Technical Paper

Survey of Adult Skills 2023 Data Analysis Manual

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Please cite this publication as:
OECD (2025), *Survey of Adult Skills 2023 Data Analysis Manual*, OECD Publishing, Paris, https://doi.org/10.1787/25a87a9d-en.

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OECD Skills Studies

Survey of Adults Skills 2023 Data Analysis Manual

Foreword

The Survey of Adult Skills, a product of the Programme for the International Assessment of Adult Skills (PIAAC), is a household survey designed to collect information on the skills proficiency of the adult population aged 16-65.

The purpose of this Data Analysis Manual is to guide researchers and users who are interested in analysing the microdata collected in the 31 countries that participated in the second cycle of the survey in 2022/2023.

Adults who participated in the survey were randomly selected to form a representative sample of the underlying population. They answered a background questionnaire (administered by trained interviewers) and then completed a direct assessment of literacy, numeracy and adaptive problem solving. Adults who were unable to complete the normal background questionnaire and the assessment due to language barriers were administered a shorter questionnaire (called “doorstep interview”), available in multiple languages, that they could self-complete on a tablet.

Part I of this manual provides a brief overview of the different datasets related to or derived from the Survey of Adult Skills, provides guidance on how they can be accessed, and describes in some details their content and all the information collected through the survey.

Part II focuses instead on how the data should be analysed. It describes how to appropriately conduct statistical analysis, in particular how to take into account the complex survey design used during data collection and how to derive correct inferences when working with the measures of skills proficiency contained in the PIAAC datasets. Available tools to facilitate the analysis of PIAAC data are also presented.

This Data Analysis Manual complements two other PIAAC products: the Reader’s Companion (OECD, 2024[1]) and the Technical Report (OECD, forthcoming[2]). The Reader’s Companion offers a broad and less technical overview of all aspects of the Survey of Adult Skills with the aim to help readers understand and interpret the results of the survey. While it is intended for the general public, many data users and researchers will find the Reader’s Companion a useful reading to familiarise themselves with PIAAC and better gauge the analytical possibilities offered by the data.

The Technical Report offers a comprehensive and technically oriented documentation of how the survey was conceived, designed, and implemented. Data users are encouraged to consult the Technical Report whenever they are not able to locate the information they seek in the Data Analysis Manual or the Reader's Companion.

Acknowledgements

The Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), is the outcome of a collaboration among participating countries and economies, the OECD Directorate for Education and Skills and the OECD Directorate for Employment, Labour and Social Affairs, and an international Consortium led by Educational Testing Service (ETS).

The PIAAC Board of Participating Countries (BPC) – co-chaired by Aviana Bulgarelli (Italy, until 2020), Ted Reininga (the Netherlands, until 2021), Katalin Zoltán (Hungary, since 2020) and James Davison (England, UK, since 2021) – steered the development of the project.

The international Consortium, under the direction of Laura Halderman and Irwin Kirsch, was responsible for developing the assessment instruments, assisting countries with sampling and survey operations, and processing the resulting data. Samuel Greiff, Jean-François Rouet, Dave Tout and Guido Schwerdt led the expert groups that oversaw the development of the direct assessment instruments and of the background questionnaire. Matthias von Davier chaired the project's Technical Advisory Group.

This Data Analysis Manual was prepared by François Keslair, Marco Paccagnella and Hajar Sabrina Yassine, under the supervision of Claudia Tamassia. Useful comments from Francesco Avvisati and Mila Staneva are gratefully acknowledged. Rachel Linden co-ordinated production.

Abbreviations and acronyms

ALL	Adult Literacy and Life Skills Survey
APS	Adaptive Problem Solving
BFI	Big Five Inventory
BQ	Background Questionnaire
BRR	Balanced Repeated Replication
CRAN	Comprehensive R Archive Network
DI	Doorstep Interview
GESIS	Gesellschaft Sozialwissenschaftlicher Infrastruktureinrichtungen *(German Social Science Infrastructure Services – Leibniz Institute for the Social Sciences)*
IALS	International Adult Literacy Survey
ICT	Information and Communication Technology
IDEAS	Internet Documents in Economics Archive Server
IRT	Item Response Theory
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification of All Economic Activities
ISO	International Organization for Standardization
JK	Jacknife
LRNR	Literacy-Related Non-Respondents
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
PSTRE	Problem Solving in Technology-Rich Environments
PSU	Primary Sampling Unit
PUF	Public-Use File
PV	Plausible Value
RePEc	Research Papers in Economics

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Part I The data collected in the Survey of Adult Skills 2023

1 Data files from the Survey of Adult Skills 2023

The data collected through the Survey of Adult Skills 2023, a product of the Programme for the International Assessment of Adult Competencies (PIAAC), are made available through different datasets, which serve different research needs and are controlled and managed by different institutions. It is possible to distinguish three categories of datasets:

- *National datasets* contain the full set of information collected in a specific country and form the basis for building harmonised international datasets.
- The *international database* contains standardised information from all countries participating in PIAAC. The international database is managed by and stored at the OECD and is not available to external users.
- *Public-use files* (PUFs) are subsets of the international database. They are freely accessible and can be downloaded from the OECD website. They only contain information that countries have agreed to put in the public domain. As a result, variables in the PUFs may be coarsened or suppressed to preserve the confidentiality of respondents and reduce the risk of reidentification. As different countries have different regulations concerning data privacy, the information contained in the PUFs varies from one country to another.

This chapter describes in some more detail the content of these different datasets. To better understand the differences between them, it is, however, useful to briefly describe first the process through which the survey was developed and administered, as well as the data management workflow.

The development of survey instruments

The development of survey instruments followed three main steps:

1. Development of the *international master version* of the survey instruments: In this phase, both the background questionnaire and the cognitive assessment of literacy, numeracy and adaptive problem solving were developed in English with the help of content experts.
2. *National adaptation* of the survey instruments: In this phase, the questionnaire and the assessment were adapted to the different national contexts, with the goal of ensuring invariance of measurement (i.e. to make sure that the questions are understood similarly by respondents in different countries so that the responses can be validly compared). Examples of adaptations include, for the background questionnaire, the preparation of a list of national qualifications to measure the highest level of education attained by respondents; for the cognitive assessment, a classic example of adaptations is the use of national currencies, or the appropriate measurement system normally used in the country (metric or imperial). As part of this process, countries also had the opportunity to add up to five minutes of national questions of their choice to their questionnaire. The variables containing answers to these questions are denoted as national variables.

3. *Translation* of the survey instruments. In this last phase, the adapted instruments are translated into the national languages used in the different participating countries.

The international database

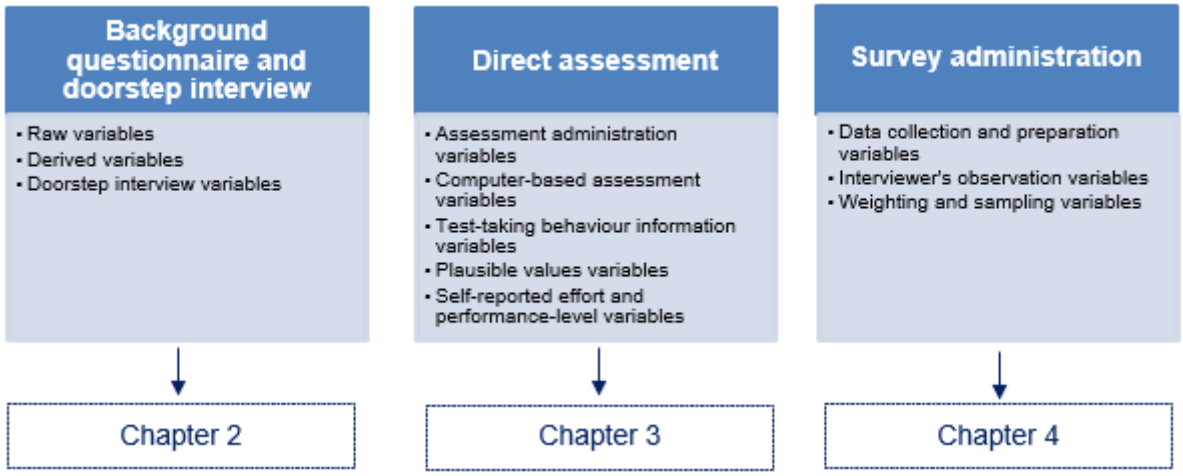
The raw data collected in the field contain the answers of respondents to the nationally adapted versions of the survey instruments. These data are then processed to map them back to the international master versions. This process of harmonisation ensures the international comparability of the data. A classic example of such a process is the reclassification of national educational qualifications into internationally comparable levels following the ISCED (International Standard Classification of Education) classification, or the coding of occupations into the ISCO (International Standard Classification of Occupations) classification.

The resulting product of this harmonisation process is the so-called *international database*. The international database contains information from all participating countries but is limited to *international variables* – i.e. variables collected from all participating countries that are internationally comparable.[1] In the case of educational qualifications, for example, the international database contains information recoded according to the ISCED classification and not the original information collected from the respondents (who normally indicated the degree they obtained following the national nomenclature).

The international database is the working file used by the OECD for the analysis of PIAAC data and the production of international reports (OECD, 2024[1]). It is managed by and stored at the OECD, is only accessible to OECD staff and cannot be shared with external users.

The first part of this manual will mainly focus on describing the variables contained in the international database. Due to the large overlap in content and structure between the international database, the national datasets and the public-use files, the manual will be useful to all data users, irrespective of the datasets they will eventually work with. A useful way of classifying the variables contained in the datasets is depicted in Figure 1.1, which also indicates the broad content of the chapters of this manual.

Figure 1.1. Categories of variables available in the PIAAC international database



National datasets

National datasets can be thought of as the source files for the international database. National datasets are managed by and stored at national centres and institutions responsible for the national administration of the survey. These institutions have full autonomy over the rules and restrictions governing access to such datasets. The OECD maintains on its website a list of contact details of national centres and institutions that have put in place procedures for granting access to national PIAAC datasets. Users interested in accessing national datasets can consult that list at https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#national, and are welcome to reach out to edu.piaac@oecd.org for assistance and further information.

The variables contained in national datasets reflect the way questions were asked in the national context. As a result, the coding scheme of many variables differs from that of the equivalent variables contained in the international database because often the response categories were adapted to the national context (this is the case, for example, of most questions on educational attainment, as respondents were normally asked to indicate which national qualification they obtained). The best way to know the content of national datasets is, therefore, to rely on national versions of the background questionnaire, which accurately replicate the actual questionnaire administered to respondents in different countries. National versions of the background questionnaire are available on the OECD website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#questionnaires).

National datasets are also richer than the international database because they contain more information in the form of *national variables* and/or *national samples*.

National variables

National variables come from questions that countries have decided to add to the international master version of the PIAAC background questionnaire. Each country was allowed to add up to five minutes of national questions, often on topics or issues of particular national interest. In some cases, national variables are not entirely new questions but are rather modifications or extensions of existing questions, where countries have, for example, decided to add further response options or categories.

National variables follow the same naming conventions as all other variables (this convention is explained in more detail in Chapter 2). They can be easily recognised because the variable name ends with a block of three or four characters containing the country code (two letters) followed by an X and, sometimes, a number. So, for example, variables B2_Q02**ATX1** and B2_Q02**ATX2** come from questions asked only in Austria (AT); the X is followed by a number (1 or 2) to indicate that the two variables are on a related topic. In this example, B2_Q02ATX1 is about whether respondents attended early childhood education (*Kindergarten* in German), and B2_Q02ATX2 is about how many years of *Kindergarten* they attended. Variable F2_Q01gCZX is an example of the addition of a response category to an existing question in the international questionnaire. In this example, the Czech Republic (CZ) added “social media” as an additional item (item g) to question F2_D01, which asked about the frequency of different reading tasks at work.

Annex Table 1.A.1 in Annex 1.A contains a list of all national variables contained in the different national datasets.

National samples and oversamples

The PIAAC target population consists of all non-institutionalised adults between age 16 and 65 (inclusive) who reside in the country (their usual place of residency is in the country) at the time of data collection. Adults were to be included regardless of citizenship, nationality or language. The target population excludes adults residing in institutional collective dwelling units or group quarters such as prisons, hospitals and nursing homes, as well as adults residing in military barracks and military bases. However, full-time

and part-time members of the military who do not reside in military barracks or military bases are included in the target population.

Some countries expanded the target population to include additional subpopulations of interest to the country. Cases from these additional subpopulations are not included in the international database or public-use files but are included in national datasets. Table 1.1 contains a list of these additional national samples.

Table 1.1. List of additional national samples

Country or economy	National samples
Chile	Persons aged 15
Denmark	PISA 2009 survey respondents
Netherlands	Persons aged 66 to 75
New Zealand	Persons aged 66 to 75
Singapore	PISA 2009 survey respondents
Slovak Republic	Primary and secondary school teachers
United States	Persons aged 66 to 74

Additionally, countries had the opportunity to oversample certain groups of respondents in order to gain statistical power to analyse the behaviour and characteristics of such subpopulations. As these respondents are part of the PIAAC target population, all these cases are included in the international database and public-use files. A list of national oversamples is provided here for convenience and information in Table 1.2.

Table 1.2. List of national oversamples

Country or economy	Groups oversampled
Austria	Low-educated individuals, immigrants and persons in certain interviewer regions
Canada	An incomplete oversample of 424 individuals who were within the scope of the PIAAC target population (Indigenous population, the youth population (aged 16-30) living in Nova Scotia) which was incorporated into the main sample by matching to non-respondents in the main sample
Denmark	Immigrants
France	Small regions
Hungary	Selected regions
Israel	The Arab population and Ultra-orthodox
Italy	Persons aged 16 to 29 and immigrants
New Zealand	Persons of Māori or Pacific ethnicity; Persons aged 16 to 24
Switzerland	Persons living in French-speaking and Italian-speaking language areas
United States	An incomplete oversample of small states was incorporated into the main sample through composite estimation

Public-use files (PUFs)

Each public-use file can be best thought of as a subset of the international database. They are made available on the OECD website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html) and are provided in both SAS, SPSS and CSV formats. Scripts are provided to facilitate the import of CSV files into Stata and R.

A common subset of variables that were collected across all participating countries/economies was designated for inclusion in the PUFs: responses to the background questionnaire and the cognitive assessments, and associated derived variables, as well as sampling weights and proficiency estimates.

As PUFs are a strict subset of the international database, they do not include any of the national variables described in the previous section on national datasets.

Some variables with minor analytical values were systematically excluded from the PUFs. In particular, the PUFs do not include:

- direct, indirect, and operational identifiers for respondents
- interviewers' identifiers
- free-text entry responses
- random numbers used for routing
- original scale score values before standardisation to an international metric.

Some information was suppressed from the PUFs to protect the privacy of respondents and reduce the risk of reidentification of survey participants. This is the case, for example, of respondents' exact birth date, exact time and date of the interview, or detailed geographical information on where the respondents live.

In order to accommodate differences in national contexts, including laws and regulations on the protection of personal data, countries were given the option of requesting the suppression of variables from their PUF. Sometimes, additional variables were created that coarsen or aggregate information at a higher level. These variables are often denoted by a _C suffix.[2] As a result, the content of the PUFs varies from country to country. A list of variables that each country has decided to suppress from their PUF is available on the OECD website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#missing).

All variables that could potentially be included in the PUFs (pending decisions of some countries to suppress them for confidentiality reasons) are presented in the international codebook. The international codebook is a printable report containing descriptive information for each variable, including variable names and value labels, as well as other metadata, such as variable type (e.g. string or numeric), precision/format or range (when applicable). The codebook is accessible from the OECD website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html).

Annex 1.A. List of national variables

Annex Table 1.A.1. National questions asked in different countries

Country or economy	Variable name (question code)	Concept/question
Austria	A2_Q05ATX1	English language proficiency
	A2_Q05ATX2	English speaking proficiency level
	B2_Q02ATX1	Attended Kindergarten
	B2_Q02ATX2	Number of years attended Kindergarten
	D2_Q13ATX	Contribution of learning activities to current job knowledge and skills
	J2_Q01ATX	Number of household members under 14 years old
	J2_Q02cATX	Highest qualification obtained by spouse or partner
	J2_Q10ATX1	Total household monthly net income (before expenses)
	J2_Q10ATX2	Household net monthly income level
Flemish Region (Belgium)	D2_Q16c2BEX	Ability to make a decent living with current wage
	I2_Q01bBEX1	Membership in political, union, professional, religious, sports, recreational, or charitable organisations
	I2_Q01bBEX2	Proportion of time spent collaborating with other members in the organisation
	I2_Q01bBEX3	Frequency of involvement in activities as a member of the organisation
	I2_Q01bBEX4	Frequency of facing simple problem-solving tasks (under 5 minutes) in the organisation
	I2_Q01bBEX5	Frequency of facing complex problem-solving tasks (requiring at least 30 minutes to think of a solution)
	I2_Q02BEX	Frequency of visits to live concerts, theatres, opera, ballet, museums, or movie theatres in the last 12 months
	I2_Q04BEX1a	I like learning new things
	I2_Q04BEX1b	I like to figure out how different ideas fit together
	I2_Q04BEX1c	I don't understand something, I look for additional information to make it clearer
Canada	A2_Q01CAX1	Respondent's age from entry component
	A2_Q01CAX2	Language of the BQ (1=English; 2=French)
	A2_Q01CAX3	Respondent's province of interview from entry component
	A2_Q01bCAX2	Age group of the respondent
	A2_Q03CAX1	Current or former landed immigrant status
	A2_Q03CAX2	Year of first landed immigrant status
	A2_Q04bCAX1	Rating of current reading skills in ^A2_D04bCAX
	A2_Q04bCAX2	Rating of current writing skills in ^A2_D04bCAX
	A2_Q04bCAX3	Rating of current speaking ability in ^A2_D04bCAX
	A2_Q04bCAX4	Rating of current reading ability in ^A2_D04bCAX
	A2_Q04bCAX5	Rating of current writing ability in ^A2_D04bCAX
	A2_Q04bCAX6	Indigenous identity: First Nations, Métis, or Inuk (Inuit)
	A2_Q04bCAX7	Status Indian under the Indian Act of Canada
	A2_Q04bCAX8	Membership in a First Nation or Indian band
	A2_Q04bCAX9	Name of First Nation or Indian band
	B2_Q04aCAX	Main field of study or specialisation for highest certificate, diploma, or degree
	B2_Q04cCAX1	Highest level of education attained outside Canada
	B2_Q04cCAX2	Country where education was attained
	B2_S04cCAX2	Country where education was attained (asked if ^B2_Q04cCAX2 = Other- specify)

