11-14 YEARS SESSION 5: The age and years of experience of women in collective action groups

Subject: Mathematics/Geography **Age range: 11-14 years** **Time: 1 hour**

Outline

Learners will plot data using different types of charts to learn which charts are better for representing which types of data. They will also gain practice interpreting charts and develop their knowledge of the women in collective action groups compared with those not in groups.

Learning objectives

- To develop data handling and presentation skills
- To understand that different presentation techniques can change the way data is perceived

Learning outcomes

- Learners will produce a bar graph, comparative bar graph, percentage bar and/or pie chart
- Learners will compare data sets represented in bar graphs and pie charts
- Learners will decide which presentation technique is best for this data

Key questions

- Is a pie chart, bar graph or comparative bar graph better to present this data?
- How does the age and years of experience of women in collective action groups compare with those not in groups?

Resources

- Slideshow 5
- *Learner worksheet 5A: Methods of Displaying Data*
- *Learner worksheet 5B: Creating Different Charts*
- *Learner worksheet 5C: Ethiopia Age and Years of Experience Data*
- *Spreadsheet: Session 5*

Curriculum links		
England *Mathematics* Pupils should be taught to: • describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) • construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data • describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs. Geography • Pupils should be taught to extend their locational knowledge and deepen their spatial awareness of the world's countries using maps of the world to focus on Africa • Pupils should be taught to understand geographical similarities, differences and links between places through the study of human and physical geography of a region within Africa • Pupils should be taught to understand human geography relating to: population and urbanisation; international development; economic activity in the primary, secondary, tertiary and quaternary sectors; and the use of natural resources • Pupils should be taught to analyse and draw conclusions from geographical data, using multiple sources of increasingly complex information.	**Wales** *Mathematics Key Stage 3* **Developing numerical reasoning** • Represent and communicate: select and construct appropriate charts, diagrams and graphs with suitable scales • Review: evaluate different forms of recording and presenting information, taking account of the context and audience *Geography Key Stage 3* **Understanding places, environments and processes** • describe and explain physical and human features • explain the causes and effects of physical and human processes and how the processes interrelate Range: Pupils should be given the opportunity to study the rich and poor world: economic development in different locations/countries *Information and Communication Technology Key Stage 3* **Find and analyse information** Skills: produce and use databases to analyse data and follow particular lines of enquiry, e.g. use simple and complex queries (searches/sorts) Range: use ICT to analyse and interpret data and produce new information on which to draw conclusions	**Scotland** *Numeracy and mathematics* I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading. **MNU 3.20a** I can display data in a clear way using a suitable scale, by choosing appropriately from an extended range of tables, charts, diagrams and graphs, making effective use of technology. **MTH 2-21a / MTH 3-21a** *Social studies* I can explain why a group I have identified might experience inequality and can suggest ways in which this inequality might be addressed. **SOC 3-16a** *Technologies* I can explore and use the features of a variety of familiar and unfamiliar software to determine the most appropriate to solve problems or issues. **TCH 3-03a**

Activity 5.1 *(10 min)*

Methods of displaying data

Give groups of learners the different types of statistical diagram showing the ages in a sample of women who belong to collective action groups compared with those who don't belong to the groups (learner worksheet 5A: Methods of Displaying Data). These include pie charts, bar charts, dual bar charts and percentage bars (all use the same raw data).

This data is from a sample of 60 women (30 in collective action groups and 30 not in groups). It will be worth re-stating the lessons about sample size from session 2, so learners are aware these charts do not use the full data set.

The charts are also available on slides 4-6 in Slideshow 5. Slide 3 shows an image of some of the women involved in this research study, at work in their collective action group. Please discuss this with learners to remind them that the data they are working with in this lesson relates to real women in Ethiopia.

Ask learners to write down what the graphs show then compare their ideas. See if any of the learners spot that they are all using the same data.

Please read the background notes for this session before explaining to learners why bar charts are an appropriate presentation technique for the age data used, as this is a 'special' case due to the age data being categorised.

Differentiation

Make it easier:

Have some specific questions or true/false statements about the graphs and charts for learners to answer e.g. there are more younger women who belong to groups.

Make it harder:

The discussion could be extended by asking learners to think about the implications of using different presentation techniques when publishing data, for example, in a newspaper story, by government or when reporting findings. Why would people want to use one technique over another?

Activity 5.2 *(40 min)*

Which data presentation technique?

In groups, learners all use the same data but each person produces a different chart (these could include some or all of the following - pie charts, bar charts, dual bar charts, comparative bar charts, population pyramids, and percentage bars). Learner worksheet 5B: Creating Different Charts will support this task.
The data can be found in learner worksheet 5C: Ethiopia Age and Years of Experience Data or worksheet 1 of spreadsheet: Session 5.
The data set is a random sample taken from the 900 women surveyed in Ethiopia.
It has the data for 30 women who belong to a collective action group and 30 who don't.
For each of these women there is data on their age and years of experience in honey production.
After producing their graphs and charts, learners should compare them and discuss which presentation technique they think works best for this data.
Learners write down which presentation technique worked best and explain why they think this.

