Revenu (EDTR) menée par Statistique Canada. Cette enquête de 1994 en Colombie Britannique minimise considérablement la dépendance vis- à-vis de l'assistance sociale et exagère les niveaux d'éducation des bénéficiaires de cette assistance en Colombie Britannique. Statistique Canada devrait prendre l'initiative, à l'échelon national, de faire en sorte que l'ensemble des données administratives des provinces soit disponible pour la recherche, et devrait utiliser ces données pour améliorer les enquêtes clés sur les recherches longitudinales nationales dans le domaine social, telles que l'EDTR, l'Enquête Longitudinale Nationale sur les Enfants et les Jeunes (ELNEJ) et l'Enquête Nationale de Santé de Population (ENSP).

This study compares administrative and survey data on BC welfare (social assistance) recipients, to test whether survey data is sufficiently accurate for use in policy-oriented research. BC welfare and education data is compared to the 1994 Public Use Microdata (BC sample) of Statistics Canada's Survey of Labour and Income Dynamics (SLID). BC 1994 SLID significantly understates welfare dependence, and overstates education levels of BC welfare recipients. Statistics Canada should lead a national initiative to make provincial administrative datasets available for research; and should use these data to improve key national longitudinal social research surveys such as SLID, NLSCY, and NPHS.

Introduction

This paper compares administrative and survey data for British Columbia to test whether or not available survey data is sufficiently reliable to serve as a basis for policy-oriented social research. The emphasis is on welfare[1] (income support) and education, but similar tests could usefully be applied to health care, pension receipt, or other social programs.

Like many social programs, welfare and education are administrative phenomena; truth is contained in the administrative records of payments or school completion. Administrative records show that more than one person in ten received welfare in Canada in 1995, making it an important social policy issue. Yet there is no national administrative micro dataset for researchers to use to study this issue. Until 2000, Human Resources Development Canada (HRDC) maintained the Longitudinal Labour Force File (LLFF), combining federal and provincial administrative and survey data to provide a second-to-none research capability for social policy issues. Unfortunately, the LLFF was painted as a "Big Brother" database by critics, and dismantled by HRDC in 2000 (Social Development Canada 2000). With its demise, most academic researchers rely on data from national surveys.

Statistics Canada has developed many excellent survey datasets for analyzing social issues that affect the broad majority of Canadians. Widely recognized for their broad scope, national coverage, excellent documentation, and overall high quality, these surveys are used for social policy research, including studies of Canada's low-income populations. In the past decade, Canada has launched major new surveys (such as the NLSCY, NPHS, and SLID[2]) intended to improve the quality and quantity of policy-relevant social research, and Statistics Canada's Data Liberation Initiative (DLI)[3] is making these data widely available to academic researchers.

The Survey of Labour and Income Dynamics (SLID) replaces the Survey of Consumer Finances and the Labour Market Activity Survey, both of which reported that they undercounted welfare expenditures by half. But Statistics Canada (Kapsalis 2001) reports that, like its predecessors, SLID undercounts social assistance expenditures by from 20 to 50 percent.

The chief advantage of administrative data is that it covers the entire population, avoiding all issues of sampling and survey design, and making calculation of confidence intervals unnecessary. Researchers such as Frenette and Picot (2003), Coelli, Green and Warburton (2003), Green and Warburton (2004), Sweetman *et al.* (2003), Fortin, Lacroix and Drolet (2004), Stewart and Dooley (1999) and Fortin, Lacroix and Thibault (1999) have used administrative data to examine issues related to welfare policy, but there remains no national initiative to make administrative data on welfare routinely available for research. Person-level administrative data on education, welfare, and health tends to be available only provincially, and is often contained in program-specific databases ill-adapted for research queries. Administrative databases can be poorly documented and are often affected by administrative changes over time. These challenges can be overcome, but few researchers inside or outside government have the necessary routine access needed to develop expertise using linked, identified, person-level information on welfare dependence, educational attainment, or other social programs, making use of provincial administrative data for national studies of social policy time-consuming at best and impossible at worst. Most researchers fall back on the Statistics Canada products and work under the assumption that errors related to sampling and response are random.

This paper uses a unique dataset, a linked set of welfare and education records, to test whether that is a reasonable assumption. We demonstrate that the errors in SLID are significant and not random: some characteristics of the welfare recipients reported in SLID are substantially different from the true characteristics apparent in administrative data, and the

overall prevalence of social assistance receipt is substantially understated. These differences are important for policy; use of survey data alone cannot be relied upon to produce accurate results related to welfare policy. Canada needs a national initiative to make identified, person-level administrative data available for policy-oriented social research.

Methods

This study presents the first comparison of SLID BC Public Use Microdata with provincial administrative data on welfare receipt and educational attainment. Data sources for this paper include British Columbia (BC) administrative data on welfare receipt and educational attainment; the Public Use Microdata (BC sample) of Statistics Canada's 1994 Survey of Labour and Income Dynamics; and BC Census data on population and education levels. We compare administrative and SLID data on BC population characteristics, welfare dependence for all or part of the year, welfare costs, and months of welfare receipt per year based on family type and education level.

What assurance do we have of the quality of the administrative data? Users of government administrative data are aware that because government financial controls are thorough, administrative data fields that affect payments are generally more reliable than those that do not. Key data fields used for our study all affect payments, hence are carefully scrutinized. The identity of welfare recipients is well established; applicants must present three forms of identification; the ministry maintains a significant investigation capability; and fraud sanctions include benefit reduction, loss of eligibility, and legal penalties (BCHR 2004*a*). Student identity and high school completion are also carefully monitored (BCEd 2004); a birth certificate or other legal proof of identity is required at time of school entry, when the personal education number is assigned, and school attendance and Grade 12 completion are carefully recorded because the Ministry of Education pays school districts for each student. Grade 12 completion also affects postsecondary admission and student financial assistance.

