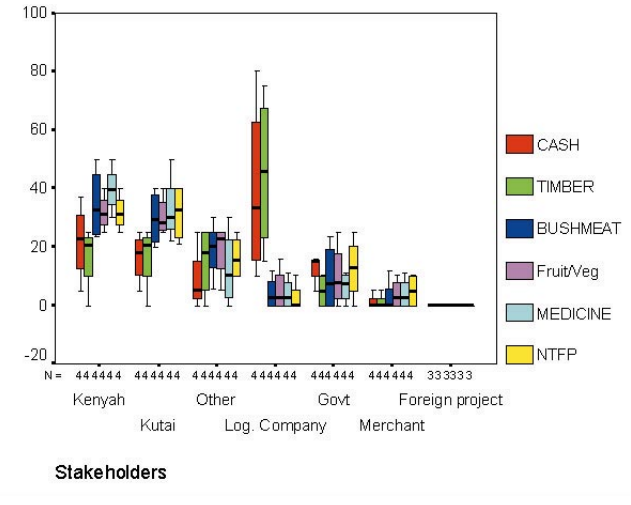


FIGURE 36. Boxplot for forest benefits data

If the data distribution is highly skewed or there are some outliers (usually indicated by asterisks or circles), we suggest you use the median instead.

- **Generating the table that describes the forest benefits distribution, according to all respondents**

From the menu, choose:

Statistics
Custom **T**ables
Basic Tables

Put all benefits in the *summaries* item. You can do this by clicking the column name and clicking on the arrow in the *summaries* box (Figure 37).

Put *stake* in *subgroups – down* item (Figure 38)

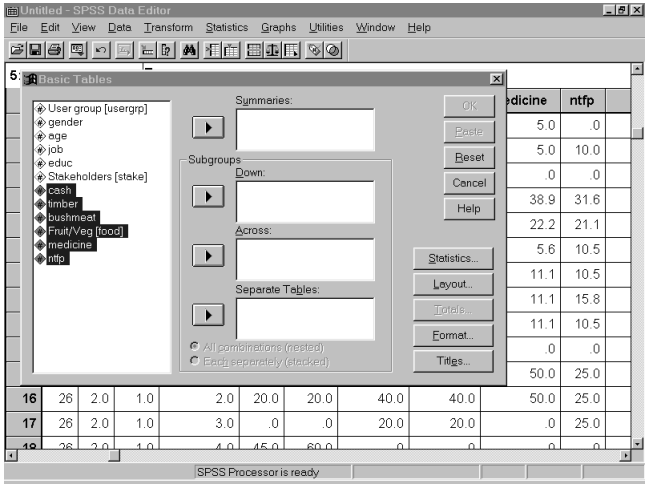


FIGURE 37. Step 1 of selecting variables of forest benefits data (for summarising)

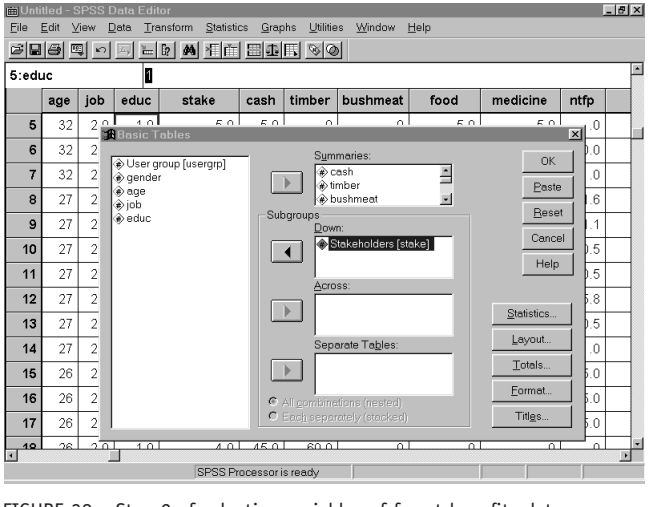
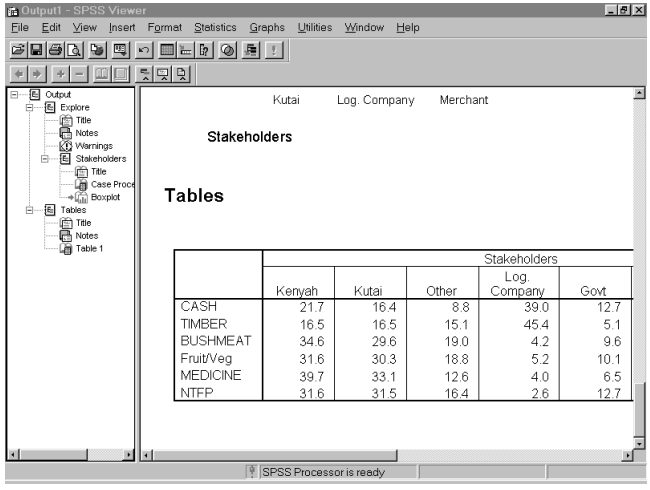


FIGURE 38. Step 2 of selecting variables of forest benefits data (for summarising)

Click on the **S**tatistics button and add *Mean* or *Median* (depend on which measure you decide to use) as the cell's statistics.

By clicking the **OK** button, you will get the results (Figure 39).



	Stakeholders				
	Kenyah	Kutai	Other	Log. Company	Govt
CASH	21.7	16.4	8.8	39.0	12.7
TIMBER	16.5	16.5	15.1	45.4	5.1
BUSHMEAT	34.6	29.6	19.0	4.2	9.6
Fruit/Veg	31.6	30.3	18.8	5.2	10.1
MEDICINE	39.7	33.1	12.6	4.0	6.5
NTFP	31.6	31.5	16.4	2.6	12.7

FIGURE 39. SPSS table describing forest benefits distribution according to all respondents.

c. Conducting simple analysis using Excel

- **Generating the table that describes forest benefits distribution, according to all respondents**

From the **D**ata Menu, choose **P**ivotTable report. You will see a dialogue box as shown in Figure 40.

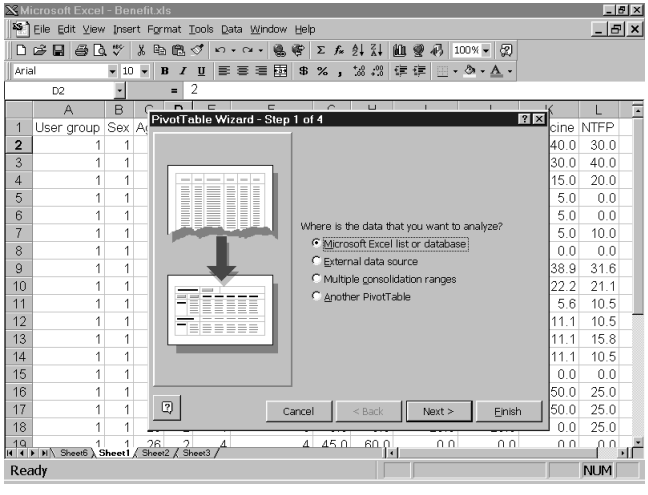


FIGURE 40. Pivot table wizard (forest benefits data)

Click on **Next>** button twice and you will see a dialogue box as shown in Figure 41.

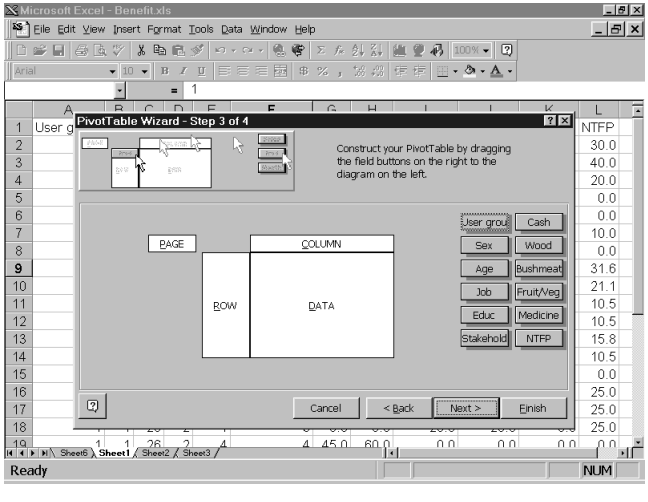


FIGURE 41. Constructing a pivot table for simple analysis of forest benefits data (Step 1)

Drag all columns where the data for forest benefits are into the data space and column where codes for stakeholders are into column space (Figure 42).

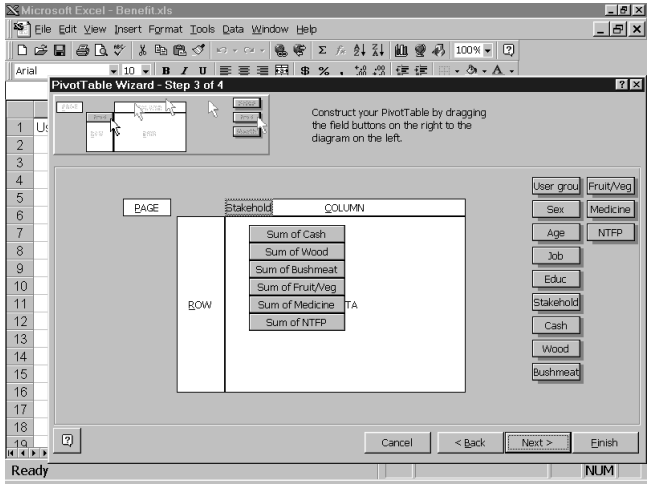


FIGURE 42. Constructing a pivot table for simple analysis of forest benefits data (Step 2)

The sum is the default statistic. You can change the statistic by clicking on the button and choosing the statistic that you want to calculate (Figure 43).

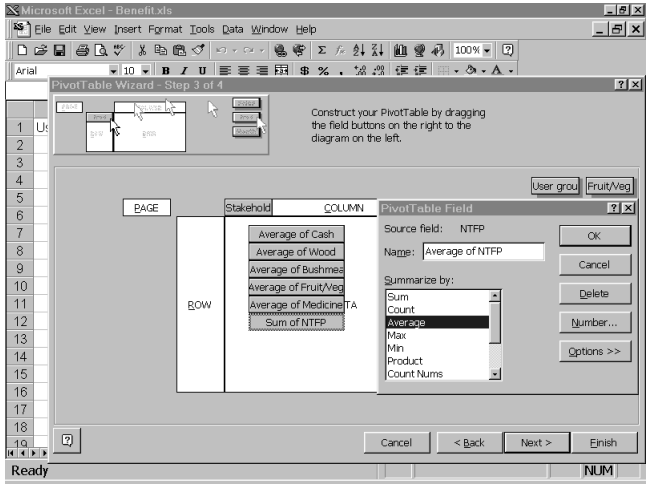
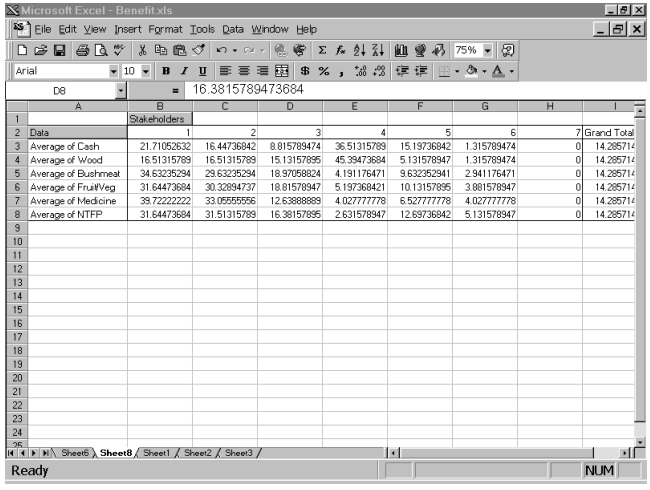


FIGURE 43. Changing the default statistic on forest benefit data.

