

Objective 1- To explore if there is any relation between the education levels and awareness of general insurance and related products.

Chi Square test is applied when we have two categorical variables from a single population. It is used to determine whether there is a significant association between the two variables.

Assumptions for conducting chi square test.

- The sampling method is simple random sampling.
- The variables under study are each categorical.
- If sample data are displayed in a contingency table, the expected frequency count for each cell of the table is at least 5.

The null hypothesis states that knowing the level of Variable A does not help you predict the level of Variable B. That is, the variables are independent. In our case, following hypothesis are created.

H₀: There is no association of education levels and awareness of general insurance and its products.

H_a: There is association of education levels and awareness of general insurance and its products.

Observed Frequencies

Education / Awareness	Yes	No
Bachelor Degree	23	17
College graduate(12th)	14	18
High school(10th)	18	11
Master Degree	19	14
Doctorate Degree	9	7

Expected Frequencies

Education / Awareness	No	Yes
Bachelor Degree	22.13333	17.86667
College graduate(12th)	17.70667	14.29333
High school(10th)	16.04667	12.95333
Master Degree	18.26	14.74
Doctorate Degree	8.853333	7.146667

Chi Square Output

X-squared	Df	p-value
2.4181	4	0.6594

With $df = 4$, the probability of finding $\chi^2 \geq 2.4181$ is 0.6594. We cannot reject Null hypothesis at 0.05 alpha level of significance and hence conclude that there is **no association of education levels and awareness of general insurance and related products.**

Objective 2- To explore if there is any relation between size of business and the source (which may be an agent or direct insurance company) of taking insurance related products.

Ho: There is no association of size of business and the source (agent or direct company) of taking insurance related products.

Ha: There is association of size of business and the source (agent or direct company) of taking insurance related products.

Observed Frequencies

Size of business	Directly from insurance company/website/advertisement	Through Agents
5-75 Crore	20	25
75-250 Crore	18	17
Over 250 Crore	19	18

Upto 5 Crore	23	18
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Expected Frequencies

Size of business	Directly from insurance company/website/advertisement	Through Agents
5-75 Crore	17.58	18.8
75-250 Crore	17.9	16
Over 250 Crore	18.58	17.8
Upto 5 Crore	23.94	16.4

Chi Square Output

X-squared	Df	p-value
9.6714	5	0.0392

With $df = 5$, the probability of finding $\chi^2 \geq 9.6714$ is 0.0392. We can reject Null hypothesis at 0.05 alpha level of significance and hence conclude that there is **association of size of business and the source of taking insurance related products.**

Objective 3 To explore if there is any relation between size of business and the type of insurance taken.

Ho: There is no association of size of business and the type of insurance.

Ha: There is association of size of business and the type of insurance.

G-test is an alternative to chi square test. Its statistic is also approximately chi-squared distributed, but for

small samples, this approximation is closer than one that chi-squared test uses. In this case, some of the observed frequencies were smaller than 5 and hence this test was more suitable.

Observed Frequency

Size of Business / Type of Business	Accounts Receivable Insurance	Business Income Insurance	Business Liability Insurance	Commercial Auto Insurance	Crime Insurance	Cyber Liability Insurance	Equipment Breakdown Insurance	Fire insurance	Health insurance	Other	Private Vehicle/Motor insurance	Property Insurance	Travel insurance	Worker's Compensation Insurance
5-75 Crore	1	2	3	2	4	3	3	4	0	5	3	1	0	6
75-250 Crore	2	3	2	1	4	5	0	3	2	2	3	1	2	5
Over 250 Crore	2	5	4	2	2	3	3	4	1	4	3	0	3	1
Upto 5 Crore	2	1	2	4	3	3	6	3	1	5	1	2	3	5

Expected Frequency

Size of Business / Type of Business	Accounts Receivable Insurance	Business Income Insurance	Business Liability Insurance	Commercial Auto Insurance	Crime Insurance	Cyber Liability Insurance	Equipment Breakdown Insurance	Fire insurance	Health insurance	Other	Private Vehicle/Motor insurance	Property Insurance	Travel insurance	Worker's Compensation Insurance
5-75 Crore	1.72666667	2.7133333	2.7133333	2.22	3.2066667	3.4533333	2.96	3.4533333	0.986667	3.946667	2.466667	0.986667	1.9733333	4.193333333
75-250 Crore	1.633333333	2.566667	2.566667	2.1	3.03333333	3.266667	2.8	3.266667	0.9333333	3.7333333	2.3333333	0.9333333	1.866667	3.966666667
Over 250 Crore	1.72666667	2.7133333	2.7133333	2.22	3.2066667	3.4533333	2.96	3.4533333	0.986667	3.946667	2.466667	0.986667	1.9733333	4.193333333
Upto 5 Crore	1.913333333	3.006667	3.006667	2.46	3.55333333	3.826667	3.28	3.826667	1.0933333	4.3733333	2.7333333	1.0933333	2.186667	4.646666667

Following is the output from R

G = 34.538, X-squared df = 39, p-value = 0.6735

With p value=0.6735, we cannot reject Null hypothesis at 0.05 alpha level of significance and hence conclude that there is **no association of size of business and type of insurance.**

Objective 4 To explore if there is any relation between sector from which insurance is taken and reasons for taking insurance.

Ho: There is no association of sector of insurance and reasons for taking general insurance and related products.

Ha: There is association of sector of insurance and reasons for taking general insurance and related products.

Observed Frequencies

	Better service	Convenience and Trust	Easy terms & conditions	Fast settlement of claims Pressure of Friends/Agents	Financial position of the company Influence of advertisements	Less official procedure compared to other company	No. of years of establishment Company Name	Persuasion of agents Service
Private	12	10	13	8	11	10	12	8
Public	10	6	12	7	9	7	8	7

Expected Frequencies

	Better service	Convenience and Trust	Easy terms & conditions	Fast settlement of claims Pressure of Friends/Agents	Financial position of the company Influence of advertisements	Less official procedure compared to other company	No. of years of establishment Company Name	Persuasion of agents Service
Private	11.44	8.32	13	6.76	11.44	6.76	10.92	9.36
Public	10.56	7.68	12	6.24	10.56	6.24	10.08	8.64

Chi Square Output

X-squared	Df	p-value
2.8039	7	0.025

With $df = 7$, the probability of finding $\chi^2 \geq 2.8039$ is 0.025. We can reject Null hypothesis at 0.05 alpha level of significance and hence conclude that there is **association between sector from which insurance is taken and the reason for taking insurance.**