We focus our comparisons on the working-age population. Most welfare recipients in British Columbia are between the ages of 19 and 64 (BCHR 2003), and this is the group of greatest concern to policymakers. Welfare caseloads peaked in 1995, and have declined precipitously since then. The number of clients in 1998 was 19 percent lower than it had been in 1994, and by 2003 was just 50 percent of the 1994 level. We used the SLID Public Use Microdata for 1994, the year before the caseload peak, and we used data for ages 16 to 64 with cross-sectional weights.[4] We compared SLID data to BC welfare and population data for 1994.

Our definition of welfare income aligns well with SLID's social assistance; in SLID, social assistance is clearly distinguished from other transfer income such as pensions, employment insurance, old age security, guaranteed income supplement, or workers' compensation.

To match welfare and education records, we initially used Automatch, developed by Mathew Jaro (1989), formerly of the US Bureau of the Census in the late 1980s and early 1990s. Automatch is the most widely used commercially available automated record linkage software, and is frequently used in research (e.g., Gomatam *et al.* 2002). For later matches, we used custom software written by W. Warburton; our tests showed that this software equalled or outperformed Automatch with our datasets.

We estimated 1994 BC population aged 16 to 64 by education and family type using both 1996 Census data and official BC population estimates for 1994 (BC Stats 2000). Census data (Statistics Canada 1998) by family type and education level are only available in five-year age range, for Census years, and BC male and female population estimates are only available for 1994 (a non-Census year) in five-

year age ranges. We estimated the Census high school completion rate for ages 16–64 using 1996 Census data on education for ages 15–64; we assumed that no 15-year-olds were high school graduates, hence we deducted the number of 15-year-olds (known from Census totals) from the non-graduate population. To estimate the number of single men, single women, and lone mothers in 1994 we applied their proportions in 1996 (from Census data) to the BC estimated 1994 population, deducting an estimate for the number of 15-year-olds (who were 2.0 percent of the BC population aged 15–64 in 1996 Census data). The above adjustments are not large enough to materially affect our results.

Lone-parent results must be viewed with caution as the definitions are different for SLID, BC welfare, and BC Census data. SLID lone parents must have "all children under age 25." In Census data, lone parents must have at least one child age 17 or younger, similar to BC welfare, where a lone parent must have at least one child age 18 or under. The SLID definition excludes some multiple-child families included by BC welfare and the Census; but also includes some families (those with all children aged 19–24) excluded by BC Welfare and the Census. Therefore, it is not clear whether the SLID result would be expected to be higher or lower than BC welfare or the Census.

We report several methods that use administrative data to determine high school completion rates of BC welfare recipients. Initially, we looked at all individuals who received welfare in May 1998. Because at that time we had Grade 12 completion records only for 1989 to 1996, we selected only welfare recipients born in British Columbia between 1971 and 1978 (those most likely to have graduated during the period covered by our graduation data). We found that only 17 percent of all recipients (then aged 20 to 27) had a graduation record. This method provided only a lower bound for the true number, since any individuals not matched (due to faulty or incomplete information) are implied not to have graduated.

We therefore decided to pursue three other methods, which we believed would be robust to matching errors.

First, we obtained data on the entire September 1990 cohort of BC Grade 8 and Grade 9 students, and matched to Grade 12 completion records for 1993 through 1996 and welfare records for 1998[5] (to allow time for the cohort to finish Grade 12[6]). Second, we obtained Education data (including Grade 12 completion through 2003) for all students who started Grade 8 from the fall of 1991 through the fall of 1997, and for all who started Grade 9 from 1991 through 1998, and matched them to December 2003 welfare records, when these students were aged 19 to 26.[7]

The Grade 8 cohorts should represent virtually the entire BC population, since school attendance is mandatory until age 16; the Grade 9 cohorts are somewhat less representative as a few students reach age 16 and leave school between Grades 8 and 9. This cohort analysis allowed us to determine graduation rates and welfare dependence for the entire population of students, and also to compare high school completion rates among those dependent (and not dependent) on welfare up to age 26. Since we expect that any matching errors (between education and welfare records) would be uncorrelated with students' likelihood of graduating, this method will give an unbiased estimate of graduation rates and welfare dependence for students who stay in British Columbia. The main limitation of this method is that it covers only young people raised in BC, not the entire welfare population, and rates of school completion might be different for older or in-migrant recipients.

To test for this possibility we used a third method. We obtained administrative data on the high school completion declared by adult welfare recipients as part of their Employability Screen (BCHR 2004*b*) for all August 2003 recipients. We included in-migrant recipients (20 percent of the 2003 adult recipients had at some time declared that they came to British Columbia from another jurisdiction, in-

cluding returning home after living elsewhere; in-migrant rates were highest for ages 26 to 47). These declared education levels are not verified by ministry staff, thus are not as reliable as Education data, but provide some indication of Grade 12 graduation rates by age for all recipients.

We combined our cohort data with declared education levels to calculate an age-weighted average graduation rate for all welfare recipients in 1994, which we then compare to the SLID estimate. (We used 1991–97 Grade 8 cohort data for ages 19–25, Employability Screen data for ages 16–18 and 26–64, and weighted these graduation rates by the 1994 welfare recipient age distribution.) Given the declines in welfare caseloads since in 1995, *levels* of welfare dependence (in 1998 and 2003) would be expected to be much lower than (hence not directly comparable to) SLID's 1994 rates; however, we compare chiefly the *relative* welfare dependence rates of high school graduates and non-graduates in SLID with those for our Grade 8/9 cohort students.

Confidence intervals for SLID estimates were calculated after consulting Statistics Canada, using their published coefficients of variation and instructions (1997, 151-210). Two-tailed probability values for comparator measures were calculated at the SurfStat Web site (SurfStat 2003).

Statistics Canada specifies data quality guidelines (1997, 152-56) that must be met for general unrestricted data release (reliable data) or for release with a warning about possible sampling variation. Note that SLID results for single men, single women, and lone mothers are not releasable according to SLID quality guidelines because of the small sample size ($n<25$; Statistics Canada 1997, 152) and these results are therefore shown for discussion purposes only. The entire SLID sample for British Columbia contained 1,995 people aged 16 to 64 in 1994, but the number of respondents declaring social assistance income was small (only 118 in all; including only 19 single men, 21 single women, 24 lone mothers, and only 63 high school graduates).

