LAB INSTRUCTION FOR BASIC COMPUTER SKILL AND DATA MANAGEMENT IN FIELD EPIDEMIOLOGY USING MS EXCEL

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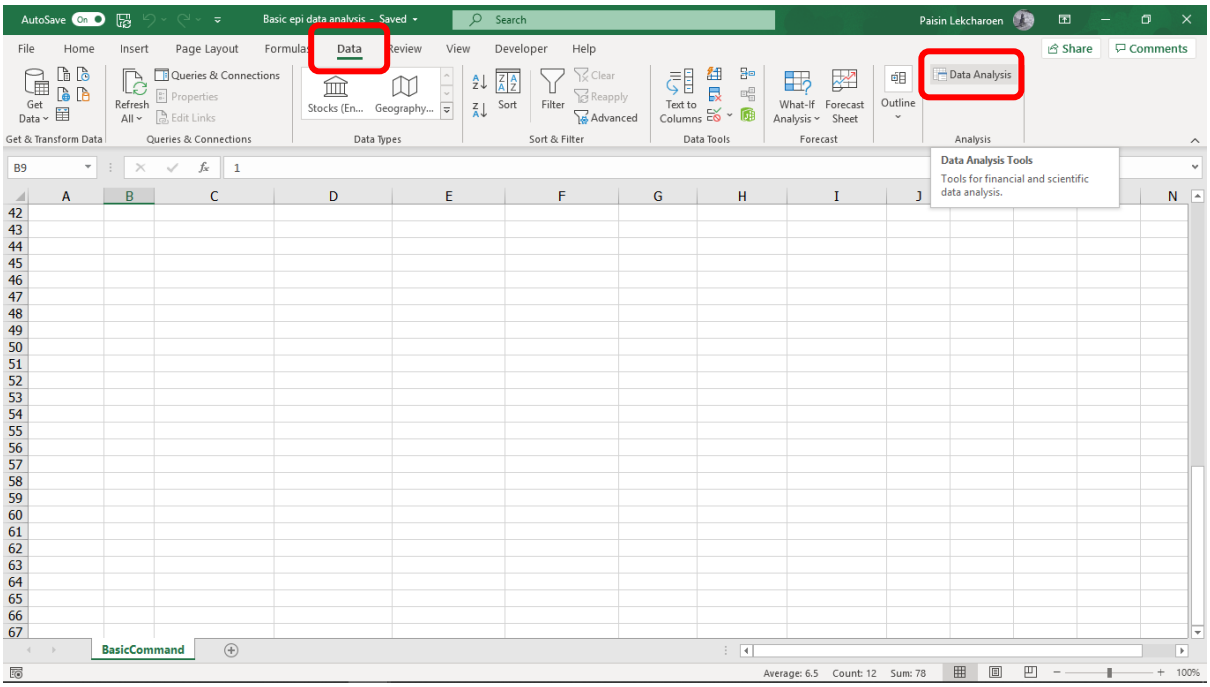
Lab Instruction for basic computer skill and data management in field epidemiology using MS Excel

Contents

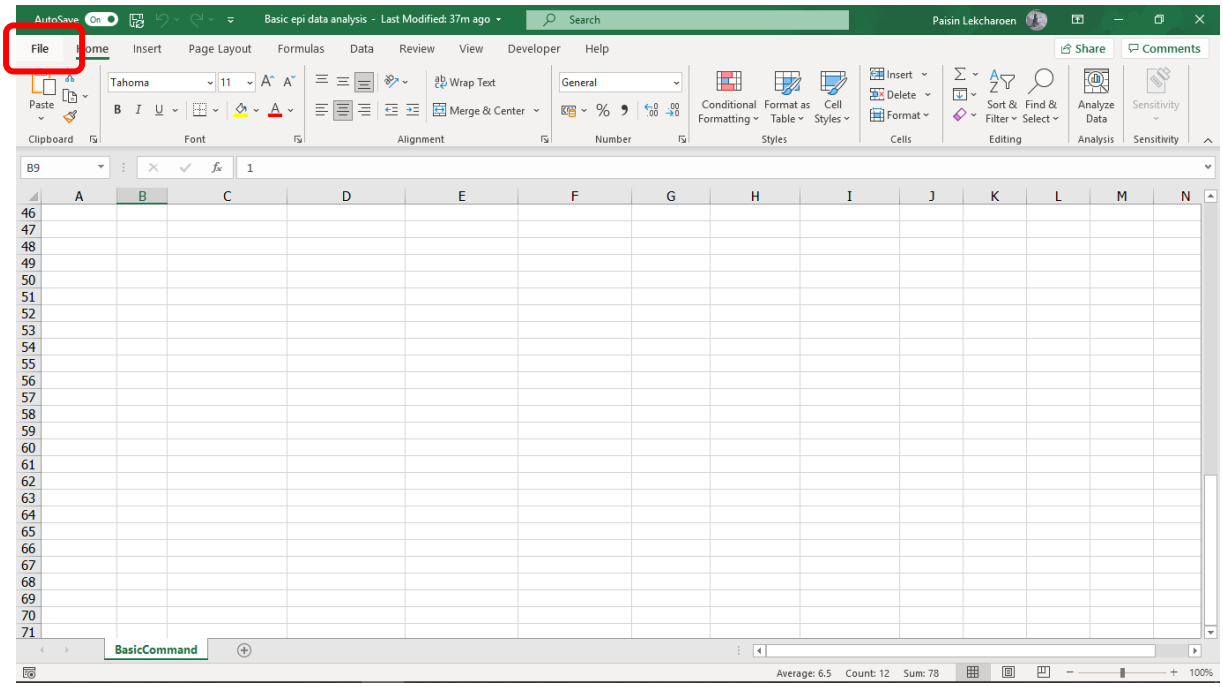
Pre-requirement

1. Download MS Excel workbook ‘Basic epi data analysis’.
2. Ensure you already have ‘Analysis Toolpak’ add-in installed then the ‘Data Analysis’ tool would appear on the MS Excel’s toolbar. If not, download it from https://support.microsoft.com/th-th/office/%e0%b9%82%e0%b8%ab%e0%b8%a5%e0%b8%94-analysis-toolpak-%e0%b9%83%e0%b8%99-excel-6a63e598-cd6d-42e3-9317-6b40ba1a66b4?ui=th-th&rs=th-th&ad=th
3. Install (if you just download it) or activate (if you already have this package in your add-ins) it, ‘Data Analysis’ tools should appear on the ‘Data’ ribbon.

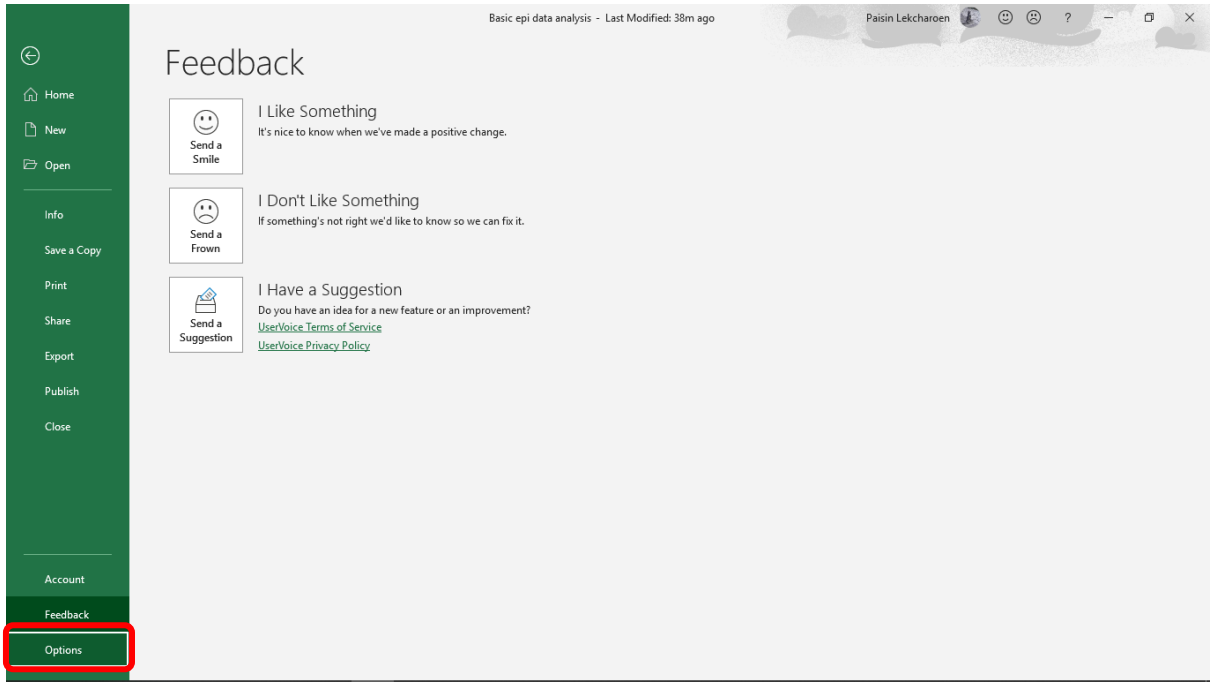


Activate 'Analysis ToolPak'

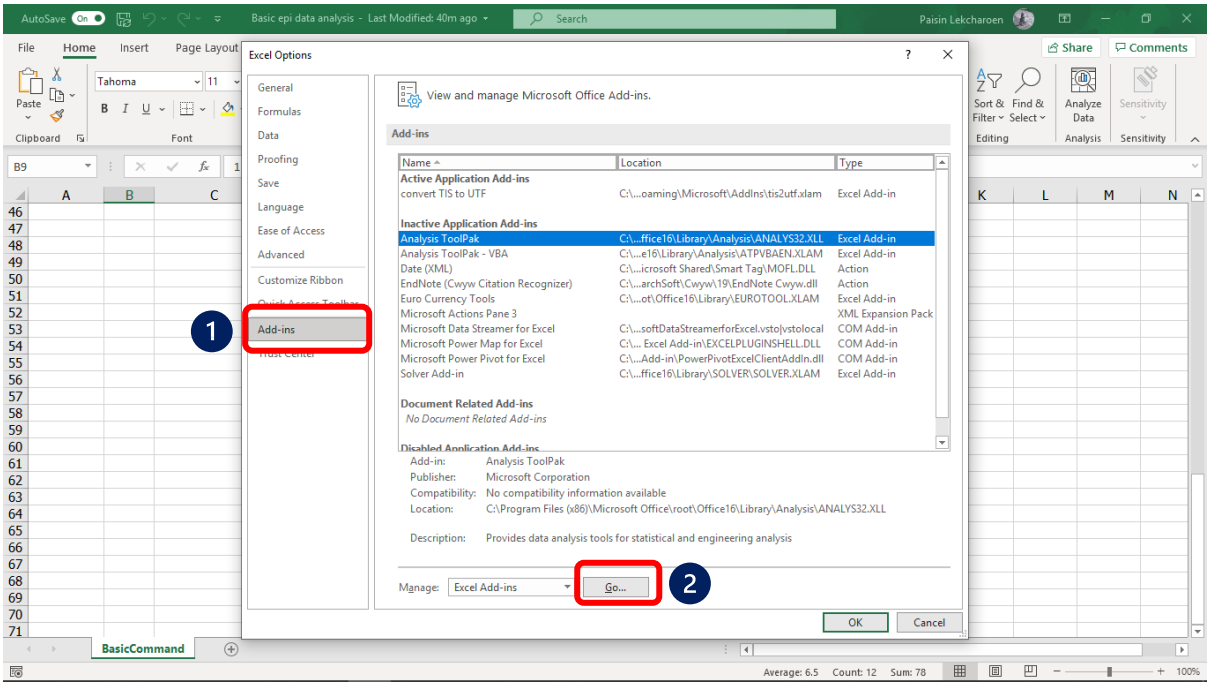
1. Click 'File' ribbon on the toolbar.



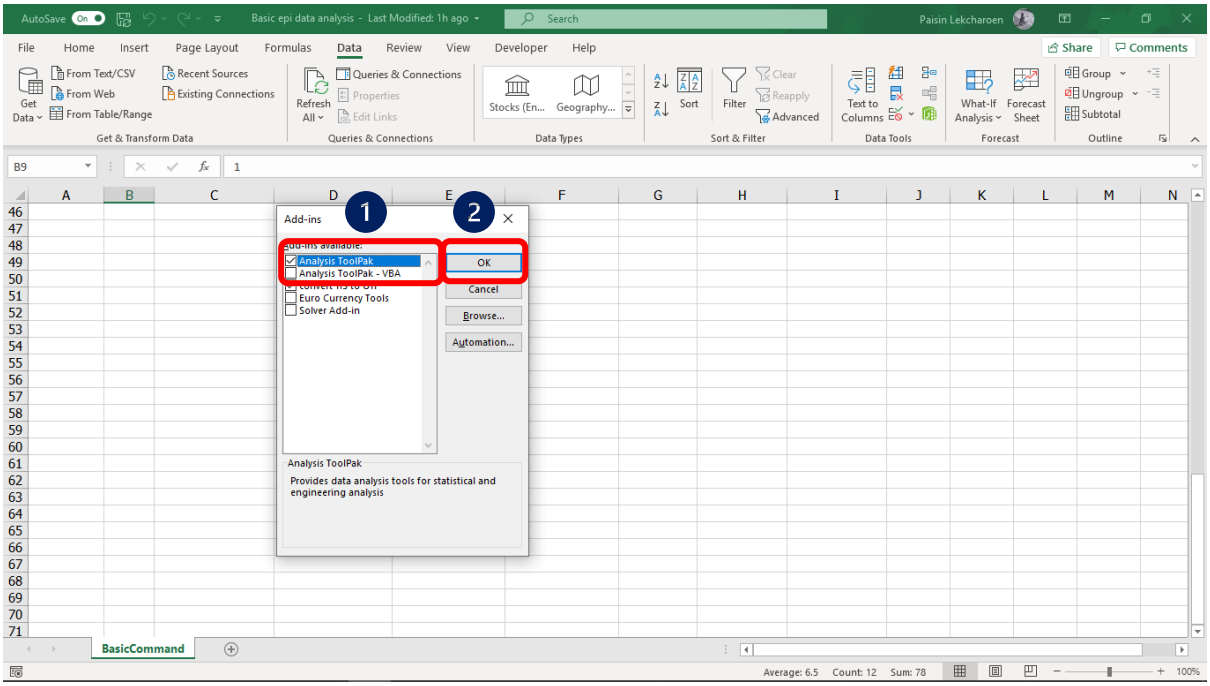
2. On its menu, select 'Options'.



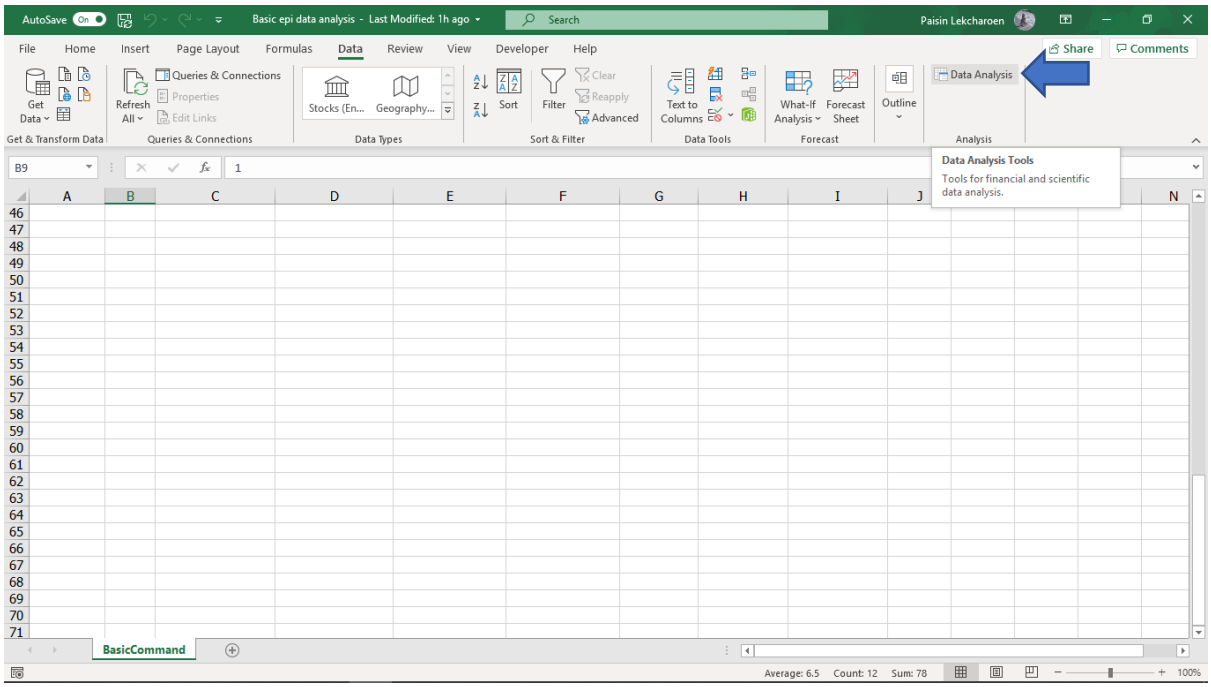
3. The ‘Excel Options’ window will appear. The ‘Analysis ToolPak’ will be showed in the ‘Inactivated Application Add-ins’ (as highlighted in blue). Then click on ‘Go’ to open the ‘Add-ins’ toolbox.



4. Check on a box ‘Analysis ToolPak’ (as highlighted in blue). Then click ‘OK’ to activate this add-in.



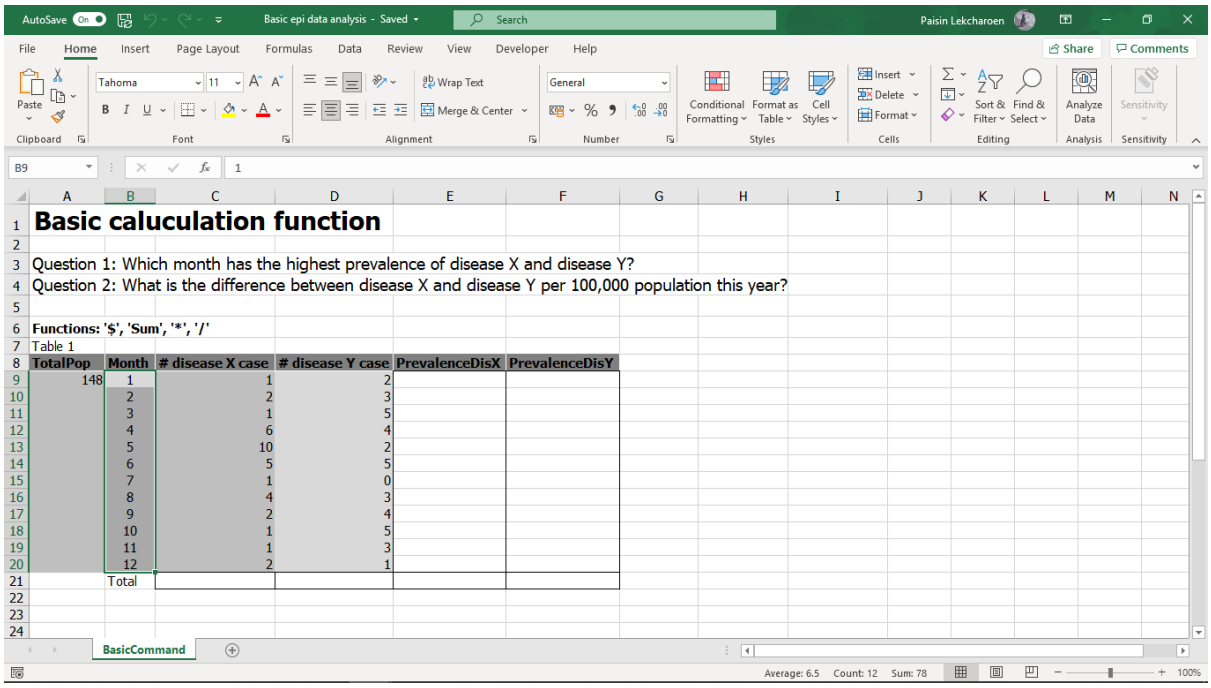
5. Then the 'Data Analysis' will appear in the 'Data' ribbon.



Review basic calculation function of Excel

Go to workbook 'Basic epi data analysis', then choose worksheet '*BasicCommand*'. Calcualte prevalence of disease for Table 1 and 2. Try to answer these questions.

Questions for Table 1



TotalPop	Month	# disease X case	# disease Y case	PrevalenceDisX	PrevalenceDisY
148	1	1	2		
	2	2	3		
	3	1	5		
	4	6	4		
	5	10	2		
	6	5	5		
	7	1	0		
	8	4	3		
	9	2	4		
	10	1	5		
	11	1	3		
	12	2	1		
	Total				

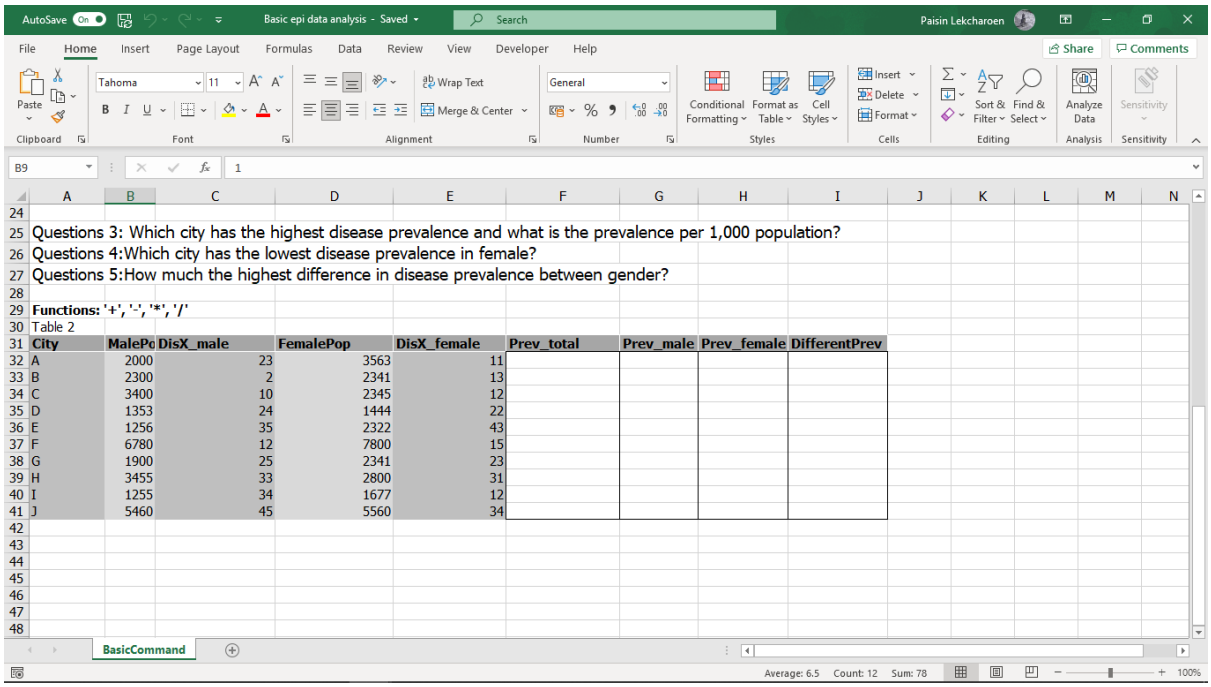
Question 1 Which month has the highest prevalence of disease X and disease Y?

Answer: Click or tap here to enter text.

Question 2 What is the difference between disease X and disease Y prevalence per 100,000 population this year?

Answer: Click or tap here to enter text.

Questions for Table 2



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
24														
25	Questions 3: Which city has the highest disease prevalence and what is the prevalence per 1,000 population?													
26	Questions 4:Which city has the lowest disease prevalence in female?													
27	Questions 5:How much the highest difference in disease prevalence between gender?													
28														
29	**Functions: '+', '-', '*', '/'**													
30	Table 2													
31	**City**	**MalePo**	**DisX_male**	**FemalePop**	**DisX_female**	**Prev_total**	**Prev_male**	**Prev_female**	**DifferentPrev**					
32	A	2000	23	3563	11									
33	B	2300	2	2341	13									
34	C	3400	10	2345	12									
35	D	1353	24	1444	22									
36	E	1256	35	2322	43									
37	F	6780	12	7800	15									
38	G	1900	25	2341	23									
39	H	3455	33	2800	31									
40	I	1255	34	1677	12									
41	J	5460	45	5560	34									
42														
43														
44														
45														
46														
47														
48														

Question 3 Which city has the highest disease prevalence and what is the prevalence per 1,000 population?

Answer: Click or tap here to enter text.

Question 4 Which city has the lowest disease prevalence in female?

Answer: Click or tap here to enter text.

Question 5 How much the highest difference in disease prevalence between gender?

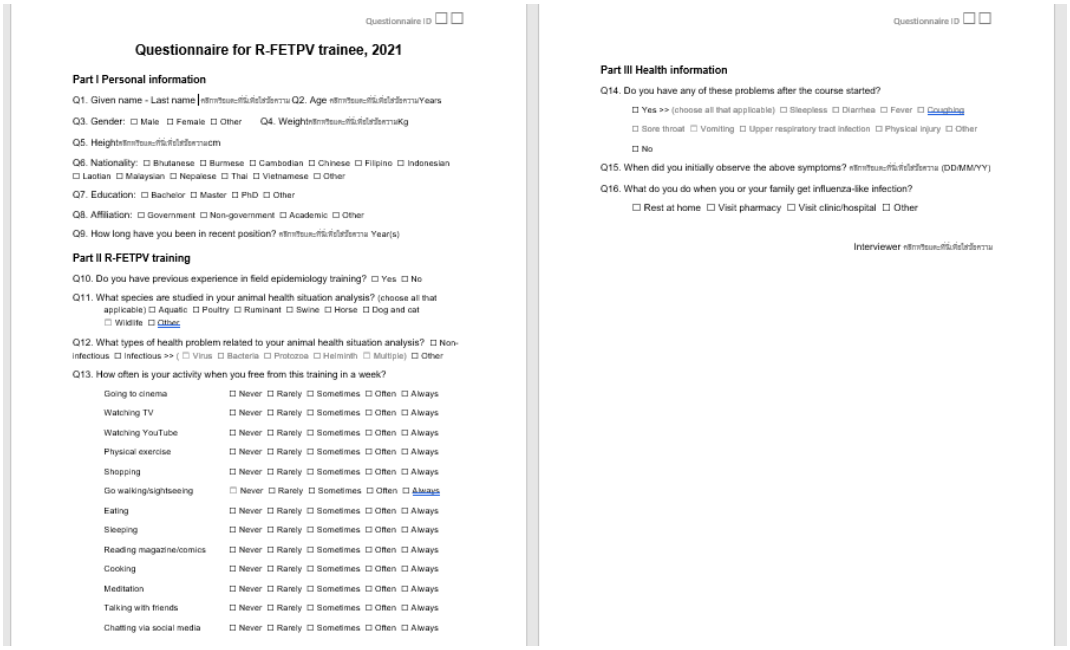
Answer: Click or tap here to enter text.

Part 1 Data entry and validation when entering data.

Functions in use:

- Format Cells
- Data Validation
- Define Name
- Allow Edit Range
- Protect Sheet

1. Familiarize with the questionnaire (download from …)



Questionnaire ID ☐☐

Questionnaire for R-FETPV trainee, 2021

Part I Personal information

Q1. Given name - Last name Q2. Age Years

Q3. Gender: ☐ Male ☐ Female ☐ Other Q4. Weight Kg

Q5. Height cm

Q6. Nationality: ☐ Bhutanese ☐ Burmese ☐ Cambodian ☐ Chinese ☐ Filipino ☐ Indonesian ☐ Laotian ☐ Malaysian ☐ Nepalese ☐ Thai ☐ Vietnamese ☐ Other

Q7. Education: ☐ Bachelor ☐ Master ☐ PhD ☐ Other

Q8. Affiliation: ☐ Government ☐ Non-government ☐ Academic ☐ Other

Q9. How long have you been in recent position? Year(s)

Part II R-FETPV training

Q10. Do you have previous experience in field epidemiology training? ☐ Yes ☐ No

Q11. What species are studied in your animal health situation analysis? (choose all that applicable) ☐ Aquatic ☐ Poultry ☐ Ruminant ☐ Swine ☐ Horse ☐ Dog and cat ☐ Wildlife ☐ Other

Q12. What types of health problem related to your animal health situation analysis? ☐ Non-infectious ☐ Infectious >> (☐ Virus ☐ Bacteria ☐ Protozoa ☐ Helminth ☐ Multiple) ☐ Other

Q13. How often is your activity when you free from this training in a week?

Going to cinema	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Watching TV	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Watching YouTube	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Physical exercise	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Shopping	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Go walking/sightseeing	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Eating	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Sleeping	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Reading magazine/comics	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Cooking	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Meditation	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Talking with friends	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always
Chatting via social media	☐ Never	☐ Rarely	☐ Sometimes	☐ Often	☐ Always

Questionnaire ID ☐☐

Part III Health information

Q14. Do you have any of these problems after the course started?

☐ Yes >> (choose all that applicable) ☐ Sleepless ☐ Diarrhea ☐ Fever ☐ Coughing
☐ Sore throat ☐ Vomiting ☐ Upper respiratory tract infection ☐ Physical injury ☐ Other
☐ No

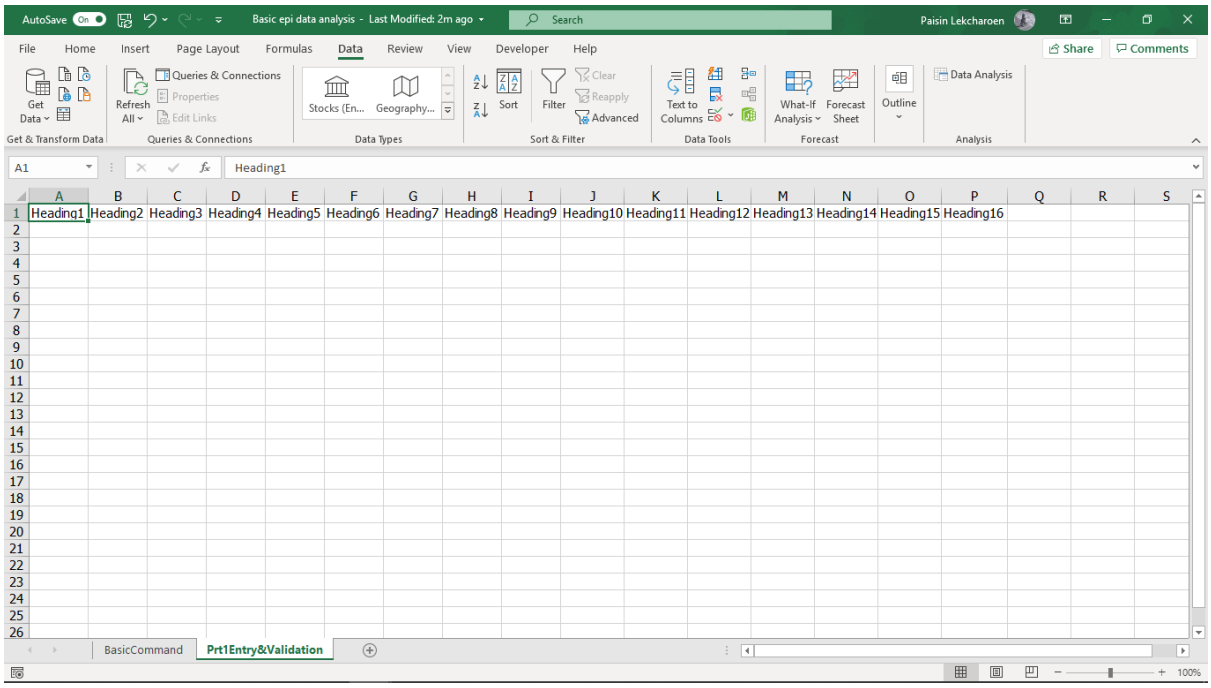
Q15. When did you initially observe the above symptoms? (DD/MM/YY)

Q16. What do you do when you or your family get influenza-like infection?

☐ Rest at home ☐ Visit pharmacy ☐ Visit clinic/hospital ☐ Other

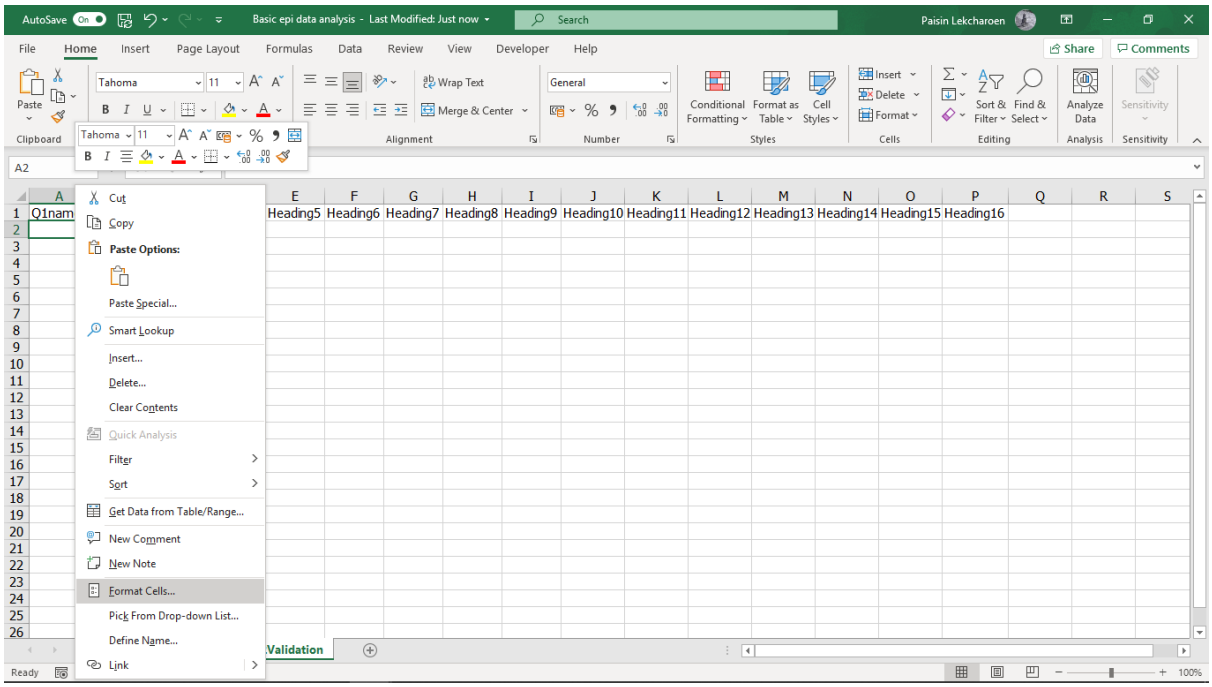
Interviewer

2. Go to 'Prt1Entry&Validation' sheet in 'Basic epi data analysis' workbook. You may see that the first row contains 16 headings: Heading1 to Heading16, correspond to 16 questions in the questionnaire.

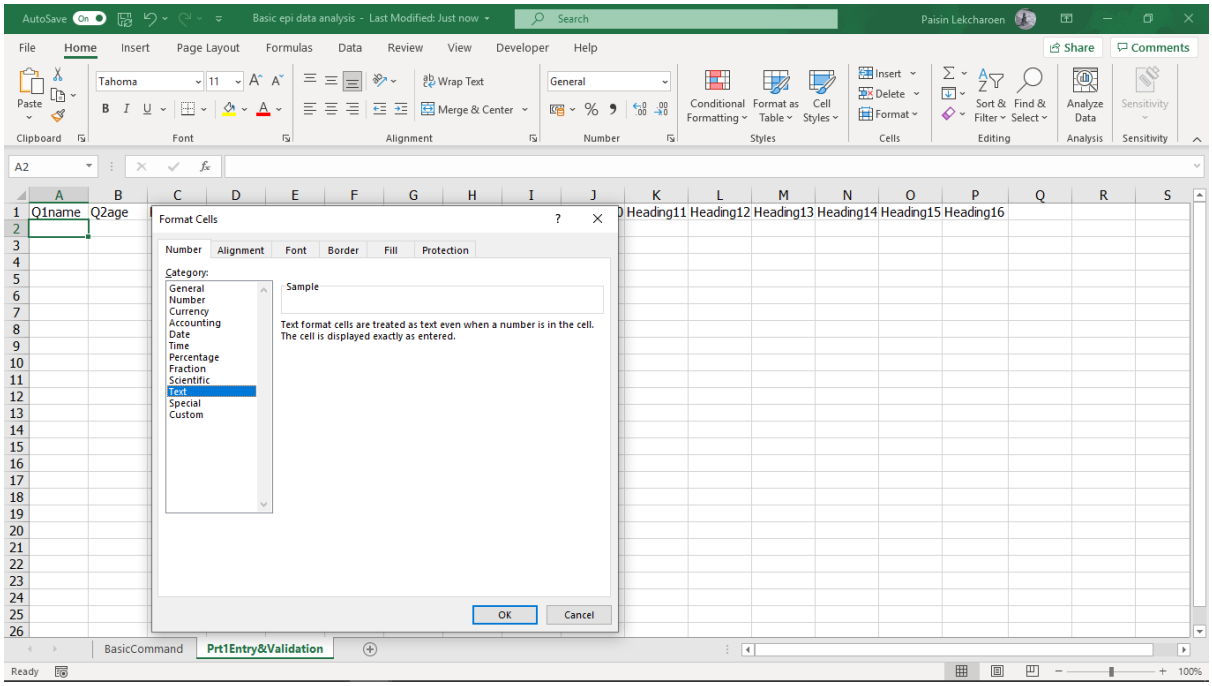


- Please create a Data Entry Form using this sheet appropriately.
- Change the heading name correspond to the question.
    - e.g., Heading1 → Q1name
    - The heading should be short, uses limited characters, represents the corresponding question or data that it may contain, be able for tracking back to the original data, and avoids space in the heading.
    - Be compatible to the Software using in analytical process.
- *Some questions, particularly the questions that can have multiple answers, can contain more than one column in the data entry form. Adjust them appropriately. Consider about how you are going to analyze them.
- Each row represents only one element/subject. The unit of the subject can be individual animal, farm, or any unit as defined in the methodology.
- Each subject should be indexed (that may derive from a subject ID or a questionnaire ID)

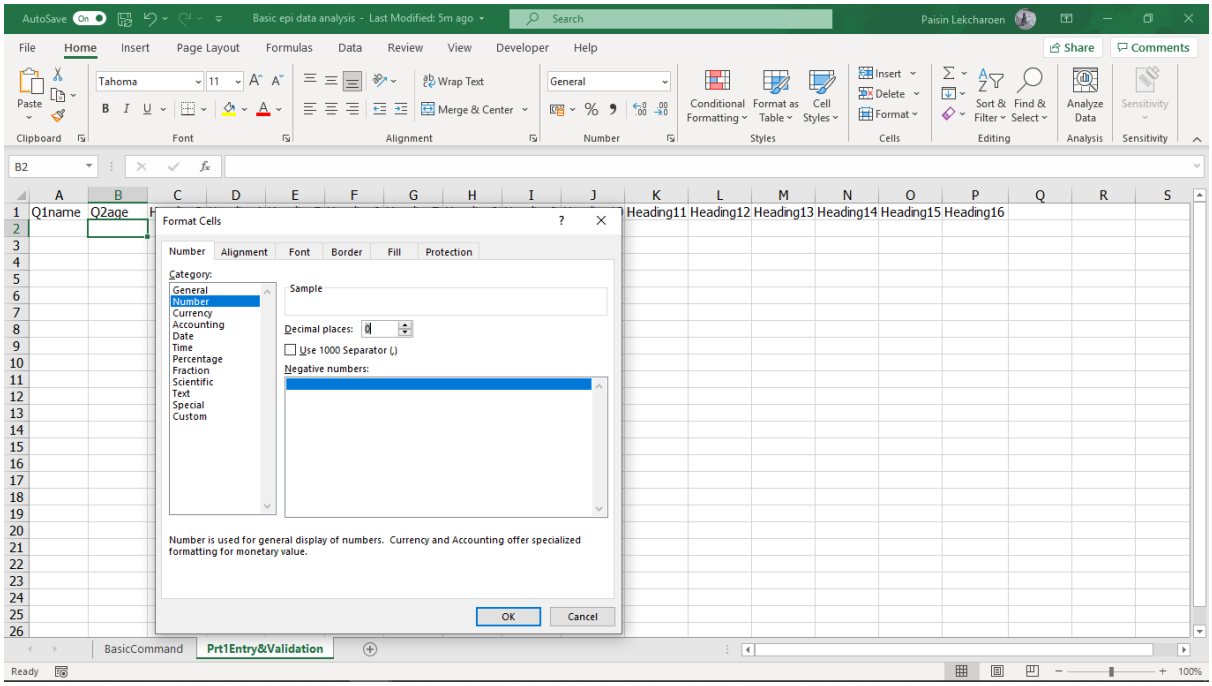
3. Use appropriate data format by using 'Format Cells' to define correct cell format for each column (or question). The cell formats can be text, number, date, etc.
    3.1. Right click on the cell(s) that you want to define its/their property.
    3.2. Choose 'Format Cells'



3.3. Select appropriate cell format from the ‘Category’ box in the ‘Number’ ribbon in the ‘Format Cells’ window. For example, the suitable cell format for ‘Q1name’ is text. Select ‘Text’ then click OK.

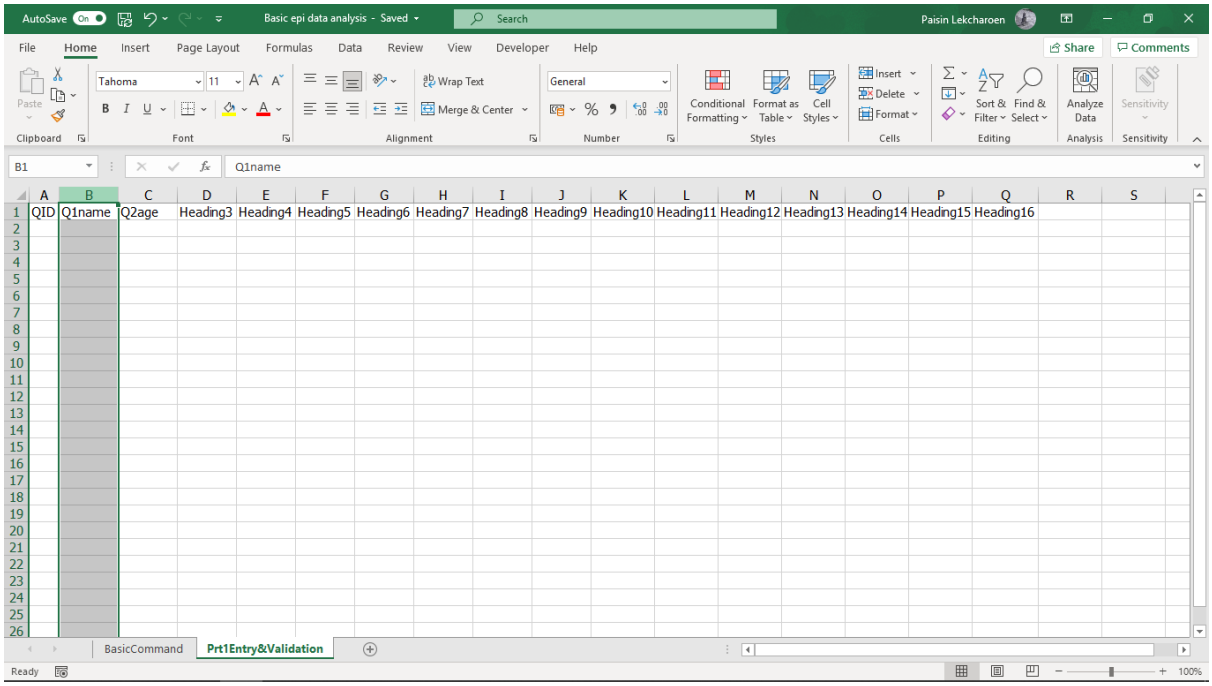


3.4. The cell format for ‘Q2age’ (upon your heading change) is number. So, select ‘Number’. Age contains no decimal so indicate ‘Decimal places’ to ‘0’.

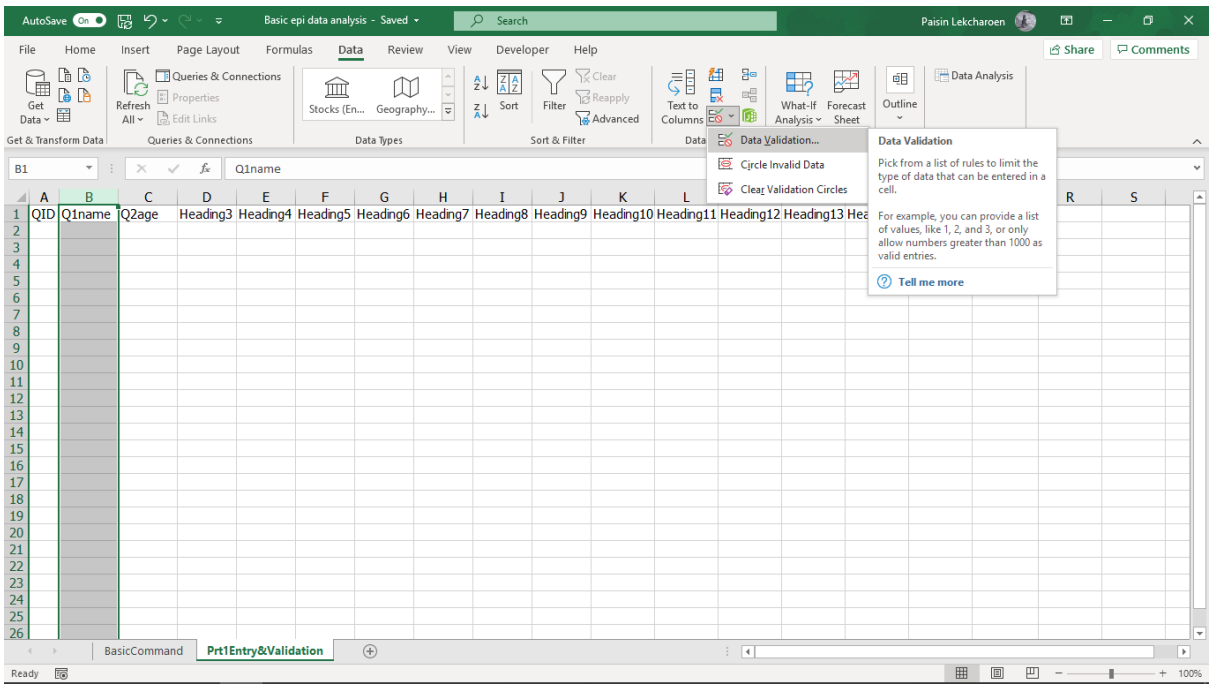


3.5. Continue to the remaining columns.

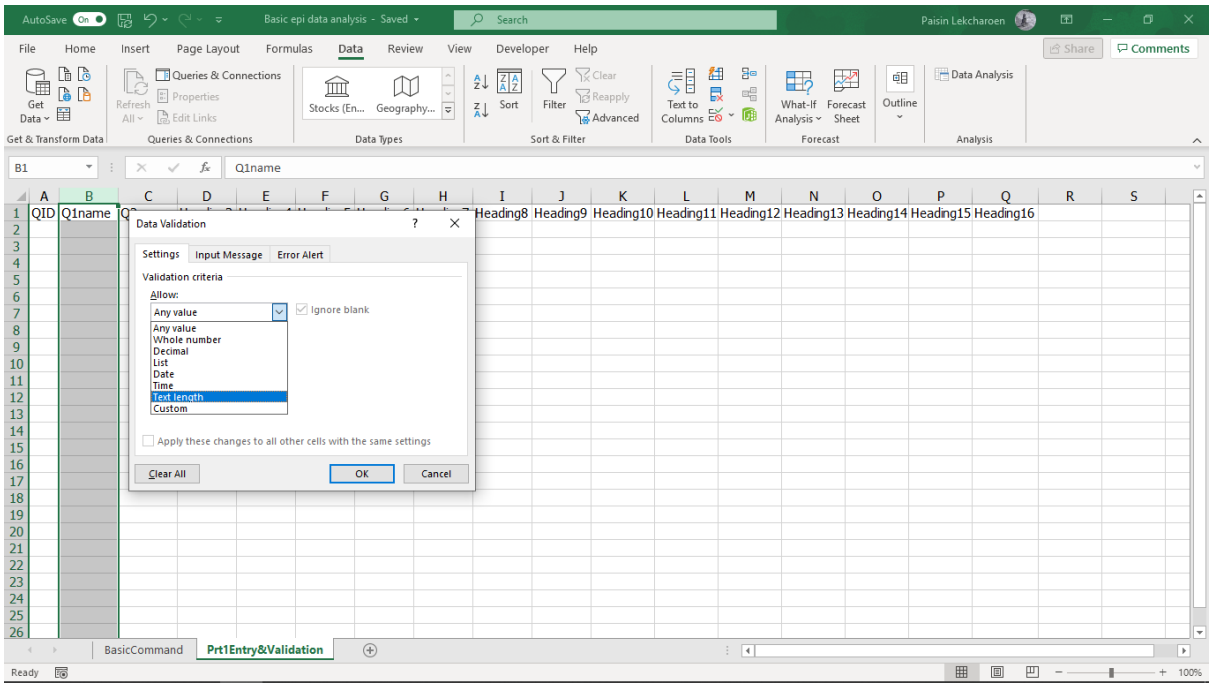
4. Mask the cells to limit possible values (answers) for each column. This can help us avoiding wrong inputs or typos during data entry.
   4.1. E.g., for Q1name, texts are allowed. Highlight the column B ‘Q1name’ (after inserting and indexing column A with the questionnaire ID - ‘QID’.



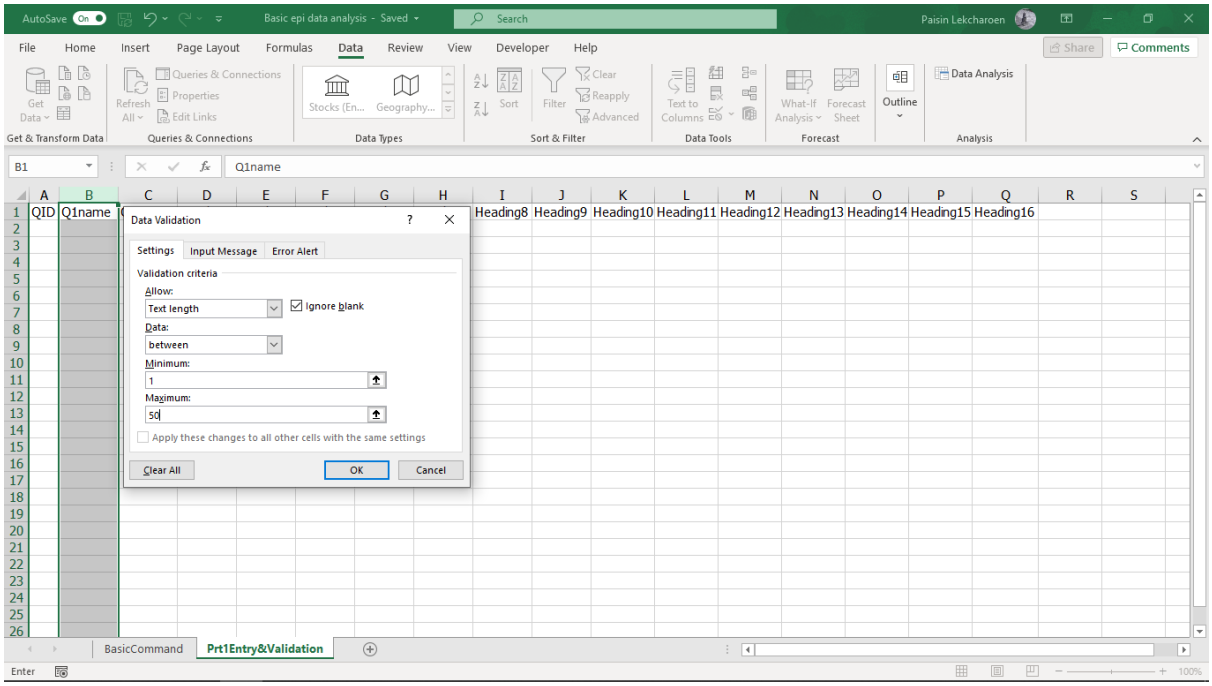
   4.2. On the Data ribbon, select ‘Data Validation’ function.



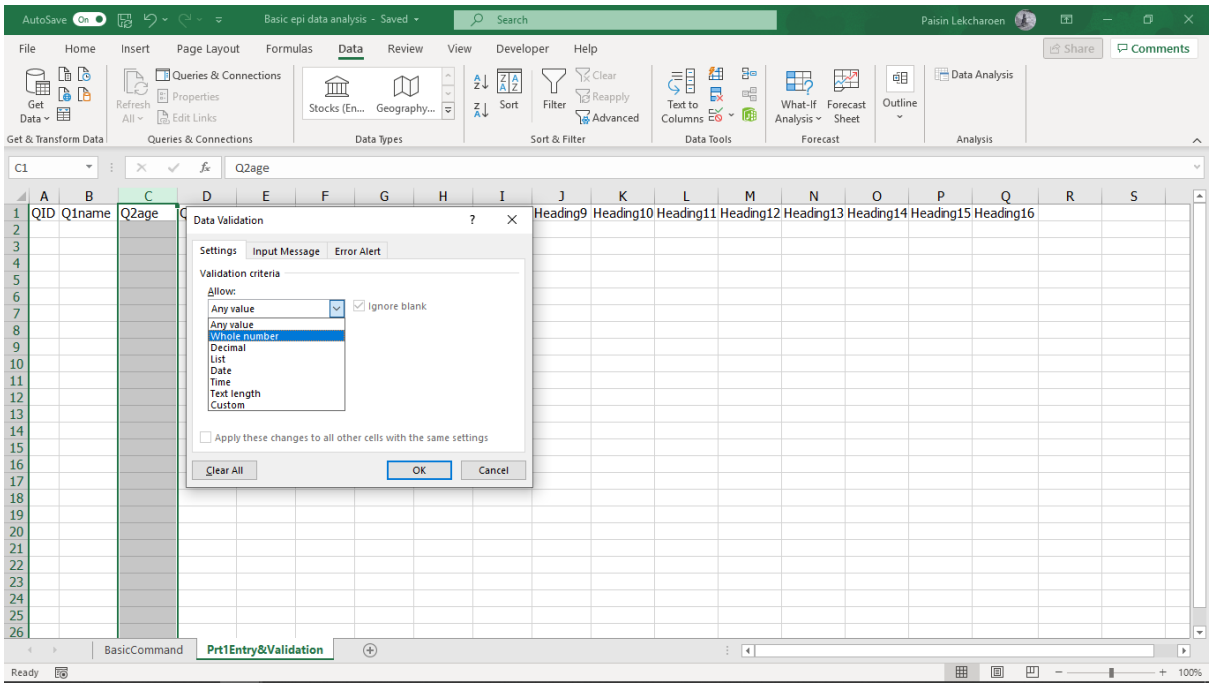
4.3. In the ‘Data Validation’ window, as the value allowed for this question is text, select ‘Text length’ from the ‘Allow:’ box.



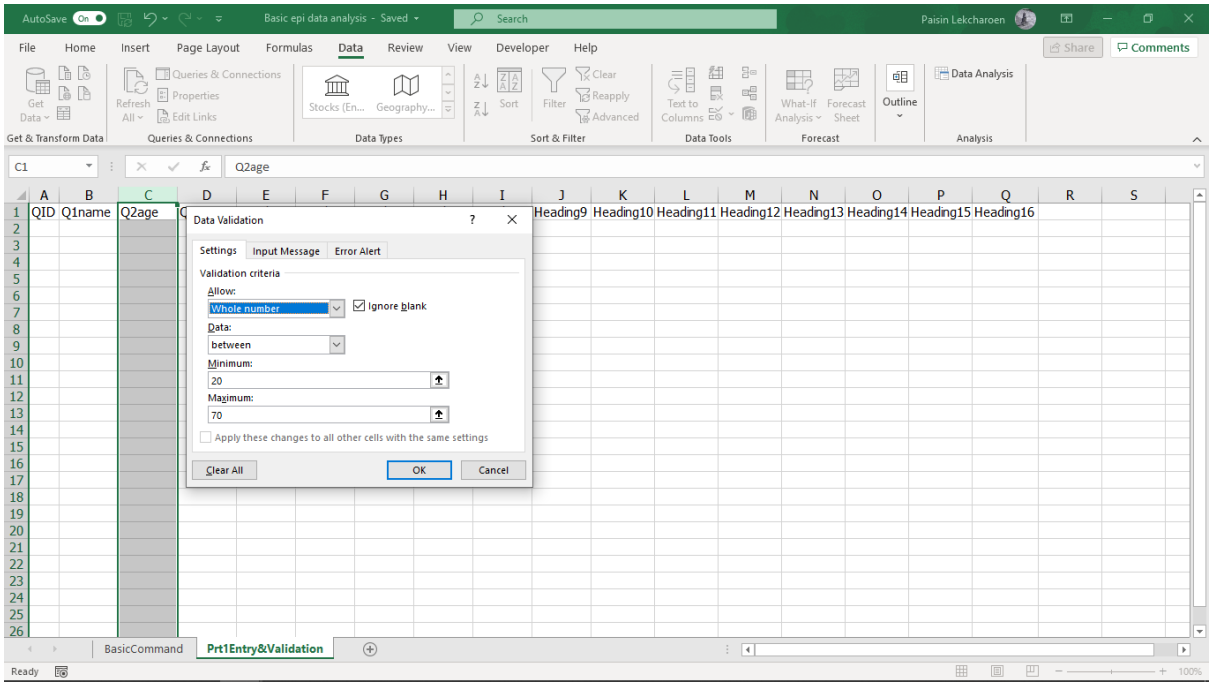
4.4. In the ‘Data:’ box, select ‘Between’. Then indicate minimum and maximum length as you preferred. In this example, the minimum length is 1 and the maximum length is 50. Then click ‘OK’.



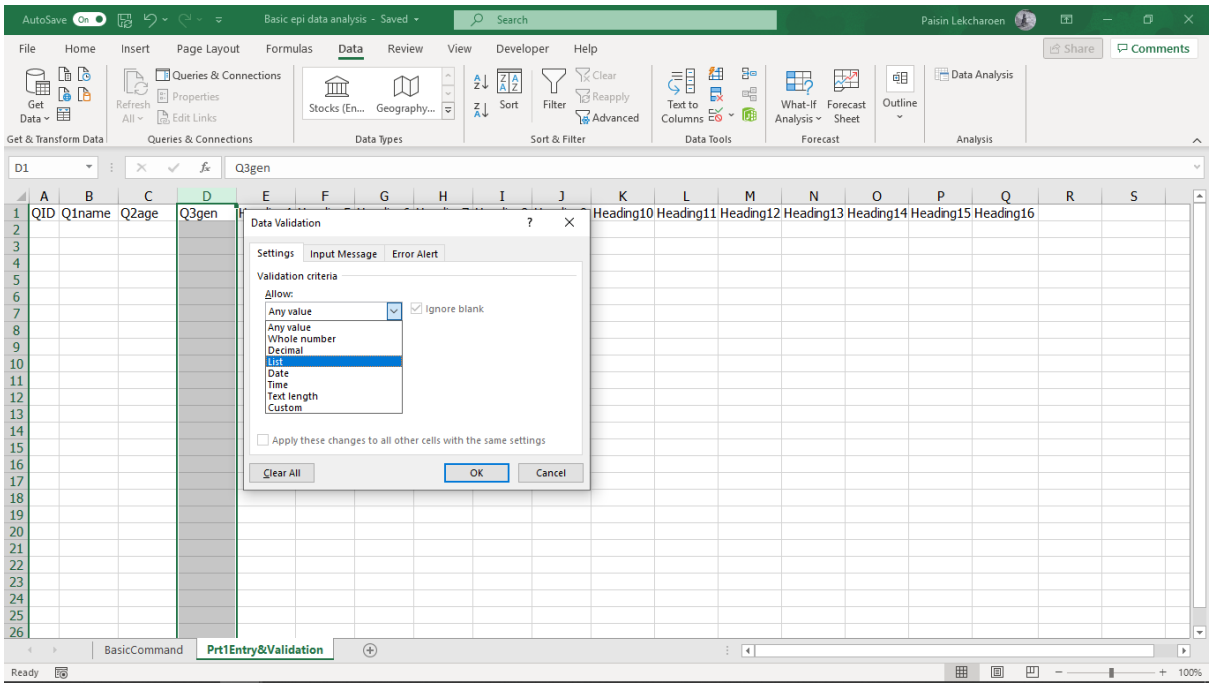
4.5. For ‘Q2age’ which only a whole number is allowed, select ‘Whole number’ from the ‘Allow:’ box in the ‘Data Validation’ window.



4.6. Select ‘Between’ for Data. As we expected that the participants are people who have already been in employment, so the age should be in between age at graduation and retirement. For this example, we indicate 20 as minimum and 70 as maximum age. Then click ‘OK’.

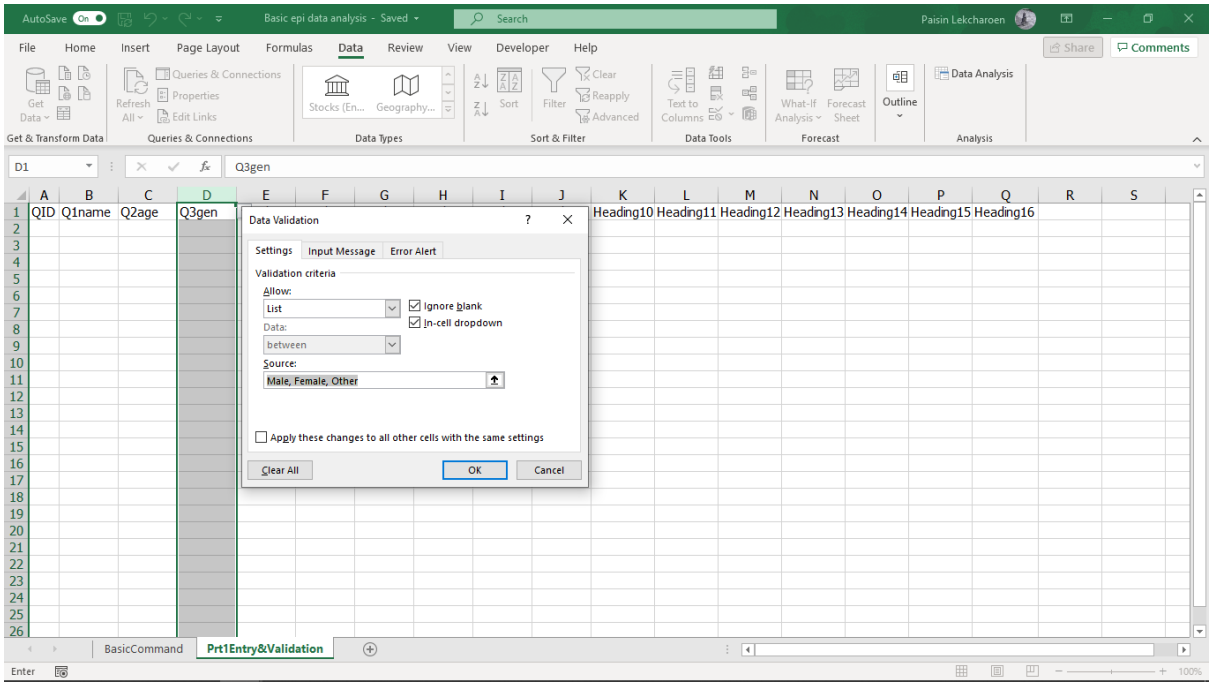


4.7. The ‘Q3gen’ representing a gender of participant allows three values: Male, Female, and Other. So, specify these values using ‘List’ from ‘Allow:’ box.

