**Practical No: 03**

**OBJECT:** In an experiment to study the dependence of hypertension on smoking habits, the following data were taken on 186 individuals:

|  |  |  |  |
| --- | --- | --- | --- |
| Hypertension |  | Smoking habits |  |
| No smokers | Moderate smokers | Heavy smokers |
| Hypertension | 21 | 36 | 36 |
| No hypertension | 48 | 26 | 19 |

Test the hypothesis that presence or absence of hypertension is independent of smoking habit. (Chi-Square test)

**WORKING EXPRESSION:**

Chi - square is a non-parametric test and it is used to measure data in nominal and ordinal scale.

**Chi -square Test for goodness of fit:**

It is used to test the significant difference between observed frequency and expected frequency.

Let us consider n observation of random variables. X is classified into k classes with their respective frequency.

Different steps in the test are;

**Test statistic:** Under Ho

**χ² = ~** χ2(r-1) (c-1), r = number of rows, c=number of columns

Where, O = Observed frequency

E = Expected frequency

=

**Hypothesis Setting:**

Null hypothesis (Hₒ): There is no significant association between two factors.

Alternative hypothesis (H₁): There is significant association between two factors.

**Level of significance(α):** 5% = 0.05

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**OUTPUT:**

WEIGHT BY Frequency.

CROSSTABS

/TABLES=Hypertension BY Smoking\_Habits

/FORMAT=AVALUE TABLES

/STATISTICS=CHISQ

/CELLS=COUNT EXPECTED

/COUNT ROUND CELL.

**Crosstabs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Case Processing Summary** | | | | | | |
|  | Cases | | | | | |
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| Hypertension and No hypertension \* No smokers, Moderate smokers, and Heavy smokers | 186 | 100.0% | 0 | 0.0% | 186 | 100.0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hypertension and No hypertension \* No smokers, Moderate smokers, and Heavy smokers Crosstabulation** | | | | |
|  | | | No smokers, Moderate smokers, and Heavy smokers | |
| No smoker | Moderate smoker |
| Hypertension and No hypertension | Hypertension | Count | 21 | 36 |
| Expected Count | 34.5 | 31.0 |
| No hypertension | Count | 48 | 26 |
| Expected Count | 34.5 | 31.0 |
| Total | | Count | 69 | 62 |
| Expected Count | 69.0 | 62.0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hypertension and No hypertension \* No smokers, Moderate smokers, and Heavy smokers Crosstabulation** | | | | |
|  | | | No smokers, Moderate smokers, and Heavy smokers | Total |
| Heavy smoker |
| Hypertension and No hypertension | Hypertension | Count | 36 | 93 |
| Expected Count | 27.5 | 93.0 |
| No hypertension | Count | 19 | 93 |
| Expected Count | 27.5 | 93.0 |
| Total | | Count | 55 | 186 |
| Expected Count | 55.0 | 186.0 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Chi-Square Tests** | | | |
|  | Value | df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 17.433a | 2 | .000 |
| Likelihood Ratio | 17.814 | 2 | .000 |
| Linear-by-Linear Association | 15.662 | 1 | .000 |
| N of Valid Cases | 186 |  |  |

|  |
| --- |
| a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.50. |

**RESULTS:**

From the chi-square Tests Table, we obtain the value of X2cal = 17.433.

**Tabulated value:** At 5% level of significance and (r-1) (c-1) = (2-1) (3-1) = 2 d.f. The tabulated value is 5.991.

**Decision:**

**χ²cal =**17.433 > **χ² tab**= 5.991. Hence, we reject Ho. Hence, we can conclude that there is a significant association between hypertension and smoking habits.

**CONCLUSION:**

Hence, we have calculated the value of chi-square. There are two hypertension and three smoking habits, and the total number of observations was 186. i.e., N=186. As from the result we have rejected Null Hypothesis and the tabulated value was written from chi-square table.