Country or economy	Variable name (question code)	Concept/question
	C2_Q09bCAX	Employment history in Canada
	C2_Q10CAX1	Total years of paid work in Canada (6+ months)
	D2_Q02aCAX	Employer name (business, government, or individual)
	E2_Q02aCAX	Previous employer name (business, government, or individual)
Chile	B2_Q01CLX1	Type of institution where undergraduate higher education was completed
	B2_Q01CLX2	Type of school where secondary education or high school was completed
	B2_Q01CLX3	Type of school where most of primary or basic education was completed
	B2_Q05bCLX1	Last year of studies successfully completed at this educational level
	B2_Q05bCLX2	Last year completed in this educational level
	B2_Q05bCLX3	Last completed year at this educational level
	B2_Q05bCLX4	The most recent year successfully completed at this educational level
	B2_Q05bCLX5	The last year completed in this educational level
	B2_Q06bCLX1	The last year of study successfully completed at the reported educational level
	B2_Q06bCLX2	The most recent year of study successfully completed at the reported educational level
	B2_Q06bCLX3	The last year of studies successfully completed at this educational level
	B2_Q06bCLX4	The most recent year of studies successfully completed at this educational level
	B2_Q06bCLX5	The last year of studies successfully completed at this educational level
Croatia	L2_Q01HRX1	Effect of the COVID-19 pandemic
	L2_Q01HRX2	Current impact of COVID-19 on work
	L2_Q01HRX3	Current impact of COVID-19 on income
	L2_Q01HRX4	Current impact of COVID-19 on education
	L2_Q01HRX5	Current impact of COVID-19 on housing
	L2_Q01HRX6	Current impact of COVID-19 on physical well-being
	L2_Q01HRX7	Current impact of COVID-19 on mental well-being
	L2_Q01HRX8	Current impact of COVID-19 on family relationships
	L2_Q01HRX9	Current impact of COVID-19 on wider social connections
	L2_Q01HRX10	Job loss due to the COVID-19 pandemic
	L2_Q01HRX11	Ease or difficulty of finding new work
	L2_Q01HRX12	Impact of COVID-19 pandemic on hours worked, salary and wages, jobs, training and study
Czech Republic	B2_Q01aCZX	Total years spent in education, including part-time, repeated years, and incomplete qualifications
	C2_Q08bCZX	Reason for being out of work during this period (voluntary or involuntary)
	F2_Q01gCZX	Added response category (use of social media for reading at work)
	F2_Q02dCZX	Added response category (use of social media for writing at work)
	G2_Q01gCZX	Added response category (use of social media for reading in everyday life)
	G2_Q02dCZX	Added response category (use of social media for writing in everyday life)
	H2_Q19bCZX2	Skills considered (higher than required) when answering the question
Estonia	A2_Q01EEX	BQ language
	A2_Q04bEEX1	BQ language proficiency
	A2_Q04bEEX2	Proficiency in languages besides the current one
	A2_Q04bEEX3	The first additional language spoken
	A2_Q04bEEX4	Proficiency level in the first additional language
	A2_Q04bEEX5	Best understood second additional language
	A2_Q04bEEX6	Proficiency level in the best understood second additional language
	A2_Q04bEEX7	Best understood third additional language
	A2_Q04bEEX8	Proficiency level in the best understood third additional language
	B2_Q02bEEX	Qualifications obtained after the highest education, including same or lower levels
Finland	B2_Q04bFIX	Completion of studies leading to a teaching qualification, as part of or in addition to the highest qualification

Country or economy	Variable name (question code)	Concept/question
	D2_Q02aFIX1	Name of the workplace (firm/organisation)
	D2_Q02aFIX2	Municipality where your workplace is located
	D2_Q02aFIX3	Address of your workplace
	E2_Q02bFIX1	Name of the workplace (firm/organisation) previously worked for
	E2_Q02bFIX2	Municipality where your previous workplace was located
	E2_Q02bFIX3	Address of your previous workplace
France	C2_Q02aFRX	Registration as a job seeker at *Pole Emploi* in the past 4 weeks
	D2_Q01aFRX1	Job status
	D2_Q01aFRX2	Main occupation of the family member the respondent assists
	D2_Q01aFRX3	Classification or working category in your job
	D2_Q01aFRX4	Classification or working category in your job
	D2_Q01aFRX5	Official status in relation to your main occupation
	D2_Q07cFRX	Size of the company, including all workplaces
	D2_Q14dFRX	Confirmation of gross pay (not net pay)
	E2_Q01aFRX1	Job status
	E2_Q01aFRX2	Main occupation of the family member receiving assistance
	E2_Q01aFRX3	Working category classification in your job
	E2_Q01aFRX4	Working category classification in your job
	E2_Q01aFRX5	Official status related to your main occupation
	E2_Q06FRX1	Was your workplace part of a larger firm or organisation?
	E2_Q06FRX2	Size of the company, including all workplaces
	J2_Q02bFRX	Highest qualification obtained by your partner or spouse
Germany	A2_Q03cDEX1	Reasons for immigrating to Germany (multiple responses allowed)
	A2_Q03cDEX2	Immigration to Germany as an *Aussiedler/-in* or *Spätaussiedler/-in*
	A2_Q03cDEX3	German citizenship
	A2_Q03cDEX5	Place of residence before the fall of the Berlin Wall (pre-1989)
	A2_Q04aDEX	Self-reported proficiency in speaking/reading/writing in German
	C2_Q07DEX	Participation in partial retirement and current phase (active working or passive)
	J2_Q07DEX	School attended at age 14
Hungary	A2_Q03cHUX1	Ethnicity most strongly identified with
	A2_Q03cHUX2	Another ethnicity also identified with
	A2_Q03cHUX3	Any other ethnicity also identified with
	A2_Q04bHUX1	Languages spoken besides mother tongue(s)
	A2_Q04bHUX2	Best-known language among those spoken
	A2_Q04bHUX3	Statement that best describes knowledge of this language
	A2_Q04bHUX4	Best-known language among the remaining ones
	A2_Q04bHUX5	Choose the statement that best describes your knowledge of this language
	A2_Q04bHUX6	Best-known language among the remaining ones
	A2_Q04bHUX7	Statement that best describes knowledge of this language
	C2_Q12HUX	Participation in Public Employment Service programs or receipt of services/benefits in the last 5 years
	G2_Q05HUX	Confidence in using a smartphone, tablet, laptop, or desktop computer
	G2_Q06eHUX	Added category (ICT use in everyday life to learn something new)
Ireland	I2_Q03IEX1	Presence of long-lasting conditions or difficulties
	I2_Q03IEX2	Difficulty in performing specific tasks or activities
Israel	A2_Q05ILX	Religion
	A2_Q05ILX1	Service in the IDF (Israel Defense Forces)
	A2_Q05ILX2	Service in national or civilian service
	A2_Q05ILX3	Self-perception (religion)
	A2_Q05ILX4	Self-perception (religion)

Country or economy	Variable name (question code)	Concept/question
	B2_Q04cILX	Study in a *High Yeshiva* or *Kolel*
	D2_Q01bILX1	Work in the locality of residence
	D2_Q01bILX2	Name of the locality of the workplace
	D2_Q04aILX1	Receipt of pay from
	D2_Q04aILX2	Source of pay
	D2_Q10ILX1	Tenure (*Kvi'ut*) at the workplace
	D2_Q10ILX2	Importance of tenure (*Kvi'ut*) at the workplace
	D2_Q10ILX3	Importance of obtaining tenure (*Kvi'ut*) status at the workplace
	D2_Q15eILX	Chances of finding a job with the same level of income if current job is lost
	E2_Q01bILX1	Previous work in the locality of residence
	E2_Q01bILX2	Name of the locality of the previous workplace
	E2_Q04aILX1	Previous work receipt of pay from
	E2_Q04aILX2	Source of pay of the previous work
	G2_Q06ILX1	Use of a computer or digital device such as a tablet or smartphone at work and everyday life, for specific purposes
	G2_Q06ILX2	
	G2_Q06ILX3	
Italy	B2_Q02ITX	Type of upper-secondary school attended
	D2_Q11ITX1	Full-time or part-time employment status
	D2_Q11ITX2	Type of part-time work
	D2_Q11ITX3	Reason for working part-time
	D2_Q12cITX	Usual qualification required to perform this type of job satisfactorily
	D2_Q12bITX	Qualification required to perform this type of job satisfactorily
	E2_Q10cITX	Qualification required to do last job satisfactorily
	E2_Q10bITX	
Japan	A2_Q04bJPX	Experience with studying or living abroad and the total duration
	B2_Q01JPX	Type of programme, level, and institution attended
	B2_Q02bJPX	
	B2_Q05bJPX	
	B2_Q06bJPX	
	B2_Q23JPX	Efforts to improve IT skills (multiple choices allowed)
	I2_Q02JPX	Frequency of participation in group activities (e.g., chorus) for a hobby in the last 12 months
	J2_Q06JPX	Frequency of participation in community activities (festivals, sports, volunteering) at age 14
Korea	B2_Q01KOX	Type of high school graduated from
Latvia	A2_Q01LVX	BQ language
	B2_Q01LVX	Language of instruction in the programme of the highest qualification
	D2_Q16c2LVX1	Payment of income in cash-in-hand without declaration to tax or social security authorities in the last 12 months
	D2_Q16c2LVX201	Percentage of gross monthly income received as cash-in-hand
	I2_Q01aLVX2	Overall satisfaction with the functioning of democracy in Latvia
	I2_Q01bLVX	Agreement with the statement about politics and government being complicated
	I2_Q05LVX1	Religious denomination
	I2_Q05LVX2	Frequency of church attendance, excluding weddings, christenings, and funerals
Lithuania	B2_Q01LTX	University graduated from
Netherlands	B2_Q01NLX	Type of *mbo-opleiding* completed
	B2_Q02bNLX	Details about *mbo-opleiding* (highest qualification)
	B2_Q05bNLX	Details about *mbo-opleiding* (current qualification)
	B2_Q06bNLX	Details about *mbo-opleiding* (uncompleted qualification)
	B2_Q23NLX	Participation in an accreditation of prior learning (APL) procedure in the last 12 months
	A2_Q03dNLX	Mother's country of birth
	A2_Q03eNLX	Father's country of birth
New Zealand	A2_Q01bNZX1	Date of birth (day)

Country or economy	Variable name (question code)	Concept/question
	A2_Q02NZX1	Ethnic group affiliation (multiple selections allowed)
	A2_Q02NZX2	Additional ethnic group affiliations (e.g., Dutch, Japanese, Tokelauan)
	A2_Q04bNZX1	Proficiency in speaking Māori for day-to-day conversation
	A2_Q04bNZX2	Proficiency in reading Māori with understanding
	A2_Q04bNZX3	Proficiency in speaking English
	A2_Q04bNZX4	Proficiency in reading English
	B2_Q04aNZX	Subject of study for the highest level of qualification, or the most important one if there were multiple
	B2_Q05aNZX1	Type of educational institution for this qualification
	B2_Q05aNZX2	Type of educational institution
	B2_Q05cNZX1	Precise subject of study for this qualification, or the most important one if there were multiple
	B2_Q06bNZX2	Institution where studies for this qualification began (school, Polytechnic, Wānanga, etc.)
	D2_Q10NZX1	Membership in a trade union or employee organisation
	D2_Q10NZX2	Type of contract: individual or collective
	E2_Q08NZX1	Belonging to a trade union or employee organisation
	E2_Q08NZX2	Type of contract: individual or collective
	J2_Q03NZX5	Gender identity
	L2_Q01NZX1	Overall effect of the COVID-19 pandemic on various areas of life
	L2_Q01NZX2	Current effect of the COVID-19 pandemic on work
	L2_Q01NZX3	Current effect of the COVID-19 pandemic on income
	L2_Q01NZX4	Current effect of the COVID-19 pandemic on education and training
	L2_Q01NZX5	Current effect of the COVID-19 pandemic on housing
	L2_Q01NZX6	Current effect of the COVID-19 pandemic on physical wellbeing
	L2_Q01NZX7	Current effect of the COVID-19 pandemic on mental wellbeing
	L2_Q01NZX8	Current effect of the COVID-19 pandemic on family relationships
	L2_Q01NZX9	Current effect of the COVID-19 pandemic on wider social connections
	L2_Q01NZX10	Job loss due to the COVID-19 pandemic
	L2_Q01NZX11	Ease or difficulty in finding new work
	L2_Q01NZX12	Changes in various aspects of life due to the COVID-19 pandemic (increased, decreased, or stayed the same)
Norway	A2_Q01NOX	BQ language
Poland	A2_Q04bPLXa	Proficiency level in other foreign languages (English, German, Russian, Other)
	H2_Q12PLX	Frequency of working during free time in the current/previous job
	J2_Q09cPLX1	Likelihood of leaving the country for a longer stay (more than three months) within the next five years
	J2_Q09cPLX2	Connections or experiences with living or working in another country or having close relatives or friends abroad
	J2_Q09CPLX3	The approximate total value of household savings compared to total household income
	J2_Q09CPLX4	The presence of any loans or credits currently owed by the household
	J2_Q09CPLX5	Description of the household's housing ownership status
Singapore	B2_Q02bSGX1	Qualifications completed after starting work
	B2_Q02bSGX2	Institution where the highest qualification was obtained: private or public
	D2_Q10SGX1	Job or business description
	D2_Q10SGX2	Employment contract duration (in years, months, weeks, or days)
	D2_Q10SGX3	Average duration of working relationship with clients/customers (in years, months, weeks, days, or hours)
	D2_Q10SGX4	Payment method in this job or business (excluding bonuses and overtime pay)
	D2_Q10SGX5	Use of online platforms (e.g. mobile apps like Grab/Uber/Deliveroo, UpWork, or websites like eBay, Carousel) to get clients/customers/tasks/assignments
	D2_Q17SGX1	Job title
	D2_Q17SGX2	Employment status (employee or self-employed)
	D2_Q17SGX3	Employees working for the respondent (including family members, paid or unpaid)

Country or economy	Variable name (question code)	Concept/question
	D2_Q17SGX4	Type of employment contract (e.g., permanent, temporary, freelance, etc.)
	D2_Q17SGX5	Job or business type (e.g., seasonal work, contract-based work, temporary assignments, casual work, internship, independent work, other businesses)
	D2_Q17SGX6	Length of employment contract (report in years, months, weeks, or days)
	D2_Q17SGX7	Average length of working relationship with clients/customers (report in years, months, weeks, days, or hours)
	D2_Q17SGX8	Payment method for this job or business (excluding bonuses and overtime pay)
	D2_Q17SGX9	Obtaining clients/customers/tasks through online platforms (e.g., Grab, Uber, Deliveroo, UpWork, eBay, Carousel)
	D2_Q18SGX1	Usual weekly working hours, including paid/unpaid overtime, excluding lunch/breaks
	D2_Q18SGX2	Willing and able to work additional hours beyond usual in the past 7 days
	D2_Q18SGX3	Reasons for being willing but unable to work extra hours beyond usual
	J2_Q10SGX1	Current residency status
	J2_Q10SGX2	Ethnic group identification (multiple choices allowed)
Slovak Republic	H2_Q13cSKX	Existence of regular meetings in the organisation where employees can express their views
	H2_Q19bSKX1	Overall satisfaction with working conditions in the main paid job
	H2_Q19BSKX2	Perceived health or safety risks due to work
Spain	G2_Q01gESX	Read reports or scholarly articles in everyday life
Sweden	H2_Q10SEX	Frequency of helping co-workers learn new skills in the current/previous job
	H2_Q13aSEX	Need for assistance with workload or challenging situations
	H2_Q13bSEX	Frequency of receiving assistance from a supervisor or manager in challenging situations
	H2_Q13cSEX	Frequency of receiving assistance from co-workers in challenging situations
Switzerland	C2_Q11CHX	Type of social benefit received
	H2_Q20CHX1	Professional goals
	H2_Q21CHX1	
England (UK)	B2_Q02bUK3X	Apprenticeship completion (including trade, EQ advanced, foundation, or modern apprenticeships)
	B2_Q05bUK3X	Current participation in a formal apprenticeship with an employer leading to qualifications
	B2_Q06bUK3X	Participation in a formal apprenticeship (including trade, EQ advanced, foundation, or modern apprenticeships)
	D2_Q12aUKX	Requirement of formal apprenticeship for the job (including trade, EQ advanced, foundation, or modern apprenticeships)
	E2_Q10aUKX	Requirement of formal apprenticeship (including trade, EQ advanced, foundation, or modern apprenticeships) for the applicant to qualify for the job
	I2_Q03UKX	Impact of long-term health problems or disabilities on day-to-day activities
	J2_Q03UKX1	Providing care to a family member aged 15 or older who is ill, disabled, or elderly, whether or not they live in the same household
	J2_Q03UKX2	Ethnic group/background
	J2_Q03UKX3	
	J2_Q03UKX4	
	J2_Q03UKX5	
	J2_Q03UKX6	
United States	A2_Q03eUSX1	Respondent identification as Hispanic or Latino
	A2_Q03eUSX2	Ethnic group
	A2_Q04cUSX1	Proficiency in speaking/reading/writing English
	C2_Q12USX3	Service in the U.S. Armed Forces, military reserves, or National Guard on active duty
	I2_Q03USX3	Diagnosis or identification of a learning disability
	I2_Q03USX4	Having medical insurance or enrolled in a program that helps pay for healthcare
	I2_Q03USX5	In the past year, participation in the following health maintenance activities: routine medical checkup, flu shot, vision check, or dental visit
	J2_Q03USX	Approximate total income of all household members in the past 12 months, including income from jobs, investments, social security, retirement, and welfare
	L2_Q01USX	Money management and finances

Country or economy	Variable name (question code)	Concept/question
	L2_Q02USX	Saving methods
	L2_Q03USX	Budgeting for expenses like food, housing, phone, and entertainment
	L2_Q04USX	Evaluating retirement savings needs
	L2_Q06USX	Ability to cover an unexpected expense of $2,000
	L2_Q07USX	Difficulty in covering expenses and paying bills in a typical month
	L2_Q08USX	Difficulty in understanding financial statements like bank, loan, mortgage, or credit card reports
	L2_Q09USX	Difficulty in understanding financial concepts like compound interest, adjustable-rate loans, and capital gain
	L2_Q10USX	Checking of credit score or credit history
	L2_Q11USX	Financial concepts

References

OECD (2024), *Do Adults Have the Skills They Need to Thrive in a Changing World?: Survey of Adult Skills 2023*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/b263dc5d-en. [1]

Notes

[1] Some sections of the international background questionnaire were optional, and some countries decided not to administer them. These sections are still considered part of the international questionnaire and are therefore included in the international database. More information on this is provided in Chapter 2.

[2] See Chapter 2 for a more detailed presentation of variables naming conventions.

2 Variables related to the background questionnaire and the doorstep interview

The first component of the Survey of Adult Skills (PIAAC) that is administered to respondents is either the background questionnaire or the doorstep interview. The background questionnaire is delivered in Computer Aided Personal Interview (CAPI) mode by a trained interviewer. It aims to collect the contextual information necessary for the analysis and interpretation of the results obtained from the direct assessment. Adults who are unable to respond to the full questionnaire because of language barriers are administered a much shorter questionnaire – the doorstep interview – which is available in over 40 languages. These adults will complete the doorstep interview autonomously in the language of their choice.

The interviewer registers all answers provided by respondents in the survey software. These direct answers are denoted as raw variables in this manual. Sometimes, these raw variables may not be immediately meaningful on their own or may lack validity for international comparisons. The dataset contains, therefore, a number of derived variables. These are either generated automatically by the survey software or are calculated ex-post (an example being the coding of open-ended answers).