After you finish changing the statistic, you can click the **Finish** button and you will get the table as shown in Figure 44. If you prefer a smaller number of digits, you can set the decimal place.[43]

43 To set the decimal place, you can go to the **F**ormat menu, choose **c**ells, and under category, choose Numbers. Then you can set the decimal place that you want by increasing or decreasing the default decimal place (default = 2).


Microsoft Excel - Benefit.xls

File Edit View Insert Format Tools Data Window Help

Arial 10 75%

D8 = 16.3815789473684

	A	B	C	D	E	F	G	H	I
1		Stakeholders							
2	Data	1	2	3	4	5	6	7	Grand Total
3	Average of Cash	21.71052632	16.44736842	8.815789474	36.51315789	15.19736842	1.315789474	0	14.285714
4	Average of Wood	16.51315789	16.51315789	15.13157895	45.39473684	5.131578947	1.315789474	0	14.285714
5	Average of Bushmeat	34.63235294	29.63235294	18.97058824	4.191176471	9.632352941	2.941176471	0	14.285714
6	Average of Fruit/Veg	31.64473684	30.32894737	18.81578947	5.197368421	10.13157895	3.881578947	0	14.285714
7	Average of Medicine	39.72222222	33.05555556	12.63888889	4.027777778	6.527777778	4.027777778	0	14.285714
8	Average of NTFP	31.64473684	31.51315789	16.38157895	2.631578947	12.69736842	5.131578947	0	14.285714

Sheet6 Sheet8 Sheet1 Sheet2 Sheet3

Ready NUM

FIGURE 44. Excel table describing forest benefits distribution according to all respondents.

d. Conducting advanced data analyses using SPSS

- **Generating the table that describes forest benefits distribution, according to a particular subgroup.**

  As in the case of the 'access to resources by generation' pebble sorting method, for which analysis was described earlier, it may be useful to compare different subgroups within each demographic element (ethnicity, gender, educational level, etc.), according to their opinions on the distribution of pebbles among stakeholders. To compare those subgroups' opinions, we need to be able to describe forest benefits distribution among stakeholders, according to each subgroup. You can follow our instructions below to get those figures. Imagine that we have a set of respondents with two educational levels, elementary and junior high school.

From the Menu choose **D**ata
Select **C**ases
Click on *if condition is satisfied* (Figure 45).

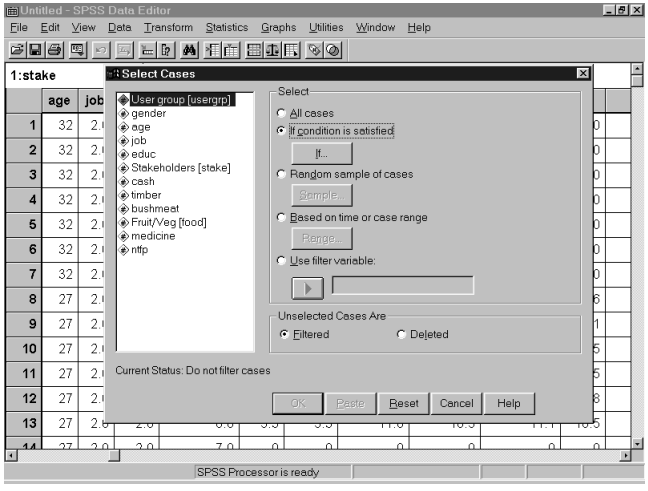


FIGURE 45. Selecting cases for specified subgroup on forest benefits data

Click on the *If* button.

Look at your coding sheet to determine the codes for elementary school and junior high school (for instance, you may have elementary school = 1, junior high school = 2)

Type in the conditional box (Figure 46):
educ = 1 (you will filter the data which has a value of 1 on the *educate* column)

Then click **Continue** and **OK** (Figure 46).

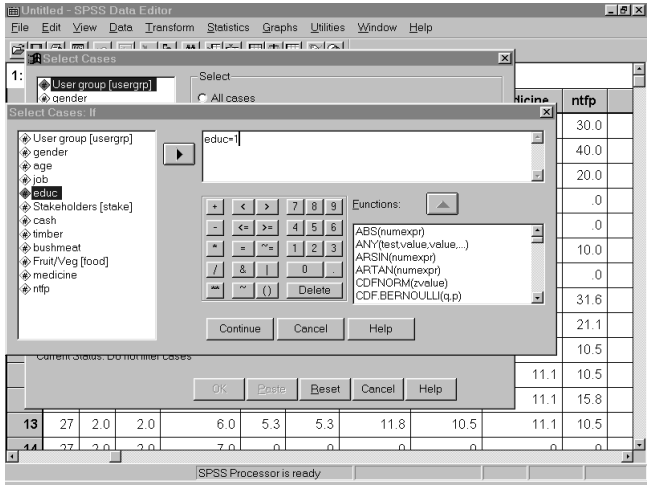
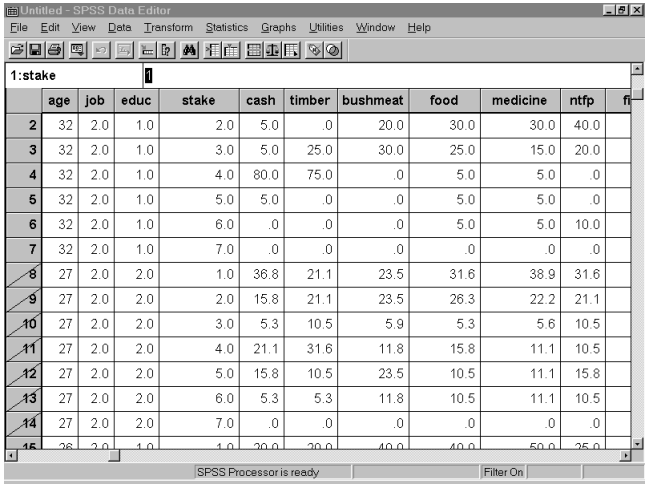


FIGURE 46. Filtering lower educational level respondents on forest benefits data

Now, if you notice on the SPSS spreadsheet, there may be rows with values that are not equal to 1 on *educ* column. These are respondents with junior high school educational level and are not included in the analysis, thus are inactive. This inactive status is marked by a diagonal line at the row number (see Figure 47).



	age	job	educ	stake	cash	timber	bushmeat	food	medicine	ntfp	fi
2	32	2.0	1.0	2.0	5.0	.0	20.0	30.0	30.0	40.0	
3	32	2.0	1.0	3.0	5.0	25.0	30.0	25.0	15.0	20.0	
4	32	2.0	1.0	4.0	80.0	75.0	.0	5.0	5.0	.0	
5	32	2.0	1.0	5.0	5.0	.0	.0	5.0	5.0	.0	
6	32	2.0	1.0	6.0	.0	.0	.0	5.0	5.0	10.0	
7	32	2.0	1.0	7.0	.0	.0	.0	.0	.0	.0	
8	27	2.0	2.0	1.0	36.8	21.1	23.5	31.6	38.9	31.6	
9	27	2.0	2.0	2.0	15.8	21.1	23.5	26.3	22.2	21.1	
10	27	2.0	2.0	3.0	5.3	10.5	5.9	5.3	5.6	10.5	
11	27	2.0	2.0	4.0	21.1	31.6	11.8	15.8	11.1	10.5	
12	27	2.0	2.0	5.0	15.8	10.5	23.5	10.5	11.1	15.8	
13	27	2.0	2.0	6.0	5.3	5.3	11.8	10.5	11.1	10.5	
14	27	2.0	2.0	7.0	.0	.0	.0	.0	.0	.0	
15	26	2.0	1.0	1.0	20.0	20.0	40.0	40.0	50.0	25.0	

FIGURE 47. Cases selection result (forest benefits data)

Do the same step as the fourth step of Part b of this section, for getting the average pebble distribution according to respondents with an elementary school educational level (Figure 48).

To get the average pebble distribution according to respondents with a junior high school educational level, simply change the conditional expression to :
educ = 2

Then do the same steps as in the fourth step of Part b of this section, as above.

Now, we can compare the differences of forest benefits distribution among two groups of stakeholders with different educational levels (Figure 49).

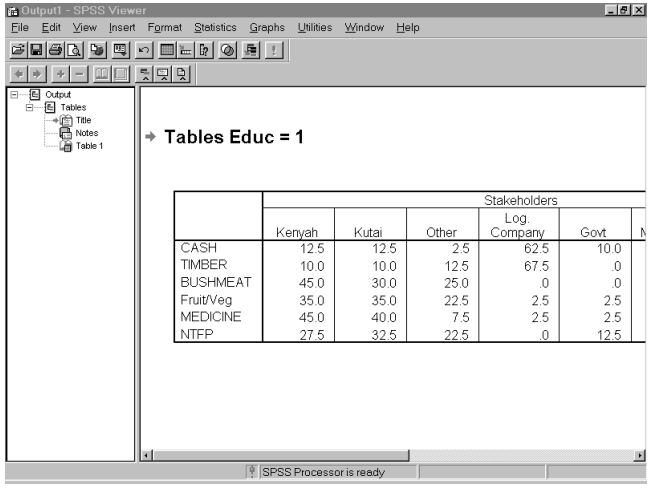


FIGURE 48. Forest benefits distribution among stakeholders according to respondents with lower educational level

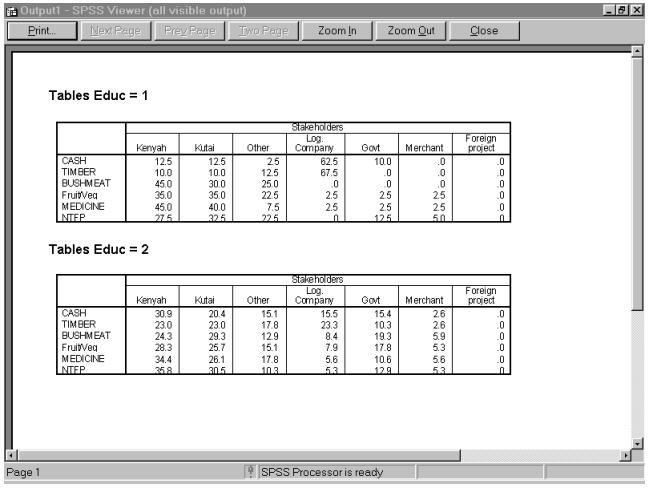


FIGURE 49. Comparison of forest benefits distribution among stakeholders based on educational level

If you have more than two categories in your demographic data (e.g., three or more educational levels), you can continue this same step to get the *mean/median* value of pebble distribution among stakeholders for the other categories.

