

BEST PRACTICES FOR DATA CLEANING

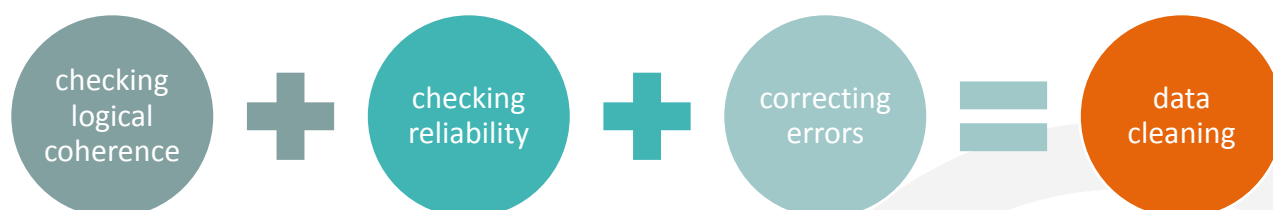
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The process of data cleaning can be done using different techniques and software (Excel, STATA, SPSS etc.). This tutorial focuses on general principles of data cleaning, zooming into how to implement data cleaning in Excel, as this is the most common and versatile tool used by Tdh.

I. Basic steps for cleaning your data¹

Cleaning up your databases ensures that you always have an up-to-date database that can be analysed without the risk of producing misinformation for those who will then make decisions. Database cleaning is primarily logic, analysing the consistency of data and performing triangulation with other information that may be available.



💡 Remember that the best way of reducing the data cleaning workload is to plan your data collection carefully from the start², including the analysis you will want to do in the planning, and testing it with fake data before you deploy!

When cleaning our databases, we are looking for the following inconsistencies and errors:

- Percentages (or total of percentages) > or < than 100%

¹ Source : <https://support.office.com/en-us/article/top-ten-ways-to-clean-your-data-2844b620-677c-47a7-ac3e-c2e157d1db19>

² <https://www.mdc-toolkit.org/design-your-forms/>

- Sums that do not match (i.e. total number of HH members different from sum of male/female in the HH...)
- Special characters that were transformed when exported
- Wrong interpretation of questions by enumerators or interviewees
- "0" instead of an empty cell or "N.A." (i.e. for a numeric question that has not been answered)
- Empty cells that should be filled
- Typing errors ("5" people in the HH)
- Unit issues (age in months/years, meters/feet, etc.), date or cell formats
- Etc etc.

There are 4 recommended basic steps for cleaning your data:

! Before, during and after each of these steps, you should check (visually or by using filters etc.) that you did not do any changes that you were not expecting!

1. Create a backup copy of the original data in a separate workbook.

! **What happens if you do not create a backup copy of the original data and you inadvertently delete a column containing data (or another element) in your database?**

Well, if it is not in Kobo anymore, that data is lost forever and there is no way to recover it. This is why it is very important to create a backup copy of the original data in a separate workbook!

2. Ensure that the data is in a tabular format of rows and columns with: similar data in each column, all columns and rows visible, no merged cells, no multiple answers in one cell and no blank rows within the range.
3. Carry out tasks that don't require column manipulation first, such as getting rid of the extra spaces or using the "Find and replace" dialog box.
4. Next, carry out tasks that require column manipulation.

II. How to clean your data in Excel^{3 4}

II.1. Get rid of extra spaces

In order to get rid of extra spaces, you can use the **TRIM function in Excel**. TRIM Function will remove all spaces from text except for single spaces between words. The function syntax is **TRIM(text)**, where (text) is a required argument of the function and refers to the text from which you want spaces removed.

First, type in your formula next to your first text entry. Then drag the formula down to cover all your text entries as below. All your text entries will then get cleaned from the extra spaces.

	A	B
1	How to clean your data	=TRIM(A1)
2	How to clean your data	
3	How to clean your data	
4	How to clean your data	
5	How to clean your data	
6	How to clean your data	
7		
8		

	A	B
1	How to clean your data	How to clean your data
2	How to clean your data	How to clean your data
3	How to clean your data	How to clean your data
4	How to clean your data	How to clean your data
5	How to clean your data	How to clean your data
6	How to clean your data	How to clean your data

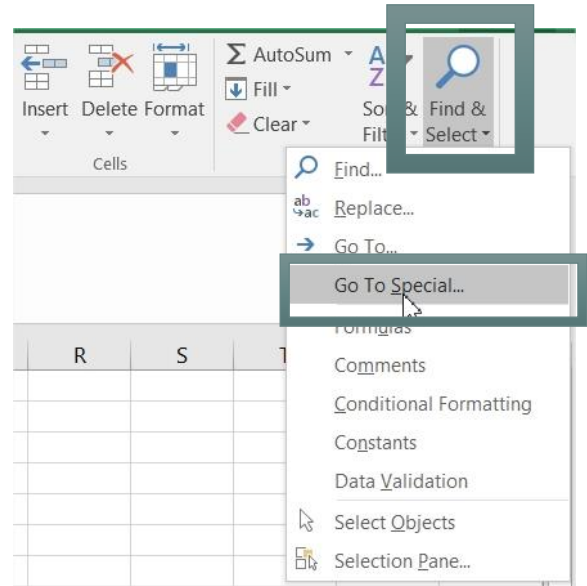
³ Sources : <https://trumpexcel.com/clean-data-in-excel/> and <https://www.youtube.com/watch?v=e0TfIbZXPeA>

⁴ The Excel version that was used for this tutorial is Excel 2011. Also, should you have any issues or questions, do not hesitate to search for your issue/question on the web as there are a multitude of sources out there likely to help you.

