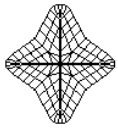

The Centre for Spatial Economics

Assessing past, present and future economic and demographic change in Canada

Labour Market Information Research Agenda Project—Situational Analysis

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Introduction

This report examines available primary and secondary labour market information (LMI), the LMI data that are used by a sample of Provincial/Territorial governments as well as by researchers and analysts outside of government. The report also examines the relevant classification schemes and definitions that are used to examine the early childhood education and care (ECEC) sector, data collection methods, and identified inconsistencies and gaps.

What is LMI?

There are many competing definitions for LMI. O'Reilly (2001) defines LMI as information concerning conditions in, or the operation of, the labour market. The International Labour Organization (ILO) defines LMI as "any information concerning the size and composition of the labour market or any part of the labour market, the way it or any part of it functions, its problems, the opportunities which may be available to it, and the employment-related intentions or aspirations of those who are part of it" (Thuy et al, 2001).[1]

In comparison, the LMI Working Group of the Forum of Labour Market Ministers (FLMM), state that LMI is the "information needed to make a labour market decision." According to the definition, any information that has an impact on labour market decisions should be included in LMI, including information not normally associated with the labour market, such as transportation information.[2]

Given these definitions of LMI, it is clear that there is not one precise definition of LMI, and therefore many different data could conceivable be included in the analysis. In the narrowest of definitions, LMI should include information on employment, labour force and wages. Since educational qualifications are required for ECEC employment in many jurisdictions and are used in differentiating between different types of workers, such as those recognized as a trained versus untrained worker, it is important to consider data on education as well.

Classification Systems[3]

LMI data that are most relevant to the ECEC sector, such as employment and labour force, from publicly available sources tend to be classified by either occupation or industry. Occupation data are categorized by the National Occupational Classification (NOC). Industry data are categorized by the North American Industry Classification System (NAICS). To understand educational qualifications currently the most relevant classification system is the Classification of Instructional Programs (CIP). Other classification systems will come into play in understanding the more broadly defined LMI, such as the North American Product Classification System (NAPCS).

National Occupational Classification (NOC)

The basic classification principle of the NOC is based on the kind of work performed. Occupations are identified and grouped primarily in terms of the work usually performed. This is determined by the tasks, duties, and responsibilities of the occupation. Factors such as the materials processed or used, the industrial processes used, the equipment used, the degree of

[1] Sharpe and Qiao (2006)

[2] Sharpe and Qiao (2006)

[3] See http://www.statcan.gc.ca/concepts/index-eng.htm for links to discussions on the NOC, NAICS, CIP & NAPCS on the Statistics Canada website that was used in this section.

responsibility and complexity of work, the products made and services provided, have been taken as indicators of the work performed when combining jobs into occupations and occupations into groups.

An occupation is defined as a collection of jobs, sufficiently similar in work performed to be grouped under a common title for classification purposes. A job, in turn, encompasses all the tasks carried out by a particular worker to complete her/his duties. Thus, within each group, the occupations are almost unique and are related to each other by similarity of kind of work performed. This approach to the grouping of occupations ensures a certain degree of homogeneity within groups and permits a distinction between groups. By focusing on work performed, the groups also tend to be homogeneous by skill level. This is natural because the nature of the work to be performed determines the education, training, experience or inherent talents required.

Occupational data are categorized according to similar systems by Statistics Canada and Human Resource and Social Development (HRDC). National Occupational Classification for Statistics (NOC-S) is used by Statistics Canada for its surveys. Different surveys currently use different version of the NOC-S. Human Resources and Social Development Canada classifies occupation data according to the National Occupational Classification 2006 (NOC 2006). These systems are the same at the unit group level, although the codes are different. The NOC-S uses an alphanumeric coding convention, while the NOC uses numbers.

For the broad early childhood education and care sector there are six potentially relevant occupations. The category "Early Childhood Educators and Assistants" is E217 in NOC-S 2007 and NOC 4214 in HRSDC's NOC. (see Appendix I for a description). Other relevant categories are: Babysitters, Nannies and Parents' Helpers (NOC-S G814, NOC 6474), Elementary School and Kindergarten Teachers (NOC-S E132, NOC 4142), Elementary and Secondary School Teacher Assistants (NOC-S G812, NOC 6472). Since Managers may or may not be included in the above categories, the categories: School Principals and Administrators of Elementary and Secondary Education (NOC-S A323, NOC 0313) and Managers in Social, Community and Correctional Services (NOC-S A324, NOC 0314) may also be relevant since directors and managers of ECEC centres will be included in this group.

The NOC has a similar structure to that of the NOC–S 2006. The two classifications have 520 unit groups, 140 minor groups and 10 broad categories in common. However, there are 47 major groups in the NOC–S 2006 and 26 major groups in the NOC 2006.

It is important to be familiar with both of these classification systems because each one provides certain benefits. Statistics Canada collects and disseminates data, so knowledge of their system is helpful in using LFS or census data. The 2006 Census occupation data are classified according to the NOC–S 2006. Earlier census data were classified using earlier classification systems. The 2001 census used the NOC-S 2001. In comparison, the 1996 census used the Standard Occupational Classification 1991 (SOC 1991), which was a predecessor to the NOC-S.

The classifications in the NOC-S 2001 are largely comparable to the NOC-S 2006 system, so data are largely comparable in these two censuses. The Labour Force Survey currently uses the NOC-S 2001. For more information on the comparability of the census and of the Labour Force Survey data, refer to Appendix II. Notably, the definition of the Early Childhood Educators and Assistants occupation (NOC-S E217, NOC 4214) was changed for the 2006 version of the NOC. And this occupation was moved from the Sales and Service broad occupational category "G", (SOC 1991 G813) to the Occupations in Social Science, Education, Government Service and Religion broad occupational category "E" in the NOC-S 2001. This means that to compared data

from the 2001 and 2006 census with data from the 1996 census the SOC 1991 category (G813) must be used.

It is also helpful to understand the NOC used by HRSDC, since this system is used to provide related LMI on their website, such as the essential skills profiles (see Appendix III) and is used to construct the NOC matrix that illustrates the "closeness" of occupations and therefore the occupations that tend to have the highest inter-occupational mobility.

North American Industry Classification System (NAICS)

Occupational classification does not stand alone but must be understood as being related to other classifications such as the North American Industry Classification System (NAICS). The industry in which the individual is employed is determined by the kind of economic activity of the establishment. The establishment is usually a factory, mine, farm, store, other place of business or an institution for which a number of basic production variables can be compiled. They include government institutions and agencies engaged in the production of marketed and non-marketed services, as well as organizations such as professional associations and unions and charitable or non-profit organizations and the employees of households.

It is important to note the conceptual differences between an industry classification and an occupation classification. An establishment can employ individuals performing completely different occupations, and these are classified to appropriate occupational groups, but the industrial classification of each individual employed in the establishment should be the same and is determined by the nature of the product made or service rendered.

NAICS Canada 2007 consists of 20 sectors, 102 subsectors, 324 industry groups, 718 industries and 928 national industries, and replaces NAICS Canada 2002. There were a number of changes between NAICS 2002 and NAICS 2007, none of which affected the child care sector.

There is a public consultation regarding changes to the NAICS for NAICS 2012. Input is requested by September 30, 2009. Submissions may be made for any industry, existing or newly created. This process is similar to the process for NOC.

The NAICS category most relevant to the child care sector is "Child Day-Care Services", NAICS 6244. (see Appendix I for a description). Other relevant categories are: 6111 Elementary and Secondary Schools and 8141 Private Households.

North American Product Classification System (NAPCS)

NAPCS will eventually become the classification system for goods and services in the Canadian economy. While goods can be transferred to third parties, services cannot. Goods can be tangible or intangible. Tangible goods have a physical presence. Intangible goods may not exist physically, but they can be stored and their ownership can be transferred just like tangible goods. An example of an intangible good is a research report. Child care is an example of a service.

The NAPCS is currently under development and is a joint project between the Canadian, American and Mexican statistical agencies. While NAPCS will eventually cover all goods and services in the economy, it currently mainly covers the industries in NAICS sectors 48-49, 51-54, 56, 61-62, 71-72 and 81. NAPCS will form the new product dimension basis in the Canadian System of National Accounts (CSNA) and in surveys conducted by statistics Canada.

NAPCS categories have a six digit code. The first three digits are industry codes based on the NAICS classification. The final three digits provide a unique and logical classification of all NAPCS categories. The NAPCS category most relevant to the child care sector is 624001.1 Child

daycare services. This category is split up into the subcategories: 624001.1.1 Child daycare services, in private residences and 624001.1.2 Child daycare services, in daycare centres. Other relevant categories are: 611001.1.1.1 Pre-primary programs and 611001.1.1.2 Elementary school programs. (see Appendix I)

Classification of Instructional Programs (CIP)

Education data by field of study available from Statistics Canada changed significant over the last five years. Previously there were separate classification systems for college, university enrolment and completer data and there was a different classification system used in the census to tabulate educational attainment.

In the 2001 census, educational attainment data were available by the Major Field of Study (MFS) classification that was unique to the census. The MFS was created for use in the 1986 Census of Population and was revised a number of times over the years. The version of MFS that was used for the 2001 census was comprised of 11 major levels, 100 minor levels and 449 unit levels.

In the last five years Statistics Canada started a program to harmonize all of its surveys to use a common classification system. The current classification used at Statistics Canada to categorize field of study is the Classification of Instructional Programs (CIP) Canada 2000. CIP Canada 2000 is divided into six chapters. The CIP is then subdivided into three levels: 49 two-digit classes, 385 four-digit classes, 1,432 six-digit classes. There is also a special aggregation structure that is comprised of 13 'primary groupings'.

Program descriptions identify the objectives and content of the instructional programs. Program descriptions using phrases such as "any program that focuses on" or "any general program that focuses on" describe academic and general programs. Program descriptions using phrases such as "program that prepares individuals for" or "program that generally prepares individuals for" describe programs designed to prepare individuals for specific occupations.

There are a number of CIP 2000 categories that are relevant for the ECEC sector, but according to census data the dominant qualification is CIP 19.0709 Child Care Provider/Assistant (see Appendix I for a description). Other potentially relevant qualifications are Education and Human Development, Family Studies and Related categories, which are included under the 2-digit and 4-digit CIP codes 13 and 19.07 respectively. Other 6-digit CIP codes that may be relevant to the child care sector include: CIP 13.1015 Education/Teaching of Individuals in Early Childhood Special Education Programs, CIP 13.1207 Montessori Teacher Education, CIP 13.1209 Kindergarten/Preschool Education and Teaching, CIP 13.1210 Early Childhood Education and Teaching, CIP 13.1501 Teaching Assistants/Aides, General, CIP 19.0706 Child Development and CIP 19.0708 Child Care and Support Services Management.

Publicly Available Data Sources

The occupation, industry and education data that are of interest to the Child Care Human Resources Sector Council (CCHRSC) are at a detailed level of aggregation. For example, the occupation "Child care educators and assistants" is at the 4-digit level of aggregation in the NOC/NOC-S. Similarly in the NAICS, the industry "Child Day-Care Services", NAICS 6244, is at the 4-digit level of aggregation. While the most common field of study used in the ECEC sector, "Child Care Provider/Assistant" from the CIP, is at the six digit level of aggregation, specifically CIP 19.0709. And the NAPCS data of interest are at the six, seven and eight digit level of aggregation, 611001.1.1.1 pre-primary programs, 624001.1 Child daycare services, and

624001.1.1 Child daycare services, in private residences, 624001.1.2 Child daycare services in daycare centres, and 814001.1 Babysitting services. Given the level of detailed that is needed, the type of publicly available information is limited to larger surveys, since data quality, confidentiality and suppression prevent other surveys that are commonly used for LMI to be utilized at this level of aggregation.

Detailed LMI data are available from Statistics Canada in several surveys:

- The Census,
- Labour Force Survey (LFS),
- Survey of Employment Payrolls and Hours (SEPH),
- Education data, and
- The Longitudinal Administrative Database (LAD).