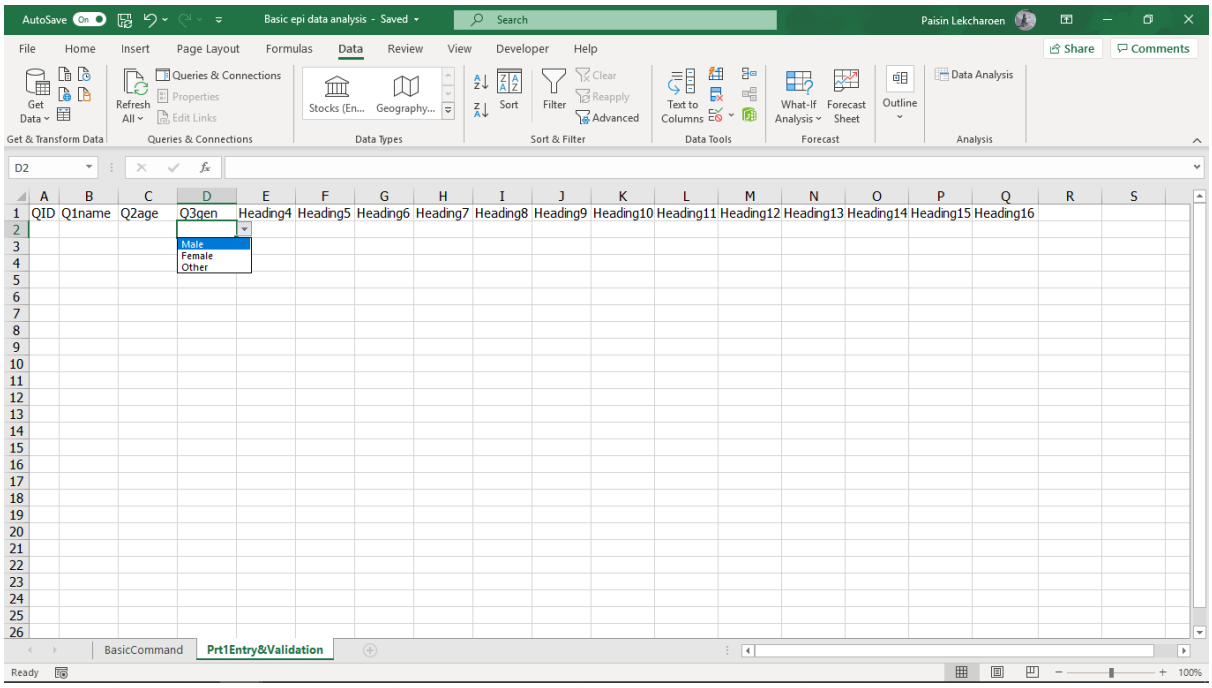


4.8. When selecting ‘List’, the ‘Source:’ box is activated. You can put values by two method:

1) Put values you use as an alternative in the question one by one, separated by comma (,), e.g., ‘Male, Female, Other’ (as shown in the figure below).
2) Put name of defined list (that contains a list of value Male, Female, and Other that you create elsewhere in different worksheet in this workbook (practice provided later).



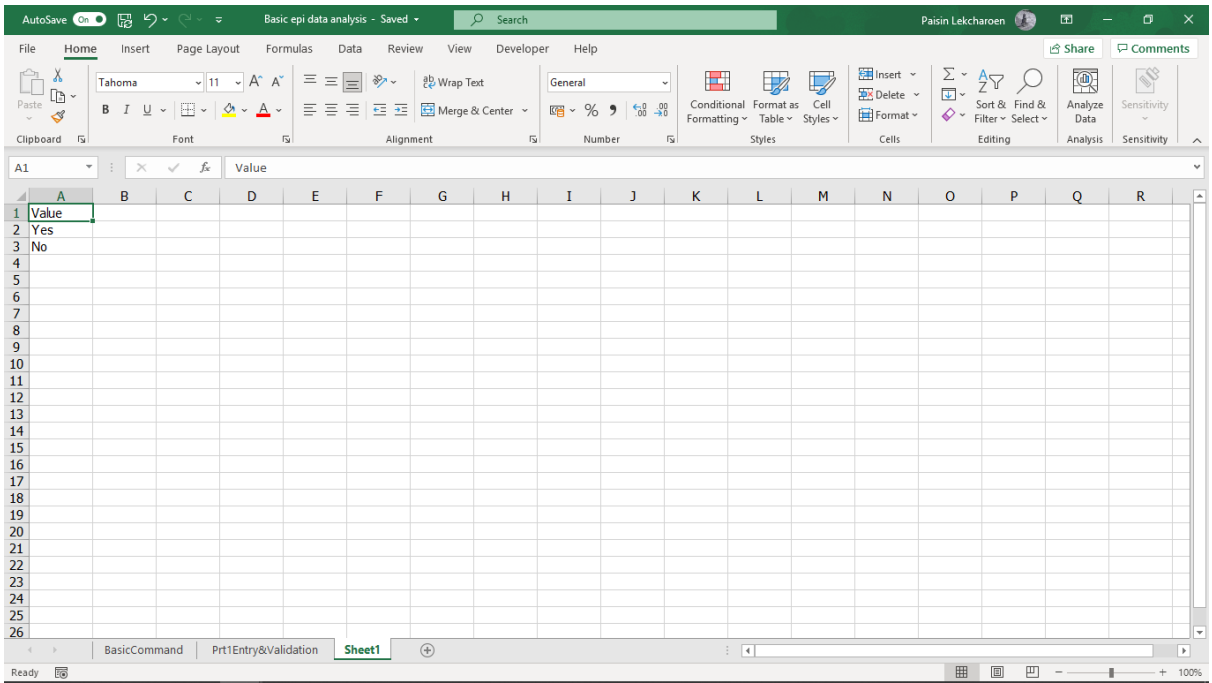
4.9. So, when you want to enter data for this question, a drop-down list of values will appear.



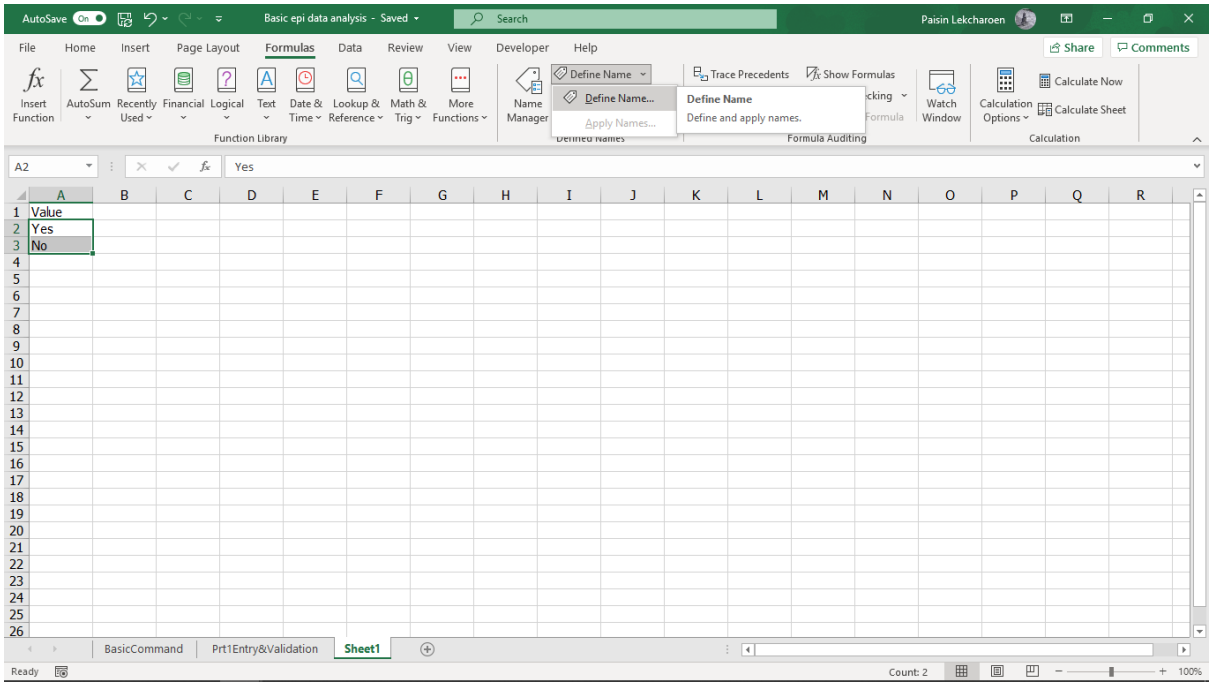
4.10. For some questions which have a same list of answer, you can define a 'List' of values and apply this list to those questions.

For example, 'Q10epiexp' (if the participant has epidemiological training experience) has 'Yes' and 'No' as the alternatives as same as those of 'Q11aq' (if the participant study about aquatic animal or not?).

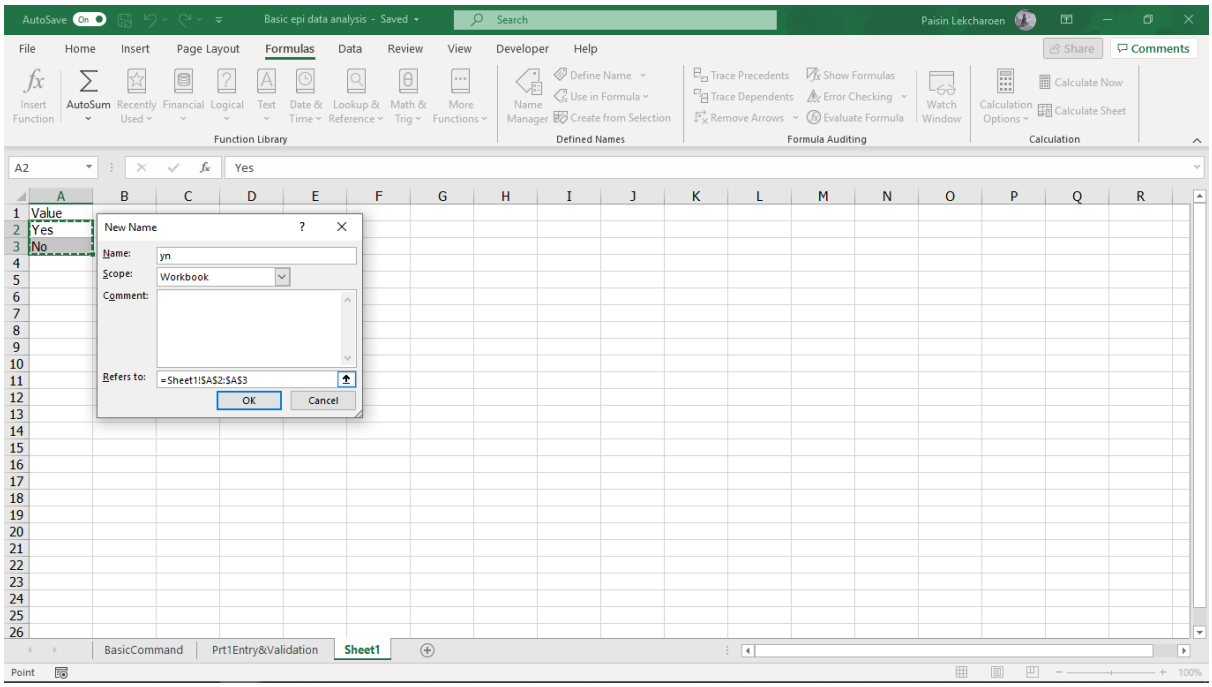
- Insert new worksheet.
- In the new worksheet, put a name for the first column (column A) as 'Value' in the first row. Then put 'Yes' and 'No' in the second and third row, respectively.



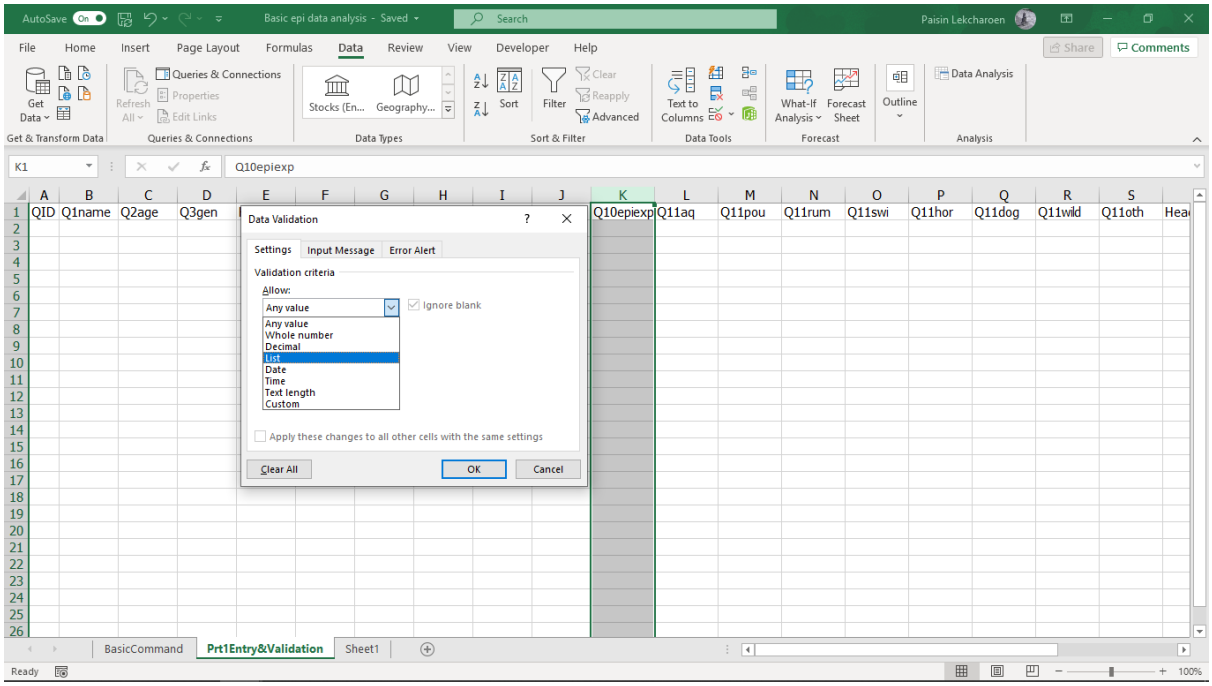
- Highlight across Yes and No. Then, click on ‘Formulas’ ribbon, select ‘Define Name’ function.



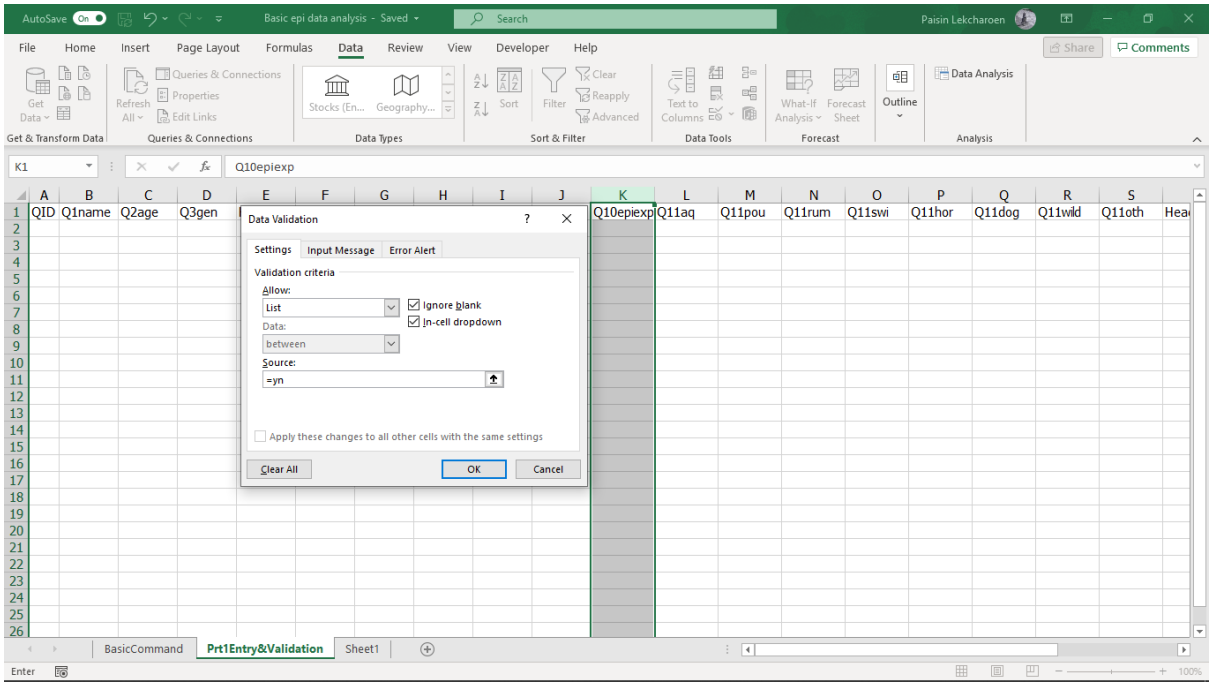
- A ‘New Name’ window appears. Write ‘yn’ (stands for a list containing Yes and No values) in the ‘Name’ box. By the way in the ‘Refers to’ box, it is shown as ‘=Sheet1!$A$2:$A$3’ while a moving rectangle appear across the cells A2 and A3 which contain Yes and No values. Click ‘OK’.



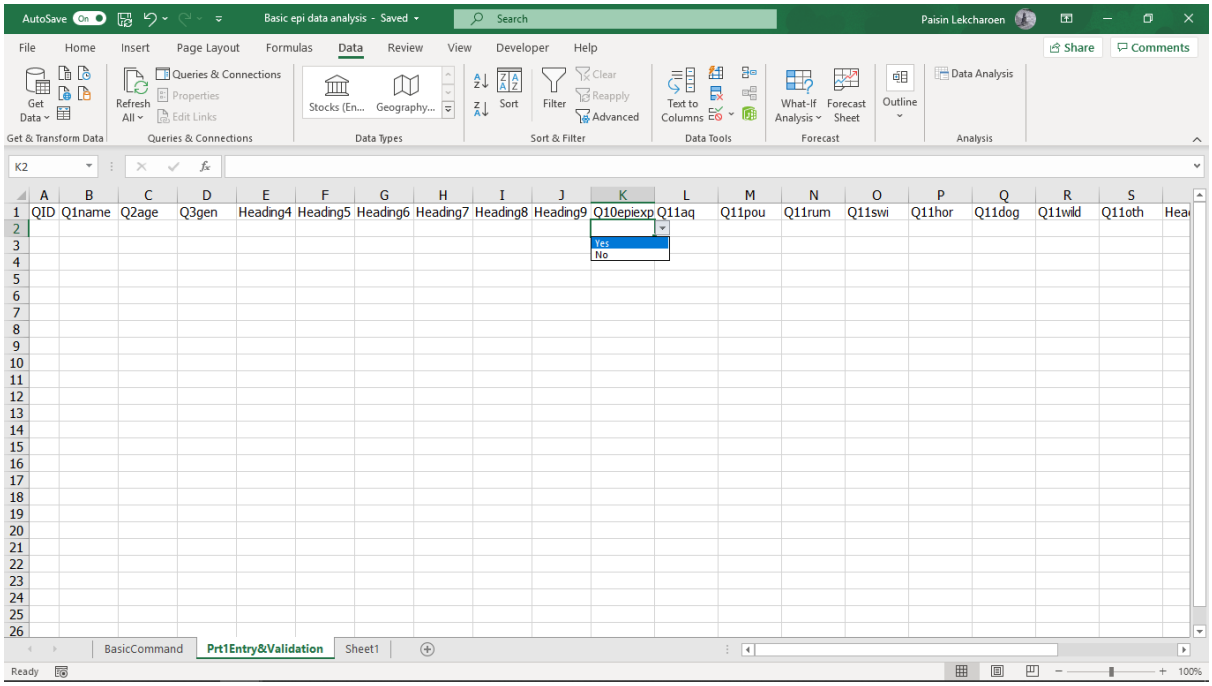
- Go back to the working sheet (Prt1Entry&Validation). Apply the 'yn' list to 'Q10epiexp'. Click 'Data' ribbon and select 'Data Validation' function. Then choose 'List' from the 'Allow' box.



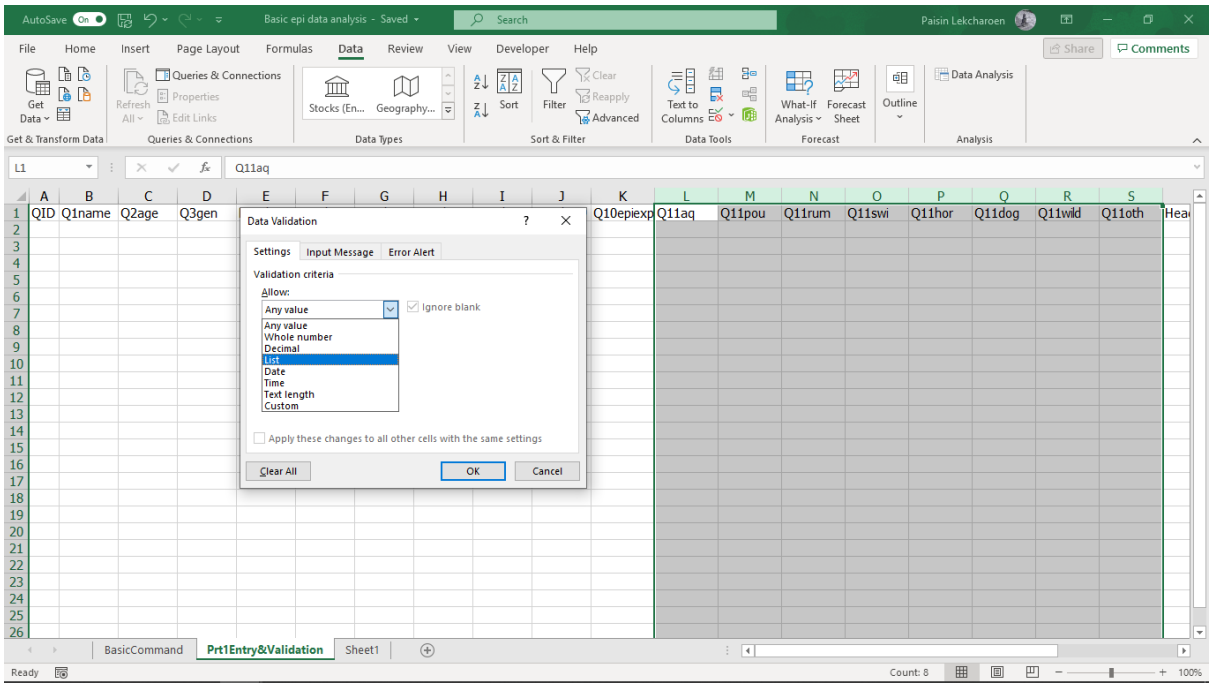
- Put '=yn' in the 'Source' box, then click 'OK'.

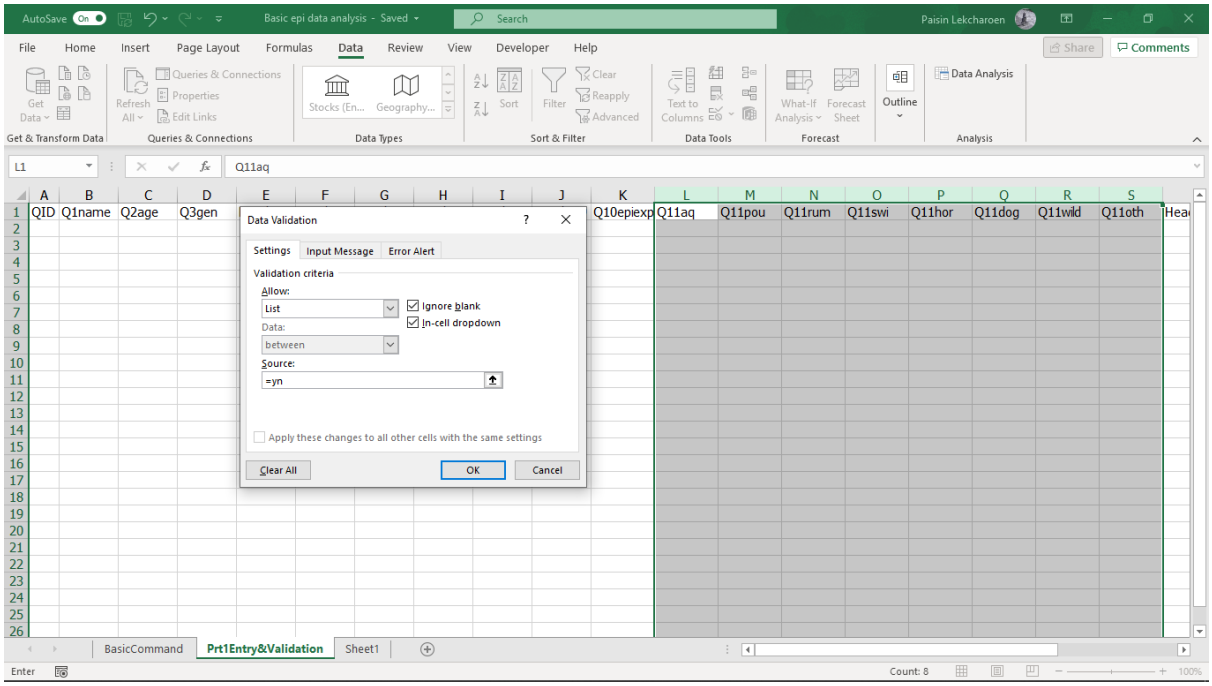


- Now you can choose only ‘Yes’ or ‘No’ from the drop-down list when entering data.



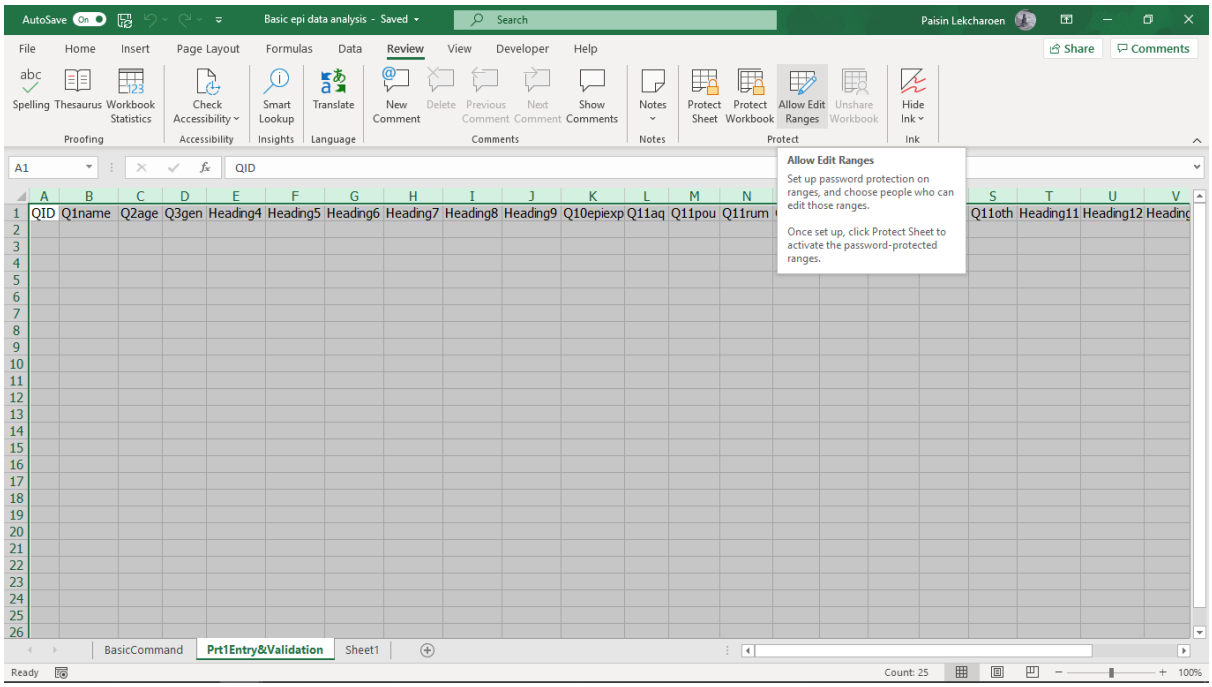
- You can also apply the list to multiple questions which have the same answer alternatives at once. ‘Q11aq’ to ‘Q11oth’ are derived from question number 11. All these questions need ‘Yes’ or ‘No’ answer if it is not missing. So, highlight all of these questions. Then apply the list ‘yn’ for these questions.



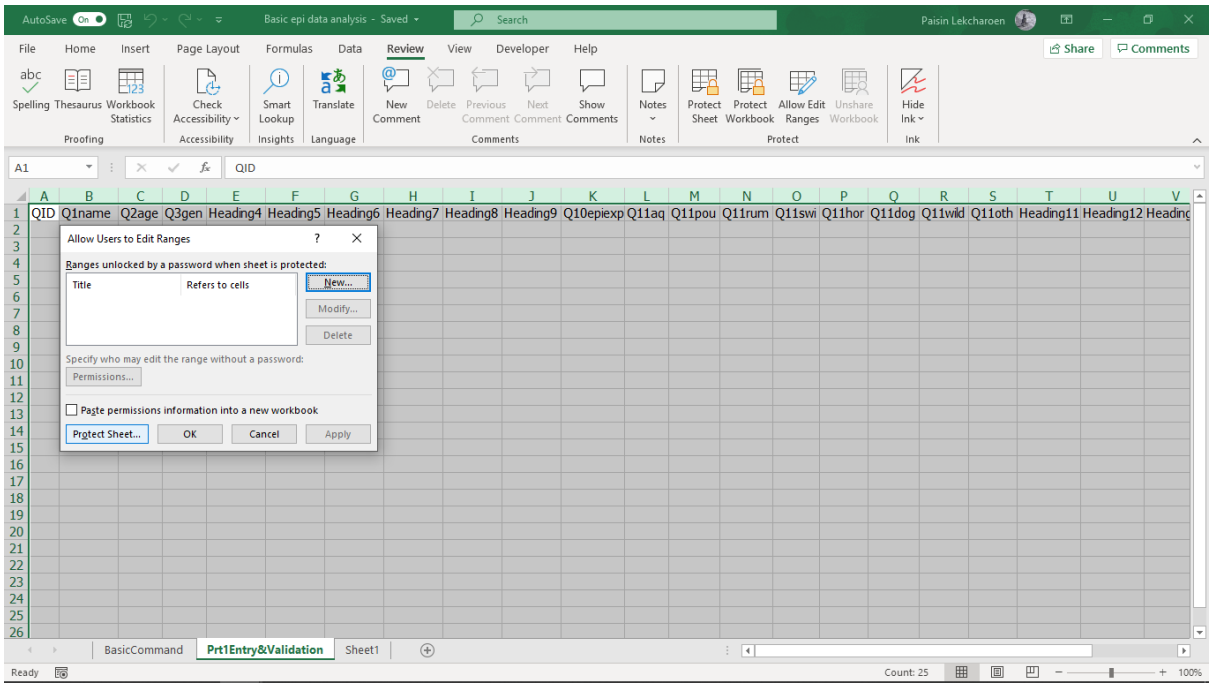


4.11. Continue to all columns as appropriate.

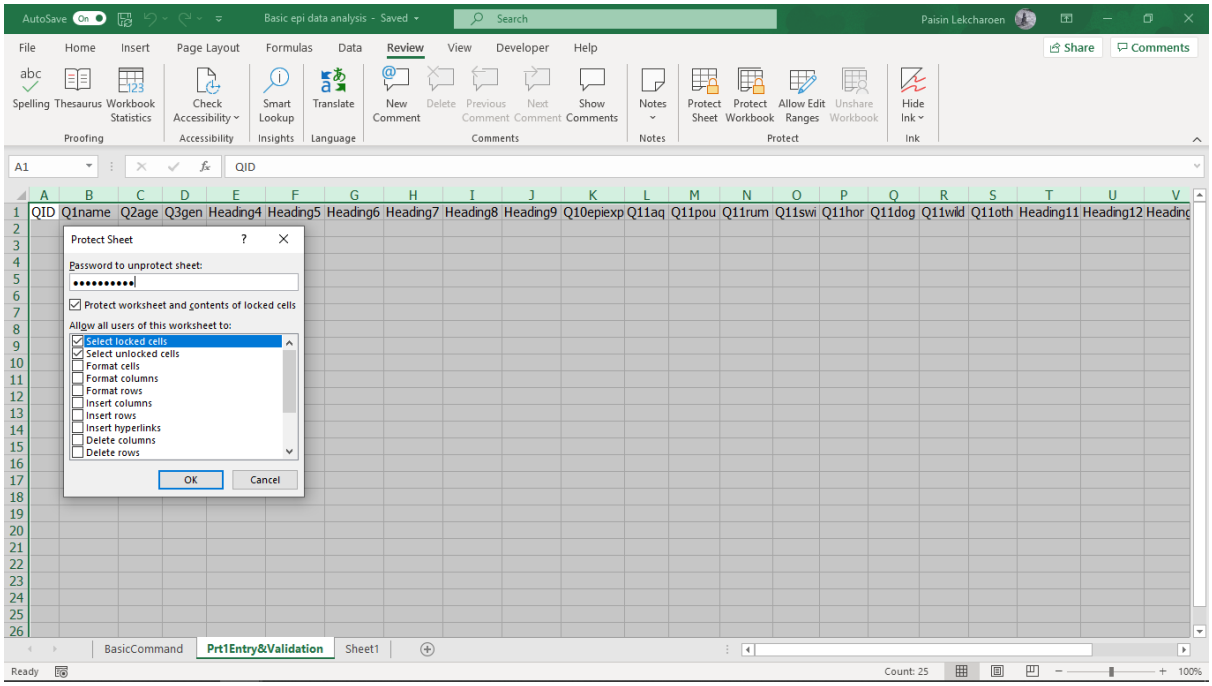
4.12. Use 'Allow Edit Ranges' function on range of cells that are going to be used by highlighting across all columns and rows you preferred. This function can be selected from 'Review' ribbon.



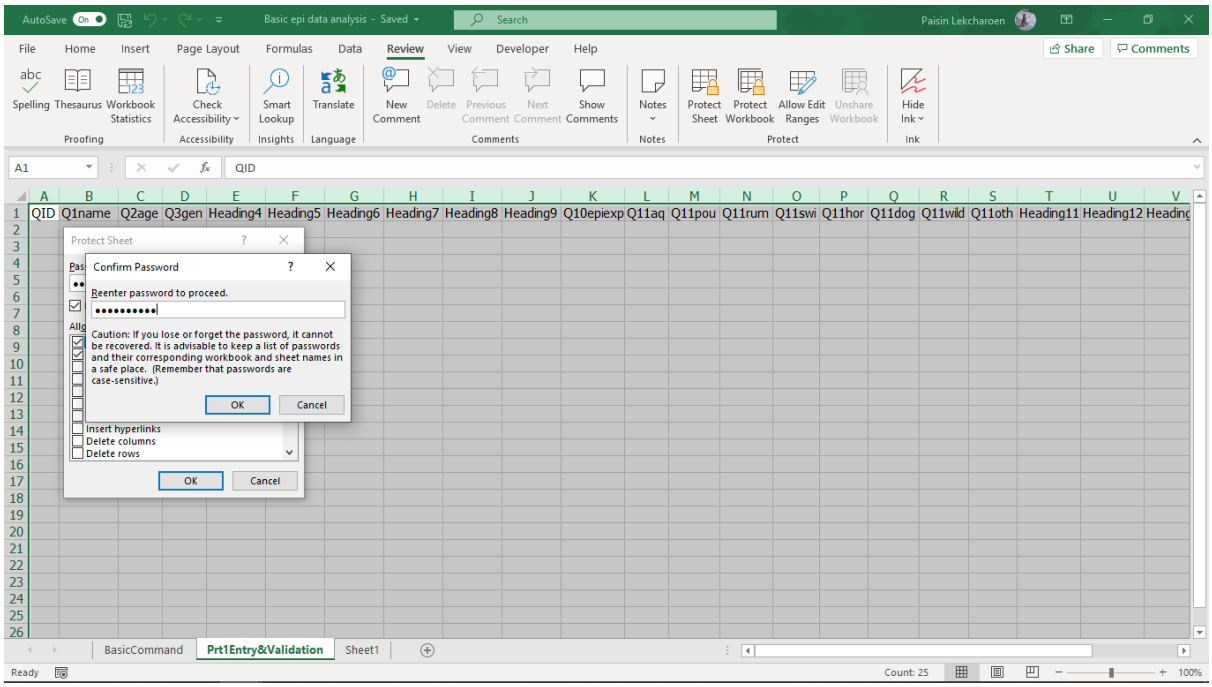
4.13. ‘Allow Edit Range’ window appears. Click ‘Protect Sheet’.



4.14. Put a password in ‘Password to unprotect sheet’ box. In this case, ‘rfetpv2021’ is used. Leave other values as default. Then click ‘OK’.



4.15. The program will ask you to re-confirm the password. Put the same password again and click ‘OK’.



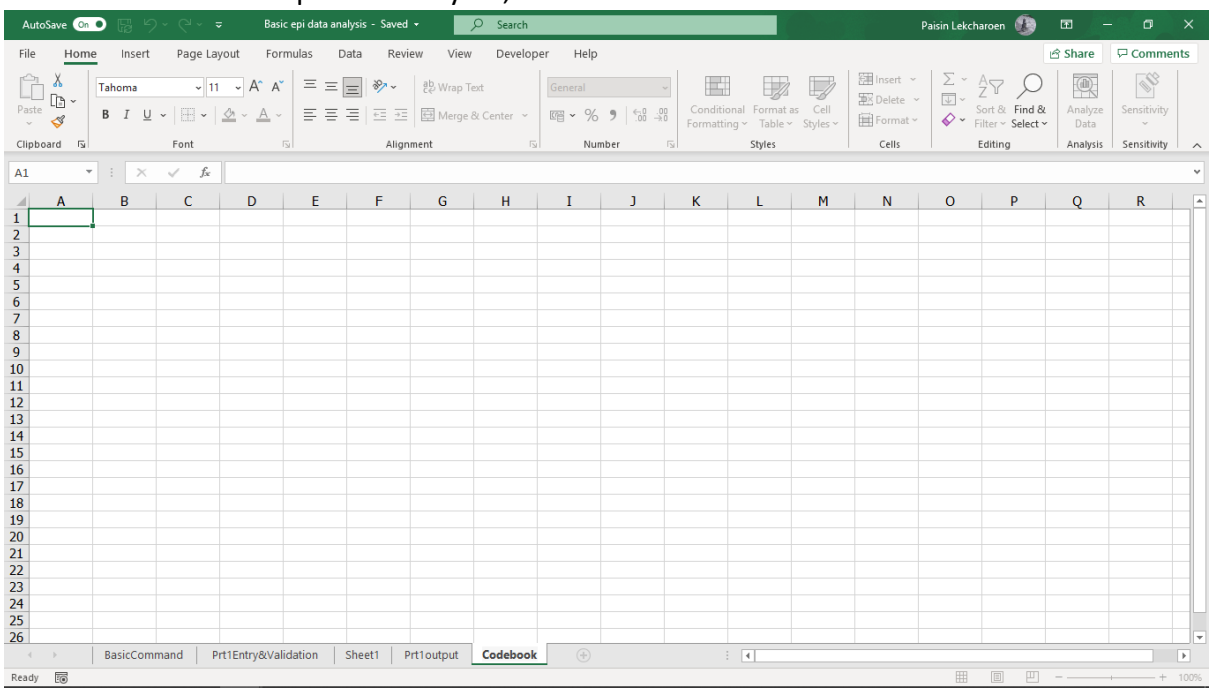
4.16. So, the worksheet is protected. If anyone is going to make change in this worksheet. It will be asked to unprotect the sheet by providing correct password. This is useful when you want to send a data entry form to your colleagues or when data entry is completed.

4.17. Now unprotect the worksheet to allow data entry. Then, enter data record from the example questionnaires.

4.18. An example of Exercise part 1 output is provided. See worksheet ‘Prt1output’. Look around about how to head each column, how to arrange each question in a suitable format for their relevant answering, and how to define list of answering values. Compare with one you have already created.

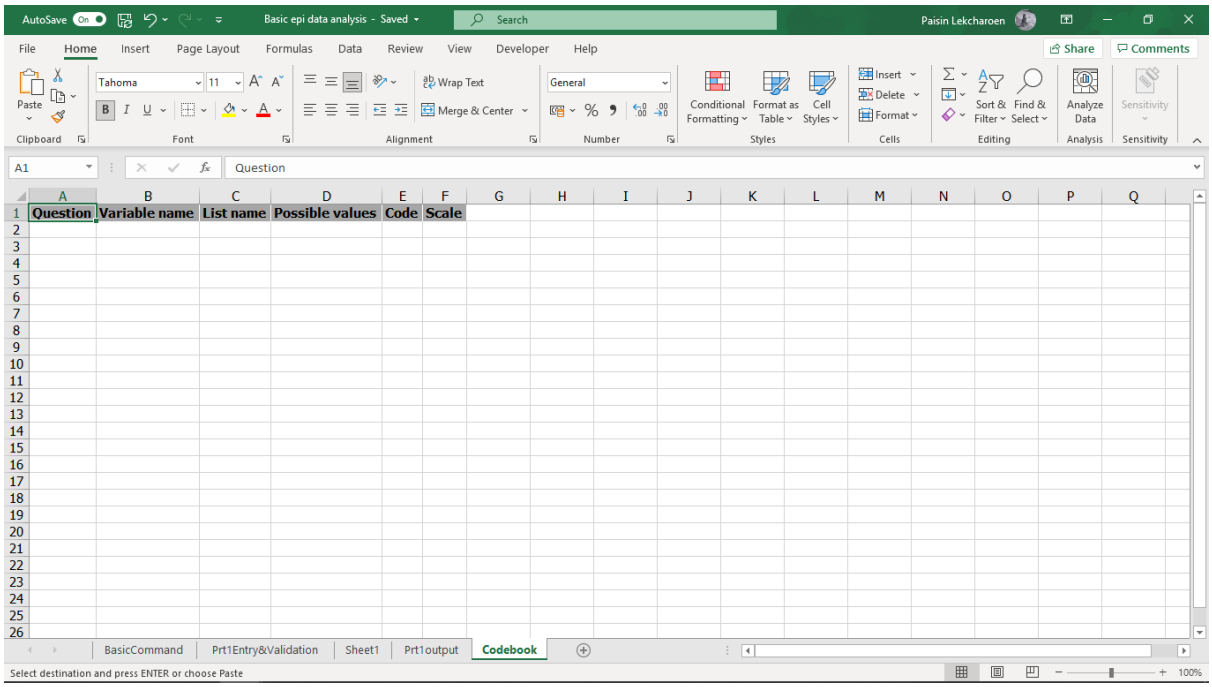
5. Generate a codebook sheet for data entry reference from the relevant questions in the questionnaire. It helps you easily keep track with the questions and answers, and allow easily interpretation of the database.

5.1. From the 'Basic epi data analysis', insert new sheet and name 'Codebook'.

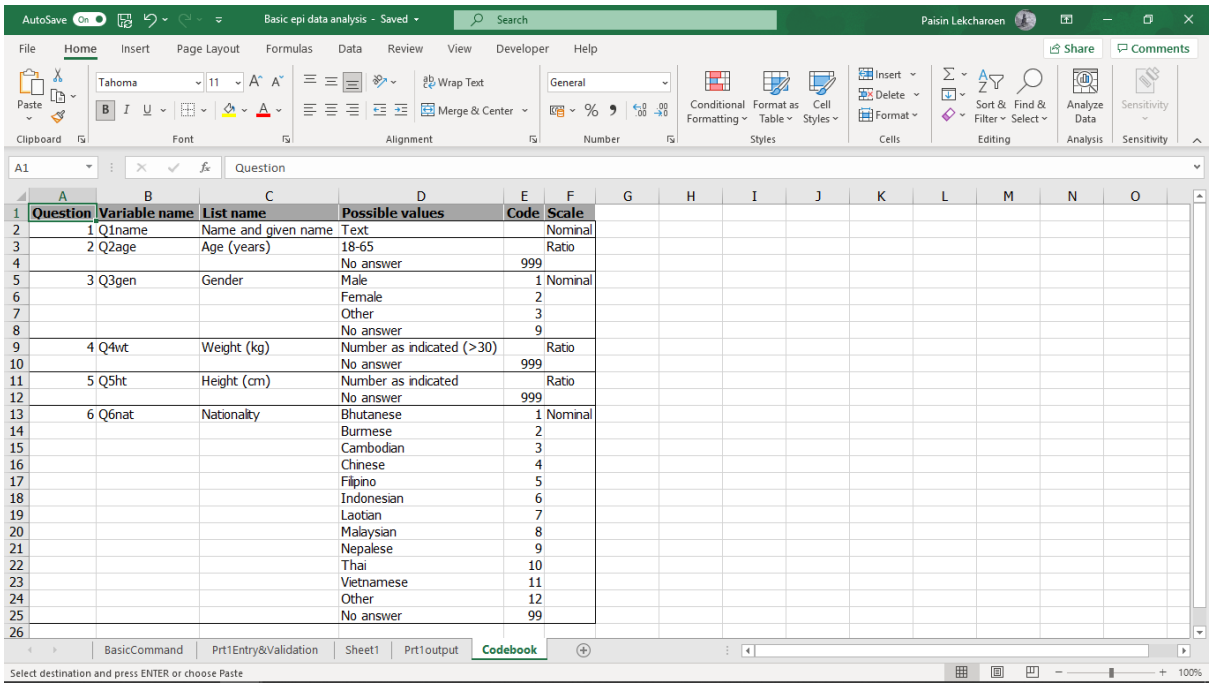


5.2. Six columns will be used in the Codebook sheet including:

1) Question
2) Variable name
3) List name
4) Possible values
5) Code
6) Scale



5.3. Put information in each column according to the question in the questionnaire. Examples are shown for questions number 1 to 6.



Question	Variable name	List name	Possible values	Code	Scale
1	Q1name	Name and given name	Text		Nominal
2	Q2age	Age (years)	18-65		Ratio
			No answer	999	
3	Q3gen	Gender	Male	1	Nominal
			Female	2	
			Other	3	
			No answer	9	
4	Q4wt	Weight (kg)	Number as indicated (>30)		Ratio
			No answer	999	
5	Q5ht	Height (cm)	Number as indicated		Ratio
			No answer	999	
6	Q6nat	Nationality	Bhutanese	1	Nominal
			Burmese	2	
			Cambodian	3	
			Chinese	4	
			Filipino	5	
			Indonesian	6	
			Laotian	7	
			Malaysian	8	
			Nepalese	9	
			Thai	10	
			Vietnamese	11	
			Other	12	
			No answer	99	

5.4. Continue to all questions. Make sure that you assign appropriate code and correct scale for all questions.

5.5. An example of a complete codebook relevant to ‘Prt1output’ is provided as ‘CBKoutput’ worksheet.

Part 2 Data conversion

A dataset from a questionnaire survey is provided in worksheet 'Prt2conversion'. **Thirty-two trainees** participate in this survey and provide answer of the 16-question questionnaire. Fifty variables, deriving from 16 questions, are obtained including questionnaire ID (QID). However, some variables are not acquired during the survey and need some conversions from the original dataset.

In addition, a worksheet 'CBKcplt' for a complete codebook is also provided. Use this worksheet for practicing 'Define Name' function to create lists of values for operating in 'Vlookup' function.

Functions in use:

- Text to Columns
- If
- And
- Left
- Right
- Vlookup
- Concatenate

Additional columns:

- ✓ DoB : Date of birth of the participants

At the end of this part, you should have additional column including:

- ✓ A column representing 'Date' of birth
- ✓ A column representing 'Month' of birth
- ✓ A column representing 'Year' of birth
- ✓ A column representing 'Season' of birth
- ✓ A column representing abbreviated season
- ✓ A column representing abbreviated year
- ✓ A column representing a season-year group
- ✓ A column representing body mass index
- ✓ Two columns representing body mass index interpretation
- ✓ A column indicating consumption behavior
- ✓ A column indicating exercise behavior
- ✓ A column indicating case status

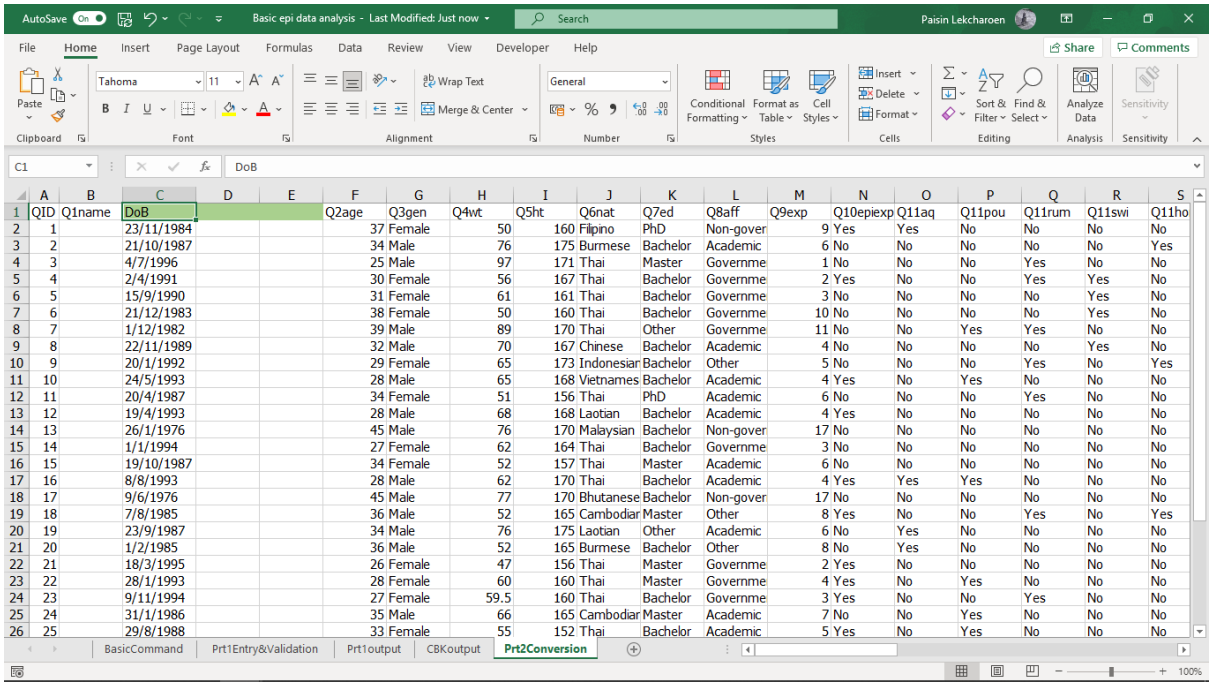
Exercise 2.1 Find a season-year (Syr) of birth for participants.

Table A. A season-year group (Syr) values.

Year of birth	Era	Season	
		Wet	Dry
1970-1979	1970s	W70	D70
1980-1989	1980s	W80	D80
1990-1999	1990s	W90	D90

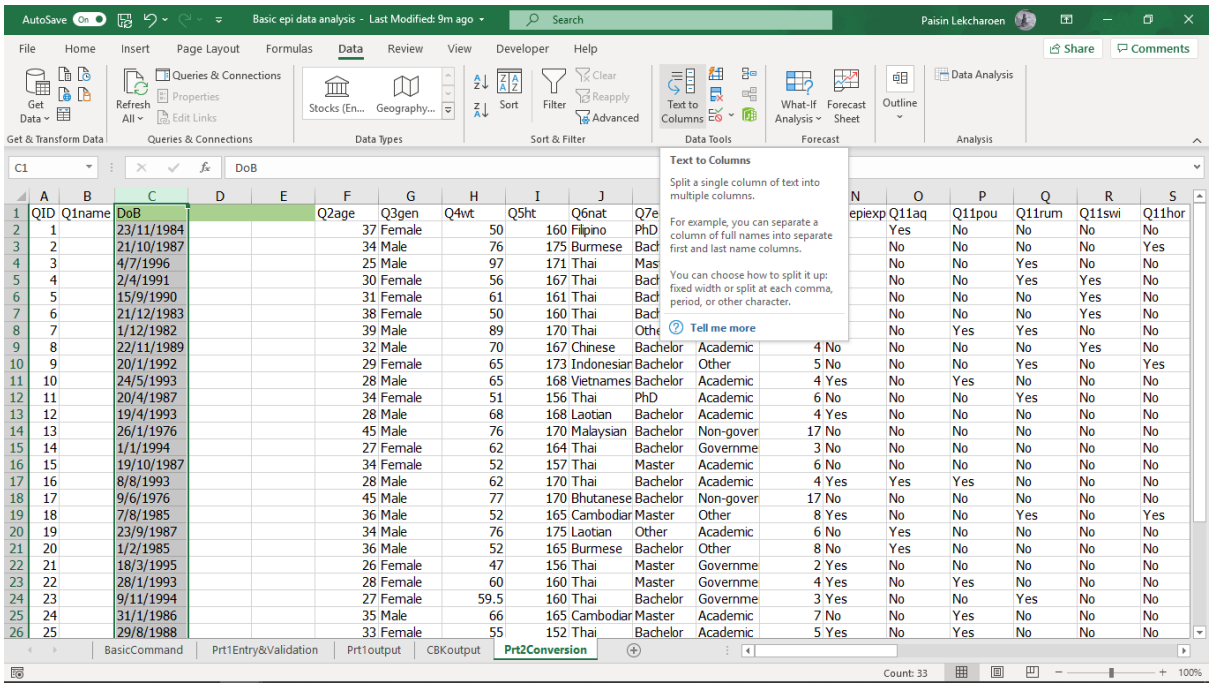
Given a wet season is between May and October and a dry season is between November and April.

1. Use 'Text to columns' function to separate a column 'DoB' into three columns of 'Day', 'Month', and 'Year'.
   1.1. Insert 2 new columns to the right of 'DoB'.

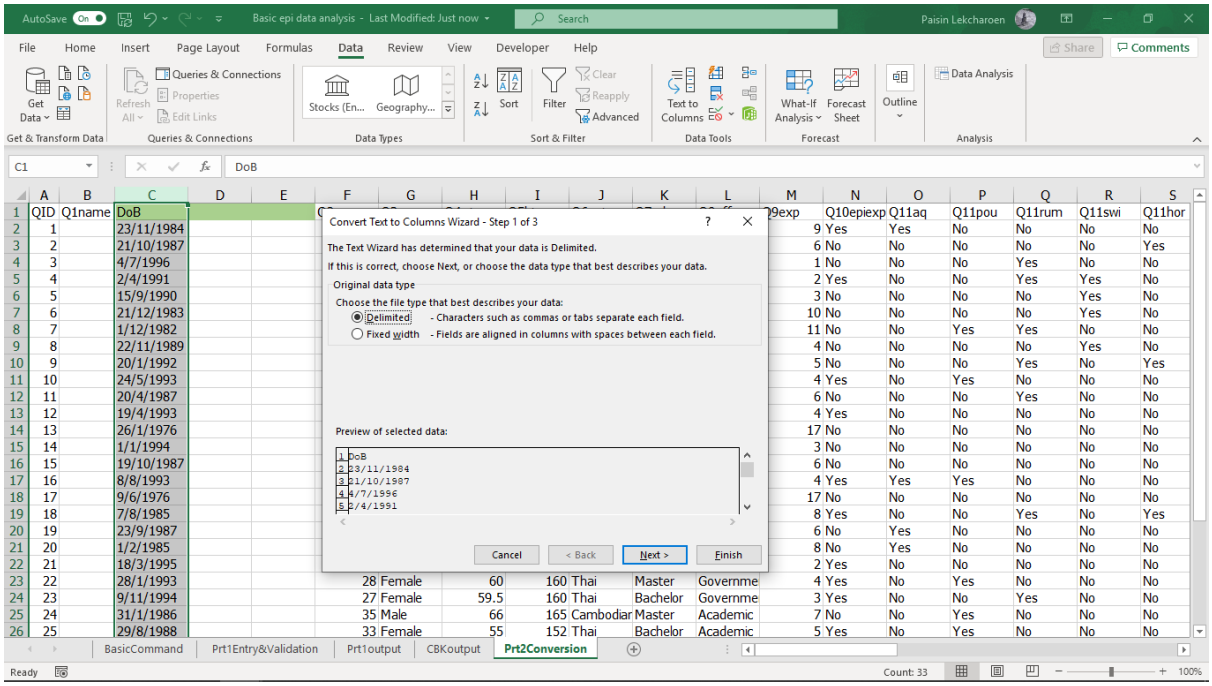


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	QID	Q1name	DoB			Q2age	Q3gen	Q4wt	Q5ht	Q6nat	Q7ed	Q8aff	Q9exp	Q10epiexp	Q11aq	Q11pou	Q11rum	Q11swi	Q11ho
2	1		23/11/1984			37	Female	50	160	Filipino	PhD	Non-gover	9	Yes	Yes	No	No	No	No
3	2		21/10/1987			34	Male	76	175	Burmese	Bachelor	Academic	6	No	No	No	No	No	Yes
4	3		4/7/1996			25	Male	97	171	Thai	Master	Governme	1	No	No	No	Yes	No	No
5	4		2/4/1991			30	Female	56	167	Thai	Bachelor	Governme	2	Yes	No	No	Yes	Yes	No
6	5		15/9/1990			31	Female	61	161	Thai	Bachelor	Governme	3	No	No	No	No	Yes	No
7	6		21/12/1983			38	Female	50	160	Thai	Bachelor	Governme	10	No	No	No	No	Yes	No
8	7		1/12/1982			39	Male	89	170	Thai	Other	Governme	11	No	No	Yes	Yes	No	No
9	8		22/11/1989			32	Male	70	167	Chinese	Bachelor	Academic	4	No	No	No	No	Yes	No
10	9		20/1/1992			29	Female	65	173	Indonesian	Bachelor	Other	5	No	No	No	Yes	No	Yes
11	10		24/5/1993			28	Male	65	168	Vietnames	Bachelor	Academic	4	Yes	No	Yes	No	No	No
12	11		20/4/1987			34	Female	51	156	Thai	PhD	Academic	6	No	No	No	Yes	No	No
13	12		19/4/1993			28	Male	68	168	Laotian	Bachelor	Academic	4	Yes	No	No	No	No	No
14	13		26/1/1976			45	Male	76	170	Malaysian	Bachelor	Non-gover	17	No	No	No	No	No	No
15	14		1/1/1994			27	Female	62	164	Thai	Bachelor	Governme	3	No	No	No	No	No	No
16	15		19/10/1987			34	Female	52	157	Thai	Master	Academic	6	No	No	No	No	No	No
17	16		8/8/1993			28	Male	62	170	Thai	Bachelor	Academic	4	Yes	Yes	Yes	No	No	No
18	17		9/6/1976			45	Male	77	170	Bhutanese	Bachelor	Non-gover	17	No	No	No	No	No	No
19	18		7/8/1985			36	Male	52	165	Cambodian	Master	Other	8	Yes	No	No	Yes	No	Yes
20	19		23/9/1987			34	Male	76	175	Laotian	Other	Academic	6	No	Yes	No	No	No	No
21	20		1/2/1985			36	Male	52	165	Burmese	Bachelor	Other	8	No	Yes	No	No	No	No
22	21		18/3/1995			26	Female	47	156	Thai	Master	Governme	2	Yes	No	No	No	No	No
23	22		28/1/1993			28	Female	60	160	Thai	Master	Governme	4	Yes	No	Yes	No	No	No
24	23		9/11/1994			27	Female	59.5	160	Thai	Bachelor	Governme	3	Yes	No	No	Yes	No	No
25	24		31/1/1986			35	Male	66	165	Cambodian	Master	Academic	7	No	No	Yes	No	No	No
26	25		29/8/1988			33	Female	55	152	Thai	Bachelor	Academic	5	Yes	No	Yes	No	No	No

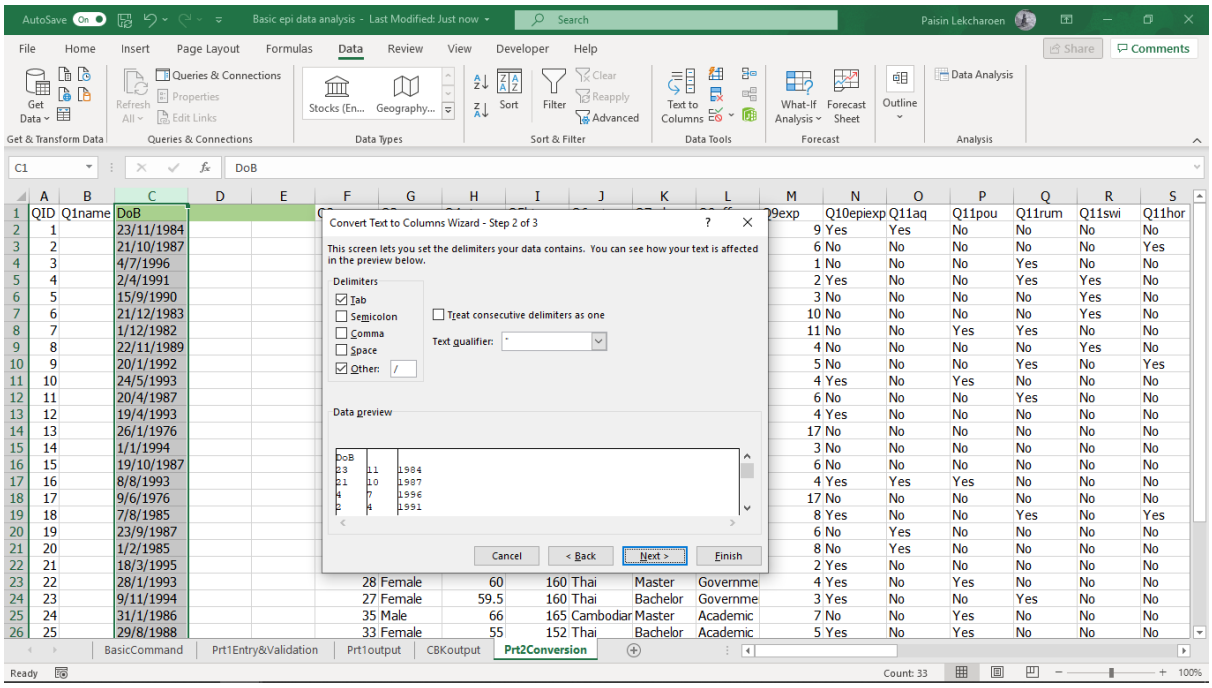
1.2. Highlight column ‘DoB’. Then, from the ‘Data’ ribbon, select ‘Text to Columns’ function.



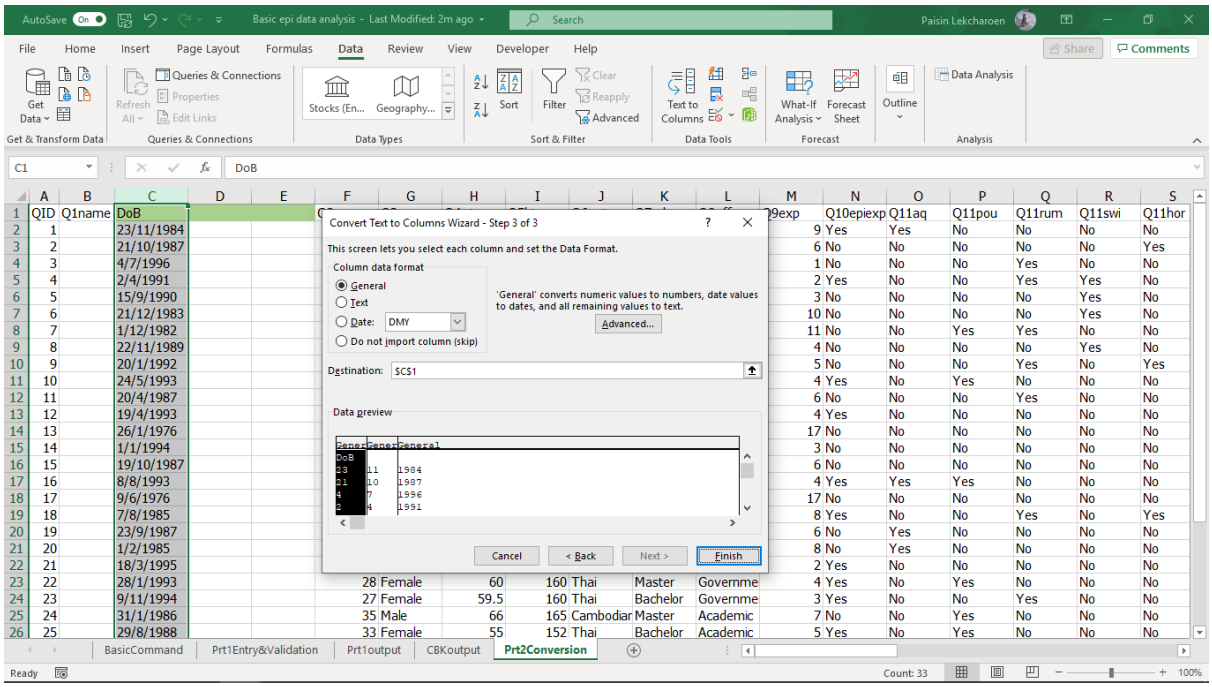
1.3. Step 1, choose ‘Delimited’ as an original data type, then click ‘Next’.



