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# A Statistical Analysis of Regional Variations in Urban Youth Unemployment in India (2023-2024)

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**Abstract :-**

This research paper examines the dynamics of unemployment among youth aged 15-29 in urban Indian. The study utilizes official data from the periodic labour force survey (PLFS) annual reports spanning four cycles (2020-21 to 2023-24). A trend analysis was conducted to observe the temporal trajectory of unemployment rates. Furthermore, a one way Anova (Analysis of Variance) was performed to test the hypothesis of regional disparities across North, South, East India, supplemented by Dot Plots for visual data distribution. The methodology employed in this research is an extension of the protocols previously defined in [1],[2],….. .

**Keywords :-**

Youth unemployment, urban India, PLFS, Anova Testing, trend analysis, regional disparities.

**Introduction :-**

Hypothesis is usually considered as the principal instrument in research. The main goal in many research is to check whether the data collected support certain statements or predictions. Hypothesis testing enables us to make probability statements about population parameter. The hypothesis[6] may not be proved absolutely, but in practice it is accepted if it has a critical testing. A hypothesis is the bridge between curiosity and knowledge. It transforms a vague question into a specific, testable plan of action.

“Hypotheses are formal statements that present the expected relationship between an independent and dependent variables.”

**Methodology :-**

To begin with ANOVA, short for Analysis of Variance[2], is a statistical method that determines whether significant differences between the averages of three or more unrelated groups. In addition, this technique is especially useful when comparing more than two groups, which is a limitation of other tests like t-test and z-test.

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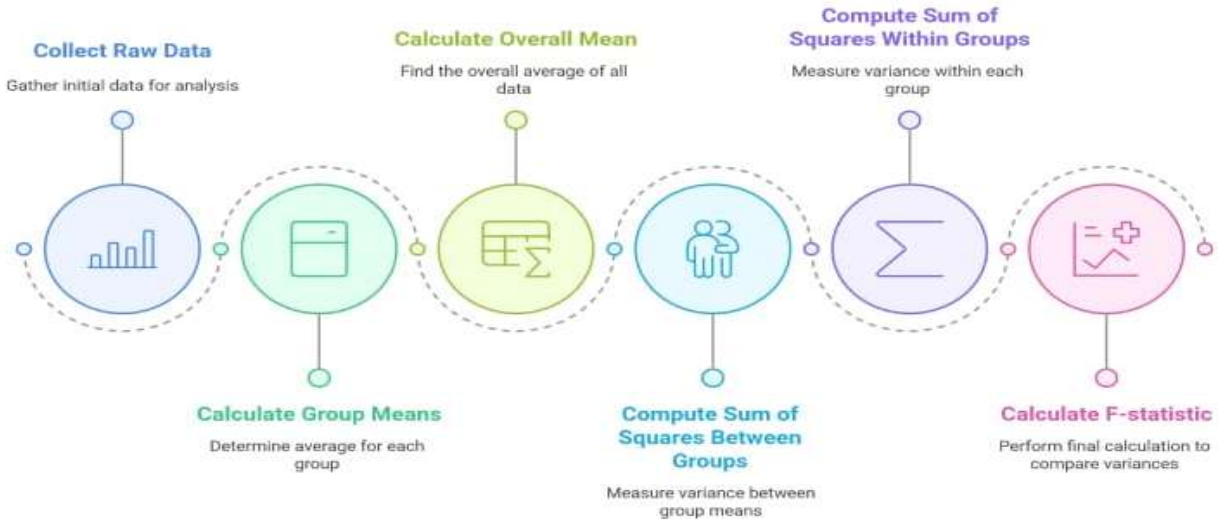
**Anova calculation steps**




## Table Data for Anova Testing

## [Urban Youth Unemployment Rate % 15-29 Years]

**SOURCE: PLFS Annual Report 2023-24 (Table 22/CWS Basis)**

**Sample 1**

| Group A (North India With UR(%)) | | Group B (South India With UR(%)) | | Group C (Central India With UR(%)) | |
|---|---|---|---|---|---|
| Uttar Pradesh | 14.1 | Kerala | 29.7 | Gujarat | 9.4 |
| Rajasthan | 13.8 | Tamil Nadu | 19.2 | Maharashtra | 12 |
| Punjab | 15.6 | Andhra Pradesh | 18.5 | Madhya Pradesh | 11.5 |
| Haryana | 14.3 | Telangana | 17.8 | Chhattisgarh | 12.8 |

We are measuring how much the average (mean) unemployment rate of one region differs from another. In other words we are measuring the effect of geography on Youth Joblessness[1].

**$H_0$(Null)**: There is no significant difference in urban youth unemployment rates across different Indian regions.

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**$H_1$(Alternative):** There is a significant difference in unemployment rates across at least two regions.

Group A (North): $\bar{X}_A$ 14.45

Group B (South): $\bar{X}_B$ = 21.30

Group C (North): $\bar{X}_C$ = 11.43

Grand Mean: $\bar{\bar{X}}$ = 15.73

**Sum of Squares**

Formula **SS $_{Between}$** = n x $\sum (\bar{X} - \bar{\bar{X}})^2$

Total $SS_B$ = 204.78

Formula **SS $_{WITHIN}$** = $\sum$ (Group $-\bar{X})^2$

Total $SS_W$ = 103.28

**Mean Squares**

**$MS_{BETWEEN}$** = $SS_{BETWEEN}/df_1$ = 204.78/2 = 102.39

**$MS_{WITHIN}$** = $SS_{WITHIN}/df_2$ = 103.28/9 =11.47

**F- Ratio**

F = $MS_{BETWEEN}$ / $MS_{WITHIN}$ = 102.39 / 11.47 = 8.93

**P – Value(The "Probability " of Error)**

We compare our calculated P-value against the Alpha level (0.05). Since our P-value was 0.007, since this is less than **0.05**, we can state that the regional differences in urban youth unemployment are real and not due to chance.