The data from secondary data sources that provide relevant information to the estimation of demand or supply of workers tend to be classified by either occupation or industry. Occupation data are categorized by the National Occupational Classification Industry data are categorized by the North American Industry Classification System.

Census

The census long form respondents are a very large sample that represents 20% of the total population. These data can provide very detailed and internally consistent information on many aspects including: employment, labour force, industry, occupation, education, income, age, sex, migration status, and place of work. Census data are available for provincial, territorial and sub-provincial areas[4]. The census, therefore, can provide detailed information on the ECEC workforce at the four digit NOC level of aggregation.

An important drawback of the census, however, is that it is collected every five years so these data do not provide annual data. Furthermore, it can take several years for the data from the long form to be made available, so the data are not up-to-date. The detailed labour force and employment data from the 2006 census, for example, were released in 2008.

The need to protect the privacy rights of respondents means that Statistics Canada can not publish data that can be used to identify individual responses. For example, if there is only one senior manager at a plant in a small town in Newfoundland, then it would be possible to determine what they earned, or what type of education they had for example. To ensure that individual responses remain confidential, Statistics Canada employs a random rounding methodology. For cells with less than ten respondents, ten, five or zero will be shown in the database. The number is randomly determined using an algorithm that weights the outcome based on the original number, which increases the likelihood that the number shown will represent the true rounding of the original number, but there is the chance that the rounding will be either higher or lower than what true rounding would show. This approach affects data quality and makes the data less reliable.[5]

A consequence of the random rounding is that there can appear to be inconsistencies in the data. Data that should be a simple sum of two other concepts do not necessarily add up, such as total employment in an occupation being the sum of men and women in that occupation. There could

[4] Geographical coverage includes: census metropolitan areas, census agglomerations, federal electoral districts, postal code areas, census divisions and subdivisions. Custom areas can be constructed on request.
[5] There are approaches that can be taken to infer what the true value is for a cell. This type of approach, however, requires the purchase of more data, and some data manipulation.

be five people identified as being employed in a particular occupation, but zero males and 10 females. This problem is most acute at the most detailed level of aggregation because the average population size represented is typically smaller.

Labour Force Survey

The Canadian LFS is a household survey of the civilian, non-institutionalized population 15 years of age or older in Canada's ten provinces. Specifically excluded from the survey's coverage are residents of the Nunavut, Yukon, and the Northwest Territories. While there are extended pilot projects being conducted by Statistics Canada in each territory that produces basic labour market data, neither occupation nor industry data are available from these surveys. Employment and labour force data are available from the LFS for the Early Childhood Educators and Assistants NOC category, and the Child Day-Care Services Industry for all provinces, for example.

The LFS is recorded monthly and typically released at the end of the first week of the month after the survey was conducted. This makes the data from the LFS the most up-to-date information on labour force developments available. Monthly and annual data are available from the LFS. The LFS provides a broad range of types of data related to the labour market, including: education, demographics, self-employment, days lost from work for maternity leave, labour force estimates by family type and family composition, wages, retirement ages, hours worked and reasons for leaving last job, which make it possible to calculate turnover rates.[6] Some of these data are available for broad NOC or NAIC categories, but coverage would vary by province. There is less coverage for detailed occupation or industry groups as confidentiality considerations restrict the availability of data.

The LFS has used a rotating sample of approximately 54,000 households since July 1995. This sample is significantly smaller than the census. As a result the LFS cannot provide the same level of consistent disaggregated data as the census. This limitation is particularly problematic for sub-national jurisdictions because the sample size for these areas is considerably smaller than the national sample. The LFS data are suppressed should the estimated number of people fall below a predetermined level. Suppression is done for confidentiality and data quality reasons and occurs at different levels depending on the jurisdiction under consideration. If the number falls below 1,500 people in Alberta, the LFS shows zero for that category, while suppression is triggered at 500 in Manitoba and 200 in PEI (See Table 1 below for an indication of sample sizes and suppression levels for Canada and the provinces).

Table 1: Canadian Labour Force Survey

	Sample Size (Jan. 2003)	Minimum size for release
Canada	53,980	1,500
Newfoundland	1,987	500
PEI	1,421	200
Nova Scotia	3,137	500
New Brunswick	2,962	500
Quebec	10,140	1,500
Ontario	15,792	1,500
Manitoba	3,906	500
Saskatchewan	4,072	500

[6] See Statistics Canada (2009) for the LFS questionnaire.

Alberta	5,372	1,500
BC	5,191	1,500
Source: Statistics Canada		

The LFS also records labour force, unemployment, and wages. Labour force data are available for the NOC-S E217, and the NAICS 6244 for Canada and all the provinces. However, due to data quality concerns the wage and unemployment data at the 4-digit level of aggregation are suppressed. Notably, the number of people unemployed and unemployment rates can be estimated from the available labour force and employment data, but for provinces with smaller populations the data are very volatile and meaningless. The reason is that because of the sample size of the survey all LFS data are provided as thousands with one significant digit. So the data are effectively rounded to the nearest one hundred. For example, if there are 49 unemployed (difference between labour force and employment), the data will show zero, but if there are 50 unemployed the next year, the number would be 100. For PEI the calculated unemployment rate for the NOC-S E217 varied between 20% in one year to zero in the next year.

Longitudinal Administrative Database

The Longitudinal Administrative Database (LAD) is a ten percent representative sample of Canadian tax filers and provides information on incomes, taxes, industry of employment and basic demographic characteristics, including province of residence. The first year of data for the LAD is 1982 and currently runs through 2004. The full set of annual tax files from which the LAD is constructed are estimated to cover from 91 to 95 percent of the target adult population, thus comparing favourably with other survey-based databases, and even rivaling the census.[7] Data quality therefore would be considerably better than the LFS. The LAD can be sub-divided by province and sub-provincial areas. At the sub-provincial level the data are organized by postal code. The LAD, however, does not have any occupational data.

These data can be used for time series analysis and provide a view of historical provincial industrial employment trends. But the data can not be used to illustrate current or even relatively recent developments in the industry or region given the time lags involved in accumulating, tabulating and delivering the data in a useable database. The lack of recent occupation-related data meant that this dataset was not used in the analysis of current conditions. LAD data are all custom orders and so take one to three weeks and are priced based on the complexity of the request and the number of series requested.

There are data on the ages of the seven youngest children, total number of children in the family, child care expense deduction and universal child care benefits which could be used to calculate the demand for child care.

Survey of Employment Payrolls and Hours

The Survey of Employment, Payrolls and Hours (SEPH), which is also known as the Survey of Employment, Earnings and Hours, is a monthly survey provided by Statistics Canada. It is produced from the combination of the Business Payroll Survey results and the payroll deductions administrative data received from Canada Customs and Revenue Agency. SEPH is Canada's only source of detailed information on the total number of paid employees, payrolls and hours at detailed industrial, provincial and territorial levels.

[7] Finnie (1998). pp 13-14.

The target population for the SEPH is all employers in Canada, except those primarily involved in agriculture, fishing and trapping, private household services, religious organizations and military personnel of defence services. The survey draws its samples from the Business Register maintained by the Business Register Division of Statistics Canada and from a list of all businesses registered in Canada Customs and Revenue Agency's Business Number program with one or more active payroll deduction accounts. SEPH therefore provides the most detailed estimates of the current number of paid employees and their hours. There is extensive industry coverage in SEPH, with data available at the 4-digit level of aggregation for select industries like the "Child day-care services". There are coverage gaps below the national level.

The main drawbacks of the SEPH are that the self-employed are not represented, some industries are excluded and it has no occupational data or labour force data and the information is not as current as the LFS. Data are released late in the month for data from two months earlier. For example, on May 29th, 2007 preliminary data were released for March 2007. SEPH data are subject to revision as more information comes available, and therefore the estimated level of employment can change for a particular reference month. The data for 2006 were to be finalized in May 2007, for example, but were not finalized until July of that year.

The result of the Survey of Employment Payrolls and Hours is reviewed using the appropriate security measures complying with the Statistics Canada Act to ensure the safeguard of the respondents' information and that no enterprise may be identified. This exercise is reviewed every year since content of 'industry geography' may change from one year to the next. The bottom line is that industry confidentiality will change year to year leading to some industries being suppressed in one year and not in the next, and vice versa.

This data source has data for the provinces and territories. There are many gaps in the data, however, for smaller jurisdictions.

National Graduates Survey

The National Graduates Survey (NGS) provides information on the level of schooling, field of study and the occupational outcomes of postsecondary school graduates two years after graduation. The NGS is cross-sectional in design with a longitudinal follow-up. The most recent survey had 60,700 participants. There are data for five levels of schooling: trade/vocational, college, bachelors, masters, and doctorate. There are data for all provinces and territories. The publicly released information provide fairly limited data on field of study, however. There are 12 fields of study: categories 01 to 12 of the primary groupings of the Classification of Instructional Programs (CIP). The actual survey does ask for the specific field of study. For example, the field of study program descriptions were coded using the CIP at the six-digit level. Custom tabulations are available from Statistics Canada at a more detailed level of aggregation. So data availability will depend on the CIP category, the level of schooling and the province/territory for which the data are needed. In the NGS, specific occupation questions are asked as well as questions to determine the income and hours of work of new graduates.

In addition to the NGS, Statistics Canada produces the Follow-up Survey of Graduates (FOG) five years after graduation. This makes it possible to look at job stability and career trajectories.

Youth in Transition Survey

The Youth in Transition Survey (YITS) is designed to examine the patterns of, and influences on, major transitions in young people's lives, particularly with respect to education, training and work. Content includes measurement of major transitions in young people's lives including

virtually all formal educational experiences and most about-market experiences, achievement, aspirations and expectations, and employment experiences. The implementation plan encompasses a longitudinal survey of each of two groups, ages 15 and 18-20, to be surveyed every two years.[8]

For the 18-20 year-old Cohort, the initial sample size was 29,000 persons. For the Reading Cohort (15 year-olds), the initial student sample size, which was conducted in 2000 was 38,000. Among the Reading Cohort (15 year-olds) and the 18 to 20 year-old cohort, only those who were re-contacted and responded in Cycle 3 were re-contacted in Cycle 4. The resulting sample size was 22,626 for the 15 year-old Reading Cohort (15 year-olds) and 14,753 for the 18 to 20 year-old cohort. Information on field of study are collected at the six digit CIP level of aggregation, but data will only be released by Statistics Canada if they are of sufficient quality. Therefore, a specific request will need to be made to determine what data are available by CIP. It is likely that the NGS will have more detailed information on education than the YITS because the sample size is so much larger.

Postsecondary Student Information System

Statistics Canada has combined three previous postsecondary student surveys with the Postsecondary Student Information System (PSIS). Information will be available by enrolment and graduates by province and territory. The field of study information is tabulated by CIP. Information on enrolment and graduates is available for trade/vocational, colleges and universities. To date the detailed CIP data have been released for universities, but not for colleges. At the time of this report, the prospective release date for the PSIS college data is March 2009. Unfortunately, the release date for these data has been changed several times over the past year, so it is not clear when these data will become available. Until the detailed college level data are made available there will not be a publicly available source of current education data for ECE.

There is information on age, sex, visible minority or aboriginal status, immigration status, on the job training, program duration in hours or semesters, previous educational activity, whether the student met the normal entrance requirements and whether instruction was done at the work place.

National Longitudinal Study of Children and Youth

The National Longitudinal Survey of Children and Youth (NLSCY) is a long-term study of Canadian children that follows their development and well-being from birth to early adulthood. The NLSCY began in 1994. Cycle 7 data are available that cover the period for 2006-2007. The study is designed to collect information about factors influencing a child's social, emotional and behavioural development and to monitor the impact of these factors on the child's development over time, including explicit child care.

