CEEISCAT
Centre d'Estudis Epidemiològics sobre les Infeccions de Transmissió Sexual i Sida de Catalunya

Jamovi

Introduction to Jamovi for the Calculation and Descriptive Analysis of Epidemiological Indicators

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1. What is Jamovi?

Jamovi is a free and open-source statistical software designed to be user-friendly and accessible for people without extensive programming skills. It was developed as a response to the growing need for software that is both intuitive and powerful for statistical analysis. The software is built on top of the R statistical language, providing a graphical user interface (GUI) that allows users to perform a wide range of analyses without needing to write code.

Jamovi is particularly popular in academia and research because of its ease of use, ability to integrate with R for more advanced analyses, and its wide range of statistical tools. It is also designed to be community-driven, with many additional modules available through the built-in Jamovi library, extending its capabilities beyond the default installation.

2. Summary of Features

Jamovi provides a wide range of statistical tools for both beginners and advanced users. Some of the key features include:

- **Descriptive Statistics**: Easily generate descriptive summaries, including measures of central tendency, dispersion, and distribution.
- **T-tests and ANOVA**: Perform various types of t-tests and ANOVA for comparing groups and examining differences.
- **Regression Analysis**: Conduct linear and logistic regression analysis with just a few clicks.
- **Frequency Analysis**: Create frequency tables and conduct chi-square tests.
- **Data Manipulation**: Provides tools for filtering, transforming, and recoding data.
- Jamovi is designed to be a complete package for statistical analysis, suitable for education, research, and data analysis in a variety of fields including health, social sciences, and business.

3. How to Install Jamovi

Installing Jamovi is a straightforward process, and it is available for multiple platforms, including Windows, macOS, and Linux. Follow the steps below to install Jamovi on your system:

3.1. Windows Installation

1. Go to the official Jamovi website: https://www.jamovi.org.
2. Navigate to the **Download** section.
3. Under the **Windows** tab, select the version appropriate for your system (32-bit or 64-bit).
4. Once the installer is downloaded, open the file and follow the installation prompts.
5. After installation is complete, you can launch Jamovi from your desktop or start menu.

3.2. macOS Installation

1. Visit the official Jamovi website at: https://www.jamovi.org.
2. Go to the **Download** section and select the **macOS** version.
3. Once the download is complete, open the `.dmg` file.
4. Drag the Jamovi icon into your `Applications` folder.
5. You can now launch Jamovi from the `Applications` folder or the Launchpad.

3.3. Linux Installation

1. Jamovi is available through flatpak for most Linux distributions.
2. First, install flatpak by following the instructions for your distribution.
3. Once flatpak is installed, open a terminal and run the following command:

```
flatpak install flathub org.jamovi.jamovi
```

4. After installation is complete, you can launch Jamovi from your application launcher or by typing the following command in your terminal:

```
flatpak run org.jamovi.jamovi
```

Jamovi is now ready to use! Whether you are analyzing data for research or learning statistics, Jamovi offers an easy-to-use platform for all your statistical needs.

4. Exploring the Jamovi Interface

Once Jamovi is installed and opened, you'll be presented with an intuitive and user-friendly graphical user interface (GUI). The interface is divided into several key areas:

4.1. Change leanguaje

We navigate to the three dots as shown in Figure 1 and select the "Language" dropdown.

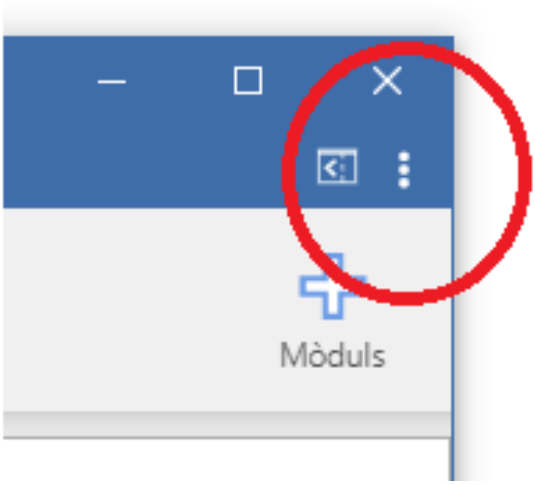

Figure 1
Tools Jamovi

4.2. Data View

The central area of the screen is the **Data View**, which is similar to a spreadsheet. This is where you can view, edit, and input your data. Each row corresponds to an observation (e.g., an individual or a case), while each column represents a variable (e.g., age, gender, or test score).