Using Excel

An alternative to producing the charts by hand is for learners to use Excel to create the charts. This offers the opportunity to use a bigger sample size and more of the data that was collected. Data can be found in spreadsheet: Session 5, worksheet 1 and 2.
Learners could go on to create a variety of graphs to explore some of the other data collected about the women, for example, the amount of honey produced (column H) or the women's marital status. Note that '0' denotes a non-group member, while '1' denotes a group member. Definitions are included on worksheet 3 of the spreadsheet.

Differentiation

Make it harder:

Each learner could produce two or more charts before deciding which is the better technique for presenting this data.

Plenary *(5 min)*

Ask learners which presentation technique they would use to present their findings to the following audiences, and why? Slide 8 in slideshow 5 will support this activity.
Someone who wasn't confident with numbers and understanding data.
Someone who wanted to know the average age of women farmers in collective action groups.
Someone who wanted to know the years of experience of women farmers in collective action groups.

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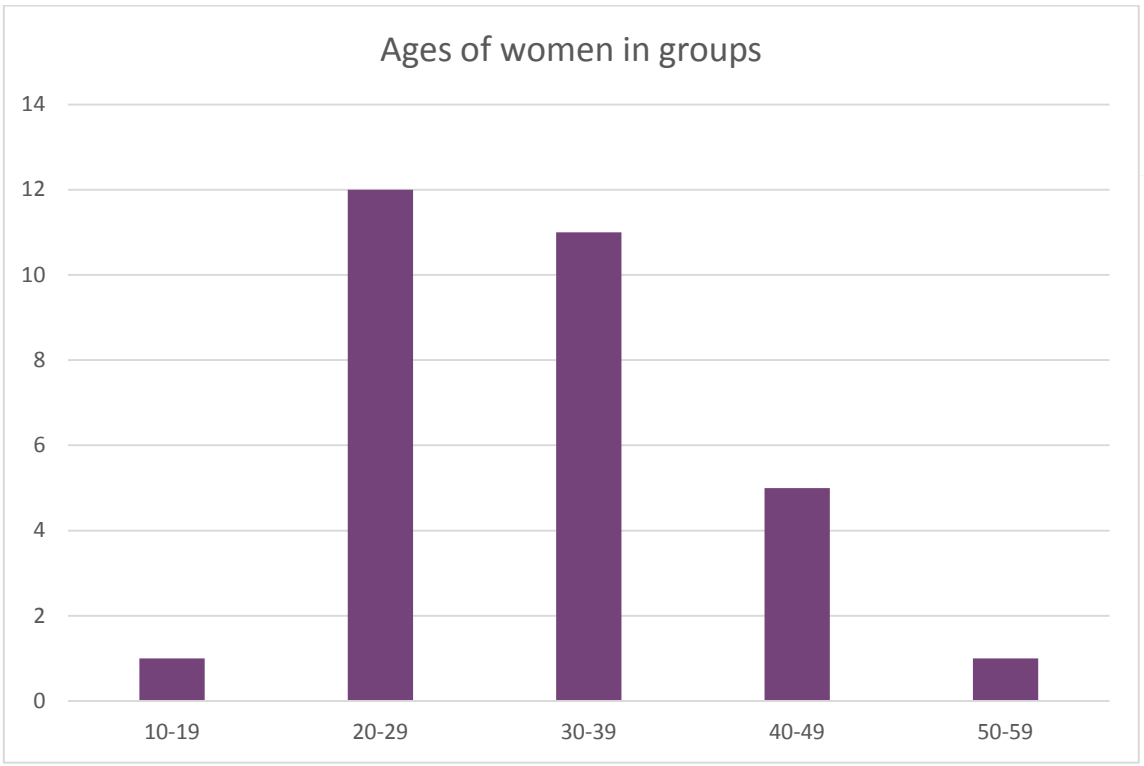
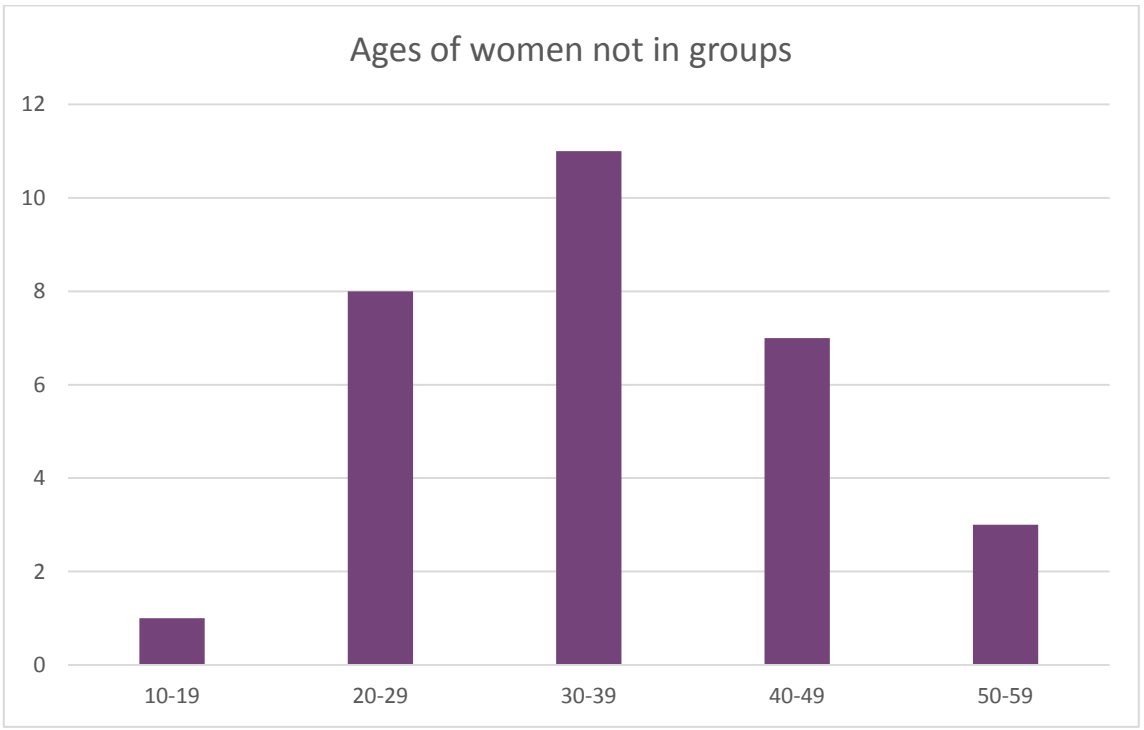
Methods of Displaying Data – Ages of Women in Ethiopia



