Mohamed Khider University- Biskra, Faculty of Architecture, Civil Engineering, and Hydraulics
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Course: Data Analysis
Teacher: Dr. BENDJEDIDI Souhaila

Chapter 04 :

Data Analysis: Exploitation of the Data Collected

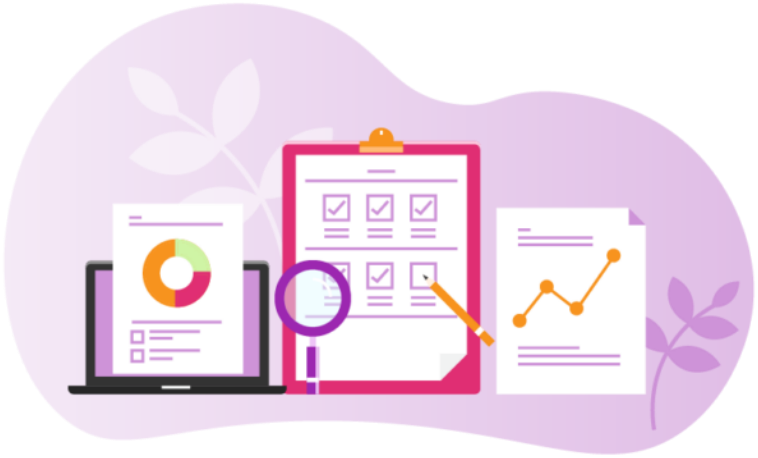


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Chapter objectives:

At the end of the chapter, the learner will be able to:

- Explore how to convert raw data into actionable information.
- Familiarize with various tools of data analysis (e.g.,Spreadsheet Software , Qualitative Data and Survey Tools…) to exploit data effectively.
- Learn the basics of using SPSS, including navigating its interface and utilizing its core functions for data analysis.
- Become familiar with the NVivo interface and its fundamental features for qualitative data analysis and coding.

Chapter 04: Data Analysis: Exploitation of the Data Collected

I-Data analysis tools

I-1-What are data analysis tools?

Data analysis tools are software programs, applications, and other aids that professionals use to analyze data sets in ways that characterize the big picture of the information and provide usable information for meaningful insights, predictions, and decision-making purposes.

You can describe them as a collection of maps, diagrams, and charts designed to gather, interpret, and visualize data across diverse applications. Choosing the right data analysis tool is essential to maximize your efforts and make it easier to meet your goals (https://www.coursera.org/articles/data-analysis-tools)

I-2- Data Analysis Tools Types

These tools provide a range of functionalities to handle data manipulation, visualization, statistical analysis, and machine learning. Here are some commonly used data analysis tools:

- ❑ Spreadsheet Software
- ❑ Data Visualization Tools
- ❑ Statistical Analysis Software
- ❑ Qualitative Data and Survey Tools….ect. (Islam, 2020).

I-2-1-Spreadsheet Software

Spreadsheet Software is a type of application that allows users to organize, manipulate, and analyze data in tabular form, using a grid of rows and columns. Each cell in the grid can contain text, numbers, or formulas that perform calculations based on the data in other cells. Spreadsheet software is widely used for tasks such as budgeting, data tracking, statistical analysis, and creating charts and graphs for data visualization.

Common Examples:

- **Microsoft Excel**: The most widely used spreadsheet software, known for its extensive features and capabilities. **Excel**: A popular tool for organizing data, performing calculations, and creating simple charts; often used for smaller datasets.
- **Google Sheets**: A cloud-based spreadsheet application that enables real-time collaboration and easy sharing of documents. **Google Sheets**: Similar to Excel, but cloud-based, allowing multiple people to work on the same file in real-time.

I-2-2-Data Visualization Tools

Data Visualization Tools are software applications designed to transform complex data sets into visual representations, such as charts, graphs, maps, and dashboards. These tools help users understand and interpret data by presenting it in a visually appealing and easily digestible format, enabling quicker insights and better decision-making.

Common Examples:

Tableau: A tool for creating visual representations of data, such as charts and dashboards, to make data easier to understand.

Power BI: A Microsoft tool for building interactive data visualizations and reports, often used for business intelligence.

I-2-3-Statistical Analysis Software

Statistical Analysis Software is a type of program that helps users perform statistical analyses on data. These tools make it easier to understand and interpret data by providing various statistical functions and methods.

Common Examples:

- **SPSS (Statistical Package for the Social Sciences):** Widely used in social sciences and market research, known for its ease of use and comprehensive statistical capabilities.
- **SAS (Statistical Analysis System):** A powerful tool often used in business, healthcare, and academia for advanced analytics and data management.

I-2-3-Qualitative Data and Survey Tools

Qualitative Data and Survey Tools are software applications designed to help users collect, analyze, and interpret qualitative data and survey responses. These tools facilitate the process of gathering insights from participants, whether through structured surveys or unstructured qualitative research, enabling researchers to understand opinions, behaviors, and experiences.

Common Examples

SurveyMonkey: SurveyMonkey is an online survey tool that allows users to create, distribute, and analyze surveys. It offers a wide range of templates and customizable options to design surveys

for collecting data from respondents. It offers both free and paid plans with various features depending on the user's needs. (Guerrero, 2019).

Qualtrics: Qualtrics is an online platform for creating surveys and collecting feedback. It helps businesses and researchers gather data from customers, employees, or any target group. Qualtrics offers tools to create customizable surveys, analyze the responses, and generate reports.

NVivo: NVivo is a software tool used for analyzing qualitative data, such as interviews, open-ended survey responses, articles, and audio/video content. It helps researchers organize, code, and interpret large amounts of unstructured data to uncover patterns and insights. NVivo offers tools for data visualization, reporting, and the creation of models to better understand complex data sets.

I-3-Choosing the right analysis data tool

Selecting the right data analysis tool depends on various factors such as:

1- Define Your Data Type and Size:

- Small to Medium Data: If you're dealing with small datasets, tools like Google Sheets, Excel, or SurveyMonkey are suitable.
- Large and Complex Data: For large datasets or big data, consider using tools like SPSS, SAS, R, or Tableau that can handle large volumes and complex data structures.

2-Identify Your Analysis Needs:

- Descriptive Analysis: If your focus is on basic statistics or creating simple visualizations, tools like Excel, Google Sheets, and Tableau are sufficient.
- Advanced Statistical Analysis: For in-depth statistical analysis, predictive modeling, and hypothesis testing, tools like SPSS, R, and SAS are better suited.
- Qualitative Data: If you're analyzing qualitative data (e.g., interviews, surveys), tools like NVivo or Qualtrics are ideal.

3-Consider Ease of Use:

- Beginner Friendly: If you're new to data analysis, look for tools with user-friendly interfaces like Google Sheets, Excel, or Power BI.
- Advanced Users: For experienced analysts or data scientists, tools like R, SAS, and SPSS offer more advanced capabilities but may require more expertise.

4-Cost and Budget:

- Free Tools: If you have a limited budget, start with free tools like Google Sheets.
- Paid Tools: If your project requires more advanced capabilities, you might need to invest in tools like SPSS, SAS, Tableau, or Power BI. (Okutan, 2023).

By considering these factors, you can select the most appropriate tool that enhances your ability to analyze data effectively and make informed decisions.

II-Analyzing Quantitative Data with SPSS (Introduction to SPSS)

II-1-Overview of SPSS:

II-1-1-What is SPSS?

SPSS (Statistical Package for the Social Sciences) is a software program used by researchers in various disciplines for quantitative analysis of complex data

It is developed by Norman H. Nie and C. Hadli Hull of IBM Corporation in the year 1968. It is compatible with Windows, Linux and Mac operation systems. SPSS is among the most widely used programs for statistical analysis

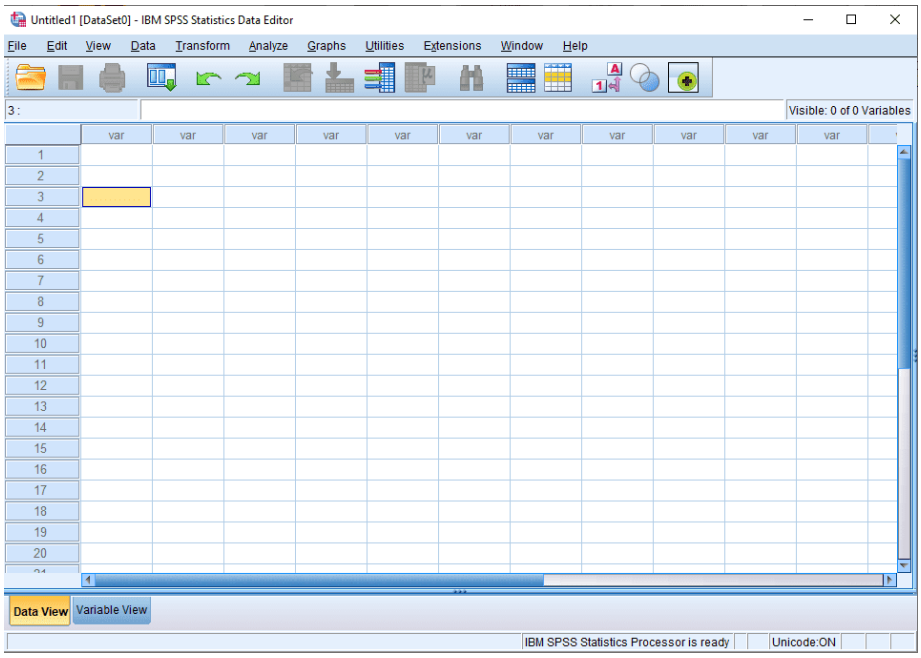
SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics, and conduct complex statistical analyses (Bryman, et al., 2011).

II-1-2-Why use SPSS for quantitative data analysis?

- **User-Friendly**: Easy interface with no coding required.
- **Powerful Tools**: Supports diverse statistical analyses and visualizations.
- **Efficient**: Simplifies data management and saves time.
- **Reliable**: Accurate results for large datasets. (So, H. Y., et al, 2020).

II-2-The SPSS interface

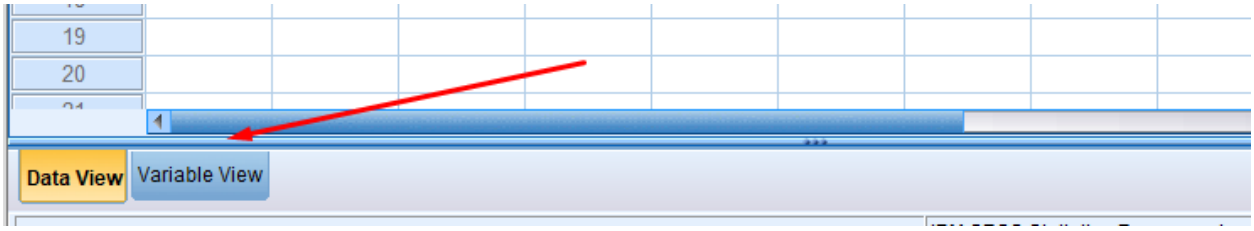
The main interface of SPSS is called the Data Editor window. This is where most of the operations in SPSS take place – from creating variables to transforming the data and choosing analyses.



The data editor window is akin the Microsoft Excel spreadsheet – a huge table with rows and columns. In SPSS **the columns** are the **Variables.** Think of the variables as the pieces of information you were collecting, or individual questions on a survey form.

