Annex B

Adult Literacy and Life Skills Survey Survey Methodology

B

Statistics Canada and OECD 2005

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Adult Literacy and Life Skills Survey Survey Methodology

Survey methodology

Each participating country was required to design and implement the Adult Literacy and Life Skills (ALL) survey according to the standards provided in the document '*Standards and Guidelines for the Design and Implementation of the Adult Literacy and Life Skills Survey*'. These ALL standards established the minimum survey design and implementation requirements for the following project areas:

1. Survey planning
2. Target population
3. Method of data collection
4.. Sample frame
5. Sample design
6. Sample selection
7. Literacy assessment design
8. Background questionnaire
9. Task booklets
10. Instrument requirements to facilitate data processing
11. Data collection
12. Respondent contact strategy
13. Response rate strategy
14. Interviewer hiring, training, supervision
15. Data capture
16. Coding
17. Scoring
18. All data file-format and editing
19. Weighting
20. Estimation
21. Confidentiality
22. Survey documentation
23. Pilot Survey

Assessment design

The participating countries, with the exception of the state of Nuevo Leon in Mexico, implemented an ALL assessment design. Nuevo Leon assessed literacy using the International Adult Literacy Survey (IALS) assessment instruments.

In both ALL and IALS a Balanced Incomplete Block (BIB) assessment design was used to measure the skill domains. The BIB design comprised a set of assessment tasks organized into smaller sets of tasks, or blocks. Each block contained assessment items from one of the skill domains and covers a wide range of difficulty, i.e., from easy to difficult. The blocks of items were organized into task booklets according to a BIB design. Individual respondents were not

required to take the entire set of tasks. Instead, each respondent was randomly administered one of the task booklets.

ALL assessment

The ALL psychometric assessment consisted of the domains Prose, Document, Numeracy, and Problem Solving. The assessment included four 30-minute blocks of Literacy items (i.e., Prose AND Document Literacy), two 30-minute blocks of Numeracy items, and two 30-minute blocks of Problem-Solving items.

A four-domain ALL assessment was implemented in Bermuda, Canada, Italy, Norway, and the French and German language regions of Switzerland. The United States and the Switzerland Italian language region carried out a three-domain ALL assessment that excluded the Problem Solving domain. In addition to the mentioned assessment domains, these participating countries assessed the use of information and communication technology via survey questions incorporated in the ALL Background Questionnaire.

The blocks of assessment items were organized into 28 task booklets in the case of the four-domain assessment and into 18 task booklets for the three domain assessment. The assessment blocks were distributed to the task booklets according to a BIB design whereby each task booklet contained two blocks of items. The task booklets were randomly distributed amongst the selected sample. In addition, the data collection activity was closely monitored in order to obtain approximately the same number of complete cases for each task booklet, except for two task booklets in the three-domain assessment containing only Numeracy items that required a larger number of complete cases.

IALS assessment

The state of Nuevo Leon, Mexico carried out an IALS assessment. The IALS assessment consisted of three literacy domains: Prose, Document, and Quantitative. In addition, the ALL Background Questionnaire was used in Nuevo Leon. The use of information and communication technology was assessed via survey questions incorporated in the ALL Background Questionnaire.

IALS employed seven task booklets with three blocks of items per booklet. The task booklets were randomly distributed amongst the selected sample. In addition, the data collection activity was monitored in order to obtain approximately the same number of complete cases for each task booklet.

Target population and sample frame

Each participating country designed a sample to be representative of its *civilian non-institutionalized persons 16 to 65 years old (inclusive)*.

Countries were also at liberty to include adults over the age of 65 in the sample provided that a minimum suggested sample size requirement was satisfied for the 16 to 65 year age group. Canada opted to include in its target population adults over the age of 65. All remaining countries restricted the target population to the 16 to 65 age group.

Exclusions from the target population for practical operational reasons were acceptable provided a country's survey population did not differ from the target population by more than five percent, i.e. provided the total number of exclusions

from the target population due to undercoverage was not more than five percent of the target population. All countries indicate that this five-percent requirement was satisfied.