ATTENTION POINT: Derived variables should be used in analysis to the extent possible

Users may encounter very similar raw and derived variables. When in doubt between two similar variables, derived variables should always be prioritised over raw variables. In fact, raw variables may contain valid skips, meaning that they may not be administered in case respondents are deemed not eligible or when the answer to a question can be unambiguously derived on the basis of the answer to a previous question. The associated derived variable often takes account of these cases.

Naming conventions for raw variables

Variables from the background questionnaire are named using a consistent and systematic naming convention. The background questionnaire is grouped into sections, and corresponding variable label prefixes are used. The content of the background questionnaire sections is described in detail later in this manual.

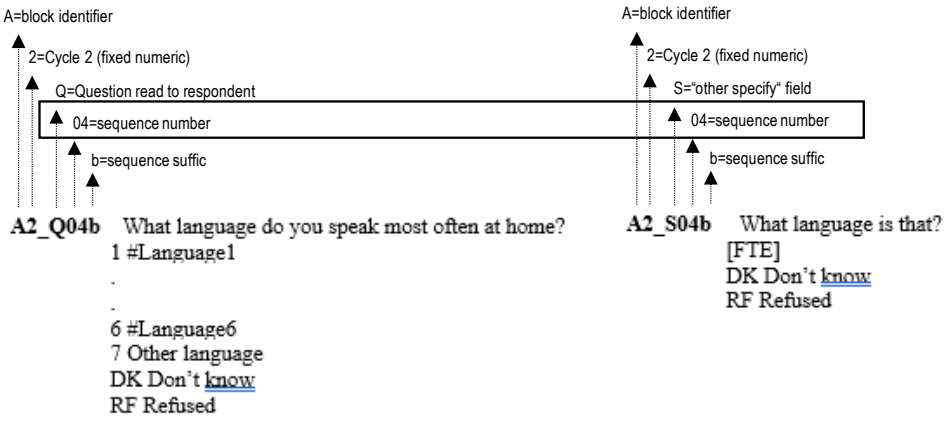
Each variable name has a *block identifier* and a *field-type identifier*:

- A block defines a set of questions and is identified by one capital letter based on the sections in the background questionnaire (A-K) and a fixed numeric value (2, to denote the second cycle of the Survey of Adult Skills). Every variable name in the block starts with the same block identifier.
- Field-type identifiers of types Q, N, D and S generate data to be stored in the dataset:[1]
  - Q for a question which is read to the respondent, for instance, B2_**Q**01
  - N for a question that the interviewer answers, for instance, A2_**N**02.
  - D for a derived variable, which is automatically generated during the interview on the basis of answers to past questions, for instance, B2_**D**01a.
  - S for an 'other-specify' text field, for instance B2_**S**03b.

A sequence number follows each field-type identifier and, if necessary, a sequence suffix.

Related variable names have at least the same sequence number, and if there is a close connection, they also have the same sequence suffix. For example, the "other-specify" field (S) is closely related to the question (Q), and therefore, they have the same sequence number and suffix. Derived variables have a sequence number that is the same as the previous or following question number. Examples of naming conventions for raw variables are provided in

Figure 2.1. Example naming convention



Naming conventions and classification of derived variables

Derived variables often follow specific naming conventions. The most commonly used derived variables will be illustrated in the rest of the chapter. A detailed description of the derivation and construction of each derived variable is provided on the OECD PIAAC website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#codebooks).

Here, it is worth noting that many derived variables have a suffix that is informative of the characteristics of the variable:

- The suffix **_C** normally denotes a variable that has been coarsened or top-coded, or a continuous variable that has been transformed into a categorical variable. For example, variable B2_Q04b1_C is a categorical variable derived from B2_Q04b1: while the original variable reports the exact age at which respondents completed their highest educational qualification, the derived variable reports the same information in six categories.
- Variables derived from Section D (Current Job) may also present a suffix _C (or simply end by C). In this case, the C denotes the fact that the information refers to the current job. Respondents who

are not currently working are, in fact, often administered similar questions but with reference to their last job (in Section E). The variables often have the same name: the suffix **_C** or **_L** indicate whether the answer refers to the current (C) or the last (L) job.

- The suffix **_TC1** denotes variables that have been recoded to make them comparable with variables from the first cycle of the Survey of Adult Skills.
- The suffix **_T** denotes variables that have been recoded to make them comparable with variables from previous adult skills surveys, in particular the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL). The dataset from the first cycle of PIAAC contains similar variables trending back to IALS and ALL.
- The suffix **_T1** also denotes variables that are comparable with IALS and ALL, but that have been reclassified differently (for example, by merging two categories into one).
- The suffix **_BQDI** denotes variables that have been constructed to harmonise the information collected in the background questionnaire and the doorstep interview.

The name of a derived variable may also depend on the category it belongs to. Derived variables may be classified into three categories: (i) simple derived variables, (ii) nomenclature variables and (iii) index variables.

- **Simple derived variables** are computed from one or more raw variables. They may have their own name, or they may take the name of the raw variable they are derived from, with the addition of a suffix, as explained above
- **Nomenclature variables** use a coding scheme based on internationally recognised classifications. The international classification is often present in their name. For example:
  - Educational qualifications are coded using the International Standard Classification of Education (ISCED)
  - Occupations are coded using the International Standard Classification of Occupations (ISCO)
  - The economic sector is coded using the International Standard Industrial Classification of All Economic Activities (ISIC)
  - Geographical information at the supra-national level follows the M49 classification of the United Nations
  - Geographical information at the sub-national level is coded using the OECD TL2 classification
  - Languages are coded using the ISO 639-2 alpha-3 code
- **Scales** combine the answers to multiple questions into a single variable. The transformation may be a simple arithmetic transformation (such as a standardisation or an averaging) or a more complex transformation based on a statistical model. Details on how each scale is constructed can be found in the Technical Report (OECD, forthcoming[1])

Doorstep interview variables

Respondents who were unable to complete the background questionnaire due to language barriers were administered the doorstep interview: a short, self-administered questionnaire designed to collect key personal background information. The doorstep interview was available in all languages used for the background questionnaire in countries participating in the 2023 Survey of Adult Skills, as well as in the languages of the main linguistic minorities in the different countries. All variables from the doorstep interview are named with the prefix DI.

There are six DI variables:

- DI_Q02: gender

- DI_Q03: age
- DI_Q04: level of education
- DI_Q05: subjective employment status
- DI_Q06a: country of birth
- DI_Q06b: time spent in the country

The variable DOORSTEP identifies respondents who took the doorstep interview.

ATTENTION POINT: Comparability of information between the background questionnaire and the doorstep interview

The doorstep interview questions were often asked in a slightly different (often simplified) way compared to similar questions asked in the background questionnaire. Users are urged to pay attention to these comparability issues when analysing information coming from these two sources.

Specific derived variables have been created with the aim of harmonising information from the DI and the BQ. These are identified by the suffix _BQDI.

Missing codes and free-text entries

The variables from the background questionnaire and the direct assessment may include up to five missing categories:

- **Don't know (string "DK")** – The sampled person is responsible for this type of item non-response by vocalising "I don't know". In this case, the variable takes the value ".d" if numeric and "7", "97", "997" or "9997" if a string in SAS and SPSS.
- **Refused (string "RF")** – The sampled person is responsible for this type of item non-response by refusing to answer the question. In this case, the variable takes the value ".r" if numeric and "9", "98", "998" or "9998" if a string in SAS and SPSS.
- **Suppressed** – Certain data were suppressed and not provided due to regulations and policies relating to privacy, confidentiality, or data protection. In this case, the variable takes the value ".s".
- **Not stated or inferred** – This is a systemic non-response and is assigned if a variable originally had a value, but the value was out of range or otherwise useless and could not be reconciled or fixed. This value was applied by the international data processing systems and/or by countries in some agreed cases. The value is also applicable for coding variables where a raw response, say, a response to an occupation question, was given but not interpretable, not covered by the coding scheme(s) or otherwise useless. In this case, the variable takes the value ".n" if numeric and "9", "99", "999" or "9999" if a string in SAS and SPSS.
- **Valid skip** – The question was not answered because a response to an earlier question directed the respondent to skip the question. In this case, the variable takes the value ".v" if numeric and "6", "96", "996" or "9996" if a string in SAS and SPSS.
- **FTE (Free-text entry)** – Free-text entry responses were used for occupation, field of industry, country, language, and foreign qualifications. To retain the information provided by the respondents and/or the interviewer for later analysis and disambiguation, the international data processing systems imported missing values for any free-text entries in the CAPI system as string constants, that is, either "[REFUSED]" or "[DON'T KNOW]".

ATTENTION POINT: Beware of valid skips during analysis

A valid skip denotes a record for which the information is missing only because the associated question was not asked. Variables featuring valid skips are generally raw variables and should not be used without being aware of the reasons why some observations are coded as valid skips. Two broad cases may arise:

1. The information was already collected elsewhere. In most but not all cases, a derived variable exists where such valid skips are imputed with the appropriate value. As an example, J2_Q02a (living with a partner) is populated with a valid skip for all observations where J2_Q01 (number of people in the household) is equal to 1. In this case, it is recommended to use the variable PARTNER, which correctly takes into account the questionnaire routing (and therefore the presence of valid skip) and reports for all records whether or not the respondent lives with a partner.

2. The respondent does not belong to the question's target population, either because it would not make sense or by design. For instance, all variables related to the respondent's current work (Section D) are populated with valid skips for respondents who are unemployed or out of the labour force. In addition, Sections F and H are not administered to students who work less than 9 hours per week (Table 2.1).

ATTENTION POINT: Variables that are not populated for Doorstep respondents do not have a specific missing label

Variables associated with the Background Questionnaire cannot be imputed for Doorstep respondents. In such a case, the variables are encoded as missing and do not feature any label. The DOORSTEP variable is the only way to identify such cases.

The sections of the background questionnaire

The background questionnaire (BQ) for the 2023 Survey of Adult Skills contains 11 sections, each of which covers one or several substantive domains. Not all respondents answered all sections of the BQ (Table 2.1). As an example, the section on current job characteristics was administered only to adults who are currently employed. When a respondent is deemed ineligible for a particular section, the answers to all questions from that section are recorded as valid skips. This form of routing of respondents could also take place for specific questions within sections (Box 2.1).

This chapter provides a short description of the different sections of the BQ, together with tables reporting the most important derived variables from each section. To facilitate navigation of the BQ, flowcharts of the different sections of the questionnaire, including routing rules, are available on the OECD PIAAC website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#questionnaires). Through the flow charts, readers can quickly identify the content of the different raw variables. A more discursive presentation of the content of the background questionnaire and the principles that have inspired its development can be found in Chapter 4 of the Reader's Companion (OECD, 2024[2]).

Table 2.1. The sections of the background questionnaire (BQ) and the population answering each of them

Sections of the BQ	Population answering the different sections of the BQ
Section A: Personal characteristics	All respondents
Section B: Education and training	Education questions: all respondents Training questions: all respondents except young people aged 16 to 19 in compulsory education
Section C: Current status and work history	All respondents
Section D: Current work	All respondents who are currently working
Section E: Last job	All respondents who are currently not working but had paid work in the past five years
Section F: Literacy, numeracy, and Information and communication technology (ICT) practices at work	All respondents who are currently working or with paid work in the past 12 months (except students who work less than 9 hours a week)
Section G: Literacy, numeracy, and ICT practices in everyday life	All respondents
Section H: Working environment	All respondents who are currently working or with paid work in the past 12 months (except students who work less than 9 hours a week)
Section I: Non-economic outcomes	All respondents
Section J: Background	All respondents
Section K: Social and emotional skills	All respondents[1]

(1) Section K was not administered in Japan, Korea, and the United States.

Box 2.1. Routing rules within the PIAAC background questionnaire

The routing of the background questionnaire ensures that respondents are only asked questions that are relevant to them. Routings may be of two sorts: between-section routings and within-section routings. The between-section routings that filter respondents at the beginning of each section can be found in Table 2.1.

Routing rules within a questionnaire serve to direct the flow of questions. Positioned between questions, these rules come into effect after the completion of the preceding question.

Some sections of the background questionnaire employ more routing rules than others, particularly Sections B and D, which respectively refer to education levels and employment status/earnings.

For instance, a routing rule of Section B (B2_**R**01) is:

IF (B2_D01a = 0) OR (B2_D01a = "DK") OR (B2_D01a = "RF") THEN GOTO B2_Q05a ELSE IF (B2_D01a = 1) OR (B2_D01a = 2) OR (B2_D01a = 3) OR (B2_D01a = 4) THEN GOTO B2_Q03a ELSE GOTO B2_Q02b

- **Question B2_D01a=0** refers to the answer that the respondent has an ISCED0 as the highest qualification.
- **Question B2_D01a=DK** refers to a “Don’t know” answer, and B2_D01a=RF refers to a “Refused answer”.
- **Question B2_D01a=1** refers to the answer that the respondent has an ISCED1 as the highest qualification.
- **Question B2_D01a=2** refers to the answer that the respondent has an ISCED2 as the highest qualification.
- **Question B2_D01a=3** refers to the answer that the respondent has an ISCED3 as the highest qualification.
- **Question B2_D01a=4** refers to the answer that the respondent has an ISCED4 as the highest qualification.
- **B2_Q03a** asks whether the qualification was obtained in the country in which the respondent lives.
- **B2_Q02b** asks which other qualifications from a show card the respondent obtained before their highest qualification.
- **B2_Q05a** asks whether the respondent is currently studying for any kind of formal qualification.

In summary, what this routing rule says is that if respondents have an ISCED0, do not know their qualification or do not want to answer, they are directed to question B2_Q05a. Otherwise, if respondents have an ISCED1 or ISCED2 qualification, then they are directed to question B2_Q03a, which asks whether the qualification was obtained in the country of residence. Lastly, if the answer to question B2_D01a is different from any of the possibilities cited above, then respondents are directed to the question on the qualifications obtained before their highest qualification.

Section A: Personal characteristics

Section A covers respondents’ basic socio-demographic background, capturing information such as gender, age, country of birth of the respondent (and of respondents’ parents), and languages learned and spoken at home.

Key derived variables of Section A are mainly based on a simple transformation of one variable or a combination of variables.

Table 2.2. Derived variables – Section A: Personal characteristics

Derived variable	Label	Main reference variable(s)
DOBMM	Date of birth month	A2_Q01b
DOBYY	Date of birth year	A2_Q01a
AGEG5LFS	Age in 5-year bands	AGE_R
AGEG10LFS	Age in 10-year bands	AGE_R
IMYRS	Years in country	AGE_R, A2_Q03c1
A2_Q03c1_C	Age of immigration (9 categories)	A2_Q03c1
CNT_BRTH	Country of birth - Respondent	A2_Q03a, A2_Q03b
BRGN_UN	Country of birth (UN geographical regions)	CNT_BRTH
LNG_HOME	Language most often spoken at home (ISO 639-2/T)	A2_Q04b
LNG_L1	First language learned at home in childhood and still understood (ISO 639-2)	A2_Q04a1
NATIVELANG	Test language is the same as the native language	LNG_CI LNG_L1
HOMLANG	Test language same as the language spoken most often at home	LNG_HOME, LNG_C1
NATBILANG	Has learned as a child and still understands at least two languages, including test language	LNG_CI, LNG_L1, LNG_L2
BORNLANG	Interactions between place of birth and language status	A2_Q03a, NATIVELANG
FORBILANG	Has learned as a child and still understands at least two languages, not including test language	LNG_CI, LNG_L1, LNG_L2
FORBORNLANG	Interactions between foreign-born and language status (2 categories)	BORNLANG

ATTENTION POINT: Multiple test languages per country or economy

The 2023 Survey of Adult Skills assesses adults' proficiency in literacy, numeracy, and adaptive problem solving in a particular language, most often the official language(s) spoken in the participating countries and economies. Variables BQLANG and DALANG specify the language of the background questionnaire and direct assessment, respectively. In the following countries, the assessment was administered in more than one language: Canada, Estonia, Finland, Israel, Latvia, the Slovak Republic, Spain, Switzerland, and the United States. The list of languages used for the direct assessment and the background questionnaire in each country and economy are provided in Chapter 3 of the Reader's Companion (OECD, 2024[2]).

Section B: Education and training

Section B covers two broad topics: formal education and non-formal education and training activities that respondents undertook after leaving the formal education system. For formal education, it covers the highest level achieved, qualifications obtained, current studies, dropout history, and field of study. Non-formal education encompasses organised learning activities outside the formal system, including intentional learning at work, in the family, or in daily life. The section measures various aspects of non-formal education, including incidence, intensity, costs, motivation, content, and barriers to participation.

The key derived variables of Section B are mostly based on the recoding of national qualifications according to the ISCED 2011 classification. The coding scheme adopted in the 2023 Survey of Adult Skills slightly deviates from ISCED in two respects. First, it captures tracking at the ISCED 2 level:

- 1200: Lower secondary comprehensive or not further specified (nfs) (ISCED 2 comp/nfs)
- 1204: (Pre-)Vocational/lower track general lower secondary (ISCED 2 pre-voc)
- 1245: Academic/higher track general lower secondary (ISCED 2 acad)

Second, at ISCED levels 6 and 7, instead of two subcategories to capture the orientation of the programme (academic or professional), three subcategories are used:

- “Vocational" is intended for higher vocational education and training, which builds on vocational education and training at ISCED levels 3-4.
- "Applied university" is intended for programmes/degrees of applied higher education (type “university of applied sciences” or college of higher education) for which a higher education entrance qualification is required.
- "Traditional university" is intended for educational programmes/degrees of universities offering traditional university education (whether the individual institution is ‘old’ or not does not matter), for which a higher education entrance qualification is also required, but often additional entrance criteria apply.

These new categories are specific to PIAAC and are contained in variables suffixed by _PISCED (where P stands for PIAAC).