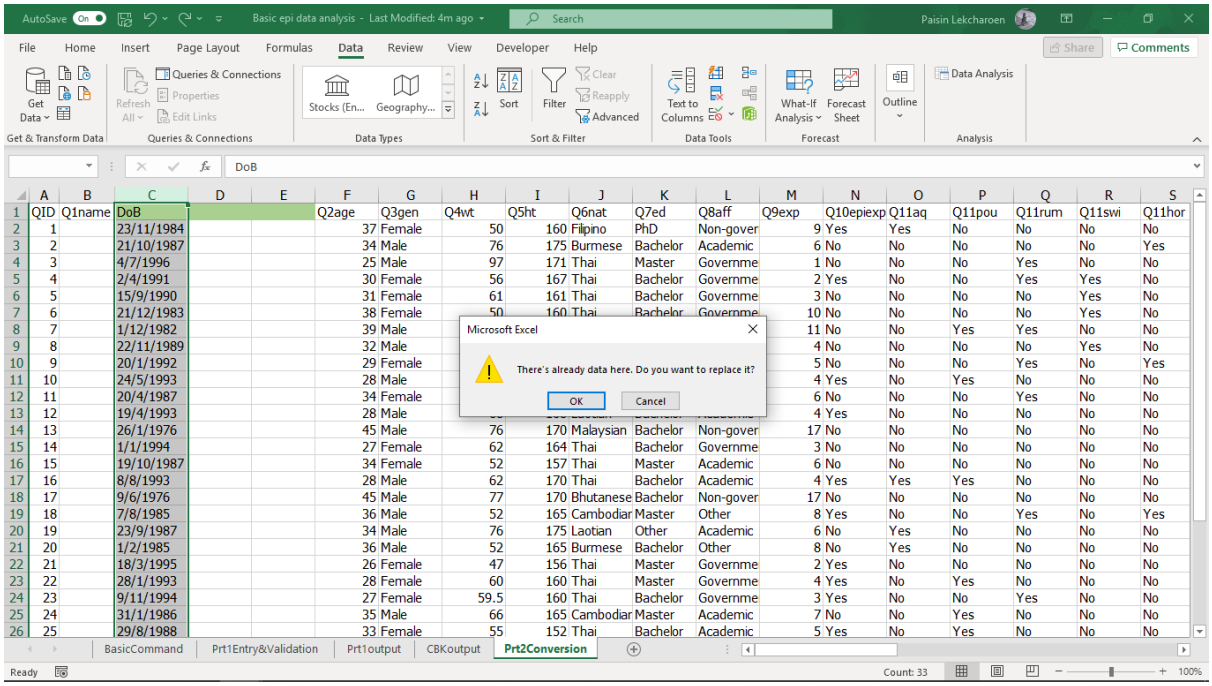
1.4. Step 2, check on ‘Other’ as a Delimiters. Put ‘/’ in the space following ‘Other’. Then click ‘Next’.



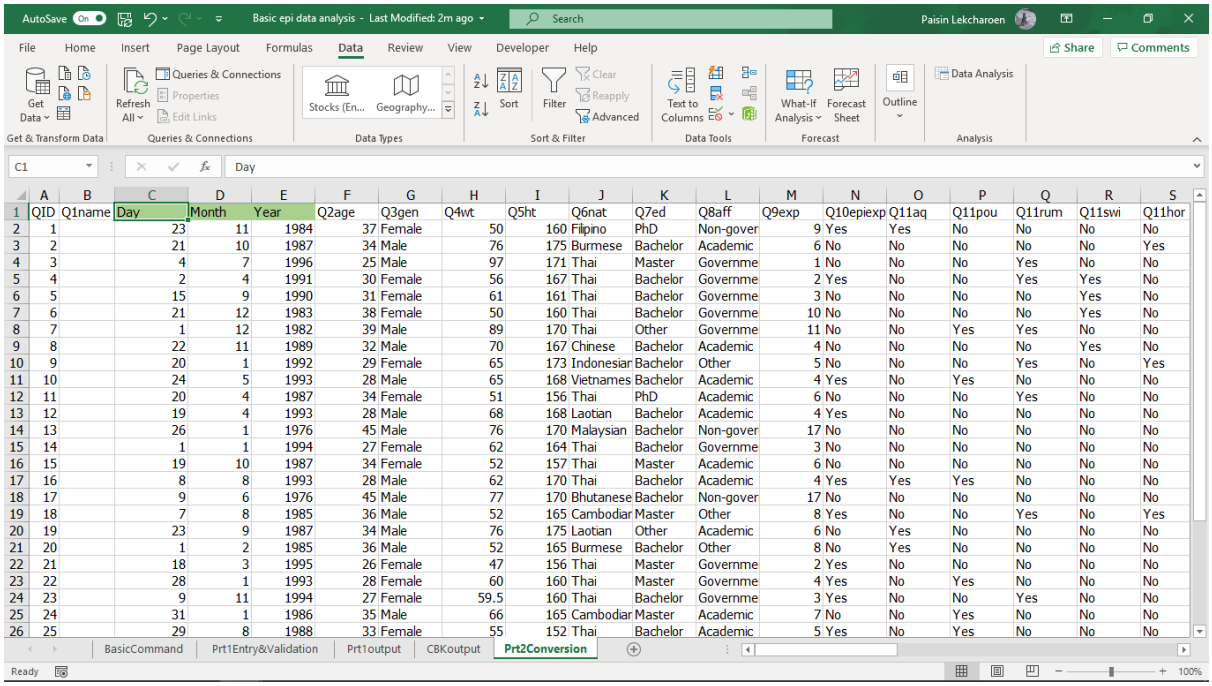
1.5. Step 3, no change is required in this step. Look through a Data preview box for the output variables that you are going to acquire. Click ‘Finish’.



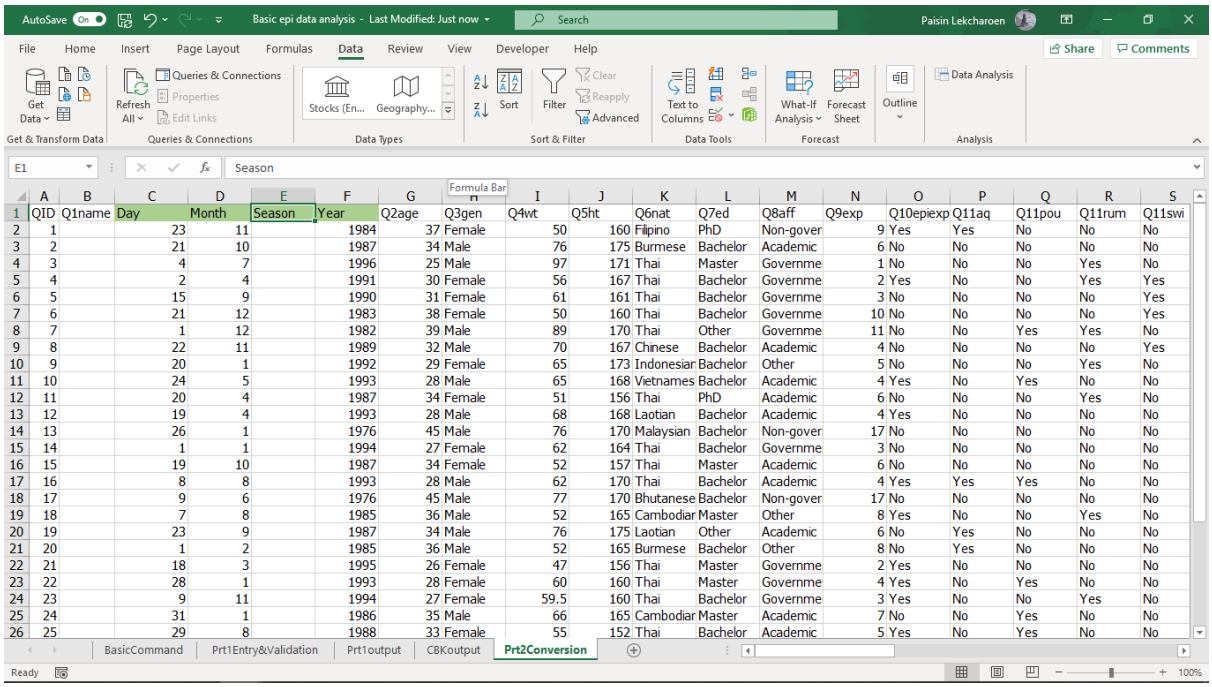
1.6. Windows will ask you if you want to replace existing data or not because it is going to replace data in 'DoB' column. Click 'OK'. Be aware that you provide enough space for your output otherwise your original data in the next column will be replaced and lost.



1.7. Now, you have 3 columns (1 replaced DoB and 2 new columns). Change the heading into 'Day', 'Month', and 'Year', respectively.

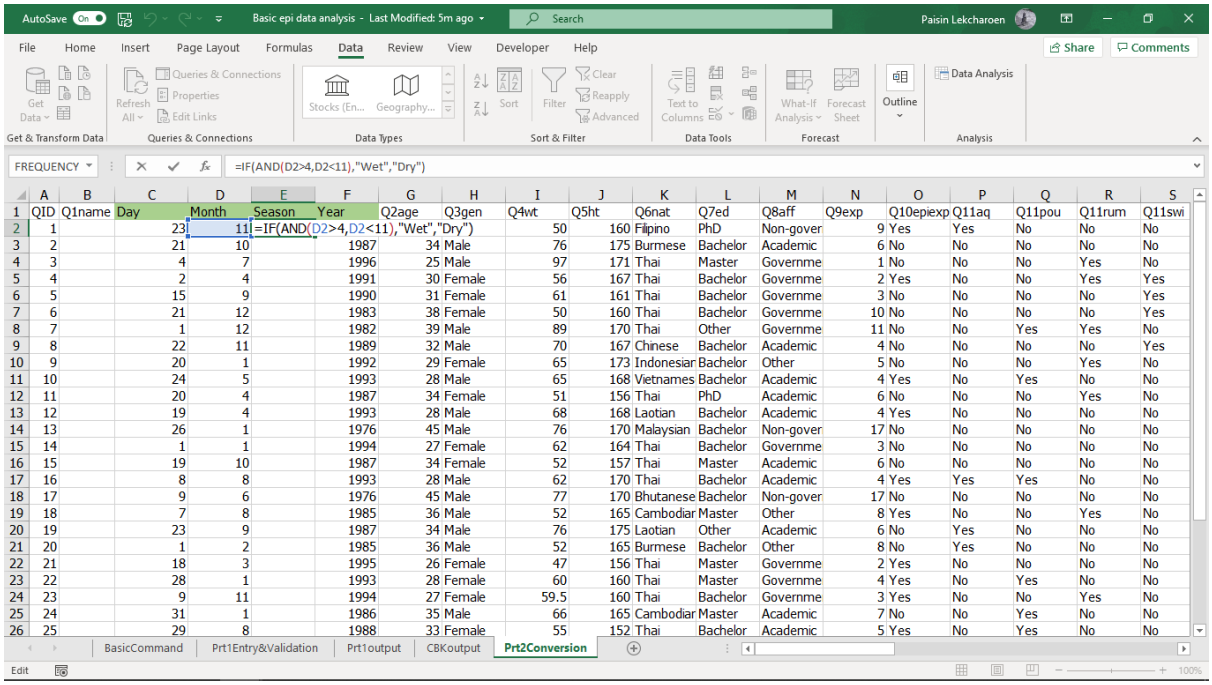


1.8. Insert a new column between ‘Month’ and ‘Year’. Give its name ‘Season’.

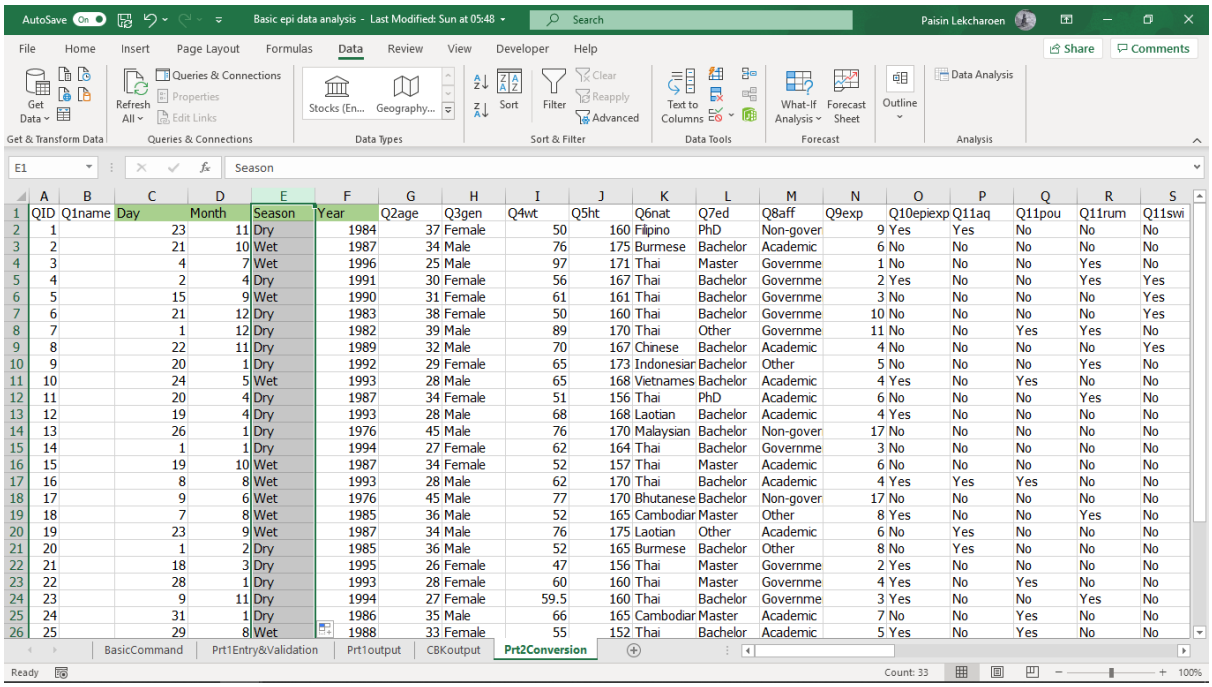


1.9. In cell E2, use ‘If’ function to convert ‘Month’ of birth into ‘Season’ of birth. As given above, Month 5 (May) to 10 (October) is ‘Wet’ season otherwise ‘Dry’ season. So, provide a condition for ‘If’ function using ‘And’ function so that a value between 5 to 10 is met. If the condition is true, return a value ‘Wet’, otherwise ‘Dry’.

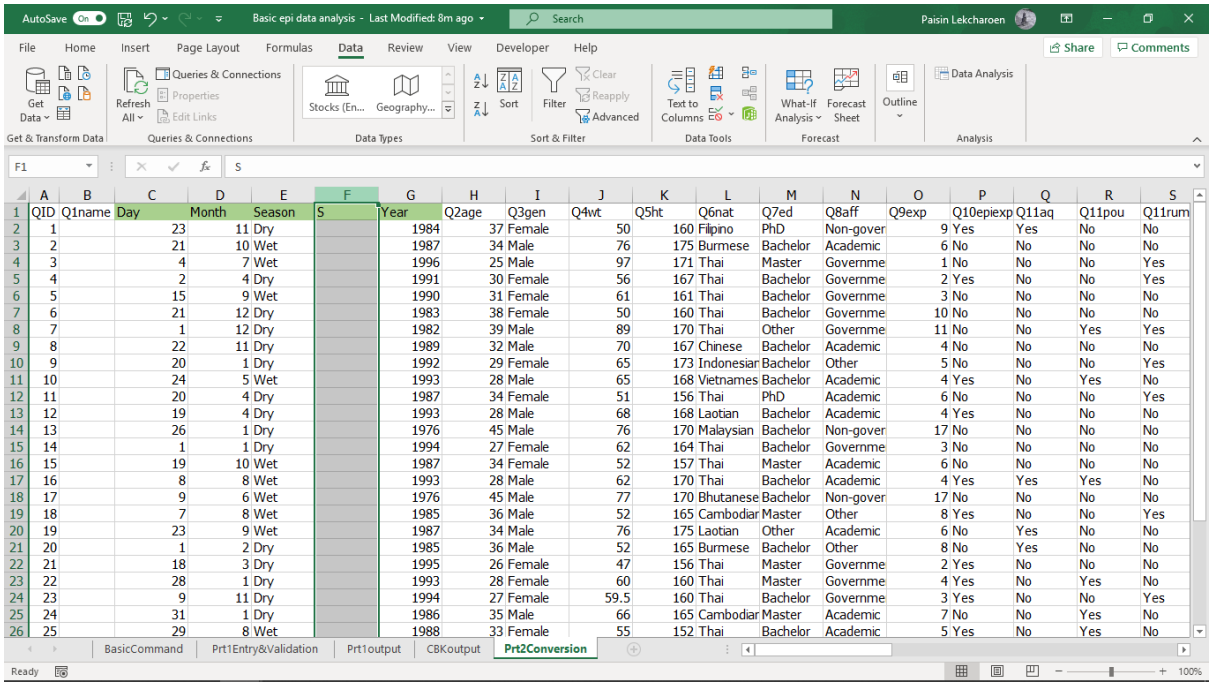
- “=IF (logical test, value if true, value if false)”
- “= IF (AND(D2>4, D2<11), “Wet”, “Dry”)”



1.10. Copy the command for all cells in the range.

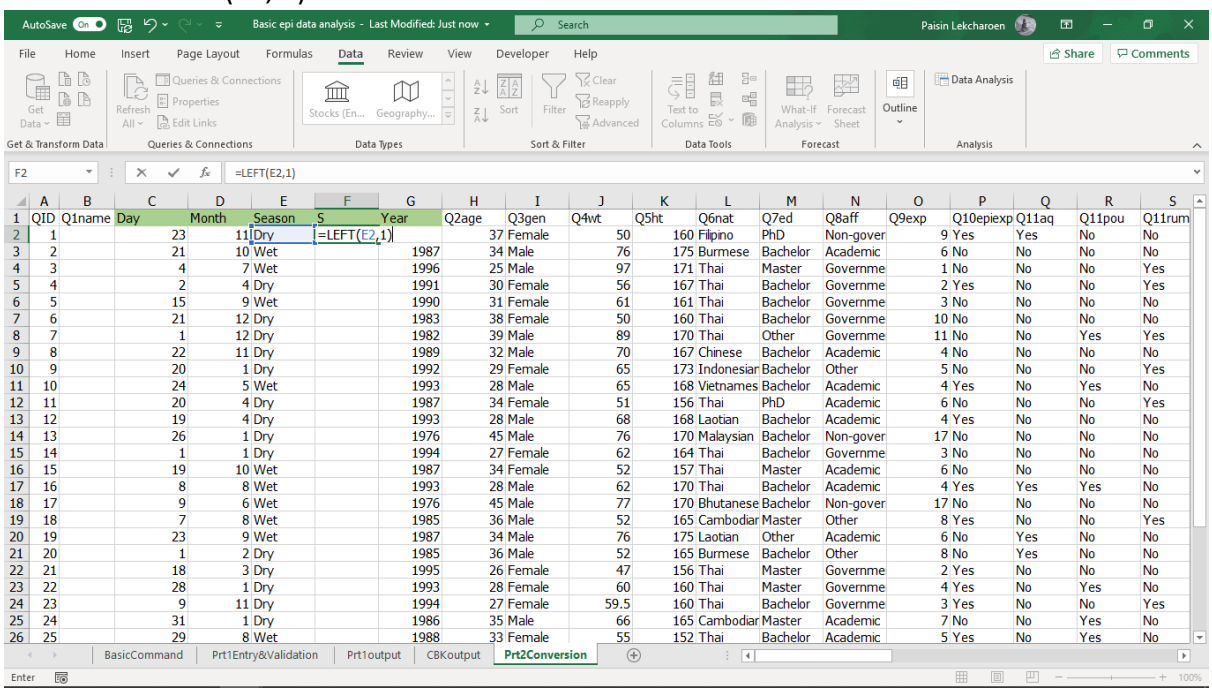


1.11. In a particular circumstance, you may like to shorten a value to a specified number of a text string, in order to make a code or an index, or abbreviate a name. At this point in the example, you would like to have only one character of 'Season': W for wet and D for Dry. Firstly, insert a column between 'Season' and 'Year'. Give a heading name 'S'.

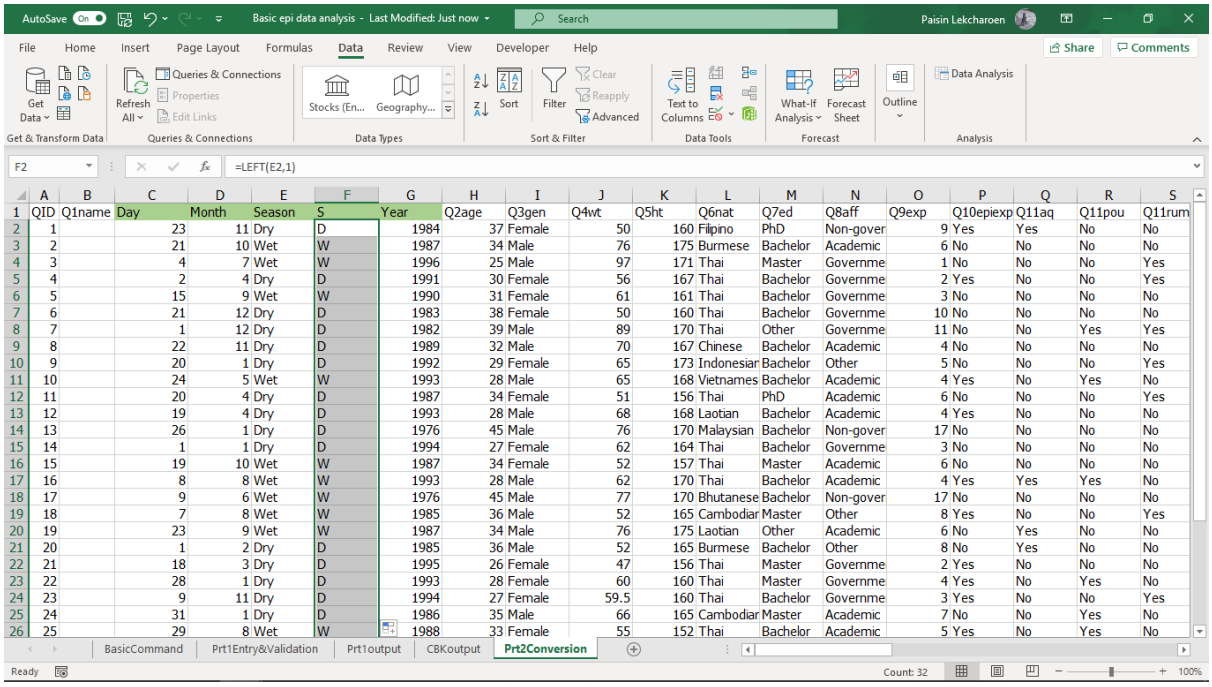


1.12. In cell F2, use function ‘Left’ to specify the first character from the value in cell E2.

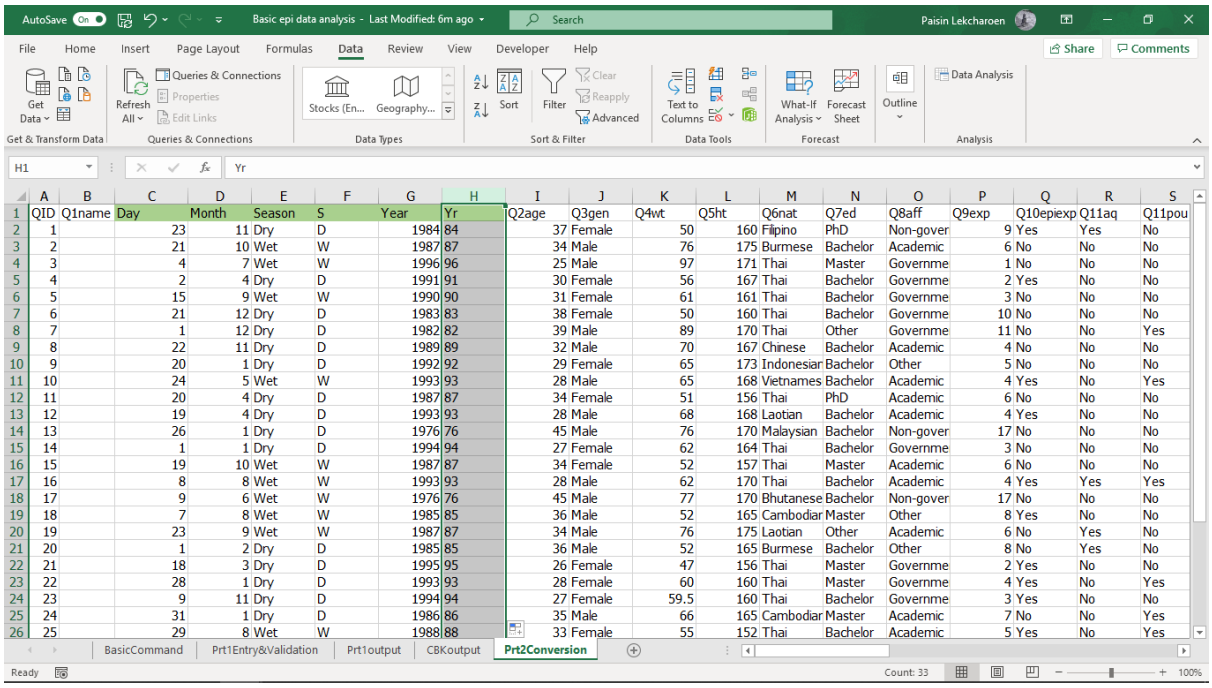
- “= LEFT (Text, Number of character)”
- “= LEFT (E2, 1)”



1.13. Copy the command for all records in the range.



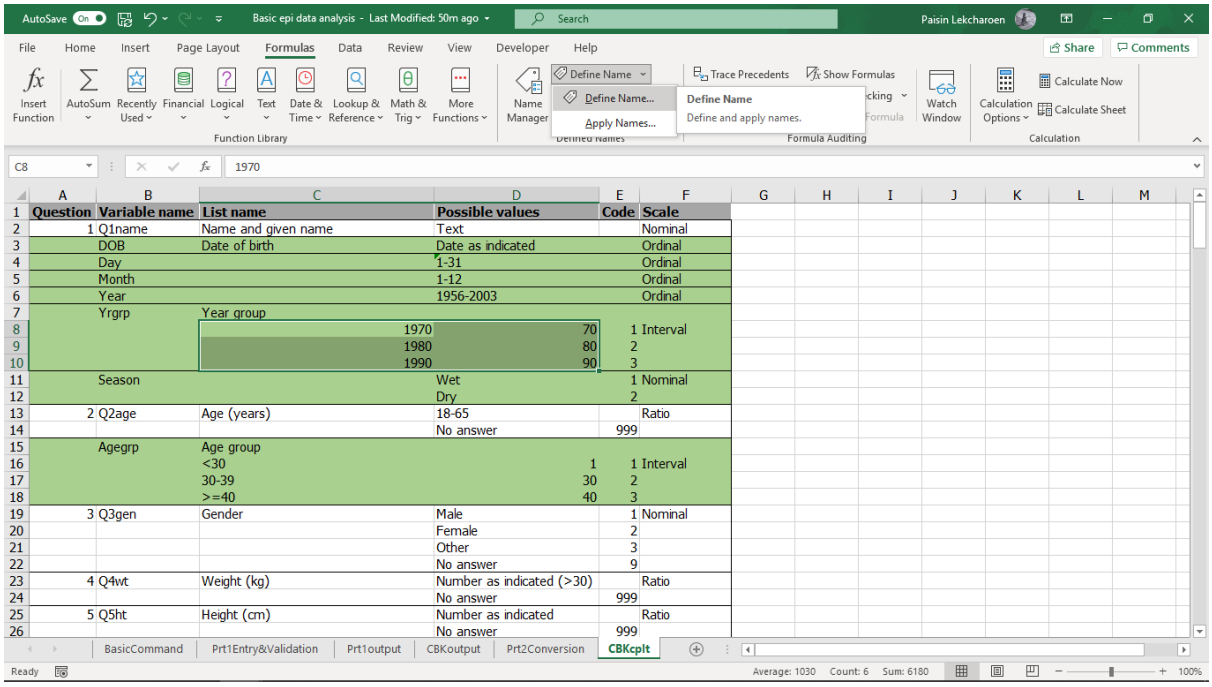
1.14. Now, you can specify 2 characters from the end of a text string in the column ‘Year’ and put it in the newly inserted column ‘Yr’ using a function ‘Right’.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	QID	Q1name	Day	Month	Season	S	Year	Yr	Q2age	Q3gen	Q4wt	Q5ht	Q6nat	Q7ed	Q8aff	Q9exp	Q10epiexp	Q11aq	Q11pou
2	1		23	11	Dry	D	1984	84	37	Female	50	160	Filipino	PhD	Non-gover	9	Yes	Yes	No
3	2		21	10	Wet	W	1987	87	34	Male	76	175	Burmese	Bachelor	Academic	6	No	No	No
4	3		4	7	Wet	W	1996	96	25	Male	97	171	Thai	Master	Governme	1	No	No	No
5	4		2	4	Dry	D	1991	91	30	Female	56	167	Thai	Bachelor	Governme	2	Yes	No	No
6	5		15	9	Wet	W	1990	90	31	Female	61	161	Thai	Bachelor	Governme	3	No	No	No
7	6		21	12	Dry	D	1983	83	38	Female	50	160	Thai	Bachelor	Governme	10	No	No	No
8	7		1	12	Dry	D	1982	82	39	Male	89	170	Thai	Other	Governme	11	No	No	Yes
9	8		22	11	Dry	D	1989	89	32	Male	70	167	Chinese	Bachelor	Academic	4	No	No	No
10	9		20	1	Dry	D	1992	92	29	Female	65	173	Indonesian	Bachelor	Other	5	No	No	No
11	10		24	5	Wet	W	1993	93	28	Male	65	168	Vietnames	Bachelor	Academic	4	Yes	No	Yes
12	11		20	4	Dry	D	1987	87	34	Female	51	156	Thai	PhD	Academic	6	No	No	No
13	12		19	4	Dry	D	1993	93	28	Male	68	168	Laotian	Bachelor	Academic	4	Yes	No	No
14	13		26	1	Dry	D	1976	76	45	Male	76	170	Malaysian	Bachelor	Non-gover	17	No	No	No
15	14		1	1	Dry	D	1994	94	27	Female	62	164	Thai	Bachelor	Governme	3	No	No	No
16	15		19	10	Wet	W	1987	87	34	Female	52	157	Thai	Master	Academic	6	No	No	No
17	16		8	8	Wet	W	1993	93	28	Male	62	170	Thai	Bachelor	Academic	4	Yes	Yes	Yes
18	17		9	6	Wet	W	1976	76	45	Male	77	170	Bhutanese	Bachelor	Non-gover	17	No	No	No
19	18		7	8	Wet	W	1985	85	36	Male	52	165	Cambodiar	Master	Other	8	Yes	No	No
20	19		23	9	Wet	W	1987	87	34	Male	76	175	Laotian	Other	Academic	6	No	Yes	No
21	20		1	2	Dry	D	1985	85	36	Male	52	165	Burmese	Bachelor	Other	8	No	Yes	No
22	21		18	3	Dry	D	1995	95	26	Female	47	156	Thai	Master	Governme	2	Yes	No	No
23	22		28	1	Dry	D	1993	93	28	Female	60	160	Thai	Master	Governme	4	Yes	No	Yes
24	23		9	11	Dry	D	1994	94	27	Female	59.5	160	Thai	Bachelor	Governme	3	Yes	No	No
25	24		31	1	Dry	D	1986	86	35	Male	66	165	Cambodiar	Master	Academic	7	No	No	Yes
26	25		29	8	Wet	W	1988	88	33	Female	55	152	Thai	Bachelor	Academic	5	Yes	No	Yes

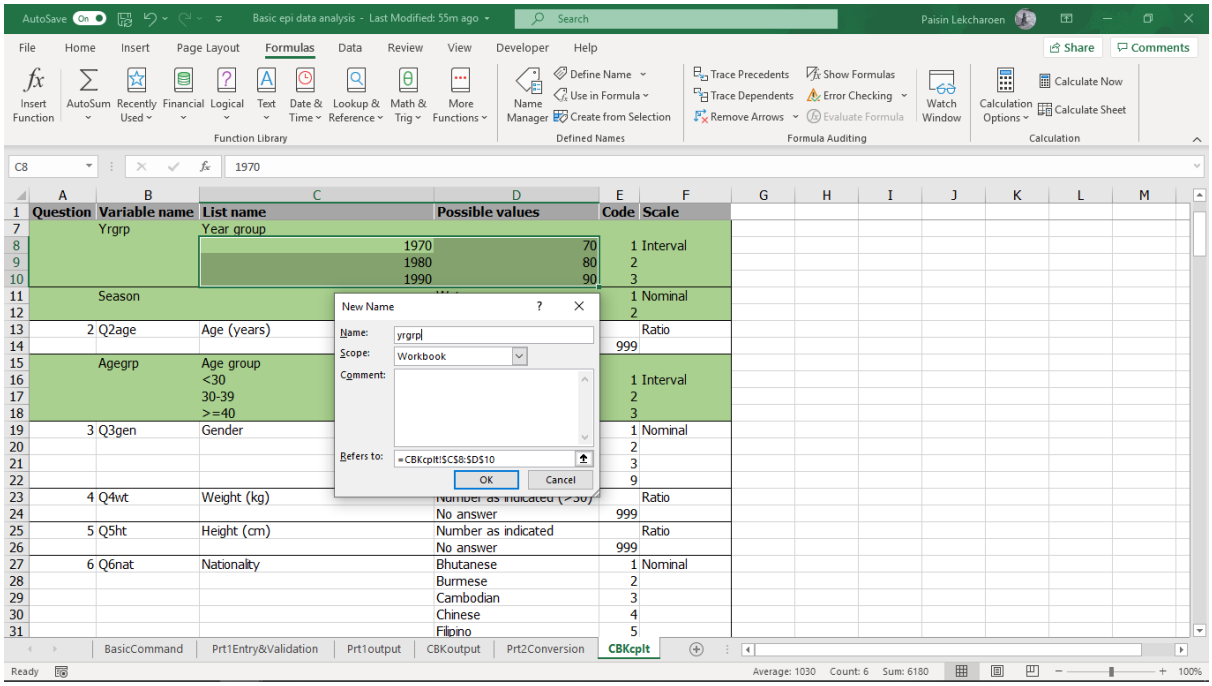
1.15. As in table A, year groups are divided into 3 eras: 1970s (70), 1980s (80), and 1990s (90). Insert a new column ‘YrGr’ for a Year Group variable.

- Define a list name ‘yrgrp’ using values in worksheet ‘CBKcplt’. Highlight values in columns ‘List name’ and ‘Possible values’ of variable ‘Yrgrp’.

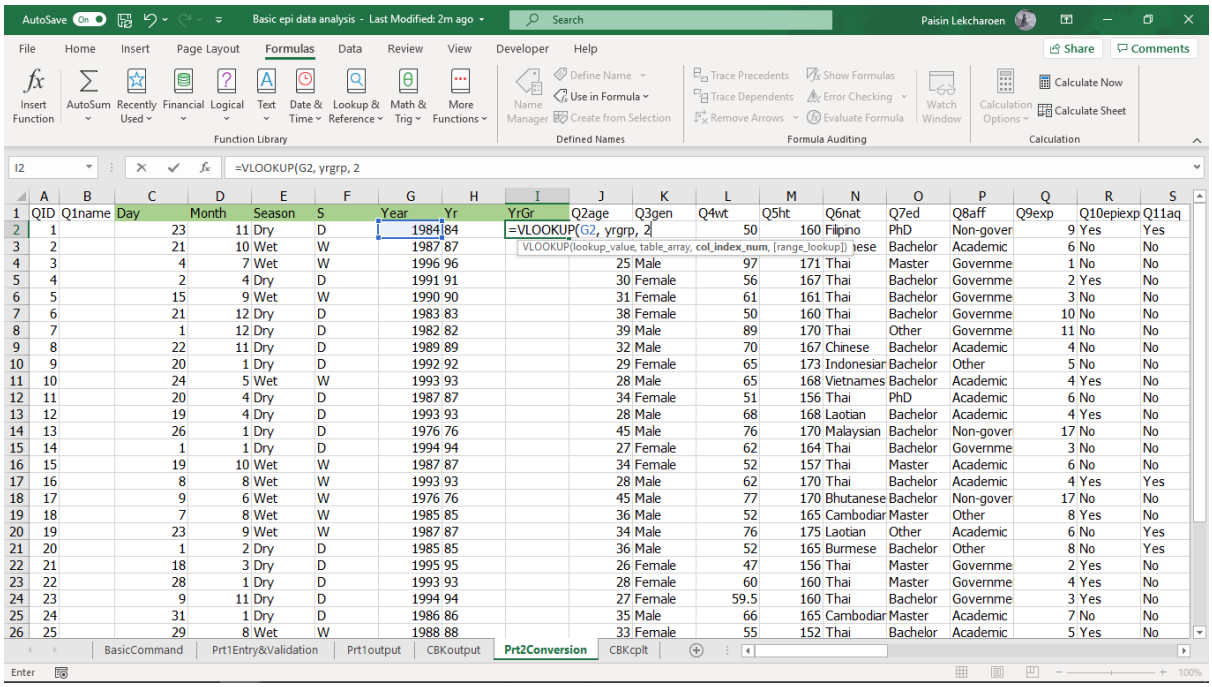


	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Question	Variable name	List name	Possible values	Code	Scale							
2	1	Q1name	Name and given name	Text		Nominal							
3		DOB	Date of birth	Date as indicated		Ordinal							
4		Day		1-31		Ordinal							
5		Month		1-12		Ordinal							
6		Year		1956-2003		Ordinal							
7		Yrgrp	Year group										
8			1970	70	1	Interval							
9			1980	80	2								
10			1990	90	3								
11		Season		Wet	1	Nominal							
12				Dry	2								
13	2	Q2age	Age (years)	18-65		Ratio							
14				No answer	999								
15		Agegrp	Age group										
16			<30	1	1	Interval							
17			30-39	30	2								
18			>=40	40	3								
19	3	Q3gen	Gender	Male	1	Nominal							
20				Female	2								
21				Other	3								
22				No answer	9								
23	4	Q4wt	Weight (kg)	Number as indicated (>30)		Ratio							
24				No answer	999								
25	5	Q5ht	Height (cm)	Number as indicated		Ratio							
26				No answer	999								

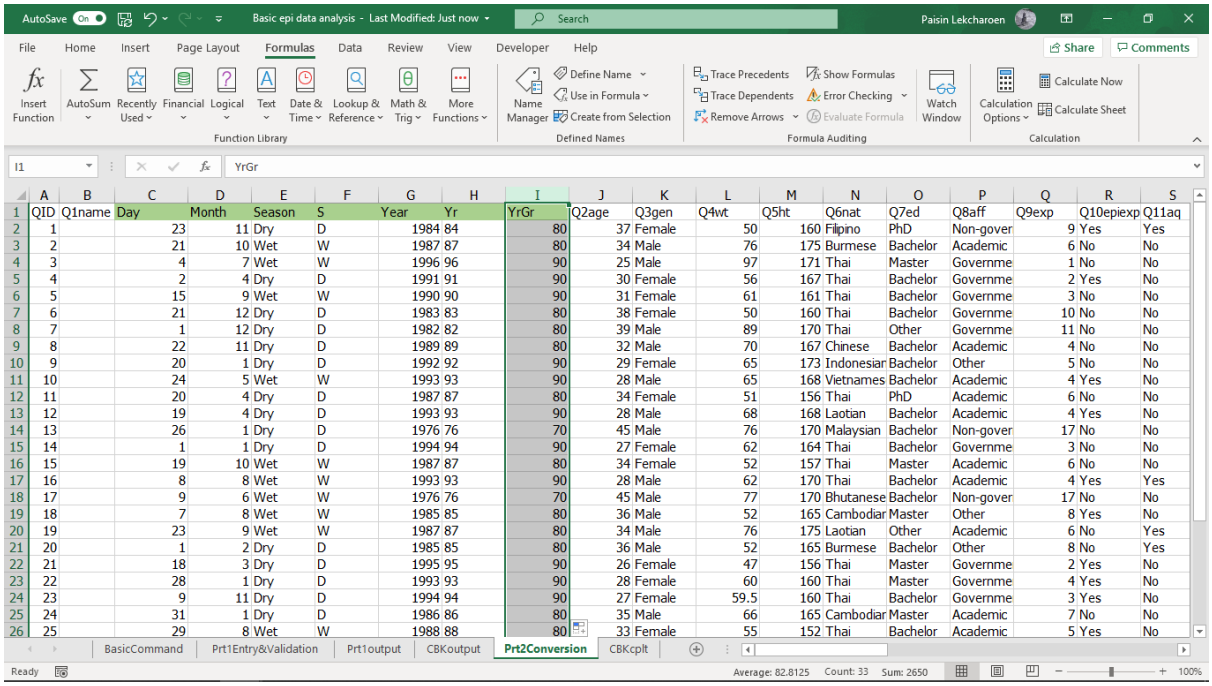
- Use ‘Define Name’ function to create a list and name it ‘yrgrp’. Click ‘OK”.



- Use ‘Vlookup’ function to look for a ‘Yr’ value in the table yrgrp and return a ‘YrGr’ value. Firstly, insert a new column and name it ‘YrGr’. Then put a command:
  - “= VLOOKUP (look up value, table array, column index number, range look up)
  - “= VLOOKUP (G2, yrgrp, 2)” , so you are going to look for a value 1984 (as in cell G2) in the table ‘yrgrp’ (that you have already created) then return a value in column 2 in the same row of that table.

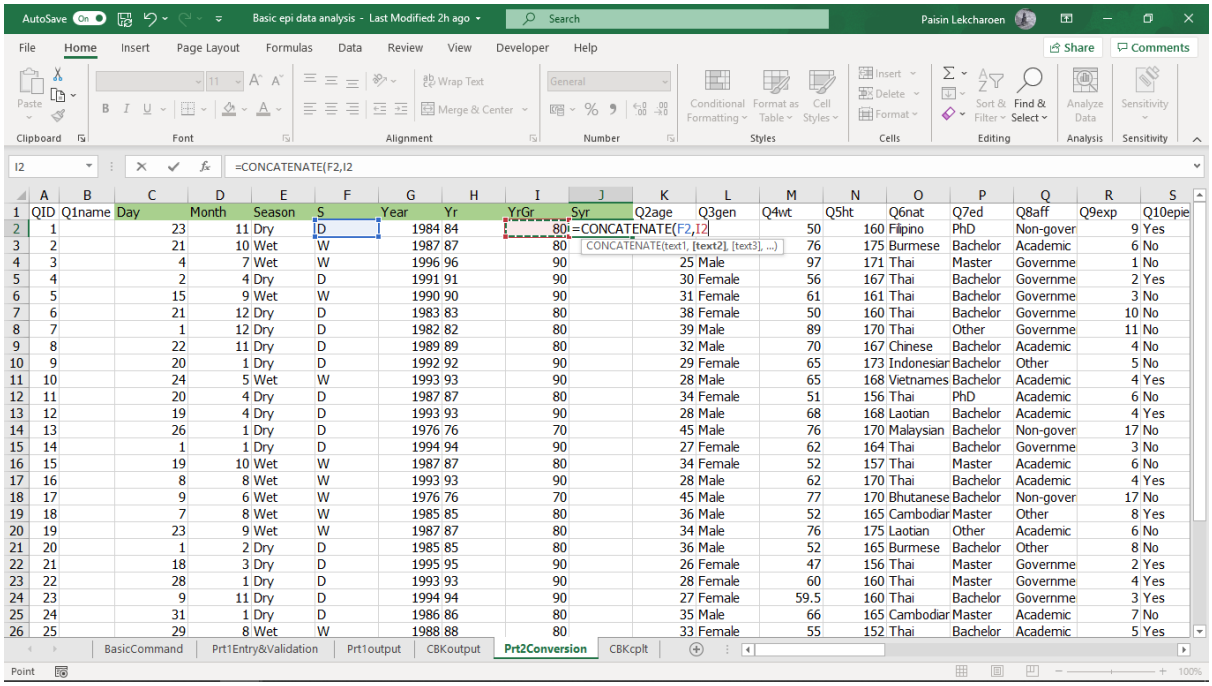


- Copy the command for all records.



1.16. Insert a new column ‘Syr’ for season-year variable. Use ‘Concatenate’ function to combine text strings from ‘S’ and ‘YrGr’ columns. Put a command in cell J2:

- “= CONCATENATE (Text1, Text2, …)
- “= CONCATENATE (F2, I2)”



1.17. Copy the command to all records.

Exercise 2.2 Calculate BMI for participants.

Calculate body mass index (BMI) and classify BMI condition for all participants.

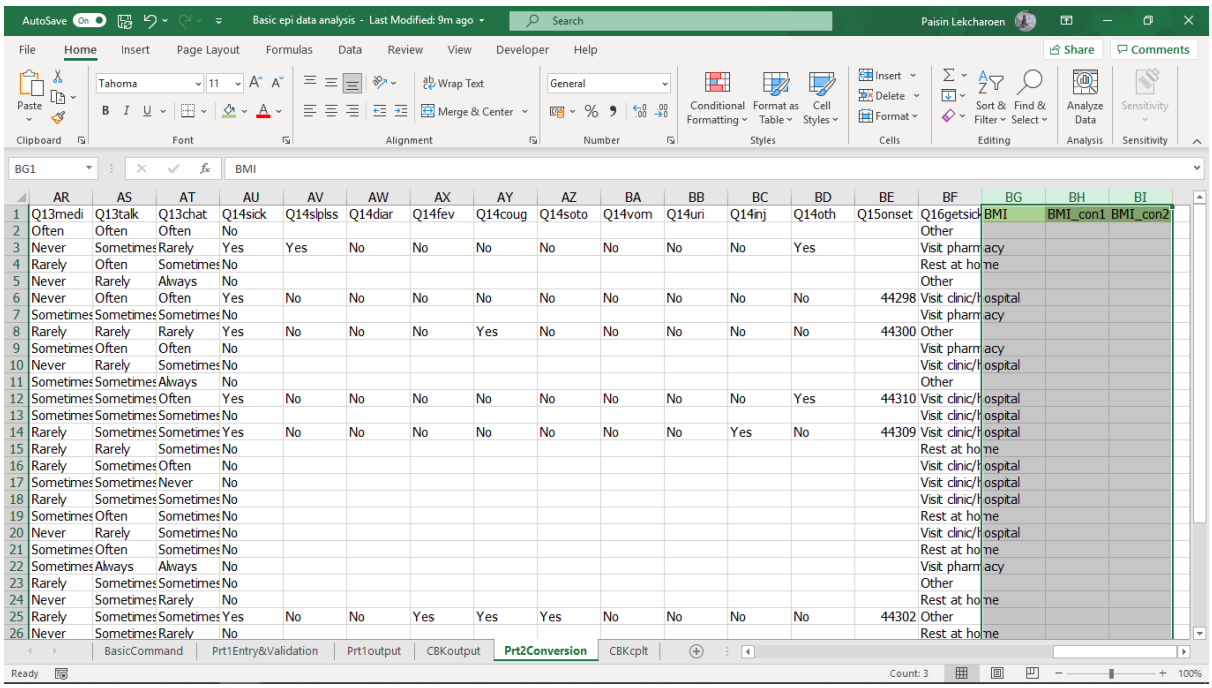
$$BMI = \frac{Body\ weight\ (kg)}{Height\ (m)^2}$$

Table B. BMI Class

BMI	Class
< 18.50	Underweight
18.50 – 22.90	Normal
23.0 – 24.90	Overweight
> 25.00	Obesity

1. Calculate BMI using the above equation in new column 'BMI'.
2. In order to classify BMI class, you can manipulate it by 2 methods:
   2.1. Use 'Vlookup' function (thus, you need to create and define name of 'a table of listed variables' in the codebook worksheet first), or
   2.2. Use 'If' function to indicate a proper condition.

   Try to operate it by both methods and compare the results. Put the output from 2.1 in a new column 'BMI_con1' and those from 2.2 in another new column 'BMI_con2'.



Exercise 2.3 Define consumption and exercise behaviors, and case condition of all participants.

You observe that consumption and exercising behavior could associate with BMI condition of participants. Eating habit and exercising regularity are provided in 'Q13eat' and 'Q13exer', respectively. However, they were collected in ordinal 'Likert' scale. You would like to convert those data into 2 categories which are 'Normal' and 'Eat' groups for consumption behavior, and 'Exercise' and 'Not exercise' for exercising behavior.

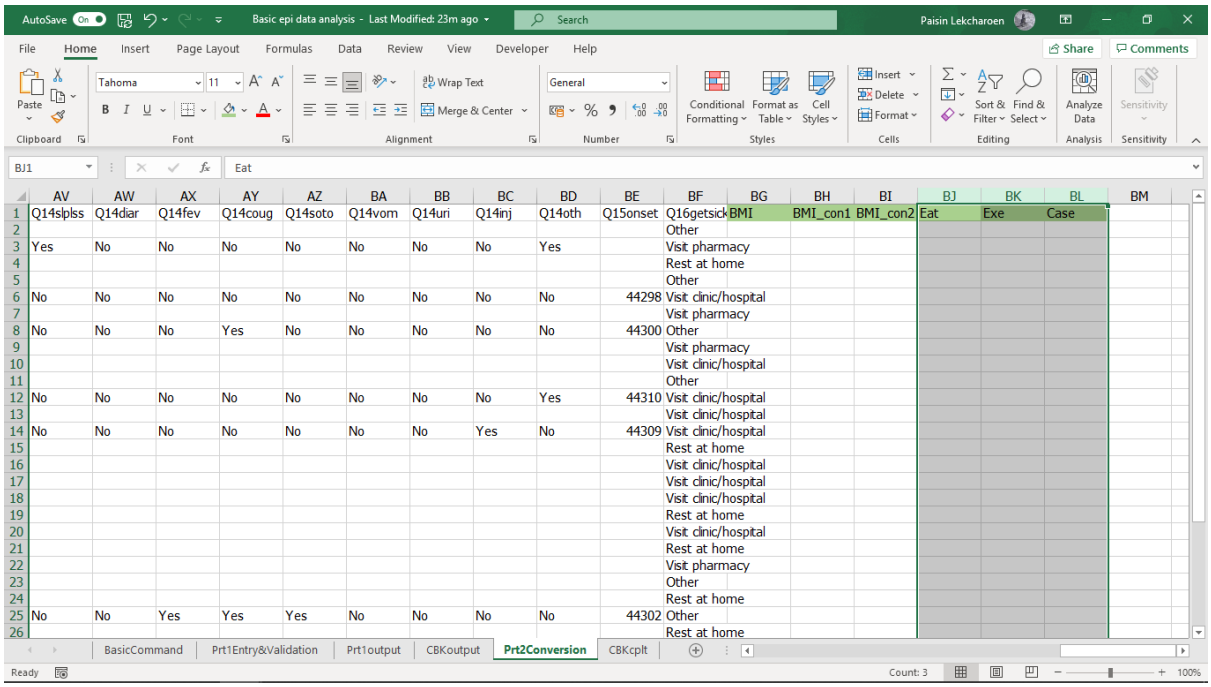
- The participants who often or always eat are considered as having 'Eat' behavior, the rest are 'Normal'.
- The participants who often or always have physical exercise are considered as having 'Exercise' behavior and the rest are 'Not exercise'.

Then, you would like to define a case status using this condition:

- The participants who have 'Overweight' or 'Obesity' BMI class are considered as 'Case', the rest are 'Not case'.

Use 'If', 'Or' or 'And' function to manage data conversion.

Place outputs for consumption behavior, exercising behavior, and case status in new columns 'Eat', 'Exe', and 'Case', respectively.



	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
1	Q14slplss	Q14diar	Q14fev	Q14coug	Q14soto	Q14vom	Q14uri	Q14inj	Q14oth	Q15onset	Q16getsick	BMI	BMI_con1	BMI_con2	Eat	Exe	Case	
2											Other							
3	Yes	No	No	No	No	No	No	No	Yes		Visit pharmacy							
4											Rest at home							
5											Other							
6	No	No	No	No	No	No	No	No	No	44298	Visit clinic/hospital							
7											Visit pharmacy							
8	No	No	No	Yes	No	No	No	No	No	44300	Other							
9											Visit pharmacy							
10											Visit clinic/hospital							
11											Other							
12	No	No	No	No	No	No	No	No	Yes	44310	Visit clinic/hospital							
13											Visit clinic/hospital							
14	No	No	No	No	No	No	No	Yes	No	44309	Visit clinic/hospital							
15											Rest at home							
16											Visit clinic/hospital							
17											Visit clinic/hospital							
18											Visit clinic/hospital							
19											Rest at home							
20											Visit clinic/hospital							
21											Rest at home							
22											Visit pharmacy							
23											Other							
24											Rest at home							
25	No	No	Yes	Yes	Yes	No	No	No	No	44302	Other							
26											Rest at home							

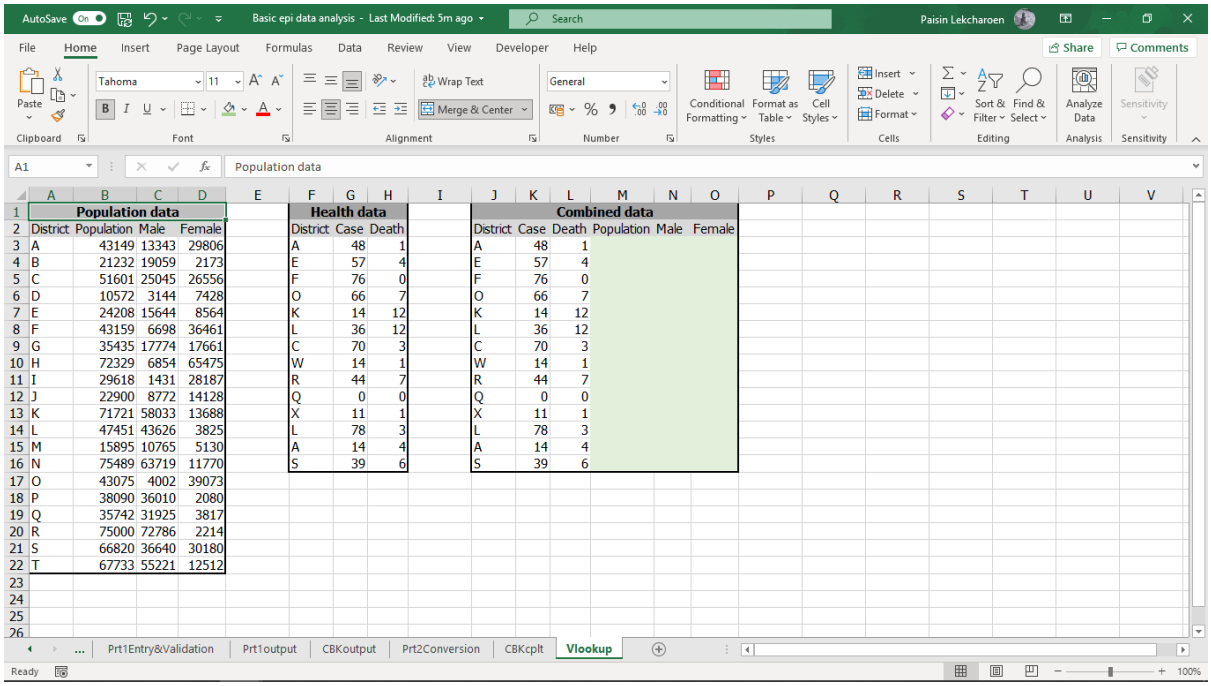
*** Answers of command for 'BMI', 'BMI_con1', 'BMI_con2', 'Eat', 'Exe', and 'Case' will be sent to those who complete all exercise in the following week.

Exercise 2.4 Vlookup function

In some circumstances, needed data are separated and stored in two different databases. See worksheet 'Vlookup'. There are 2 databases. The first table comprises population data by district. The second table reports number of cases and deaths by district.

You would like to combine these 2 databases into a combined table.

1. The first 3 columns of combined data table are duplicated from health data table. Last 3 columns are empty and need to be retrieved from population data table.

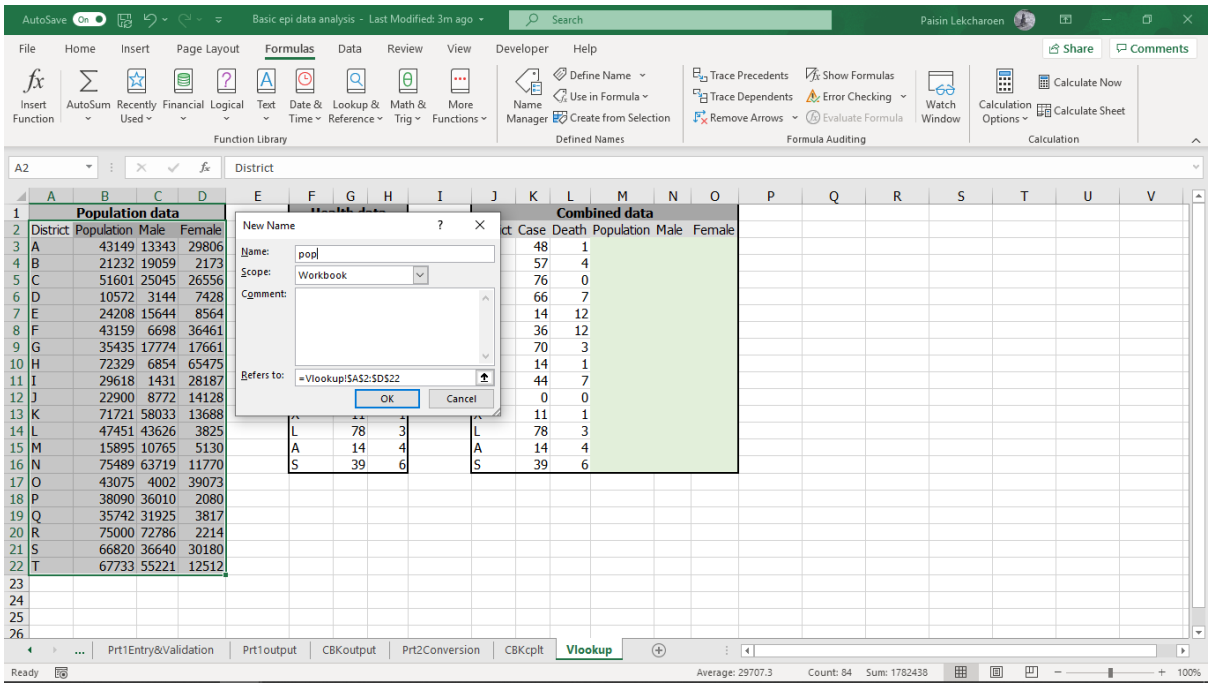


Population data			
District	Population	Male	Female
A	43149	13343	29806
B	21232	19059	2173
C	51601	25045	26556
D	10572	3144	7428
E	24208	15644	8564
F	43159	6698	36461
G	35435	17774	17661
H	72329	6854	65475
I	29618	1431	28187
J	22900	8772	14128
K	71721	58033	13688
L	47451	43626	3825
M	15895	10765	5130
N	75489	63719	11770
O	43075	4002	39073
P	38090	36010	2080
Q	35742	31925	3817
R	75000	72786	2214
S	66820	36640	30180
T	67733	55221	12512

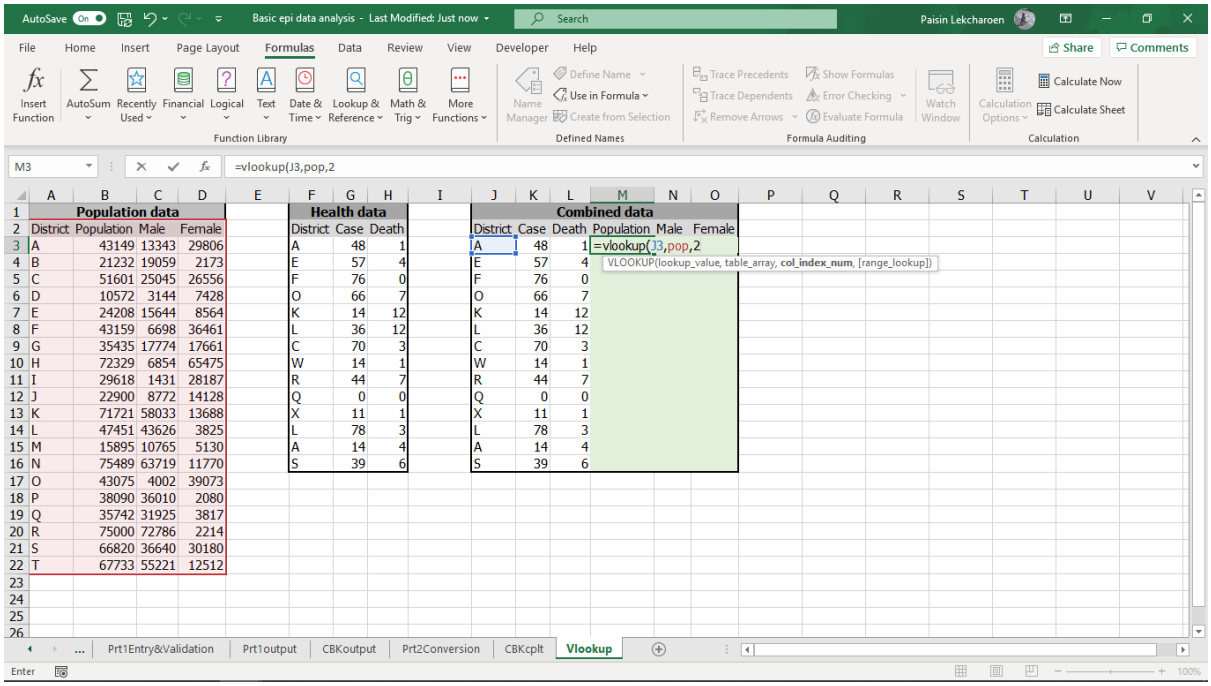
Health data		
District	Case	Death
A	48	1
E	57	4
F	76	0
O	66	7
K	14	12
L	36	12
C	70	3
W	14	1
R	44	7
Q	0	0
X	11	1
L	78	3
A	14	4
S	39	6

Combined data					
District	Case	Death	Population	Male	Female
A	48	1			
E	57	4			
F	76	0			
O	66	7			
K	14	12			
L	36	12			
C	70	3			
W	14	1			
R	44	7			
Q	0	0			
X	11	1			
L	78	3			
A	14	4			
S	39	6			

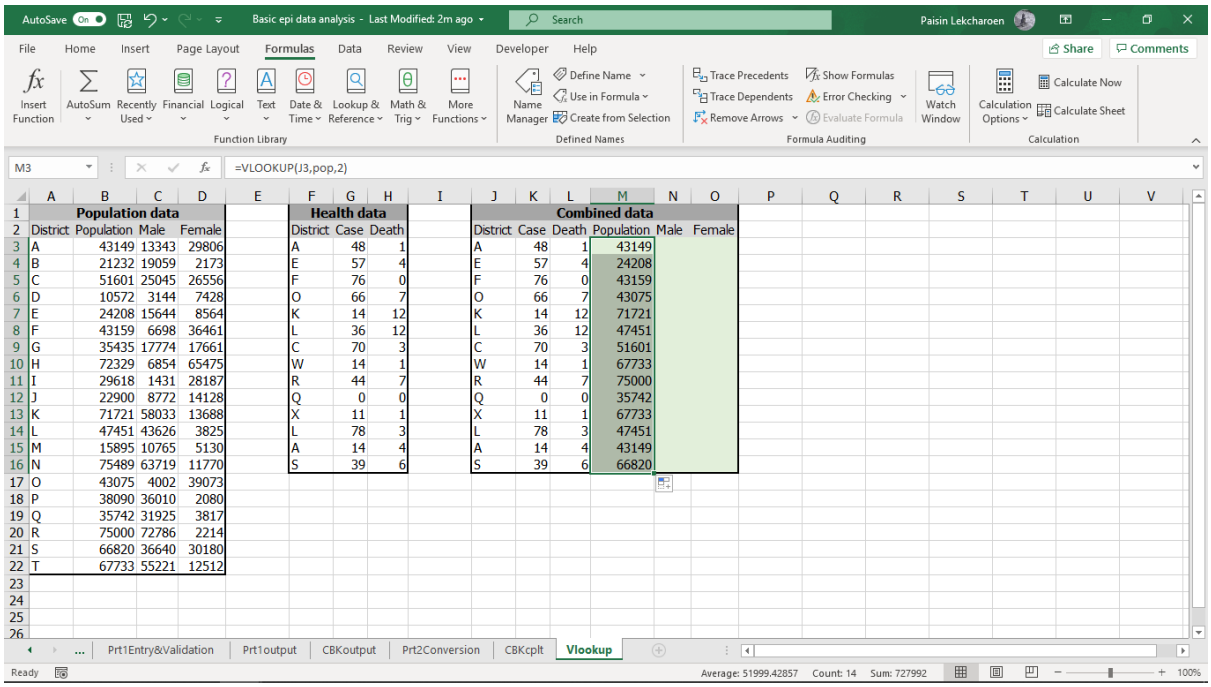
2. Use 'Define Name' to create a list of value table of population data. Give the table name 'pop'.