Results

Table 1 displays our main results, showing SLID estimates, approximate SLID 95 percent confidence interval limits, administrative or other comparator values, and two-tailed probability values that give the probability of observing the comparator value if the SLID estimate is accurate. Results are approved for general unrestricted release except as noted.

Table 2 displays welfare recipients' high school completion rates by age for our 1990 Grade 8/9 cohort (in 1998), for 1991–98 Grade 8 and 9 cohorts (in 2003), and as declared by August 2003 recipients, showing means for various age groups where possible. Although declared graduation rates (not verified against education records) are 11 to 20 percentage points higher than actual rates, actual and declared rates show similar age profiles. Graduation rates climb sharply from age 16 to age 22; rise slowly to age 30; then gradually decline to age 65 (not shown in table).[8] The mean for ages 16 to 64 is reached by the mid-twenties; therefore, we believe that completion rates for our Grade 8 and 9 cohort members aged 25 or 26 provide a reasonable comparator for age 16–64 mean rates reported by SLID. The decline in welfare dependence between 1998 and 2003 might be expected to cause lower rates of Grade 12 completion among 2003 welfare recipients, as less employable clients are more likely to be on welfare now than in 1998. In fact, 2003 rates of school completion for welfare recipients are similar to 1998 rates, and we believe that it is reasonable to compare our weighted average graduation rate (based on the 1994 age distribution and 2003 school completion rates) to 1994 SLID in Table 1.

For basic descriptive information about the BC population, no striking differences emerge. Administrative estimates of the proportion of high school graduates in British Columbia are within SLID estimated 95 percent confidence intervals for releasable estimates.

TABLE 1
Comparison of SLID, Administrative and Other Data

	1994 SLID Estimate	SLID not Releasable	95% CI Lower Bound	95% CI Upper Bound	Comparator Data	Prob-value Comparator	Source of Comparator Data	SLID Unreliable?*
BC Population Composition Comparison								
Unattached men	8.8%	X	6.9%	10.6%	10.5%	0.0736	BC Census	
Unattached women	7.3%	X	5.5%	9.1%	8.0%	0.4620	BC Census	
Lone mothers	5.6%	X	4.1%	7.2%	3.1%	**0.0035**	BC Census	
HS grads	73.0%		69.8%	76.2%	71.6%	0.0767	BC Census	
Non-HS-grads	27.0%		23.6%	30.3%	28.4%	0.0891	BC Census	
BC Welfare Dependence								
Unattached men	11.4%	X	4.1%	18.8%	61.7%	**<0.001**	1994 BC Welfare	
Unattached women	14.5%	X	5.7%	23.4%	35.8%	**<0.001**	1994 BC Welfare	
Lone mothers	21.8%	X	9.4%	34.2%	87.9%	**<0.001**	1994 BC Welfare	
HS grads	4.3%		2.6%	5.9%	3.1%	0.1695	1990 8/9 Cohort†	
Non-HS-grads	8.6%		5.0%	12.3%	21.4%	**<0.001**	1990 8/9 Cohort†	Y
Total (ages 16–64)	5.5%		4.0%	7.0%	14.0%	**<0.001**	1994 BC Welfare	Y
High School Completion Rate (Ages 16–64)								
Welfare recipients	57.3%		41.4%	73.3%	32.0%	**0.0023**	Cohort/declared§	Y
Non-recipients	73.9%		70.7%	77.2%	69.9%	**0.0133**	1991 8 Cohort‡	Y
Total	73.0%		69.2%	76.8%	71.6%	0.4534	1996 BC Census	
BC and Canada Welfare Paid & Received (million $)								
BC unattached men	93	X	33	153	564	**<0.001**	1994 BC Welfare	
BC unattached women	117	X	46	188	282	**<0.001**	1994 BC Welfare	
BC lone mothers	223	X	96	350	592	**<0.001**	1994 BC Welfare	
BC Total	710		544	876	1,733	**<0.001**	1994 BC Welfare	Y
Canada Total 1994§§	9,300		6,956	11,644	14,266	**<0.001**	HRDC	Y
Canada Total 1996§§	11,600		8,677	14,523	12,724	0.4429	HRDC	
Average Months of Welfare Dependence per year (among recipients only)								
Unattached men	6.3	X	2.2	10.3	6.5	0.9058	1994 BC Welfare	
Unattached women	8.7	X	3.4	14.0	7.2	0.5684	1994 BC Welfare	
Lone mothers	8.3	X	3.6	13.0	9.0	0.7669	1994 BC Welfare	
HS grads	7.2		4.4	9.9	6.4	0.5707	1990 8/9 Cohort†	
Non-HS-grads	9.1		5.2	13.0	7.8	0.4994	1990 8/9 Cohort†	
Total	8.0		4.6	11.4	7.2	0.3700	1994 BC Welfare	
Average Welfare Payment per month (among recipients only)								
Unattached men	693.64	X	248.32	1,138.96	546.18	0.5176	1994 BC Welfare	
Unattached women	590.43	X	230.27	950.59	565.49	0.8901	1994 BC Welfare	
Lone mothers	1,015.87	X	438.85	1,592.88	983.28	0.9134	1994 BC Welfare	
Total	756.92		579.80	934.03	709.59	0.5971	1994 BC Welfare	
Non-High-School Graduates as a percentage of Recipients and Months								
% recipients	42.7%		24.5%	60.8%	80.8%	**<0.001**	1990 8/9 Cohort†	Y
% months	48.6%		27.9%	69.3%	83.7%	**0.0013**	1990 8/9 Cohort†	Y

Notes: * SLID data releasable with no data quality warning, yet SLID estimated 95 percent confidence interval does not include the administrative value.

† High school completion through 1996, welfare dependence in 1998, for 1990 Grade 8/9 cohort members, aged 19–21. Note there were 18 percent fewer welfare clients in 1998 than in 1994.

§ Weighted average calculated using 1991–97 Grade 8 cohort data for ages 19–25. Employability screen data (self-declared) for all August 2003 BC recipients for ages 16–18 and 26–64, weighted by 1994 recipient age distribution.