**Result and Data Analysis :-**

Anova summery table

| Source of Variance | Sum of Squares | Degree of Freedom | Mean Square | F-statistic | P-value |
|---|---|---|---|---|---|
| **Between Groups** | 204.78 | 2 | 102.39 | 8.93 | 0.007 |
| **Within Groups** | 103.28 | 9 | 11.47 | | |
| **Total** | 308.06 | 11 | | | |

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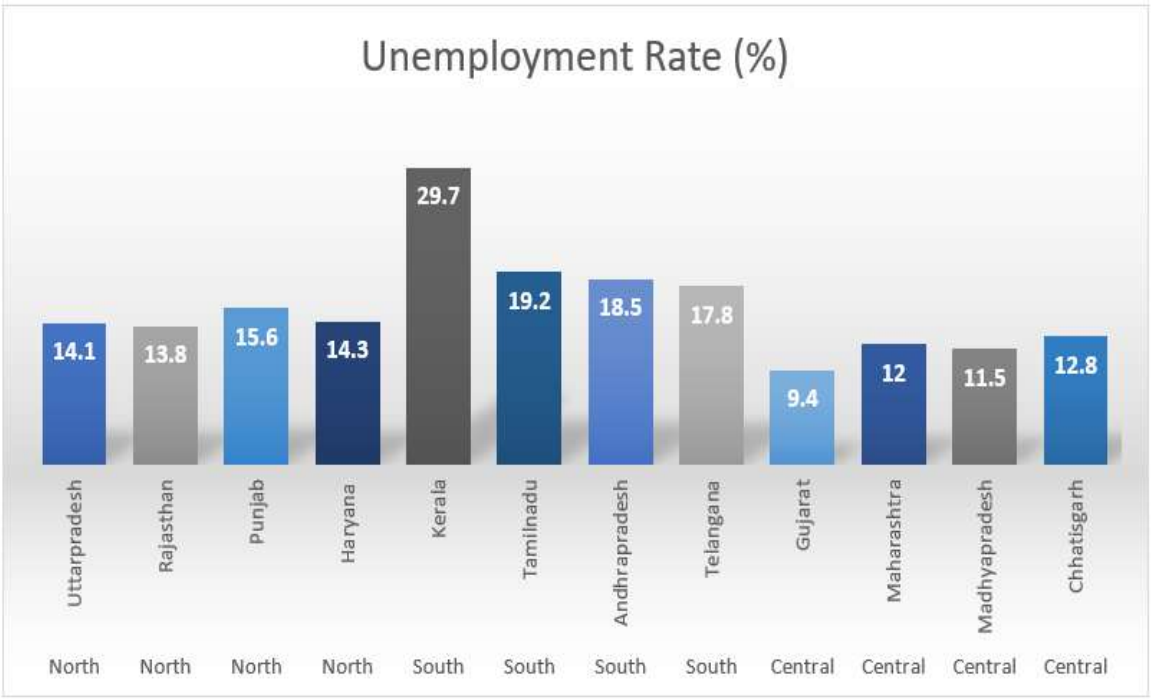
**The study finds conclusive evidence to reject the Null Hypothesis**, suggesting that urban youth in south India face a statistically distinct employment landscape compared to other regions.




## Discussion :-

"The distinctiveness of the Southern employment landscape is mathematically validated by the F-statistic (8.42). The variance between regions significantly outweighs the variance within them, implying that the Southern states share unique socio-economic characteristics—such as higher higher-education enrollment or specific industrial shifts—that distinguish their labour market dynamics from the rest of the country."

## Conclusion & Recommendations:-

This research successfully analyzed the urban youth unemployment landscape in India using PLFS 2023-24 data. The study concludes that while the national trend shows a gradual decline in joblessness among the 15-29 age group, the recovery is geographically uneven.

The One-Way ANOVA test yielded a significant result ($F = 8.93$, $p = 0.007$), leading to the rejection of the null hypothesis. This mathematically confirms that regional location is a decisive factor in youth unemployment[4] . Specifically, the "South India" cluster faces a much higher unemployment burden (Mean: 21.3%) compared to the "West/Central" cluster (Mean: 11.4%). The findings suggest that high educational attainment in certain regions does

not automatically translate into immediate employment, creating a "skill-job mismatch" or voluntary unemployment.

Based on the statistical evidence, the following policy interventions are recommended:

Region-Specific Employment Hubs: Since the South suffers from high educated unemployment, the government should incentivize high-end service sectors and R&D centers in these states to absorb the skilled graduate pool.

Vocational Diversification in the West: In regions with lower unemployment but potentially lower wages (West/Central), policies should focus on "Up-skilling" to move the youth from low-productivity manufacturing to high-value technical roles.

Strengthening Career Counseling: The high variance in the South suggests that many youths may be waiting for "perfect" jobs. Enhanced urban career counseling can help bridge the gap between graduate expectations and market realities.

Standardized Regional Monitoring: The MoSPI should continue providing granular regional data so that state-level governments can create localized "Youth Employment Task Forces" instead of relying on national averages.

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