Derived variables capturing levels of education and formal qualifications adopt the following naming convention:

- **EDA** - Variables whose name starts with EDA refer to the highest level of educational attainment (e.g. EDA_ISCED1)
- **EDE** - Variables whose name starts with EDE refer to the level in which the respondent is currently enrolled (e.g. EDE_ISCED1)
- **EDI** - Variables whose name starts with EDI refer to the incomplete qualifications that the respondent started but did not finish (e.g. EDI_ISCED1)
- **EP** - Variables whose name starts with EP refer to educational pathways, that is, qualifications obtained besides (or before) the highest qualification reported

Table 2.3. Derived variables – Section B: Education and training

Derived variable	Label	Main reference variable(s)
	Variables related to: Formal education	
EDA_PISCED	Educational attainment, most detailed PIAAC-A variable	B2_Q01
EDA_ISCED1	Educational attainment, coded to ISCED-A 2011 digit 1	B2_Q01
EDLEVEL3	Educational attainment in three levels (low/medium/high, corresponding roughly to primary, upper-secondary, and tertiary education)	B2_Q01
YRSQUALC2	Years of formal education	B2_Q01
LEAVEDU	Respondent’s age when leaving formal education	B2_Q05a, B2_Q06a, B2_Q04b1, B2_Q04b2, A2_Q01a, B2_Q06c1, B2_Q06c2
LEAVER1624C2	Youth aged 16 to 24 who have left education without completing ISCED 3 or higher	AGE_R, EDCAT8_TC1, B2_Q05a
B2_D01d_C	Time elapsed since finished highest qualification for respondents who finished the highest qualification less than two years ago (2 categories)	B2_D01d
B2_D03d_C	Time elapsed since leaving education without completing the program for respondents who left education less than two years ago (2 categories)	B2_D03d

Derived variable	Label	Main reference variable(s)
B2_Q04b1_C	Education - Highest qualification - Age of finish (6 categories)	B2_Q04b1
B2_Q06c1_C	Education - Uncompleted qualification - Age of dropout (6 categories)	B2_Q06c1
CTRYQUAL	Country where highest qualification obtained (9 regions)	B2_Q03a, B2_Q03b
Variables related to: Education pathways		
EP_TISC2	Education pathway: track completed in ISCED 2 before the highest qualification	B2_Q02b02, B2_A02b03, B2_Q02b04
EP_ISC4	Education pathway: ISCED 4 completed before the highest qualification	EP_ISCED1_4, EDA_ISCED1
EP_ACAD	Education pathway: academic pathway at ISCED 2-3 before highest qualification	B2_Q02B02, B2_Q02B04, B2_Q02B06, B2_Q02B09, B2_Q02B13, CNTRY
EP_VET	Education pathway: includes VET at any level before the highest qualification	B2_Q02b03, B2_Q02b05, B2_Q02b08, B2_Q02b10, B2_Q02b12, B2_Q02b15, B2_Q02b17, B2_Q02b20, B2_Q02b23, B2_Q02b26
Variables related to: Field of study and orientation		
EDFIELD	Field (Area) of study of highest qualification	B2_Q01, 2_Q04a
EDCURFIELD	Field (Area) of study of current qualification	B2_Q05b, B2_Q05c
VETC2	Respondent's highest level of education is vocationally oriented	EDA_PISCED
Variables related to: Adult education and training		
AETPOPC2	Adult education/training population (AET) – excludes youths 16-24 in the initial cycle of studies	AGE_R, FE12C2, EDCAT8_TC1, B2_Q05a, B2_Q05b_TC1, B2_Q06a, B2_Q06b
EDWORKC2	Interaction between adults' work and education status	C2_D05, B2_Q05a, FE12C2, NFE12C2
FAET12C2	Participated in formal AET in 12 months preceding the survey (see AETPOP)	FE12C2, AETPOPC2
NFE12JRC2	Participated in non-formal education for job-related reasons in the 12 months preceding the survey	NFE12C2, B2_Q11
NFECOSTS	Training costs	B2_Q2001; B2_Q2002; B2_Q2003; B2_Q2004; B2_Q2005; B2_Q2006; B2_Q2007; B2_Q20DK; B2_Q20RF

Section C: Current status and work history

Section C provides key information in terms of the labour force status and work history of respondents, which is not only crucial information in its own right, but also plays a key role in the subsequent routing within the BQ. This section includes questions on current paid and unpaid work, recent job search, reasons not to search for work, self-assessed current situation/employment status, and basic employment history.

Table 2.4. Derived variables – Section C: Current status and work history

Derived variable	Label	Main reference variable(s)
C2_Q09c1_C	Current status/work history - Age when stopped working in the last job (10 categories)	C2_Q09c1
C2_Q10_C	Current status/work history - Years of paid work during lifetime	C2_Q10
C2_Q12_C	Current status/work history - How many different firms or organisations worked in the last five years	C2_Q12
EDWORKC2	Interaction between adults' work and education status	C2_D05, B2_Q05a, FE12C2, NFE12C2
NOPAIDWORKEVER	Adults who never had paid work, including self-employment, in the past	C2_D06 and C2_Q09a
PAIDWORK12	Adults who have had paid work during the 12 months preceding the survey	C2_D06, C2_Q09a and C2_Q09b

PAIDWORK5	Adults who have had paid work in the last five years	C2_D06, C2_Q09a, C2_D09c, A2_D01a3, C2_Q09c2
NEETC2	Adults not employed at the time of the survey and not in education or training in 12 months preceding the survey	C2_D05, FE12C2 and NFE12C2

Sections D and E: Current work and last job

Section D provides the key characteristics of the jobs held by those currently in employment, such as occupation, sector of industry, tenure, working hours, job satisfaction, and labour earnings. Other job characteristics provided by this section include the required experience for the job, firm size, and contract type.

When asking for information on labour earnings, respondents were first asked about the easiest way for them to report their wages (for instance, on an hourly, weekly, monthly, or yearly basis). If respondents refused or were not comfortable reporting an actual amount for their wages, they were offered the opportunity to report it in broad categories. In this case, the interviewer would show the respondent a card reporting different percentiles of the country-specific wage distribution (estimated from external sources) and would ask the respondent to position himself at a particular point. The showcard reported the 10th, the 25th, the 50th, the 75th and the 90th percentiles of the wage distribution. This method is applied to questions D2_Q14d1- D2_Q14d6, for example.

When respondents reported their wages in broad categories, their actual wages were imputed on the basis of a range of personal characteristics, including age, gender, level of education, occupation, and cognitive skills as measured through the PIAAC direct assessment.

ATTENTION POINT: Beware of outliers in earnings variables

The purpose of measuring earnings in the Survey of Adult Skills is to analyse the relationship between income and human capital for the whole population and not to establish robust estimates of the top of the distribution, which requires specific sampling processes. In most countries, the distribution of earnings is extremely skewed, with very high observations at the top of the distribution. The Technical Report (OECD, forthcoming[1]) presents a table with the different deciles of the earnings distribution in each participating country where this phenomenon is particularly evident. Extreme observations can significantly influence statistics like averages or regression coefficients. One common solution routinely adopted in OECD reports is to trim the distribution by removing observations above the 99th percentile and below the 1st percentile of the national distribution.

In some countries, the respondents' actual earnings are not disclosed in the public-use files and only the information on the respondents' position in the national distribution (expressed in deciles) is available. Data users can find cut-off values, means and medians for each decile in each country in the Technical Report (OECD, forthcoming[1]). This allows for turning the income deciles into a proxy of the income distribution that mirrors the actual income gaps existing between each decile. However, the average of the top decile is heavily influenced by extreme values. In this case, it is recommended to rely on the median.

Section E describes characteristics of the last job for respondents who are currently not in employment in a similar way as in Section D. Additionally, in this section, respondents are asked the main reason why they stopped working in their last job.

Table 2.5. Derived variables – Sections D and E: Current work and last job

Derived variable	Label	Main reference variable(s)
Variables related to: Current and past work		
ISCO08_C	Occupational classification of respondent's current job (ISCO 2008)	D2_Q01a, D2_Q01b
ISCO08_L	Occupational classification of respondent's last job (ISCO 2008)	E2_Q01a, E2_Q01b
ISCOSKIL4	Occupational classification of respondent's job (4 skill-based categories), last or current	ISCO08_C, ISCO08_L, PAIDWORK5
ISIC4_C	The industry classification of the respondent's current job (ISIC Rev 4)	D2_Q02a, D2_Q02b
ISIC4_L	The industry classification of the respondent's last job (ISIC Rev 4)	E2_Q02a, E2_Q02b
EGC_ISCED1	Qualification needed to get respondent's current job (ISCED-A 2011 digit 1)	D2_Q12a
EGL_ISCED1	Qualification needed to get respondent's last job (ISCED-A 2011 digit 1)	E2_Q10a
Variables related to: Earnings		
EARNFLAGC2	Earnings including bonuses reporting method: reported directly or imputed	EARNHRC2, EARNMTHC2, EARNHRBONUSC2, EARNMTHBONUSC2, EARNMTHSELFC2
EARNHRBONUSPPPC2	Hourly earnings, including bonuses for wage and salary earners, PPP corrected $US	D2_Q14b, D2_Q14d1-d6, D2_Q04, CALCAGE, GENDER, A2_Q03a, B2_Q05a, B2_Q01, ISCO08_C, D2_Q11, D2_Q13, F2_Q01a-1g, F2_Q03a-3e, F2_Q05a, F2_Q05c-5f
EARNHRPPPC2	Hourly earnings, including bonuses for wage and salary earners, PPP corrected $US	D2_Q14b, D2_Q14d1-d6, D2_Q04, CALCAGE, GENDER, A2_Q03a, B2_Q05a, B2_Q01, ISCO08_C, D2_Q11, D2_Q13, F2_Q01a-1g, F2_Q03a-3e, F2_Q05a, F2_Q05c-5f
EARNHRBONUSDCLC2	Hourly earnings, including bonuses for wage and salary earners, in deciles	EARNHRBONUSC2
EARNHRDCLC2	Hourly earnings, excluding bonuses for wage and salary earners, in deciles	EARNHRC2
EARNMTHALLPPPC2	Monthly earnings, including bonuses for wage and salary earners and self-employed, PPP corrected $US	D2_Q14b, D2_Q14d1-d6, D2_Q15b, D2_Q15d, D2_Q16a, D2_Q16c1-c2, D2_Q04, CALCAGE, GENDER, A2_Q03a, B2_Q05a, B2_Q01, ISCO08_C, D2_Q11, D2_Q13, F2_Q01a-1g, F2_Q03a-3e, F2_Q05a, F2_Q05c-5f, D2_Q03, D2_Q10, D2_Q07a, D2_Q09a, D2_Q12d, J2_Q02a
EARNMTHSELFPPPC2	Monthly earnings, including bonuses for wage and salary earners and self-employed, PPP corrected $US	D2_Q16a, D2_Q16c1-c2, D2_Q04, CALCAGE, GENDER, A2_Q03a, B2_Q05a, B2_Q01, ISCO08_C, D2_Q11, D2_Q13, F2_Q01a-1g, F2_Q03a3e, F2_Q05a, F2_Q05c-5f
MONTHLYINCPR	Monthly income percentile rank category	D2_Q14a, D2_Q14b, D2_Q16a, A2_D01a3, A2_D01a1, D2_Q05b2, D2_Q05b3, D2_D14a, D2_Q11, C2_Q10, D2_Q14d1 to D2_Q14d6
YEARLYINCPR	Yearly income percentile rank category	D2_Q14a, D2_Q14b, D2_Q16a, A2_D01a3, A2_D01a1, D2_Q05b2, D2_Q05b3, D2_D14a, D2_Q11, C2_Q10, D2_Q14d1 to D2_Q14d6

Sections F and G: Literacy, numeracy, and ICT practices at work and in everyday life

Section F asks respondents at which frequency they engage in tasks requiring the use of reading, writing, numeracy or ICT (Information and communication technology) skills in their current job (or in their past job if they have been employed in the 12 months preceding the interview). The questions refer to tasks that are representative of the modes of reading, writing, numeracy, and ICT use in modern work organisations.

Section G is similar to Section F but is focused on tasks (and therefore on skills use) in everyday life. For this reason, Section G is administered to all respondents, irrespective of their employment status. As in Section F, questions have been designed to reflect the demands of modern society and take into account recent technological developments. However, given that the activities undertaken in work settings systematically differ from those undertaken outside of work, the tasks that are the object of the questions in Section G differ from the tasks present in Section F.

For both Sections F and G, summary scales are computed to provide information about the degree to which respondents use reading, literacy, numeracy and ICT skills at work and in everyday life. Such scales are computed using Item Response Theory, in particular a Generalised Partial Credit Model (see the Reader's Companion (OECD, 2024[2]) and the Technical Report (OECD, forthcoming[1])). The resulting scales are continuous variables, standardised to have a mean of 2 and a standard deviation of 1 across the pooled sample of respondents in all participating countries and economies.

ATTENTION POINT: Routing for questions on ICT practices

In both Sections F and G, the questions on the frequency of tasks requiring the use of ICT skills are not administered to respondents who do not use (in their work – Section F) or have never used (in their everyday life – Section G) a digital device, such as a computer, a laptop, a tablet, or a smartphone.

Table 2.6. Derived variables – Sections F and G: Literacy, numeracy, and ICT practices at work and in everyday life

Derived variable	Label	Main reference variable(s)
ICTWORKC2	Index of use of ICT skills at work	F2_Q05a, F2_Q05c, F2_Q05d, F2_Q05e, F2_Q05f
NUMWORKC2	Index of use of numeracy skills at work (basic and advanced)	F2_Q03a, F2_Q03b, F2_Q03c, F2_Q03d, F2_Q03e
READWORKC2	Index of use of reading skills at work (prose and document texts)	F2_Q01a, F2_Q01b, F2_Q01c, F2_Q01d, F2_Q01e, F2_Q01f
WRITWORKC2	Index of use of writing skills at work	F2_Q02a, F2_Q02b, F2_Q02c
ICTHOMEC2	Index of use of ICT skills at home	G2_Q06a, G2_Q06b, G2_Q06c, G2_Q06d, G2_Q06e
NUMHOMEC2	Index of use of numeracy skills at home (basic and advanced)	G2_Q03a, G2_Q03b, G2_Q03c, G2_Q03d, G2_Q03e
READHOMEC2	Index of use of reading skills at home (prose and document texts)	G2_Q01a, G2_Q01b, G2_Q01c, G2_Q01d, G2_Q01f
WRITHOMEC2	Index of use of writing skills at home	G2_Q02a, G2_Q02b, G2_Q02c

Section H: The working environment

This section collects information on the characteristics of the respondents' working environment. This includes eliciting the intensity of use of a broad range of skills (by asking how often respondents perform certain tasks in their job), measures of self-reported skill mismatch, and information on how the work is

organised. A particular emphasis is based on the presence of so-called “high-performance work practices” (such as the presence of teamwork, social support and knowledge sharing, well-defined objectives, and continuous feedback and rewards for good performance) that are often thought of as favouring a better allocation of skills to tasks and better incentives for workers to invest in developing their skills.

The information on the use of skills at work is used to construct summary scales using the same methodology followed for calculating the summary scales for the use of reading, writing, numeracy and ICT skills in Sections F and G. The resulting derived variables are presented in Table 2.7.

Table 2.7. Derived variables – Section H: The working environment

Derived variable	Label	Main reference variable(s)
INFLUENCEC2	Index of use of influencing skills at work	H2_Q03b, H2_Q03c, H2_Q05a, H2_Q05b
LEARNATWORKC2	Index of learning at work	H2_Q09a, H2_Q09b, H2_Q09c
TASKDISCC2	Index of use of task discretion at work	H2_Q08a, H2_Q08b, H2_Q08c, H2_Q08d

ATTENTION POINT: Optional questions on high-performance work practices

Questions H2, H10, H13 and H14 were part of an international option. They were only administered in Austria, the Flemish Region (Belgium), Chile, Croatia, Czechia, Denmark, Estonia, France, Hungary, Italy, Latvia, the Netherlands, New Zealand, Poland, Portugal, the Slovak Republic, Spain, England (United Kingdom), and the United States.

Section I: Non-economic outcomes

This section focuses on non-economic outcomes and contains measures of life satisfaction, general self-perceived health, generalised trust, participation in voluntary work, political efficacy, and patience. Section I includes only six questions, presented in Table 2.8, from which no derived variable is generated.

Table 2.8. Questions from Section I: non-economic outcomes

Variable name	Label	Question
I2_Q01a	Political efficacy	How much would you say the political system in #CountryName allows people like you to have a say in what the government does? Please answer using this card, where 0 means 'not at all' and 10 means 'completely'.
I2_Q01a	Trust	Generally speaking, would you say that most people can be trusted, or that you can’t be too careful in dealing with people? Please answer using this card, where 0 means ‘you can’t be too careful’ and 10 mean ‘Most people can be trusted’.
I2_Q02	Volunteering	In the last 12 months, how often, if at all, did you do voluntary work, including unpaid work for a charity, political party, trade union or other non-profit organisation? Never/less than once a monh/at least once a month/at least once a week/every day.
I2_Q03	Health	In general, would you say your health is excellent, very good, good, fair, or poor?
I2_Q04	Patience	How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future? Please answer using this card, where 0 means 'completely unwilling to do so' and 10 means 'very willing to do so'.
I2_Q05	Life satisfaction	All things considered, how satisfied are you with your life as a whole these days? Please answer using this card, where 0 means 'extremely dissatisfied' and 10 means 'extremely satisfied'.

Section J: Background

This section covers additional questions on respondents' socio-demographic background. While Section A focused on the current (or time-invariant) characteristics of the respondent, Section J focuses on the environment in which the respondent grew up (as a general rule, all questions refer to when the respondent was 14 years old). Moreover, Section J contains some questions on the characteristics of the household. The different questions and the routing of Section J can be found in Annex A.

The main derived variables from Section J are the coding of occupation and educational qualifications of respondents' parents. The coding is done according to ISCO08 and ISCED 2011. A list of such derived variables can be found in Table 2.9

Table 2.9. Derived variables – Section J: Background

Derived variable	Label	Main reference variable(s)
ISCO1_FATH	Occupational classification of respondent's father's or male guardian's job when respondents were 14 at 1-digit level (ISCO 2008)	ISCO08_F, J2_Q05d
ISCO1_MOTH	Occupational classification of respondent's mother's or female guardian's job when respondents were 14 at 1-digit level (ISCO 2008)	ISCO08_M, J2_Q04d
ISCOSKIL4_FATH	Occupational classification of respondent's father's or male guardian's job when respondent was 14 (4 skill-based categories)	ISCO08_F, J2_Q05d
ISCOSKIL4_MOTH	Occupational classification of respondent's mother's or female guardian's job when respondent was 14 (4 skill-based categories)	ISCO08_M, J2_Q04d
PAREDC2	Highest of the mother or father's level of education	J2_Q04c, J2_Q05c

Section K: Social and emotional skills

The measurement of social and emotional skills in the 2023 Survey of Adult Skills relies on the five-factor model of personality, a hierarchical organisation of personality traits in terms of five basic dimensions – Extraversion, Agreeableness, Conscientiousness, Emotional stability, and Open-mindedness – commonly referred to as Big Five (McCrae and John, 1992[3]).[2]

Within each of the five dimensions (or domain), it is possible to identify three sub-dimensions, also called *facets*:

- Extraversion:
  - Sociability
  - Assertiveness
  - Energy Level
- Agreeableness:
  - Compassion
  - Respectfulness
  - Trust
- Conscientiousness
  - Organisation
  - Productiveness
  - Responsibility
- Emotional Stability
  - Anxiety

  - Depression
  - Emotional volatility
- Open-mindedness
  - Aesthetic sensitivity
  - Intellectual curiosity
  - Creative imagination

These traits are elicited from respondents by asking them to which extent they agree or disagree that certain characteristics apply to them. The 2023 Survey of Adult Skills uses the short (BFI-2-S) and extra-short (BFI-2-XS) forms of the Big Five Inventory (Soto and John, 2017[4]). The BFI-2-S inventory contains 30 items (six items per domain, two items per facet), while the BFI-2-XS contains only 15 items (three items per domain). Items in the BFI-2-XS inventory are a subset of the items contained in the BFI-2-S.