‡ High school completion through 2003, welfare dependence December 2003, for 1991 Grade 8 cohort members, aged 25. Note there were 50 percent fewer welfare clients in 2003 than in 1994.

§§ SLID 1994 from Kapsalis (2001); SLID 1996 from Cotton *et al.* (1999); comparator from HRDC (2000).

TABLE 2
High School Completion Rate of Welfare Recipients (percent)

Age	1998 (Grade 8/9 in 1990) (%)	2003 (Grade 8 1991–97) (%)	2003 (Grade 9 1991–98) (%)	August 2003 (Emp. Screen) All recipients (%)	August 2003 (Emp. Screen) In-migrants (%)
16				0.0	0.0
17				0.0	0.0
18				12.0	2.6
19		0.1	0.1	20.5	12.8
20		10.3	11.8	26.0	25.2
21	15.7	18.1	19.3	29.9	33.5
22	22.7	22.2	24.1	35.0	32.8
23		22.4	24.3	35.6	42.3
24		23.3	24.9	38.1	36.9
25		24.7	26.7	39.2	40.3
26			25.3	41.7	47.4
27				40.2	43.8
28				45.4	44.9
29				44.0	46.2
30				45.2	47.3
16–18				**7.0**	**1.8**
16–64				**40.1**	**42.8**
19–25		**17.7**		**32.7**	**33.9**
19–64				**40.1**	**42.9**
26–64				**41.5**	**43.9**
31–64				**41.2**	**43.8**

Social assistance dependence is severely understated by SLID, however:

- For the entire BC population, SLID data shows that 5.5 percent (CI 4 to 7 percent) used social assistance at some time in 1994, while administrative data records payments to 14.0 percent ($p<0.001$) of the Census population in that year.

- Among single men, single women, and lone mothers, BC welfare records indicate dependence rates two to five times higher than in SLID (note that these SLID figures are not releasable due to the small sample size, $n<25$; Statistics Canada 1997).

- SLID data for 1994 showed that non-graduates were twice as likely as graduates to have used social assistance (8.6 percent versus 4.3 percent) while administrative data shows that young non-graduates are nearly seven times as likely to depend on welfare. In the 1990 Grade 8/9 cohort, 3.1 percent of graduates and 21.4 percent of non-graduates were dependent on welfare in 1998, at ages 21–23. Among our 1991 Grade 8 students, 1.3 percent of high school graduates and 8.7 percent of non-graduates were dependent on welfare in 2003, at age 25 (not in table). Note that overall welfare caseloads have declined sharply since 1995.

Grade 12 completion rates for welfare recipients, non-recipients, and the total population also reveal striking differences between SLID and administrative data, with none of the administrative figures within SLID confidence intervals.

- For social assistance recipients, SLID shows that 57.3 percent (CI 41 to 73 percent) have completed Grade 12, while the BC administrative weighted

average completion rate (using 1994 age distribution and 2003 completion rates from cohort and Employability Screen data) is 32 percent (p=0.0023).

- Even using BC Employability Screen data for all ages, and weighting by the 1994 age distribution, the average school completion rate rises to only 37.4 percent, still significantly different from SLID (p=0.0151; not in table). Since Employability Screen education levels are likely overstated by at least ten percentage points, the 32 percent weighted average rate (above) represents an upper bound for the true recipient school completion rate.

- Given the school completion rates of recipients aged 19–25 from BC administrative data, what would the SLID average school completion rate imply for other recipients? Weighting by the age distribution of welfare recipients in 1994, and using school completion rates from our 2003 Grade 8 cohorts (17.7 percent graduates for ages 19 to 25) and the Employability Screen (mean 7.0 percent completion for ages 16 to 18), nearly three-quarters (74 percent) of older recipients (ages 26 to 64) would need to have completed high school to bring the average for all social assistance recipients to the level reported by SLID (57 percent). A 74 percent school completion rate is clearly unrealistic, being nearly double even the declared school completion rate of recipients of this age (41.5 percent from the Employability Screen, see Table 2).

- Grade 8 cohort school completion was also significantly different than SLID for non-recipients (SLID 74 percent graduates versus BC cohort 70 percent, p=0.0133).

Comparing total SLID-declared social assistance payments with amounts actually paid out by British Columbia and Canada again reveals some significant differences.

- For British Columbia and Canada in 1994, SLID totals are far from actual amounts. For BC, only 41 percent of actual payments ($1.7 billion from HRDC [2000]; p<0.001) are reported by SLID ($710 million; CI $544 to 876 million). For Canada, only 65 percent of actual payments are reported in SLID (p<0.001); Kapsalis (2001) reports a SLID total of $9.3 billion (CI $7.0 to 11.6 billion) versus $14.3 billion from HRDC (2000).

- For Canada in 1996, however, totals reported and paid are reasonably close, with SLID (Cotton *et al.* 1999, 24) reporting $11.6 billion received (CI $8.7 to 14.5 billion) versus actual payments (HRDC 2000) of $12.7 billion (p=0.4413).

- As was the case for dependence rates, actual payments are two to six times higher than reported payments for single men, single women, and lone mothers, with the largest discrepancy for single men ($93 million reported versus $564 million paid). These SLID figures are not releasable, however, due to the small sample size (n<25); Statistics Canada (1997).

By contrast, comparing annual months of social assistance dependence and amounts received by family type and high school completion reveals no striking differences. All SLID estimated 95 percent confidence intervals include the administrative values, even those for single men, single women, and lone mothers, which would normally not be released due to the small sample size (n<25).

Finally, comparing the use of welfare by non-Grade 12 graduates reveals large differences. BC cohort data reveals that non-graduates are 81 percent (p<0.001) of all recipients and receive 84 percent (p=0.0013) of total months paid. SLID underestimates non-graduates as a proportion of both recipients (43 percent) and months (49 percent), and SLID confidence intervals (25–61 percent of recipients, 28–69 percent of months) do not include the administrative figures.