- **Testing agreement/disagreement among different groups on the distribution of forest benefits**

  You can check whether there is agreement or disagreement among the subgroups within each demographic characteristic[44] about the amount of forest benefits attributed to each stakeholder. You can do the analysis for each stakeholder. Filter the data so that only rows for selected stakeholders are active and the other rows are inactive (see above, on how to filter subgroups of data). In Figure 50, we filter the data so that only rows for Stake = 1 (Kenyah) are active while the others are inactive.

From menu, choose: **S**tatistics
Nonparametric test
2 independent samples or
K independent samples[45]

44 Demographics characteristics here could be gender, educational level, ethnicity, etc.

45 If you would like to test the data with only two categories or two groups, you should choose **2** independent samples and then use the Mann-Whitney test. If you are dealing with data in more than two categories, you should choose **K**-independent samples, and then use the Kruskall-Wallis test.

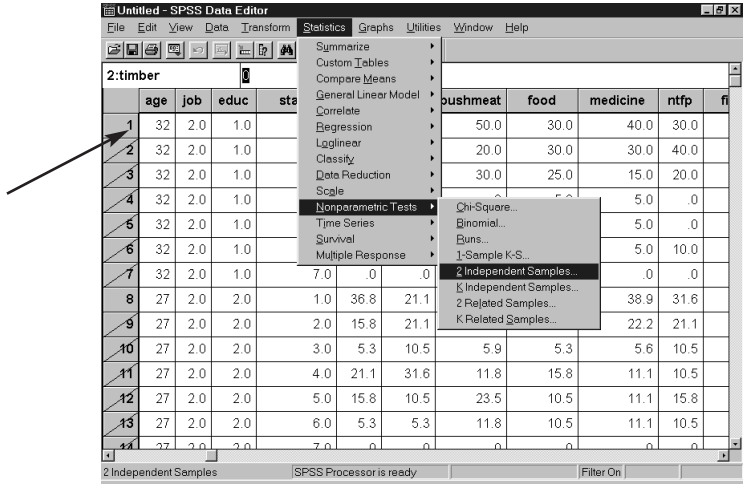


FIGURE 50. Filtering data for Kenyah and selecting statistical test (forest benefits data)

Put the test variables[46] into the *test variable list* box and grouping variable into the *grouping variable* box (Figure 51). You then should define a minimum and a maximum value of the grouping variable (you can see the meaning of each code on your coding sheet). See Figure 52 for details.

46 *'Test variables'* should be the column containing the pebble for each benefit. The grouping variable is the column containing the demographic characteristics of subgroups that we want to compare.

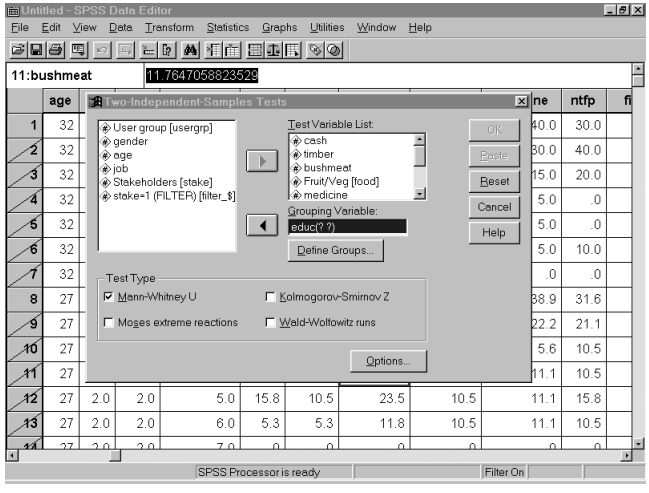


FIGURE 51. Selecting test variables and grouping variable (forest benefits data)

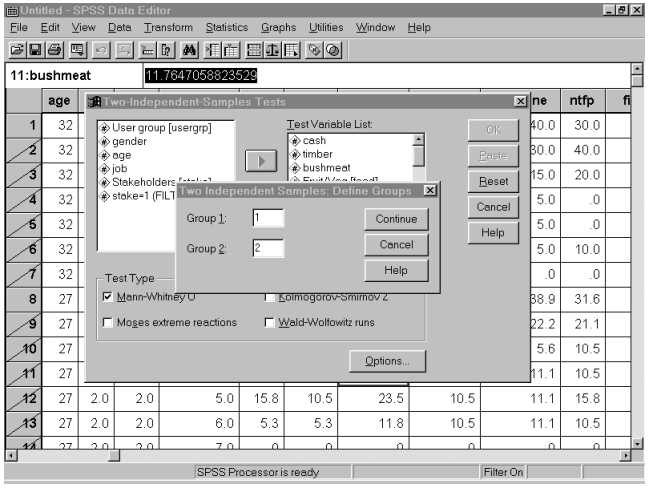


FIGURE 52. Defining the range for grouping variable (forest benefits data)

Click **Continue** and then **OK**.

You will get the results as shown in Figure 53. The test will be carried out for each benefit. Be sure to check the significance of each test.

See the P-value (indicated by the arrow). If the P-value falls below 0.05, we reject the null hypothesis[47] and conclude there is disagreement among the groups about the amount of pebbles belonging to the selected stakeholder (Kenyah, in this case). If the P-value falls above 0.05, then we conclude there is agreement among the different groups.

Do the same step to test agreement/disagreement about the amount of forest benefits attributed to the other stakeholders. For instance, if you want to check agreement/disagreement among different groups on amount of pebbles attributed to *Kutai*, you can filter the data so that only rows with *Stake* = 2 (*Kutai*) are active while the others are inactive).

47 Under each forest benefit, the null hypothesis is: That all the subgroups allocated the same amount of pebbles for the stakeholder being tested. In the other words, all subgroups agreed about the amount of corresponding forest benefits attributed to the stakeholder being tested.

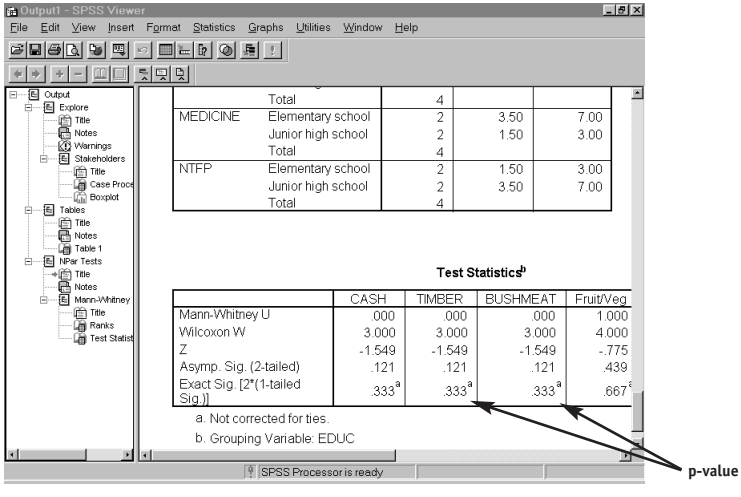


FIGURE 53. Output of statistical test for Kenyah based on educational level (forest benefit data)

e. Conducting advanced data analysis using Excel

- **Generating the table that describes forest benefits distribution, according to a particular subgroup**

You can use a similar procedure to generate a table of forest benefits distribution according to all respondents (Part c of this section). The difference will be when you construct the pivot table. Instead of just dragging all benefits to the data space and stakeholders to the column space, you must also drag the column where the particular demographic characteristics are into the row space[48] (Figure 54). In this example, we use educational level.

48 Demographic characteristics here can be gender, educational level, age, ethnicity, etc.

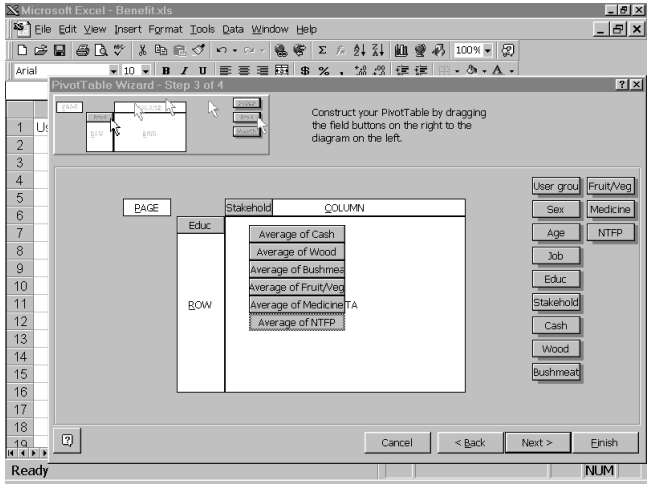
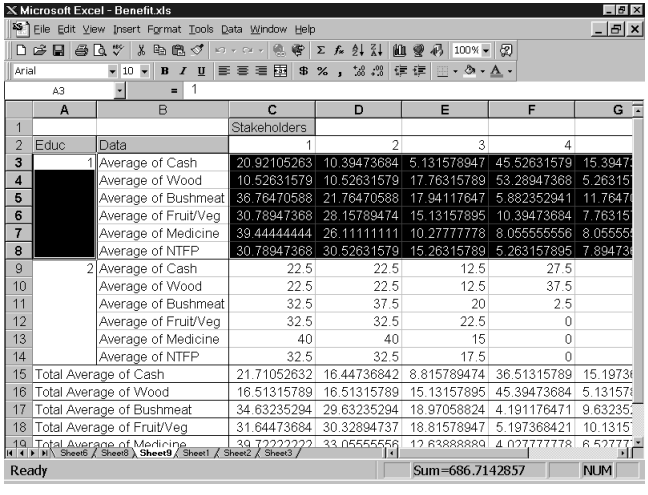


FIGURE 54. Constructing a pivot table for advanced analysis of forest benefits data

By clicking the **Finish** button, you will get the result (Figure 55). Notice the two sub-tables for each educational level (in this example, as in the previous one, educational level 1 means elementary school, while educational level 2 means junior high school).