The rows are known as **cases,** or individual respondents on a survey. This could be a single household in a household survey, or a single patient in a clinical study.

The data editor window is composed of **2 tabs**; **the data view** and **the variable view**. The tabs used to switch between these views are located at the bottom-left of the window.



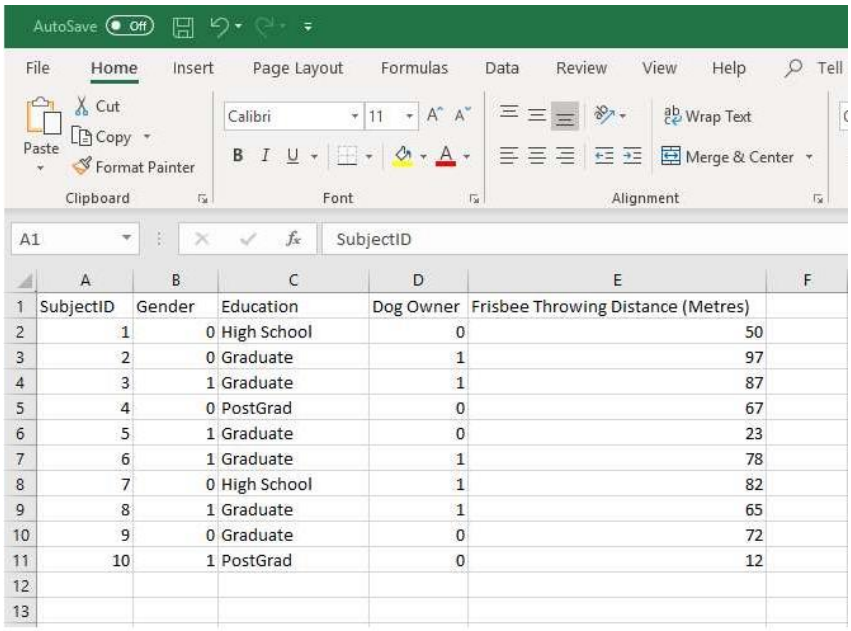
The data view is where you can view and edit the data.

The variable view is where you can define and edit the variables.

II-3-Step-by-Step SPSS Data Analysis Process

Step 1: Prepare Your Data

Ensure that the data is collected and organized in a clear format, such as an Excel spreadsheet, with all necessary variables and values in tabular form.



	A	B	C	D	E	F
1	SubjectID	Gender	Education	Dog Owner	Frisbee Throwing Distance (Metres)	
2	1	0	High School	0	50	
3	2	0	Graduate	1	97	
4	3	1	Graduate	1	87	
5	4	0	PostGrad	0	67	
6	5	1	Graduate	0	23	
7	6	1	Graduate	1	78	
8	7	0	High School	1	82	
9	8	1	Graduate	1	65	
10	9	0	Graduate	0	72	
11	10	1	PostGrad	0	12	
12						
13						

Step 2: Getting data into SPSS

There are multiple ways to bring data into SPSS. In this lesson, I will demonstrate how to define variables, enter data manually, and import data from Excel into SPSS.

A/- Entering Data Manually

A/1- Defining Variables in SPSS

Defining variables in SPSS is an important step to ensure your data is properly organized and ready for analysis. Each column in the SPSS Data View represents a variable, and defining these variables involves specifying details about their names, types, and properties.

To define variables in SPSS, switch to the Variable View in the Data Editor. Here, you specify characteristics such as:

- **Variable Name**

Each variable must have a unique name. The name should begin with a letter and cannot contain spaces or special characters (e.g., "Age" or "Income").

- **Variable Type**

In the "Type" column, choose the type of data your variable contains. Common types include:

1. **Numeric**: For numbers (e.g., age, income).
2. **String**: For text (e.g., names, categories).

- **Adding Labels:**

Use the "Label" column to provide a detailed description of the variable. For example, instead of just "Age," the label might be "Respondent's Age in Years."

- **Defining Value Labels (Optional):**

For categorical data (e.g., gender or education level), you can assign labels to specific values using the "Values" column. For example:

1 = Male

2 = Female

- **Specifying Measurement Levels:**

In the "Measure" column, select the variable's level of measurement:

- Nominal: For categories without order (e.g., gender, color).
- Ordinal: For categories with a logical order (e.g., education levels).
- Scale: For numeric data with meaningful intervals (e.g., height, income).

- **Adjusting Other Properties:**

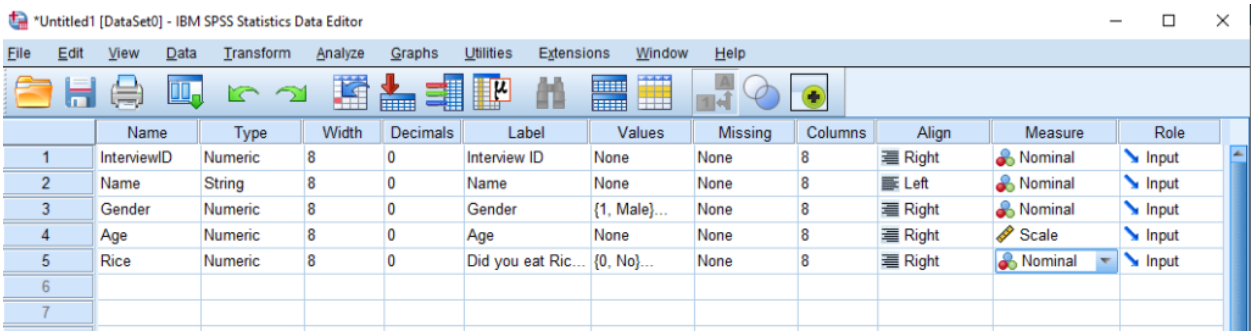
- Width: Specifies the number of characters or digits the variable can hold.
- Decimals: Sets the number of decimal places for numeric variables.
- Missing Values: Indicates any specific values (e.g., 999) that should be treated as missing data.

Once the variables are fully defined, return to the "Data View" tab to begin entering or analyzing your data. Properly defining variables ensures accurate analysis and better organization of your dataset.

Example:

Name	Type	Decimals	Label	Values	Measure
Name	String	0	Name		Nominal
Gender	Numeric	0	Gender	1 – Male 2 – Female	Nominal
Age	Numeric	0	Age		Scale
Rice	Numeric	0	Did you eat Rice in the past 7 days?	1 – Yes 0 – No	Nominal

The Variable view will look like this:



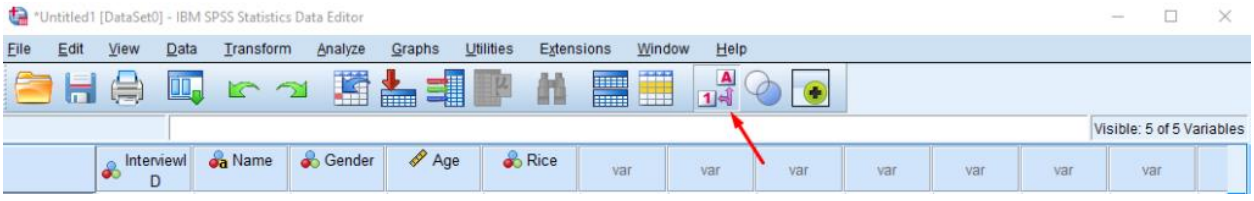
	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	InterviewID	Numeric	8	0	Interview ID	None	None	8	Right	Nominal	Input
2	Name	String	8	0	Name	None	None	8	Left	Nominal	Input
3	Gender	Numeric	8	0	Gender	{1, Male}...	None	8	Right	Nominal	Input
4	Age	Numeric	8	0	Age	None	None	8	Right	Scale	Input
5	Rice	Numeric	8	0	Did you eat Ric...	{0, No}...	None	8	Right	Nominal	Input
6											
7											

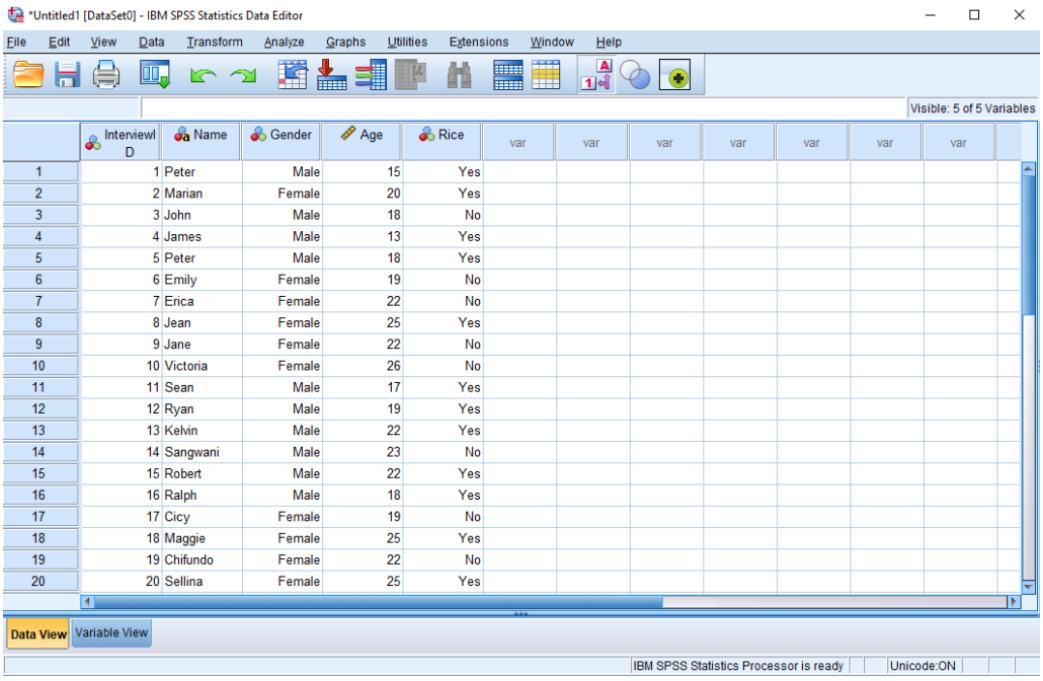
A/2- Data Entry in SPSS

Entering data in SPSS is simple and works like Excel:

1. **Go to Data View**: Click the "Data View" tab at the bottom-left of the screen.
2. **Enter Data**: Type values directly into the cells (e.g., type "1" in the Gender column).
3. **Show Labels**: Click the "Value Labels" button on the toolbar to display labels like "Male" instead of "1."

This makes data entry and viewing easier to understand.