The exact questions in the survey have varied over the years. In Cycle 7, detailed information on child care use was collected from employed parents or those in school (although participation in kindergarten is collected from all parents). Less detailed information were collected from parents who are not employed or going to school. While the NLSCY does not include direct measures of program quality, the survey collects some measures that should influence program quality, such as training of child care providers. For Cycle 7 new content was added to the Child care section that will provide information on issues of interest such as parental interactions with child care

[8] http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?lang=eng&catno=81-588-X

provide, the preferred form of childcare, reasons for using childcare, criteria for selecting childcare, availability of financial assistance/subsidy and cost of childcare.

The survey covers a range of topics on child care (see Appendix VI for a more complete list survey questions) including:

Age of children in child care
Main child care when parent in work or school,
Types of child care currently using,
Age of child when started child care
Number of other children cared for by child care provider
Number of child care providers, including assistants
Training of child care provider
Receipt of financial assistance
Cost of child care
Hours in child care
Home-based child care
Licensed child care
Non-profit child care

The NLSCY has been terminated. Current plans are for the survey to be replaced with a cross sectional survey, so the longitudinal aspects will likely not continue. There are plans for the survey participants to "graduate" to the Canadian Household Panel Survey (see the section on the SLID), which will enable long-term child development questions to be addressed. As of 2009, the contents of the new survey is at the consultation phase. Therefore at this point in time, it is unknown what data will be available in the future from the new survey.

Workplace and Employee Survey

The Workplace and Employee Survey (WES) looks at how employers and employees respond to changes in competition and technology. Information is collected on education and training, income, hours of work, work arrangements and workplace characteristics. It is an annual longitudinal survey which currently has information for the period 1999-2005. WES has been terminated, so data for 2006 relates to longitudinal questions on the workplace side of the questionnaire. The survey contains an employer and employee survey. The average sample size is around 6,000 employers and 20,000 employees.[9]

WES provides information for seven occupational groups. Depending on how disaggregated the industry categories for the WES are, the data set can provide information on industry vacancy and turnover rates. The WES has been terminated, so these data will not be updated in the future.

Survey of Labour and Income Dynamics

The Survey of Labour and Income Dynamics (SLID) is an annual survey which looks at the changes of individual's labour market activity and income over time. It combines the longitudinal

[9] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=2615&lang=en&db=IMDB&dbg=f&adm=8&dis=2

aspect of changes over time with cross-sectional data on labour market activity and income. The 2006 dataset was released on May 5th, 2008. The sample size is around 15,000 households.[10]

This survey links self-identified child care workers with information on income and labour market attachment. This makes it possible to calculate career trajectories and may make it possible to calculate turnover rates. In addition, information on child care expenditures has been collected since 1999.

In the public use SLID data, Early childhood educators and assistants are combined with other occupations into a larger aggregation called "Social Science, Government Service and Religion" (E011-E039 and E211-E217), while "Childcare and Home Support Workers" (G811-G814), includes Visiting homemakers, housekeepers and related occupations, Elementary and secondary school teacher assistants, and Babysitters, nannies and parents' helpers.

SLID has been terminated. It is being replaced with the Canadian Household Panel Survey (CHPS). The plan is for the CHPS to be smaller than the SLID. The CHPS will be linked to T4 information. The intent is to develop a survey similar to the British Household Panel Survey. The focus will be on labour income, human capital and job satisfaction. This survey is in the consultation phase to determine what is important to users. A pilot survey has been conducted.

Survey of Household Spending

The Survey of Household Spending (SHS) is an annual survey that collects detailed information on household spending. Information is also collected on dwelling characteristics and household equipment. The SHS replaces the previous surveys: The family expenditure survey and the household facilities and equipment survey. The 2007 dataset was released on December 22nd 2008. The sample size in 2007 was over 21,000 households.[11]

While the SHS does not have occupational information it does have variables that can be useful in determining demand for child care such as household expenditures on child care outside the home, including child day-care centres and other child care outside the home, and child care inside the home.

General Social Survey – Family

The General Social Survey (GSSF) is one of five surveys in the general social survey (GSS). Each of the five surveys are conducted in a different year, which explains why the GSSF is conducted every five years. The GSSF collects information on family structure such as marriages, common-law unions, children and fertility intentions. There is an important child care subcomponent in the GSSF. The last GSSF was conducted in 2006 and the data for this was released on June 13th, 2007. The current sample size is 25,000 persons.[12]

The GSSF has much information on the demand for regulated and unregulated child care which can be linked to marital status and fertility intentions. However, the 2006 child care module

[10] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3889&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[11] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3508&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[12] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4501&lang=en&db=IMDB&dbg=f&adm=8&dis=2

sample size (23,608 respondents, but 15,877 without children, and 1,984 of those with children using child care) is much smaller than the NLSCY sample size and since the NLSCY uses similar questions, the NLSCY is superior on all counts.

National Population Health Survey

The National Population Health Survey (NPHS) is a biennial (two-year) survey that collects information on population health and socio-demography. The survey is quite similar to the Canadian Community Health Survey (CCHS), the main difference between the two being that the CCHS is more geared toward collecting health related data at the sub-provincial level (by health region). The NPHS became a strictly longitudinal sample in 2000-2001. The longitudinal sample consists of 17,276 people of all ages. These same 17,276 people are interviewed every two years. The latest data for the NPHS is available for 2006-2007, and this data was released on July 16th 2008.[13]

Self-identified child care workers can be linked to health, occupation and income outcomes.

The Longitudinal Survey of Immigrants to Canada

The Longitudinal Survey of Immigrants to Canada (LSIC) follows the target group over time and is able to provide data by education and the occupation that they worked at since arriving in Canada. The first wave that reflects their situation soon after arriving in Canada had a sample size of 20,322 for all of Canada. The second wave, which illustrates their situation after two years has a sample size of 12,000. The third wave, which shows their situation after five years is expected to have a sample size of less than 6,000. Unfortunately, there would be insufficient sample size from this survey to provide occupational details for province specific estimates.

Other Secondary Data

Beyond the secondary data that are available to estimate employment and labour force for the ECEC sector, there are many other publicly available data sources that can provide information relevant to the ECEC sector. The Consumer Price Survey has information on the price of child care services at the national level; the sub-national data are only available for data at a higher level of aggregation, specifically "Child care and domestic services". The LFS has a variety of data concepts available for the ECEC related occupation and industry that extend beyond basic employment and labour force related data.

Kohen et al. (2006) examined ECEC related information in several data sources. Excluding the secondary data described above, some of the data sources mentioned were: Survey of Persons Not in the Labour Force (SPNILF), Survey of Work Arrangements (SWA), Labour Market Activity Survey (LMAS), Survey of Family Expenditures (SFE) and National Child Care Survey (NCCS). The SPNILF, SWA, LMAS and NCCS were all one-time supplements to the Labour Force Survey and are no longer current. The SFE was replaced by the NPHS.

Cleveland et al. (2003) mention the additional data sources: Caring for a Living (CL), You Bet I Care (YBIC) and Canadian Community Health Survey (CCHS). CL was a one-time study and is over fifteen years old. The YBIC is a more recent survey which has a good survey design which could be redone in the future to obtain pertinent labour market information such as vacancy,

[13] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3225&lang=en&db=IMDB&dbg=f&adm=8&dis=2

turnover rates and job satisfaction. As mentioned before the CCHS contains information similar to the NPHS.

Administrative Data

Provinces, territories and local governments collect data on the ECEC sector. Most of the data collected only related to LMI using a very broad definition. Relatively little of the data that are collected are directly related to LMI, although several provinces and territories contacted expressed an interest in obtaining more narrowly defined LMI for the ECEC sector in their jurisdiction. The following will discuss these data sources.

Provincial, Territorial and Municipal Administrative Data

As discussed by Cleveland et al. (2003), the provinces/territories collect considerable amounts of administrative data. The bulk of the data collected by provinces/territories are collected in the course of funding, licensing, monitoring and regulating these services. The data, however, often are not comparable across jurisdictions and in some instances provinces/territories do not collect information routinely collected in other jurisdictions. In other cases, the same information is collected across provinces/territories, but the methodology used differs and results in data that are not comparable from one jurisdiction to another..

Some municipalities in Ontario directly operate child care and have developed their own systems to collect basic data and monitor and evaluate their programs. An example of this is the comprehensive data system of the City of Toronto. Toronto uses the data it collects to monitor service levels, plan for service enhancements, and, when merged with census and other information, analyse service needs and emerging trends. Information on vacancies and other public information derived from the data system is provided on a website.[14]

Key Informant Interviews

Key informant interviews were conducted for this project with 13 governments and seven outside researchers, for a total of 20 interviews. These interviews were mostly conducted between December 23, 2008 and January 13, 2009. The responses listed below represents the information collected.

What Data Are Collected

There is a distinct division in ECEC data needs between the government ministries or departments that monitor the ECEC sector and non-governmental analysts that permeates all aspects of data collection, use and LMI priorities. This division parallels the situation that was found by Cleveland et al. (2003) and Doherty et al. (2003). The fundamental need of governmental representatives in the departments monitoring the ECEC sector is for information to help monitor funding, licensing and regulating ECEC services. These data are obtained via licensing and funding applications. These data include for example child care spaces, number of children, number of subsidized spaces, and number of ECE trained staff. Most of these data are only tangentially related to LMI. Data on the Early Childhood Education (ECE) qualifications of staff are collected primarily to ensure compliance with regulations. Some of the government departments surveyed obtain data on hours, and a few are monitoring inflows of ECE trained graduates from the school system and wages. These data are primarily for licensed child care centre based staff. Some government ministries differentiate between regulated and licensed.

[14] Doherty et al. (2003)

Government ministries typically do not collect any information for services that lies outside their mandate, and many typically do not use any data other than the data they collect. Government representatives primarily use their own data because they provide the information that are needed.

Some of the government departments surveyed use a combination of primary and secondary data sources to get a more complete picture of the ECEC situation. The most common information is demographic data from the census. A few government ministries use other data from the census for the child care occupation. No government representatives surveyed mentioned using industry data. A few government departments use data from the LFS and education data for local colleges. No government participant mentioned using other LMI data sources such as the SEPH or LAD.

When asked what their data priorities are, the most common LMI related information pertained to turnover, waitlists, wages, and education. None directly stated that they wanted data consistent with other jurisdictions. When asked directly, the most common answer is that it is nice to have, but not necessary. "So long as everyone harmonizes to my data, that would be fine".

Non-governmental analysts tend to use Statistics Canada data, and typically require consistent pan-Canadian data. Some use child care space data from the provinces/territories or from reports that provide these pan-Canadian comparisons. They will often decry the inconsistencies that are found with the provincial/territorial data definitions.

How Data Are Collected

Governments departments typically collect data as part of licensing and funding of firms and/or workers in the ECEC sector. Most provincial/territorial governments collect data in hardcopy form, and translate some of these data into electronic form via data entry. Cross-Canada administrative data are published in the report Early Childhood Education and Care in Canada (Cleveland et al, 2003).[15]

External analysts collect data by using electronically available data from Statistics Canada, and will collect data from the provinces and territories. The latter are often collected by direct contact or through data that are collected and published by third parties.

Data Gaps and Inconsistencies

Different data are collected by the provincial/territorial governments, and even for the same data concept definitions are often very different. One participant indicated to me that a space was not a space. That is a child care space is defined differently across jurisdictions. Training level data also differs from one end of the country to the other because these data reflect local regulations, which vary across the country.

There is a basic inconsistency between the data that are available from Statistics Canada, and what data are collected by the provinces/territories. Most P/T data for workers are for the child care providers of licensed child care centred based care, while none of the surveys from Statistics Canada directly provide data for this concept. The LFS data will include family child care for the occupation or industry data. The data from the SEPH provides the closest approximation to this concept in terms of the child care centres as employers. The census differentiation between workers who go to a usual place of work outside the home is another possible approximation. But no province or territory uses SEPH. And no province/territory mentioned the use of the census data for workers outside the home. Some external analysts have used this concept, however.

