

# **HR Data: Predicting & Understanding Employee Attrition**

**By**

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# Business Problem

Employee attrition presents a significant challenge for the organization, impacting operational continuity, employee morale, and financial performance. The company seeks to understand why employees are leaving, identify key predictors of attrition, and design data-driven strategies to reduce turnover—particularly among specific demographics such as younger employees, lower-income groups, certain job roles (e.g., Sales Reps, Lab Technicians), and those with lower job satisfaction or shorter tenures.

The core business challenge is:

**"How can the organization use data to identify at-risk employees and develop targeted, proactive strategies to reduce voluntary attrition, improve employee engagement, and retain top talent across all departments and roles?"**

Addressing this issue will help the company:

- Reduce the high costs of rehiring and retraining.
- Improve organizational knowledge retention and productivity.
- Enhance employee satisfaction and workplace culture.
- Strengthen talent development and leadership pipelines.

# Dataset Description

- **Data Source:** Kaggle
- **Number of rows & columns:** 1480 rows & 38 columns
- **Data Types:** Object, Int64, Float64

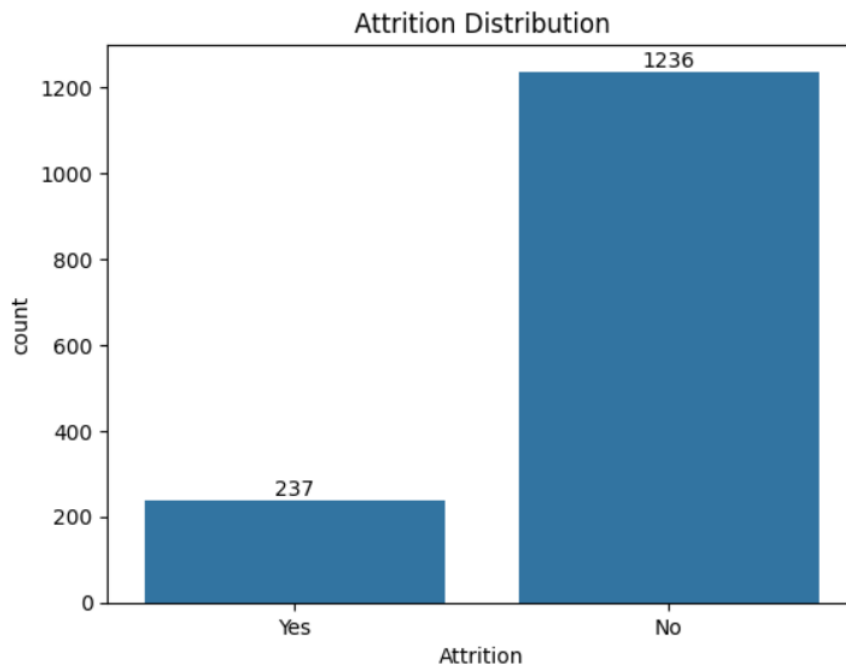
## Data Cleaning

- **Missing Value:** Null
- **Duplicates:** 7

## Analysis

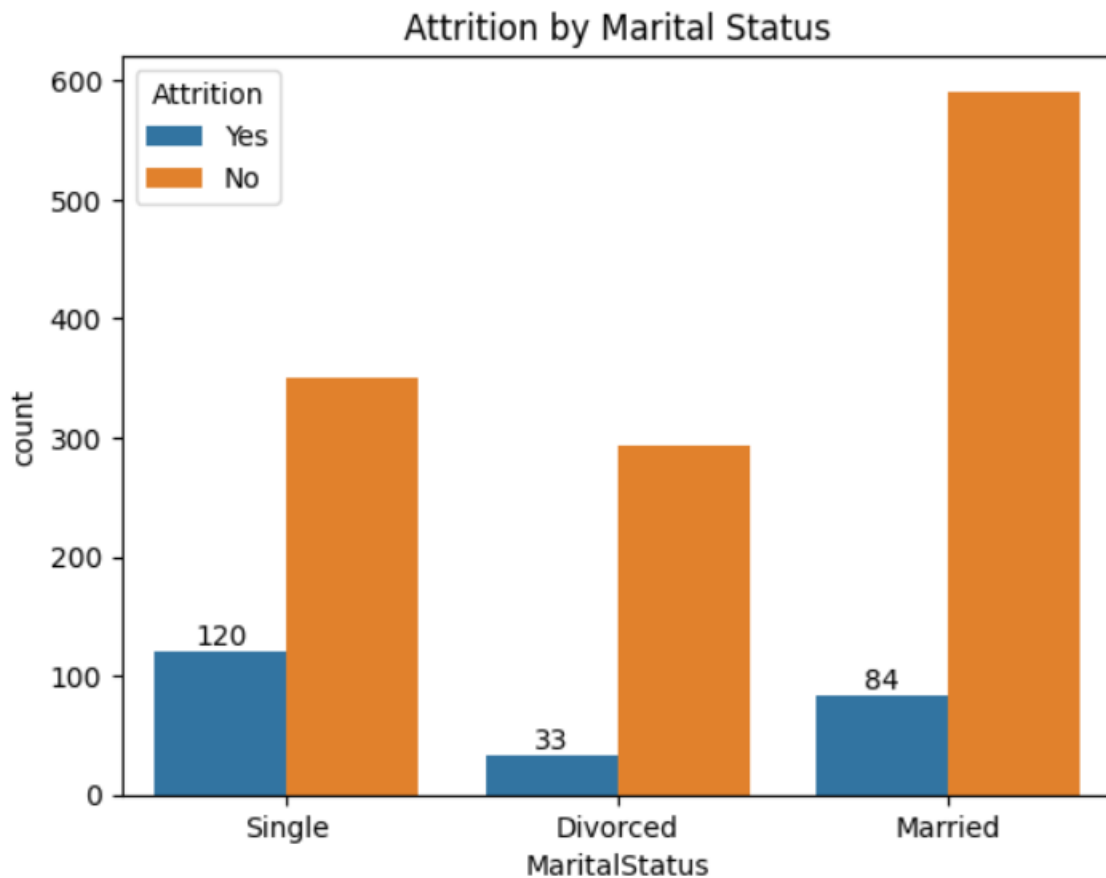
**Python**

### 1.How many employees have left vs stayed?



Out of 1473 employees, 237 has left the company.

## 2.Attrition by marital Status.

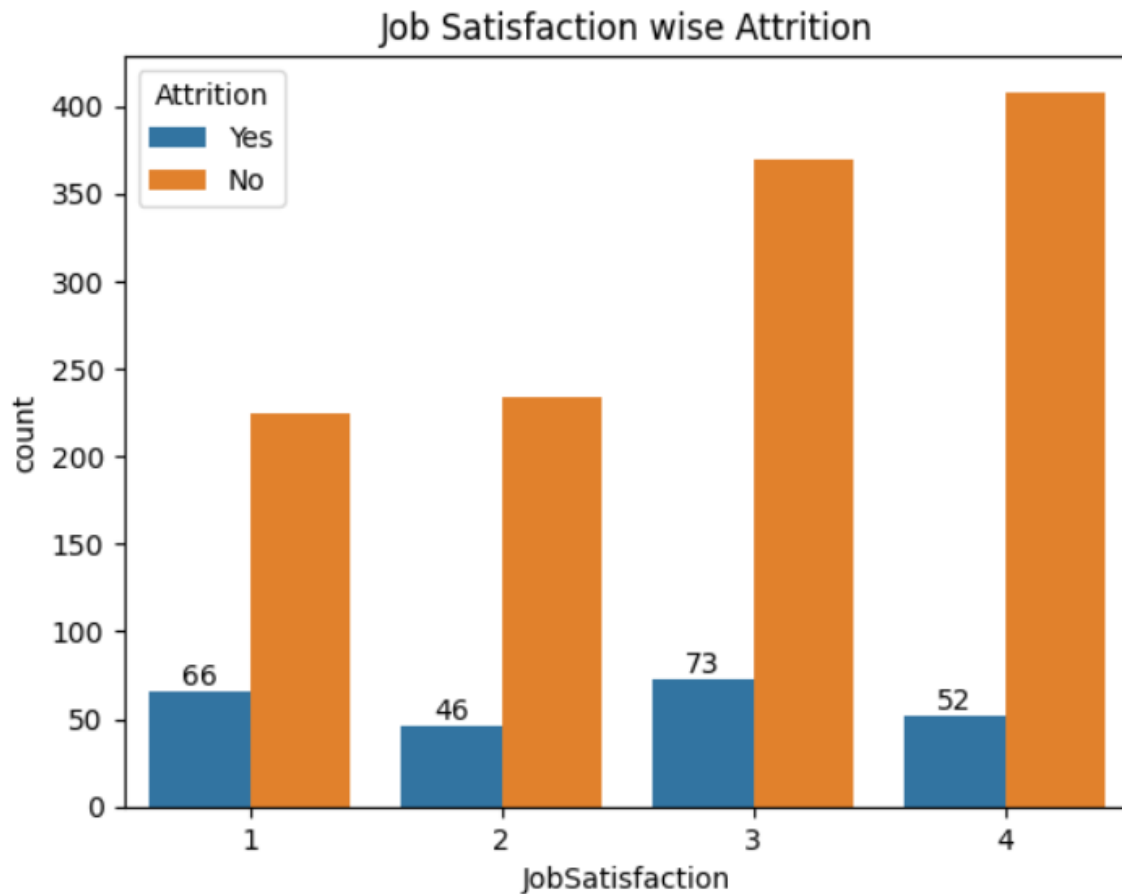


Single employees have the highest number of attritions (120), even though they are not the largest group overall.