	A	B	C	D	E	F	G
1			Stakeholders				
2	Educ	Data	1	2	3	4	
3	1	Average of Cash	20.92105263	10.39473684	5.131578947	45.52631579	15.3947
4		Average of Wood	10.52631579	10.52631579	17.76315789	53.28947368	5.26315
5		Average of Bushmeat	36.76470588	21.76470588	17.94117647	5.882352941	11.7647
6		Average of Fruit/Veg	30.78947368	28.15789474	15.13157895	10.39473684	7.76315
7		Average of Medicine	39.44444444	26.11111111	10.27777778	8.055555556	8.05555
8		Average of NTFP	30.78947368	30.52631579	15.26315789	5.263157895	7.89473
9	2	Average of Cash	22.5	22.5	12.5	27.5	
10		Average of Wood	22.5	22.5	12.5	37.5	
11		Average of Bushmeat	32.5	37.5	20	2.5	
12		Average of Fruit/Veg	32.5	32.5	22.5	0	
13		Average of Medicine	40	40	15	0	
14		Average of NTFP	32.5	32.5	17.5	0	
15	Total Average of Cash		21.71052632	16.44736842	8.815789474	36.51315789	15.1973
16	Total Average of Wood		16.51315789	16.51315789	15.13157895	45.39473684	5.13157
17	Total Average of Bushmeat		34.63235294	29.63235294	18.97058824	4.191176471	9.63235
18	Total Average of Fruit/Veg		31.64473684	30.32894737	18.81578947	5.197368421	10.1315
19	Total Average of Medicine		39.72222222	33.05555556	12.63888889	4.027777778	6.52777

FIGURE 55. Excel table describing comparison of forest benefits distribution based on educational level

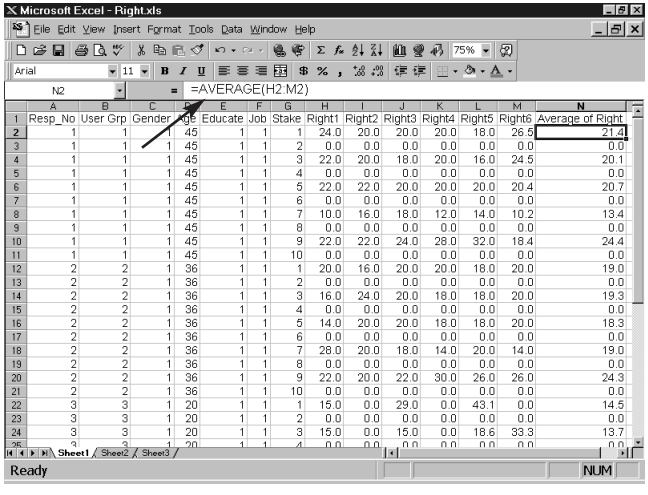
C – ANALYSIS OF METHODS FOR RIGHTS AND MEANS TO MANAGE

This section contains guidance for analysing the results from a pebble distribution method found useful in assessing people's rights and means to manage forests in a co-operative and equitable manner. We have divided the presentation into three parts. We first provide information on how to set up the spreadsheet and enter the data from this pebble distribution method. Next, we explain how to perform simple statistical analyses on the data, including how to examine the data distribution and how to generate simple descriptive tables. For those of you who are satisfied with simple analyses, you can stop there. The final part is intended for those who want to conduct more advanced analyses, such as testing the significance of opinion differences among different groups within each demographic characteristics (based on ethnicity, age, gender, etc.).

1. RIGHTS TO MANAGE THE FOREST GUIDELINES

a. Entering the data

- Enter the data using a spreadsheet programme, such as Excel or Lotus.
- Enter the demographic data, such as user group, gender, age, educational level, etc. in the left-hand columns (as shown in Figure 56, columns A–F). Insofar as possible, enter the demographic data using numeric codes. So if you have categorical data, such as gender, educational level, etc., you need to convert them into numeric codes (e.g., female = 0, male = 1, etc.). It is very important to keep a coding sheet, so you will know the meaning of each code. You will need the coding sheet when you undertake the analysis.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Resp_No	User Grp	Gender	Age	Educate	Job	Stake	Right1	Right2	Right3	Right4	Right5	Right6	Average of Right
2	1	1	1	45	1	1	1	24.0	20.0	20.0	20.0	18.0	26.5	21.4
3	1	1	1	45	1	1	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	1	1	45	1	1	3	22.0	20.0	18.0	20.0	16.0	24.5	20.1
5	1	1	1	45	1	1	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	1	1	1	45	1	1	5	22.0	22.0	20.0	20.0	20.0	20.4	20.7
7	1	1	1	45	1	1	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	1	1	1	45	1	1	7	10.0	16.0	18.0	12.0	14.0	10.2	13.4
9	1	1	1	45	1	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1	1	1	45	1	1	9	22.0	22.0	24.0	28.0	32.0	18.4	24.4
11	1	1	1	45	1	1	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	2	2	1	36	1	1	1	20.0	16.0	20.0	20.0	18.0	20.0	19.0
13	2	2	1	36	1	1	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	2	2	1	36	1	1	3	16.0	24.0	20.0	18.0	18.0	20.0	19.3
15	2	2	1	36	1	1	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	2	2	1	36	1	1	5	14.0	20.0	20.0	18.0	18.0	20.0	18.3
17	2	2	1	36	1	1	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	2	2	1	36	1	1	7	28.0	20.0	18.0	14.0	20.0	14.0	19.0
19	2	2	1	36	1	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	2	2	1	36	1	1	9	22.0	20.0	22.0	30.0	26.0	26.0	24.3
21	2	2	1	36	1	1	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	3	3	1	20	1	1	1	15.0	0.0	29.0	0.0	43.1	0.0	14.5
23	3	3	1	20	1	1	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	3	3	1	20	1	1	3	15.0	0.0	15.0	0.0	18.6	33.3	13.7
25	3	3	1	20	1	1	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

FIGURE 56. Spreadsheet format for rights to manage data

- If you have a certain number (*n*) of stakeholders, you should use *n* rows for each respondent, or in other words, one row for each stakeholder. For example, in Figure 56, we use a data set from Bulungan[49] where we identified 10 stakeholders. We use rows 2–11 (10 rows) for respondent1, rows 12–21 (10 rows) for respondent2, and so on. We need one column in which to enter the stakeholder's code[50], indicating which rows belong to which stakeholders. Column G in our example above contains the stakeholder's code.

- You can enter the number of pebbles for each stakeholder allocated by the respondents in the next six columns. Column H for Right1 (Determining/protecting Boundaries), Column I for Right2 (Develop/apply Rules/Regulations), and so on.

49 Bulungan is located in East Kalimantan, Indonesia, one of CIFOR's research sites.

50 Each stakeholder was coded using a number. If we have *n* stakeholders, we assign 1-*n* to each stakeholder arbitrarily. But we suggest you code the stakeholders in a mnemonic fashion that will make some sort of intuitive sense to you. In our analyses, big numbers were given to stakeholders with a close relationship with government and small numbers to local people, who in many cases have little interaction with the government.

- Use the next to the last column on the right (Right6) for getting the average of rights for each stakeholder. To get the average, simply use Excel's AVERAGE function[51]. For instance, cell N2 in Figure 56 is an average of cell H2 to cell M2 (shown by the arrow).
- After you finish entering the data for all respondents, don't forget to save the file in Lotus 123 format (*.wk1).

b. Conducting simple data analyses using SPSS[52]

We have used SPSS (Statistical Package for Social Sciences) to analyse the data.

- **Opening the data—**You can open the Lotus 123 file in an SPSS spreadsheet. Use the read variable name option.[53]
- **Labelling the data**—Use the coding sheet, the one that you made when you coded the demographic data into numeric codes, to label the data. For labelling the data, place the cursor at the column containing the demographic data. Here we give an example to label educational level data.

From the menu, choose: **D**ata
Define variable (Figure 57)

Click **Label** button (shown by the arrow). You will be asked to enter your label (Figure 58).

51 To use the AVERAGE function, just type = **AVERAGE (Start Cell:End Cell)**. Start and end cell is the range to be averaged. For example, in Figure 1, cell N2 is the average of H2 to M2 (shown by the arrow).

52 We have also made guidelines for those of you who want to carry out simple analyses using Excel (see Part c of this section).

53 From the SPSS menu bar, you can choose **F**ile → **O**pen, then change the file type to Lotus (*.wk1) and choose the file you want to open. The SPSS processor automatically will ask you whether you want to read the variable name or not. Click on the *'read the variable names'* option.

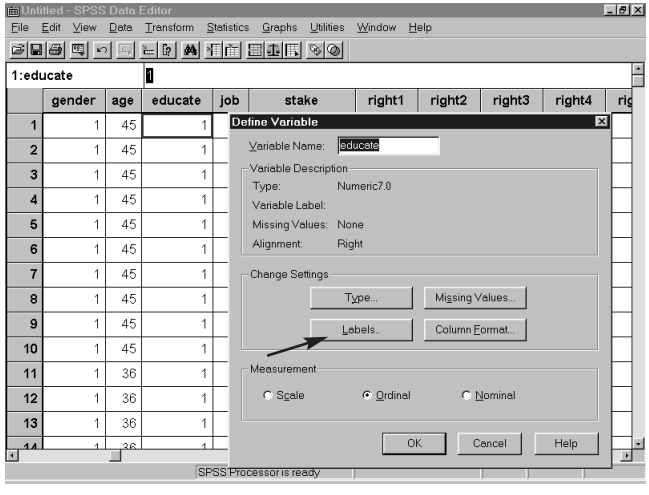


FIGURE 57. Label button (rights to manage data)

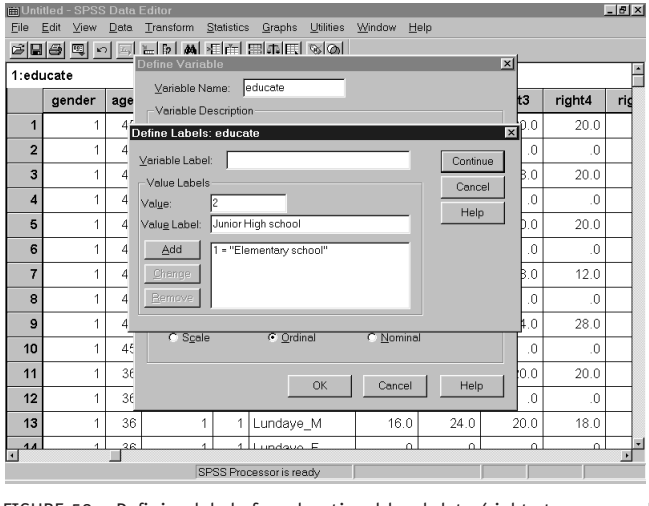


FIGURE 58. Defining labels for educational level data (rights to manage data)

Enter the demographic label (e.g., junior high school, in the example above) and when you finish, click **Continue**.

Follow the same procedure for the other demographic data.

- **Checking data distribution**

  Commonly, we calculate a *mean/average* to measure the distribution of pebbles according to the respondents. However, using a *mean* has some disadvantages when the data are not spread symmetrically or when there are one or more outliers. If this occurs, we can use median value instead. To check whether the data are spread symmetrically or not, we use a *boxplot*.

  You can obtain a *boxplot* by following these instructions:

From the menu, choose: **G**raph
Bo**x**plot

Choose *simple* and *summaries for groups of cases* (Figure 59).

Click on **Define**.

Enter *average of rights* as variable and *stake* as category axis (Figure 60).

You will get the boxplot as shown in Figure 61. The black line inside the box shows the median position. The upper and lower edges of the box show the position of the 3rd and 1st quartiles, respectively. The data are distributed symmetrically if and

only if the median is located in the middle of the box, at approximately the same distance from both the 3rd and 1st quartiles.