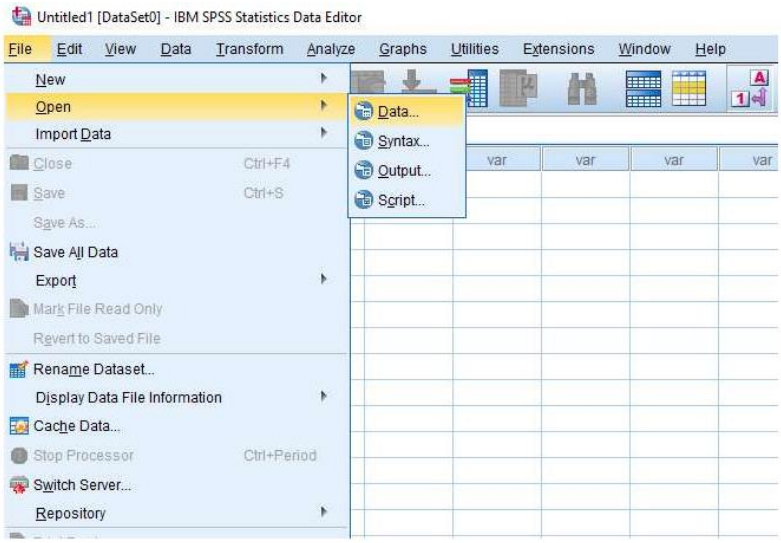




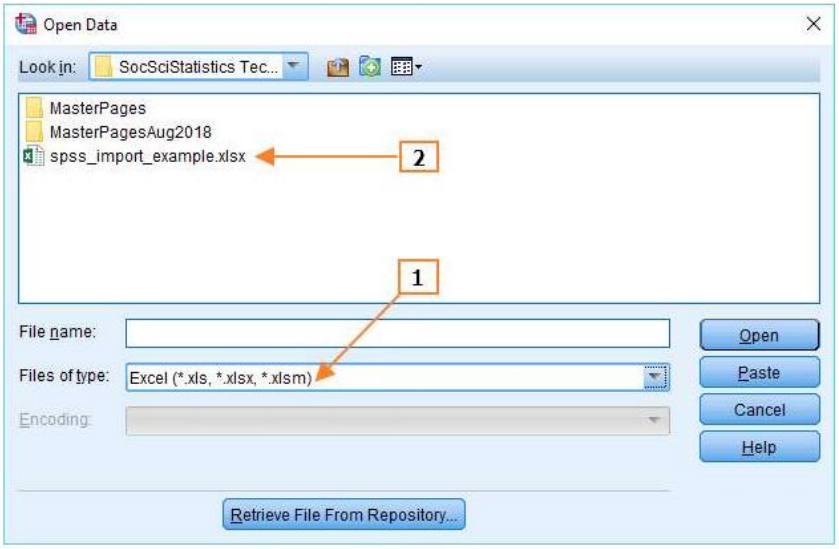
	InterviewID	Name	Gender	Age	Rice
1	1	Peter	Male	15	Yes
2	2	Marian	Female	20	Yes
3	3	John	Male	18	No
4	4	James	Male	13	Yes
5	5	Peter	Male	18	Yes
6	6	Emily	Female	19	No
7	7	Erica	Female	22	No
8	8	Jean	Female	25	Yes
9	9	Jane	Female	22	No
10	10	Victoria	Female	26	No
11	11	Sean	Male	17	Yes
12	12	Ryan	Male	19	Yes
13	13	Kelvin	Male	22	Yes
14	14	Sangwani	Male	23	No
15	15	Robert	Male	22	Yes
16	16	Ralph	Male	18	Yes
17	17	Cicy	Female	19	No
18	18	Maggie	Female	25	Yes
19	19	Chifundo	Female	22	No
20	20	Sellina	Female	25	Yes

B/-Importing Data from Excel into SPSS

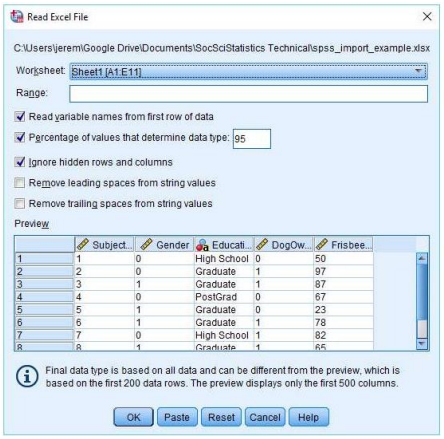
To start, click File -> Open -> Data (as below).



Once you click Data, the Open Data box will appear.



In the Files of type box, you need to select Excel (see 1 above), Then navigate to the folder that contains your Excel file, and you'll see your Excel file pop up (see 2 above). Open the file, and you'll get the Read Excel File dialog box.

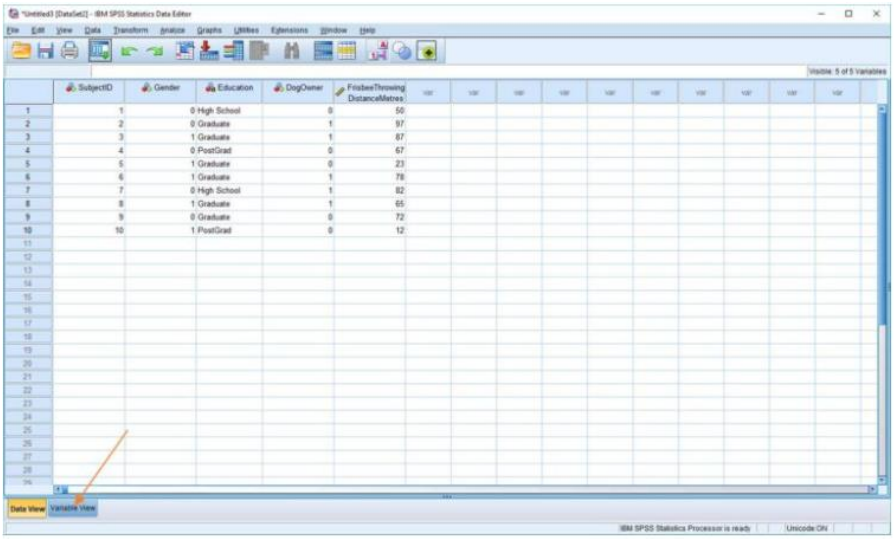


Read Excel File Dialog Box

This dialog box provides several options, most of which are easy to understand. One important option is the “Percentage of values that determine data type.” This setting controls how SPSS assigns a data type (e.g., numeric or string) to your variables. For example, if the percentage is set to 95%, SPSS will assign a numeric type if 95% of the values in a column are numbers. The percentage can be any number above 50. If SPSS cannot determine the data type, it will default to a string type. Once you've selected your options and checked the data in the preview window, click "OK" to start the import.

-Check Your Data Within SPSS

SPSS will import your data into a new Data View with variable names at the top.



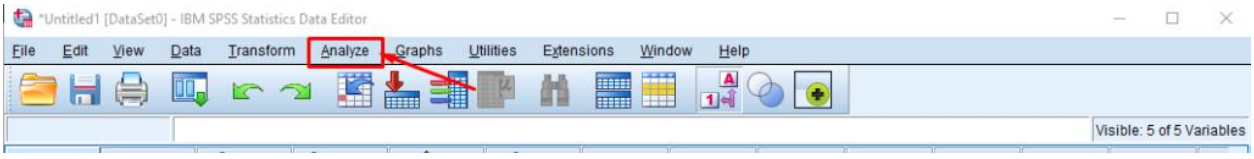
Obviously, the first thing to do here is to check that the data has come across successfully. If everything looks okay, the next stage is to check whether the various data parameters have been set correctly. Is numerical data correctly set as numerical, for example?

To check this, click on the Variable View tab (see red arrow, above). This will bring up the variable view within SPSS.

When importing data, SPSS defines variables automatically, but it’s still important to review and adjust the settings in the Variable View to ensure accuracy before performing any analysis

Step 3: Data Analysis

There are numerous kinds of data analyses available in SPSS and all of them are found under the **Analyze** option on the menu.

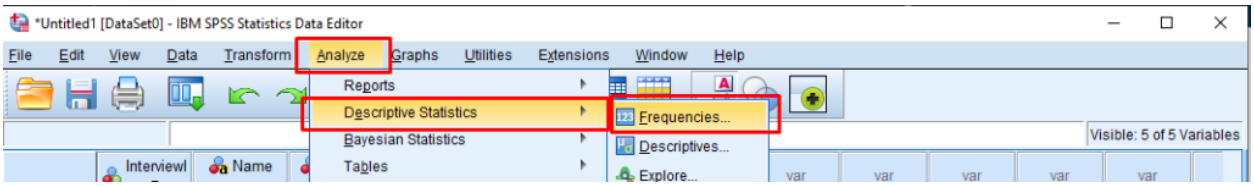


In this lesson, we will look at basic descriptive statistics.

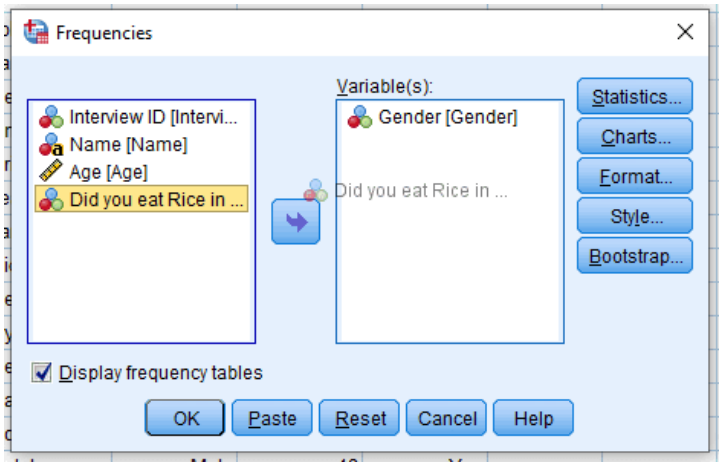
A/- Analyzing categorical variables

Variables that were designated as ordinal or nominal are best analyzed using frequencies. Frequencies are simply the number of times a value appears in the data set. For example, we may be interested to know how many people were male and how many were female.

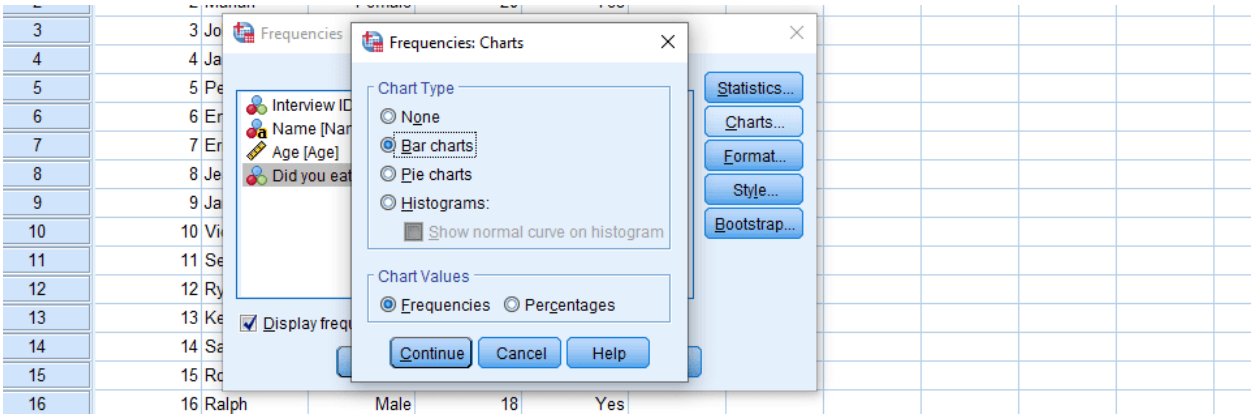
Click on the Analyze item on the menu, point on Descriptive statistics and click Frequencies



