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# **Descriptive Data and Assumptions: Correlation**

## Frequency Distribution Table

|  |  |
| --- | --- |
| PM size | Frequency |
| 0-1 | 8 |
| 2-4 | 24 |
| 5-7 | 37 |
| 8-10 | 34 |

|  |  |
| --- | --- |
| Sick Days | *Frequency* |
| 0-2 | 1 |
| 4-7 | 61 |
| 8-9 | 30 |
| 10-12 | 11 |

## Histogram

## Descriptive Statistics Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Microns* |  |  | *Sick day* |  |
|  |  |  |  |  |
| Mean | 5.65728155 |  | Mean | 7.126214 |
| Standard Error | 0.25560014 |  | Standard Error | 0.186484 |
| Median | 6 |  | Median | 7 |
| Mode | 8 |  | Mode | 7 |
| Standard Deviation | 2.59405814 |  | Standard Deviation | 1.892605 |
| Sample Variance | 6.72913764 |  | Sample Variance | 3.581953 |
| Kurtosis | -0.8521619 |  | Kurtosis | 0.124923 |
| Skewness | -0.37325713 |  | Skewness | 0.14225 |
| Range | 9.8 |  | Range | 10 |
| Minimum | 0.2 |  | Minimum | 2 |
| Maximum | 10 |  | Maximum | 12 |
| Sum | 582.7 |  | Sum | 734 |
| Count | 103 |  | Count | 103 |
| Largest(1) | 10 |  | Largest(1) | 12 |
| Smallest(1) | 0.2 |  | Smallest(1) | 2 |
| Confidence Level(95.0%) | 0.50698167 |  | Confidence Level(95.0%) | 0.36989 |

## Kolmogorov-Smirnov Test

H01: There is no statistically significant relationship between particulate matter size, and employee annual sick days.

HA1: There is a statistically significant relationship between particulate matter size, and employee annual sick days.

## Measurement Scale

Ordinal

## Measure of Central Tendency

Mean

## Evaluation

An alpha of 0.05 is an indication that the p-values are <0.05 alpha; thus, the null hypothesis (H01) is rejected, and the (HA1) hypothesis is accepted that there is a statistically significant relationship between particulate matter size, and employee annual sick days. This correlation analysis shows that the authors are comfortable with making a Type I error (Creswell & Creswell, 2018). They indicate the p-value 1.89059E-17 (1.89059\*10-17)< 0.05.

The size of the particulate matter is strongly correlated with and negatively related to the number of annual employees' sick days according to Pearson's correlation coefficient, with r = 0.715 and R2 = 51. This illustrates that the variability in employee sick days is 51%, which will be explained by the size of the particulate matter.

# **Descriptive Data and Assumptions: Simple Regression**

## Frequency Distribution Table

|  |  |
| --- | --- |
| Expenditure | *Frequency* |
| 20-500 | 108 |
| 501-1000 | 76 |
| 1001-1500 | 27 |
| 1501-2000 | 11 |
| 2001-2500 | 1 |

|  |  |
| --- | --- |
| Time | *Frequency* |
| 0-50 | 6 |
| 51-100 | 26 |
| 101-200 | 98 |
| 201-300 | 85 |
| 301-400 | 8 |

## Histogram

## Descriptive Statistics Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *safety training expenditure* |  |  | *lost time hours* |  |
|  |  |  |  |  |
| Mean | 595.9843812 |  | Mean | 188.0045 |
| Standard Error | 31.4770075 |  | Standard Error | 4.803089 |
| Median | 507.772 |  | Median | 190 |
| Mode | 234 |  | Mode | 190 |
| Standard Deviation | 470.0519613 |  | Standard Deviation | 71.72542 |
| Sample Variance | 220948.8463 |  | Sample Variance | 5144.536 |
| Kurtosis | 0.444080195 |  | Kurtosis | -0.50122 |
| Skewness | 0.951331922 |  | Skewness | -0.08198 |
| Range | 2251.404 |  | Range | 350 |
| Minimum | 20.456 |  | Minimum | 10 |
| Maximum | 2271.86 |  | Maximum | 360 |
| Sum | 132904.517 |  | Sum | 41925 |
| Count | 223 |  | Count | 223 |
| Largest(1) | 2271.86 |  | Largest(1) | 360 |
| Smallest(1) | 20.456 |  | Smallest(1) | 10 |
| Confidence Level(95.0%) | 62.03197147 |  | Confidence Level(95.0%) | 9.465484 |

## Kolmogorov-Smirnov Test

H02: There is no statistically significant relationship between safety training programs, expenditure, and lost-time hours.