3. These 2 databased can be linked via ‘District’ variable. So, in cell M3 that you need population data, use ‘Vlookup’ function to look for the ‘District’ value in its own table (J3) and targeted defined table (population table ‘pop’, column 1). Ask it to return the value from column 2. Thus:
   - “= VLOOKUP (J3, pop, 2)”



Then copy the command for all records.



4. Look for ‘Male’ and ‘Female’ values and put them in the combined data table.

Part 3 Data cleaning and recoding

After a data entry procedure, the database should be cleaned before operating data analysis. Some variables may be recoded into a suitable value that is compatible with the software being used in analytical processes.

During a data entry process, questionnaires (of different questionnaire ID) and data entry form prepared in Part 1 may be distributed to many team members in order to reduce time spent at this step. In the steps of entering and combining data, several problems and erroneous data entering may occur.

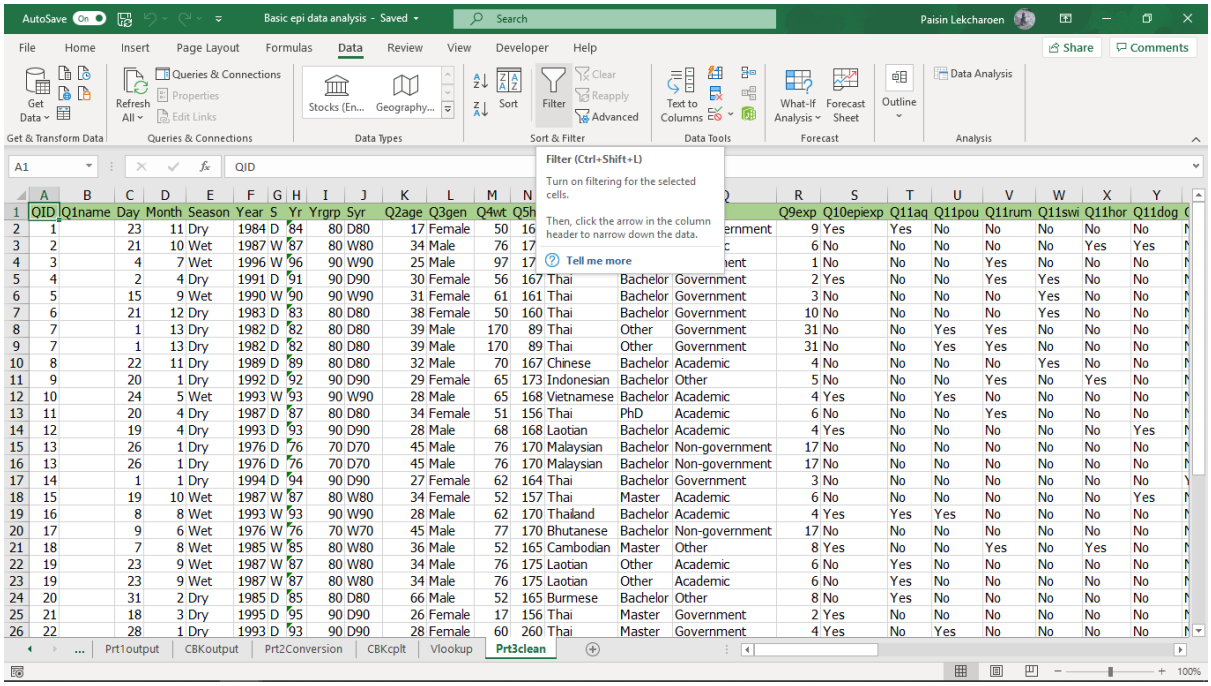
Now you receive a combined database from your team member as you see in worksheet 'Prt3clean'. This database contains several errors. Try to find and correct those errors!

Functions in use:

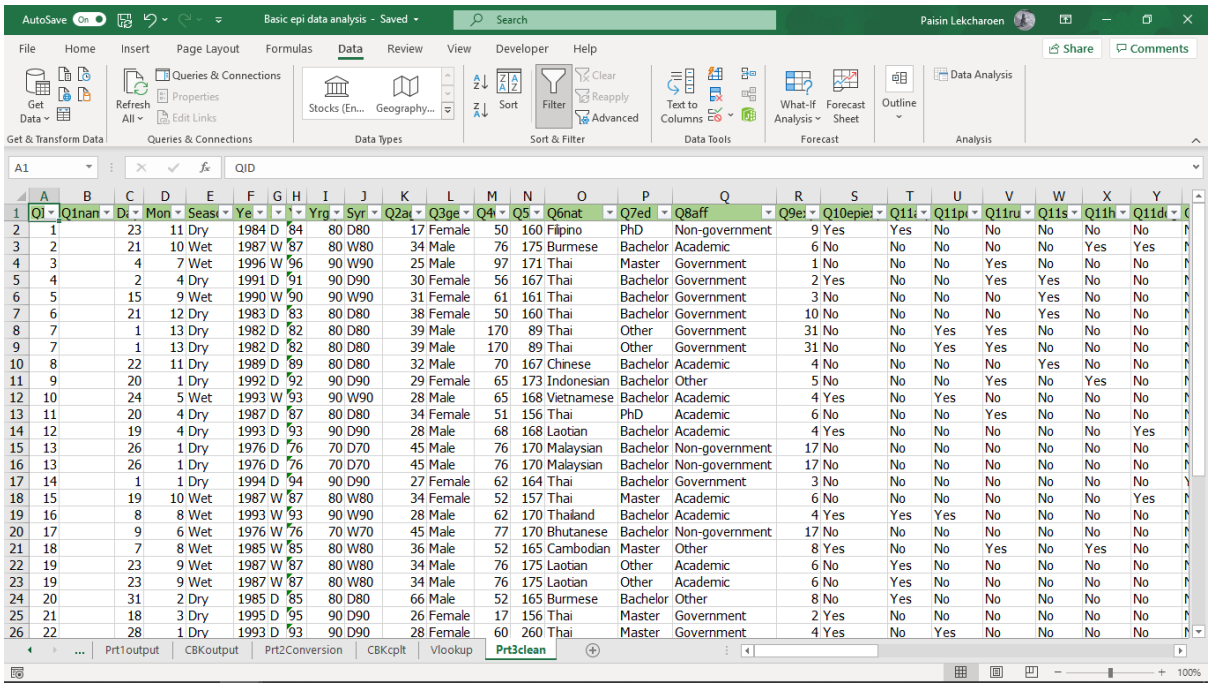
- Filter
- Data Validation
- Circle Invalid Data
- Pivot Table
- Conditional Formatting
- Remove Duplicates
- Define Name
- Vlookup
- Find and Replace*

Exercise 3.1 Filter

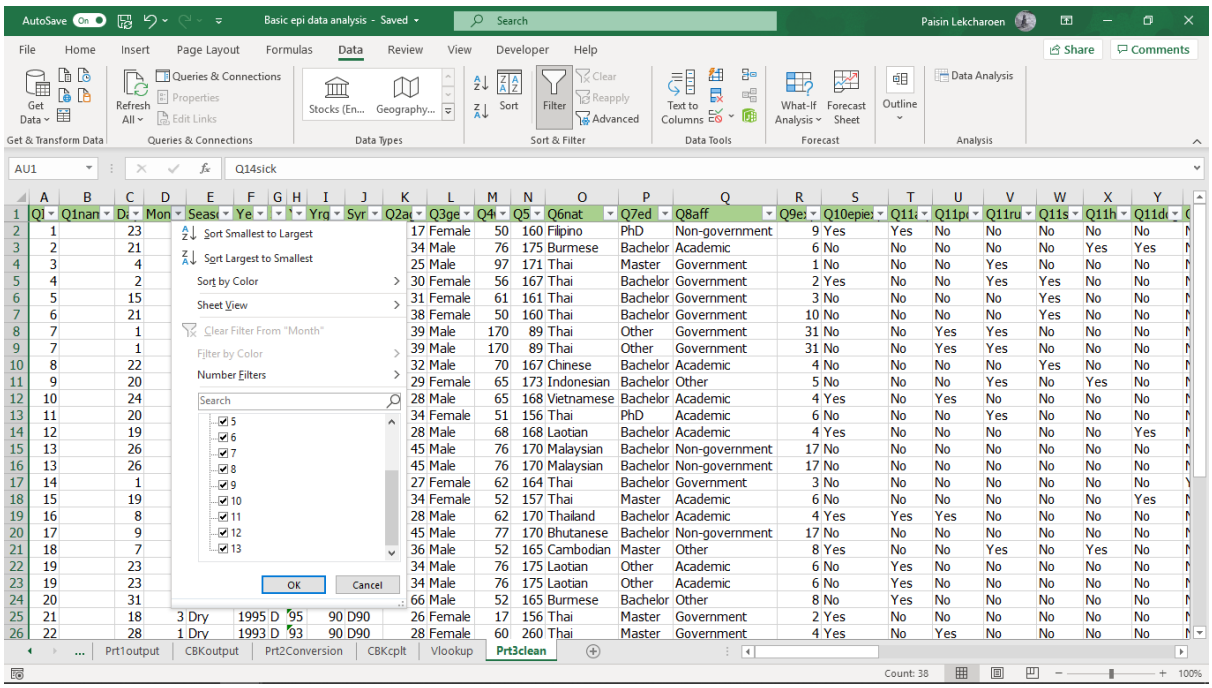
1. Use 'Filter' function to find erroneous data entry. Go to 'Data' ribbon and select 'Filter' function. Make sure the active cell is any cells on the first row.

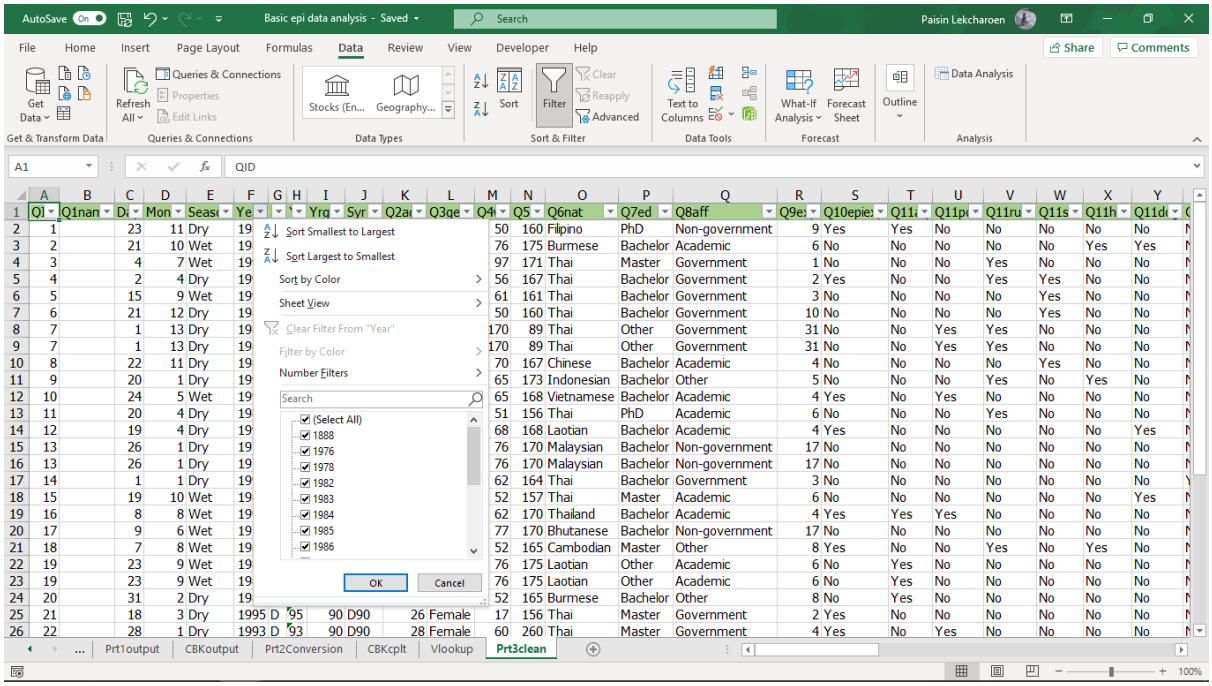


2. When activated, drop-down will appear at the end of each heading.



3. Check for:
   3.1. Number of records
   3.2. Any values outside a range of values allowed for that question, for example:
      3.2.1. Day is between 1 and 31 (28, 29, and 30 in some cases), Month is between 1 and 12.

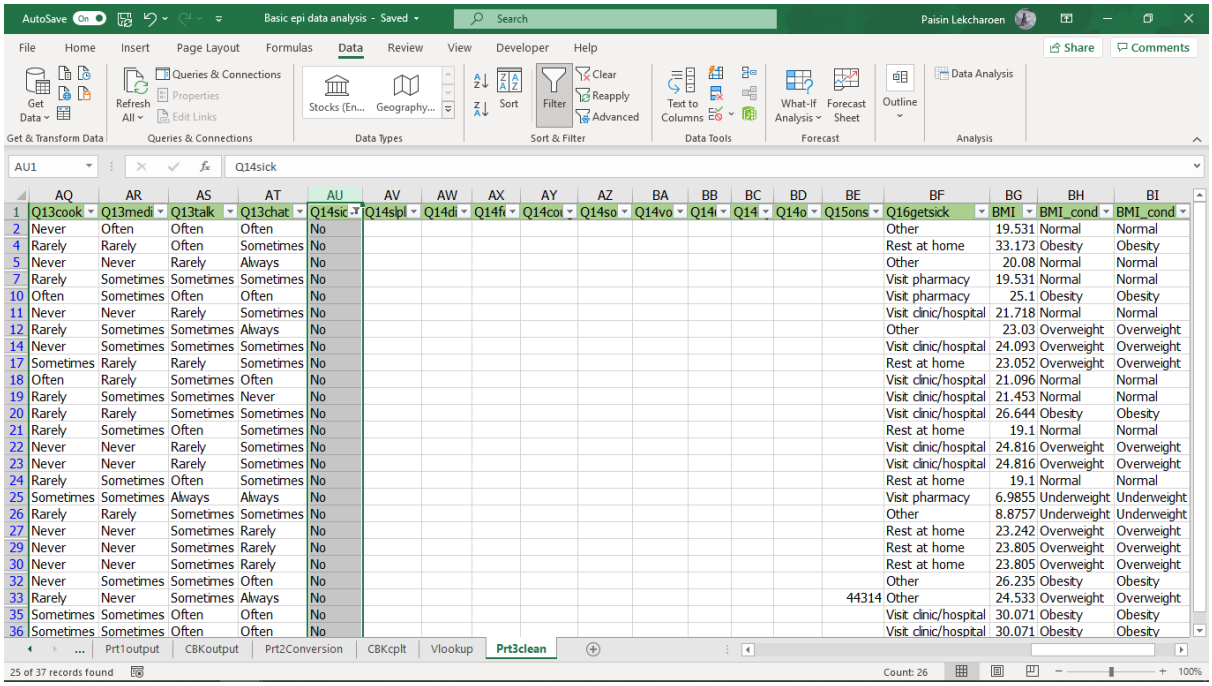




3.2.2. Season is Wet or Dry.

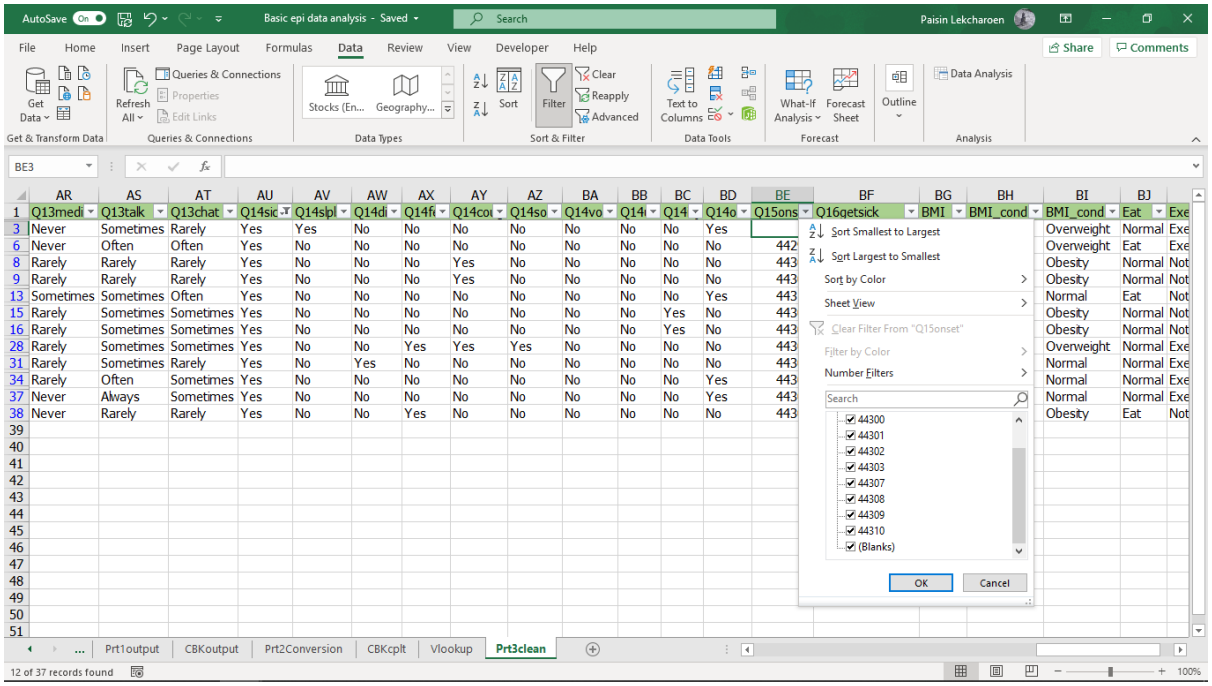
3.2.3. Year or Working Experience should be relevant with Age.

3.2.4. Following answer for a sub-question or that emerged when you separate a multiple-answer question into multiple single questions, should not break a condition of the proxy main question. For example, if you say ‘No’ for a question asking whether you are sick or not, you should have ‘No’ for all following questions asking about clinical symptoms.

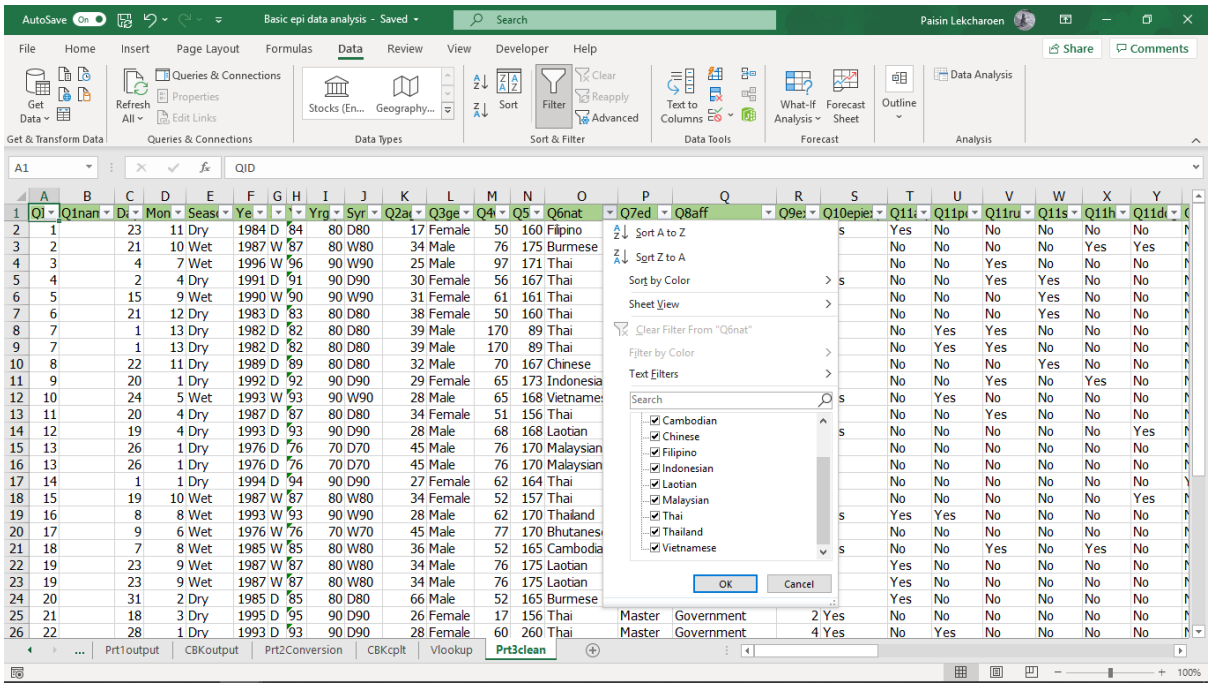


Refer to the codebook or questionnaire. Check for any compatible values.

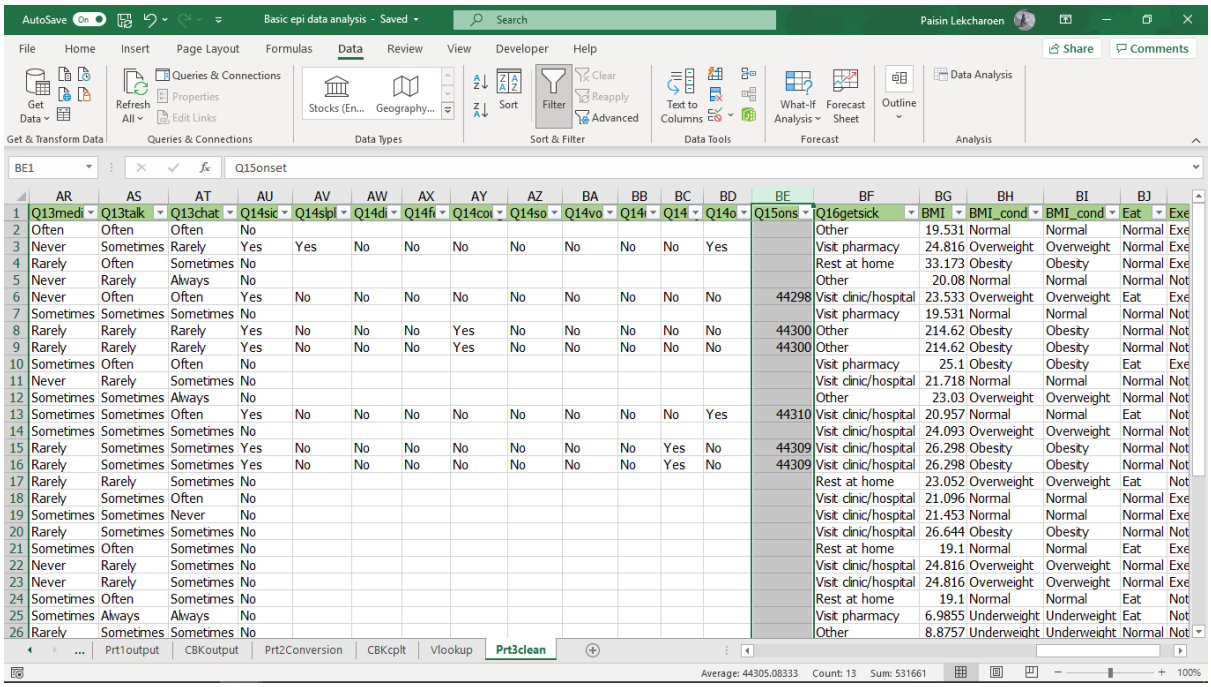
3.3. Missing or blank value.



3.4. Any typos for example, one may input ‘Thai’, ‘Thailand’, or ‘Thialand’ for the question about nationality.



3.5. Wrong data format. For example, if you have not set a data format at the first place, e.g., 'Onset' should be allowed for 'Date' format, it will return a 'General' type of data format as a number or text string.

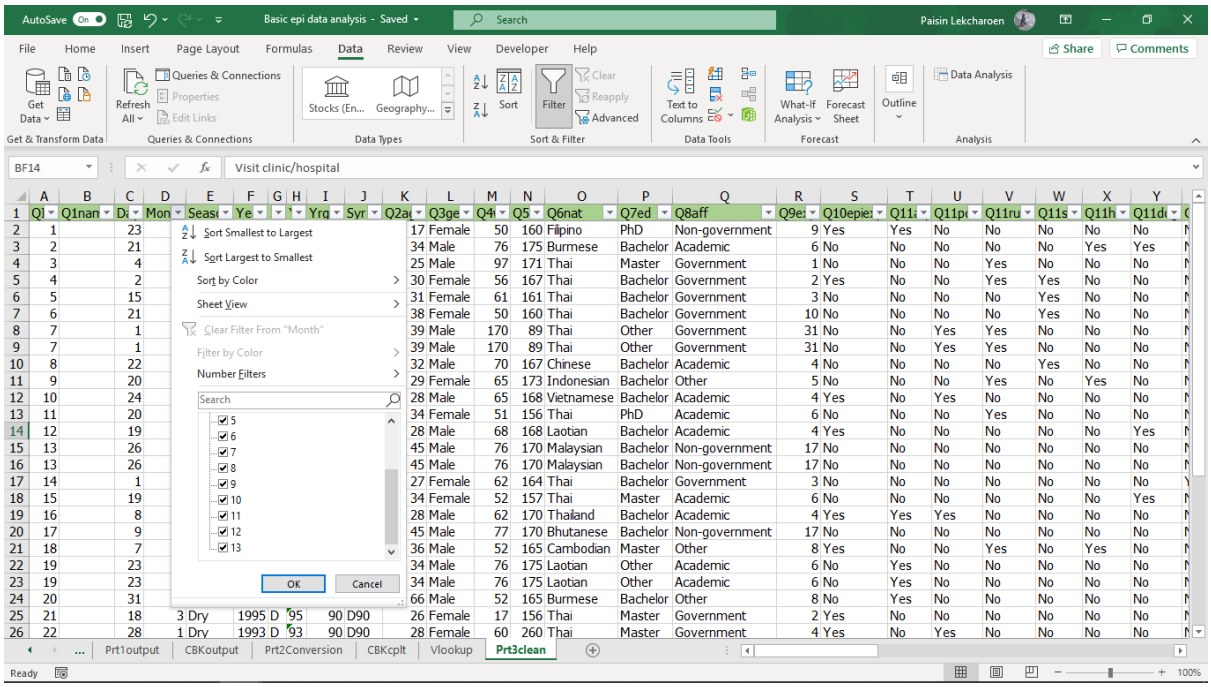


3.6. Highlight any erroneous data/cells/cell ranges for further recheck and correction.

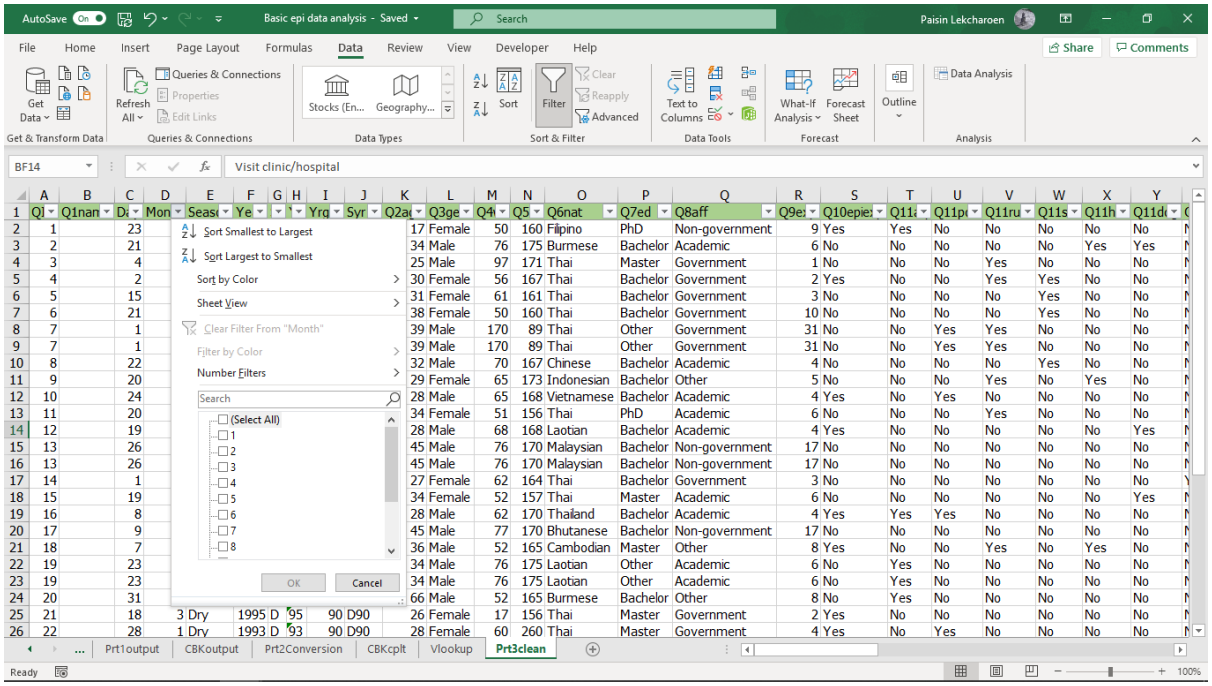
4. If you find any irrelevant non-missing data, return to the original questionnaire to correct them.

For example, in 'Month', there are records containing value '13', which is incorrect.

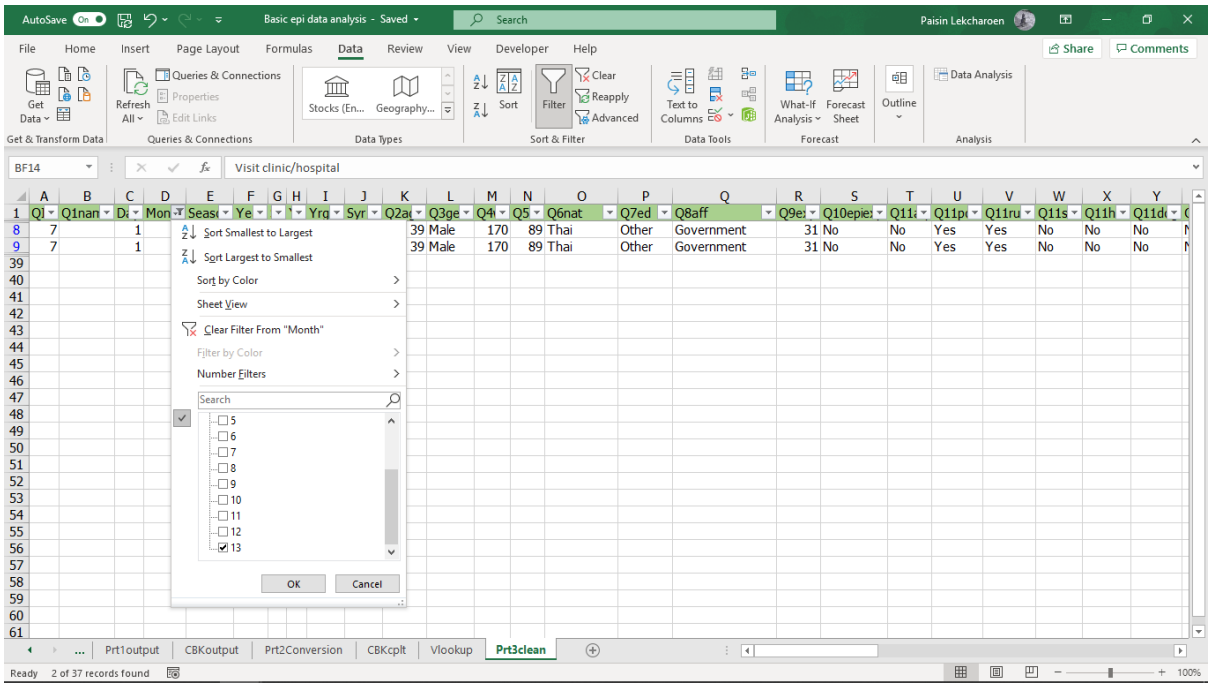
4.1. Click on drop-down. Look through the list of values.



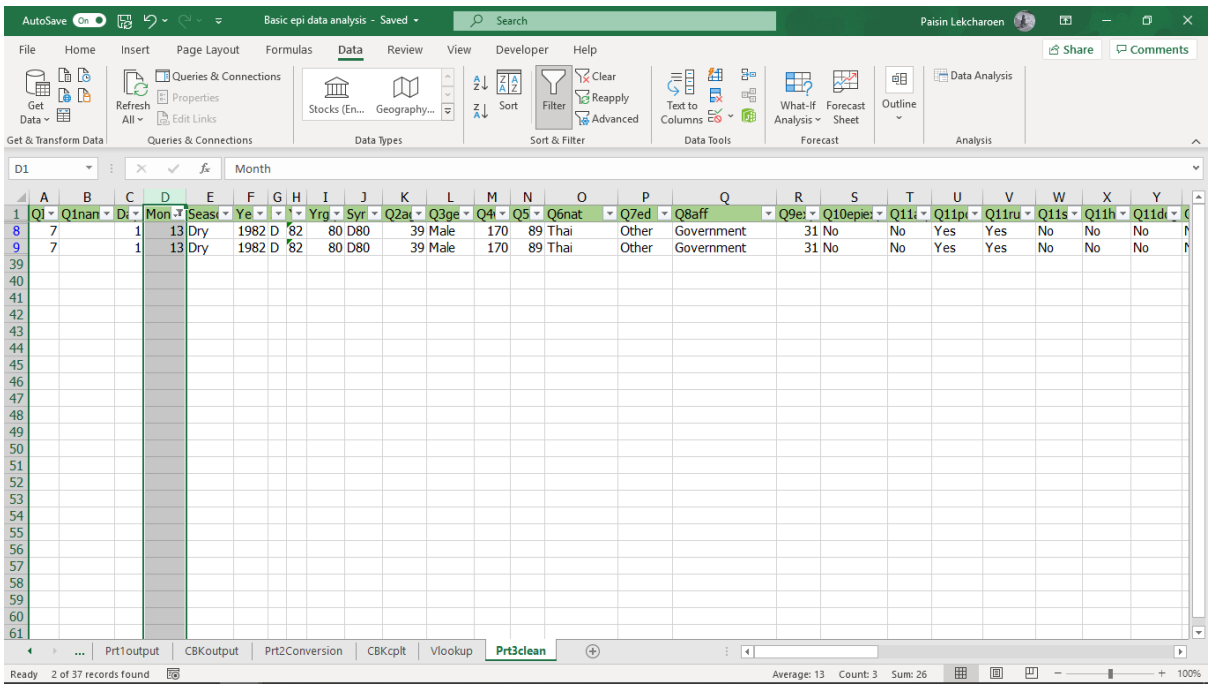
4.2. Uncheck a box in front of '(Select All)'.



4.3. Then check only a box in front of '13'.



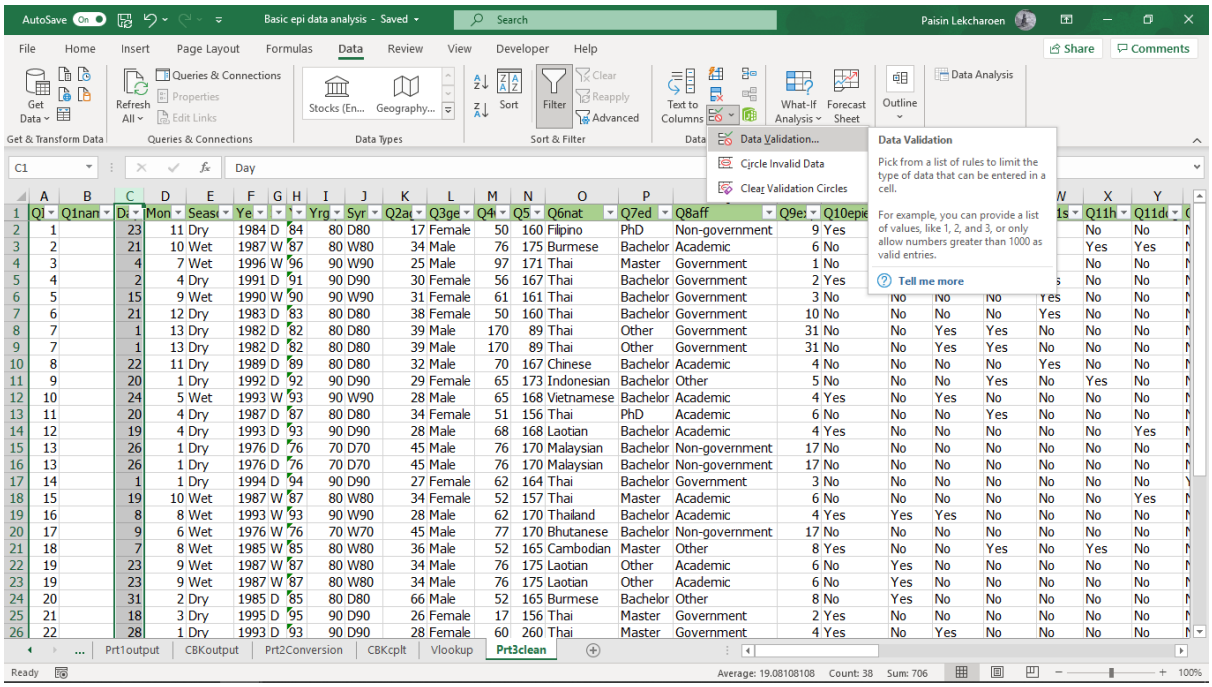
4.4. Only records containing value ‘13’. See QID of these records. Find correct data from the original data in the questionnaire and correct it.



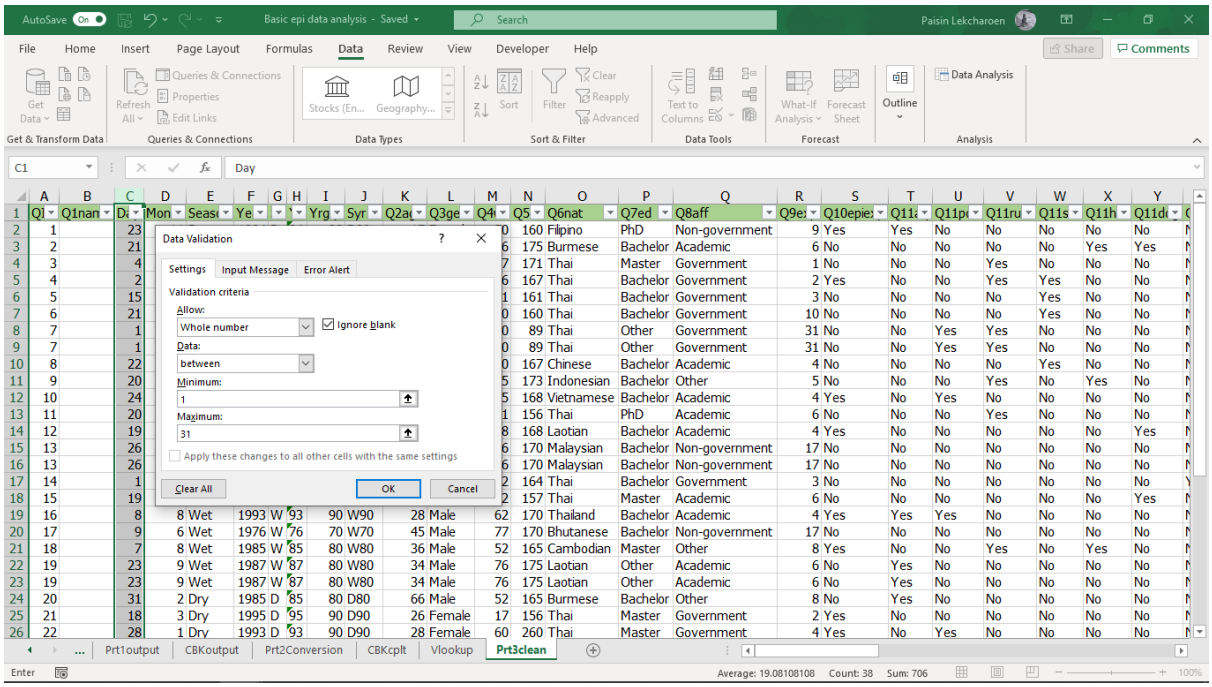
Exercise 3.2 Data Validation

You can use 'Data Validation' function to validate your database. It is easy if you already have indicated a data format and a range of possible values before you enter data (as in Part 1). However, you can still use this function after a data entering process.

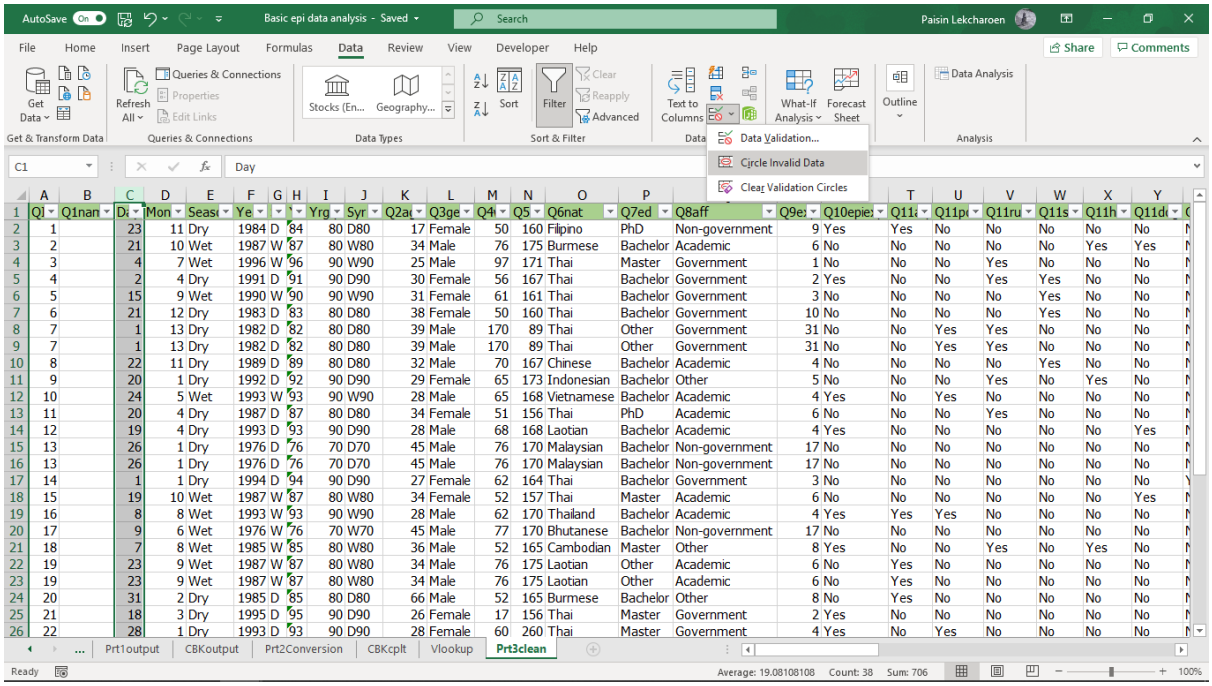
1. For example, a column 'Day' can have a range of 1 to 31. So, select 'Data Validation' from 'Data' ribbon after highlight all the column 'Day'.



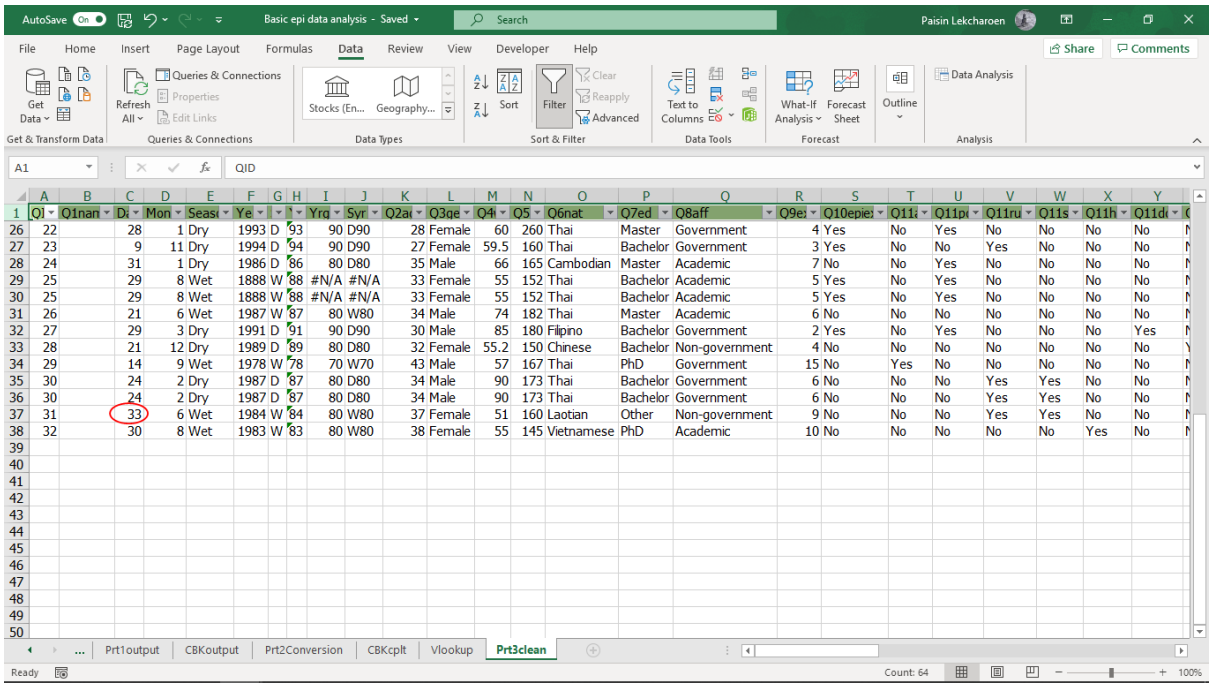
2. Allow 'Whole Number' as a valid data format. Indicate 1 as minimum and 31 as maximum value. Then click 'OK'.



3. Now, select ‘Circle Invalid Data’.



4. It will show a red circle on cell(s) containing invalid data. So, you can recheck and correct it.

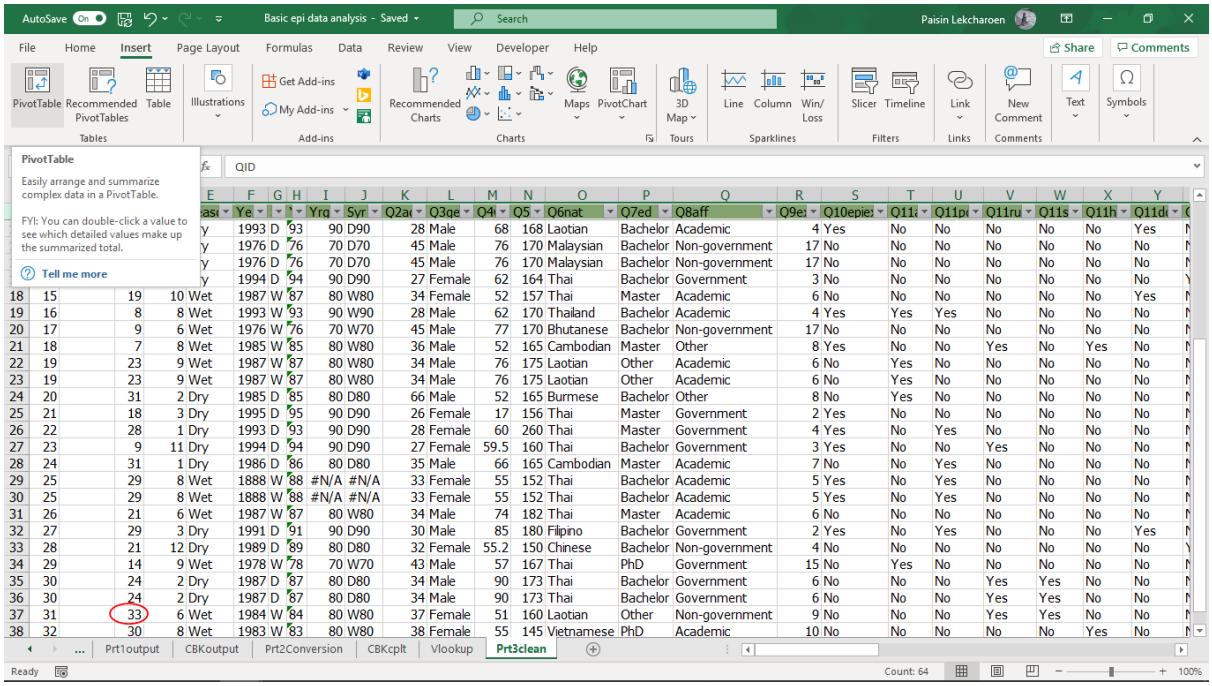


5. Apply this function to other columns and see if it circles the same cells as you have highlighted from previous exercise.

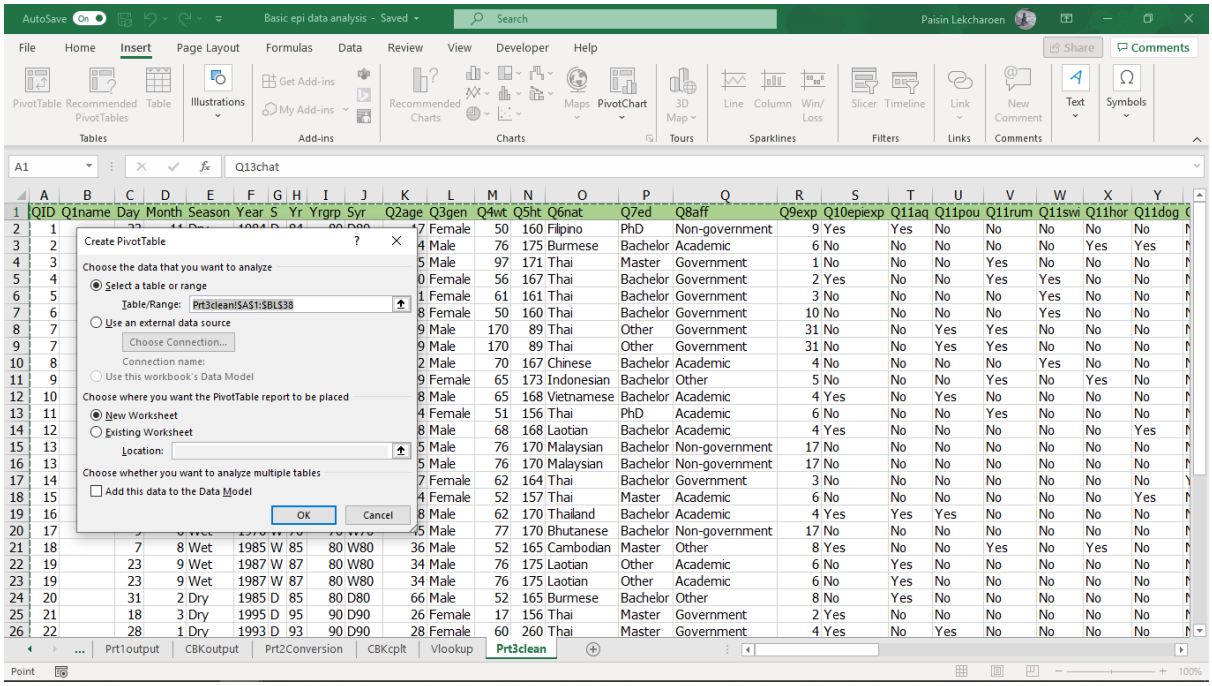
Exercise 3.3 Pivot Table

You can also use a pivot table to validate your database.

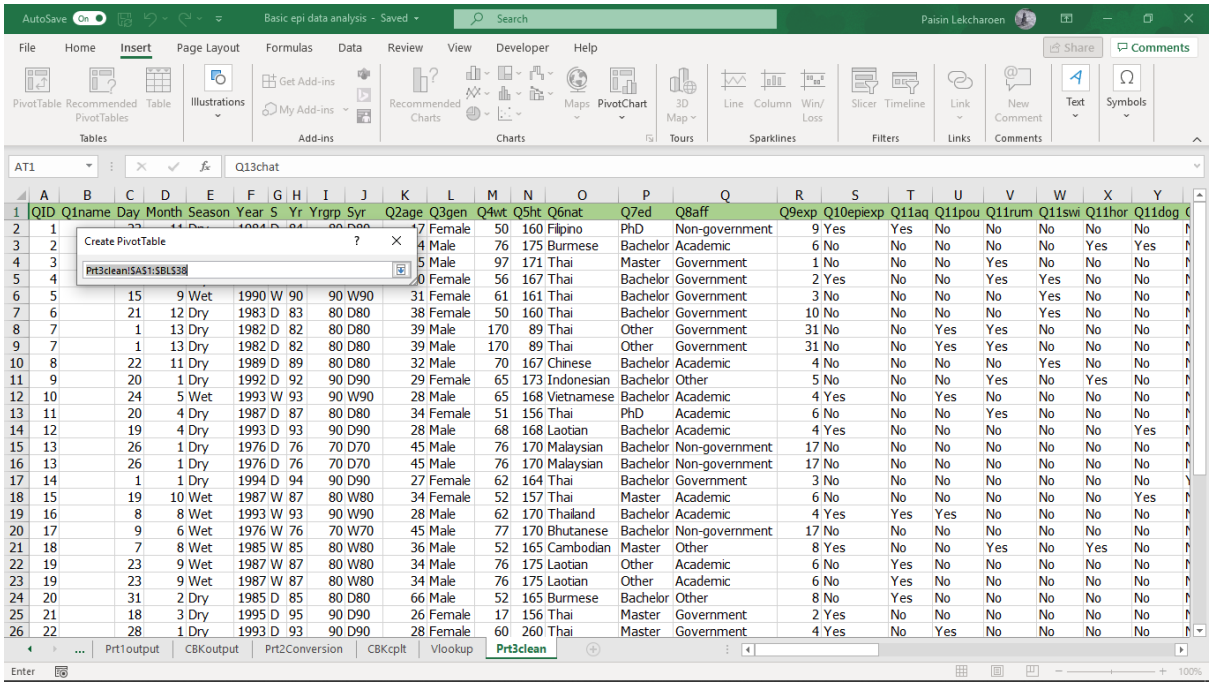
1. On 'Insert' ribbon, select 'Pivot Table'.

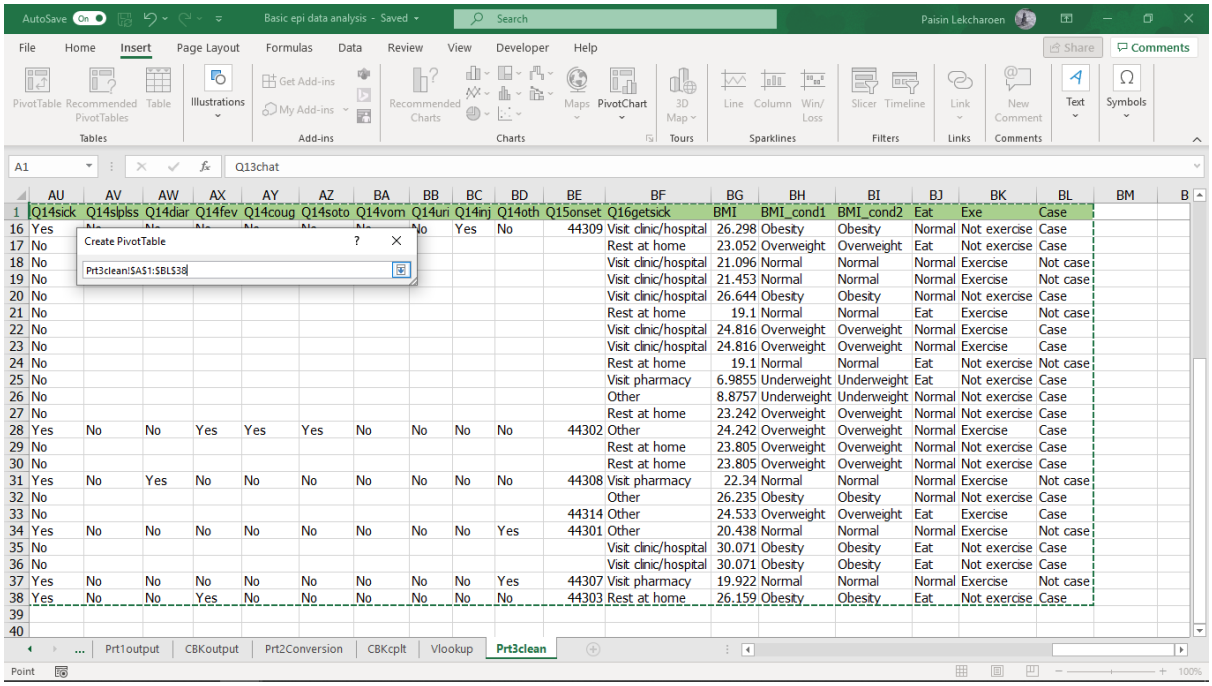


2. It will automatically select a table or range of cell you want to further your analysis. However, if it does not select data range properly, you can define it by click on the upward arrow at the end of 'Table/Range' box.

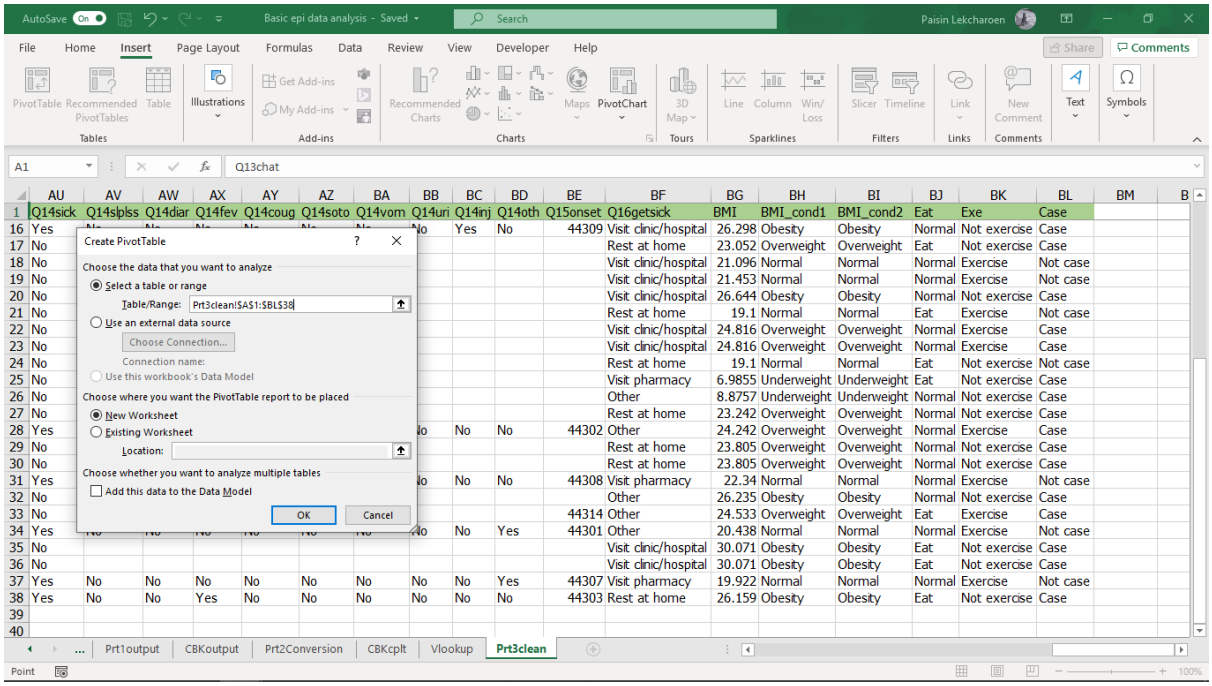


3. A ‘Create PivotTable’ window appear. Drag cursor to cover all cells that you want to use. The data in the box will be moving upon your dragging. Then click on downward arrow.

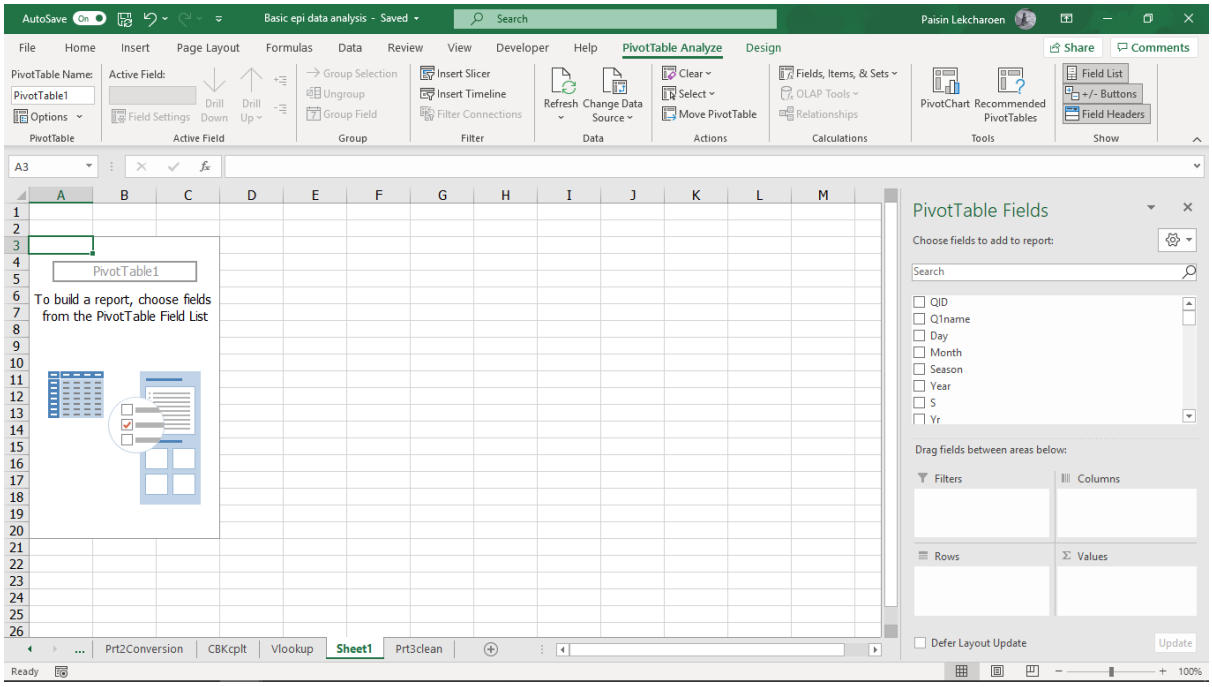




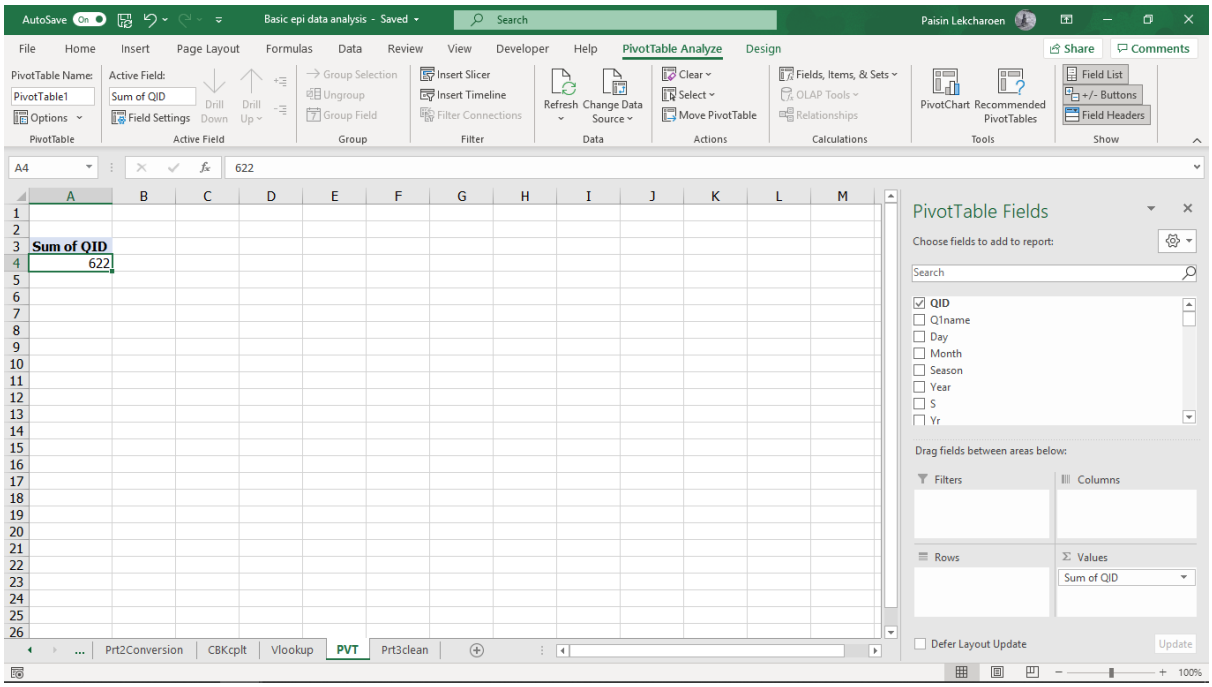
4. Then, select where you want to place the PivotTable. In this case, ‘New Worksheet’ is preferred.