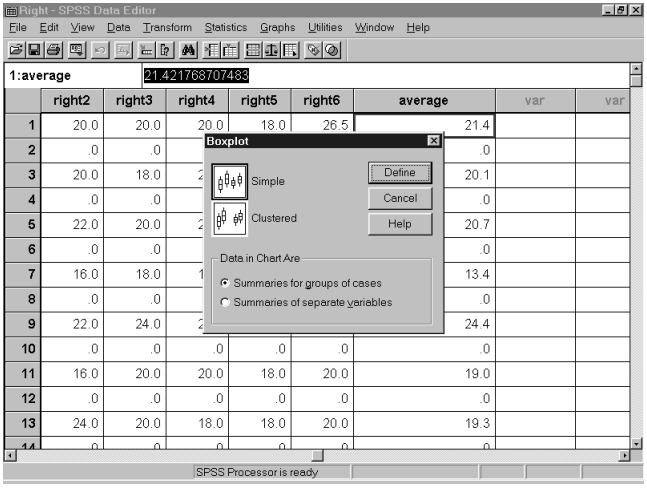


FIGURE 59. Choosing type of boxplot for rights to manage data

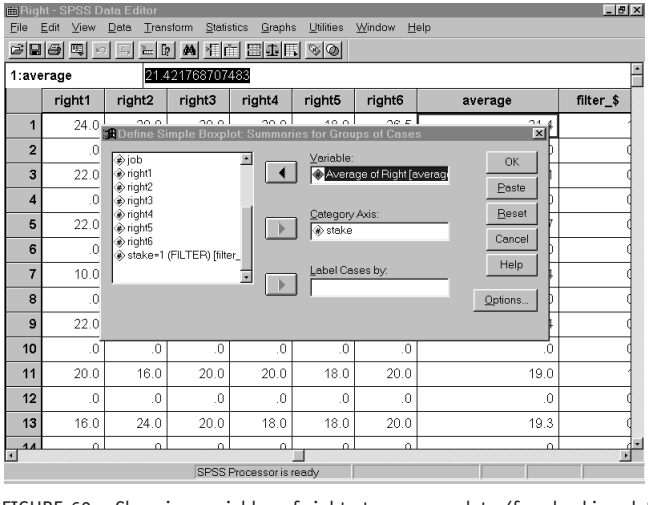


FIGURE 60. Choosing variables of rights to manage data (for checking data distribution)

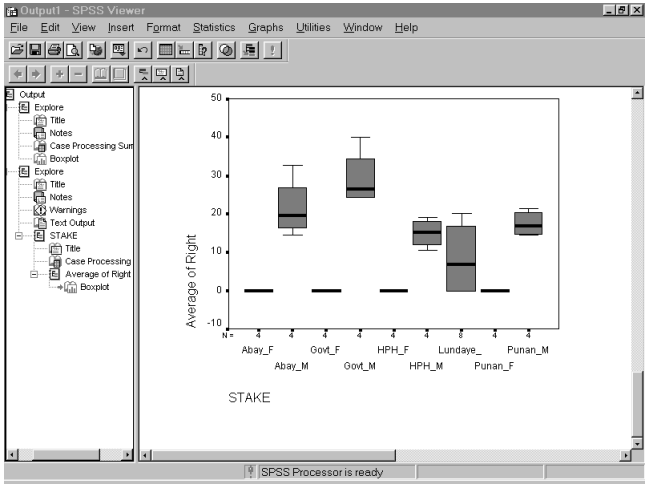


FIGURE 61. Boxplot for rights to manage data

If the data distribution is highly skewed or there are some outliers (usually indicated by asterisks or circles), we suggest you use the median instead.

- **Generating the table that describes the pebble distribution according to all respondents**

From the menu, choose: **S**tatistics
Custom **T**ables
Basic Tables

Put *average of rights* in the *summaries* box. You can do this by clicking the column name and clicking on the arrow beside the *summaries* box (Figure 62).

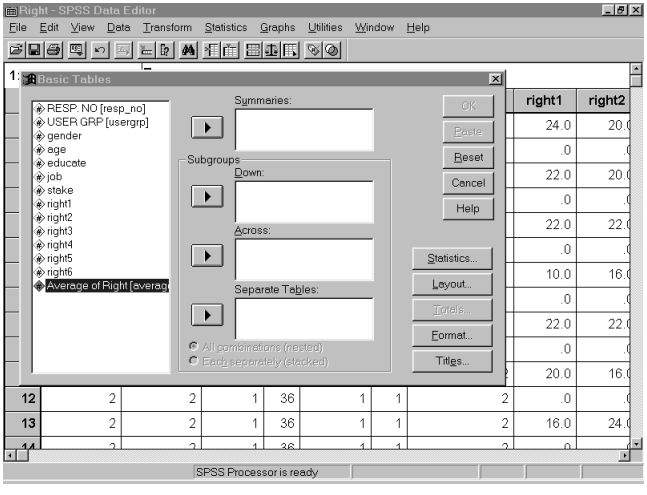


FIGURE 62. Step 1 of selecting variables of rights to manage data (for summarising)

Put *stake* in *subgroups – down* box (Figure 63).

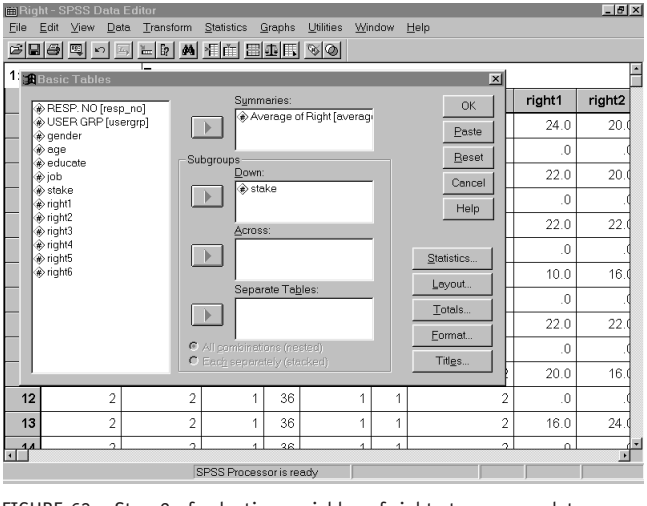


FIGURE 63. Step 2 of selecting variables of rights to manage data (for summarising)

Click on **S**tatistics button and add *Mean* or *Median* (depending on which measure you decide to use) as the cell's statistics.

By clicking the **OK** button, you will get the results (Figure 64).

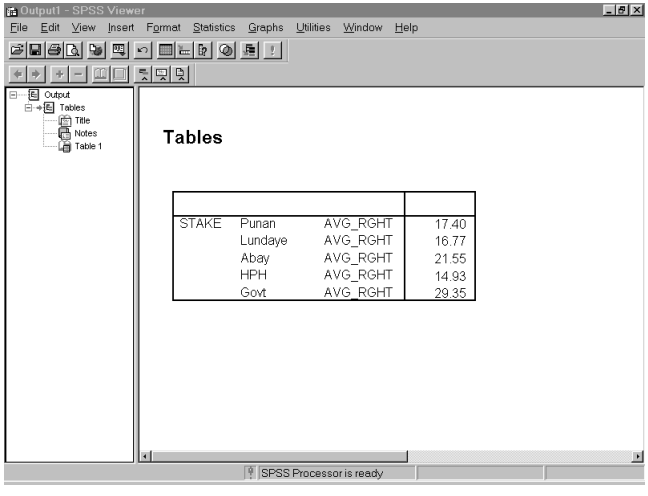


FIGURE 64. SPSS table describing distribution of rights to manage among stakeholders, according to all respondents

c. Conducting simple data analysis using Excel

- **Generating the table that describes the distribution of rights to manage, according to all respondents**

From the **D**ata Menu choose, **P**ivotTable report, you will see the dialogue box as shown in Figure 65.

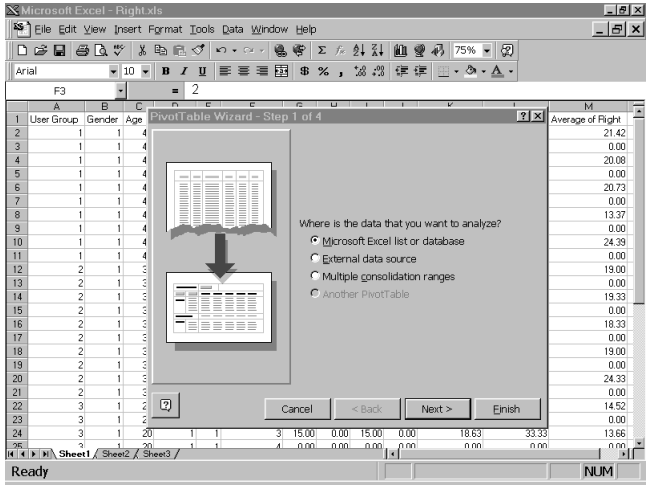


FIGURE 65. Pivot table wizard (rights to manage data)

Click on **Next** button twice and you will see the dialogue box as shown in Figure 66.

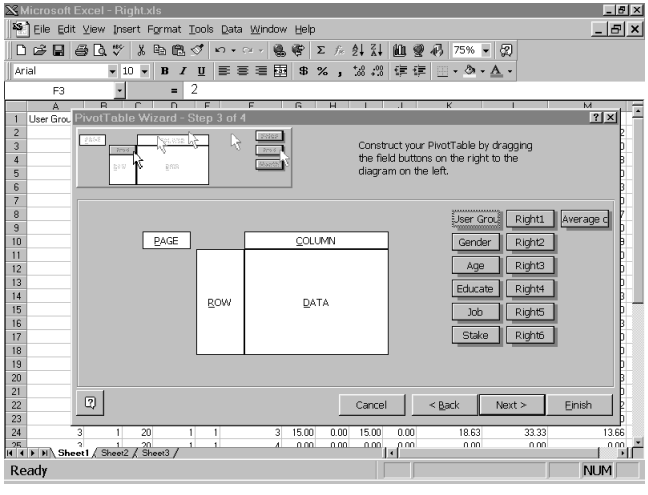


FIGURE 66. Constructing a pivot table for simple analysis of rights to manage data (Step 1)

Drag *average of rights* into data space and stakeholders to row space (Figure 67).

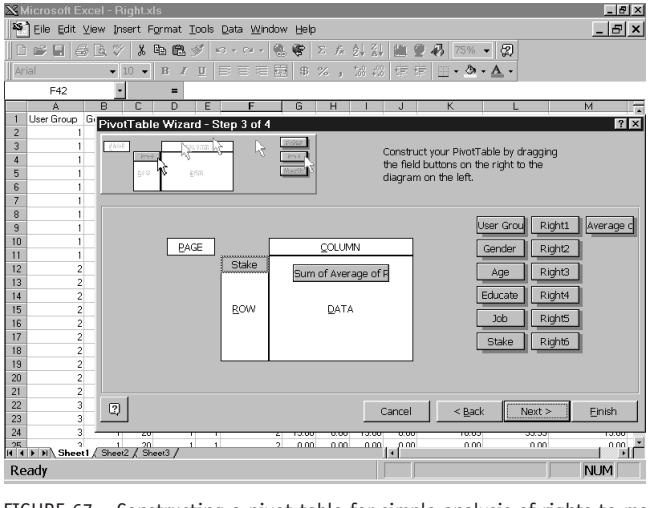


FIGURE 67. Constructing a pivot table for simple analysis of rights to manage data (Step 2)

The sum is the default statistics. You can change the statistic by double-clicking the button and choosing the statistic that you want to calculate (Figure 68).