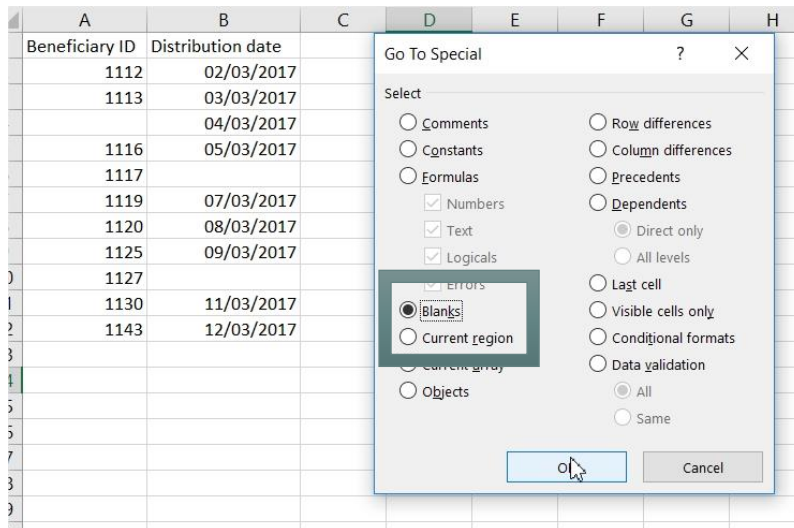
II.2. Select and treat all blank cells (missing data)

You might want to detect all blank cells, as it could represent missing data, and replace it with "Missing Data" for example. In order to do so, select the entire dataset, click on **"Find and Select"** and then on **"Go to special"** where a Go to special dialogue box will open.

	A	B	C
	Beneficiary ID	Distribution date	
1	1112	02/03/2017	
2	1113	03/03/2017	
3		04/03/2017	
4	1116	05/03/2017	
5	1117		
6	1119	07/03/2017	
7	1120	08/03/2017	
8	1125	09/03/2017	
9	1127		
10	1130	11/03/2017	
11	1143	12/03/2017	
12			
13			
14			



In the dialogue box, select the **"Blanks"** option in order to make your blank cells appear in grey.



This will select all the blank cells in your dataset at the same time. The first selected cell will be blank (and not light grey like the others) as this cell is the **active cell**. In order to input M/D in all the blank cells (=missing data), type in this text in the active cell and hit **Ctrl+Enter**.

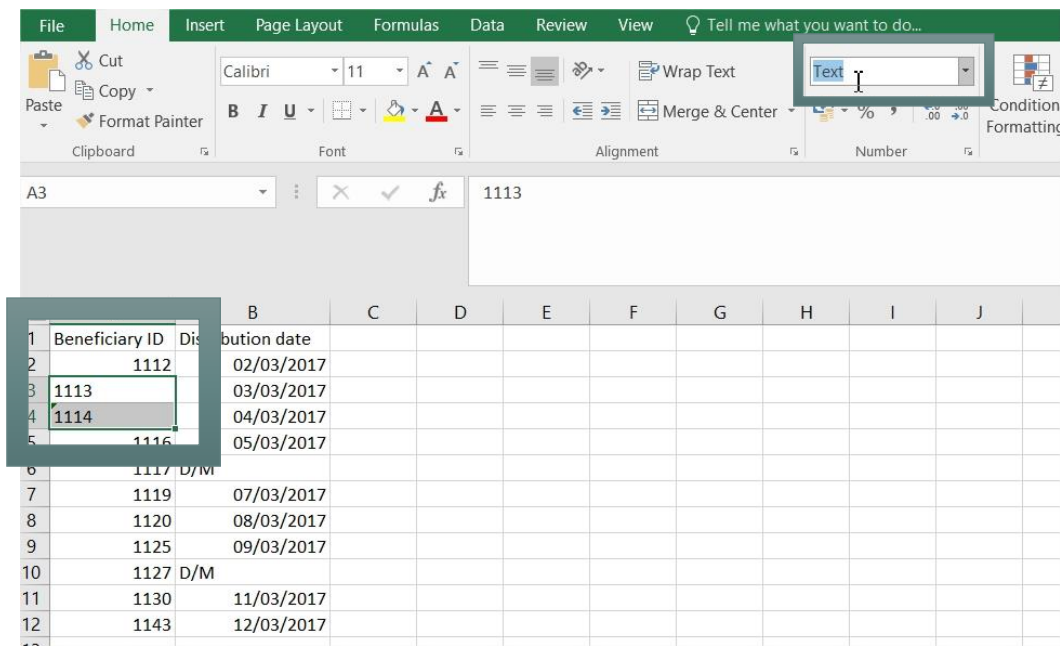
	A	B	C
1	Beneficiary ID	Distribution date	
2	1112	02/03/2017	
3	1113	03/03/2017	
4		04/03/2017	
5	1116	05/03/2017	
6	1117		
7	1119	07/03/2017	
8	1120	08/03/2017	
9	1125	09/03/2017	
10	1127		
11	1130	11/03/2017	
12	1143	12/03/2017	
13			

	A	B	
1	Beneficiary ID	Distribution date	
2	1112	02/03/2017	
3	1113	03/03/2017	
4	D/M	04/03/2017	
5	1116	05/03/2017	
6	1117	D/M	
7	1119	07/03/2017	
8	1120	08/03/2017	
9	1125	09/03/2017	
10	1127	D/M	
11	1130	11/03/2017	
12	1143	12/03/2017	
13			