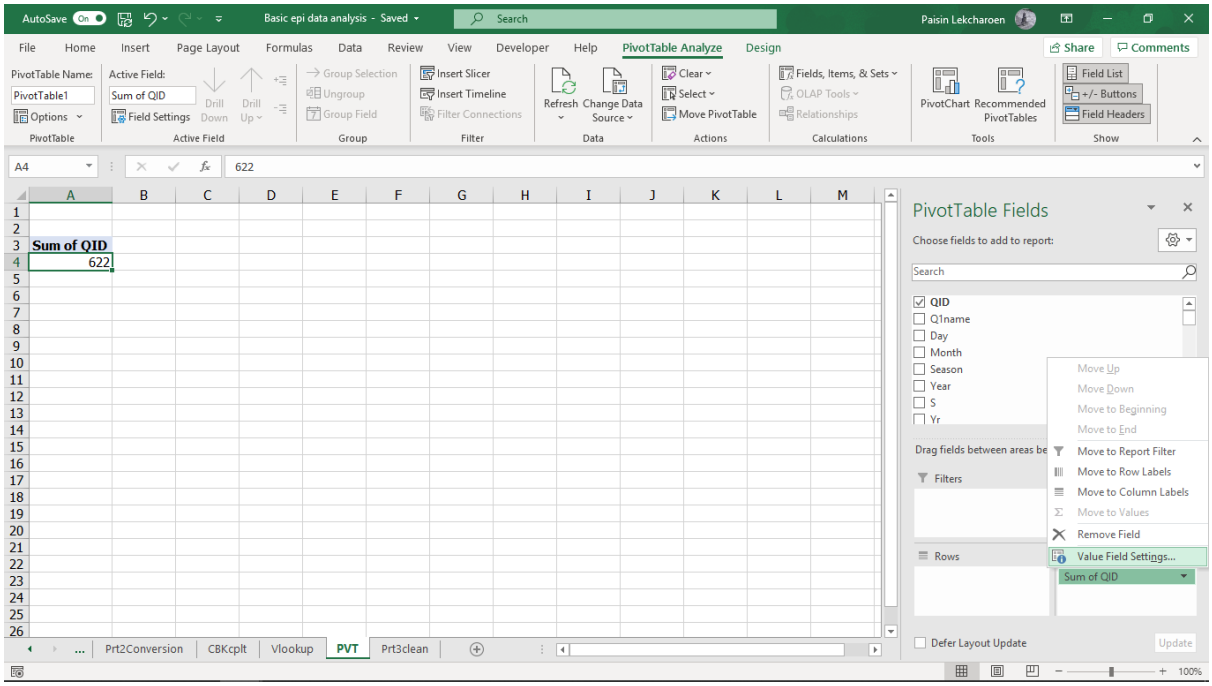
5. A new worksheet (in this case, sheet1) which contains PivotTable space, will present beside (to the left, normally) yourPrt3clean worksheet. You may name this worksheet accordingly (in this case, it names ‘PVT’. PivotTable fields show all variables from your original table.



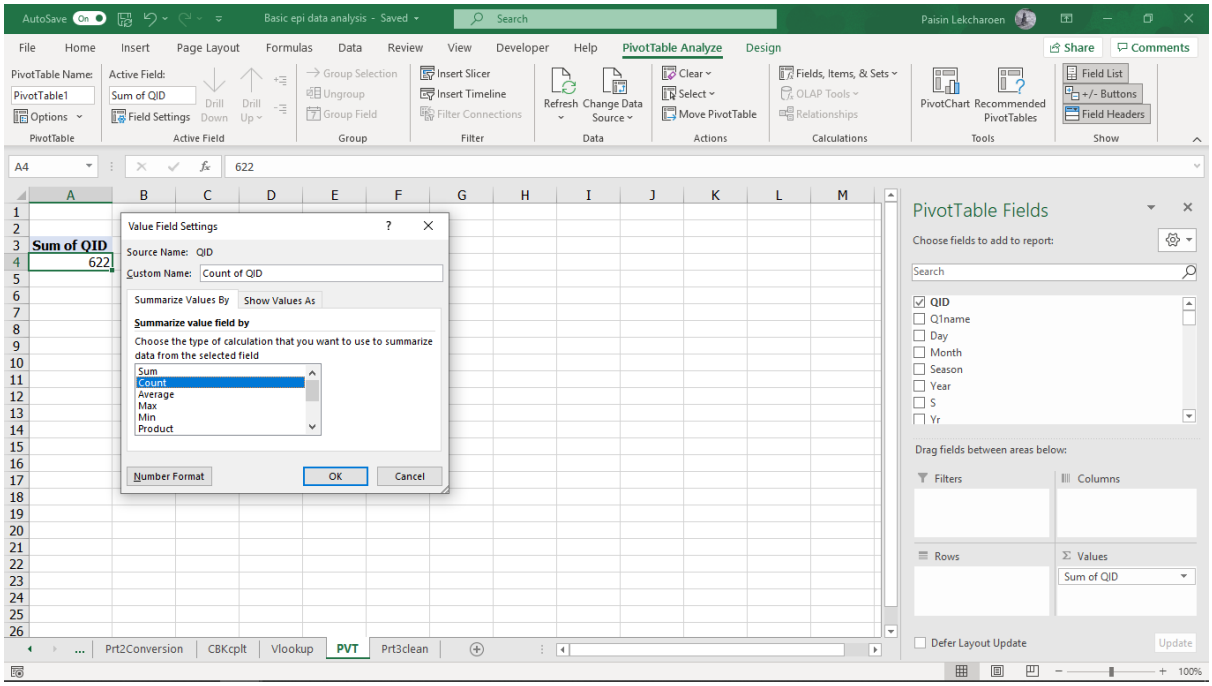
6. Drag ‘QID’ variable in variable list in the PivotTable fields and drop it in ‘Σ Values’ box. The PivotTable will show a value of ‘622’ and the heading indicates ‘Sum of QID’. This indicates that it sums up all values from the variable ‘QID’ which is not our purpose.



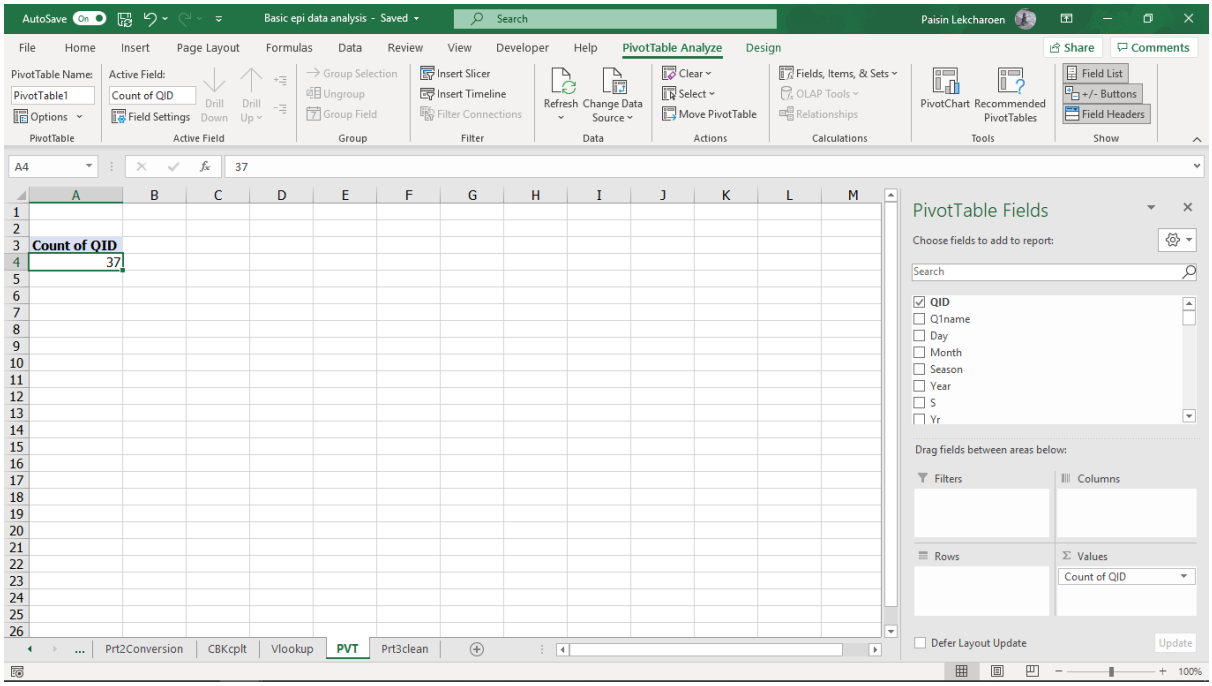
7. Click on the arrow at the end of ‘Sum of QID’ item in ‘Σ Values’ box. Select ‘Value Field Settings’.



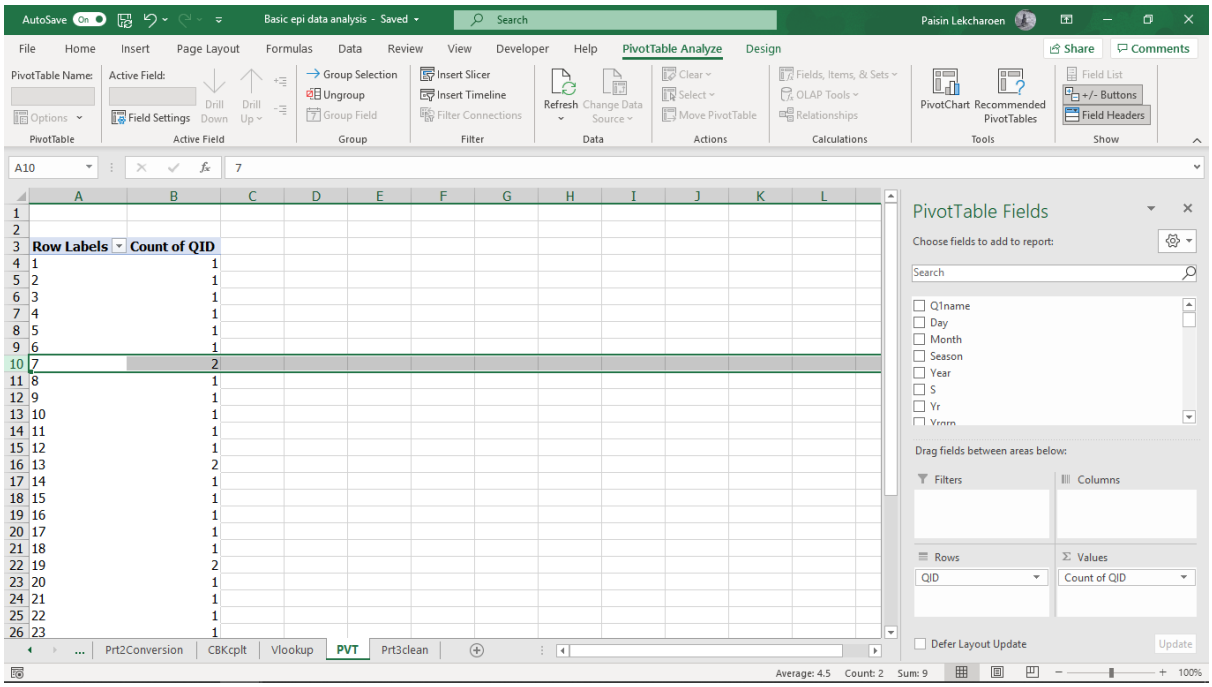
8. Select ‘Count’ instead of ‘Sum’ and click ‘OK’.



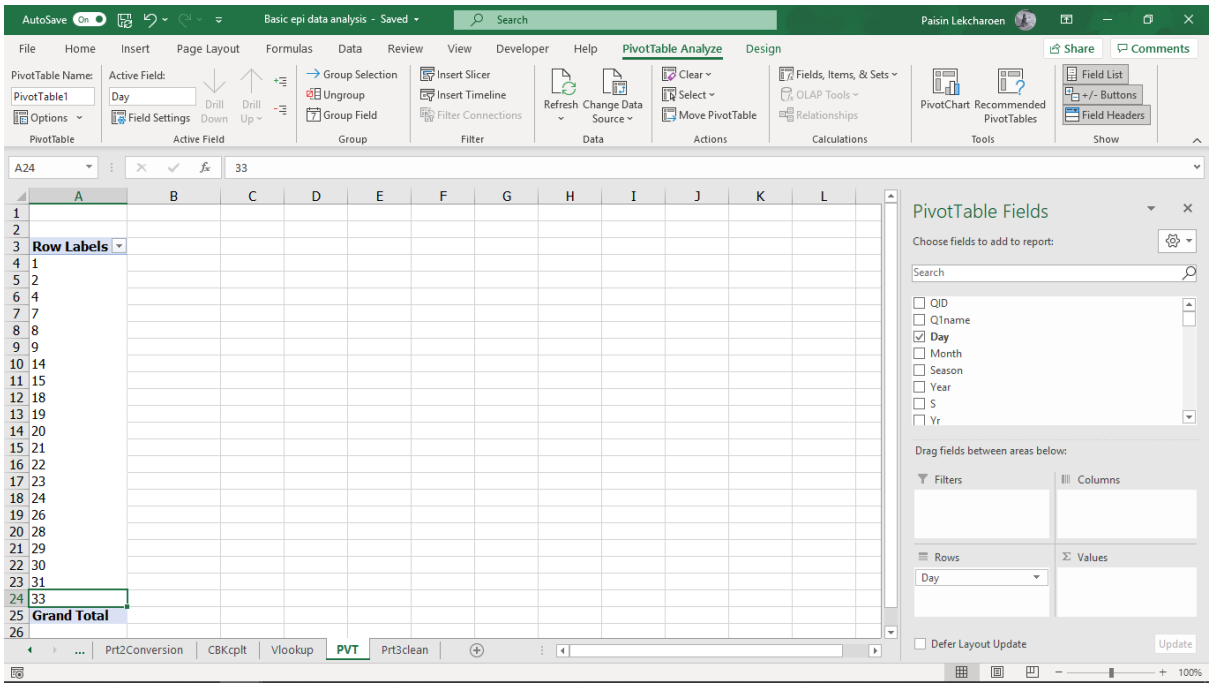
9. The value indicates 37 for the ‘Count of QID’. Do you think this is a correct value? No, you have collected data from 32 participants as indicated in Part 2. So, it should have something wrong. There may be some duplicates or incorrect QID.



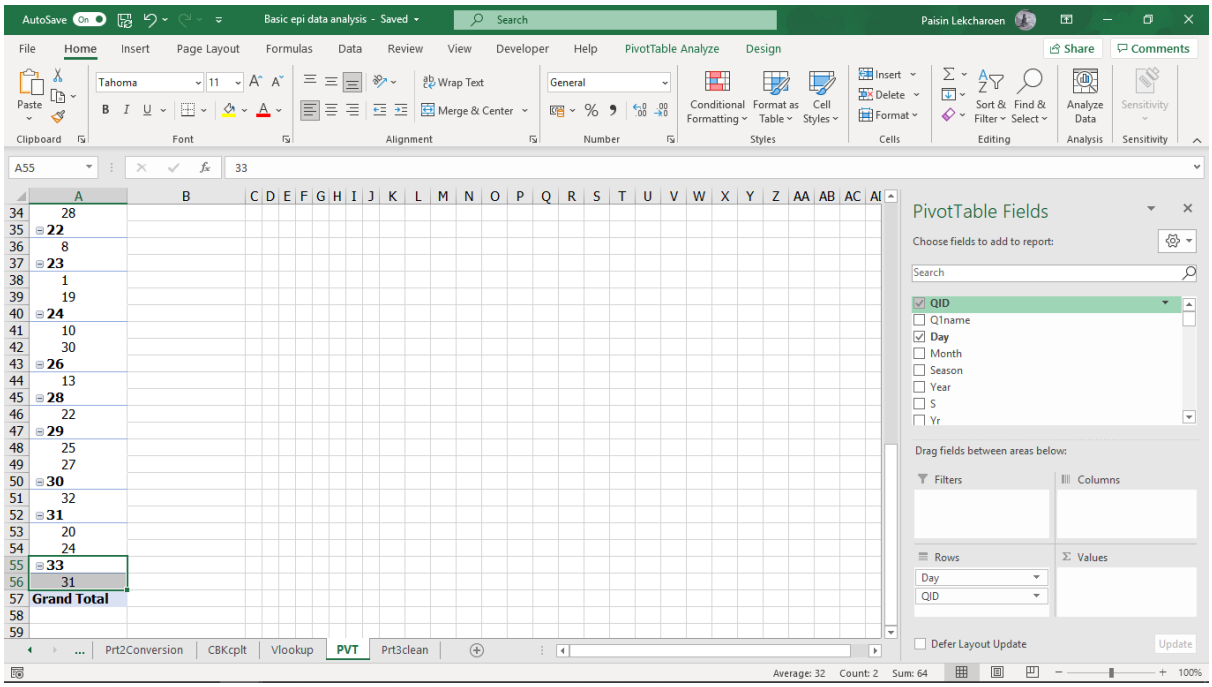
10. Now, drag and drop ‘QID’ variable in the ‘Row’ box. Each row will show each value for QID (which are 1 to 32). The Count of QID column shows a count of each value in the row. Each count should be 1; however, the count for ‘7’, ‘13’, ‘19’, and some others is 2, suggesting duplicate records.



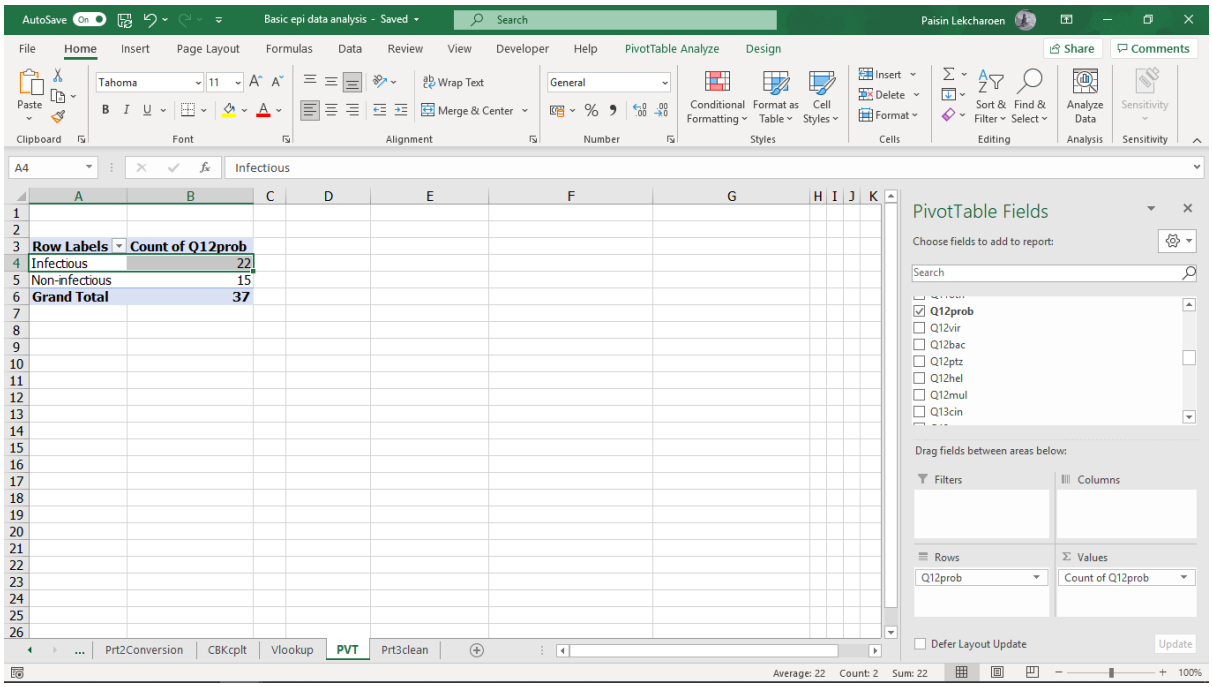
11. Move to check ‘Day’ variable. Clear the value in the PivotTable fields by uncheck a box in front of QID variable. Then, drag and drop ‘Day’ into the ‘Row’ box. It will show Day number in each row. You may notice that ‘33’ is an invalid value for Day.



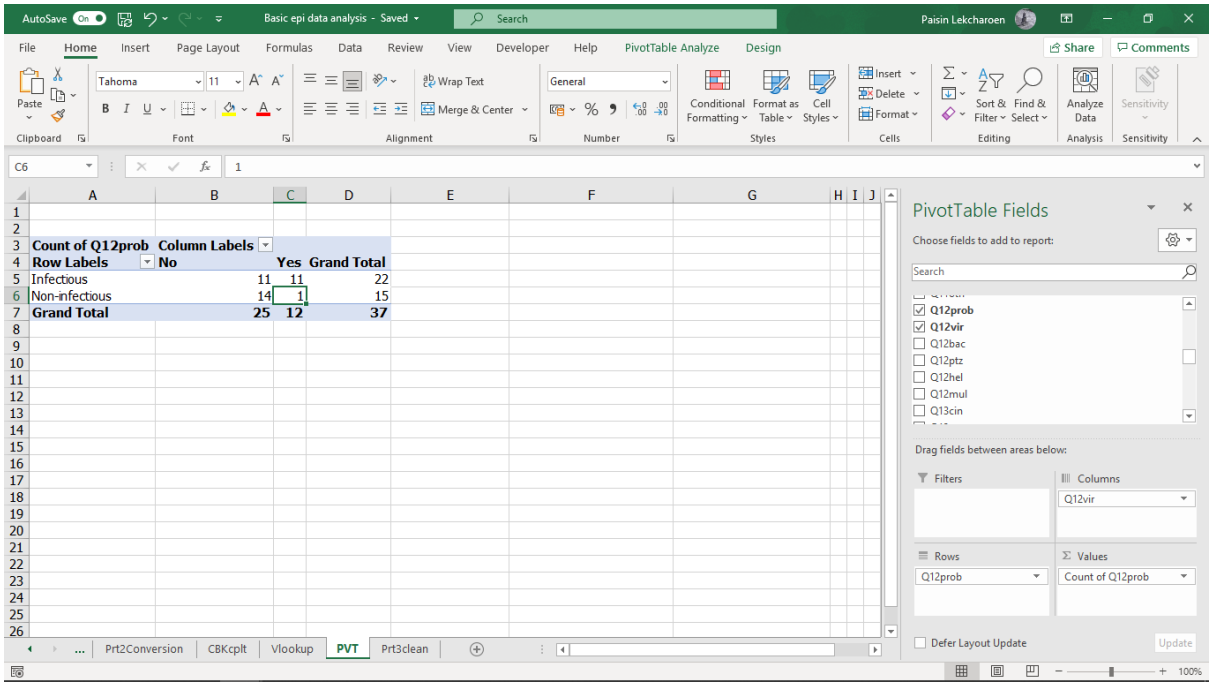
12. Drag and drop QID variable under Day variable in the Row box. You may see that the QID that contains a value of Day 33 is QID 31. This helps you to identify which questionnaire has incorrect value or which record may have invalid data entering.



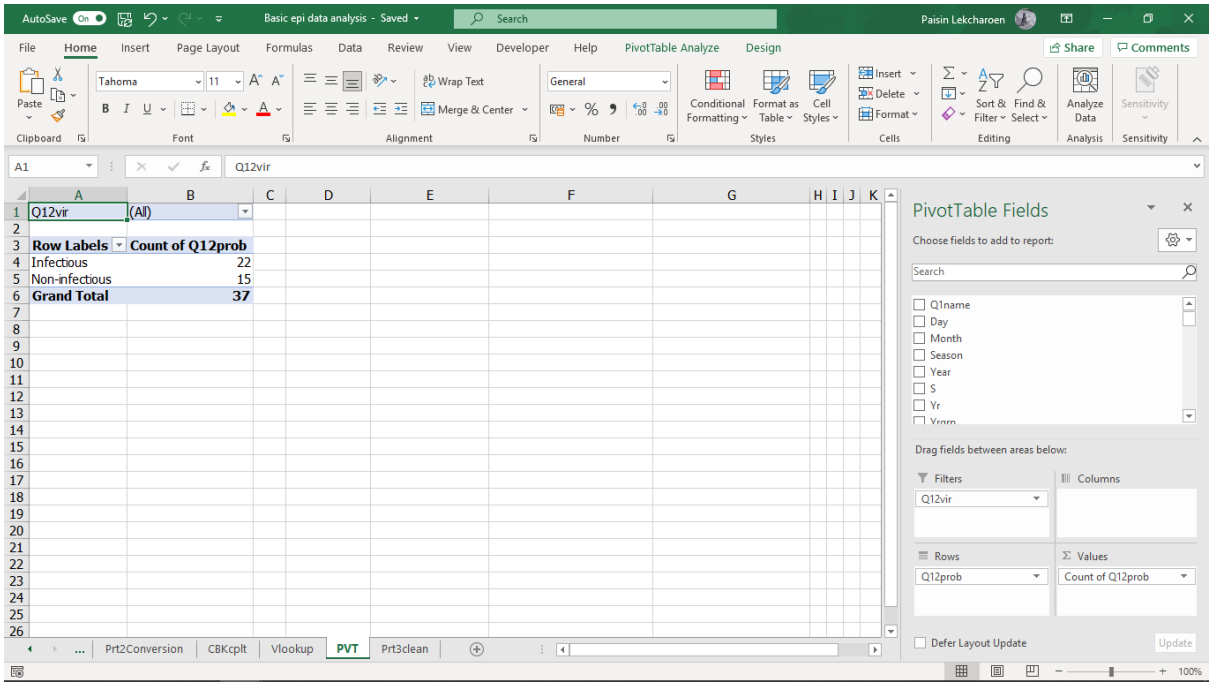
13. PivotTable can help to identify invalid condition. For example, put Q12prob in both Row and Values boxes. Set a value as a count. It will count a number of infectious and non-infectious records.



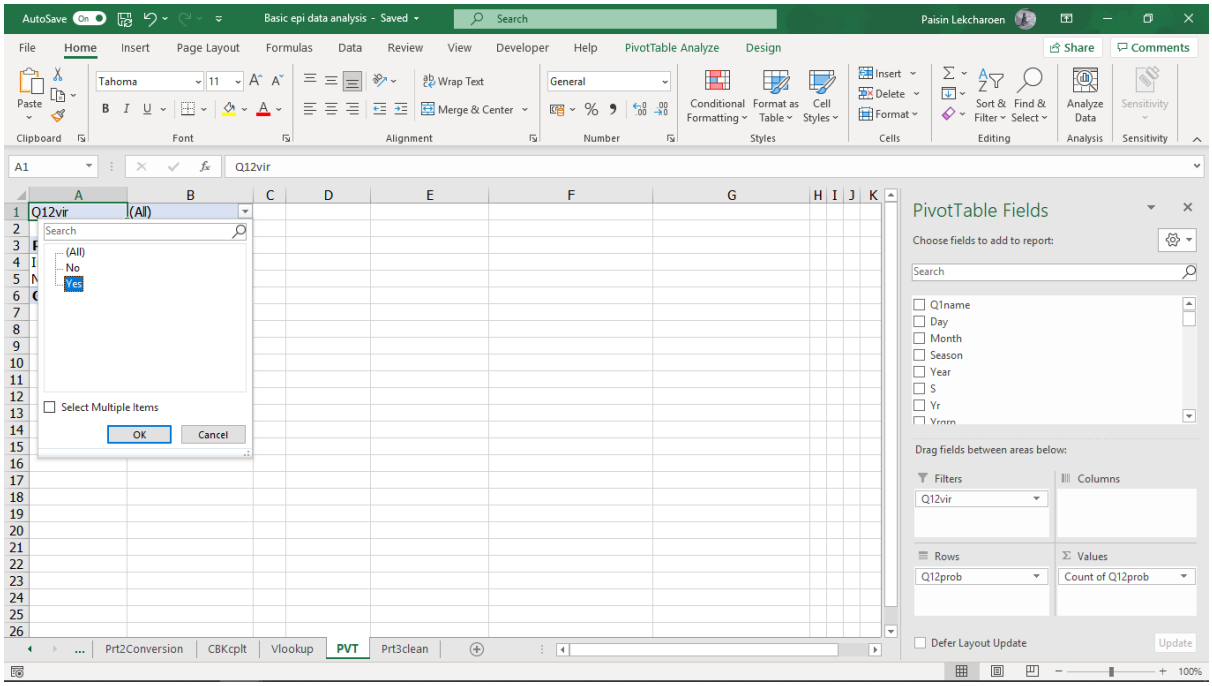
14. Let you check that how many 'Infectious' records are studies about viruses. Drag and drop Q12vir in Column box. You may see that there are 11 records in Infectious row answering Yes and 11 records answering No which is possible (there are other infectious problems such as bacteria and protozoa!). However, there is one record in Non-infectious row answering Yes which is not possible. Then you can go back and look for the correct value.



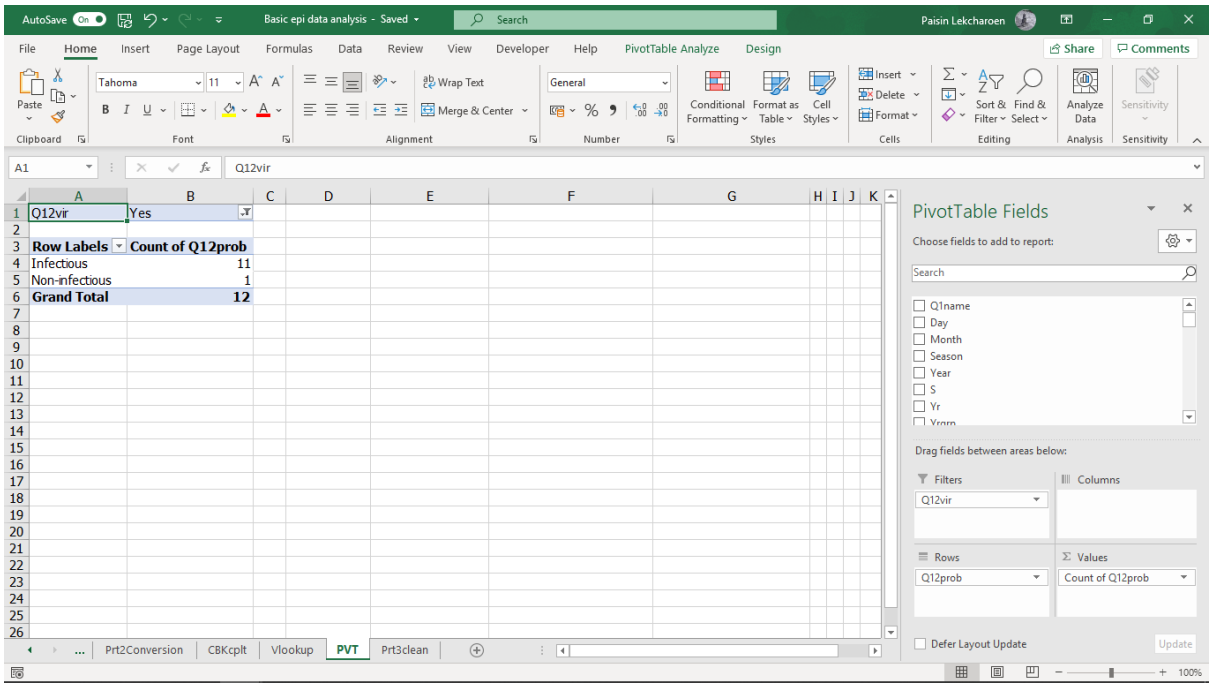
15. Now, if you want to know which record has incorrect condition, move Q12vir from Colum box to Filter box. The filter for possible value of Q12vir, which are Yes and No, will appear above the table. Now it shows all values in the table.



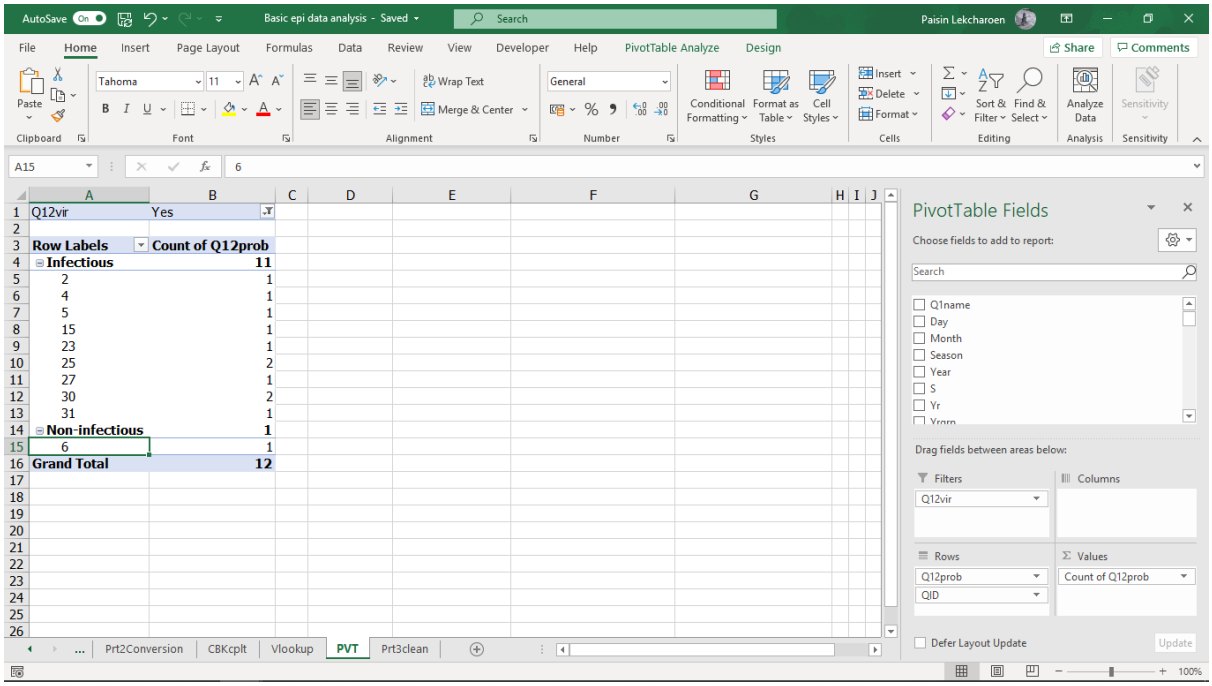
16. Click the arrowhead at the end of the filter of Q12vir. Select only Yes and click OK.



17. Again, it sums up a number of records answering Yes for each row.



18. Then, drag and drop QID variable under Q12prob in the Row box. So, you can identify which record may contain incorrect value.



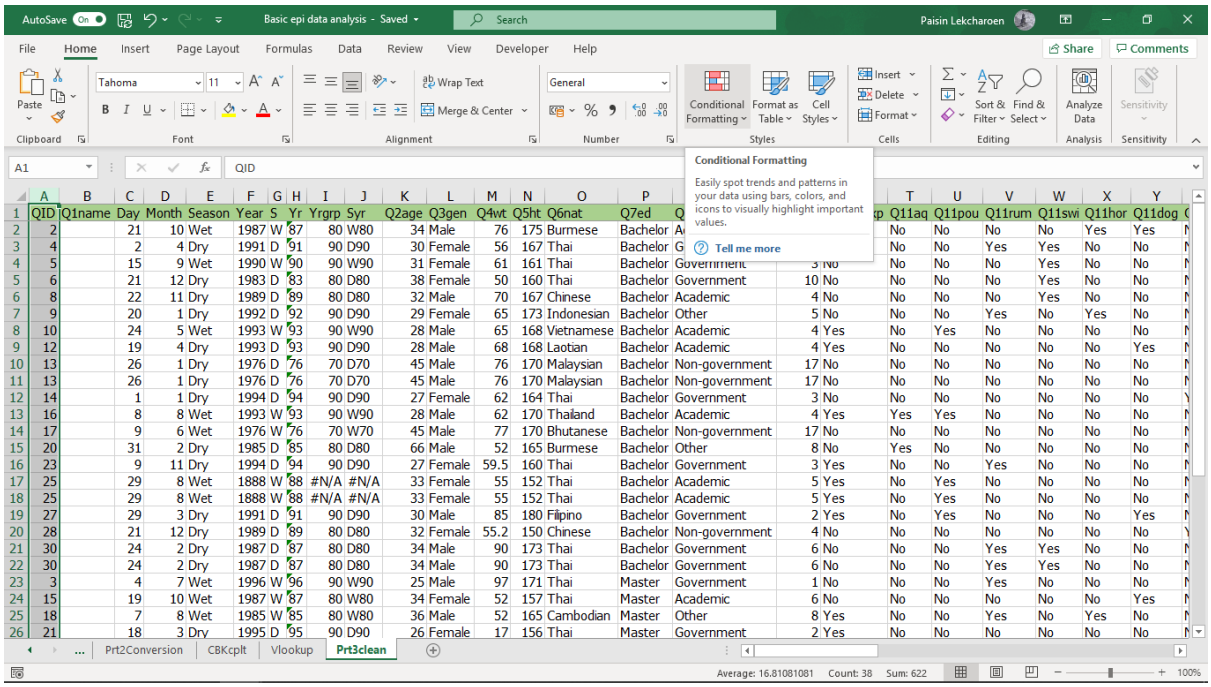
Q12vir	Yes
Row Labels	**Count of Q12prob**
Infectious	**11**
2	1
4	1
5	1
15	1
23	1
25	2
27	1
30	2
31	1
Non-infectious	**1**
6	1
Grand Total	**12**

19. Play around with other variables. Then correct all errors you can identify.

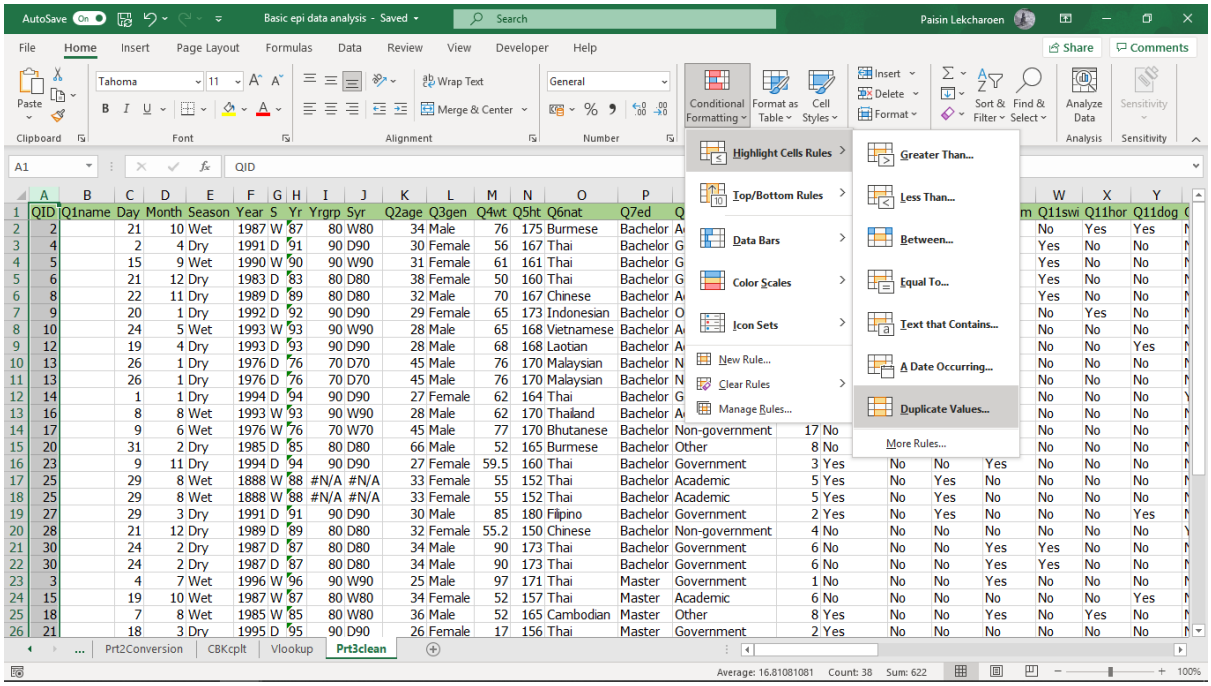
Exercise 3.4 Look for and eliminate duplicates.

In the previous exercise, you may notice that there are some duplicates. You have to clean up those records before furthering your analysis.

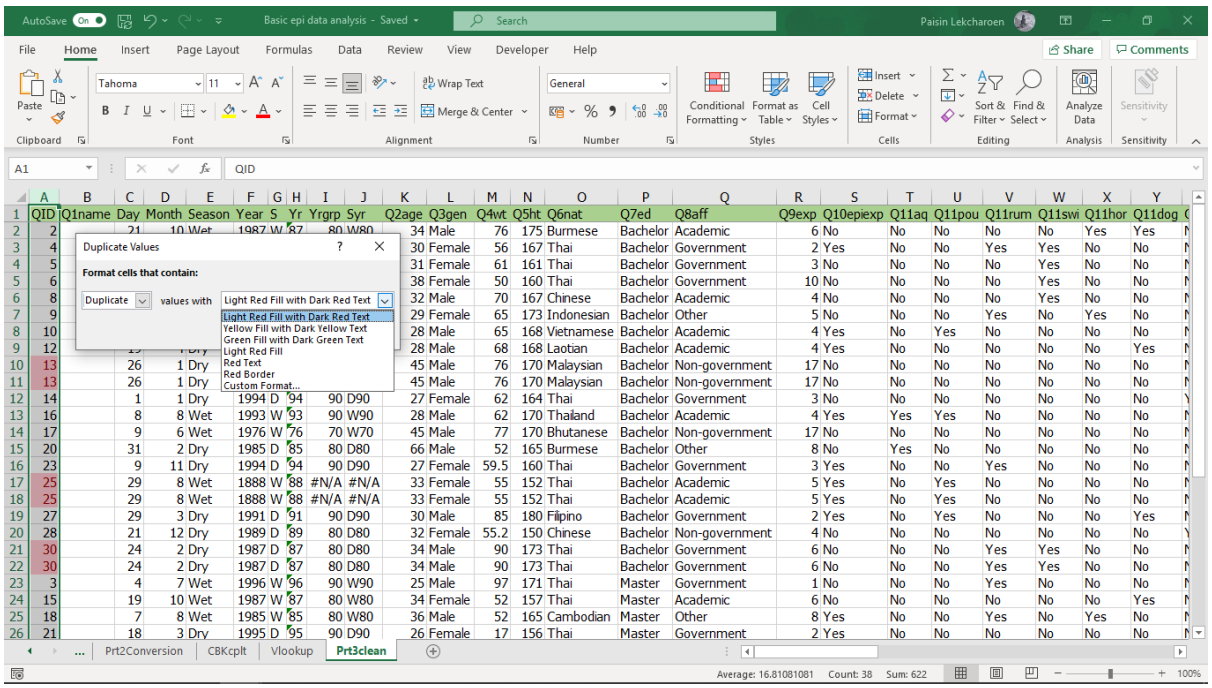
1. Identify duplicate QID using 'Conditional Formatting' function.
   1.1. Highlight QID column, then select 'Conditional Formatting' function from 'Home' ribbon.



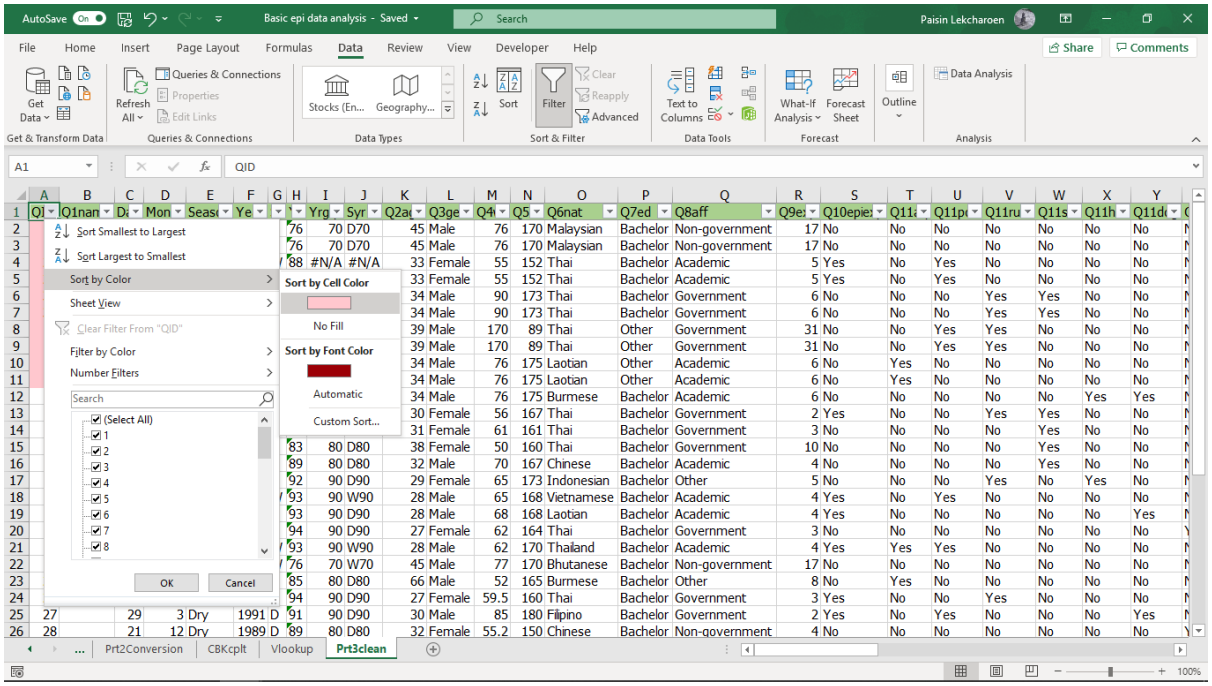
   1.2. Select 'Highlight Cells Rules', then select 'Duplicate Values'.

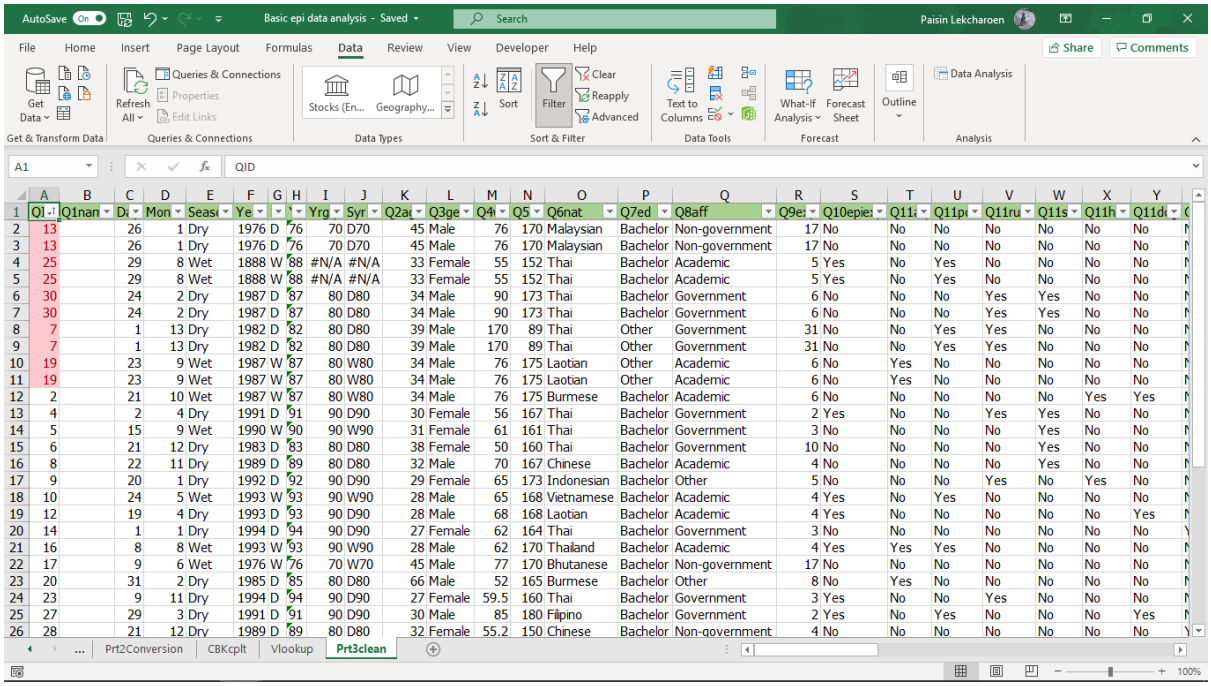


1.3. A ‘Duplicate Values’ appears. Choose ‘Duplicate’ and select cell highlight as you would like.



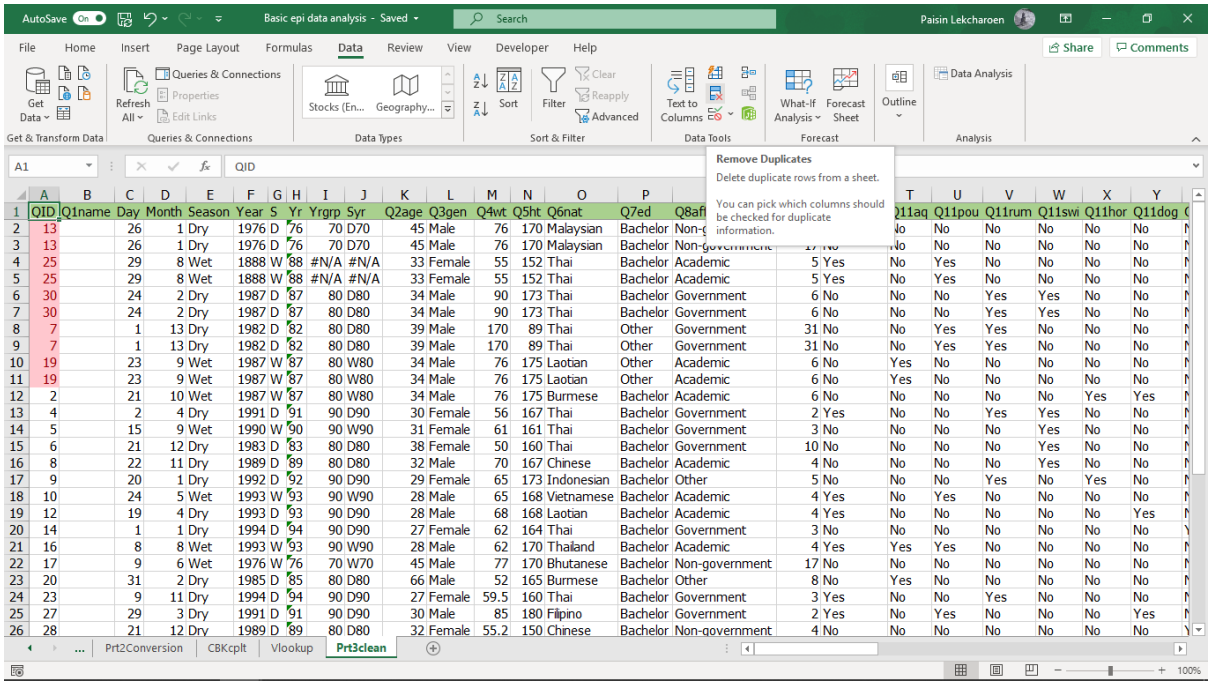
1.4. The duplicate values will be highlighted. You can sort for the highlighted values so it is easy to delete.



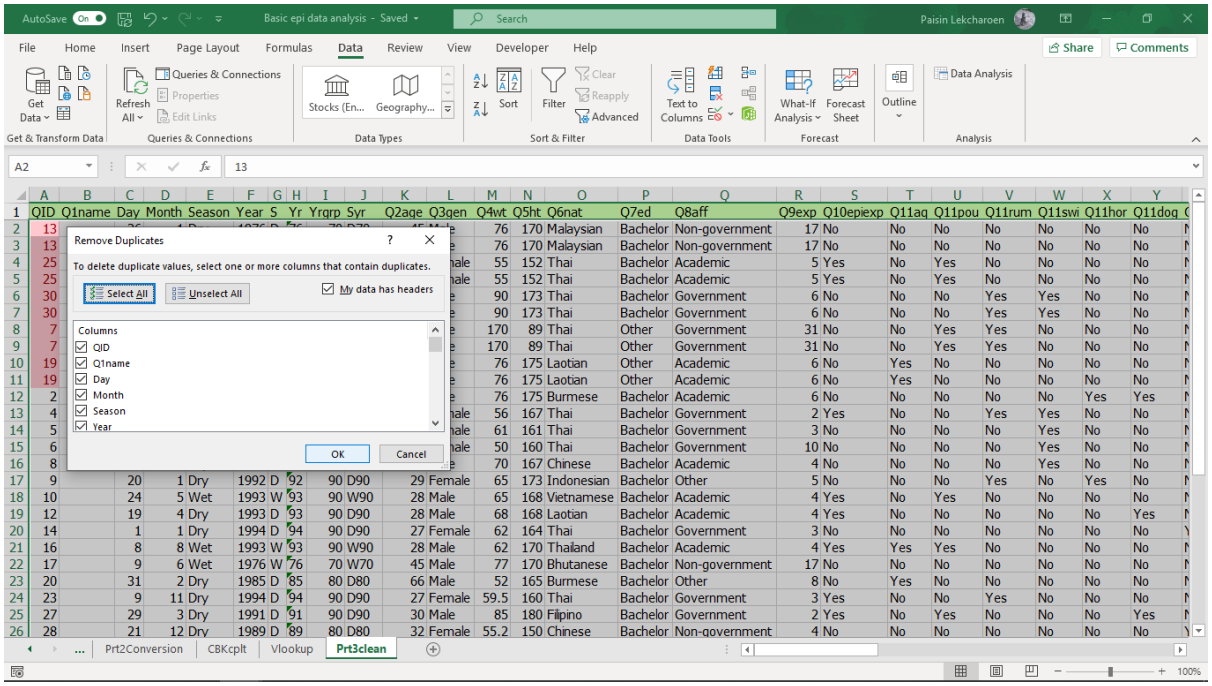


2. After you identify any duplicate records, you can delete them manually or using 'Remove Duplicates' function.

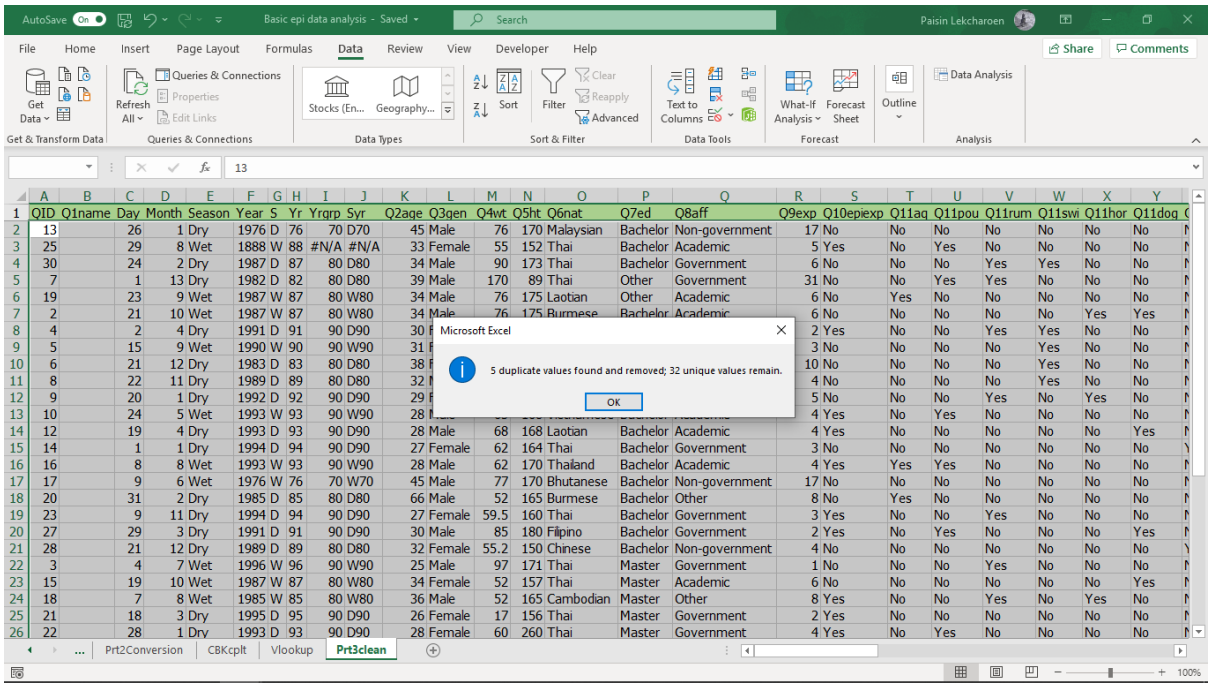
   2.1. On the 'Data' ribbon, select 'Remove Duplicates' function.



2.2. A ‘Remove Duplicates’ window appears. Select all columns and click ‘OK’.



2.3. It will report a number of removed and remaining records.



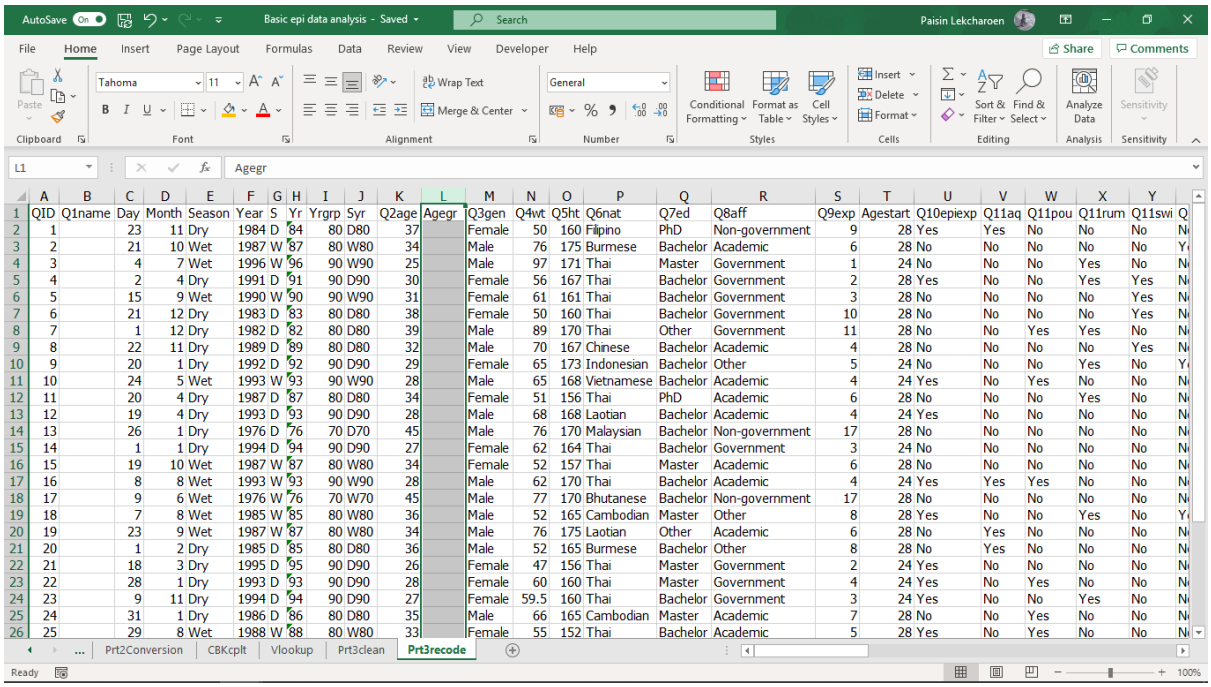
Hint: Variables containing erroneous data

Day, Month, Year, Yrgrp, Syr, Q2age, Q4wt, Q5ht, Q6nat, Q9exp, Q12vir, Q12bac, Q12mul, Q15onset

Exercise 3.5 Recode.

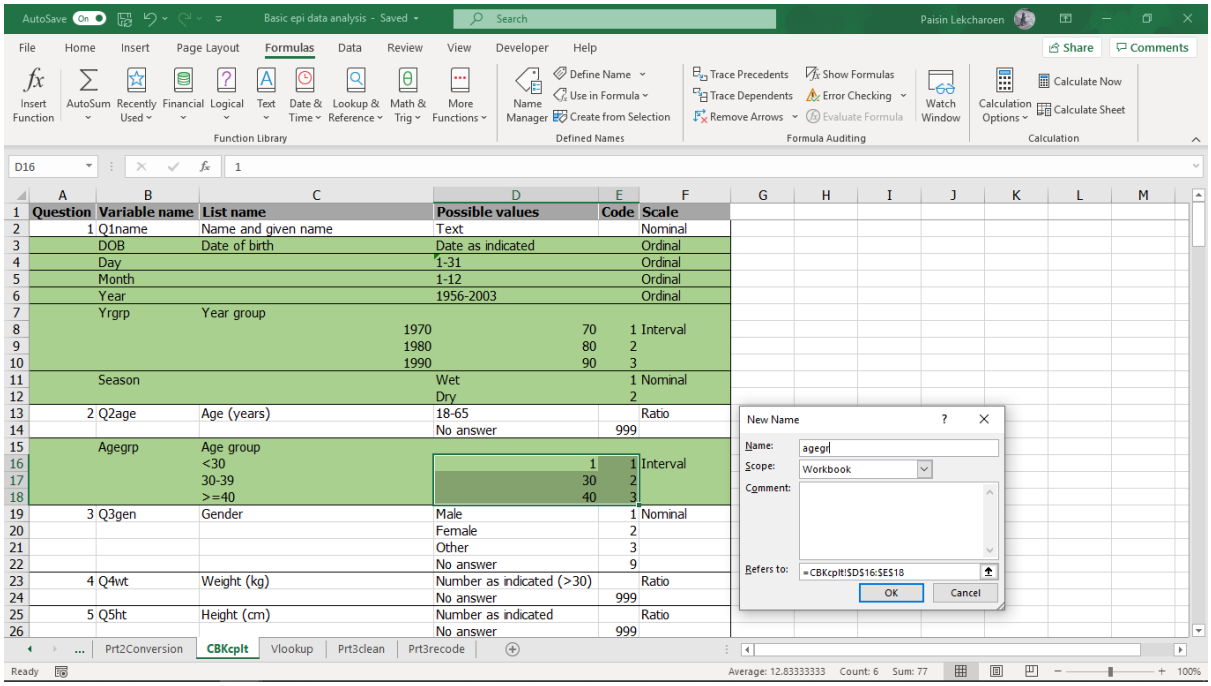
Many software are available for data management and analysis, e.g., MS Excel, EpiInfo, STATA, SAS, SPSS, and R. Each software requires different data types and formats. However, most software can manipulate data in numeric format. Therefore, it is more comfortable if you can change your text string data into numeric format by recoding them. Furthermore, some continuous data may be difficult to analyze for finding association. It is preferred to group or re-group these data.