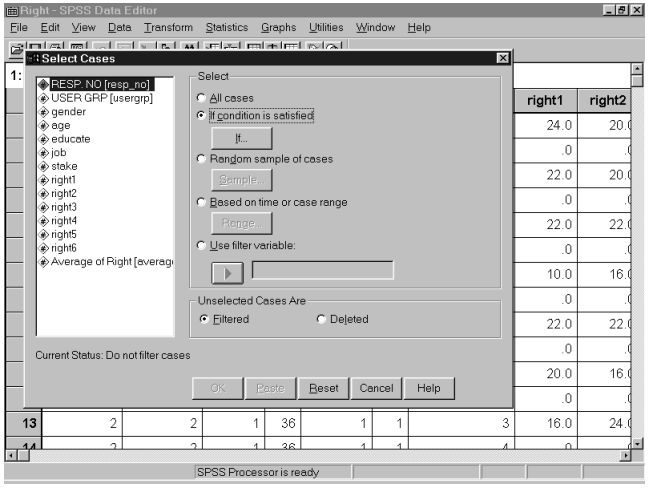


FIGURE 68. Changing the default statistics on rights to manage data

After, you have decided on the appropriate statistic, you can click the **Finish** button and you will get the table as shown in Figure 69. If you prefer a smaller number of digits, you can set the decimal place.[54]

54 To set the decimal place, go to **F**ormat menu, choose **c**ells and under category, choose **n**umbers. Then you can set the decimal place that you want by increasing or decreasing the default decimal place (default = 2).

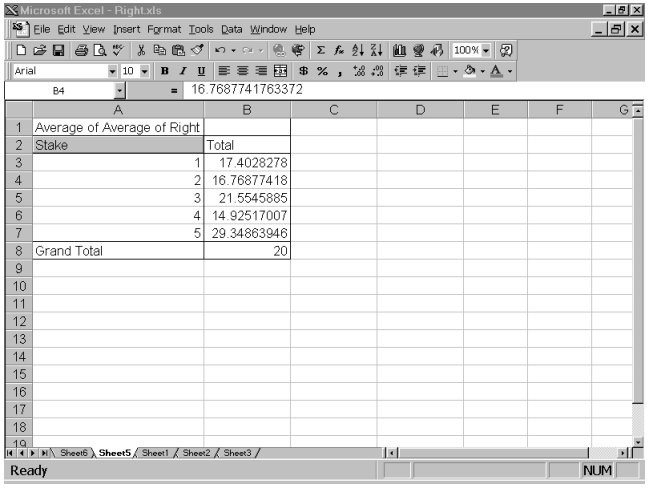


FIGURE 69. Excel table describing distribution of rights to manage among stakeholders, according to all respondents

d. Conducting advanced data analyses using SPSS

- **Generating a table that describes the distribution of rights to manage, according to a particular subgroup**

  Sometimes, it is interesting to compare different subgroups' opinions within each demographic characteristic (ethnicity, gender, educational levels, etc.) on the distribution of pebbles among stakeholders. To compare those subgroups' opinions, we need to know the figures that describe the distribution of rights to manage among stakeholders according to each subgroup. You can follow our instructions below. Imagine we have a set of respondents with two educational levels, elementary and junior high school.

From the menu, choose: **D**ata
Select **C**ases
Tick on *if condition is satisfied* (Figure 70)

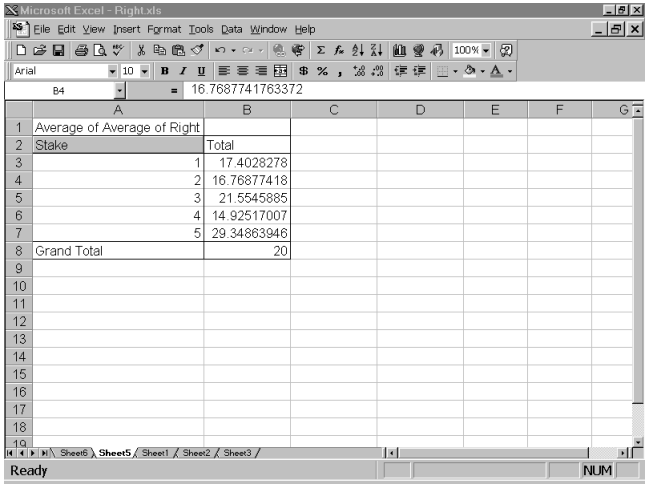


FIGURE 70. Selecting cases for specified subgroups (rights to manage data)

Click on the *If* button.

Look at your coding sheet to determine the codes for elementary school and junior high school (for instance, you may have elementary school = 1, junior high school = 2)

Type in the conditional box
educate = 1 (you will filter the data which has a value of 1 on *educate* column).

Then click **Continue** and **OK** (Figure 71).

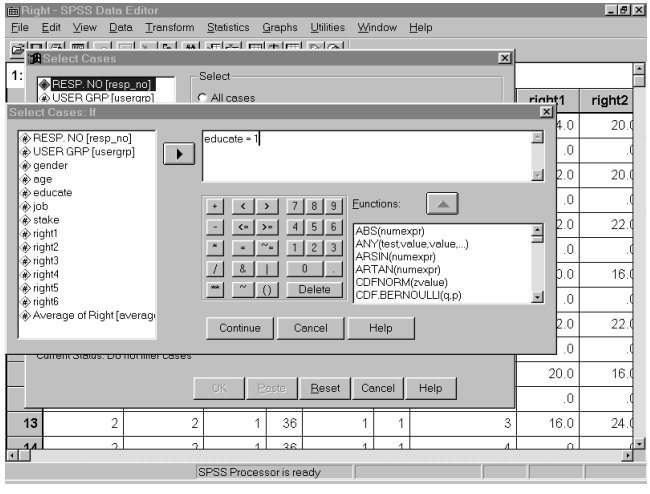
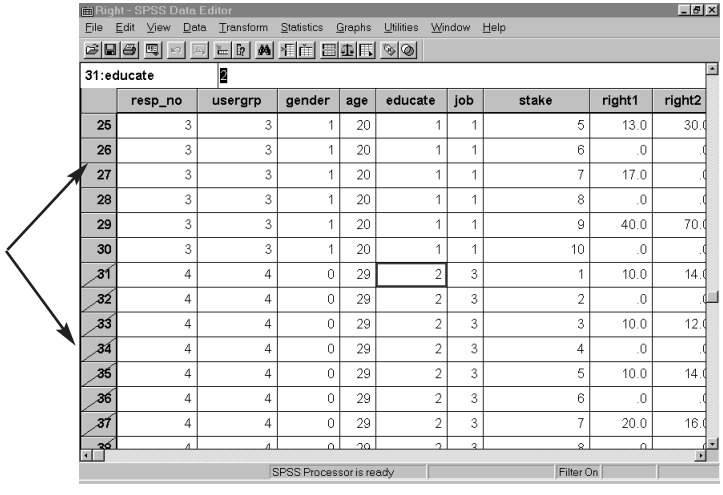


FIGURE 71. Filtering with a lower educational level respondents on rights to manage data

Now, If you notice on the SPSS spreadsheet, there may be rows with values not equal to 1 in the *educate* column. These are respondents with higher educational level and are not included in the analysis, thus are inactive. This inactive status is marked by a diagonal line through the row number (see figure 72 for details).



	resp_no	usergrp	gender	age	educate	job	stake	right1	right2
25	3	3	1	20	1	1	5	13.0	30.0
26	3	3	1	20	1	1	6	.0	.0
27	3	3	1	20	1	1	7	17.0	.0
28	3	3	1	20	1	1	8	.0	.0
29	3	3	1	20	1	1	9	40.0	70.0
30	3	3	1	20	1	1	10	.0	.0
31	4	4	0	29	2	3	1	10.0	14.0
32	4	4	0	29	2	3	2	.0	.0
33	4	4	0	29	2	3	3	10.0	12.0
34	4	4	0	29	2	3	4	.0	.0
35	4	4	0	29	2	3	5	10.0	14.0
36	4	4	0	29	2	3	6	.0	.0
37	4	4	0	29	2	3	7	20.0	16.0

FIGURE 72. Result from selecting cases (rights to manage data)

Do the same step as in the fourth step of Part b of this section, for getting the average pebble distribution according to respondents with an elementary school educational level (see Figure 73).

To get the average pebble distribution according to respondents with a junior high school education level, simply change the conditional expression to :
Educate = 2

Then do the same step as in the fourth step of Part b of this section.

Now, we can compare the differences in pebble distribution among two groups of stakeholders with different educational levels (Figure 74).

If you have more than two categories in your demographic data, you can do the same step to get the *mean/median* value of pebble distribution among stakeholders.

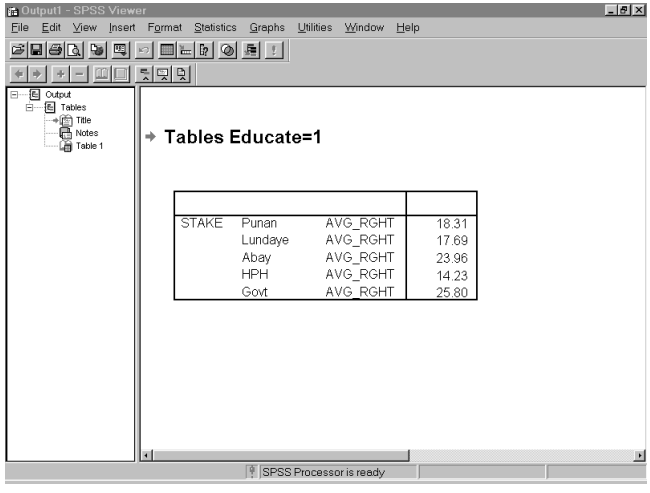


FIGURE 73. Distribution of rights to manage among stakeholders, according to respondents with a lower educational level

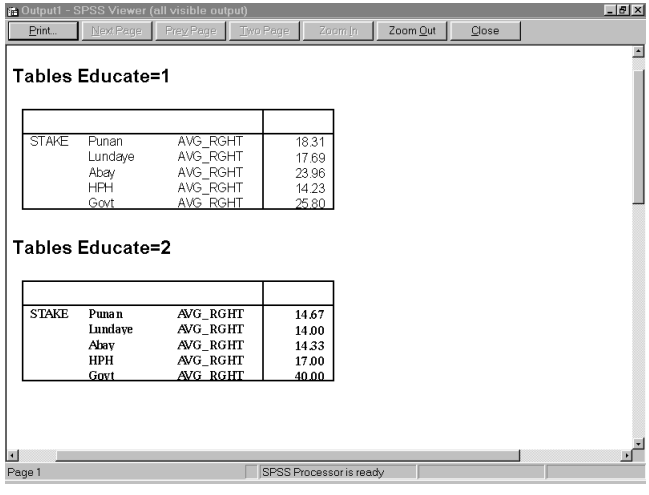


FIGURE 74. Comparison of rights to manage distribution based on educational level

- **Testing agreement/disagreement among different groups on the distribution of rights to manage**

  You can check whether there is agreement or disagreement among the different groups within each demographic characteristic[55] about the amount of rights attributed to specified stakeholders. You can do the analysis for each stakeholder. What you should do first is filter the data so that only rows for specified stakeholders are active while the other rows are inactive. In this case, we filter data attributed to Punan (*Stake* = 1) only (see Figure 75). For detailed guidance on how to filter the data, see the first step of Part d of this section.