ATTENTION POINT: Administration of Section K in different countries

Section K was not administered in Japan, Korea, and the United States.

The BFI-2-XS was administered in Austria, the Flemish Region (Belgium), Switzerland, Denmark, Finland, France, England (United Kingdom), Hungary, Ireland, Israel, Lithuania, Latvia, the Netherlands, Poland, Singapore, and Sweden. Information on facets is not available for these countries, as each facet was captured by only one item.

The BFI-2-S was administered in Canada, Chile, Czechia, Germany, Spain, Estonia, Croatia, Italy, Norway, New Zealand, Portugal, and the Slovak Republic. Information on facets is available for these countries.

Summary measures (scales) for each dimension and facet were constructed by taking a simple average of the answers given to the relevant items. All scales were then standardised to have a mean value of zero and a standard deviation of one in each country.

The list of derived variables (scales) from Section K is presented in Table 2.10.

ATTENTION POINT: Comparability of social and emotional skills across countries

As the scales for the Big Five domains and facets are standardised at the country level, comparisons of average levels of social and emotional skills across countries are to be avoided. On the other hand, it is possible to compare, across different countries, the patterns of correlation between social and emotional skills and other variables, although caution is advised in interpreting the results of such analysis.

It should also be noted that, for countries that administered the BFI-2-S, two different measures at the domain level are available: one drawing on all the six items that are related to a domain and another based only on the three items that are administered in the BFI-2-XS. These latter measures, although less reliable (because they are based on a smaller number of items), may be preferred in comparative analysis, as they would ensure consistency in measurement across countries.

Estimates of the reliability of each scale are provided in OECD (forthcoming[1]). Data users may wish to use such estimates to correct for attenuation bias.

Table 2.10. Derived variables – Section K: Social and emotional skills

Derived variable	Label	Main reference variable(s)
EXTR	Extraversion dimension z-score based on 3 items/BFI-2-XS	K2_Q01a, K2_Q02a, K2_Q03a
EXTR_6	Extraversion dimension z-score based on 6 items/BFI-2-S	K2_Q01a, K2_Q02b, K2_Q03a, K2_Q04a, K2_Q05a, K2_Q06a
EXTR_SOCI	Sociability facet in extraversion dimension z-score	K2_Q01a, K2_Q04a
EXTR_ASSE	Assertiveness facet in extraversion dimension z-score	K2_Q02a, K2_Q05a
EXTR_ENER	Energy level facet in extraversion dimension z-score	K2_Q03a, K2_Q06a
AGRE	Agreeableness dimension z-score based on 3 items/BFI-2-XS	K2_Q01b, K2_Q02b, K2_Q03b
AGRE_6	Agreeableness dimension z-score based on 6 items/BFI-2-S	K2_Q01b, K2_Q02b, K2_Q03b, K2_Q04b, K2_Q05b, K2_Q06b
AGRE_COMP	Compassion facet in agreeableness dimension z-score	K2_Q01b, K2_Q04b
AGRE_RESP	Respectfulness facet in agreeableness dimension z-score	K2_Q02b, K2_Q05b
AGRE_TRUS	Trust facet in agreeableness dimension z-score	K2_Q03b, K2_Q06b
CONS	Conscientiousness dimension z-score based on 3 items/BFI-2-XS	K2_Q01c, K2_Q02c, K2_Q03c
CONS_6	Conscientiousness dimension z-score based on 6 items/BFI-2-S	K2_Q01c, K2_Q02c, K2_Q03c, K2_Q04c, K2_Q05c, K2_Q06c
CONS_ORGA	Organisation facet in conscientiousness dimension z-score	K2_Q01c, K2_Q04c
CONS_PROD	Productiveness facet in conscientiousness dimension z-score	K2_Q02c, K2_Q05c
CONS_RESP	Responsibility facet in conscientiousness dimension z-score	K2_Q03c, K2_Q06c
EMOS	Emotional stability dimension z-score based on 3 items/BFI-2-XS	K2_Q01d, K2_Q02d, K2_Q03d
EMOS_6	Emotional stability dimension z-score based on 6 items/BFI-2-S	K2_Q01d, K2_Q02d, K2_Q03d, K2_Q04d, K2_Q05d, K2_Q06d
EMOS_ANXI	Anxiety facet in emotional stability dimension z-score	K2_Q01d, K2_Q04d
EMOS_DEPR	Depression facet in emotional stability dimension z-score	K2_Q02d, K2_Q05d
EMOS_VOLA	Emotional volatility facet in the emotional stability dimension z-score	K2_Q03d, K2_Q06d
OPEM	Open-mindedness dimension z-score based on 3 items/BFI-2-XS	K2_Q01e, K2_Q02e, K2_Q03e
OPEM_6	Open-mindedness z-score based on 6 items/BFI-2-S	K2_Q01e, K2_Q02e, K2_Q03e, K2_Q04e, K2_Q05e, K2_Q06e
OPEM_AEST	Aesthetic sensitivity facet in open-mindedness dimension z-score	K2_Q01e, K2_Q04e
OPEM_CURI	Intellectual curiosity facet in open-mindedness dimension z-score	K2_Q02e, K2_Q05e

OPEM_IMAG	Creative imagination facet in open-mindedness dimension z-score	K2_Q03e, K2_Q06e

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Notes

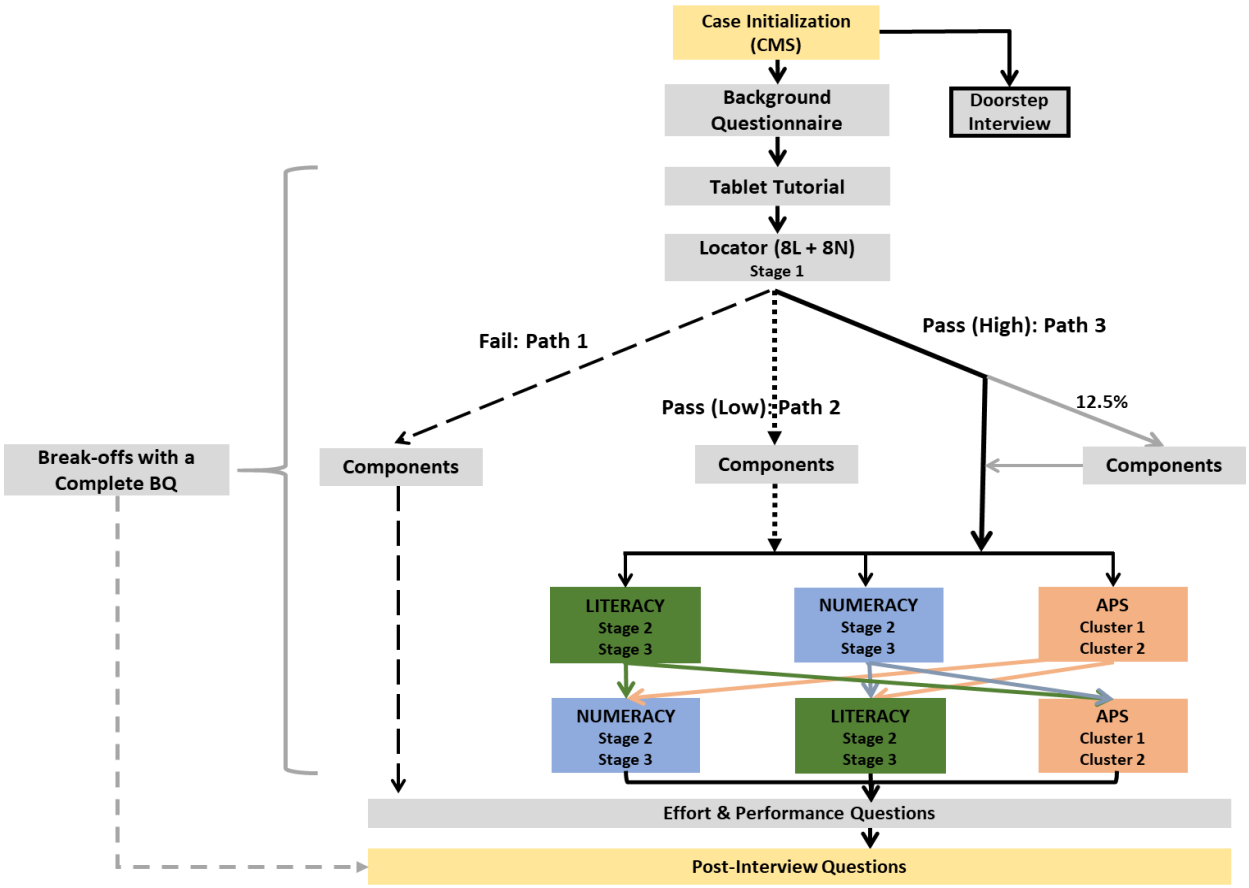
[1] Fields of types R, C and I, that users may find in the questionnaires, do not generate any data other than log entries.

[2] Emotional stability is sometimes also referred to as Neuroticism or Negative emotionality, and Open mindedness is sometimes referred to as Openness to experience.

3 Variables related to the direct assessment

The Survey of Adult Skills 2023 includes a direct assessment of three skills domains: literacy, numeracy and adaptive problem solving (APS).[1] To better understand how the direct assessment is structured, Figure 3.1 illustrates the assessment design, particularly the different paths that respondents can take through the assessment.

Figure 3.1. The 2023 Survey of Adult Skills assessment design



Source: OECD (2024[1]), *Survey of Adult Skills – Reader's Companion*, OECD Skills Studies, https://doi.org/10.1787/3639d1e2-en.

The direct assessment begins immediately after respondents complete the background questionnaire. It starts with a short **tablet tutorial** designed to familiarise respondents with the tablet device and ensure they can use it effectively to answer the assessment questions. Next, all respondents take a **locator test**

comprising eight literacy and eight numeracy items. The locator test offers preliminary insights into the respondents' likely literacy and numeracy skills, which helps determine the routing path the respondents will follow. This adaptivity is a key element of the assessment design: the selection of subsequent questions partly depends on how respondents answered previous questions. The aim is to target questions as close as possible to the respondents' proficiency. Questions that are either too easy or too difficult may only indicate what respondents can or cannot do, but they fail to discriminate among proficiency levels at intermediate points in the distribution.

Respondents who fail the locator test (scoring no more than two correct answers in both the literacy and numeracy items) are only assessed in the literacy and numeracy components assessment. Their proficiency is too low to attempt the computer-based assessment of literacy, numeracy and adaptive problem solving (path 1 in Figure 3.1).

Respondents who pass the locator test with a low score (no more than six correct answers in the literacy items and no more than five in the numeracy items) first go through the reading and numeracy components. They then proceed to the computer-based assessment of literacy, numeracy and adaptive problem solving. Each respondent is randomly assigned to one of these domains – literacy, numeracy or adaptive problem solving – for their initial assessment. Upon completing the first domain, they are again randomly assigned to one of the remaining two domains (path 2 in Figure 3.1).

Respondents who pass the locator test with a high score (at least seven correct answers in the literacy items or at least six in the numeracy items) predominantly proceed directly to the computer-based assessment of literacy, numeracy and adaptive problem solving. However, a randomly selected sample of 12.5% of high-scoring respondents is directed to the reading and numeracy components assessment before continuing with the computer-based assessment of literacy, numeracy and adaptive problem solving (path 3 in Figure 3.1).

At the end of the direct assessment, respondents are asked to provide a subjective rating of their performance and of the effort they exerted in answering the assessment items.

Four categories of variables containing information collected in the course of the direct assessment can be identified:

1. **Variables related to the assessment administration:** these capture details of how the assessment was conducted, such as the routing followed by the respondent.
2. **Variables related to performance in the assessment and test-taking behaviour:** these include data on responses to the assessment items, along with how participants interact with the digital platform, such as response time and number of actions.
3. **Plausible values:** these are statistical estimates of the likely position of the respondent on the underlying proficiency scale for each of the assessment domains. For each domain, ten plausible values are estimated for each respondent.
4. **Variables capturing self-reported effort and the participants' beliefs about their performance**: after they complete the assessment, respondents are asked to rate on a scale from 1 to 10 the effort they put in completing the assessment tasks and to give an estimate of the share of items they believe they answered correctly.

The following sections describe these variables in more detail, including the relevant naming conventions.

Assessment administration variables

Assessment administration variables are normally automatically generated by the computer platform. They do not contain information directly provided by the respondents, but rather record the path followed by the respondent among the possibilities presented in Figure 3.1.

First, a series of variables indexed with the prefix "ATTMPT" captures whether the respondent attempted the different modules. Variables **ATTMPTTUT, ATTMPTLOC, ATTMPTCMP**, and **ATTMPTCBA,** respectively indicate whether the respondent attempted the tablet tutorial, locator, components, and computer-based assessment (CBA). The respondent's result (fail / pass low / pass high) to the locator is captured with the variable **RSLTLOC**.

Subsequently, other variables capture the assignment of respondents to the different forms (for the locator), blocks (for the components) or testlets (for the computer-based assessment). All these variables start with "WF_" (which stands for workflow) and are summarised in Table 3.1. More information on the assessment design and the content and the assignment rules for the different forms, blocks and testlets is available in the Survey of Adult Skills Technical Report (OECD, forthcoming[2]).

Table 3.1. Assessment administration variables

Variable	Label
WF_LOCATCOMP	Selection of forms for Locator (1 of 2)
WF_PATH3COMP	Random assignment of Path 3 respondents to Components (1 of 4)
WF_NUMCOMP and **WF_READCOMP**	Selection of the blocks for Numeracy Components (1 of 36) and Reading Components (1 of 24)
WF_DOMAIN1 and **WF_DOMAIN2**	Selection of the first/second domain (LIT, NUM, APS) in the CBA section
WF_DOMAINSEL1 and **WF_DOMAINSEL2**	Selected first/second domain (LIT, NUM, APS)
WF_LINEAR1 and **WF_LINEAR2**	Linear/Adaptive selection for first/second domain (25%/75%)
WF_STAGE21 and **WF_STAGE22**	Selection of Stage 2 testlet in first/second domain (1 of 3)
WF_STAGE31 and **WF_STAGE32**	Selection of Stage 3 testlet in first/second domain (1 of 2)
WF_ScoreLOCNUM and **WF_ScoreLOCLIT**	Recorded score for Numeracy/Literacy locator
WF_ScoreSTG2NUM and **WF_ScoreSTG2LIT**	Recorded score for Numeracy/Literacy Stage 2
WF_TESTLET11 and **WF_TESTLET12**	Selected first/second testlet in the first domain
WF_TESTLET21 and **WF_TESTLET22**	Selected first/second testlet in the second domain
WF_SENTPAIRS	Selected pair of blocks for Reading Components sentences
WF_HMPAIRS	Selected pair of blocks for Numeracy Components: How Many items
WF_BIGPAIRS	Selected pair of blocks for Numeracy Components: Biggest items

Performance in the assessment and test-taking behaviour

The international database contains information on all the items that are part of the Survey of Adult Skills direct assessment. These items can belong to either the locator test, the reading and numeracy components assessment, or the computer-based assessment of literacy, numeracy and adaptive problem solving.

For each item, six variables are available in the international database, containing information on:

1. The scored response, i.e. whether the respondent gave a correct, an incorrect, or a partially correct answer. This variable does not capture the actual response made by the respondent. The possible values for this variable depend on the scoring rules for each item.
2. The total number of actions performed by the respondent when viewing/working on an item. The number of actions is equal to the number of taps a respondent makes. This means that an action will be logged and counted anytime a respondent taps on a tab, a webpage, a link, a box to drag and drop it, an empty field to bring up the numeric keypad, each number for a numeric response, a cell of a table or even a random area of the tablet screen. The number of actions is cumulative across visits to the item. Each item will have a unique requirement for the number of actions required to complete it successfully. Similar item types may have the same required number of

actions (i.e. multiple-choice items where only one response is selected may be consistent across items). This variable does not distinguish between what kind of action was taken.

3. The total time spent on the item, in milliseconds. This variable is cumulative across all visits to an item and includes quick pass-throughs while a respondent skips backwards or forwards in a unit. This variable excludes the time the system takes to load the item and stimulus and to score the time. Thus, this variable only captures the time a respondent was viewing/working on an item.
4. The time elapsed between the moment the item is displayed to the respondent and the first action performed by the respondent and recorded by the assessment platform (this is normally referred to as time to first action). If no action is taken on an item except to tap the Next arrow, the time to first action will be 0. If an action is taken the first time a respondent visits an item and the respondent goes back to the item to change an answer, the time to first action will remain the same as it was for the first visit to the item. This variable does not reset when a respondent leaves the item and comes back. The first action will always be the very first action made for an item, regardless of how many times the item is viewed.
5. The total number of visits. This variable captures every time the item was presented, even if it was presented for a very brief duration (i.e. when a respondent skips through an item to go back or forward to an item), regardless of whether the user interacts with the item. Note that it is not possible to go back to a previous item in the adaptive problem solving (APS) assessment, so the total number of visits for each APS item will be 1.
6. The total number of short visits. This variable contains the number of visits to an item that are less than 500 milliseconds (half a second). Very short visits likely indicate a pass-through – a respondent skipping over the item to go backwards or forwards in the unit. These visits do not represent another review of the item or an attempt to change or confirm the response to an item. Thus, for secondary users of the data, it will be helpful to potentially subtract the number of short visits from the total number of visits.

The five variables related to timing and number of actions and visits are part of a larger set of information normally referred to as log files (or process data). An important advantage of computer-based assessment is the possibility of keeping track of and potentially recording all the interactions between the respondent and the computer interface used to administer the assessment. Log files are potentially useful for better understanding respondents' test-taking behaviour (OECD, 2019[3]). Log files contain a large amount of (unstructured) information, often not perfectly comparable across items, as item characteristics heavily influence the types of interactions that respondents can have with the computer interface. For example, log files capture information on the specific types of actions that are performed.

The five variables derived from log files and included in the international database were chosen because they capture the basic and relevant behaviour of respondents that can plausibly be interpreted similarly across different items.

PIAAC (Programme for the International Assessment of Adult Competencies) was intentionally designed to establish psychometric links in literacy and numeracy with earlier international assessments of adult skills, such as the International Adult Literacy Survey (IALS) and the Adult Literacy and Life Skills Survey (ALL). Several items were initially designed for these predecessor surveys and now serve as linking items.[2] Linking items refer to items selected from IALS and ALL that were used to establish the link between PIAAC and these previous studies and between paper-and-pencil and computer-delivered formats.

Naming conventions

The variable names of all cognitive items start with a letter followed by three numbers. These indicate the skills domain and whether the item was newly created for the second cycle of PIAAC or if it was a trend item already used in previous cycles (Table 3.2). Following these first four characters, a sequence of either

three characters (three numbers) or four characters (one letter and three numbers) indicates the item's sequential position.