4.3. Variables View

In addition to the **Data View**, Jamovi also includes a **Variables View**, where you can see details about the variables in your dataset. You can access it by clicking the variable icons on the left. Here, you can modify variable types (e.g., continuous, categorical), change labels, and add descriptions.

4.4. Analysis Panels

On the right side of the interface, you'll find the **Analysis Panels**. This is where the results of your analyses are displayed. Jamovi provides real-time updates, so every time you modify an analysis, the output will automatically refresh.

4.5. Modules

Jamovi is modular, meaning you can add additional functionality through modules. These modules can be installed via the "Modules" button at the top of the screen. Some popular modules include advanced statistical tests, machine learning, and psychometrics.

5. Loading Data into Jamovi

Before you can start analyzing data, you need to import a dataset into Jamovi. Jamovi supports various data formats, such as CSV, Excel, and SPSS files. To load a dataset, follow these steps:

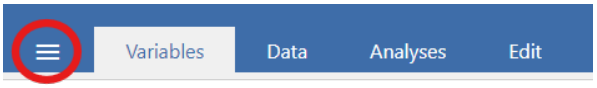

Figure 2
Main menu

1. Click on the **Open** button located at the top-left corner of the interface.
2. Select **Browse** and navigate to the location of your dataset.
3. Choose your dataset in one of the supported formats (e.g., CSV, Excel, or SPSS).
4. Click **Open** to load the data into Jamovi.

After loading the data, you'll see it displayed in the Data View, where you can begin exploring or modifying it as necessary.

6. Performing a Descriptive Analysis

Now that your data is loaded, you can perform a basic descriptive analysis to summarize key variables. Follow these steps to compute descriptive statistics:

6.1. Step-by-Step Guide

1. Go to the **Analyses** panel on the left-hand side.
2. Click on **Exploration** to open the analysis menu.
3. Select **Descriptives** from the list of available options.

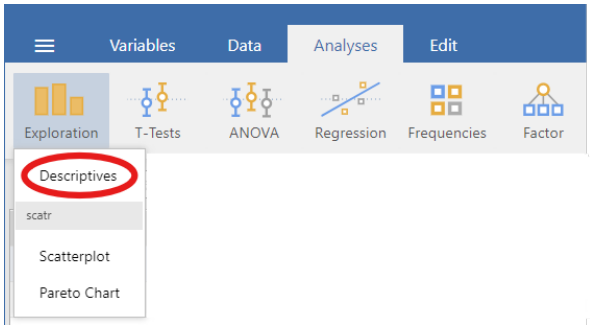

Figure 3
Descriptive Seccion

4. In the window that appears, choose the variables you want to analyze by dragging them from the left panel into the "Variables" box.
5. By default, Jamovi will compute basic statistics, such as the mean, median, standard deviation, and range. You can customize these options in the "Statistics" tab.
6. To include visualizations, such as histograms or boxplots, check the corresponding options in the "Plots" tab.
7. The results will automatically appear in the **Analysis Panels** on the right side of the screen.

6.2. Interpreting the Results

Once the analysis is complete, you'll see a table displaying the summary statistics for each variable you selected. Key values to interpret include:

- **Mean**: The average value of the variable.

- **Median**: The middle value when the data is sorted.
- **Standard Deviation**: A measure of how spread out the values are.
- **Range**: The difference between the maximum and minimum values.

In addition to the numerical output, Jamovi can generate plots to help you visually interpret your data. For example, a histogram shows the distribution of a variable, while a boxplot provides insights into the spread and potential outliers in the data.

7. Saving Your Results

Once you've completed your analysis, you may want to save both the dataset and the results for future reference. Jamovi provides several options for exporting data and results:

7.1. Saving the Dataset

1. Click on the **Save** button at the top-left corner of the screen.
2. Choose **Save As** to specify a location and filename for your dataset.
3. Jamovi will save the data in its native format (`.omv`), which allows you to reopen and continue working on the same project later.

7.2. Exporting Results

1. To export the results of your analysis, click the **Export** button in the top-right corner of the analysis panel.
2. You can choose to export the results as a Word document (`.docx`), a PDF file (`.pdf`), or an image (`.png`) for use in presentations or reports.

8. Exporting Results in Jamovi

After performing your analysis in Jamovi, you may want to export your results for sharing or further use in reports and presentations. Jamovi offers several export formats, each with its own advantages depending on your needs.

