# A STUDY OF ELECTRICITY ACCESS AND USAGE PATTERN IN NORTH AND WESTERN REGIONS OF INDIA

**Aim:** To study electricity access and usage patterns of North and Western regions of India.

**Objectives:**
1)To analyse residential household electric consumption across various districts of India.
2)To study the pattern of electric consumption among residential households by the means household conditions.
3)To study the pattern of electric consumption among residential households by the means of asset ownership of a particular household.

**Methodology:**

Identifying the topic → Literature review to know variables → Identifying Aim & Objective → Data collection from Census of India → Analysis of data on Stata → Identifying sampling strategy & sample size → Analysing relation between variables with different tests

**Sampling Strategy:** Stratified Random Sampling Strategy

**Equation:** $$n = (\frac{s.d. \times z}{\epsilon})^2$$

**Sample Size:** Standard Deviation (s.d.) = 15.10,
z= z score =1.96,
Mean = 78.91
Margin of error= ϵ=5% of mean i.e. 5% of 78.91=3.94
n = (15.10× 1.96/3.94)²
**n = 56.41**

## Co – relation Analysis:

| Null Hypothesis ( there is no significant relation between the percentage of household having access to electricity and) | Co - relation Value | P - Value | Accept/ Reject null hypothesis |
|---|---|---|---|
| percentage of household having good living condition | 0.6142 | 0.0000 | Reject |
| percentage of household having liveable condition | -0.6022 | 0.0000 | Reject |
| percentage of household having dilapidated condition | -0.264 | 0.0493 | Reject |
| percentage of household having Radio | 0.2243 | 0.0966 | Accept |
| percentage of household having Television | 0.7987 | 0.0000 | Reject |
| percentage of household having Computer with Internet | 0.3978 | 0.0024 | Reject |
| percentage of household having Computer without Internet | 0.2381 | 0.0772 | Accept |

**Null Hypothesis: There is no significant relation between the condition of household across districts and the percentage of household having access to electricity.**

## Chi – Square test :

| State Name | Access to Electricity | | Total |
|---|---|---|---|
| | High Access | Low Access | |
| Gujarat | 13<br>39.39 | 1<br>4.35 | 14<br>25.00 |
| Jammu & Kashmir | 10<br>30.30 | 4<br>17.39 | 14<br>25.00 |
| Maharashtra | 9<br>27.27 | 5<br>21.74 | 14<br>25.00 |
| Rajasthan | 1<br>3.03 | 13<br>56.52 | 14<br>25.00 |
| Total | 33<br>100.00 | 23<br>100.00 | 56<br>100.00 |
| Pearson Chi2 (3) = 23.2411 Pr = 0.000 | | | |

**Null Hypothesis: As the value of chi-square i.e. $x^2$ is greater than the critical value i.e. 7.817 at 95% confidence interval, therefore here we reject the null hypothesis. Thus, there is a significant co-relation between the states with access to electricity.**

**Null Hypothesis:**
- Ownership of appliances have no significant effect on the variation of access to electricity across districts. At confidence interval of 95%
- Housing conditions have no significant effect on the variation of access to electricity across districts. At confidence interval of 95%
- Electricity consumption of the district has no significant effect on the variation to access of electricity across districts. At confidence interval of 95%

## T - test:

| Variable | Observation | Mean | Confidence Interval | t-value | Degree of Freedom | Pr(\|T\| > \|t\|) |
|---|---|---|---|---|---|---|
| % of households having access to electricity | 56 | 79.42 | 95% | 0.25 | 55 | 0.79 |

**Null Hypothesis: The mean of the sample is not significantly different from the population mean**

## Linear Regression Analysis:

| Null Hypothesis (there is no significant relation between percentage of household having access to electricity and ) | Prob > F | R - squared | degree of freedom | F-test | Accept/ Reject null hypothesis |
|---|---|---|---|---|---|
| percentage of household having good living conditions | 0.0000 | 0.3773 | 1 | 32.72 | Reject |
| percentage of household having liveable conditions | 0.0000 | 0.3627 | 1 | 30.73 | Reject |
| percentage of household having dilapidated conditions | 0.0493 | 0.0697 | 1 | 4.05 | Reject |
| percentage of household having television | 0.0000 | 0.6379 | 1 | 95.13 | Reject |
| percentage of household having radio | 0.0966 | 0.0503 | 1 | 2.86 | Accept |
| Computer with internet | 0.0024 | 0.1582 | 1 | 10.15 | Reject |
| percentage of household having Computer without internet | 0.0772 | 0.0567 | 1 | 3.24 | Accept |