On the dialog box, Click and drag the Gender variable to the box on the right

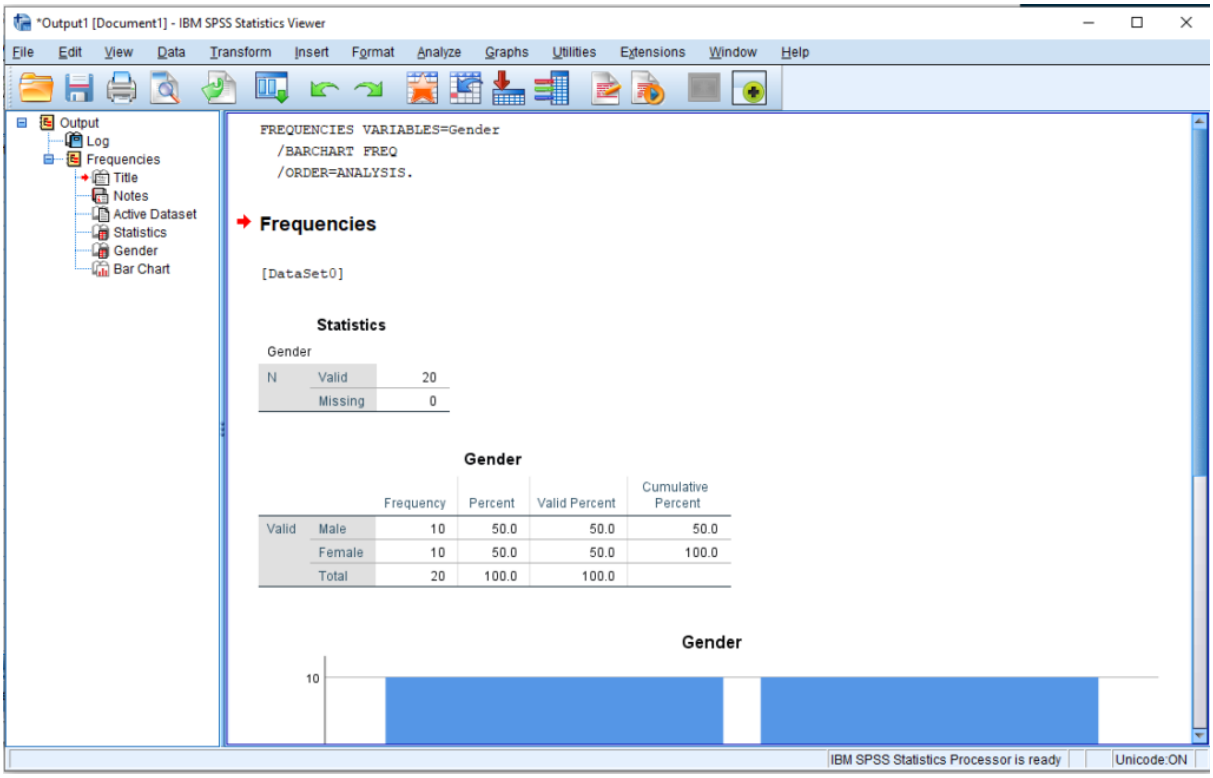


- Do the same for the “Did you eat Rice in the past 7 days?”
- Click the Charts button on the right of the dialog box
- Choose bar charts and click Continue



- Click OK

A new window called the Viewer will appear with the results of your analysis



The first table in the output are the **Statistics**. Since we did not select any statistics, we only have 2 values: Valid and Missing.

- The **Valid** number represents the number of cases that have valid responses on the variable.
- The **Missing** number represents the number of cases that did not provide a valid response to the variable – either by leaving it blank or by providing a value that we defined as Missing in the variable view.

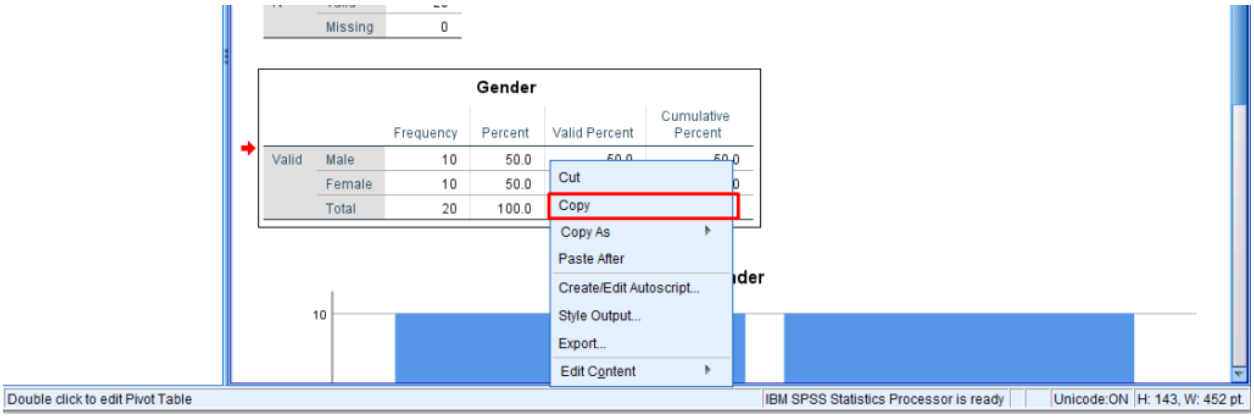
The second table is the Table of Frequencies.

- **Frequency**: The count of how often a value appears in the dataset.
- **Percent**: The frequency expressed as a percentage of the total cases.
- **Valid Percent**: The percentage based on only the valid (non-missing) cases; typically reported.
- **Cumulative Percent**: The running total of the Valid Percent column up to the current row.

To report the results from the table you can say:

There was a total of 20 respondents in the survey. Out of this, 10 were Male, and 10 others were Female – each representing 50% of the sample respectively.

To get the output to Microsoft Word for your reporting, just right-click on the output e.g. a chart or a table and select copy. In Microsoft Word, right click where you want the chart or table to go and select paste.



B/-Analyzing continuous (scale variables)

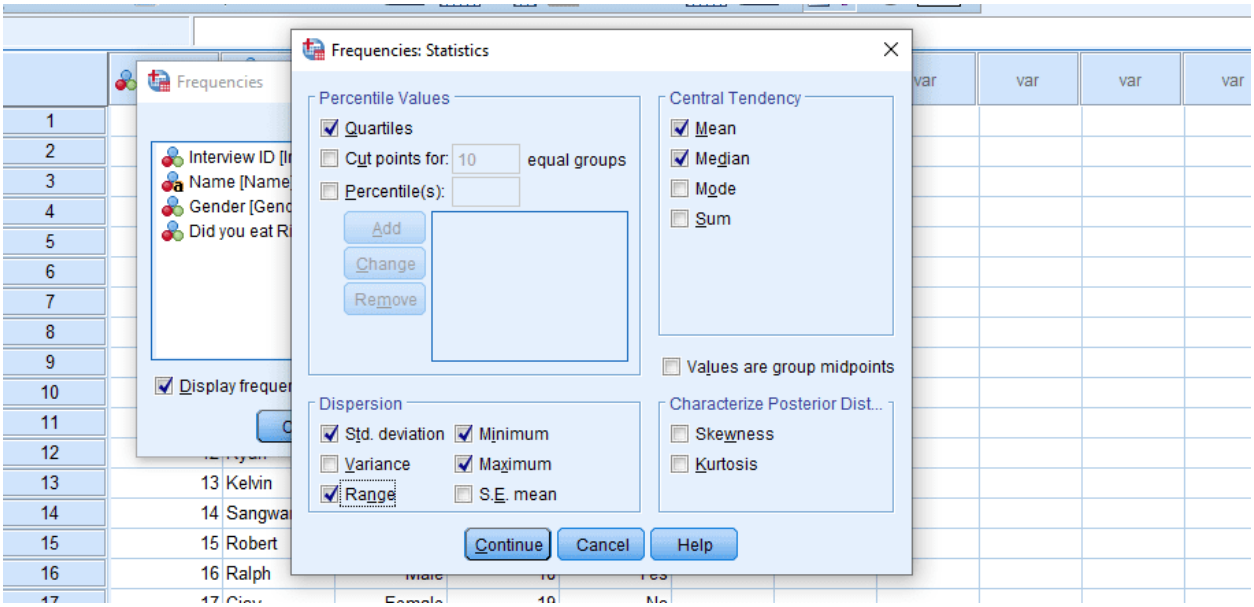
The frequency table that we produced in the last analysis wont work well with variables that have many different data values, for example age. The result will simply be a long table of frequencies that doesn't make any sense.

When we arrange the values of a variable in order from the lowest to the highest, we call this the **frequency distribution**.

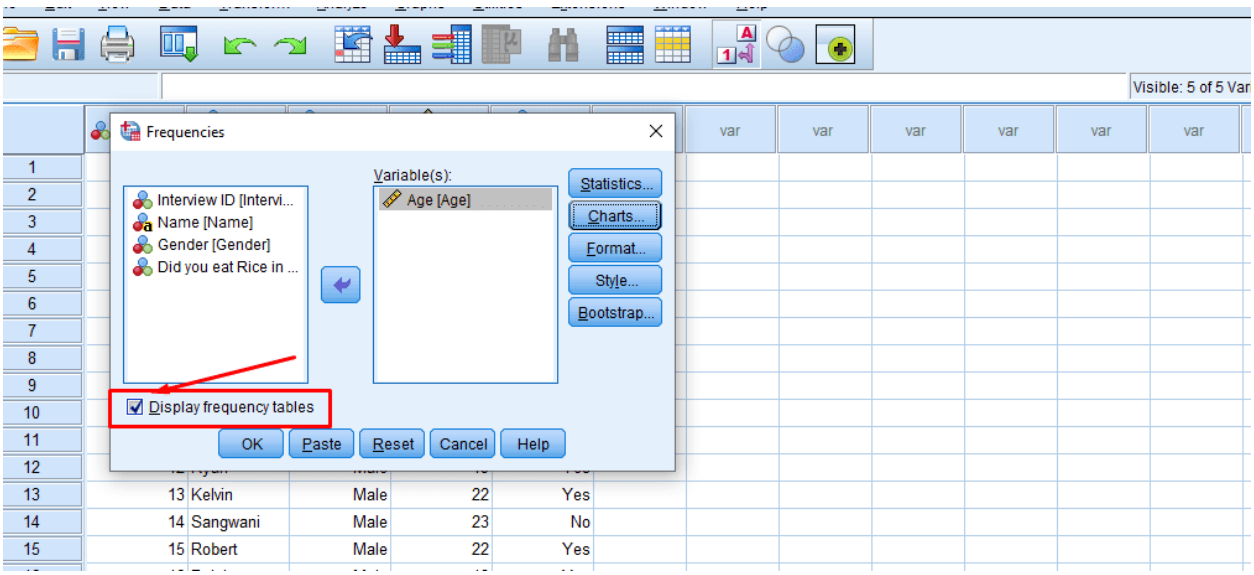
To analyze scale variables, we first of all find the central point or average of the frequency distribution. We use the **mean**, the **median** or the **mode** for this. These 3 measures are known as **measures of central tendency**.

The measures of central tendency alone wont paint the full picture of what's going on with the variable. Aside from observing the central point, we also need to know how the values vary within the variable. We do this using **measure of variability** also known as **measures of dispersion**. These include the **range**, **variance** and **standard deviation**.