1. Open 'Prt3recode' worksheet. Many variables contain text string as data. It will be better to use 'Vlookup' function to recode these values.
   Before that, you need to generate table of values for each variable.
   Let's start with Q2age. It is especially important to define age into age group. Insert a new column name 'Agegr'.

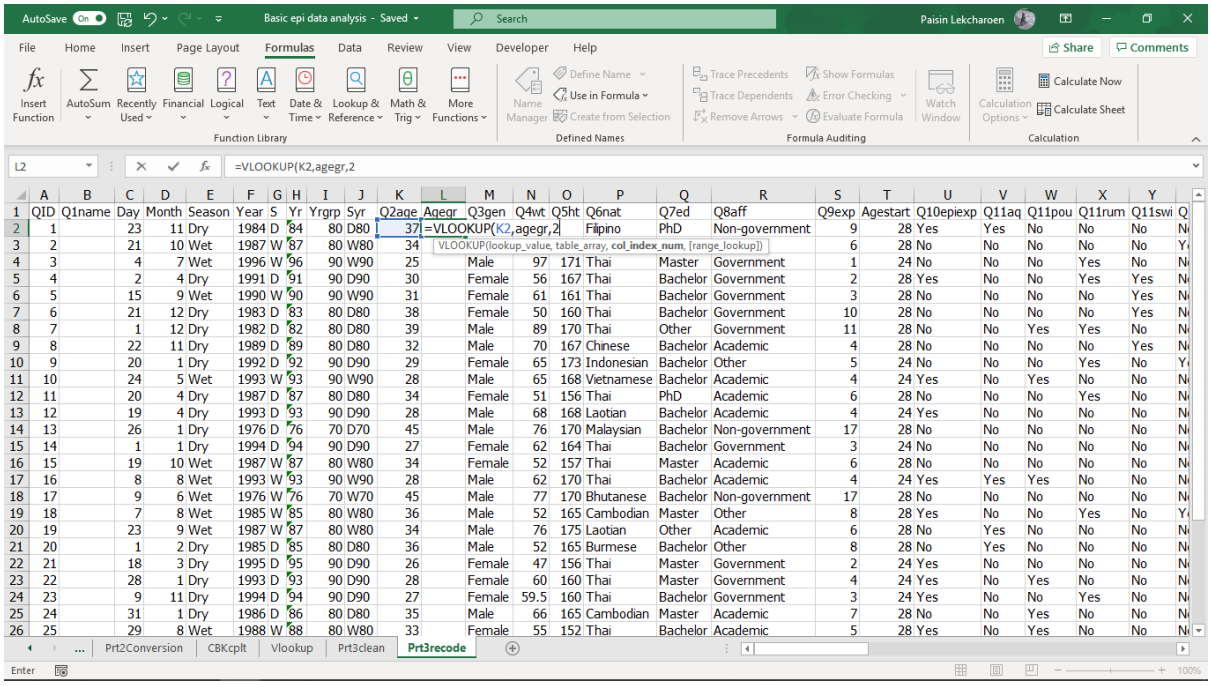


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	QID	Q1name	Day	Month	Season	Year	S	Yr	Yrgrp	Syr	Q2age	Agegr	Q3gen	Q4wt	Q5ht	Q6nat	Q7ed	Q8aff	Q9exp	Agestart	Q10epiexp	Q11aq	Q11pou	Q11rum	Q11swi	Q
2	1		23	11	Dry	1984	D	84	80	D80	37		Female	50	160	Filipino	PhD	Non-government	9	28	Yes	Yes	No	No	No	N
3	2		21	10	Wet	1987	W	87	80	W80	34		Male	76	175	Burmese	Bachelor	Academic	6	28	No	No	No	No	No	Y
4	3		4	7	Wet	1996	W	96	90	W90	25		Male	97	171	Thai	Master	Government	1	24	No	No	No	Yes	No	N
5	4		2	4	Dry	1991	D	91	90	D90	30		Female	56	167	Thai	Bachelor	Government	2	28	Yes	No	No	Yes	Yes	N
6	5		15	9	Wet	1990	W	90	90	W90	31		Female	61	161	Thai	Bachelor	Government	3	28	No	No	No	No	Yes	N
7	6		21	12	Dry	1983	D	83	80	D80	38		Female	50	160	Thai	Bachelor	Government	10	28	No	No	No	No	Yes	N
8	7		1	12	Dry	1982	D	82	80	D80	39		Male	89	170	Thai	Other	Government	11	28	No	No	Yes	Yes	No	N
9	8		22	11	Dry	1989	D	89	80	D80	32		Male	70	167	Chinese	Bachelor	Academic	4	28	No	No	No	No	Yes	N
10	9		20	1	Dry	1992	D	92	90	D90	29		Female	65	173	Indonesian	Bachelor	Other	5	24	No	No	No	Yes	No	Y
11	10		24	5	Wet	1993	W	93	90	W90	28		Male	65	168	Vietnamese	Bachelor	Academic	4	24	Yes	No	Yes	No	No	N
12	11		20	4	Dry	1987	D	87	80	D80	34		Female	51	156	Thai	PhD	Academic	6	28	No	No	No	Yes	No	N
13	12		19	4	Dry	1993	D	93	90	D90	28		Male	68	168	Laotian	Bachelor	Academic	4	24	Yes	No	No	No	No	N
14	13		26	1	Dry	1976	D	76	70	D70	45		Male	76	170	Malaysian	Bachelor	Non-government	17	28	No	No	No	No	No	N
15	14		1	1	Dry	1994	D	94	90	D90	27		Female	62	164	Thai	Bachelor	Government	3	24	No	No	No	No	No	N
16	15		19	10	Wet	1987	W	87	80	W80	34		Female	52	157	Thai	Master	Academic	6	28	No	No	No	No	No	N
17	16		8	8	Wet	1993	W	93	90	W90	28		Male	62	170	Thai	Bachelor	Academic	4	24	Yes	Yes	Yes	No	No	N
18	17		9	6	Wet	1976	W	76	70	W70	45		Male	77	170	Bhutanese	Bachelor	Non-government	17	28	No	No	No	No	No	N
19	18		7	8	Wet	1985	W	85	80	W80	36		Male	52	165	Cambodian	Master	Other	8	28	Yes	No	No	Yes	No	Y
20	19		23	9	Wet	1987	W	87	80	W80	34		Male	76	175	Laotian	Other	Academic	6	28	No	Yes	No	No	No	N
21	20		1	2	Dry	1985	D	85	80	D80	36		Male	52	165	Burmese	Bachelor	Other	8	28	No	Yes	No	No	No	N
22	21		18	3	Dry	1995	D	95	90	D90	26		Female	47	156	Thai	Master	Government	2	24	Yes	No	No	No	No	N
23	22		28	1	Dry	1993	D	93	90	D90	28		Female	60	160	Thai	Master	Government	4	24	Yes	No	Yes	No	No	N
24	23		9	11	Dry	1994	D	94	90	D90	27		Female	59.5	160	Thai	Bachelor	Government	3	24	Yes	No	No	Yes	No	N
25	24		31	1	Dry	1986	D	86	80	D80	35		Male	66	165	Cambodian	Master	Academic	7	28	No	No	Yes	No	No	N
26	25		29	8	Wet	1988	W	88	80	W80	33		Female	55	152	Thai	Bachelor	Academic	5	28	Yes	No	Yes	No	No	N

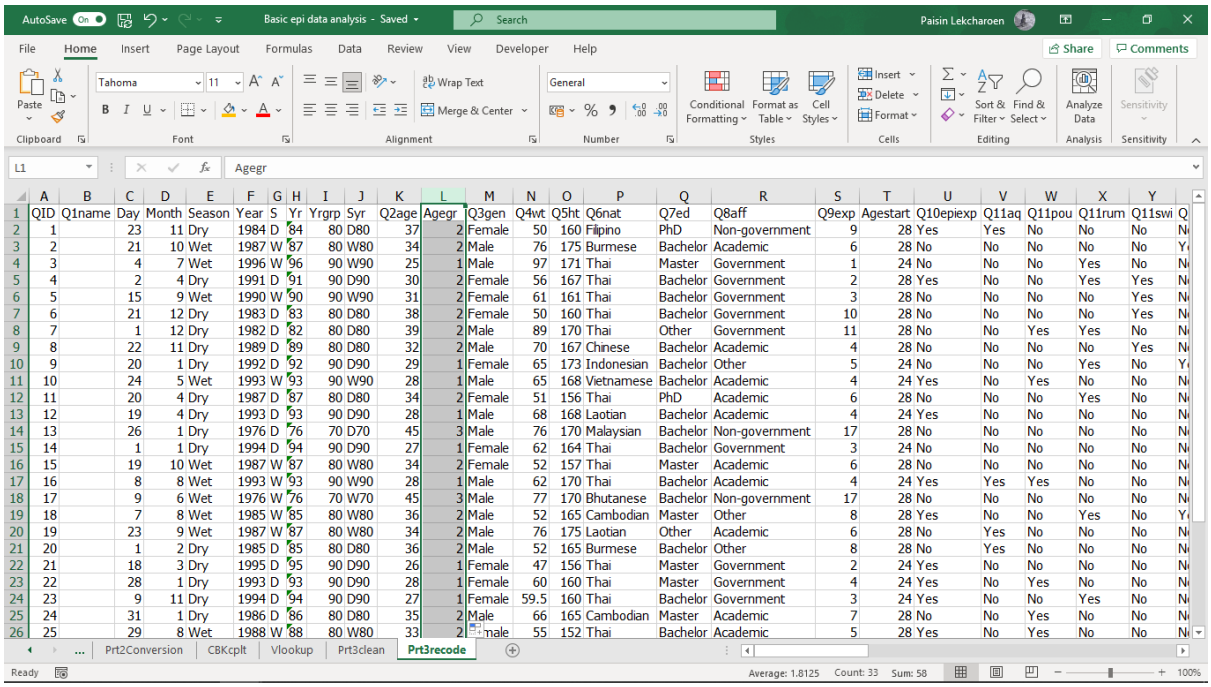
2. Go to the codebook ‘CBKcplt’ worksheet. There is an information for ‘Agegr’ variable provided. Highlight ‘Possible values’ and ‘Code’ columns of ‘Agegr’. Use ‘Define Name’ function to create a ‘agegr’ table. Click ‘OK’.



3. Go back to ‘Prt3recode’ worksheet. In cell L2, put a command as follow:
   - ‘= VLOOKUP (K2, agegr, 2)”



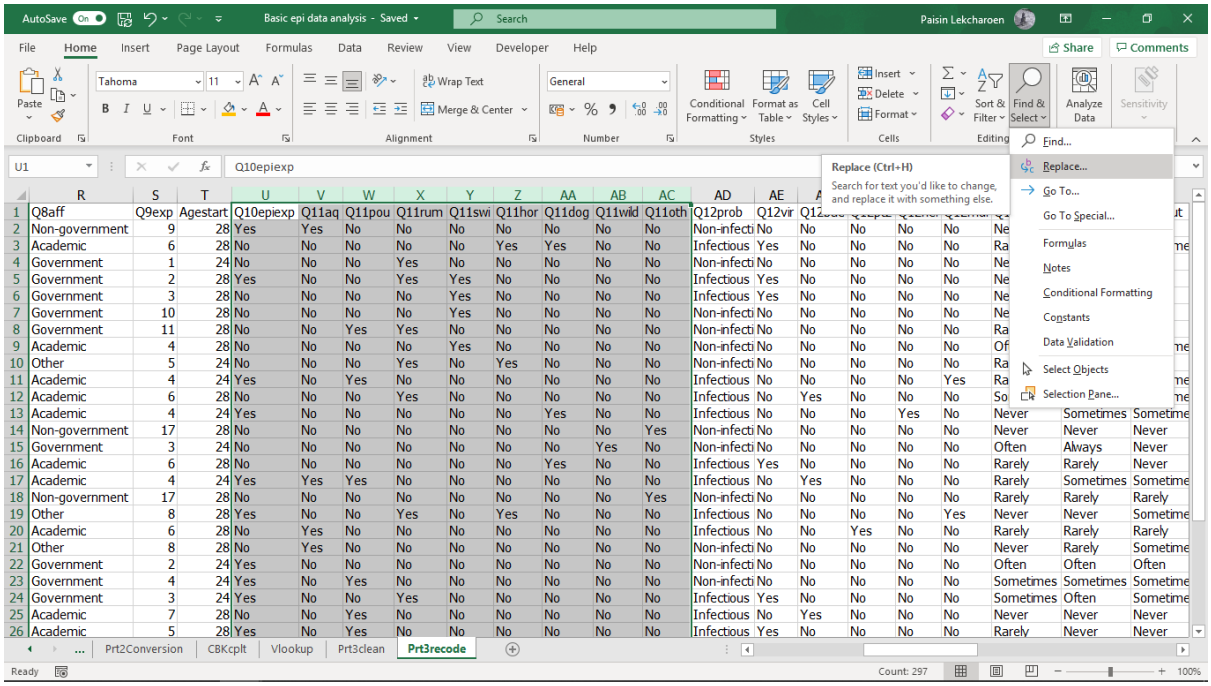
4. So, it will look for the same value as K2 in the agegr table and return a value in the second column in the same row of that table. Then copy the command for all records.



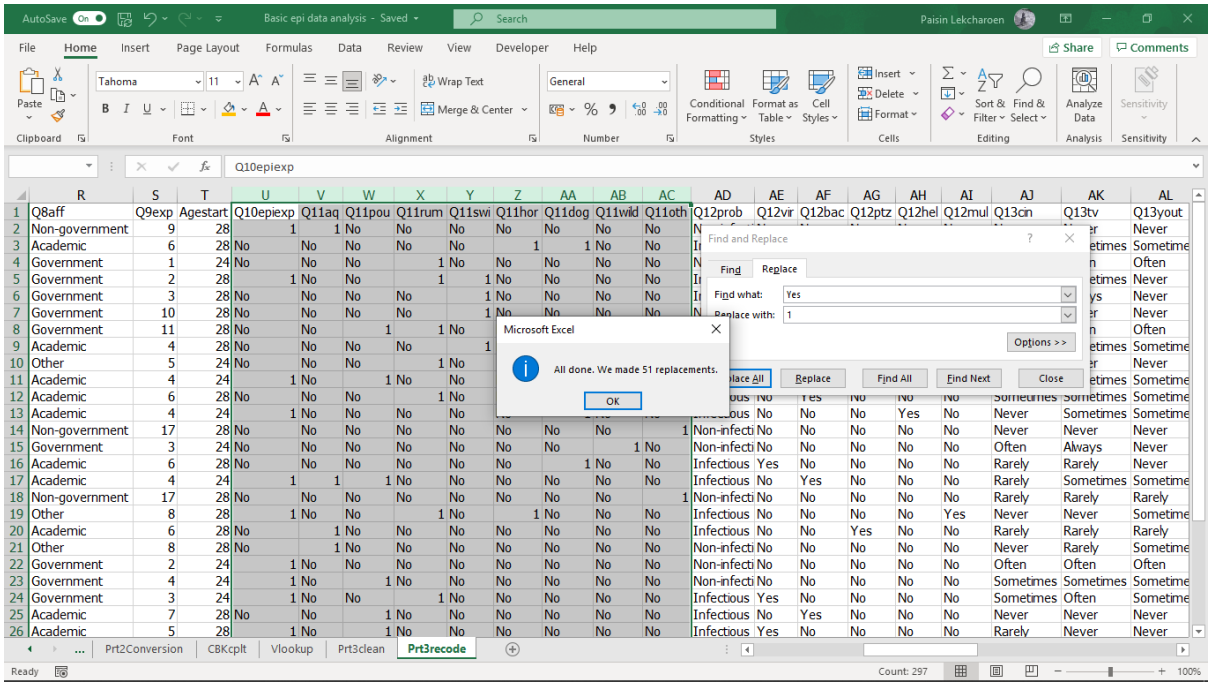
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	QID	Q1name	Day	Month	Season	Year	S	Yr	Yrgrp	Syr	Q2age	Agegr	Q3gen	Q4wt	Q5ht	Q6nat	Q7ed	Q8aff	Q9exp	Agestart	Q10epiexp	Q11aq	Q11pou	Q11rum	Q11swi
2	1		23	11	Dry	1984	D	84	80	D80	37	2	Female	50	160	Filipino	PhD	Non-government	9	28	Yes	Yes	No	No	No
3	2		21	10	Wet	1987	W	87	80	W80	34	2	Male	76	175	Burmese	Bachelor	Academic	6	28	No	No	No	No	No
4	3		4	7	Wet	1996	W	96	90	W90	25	1	Male	97	171	Thai	Master	Government	1	24	No	No	No	Yes	No
5	4		2	4	Dry	1991	D	91	90	D90	30	2	Female	56	167	Thai	Bachelor	Government	2	28	Yes	No	No	Yes	Yes
6	5		15	9	Wet	1990	W	90	90	W90	31	2	Female	61	161	Thai	Bachelor	Government	3	28	No	No	No	No	Yes
7	6		21	12	Dry	1983	D	83	80	D80	38	2	Female	50	160	Thai	Bachelor	Government	10	28	No	No	No	No	Yes
8	7		1	12	Dry	1982	D	82	80	D80	39	2	Male	89	170	Thai	Other	Government	11	28	No	No	Yes	Yes	No
9	8		22	11	Dry	1989	D	89	80	D80	32	2	Male	70	167	Chinese	Bachelor	Academic	4	28	No	No	No	No	Yes
10	9		20	1	Dry	1992	D	92	90	D90	29	1	Female	65	173	Indonesian	Bachelor	Other	5	24	No	No	No	Yes	No
11	10		24	5	Wet	1993	W	93	90	W90	28	1	Male	65	168	Vietnamese	Bachelor	Academic	4	24	Yes	No	Yes	No	No
12	11		20	4	Dry	1987	D	87	80	D80	34	2	Female	51	156	Thai	PhD	Academic	6	28	No	No	No	Yes	No
13	12		19	4	Dry	1993	D	93	90	D90	28	1	Male	68	168	Laotian	Bachelor	Academic	4	24	Yes	No	No	No	No
14	13		26	1	Dry	1976	D	76	70	D70	45	3	Male	76	170	Malaysian	Bachelor	Non-government	17	28	No	No	No	No	No
15	14		1	1	Dry	1994	D	94	90	D90	27	1	Female	62	164	Thai	Bachelor	Government	3	24	No	No	No	No	No
16	15		19	10	Wet	1987	W	87	80	W80	34	2	Female	52	157	Thai	Master	Academic	6	28	No	No	No	No	No
17	16		8	8	Wet	1993	W	93	90	W90	28	1	Male	62	170	Thai	Bachelor	Academic	4	24	Yes	Yes	Yes	No	No
18	17		9	6	Wet	1976	W	76	70	W70	45	3	Male	77	170	Bhutanese	Bachelor	Non-government	17	28	No	No	No	No	No
19	18		7	8	Wet	1985	W	85	80	W80	36	2	Male	52	165	Cambodian	Master	Other	8	28	Yes	No	No	Yes	No
20	19		23	9	Wet	1987	W	87	80	W80	34	2	Male	76	175	Laotian	Other	Academic	6	28	No	Yes	No	No	No
21	20		1	2	Dry	1985	D	85	80	D80	36	2	Male	52	165	Burmese	Bachelor	Other	8	28	No	Yes	No	No	No
22	21		18	3	Dry	1995	D	95	90	D90	26	1	Female	47	156	Thai	Master	Government	2	24	Yes	No	No	No	No
23	22		28	1	Dry	1993	D	93	90	D90	28	1	Female	60	160	Thai	Master	Government	4	24	Yes	No	Yes	No	No
24	23		9	11	Dry	1994	D	94	90	D90	27	1	Female	59.5	160	Thai	Bachelor	Government	3	24	Yes	No	No	Yes	No
25	24		31	1	Dry	1986	D	86	80	D80	35	2	Male	66	165	Cambodian	Master	Academic	7	28	No	No	Yes	No	No
26	25		29	8	Wet	1988	W	88	80	W80	33	2	nale	55	152	Thai	Bachelor	Academic	5	28	Yes	No	Yes	No	No

5. In the ‘CBKcplt’ worksheet, try to define tables necessary for using in recoding process, such as:
   - ✓ Gender: male, female, other → 1, 2, 3
   - ✓ Nationality: …, …, … → 1, 2, 3, 4, 5, …
   - ✓ Yes, No → 1, 0
   - ✓ Regularity: never, rarely, sometimes, often, always → 1, 2, 3, 4, 5
   - ✓ Case, Not case → 1, 0
6. Now you can apply ‘Vlookup’ function for necessary variables to be recoded. Just change a referent table.

7. Another way to recode data is using ‘Find and Replace’. For example, in order to replace ‘Yes’ and ‘No’ value with ‘1’ and ‘0’, respectively, select data range that you would like to recode the value. Then select ‘Find & Select’ function and choose ‘Replace’ function.



8. Put ‘Yes’ in the ‘Find what’ box and ‘1’ in the ‘Replace’ box. Click ‘Replace All’. It will report how many values have been replaced.



9. Now you can replace ‘No’ with ‘0’ within the same data range. You may extend this function for other variables that use the same answering system (Yes, No). By the way, you can use the similar recoded system (1, 0) for other variables such as Case/Not case, Eat/Normal, and Not exercise/Exercise.

Hint: Variables to be recoded: Q3gen, Q6nqt, Q7ed, Q8aff, Q9exp, Q10epiexp, Q11aq, Q11pou, Q11rum, Q11swi, Q11hor, Q11dog, Q11wild, Q11oth, Q12prob, Q12vir, Q12bac, Q12ptz, Q12hel, Q12mul, Q13cin, Q13tv, Q13yout, Q13exer, Q13shop, Q13walk, Q13eat, Q13sleep, Q13sleep, Q13read, Q13cook, Q13medi, Q13talk, Q13chat, Q14sick, Q14slplss, Q14diar, Q14fev, Q14coug, Q14soto, Q14vom, Q14uri, Q14inj, Q14oth, Q16getsick, BMI_con1, BMI_con2, Eat, Exe, and Case.

Part 4 Basic data analysis using Pivot Table.

'PivotTable' help you in pre-analytical process. In addition, this function is also useful in analytical steps. Go to 'Prt4pivot' worksheet' and find what you can do more with PivotTable function. Review how to start a Pivot Table from the previous exercise if needed.

Functions in use:

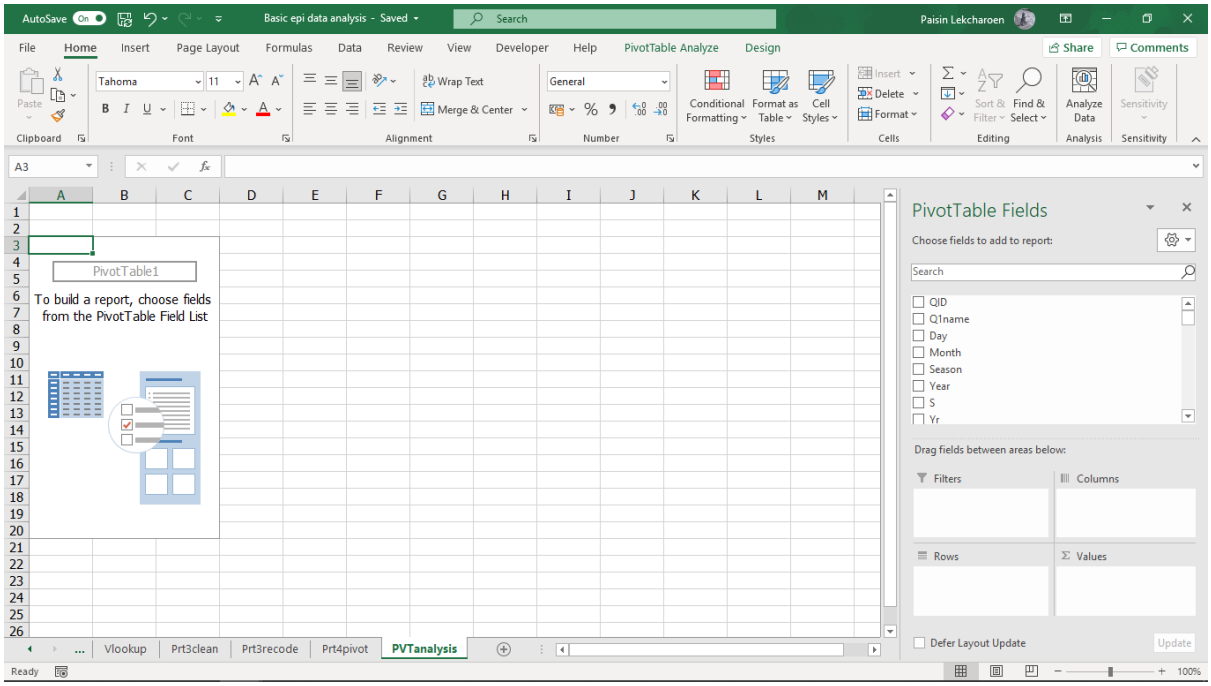
- PivotTable

Exercise 4.1 Find a proportion of PhD graduate among participants.

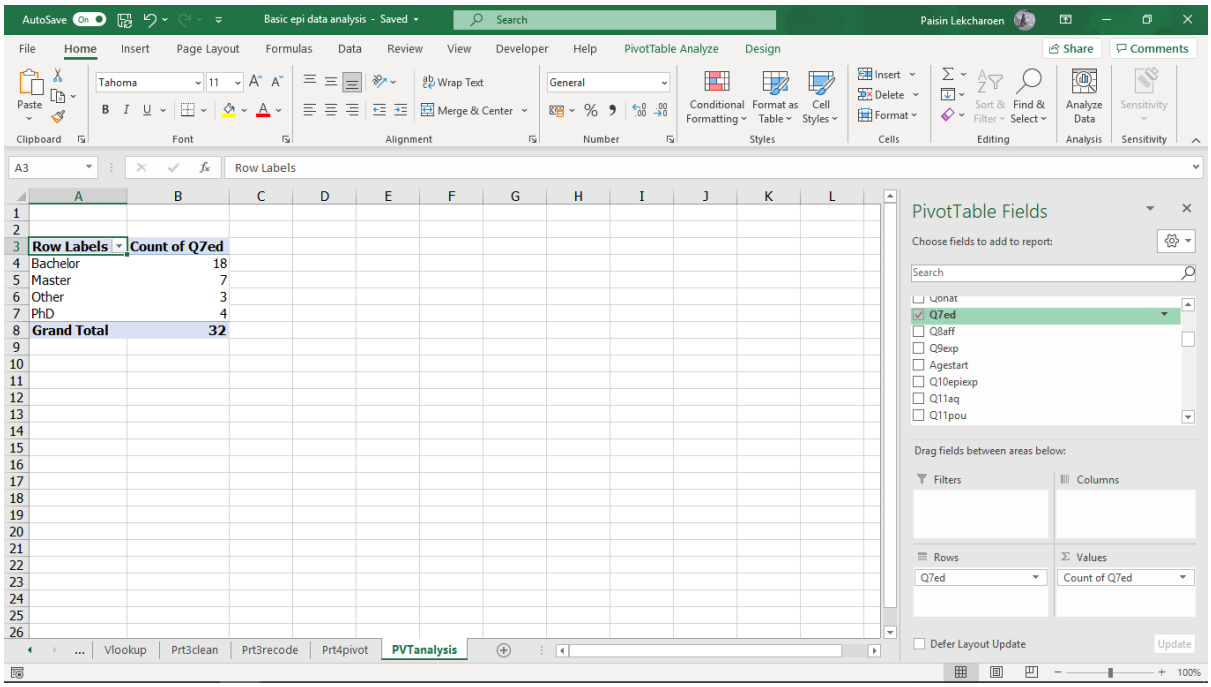
Try to complete this table with PivotTable.

Education level	Percentage
Bachelor	
Master	
PhD	
Other	

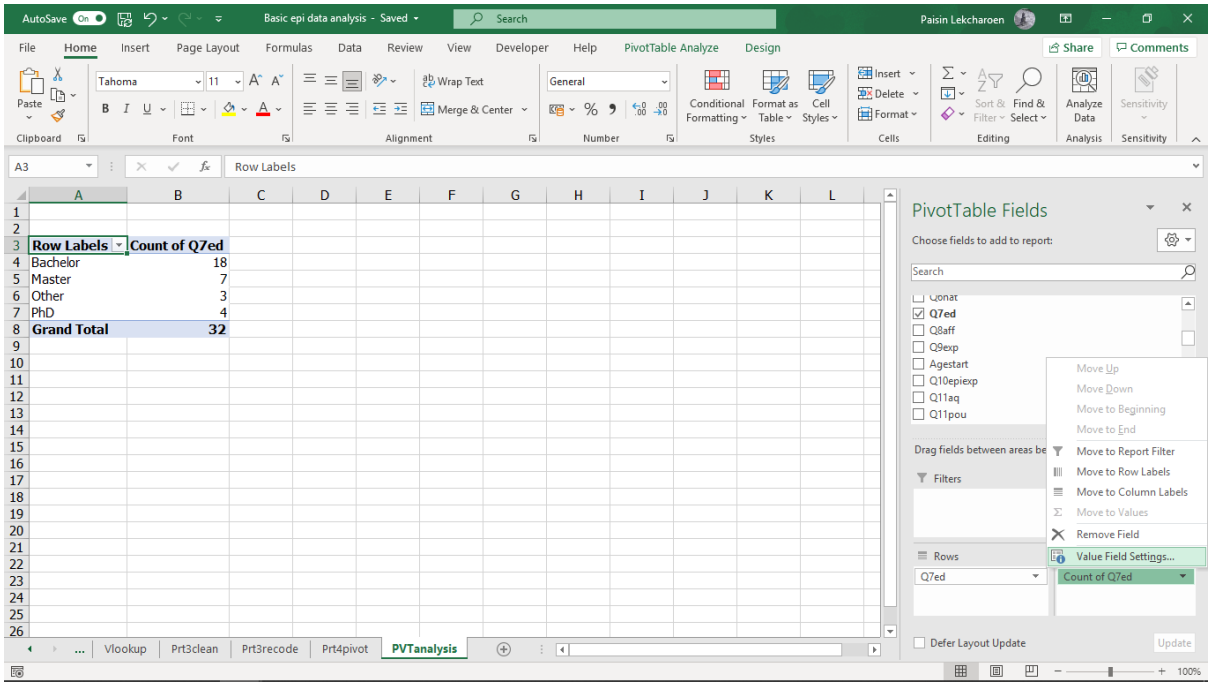
1. Insert PivotTable in a new worksheet. Make sure you have all variables needed for analysis.

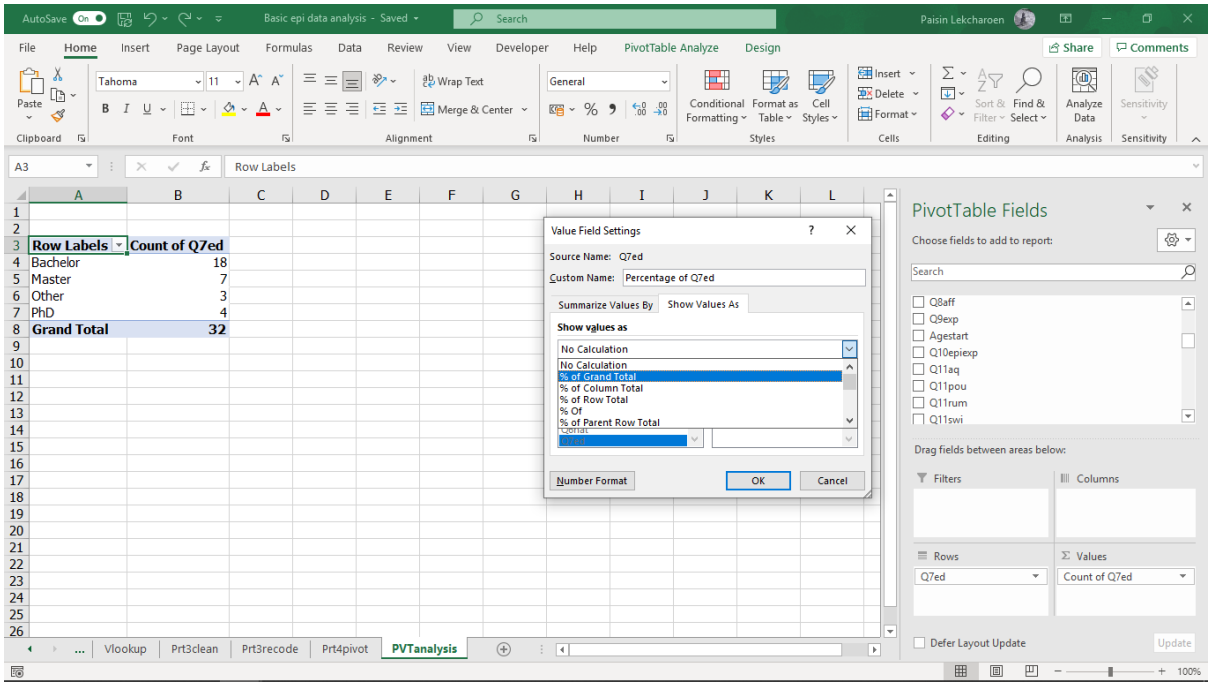


2. Drag and drop Q7ed in Row and Value boxes.

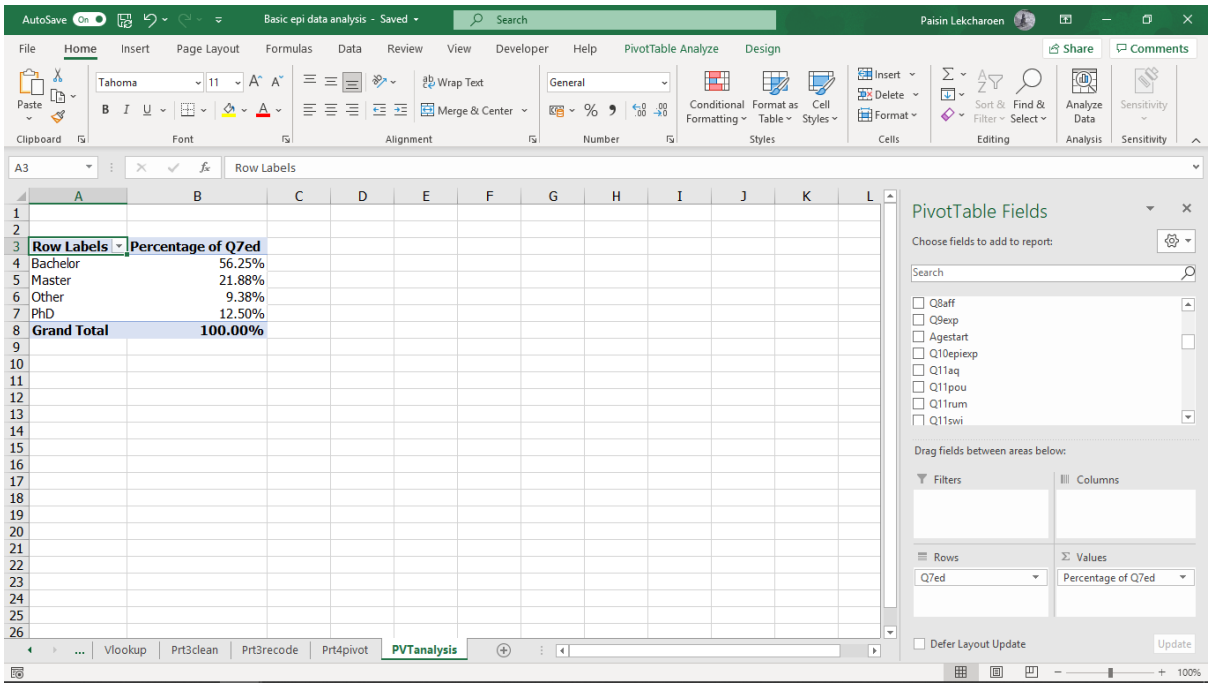


3. Change a value setting. In the 'Show Values As' box, select '% of Grand Total'.



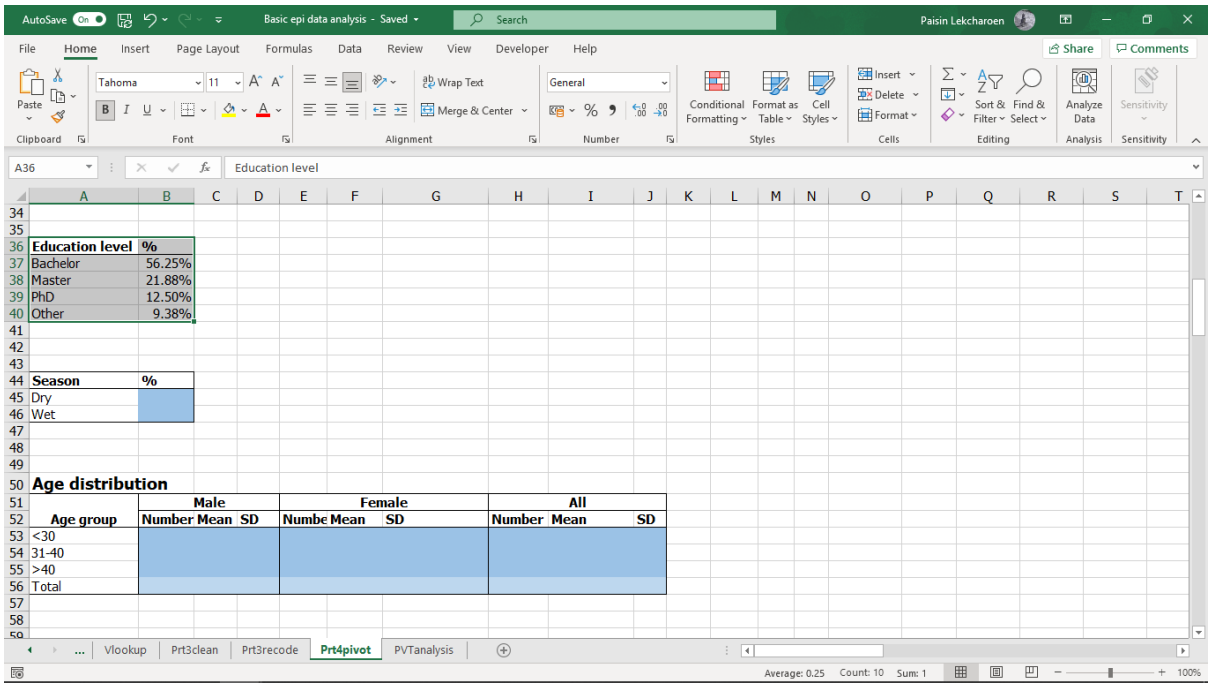


Row Labels	Count of Q7ed
Bachelor	18
Master	7
Other	3
PhD	4
Grand Total	32



Row Labels	Percentage of Q7ed
Bachelor	56.25%
Master	21.88%
Other	9.38%
PhD	12.50%
Grand Total	100.00%

4. Put the output values in the table provided. Make sure to copy correct answer for each row.



Question 6 What is a proportion of participants who was born in wet season?

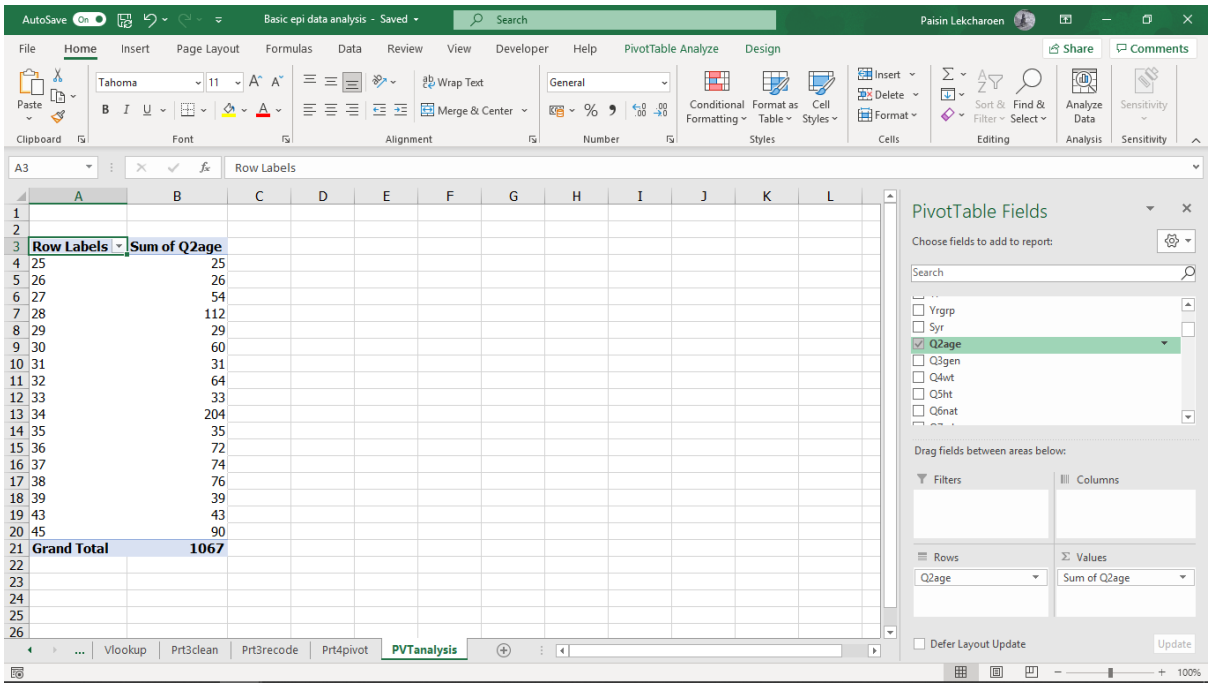
Answer: Click or tap here to enter text.

Exercise 4.2 Find a central tendency and dispersal of variables.

You would like to know average age of all participants and also among different genders.

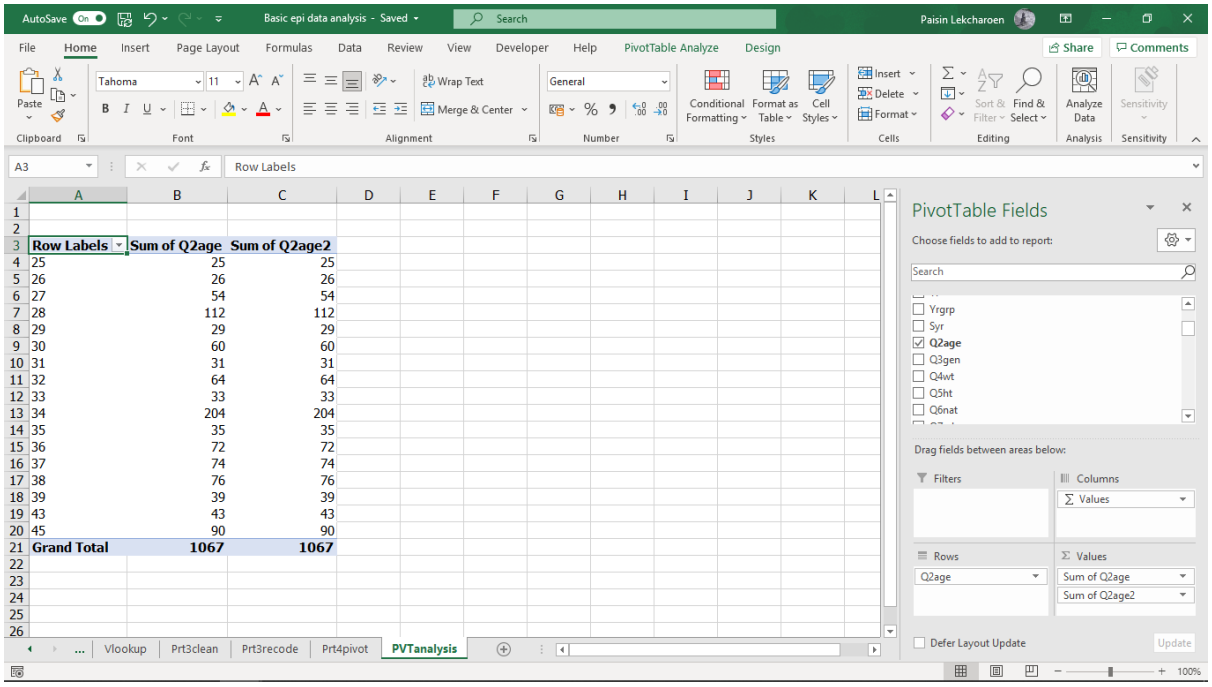
Age group (year)	Male			Female			All		
	No	Mean	SD	No	Mean	SD	No	Mean	SD
<30									
31-40									
>40									
Total									

1. In the 'PVTanalysis', drag and drop Q2age into Row and Value boxes. The default value is Sum for continuous data.

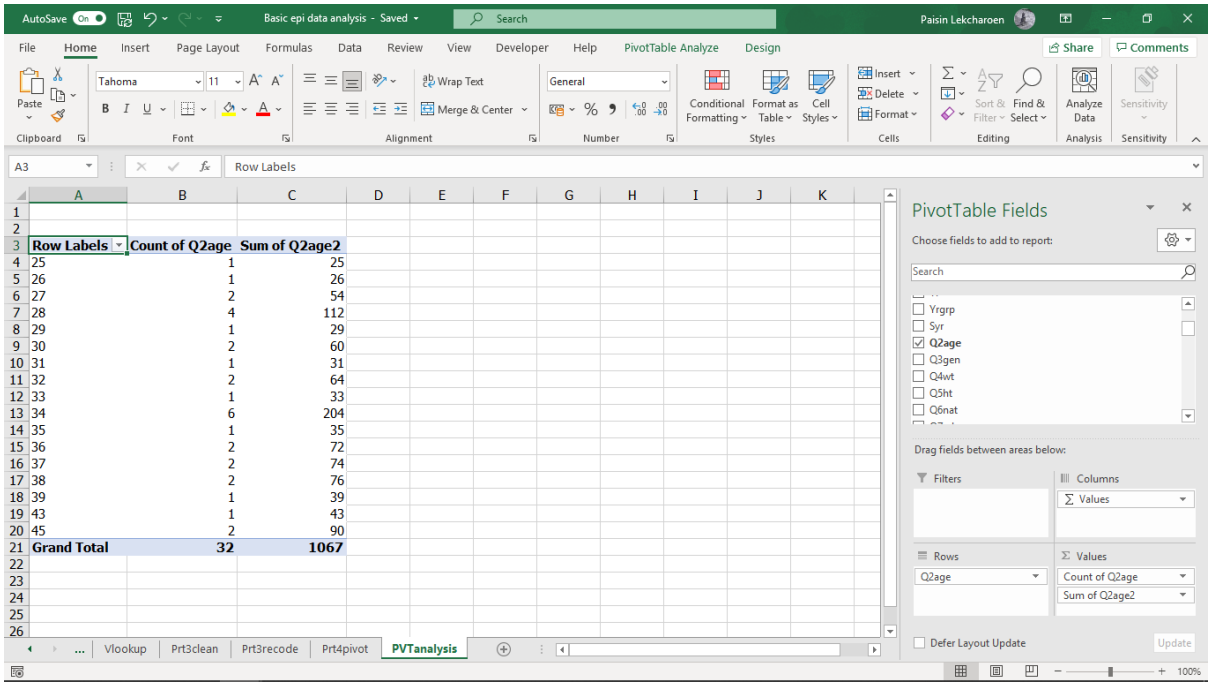


Row Labels	Sum of Q2age
25	25
26	26
27	54
28	112
29	29
30	60
31	31
32	64
33	33
34	204
35	35
36	72
37	74
38	76
39	39
43	43
45	90
Grand Total	1067

2. You may want to see how many people contribute to each age year. Drag and drop Q2age into Value box again. Similarly, it shows the Sum of age and labels as 'Sum of Q2age2'. Set one of this value to Count.

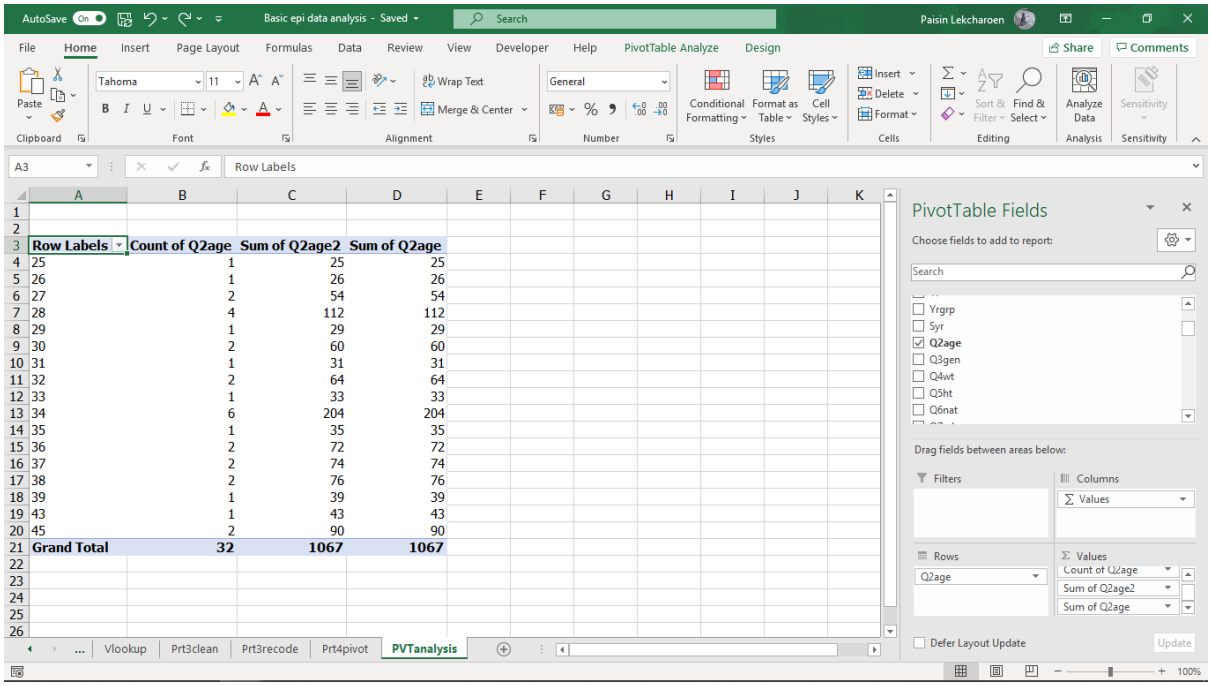


Row Labels	Sum of Q2age	Sum of Q2age2
25	25	25
26	26	26
27	54	54
28	112	112
29	29	29
30	60	60
31	31	31
32	64	64
33	33	33
34	204	204
35	35	35
36	72	72
37	74	74
38	76	76
39	39	39
43	43	43
45	90	90
Grand Total	1067	1067

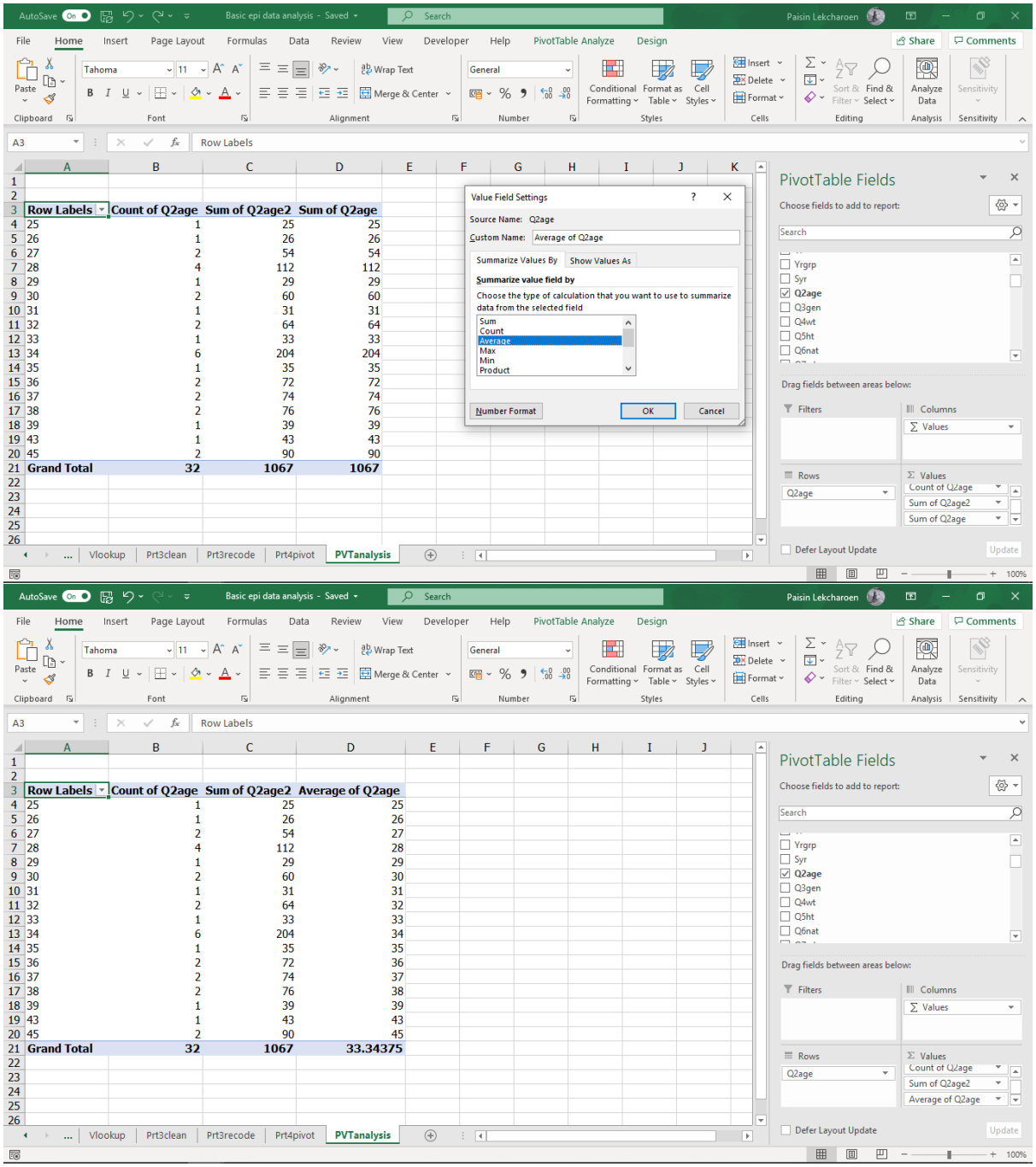


Row Labels	Count of Q2age	Sum of Q2age2
25	1	25
26	1	26
27	2	54
28	4	112
29	1	29
30	2	60
31	1	31
32	2	64
33	1	33
34	6	204
35	1	35
36	2	72
37	2	74
38	2	76
39	1	39
43	1	43
45	2	90
Grand Total	32	1067

3. And again. Drag and drop Q2age into Value box. But this time you may set the value to Average.



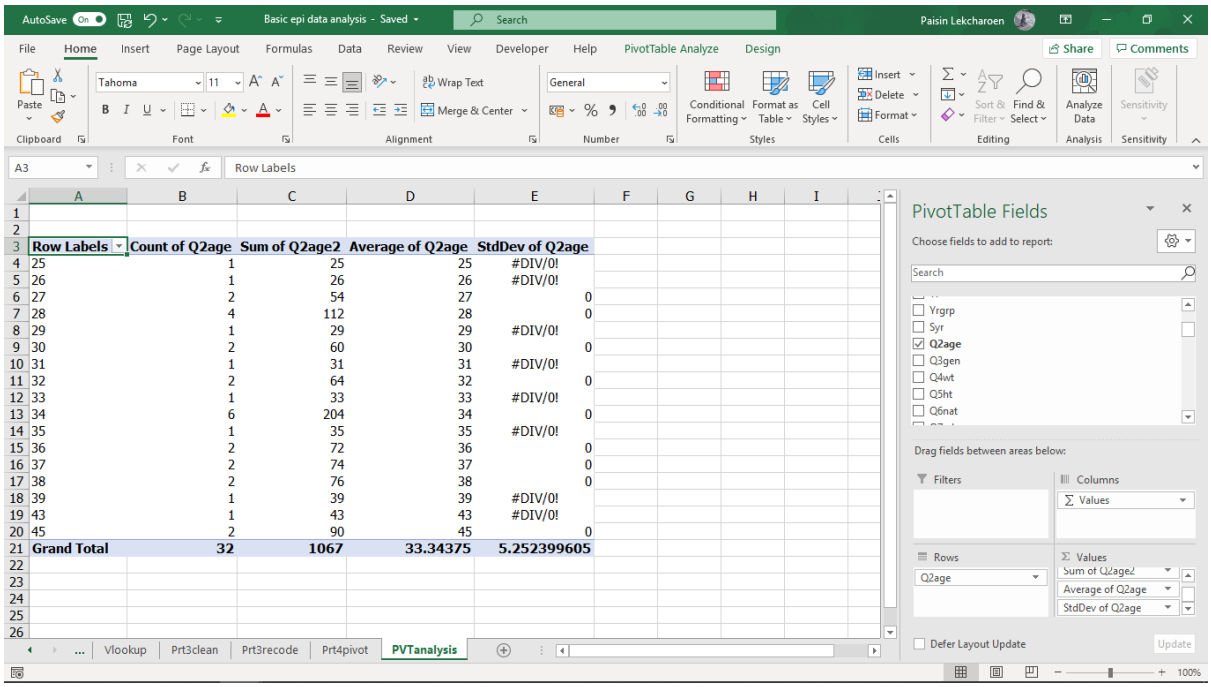
Row Labels	Count of Q2age	Sum of Q2age2	Sum of Q2age
25	1	25	25
26	1	26	26
27	2	54	54
28	4	112	112
29	1	29	29
30	2	60	60
31	1	31	31
32	2	64	64
33	1	33	33
34	6	204	204
35	1	35	35
36	2	72	72
37	2	74	74
38	2	76	76
39	1	39	39
43	1	43	43
45	2	90	90
Grand Total	32	1067	1067



Row Labels	Count of Q2age	Sum of Q2age2	Sum of Q2age
25	1	25	25
26	1	26	26
27	2	54	54
28	4	112	112
29	1	29	29
30	2	60	60
31	1	31	31
32	2	64	64
33	1	33	33
34	6	204	204
35	1	35	35
36	2	72	72
37	2	74	74
38	2	76	76
39	1	39	39
43	1	43	43
45	2	90	90
Grand Total	32	1067	1067

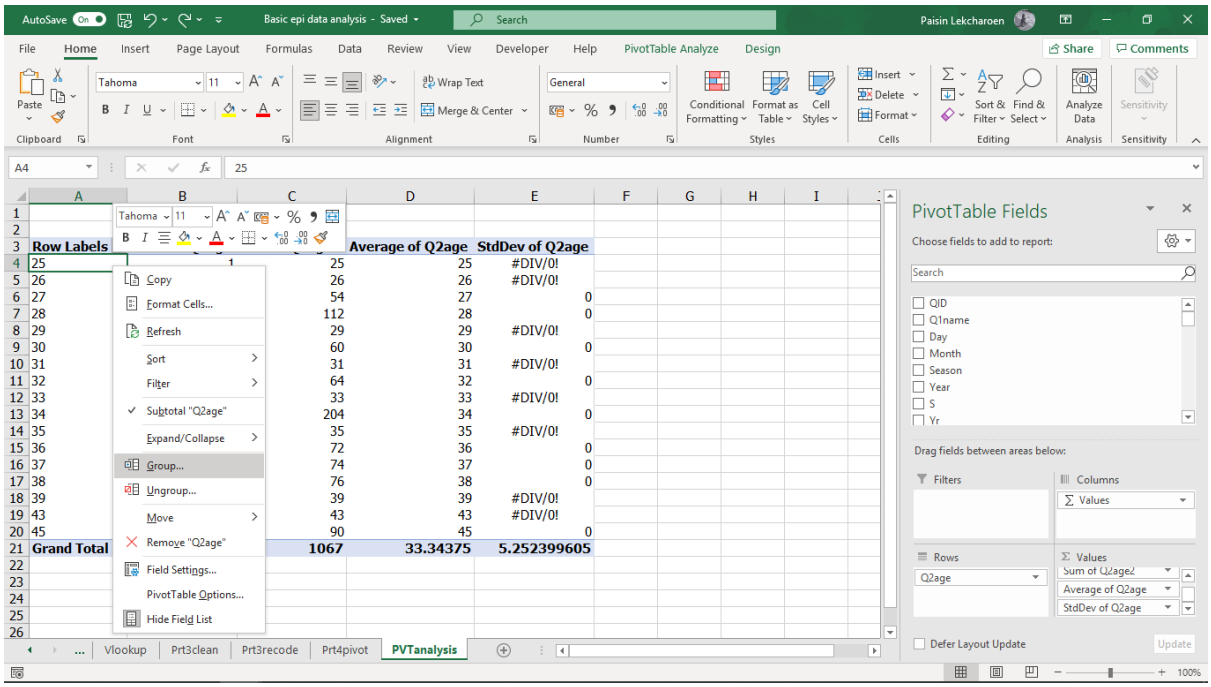
Row Labels	Count of Q2age	Sum of Q2age2	Average of Q2age
25	1	25	25
26	1	26	26
27	2	54	27
28	4	112	28
29	1	29	29
30	2	60	30
31	1	31	31
32	2	64	32
33	1	33	33
34	6	204	34
35	1	35	35
36	2	72	36
37	2	74	37
38	2	76	38
39	1	39	39
43	1	43	43
45	2	90	45
Grand Total	32	1067	33.34375

4. Now you can do similar way for SD.

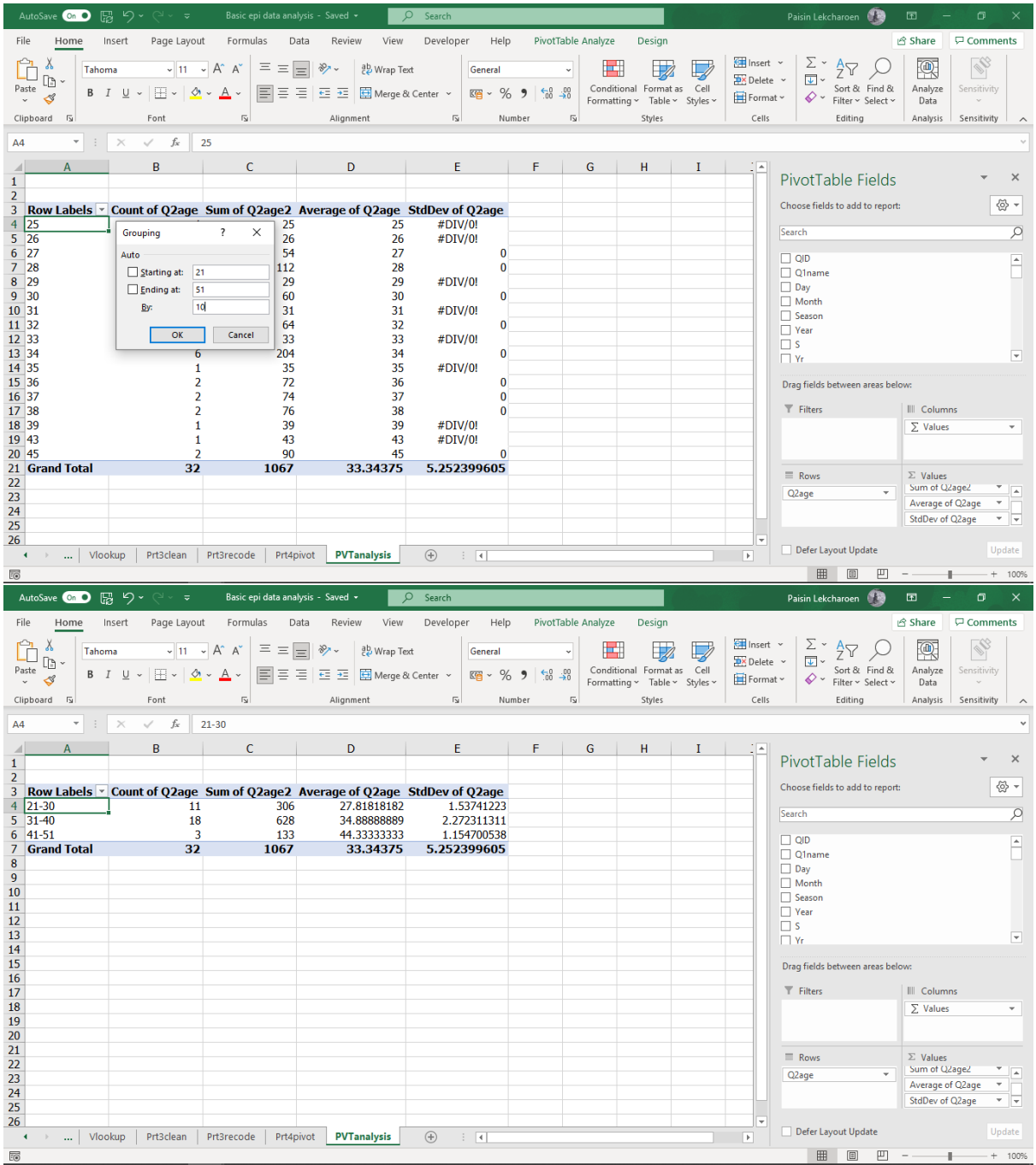


Row Labels	Count of Q2age	Sum of Q2age2	Average of Q2age	StdDev of Q2age
25	1	25	25	#DIV/0!
26	1	26	26	#DIV/0!
27	2	54	27	0
28	4	112	28	0
29	1	29	29	#DIV/0!
30	2	60	30	0
31	1	31	31	#DIV/0!
32	2	64	32	0
33	1	33	33	#DIV/0!
34	6	204	34	0
35	1	35	35	#DIV/0!
36	2	72	36	0
37	2	74	37	0
38	2	76	38	0
39	1	39	39	#DIV/0!
43	1	43	43	#DIV/0!
45	2	90	45	0
Grand Total	32	1067	33.34375	5.252399605

5. You may see that it does not make any sense to get an average and a standard deviation for each age year because of the small sample. Let's try to group age into age groups. At the first value of the Row Labels column (A4), right click and select 'Group'.