Number of women

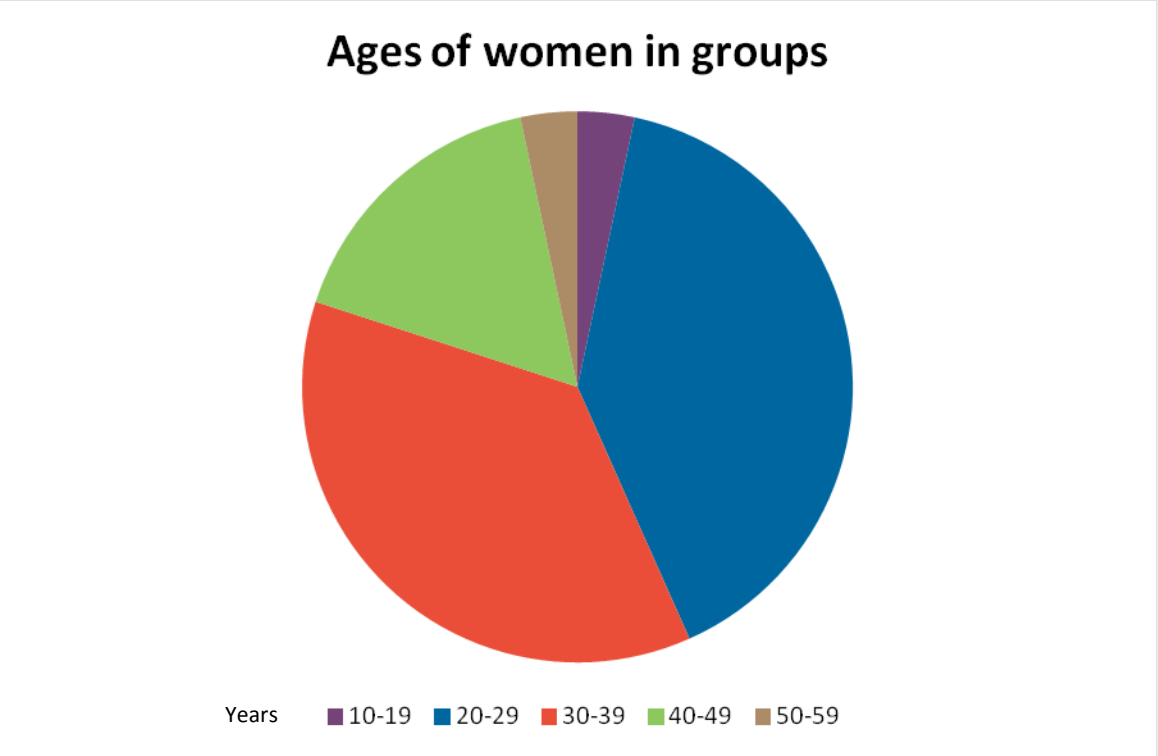
Years

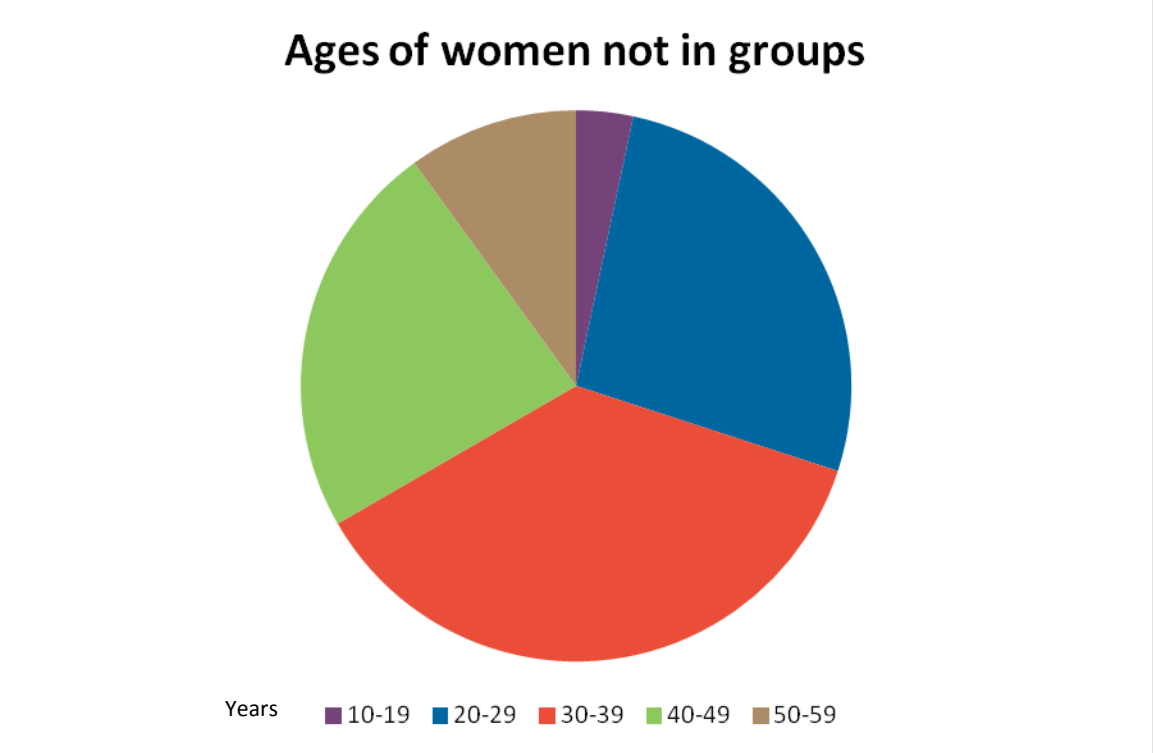


Number of women