[15] "Early Childhood Education and Care in Canada" is available at www.childcarecanada.org

How are Data Used

Most provinces/territories tabulate the results and simply look at the data, without the aid of any special methods including statistical analysis. Not all data are tabulated, let alone analyzed. A few provinces/territories combine the collected ECEC data with other secondary data sources to do more detailed analysis. Some of the participants indicated that others within their department or in another department will use the data for more detailed analysis. A few use the data to try to forecast the data to try to determine what will happen in the future. External analysts will use a range of statistical techniques and do in depth analysis of the current child care situation.

Priorities Highlighted by Expert Panel

1. Expanded and Updated Snapshot of the ECEC Workforce

Summary of Topic:

Provide updated information on the broader ECEC workforce. The new snapshot updates and builds on the one created as part of the Labour Market Update (Beach and Costigliola, 2005). The main source is from the census, expanded with relevant supplementary information from other public data sets.

Data currently used:

Census data for the broader ECEC workforce:
Early Childhood Educators and Assistants (NOC 4214, NOC-S E217),
One eighth of Elementary School and Kindergarten Teachers (NOC 4142, NOC-S E132)
One half of Elementary and Secondary School Teacher Assistants (NOC 6472, NOC-S G812)
Babysitters, Nannies and Parents' Helpers (NOC 6474, NOC-S G814)

Employment
Labour Force
Data Cross Tabulated With
- Geography (Province and Territory)
- Urban and Rural
- Educational Attainment by Level of Schooling and Field of Study (CIP)
- Place of Work (Usual Place of Work & Home)
- Industry (NAICS)
- Age of Labour Force
- Median Full-Time, Full-Year Earnings

Other data used includes population zero to five years by province and territory.

Data Needed:

There are no data for Kindergarten Teachers, and Elementary School Teaching Assistants. The data for these two occupations are estimated using a fixed ratio based on information for Elementary School and Kindergarten Teachers, and Elementary and Secondary School Teacher Assistants respectively. The ratios used appear to be rough rules of thumb. There is the possibility that the "true" ratios might differ from the ratios used in the report, there is also the chance that the ratios change over time. Ideally data for these missing groups should be obtained directly from an alternative data source, or the ratios used to estimate the data should be corroborated using other information and if the ratio has changed over time, then this new ratio could be used to estimate a more exact level of employment in these occupations. An alternative data source might also provide more precise information on educational attainment and/or earnings.

Data for managers and directors were not included in the portrait. ECEC managers and directors are a portion of Managers in Social, Community and Correctional Services (NOC-S A324, NOC 0314). An estimate of the number of managers and directors in the ECEC sector could be calculated using currently available ratios based on the average number of managers and directors per employee in the social services field or by cross tabulating the occupation Managers in Social, Community and Correctional Services with the Child Day-Care Services Industry. Ideally data for this occupation should be obtained directly. If the ratio of managers per employee is used, it should be corroborated using other information and if the ratio of managers per employee has changed over time, then this new ratio could be used to estimate a more exact level of employment in this occupation.

Data that should be included in the extended portrait depends on the intended audience for the information. The portrait does not include data from the LFS or other data sources that provide more current information. The portrait could be expanded to include these data. LFS data are typically not available for cross tabulations for most 4-digit categories, particularly at the sub-national level. The availability of any custom data would need to be verified with Statistics Canada. The likely focus of the current data would be to provide a snapshot of what the situation is in the sector for employment and labour force.

2. Occupational Demand and Supply Model

Summary of Topic:

Develop an occupational model capable of forecasting ECEC employment, labour force and workforce shortages.

Data currently used:

Currently no province/territory has constructed a detailed occupational demand/supply model for all of the ECEC specific occupations.[16] A variety approaches are used by P/T to estimate the demand for child care workers. The approach taken by several P/T in estimating future demand for child care workers is to determine the number of new spaces desired, and then estimate the number of workers needed to staff those spaces based on current child to staff ratios. At a minimum this approach needs an estimate of the number of new child care spaces and the average staff/child ratio in the P/T. Preferably, this approach requires information on the number of new child care spaces, the age of the children to use those spaces, and the staff/child ratios required for that jurisdiction.

One province has developed a planning model to forecast child care needs based on a simple relationship between demographics and child care centre demand in local areas. The data required for this approach are detailed population projections for all the areas for which a forecast is to be developed. Information on the staff/child ratios by age would also be required.

A couple of provinces use information from large scale provincial occupational modelling systems. These models provide forecasts at the 4-digit NOC level of occupational detail. These modelling systems (several distinct models are used including a macro model that has industry production and employment blocks, occupational employment share model and replacement demand model, and can include school leavers and migration models) use a massive amount of

[16] See "Addressing Workforce Shortages in Early Childhood Education and Care: Data and Model Feasibility" for a more detailed discussion of the current situation and the resources needed to build an occupational demand/supply model.

data. These models use 4-digit NOC employment and labour force, but most of the other detailed data used in these models are at a higher level of aggregation and are not specifically tailored to the ECEC sector. Users of the information can obtain information for employment and replacement demand (or labour force withdrawals) for the occupation Early Childhood Educators and Assistants. These models can also provide information on the expected supply of ECE&As, and workforce shortages, although the information on future WFS are typically used to produce an indicator that shows if future labour market prospects are very good, good, somewhat good, fair, somewhat limited, limited or very limited, for example.

Data Needed:

The data that are required to build a model depends on the model that is to be built, which in part depends on the questions that need to be address and the resource available to develop and use the model. In turn, data availability and quality will influence what kind of model can be built. To estimate future workforce shortages, the model needs some basic components: expansion demand, replacement demand and labour supply. At a minimum the level of employment is needed to reflect expansion demand. Ideally, work hours and vacancies are available to more precisely determine expansion demand. The more details there are concerning employment and work hours, such as by training, the more detailed the model and workforce shortage estimates can be. If wage data and other factors that influence the demand for workers are available then a more complete model can be constructed.

To estimate replacement demand, at a minimum some estimate of workforce turnover or separations is needed. The more detailed the data available, the more detailed the model can be concerning replacement demand by level of training for example. Ideally information on different types of separations should be available. For example, separations because of retirements, deaths, maternity or other family reasons and going back to school have different implications than people who leave their jobs for another position in the child care sector, or in another sector of the economy. Since many of these separations are age related, then the age structure of the workforce should be obtained. Ideally, information on the factors that have been found in the literature that influence turnover are available to develop a more complete model, such as child care quality, auspice, wages, training, job satisfaction, working conditions, flexibility, etc.

To estimate labour supply at a minimum some estimate of potential and/or actual labour supply is needed. For example, the number of people with ECE training who are employed, unemployed and not in the labour force would be helpful. Also wage and data on current training would make the model more complete. In order to forecast labour supply, it would be helpful to have data on the inflows to and outflows from labour supply. Since the sector typically has training requirements, flow data on the number of people with these credentials would be helpful, such as information on completers from the education system, migrants, and labour market re-entrants.

Depending on the type of questions that need to be addressed with the model, then the model could include additional features. For example, the model could include a component that determines the demand for different types of ECEC services. This would allow a closer link between demand for ECEC services, and the demand for workers, and workforce shortages, since it would permit an estimate of the unrealized demand for ECEC services and workers. This type of model requires data on the demand for and supply of different types of ECEC services. Ideally this type of model should have data on the quantity of services used, the price of the service and the income and/or attributes of the people using the service. Since government funding and regulations apply to the ECEC sector, then information on these aspects would be helpful as well.

3. Integrated Electronic Data System

Summary of Topic:

The integrated electronic data system and software to would be used to facilitate Human Resource Management (HRM),data collection and accuracy.

Data currently used:

There are no integrated electronic data systems currently in use in Canada. Some provinces collect data electronically, but these systems tend to be unidirectional, with information from the employer being submitted to the ministry responsible for ECEC. Most current data collection processes tend to rely on hard copy information being submitted to provinces and territories. Each P/T collect data that are specific to their regulatory and funding requirements. It is not clear what methods are used and data collected by ECEC employers for internal administrative purposes.

Data Needed:

To develop an integrated electronic data system, the system must benefit both the ministry that regulates/funds ECEC as well as employers. Provincial and territorial governments require information for regulatory and funding purposes. ECEC employers require information for internal administrative purposes and to provide the needed information to P/T.

Most SMEs do not have formal HRM information systems. An admin tool kit or HRM data system that permits employers to collect relevant information for the conduct of their business that also can be used to provide information to the provinces/territories could lessen the administrative burden of collecting data. By making the system deliver information that is relevant to employers, there would be an incentive to employers to use the system, which would reduce compliance problems for P/T, and should improve data quality.

The benefits of the information collected can be enhanced if information flows in both directions. This would permit the information to be collected, aggregated and provided back to employers to enhance HRM. For example, human resource planning could be enhanced if the system is used to populate an simple HR planning model to determine future expansion, replacement and recruitment demand.

Each P/T has their own regulatory requirements, therefore a system that is used throughout the country would need to be very flexible. To enhance the flexibility of the information should be inputted into the system by the operator at the most atomic level possible: the individual worker and child. The employer already needs to record information on individual employees for administrative purposes, such as for their payroll. They operator also needs to record information on the children using their services. Therefore recording information at this level of detail should not be an additional burden on the employer and could inform many HRM practices. The idea is the provide an integrated system that uses the information for multiple purposes. The information collected should be determined based on the information required by the P/T and the information that would enhance HRM practices.

4. Re-do a "You Bet I Care!" Type Survey

Summary of Topic:

The data that are needed to carry out many topics of the LMIRA do not exist. To obtain the data, very extensive surveys will need to be conducted. At this stage the term a "You Bet I Care! type survey" has been used as a way to refer to the detailed surveys that would

be needed to be conducted in order to obtain the data needed to inform much of the rest of the research agenda.

Data currently used:

The You Bet I Care! (YBIC!) project used three extensive questionnaires with a total of close to 200 distinct questions to examine many facets of the ECEC sector. Questionnaires were provided to centre-based staff, centre-based directors, agency caregivers and agency directors. The answers to these surveys produced three datasets, which contained information about both centre-based and regulated family child care. These data include:

- information about the people who are employed in the regulated ECEC sector
- including: demographics and education
- information about the views of people employed in the regulated ECEC sector
- remuneration levels
- working conditions
- including: hours worked and hours worked with children
- identification of issues of most concern to centre and family child care agency directors
- levels and predictors of quality in each type of setting

A number of other surveys have been conducted that examine similar or other topics, Malatest and Associates (2009), SPARC (2008), Don Gallant and Associates (2007) and Rochon (2006), Caring for a Living Study collected in 1991 or groups outside the ECEC sector, such as those taking ECE training, (Beach, 2004)

Data Needed:

Who is surveyed, and what questions are asked will depend on the rest of the research agenda and the research questions that need to be addressed. At a minimum, any questionnaire needs to include questions on the topics that form the basis of the research agenda. Given that the YBIC datasets were used for over a decade following the collection of the survey information, the topic areas should extend beyond the current LMIRA timeframe of three to five years to include information that would be pertinent for other research as well.

If information is required to populate an occupational demand/supply model, then the following information would be useful: employment by level of ECE training, hours worked by level of ECE training, vacancies by level of ECE training, turnover by level of ECE training, number of children cared for, number of hours working with children, number of child care spaces by age, child care quality, and number of children on waiting lists.

Ideally, given the magnitude of turnover in the ECEC sector detailed information on the type of turnover should be included that permits the identification of all gross outflows from the sector as per Table 2 below (job-to-job mobility within the ECEC sector, job-to-job mobility outside the ECEC sector, job-to-unemployment transitions, job-to-not in the labour force transitions. Information on reasons for turnover would also be helpful including the factors that have been found in the literature that influence turnover, such as: HRM practices, child care quality, auspice, wages including wage distribution, training, job satisfaction, unionization, working conditions including workplace flexibility.