55 Demographic characteristics here could be gender, educational level, ethnicity, etc.

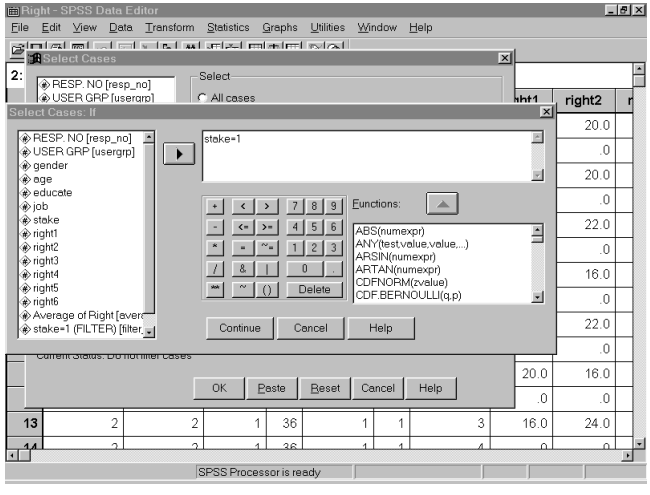


FIGURE 75. Filtering data for Punan (rights to manage data)

From the menu, choose: **S**tatistics
Nonparametric test
2 independent samples or
K independent samples[56]
(See Figure 76)

56 If you would like to test the data with only two categories or two groups, you should choose two independent samples and then use the Mann-Whitney test. If you are dealing with data with more than two categories, you should choose K-independent samples, and then use the Kruskall-Wallis test.

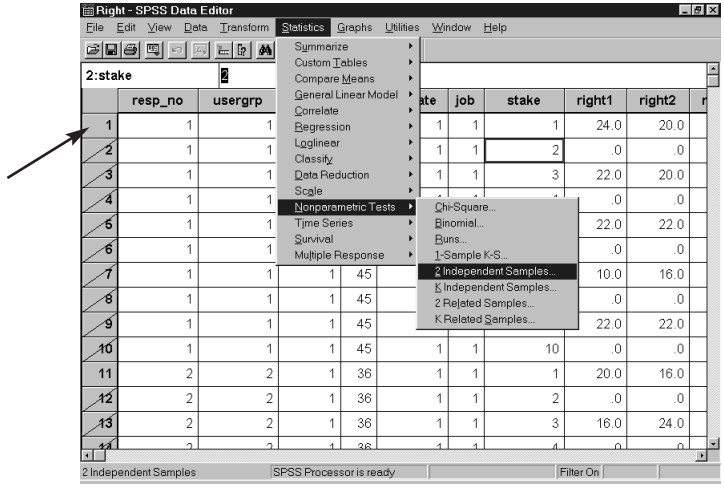


FIGURE 76. Selecting Statistical Test for Testing Agreement on *Rights to Manage Data*

Put the test variable[57] into the *test variable list* box and the grouping variable into the *grouping variable* box (Figure 77). Then, you should define a minimum and maximum value of the grouping variable as shown in Figure 78 (you can see the meaning of each code on your coding sheet).

57 The test variable should be the column containing the average of rights. The grouping variable is the column containing demographic characteristics that we want to compare.

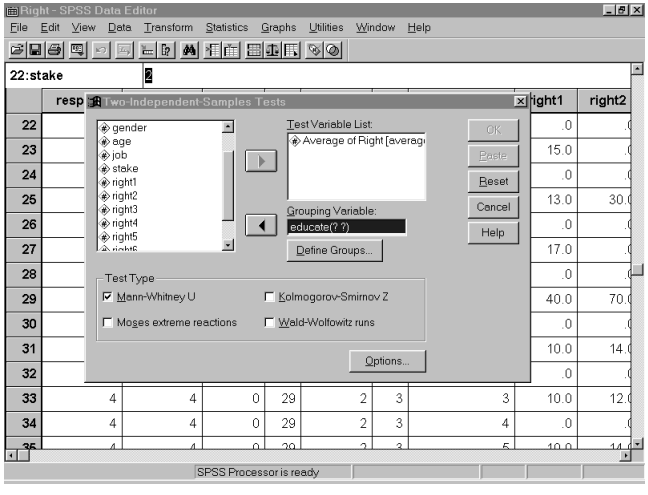


FIGURE 77. Selecting test variables and grouping variables (rights to manage data)

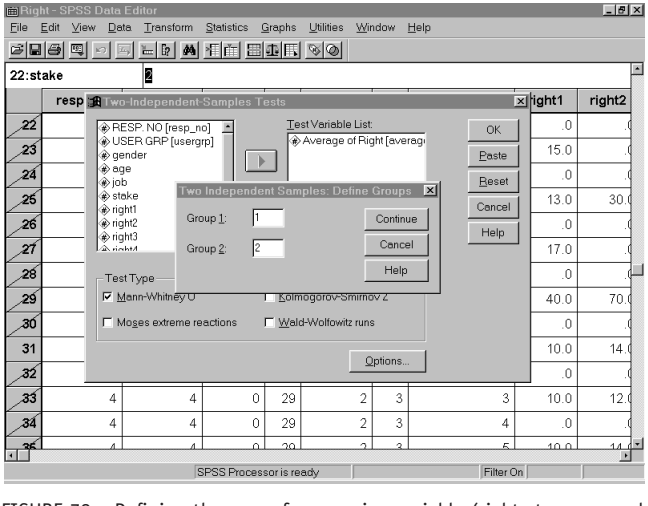


FIGURE 78. Defining the range for grouping variable (rights to manage data)

Click **Continue** and then **OK**.

You will get the results as shown in Figure 79.

See the P-value (indicated by the arrow). If the P-value falls below 0.05, we reject the null hypothesis[58] and conclude there is disagreement among the groups about the amount of pebbles belonging to the specified stakeholder. If the P-value exceeds 0.05 then we conclude there is agreement among the different groups.

You can undertake analysis for the other stakeholders as well, by changing the filtering statement. For instance if you want to test the amount of pebbles attributed to *Lundaye*[59] (look at your coding sheet and get the code for *Lundaye*, *Stake* = 2). Then change the filtering status in Figure 18 to *Stake* =2 and run the same procedure to obtain the statistical test.

58 The null hypothesis is: That all subgroups allocated the same amount of pebbles for the stakeholder being tested. In the other words, all subgroups agreed about the amount of rights attributed to the stakeholders being tested.

59 *Lundaye* is one of the major ethnic group in Paking, Bulungan, where we undertook our field test.

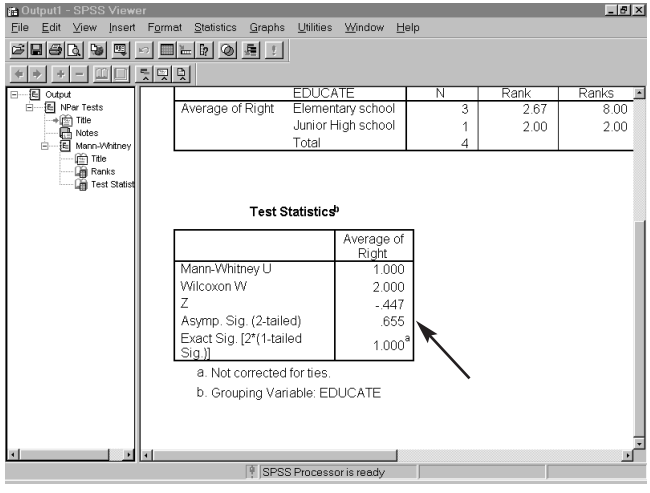


FIGURE 79. Output of statistical test for Punan based on educational level (rights to manage data)

e. Conducting advanced data analysis using Excel

- **Generating a table that describes the pebble distribution, according to particular subgroups**

You can do a similar procedure as the one for getting a table of pebble distribution according to all respondents. The differences will start when you construct the pivot table. Instead of just dragging all benefits to the data space and the stakeholder to the row space, you must also drag the column where the particular sub groups are into the column space[60] (Figure 80). In this example, we use the educational level as an example.

60 Sub groups here can be gender, educational level, age, ethnicity, etc.

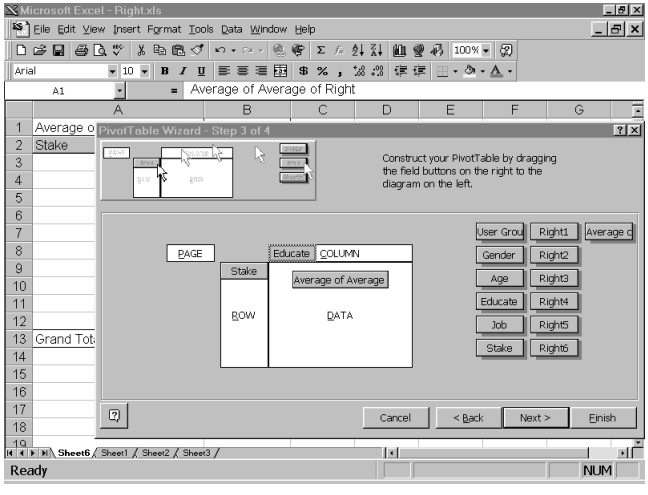
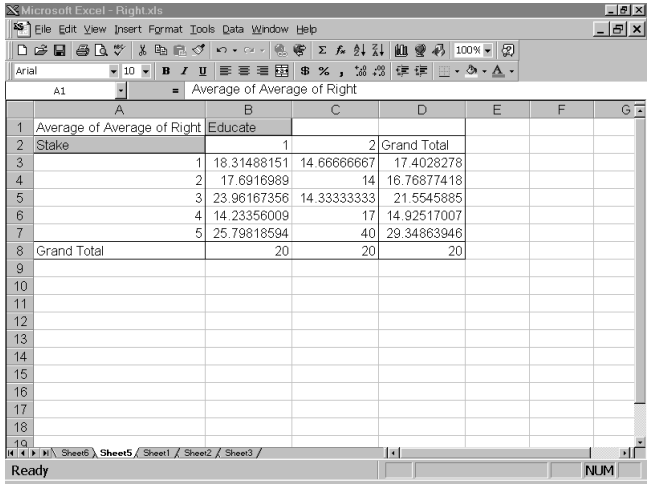


FIGURE 80. Constructing a pivot table for advanced analysis on rights to manage data

By clicking the **Finish** button, you will get the result (Figure 81). There are two sub-tables, one for each educational level (in this example, as the previous one, educational level = 1 means elementary school, while educational level = 2 means junior high school).