II.3. Convert Numbers stored as text into numbers

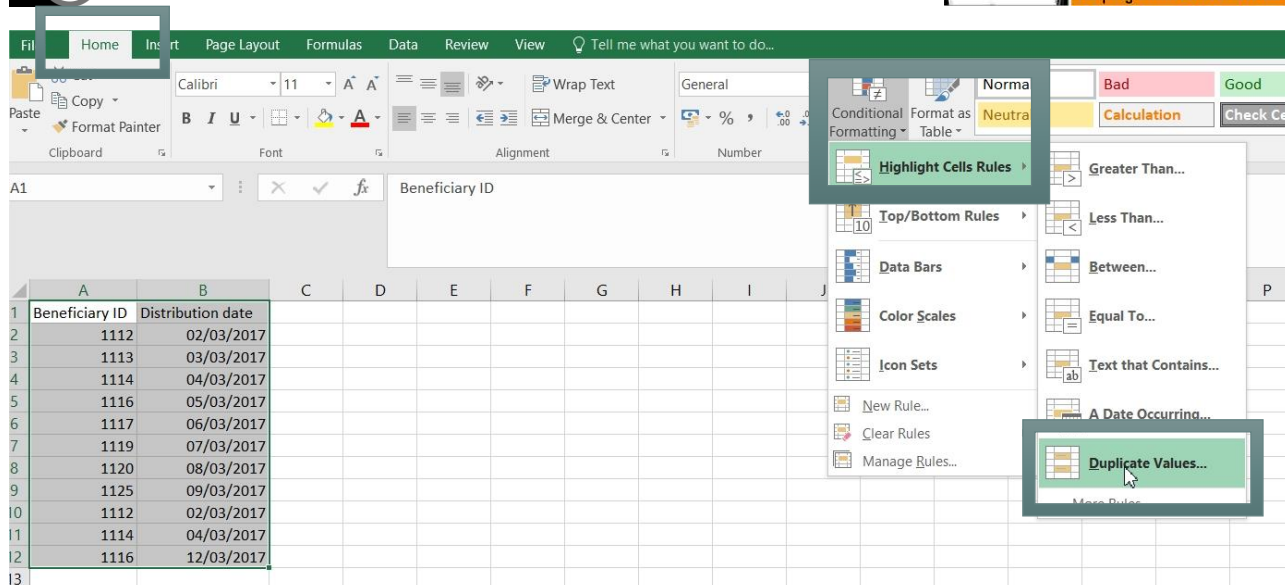
In order to convert a number stored as text into a number, go to the **"Formatting box"** and type in **"General"**. This will transform all numbers stored as text into numbers (i.e. they are aligned to the right of the cell).

💡 Numbers are always aligned to the right of cell, whereas text gets aligned to the left of the cell.

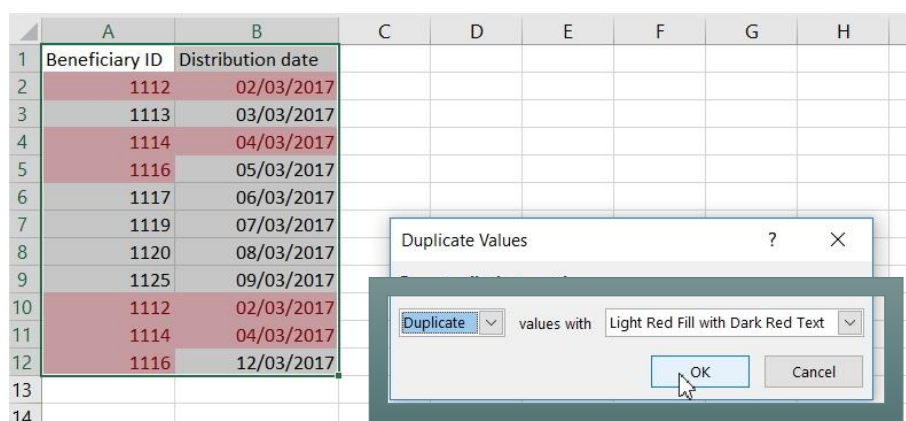


II.4. Remove duplicates


You first have to find where the duplicates are. Select the whole dataset, go to **"Home"** on **"Conditioning formatting"**, then on **"Highlight Cell Rules"** and click on **"Duplicate values"**.



Excel then gives you the option to highlight duplicates in light red, where you will have to click on **"OK"** to approve.