8.1. Steps to Export Results

1. To export the results of your analysis, click the **Export** button in the top-right corner of the analysis panel.
2. You can choose to export the results in various formats such as Word document (`.docx`), PDF file (`.pdf`), or image (`.png`) for use in presentations or reports.

8.2. Available Export Formats

Jamovi allows exporting results in several formats, each suited to different purposes. Below is a comparison of the most commonly used export formats, with details about their characteristics and when to use each one.

File Format	Characteristics
`.omv` (Jamovi)	The native Jamovi format. This format saves both your data and all the analyses you have conducted. It allows you to reopen the file in Jamovi and continue working where you left off, with full functionality for modifying analyses and generating new results.
`.pdf` (Portable Document Format)	Ideal for sharing finalized reports. A PDF captures the output as a static, print-ready document. It is not editable but ensures that the layout and appearance remain consistent across all devices.
`.docx` (Microsoft Word)	Useful for editing and further enhancing your report. This format is fully compatible with Word processors, allowing for text and layout modifications, along with additional annotations or content.
`.csv` (Comma-Separated Values)	This format exports raw data tables. It is most useful for importing data into other software (such as Excel, R, or Python) for further analysis or visualization.
`.html` (HyperText Markup Language)	Suitable for web-based reports. Exporting to HTML allows you to share your results as a webpage, making it accessible in browsers. It is useful for interactive or easily accessible reporting.
`.png` (Portable Network Graphics)	Exports graphs and visual outputs as image files. The PNG format ensures a high-quality, lossless image suitable for presentations or embedding in documents.

Table 1
File formats available for exporting results in Jamovi and their characteristics.

As shown in Table 1, each export format serves different purposes. For example, if you plan to continue your analysis, you should save the results in the `.omv` format.

On the other hand, if you need a professional report for sharing with colleagues, the `.pdf` or `.docx` formats are more suitable. For raw data or further processing, `.csv` is recommended.

9. Example 1: Analyzing a Sample Dataset in Jamovi

In this section, we will use the sample dataset containing variables for `Sex`, `Weight`, and `Height` for 50 females and 50 males. The dataset is saved in the file `jamovi_example_data.csv`. We will load this dataset into Jamovi, perform descriptive analyses, and visualize the data using various plots. Finally, we will save the results for further use.

9.1. Loading the Dataset into Jamovi

To begin, open Jamovi and follow these steps to load the dataset:

1. Click the **Open** button in the top-left corner of the Jamovi interface.
2. Select **Browse** and locate the file `jamovi_example_data.csv`.
3. Once the file is selected, Jamovi will automatically load the dataset, and you will see the variables `Sex`, `Weight`, and `Height` displayed in the data view.

9.2. Descriptive Statistics

Once the dataset is loaded, we can perform a descriptive analysis to summarize the key variables.

1. In the left panel, click on **Analyses**.
2. Go to **Exploration** and select **Descriptives**.
3. Drag the `Weight` and `Height` variables into the "Variables" box.
4. Jamovi will automatically calculate descriptive statistics such as the mean, median, standard deviation, and range.

Descriptives

	Weight	Height
N	100	100
Missing	0	0
Mean	70.9	169
Median	70.9	168
Standard deviation	10.1	11.1
Minimum	50.1	150
Maximum	89.4	190

Figure 4
Descriptives1

9.3. Exploring Differences by Sex

We can compare the weight and height between males and females. To do this, we will group the analysis by the variable `Sex`:

1. In the same **Descriptives** analysis window, drag `Sex` into the "Split by" box.
2. Jamovi will now calculate the descriptive statistics for both males and females separately.
3. Review the output, which includes measures such as the mean weight and height for both males and females.

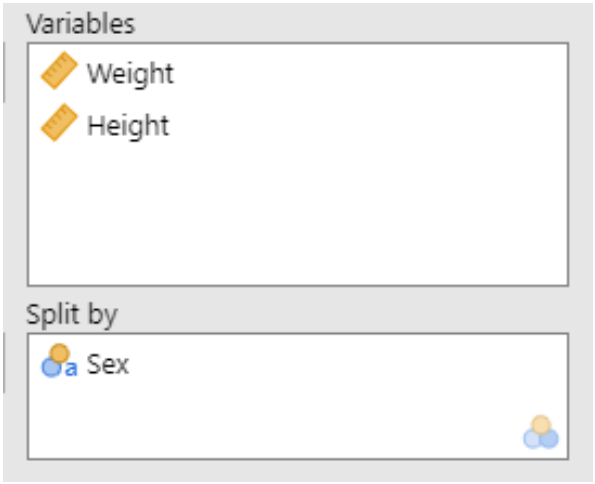

Figure 5
Variables Split

9.4. Creating Graphs

Jamovi provides several options for visualizing data. We can create histograms, boxplots, and bar charts to better understand the distribution of weight and height.