- Back in the SPSS data editor window, click Analyze -> Descriptive Statistics -> Frequencies
- Click the **Reset** button at the bottom of the dialog box
- Move the Age variable to the box on the right by dragging and dropping
- Click the **Statistics** button
- Put checkmarks on Mean, Median, Std Deviation, Range, Minimum, Maximum and Quartiles

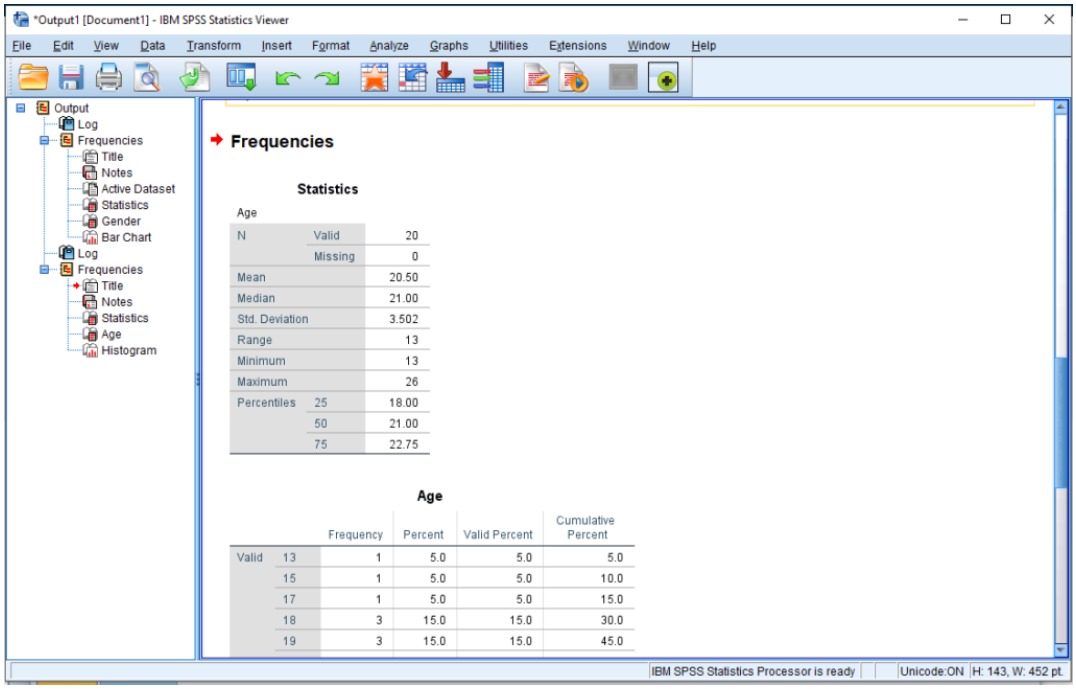


- Click **Continue**
- Click the **Charts** button
- Select Histogram and turn on "Show normal curve on histogram"
- Click **Continue**
- Turn off "**Display Frequency Table"** option at the bottom left of the Frequencies dialog box



- Click **OK**

Once again, you will have your output appear in the Viewer window.



Once again we have our Table of Statistics. This time with more statistics – the ones we selected in the Statistics options dialog box

- **Mean**: The average, calculated by adding all values and dividing by the total number of values.
- **Median**: The middle value of a data set. If there are an even number of values, it's the average of the two middle numbers.
- **Standard Deviation**: Measures how much values differ from the mean on average. A value of 0 means no variability, while a higher value indicates greater differences.
- **Range**: The difference between the largest and smallest values.
- **Percentiles**: Indicate the value below which a certain percentage of the data falls (e.g., the 25th percentile shows the value below which 25% of scores lie).

III-Analyzing Qualitative Data with Nvivo (Introduction to Nvivo)

II-1-Overview of NVivo

II-1-1-What is NVivo?

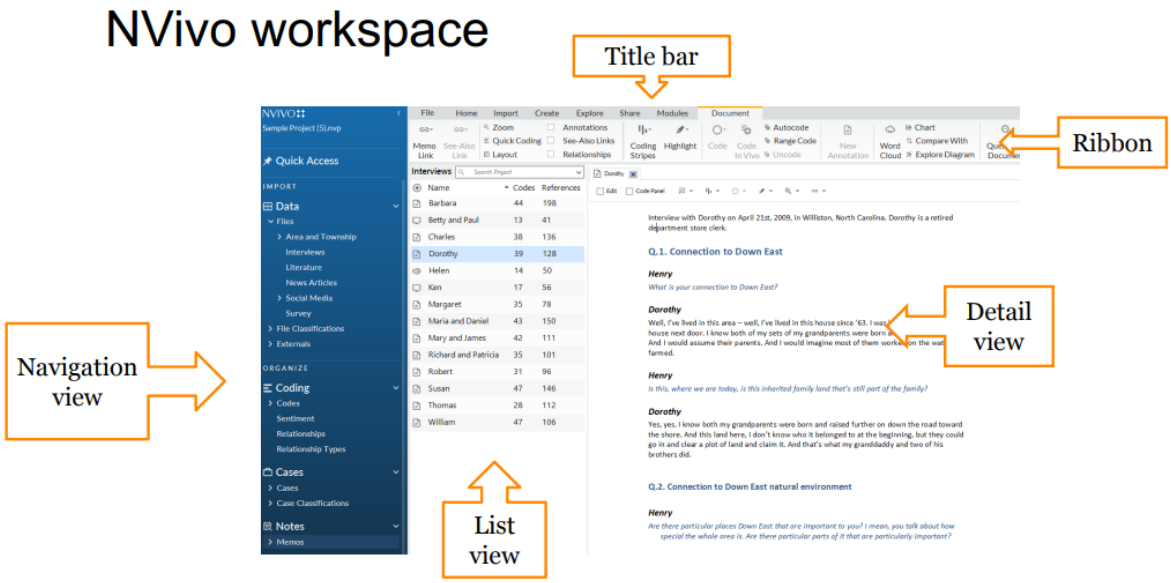
NVivo is a software program used for qualitative and mixed-methods research. Specifically, it is used for the analysis of unstructured text, audio, video, and image data, including (but not limited to) interviews, focus groups, surveys, social media, and journal articles. It is available for both Windows and Macintosh operating systems. (Pival, 2023).

II-1-2-Why Use NVivo for Qualitative Data Analysis?

- Handles large and diverse datasets (text, audio, video, surveys, etc.).
- Provides advanced coding tools to identify and organize themes.
- Facilitates data organization with classifications and attributes.
- Includes visualization tools (word clouds, charts, tree maps, concept maps).
- Integrates with other platforms (Excel, SurveyMonkey, social media, EndNote).
- Ideal for mixed-methods research (qualitative + quantitative integration).
- Generates reports and exports findings for publication or presentations. (Dhakal, 2022).

II-2-Explore the NVivo Interface

The left side menu (navigation view) helps you navigate the various items of your project, such as your files, codes, notes, queries, etc. We will look at these sections as we use the tool.

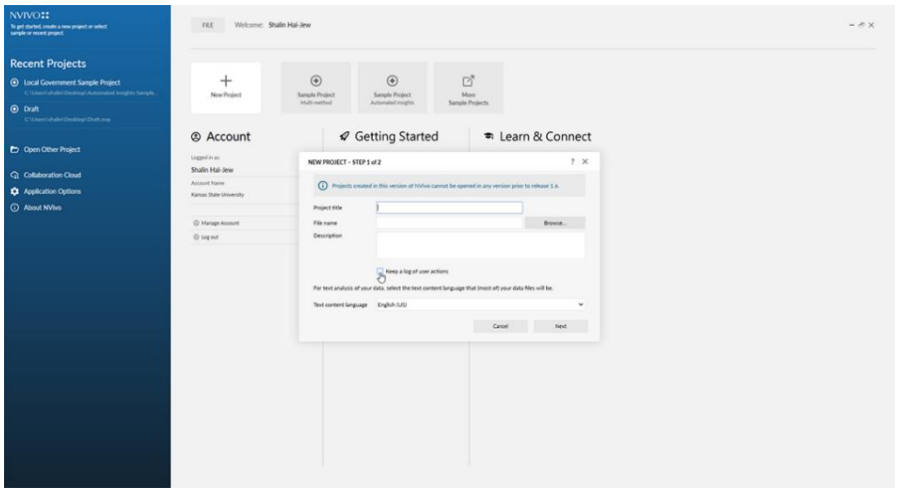


At the top are various ribbon menus, similar to Microsoft tools, such as Word or Excel. These menus and their options will change depending on what is selected.

II-3-Step-by-Step NVivo Data Analysis Process

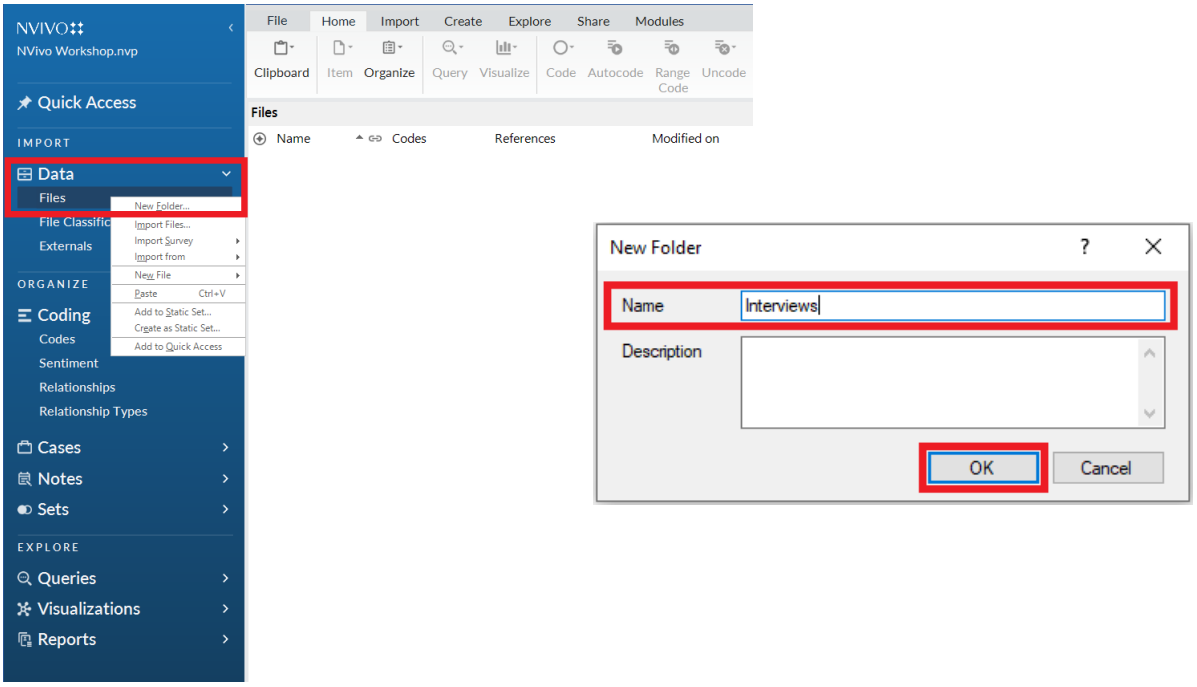
Step 1: Set Up a New Project

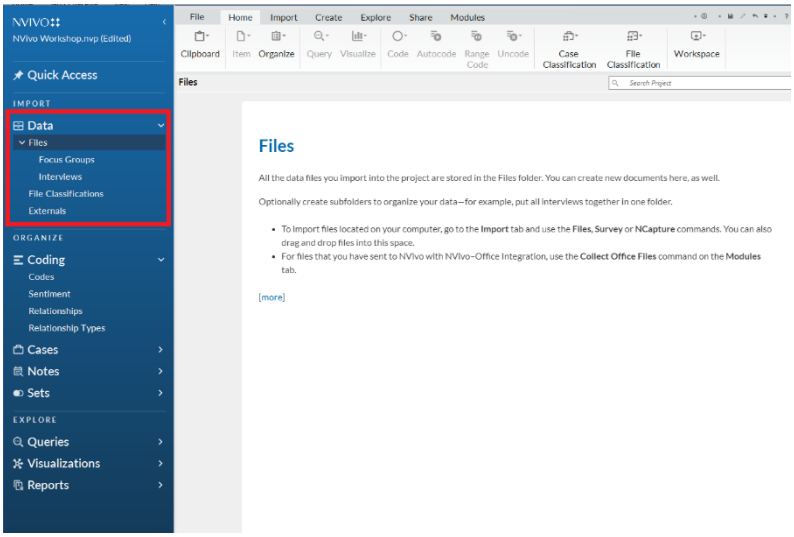
- Create a new project: Open NVivo and click on "New Project."
- Provide a name and optional description for your project.
- Save the project file to a designated folder on your computer.