### Remedy:-

- Offer career path clarity, growth opportunities, and flexible work arrangements.
- Consider mentorship or social integration programs to build stronger workplace bonds.

### 3.Attrition by Job Satisfaction:

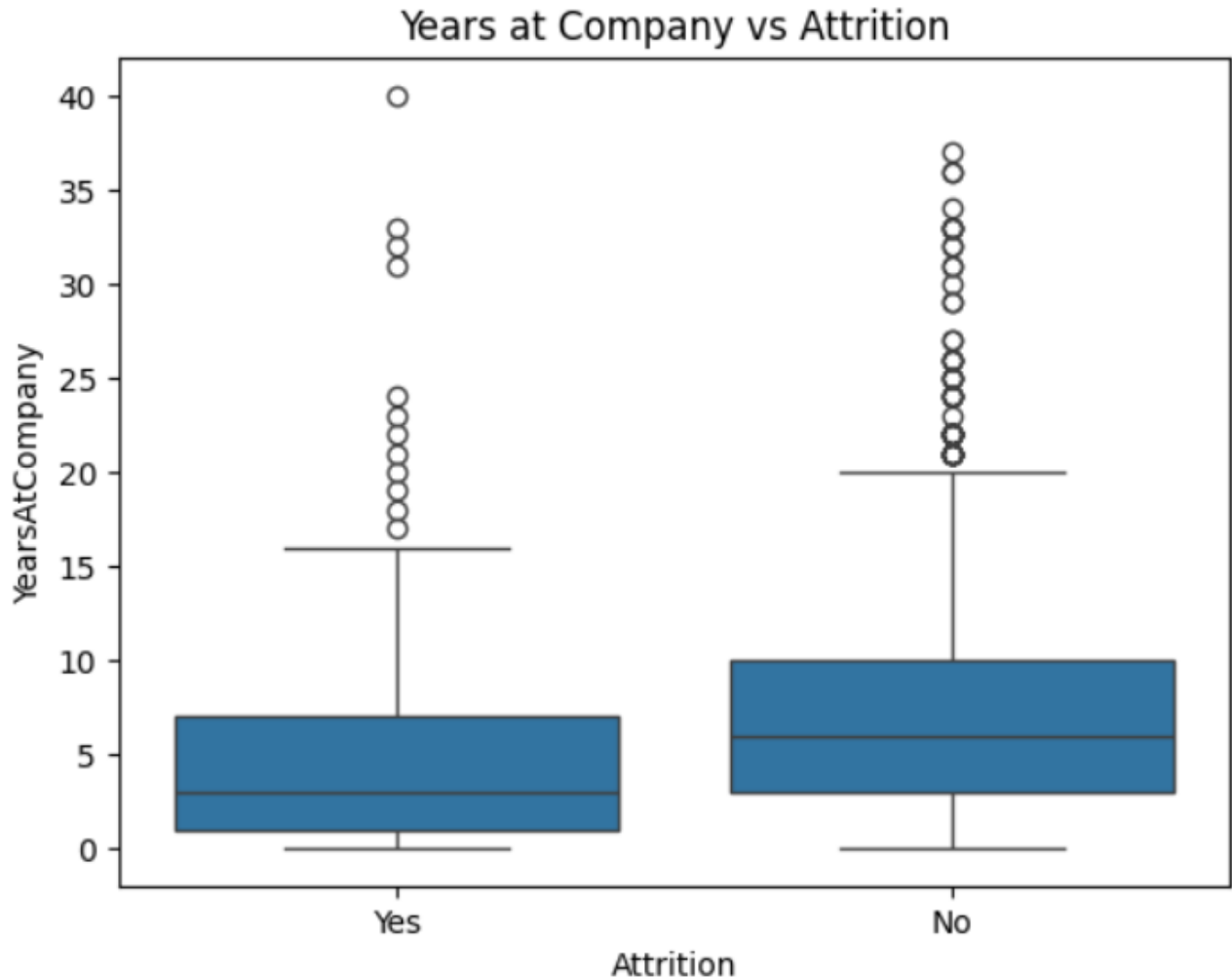


Graph indicates that low job satisfaction is still a strong predictor of attrition. Highest attrition count (73) is at satisfaction level 3. 66 employees left, which is second highest in attrition count.

#### Remedy:-

- **Level 3**-These employees are at risk. Consider career development conversations with role enrichment and recognition.
- **Level 1**-Improve management practices, workload balance, and internal mobility.