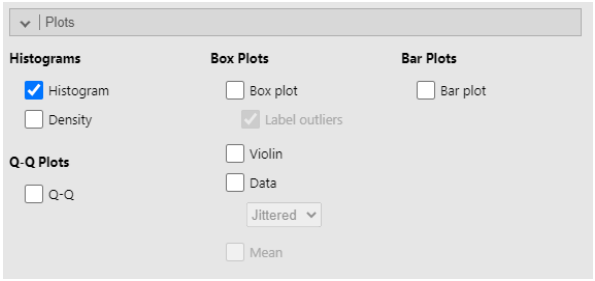

Figure 6
Plots

9.4.1. Histogram of Weight

To create a histogram of the `Weight` variable:

1. In the **Descriptives** window, go to the **Plots** tab.
2. Check the **Histogram** option.
3. Jamovi will generate a histogram for `Weight`, showing the distribution across the sample.

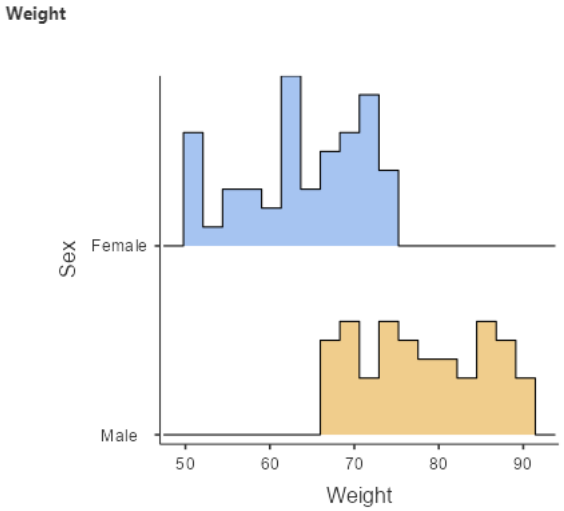

Figure 7
Histogram of the weight

9.4.2. Boxplot of Weight by Sex

To create a boxplot that compares `Weight` between males and females:

1. In the **Plots** tab of the **Descriptives** window, check the **Boxplot** option.
2. Ensure that `Sex` is selected in the "Split by" box to generate separate boxplots for males and females.
3. Jamovi will display a boxplot, which allows you to compare the distribution, median, and potential outliers in weight between the two groups.

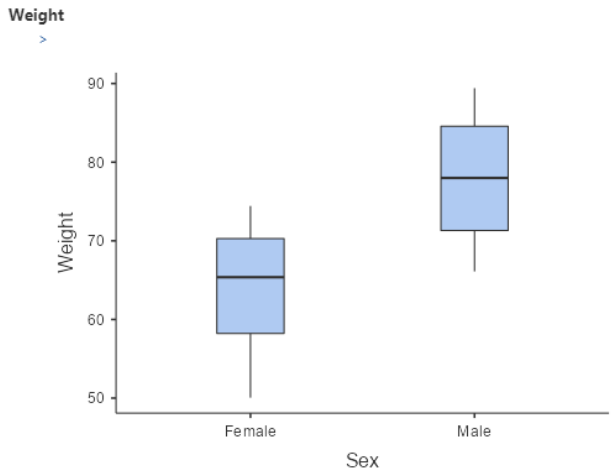

Figure 8
Boxplot weight

9.4.3. Scatterplot of Height vs Weight

We can also explore the relationship between height and weight by creating a scatterplot:

1. Go to **Analyses**, **Exploration**,**Scatterplot**, select **Regression**, and choose **Linear Regression**.
2. Drag `Weight` into the "X-Axis" box and `Height` into the "Y-Axis" box.
3. In the **Plots** tab, check the option for **Linear**.
4. Jamovi will generate a scatterplot, showing the relationship between height and weight.