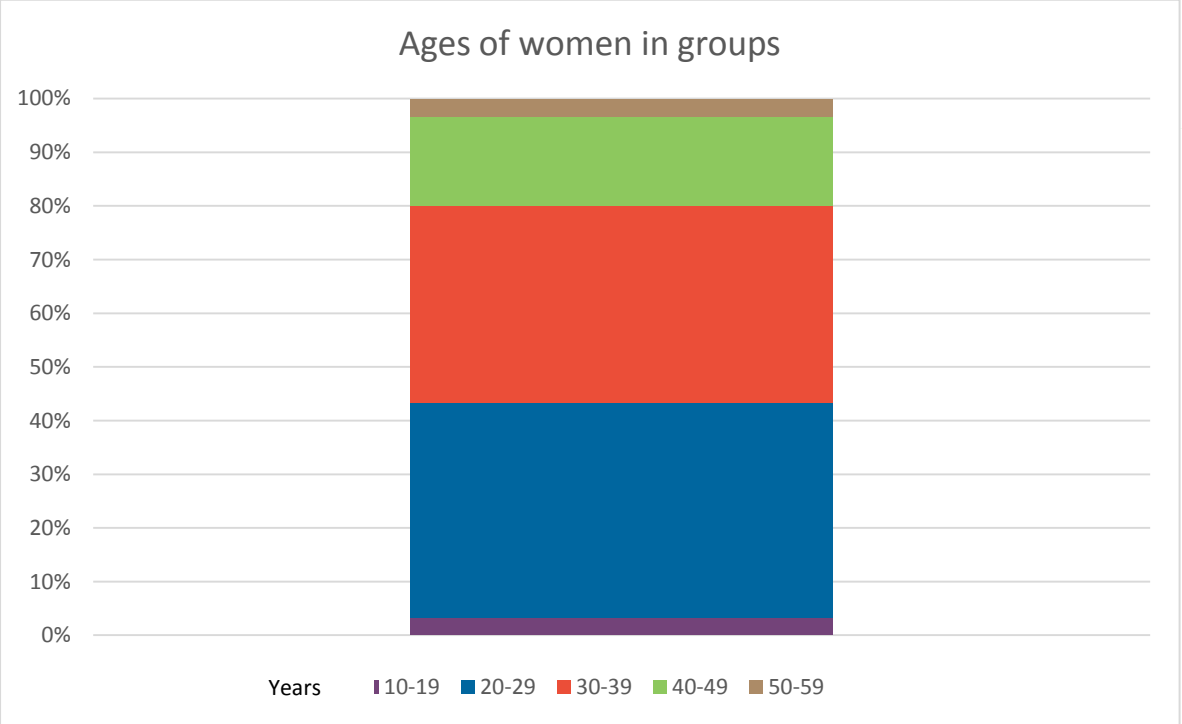
Years

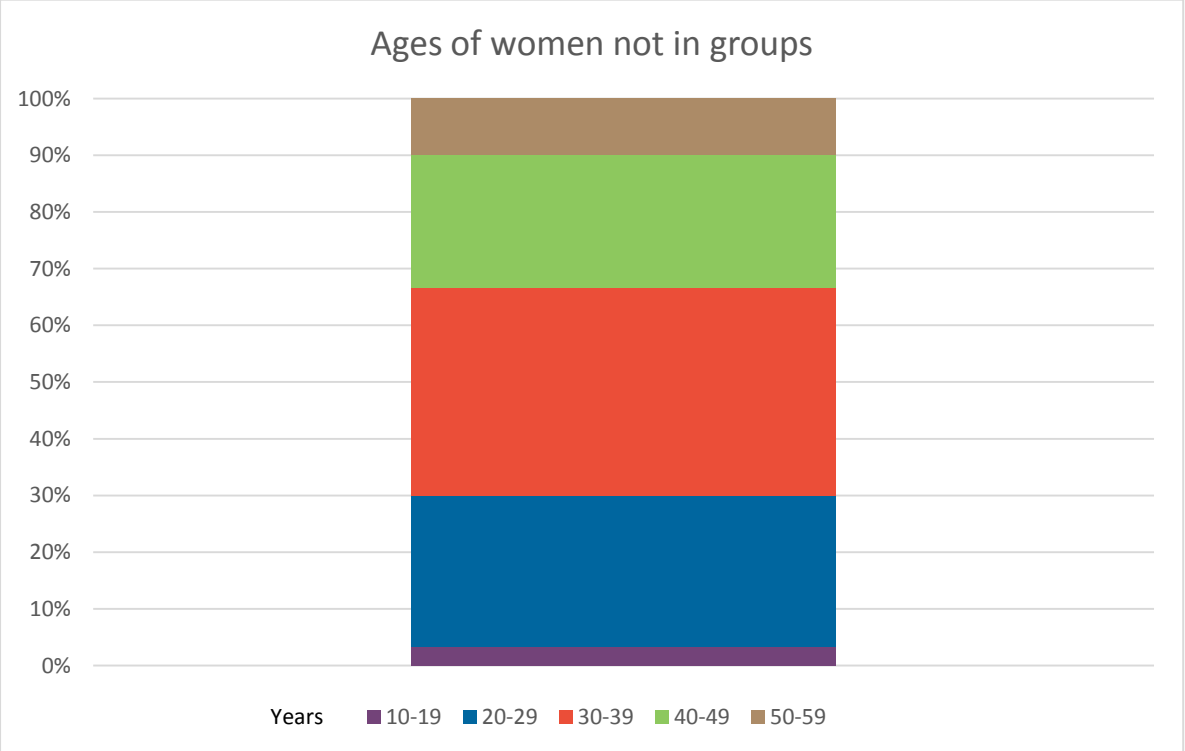
Methods of Displaying Data – Ages of Women in Ethiopia