Table 3.2. Naming conventions for assessment items

First character (letter)	Second to fourth characters (digits range)	Domain	Origin of the item
C	300-399	Literacy	Sourced from ALL (originally paper-based)
D	300-399		Sourced from IALS (originally paper-based)
E	300-399		Sourced from PIAAC Cycle 1 (originally computer-based)
C	500-599		Newly created for PIAAC Cycle 2 (computer-based)
C	600-699	Numeracy	Sourced from ALL (originally paper-based)
E	600-699		Sourced from PIAAC Cycle 1 (originally computer-based)
C	800-899		Newly created for PIAAC Cycle 2 (computer-based)
C	100-199	APS	Newly created for PIAAC Cycle 2 (computer-based)
C	598	Reading components	Sentences newly created for PIAAC Cycle 2 (computer-based)
C	593-596		Passages newly created for PIAAC Cycle 2 (computer-based)
C	890	Numeracy components	Newly created for PIAAC Cycle 2 (computer-based)

The last character indicates the actual information contained in the variable (scored response or some test-taking behaviour information):

- S for the scored response (correct/incorrect nature of the answer that the respondent provides)
- TT for the total time spent on the item
- F for the time to respondents' first action
- A for the number of actions
- V for the total number of visits
- VS for the number of short visits

For instance, item C804P002 ("Car Route") is a numeracy item newly created for the second cycle of PIAAC. Six variables are associated with this item:

- **C804P002S** captures the scoring of the item. It does not capture the actual response made by the respondent. The possible values for this variable depend on the scoring rules for each item.
- **C804P002TT** captures the total time spent on an item. This variable is cumulative across all visits to an item and includes quick pass-throughs while a respondent skips backwards or forwards in a unit. The unit of this variable is milliseconds.
- **C804P002F** measures the time elapsed between the moment when an item is presented to the respondent and the moment in which they perform their first action.
- **C804P002A** captures the number of actions that were taken by the respondent when viewing/working on an item. The number of actions is equal to the number of taps on the tablet a respondent makes. The number of actions is cumulative across visits to the item.
- **C804P002V** captures the number of times a respondent visited an item. This variable captures every time the item was presented, even if it was presented for a very brief duration (i.e. when a respondent skips through an item to go back or forward to an item), regardless of whether the user interacts with the item.
- **C804P002VS** captures the number of short visits.

The coding of missing values follows the same convention described in Chapter 2 for background questionnaire variables.

The Technical Report (OECD, forthcoming[2]) contains more detailed information on the characteristics of the item pool, including names of each unit and all items within each unit, the psychometric characteristics of each item, how they map into the assessment frameworks, and how the assessment testlets were assembled.

Plausible values

To produce an accurate measurement of the skills of the adult population, PIAAC (like all other major large-scale assessments) relies on plausible values (Jacob and Rothstein, 2016[4]; Braun and von Davier, 2017[5]; Khorramdel et al., 2020[6]). The process involves combining the Item Response Theory (IRT) scaling of cognitive items with a latent regression model. This model incorporates information from the background questionnaire and the doorstep interview. Finally, multiple plausible values are drawn from the posterior distribution.[3]

Ten plausible values are drawn for each domain (**PVLIT1** to **PVLIT10** for literacy, **PVNUM1** to **PVNUM10** for numeracy and **PVAPS1** to **PVAPS10** for adaptive problem solving).

ATTENTION POINT: Using plausible values to replicate results from the international report

Replicating results from the OECD international report (OECD, 2024[7]) requires the use of plausible values. It is important to consider that the Survey of Adult Skills does not aim to produce scores for individual respondents (which is why not all respondents answer the same items). Part 2 of this Data Analysis Manual provides more information on how plausible values are generated and how to use them in the analysis.

Self-reported effort and estimated performance

After completing the direct assessment, respondents are asked two final questions, eliciting their beliefs about how they performed on the assessment and the effort they put into it. The first question (**EffortP001**) asks respondents about the share of questions they believe they answered correctly (answer options are “Just a few, 20% or less”, “21-40%, “Around half, 41%-60%”, “61%-80%”, “Almost all, 81%-100%”). The second question (**EffortP002**) asks, on a scale between 1 and 10, how much effort they put into the assessment.

References

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OECD (2019), *Beyond Proficiency: Using Log Files to Understand Respondent Behaviour in the Survey of Adult Skills*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/0b1414ed-en. [3]

OECD (forthcoming), *Survey of Adult Skills 2023 Technical Report*, OECD Publishing, Paris. [2]

Notes

[1] See OECD (2021[8]) for a detailed description of the conceptual frameworks of the three assessment domains.

[2] More information on previous adult skills assessments can be found in Chapter 6 of the Reader's Companion (OECD, 2024[1]).

[3] More detailed information on the scaling of the cognitive assessment can be found in the Technical Report (OECD, forthcoming[2]).

4 Variables related to survey administration

Survey administration variables are not elicited from respondents. They may fall into three categories:

1. Variables related to **data collection and preparation**: these capture aspects of how the survey data is gathered and prepared for analysis.
2. Variables from the **observation section**: these refer to aspects of the survey that involve direct observation of the respondent's behaviour or interaction during the assessment.
3. Variables related to **weighting and sampling procedures**: these capture the methods used to ensure the survey sample is representative of the target population. This includes the techniques used to select participants (sampling) and adjust the results to account for unequal probabilities of selection or other biases (weighting).

Data collection and preparation variables

Every dataset contains identification variables that correspond to units, entities or people in a survey or those who participated in its conduct. The main variables used to identify respondents in the 2023 Survey of Adult Skills are:

- **CNTRYID**: This variable denotes the country or economy in which the interview was administered. It follows the ISO 31665 standard.
- **PERSID**: This variable is the operational identification number that uniquely identifies sampled individuals. The PERSID variable appears in all PIAAC datasets as it defines the respondent for whom the values have been collected. It is assigned at the sampling stage. In the case of household sampling, the PERSID will typically only be assigned when within-household screening is completed.
- **SEQID**: This is a randomly derived sequential ID that is used in the public use files. It is used to break the link between respondents' responses and the sampling information that could be used to reidentify respondents.
- **INTVID**: interviewers' identifier (unique within countries).
- **ID_HH**: sampled household identifier.
- **BQLANG and DALANG**: Language of the background questionnaire and direct assessment.
- **DISP_**: Variables with the DISP_ prefix are related to final disposition codes for various stages of the survey. Each DISP_ variable represents the final disposition either for the household (in the screener phase) or the individual (in the main survey phase). For instance, **DISP_CIBQ** indicates whether the respondent has completed the background questionnaire or faced any language barrier, proceeding in this case with the doorstep interview. Similarly, variable **DISP_TUT** indicates

whether the respondent completed the tablet tutorial and, if not, the reason (e.g. "Partial complete/break-off," "Refusal," "Lacks skills to use the tablet," or various disabilities and technical issues). Table 4.1 lists all disposition code variables.

Table 4.1. Disposition codes variables

Variable	Label
DISP_SCR	Final disposition code for the household for **screener**
DISP_DS	Final disposition code for the **Doorstep interview**
DISP_CIBQ	Final disposition code for the person – **combining case initialisation and BQ**
DISP_TUT	Final disposition code for the person for the **Tablet Tutorial**
DISP_LOC	Final disposition code for the person for the **Locator instrument**
DISP_CMP	Final disposition code for the person for the **Components**
DISP_CBA	Final disposition code for the person for the **Main task instrument, computer literacy/numeracy**
DISP_MAIN	Final derived disposition code for the person for the **Assessment**

Observation variables

Primarily collected for quality control purposes, observation variables are based on the interviewer's assessment of the environment in which the interview occurred. These variables are not asked of the respondent but are instead completed directly by the interviewer at the end of the interview.

They relate to the presence of people during the assessment (**ZZ1a_01- ZZ1a_03**), the assistance the respondent may have received when taking the assessment (**ZZ1b_01- ZZ1b_03**), the respondent's understanding of the question (**ZZ2**), the assistance offered by the interviewer (**ZZ3**), the request for assistance the respondent may have asked **(ZZ4** and **ZZ5**), the sound and visual environment of the respondent (**ZZ6_01- ZZ6_07**), and the respondent behaviour with the exercise (**ZZ7, ZZ8** and **ZZ9**). A full list of these variables is provided in Table 4.2

Table 4.2. Observation variables

Variable	Label
ZZ1a_01	Observation module: No one else was present during the interview
ZZ1a_02	Observation module: Someone else was present during the background questionnaire
ZZ1a_03	Observation module: Someone else was present during the exercise
ZZ1b_01	Observation module: No one assisted the respondent
ZZ1b_02	Observation module: A translator or interpreter helped with the background questionnaire
ZZ1b_03	Observation module: Someone assisted during the exercise
ZZ2	Observation module: Respondent understood the questions
ZZ3	Observation module: Assisted the respondent with the exercise
ZZ4	Observation module: Respondent asked for assistance in using the features of the
ZZ5	Observation module: Respondent asked for assistance while completing the exercise
ZZ6_01	Observation module: Air traffic, rail traffic, road traffic, including emergency
ZZ6_02	Observation module: Loud noises outside the house
ZZ6_03	Observation module: Household appliances in use
ZZ6_04	Observation module: Television, radio, game console or music player in use
ZZ6_05	Observation module: People talking loudly, crying babies or children, pets
ZZ6_06	Observation module: Other background noise during the exercise
ZZ6_07	Observation module: not applicable
ZZ7	Observation module: Respondent stopped working on the exercise

ZZ8	Observation module: Exercise taking too long for the respondent
ZZ9	Observation module: Place of the exercise

Weighting and sampling procedures variables

This section lists variables related to the sample design, variance estimation stratification method, and number of replicates.

- **Weighted case flag (WEIGHTFLG)**: This variable indicates whether the respondent receives weights and is derived from **DISP_CIBQ** (final disposition code for person, combining case initialisation – CI – and the background questionnaire – BQ) and **DISP_DS** (final disposition code for the doorstep interview). This flag is used to identify cases in which a non-zero weight is needed. It includes records that completed the CI or is a BQ language barrier with completed doorstep interviews.
- **Replication approach (VEMETHODN)**: it designates the replication approach used[1]:
  - 1 for the delete-one jackknife (JK1), a random groups approach
  - 2 for the paired jackknife (JK2), with two variance units per stratum, that is appropriate for sample designs where primary sampling units (PSUs) are stratified or selected with systematic sampling from a sorted list
  - 3 for the balanced repeated replication (BRR) approach that is also commonly used when strata are involved
  - 4 for the Fay's method (FAY) that is a variant of the BRR approach
- **Fay's K factor used in creating replicate weights (VEFAYFA)**: this variable is available only when Fay's replication method is applied.
- **Number of replicate weights created (VENREPS)**: the allowed number of replicates ranges from a minimum of 15 to a maximum of 80 replicate weights.
- **Final full sample weight and replicate weights**: variables **SPFWT0** and **SPFWT1 – SPFWT80** represent, respectively, the final full sampling weight and the 80 replicate weights used for the estimation of sampling variance.
- **Variance strata (VARSTRAT) and variance unit (VARUNIT):** forming replicates requires the assignment of variance strata and/or variance units to each sampled case. Consortium statisticians assign the variance strata and/or variance units for countries according to their sample designs (e.g., whether or not stratification was used and how many PSUs were in each stratum).
- **PIAAC cycle 2**: the variable **INPIAAC2** identifies completed cases that are part of the Cycle 2 target population and are included in the sampling plan. It excludes supplementary national samples but includes cases from oversampling (see Chapter 1 for a discussion of additional national samples and national oversamples).

Notes

[1] The replication approaches used for PIAAC Cycle 2 are only JK2 and FAY. Please refer to Chapter 6 of this Data Analysis Manual for more information on the different replication methods.

Part II How to analyse data from the Survey of Adult Skills 2023

5 How to take into account the survey and the assessment designs

The Survey of Adult Skills (PIAAC) was conceived to describe the proficiency in key information-processing skills of the adult population and provide comparable estimates across countries and (to the extent possible) over time. A number of complex design choices were taken to support this purpose. While they improve the quality of the data in the end, they also make working with the data error-prone. This chapter describes the statistical procedures that must be applied to obtain valid estimates (representative of the underlying target population) and standard errors that correctly reflect both sampling and imputation errors. The recommendations provided in this chapter apply to data from both the first and the second cycle of the Survey of Adult Skills.

Sampling design

In implementing the 2023 Survey of Adult Skills, each country adopted some form of complex survey design, departing from a single-stage probabilistic random sampling where each person has exactly the same probability of being included in the sample. As a result, final sampling weights included in the dataset must be used in all analyses to produce estimates that are representative of the underlying target population (Meinck, 2015[1]).

Full final sampling weights

All cases included in the different datasets are *completed cases* (Box 5.1) and have an associated *full sample final weight* named SPFWT0. Together, completed cases form a sample that is representative of the target population. The target population consists of all non-institutionalised adults between the ages of 16 and 65 (inclusive) who reside in the country at the time of data collection, regardless of their citizenship or language. For instance, this excludes military personnel accommodated in barracks and individuals serving prison sentences.

ATTENTION POINT: Unbiased estimates of population parameter

Full final sampling weights must be used to obtain unbiased point estimates of population parameters.

The final weight establishes the link between observations in the sample and the population. As a result of the weighting procedure (OECD, forthcoming[2]), each weight stands for the number of individuals in the target population the survey respondent represents. When estimating a statistic (such as the average literacy or numeracy proficiency in the sample), respondents contribute to the statistics in proportion to their weight. These weights are not equal. First, the sample is a probability sample, *i.e.* potential

respondents are selected randomly following a country-specific multi-staged sampling plan. Therefore, each potential respondent does not represent the same number of individuals in the target population. In addition, the validation of potential respondents as a completed case also depends on their demographic characteristics, and some subpopulations are less likely to be validated, mostly because they are more likely to refuse to participate in the survey. In such a case, the sample does not reflect the actual demographic composition of the population and weights that adjust for non-participation are necessary to correct this imbalance.

Box 5.1. Definition of a complete case

A complete case is one that meets the following criteria:

- Responses to key background questions in the full background questionnaire (BQ), including age, gender, highest level of schooling, employment status and country of birth (native/non-native); and
- The Tablet Tutorial Section is attempted; and
- The Locator is attempted.
- OR
- The Doorstep Interview is completed

Replicate weights

Each sample gives only an approximation of the target population. Other samples could have been drawn following the same procedures. These samples would have contained different respondents and therefore resulted in different estimates of the same parameter of interest. The degree to which a statistic computed with a representative sample is close to the same statistic computed with the full target population is called the sampling error.

Since PIAAC uses probability samples, it is possible to compute this sampling error for any statistic using jackknife methods. The principle underlying these methods is simple: simulating alternative samples, called replicates, from the final sample itself and then computing how much the statistic varies in these new samples. In practice, the creation of these samples comes down to the reweighting of the final sample in specific and symmetric ways according to a replication scheme. Each observation in the database is thus attached to its final weight SPFWT0, and up to 80 replicated weights, numbered from SPFWT1 to SPFWT80, each standing for a simulated sample. In some countries, the actual number of replicates is lower than 80. For these countries, extraneous weights were set to the same values as SPFWT0.

ATTENTION POINT: Computing standard errors of population statistics

Replicate weights should be used to compute standard errors that correctly reflect sampling error.

The sampling variance for any statistic s is then a function of the squared differences between the estimate of this statistic using the final weight (s_0) and the estimate using the replicated weights (s_i). The general formula is the following and involves a parameter c, called *variance factor*, which depends on the replication scheme chosen:

$$\text{sampling variance} = c \sum_i (s_i - s_0)^2$$

Importantly, the replication scheme differs from country to country. Both c and the number of effective replicates vary by country, as summarised in Table 5.1. Replication scheme parameters are saved in the database (See section 3).

Table 5.1. Replication method and number of replicate weights in the second cycle of the Survey of Adult Skills

Countries	Method (**VEMETHODN**)	Number of replicates (**VENREPS**)	Variance factor
Austria, Flemish comm. (Belgium), Canada, Switzerland, Czechia, Germany, Denmark, Spain, Estonia, Finland, England (UK), Croatia, Hungary, Ireland, Israel, Italy, Japan, Korea, Lithuania, Latvia, Netherlands, Norway, New Zealand, Poland, Singapore, Slovak Republic, Sweden	Balanced Repeated Replication with Fay's adjustment. Fay's coefficient is equal to 0.3 (**VEFAYFA**)	80	$\frac{1}{80 \times (1-0.3)^2}$
Portugal	Balanced Repeated Replication with Fay's adjustment. Fay's coefficient is equal to 0.3 (**VEFAYFA**)	52	$\frac{1}{52 \times (1-0.3)^2}$
United States	Balanced Repeated Replication with Fay's adjustment. Fay's coefficient is equal to 0.3 (**VEFAYFA**)	44	$\frac{1}{44 \times (1-0.3)^2}$
Chile	Balanced Repeated Replication with Fay's adjustment. Fay's coefficient is equal to 0.3 (**VEFAYFA**)	28	$\frac{1}{28 \times (1-0.3)^2}$
France	Jackknife 2	80	1

Box 5.2. Pooling samples with different replication methods

The primary use of PIAAC data is to generate statistics at the level of a country sample or subsample using replicates built with the same method. However, some research questions may require pooling different samples together. An example would be pooling data from the first and second cycle of the Survey of Adult Skills for a country for which the replication method has changed between the two cycles. In such a case, the pooled sample will be representative of the pooled population, with each sample contributing in proportion to their population size. While pooling samples does not induce bias in the estimates for the statistic of interest, the corresponding sampling variance would be incorrectly estimated, unless the variance factors are identical across samples.

A correct (unbiased) approximation of the sampling variance can be obtained by normalising all replicates within a source sample using the corresponding variance factor. For example, the new replicates s'_i can be derived as follows, with c being the country-specific variance factor:

$$s'_i = s_0 + \sqrt{c}(s_i - s_0)$$

This normalisation ensures that all observations in the pooled sample (regardless of their original variance factor) can be analysed in line with the sampling-variance formula for the Jackknife 2 method, which uses a variance factor of 1.

Estimating of skills proficiency

Plausible values

Literacy, numeracy and adaptive problem solving are measured in the 2023 Survey of Adult Skills by means of a performance-based assessment. Each respondent was assessed in two of these three domains. For each domain, the assessment consists of a selection of items of various difficulty. Even though a score is estimated to reflect the respondent's performance, these scores are not included in the database. They are replaced by a set of plausible values which are better suited for producing estimates of proficiency at the population level (von Davier, Gonzalez and Mislevy, 2009[3]; Jacob and Rothstein, 2016[4]; Braun and von Davier, 2017[5]; Khorramdel et al., 2020[6]).

ATTENTION POINT: Literacy, Numeracy and Adaptive problem solving are measured on separate, independent scales that cannot be directly compared

The skills assessed in the 2023 Survey of Adult Skills – literacy, numeracy and adaptive problem solving – are latent, unobserved constructs. Responses to assessment items serve as manifestations of these latent constructs, enabling the development of a measurement scale. However, scaling choices remain arbitrary. In PIAAC, all scales are designed to span an interval between 0 and 500, with a pooled international average of 250 and a pooled international standard deviation of 50 (OECD, forthcoming[2]).