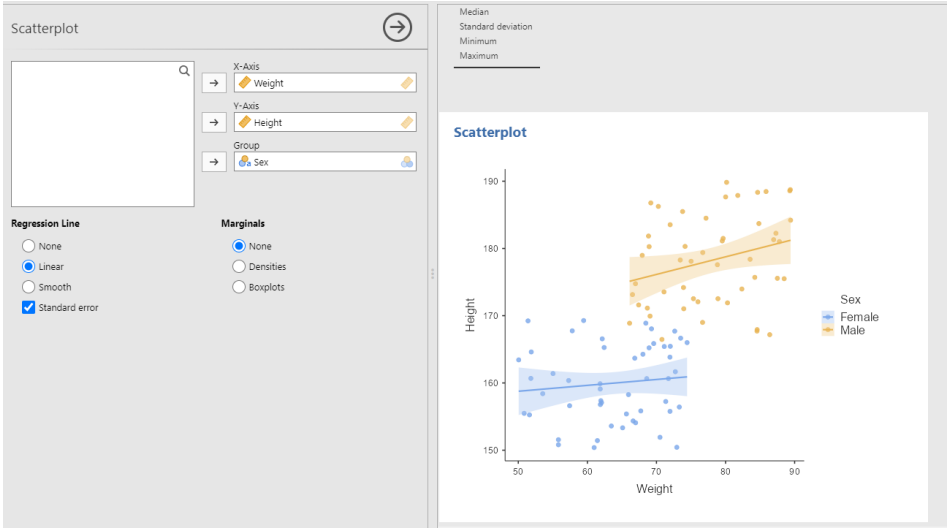

Figure 9
Scatterplot

9.5. Saving Results

After performing the analyses and generating the graphs, you may want to save the results for future use or for inclusion in a report.

9.5.1. Exporting Tables and Results

To export the tables and statistical results:

1. Click on the **Menu** (Figure 10), **Export** button.

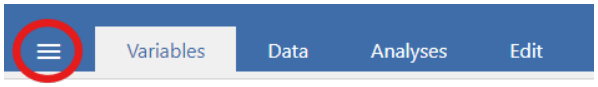

Figure 10
Main menu

2. You can choose to save the results in `.pdf`, `.docx` (Word), or `.html` formats.

9.5.2. Saving Plots

To save the generated plots:

1. Right-click on the plot you want to save.
2. Select **Export** and choose the desired format (`.png`, `.jpeg`, or `.pdf`).
3. Choose the destination folder and file name for your plot.

10. Example 2: "COBATEST Data"

In this section, we will work with a sample dataset containing 186 variables related to HIV testing and various health indicators. The dataset, named `hivtest`, has been used in the COBATEST project. We will load this dataset into Jamovi to perform descriptive analyses and explore relationships between different variables. Additionally, we will create visualizations to better understand the data. Finally, we will save the results for future use and reporting.

10.1. Exercise 1: Creating Indicator CBVCT 1

1. **Objective**: Calculate the total number of clients tested for HIV.
2. **Steps**:
   (a) Load the `hivtest` dataset into Jamovi.
   (b) Identify the variable that contains unique client identifiers, `hiv_test_performed == 1`.
   (c) Count the total number of unique clients tested for HIV using the unique identifier.