Discussion

Economists interested in policy-relevant research have long been concerned with data quality. When comparing the results of random assignment studies of active labour market programs to observational studies of the same programs, Heckman, LaLonde and Smith (1999, 2082) conclude, "no econometric or statistical cure-all fixes the problem of fundamentally bad data." The conclusions of other researchers are not generally as strong, although none would disagree with the milder conclusion that "using better data ... helps a lot" (ibid., 2084).

There is ample evidence of errors in survey measurement of variables that are of fundamental interest to social policy analysts, such as income (especially transfer income) and education. For example, Ashenfelter and Krueger (1993, 7) report that between 8 percent and 12 percent of the variance in surveyed education levels is error. Bound and Krueger (1991) report that 18 percent (men) and 8 percent (women) of the variance in earnings in the Current Population Survey is error. Card, Hildreth and Shore-Sheppard (2001) report that the Survey of Income and Program Participation understates Medicaid coverage in California by 10 percent. Bollinger and David (2001) report that only 78 percent (138 of 177) of SIPP respondents whose administrative records indicated they had received food stamps in both of two years, declared having received food stamps in both years. Moore, Stinson and Welniak Jr. (1997) conclude that there is "a general tendency for transfer program income to be at least modestly — and in some instances substantially — under reported" (quoted in Hotz and Scholz 2002, 289).

If these errors were classical and random, then dealing with them using statistical methods would be straightforward. But American researchers are finding that the errors are substantially greater at the low end of the distribution, both for education and income. Using the Post-Secondary Education Transcript Study, Kane, Rouse and Staiger (1999, Table 1) report that for almost 98 percent of those reporting a bachelor's degree, a bachelor's degree was found in the transcripts. By contrast, they report that self-reported and parent-reported education levels agreed for only 57 percent of high school dropout respondents in the National Education Longitudinal Study (p. 23). For income, Hotz and Scholz (2002, 286) conclude that overall income and earnings seem to be well reported in surveys, but cite unpublished work by the US Bureau of the Census which reports that "below $10,000 and above $150,000, at least half the observations have discrepancies exceeding 20 percent, and most are larger than that."

Canada is not immune from these problems. Statistics Canada reports that low-income populations present some special challenges to agencies conducting national surveys (Abraham *et al.* 2001) and that social assistance income is more likely than other types of income to be underreported in SLID (Kapsalis 2001; Cotton *et al.* 1999; Adler and Wolfson 1988). The primary purpose of the Labour Force Survey and SLID is to provide a longitudinal database on labour, income, and their relationship to family composition (Statistics Canada 1999); it may be unrealistic to expect it to accurately cover low-income populations. Yet, despite the known problems, Statistics Canada has no better data source and so continues to publish income statistics based on survey data (Statistics Canada 2003). These statistics, which significantly understate the prevalence of welfare receipt, are generally the best or only ones available for use in policy discussions related to poverty.

For social assistance income, the risk of recall bias or misreporting in SLID is less than for education, because 63 percent of all 1994 sample respondents consented to use of income data from their T1 tax return. Actual coverage is slightly lower because some records cannot be matched (Statistics Canada 1997, 46). Social assistance payments

are felt to be underreported by from 10 to 20 percent on the T1 (Marc Frenette, personal communication), so accuracy could be further improved by asking respondents' permission to get the information directly from the T5007 instead of the T1.

Kapsalis (2001) noted that SLID undercounts recipients and underreports social assistance income by nearly 50 percent, in part because usual practice (reflected in our results) is to exclude respondents who declare that they received social assistance but fail to specify in which months; even imputing average social assistance for all months for these respondents raises the SLID figure to only about two-thirds of the HRDC estimated payments. Kapsalis (2001) concluded that linkage to provincial records was needed to reduce the underreporting of social assistance income.

Since the estimate of error in the T1s (10 to 20 percent) does not overlap with the estimate of undercounting of social assistance on SLID (20 to 50 percent; Kapsalis 2001), there must be other problems: sampling for SLID may not capture enough welfare recipients, or there may be a non-response or underreporting of welfare income by welfare recipients, or both. In addition, SLID's use of proxy reporting (more than half of SLID responses are from one family member, responding on behalf of all others) may create a problem; administrative contact with BC welfare recipients occasionally reveals that family members do not know their relative is receiving benefits (personal experience, W.P. Warburton).

The striking difference between the comparability of SLID and administrative aggregates for BC and Canada (seen in Table 1) suggest either that reliability may vary from province to province, and from year to year, or that greater reliance on tax data (over time) is improving SLID's accuracy. The 1996 HRDC social assistance total is within the SLID confidence interval and by 1997, 80 percent of SLID respondents agreed to use of their tax data (Abraham *et al.* 2001). The 1996 SLID sample is also twice as large as the 1994 sample, because in 1996 two different survey panels overlapped (Statistics Canada 1997).

US research results suggest that there may be misreporting of welfare income and education by people with low levels of education. BC administrative data shows that SLID is relatively accurate for overall education levels, but overstates education levels of welfare recipients, consistent with underreporting of welfare dependence, and/or overstatement of education levels, by SLID respondents who have not completed high school. Information on education levels of welfare recipients could be improved by requesting respondents' permission to access both welfare and high school completion records.

The policy implications of errors in national survey data go beyond the analysis of welfare. If SLID undercounts social assistance recipients because of sampling, response, or recall difficulties at the lower end of the income distribution, this will affect analyses of issues related to all aspects of low income, from basic facts such as counts of the number of people with low income to estimates of education levels, socio-economic status, and health. If indeed SLID respondents with low levels of education are more likely to misreport income and/or education than people with higher levels of income, then SLID-based estimates of the impact of education on earnings and health status could be hopelessly inaccurate.

Statistics Canada's Social Policy Simulation Database and Model (SPSD/M) adjusts declared social assistance receipt (from the Survey of Consumer Finances) in order to arrive at benefit totals reported by HRDC. Based on previous research, logistic regression is used to estimate individuals' probability of receiving assistance, and amounts are assigned to some persons who did not report assistance income on the survey (Bordt *et al.* 1990). This method allows the model to produce reasonably

accurate estimates of aggregate policy impacts, but is not a substitute for accurate information on assistance receipt. Applying similar methods to SLID or other surveys would not solve the problem of inaccurate information about education, health, or other personal characteristics of welfare recipients.