Each country chose or developed a sample frame to cover the target population. The following table shows the sample frame and the target population exclusions for each country:

TABLE B1

Sample frame and target population exclusions

Country	Sample frame	Exclusions
Bermuda	Land Valuation List • an up-to-date listing of all housing units in Bermuda.	Persons residing in institutions, visitors to Bermuda (i.e., persons staying less than 6 months).
Canada	Census of Population and Housing database, reference date of May 15, 2001 • households enumerated by the Census long-form (20% sample)	Long-term institutional residents, members of the armed forces, individuals living on Indian Reserves, residents of sparsely populated regions.
Italy	Polling list – a list of individuals aged 18 and over that are resident in Italy and have civil rights	None
Norway	Norwegian Register of Education (2002 version)	Permanent residents in institutions, individuals for whom education level is unknown
Nuevo Leon, Mexico	Census of Population and Housing database, reference year 2000	Persons residing in institutions, members of the Mexican Navy
Switzerland	Register of private telephone numbers (September 2002)	Persons living in institutions, people living in very isolated areas, persons with no private telephone number
United States	Area Frame – 1,883 Primary Sampling Units covering all counties in the 50 states in the United States plus Washington, DC	Full-time military personnel, residents in institutionalized group quarters

Sample design

Each participating country was required to use a probability sample representative of the national population aged 16 to 65. Of course, the available sampling frames and resources varied from one country to another. Therefore, the particular probability sample design to be used was left to the discretion of each country. Each country's proposed sample design was reviewed by Statistics Canada to ensure that the sample design standards and guidelines were satisfied.

Each country's sample design is summarized below. The sample size and response rate for each country can be found in the section following this one.

Bermuda

A two-stage stratified probability design was employed. In stage one Bermuda's Land Valuation List of dwellings was stratified by parish, i.e., geographic region. Within each parish, a random sample of dwellings was selected with probability proportional to the number of parish dwellings. At stage two, one eligible respondent was selected using a Kish-type person selection grid.

Canada

A stratified multi-stage probability sample design was used to select the sample from the Census Frame. The sample was designed to yield separate samples for the two Canadian official languages, English and French. In addition, Canada increased the sample size in order to produce estimates for a number of population subgroups. Provincial ministries and other organizations sponsored supplementary samples to increase the base or to target specific subpopulations such as youth (ages 16 to 24 in Québec and 16 to 29 in British Columbia), adults aged 25 to 64 in Québec, linguistic minorities (English in Québec and French elsewhere), recent and established immigrants, urban aboriginals, and residents of the northern territories.

In each of Canada's ten provinces the Census Frame was further stratified into an urban stratum and a rural stratum. The urban stratum was restricted to urban centers of a particular size, as determined from the previous census. The remainder of the survey frame was delineated into primary sampling units (PSUs) by Statistics Canada's Generalised Area Delineation System (GArDS). The PSUs were created to contain a sufficient population in terms of the number of dwellings within a limited area of reasonable compactness. In addition, the Census Frame was ordered within each geographic region by highest level of education prior to sample selection, thus ensuring a representation across the range of educational backgrounds

Within the urban stratum, two stages of sampling were used. In the first stage, households were selected systematically with probability proportional to size. During the second stage, a simple random sample algorithm was used by the CAPI application to select an individual from the eligible household adults. Three stages were used to select the sample in the rural stratum. In the first stage, Primary Sampling Units were selected with probability proportional to population size. The second and third stages for the rural stratum repeated the same methodology employed in the two-stage selection for the urban stratum.

Italy

A stratified three-stage probability design was used to select a sample using municipal polling lists. Italy was stratified geographically into 22 regions. In general the sample was allocated proportionally to the 22 regions. However, the regions Piemonte, Veneto, Toscana, Campania, and Trento were oversampled to satisfy an objective to produce separate estimates in these five regions.

At the first stage, municipalities were the primary sampling units. Within each geographic region the municipalities were stratified, based on the municipality population size, into self-representing units and non-self-representing units. The self-representing units, i.e., the larger municipalities and metropolitan municipalities, were selected with certainty in the sample. In the non-self-representing stratum in each region, two municipalities were selected with a probability proportional to the target population size. In total, 256 municipalities were selected from the self-representing and non-self-representing strata.