#### 4. Attrition according to years of company.

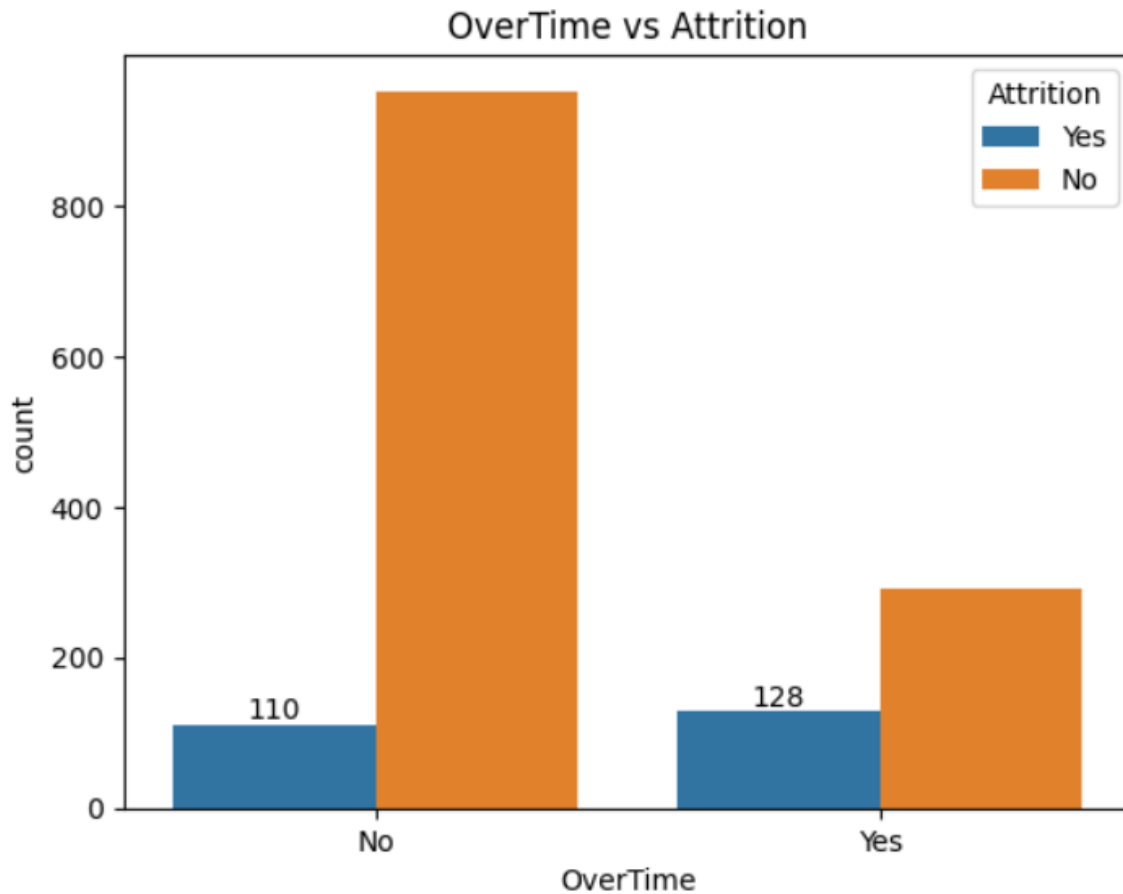


Employees who left ("Yes") had a lower median number of years at the company. Employees who stayed ("No") had a higher median tenure.

#### Remedy:-

- Onboarding, mentorship, and engagement in the first 1–5 years are crucial.
- Employees might leave early due to lack of progression or unclear growth paths. Structured development plans may help.