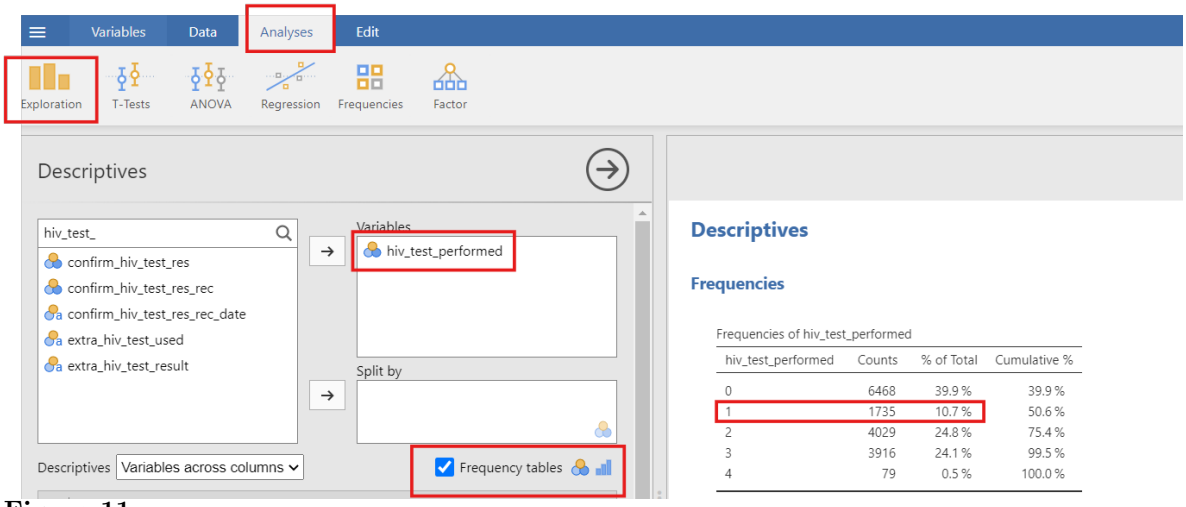

Figure 11
Frequency Table of CBVCT 1

10.2. Exercise 2: Creating Indicator CBVCT 2

1. **Objective**: Calculate the proportion of clients who reported having been previously tested for HIV.
2. **Steps**:
   (a) Create a new indicator to calculate the proportion of clients who indicated having been tested previously (`previous_hiv_test == 1`).
   (b) Use the formula: $\left[\text{Proportion} = \left(\frac{\text{Number of clients previously tested } \texttt{(previous\_hiv\_test == 1)}}{\text{Total number of clients tested } \texttt{(hiv\_test\_performed == 1)}}\right) \times 100\right]$

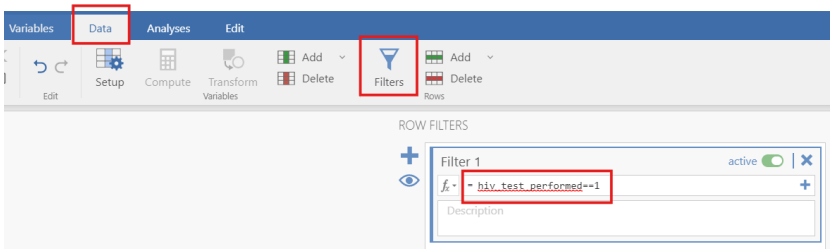

Figure 12
Filter previous tested

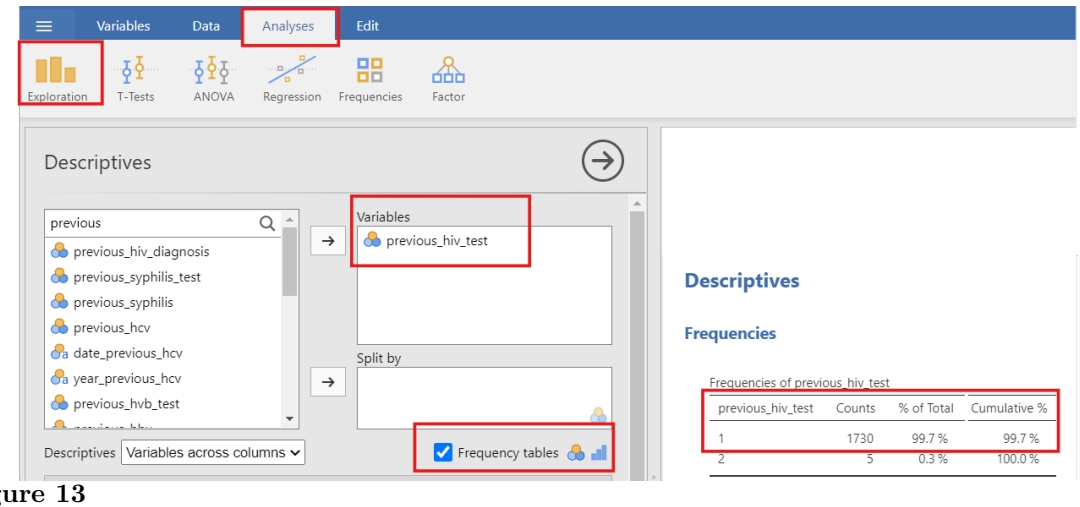

Figure 13
CBVCT2 calculated

10.3. Exercise 3: Creating Indicator CBVCT 3

1. **Objective**: Calculate the proportion of clients who were tested in the preceding 12 months.
2. **Steps**:

(a) Identify the variables indicating whether clients were tested in the preceding 12 months. Clients are considered to have been tested in the last 12 months if they satisfy the following condition:

$$\texttt{previous\_hiv\_test} = 1 \quad \text{and} \quad (\texttt{lasthivtest} = 1 \text{ or } \texttt{lasthivtest} = 2)$$

where:

- `lasthivtest == 1`: Tested in the last 3 months.
- `lasthivtest == 2`: Tested in the last 12 months.