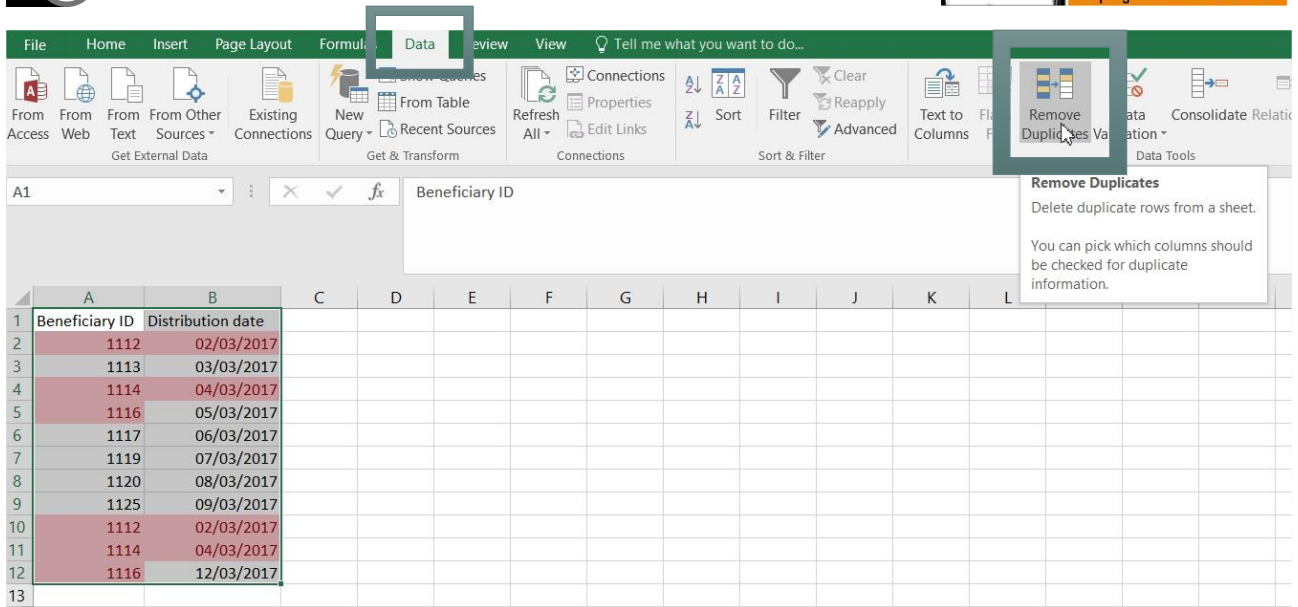


It will then highlight all the duplicated values.

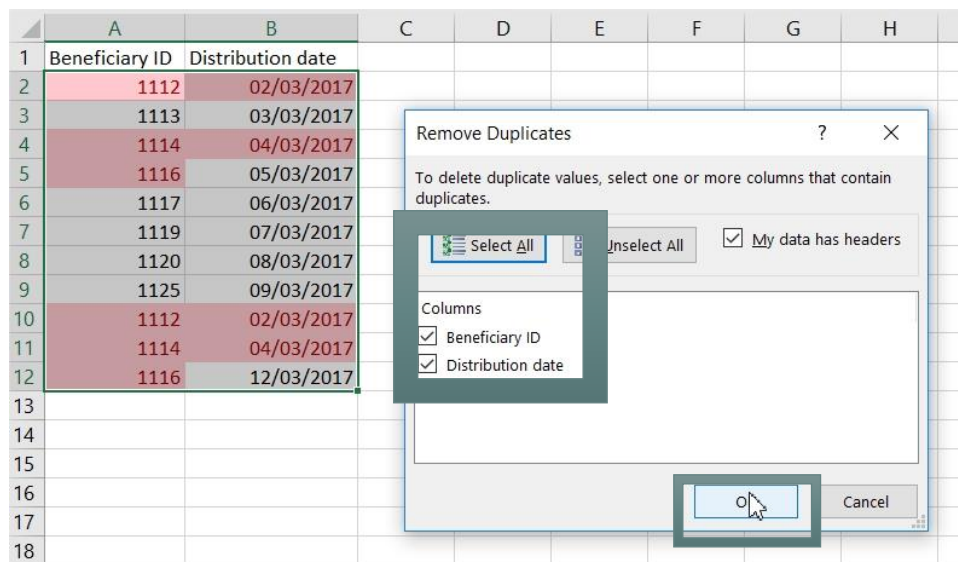
 In the example below you can see that the Beneficiary ID 1116 has been highlighted only in the "Beneficiary ID" column and not in the "Distribution Date" column. This is due to the fact that those are not true duplicates as the dates of distribution for the two entries are different: thus they are two different data entries.

	A	B
1	Beneficiary ID	Distribution date
2	1112	02/03/2017
3	1113	03/03/2017
4	1114	04/03/2017
5	1116	05/03/2017
6	1117	06/03/2017
7	1119	07/03/2017
8	1120	08/03/2017
9	1125	09/03/2017
10	1112	02/03/2017
11	1114	04/03/2017
12	1116	12/03/2017
13		

Then, go to **"Data"** and click on **"Remove Duplicates"** in order to delete the real duplicates.



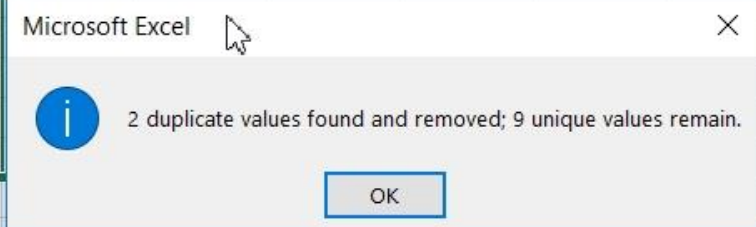
Excel will then ask you to select the columns that contain the duplicates. **Select them all** and click on **“OK”**.



It then informs you how many duplicates have been deleted and how many data entries (unique values) have been kept.

💡 As you can see, the 1116 “false” duplication has been kept.