HA2: There is a statistically significant relationship between safety training programs, expenditure, and lost-time hours.

## Measurement Scale

Nominal

## Measure of Central Tendency

Median

## Evaluation

When observing the above data, the *simple regression* analysis uses an alpha 0.05. It also states a p-value of 7.7E-105 (7.6586\* 10-105) < 0.05. The null hypothesis (H02) is rejected, and the alternative hypothesis (HA2) is accepted; there is a statistically significant relationship between safety training programs, expenditure, and lost hours.

The correlation coefficient is r = 0.94, and a very strong negative relationship was found between safety training programs, expenditure, and a decrease in lost hours. This correlates to an R2 of 0.884, which explains the 88.4 percent of the variance between safety training programs, expenditure, and reducing lost hours.

The lost time hours equations are performed by a linear formula: Y = m + bX, which is equivalent to coefficients 1753.60 + (-6.158) (safety training programs, expenditure, and reducing lost hours).

# **Descriptive Data and Assumptions: Multiple Regression**

## Frequency Distribution Table

|  |  |
| --- | --- |
| Decibel | *Frequency* |
| 100-106 | 4 |
| 107-111 | 51 |
| 112-116 | 126 |
| 117-121 | 249 |
| 122-131 | 786 |
| 132-141 | 287 |

## Histogram

## Descriptive Statistics Table

|  |  |
| --- | --- |
| *Decibel* |  |
|  |  |
| Mean | 124.8359 |
| Standard Error | 0.177945 |
| Median | 125.721 |
| Mode | 127.315 |
| Standard Deviation | 6.898657 |
| Sample Variance | 47.59146 |
| Kurtosis | -0.31419 |
| Skewness | -0.41895 |
| Range | 37.607 |
| Minimum | 103.38 |
| Maximum | 140.987 |
| Sum | 187628.4 |
| Count | 1503 |

## Kolmogorov-Smirnov Test

H03: There is no statistically significant relationship between the primary variable (frequency, angle in degrees, cord length, velocity, and displacement), and decibel level.

HA3: There is a statistically significant relationship between the primary variable (frequency, angle in degrees, cord length, velocity, and displacement), and the decibel level.

## Measurement Scale

Internal

## Measure of Central Tendency

Mean

## Evaluation

The multiple regression analysis uses an alpha of 0.05; the results of the Frequency (Hz), Velocity (as measured meters per second), and displacement show the p-value of 4.10E-104 (4.10\*10-104), 1.02E-18 (1.02\*10-18), and 5.21E-45 (5.21\*10-45) respectively. These have listed p-values < 0.05 alpha. The null hypothesis (H03) is rejected, and (HA3) is accepted, i.e., there is a statistically significant relationship between the primary variable (frequency, angle in degrees, cord length, velocity, and displacement), and decibel level.

The results of the multiple regression state that the angle in degrees and chord shows the p-values of 0.205 and 0.061, respectively. These p-values > 0.05. The null hypothesis (H03) is accepted, and the (HA3) is rejected, i.e., there is no statistically significant relationship between the primary variable (frequency, angle, cord, velocity, and displacement), and level of dB not increasing after the employees are placed on the site for future use.

The correlation coefficient of r = 0.31 states a positive correlation among the other groups. This equates to an R2 of 0.9 and states that 9 percent of the variability in decibel levels is explained by the above-listed groups.

Decibel level equations are performed by a linear formula:

Y= a + b1 X1 + b2 X2 + b3 X3 +…+ bn Xn

Decibel level = 126.82+ (-0.0011) (Frequency) +(.0.47) (Angle in Degrees) +(-5.49) (Cord Length) +(0.083) (Velocity) + (-240.51) (Displacement)

# **Descriptive Data and Assumptions: Independent Samples *t* Test**

## Frequency Distribution Table

|  |  |
| --- | --- |
| Training | *Frequency* |
| 49-60 | 12 |
| 61-70 | 20 |
| 71-80 | 21 |
| 81-90 | 8 |
| 91-100 | 1 |

|  |  |
| --- | --- |
| Training | *Frequency* |
| 74-80 | 14 |
| 81-85 | 21 |
| 86-90 | 19 |
| 91-95 | 6 |
| 96-100 | 2 |