The second stage of the sample design defined 'sex sub-lists' as the secondary sampling unit. The polling list for each selected municipality comprised a number of sub-lists that were stratified by gender, referred to as 'sex sub-lists'. The polling list included the household address of Italian residents aged 18 to 65. The same number of sex sub-lists was systematically selected for each gender. A total of

1,326 sex sub-lists (663 in the male stratum and 663 in the female stratum) were selected.

At the third stage of sample design, a sample of 18 to 65 year old individuals was systematically selected from the secondary sampling units. Subsequently, at the household contact phase, all 16 to 17 year olds living in the household of a selected 18 to 65 year old were included in the sample.

Norway

The sample was selected from the 2002 version of the Norwegian Register of Education using a two-stage probability sample design.

The design created 363 primary sampling units (PSUs) from the 435 municipalities in Norway. These PSUs were grouped into 109 geographical strata. Thirty-eight strata consisted of one PSU that was a municipality with a population of 25,000 or more. At the first stage of sample selection, each of these 38 PSUs was included with certainty in the sample. The remaining municipalities were allocated to 79 strata. The variables used for stratification of these municipalities were industrial structure, number of inhabitants, centrality, communication structures, commuting patterns, trade areas and (local) media coverage. One PSU was selected with probability proportional to size from each of these 79 strata.

The second stage of the sample design involved the selection of a sample of individuals from each sampled PSU. Each selected PSU was stratified by three education levels defined by the Education Register. The sample size for each selected PSU was determined by allocating the overall sample size to each selected PSU with probability proportional to the target population size. The PSU sample was then allocated with 30 percent from the low-education group, 40 percent from the medium-education group and 30 percent from the high-education group. Individuals for whom the education level (84,318 persons) was not on the Education Register were excluded from the sampling.

Nuevo Leon, Mexico

The sample design was a stratified probability design with two stages of sampling within each stratum.

The 51 municipalities in Nuevo Leon were grouped geographically into three strata: Stratum 1 – Census Metropolitan Area of Monterrey, consisting of 9 municipalities; Stratum 2 – the municipalities of Linares and Sabinas Hidalgo; Stratum 3 – the remaining 40 municipalities of Nuevo Leon. The initial sample was allocated to the three strata proportional to the number of dwellings in each stratum.

At the first stage of sample selection, in each stratum a simple random sample of households was selected. The second sampling stage consisted of selecting one person belonging to the target population from each selected household using a Kish-type person selection grid.

Switzerland

The sample design was a stratified probability design with two stages of sampling. Separate estimates were required for Switzerland's three language regions (i.e., German, French, Italian). Thus, the three language regions are the primary strata. Within the language regions, the population was further stratified into the

metropolitan areas represented by the cantons of Geneva and Zurich and the rest of the language regions. At the first stage of sampling, in each stratum a systematic sample of households was drawn from a list of private telephone numbers. In the second stage, a single person belonging to the target population was selected from each household using a Kish-type person selection grid.

United States

A stratified multi-stage probability sample design was employed in the United States.

The first stage of sampling consisted of selecting a sample of 60 primary sampling units (PSUs) from a total 0f 1,883 PSUs that were formed using a single county or a group of contiguous counties, depending on the population size and the area covered by a county or counties. The PSUs were stratified on the basis of the social and economic characteristics of the population, as reported in the 2000 Census. The following characteristics were used to stratify the PSUs: region of the country, whether or not the PSU is a Metropolitan Statistical Area (MSA), population size, percentage of African-American residents, percentage of Hispanic residents, and per capita income. The largest PSUs in terms of a population size cut-off were included in the sample with certainty. For the remaining PSUs, one PSU per stratum was selected with probability proportional to the population size.

At the second sampling stage, a total of 505 geographic segments were systematically selected with probability proportionate to population size from the sampled PSUs. Segments consist of area blocks (as defined by Census 2000) or combinations of two or more nearby blocks. They were formed to satisfy criteria based on population size and geographic proximity.

The third stage of sampling involved the listing of the dwellings in the selected segments, and the subsequent selection of a random sample of dwellings. An equal number of dwellings was selected from each sampled segment.