## 5.Impact of overtime on attrition.

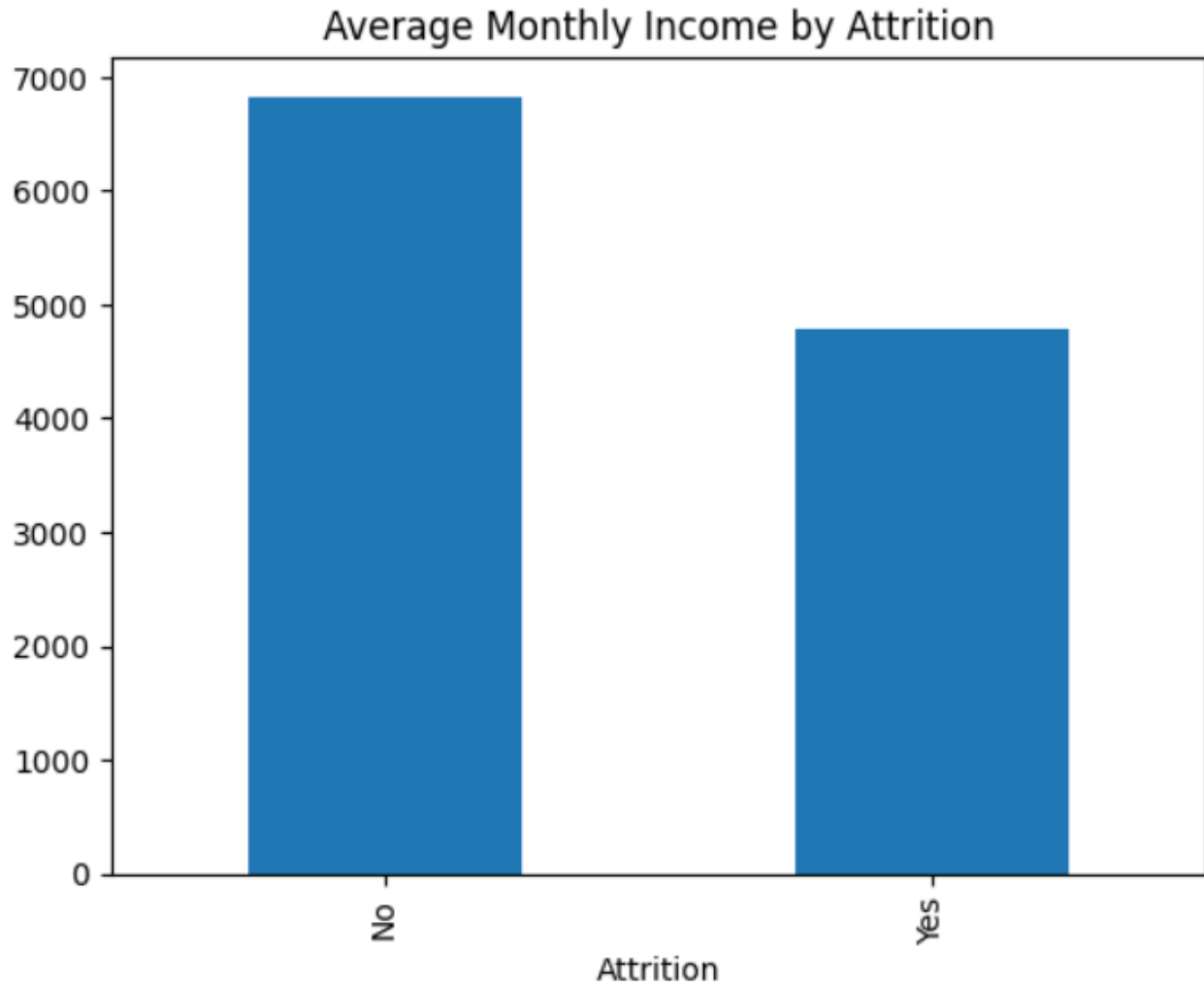


Overtime strongly correlates with higher attrition.

### Remedy:-

- Use time-tracking tools to flag employees who regularly work late or extra hours.
- Ensure that employees who do overtime are either compensated fairly or recognized meaningfully.

## 6.Average income of leavers vs stayers.



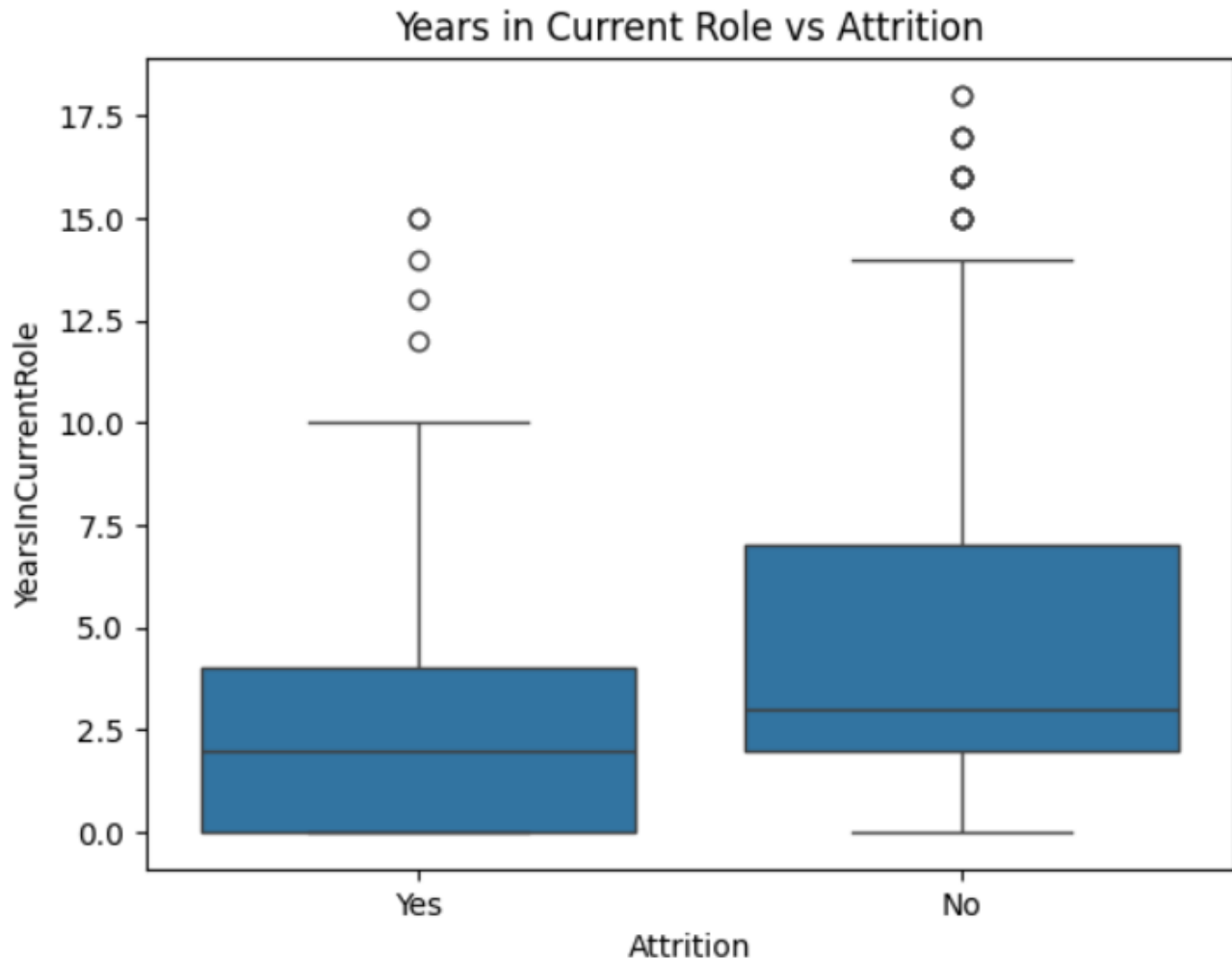
Employees who left the company had a lower average monthly income (~4800). Employees who stayed earned a higher average monthly income (~6800).