There may be a way to combine some of the information needs of external researchers with those of the integrated data delivery system to produce "blind" matched data or aggregated data for researchers to examine at some point in the future. This would need to be done in a manner that does not lead to an excessive burden on employers and ensure the integrity of private information, which suggests that at best the data that would be included would be limited to those that are already needed to be tabulated by employers for other purposes. These data could conceivably provide a treasure trove of information that could be used to improve understanding of recruitment and retention issues in the ECEC sector and ultimately benefit the employers.

5. Labour Mobility (ECEs and Directors)

Summary of Topic:

Labour mobility for ECEs and Directors includes a number of topics that range from identifying labour mobility within the sector to determining the causes and implications of labour mobility and immobility. In particular the following topic areas were identified:

- Conceptual paper on various types of mobility: eg. across modes (within broader ECEC) and inter-occupational mobility, career advancement, across geography, in and out of the workforce
- Define and document labour mobility in the sector
- What causes labour mobility (entry and exit) and immobility (barriers, the Agreement on Internal Trade (AIT) & recommendations)? What are the implications of mobility
- What are the labour mobility opportunities and challenges? Where do we go from here?
- Barriers to work (education)
    - Physical barriers, & other barriers
    - Information barriers, lack of LMI?

Data currently used:

Labour mobility occurs when a person enters or leaves a job. The development of a complete analysis or model of labour mobility requires a tremendous amount of data. In particular, flow data are needed that represent the movement of people from one labour force state to another, from one occupation to another and from one geographic location to another. (see the discussion below and Table 2)

Data are available from the census and LFS concerning employment and labour force of the Early Childhood Educators and Assistants occupation and the Managers in Social, Community and Correctional Services occupation. The former could be broken down in the census data into ECEs and ECEAs by using educational attainment. The number of managers and directors could be estimated from the census using a cross tabulation with the Child Day-Care Services industry or by using a ratio relative to all ECEC employees. These data are used to provide an estimate of the level of employment, and therefore the change in employment.

The NGS provides information about school to work transitions and the LSIC provide information about the integration of international newcomers into the workforce. The LSIC, however, has too small a sample to provide an accurate picture for sub-national jurisdictions. Some provinces collect information about turnover, and the YBIC datasets have information about employee turnover. Other surveys have collected data on intentions to stay or become employed in the ECEC sector, (Beach et al. 2004). Furthermore, the LFS has information about

reasons why people left their previous jobs, but these typically would not be available for ECEC specific occupations. SLID has data on labour mobility at a higher level of occupational or industry aggregation than the ECEC specific occupations and industries.

Several parts of the information required to develop a complete understanding of labour mobility of the ECEC sector are available, but there are many gaps and given the various sources of information and different time periods for which these data were collected. Therefore the information would not be consistent. At best current information could be constructed by assuming a relationship with other data for which more current data are available. For example, it could be assumed that the turnover rate for the sector changes by the same amount as the aggregate turnover rate in the economy. Alternatively, there are more complete labour mobility data at a higher level of aggregation, which could be used under the assumption that the same rates apply to that sector. The best option would be to collect internally consistent data that captures the various flows that represent labour mobility and the reasons for mobility and immobility. This could be done in a YBIC! type survey (see topic 4).

Data Needed:

There are a number of possible gross flows in the labour market between different labour market states and occupations. Table 2 highlights these flows between two points in time, from time t to t+1.[17] In the table Occupation 1 represents an occupation and Occupation 2 stands for all other occupations. If the columns signify inflows and the rows outflows, then those leaving Occupation 1 to enter Occupation 2 are represented by "B". And those leaving Occupation 2 to enter Occupation 1 are represented by E. Inter-occupational mobility, for example, is signified by E and B. And the number of net job changers in Occupation 1 is represented by E-B. People leaving Occupation 1 and entering unemployment are represented by "C", while the number of people leaving Occupation 1 and leaving the labour force are represented by "D".

Table 2: Labour Flows

t\t+1	Occupation 1	Occupation 2	Unemployment	Not In Labour Force
Occupation 1	A	B	C	D
Occupation 2	E	F	G	H
Unemployment	I	J	K	L
Not In Labour Force	M	N	O	P+Q

Clearly the flows from any of these states can be broken down into many sub-groups, such as differentiating by geographic location, differentiating between the short-term and the long-term unemployed, or differentiating between newcomers and occupational re-entrants or differentiating on the basis of training. To include geographic location, for example, each of the gross flows highlighted in the tables would be duplicated to represent a transition to another geographic location. The biggest problem that researchers face is that these flows are typically not available in publicly available data for 4-digit NOC occupations. Either the data would need to be constructed or new data would need to be obtained via a survey.

[17] This figure is from Boothby, Roth and Roy (1995).

Throughout the world, a number of groups have used the cohort component method to estimate flow data from the available stock data.[18] Eck (1991) and Willems and de Grip (1993) used the cohort component method to calculate occupational net replacement needs in the US and the Netherlands, respectively. For Canada Boothby (1995) explains how to construct data on labour mobility from detailed single year LFS data, combined with some simplifying assumptions. See Appendix VII for a discussion of using the cohort component method.

The best option would be to conduct a survey of the ECEC sector that provides information about the gross flows indicated in Table 2. This could be done as part by of a broad survey that extends beyond the sample group that was the focus of the YBIC! type survey (see topic 4). The survey on labour mobility would need to capture four distinct groups. First, those who have decided to stay in the ECEC sector and the reasons for their decision to stay (which could be covered as part of a YBIC! type survey). Second, those who were employed in the ECEC sector, but have already left and the factors that influenced their decision to leave the sector. Third, those who are taking or have taken ECE training and plan to enter the sector and the factors that influenced their decision. Fourth, those who are taking or have taken ECE training and do not plan to find employment in the sector and the factors that are influencing their decision. Fifth, those who wish to enter the sector, but face a barrier to employment or education and identification and ideally quantification of those barriers, such as distance to school/work. In addition to the above groups, an examination of the lack of LMI would also need to include those who do not intend to enter the sector because of a lack of information.

Notably, depending on how broadly "labour mobility" is defined, this topic could include many aspects of topics 6-8. Clearly, a lot of the basic data would be the same, particularly if the factors that influence mobility (and immobility) are included in the data collection and analysis.

6. Career Choices

Summary of Topic:

Career choices is a term that includes:

- ECE trained and were never employed in ECEC, ECE trained and use it as a stepping stone to ECEC-related work, and ECE trained and leave the ECEC sector
- Information could be used for recruitment and retention activities
- Rate of return on formal ECE education
    - Under what conditions
    - ROR of match box colleges
    - Rate of return on formal ECE education
    - Rate of return on professional development and training

Data currently used:

There are some questions in the LFS that examines why non-employed people left their job. This information, however, is at a higher level of NOC aggregation than ECEC specific occupations. There are, however, no questions for employed workers, so there would not be information to

[18] The cohort component method calculates net flows, not gross flows. This is because the change in the level of the concept is calculated, and the change is the consequence of all inflows and outflows combined.

examine those who never go into ECEC and those who left for another occupation. The NGS and the follow-up survey of graduates examines education and labour market outcomes. It has information on first jobs after graduation and current jobs.

Most of the research that examines recruitment and retention use surveys specifically designed to address this topic. Rolfe (2005) for the U.K. used a survey of employers, employees and agencies. And Whitebook et al. (2001) for the U.S. developed their own dataset based on survey information. For Canada, as highlighted by Doherty and Friendly (2002), the existing YBIC! datasets can be used to examine recruitment and retention issues. Other studies that specifically address recruitment and retention in Malatest (2009), SPARC (2008), Don Gallant and Associates (2007) and Rochon (2006). Each of these studies conducted detailed surveys to examine recruitment and retention issues.

Cleveland and Hyatt (2002) examined the rate of return for ECEC workers. They used information from the "*Caring For A Living Study"* which was comprised of two linked surveys, on separate questionnaires, from staff and directors in licensed group child care centres. The staff questionnaire collected information about wages, working conditions, the educational and other characteristics of individual staff members, staff attitudes and motivations. The director's questionnaire collected information about the characteristics of the centre and budgetary information, turnover rates, staff and child characteristics, typical wages and working conditions in each centre. The data sets can be merged, so that there is information on both the workers' characteristics and additional information on the characteristics of the centre at which she is employed.

Data Needed:

The examination of career choices as described in the topic summary requires a survey that specifically collects information on the groups and topics that need to be address. One option would be to conduct surveys of the ECEC sector that provides information about the gross flows indicated in Table 2. This could be done in a YBIC! type survey (see topic 4) plus surveys of groups not covered by a YBIC! type survey (see topic 5). Surveys would need to capture six distinct groups. First, those who have decided to stay in the sector and the reasons for their decision to stay. Second, those who were employed in the ECEC sector, and have already left to take a different position in the broader ECEC sector. Third, those who were employed in the ECEC sector and have left the sector, and the factors that influenced their decision to leave the sector. Fourth, those who are taking or have taken ECE training and plan to enter the sector and the factors that influenced their decision. Fifth, those who are taking or have taken ECE training and do not plan to find employment in the sector and the factors that are influencing their decision. Sixth, those who wish to enter the sector, but face a barrier to employment or education and identification and ideally quantification of those barriers, such as distance to school/work.

Rate of return type of studies need information on years of schooling (or specific schooling), years of experience, remuneration as well as other factors that influence wages in order to determine a more precise estimate of the returns to schooling.

7. Job Satisfaction, HRM and Labour Market Outcomes

Summary of Topic:

Job satisfaction and the impact of human resource management (HRM) practices on job satisfaction and labour market outcomes. This topic follows-up on the research that identifies job

satisfaction as a key non-monetary factor that influences job quit rates and the literature that highlights that HRM impacts job satisfaction (see Fairholm and Davis, 2009).

Data currently used:

Currently, there are no known studies that examine the linkage from HRM practices onto job satisfaction, and from job satisfaction onto quit rates in the Canadian ECEC sector. In other countries, studies that examine parts of this link conducted special surveys to obtain the needed information.

Rolfe (2005) examined the link between HRM practices and recruitment and retention in the U.K. In order to examine this relationship, a survey was conducted of employers, employees and Early Years Development and Childcare Partnerships that are required to run a Children's Information Service and to provide advice, support and training for child care workers. Similarly Whitebook et al. (2001) examined the link between job satisfaction and retention by following 75 child care centers in three California communities for six years.

Data Needed:

To examine the linkage from HRM practices to job satisfaction to turnover a detailed matched survey of employers and employees would need to be conducted to identify HRM practices of employers, employee job satisfaction, the impact of HRM practices on job satisfaction and employee turnover. Ideally, those who have left jobs in the ECEC sector should be surveyed in order to identify reasons why they left their job, and the importance of job satisfaction and HRM practices on those actions. This information could be collected as part of the surveys for topics 4-6. If recruitment is also included then those who obtain ECE training would also need to be surveyed to determine the HRM factors that influence recruitment.

8. Impact of Non-Wage Financial Benefits

Summary of Topic:

Examine the impact of non-wage financial benefits on recruitment and retention. Non-wage benefits can have different impacts on recruitment and retention that diverge from their financial costs because of the preferences of new recruits and existing employees. Non-wage financial benefits include:

- Pensions
- Medical
- Dental
- Other financial benefits
- In-kind transfers (reduced rate for child care)

Data currently used:

Cleveland and Hyatt (2002) find that employer payment of pension benefits, either in whole or in part, appears to have strong negative effects on turnover. Rolfe (2005) pension rights and sick pay as two of the factors that influence turnover in the U.K. Whitebook et at. (2001) identify a number of non-wage financial benefits that affect recruitment and retention.

Data Needed:

Cleveland and Hyatt (2002) and Whitebook et al. (2001) indicate that a number of non-wage benefits influence recruitment and retention. Therefore, data would be needed on these benefits. Specifically, data are needed on the non-wage financial benefits. These benefits could include:

dental, medical and pension benefits, paid vacation, sick days, retention allowances, recruitment or referral bonuses, relocation bonuses, performance and productivity-based awards such as cash awards, honourific awards, time-off awards, within-grade promotions, and other recognition devices. They also identify personalized benefit packages, benefits for part-time staff on a pro-rated basis, discretionary annual benefit funds and other benefit incentives.