## Histogram

## Descriptive Statistics Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Prior Training* |  |  | *Revised Training* |  |
|  |  |  |  |  |
| Mean | 69.79032 |  | Mean | 84.77419 |
| Standard Error | 1.402788 |  | Standard Error | 0.659479 |
| Median | 70 |  | Median | 85 |
| Mode | 80 |  | Mode | 85 |
| Standard Deviation | 11.04556 |  | Standard Deviation | 5.192742 |
| Sample Variance | 122.0045 |  | Sample Variance | 26.96457 |
| Kurtosis | -0.77668 |  | Kurtosis | -0.35254 |
| Skewness | -0.0868 |  | Skewness | 0.144085 |
| Range | 41 |  | Range | 22 |
| Minimum | 50 |  | Minimum | 75 |
| Maximum | 91 |  | Maximum | 97 |
| Sum | 4327 |  | Sum | 5256 |
| Count | 62 |  | Count | 62 |
| Largest(1) | 91 |  | Largest(1) | 97 |
| Smallest(1) | 50 |  | Smallest(1) | 75 |
| Confidence Level(95.0%) | 2.805048 |  | Confidence Level(95.0%) | 1.31871 |

## Kolmogorov-Smirnov Test

H04: There is no statistically significant difference in means scores between the prior and revised training programs.

HA4: There is a statistically significant difference in means scores between the prior and revised training programs.

## Measurement Scale

Internal

## Measure of Central Tendency

Mean

## Evaluation

The results indicate that Group A (variable) has a lower mean. With the help of the alpha of 0.05, the p-values of t Stat is 1.94E-15 (1.93993\* 10-15) < 0.05. It shows that alternative hypotheses (H04) will be rejected, while the null hypothesis (HA4) will be accepted as it assumed a statistically significant difference in mean scores between the prior and revised training programs.

The mean scores of the Group B (variable) revised training had significantly improved. The mean score of Group A [(variable) prior training] was 69.7903, and Group B (revised training) was 84.7742. Therefore, the mean difference is not zero.

# **Descriptive Data and Assumptions: Dependent Samples *t* Test**

## Frequency Distribution Table

|  |  |
| --- | --- |
| Exposure | *Frequency* |
| 5-15 | 5 |
| 16-25 | 8 |
| 26-35 | 12 |
| 36-45 | 16 |
| 46-56 | 8 |

|  |  |
| --- | --- |
| Exposure | *Frequency* |
| 5-15 | 5 |
| 16-25 | 8 |
| 26-35 | 11 |
| 36-45 | 17 |
| 46-56 | 8 |

## Histogram

## Descriptive Statistics Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Pre-Exposure μg/dL* |  |  | *Post-Exposure μg/dL* |  |
|  |  |  |  |  |
| Mean | 32.8571429 |  | Mean | 33.28571 |
| Standard Error | 1.75230655 |  | Standard Error | 1.781423 |
| Median | 35 |  | Median | 36 |
| Mode | 36 |  | Mode | 38 |
| Standard Deviation | 12.2661458 |  | Standard Deviation | 12.46996 |
| Sample Variance | 150.458333 |  | Sample Variance | 155.5 |
| Kurtosis | -0.57603713 |  | Kurtosis | -0.65421 |
| Skewness | -0.42510965 |  | Skewness | -0.48363 |
| Range | 50 |  | Range | 50 |
| Minimum | 6 |  | Minimum | 6 |
| Maximum | 56 |  | Maximum | 56 |
| Sum | 1610 |  | Sum | 1631 |
| Count | 49 |  | Count | 49 |
| Largest(1) | 56 |  | Largest(1) | 56 |
| Smallest(1) | 6 |  | Smallest(1) | 6 |
| Confidence Level(95.0%) | 3.52324845 |  | Confidence Level(95.0%) | 3.581792 |

## Kolmogorov-Smirnov Test

H05: There is no statistically significant relationship differences between the blood lead level of the employees and pre and post-exposure to an unhealthy workplace condition.

HA5: There is a statistically significant relationship differences between the blood lead level of the employees and pre and post-exposure to an unhealthy workplace condition.