Step 2: Organize Data

1. Open NVivo and navigate to your project.
2. In the Navigation Pane (left menu), expand Data.
3. Right-click on Files and select New Folder.
4. Name the folder based on your data type (e.g., “Interviews,” “Focus Groups”).
5. Repeat this process for other data categories to create a structured workspace.

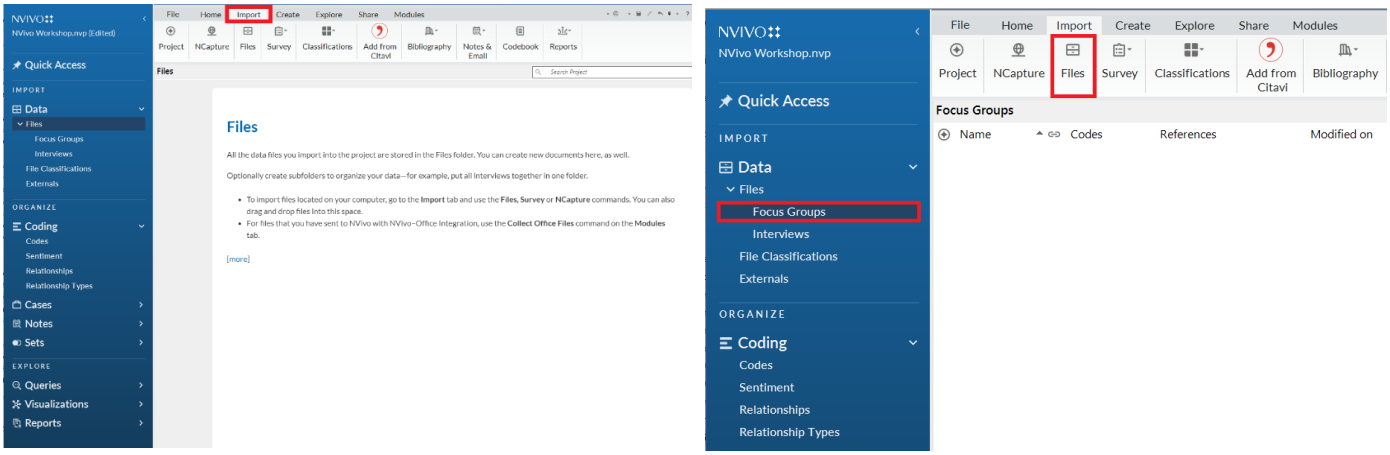




Step 3: Import Data

You can import a wide range of materials into NVivo, including word documents, PDFs, audio/video recordings, social media content, web pages, journal articles and survey data.

- Click on the folder you created (e.g., “Interviews”).
- Right-click inside the folder and select **Import > Files** (or use the toolbar's Import option).
- Browse your computer to find the data files (e.g., Word documents, PDFs, audio, or video files).
- Select the files and click **Import**.
- Review the imported files to ensure they are placed in the correct folder.



Step 4: Creating Codes and Coding

Codes act as containers to hold references to specific themes, topics, or ideas in your data. Accessible from the **Codes** section in the left menu, which includes folders like **Codes** and **Sentiment**.

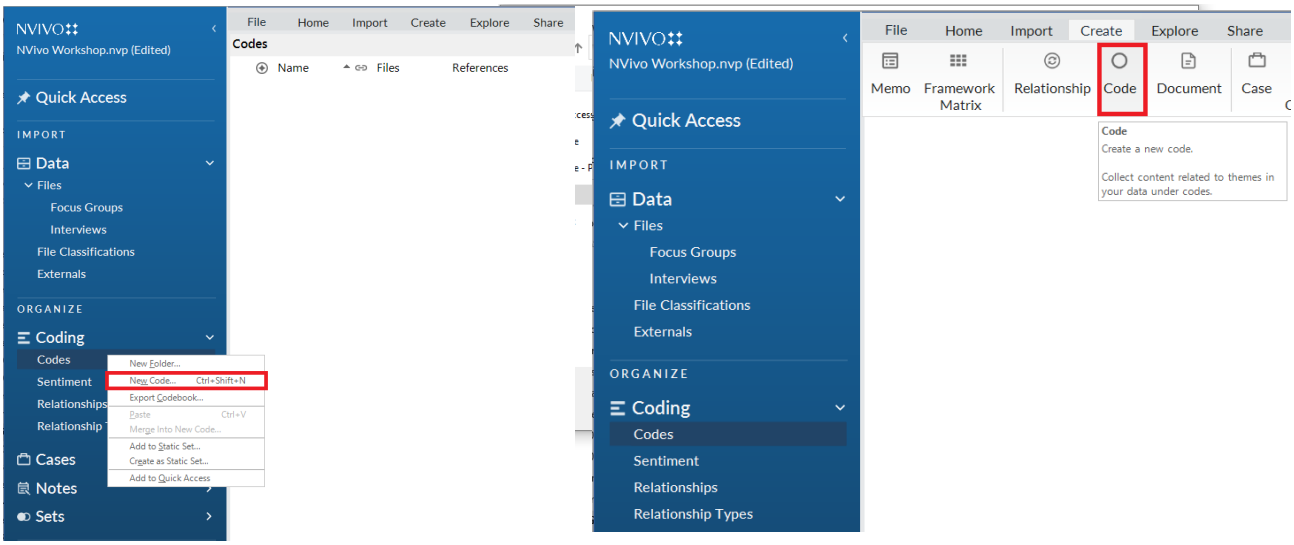
- **Approaches to Coding**:

- **Deductive**: Predefined codes are created before analyzing the data.
- **Inductive**: Codes are created as you analyze the data and discover new themes.
- **Combination**: Start with predefined codes but create new ones as themes emerge.

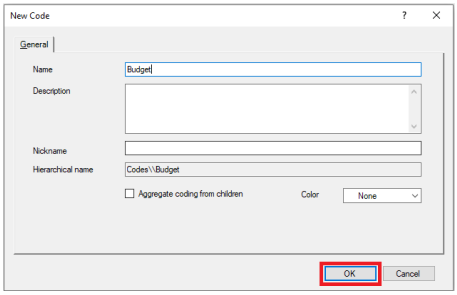
Example Process:

- Begin by creating a few predefined codes in the **Codes** section.
- As you review your data, create additional codes as needed.

1-From the Codes section on the left, **right click on the Codes folder** and **select New Code** or you can go to the **Create menu** and **select Code** to create a new code.

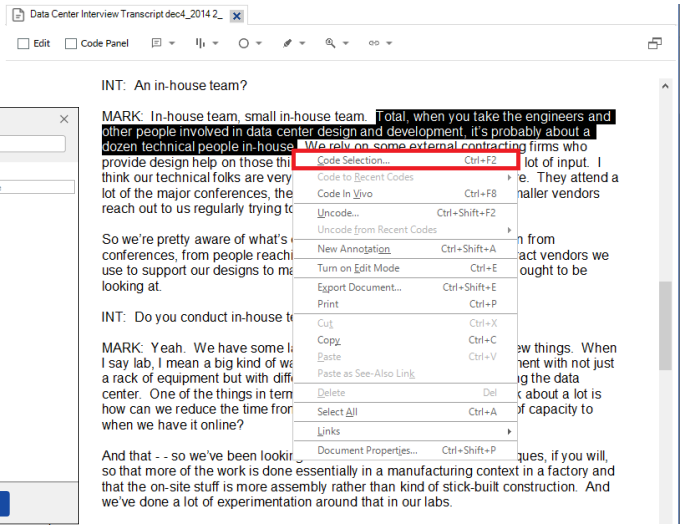


2-Enter a name, a description and a nickname (optional) for your new code.

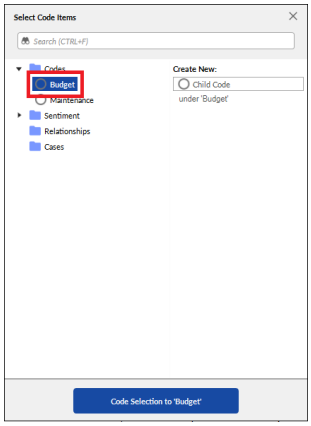


Coding:

Open a file, highlight the text you want to code, right-click, and select **Code Selection**.



Next, **select the code you want to use to code** this text, such as Budget, and then **click Code Selection to Budget**. Now it is coded.



Step 5: Query Data

NVivo provides query tools to analyze coded data. You can run **text search queries**, **word frequency queries**, or **matrix coding queries**.

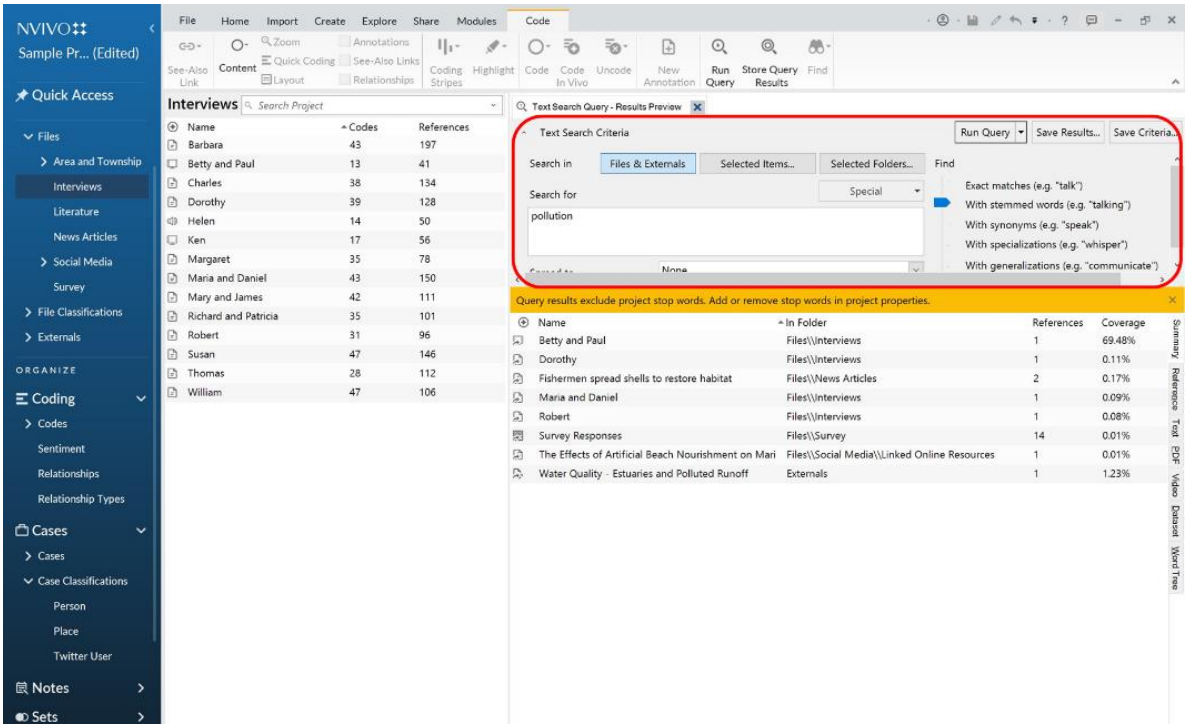
A-Text Search

Text search lets users find specific words or phrases in your project items.