(b) Use the following formula to calculate the proportion:

$$\text{Proportion} = \left(\frac{\text{Number of clients tested in the preceding 12 months}}{\text{Total number of clients tested}} \right) \times 100$$

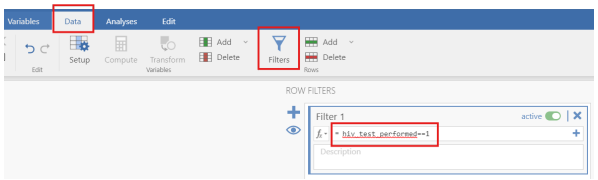

Figure 14
Filter previous tested

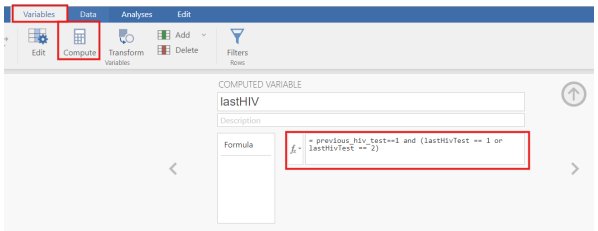

Figure 15
Creating the new variable

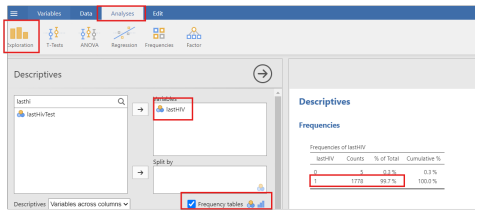

Figure 16
CBVCT3 calculated

10.4. Exercise 4: Creating New Variables for Key Populations

In this section, we will create new variables in Jamovi to identify key populations based on existing dataset variables. These key populations include Men who have Sex with Men (MSM), Sex Workers (SW), People Who Inject Drugs (PWID), and Migrants. Each variable will be created using logical conditions, as shown below.

10.4.1. Definitions of New Variables

- **MSM**: A client is classified as MSM if they identify as cisgender men (`gender == 1`) or transgender men (`gender == 4`), and they report sexual relations with cisgender men (`with_men_cis == 1`) or transgender men (`with_men_trans == 1`).
  MSM = 1 if:

  (gender = 1 or gender = 4) and (with_men_cis = 1 or with_men_trans = 1)

- **SW**: A client is classified as a Sex Worker if `sex_worker == 1`.
  SW = 1 if:

  sex_worker = 1

- **PWID**: A client is classified as a Person Who Injects Drugs if they report drug use (`drug_use == 1`) and injection (`injecting == 1`).
  PWID = 1 if:

  drug_use = 1 and injecting = 1

- **Migrant**: A client is classified as a Migrant if `foreign_national == 1`.
  Migrant = 1 if:

  foreign_national = 1

10.4.2. Steps to Create Variables in Jamovi

1. Open the `hivtest` dataset in Jamovi.
2. Go to the **Data** tab and click on **Compute** to create a new variable.
3. In the formula editor, input the following formulas to create the corresponding variables:
   - **For MSM:**

```
(gender == 1 | gender == 4)
& (with_men_cis == 1 | with_men_trans == 1)
```