Non-wage benefits could also include in-kind transfers, such as reduce feed child care, since this could be a low cost method to improve the benefits that ECEC workers receive from working in the ECEC sector if they have children themselves.

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Appendix I: Definitions Related to ECEC

National Occupation Classification for Statistics (NOC-S)

E217 Early Childhood Educators and Assistants

Early childhood educators plan and organize activities for preschool and school-age children. Early childhood educator assistants provide care and guidance to preschool children under the supervision of early childhood educators. Early childhood educators and assistants lead children in activities to stimulate and develop their intellectual, physical and emotional growth. They are employed in child-care centres, kindergartens, nursery schools, agencies for exceptional children, and other environments where early childhood education services are provided, or they may be self-employed. Early childhood educators who are supervisors are included in this group.

E217 aide, day care
aide, nursery school
assistant, early childhood educator
baby-care worker
baby-care worker assistant
baby-care workers supervisor
child-care worker - day care
child-care worker assistant
child-care worker, day care
co-op day-care co-ordinator
co-ordinator, daycare
co-ordinator, day-care co-op
day-care aide
day-care attendant
day-care co-op co-ordinator
day-care co-ordinator
day-care helper
day-care supervisor
day-care teacher
day-care worker
day-care worker assistant
early childhood assistant
early childhood education worker
early childhood educator
early childhood educator assistant
early childhood program staff assistant
early childhood supervisor
helper, day care
helper, nursery school
infant day-care workers supervisor
infants' day-care worker
junior-kindergarten educator assistant
kindergarten educator assistant
nursery school aide
nursery school helper
nursery school teacher
preschool helper
preschool supervisor
preschool teacher
teacher, day care
teacher, preschool

North American Industry Classification System (NAICS)

6244 Child Day-Care Services

This industry group comprises establishments primarily engaged in providing day-care services for infants or children. These establishments may care for older children when they are not in school and may also offer pre-kindergarten educational programs.

62441 Child Day-Care Services

This industry comprises establishments primarily engaged in providing day-care services for infants or children. These establishments may care for older children when they are not in school and may also offer pre-kindergarten educational programs.

Exclusion(s): Establishments primarily engaged in:

- providing kindergarten education (61111, Elementary and Secondary Schools)
- providing baby-sitting or nanny services (81411, Private Households)

624410 Child Day-Care Services US

This Canadian industry comprises establishments primarily engaged in providing day-care services for infants or children. These establishments may care for older children when they are not in school and may also offer pre-kindergarten educational programs.

Example Activities 624410

Child care centres
Day-care centres, child
Nursery school
Pre-kindergarten (except when part of elementary school system)
Pre-kindergarten care services (except when part of elementary school system)
Preschool centres (except when part of elementary school system)

Classification of Instructional Programs (CIP)

19.0709 Child Care Provider/Assistant

This instructional program class comprises any program that prepares individuals to be primary providers of home, family, residential, or institutional-based child care services. These programs include courses in child growth and development; nutrition; recreation; planning and supervision of play and learning activities; child abuse and neglect prevention; parent-child relationships; and applicable legal and administrative requirements.

Example Program Names:

Child care
Child care assistant
Child care services
Child care worker
Day care
Day care worker
Daycare assistant
Daycare provider
Early childhood education
Early childhood education (ECE) teaching
Early childhood education assistant
Infant and toddler care
Exclusions:
Early childhood education teaching [see 13.1210 Early Childhood Education and Teaching]
Child and youth studies [see 19.0706 Child Development]
Child care management [see 19.0708 Child Care and Support Services Management]
Child and youth care [see 44.0702 Youth Services/Administration]

North American Product Classification System (NAPCS)

611001 Basic education and skills programs

Output Group	611001
NAPCS code	611001.1.1
NAPCS title	Pre-primary, elementary and secondary programs, for children and youth Programs and courses providing a formal basic education for children and youth from pre-primary through grade 12. Includes special education programs, second language immersion programs, home schooling, individualized education plans, Certificates of Competence programs, technology/industrial arts programs, university preparatory programs such as the International Baccalaureate and Advanced Placement programs, and academic educational camps.
NAPCS code	611001.1.1.1
NAPCS title	Pre-primary programs Programs designed to introduce very young children (typically 4 or 5 years old, but at least 3) to a school type environment.

624001 Child daycare services

NAPCS code	624001.1
NAPCS title	Child daycare services Providing care for children on a recurring basis, either for a child who does not attend school, or outside school hours for a child who does attend. Services may be provided in a daycare centre, the child's home, or another private residence. May include recreation, meals and transportation services
NAPCS code	624001.1.1
NAPCS title	Child daycare services, in private residences Providing care for children on a recurring basis, either for a child who does not attend school, or outside school hours for a child who does attend, in the child's home, or another private residence. May include recreation, meals and transportation services.
NAPCS code	624001.1.2
NAPCS title	Child daycare services, in daycare centres Providing care for children on a recurring basis, either for a child who does not attend school, or outside school hours for a child who does attend, in a daycare centre. May include recreation, meals and transportation services.

814001 Babysitting services

Output Group	814001
NAPCS code	814001.1
NAPCS title	Babysitting services Purely custodial care of children, carried out in private residences.

Appendix II: NOC in Census and Labour Force Survey

The Labour Force Survey is based on the National Occupational Classification for Statistics 2001 (NOC-S 2001). NOC-S 2001 is an update from the previous classification system (SOC 1991), with the main changes being concentrated in the informatics occupations. To meet user requirements, the LFS provides historical data based on NOC-S 2001 back to 1987. These historical data were created by imputation.

NOC-S 2006

The occupation data for the 2006 census is based on the 2006 revision of the National Occupational Classification for Statistics (NOC-S). The NOC-S 2006 was updated to incorporate emerging occupations and new job titles while maintaining historical comparability. The structure of NOC-S 2006 remains unchanged from that of NOC-S 2001. No major groups, minor groups or unit groups have been added, deleted or combined, though some groups have new names or updated content. Title changes at the unit group and minor group levels and updates to the definitions of some unit groups reflect added information, correction of terminology to correspond with current usage and the evolution of some occupations and where they are found.

Many new occupational titles have been added to NOC-S 2006. New occupational titles arise as the division of labour in Canadian society evolves, creating new jobs and new specializations, and as technological change brings with it new terminology. Some of the occupational titles added to reflect such changes are: respite worker (home support), telehealth registered nurse, bioanalytical chemist, systems biologist, artificial intelligence designer, benefits consultant (HR), turntablist, veejay (VJ), accounting technician, e-business manager, e-business software developer and e-business Web site developer. Other added titles are modified versions of, or alternatives for, titles that appeared in previous versions of the NOC-S and have been added to help users find particular occupations they are looking for. For example, grape grower appeared in earlier versions of the NOC-S; viticulturist has been added.

Very few occupational titles have been re-assigned to a different unit group in NOC-S 2006 compared to NOC-S 2001. The impact of this on the comparability of data between 2001 and 2006 is negligible. The only persons who have been coded to a different unit group in 2006 are those who reported their occupation as “florist” and who worked in “retail”. They have moved from Retail Trade Managers (A211) to Retail Salespersons and Sales Clerks (G211). This change will have a minimal impact on the unit groups affected. The occupational title, library curator, has been moved from Library, Archive, Museum and Art Gallery Managers (A341) to Conservators and Curators (F012) as this is a more appropriate placement; however, as this title was not reported in 2001, there is no impact on data comparability.

In all other cases where occupational titles have been moved, this was done to more accurately describe the content of these unit groups. For example, because of the nature of the duties reported by census respondents, personal trainers were coded to Program Leaders and Instructors in Recreation, Sport and Fitness (F154) in 2001, not to Recreation, Sports and Fitness Program Supervisors and Consultants (E036), and campground maintenance workers were coded to Landscaping and Grounds Maintenance Labourers (I212) rather than to Operators and Attendants in Amusement, Recreation and Sport (G731). These placements have been recognized in NOC-S 2006. The majority of occupational titles that moved are military titles. In NOC-S, all military personnel are classified solely on the basis of rank either to Commissioned Officers, Armed Forces (A353) or to Other Ranks, Armed Forces (G624). The NOC-S 2001 noted this treatment of military personnel in its Introduction, but showed some military occupational titles in unit

groups with their civilian counterparts. The NOC-S 2006 more clearly conveys how military personnel have been coded by showing all exclusively military occupational titles in the appropriate military unit group.

More information on these changes is available in the following tables which summarize the changes of note between NOC-S 2001 and NOC-S 2006.

NOC-S Unit Group Titles Changed in 2006

A number of Unit Group Titles Changed in 2006, but none affected the child care sector.

NOC-S Minor Group Titles Changed in 2006

Note: No minor group titles were changed in 2006.

NOC-S Unit Groups with Added or Modified Occupational Titles in 2006

No Unit Group changes directly affected the child care occupation E217, but there were a number of changes to occupations that had educational aspects or were in the broader E21 category.

Code	NOC-S 2006 Unit Group with New or Updated Occupational Titles
E112	Post-Secondary Teaching and Research Assistants
E121	College and Other Vocational Instructors
E131	Secondary School Teachers
E133	Educational Counsellors
E212	Community and Social Service Workers
E214	Instructors and Teachers of Persons with Disabilities
E215	Other Instructors
E216	Other Religious Occupations
G812	Elementary and Secondary School Teacher Assistants

Changes in Unit Group Definitions related to Child Care

E217 Early Childhood Educators and Assistants
Early childhood educators plan and organize activities for preschool and school-age children. Early childhood educator assistants provide care and guidance to preschool children under the supervision of early childhood educators. Early childhood educators and assistants lead children in activities to stimulate and develop their intellectual, physical and emotional growth. *They are* employed in child-care centres, kindergartens, nursery schools, *agencies for exceptional children, and other environments where early childhood education services are provided, or they may be self-employed*. Early childhood educators who are supervisors are included in this group.

Appendix III: Essential Skills Profiles

Essential Skills profiles describe how each of the nine Essential Skills are used by workers in various occupations. Over the past several years, the Government of Canada has conducted research examining the skills people use at work. From this research and through interviews with workers, managers, practitioners and leading researchers, approximately 300 Essential Skills profiles have been developed for various occupations of the National Occupational Classification. To date, profiles have been completed for all occupations requiring a high school education or less. Research is ongoing to complete occupations requiring university, college or apprenticeship training.[19]

What the profiles include:

- A brief description of the occupation.
- A list of the most important Essential Skills.
- Examples of tasks that illustrate how each Essential Skill is applied.
- Complexity ratings that indicate the level of difficulty.
- The physical aspects of performing the job and the attitudes that workers feel are needed to do the job well.
- Future trends affecting Essential Skills.

[19] http://www.hrsdc.gc.ca/eng/workplaceskills/essential_skills/general/home.shtml

Appendix IV: NOC Revision Methods

The NOC must be revised periodically to reflect developments in technology, organizations and language of work in order to remain accurate and useful. Revisions have been made in five year cycles coinciding with Census intervals.

Prior to the 2006 update, consultations were held with Sector Councils, industry representatives and federal, provincial and territorial personnel to identify areas where changes could be required. In some cases these consultations suggested that structural changes were desired. However, by agreement with Statistics Canada, structural changes are considered over a ten-year time frame to allow users of statistics to compare data from different time periods. These comparisons are important for identifying trends and would be hampered by changes to the classification structure. Therefore, updating for NOC 2006 was mainly restricted to changes such as adding new occupational titles to existing groups, validating and modifying content in unit group descriptions, and correcting and enhancing title indexes and concordances between English and French.

Analysts were assigned to occupational areas according to the skill types of the classification. Within an area of specialization, analysts reviewed user inquiries from the NOC inbox, correspondence from sectors and employers, and problems reported by statistical or program coding operations. They identified possible gaps, changes or new or emerging occupations. Analysts also reviewed available literature, sector studies, occupational standards, career information, industry web sites and job advertisements. Write-in information from Job Bank job orders was analyzed to identify changing tasks and certification requirements.