	A	B	C	D	E	F	G
1	Average of Average of Right	Educate					
2	Stake	1	2	Grand Total			
3	1	18.31488151	14.66666667	17.4028278			
4	2	17.6916989	14	16.76877418			
5	3	23.96167356	14.33333333	21.5545885			
6	4	14.23356009	17	14.92517007			
7	5	25.79818594	40	29.34863946			
8	Grand Total	20	20	20			
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							

FIGURE 81. Excel table describing comparison of rights to manage distribution based on educational level

D – CONCLUSIONS

This manual has been designed for use with CIFOR's other C&I tools, particularly *The BAG* and *The Grab Bag*. *The Scoring and Analysis Guide* has covered three main topics: a scoring guide, guidelines on developing a master C&I spreadsheet for use with the scoring guide, and an analysis guide. The first (Section I) provided the user with some global comparisons of conditions, linked to scores considered reasonable by the authors and based on considerable field experience in testing C&I. The purpose was to aid users in making assessments of conditions they encounter in the field, linked to human well-being. The second (II) was designed for users who are relatively unfamiliar with computer spreadsheet use, and explained both the process of making and using a spreadsheet, and provided more details about a proposed, overall scoring method. The third and longest, Section III, provided considerable detail on ways to analyse the results from several of the quantitative methods described in *The BAG* and *The Grab Bag*. This manual is to be used as a reference document, with users going directly to the section most relevant for their particular needs.

We have tried to provide assistance and guidance in the difficult task of assessing, scoring, and analysing data resulting from assessment procedures. Although we have found these procedures helpful, we recognise that the task of assessment and the judgements required remain formidable. Assessing human well-being is not an easy task.

We remain convinced that the best assessments will result from experienced and sympathetic assessors who continue to use their minds in creative and constructive ways as they go through the procedures suggested in this manual. We have not yet reached a state in the assessment of sustainable forest management, including human well-being, where we can follow procedures blindly and come up with sen-

sible conclusions. We conclude by urging users to keep their minds engaged as they examine the conditions of the people in and around the forests they are assessing.

E – BIBLIOGRAPHY

Colfer, C.J.P., Brocklesby, M.A., Diaw, C., Etuge, P., Günter, M., Harwell, E., McDougall, C., Porro, N.M., Porro, R., Prabhu, R., Salim, A., Sardjono, M.A., Tchikangwa, B., Tiani, A.M., Wadley, R.L., Woelfel, J. and Wollenberg, E. 1999. The BAG (Basic assessment guide for human well-being). Criteria and Indicators Toolbox Series No. 5. CIFOR, Bogor, Indonesia.

Colfer, C.J.P., Brocklesby, M.A., Diaw, C., Etuge, P., Günter, M., Harwell, E., McDougall, C., Porro, N.M., Porro, R., Prabhu, R., Salim, A., Sardjono, M.A., Tchikangwa, B., Tiani, A.M., Wadley, R.L., Woelfel, J. and Wollenberg, E. 1999. *The Grab Bag:* Supplementary methods for assessing human well-being. Criteria and Indicators Toolbox Series No. 6. CIFOR, Bogor, Indonesia.

Draper, N. and Smith, H. 1981. Applied regression analysis. Wiley, New York.

Makridakis, S., Wheelwright, S.C. and McGee, V.E. 1983. Forecasting: Methods and applications. Wiley, New York.

Sardjono, M.A., Rositah, E., Wijaya, A. and Angie, E.M. 1997. A test of social science assessment methods concerning indicators and criteria for sustainable forest management in East Kalimantan. CIFOR Report. CIFOR, Bogor, Indonesia.

SPSS for Windows, Rel. 8.0.0. 1997. SPSS Inc., Chicago.

Tchikangwa, N.B. with Sikoua, S., Metomo, M. and Adjudo, M.F. 1998. Test des méthodes en sciences sociales de vérification des critères et indicateurs d'aménagement durable des forêts: Périphérie est de la Réserve du Dja (Sud-Cameroun). CIFOR Report. CIFOR, Bogor, Indonesia.

Woelfel, J.K. 1998. User's Guide CatPac II version 2.0. Rah Press, Amherst, NY.

APPENDIX A: CHECKING REGRESSION ANALYSIS ASSUMPTIONS

1. HOMOGENEITY OF RESIDUAL VARIANCES (HOMOSCEDASTICITY)

By homoscedasticity we mean the residual variances is constant for any value of the independent variable (X). A cone-shaped distribution of residuals against the fitted value may give first sight that the residuals variances is not constant (see Figures 82a and 82b). A model that satisfies this assumption will have constant residual variances as shown in Figure 82c.

If the residual shows pattern a or b, you can use *weighted linear regression* (Draper&Smith 1981).

For further discussion on how to overcome this problem, please consult a statistician.

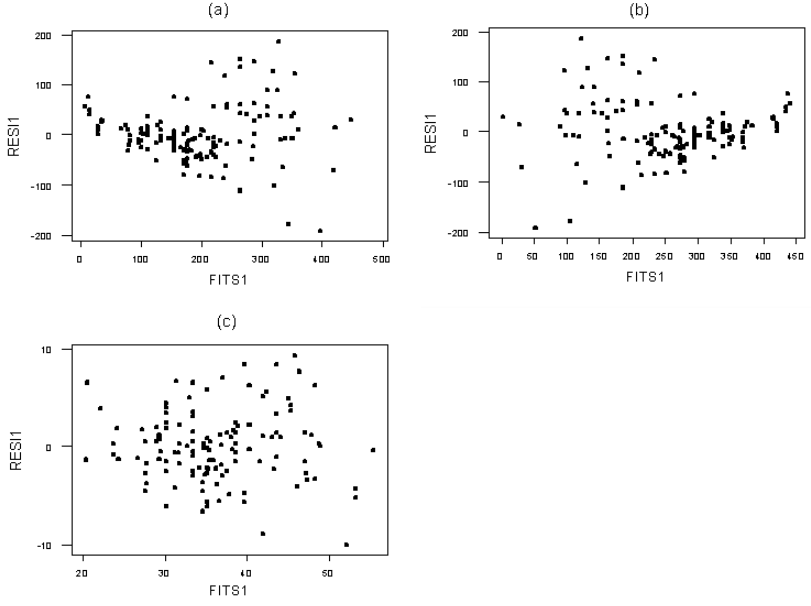


FIGURE 82. Some patterns of residual variances

2. NORMALITY OF RESIDUAL

Regression analysis assumes that the residuals of the model follow normal distribution[61] with zero mean and unity standard deviations. There are many tests to check the normality assumption including the Kolmogorov-Smirnov-test, and the Shapiro-Wilk test. These tests can be easily performed using Minitab. However, we can check this assumption quickly using normal Q-Q plot.

When you run the regression analysis using Excel remember you have clicked on normal probability plot option. This option will produce a normal quantile-quantile (Q-Q) plot, as shown in Figure 83.

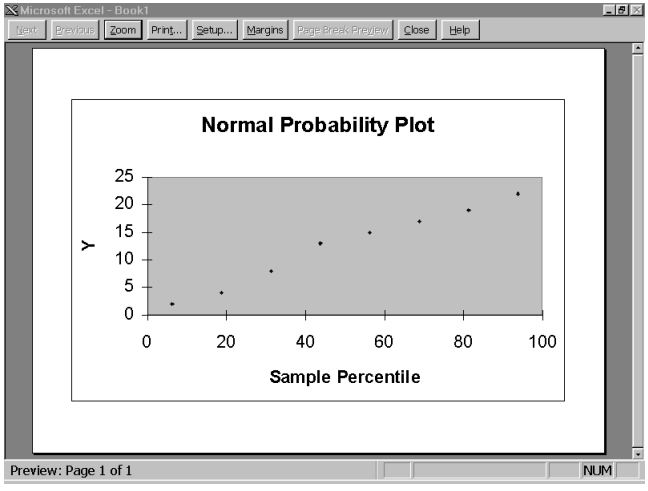


FIGURE 83. Normal probability plot of residual

61 X is said to follow normal distribution if its probability function, f(x) approximately equal to $\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\frac{(x-\mu)^2}{\sigma^2}}$, where μ and σ^2, respectively, are mean and variances of the variable.

If the residual patterns follow a straight line, we may conclude that the residual was distributed following a normal distribution assumption. The more the residuals depart from straight line pattern, the more likely residual was not distributed following normal distribution. If this occurs, more detailed tests such as those suggested above should be used. Please consult a statistician on how to perform and to draw conclusions from the test.

3. UNCORRELATED RESIDUAL

In regression analysis, we assume that the observational errors are uncorrelated. There are, of course, many cases where the residuals may be correlated (Draper&Smith 1981). This kind of phenomenon more often occurs when we deal with time series data. The most common pattern we may find is that the residual from the i^{th} (in time sequence) observation has linear relationship with residual for the $(i-1)^{th}$ observation. Figure 84a and 84b show two plots that reveal functional relationships between residuals. Figure 84a shows positive trend between one step apart residuals; meanwhile, Figure 84b shows a negative trend between the residuals.

The correlation between the i^{th} and $(i-1)^{th}$ observations was called *lag-1 serial correlation*. To view the existence of serial correlation of larger lag, you can plots the residual two steps apart, three steps apart, and so on. In the presence of autocorrelated residual, several methods can be used, including *autoregressive regression*.

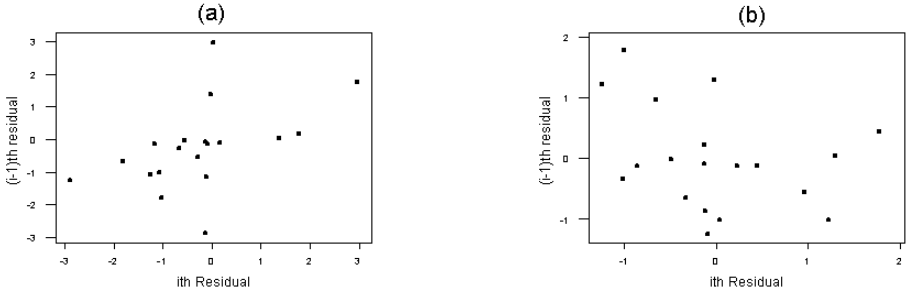
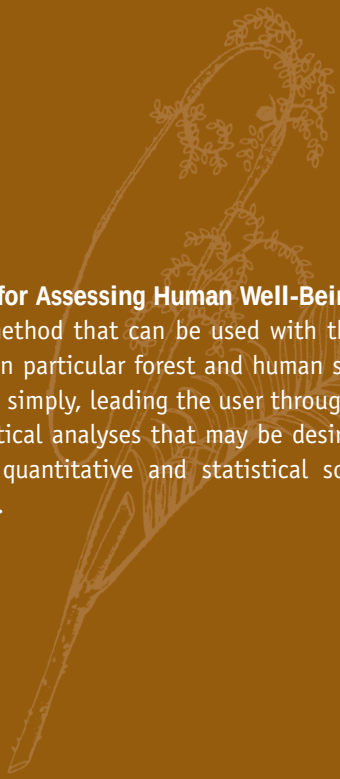


FIGURE 84. Plots show autocorellated residual



The Scoring and Analysis Guide for Assessing Human Well-Being is designed to supplement *The BAG* and *The Grab Bag*. It provides a scoring method that can be used with the two manuals, to come to a decision about particular criteria and indicators in particular forest and human settings. Following the section on scoring is a section on analysis. It begins very simply, leading the user through the steps of making a spreadsheet, and concluding with more complex statistical analyses that may be desireable in some circumstances. Different teams have different requirements for quantitative and statistical sophistication in their analyses. This manual responds to these differing needs.

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