1. On the **Explore** tab, click **Text Search** or **Query Wizard**.

Choose **See where particular terms occur in content** if using the wizard.

2. Enter the word or phrase you want to search for. You can also add Boolean operators in your query via the **Special** button.
3. Select a **Find** option and choose where you want to search (Files and Externals/Selected Items/Selected Folders)
4. Run the query.



B-Word Frequency Query

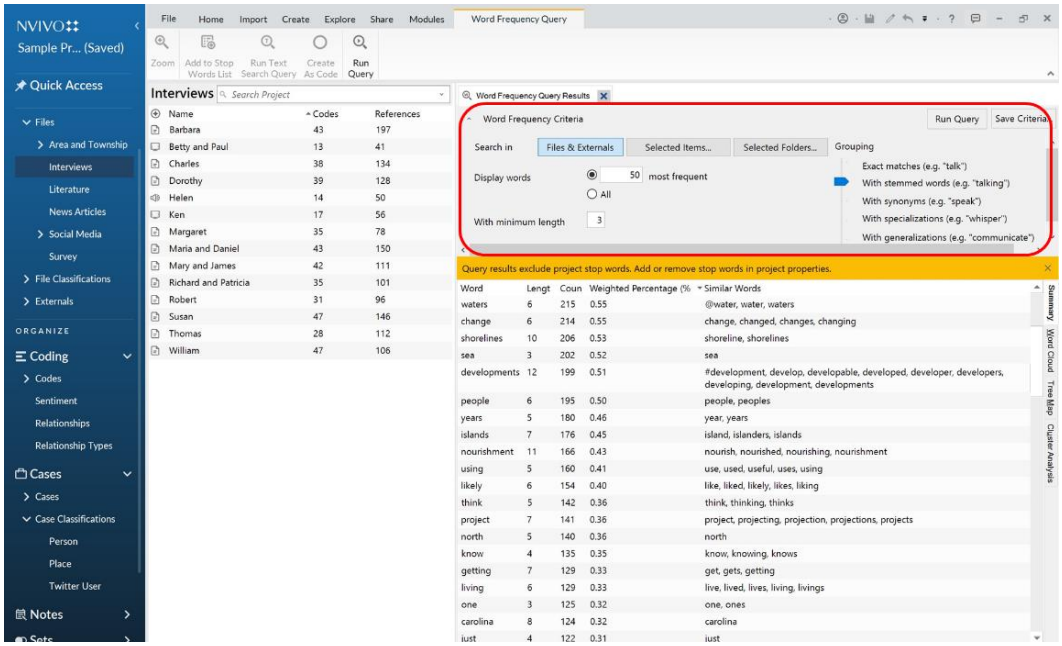
Word frequency queries let users find the most frequently occurring words in your data.

1. On the **Explore** tab, click **Word Frequency** or **Query Wizard**.

Choose **Identify frequently occurring terms in content** if using the wizard.

2. Specify the terms you want to search for and choose where you want to search.

3. Run the query.

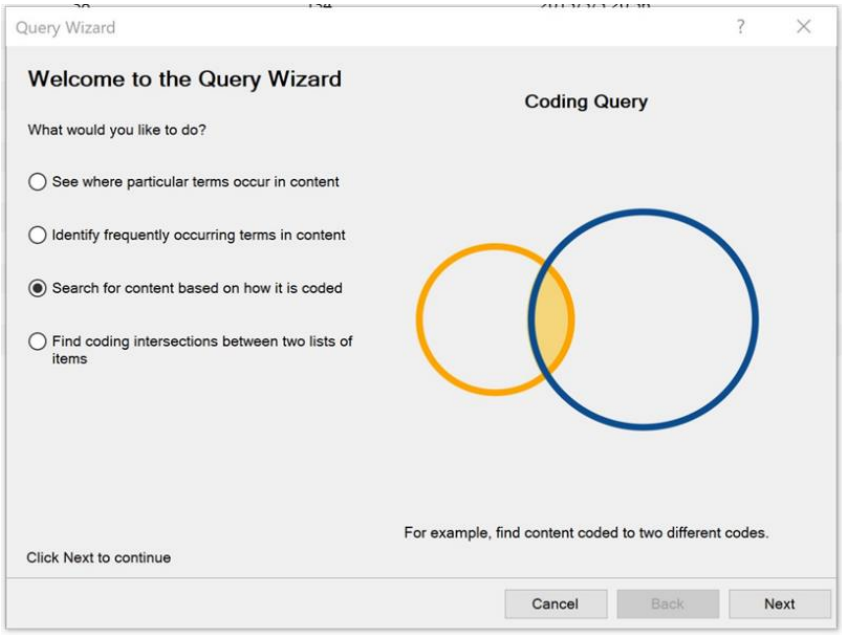


C/-Coding Query

You can run a coding query for two or more codes to see where they intersect (e.g. Negative attitudes toward Real estate development).

1. On the **Explore** tab, click **Queries** or **Query Wizard**.

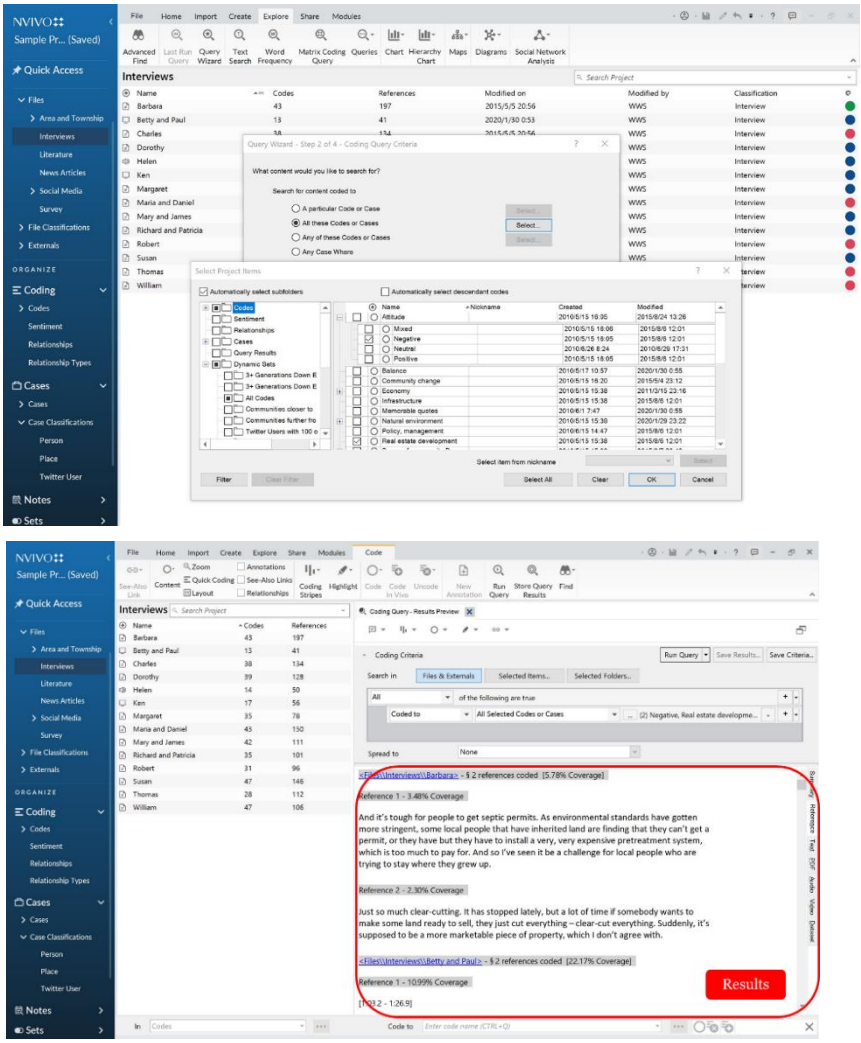
Choose **Search for content based on how it is coded** if using the wizard.



2. Select what content you would like to search for.

e.g. To run a query on the intersection of the specific codes you are interested in, select **All these Codes or Cases**, then choose the relevant codes.

3. Choose where you want to search.
4. Run the query.



Step 6: Analyze Data

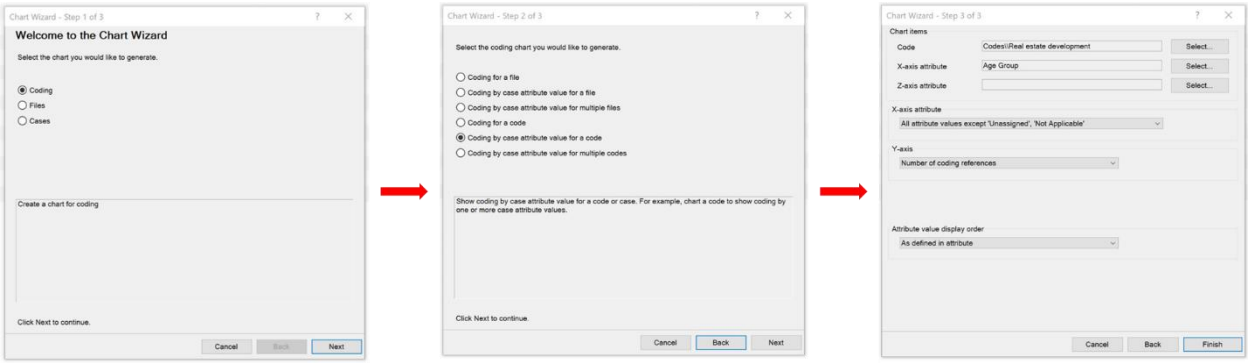
After coding and running queries, NVivo allows you to explore your data through visual tools like **charts**, **word clouds**, and **models**.