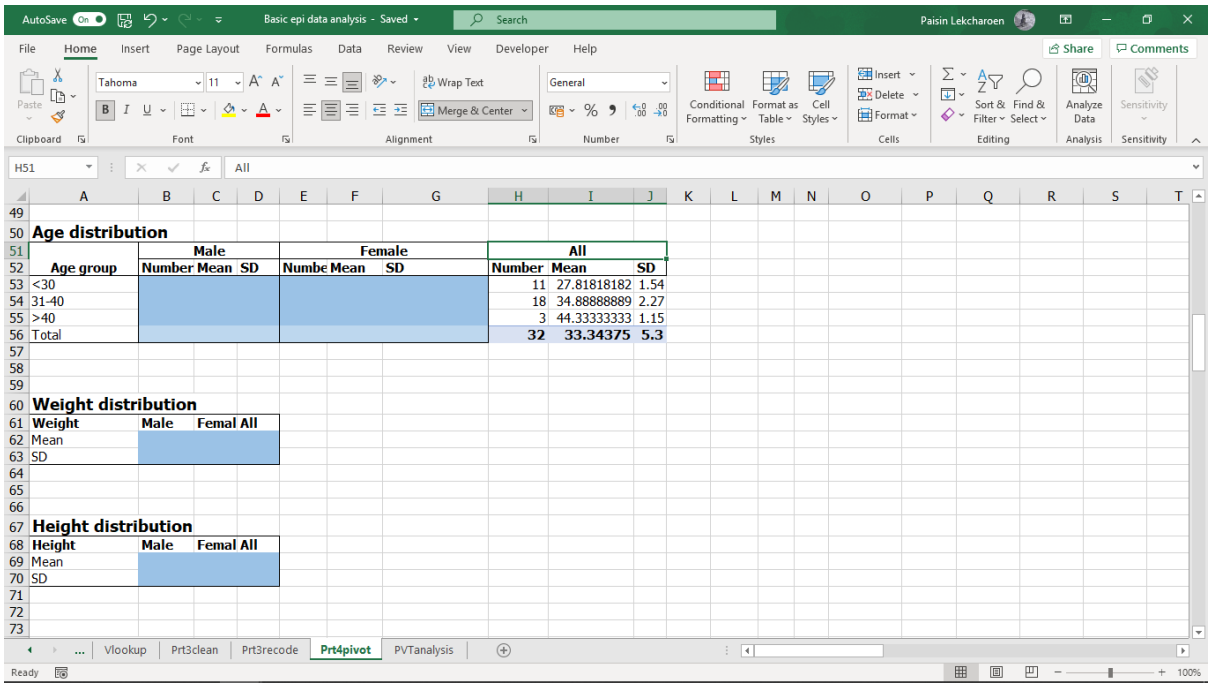
6. Group the age into 3 groups: ≤30 years, 31-40 years, and >40 years. Firstly, put 21 for the starting, 51 for the ending, and 10 for by. It will define 21-30 as the first group, 31-40 for the second group, and 41 to 50 for the last group.



Row Labels	Count of Q2age	Sum of Q2age2	Average of Q2age	StdDev of Q2age
25	1	25	25	#DIV/0!
26	1	26	26	#DIV/0!
27	2	54	27	0
28	4	112	28	0
29	1	29	29	#DIV/0!
30	2	60	30	0
31	1	31	31	#DIV/0!
32	2	64	32	0
33	1	33	33	#DIV/0!
34	6	204	34	0
35	1	35	35	#DIV/0!
36	2	72	36	0
37	2	74	37	0
38	2	76	38	0
39	1	39	39	#DIV/0!
43	1	43	43	#DIV/0!
45	2	90	45	0
Grand Total	**32**	**1067**	**33.34375**	**5.252399605**

Row Labels	Count of Q2age	Sum of Q2age2	Average of Q2age	StdDev of Q2age
21-30	11	306	27.81818182	1.53741223
31-40	18	628	34.88888889	2.272311311
41-51	3	133	44.33333333	1.154700538
Grand Total	**32**	**1067**	**33.34375**	**5.252399605**

7. Put the result into the table provided.

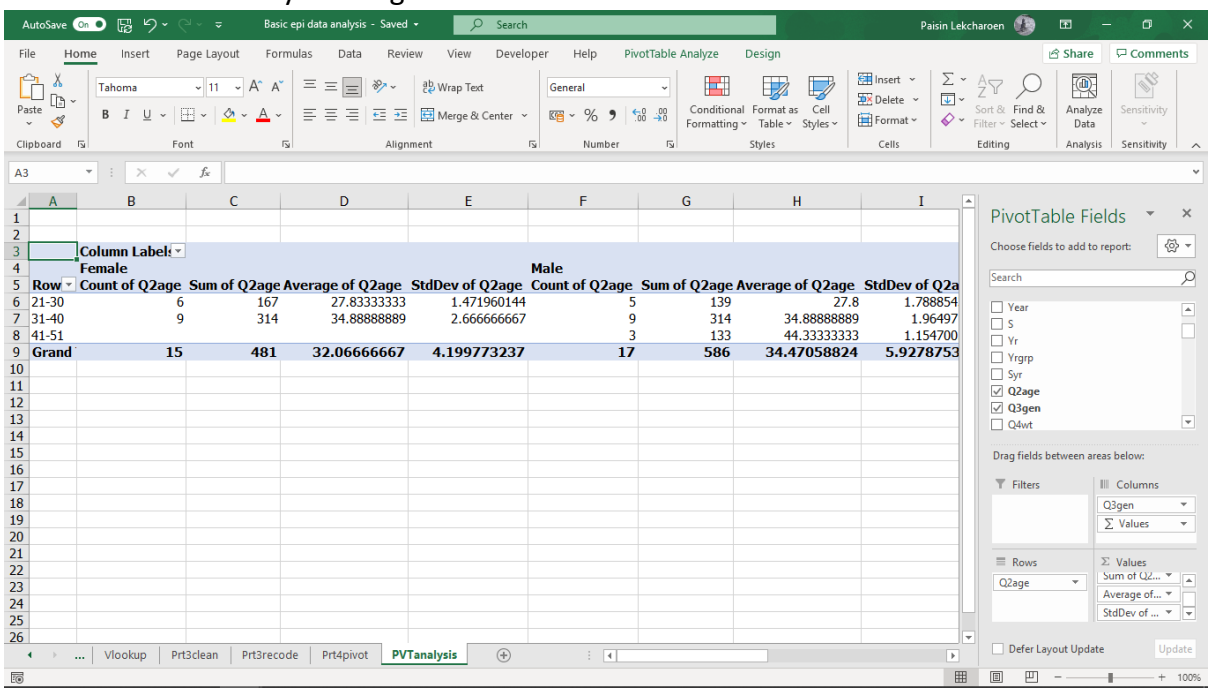


Age distribution									
	Male			Female			All		
Age group	Number	Mean	SD	Numbe	Mean	SD	Number	Mean	SD
<30							11	27.81818182	1.54
31-40							18	34.88888889	2.27
>40							3	44.33333333	1.15
Total							32	33.34375	5.3

Weight distribution		
Weight	Male	Femal All
Mean		
SD		

Height distribution		
Height	Male	Femal All
Mean		
SD		

8. Now you would like to see those values of male and female. So, drag and drop Q3gen into Column box and you will get the results.



Row	Female Count of Q2age	Female Sum of Q2age	Female Average of Q2age	Female StdDev of Q2age	Male Count of Q2age	Male Sum of Q2age	Male Average of Q2age	Male StdDev of Q2a
21-30	6	167	27.83333333	1.471960144	5	139	27.8	1.788854
31-40	9	314	34.88888889	2.666666667	9	314	34.88888889	1.96497
41-51					3	133	44.33333333	1.154700
Grand	15	481	32.06666667	4.199773237	17	586	34.47058824	5.9278753

9. Find averages and standard deviations for weight, height, and BMI and answer the questions below.

Question 7 Which gender has higher average weight?

Answer: Click or tap here to enter text.

Question 8 How much different among average height of male and female?

Answer: Click or tap here to enter text.

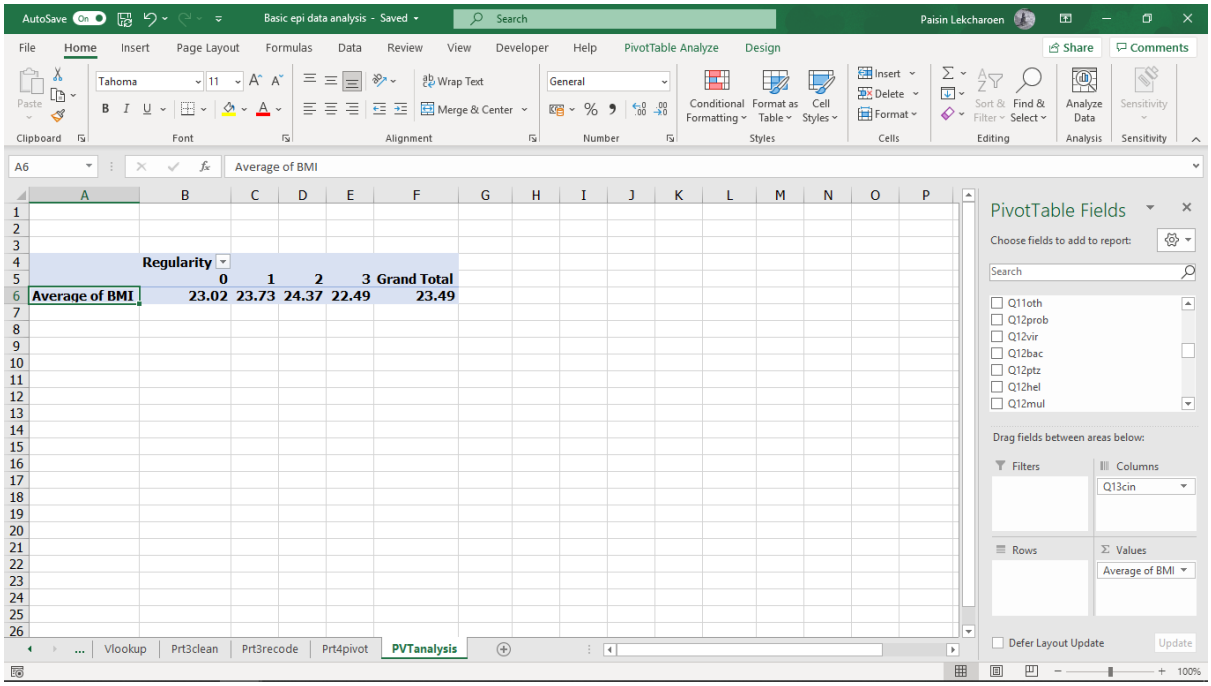
Question 9 Which gender has lower variation of BMI?

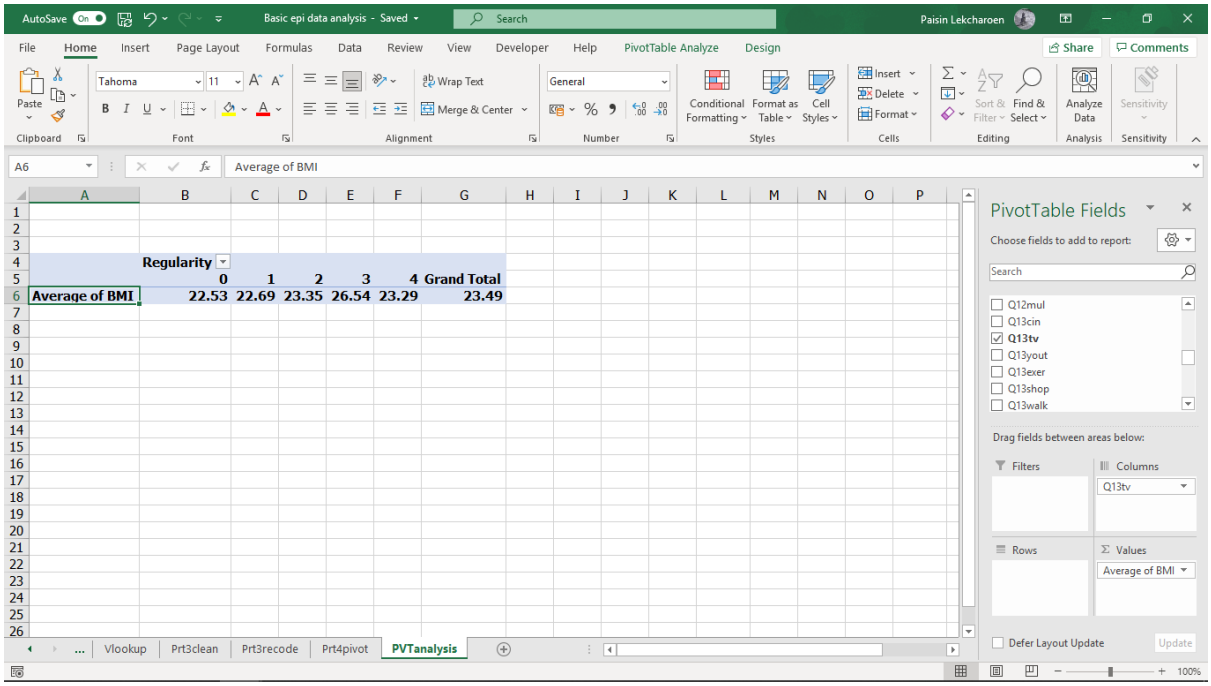
Answer: Click or tap here to enter text.

Exercise 4.3 Find average BMI among different regularities of activities.

Activity	Regularity					All
	Never	Rarely	Sometimes	Often	Always	
Go to cinema						
Watch TV						
Watch YouTube						
Physical exercise						
Go shopping						
Go walking						
Eat						
Sleep						
Read						
Cook						
Meditation						
Talk with friends						
Chat						

1. You can do it in the same way that you find these values in the previous exercise. Try to do it for every activity one by one. Fill your finding in the table provided.

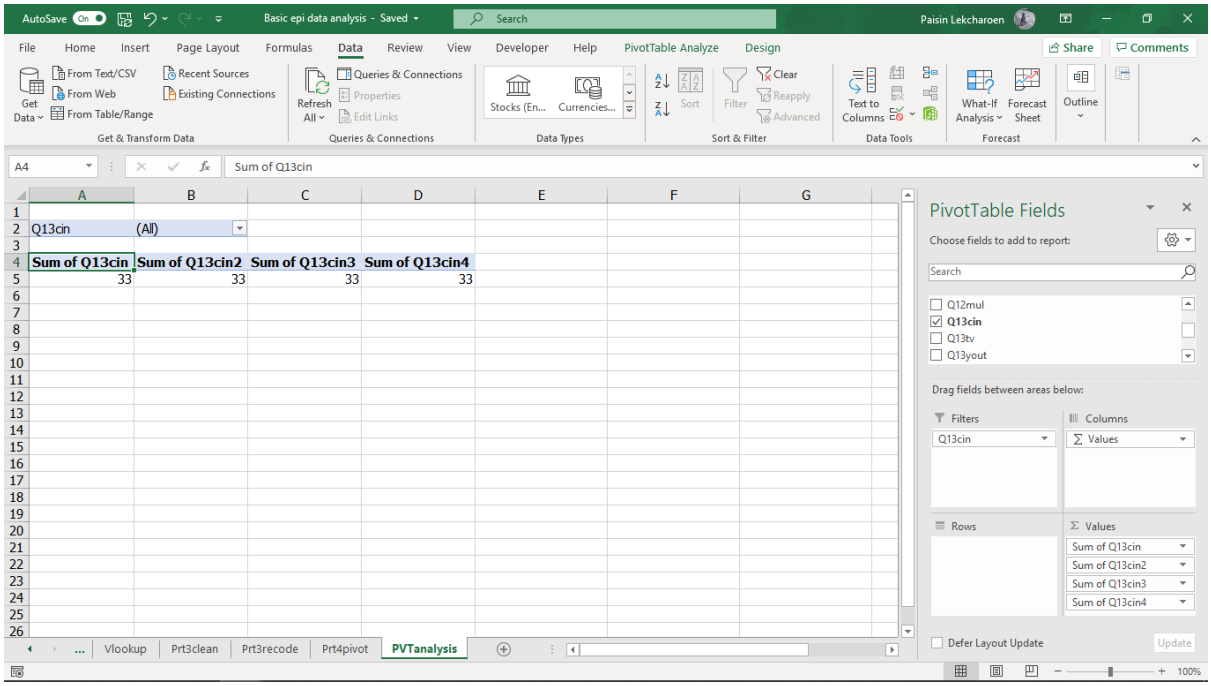




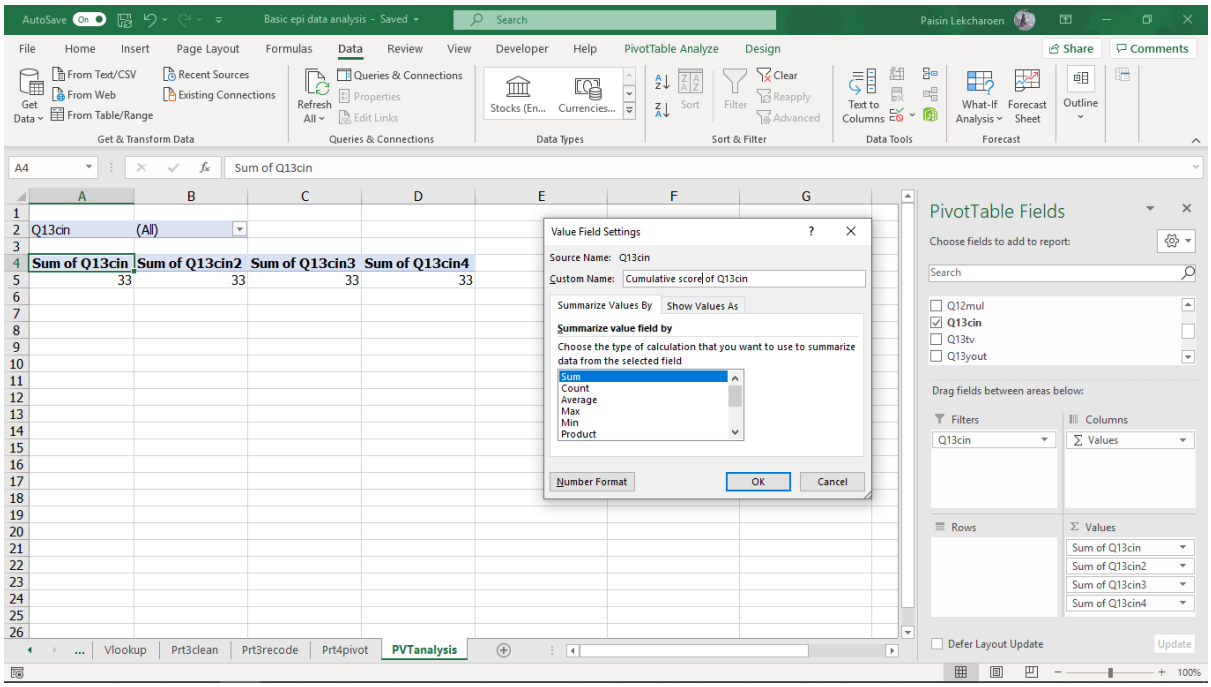
2. Now you would like to compare score and BMI among those who have higher regularity of each activity. Again, you need to do it one by one for each activity.

Activity	Cumulative score	Average score	SD score	Average BMI
Go to cinema				
Watch TV				
Watch YouTube				
Physical exercise				
Go shopping				
Go walking				
Eat				
Sleep				
Read				
Cook				
Meditation				
Talk with friends				
Chat				

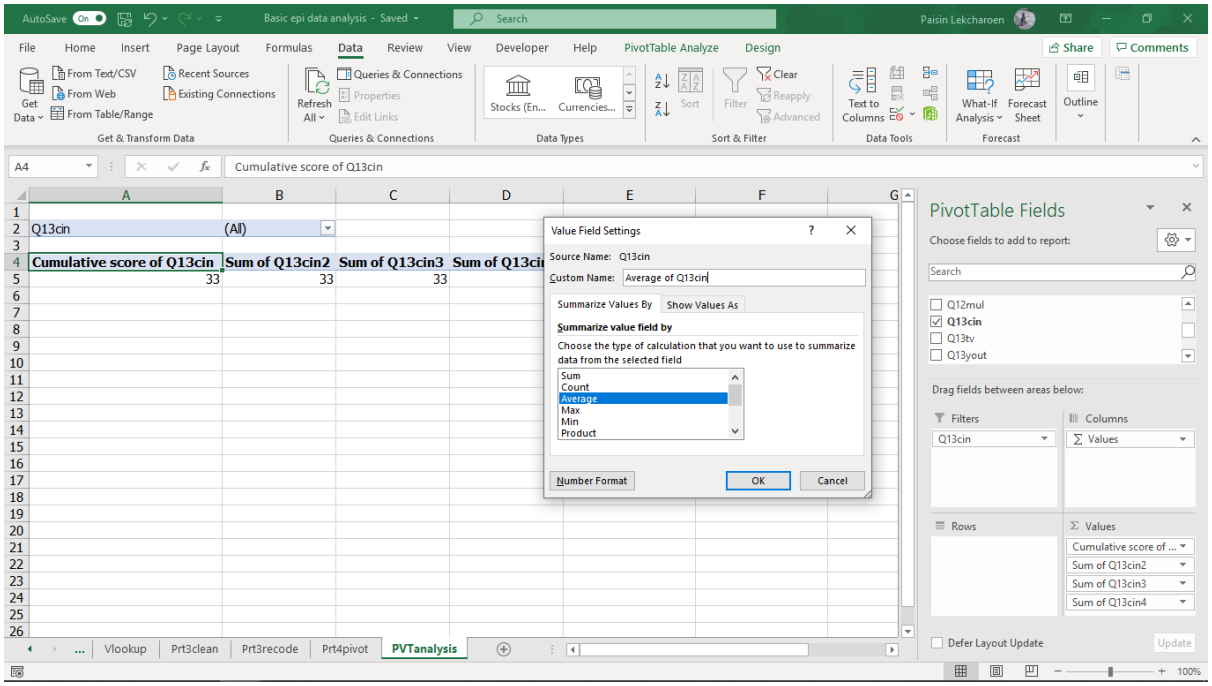
Values needed includes cumulative score, average score and SD, and average BMI. Drop Q13cin into Filter box once and into Value box 3 times. Then drop BMI into Value box once.



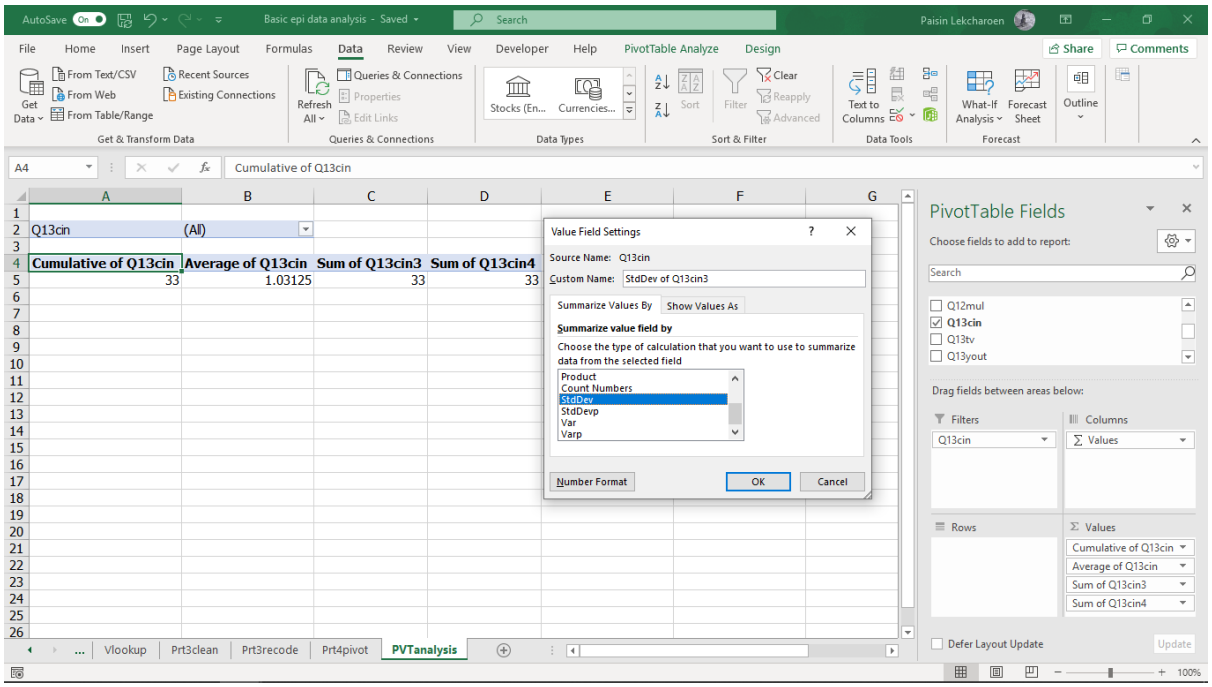
3. Set value for those in the Value box:
   - Cumulative score of Q13cin.



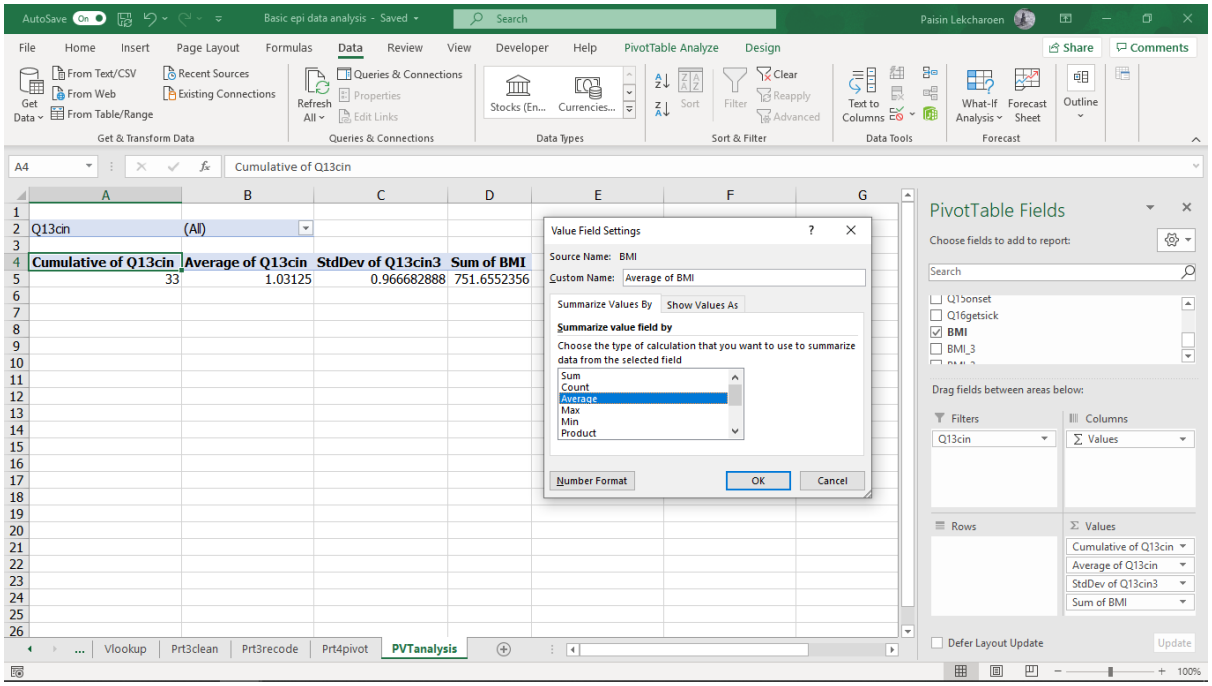
- Average score of Q13cin.



- SD of Q13cin.

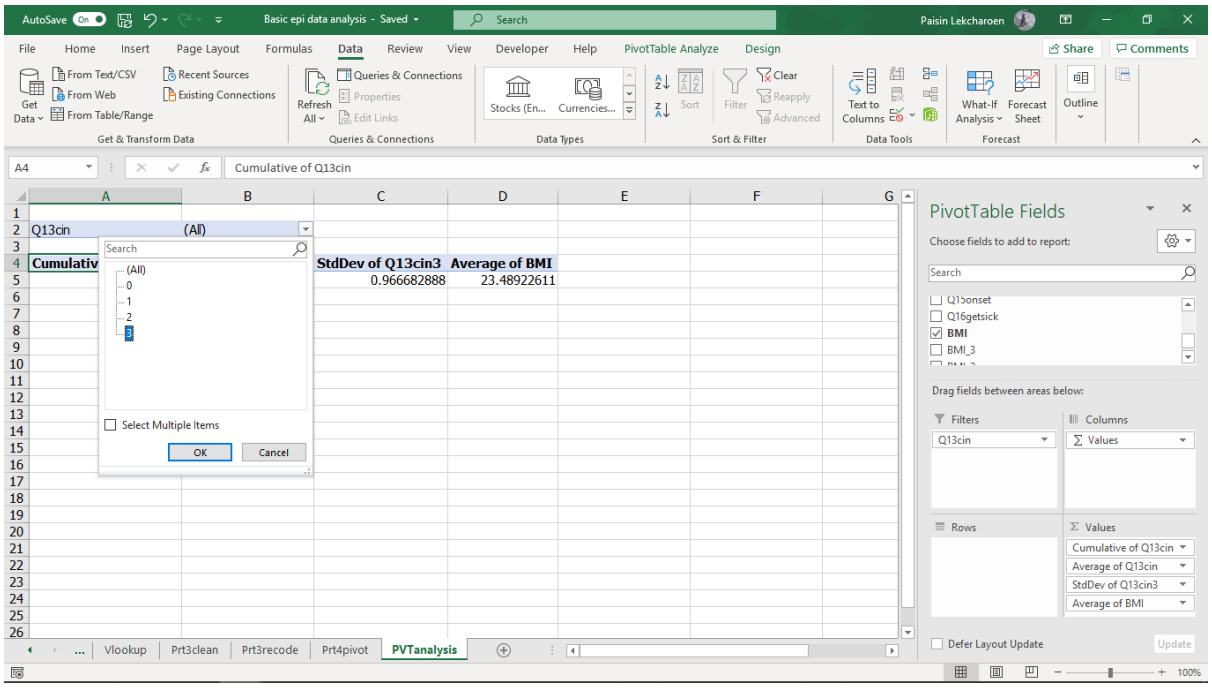


➢ Average BMI



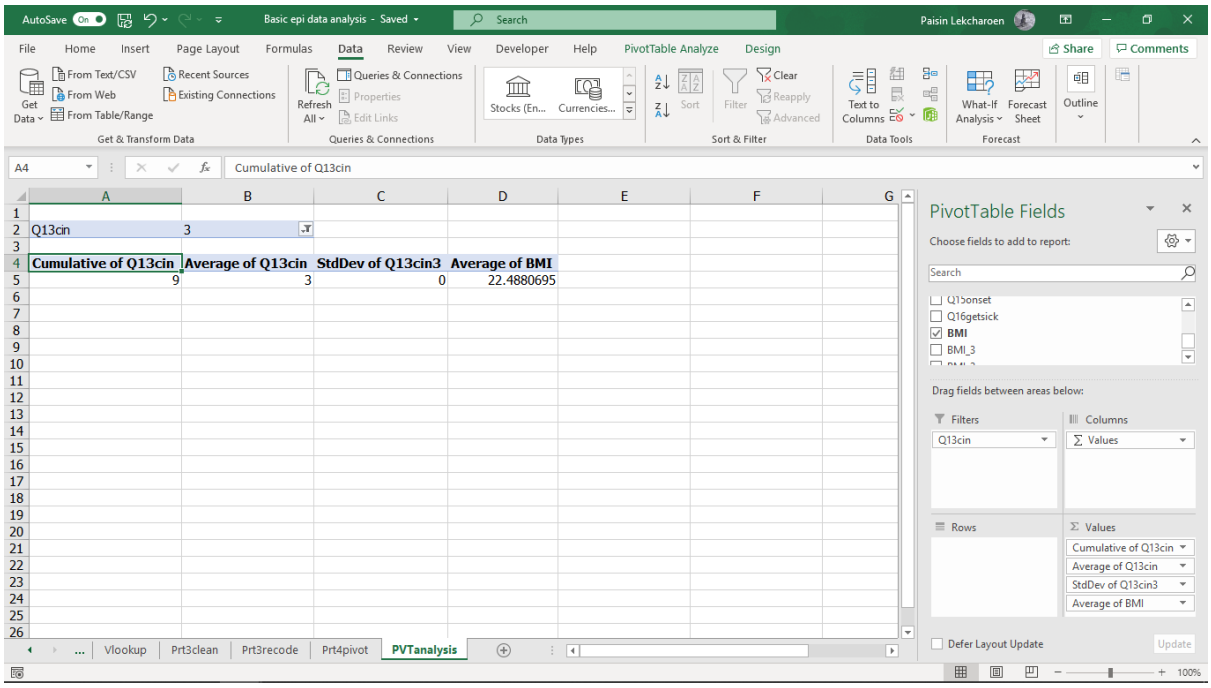
Q13cin	(All)			
Cumulative of Q13cin	Average of Q13cin	StdDev of Q13cin3	Sum of BMI	
33	1.03125	0.966682888	751.6552356	

4. However, these values are of all regularity of this activity. But you need only those values of who has higher activity (often/always).
Click the arrowhead of the variable in the Filter box. Select only 3 (and 4) which represent Often (and Always) in regularity.

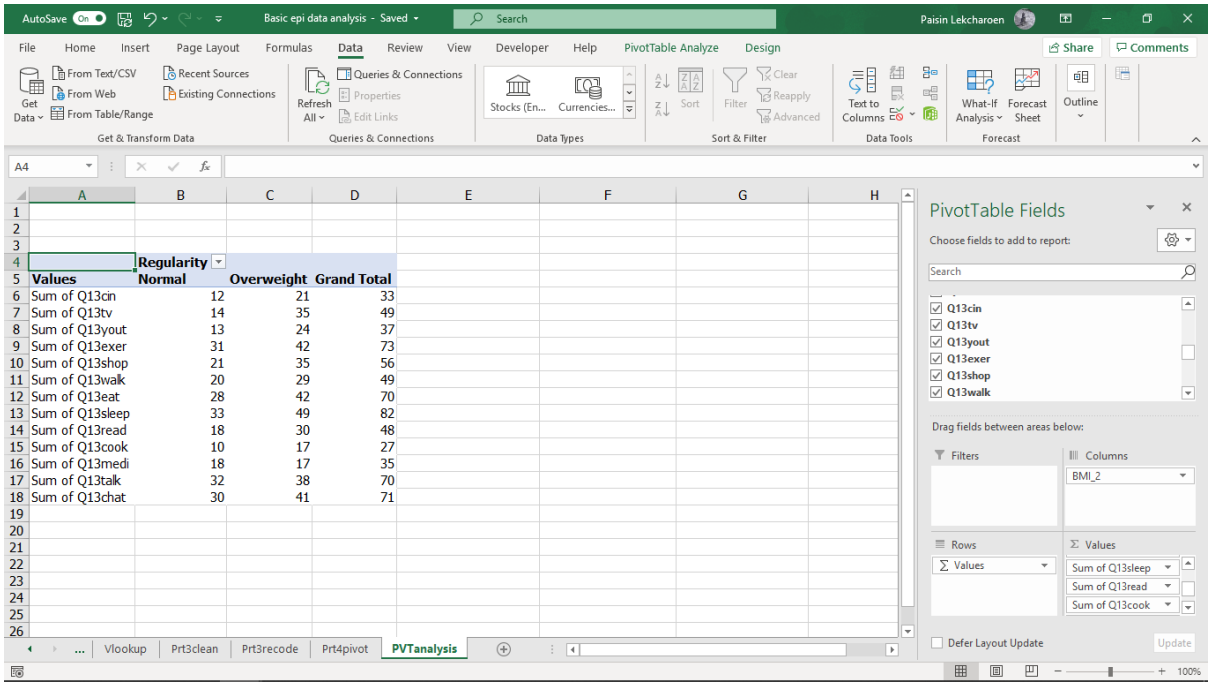


Q13cin	(All)		
Cumulativ		StdDev of Q13cin3	Average of BMI
		0.966682888	23.48922611

5. You will get the results. Put your results into the table provided and do similar thing to the rest activities.



6. Now you are going to see which are the top 5 activities of those who has normal and overweight condition.
   Firstly, you have to compare cumulative score for each activity in those who has normal condition and also for those who has overweight.
   Drop 'BMI_2' into Column box and all activities into Value box. You will have cumulative score for each activity by BMI conditions.



7. Copy the results into another tale. Then sort the score for both BMI conditions to rank top 5 activities for each group. Use the results for the next exercise.

Exercise 4.4 How to find odds ratio.

From the previous exercise, you find which activities have higher rank for those who has overweight. So, you would like to quantify if there any association among activity and BMI condition.

The basic measures of frequency include risk ratio, odds ratio, prevalent ratio, and prevalent odds ratio upon study design.

Question 10 what is the study design for this study?

Answer: Click or tap here to enter text.

Odds ratio is a measure that can be used in any study designs. It compares the odds of different outcomes that are likely to be exposed with the exposure of interest. In this study, you are going to compare the odds of those who has overweight has exposed to certain regularity of activity with those who has normal condition.

		BMI condition		
		Overweight	Normal	
Regularity of activity	High	a	b	a+b
	Low	c	d	c+d
		a+c	b+d	a+b+c+d

Odds of exposed among overweight = Proportion of overweight having high regularity/Proportion of overweight having low regularity

= [a/(a+c)]/[c/(a+c)]

= a/c

Odds of exposed among normal = Proportion of normal having high regularity/Proportion of normal having low regularity

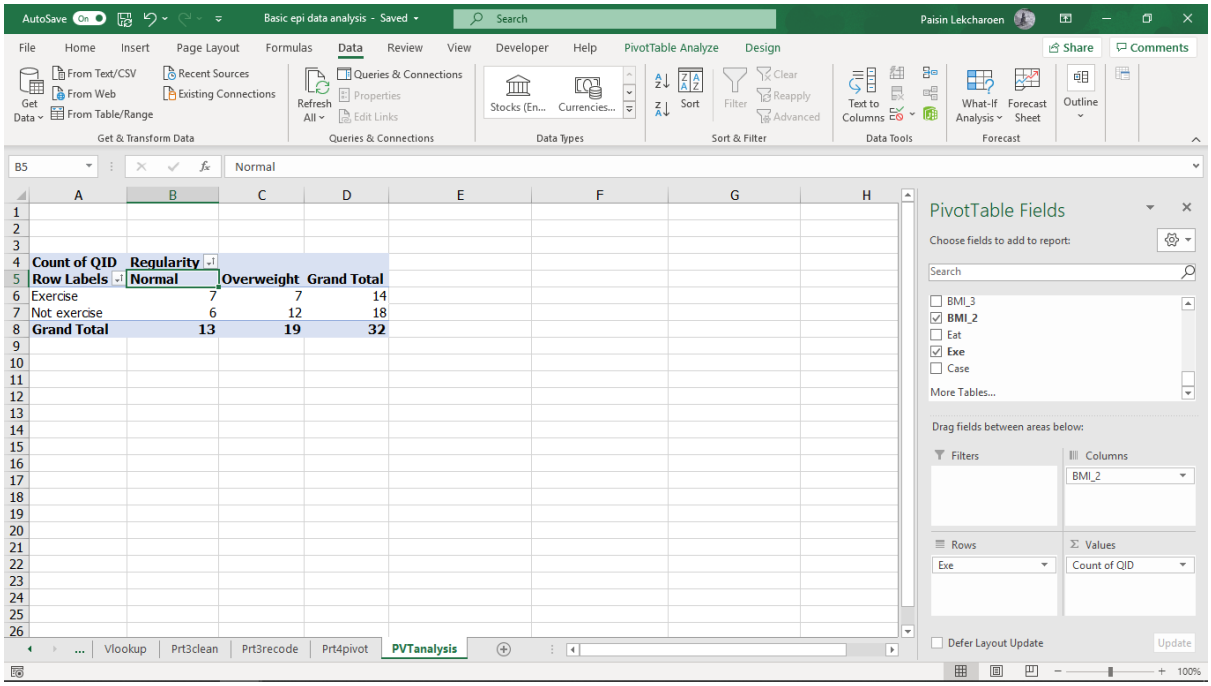
= [b/(b+d)]/[d/(b+d)]

= b/d

Odds ratio = Odds of exposed among overweight/Odds of exposed among normal

= (a/c)/(b/d) = ad/bc

1. You have observed that sleeping activity is the same rank among those who has overweight and normal BMI. So, you would like to compare the next rank. You pick up exercise activity as the next exposure of interest.
   Recode regularity into two groups: low and high. So, you can use it in the analysis more comfortably. In this case, exercising regularity has already been classified into two group under the variable 'Exe'.
   Drop 'Exe' into Row box and 'BMI_2' into Column box. Then drop 'QID' into Value box and change it to a Count. So, you will get a 2x2 table.



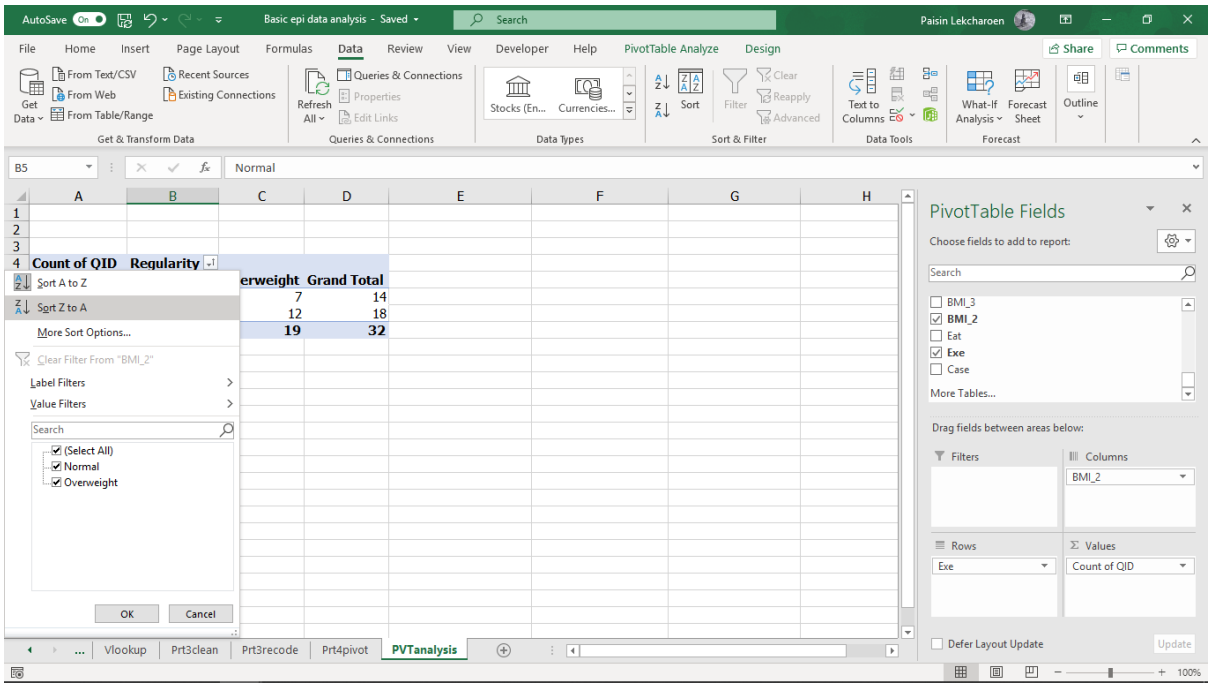
Question 11 What is the odds ratio for this table?

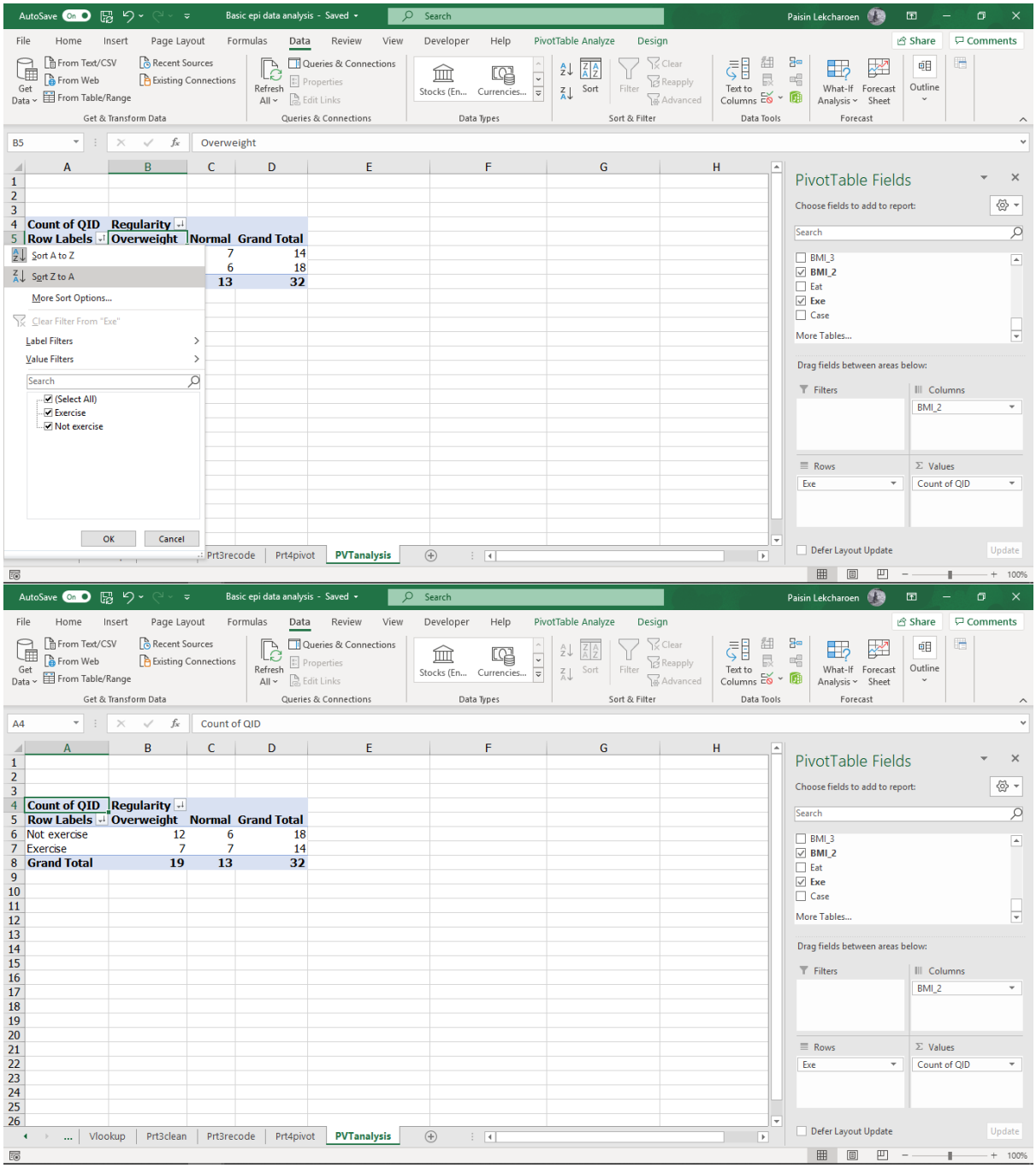
Answer: Click or tap here to enter text.

Question 12 What is your interpretation?

Answer: Click or tap here to enter text.

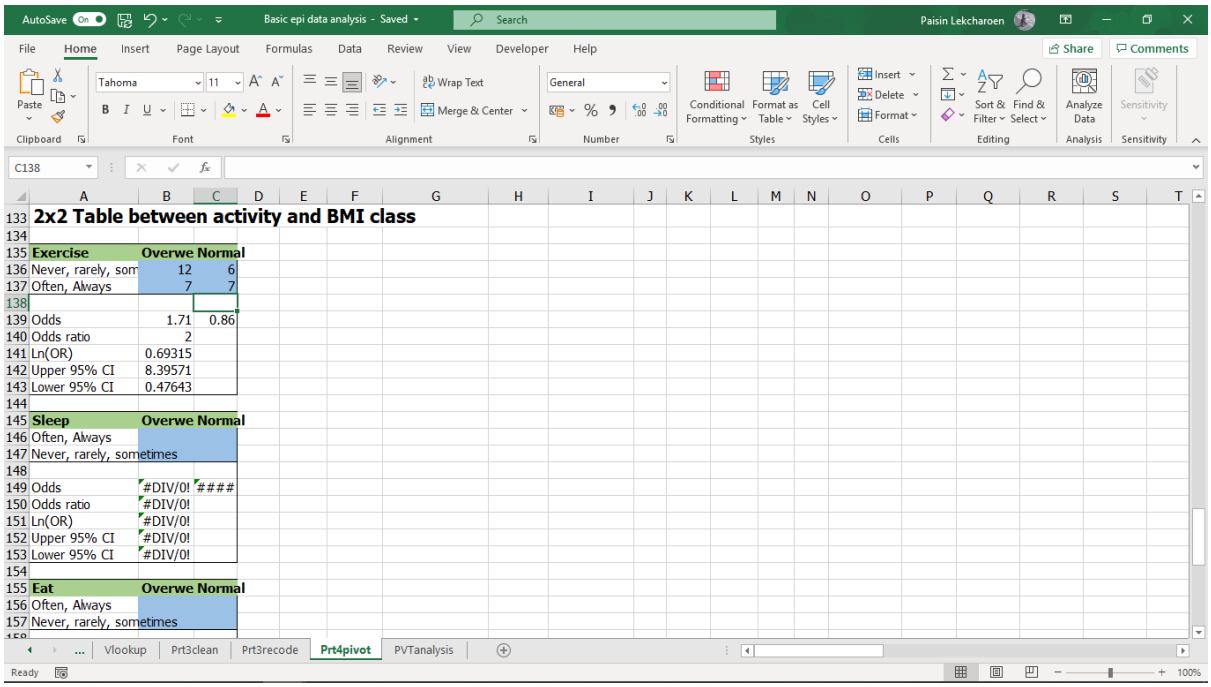
2. Generally, we interpret the table above as those who has regular exercise associated with normal BMI. In causal relationship sense, we may expect to see the association among possible risk factor, in this case, less regular exercise, with problem, in this case, overweight. You can re-arrange the order of both values in both row and column.





It may have more sense to be interpret. However, the calculation remains the same.

3. Transfer the values to the 2x2 table provided in Prt4pivot worksheet. Other calculations for 95% confidence interval are also provided.



2x2 Table between activity and BMI class		
Exercise	**Overwe**	**Normal**
Never, rarely, som	12	6
Often, Always	7	7
Odds	1.71	0.86
Odds ratio	2	
Ln(OR)	0.69315	
Upper 95% CI	8.39571	
Lower 95% CI	0.47643	
Sleep	**Overwe**	**Normal**
Often, Always		
Never, rarely, sometimes		
Odds	#DIV/0!	####
Odds ratio	#DIV/0!	
Ln(OR)	#DIV/0!	
Upper 95% CI	#DIV/0!	
Lower 95% CI	#DIV/0!	
Eat	**Overwe**	**Normal**
Often, Always		
Never, rarely, sometimes		

4. Find OR and 95%CI for other activities in the top 5 rank of those who has overweight. Complete all tables and try to answer the following questions.

Question 13 What is the odds of having regular sleep (often/always) and having overweight?

Answer: Click or tap here to enter text.

Question 14 Do participants who have overweight and normal BMI have different eating regularity?

Answer: Click or tap here to enter text.

Question 15 Please interpret the likelihood of regularity of talking with friend and being overweight?

Answer: Click or tap here to enter text.

Part 5 Basic data analysis

Excel has a power function for some statistical tests, e.g., 'Data Analysis' function.

Functions in use:

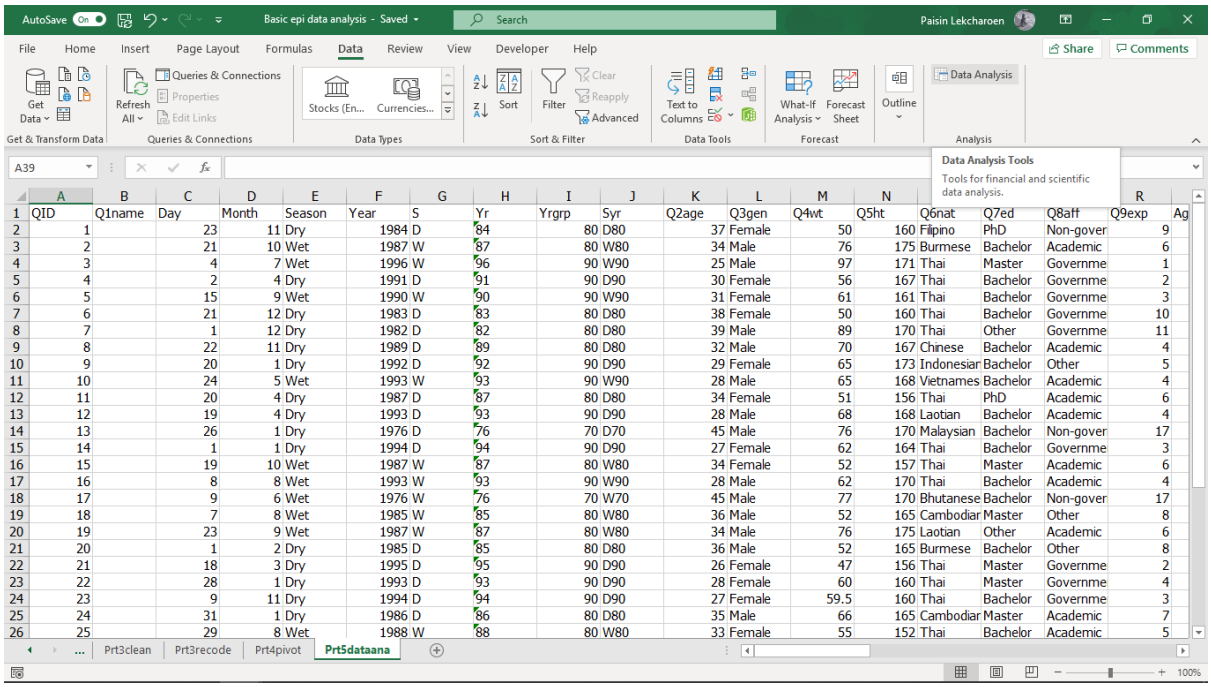
- Data Analysis
  - ✓ Descriptive Statistics
  - ✓ F-Test
  - ✓ t-Test
  - ✓ ANOVA

Exercise 5.1 Descriptive statistics

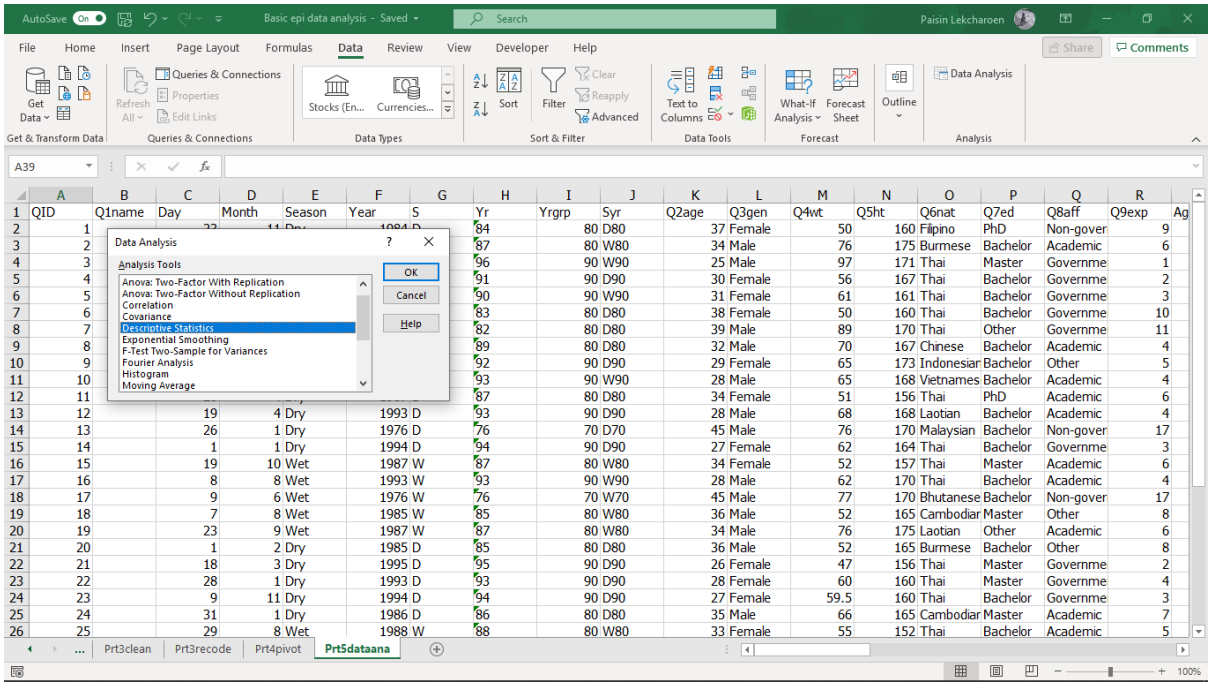
For some continuous data, descriptive statistics can be obtained by performing a basic data analysis using 'Data Analysis function.

1. Go to 'Prt5dataana' worksheet. Find the measures of central tendency and variability of age, weight, height, and BMI of participants.

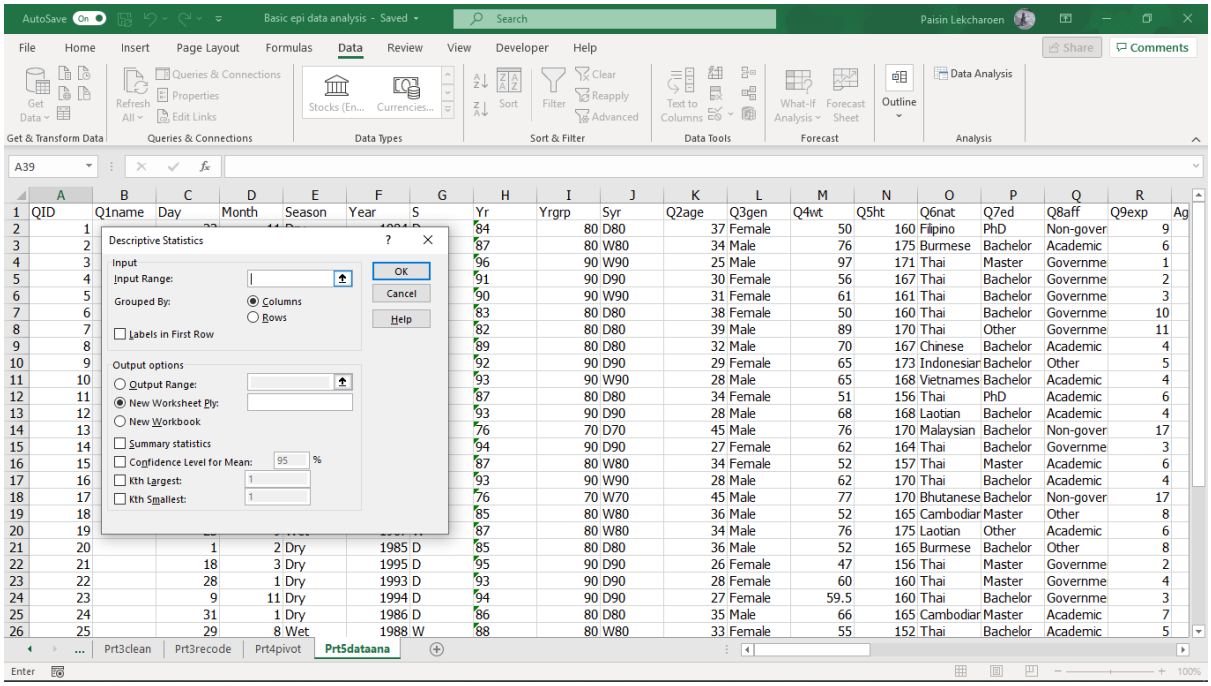
   1.1. Go to 'Data' ribbon. Select 'Data Analysis' function



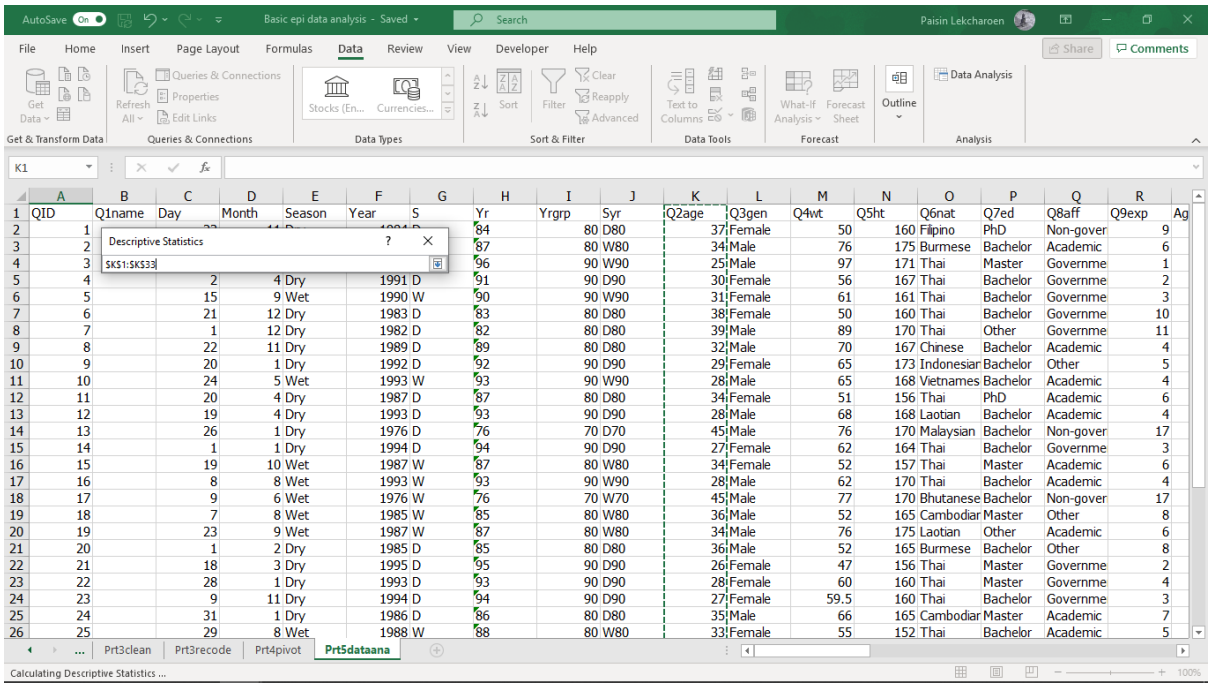
   1.2. Select 'Descriptive Statistics' tool from 'Data Analysis' window



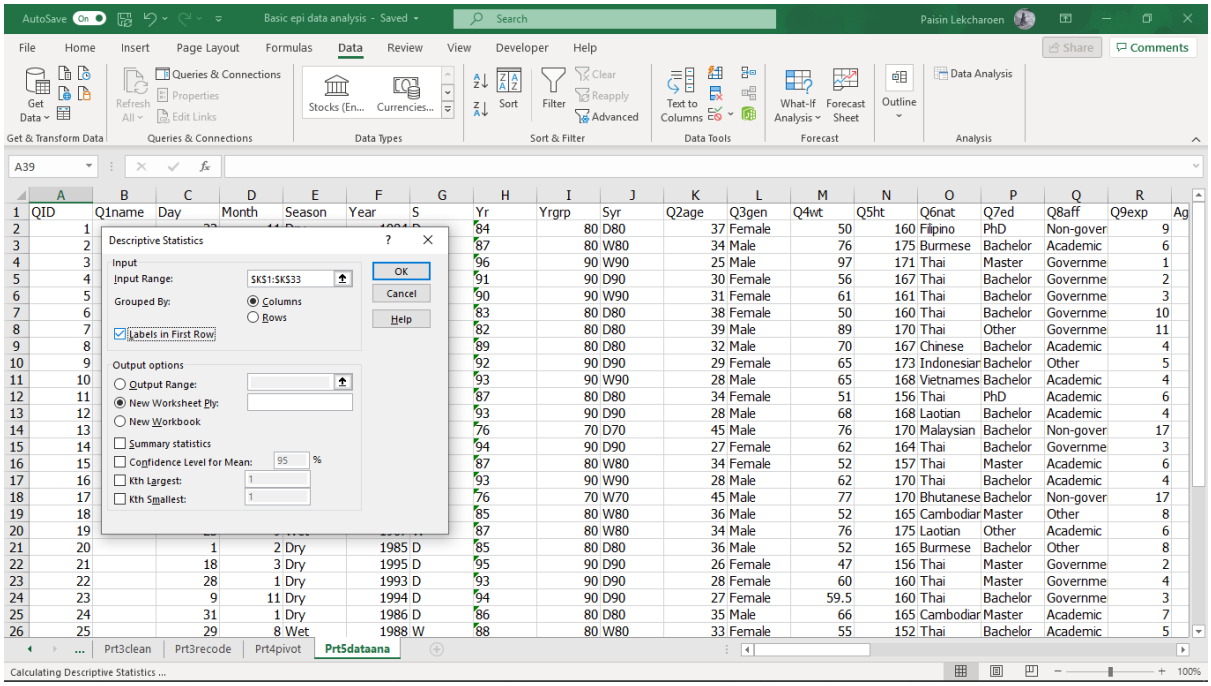
1.3. Click the upward arrow to open window for specifying input range of data needed for analysis.