	A	B	C	D	E	F	G	H
1	Beneficiary ID	Distribution date						
2	1112	02/03/2017						
3	1113	03/03/2017						
4	1114	04/03/2017						
5	1116	05/03/2017						
6	1117	06/03/2017						
7	1119	07/03/2017						
8	1120	08/03/2017						
9	1125	09/03/2017						
10	1116	12/03/2017						
11								
12								
13								
14								
15								

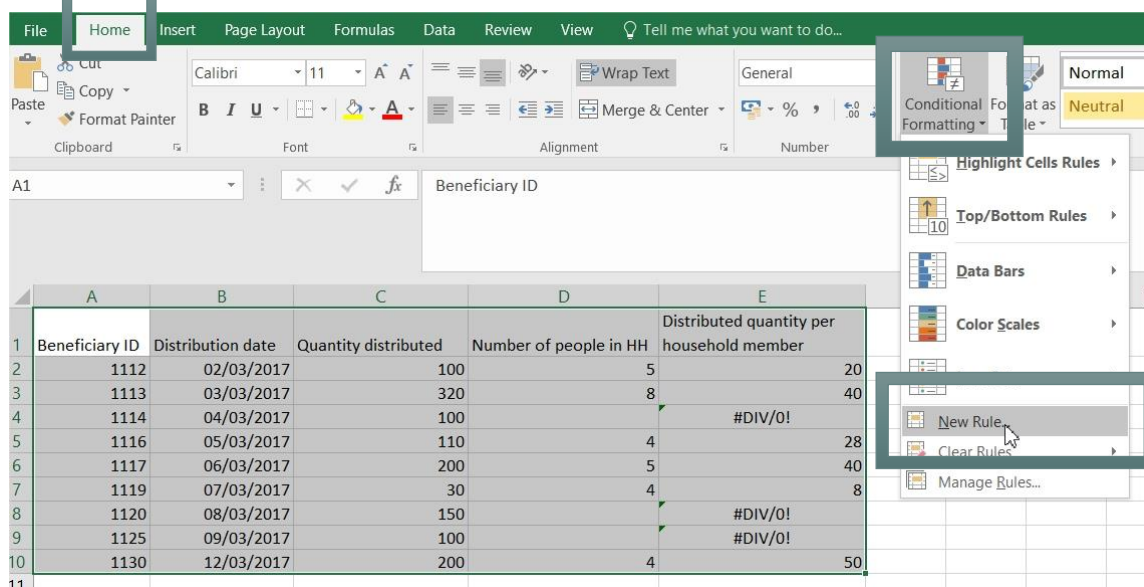


II.5. Highlight and correct errors

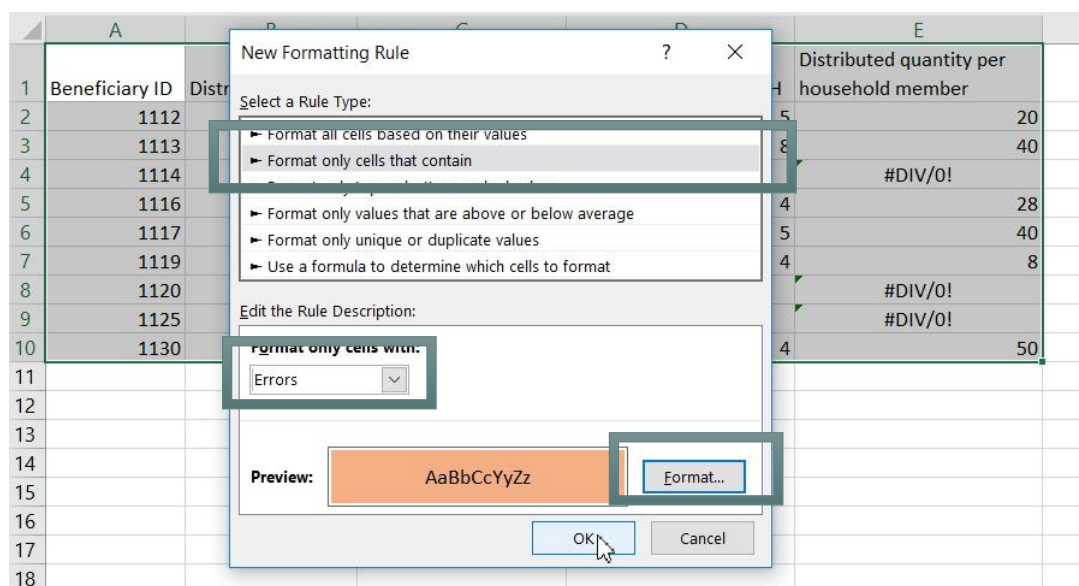
In the table below, an indicator named "Distributed quantity per household member" has been computed from the "Quantity distributed" and "Number of people in HH" indicators. However, some values have errors (as there are some missing values in the "number of people in HH" indicator).

	A	B	C	D	E
1	Beneficiary ID	Distribution date	Quantity distributed	Number of people in HH	Distributed quantity per household member
2	1112	02/03/2017	100	5	20
3	1113	03/03/2017	320	8	40
4	1114	04/03/2017	100		#DIV/0!
5	1116	05/03/2017	110	4	28
6	1117	06/03/2017	200	5	40
7	1119	07/03/2017	30	4	7.5
8	1120	08/03/2017	150		#DIV/0!
9	1125	09/03/2017	100		#DIV/0!
10	1130	12/03/2017	200	4	50
11					

In order to detect there errors, go to **"Home"**, **"Conditional Formatting"** and click on **"New Rule"**.



In the **"New Formatting Rule"** box that opens, click on **"Format only cells that contain"**, then select **"Errors"** and choose the colour of the **"Format"**.



Excel will then highlight all the cells containing an error. You can now therefore filter the associated columns by colour to work directly on the cells with errors.

	A	B	C	D	E
1	Beneficiary ID	Distribution date	Quantity distributed	Number of people in HH	Distributed quantity per household member
2	1112	02/03/2017	100	5	20
3	1113	03/03/2017	320	8	40
4	1114	04/03/2017	100		#DIV/0!
5	1116	05/03/2017	110	4	28
6	1117	06/03/2017	200	5	40
7	1119	07/03/2017	30	4	8
8	1120	08/03/2017	150		#DIV/0!
9	1125	09/03/2017	100		#DIV/0!
10	1130	12/03/2017	200	4	50
11					

II.6. Change text to lower/upper/proper case

In the example below, names are written in different ways. You can harmonize them by using LOWER/UPPER/PROPER functions.