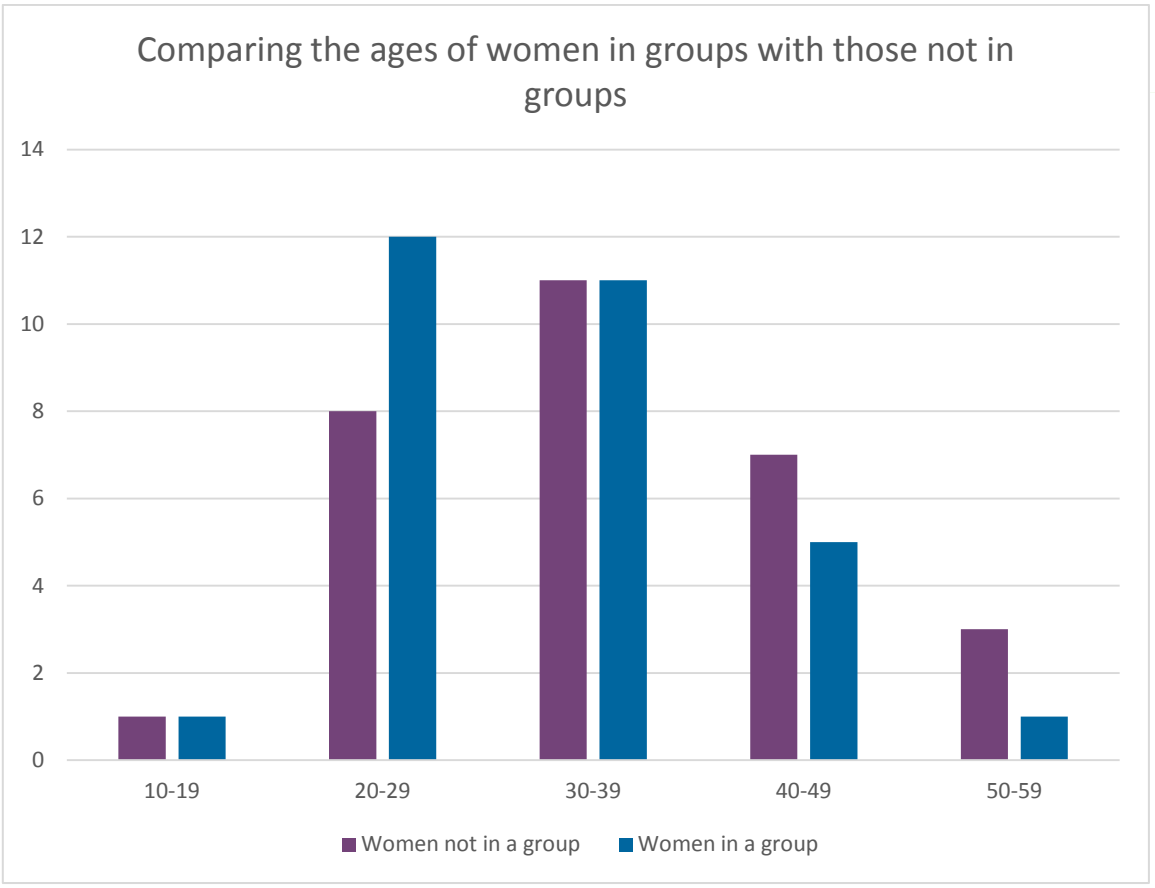
Methods of Displaying Data – Ages of Women in Ethiopia





Learner Worksheet 5A

Methods of Displaying Data – Ages of Women in Ethiopia



Creating Different Charts

How to Create a Dual Bar Chart

- Always use a pencil and a ruler.
- You need to give your chart a title. *Graph to show…*
- The frequency will always be on the y-axis (vertical axis, from the top to the bottom of the page). Always start the y-axis at zero.
- You need to leave gaps between the bars (as this chart represents *categorical* data).
- All of the bars should be the same width and the gaps between them should be equal.
- You need to label both of the axis.
- You need to include a key.

1. First of all you need to create a frequency table, an example is included below. First decide on the categories, these go into the left-hand column. Then, add up how many women fall into each category and put that number in the middle and right hand column.