At the fourth and final stage of sampling, one eligible person was randomly selected within households with fewer than four eligible adults. In households with four or more eligible persons, two adults were randomly selected.

Sample size

A sample size of 5,400 completed cases in each official language was recommended for each country that was implementing the full ALL psychometric assessment (i.e., comprising the domains Prose and Document Literacy, Numeracy, and Problem-Solving). A sample size of 3,420 complete cases in each official language was recommended if the Problem Solving domain was excluded from the ALL assessment.

A sample size of 3,000 complete cases was recommended for the state of Nuevo Leon, Mexico, which assessed literacy skills with the psychometric task booklets of the International Adult Literacy Survey (IALS).

Table B2 shows the final number of respondents (complete cases) for each participating country's assessment language(s).

TABLE B2

Sample size by assessment language

Country	Assessment language	Assessment domains [1]	Number of respondents [2]
Bermuda	English	P, D, N, PS	2,696
Canada	English	P, D, N, PS	15,694
	French	P, D, N, PS	4,365
Italy	Italian	P, D, N, PS	6,853
Norway	Bokmal	P, D, N, PS	5,411
Nuevo Leon, Mexico	Spanish	P, D, Q	4,786
Switzerland	French	P, D, N, PS	1,765
	German	P, D, N, PS	1,892
	Italian	P, D, N	1,463
United States	English	P, D, N	3,420

1. P – Prose, D – Document, N – Numeracy, PS – Problem Solving, Q - Quantitative.
2. A respondent's data is considered complete for the purposes of the scaling of a country's psychometric assessment data provided that at least the Background Questionnaire variables for age, gender and education have been completed.

Data collection

The ALL survey design combined educational testing techniques with those of household survey research to measure literacy and provide the information necessary to make these measures meaningful. The respondents were first asked a series of questions to obtain background and demographic information on educational attainment, literacy practices at home and at work, labour force information, information communications technology uses, adult education participation and literacy self-assessment.

Once the background questionnaire had been completed, the interviewer presented a booklet containing six simple tasks (Core task). Respondents who passed the Core tasks were given a much larger variety of tasks, drawn from a pool of items grouped into blocks, each booklet contained 2 blocks which represented about 45 items. No time limit was imposed on respondents, and they were urged to try each item in their booklet. Respondents were given a maximum leeway to demonstrate their skill levels, even if their measured skills were minimal.

Data collection for the ALL project took place between the fall of 2003 and early spring 2004, depending on the country. Table B3 presents the collection periods for each participating country.

TABLE B3

Survey collection period

Country	Collection date
Bermuda	March through August 2003
Canada	March through September 2003
Italy	May 2003 through January 2004
Norway	January through November 2003
Nuevo Leon, Mexico	October 2002 through March 2003
Switzerland	January through November 2003
United States	January through June 2003

To ensure high quality data, the ALL Survey Administration Guidelines specified that each country should work with a reputable data collection agency or firm, preferably one with its own professional, experienced interviewers. The manner in which these interviewers were paid should encourage maximum response. The interviews were conducted in home in a neutral, non-pressured manner. Interviewer training and supervision was to be provided, emphasizing the selection of one person per household (if applicable), the selection of one of the 28 main task booklets (if applicable), the scoring of the core task booklet, and the assignment of status codes. Finally the interviewers' work was to have been supervised by using frequent quality checks at the beginning of data collection, fewer quality checks throughout collection and having help available to interviewers during the data collection period.

The ALL took several precautions against non-response bias, as specified in the ALL Administration Guidelines. Interviewers were specifically instructed to return several times to non-respondent households in order to obtain as many responses as possible. In addition, all countries were asked to ensure address information provided to interviewers was as complete as possible, in order to reduce potential household identification problems.

Countries were asked to complete a debriefing questionnaire after the Main study in order to demonstrate that the guidelines had been followed, as well as to identify any collection problems they had encountered. Table B4 presents information about interviews derived from this questionnaire.