**Null Hypothesis: There is no significant relation between the states owned and the percentage of household having access to electricity.**

**Inference:** The percentage of household having access to electricity have significant relation with percentage of household with good living conditions, percentage of household with liveable living conditions, percentage of household with dilapidated conditions, percentage of household having computer with net and percentage of household with television.

**Sampling Strategy:** Stratified Random Sampling Strategy

**Equation:** (z x S/M.E) ²
n = (1.96 x 15.08/4.08)²

**Sample Size:**
Standard Deviation (s.d.) = 15.08,
z= z score =1.96,
Mean = 78.90
Margin of error= ϵ=5% of mean i.e. 5% of 78.90=3.94
**n = 52.53**

## T-test:

| Variable | Observation | Mean | Confidence Interval | t-value | Degree of Freedom | Pr(\|T\| > \|t\|) |
|---|---|---|---|---|---|---|
| % of households having access to electricity | 52 | 78.90 | 95% | 0.25 | 55 | 0.994 |

**Null Hypothesis: The mean of the sample is not significantly different from the population mean**

## Co-relation Analysis:

**Null Hypothesis: Ownership of assets does not affect the level of electricity consumption**

| Null Hypothesis (Ownership of assets does not affect the level of electricity consumption) | Co - relation Value | P - Value | Accept/ Reject null hypothesis |
|---|---|---|---|
| percentage of household having Television | 0.8036 | 0.0000 | Reject |
| percentage of household having Computer with Internet | 0.4931 | 0.0024 | Reject |
| percentage of household having Computer without Internet | 0.5259 | 0.0772 | Reject |

**Inference :There is a significant relation between the selected variables of asset and electricity consumption**

## Conclusion:

Aim of this study is to understand if owning appliances and assets affects the level of electricity consumption at domestic level and do energy efficient appliances help in improving it.
This study shows that there are many factors affecting domestic electricity use. This includes various socio-economic factors, dwelling factors and appliances factors.
Thus the study establishes that ownership of assets affect the level of electricity consumption at domestic level and if energy efficient appliances and technologies are used that will help in saving energy and thus help in combating climate change.

**Null Hypothesis:**
- Ownership of assets does not significantly affect the level of electricity consumption across districts. At confidence interval of 95% .
- Owning Television does not significantly affect the level of electricity consumption across districts. At confidence interval of 95% .
- Household conditions & access to internet does not affect the level of electricity consumption across districts. At confidence interval of 95%.

## Chi square Test :

**Null Hypothesis: Ownership of assets does not affect the level of electricity consumption**

| Null Hypothesis | Chi square value (observed) | P Value (critical) | Confidence Interval | Degree of Freedom | Accept/Reject null hypothesis |
|---|---|---|---|---|---|
| There is no relation between ownership of assets and level of electricity consumption | 18.069 | 0.0000 | 95% | 1 | Reject |

**Inference: There is significant relation between ownership of assets & level of electricity consumption**

## Linear Regression Analysis:

**Null Hypothesis: Ownership of assets does not affect the level of electricity consumption**

| Null Hypothesis (there is no significant relation between percentage of household having access to electricity and ) | Number of Observation | Prob > F | R - squared | degree of freedom | F-test | Accept/ Reject null hypothesis |
|---|---|---|---|---|---|---|
| percentage of household having television | 52 | 0.0000 | 0.6457 | 1 | 91.14 | Reject |
| Computer with internet connection | 52 | 0.0000 | 0.5281 | 1 | 91.14 | Reject |
| percentage of household having good living condition | 52 | 0.0000 | 0.5281 | 1 | 27.42 | Reject |

**Inference: Ownership of assets affects the level of electricity consumption.**

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