Other primary occupational research methods were available as needed to clarify issues of content for the occupational unit groups and titles. These methods were used in the original development of the NOC and included interviews with employers, observation-interviews with workers, subject matter expert group interviews, or surveys of employers or workers. Studies could be contracted or conducted in-house. For reasons of economy for the 2006 revision, contracted research was conducted in certain occupational areas and interviews were generally used only where needed to clarify issues identified by stakeholders, users and literature reviews.

Analysts prepared draft revisions, which were then reviewed with their supporting evidence by occupational classification experts within HRSDC. Proposals were then sent to Statistics Canada for review and consideration of their impact, operational feasibility and codability. Finally the revisions were discussed and accepted, modified or rejected by a committee of classification experts from the two departments.

Future revisions of the NOC are expected to revisit the issue of structural changes, as well as the ongoing need to accurately represent the evolving characteristics of the world of work.

For information go to the following website.
http://www5.hrsdc.gc.ca/NOC/English/NOC/2006/AboutNOC.aspx

Appendix V: Data Quality

Data Accuracy: Census[20]

Several factors can influence census data accuracy. The accuracy of census counts and data is first affected by the degree to which the total population is missed in the census (undercoverage). The census count of 31,612,897 persons in 12,506,814 dwellings does not include persons living in dwellings missed during census enumeration, or persons mistakenly omitted from the questionnaires of responding dwellings. (The count of dwellings includes occupied private and collective dwellings and responses received from outside Canada. It excludes unoccupied dwellings and dwellings occupied only by foreign and temporary residents.) For the 2001 Census the estimated rate of net missed persons was 3.1%. Final estimates of 2006 Census coverage error will be available in September 2008.

The quality of the census count is further impacted by response to the census. The majority of the above count consists of 30,679,721 persons enumerated in 12,071,390 responding dwellings. The remainder of the census count was estimated on the basis of a sample survey of known dwellings that did not return a census questionnaire and consists of 933,176 persons imputed into 435,424 dwellings. The overall response rate can be calculated as 12,071,390/12,506,814, equaling 96.5%. While this is slightly lower than in the 2001 Census, the methodology underlying this last adjustment differs from that used in 2001 with the result that response rates for the 2001 and 2006 censuses are not strictly comparable.

An assessment of the quality, comparability and limitations of the 2006 Census data is carried out as an integral part of release and dissemination activities. All variables are certified before release, by way of a set of brief studies designed to judge the consistency of the data with that of previous censuses and that of alternate data sources. This process is augmented by measures of data quality provided by evaluation studies. The studies provide indications of the quality of the census data as affected by potential sources of error--e.g., coverage, response, non-response, processing and sampling--and of the impact on individual variables.

Errors can arise at virtually every stage of the census process, from the preparation of materials through data processing, including the listing of dwellings and the collection of data. Some errors occur at random, and when the individual responses are aggregated for a sufficiently large group, such errors tend to cancel out. For errors of this nature, the larger the group, the more accurate the corresponding estimate. It is for this reason that users are advised to be cautious when using small estimates. There are some errors, however, which might occur more systematically, and which result in biased estimates. Because the bias from such errors is persistent no matter how large the group for which responses are aggregated, and because bias is particularly difficult to measure, systematic errors are a more serious problem for most data users than the random errors referred to previously.

For census data in general, the principal types of error are as follows:

> 1) coverage errors, which occur when dwellings or individuals are missed, incorrectly enumerated or counted more than once;

[20] Statistics Canada (2003a) pp 291-292.

See also Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3901&lang=en&db=IMDB&dbg=f&adm=8&dis=2#3

2) non-response errors, which result when responses cannot be obtained from a certain number of households and/or individuals, because of extended absence or some other reason;

3) response errors, which occur when the respondent, or sometimes the Census Representative, misunderstands a census question, and records an incorrect response or simply uses the wrong response box;

4) processing errors, which can occur at various steps including coding, when .write-in. responses are transformed into numerical codes; data capture, when responses are transferred from the census questionnaire in an electronic format, by key-entry operators; and imputation, when a valid, but not necessarily correct, response is inserted into a record by the computer to replace missing or invalid data on the record);

5) sampling errors, which apply only to the supplementary questions on the long form that are asked of a one-fifth sample of households, and which arise from the fact that the responses to these questions, when weighted up to represent the whole population, inevitably differ somewhat from the responses which would have been obtained if these questions had been asked of all households.

The above types of error each have both random and systematic components. Usually, however, the systematic component of sampling error is very small in relation to its random component. For the other non-sampling errors, both random and systematic components may be significant.

Data Accuracy: Population Estimates[21]

The estimates of population by age and sex contain certain inaccuracies stemming from (1) errors in corrections for net census undercoverage and (2) imperfections in other data sources and the methods used to estimate the components. Errors due to estimation methodologies and data sources other than censuses are difficult to quantify but not insignificant. The more detailed the breakdown of the data, the larger the inaccuracy coefficient becomes. The component totals contain a certain amount of initial error, and the methodology used to classify them by sex and age, produces additional error in the figures at each stage. Nevertheless, the components can be divided into two categories according to the quality of their data sources: births, deaths, immigration and non-permanent residents, for which the sources of final data may be considered very good; emigrants, returning emigrants, net temporary emigrants and interprovincial migration for which the methods used may be a more substantial source of error. Lastly, the size of the error due to component estimation may vary by province, sex, and age and errors in some components (births and emigration) may have a greater impact on a given age group or sex. Intercensal estimates contain the same types of errors as postcensal estimates, as well as errors resulting from the way in which the errors present at the end of the period were distributed, that is, on the basis of the time elapsed since the reference Census.

[21] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3603&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Data Accuracy: Labour Force Survey[22]

The labour force survey produces estimates based on information collected from and about a sample of individuals. Somewhat different estimates might have been obtained if a complete census had been taken using the same questionnaire, interviewers, supervisors, processing methods, etc. as those actually used in the survey. The difference between the estimates obtained from the sample and those resulting from a complete count taken under similar conditions is called the sampling error of the estimate. It is unavoidable that estimates from a sample survey are subject to sampling error.

A measure of the sampling error is the standard error. This measurement is based on the idea of selecting several samples, although in a survey only one sample is drawn and information is collected on units in that sample. Using the sampling plan, if a large number of samples were to be drawn from the same population, then about 68% of the samples would produce a sample estimate within one standard error of the census value and in about 95% of the samples it will be within two standard errors of the census value.

Sampling variability can also be expressed relative to the estimate itself. The standard error as a percentage of the estimate is called the coefficient of variation (CV) or the relative standard error. For LFS estimates, the CV is used to give an indication of the uncertainty associated with the estimates. Probability statements can also be made about CVs; for example, if an estimate is 100,000 with a CV of 7%, the true (census) value will lie between 93,000 and 107,000 with 68% certainty, and between 86,000 and 114,000 with 95% certainty.

Small CVs are desirable since the smaller the CV the smaller the sampling variability is relative to the estimate. The CV depends on the size of the estimate, the sample size that the estimate is based on, the distribution of the sample and the use of postcensal population estimates in the estimation procedure. Of two estimates, the one with the larger sample will likely have a smaller sampling error; and, of two estimates of the same size the one referring to a characteristic that is more clustered geographically will have a larger variability associated with it. In addition, estimates relating only to age and sex are usually more reliable than other estimates of comparable sample size because, in the LFS, the sample is calibrated by age, sex and geographic region to independent sources.

Approximate sampling variability tables

The following table give approximate coefficients of variation as a function of the size of the estimate and geography. The rows give the geographic level of the estimate while the columns indicate the resulting level of accuracy in terms of the CV, given the size of the estimate. To determine the CV for an estimate of size X in an area A, look across the row for area A, find the first estimate that is less than or equal to X. Then the title of the column will give the approximate CV. For example, to determine the sampling error for an annual average estimate of 37.5 thousand unemployed in Newfoundland and Labrador, we find the closest but smaller estimate of 19.9 thousand giving a CV of 2.5%. Therefore, the estimate of 37,500 unemployed in Newfoundland and Labrador has a CV of roughly 2.5%.

[22] Statistics Canada (2007).
Also see Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3701&lang=en&db=IMDB&dbg=f&adm=8&dis=2#3

The CV values given in the table are derived from a model based on 2002, 2003, 2004, 2005 and most of 2006 LFS sample data. These values are approximations. The table provides a rough guide to the sampling variability. The sampling variability is modelled so that, given an estimate, approximately 75% of the actual CVs will be less than or equal to the CVs derived from the table. There will, however, be 25% of the actual CVs that will be somewhat higher than the ones given by the table.

Table AII.1: CVs for estimates* of annual totals for Canada and the provinces

Geographic Area	1.0%	2.5%	5.0%	7.5%	10.0%	15.0%	20.0%	25.0%	30.0%
Canada	384.5	112.6	51.1	30	16.1	9.4	6.3	4.6	3.5
Newfoundland	71.4	19.9	9	5.2	2.6	1.5	1	0.7	0.5
PEI	17	5.3	2.6	1.6	0.9	0.5	0.4	0.3	0.2
NS	64.6	20.2	10	6.1	3.2	1.9	1.3	1	0.8
NB	57.4	16.6	7.8	4.6	2.3	1.4	0.9	0.7	0.5
Quebec	297	88.3	41.7	24.9	12.9	7.7	5.2	3.7	2.9
Ontario	278.5	86.9	43.1	26.4	13.7	8.4	5.7	4.2	3.3
Manitoba	72.9	22.1	10.8	6.5	3.3	2	1.4	1	0.8
Saskatchewan	66	18.3	8.4	4.9	2.4	1.4	0.9	0.6	0.5
Alberta	179.6	53.6	25.9	15.6	7.9	4.7	3.2	2.3	1.8
BC	209.3	63	30.6	18.5	9.4	5.7	3.8	2.8	2.1

*Estimates are in thousands.

The CV depends on the size of the estimates, the sample size the estimate is based on, the distribution of the sample, and the use of auxiliary information in the estimation procedure. The size of the estimates is important because the CV is the sampling error expressed as a percentage of the estimate. The smaller the estimate, the larger the CV will be (all other things being equal). For example, when the unemployment rate is high the CV may be small. If the unemployment rate falls due to improved economic conditions then the corresponding CV will become larger. Typically, of similar estimates, the one with largest sample size will yield the smaller CV. This is because the sampling error is smaller.

Also, estimates referring to characteristics that are more clustered will have a higher CV. For example, persons employed in forestry, fishing, mining, oil and gas in Canada are more clustered geographically than employed women aged 55 to 64 years in Ontario. The latter will have a smaller sampling variability although the estimates are of approximately the same size. Finally estimates referring to age and sex are usually more reliable than other similar estimates because the LFS sample is calibrated to post-censal population projections of various age and sex groupings. Continuing the previous example, persons employed part-time in Alberta will have a larger sampling variability than employed men aged 35 to 44 years in British Columbia although the estimates are of similar size.

Data Accuracy: Longitudinal Administrative Data[23]

Details on cross-sectional data accuracy may be consulted under the entry for the T1 Family File (T1FF, record number 4105). The main departures from the T1FF are the sampling and the longitudinal components.
Since the Longitudinal Administrative Data's sampling rate is relatively high at 20%, the

[23] Statistics Canada Website: http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4107&lang=en&db=imdb&adm=8&dis=2

variation due to sampling is quite low for relatively small populations. For example, for population counts of individuals with specific characteristics, the coefficient of variation (CV) due to sampling error is 20% or less when the population has 100 or more units, less than 10% when population exceeds 400 and less than 2% for populations of 10,000 or more. When calculating percentages of a population with specific characteristics, the CV due to sampling would be less than 10% as long as the population count is 400 people or more and the estimated percentage is 50% or more or if the population count is 1000 people or more and the estimated percentage is above 20%.