A/-Charts

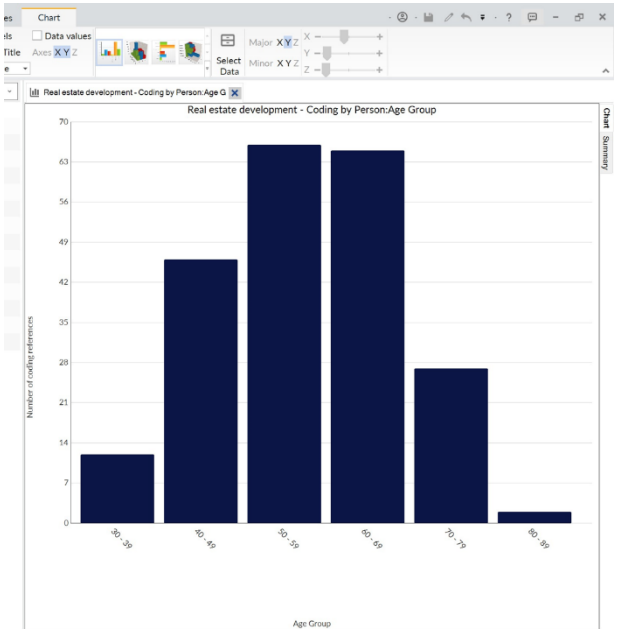
Charts can be used to present or explore your coding, cases, or files.

1. On the **Explore** tab, click **Chart**. The **Chart Wizard** appears.
2. Select the chart you would like to generate, and set the code and attributes for your chart.

The example demonstrates how to create a chart showing Real estate development coding by age group.



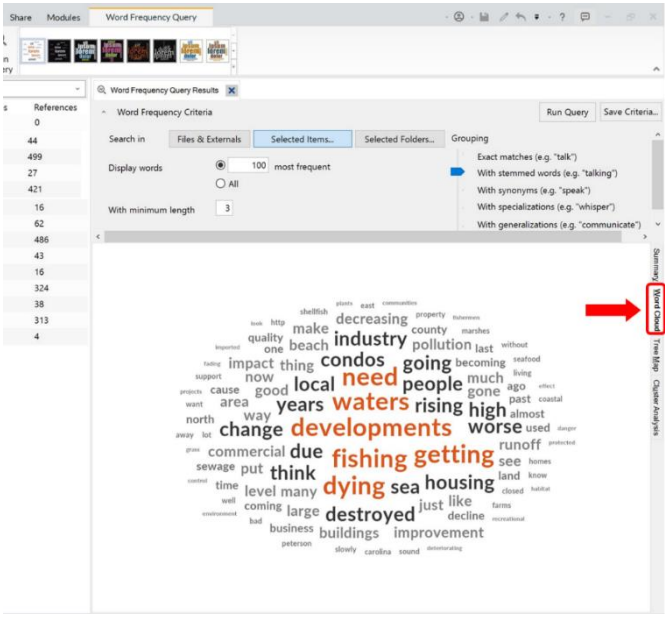
3. Click **Finish**.



B/-Word Clouds

You can use NVivo to generate word clouds to visualize word frequency.

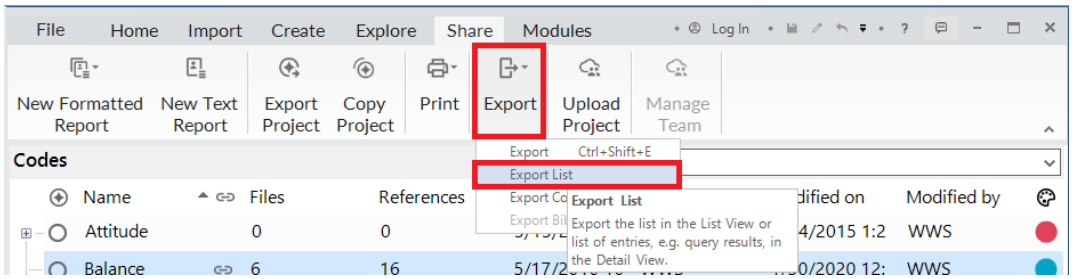
1. Run the **Word Frequency Query**.
2. In the Detail View of the query results, click Word Cloud.



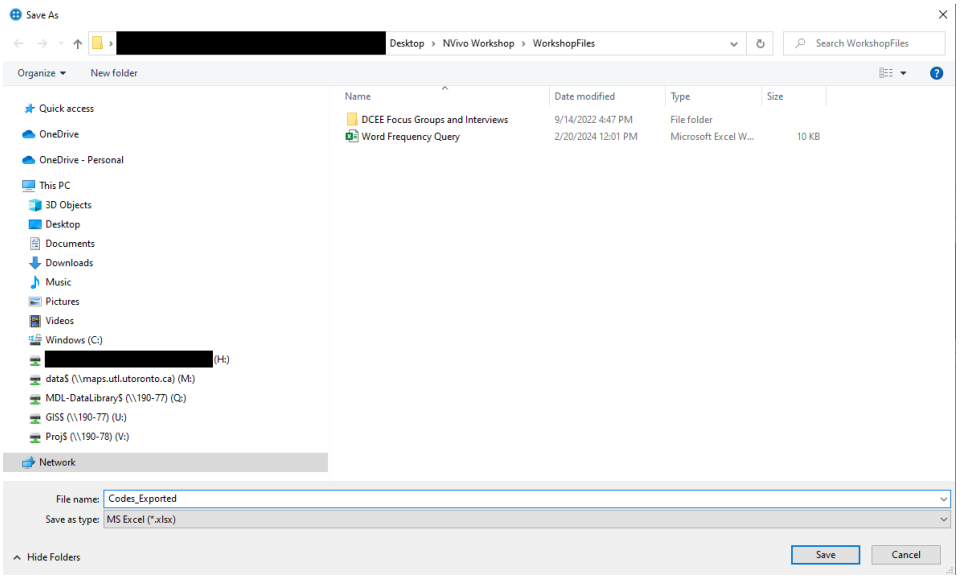
Step 7: Export Results

Once your analysis is complete, you can export results to Word, Excel, or other formats.

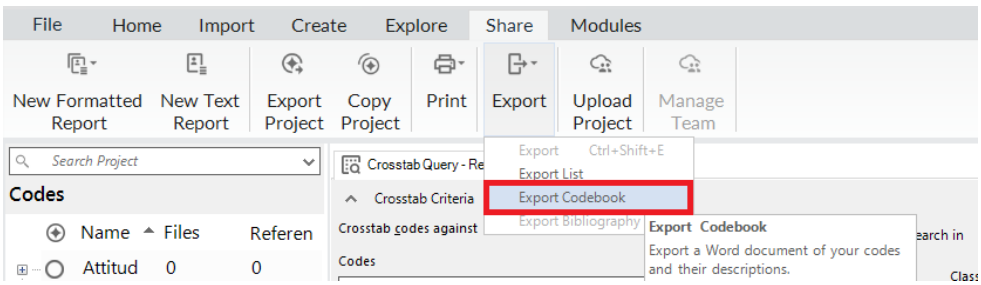
To export your full list of codes, first open up your Codes list and select at least one code. **Go to the Share menu, and from the Export drop-down menu, select Export List**. This will save all of your codes in a spreadsheet. It will include the number of files coded with that code, and the number of references.



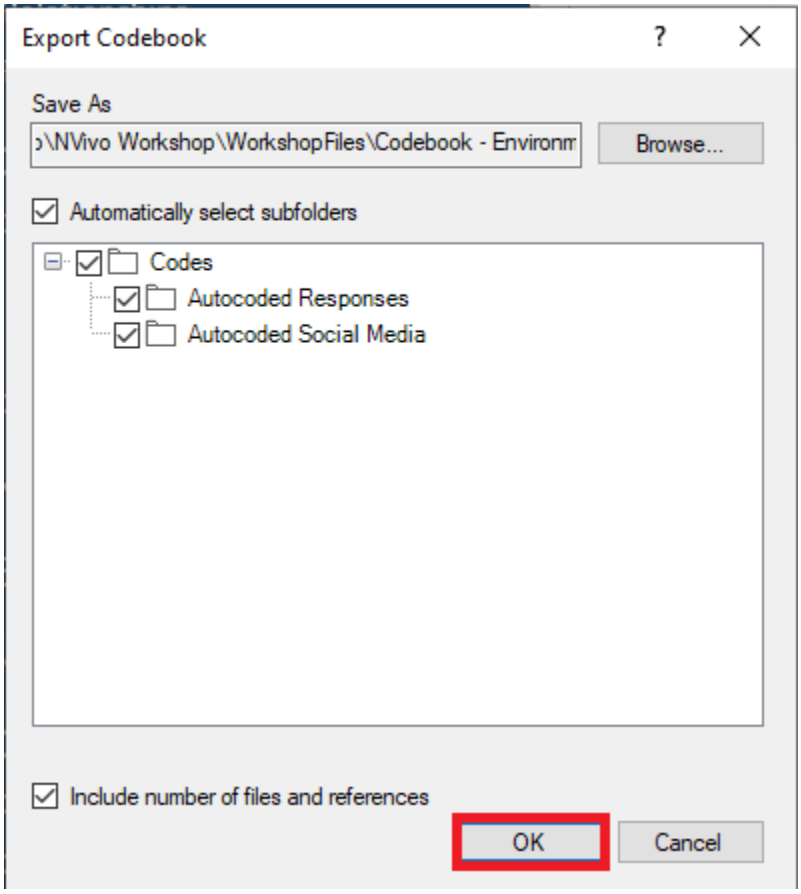
Browse to your workshop folder, name your file or keep the default and click on Save.



You can also export your codebook (a structured list of all your codes (or nodes) along with their descriptions, definitions, and other details.), to understand when a code is normally used. Again, go to the Share menu, and from the Export drop-down menu, select Export Codebook.



Select Include number of files and references. This creates a Word document with this information. Keep the defaults and click on OK. (https://survivingresearch.com/how-to-use-nvivo-step-by-step-guide-2025/)



Bibliography

- Bryman, A., & Cramer, D. (2011). Quantitative Data Analysis with IBM SPSS 17, 18 and 19: A Guide for Social Scientists (4th ed.). Routledge
- Dhakal, K. (2022). NVivo. Journal of the Medical Library Association, 110(2), 270-272. https://doi.org/10.5195/jmla.2022.1271
- Guerrero, H. (2019). Excel Data Analysis: Modeling and Simulation (2nd ed.). Springer. https://doi.org/10.1007/978-3-030-01279-3
- Islam, M. (2020). Data Analysis: Types, Process, Methods, Techniques and Tools. International Journal on Data Science and Technology, 6(1), 10-15. https://doi.org/10.11648/j.ijdst.20200601.12
- Okutan, P. (2023, May 4). Choosing the right tools for data analysis: A beginner's guide. Medium. https://medium.com/@pelinokutan/choosing-the-right-tools-for-data-analysis-a-beginners-guide-cc0e6f9e36f1

- Pival, P. (2023). A Gentle Introduction to Using NVivo to Analyse Qualitative Survey Data. International Federation of Library Associations and Institutions (IFLA).
- So, H. Y., Erbas Oz, U., Griffith, L., Kirkland, S., Ma, J., Raina, P., Sohel, N., Wolfson, C., & Thompson, M. E. (2020). Modelling complex survey data using R, SAS, SPSS and Stata: A comparison using CLSA datasets. arXiv. https://arxiv.org/abs/2010.09879
- Rahman, A., & Muktadir, M. G. (2021). SPSS: An imperative quantitative data analysis tool for social science research. International Journal of Research & Innovation in Social Science, 5(10), 300-302. Retrieved from https://rsisinternational.org/virtual-library/papers/spss-an-imperative-quantitative-data-analysis-tool-for-social-science-research/

Webography

- https://www.coursera.org/articles/data-analysis-tools
- https://survivingresearch.com/how-to-use-nvivo-step-by-step-guide-2025/