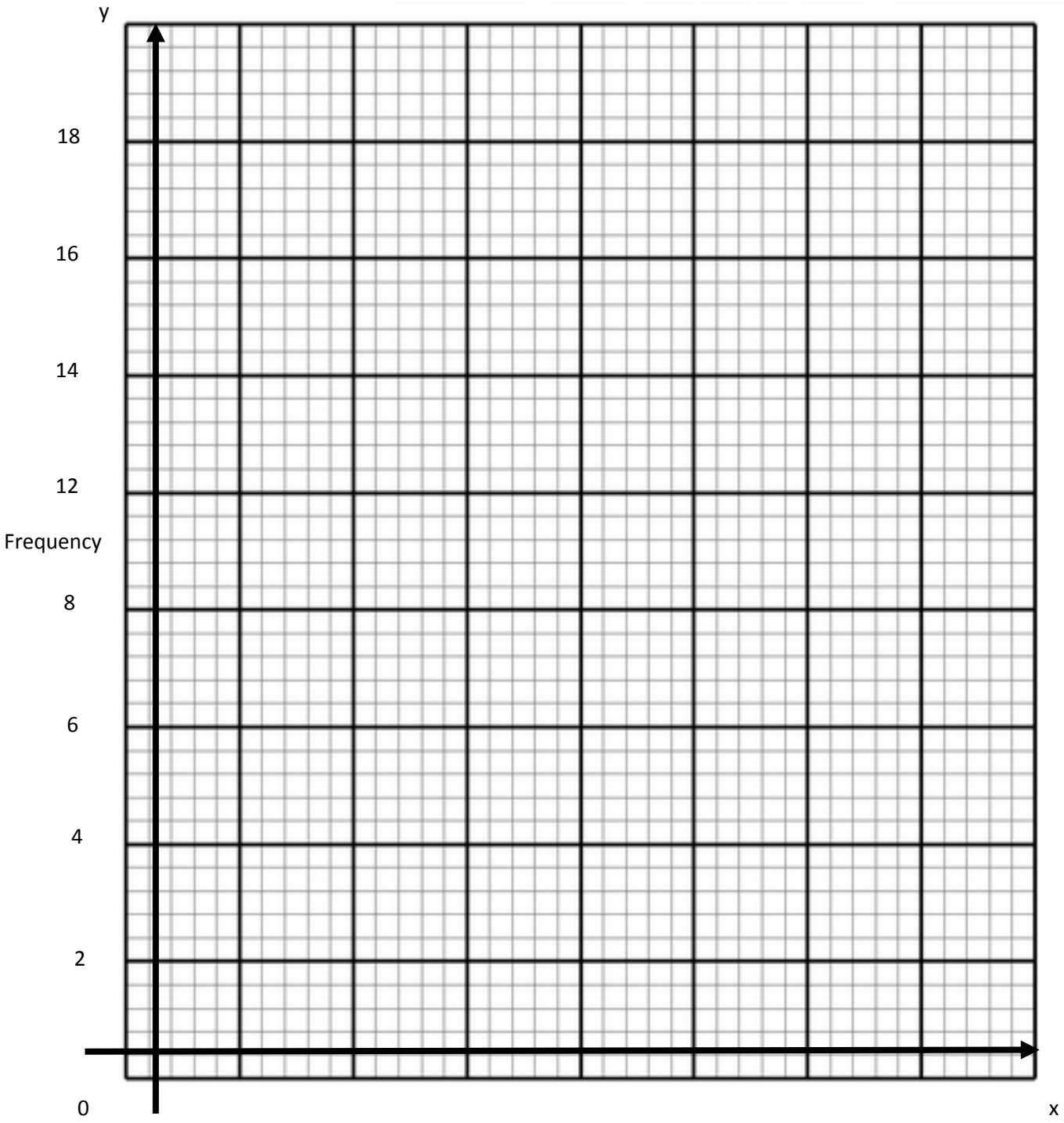
Age	**Number of women IN collective action groups**	**Number of women NOT in collective action groups**
e.g. 0-10		
e.g. 11-20		

2. When you have worked out the frequencies for each category, you can work out what scale you will need to use on the y-axis. This requires a bit of thought – what is the biggest number you will be plotting on your graph? You need to count how many squares are available and then work out the best way to divide these equally, so you will be able to plot the biggest number. Use the larger squares on the graph paper to help you work this out.
3. You also need to work out how wide your bars can be. Remember, you need two bars for each category – one for women in collective action groups and one for women not in groups - and all of the bars need to be the same width.
4. Now you can draw your x and y axis and write on the numbers at equal intervals. The x-axis is the horizontal axis – this will be a straight line along the bottom of your page. The y-axis is the vertical axis – this will be a straight line from the top to the bottom of the page, on the left-hand side. Make sure you draw these lines over one of the thicker lines on the graph paper, so you are using the larger squares.
5. Next, you need to draw in your bars. Each category will have two bars – one for women in collective action groups and one for women not in groups. Make sure you draw these accurately, counting the squares to get the correct height.

6. Finally, you need to colour in your bars and add a key. Each bar that represents the women in a collective action group should be one colour, and each bar that represents women not in a group should be a second colour. They key will explain what each colour represents.

How to Create a Percentage Bar

A graph to show _____.