Although scores on the three skills domains may appear "similar", they are measured on conceptually distinct units. As a consequence, directly comparing proficiency across domains is not meaningful. For instance, if someone scores 240 in literacy and 260 in numeracy, it would be incorrect to conclude that they are "better at numeracy than at literacy" or that they possess "higher numeracy skills than literacy". Similarly, scores from different domains should not be summed or averaged, just as it would be illogical to average or sum an individual's weight and height.

Comparison across domains can only be interpreted relatively. For instance, if an individual scores at the 75th percentile in the national distribution of literacy and at the 50th percentile in the national distribution of numeracy, it is valid to conclude that they are relatively stronger in literacy.

Additionally, readers should note that there is some debate about whether test scores (even those derived from item-response theory models) have desirable interval properties or are better understood as ordinal measures (Bond and Lang, 2013[7]; Jacob and Rothstein, 2016[4]; Braun and von Davier, 2017[5]).

PIAAC is not designed to measure the individual performance of each respondent at a point in time but to estimate how proficiency is distributed in the population. Psychometric scores come with several limitations for this endeavour. These scores cannot be computed for the third domain on which the respondent was not assessed. Moreover, they carry the influence of the varying circumstances under which the assessment was taken, such as the test-taking environment or the specific set of items the respondent had to answer, which may improve or damage the observed performance and add an error to what the usual proficiency of the respondent is. The same respondent, under different circumstances, could have received a different score.

The principle behind plausible values is to rely on the performance of respondents with similar characteristics (as measured by their answers to the background questionnaire) to obtain a "more plausible" estimate of the proficiency of respondents. Although other respondents also face the influence of specific settings during the assessment, these influences are independent of each other, and this update helps to even them out and minimise them. Concretely, ten plausible values are drawn from the local (according to background questionnaire and item responses) distribution of psychometric scores. As the spread of the local distribution reflects the extent of the imputation error, drawing several plausible values makes it possible to estimate the imputation error. This local distribution can also be computed for respondents who were not assigned to the specific domain. In addition, the definition of a completed case (Box 5.1) secures the presence of enough information in the background questionnaire to compute plausible values. Another model, independent but similar in principle, is also applied to respondents with a doorstep interview who did not take part in the direct assessment. Therefore, all respondents receive a set of ten plausible values for all three domains.[1]

Regarding the computation of point estimates, a plausible value works exactly like a score. Any plausible value can be used, associated with the final weight, to obtain a valid estimate. For example, the weighted average of the 5th plausible value for literacy gives a valid estimate of the country's population average. A common mistake is to compute a statistic using the average of the ten plausible values. While each plausible value is a random draw of the score's local distribution, their average is not, and the distribution of the average across plausible values is, by virtue of the independent nature of these random draws, closer to the mean of the local distribution. Using this average will bias the variance estimate for the population distribution of proficiency towards zero.

ATTENTION POINT: Accounting for imputation error

Plausible values should be used to correctly account for imputation errors when estimating skills proficiency.

To correctly compute the imputation variance, all ten plausible values must be used. In fact, the imputation variance is proportional to the variance of the statistic over the ten plausible values. For a statistic s_0, using the final weight and plausible values θ^js:

$$imputation\ variance = \left(1 + \frac{1}{10}\right)\frac{1}{9}\sum_{j=1}^{10}\left(s_0(\theta^j) - \overline{s_0(\theta)}\right)^2$$

with

$$\overline{s_0(\theta)} = \sum_{j=1}^{10} s_0(\theta^j)$$

By convention, all statistics published by the OECD take the average of the point estimate across all plausible values and the average of the sampling variance across all plausible values. This results in the computations of 810 times the same statistic, 81 times with each plausible value.

The point estimate published by the OECD would thus be:

$$\sum_{j=1}^{10} s_0(\theta^j)$$

and the standard error will be:

$$SE = \sqrt{imputation\ variance(s_0) + \frac{1}{10}\sum_{j=1}^{10} sampling\ \ variance(s(\theta^j))}$$

A common way to speed up computation while maintaining the validity of the estimate is to compute the sampling error using only one plausible value. This requires computing the statistic 90 times only.

Proficiency levels

The PIAAC datasets only contain sets of plausible values standing for the score in each of the three domains. Some statistics, such as the proportion of respondents in a given proficiency level, are more easily computed by creating new variables.[2] Since these variables are derived from plausible values, an imputation error should also be computed. Therefore, a new variable must be created for each plausible

value. The analysis will then rely on ten categorical variables, indicating whether each of the ten plausible values falls in a given proficiency level. Table 5.1Table 5.2 shows the cut-offs that define each proficiency level. They are the same across all domains, with the only caveat that there is no Level 5 for adaptive problem solving.

Table 5.2. Cut-offs defining proficiency levels in literacy, numeracy and adaptive problem solving

	Literacy	Numeracy	Adaptive Problem Solving
Below level 1	Less than 176	Less than 176	Less than 176
Level 1	Between 176 and 226	Between 176 and 226	Between 176 and 226
Level 2	Between 226 and 276	Between 226 and 276	Between 226 and 276
Level 3	Between 276 and 326	Between 276 and 326	Between 276 and 326
Level 4	Between 326 and 376	Between 326 and 376	More than 326
Level 5	More than 376	More than 376	-

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Notes

[1] More information on the model used to produce the plausible values is contained in the Technical Report (OECD, forthcoming[2]).

[2] See OECD (2024[8]; forthcoming[2]) for a description of proficiency levels and a discussion of how they should be interpreted.

6 How to analyse data from different cycles of the Survey of Adult Skills

The Survey of Adult Skills (PIAAC) is designed as a recurrent survey. An important goal of PIAAC is to track the evolution of skills proficiency of the adult population over time. For this reason, the first cycle of the survey used assessment items from previous international adult skills surveys – the International Adult Literacy Survey (IALS) and the Adult Literacy and Lifeskills Survey (ALL) – to construct comparable measures of literacy and numeracy. Similarly, the second cycle of the survey (the Survey of Adult Skills 2023) was strongly linked to the first cycle (and therefore also to IALS and ALL).

Survey operations also remained largely unchanged over time, which further strengthened comparability. For example, all surveys were conducted by trained interviewers in the respondents' households. However, not everything remained the same. Innovations were introduced to improve the efficiency and quality of data collection, with the most visible change probably being the move from paper-based instruments (used in IALS and ALL) to a computer-based assessment (with the option of taking the assessment on paper) in the first cycle of PIAAC. The second cycle of PIAAC marked a further evolution in this respect by moving from computers to tablets and by removing the possibility of taking the assessment on paper.

Moreover, the assessment items themselves evolved to reflect better the contemporary contexts and the changing nature of reading and numeracy tasks demanded of adults in modern societies.

Some caution is therefore always advised when comparing results across different surveys, especially as they were conducted many years apart and under different conditions. A more detailed discussion of the differences between IALS, ALL, and the first and second cycle of PIAAC can be found in the Reader's Companion (OECD, 2024[1]), as well as in the initial report from the Survey of Adult Skills 2023 (OECD, 2024[2]) and in the associated Technical Report (OECD, forthcoming[3]).

The Survey of Adult Skills 2023 introduced several modifications to the design of the survey instruments and data collection. These changes sought either to adapt the instruments (both the background questionnaire and the cognitive assessment) to the relevant evolution of society and its environment that happened between the two cycles or to correct and improve measurements. Such a task is always governed by a trade-off between the improvement of the survey and the preservation of trends.

This chapter focuses on the consequences of these changes in term of comparing statistics drawn from the two cycles of the Survey of Adult Skills.

Analysing changes in skills proficiency over time

The design and scoring of the cognitive assessments in the first and second cycle follow the same basic structure, with a locator test that filters respondents into different assessment paths (see Chapter 3 of this manual), an adaptive selection of item booklets in the main assessment stage, and a population model that leverages information available in the background questionnaire (BQ) to produce plausible values. Results in literacy and numeracy are comparable across the two cycles, while results in adaptive problem

solving are *not* comparable to results from the assessment of problem solving in technology-rich environments administered in the first cycle of PIAAC.

ATTENTION POINT: Comparability of results from the problem-solving assessment

The 2023 Survey of Adult Skills included a new assessment of adaptive problem solving (APS). This new domain replaced the assessment of problem solving in technology-rich environments (PSTRE) administered in the first cycle of the survey. As these two assessments do not share a common conceptual framework or any assessment items, the results from these two assessments are not comparable.

Implications of changes in the assessment instruments: the linking error

The set of items used for assessing literacy and numeracy changed from the first cycle to the second. To provide a strong link across the two cycles, about one-third of the items used in the second cycle were trend items that were also used in the first cycle. Despite this link, a score in the second cycle is not exactly equivalent to the same score in the first cycle.

The difference between a score in the second cycle scale and the corresponding score in the first cycle scale has been modelled as a random variable, equal for all countries and at all points of the proficiency scale. The standard deviation of this random variable is denoted $le_{1,2}$. It can be estimated and represents the so-called *linking error.* This linking error should be added to the standard error of any trend statistics expressed as a proficiency score (e.g. differences in mean proficiency across cycles, or the values of the percentiles of the proficiency distribution). More formally, the standard error of the change in proficiency for country (or subgroup) g between the first and second cycle is:

$$\sigma(\Delta_{g2-g1}) = \sqrt{\sigma_{g2}^2 + \sigma_{g1}^2 + le_{1,2}^2}$$

where σ_{g1} is the standard error of the proficiency of group g in the first cycle, σ_{g2} is the standard error of the proficiency of group g in the second cycle, and $le_{1,2}$ is the linking error between the two cycles. The value of the linking error is 3.27 for literacy and 2.95 for numeracy (OECD, forthcoming[3]).

ATTENTION POINT: Linking error

The linking error should always be added to the standard errors of differences in average proficiency between the first and the second cycles of PIAAC. No linking error has been estimated for comparing results from PIAAC with results from previous adult skills surveys (IALS and ALL).

It should be noted that the linking error does not apply to trends of any statistic which is homogenous to a score point difference, such as gender or age gaps in proficiency scores. Given that the additional uncertainty for comparing results across cycles is modelled as a constant at all points of the scale, when taking the difference between two scores, the uncertainties associated with the scores of the two groups cancel each other out, and there is no need to add the linking error term.

A more complex case is when the analysis looks at changes over time in the share of the population scoring at a given proficiency level. In this case, the additional error term for the standard error of these trends depends on $le_{1,2}$, but also on the density f_g of the proficiency score distribution around these cut-offs. For instance, the resulting linking error for the trend in the proportion of the population score at Level 1 in group g will be $le_{1,2}^2 \left(f_g(226) - f_g(176)\right)^2$.

Implications of changes in the assessment device

In the first cycle, the assessment could be undertaken either using paper-based instruments or on a computer. The second cycle assessment was delivered fully on a touchscreen tablet device, with the additional support of a digital stylus. Having a single digital device improved the efficiency of the survey and within-cycle comparability. Thanks to the rapid diffusion of smartphones, tablet devices were found to be the ideal solution, being easy to use also for adults with low familiarity with a traditional computer and giving a user experience similar to paper-based instruments (thanks to the support of the digital stylus).

During the field trial of the first cycle of the Survey of Adult Skills, a randomised controlled trial demonstrated the comparability of results between paper-based and computer-based instruments. In the second cycle, no formal study was conducted on the basis that moving from computer to tablet constituted a smaller step than moving from paper to computer. The comparability of results between the two delivery modes was confirmed by the fact that parameters of linking items (i.e. items administered in both the first and the second cycle) remained rather stable despite the switch from laptop to tablet.

Inclusion of reading and numeracy components in the estimation of literacy and numeracy proficiency

In the first cycle of PIAAC, adults who failed a short locator test (called “assessment core”) were only administered an assessment of reading components, designed to measure basic reading skills (OECD, 2019[4]). Performance in the reading components assessment did not contribute to the estimation of literacy and numeracy proficiency for such respondents, who received scores (in the form of plausible values) based exclusively on their background characteristics and their answers to the core assessment.

ATTENTION POINT: Comparability of proficiency over time for low-skilled adults

Because of changes in the way performance in the components assessment contributes to the estimation of literacy and numeracy proficiency, caution is advised when comparing results for groups of adults with a large incidence of respondents who failed the locator in the second cycle and, therefore, only took the assessment of reading and numeracy components.

The assessment design of the second cycle of PIAAC introduced some innovations. The core assessment (now called locator) was expanded; an assessment of numeracy component was introduced; and respondents who passed the locator with a low score, as well as a random fraction of respondents who passed the locator with a high score, were directed to both the reading and the numeracy components assessment.

This design increased the number of respondents who took the components and provided more information on the relationship between performance in the components and performance in the “regular” assessment of literacy, numeracy and adaptive problem solving. In order to provide more accurate

estimates of proficiency at the bottom end of the skills distribution, performance in the reading and numeracy components was taken into account in the estimation of plausible values.

This methodological change had a negligible impact on aggregate scores (where "impact" is defined as the change in proficiency estimates if the same method was adopted in the first cycle). However, it had a more significant impact on the proficiency estimates of adults who failed the locator and only took the component assessment. In the first cycle, the proficiency of these respondents would have been computed differently, which would have led to sometimes significantly different results. It should be noted that, in most countries, the share of respondents concerned by this issue is minimal, ranging between 0 and 2%; it is as high as 5% in the United States and 7% in Chile and Poland (OECD, 2024[1]).

Caution is advised when analysing the evolution of proficiency for subgroups where a high (weighted) proportion of respondents failed the locator in the second cycle. As a (admittedly arbitrary) rule, the OECD chose not to report results when this share exceeds 20% (OECD, 2024[2]).

Implications of changes in sampling design

With the exception of France, all other countries that participated in both the first and the second cycle of the Survey of Adult Skills changed the method used to compute replicate weights, from jackknife 1 or 2 to Balanced Repeated Replication with Fay's adjustment. The number of replicate weights also changed. As explained in Box 5.2 in Chapter 5, replicates should be normalised when working with pooled data from the two cycles.

Implications of changes in the survey design: The Doorstep interview

In all countries, a small percentage of adults were unable to participate in the survey because they lacked the necessary language proficiency to communicate with the interviewer who administered the background questionnaire. For the same reason, they were also unable to participate in the cognitive assessment. In the first cycle of the Survey of Adult Skills, these adults were referred to as "literacy-related nonrespondents" (LRNR). As no information was collected on such adults, their proficiency was not estimated, effectively leading to a small under-coverage of the target population and an upward bias in the average proficiency of the population. The share of LRNR in the first cycle of PIAAC was below 2% in the vast majority of countries, but reached 4% in the United States in 2012/14, 4.5% in Lithuania, 5% in the Flemish Region (Belgium), and 5.6% in the United States in the third round of the first cycle in 2017 (OECD, 2019[4]).

ATTENTION POINT: The doorstep interview

When comparing results across the two cycles of the Survey of Adult Skills, it is recommended to exclude from the analysis respondents who, in the second cycle, only took the doorstep interview. In the first cycle, such respondents would have been classified as "literacy-related nonrespondents" and would not have received a proficiency score.

In the 2023 Survey of Adult Skills, adults with insufficient language proficiency were administered a very short questionnaire available in many languages that they could self-complete on a tablet (called "doorstep interview"). The information collected through this doorstep interview (age range, gender, years of completed education, employment status and migration history) was used to generate plausible values for these respondents, thus allowing them to contribute to the estimation of the average proficiency of the population. The share of doorstep interview cases is generally small in most countries, rarely exceeding

2%. However, it is much higher among certain groups of the population, like those with an immigrant background (OECD, 2024[1]).

The introduction of the doorstep interview creates a small misalignment between the populations for which proficiency estimates are available in the two cycles of the survey. For this reason, it is recommended to exclude doorstep interview cases from analysis when comparing both cycles.

It should also be noted that countries had the possibility of relying on a translator or interpreter to help respondents complete the background questionnaire. This person could be a family member or a staff of the survey organisation. The intervention of an interpreter is recorded in the dataset (variable **ZZ1b_02** – see Chapter 4 of this Data Analysis Manual). Sweden was the only country that made systematic use of interpreters in both cycles of the survey. As a result, all respondents in Sweden, in both cycles, were able to complete the background questionnaire, and no respondents were classified as literacy-related nonrespondents (in the first cycle) nor took the doorstep interview (in the second cycle). This improved the precision of the estimates of proficiency for such respondents in Sweden because richer information is available to them. However, it also introduced a small difference in survey operations between Sweden and other countries, as adults who were not able to participate in the survey because of language barriers were treated slightly differently in Sweden than in other countries. As such cases constitute a very small percentage of the population, the threat to comparability remains low. However, some caution is warranted when comparing results between Sweden and other countries for groups of adults that may include a larger share of adults with very low language proficiency (for example, recent immigrants).

Analysing variables from the background questionnaire

While the basic structure of the background questionnaire has not changed between the first and the second cycle of PIAAC, and there is a large overlap in the questions asked in the two cycles, the questionnaire went through a thorough revision. In some cases, questions were revised or modified, which could impact the comparability of the answers.

ATTENTION POINT: The international codebook

The international codebook contains the trend status of all variables.

Chapter 2 of this Data Analysis Manual describes in more detail the information collected through the background questionnaire and the associated variables. In many cases, suffixes to variables' names indicate explicitly whether the variable was purposefully created to be a "trend" variable that can be compared with the first cycle of PIAAC or, in some cases, with previous adult skills surveys (IALS and ALL). However, this gives only a partial account of which variables can be compared to their equivalent in the first cycle since many variables did not require any modification to be comparable. The codebook available on the OECD website (https://www.oecd.org/en/data/datasets/piaac-2nd-cycle-database.html#codebooks) indicates whether or not a variable can be compared to previous skills surveys. Four cases are possible:

- **NEW**: the variable does not have an equivalent in the first cycle. These variables capture a type of information that was not collected in the first cycle, such as social and emotional skills or life satisfaction.
- **ADAPTED FROM CYCLE 1**: A similar variable exists in the first cycle, but the changes are too important to maintain comparability.

- **SOFT TREND TO CYCLE 1**: Changes, such as the wording of a question or the prompt introducing it, were deemed minor enough not to jeopardise the comparability with the first cycle. However, this assessment is only qualitative and systematic differences in the information collected cannot be ruled out. It is recommended to compare both versions of the questions in the background questionnaire or to consult the relevant sections of the Technical Report (in the case of derived variables) to assess the suitability of the variables for the intended analysis.
- **TREND TO CYCLE 1**: the information contained in this variable was collected in the same way across the two cycles.

More information on the differences between the background questionnaires from the first and second cycle of PIAAC is contained in the Technical Report, which presents a side-by-side comparison of all raw questions that are considered either strict or soft trends.

ATTENTION POINT: Comparability of scales derived from the background questionnaire

Many derived variables summarise the information contained in several items by creating scales. This is the case, most notably, of questions related to the use of skills at work and in everyday life (Sections F and G of the background questionnaire – see Chapter 2 of this Data Analysis Manual). To better reflect the tasks that adults perform in today's modern societies, these two sections of the background questionnaire were more heavily revised. As a result, only a few of these scales are comparable to their first cycle versions: reading at home and work, influence, and task discretion. For all other scales, the number of common items is too low to preserve comparability (OECD, forthcoming[3]).