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA			
3	Joe strike			
4	Martha Hoey			
5	Phil COLSON			
6				

If you want to make them be fully written in lower cases, you can use the **LOWER(text)** function, where (text) refers to the text to be modified. Once you have entered your function for one data entry, drag the formula down to cover all the data entries that you want to modify.

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	=LOWER(A2)		
3	Joe strike			
4	Martha Hoey			
5	Phil COLSON			
6				

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	jane fonda		
3	Joe strike	joe strike		
4	Martha Hoey	martha hoey		
5	Phil COLSON	phil colson		
6				

If you want to make them be fully written in upper cases, you can use the **UPPER(text)** function, where (text) refers to the text to be modified. Once you have entered your function for one data entry, drag the formula down to cover all the data entries that you want to modify.

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	jane fonda	=UPPER(A2)	
3	Joe strike	joe strike		
4	Martha Hoey	martha hoey		
5	Phil COLSON	phil colson		
6				

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	jane fonda	JANE FONDA	
3	Joe strike	joe strike	JOE STRIKE	
4	Martha Hoey	martha hoey	MARTHA HOEY	
5	Phil COLSON	phil colson	PHIL COLSON	
6				

If you want to have the first letters of the first and last names be written in upper cases and the rest in lower cases, you can use the **PROPER(text)** function, where (text) refers to the text to be modified. Once you have entered your function for one data entry, drag the formula down to cover all the data entries that you want to modify.

	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	jane fonda	JANE FONDA	=PROPER(A2)
3	Joe strike	joe strike	JOE STRIKE	
4	Martha Hoey	martha hoey	MARTHA HOEY	
5	Phil COLSON	phil colson	PHIL COLSON	
6				

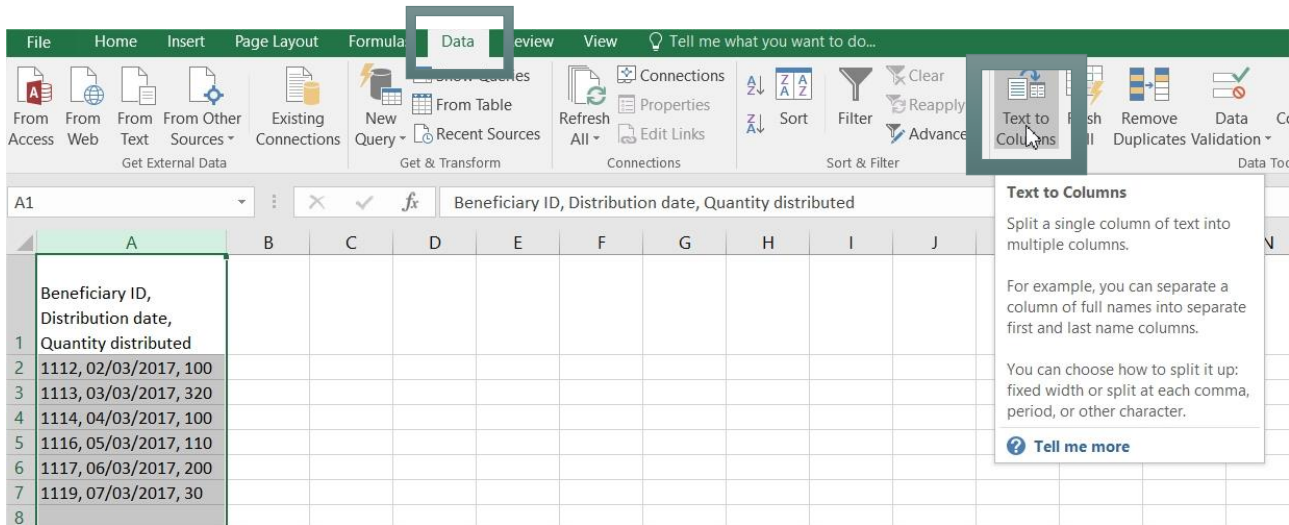
	A	B	C	D
1	Enumerator name	Lower	Upper	Proper
2	JANE FONDA	jane fonda	JANE FONDA	Jane Fonda
3	Joe strike	joe strike	JOE STRIKE	Joe Strike
4	Martha Hoey	martha hoey	MARTHA HOEY	Martha Hoey
5	Phil COLSON	phil colson	PHIL COLSON	Phil Colson
6				

II.7. Use Text to Columns to parse data in Excel

It might happen that you obtain a .csv version of the database, where all the data is concentrated in a single column (separated by a coma, tab etc.) such as in the example below.

