Bar Charts and Histograms Worksheet

Module: Research Methods and Professional Practice
Student: Ketan Mone
University of Essex Online

Introduction

This unit illustrates how bar charts and histograms can be used to visualise quantitative and categorical data in Excel and LibreOffice.
While earlier units focused on statistical inference and hypothesis testing, Unit 9 translates those numerical outputs into *visual summaries* that reveal key patterns, trends, and distributions.
Bar charts help compare proportions between groups, whereas histograms show frequency distributions for continuous variables.

The exercises apply these methods to datasets from consumer preference studies and dietary weight-loss trials.
The completed charts are presented below with concise interpretations to support evidence-based decision-making (Field, 2018; Upton and Cook, 2014).

Bar Charts – Brand Preferences

Example 9.1 – Area 1 Brand Preferences

A percentage-frequency bar chart for **Area 1** shows three categories: Brand A, Brand B, and Other.
The proportions indicate that **Brand A** is least preferred, followed by **Brand B**, while the **majority of respondents (≈ 60 %)** selected “Other brands”.
The pattern suggests a diverse consumer market in which local or niche brands outperform established ones.

Exercise 9.1 – Area 2 Brand Preferences

A comparable chart for **Area 2** reveals similar ranking but with higher shares for the named brands.
Brand A rises from roughly 15 % in Area 1 to ≈ 25 % in Area 2, and **Brand B** increases by about 10 percentage points.
The "Other brands" segment drops accordingly.

Interpretation:
Area 2 shows stronger loyalty to known brands, possibly due to demographic or income differences.
Brand A's improved standing may justify targeted advertising in that region.

Example 9.2 – Clustered Column Chart (Area 1 vs Area 2)

A combined clustered-column chart comparing both areas confirms these trends visually.
Across all brands, **Area 2 records higher percentages for A and B**, while **Area 1** maintains a larger proportion under "Other".
This highlights how market preferences vary geographically: consumers in Area 1 are more brand-diverse, whereas those in Area 2 show focused preferences.

Exercise 9.2 – Heather Species Prevalence

Using Data Set E, a clustered-column chart comparing **heather species prevalence** between two ecological locations shows that *Calluna vulgaris* dominates both sites but with slightly lower frequency in Location 2.
Other species (e.g., *Erica tetralix*) appear more frequently in Location 2, suggesting soil-moisture differences influence species composition.

Interpretation:
The visual outcome indicates moderate ecological variation between sites, supporting field observations on habitat heterogeneity.

Histograms – Weight Loss Distributions

Example 9.3 – Diet A Histogram (Excel)

The relative-frequency histogram for **Diet A weight loss** (n = 50) displays a unimodal, near-symmetrical distribution centred around 4–6 kg.
The tail on the left is slightly longer, implying mild **negative skewness**.
Most participants achieved moderate weight loss, with very few losing less than 0 kg or more than 10 kg.

Interpretation:
Diet A produces consistent results with limited variability.
The pattern suggests an effective yet stable programme with predictable outcomes.

Exercise 9.3 – Diet B Histogram

The histogram for **Diet B** (same class intervals) shows a broader spread and a right-skewed shape, with more cases clustering between 1 and 3 kg loss.
A small tail extends toward higher losses (> 8 kg).
Compared with Diet A, the mean weight loss is lower, and variability is greater.

Interpretation:
Diet B is less effective overall and yields less uniform outcomes, reinforcing statistical findings from Unit 7 that Diet A outperforms Diet B.

LibreOffice Visualisations

Example 9.4 – Area 1 Bar Chart (LibreOffice)

Replicating the Area 1 chart in LibreOffice produces the same pattern as in Excel: Brand A and B remain least favoured, and “Other” retains the majority.
Despite minor stylistic differences, LibreOffice Charts correctly represent proportional differences, validating cross-software consistency.

Exercise 9.4 – Area 2 Bar Chart (LibreOffice)

A second chart for Area 2 demonstrates higher preference levels for both Brand A and Brand B relative to Area 1.

When placed side-by-side, the two graphs clearly illustrate regional shifts in consumer loyalty.

Interpretation:
Marketing campaigns in Area 2 should reinforce these existing brand identities, whereas Area 1 requires diversified branding strategies.

Example 9.5 – Clustered Column Chart for Two Areas (LibreOffice)

The combined clustered chart comparing **Area 1 vs Area 2** again reveals higher brand-name preference in Area 2 and a smaller share of “Other” brands.
Both environments confirm Brand A as the least-favoured overall choice but with improving perception outside Area 1.

Interpretation:
The comparison supports the idea of regional market segmentation, implying that consumer behaviour differs substantially by location.

Exercise 9.5 – Heather Species (Locations 1 and 2)

In LibreOffice, a similar clustered chart of heather species frequencies mirrors the Excel output: dominant species persist across sites, though proportions vary.
Visual comparison shows Location 1 has higher *Calluna* presence, while Location 2 supports greater *Erica* diversity.
These visuals provide ecological clarity beyond tabulated data alone.

Histograms in LibreOffice

Example 9.6 – Diet A Histogram

The relative-frequency histogram for **Diet A** in LibreOffice reproduces the same unimodal shape, though slight gaps remain between bars due to software constraints.
The pattern still reveals symmetry and moderate concentration of weight losses around 4–6 kg.

Interpretation:
Both platforms show consistent distribution shapes, reinforcing analytical reliability and illustrating the adaptability of open-source software in quantitative research (Open University, 2023).

Exercise 9.6 – Diet B Histogram

For **Diet B**, the LibreOffice chart again demonstrates a right-skewed profile with higher variability and a lower central tendency than Diet A.
While minor formatting differences exist, the overall interpretation remains unchanged: Diet A yields more stable and effective outcomes.

Overall Findings

Across Units 9.1–9.6, visualisation techniques confirm key insights from earlier statistical analysis:

- **Bar charts** effectively reveal categorical comparisons (brands, species).
- **Clustered columns** provide clarity for multi-group comparisons.
- **Histograms** uncover the distributional nature of continuous data.
- Consistency between Excel and LibreOffice demonstrates methodological robustness and data reproducibility.

In marketing contexts, charts highlight regional brand differences; in health studies, histograms underline the consistency of Diet A performance.
Together, these graphics strengthen interpretation and communication of research findings.

Reflection

Completing Unit 9 helped me translate statistical outputs into intuitive visual narratives.
I learnt to evaluate which chart type best communicates the data story — bar charts for discrete comparisons and histograms for continuous variables.
I also realised the importance of visual design choices (scales, labels, colours) in preventing misinterpretation.
Using both Excel and LibreOffice enhanced my technical versatility and confidence in presenting quantitative evidence to non-technical audiences.
These visualisation skills will support future professional projects where data storytelling is essential (Field, 2018; Open University, 2023).

References

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Upton, G. and Cook, I. (2014) *Oxford Dictionary of Statistics.* 3rd edn. Oxford: Oxford University Press.

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