TABLE B4

Interviewer information

Country	Number of languages	Number of interviewers	Average assignment size	Interviewer experience
Bermuda	1	105	40	No specific information provided.
Canada	2	317	62	Professional interviewers with at least 2 years experience.
Italy	1	150	45	Professional interviewers, most of which had at least 2 years experience.
Norway	1	320	30	Only a third of the interviewers had at least 2 years experience, the others were trained specifically for this survey.
Nuevo Leon, Mexico	1	209	29	Approximately 70% of interviewers had 2 years of experience.
Switzerland	3	110	60	No specific information provided.
United States	1	106	64	Professional interviewers approximately a quarter of which had no previous survey experience.

As a condition of their participation in the ALL study, countries were required to capture and process their files using procedures that ensured logical consistency and acceptable levels of data capture error. Specifically, countries were advised to conduct complete verification of the captured scores (i.e. enter each record twice) in order to minimize error rates. Because the process of accurately capturing the task scores is essential to high data quality, 100 per cent keystroke verification was required.

Each country was also responsible for coding industry, occupation, and education using standard coding schemes such as the International Standard Industrial Classification (ISIC), the International Standard Classification for Occupation (ISCO) and the International Standard Classification for Education (ISCED). Coding schemes were provided by Statistics Canada for all open-ended items, and countries were given specifics instructions about coding of such items.

In order to facilitate comparability in data analysis, each ALL country was required to map its national dataset into a highly structured, standardized record layout. In addition to specifying the position, format and length of each field, the international record layout included a description of each variable and indicated the categories and codes to be provided for that variable. Upon receiving a country's file, Statistics Canada performed a series of range checks to ensure compliance to the prescribed format, flow and consistency edits were also run on the file. When anomalies were detected, countries were notified of the problem and were asked to submit cleaned files.

Scoring of tasks

Persons charged with scoring in each country received intense training in scoring responses to the open-ended items using the ALL scoring manual. As well they were provided a tool for capturing closed format questions. To aid in maintaining scoring accuracy and comparability between countries, the ALL survey introduced the use of an electronic bulletin board, where countries could post their scoring questions and receive scoring decisions from the domain experts. This information could be seen by all countries who could then adjust their scoring.

To further ensure quality, countries were monitored as to the quality of their scoring in two ways.

First, within a country, at least 20 per cent of the tasks had to be re-scored. Guidelines for intra-country rescoring involved rescoring a larger portion of booklets at the beginning of the scoring process to identify and rectify as many scoring problems as possible. As a second phase, they were to select a smaller portion of the next third of the scoring booklets; the last phase was viewed as a quality monitoring measure, which involved rescoring a smaller portion of booklets regularly to the end of the re-scoring activities. The two sets of scores needed to match with at least 95 percent accuracy before the next step of processing could begin. In fact, most of the intra-country scoring reliabilities were above 95 per cent. Where errors occurred, a country was required to go back to the booklets and rescore all the questions with problems and all the tasks that belonged to a problem scorer.

Second, an international re-score was performed. Each country had 10 per cent of its sample re-scored by scorers in another country. For example, a sample of task booklets from the United States was re-scored by the persons who had scored Canadian English booklets, and vice-versa. The main goal of the re-score was to verify that no country scored consistently differently from another. Inter-country score reliabilities were calculated by Statistics Canada and the results were evaluated by the Educational Testing Service based in Princeton. Again, strict accuracy was demanded: a 90 per cent correspondence was required before the scores were deemed acceptable. Any problems detected had to be re-scored. Table B5 shows the high level of inter-country score agreement that was achieved.

TABLE B5

Scoring – per cent reliability by domain

Country pairing (rescoring country – original country)	Psychometric domain: Prose and document (%)	Numeracy (%)	Problem solving (%)	Total (%)
Canada English – Canada French	95	95	92	95
Canada French – Canada English	95	97	94	95
Norway – Canada	91	93	91	92
Canada – United States	94	97	...	95
United States – Canada	95	97	...	95
United States – Bermuda	91	94	...	90
Bermuda – United States	93	95	...	93
Canada French – Switzerland	95	98	97	96
Switzerland – Canada French	94	96	94	95
Switzerland – Italy	96	98	96	96
Italy – Switzerland	93	97	93	94
Canada – Bermuda	...	...	83	83
Canada – Nuevo Leon, Mexico	91	95 [1]	...	92

... Not applicable.
1. Quantitative literacy.