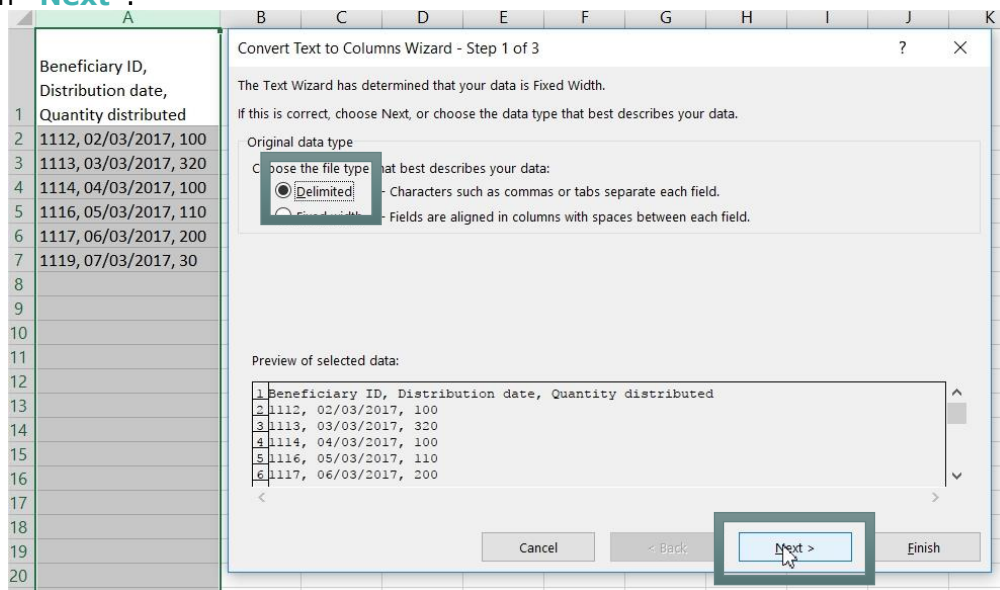
	A	B	C
1	Beneficiary ID, Distribution date, Quantity distributed		
2	1112, 02/03/2017, 100		
3	1113, 03/03/2017, 320		
4	1114, 04/03/2017, 100		
5	1116, 05/03/2017, 110		
6	1117, 06/03/2017, 200		
7	1119, 07/03/2017, 30		
8			

In order to do so, go to **"Data"** and click on **"Text to Columns"**.



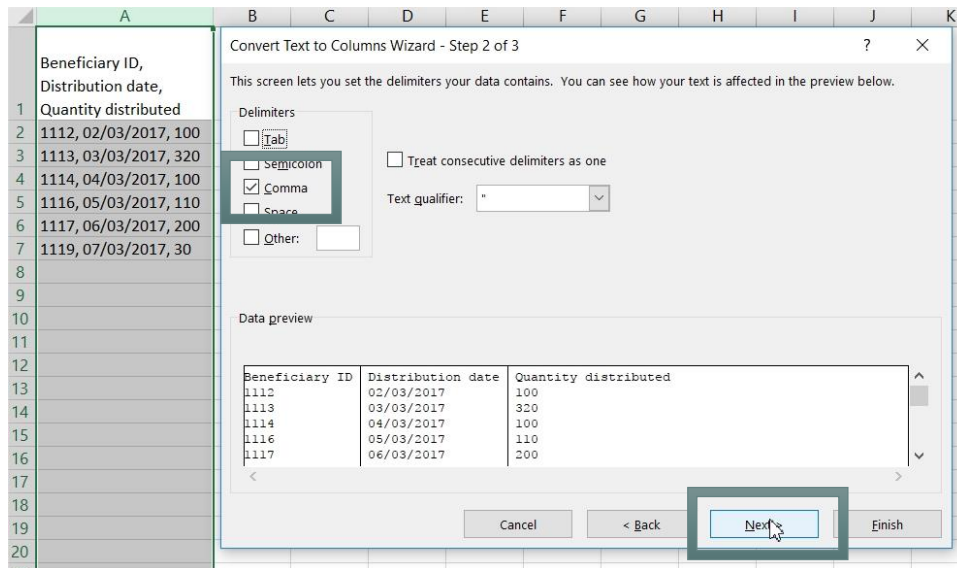
The image shows the Excel ribbon with the 'Data' tab selected. The 'Text to Columns' button is highlighted in the 'Data Tools' group. A tooltip for 'Text to Columns' is visible, explaining its function: 'Split a single column of text into multiple columns. For example, you can separate a column of full names into separate first and last name columns. You can choose how to split it up: fixed width or split at each comma, period, or other character.'

In the **"Convert Text to Columns Wizard"** box that opens, select **"Delimited"** and then click on **"Next"**.

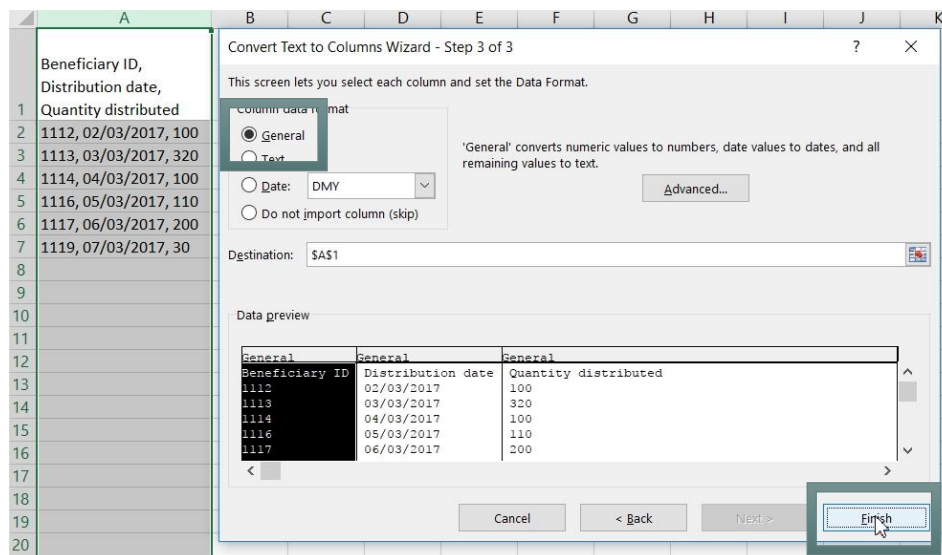


The image shows the 'Convert Text to Columns Wizard - Step 1 of 3' dialog box. The 'Original data type' section shows 'Delimited' selected. The 'Preview of selected data' section shows the data from the table above, split into three columns: Beneficiary ID, Distribution date, and Quantity distributed. The 'Next >' button is highlighted.

