Turas Weighting

Transparent. Trustworthy. Tangible insights.

Corrects sample imbalances so your data reflects the population you're studying. When your survey respondents don't mirror your target population, weighting mathematically adjusts the data to fix over/under-representation of demographic groups.

What This Module Does

Weighting transforms a biased sample into one that accurately represents your target population. If your sample skews young, female, and urban, weighting adjusts each respondent's contribution so the final results reflect true population proportions.

The module uses rim weighting (raking) via survey::calibrate()—the industry standard used by the US Census Bureau, CDC, and WHO. This iterative algorithm balances multiple demographic dimensions simultaneously until all targets are achieved.

What You Get

Excel Outputs

- **Weighted dataset:** Original data with weight column(s), ready for analysis in Tabs or other modules
- **Weighting summary:** Before/after comparison tables showing target achievement
- **Quality diagnostics:** Weight distribution, DEFF, effective sample size, efficiency score
- **Validation output:** Convergence diagnostics, margin achievement by variable

Key Metrics Provided

- **Design Effect (DEFF):** Measures precision loss from weighting—keep below 2.0 if possible
- **Effective sample size:** Your actual statistical power after weighting ($n\_eff = n / DEFF$)
- **Weighting efficiency:** Percentage of original precision retained (aim for >70%)
- **Weight range:** Min/max weights with flagging for extreme values

How It Works

The Rim Weighting Process

You provide population targets (e.g., 51% female, 29% aged 18-34, 67% urban). The algorithm iteratively adjusts weights across all dimensions until every target is achieved simultaneously.

- Iteration 1: Weight to match gender → age → region → education (each step slightly disturbs previous)
- Iteration 2-N: Repeat adjustments until convergence (typically 5-10 iterations)
- Convergence: All targets achieved within tolerance (e.g., ±0.01%)

What a Weight Means

A weight of 1.0 means the respondent represents themselves. A weight of 2.0 means they represent 2 people (under-represented group). A weight of 0.5 means they count as half a person (over-represented group).

Packages Used

All packages are peer-reviewed, open-source R packages available on CRAN.

Package	Why We Use It
survey	calibrate() function—gold standard for rim weighting, used by US Census, CDC, WHO
data.table	Fast iteration and weight calculations for large datasets
openxlsx	Professional Excel output with formatting

Strengths

✓ **Industry-standard method:** survey::calibrate() is the modern gold standard for survey weighting

✓ **Iterative convergence:** Achieves all demographic targets simultaneously

✓ **Transparent efficiency metrics:** Quantifies exactly how much precision you lose from weighting

✓ **Extreme weight control:** Built-in bounds prevent single respondents from dominating results

✓ **Validation built-in:** Confirms all targets achieved before completing

✓ **Flexible:** Supports any demographic variables with reliable population benchmarks

Limitations

⚠ **Requires target data:** Need reliable population benchmarks (census, industry data)

⚠ **Always reduces precision:** Weighting increases margin of error—this is unavoidable

⚠ **Can't fix bad sampling:** Weights correct imbalance but can't fix fundamental sampling flaws

⚠ **Complexity limits:** 4+ weighting variables can create convergence issues or extreme weights

⚠ **Assumes random within cells:** Works best when non-response is random within demographic groups

Sample Size Requirements

Minimum n=100 for weighting to be meaningful. For stable weights with 3-4 weighting variables, recommend n=500+. Very small samples (<100) may see precision loss that makes weighting counterproductive.

Best Use Cases

Ideal For

✓ Online panels (tend to skew young, female, urban)

✓ Any sample that doesn't match census demographics

✓ Pre/post campaign measurement (ensure comparable samples)

✓ Tracking studies (weight each wave consistently)

✓ National surveys requiring geographic representativeness

Not Ideal For

⚠ Random probability samples (already representative)

⚠ Very small samples (<100) where weighting makes precision worse

⚠ When you don't have reliable population targets

⚠ Exploratory research where representation isn't critical

Key Takeaways

✓ Weighting corrects sample imbalance to match population—essential for biased samples

✓ DEFF measures precision loss—keep below 2.0 for acceptable results

✓ Effective n is what matters for statistical power, not actual n

✓ Always check efficiency after weighting—below 50% is problematic

✓ Sometimes NOT weighting (with caveats) is more honest than bad weights

The Bottom Line

Weighting is your insurance policy against sample bias. When your survey respondents don't mirror the population you care about, rim weighting mathematically corrects the imbalance. Turas uses industry-standard methods with transparent reporting of the precision cost through DEFF and effective sample size. You'll know exactly what you're getting—no black boxes, no hidden assumptions.

About The Research LampPost

Turas is developed and delivered by **The Research LampPost**, an organisational member of the Southern African Marketing Research Association (SAMRA). Duncan Brett is a SAMRA accredited researcher with 30+ years of market research experience. If you have questions about whether Turas is right for your project, if there is interest in the statistical documentation or module-specific information, or you would like a copy of our credentials, please get in touch at duncan@researchlamppost.co.za

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