TABLE B6

Scoring operations summary

Country	Scoring start[1]	Number of scorers	Average scoring time per booklet
Bermuda	middle	5	20 min.
Canada	middle	18 [2]	13 min.
Italy	beginning	9	15 min.
Norway	middle	17	8 min.
Nuevo Leon, Mexico	middle	12	N.A.
Switzerland	beginning	11	22 min.
United States	beginning	7	12 min.

1. Indicates that the scoring started at the beginning, middle or end of collection.
2. Includes 15 scorers, 2 people to capture problem solving closed format questions and 1 person to capture scoring sheets.

Survey response and weighting

Each participating country in ALL used a multi-stage probability sample design with stratification and unequal probabilities of respondent selection. Furthermore, there is a need to compensate for the non-response that occurred at varying levels. Therefore, the estimation of population parameters and the associated standard errors is dependent on the survey weights.

All participating countries used the same general procedure for calculating the survey weights. However, each country developed the survey weights according to its particular probability sample design.

In general, two types of weights were calculated by each country, population weights that are required for the production of population estimates, and jackknife replicate weights that are used to derive the corresponding standard errors.

Population weights

For each respondent record the population weight was created by first calculating the theoretical or sample design weight. Then a base sample weight was derived by mathematically adjusting the theoretical weight for non-response. The base weight is the fundamental weight that can be used to produce population estimates. However, in order to ensure that the sample weights were consistent with a country's known population totals (i.e., benchmark totals) for key characteristics, the base sample weights were ratio-adjusted to the benchmark totals.

Table B7 provides the benchmark variables for each country and the source of the benchmark population counts.

Jackknife weights

It was recommended that 10 to 30 jackknife replicate weights be developed for use in determining the standard errors of the survey estimates.

Switzerland produced 15 jackknife replicate weights. The remaining countries produced 30 jackknife replicate weights.

TABLE B7

Benchmark variables by country

Country	Source of benchmark counts	Benchmark variables
Bermuda	Census 2000	Age, Gender, Education level
Canada	Census Demography Counts, June-2003	Province, Census geographic area (i.e., CMA/CA), Age, Gender
Italy	ISTAT Multipurpose Survey 2002	Region, Age, Gender, Education level, Employment status
Norway	Norwegian Register of Education (2002 version)	Age, Gender, Education level
Nuevo Leon, Mexico	Census of Population and Housing (2000)	Age, Gender, Education level
Switzerland	Swiss Labor Force Survey (SAKE)	Language region, Age, Gender, Education level, Immigrant status
United States	2003 Current Population Survey, March Supplement	Census region, Metropolitan Statistical Area (MSA) status, Age, Gender, Race/ethnicity, Immigrant status

The following table summarizes the sample sizes and response rates for each participating country.

TABLE B8

Sample size and response rate summary

Country	Population aged 16 to 65	Initial sample size (16 to 65)	Out-of-scope cases [1]	Number of respondents[2] (16 to 65)	Response rate [3] (16 to 65)
					%
Bermuda	43,274	4,049	745	2,696	82
Canada	21,960,683	35,270	4,721	20,059	66
Italy	38,765,513	16,727	971	6,853	44
Norway	2,945,838	9,719	16	5,411	56
Nuevo Leon, Mexico	2,382,454	6,000	36	4,786	80
Switzerland	1,161,735	18,282	5,310	5,120	40
United States	184,260,910	7,045	1,846	3,420	66

1. Out-of-scope cases are those that were coded as residents not eligible, unable to locate the dwelling, dwelling under construction, vacant or seasonal dwelling, or duplicate cases.
2. A respondent's data is considered complete for the purposes of the scaling of a country's psychometric assessment data provided that at least the Background Questionnaire variables for age, gender and education have been completed.
3. The response rate is calculated as number of respondents divided by the initial sample size minus the out-of-scope cases.

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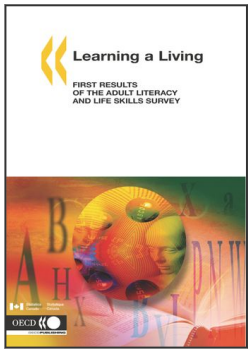

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