Changes in the coding of educational qualifications

The questions designed to capture respondents' educational attainment require national adaptations in each participating country to reflect the national landscape of qualifications. These national qualifications are then coded using the International Standard Classification of Education (ISCED 2011) to derive comparable levels of education across countries. While this process has only undergone marginal changes in the second cycle and remains broadly comparable with the first cycle, some adjustments warrant attention due to their potential impact on cross-country comparability.

One relatively minor change relates to qualifications obtained abroad. In the second cycle of PIAAC, respondents are asked to indicate the equivalent national qualification.

ATTENTION POINT: Comparability of educational qualifications

Changes in the way national qualifications are mapped in the ISCED international classification may affect the comparability of results between the first and the second cycle of PIAAC. Data users are advised to consult the Technical Report (OECD, forthcoming[3]), which contains the mapping between national qualifications and the international classification followed in the two cycles, allowing them to recode national qualifications more consistently across the two surveys.

A more visible and impactful change is the move from ISCED 97 to ISCED 2011. Crosswalks between the two classifications exist, and the PIAAC datasets already include variables that follow the ISCED

97classification (e.g. **B2_Q01_TC1**, **EDCAT6_TC1**, **EDCAT7_TC1** and **EDCAT8_TC1**). It is recommended that these variables be used when analysing data from the two cycles of PIAAC.

However, these variables are derived using correspondence between ISCED 97 and ISCED 2011 rather than derived independently from the correspondence between national diplomas and ISCED 97.

Issues may arise for countries that have revised the questions on educational attainment and qualifications or when the status of certain qualifications changed in some countries between the first and second cycle. This is the case, for instance, when new legislation grants access to tertiary education to individuals with a given vocational secondary qualification. Since the year in which the qualification was obtained is not taken into account when mapping it to the international ISCED classification, the same diploma could be coded differently in the second cycle than it was in the first cycle. This can obviously impact comparability, distorting analysis looking at how educational attainment has changed over time.

Data users are strongly advised to consult the Technical Report, which contains a comprehensive comparison of national questions in both cycles for all countries, including a reclassification of qualifications from the second cycle of PIAAC following the same criteria that would have been used in the first cycle of the Survey of Adult Skills (OECD, forthcoming[3]). For instance, the OECD performed this reclassification in the international report on the second cycle of PIAAC (OECD, 2024[2]).

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7 Tools available for statistical analysis

A number of different tools have been developed to facilitate the analysis of data from the Programme for the International Assessment of Adult Competencies (PIAAC). These tools normally support also the analysis of data from other international large-scale assessments that share the same methodology. This chapter aims to provide a brief overview of these tools, focusing on those developed and used by the OECD. The chapter provides some general guidelines for data users and some specific recommendations on the handling of missing values. The chapter does not aim to provide a comprehensive description or a detailed guide to the use of such tools but rather to direct readers and users to the appropriate existing resources and documentation.

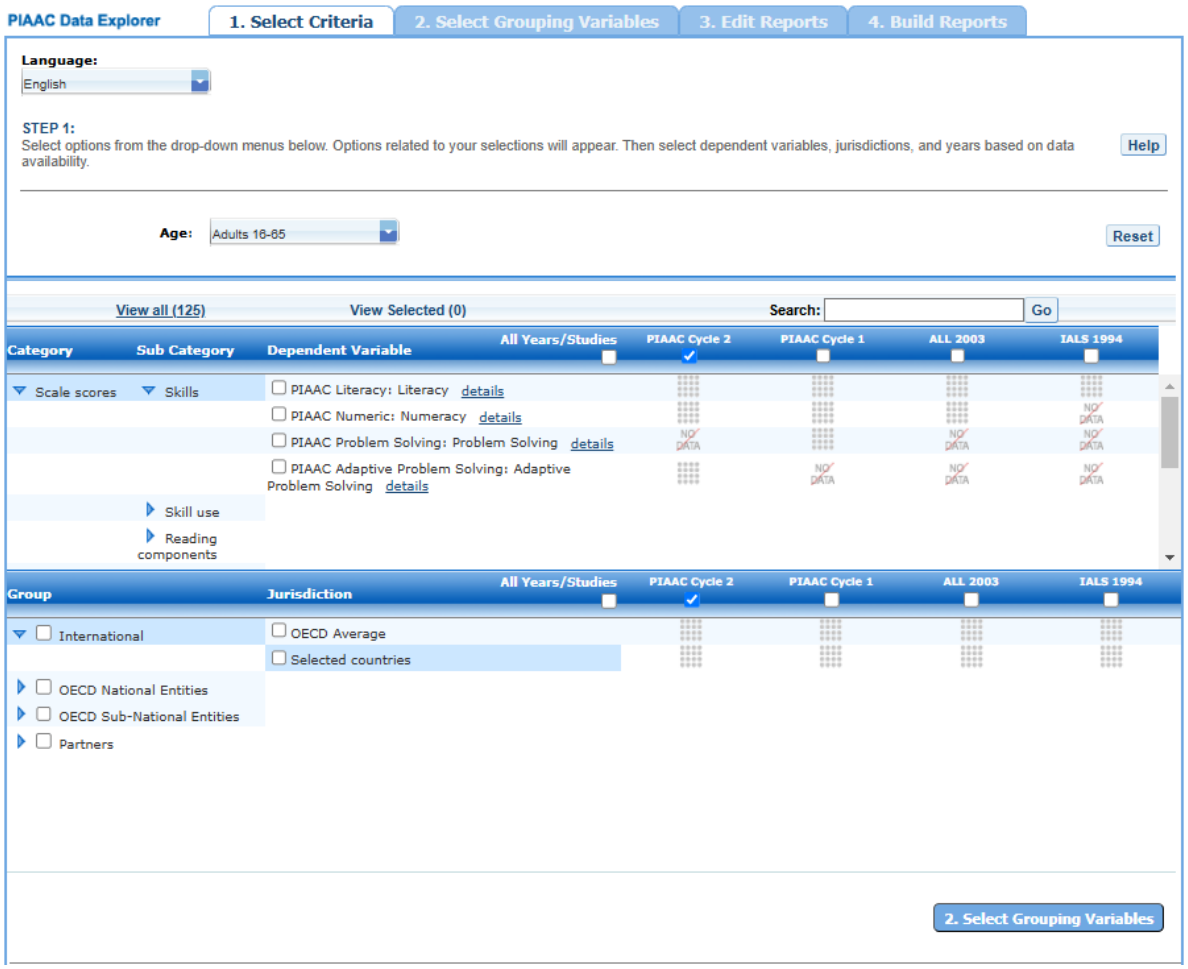
The PIAAC Data Explorer

The PIAAC Data Explorer is the only tool discussed in this chapter that does not require accessing microdata contained in the datasets described in Chapter 1. It is an online tool, accessible from the OECD website (https://piaacdataexplorer.oecd.org/ide/idepiaac/), that allows users to compute simple statistics and frequencies. The tool consists of an interface that helps design and generate statistical reports without providing any direct access to the actual records of the databases. The computations are run on a server, taking into account the plausible values and the replicate weights when appropriate.

The PIAAC Data Explorer can also prove to be useful to more expert users and researchers. First, it provides an easy way to compare not only the two cycles of the Survey of Adult Skills but also their predecessors, the Adult Literacy and Life Skills Survey (ALL) and the International Adult Literacy Survey (IALS). Second, the dataset underlying the PIAAC Data Explorer contains more information than the ones contained in the public-use files (PUFs) because the fact that users do not have access to the underlying micro-level data alleviates concerns about the risk of reidentifying respondents.

Figure 7.1 presents the interface of the PIAAC data explorer. This interface is divided into four tabs that cover the four steps needed to generate a (collection of) reports. Importantly, the first tab features a *help* button that hosts a comprehensive documentation of the tool. The document provides a good description of the possibilities offered. Importantly, these do not include multivariate modelling, which can only be performed with dedicated statistical software.

Figure 7.1. Interface of the PIAAC Data Explorer



The four steps that precede the creation of reports are the following:

1. The first step defines the target variables and the country samples that will be used in the computations. The set of target variables totals 125 variables covering proficiency scores, but also derived variables such as wages or skills use indices and some items from the background questionnaire such as educational levels or the number of hours worked per week. All of them are considered as continuous variables.
2. The second step allows the estimation sample to be split into reporting groups such as gender or age intervals. The set of groups available includes proficiency levels. Frequency tables for these grouping variables can be generated.
3. The third step presents the contents of each report, which are defined by the different combinations of target variables and grouping variables and helps edit them. Statistics that can be computed are means, standard deviations and the 10th, 25th,50th, 75th and 90th percentiles. The percentage option does not apply to the target variable but to the grouping variable instead.
4. The fourth step displays the results of each report and offers the possibility of exporting them in various formats (HTML, xlsx, docx or PDF).

Tools available for working with PIAAC microdata

Datasets containing individual records from the Survey of Adult Skills are originally produced as SAS and SPSS files. The public-use files are also made available in comma-separated value format (CSV), and scripts are available on the OECD website to facilitate the import of these files into Stata and R (see Chapter 1).

In principle, any statistical software can be used to analyse microdata from the Survey of Adult Skills, provided users pay attention to what is described in Chapter 5 and handle correctly plausible values and replicate weights. Some specific tools have been developed to facilitate analysis in Stata, R, SAS and SPSS. This chapter will describe in some more detail the Repest (Avvisati and Keslair, 2014[1]) and RRepest (Ilizaliturri, Avvisati and Keslair, 2023[2]) tools, developed and used at the OECD for analysis of data from international large-scale assessments in Stata and R, as well as the International Data Base (IDB) Analyzer, an application developed by the International Association for the Evaluation of Educational Achievement (IEA) that can be used to analyse data from most major large-scale assessment surveys using SPSS, SAS or R (IEA, 2025[3]).

Many other tools and resources exist to work with data from international large-scale assessments. A good place to start is the webpage of the Research Data Center PIAAC, hosted by GESIS (*Gesellschaft Sozialwissenschaftlicher Infrastruktureinrichtungen)* – Leibniz Institute for the Social Sciences (https://www.gesis.org/en/data-on-adult-education/research-data-center-piaac), where data users can find many resources and training materials also covering other tools and software packages like Mplus or the EdSurvey package for R (Bailey et al., 2017[4]). A good overview of the different tools is provided in (Maehler and Rammstedt, 2020[5]).

Working with Stata: Repest

Importing data into Stata

The OECD provides a programme on its website to import and label the CSV files into Stata. Stata limits label length to 80 characters, and some labels are therefore truncated. In such a case, users are advised to refer to the international codebook.

Exploring the dataset and working with missing values

As mentioned in the previous section, it is important to check for the presence of valid skips and source them before using a variable in an estimate. Missing values in Stata are represented with either a simple dot (.) or a dot and a letter when they have a label (for instance, .v). In the *tabulate* command, the different cases of missing values can be distinguished using the *missing* option. Without this option, they will be left out of the sample.

```
tabulate B2_Q12,missing

    Training - Reason for participating |      Freq.     Percent        Cum.
----------------------------------------+-----------------------------------
To improve my job or career opportuniti |     11,038        6.85        6.85
To improve my knowledge or skills on a  |     12,337        7.66       14.52
To better carry out my regular work tas |     10,406        6.46       20.98
To better deal with new or changing wor |      5,637        3.50       24.48
    To obtain or to renew a certificate |      4,356        2.70       27.18
           I was obliged to participate |      8,911        5.53       32.72
                         Other reason |        927        0.58       33.29
                                    . |      2,719        1.69       34.98
                           Don't know |          9        0.01       34.99
                              Refused |          1        0.00       34.99
                           Valid skip |    104,697       65.01      100.00
----------------------------------------+-----------------------------------
                                Total |    161,038      100.00
```

The *missing* function can be used to capture all different types of missing. The normal '==' operator will only capture missing values that do not have labels:

```
count if B2_Q12==.
  2,719

count if missing(B2_Q12)==1
  107,426
```

Repest

Repest is an *ado* programme designed by the OECD to help Stata users work with OECD skills assessments, including PIAAC (Avvisati and Keslair, 2014[1]). *Repest* estimates statistics using replicate weights (balanced repeated replication – BRR – or Jackknife), thus accounting for complex survey designs in the estimation of sampling variances. It also allows for analyses with multiple imputed variables (plausible values). *Repest* automatically takes into account survey parameters such as the methodology used for replicates, the number of plausible values or the names of the weights. *Repest* also works with any *Stata* command, provided it is an *eclass* command. It also includes many options to help generate complex tables of estimates according to user-defined breakdowns and countries. For instance, the following command will compute estimates for the literacy and numeracy average of women and men, along with the difference between both, in every country of the database:

```
repest PIAAC, estimate(means PVLIT@ PVNUM@) over(GENDER_R) by(CNTRYID)
```

The most recent official version of *Repest* is available on IDEAS RePEc (https://ideas.repec.org/c/boc/bocode/s457918.html), where users can download the help file that documents all features. The latest development version is available on the OECD Algobank (https://gitlab.algobank.oecd.org/edu_data/repest), along with a cheat sheet.

Working with R: RRepest

Importing data into R

The OECD provides a programme on its website to import and label CSV files. This program uses the *haven* package to import the files as a *tibble* and encodes missing values as *tagged NA*. Labels are applied to variables and values with the labelled package. The *lookfor* function from the labelled package helps explore the contents of the dataset by searching for a keyword among variable names, values and labels.

Exploring the dataset and working with missing values

R is not suited to work with several types of missing values, but the *haven* package uses the flexibility offered by an array of doubles to store the same array values and missing codes for *NA*. Taking the example of B2_Q12 (reason for participating in training), any direct call of this variable will not distinguish *NA*. For instance, the following code will have one *NA* category:

```
PIAAC2$B2_Q12 %>% table(useNA = "always")

    1     2     3     4     5     6     7  <NA>
11038 12337 10406  5637  4356  8911   927 107426
```

Tagged NAs can only be accessed through the *na_tag* function. The *na_tag* function turns observations with an NA tag into their characters, *NA* without tags into *NA*, and all numeric values into *NA*:

```
PIAAC2$B2_Q12 %>% na_tag %>%  table(useNA = "always")

d     r     v  <NA>
9     1 104697 56331
```

Please note that the *count* function of the *dplyr* package will not distinguish *NA* tags and can wrongly assign all *NA* observations to a given tag. It is recommended to use the following user-defined functions *to_character2* and *count2*:

```
PIAAC2$B2_Q12 %>% na_tag %>%  table(useNA = "always")

d     r     v  <NA>
9     1 104697 56331
```

The output of the *count2* function will display values and labels together, including tagged NA.

```
                    > piaac2 %>%  count2(B2_Q12)
# A tibble: 11 × 2
# Groups:   B2_Q12 [11]
   B2_Q12                                                                n
   <chr>                                                             <int>
 1 1: To improve my job or career opportunities                      11038
 2 2: To improve my knowledge or skills on a subject that interests me 12337
 3 3: To better carry out my regular work tasks                      10406
 4 4: To better deal with new or changing work tasks                  5637
 5 5: To obtain or to renew a certificate                             4356
 6 6: I was obliged to participate                                    8911
 7 7: Other reason                                                     927
 8 NA: NA                                                             2719
 9 NA: d                                                                 9
10 NA: r                                                                 1
11 NA: v                                                            104697
```

Rrepest

Rrepest is equivalent to Stata *Repest,* for R (Ilizaliturri, Avvisati and Keslair, 2023[2]). It offers the same possibilities and follows a very similar syntax. The following command will compute estimates for the literacy and numeracy average of women and men, along with the difference between both, in every country of the database:

```
piaac2 %>%  Rrepest(svy="PIAAC",
  est = est("means",c("PVLIT@","PVNUM@")),
  over="GENDER_R",test=TRUE,
  by="CNTRYID")
```

The most recent official version of *Rrepest* is available on CRAN (https://cran.r-project.org/web/packages/Rrepest/index.html), along with comprehensive documentation. The latest development version is available on the OECD Algobank (https://gitlab.algobank.oecd.org/edu_data/rrepest), along with a cheat sheet and many examples.

Working with the IDB Analyzer

The IDB Analyzer

The IDB Analyzer was developed by the *International Association for the Evaluation of Educational Achievement* (IEA). It creates SAS, SPSS, and R syntax that can be used to analyse data from all IEA studies, as well as from other international large-scale assessments, including the Survey of Adult Skills. While the IDB Analyzer is free software, it requires a working version of SPSS, SAS, or R (Version 4.2.0 or above) and RStudio. The resulting code can be used to estimate simple statistics such as percentiles and averages but also more complex models, along with their corresponding standard errors, combining sampling and imputation variance. The IDB Analyzer is available from the following permanent URL: http://www.iea.nl/data.html.

The IDB Analyzer comprises three modules. The two first modules, *Convert* and *Merge,* help turn SPSS versions of the databases into R data files and append together databases from different country samples. The *Analysis* module generates the codes with the help of a window interface. The software comes with comprehensive documentation.

Exploring the dataset and working with missing values

SPSS automatically distinguishes the different types of missing values. In SAS *Proc Freq*, they are displayed once the *missing* option is set.

References

Avvisati, F. and F. Keslair (2014), *REPEST: Stata module to run estimations with weighted replicate samples and plausible values*, Boston College Department of Economics, http://RePEc:boc:bocode:s457918. [1]

Bailey, P. et al. (2017), "EdSurvey: Analysis of NCES Education Survey and Assessment Data", *CRAN: Contributed Packages* (database), https://doi.org/10.32614/cran.package.edsurvey (accessed on 12 March 2025). [4]

IEA (2025), *Help Manual for the IEA IDB Analyzer (Version 5.0)*, http://www.iea.nl (accessed on 12 March 2025). [3]

Ilizaliturri, R., F. Avvisati and F. Keslair (2023), “Rrepest: An Analyzer of International Large Scale Assessments in Education”, *CRAN: Contributed Packages* (database), https://doi.org/10.32614/cran.package.rrepest (accessed on 12 March 2025). [2]

Maehler, D. and B. Rammstedt (eds.) (2020), *Large-Scale Cognitive Assessment*, Springer International Publishing, Cham, https://doi.org/10.1007/978-3-030-47515-4. [5]

The 2023 Survey of Adult Skills, a product of the OECD Programme for the International Assessment of Adult Competencies (PIAAC), provides a comprehensive overview of adults' literacy, numeracy, and adaptive problem-solving skills – skills that are fundamental for personal, economic, and societal development. These key information-processing skills provide the foundation for access to employment, higher wages and continuous learning, while enabling individuals to navigate the complexities of their personal and civic lives.

The Survey of Adult Skills 2023 Data Analysis Manual constitutes a resource for researchers interested in working with data from the Survey of Adult Skills. It describes the content and the availability of PIAAC datasets, provides guidance on the methodological aspects of the survey that must be taken into account in the analysis, and presents the available statistical softwares and tools that researchers can use.

This Data Analysis Manual is a companion volume to Do adults have the skills they need to thrive in a changing world? Survey of Adult Skills 2023, which reports initial results from the 31 countries and economies that participated in the latest edition of the Survey of Adult Skills and collected data in 2022/23.

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