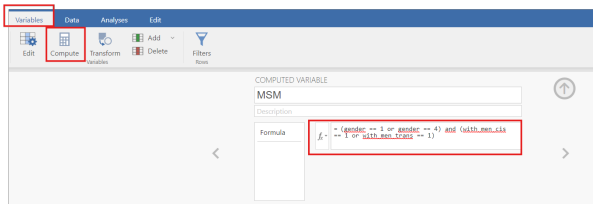

Figure 17
Create MSM variable

– **For SW:**

```
sex_worker == 1
```

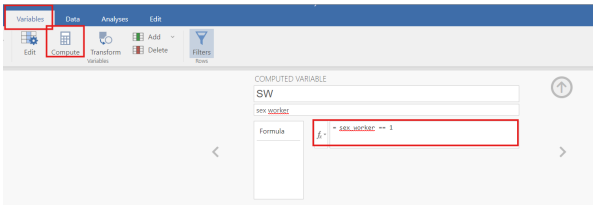

Figure 18
Create sex worker variable

– **For PWID:**

```
drug_use == 1 & injecting == 1
```

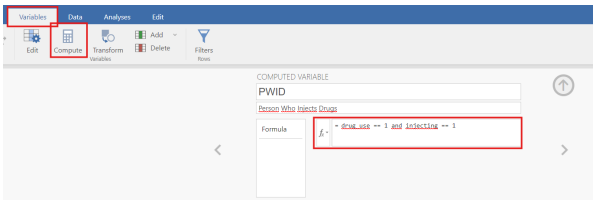

Figure 19
Create PWID variable

– **For Migrant:**

```
foreign_national == 1
```

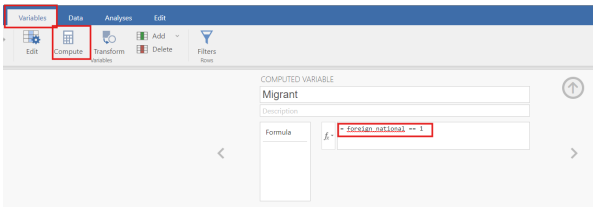

Figure 20
Create Migrant variable

4. Name each variable according to the key population (e.g., `MSM`, `SW`, `PWID`, `Migrant`) and click **OK**.

Once the new variables are created, they can be used for further analysis and to produce disaggregated reports by key populations.

10.5. Exercise 5: Disaggregation of Indicators by Gender, Age and Key Population

1. **Objective**: Calculate indicators CBVCT 1-3 by the newly created variables.
2. **Steps**:
   (a) Create subgroups for key populations.
   (b) Repeat calculations for indicators CBVCT 1-3 for each subgroup.
   (c) (Optional) As a minimum, attempt to create a bar chart to visually represent the distribution of the CBVCT indicators across the different subgroups.

Example:

– First of all, change the names of the categories to ensure clear comprehension.

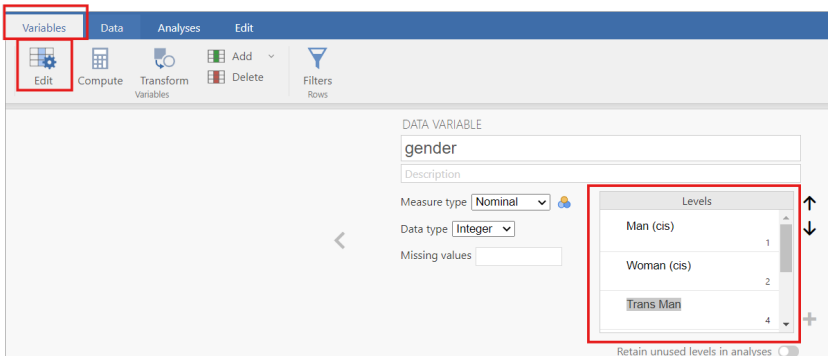

Figure 21
Disaggregation of gender variable

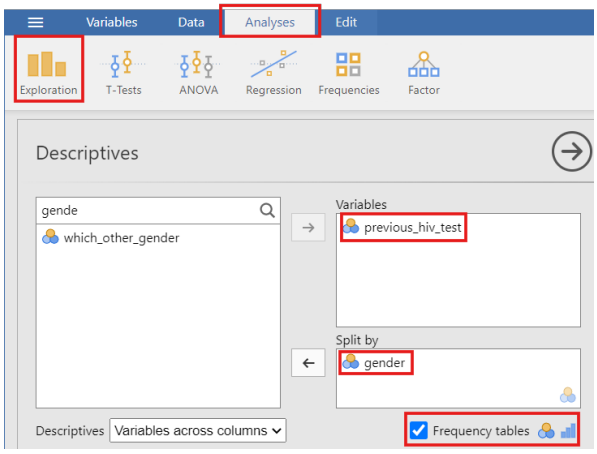

Figure 22
Disaggregation of gender variable

Frequencies of previous_hiv_test

previous_hiv_test	gender	Counts	% of Total	Cumulative %
1	Man (cis)	1517	85.3 %	85.3 %
	Woman (cis)	178	10.0 %	95.3 %
	Trans Man	8	0.4 %	95.8 %
	Trans Woman	37	2.1 %	97.9 %
	Non-Binary	33	1.9 %	99.7 %
2	Man (cis)	5	0.3 %	100.0 %
	Woman (cis)	0	0.0 %	100.0 %
	Trans Man	0	0.0 %	100.0 %
	Trans Woman	0	0.0 %	100.0 %
	Non-Binary	0	0.0 %	100.0 %

Figure 23
Results

– Create the plot of the disaggregated variables.

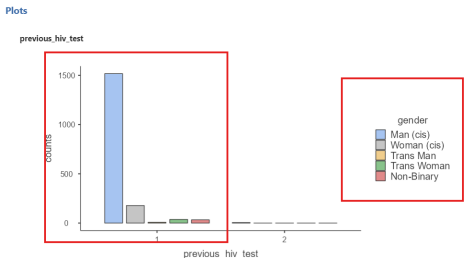

Figure 24
Plot