Given the agreement between SLID and administrative data for average annual months of dependence and average monthly payments, we speculate that SLID respondents declaring social assistance income may be fairly typical of average welfare recipients. Aggregate caseloads and benefits paid are underestimated, however, because the prevalence of welfare receipt in the population (which determines the sample weights) has been underestimated. This is consistent with the assumptions used to adjust Statistics Canada's Social Policy Simulation Database and Model. Currently, SLID income strata are based on labour income (Bordt *et al.* 1990); re-estimating based on aggregate administrative welfare data would allow SLID to more accurately weight the lower end of the income distribution. If response rates or declared welfare receipt were observed to be problematic at the low end of the income distribution, Statistics Canada could compensate by over-sampling low-income respondents, re-weighting available responses based on the administrative data, and/or directly verifying welfare receipt and other characteristics using administrative data.

Conclusions and Recommendations

SLID data may be considered unreliable if they are released with no data quality warning yet are inaccurate. Our comparison shows that SLID data is mostly reliable for the overall BC population, but often unreliable for the BC population receiving welfare. SLID seriously underreports the number of BC residents who receive welfare. While SLID respondents seem similar to actual recipients in terms of months of dependence and average payment amounts, the education levels of social assistance recipients reported by SLID differ dramatically from the levels seen in administrative data.

The differences we found between administrative and survey data could be caused by sampling bias, non-response bias, recall bias, measurement error, weighting errors, attrition (which may be higher for welfare recipients), deliberate inaccuracy by respondents, lack of knowledge by respondents (for proxy reports), or (most probably) some combination of these. Whatever the cause, the magnitude of the discrepancies is clearly sufficient to compromise the usefulness of SLID for policy analyses related to welfare and low income in Canada. Most strikingly, SLID data suggests that education levels of social assistance recipients are similar to those of non-recipients, while administrative data reveals that young non-high school graduates are roughly seven times as likely as their high school graduate peers to depend on welfare.

Currently, national surveys serve as the basis for most policy-related information, despite being known to underestimate social assistance income. Our work shows that national surveys also overstate education levels of many welfare recipients, and this error is likely to lead to missed opportunities for beneficial policy. The administrative data strongly suggests the need to examine the impacts of the BC educational system on welfare receipt; SLID data tends to direct attention away from education. Similar missed opportunities could exist for other provinces, and in other areas of social policy such as health care, child care, or child welfare. Priority must be given to determining whether the same discrepancies found for BC welfare and education data are found for other provinces, and when other national longitudinal surveys (such as the NLSCY or NPHS) are compared to relevant provincial administrative databases.

Even without further study, the appropriate remedy (on a policy level) for the various discrepancies revealed here (for welfare and education data) is a national initiative to make linked, identified, person-

level provincial social program administrative data routinely available for social policy research. In addition to being used for policy research, this administrative data could be used to assist with sampling, data collection, and weighting for SLID and other national surveys. Routine comparison of administrative and survey data would allow verification and validation of survey results, and potentially resolve questions about the nature of the reporting and sampling difficulties that lead to welfare income being underestimated in national surveys.

Different remedies may apply to different causes of error. As noted above, sampling could be improved by using aggregate administrative data on welfare, education, health care, and other social programs to better estimate prevalence and appropriately stratify samples by income, education, health-care usage, and other important characteristics, as needed to support the research questions to be addressed using survey data. Better sample stratification would allow Statistics Canada to monitor response rates and attrition more carefully, and to compensate with higher weights or over-sampling if particular (e.g., low-income or chronically ill) respondents have lower response rates or higher attrition rates. Errors related to response content (recall bias or deliberate understatement) would be best addressed by making greater use (with respondent permission) of reliable data, for instance obtaining social assistance income from the T5007 (instead of the T1), and in general obtaining all data from the most direct and reliable source. Should proxy responses be revealed to be particularly inaccurate for social assistance income, their use could be reduced or eliminated based on family income or other characteristics associated with receipt of welfare.

Because health care, education, and welfare are administered by provinces, routine use of administrative data for research would require close collaboration between Statistics Canada and provincial governments. We recommend that national linked, identified, person-level data be managed by Statistics Canada, both to protect against misuse, and to assure consistency and reliability. Strong safeguards must ensure that survey respondents' records are linked to administrative records only as permitted by applicable federal and provincial privacy legislation, and that the resulting data is held securely and used only for legitimate purposes. A "coordinating file" design, in which different databases are linked only as needed, through one central file containing identifiers but no other personal data, has been used successfully in British Columbia (Barer, Hertzman and Warburton 1996; Chamberlayne *et al.* 1998), and might allay public concern about development of a "Big Brother" database.

Protecting the privacy of personal information is important; but the cost of disallowing routine research using linked administrative data is too high. Canada is a wealthy country, but equal opportunity for all remains an unrealized ideal. Equalizing opportunities depends on finding the policy levers that can improve life chances for the disadvantaged, and such evidence-based policy research requires accurate data. Canada's major new surveys are a step in the right direction, but survey data can be misleading in areas critical to policy. A national effort to harness the power of administrative data is essential to support constructive, evidence-based policies to assist low-income Canadians.

Notes

Acknowledgements

This analysis is based on Statistics Canada's Survey of Labour and Income Dynamics (SLID) Public Use Microdata 1994, which contains anonymized data collected in the Survey of Labour and Income Dynamics. The authors gratefully acknowledge the access to the Public Use SLID Microdata provided by David Green and William Stewart of the University of British Columbia, through the Data Liberation Initiative; the access to

administrative data provided by the British Columbia Ministries of Human Resources and Education; the access to Census data provided by BC Stats, BC Ministry of Finance; the assistance of Sylvie Laroche of Statistics Canada with the calculation of approximate confidence intervals for SLID data; and the use of statistical tables at the SurfStat Web site (SurfStat 2003) for probability values in Table 1. We are also grateful for the comments on drafts provided by Arthur Sweetman (School of Policy Studies, Queen's University), Jeff Smith (Department of Economics, University of Maryland), Brian Murphy and Philip Giles (Statistics Canada), and the editor and anonymous reviewers of *Canadian Public Policy/Analyse de Politiques*. SLID data extractions were performed by William Stewart based on instructions provided by Rebecca N. Warburton, and the responsibility for the use and interpretation of these data is entirely that of the authors.