### Remedy:-

- Offer bonuses, training grants, or skill-based raises for entry- or mid-level employees.
- Help employees see how they can grow into better-paying roles.



## 7.Years in current role vs attrition.

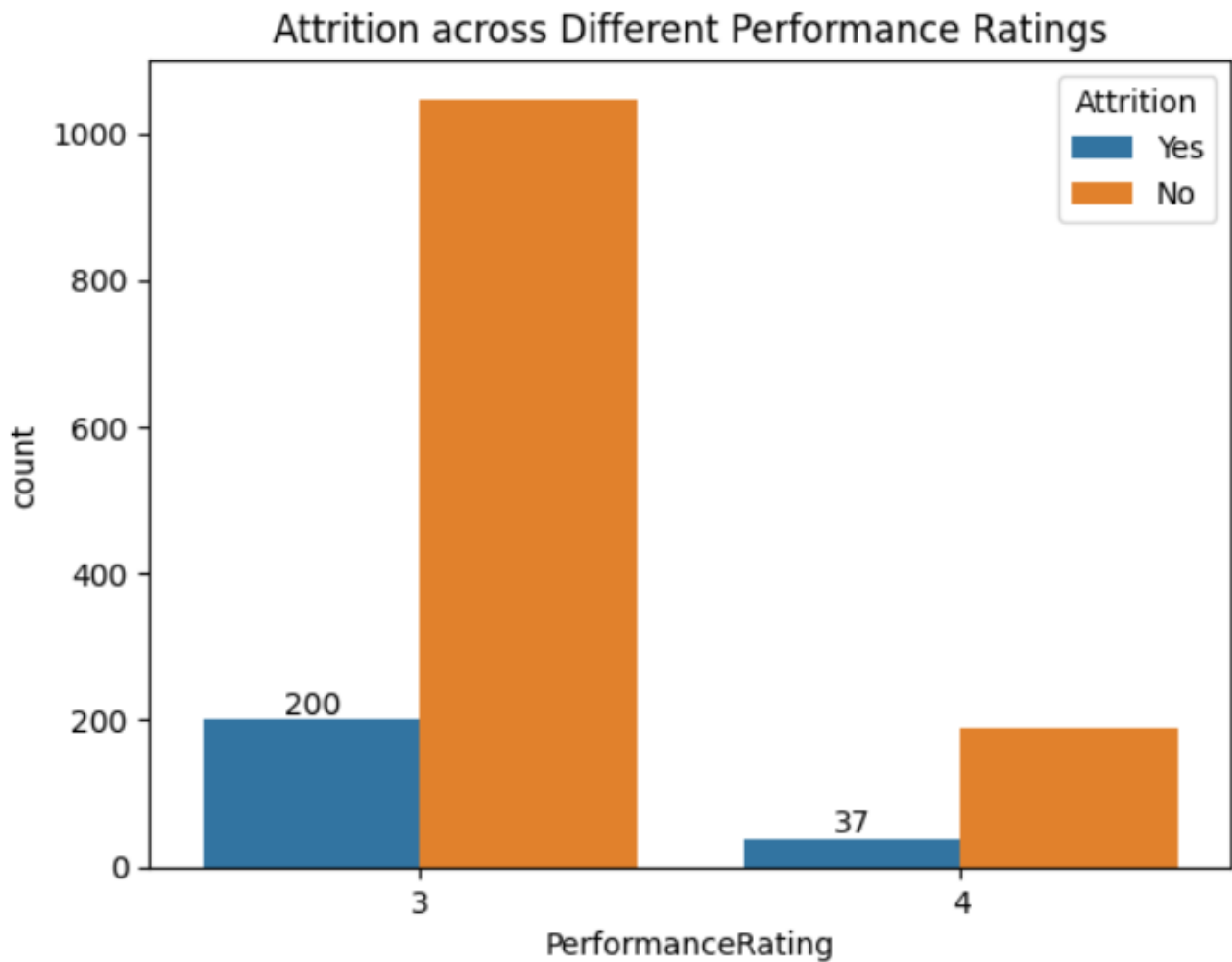


Short Tenure in Role is Linked to Higher Attrition. Employees tend to leave early in their role, often within the first 2–3 years.

### Remedy:-

- Improve onboarding and first-year experience.
