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Pizza T-Test Analysis Report

Research Objective: You and some of your friends have decided to test the validity of an advertisement by a local pizza restaurant, which claims it delivers to the dormitories faster than a local branch operated by a national chain. Both the local pizza restaurant and the national chain are located across the street from your college campus. The variable of interest is delivery time in minutes from the time the pizza is ordered to when it is delivered. You collect the data ordering 16 pizzas from local pizza restaurant and 16 from the national chain at different times. The following table is the record of the delivery times:

At the .05 level of significance, is there any evidence that the mean delivery time the local pizza restaurant in less than the mean delivery time for the national chain?

Local (Delivery time in minutes)		National Chain (Delivery time in minutes)	
16.8	11.7	22.0	19.5
18.1	14.1	15.2	17.0
15.6	21.8	18.7	19.5
16.7	13.9	15.6	16.5
17.5	20.8	20.8	24.0
18.2	21.5	19.7	23.0
19.2	12.2	21.2	16.7
13.7	11.4	23.9	17.5

Problem Definition –

Is there any significant difference in the average time it takes to deliver a pizza from the local chain or the national chain?

Hypothesis –

H_0: $\mu_L \geq \mu_N$

H_1: $\mu_L < \mu_N$

Decision Rule –

If t critical ratio t is < -1.697 then reject the null.

Test – Two-Sample T-Test and CI: Local, National Chain

Method

μ_1: mean of Local
μ_2: mean of National Chain
Difference: $\mu_1 - \mu_2$

Equal variances are assumed for this analysis.

Descriptive Statistics

Sample	N	Mean	StDev	SE Mean
Local	16	16.45	3.41	0.85
National Chain	16	19.43	2.88	0.72

Estimation for Difference

Difference	Pooled StDev	95% Upper Bound for Difference
-2.98	3.15	-1.08

Test

Null hypothesis H_0: $\mu_1 - \mu_2 = 0$
Alternative hypothesis H_1: $\mu_1 - \mu_2 < 0$

T-Value	DF	P-Value
-2.67	30	0.006

Conclusion –

1. T Critical ratio of -2.67 is less than the critical value of -1.697. Reject the null, there is a 5% chance that T1 error has occurred.
2. The upper bound confidence interval of -1.08 does not contain zero, reject null.
3. Pvalue of 0.006 is < alpha of 0.05 = Reject Null.

Interpretation –

There is a significant evidence that the mean of the local pizza chain delivery time is less than the mean delivery time of the national chain and can continue making the claim that the local pizza chain is faster than the national pizza chain.

Assumptions –

The graphed medians fall at the center of the distribution within the inner quartile range and the arithmetic means are close to the medians for each distribution. The whiskers are approximately equal in length indicating equal variance for both populations. Small samples that provide characteristics of normality are usually considered normal due to the fact that these characteristics increase as the sample sizes increase.