Notice

This report is not an official document of the British Columbia government, and does not necessarily reflect the views of that or any other organization. The authors are responsible for content and for any errors or omissions.

This paper is the product of collaboration. The ordering of names reflects degree of involvement in the drafting and revision of the final article. Both authors have made substantial contributions to conception and design, and to the acquisition, analysis, and interpretation of data. William Warburton performed administrative data analysis; Rebecca Warburton directed SLID data extractions, calculated SLID confidence intervals, downloaded publicly available education and Census data, and performed data analysis for non-administrative data. Both authors share responsibility for the integrity of the work as a whole, from inception to published article, including final approval of the version to be published.

[1]In this paper we use the term "welfare" to refer to benefits paid under the *BC Benefits* (Youth Works) *Act*, the *BC Benefits* (Income assistance) *Act*, and the *Disability Benefits Program Act*. SLID describes programs of this type as "social assistance."

[2]Canada's National Longitudinal Survey of Children and Youth and National Population Health Survey were launched in 1994. The Survey of Labour and Income Dynamics (SLID), begun in 1993, replaces the Survey of Consumer Finances and the Labour Market Activity Survey. Statistics Canada's comparison of SLID and SCF reports that overall, SLID and SCF produce similar results, though SLID finds more people with low incomes, and SCF found more people with no income (Cotton *et al.* 1999).

[3]The Data Liberation Initiative (DLI) provides Canadian academic institutions with affordable access to Statistics Canada data files and databases for teaching and research. The DLI is a cooperative effort among the Humanities and Social Science Federation of Canada (HSSFC), the Canadian Association of Research Libraries (CARL), the Canadian Association of Public Data Users (CAPDU), the Canadian Association of Small University Libraries (CASUL), Statistics Canada and other government departments. See http://www.statcan.ca/english/freepub/11-533-XIE/free.htm.

[4]SLID uses stratified sampling, where categories of respondents in the sample represent similar members of the population; category weights are based primarily on Census data and reflect the estimated prevalence of different categories in the population. See Statistics Canada (1997, 24-35).

[5]Students were identified by name, gender, and birth date. Matching was relatively straightforward because only about 150 people share each birth date in British Columbia.

[6]In the 1990 cohorts, 78 percent of the Grade 8 students were born in 1977, and another 17 percent in 1976. Seventy-six percent of Grade 9 students were born in 1976 and another 18 percent in 1975. By 1998, these students were age 21 or more, and most BC students graduate high school at age 17 or 18 (BCEd 1996).

[7]In the 1991 cohorts, 80 percent of the Grade 8 students were born in 1978, and another 16 percent in 1977; 76 percent of Grade 9 students were born in 1977 and another 17 percent in 1976. By 2003, these students were age 25 or more, and most BC students graduate high school at age 17 or 18 (BCEd 1996).

[8]Lower completion rates above age 30 are consistent with rising rates of Grade 12 completion over time. Recent Ministry of Education statistics show that rates of Grade 12 completion (within six years of completing Grade 8, by all Grade 8 students) continue to increase

gradually, from 63.5 percent in 1990/91 to 75.3 percent in 1999/2000 (BCEd 2001, 15).

References

Abraham, E., M. Rivard, P. Giles and H. Lathe. 2001. *Results of the Tax Permission Questionnaire in the Survey of Labour and Income Dynamics.* Catalogue No. 75F0002MIE-01-002. Ottawa: Income Statistics Division, Statistics Canada.

Adler, H.J. and M.C. Wolfson. 1988. "A Prototype Micro-Macro Link for the Canadian Household Sector," *Review of Income and Wealth* 34 (December):371-92.

Ashenfelter, O. and A. Krueger. 1993. "Estimates of the Economic Return to Schooling from a New Sample of Twins." Industrial Relations Paper No. 304. Princeton, NJ: Department of Economics, Princeton University.

Barer, M.L., C. Hertzman and R.N. Warburton. 1996. *Access Policy for Research Uses of Linked Health Data.* Victoria: British Columbia Ministry of Health. Accessed at http://www.chspr.ubc.ca/Resources/LinkDap.PDF, May 2004.

Bollinger, C. and M.H. David. 2001. "Estimation with Response Error and Non-response: Food Stamp Participation in the SIPP," *Journal of Business and Economic Statistics* 19(2):129-41.

Bound, J. and A. Krueger. 1991. "The Extent of Measurement Error in Longitudinal Earnings Data: Do Two Wrongs Make a Right?" *Journal of Labor Economics* 9:1-24.

Bordt, M., G. Cameron, S. Gribble, B. Murphy, G. Rowe and M. Wolfson. 1990. "The Social Policy Simulation Database and Model: An Integrated Tool for Tax/Transfer Policy Analysis," *Canadian Tax Journal* 38(1):48-65.

British Columbia Ministry of Education (BCEd). 1996. *Ministry of Education 1994/95 Statistical Supplement to the Annual Report, School Completion High School Level Completion: BC Dogwood Diplomas and Alternative High School Completion Certificates Granted.* Victoria: Government of British Columbia. Accessed at http://www.bced.gov.bc.ca/annualreport/94_95/educ/sup/sup_p19.htm, 1 July 2003.

_____ 2001. *Ministry of Education 1999/2000 Annual Report.* Victoria: Government of British Columbia. Accessed at http://www.bced.gov.bc.ca/annualreport/99_2000/99_2000.pdf, 1 July 2003.

_____ 2004. *Documentation Guidelines.* Accessed at http://www.bced.gov.bc.ca/pen/schools/guidelines.htm.

British Columbia Ministry of Human Resources (BCHR). 2003. *Income Assistance Records.* Victoria: Government of British Columbia.

_____ 2004*a*. *BC Employment and Assistance Web Orientation.* Accessed at http://www.weborientation.gov.bc.ca/info_req1.asp, March 2004.