- Celebrate achievements in the first 1–2 years to boost morale and retention.

## 8. Performance ratings wise attrition.

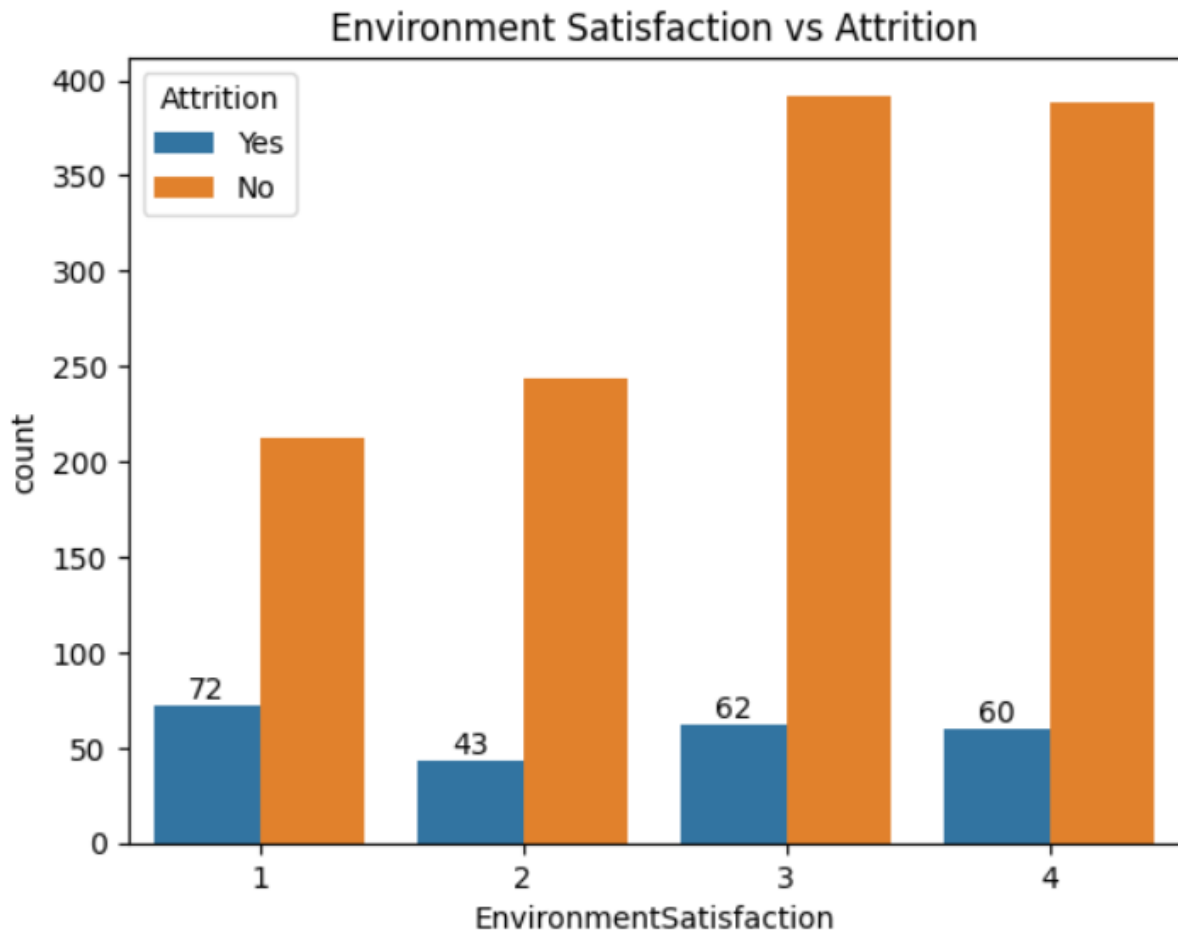


Most attrition is coming from average performers.

### Remedy:-

- Provide growth paths, stretch assignments, or mentorship to help them progress.
- Ensure “solid” employees (rating 3) feel seen and appreciated, not just the top performers.