For longitudinal projects, the coverage will be lower than that observed in any single cross-sectional year: the main restriction is the inability to follow individuals without a reliable identifier. Furthermore, the individual usually must be included in both of the study years. For example, when studying one-year transitions, 95.9% of individuals with a record for 2004 income reference year also have one in 2005. Emigration or death accounts for 0.8% of the original 2004 group so 3.2% remain unexplained missing; these could be non-filers or late filers in 2005. When studying the composition of the 2005 cohort, 94.9% were also in the 2004 file, 2.7% had never filed before or moved to Canada in 2005 and 2.3% were non-filers or late filers in 2004 (of these, 56.3% had filed in 2003). The study of longer periods would result in more observations with a least one missing year of income data.

Data Accuracy: Survey of Employment, Payrolls and Hours

For the administrative portion of the survey, response rates based on employment are produced and published every month for Canada, the provinces and the territories by type of payroll deduction accounts for the preliminary and final estimates (see Annex 2 of Statistics Canada catalogue number 72-002-XIB). The total response rate for Canada as a whole usually varies between 80% and 90%.

Every month, coefficients of variation (CV) are published for all variables and every domain (by NAICS industry for Canada, the provinces and the territories). These CVs take into account the sampling variance coming from the BPS as well as the variance due to imputation of the administrative source.

Data accuracy: National Graduates Survey[24]

The Follow-up Survey of Graduates (FOG) sample is a subsample of the NGS sample, i.e comprised of NGS respondents. Initially, the NGS sample was divided into two components -- the basic sample and the supplementary sample. The core sample was designed to yield estimates of a minimal proportion of 5.5% with a maximum coefficient of variation (CV) of 16.5% for any of the NGS2000's marginal. A marginal was defined as i) a given field of study regardless of the province of institution; or ii) a given province of institution regardless of the field of study; and that for each of the five levels of certification. The marginal's CVs were then allocated to each stratum (or cell in a table) to obtain the cells or stratums CV using a raking-ratio algorithm. The last step consisted of converting the CVs into sample sizes.

[24] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5012&lang=en&db=IMDB&dbg=f&adm=8&dis=2

The supplementary sample targeted specific subpopulations in order to meet the interests of external partners. The provinces of Quebec and Manitoba made such requests for graduates at the bachelor's and master's levels.

Finally, the last step consisted of over sampling to compensate for expected non-response. The determination of the final sample size was based on some hypothesis about attrition rates for the follow-up survey and past NGS response rates.

The overall response rate for the FOG2000 is 68.5%.

Data Accuracy: Youth in Transition Survey[25]

Data quality is affected by both sampling and non-sampling errors. Non-sampling errors were minimized through testing (focus group, pilot survey and main survey); training of regional office staff; observation by head office personnel; tabulations of initial data; and adjustment of questionnaire specifications for future cycles. Quality assurance measures were implemented at each step of the data collection and processing cycle to monitor data quality. For sampling error, data reliability guidelines were established based on coefficient of variations (CV). The table A3.3 provides an indication of data quality for a select set of YITS, Cycle 4 variables for Cohort B, 24-26 year-olds. Additional data quality indicators are presented in all YITS publications.

Table A3.3 Data quality for YITS Cycle 4 variables for 24-26 year-olds

Postsecondary (PSE) status	%	Standard Error	CV (%)
PSE graduate continuer	15.99	0.5386	3.6
PSE graduate non-continuer	59.61	0.7960	1.3
PSE continuer	9.26	0.4277	5.1
PSE dropout	15.13	0.5586	4.1
No PSE	20.65	0.6843	2.7

Data Accuracy: Postsecondary Student Information System[26]

The coverage of educational institutions for the PSIS has gradually increased over time. In the latest round, 2006-2007, 80% of public institutions were covered. The educational institutes targeted are for the most part unlikely to disappear any time soon, making the data consistent over time. Quality is helped by responses to the survey being mandatory, although there are still issues with non-response. Common non-response variables include mother tongue, activity limitations, ethnicity and previous education. Quality control measures are implemented to detect errors both at Statistics Canada and the educational institutions, to get the educational institutions to approve quality certification tables and to audit internal data

[25] http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?lang=eng&catno=81-588-X

[26] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=5017&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Data Accuracy: National Longitudinal Study of Children and Youth[27]

The NLSCY is subject to sampling and non-sampling errors. As with all samples, caution should be used in analyzing rare characteristics or rare sub-populations, since these data are drawn from small samples resulting in high variability. Non-sampling errors are caused by questions deemed sensitive by respondents, poor memory, translated questionnaires, approximate answers, conditioning bias, non-response and coverage issues.

Specifically, some longitudinal respondents do not participate in every cycle. For example, a participant responds to cycles 1-6 but not cycle 7. This problem and other partial non-response problems can be addressed through imputation, dropping the incomplete observations or applying longitudinal weights. Coverage errors result from only LFS respondents being selected for the NLSCY sample and an under-coverage of babies born at the end of the year. Coverage errors can be minimized through appropriate longitudinal and cross-sectional weights.

Data Accuracy: Workplace and Employee Survey[28]

This survey is subject to sampling and non-sampling errors. Sampling errors are caused by only a portion of the whole population being sampled. Non-sampling errors are due to tabulation errors, sampling errors and non-response. 85% of the totals were deemed accurate enough to publish. Lower coefficients of variation and higher response rates increase the quality of the estimates. Maximum CVs are 5% for industries and 10% for industries by region. The response rate in 2006 was 74.9%.

Data Accuracy: Survey of Labour and Income Dynamics[29]

The SLID is impacted by sampling and non-sampling errors. Non-sampling errors are due to human mistakes, misunderstanding and misinterpretation. Random sampling errors should be relatively small for large samples. However, systematic sampling errors do not disappear in large samples, and great effort should be undertaken to minimize these errors.

Non-sampling errors include coverage, response, non-response and processing errors. Coverage errors arise when the sample population does not represent the true population. Under-coverage, the most prevalent problem, occurs when population subgroups have been left out. Under-coverage can be measured and compensated for by measuring the difference between SLID totals, which cover 84% of the target population, and census totals, and use the differences to adjust the SLID totals.

Coverage rates are available by sex, province and age groupings. The overall response rate was 74.9%.

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[27] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4450&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[28] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=2615&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[29] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3889&lang=en&db=IMDB&dbg=f&adm=8&dis=2

Data Accuracy: Survey of Household Spending[30]

Information on data variability, CVs, is available on request from Client Services, Income Statistic Division, 1-888-297-7355, income@statscan.gc.ca.

The response rate for 2007 was 65.1%

Data Accuracy: General Social Survey – Family[31]

This survey, like all other surveys, is subject to both sampling and non-sampling errors. The data will vary from sample to sample due to the sample size not being as high as for the census. Sampling variability estimates have been created through the boot-strap method and the estimates can be found in the publication series 'General Social Survey, Cycle 20, Family Transitions'.

Common non-sampling errors are imperfect coverage, non-response, response errors and processing errors. Coverage may be biased by the fact that the survey is conducted over the telephone and although almost all households have a telephone, lower income households are less likely to have a telephone. This means that the lowest income households are slightly underrepresented. In addition, despite the best efforts to avoid non-response, the non-response rate for the survey was 32%. If the people not responding are different from those responding, this would further bias the results.

Data Accuracy: National Population Health Survey[32]

One main non-sample error for the NPHS is the coverage error, which occurs at all steps of designing and conducting a survey. The slippage rate, the discrepancy between the survey and census population estimates, was about 10% for the 1994-95 longitudinal sample. To reduce this coverage error, information is adjusted based on the census information.

Using appropriate bootstrap weights, CVs for the sample are calculated and provided to users of the data. For example, CVs are available for tobacco use, self-rated health, body mass index and physical activity.

Data Accuracy: Longitudinal Survey of Immigrants to Canada

It is almost impossible to derive an exact formula to calculate the variance for the LSIC due to the complex sample design, weight adjustments and post-stratification. A good way to approximate the true variance is to use a replication method. This method is known to correctly approximate the true value of the variance. A file containing 1,000 bootstrap weights is available. Variance calculation using 1,000 bootstrap weights involves calculating the estimates with each of these 1,000 weights and then, calculating the variance of these 1,000 estimates.[33]

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[30] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3508&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[31] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4501&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[32] Statistics Canada Website: http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3225&lang=en&db=IMDB&dbg=f&adm=8&dis=2

[33] Longitudinal Survey of Immigrants to Canada, Wave 3 – User Guide Special

Appendix VI: You Bet I Care! Datasets

Three surveys were conducted for the You Bet I Care! project. Dozens of questions were asked in the following general topic areas. For the specific questions in these topic areas please refer to the You Bet I Care! reports listed in the reference section: Doherty et al. (2000a), Doherty et al (2000b), Doherty et al (2001) and Goelman et al (2000).

Staff Questionnaire
Section A: Child care experience
Section B: Wages, benefits and working conditions
Section C: Other paid work
Section D: Feelings about the child care field
Section E: Feelings about your centre
Section F: Educational background
Section G: Professional development
Section H: Personal background
Section J: Recommendations for the child care field

Director Questionnaire
Section A: Child care experience
Section B: Other paid work
Section C: Feelings about the child care field
Section D: Feelings about my centre
Section E: Educational background
Section F: Professional development
Section G: Personal background
Section H: Recommendation for the child care field

Agency Caregiver Questionnaire
Section A: Child Care Experience
Section B: The Children in Your Care
Section C: Working Conditions, Income, and Benefits
Section D: Supports
Section E: Your Feelings About Caregiving
Section F: Feelings About Your Work Situation
Section G: Relationship with Your Agency
Section H: Educational and Professional Background
Section J: Personal Background
Section K: Recommendations

Appendix VII: Net Separations Using Cohort Component Method

For a complete model of inter-occupational flows data are needed that represent the movement of people from one labour force state to another or from one occupation to another. To inform their models, researchers have used the cohort component method to derive flow data from the available stock data. This is done in the Netherlands, Canada, US and Australia, for example, and represents the best way to derive the flow data that are needed for detailed occupational models.[34]

Separate information on re-entrants and new entrants is often unavailable from standard labour surveys, but it is possible to approximate the category of new entrants by using a method of estimation applied to the data available in the Labour Force Survey.

Such a method of estimation is the cohort-component method. The cohort-component method has been widely used for calculating survival ratios in demography, student progression rates through courses in higher education and wastage rates in health employment studies. Eck (1991) and Willems and de Grip (1993) have used the method to calculate occupational net replacement needs in the US and the Netherlands, respectively. To explain how the cohort-component method can be used to approximate net replacement first, net outflows are defined. Suppose for simplicity that the annual employment data in an occupation are available by five-year age groups, E_{at} represents the size of the cohort of age a at time t and $E_{a+5,t+5}$ represents the size of the same cohort five years later. Then the net five-year flow from this cohort is represented by the change in the size of the cohort over this period. In other words, it is given by:

$$F_{at} = E_{a+5,\ t+5} - E_{a,t}$$

If the size of the cohort has decreased ($F_{at} < 0$) then we say there has been a net outflow of ($-F_a$), otherwise the net outflow is zero. In most occupations there are likely to be more leavers from older aged cohorts than there are entrants. Furthermore, new entrants to an occupation are likely to be found mainly in the younger cohorts and re-entrants mainly in the older cohorts. Consequently net outflows from the older aged cohorts are more likely to be positive, and will be made up of leavers less (mostly) re-entrants. The sum of the net outflows over all cohort components approximates the number of leavers from an occupation less (mostly) reentrants, and thus provides an estimate for net turnover or replacement needs in the occupation.

The above is true if employment in the occupation has been expanding. On the other hand if employment has been declining, then the sum of the net outflows is reduced by the contraction in employment, because in this case not all those who leave are replaced.

[34] Willems and de Grip (1993), Boothby, Roth and Roy (1995), Eck (1991) and Shah and Burke (2003).