_____ 2004*b*. *BC Employment and Assistance Manual.* Accessed at http://www.mhr.gov.bc.ca/PUBLICAT/VOL1/pdf/6-4pol.pdf, April 2004.

BC Stats. 2000. *Forecast 5/00, Tables, 6, 7, 8.* Victoria: BC Ministry of Finance.

Card, D., A.K.G. Hildreth and L.D. Shore-Sheppard. 2001. "The Measurement of Medicaid Coverage in the SIPP: Evidence from California, 1990-1996." NBER Working Paper No. 8514. Cambridge, MA: National Bureau of Economic Research.

Chamberlayne, R., B. Green, M.L. Barer, C. Hertzman, W.J. Lawrence and S.B. Sheps. 1998. "Creating a Population-based Linked Health Database: A New Resource for Health Services Research," *Canadian Journal of Public Health* 89(4):270-73.

Coelli, M., D. Green and W.P. Warburton. 2003. "Breaking the Cycle: The Effect of Education on Welfare Receipt among Children of Welfare Recipients." Paper presented at CEA 37th Annual Meetings, 29 May–1 June. Carleton University, Ottawa.

Cotton, C., K. Bishop, P. Giles, P. Hewer and Y. Saint-Pierre. 1999. *A Comparison of the Results of the Survey of Labour and Income Dynamics (SLID) and the Survey of Consumer Finances (SCF) 1993-1997: Update.* Catalogue No. 75F0002MIE-99-007. Ottawa: Income Statistics Division, Statistics Canada.

Fortin, B., G. Lacroix and S. Drolet. 2004. "Welfare Benefits and the Duration of Welfare Spells: Evidence from a Natural Experiment in Canada," *Journal of Public Economics* 88(7-8):1495-520.

Fortin, B., G. Lacroix and J.F. Thibault. 1999. "The Interaction Between UI and Welfare, and the Dynamics of Welfare Participation of Single Parents," *Canadian Public Policy/Analyse de Politiques* 25(Supplement): S115-S131.

Frenette, M. and G. Picot. 2003. *Life After Welfare: The Economic Well Being of Welfare Leavers in Canada during the 1990s.* Catalogue No. 11F0019MIE. Analytical Studies Research Paper No. 192. Ottawa: Statistics Canada.

Gomatam, S., R. Carter, M. Ariet and G. Mitchell. 2002. "An Empirical Comparison of Record Linkage Procedures," *Statistics in Medicine* 21(10):1485-96.

Green, D. and W.P. Warburton. 2004. "Tightening a Welfare System: The Effects of Benefit Denial on Future Welfare Receipt," *Journal of Public Economics* 88(7-8):1471-93.

Heckman, J.J., R. LaLonde and J. Smith. 1999. "The Economics and Econometrics of Active Labor Market Policies," in *Handbook of Labor Economics*, Volume 3A, ed. O. Ashenfelter and D. Card. Amsterdam: North Holland.

Hotz, V.J. and J.K. Scholz. 2002. "Measuring Employment and Income Outcomes for Low-Income Populations with Administrative and Survey Data," in *Studies of Welfare Populations: Data Collection and Research Issues*. Washington, DC: National Research Council, National Academy Press, pp. 275-315.

Human Resources Development Canada (HRDC). 2000. *Provincial and Municipal Social Assistance Program Expenditures, Table 438: Provincial and Municipal Social Assistance Program Expenditures, by Province and for Canada, Fiscal Years Ending March 31, 1980-81 to 1999-2000.* Accessed at http://www.hrdc-drhc.gc.ca/sp-ps/socialp-psociale/statistics/75-76/tabfig/tab438e.html, 3 July 2003.

Jaro, M.A. 1989. "Advances in Record-Linkage Methodology as Applied to Matching the 1985 Census of Tampa, Florida," *Journal of American Statistical Association* 89:414-20.

Kane, T.J., C.E. Rouse and D. Staiger. 1999. "Estimating Returns to Schooling when Schooling is Misreported." NBER Working Paper No. 7235. Cambridge, MA: National Bureau of Economic Research. Accessed at http://www.nber.org/papers/w7235, 1 July 2003.

Kapsalis, C. 2001. *An Assessment of EI and SA Reporting in SLID.* Catalogue No. 11F0019MIE-01-166. Ottawa: Statistics Canada and Data Probe Economic Consulting Ltd.

Moore, J.C., L.L. Stinson and E.J. Welniak, Jr. 1997. *Income Measurement Error in Surveys: A Review.* Statistical Research Report. Washington DC: US Census Bureau.

Social Development Canada. 2000. *Press Release: HRDC Dismantles Longitudinal Labour Force File Databank*, 29 May. Ottawa. Accessed at http://www.sdc.gc.ca/en/cs/comm/news/2000/000529_e.shtml, May 2004.

Statistics Canada. 1997. *Survey of Labour and Income Dynamics Microdata User's Guide.* Catalogue No. 75M0001GPE. Ottawa: Statistics Canada.

_____ 1998. *Nation Series (1996 Census).* Catalogue No. 93F0028XDB96006, Table 1-T1, Table 2-T10. Ottawa: Statistics Canada.

_____ 1999. *Survey of Labour and Income Dynamics.* Ottawa: Statistics Canada. Accessed at http://data.library.ubc.ca/java/jsp/database/production/detail.jsp?id=787, May 2004.

_____ 2003. *Income Trends in Canada.* Catalogue No. 13F0022XCB. Ottawa: Statistics Canada.

Stewart, J. and M. Dooley. 1999. "The Duration of Spells On Welfare and Off Welfare among Lone Mothers in Ontario." *Canadian Public Policy/Analyse de Politiques* 25(S):S47-S72.

SurfStat. 2003. *SurfStat Australia: Statistical Website.* Accessed at http://www.anu.edu.au/nceph/surfstat, 1 July.

Sweetman, A., R.N. Warburton, W.P. Warburton, R. McPhee and L. DeBenedictus. 2003. "Disability Status: Impacts on Health and Welfare Dependence." Unpublished paper.