Learner Worksheet 5B

Creating Different Charts

How to Create a Percentage Bar

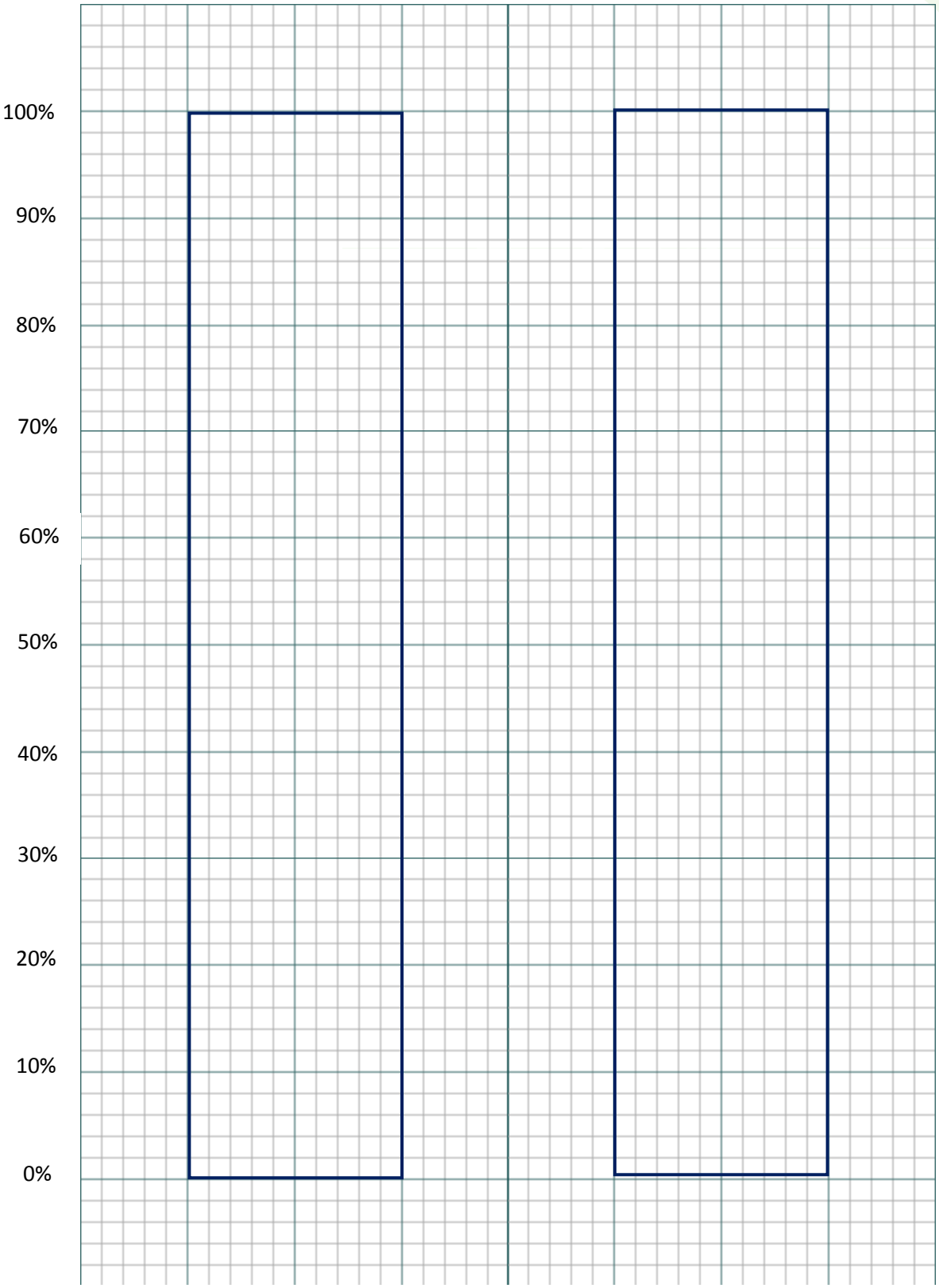
Always use a pencil and a ruler.
You need to give your chart a title. Graph to show…
You need to include a key.
The bar is divided into segments which add up to 100%

1. First of all you need to create a frequency table, an example is included below. First decide on the categories, these go into the left-hand column. Then, add up how many women fall into each category and put that number in the appropriate column.

Age	**Number of women IN collective action groups**	**%**	**Number of women NOT in collective action groups**	**%**
e.g. 0-10	e.g. 2	3%		
e.g. 11-20				
Total	e.g. 60			

2. When you have worked out the frequencies for each category, you need to work out what percentage that represents. You do this by dividing the number for each category by the total. You then multiply this answer by 100. Using the numbers in the table above as an example – (2/60) x 100 = 3%
    - You can check your sums, as all of the percentages should add up to 100.
3. Draw two bars with your ruler - 10cm long or high and 3cm wide. This is a useful size as 10 cm is 100mm, so every 1% can be measured as 1mm. You need two bars as you are plotting data on one for women IN collective action groups and data on the second for women NOT in groups.
4. Carefully plot the percentages for each category, measuring 1mm for each 1%.
5. Colour or shade in each segment of the bar.
6. Either label each segment or create a key to show what each colour represents.
7. Generally, the statistics are plotted in order of size, with the largest first.
8. If you have an 'other' or 'unknown' category, this is generally plotted last regardless of how big it is.

A graph to show _____ **A graph to show** _____ **.**



Ethiopia Age and Years of Experience Data

Years of Experience = how many years the women farmers have been working in bee-keeping and honey production. If no number is given, the data is missing for that woman.

These women DO NOT belong to a WCA group			**These women DO belong to a WCA group**	
Age	**Years of Experience**		**Age**	**Years of Experience**
35	5		35	
56	40		26	8
30	4		18	
22	4		25	15
57	20		40	10
30	15		38	3
30			47	12
48	10		60	10
20	4		36	16
57			28	2
45			47	20
30	2		32	11
40			38	
48	2		37	
45	30		55	9
25	20		28	12
45	2		30	7
40	20		28	
38	4		28	8
45			55	2
30	8		25	3
30	6		27	2
20	3		38	4
40	2		50	2
35	6		45	12
55	7		22	9
30	15		52	9
50	10		25	
25	7		38	16
40	10		50	