Excel will then ask the way in which it should separate your data. As a comma separates your different data entries in our example here, select **"Comma"** and then click on **"Next"**. Other options could be **"Tab"**, **"semicolon"**, **"Space"** and **"Other"**.



It will then ask the format to which the data should be separated to. Select **“General”** and then click on **“Finish”**.

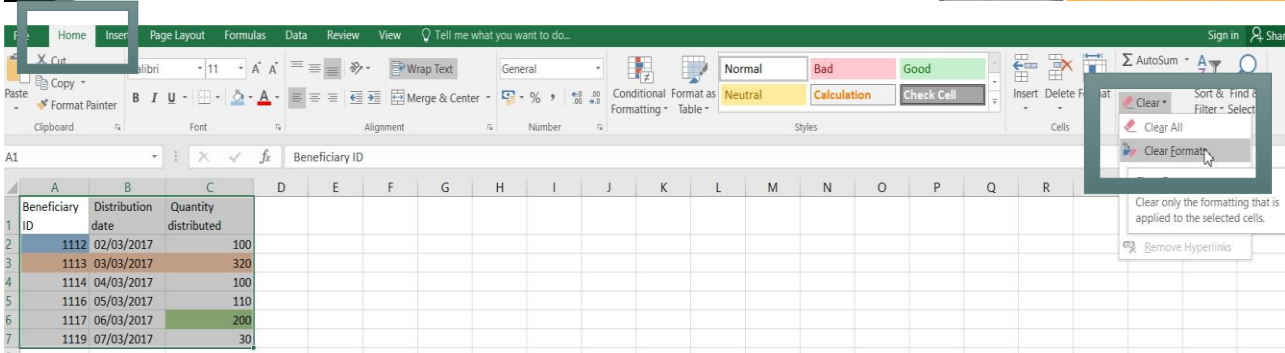


Your data entries are now parsed in different columns on Excel.

	A	B	C
	Beneficiary ID	Distribution date	Quantity distributed
1			
2	1112	02/03/2017	100
3	1113	03/03/2017	320
4	1114	04/03/2017	100
5	1116	05/03/2017	110
6	1117	06/03/2017	200
7	1119	07/03/2017	30
8			

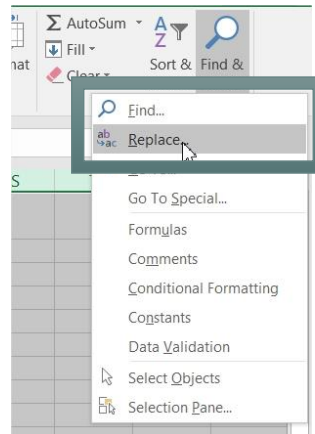
II.8. Delete all formatting

If you still have a lot of conditional formatting in your data and wish to get rid of it as it is not useful anymore, you can first select all your dataset, go to **“Home”**, then **“Clear”** and click on **“Clear Formatting”**.

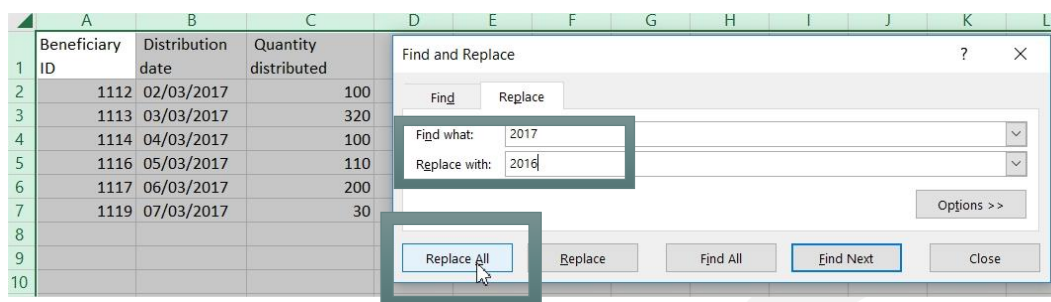


II.9. Use "find and replace" to clean data in Excel

If you have the same data entries in your dataset but written in different ways (i.e. with different spellings etc.), the **"Find and replace"** option in Excel can become very useful. In order to use it, first find all the data to be replaced by going to "Home", to "Find" and then click on "Find all". Check that you will not be replacing data from other columns that you wouldn't expect to. Then, select all your data that has to be cleaned, go to **"Home"**, to **"Find & Select"** and click on **"Replace"**.



In the **"Find and Replace"** box that opens, enter the values that you want to be replaced in **"Find what"**, enter the values that you want to replace them with in **"Replace with"** and then click on **"Replace all"**.



Excel will then inform you of how many values have been replaced/modified.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Beneficiary ID	Distribution date	Quantity distributed									
2		1112	02/03/2016	100								
3		1113	03/03/2016	320								
4		1114	04/03/2016	100								
5		1116	05/03/2016	110								
6		1117	06/03/2016	200								
7		1119	07/03/2016	30								

Find and Replace

Find what: 2017

Replace with: 2016

Options >>

Replace All Replace Find All Find Next Close

Microsoft Excel

All done. We made 6 replacements.

⚠ Note of course that this tutorial is not comprehensive as data cleaning can take so many forms!