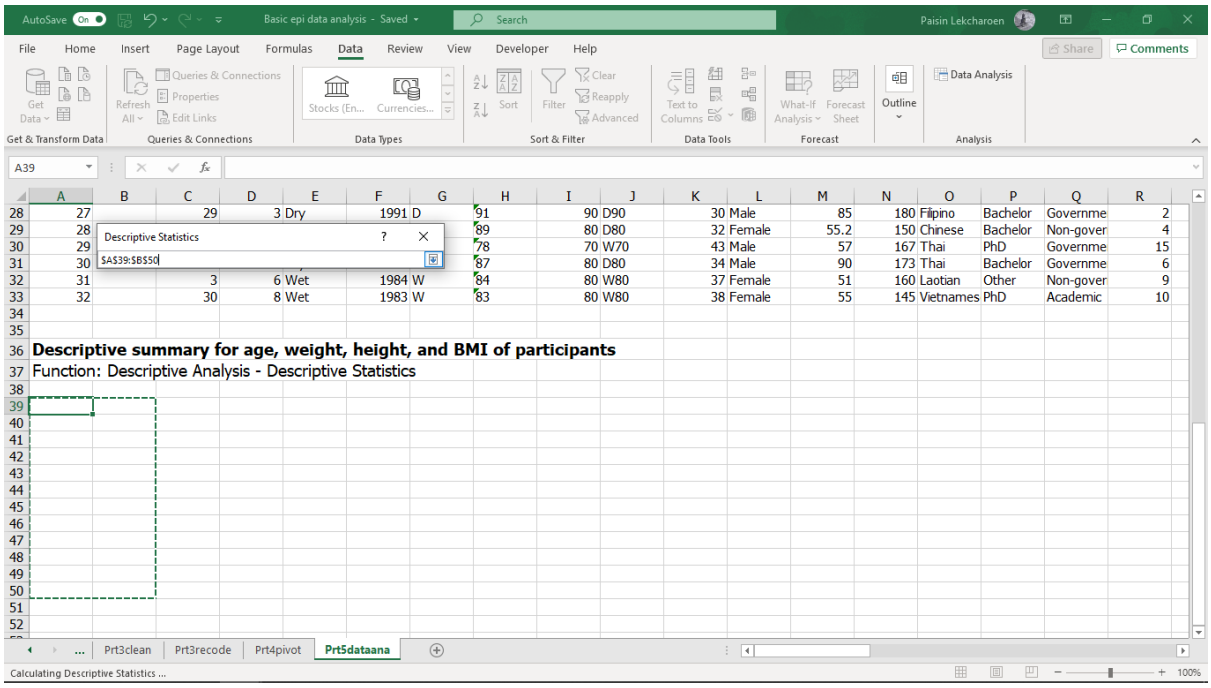
1.4. Select a range of data. For this exercise, choose a range of 'Q2age' first. You will see a dot borderline around the range you have selected and the range is shown in the descriptive statistics window. Then click on arrowhead at the end of the box.



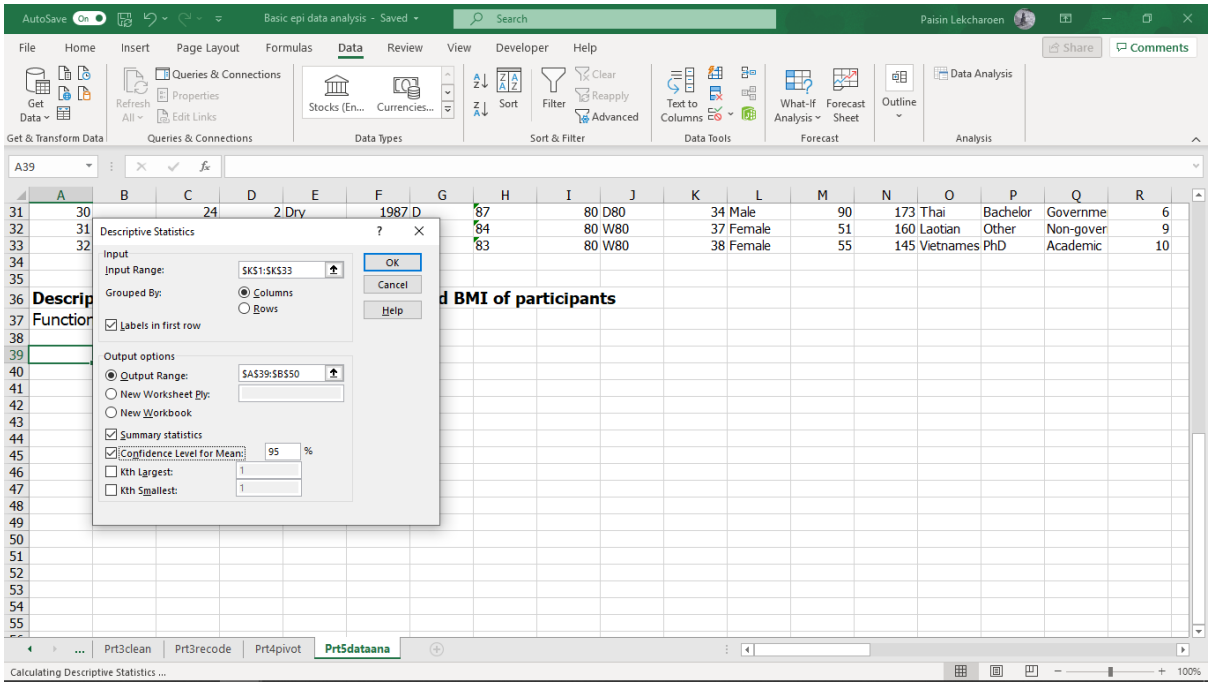
1.5. In this case, data is grouped by column. You also include a heading in the data range, so check on ‘Labels in First Row’.

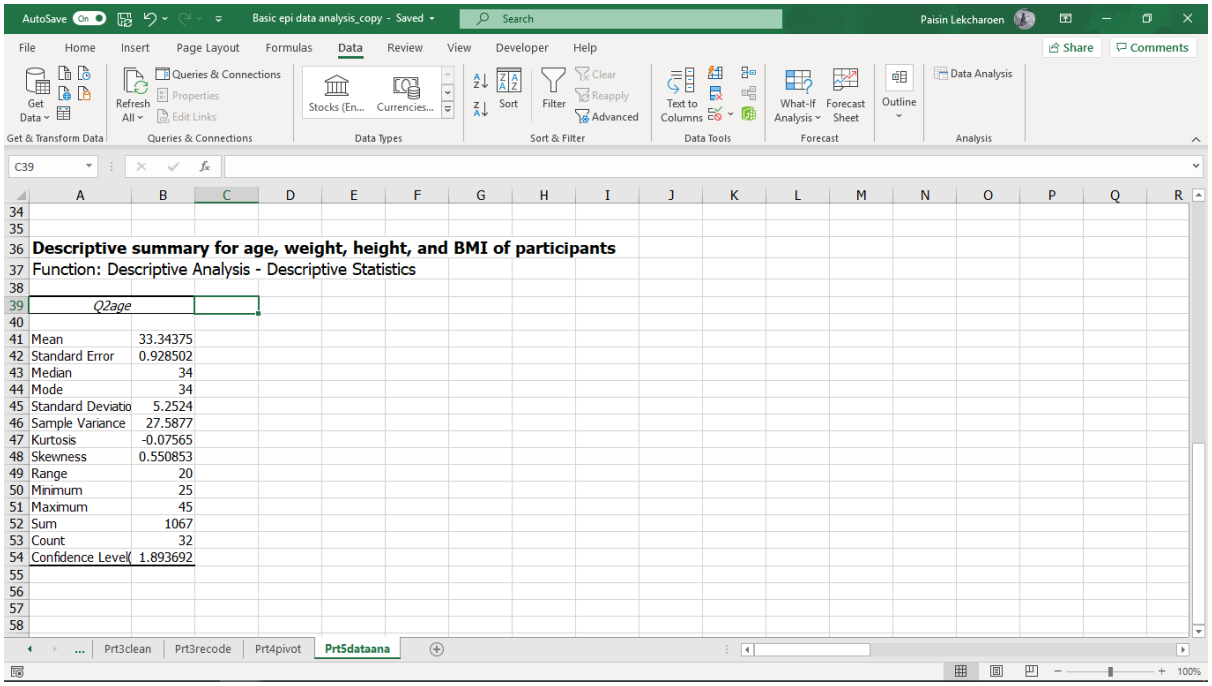


1.6. Specify the output range somewhere in this sheet under the range of data.



1.7. Check on ‘Summary Statistics’ and specify confidence level equal to 95. Click ‘OK’.





1.8. Then, you will have measures of central tendency and dispersal of age. So, perform this calculation but for weight, height, and BMI of the participants.

Question 16 What is the average weight of the participants?

Answer: Click or tap here to enter text.

Question 17 What is a standard variation of height of participants?

Answer: Click or tap here to enter text.

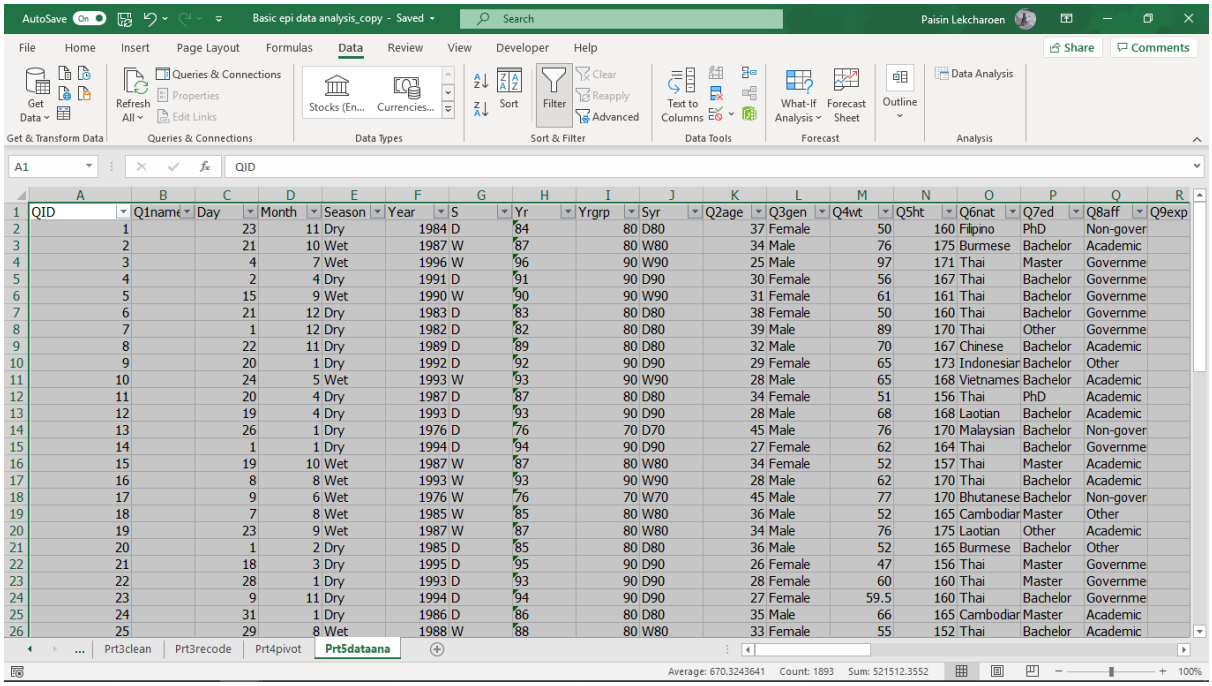
Question 18 What direction is the skewness of BMI?

Answer: Click or tap here to enter text.

Exercise 5.2 Comparison of means in 2 independent groups.

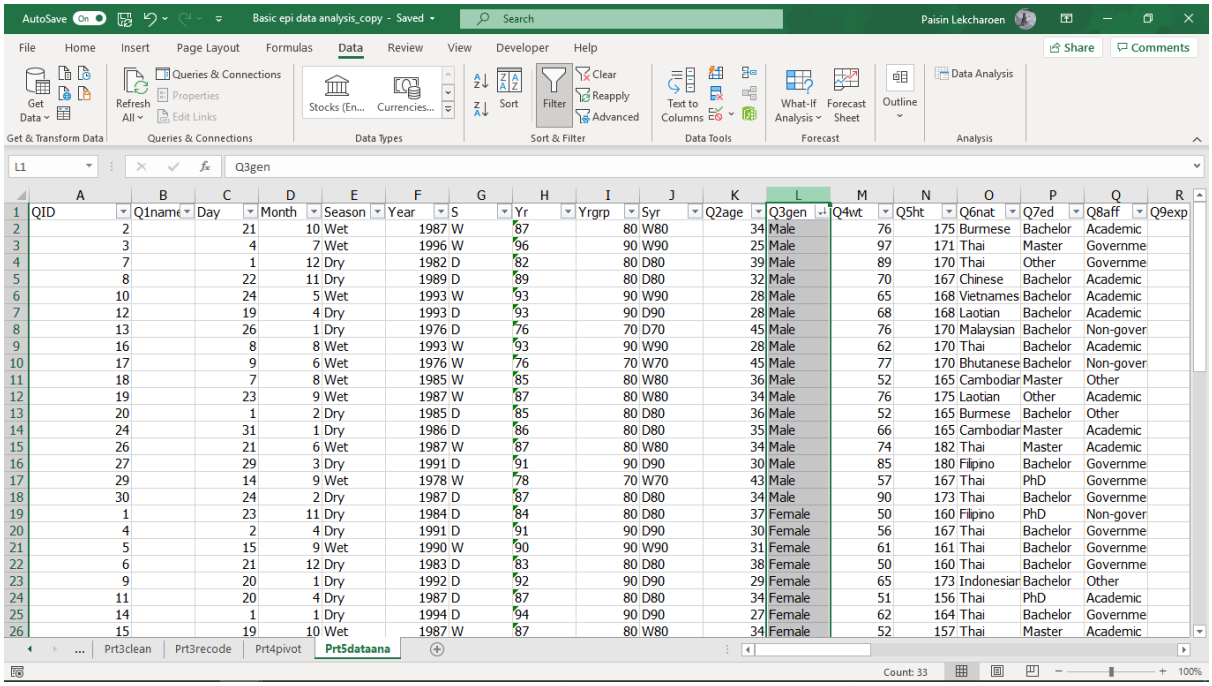
In this exercise, you would like to compare some characteristics among participants. In this case, you will see whether male is higher than female or not, or significantly.

1. Perform 'Descriptive Statistics' function to see the average height and SD among male and female.
   1.1. Highlight the range of the original data. Go to 'Data' ribbon and select 'Filter'.

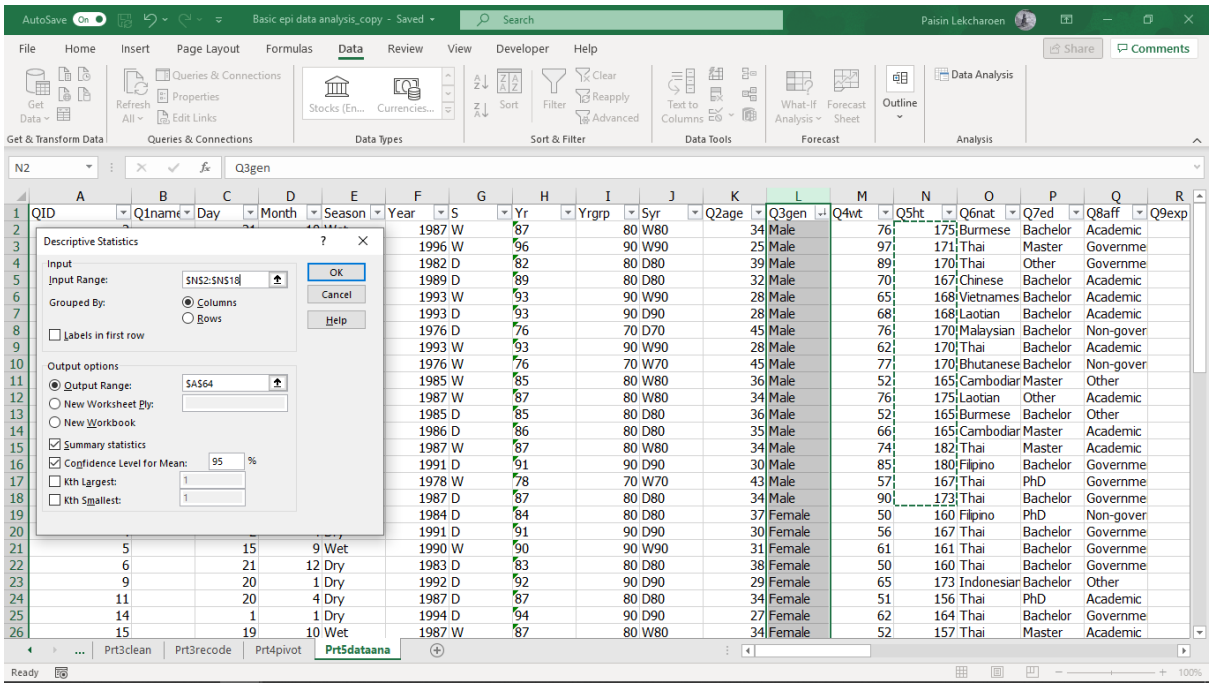


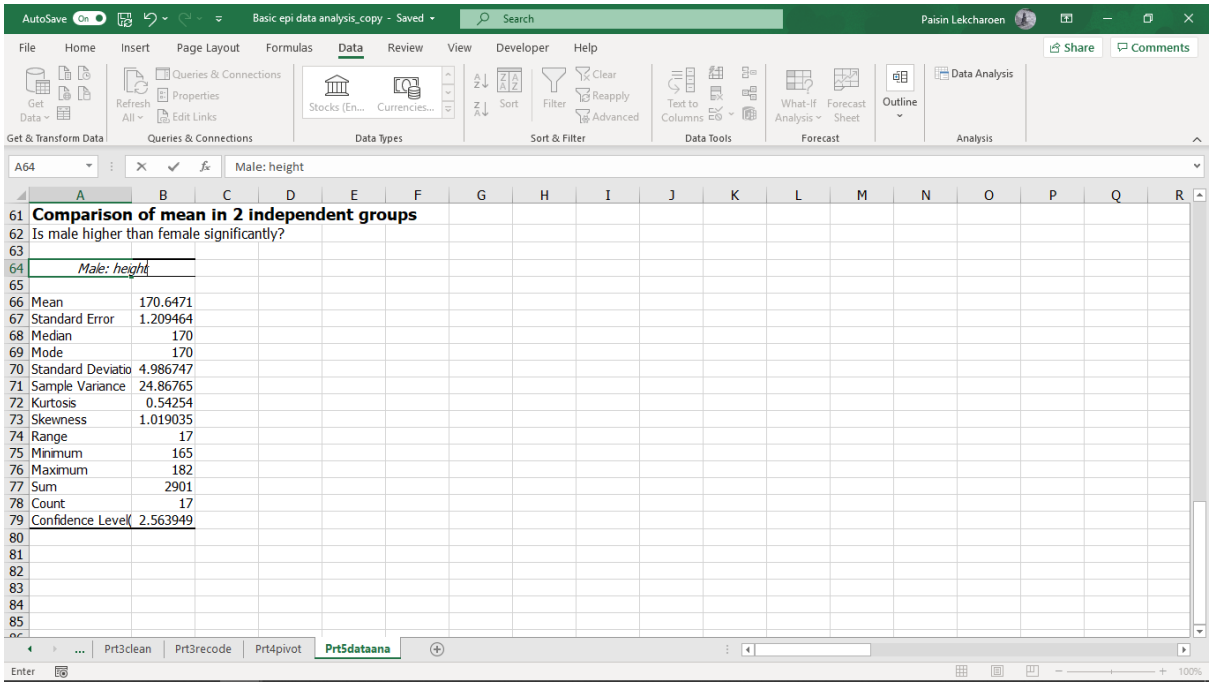
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	QID	Q1name	Day	Month	Season	Year	S	Yr	Yrgrp	Syr	Q2age	Q3gen	Q4wt	Q5ht	Q6nat	Q7ed	Q8aff	Q9exp
2	1		23	11	Dry	1984	D	84	80	D80	37	Female	50	160	Filipino	PhD	Non-gover	
3	2		21	10	Wet	1987	W	87	80	W80	34	Male	76	175	Burmese	Bachelor	Academic	
4	3		4	7	Wet	1996	W	96	90	W90	25	Male	97	171	Thai	Master	Governme	
5	4		2	4	Dry	1991	D	91	90	D90	30	Female	56	167	Thai	Bachelor	Governme	
6	5		15	9	Wet	1990	W	90	90	W90	31	Female	61	161	Thai	Bachelor	Governme	
7	6		21	12	Dry	1983	D	83	80	D80	38	Female	50	160	Thai	Bachelor	Governme	
8	7		1	12	Dry	1982	D	82	80	D80	39	Male	89	170	Thai	Other	Governme	
9	8		22	11	Dry	1989	D	89	80	D80	32	Male	70	167	Chinese	Bachelor	Academic	
10	9		20	1	Dry	1992	D	92	90	D90	29	Female	65	173	Indonesian	Bachelor	Other	
11	10		24	5	Wet	1993	W	93	90	W90	28	Male	65	168	Vietnames	Bachelor	Academic	
12	11		20	4	Dry	1987	D	87	80	D80	34	Female	51	156	Thai	PhD	Academic	
13	12		19	4	Dry	1993	D	93	90	D90	28	Male	68	168	Laotian	Bachelor	Academic	
14	13		26	1	Dry	1976	D	76	70	D70	45	Male	76	170	Malaysian	Bachelor	Non-gover	
15	14		1	1	Dry	1994	D	94	90	D90	27	Female	62	164	Thai	Bachelor	Governme	
16	15		19	10	Wet	1987	W	87	80	W80	34	Female	52	157	Thai	Master	Academic	
17	16		8	8	Wet	1993	W	93	90	W90	28	Male	62	170	Thai	Bachelor	Academic	
18	17		9	6	Wet	1976	W	76	70	W70	45	Male	77	170	Bhutanese	Bachelor	Non-gover	
19	18		7	8	Wet	1985	W	85	80	W80	36	Male	52	165	Cambodian	Master	Other	
20	19		23	9	Wet	1987	W	87	80	W80	34	Male	76	175	Laotian	Other	Academic	
21	20		1	2	Dry	1985	D	85	80	D80	36	Male	52	165	Burmese	Bachelor	Other	
22	21		18	3	Dry	1995	D	95	90	D90	26	Female	47	156	Thai	Master	Governme	
23	22		28	1	Dry	1993	D	93	90	D90	28	Female	60	160	Thai	Master	Governme	
24	23		9	11	Dry	1994	D	94	90	D90	27	Female	59.5	160	Thai	Bachelor	Governme	
25	24		31	1	Dry	1986	D	86	80	D80	35	Male	66	165	Cambodian	Master	Academic	
26	25		29	8	Wet	1988	W	88	80	W80	33	Female	55	152	Thai	Bachelor	Academic	

1.2. Sort ‘Q3gen’ either ‘A to Z’ or ‘Z to A’. In this case, ‘Z to A’ is used.

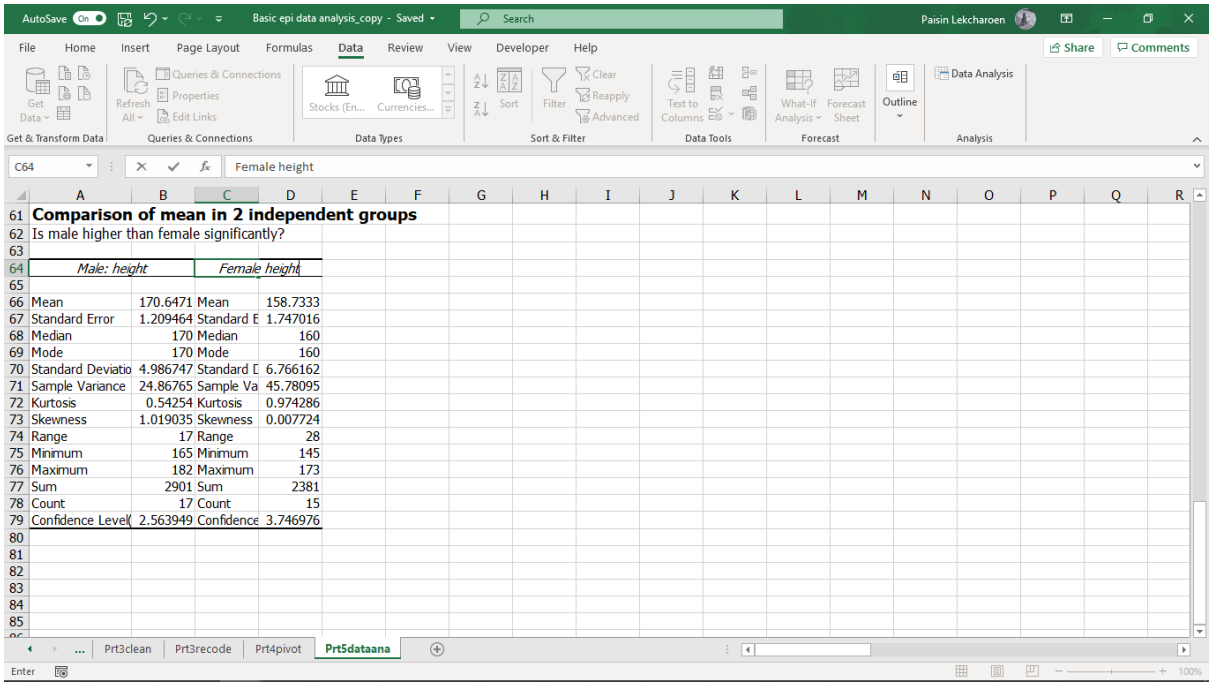


1.3. The input range comprises only ‘Q5ht’ only for ‘Male’ first. Change the heading of the output table to Male height.





1.4. Do the same thing for Female.



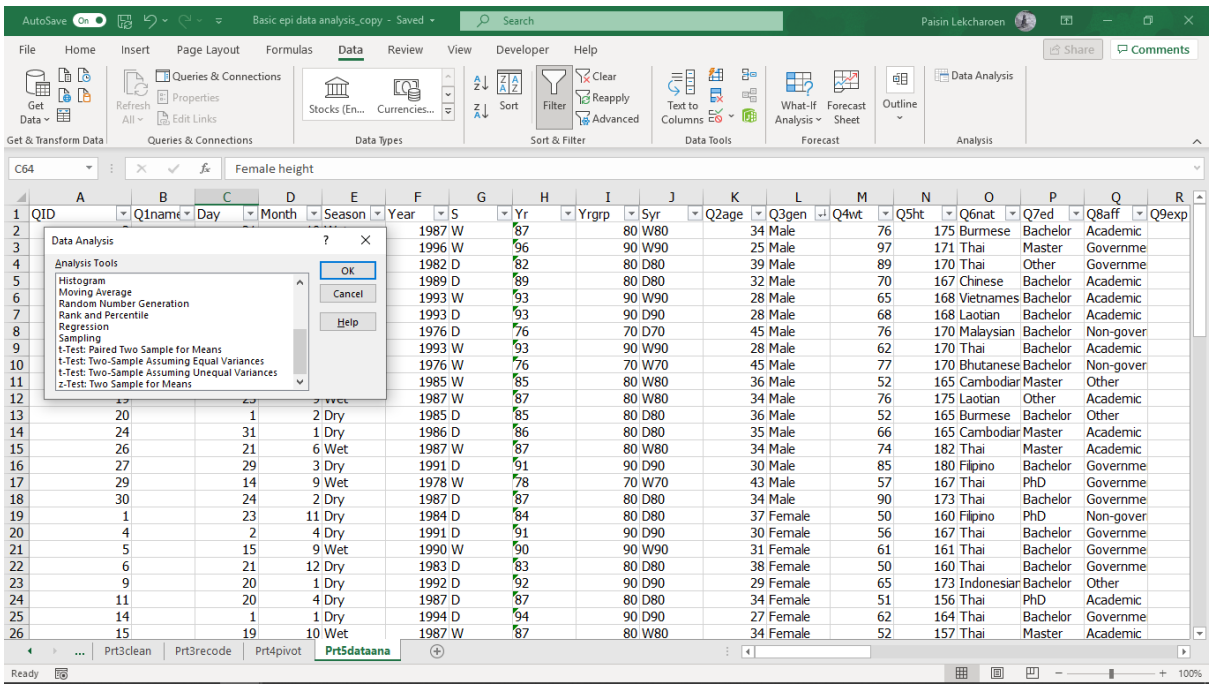
1.5. So, you can compare all measures those of male and female.

Question 19 Which gender has higher average height?

Answer: Click or tap here to enter text.

2. It is shown that male has higher average height, but female has higher height variation. Are these finding exactly true? To compare the average height, in this case the mean, among 2 independent groups – male and female, the t-Test is appropriate and is going to be performed.

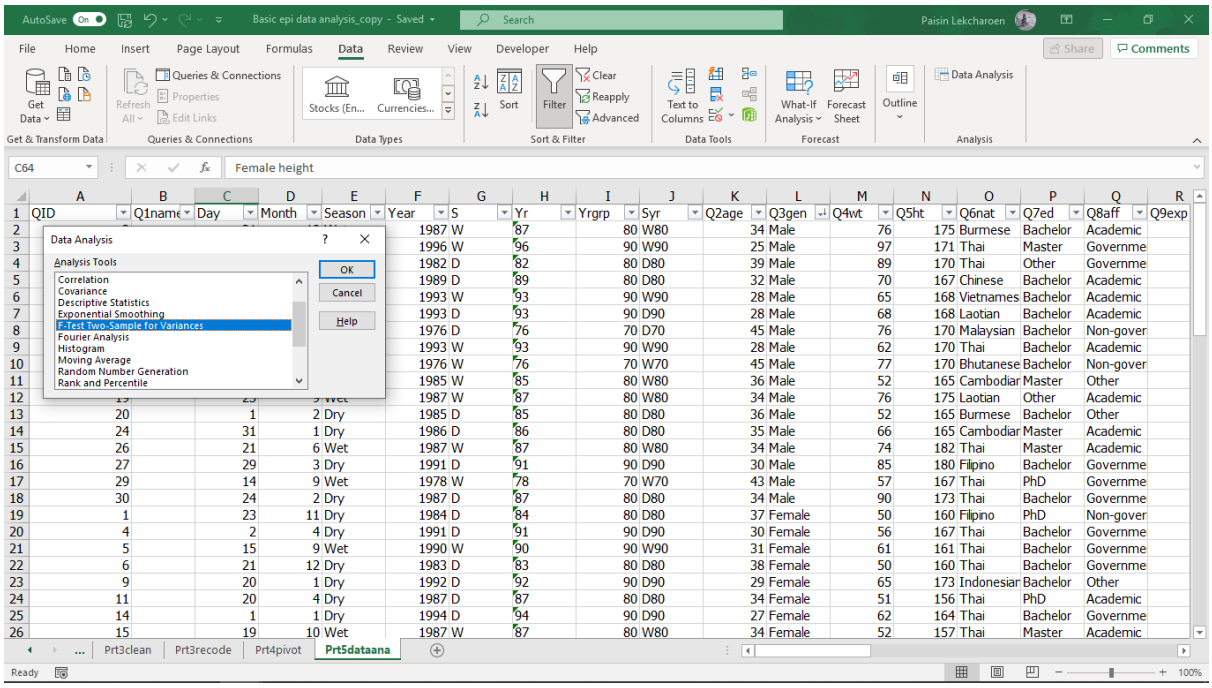
2.1. Go to ‘Data Analysis’ function again. In this time, you switch to use a function ‘t-Test’. But three different technics are provided.



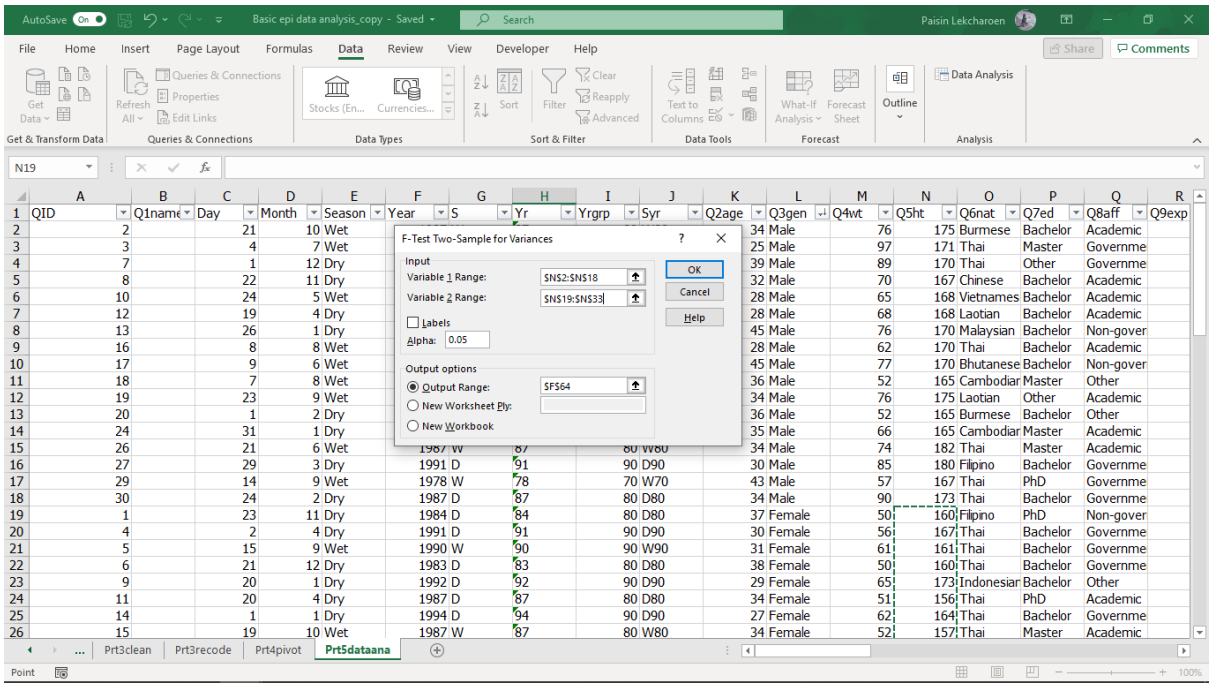
2.2. It is not a paired group so you cannot choose ‘t-Test: Paired Two Sample for Means’. Thus, your options are ‘t-Test: Two Sample Assuming Equal or Unequal Variances’. Even though you know the variances of the two groups, you still do not know whether it is exactly different.

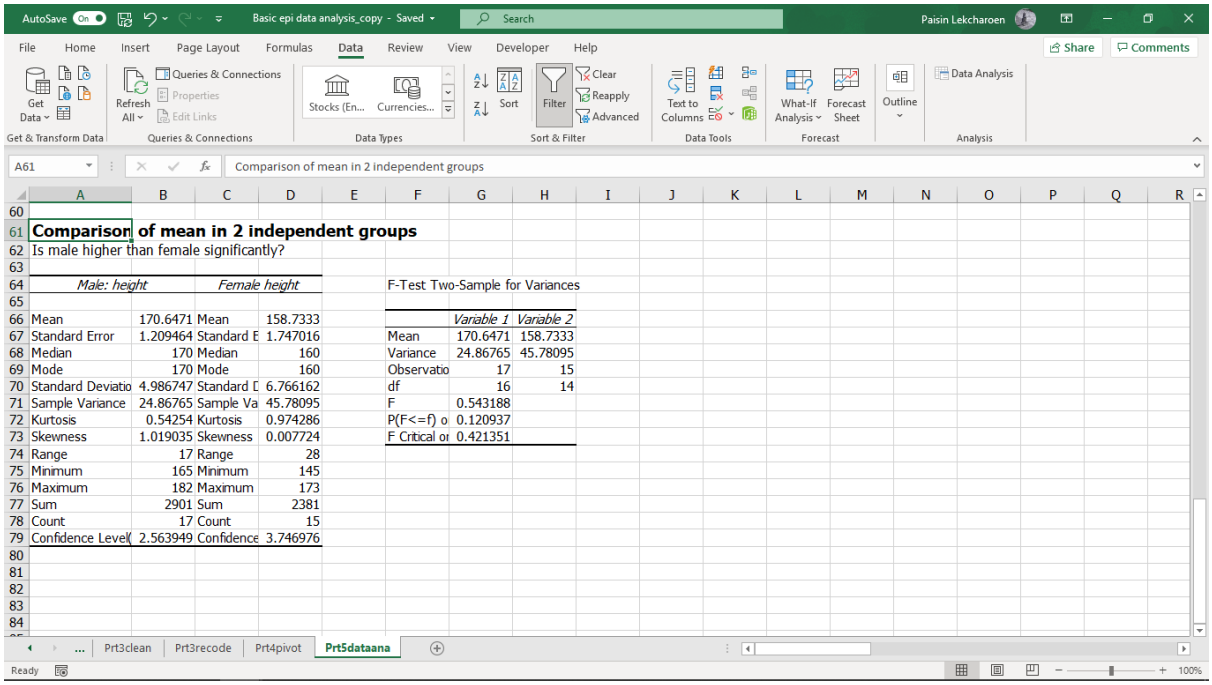
3. Use F-Test to find out whether two sample variances are equal or unequal.

3.1. In ‘Data Analysis’ window, select to open ‘F-Test Two-Sample for Variances’ tools.



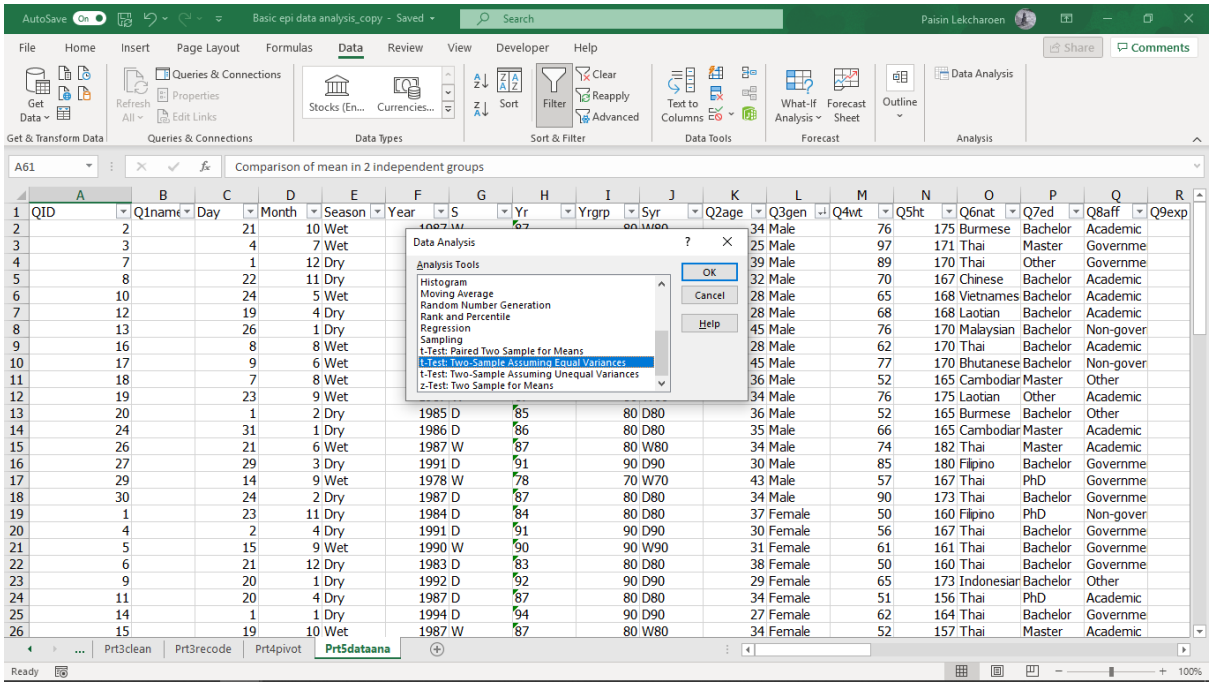
3.2. Put a range of male height in 'Variable 1 Range' and female height in 'Variable 2 Range'. Set 'Alpha' as 0.05. indicate 'Output Range' at the range of cells beside the results from descriptive statistics.



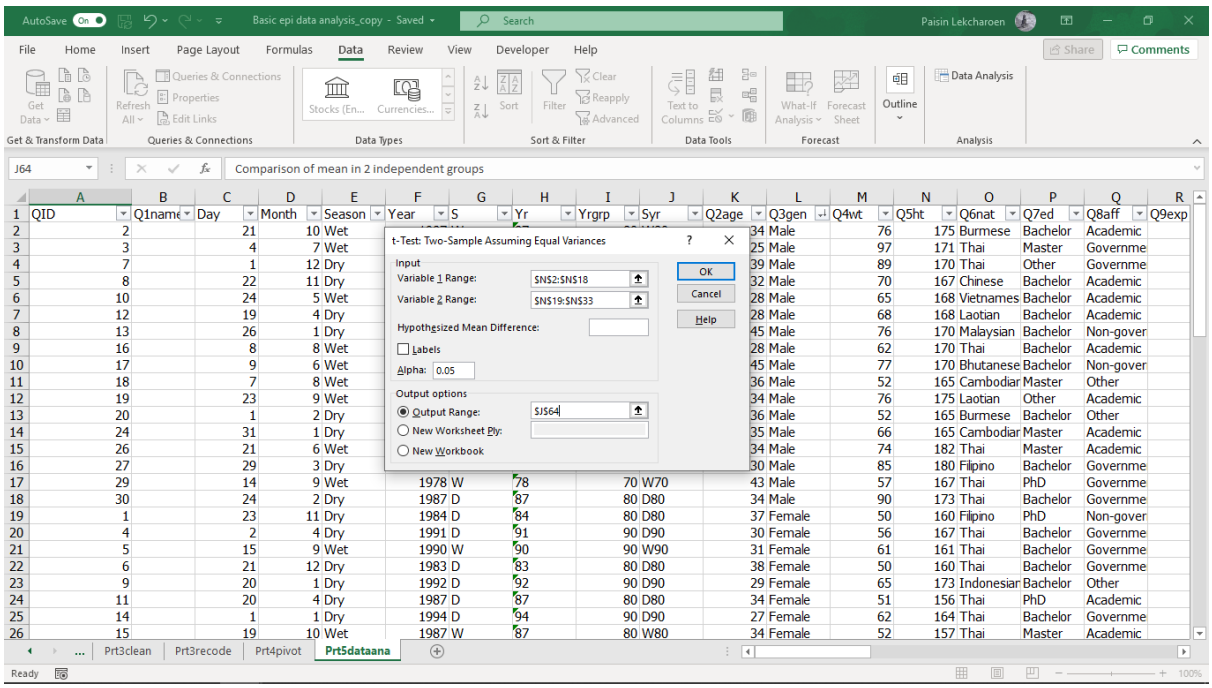


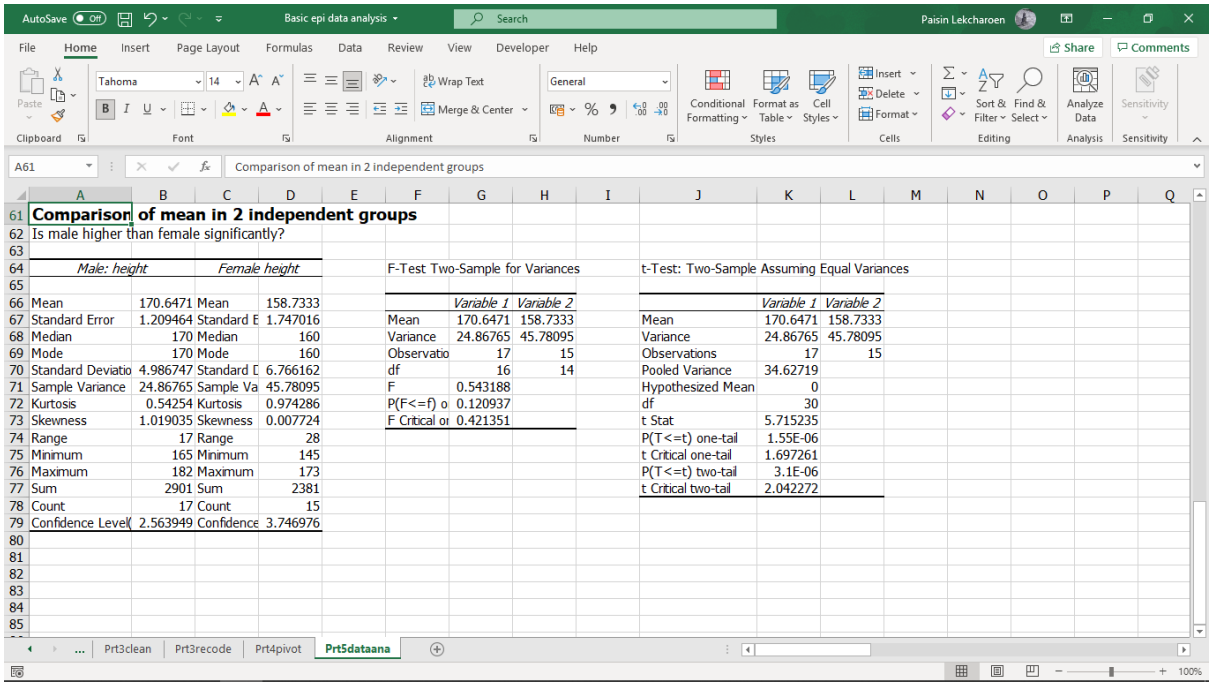
3.3. It calculates means and variances for variable 1 (male height) and variable 2 (female height). F is 0.543188 and F Critical one-tail is 0.42135. When F is less than 1, we will reject the null hypothesis (Two variances are equal) when F < F Critical one-tail. So, we have not enough evidence to reject the null hypothesis.

4. From the previous step, it is suggested a ‘t-Test: Two Samples Assuming Equal Variance’.
   4.1. In the ‘Data Analysis’ window, select ‘t-Test: Two-Sample Assuming Equal Variances’



   4.2. Put male height in the variable 1 range input and female height in the variable 2 range input. No hypothesized mean difference needed. Set alpha as 0.05 and put the output range beside the previous result.





	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
61	**Comparison of mean in 2 independent groups**																
62	Is male higher than female significantly?																
63																	
64	*Male: height*		*Female height*			F-Test Two-Sample for Variances				t-Test: Two-Sample Assuming Equal Variances							
65																	
66	Mean	170.6471	Mean	158.7333			*Variable 1*	*Variable 2*			*Variable 1*	*Variable 2*					
67	Standard Error	1.209464	Standard E	1.747016		Mean	170.6471	158.7333		Mean	170.6471	158.7333					
68	Median	170	Median	160		Variance	24.86765	45.78095		Variance	24.86765	45.78095					
69	Mode	170	Mode	160		Observatio	17	15		Observations	17	15					
70	Standard Deviatio	4.986747	Standard D	6.766162		df	16	14		Pooled Variance	34.62719						
71	Sample Variance	24.86765	Sample Va	45.78095		F	0.543188			Hypothesized Mean	0						
72	Kurtosis	0.54254	Kurtosis	0.974286		P(F<=f) o	0.120937			df	30						
73	Skewness	1.019035	Skewness	0.007724		F Critical or	0.421351			t Stat	5.715235						
74	Range	17	Range	28						P(T<=t) one-tail	1.55E-06						
75	Minimum	165	Minimum	145						t Critical one-tail	1.697261						
76	Maximum	182	Maximum	173						P(T<=t) two-tail	3.1E-06						
77	Sum	2901	Sum	2381						t Critical two-tail	2.042272						
78	Count	17	Count	15													
79	Confidence Level(	2.563949	Confidence	3.746976													
80																	
81																	
82																	
83																	
84																	
85																	

4.3. If you would like to know whether average male height is significantly higher than those of female or not, it is a one-tail test.

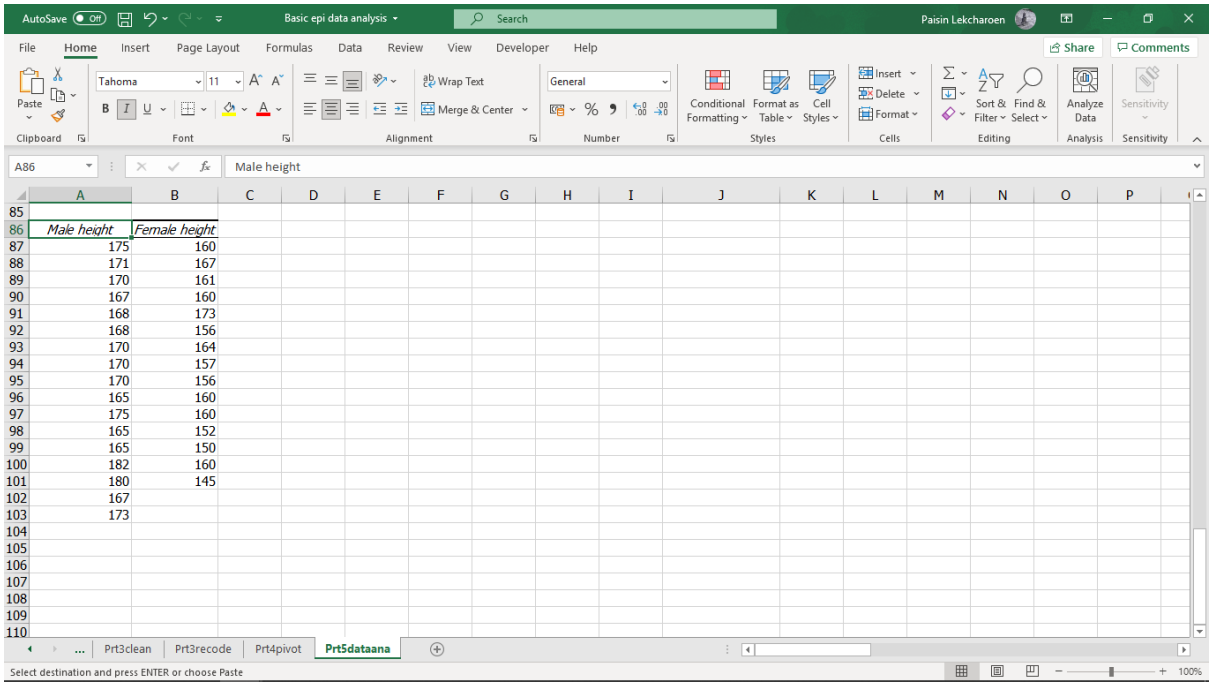
4.4. Your null hypothesis (H_0) is average male height is less than or equal to average female height and the alternative hypothesis (H_a) is average male height is greater than that of female.

4.5. The t stat (5.715235) is greater than the t Critical one-tail (1.697261). So, you have enough evidence to reject the null hypothesis. Therefore, you reject that average male height is less than or equal to average female height.

4.6. The P-value (one-tail) is 1.55×10^{-6}, that is less than 0.05. It also confirms that this difference is statistically significant.

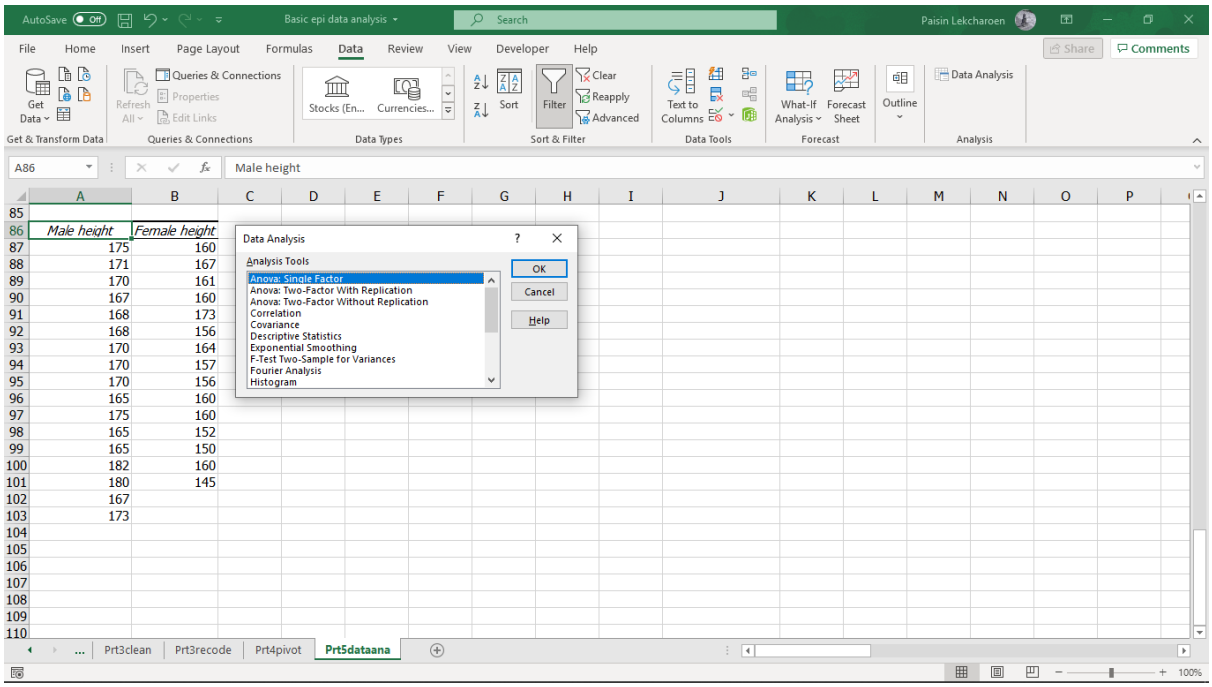
5. You can also perform an ANOVA test.

5.1. Rearrange values of male and female height in a separated table.

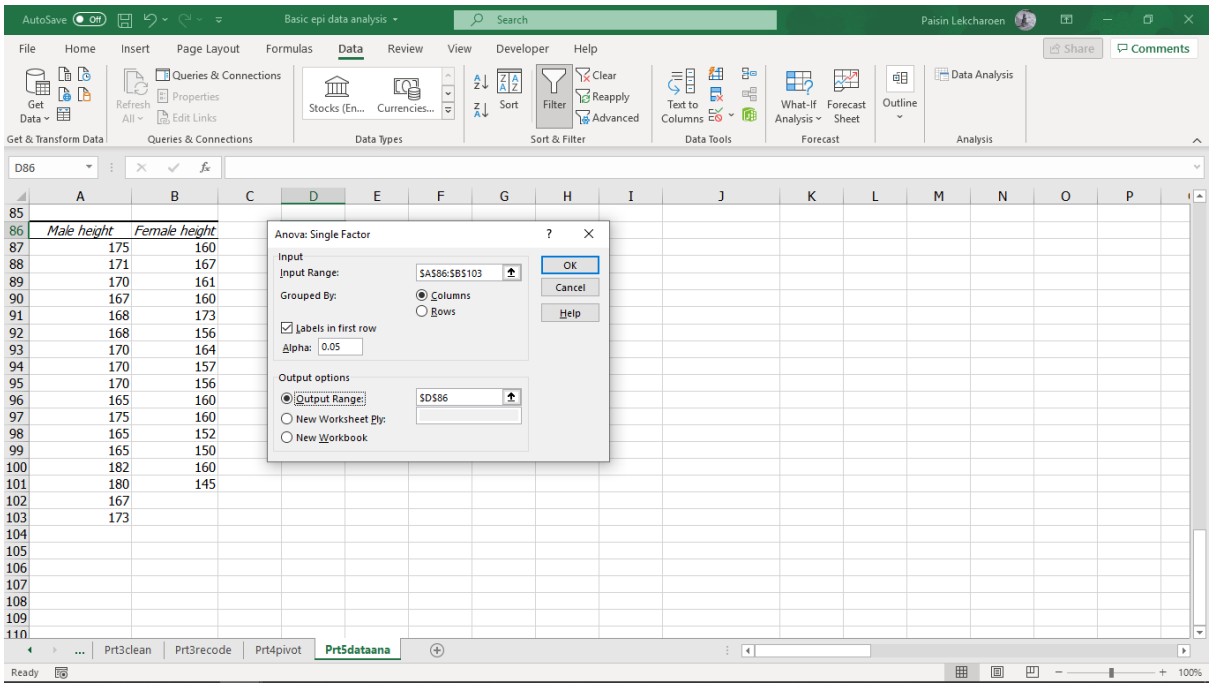


	Male height	Female height
87	175	160
88	171	167
89	170	161
90	167	160
91	168	173
92	168	156
93	170	164
94	170	157
95	170	156
96	165	160
97	175	160
98	165	152
99	165	150
100	182	160
101	180	145
102	167	
103	173	

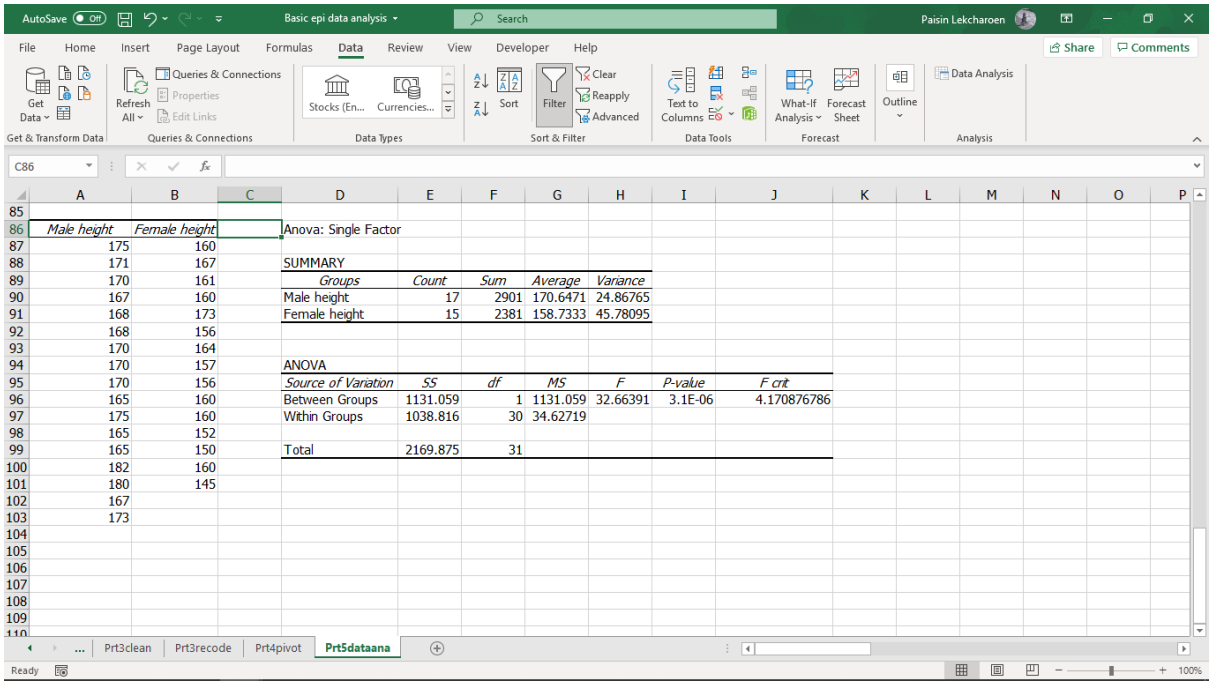
5.2. Open ‘Data Analysis’ function, then choose ‘ANOVA: Single Factor’.



5.3. Select a range of values covering all male and female height and put in the input range. Grouped by columns. Check on 'Labels in first row'. Set alpha as 0.05. Put the output range in the same sheet.



Male height	Female height
175	160
171	167
170	161
167	160
168	173
168	156
170	164
170	157
170	156
165	160
175	160
165	152
165	150
182	160
180	145
167	
173	



Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Male height	17	2901	170.6471	24.86765
Female height	15	2381	158.7333	45.78095

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1131.059	1	1131.059	32.66391	3.1E-06	4.170876786
Within Groups	1038.816	30	34.62719			
Total	2169.875	31				

5.4. You can see that the F value is greater than F Critical value. Therefore, you can reject the null hypothesis (average male height is equal to average female height).

5.5. The P-value shows similar thing as the t-Test.

6. Perform the similar test for BMI in those who do not have regular exercise and those who has.

Question 20 Is BMI of participants who have more regularity (often and always) in physical exercise less than of those who have not?

Answer: Click or tap here to enter text.

Exercise 5.3 Comparison of an average BMI among different age groups and different birth season.

This is a self-performing exercise. No example and lab direction provided.

Hint: Use 'Pivot Table' and 'ANOVA: Two-Factor without replication' tool.

Question 21 Are there any differences of BMI among participants who has different age and birth season?

Answer: Click or tap here to enter text.

END

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