

EVALUATING THE EFFECTIVENESS OF A DIET-BASED INTERVENTION ON BLOOD PRESSURE REDUCTION: A PAIRED SAMPLE T-TEST USING SPSS

1. Background and Objective

A private nutrition clinic in the UK initiated a 6-week low-sodium dietary intervention for middle-aged adults with borderline high blood pressure. The clinic needed to assess whether the intervention had a statistically significant effect on **reducing systolic blood pressure (SBP)**.

Primary Research Question: Does participation in the diet program significantly reduce participants' systolic blood pressure?

2. Hypotheses and Statistical Test

Null Hypothesis (H₀): There is no difference in mean systolic blood pressure before and after the intervention.

$$H_0: \mu_{\text{pre}} = \mu_{\text{post}}$$

Alternative Hypothesis (H₁): There is a statistically significant difference in systolic blood pressure after the intervention.

$$H_1: \mu_{\text{pre}} \neq \mu_{\text{post}}$$

Test Used: Paired Sample t-Test using SPSS v28

3. Dataset Overview

Variable Name	Description	Type
ID	Participant identifier	Categorical
SBP_Pre	Systolic blood pressure before the intervention	Scale
SBP_Post	Systolic blood pressure after 6 weeks of program	Scale
Gender	Male/Female	Nominal
Age	Age in years	Scale

- **Sample Size (n):** 42 participants
- **Inclusion Criteria:** Ages 35–60, pre-hypertension (SBP 130–139 mmHg)

4. Data Analysis in SPSS

Descriptive Statistics:

Measure	SBP_Pre (mmHg)	SBP_Post (mmHg)
Mean	135.2	128.6
Standard Deviation	4.9	6.2
Minimum	130	120
Maximum	142	136

Assumptions Check:

- **Normality (Differences):** Shapiro-Wilk Test: $p = 0.15 \rightarrow$ Normality **not violated** Histogram and Q-Q plot of SBP difference looked symmetric

Paired t-Test Results (SPSS Output):

- **Mean Difference:** 6.64 mmHg
- **Standard Deviation of Difference:** 5.18
- **t (df = 41):** 7.95
- **p-value (2-tailed):** < 0.001
- **95% CI of the Difference:** [4.89, 8.39]
- **Cohen's d:** 1.23 \rightarrow Large effect

5. Interpretation of Results

The results provide strong evidence to **reject the null hypothesis**. There is a statistically significant reduction in systolic blood pressure after the 6-week dietary intervention, with a large effect size.

- The average drop in SBP was **6.64 mmHg**, which is both statistically and clinically meaningful.
- **Implication:** The diet program is effective and can be promoted as a non-pharmaceutical intervention for pre-hypertensive patients.

6. Deliverables Provided to Client

- **SPSS file (.sav)** with labeled variables and syntax
- **Statistical report (6 pages)** with APA-style writeup and interpretation
- **One-page executive summary** for clinical distribution
- **Visuals:**
 - Paired bar chart (mean pre vs. post SBP)
 - Difference histogram
 - Q-Q plot of paired differences
- **Optional add-on:** PowerPoint deck for wellness program marketing

7. Business and Academic Relevance

- **Healthcare and Wellness Industry:** Clinics and fitness centers can use this format to validate interventions with quantifiable impact.
- **Academic Relevance:** Ideal example for students studying hypothesis testing, biostatistics, or applied SPSS in public health coursework.