## Measurement Scale

Interval

## Measure of Central Tendency

Mean

## Evaluation

By using an alpha of 0.05, the p-value of the t Stat is 0.0596>0.05 of alpha. The alternative hypothesis (H05) will be highly accepted and no statistically significant difference, while the null hypothesis (HA5) is rejected. In this case, it means that the pre-exposure and post-exposure were the same. As long as the instances regarding lead blood levels are contained and results proven via post-exposure results, it is clear that the mean has increased slightly (pre-exposure = 32.8571, while post-exposure =33.2857).

# **Descriptive Data and Assumptions: ANOVA**

## Frequency Distribution Table

|  |  |
| --- | --- |
| *Air* | *Frequency* |
| 1-3 | 1 |
| 4-6 | 4 |
| 7-9 | 6 |
| 10-12 | 7 |
| 12-15 | 2 |

|  |  |
| --- | --- |
| Soil | *Frequency* |
| 5-7 | 3 |
| 8-10 | 13 |
| 10-13 | 4 |

|  |  |
| --- | --- |
| Water | *Frequency* |
| 1-3 | 1 |
| 4-6 | 10 |
| 7-9 | 5 |
| 10-12 | 4 |

|  |  |
| --- | --- |
| Training | *Frequency* |
| 1-3 | 1 |
| 4-6 | 16 |
| 7-9 | 3 |

## Histogram

## Descriptive Statistics Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *A = Air* |  |  | *B = Soil* |  |
|  |  |  |  |  |
| Mean | 8.9 |  | Mean | 9.1 |
| Standard Error | 0.684028 |  | Standard Error | 0.390007 |
| Median | 9 |  | Median | 9 |
| Mode | 11 |  | Mode | 8 |
| Standard Deviation | 3.059068 |  | Standard Deviation | 1.744163 |
| Sample Variance | 9.357895 |  | Sample Variance | 3.042105 |
| Kurtosis | -0.6283 |  | Kurtosis | 0.11923 |
| Skewness | -0.36085 |  | Skewness | 0.492002 |
| Range | 11 |  | Range | 7 |
| Minimum | 3 |  | Minimum | 6 |
| Maximum | 14 |  | Maximum | 13 |
| Sum | 178 |  | Sum | 182 |
| Count | 20 |  | Count | 20 |
| Largest(1) | 14 |  | Largest(1) | 13 |
| Smallest(1) | 3 |  | Smallest(1) | 6 |
| Confidence Level(95.0%) | 1.431688 |  | Confidence Level(95.0%) | 0.816294 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *C = Water* |  |  | *D = Training* |  |
|  |  |  |  |  |
| Mean | 7 |  | Mean | 5.4 |
| Standard Error | 0.575829 |  | Standard Error | 0.265568 |
| Median | 6 |  | Median | 5 |
| Mode | 6 |  | Mode | 5 |
| Standard Deviation | 2.575185 |  | Standard Deviation | 1.187656 |
| Sample Variance | 6.631579 |  | Sample Variance | 1.410526 |
| Kurtosis | -0.23752 |  | Kurtosis | 0.253747 |
| Skewness | 0.760206 |  | Skewness | 0.159183 |
| Range | 9 |  | Range | 5 |
| Minimum | 3 |  | Minimum | 3 |
| Maximum | 12 |  | Maximum | 8 |
| Sum | 140 |  | Sum | 108 |
| Count | 20 |  | Count | 20 |
| Largest(1) | 12 |  | Largest(1) | 8 |
| Smallest(1) | 3 |  | Smallest(1) | 3 |
| Confidence Level(95.0%) | 1.205224 |  | Confidence Level(95.0%) | 0.55584 |

## Kolmogorov-Smirnov Test

H06: There are no statistically significant differences relationship between return on investment and air, soil, water, and safety training.

HA6: There is a statistically significant difference in return on investment between air, soil, water, and safety training.

## Measurement Scale

Ratio

## Measure of Central Tendency

Mean

## Evaluation

According to the results demonstrated above, while using an alpha of 0.05, the p-value of the ANOVA analysis is 1.76E-06 < 0.05. Evidently, F = 11.9232, while F crit = 2.724944. Therefore, F > F crit. This outcome debunks the null hypothesis. (H06) is rejected, and (HA6) is accepted. There are significant differences, and this confirms that they are not equal regarding the return of their investments among the four groups.

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