## 9. Attrition according to environmental satisfaction.

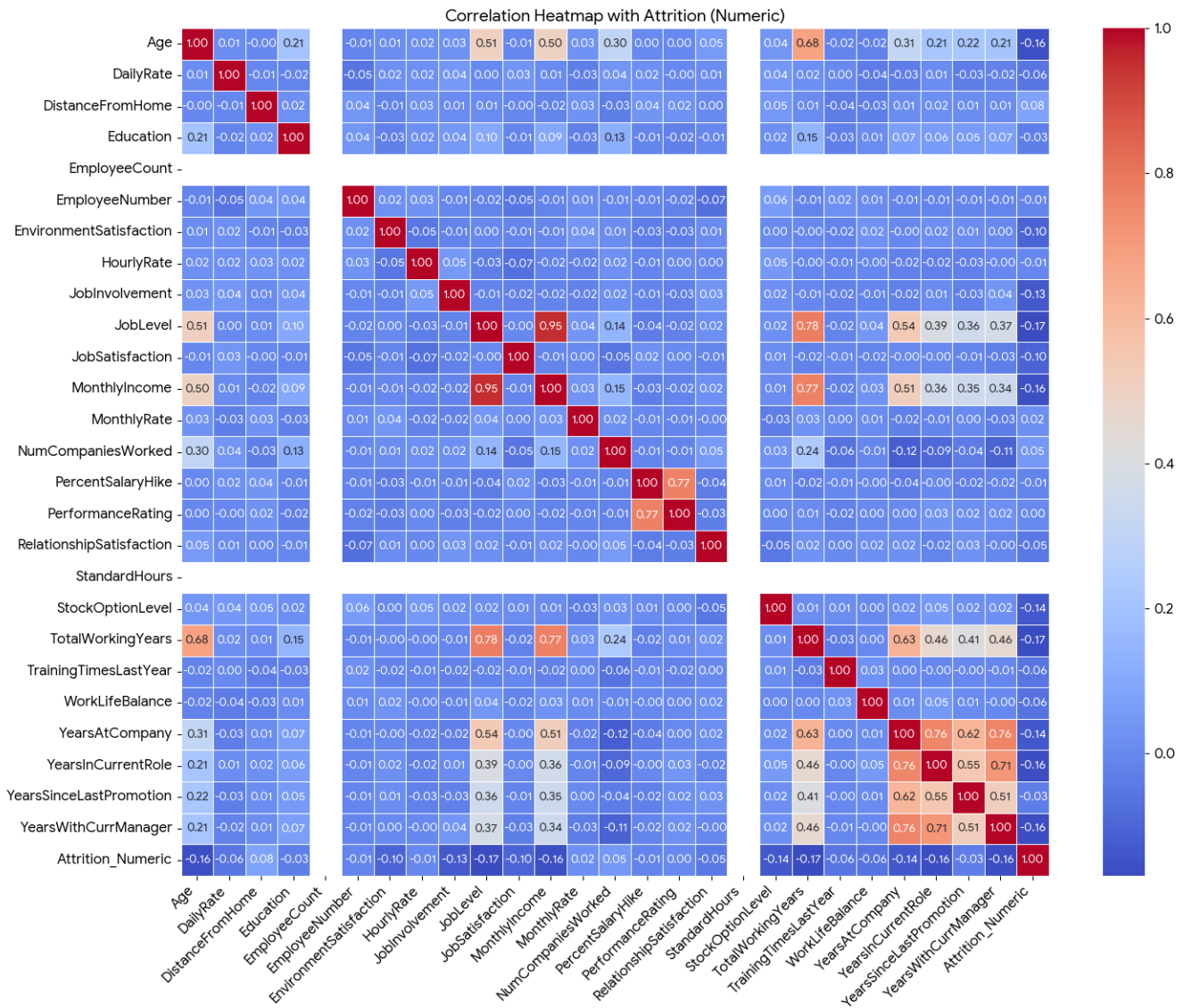


Low Environment Satisfaction is a red flag for attrition.

### Remedy:-

- Understand what specifically causes dissatisfaction (e.g., noise, safety, leadership, inclusiveness).
- Enhance physical workspace, promote positive culture, improve leadership accessibility, etc.

## 10.Heatmap of employee attrition & different numeric values.



Based on the heatmap we generated, we can analyze the relationships between **Attrition\_Numeric** and other numerical columns by looking at the Attrition\_Numeric row or column in the matrix. The values in this row/column indicate the Pearson correlation coefficient, which ranges from -1 to +1.

- **Positive Correlation (closer to +1):** Means that as the value of the other numerical column increases, the likelihood of attrition (being 'Yes', or 1) also tends to increase.
- **Negative Correlation (closer to -1):** Means that as the value of the other numerical column increases, the likelihood of attrition tends to decrease.
- **Near Zero Correlation (closer to 0):** Suggests a weak or no linear relationship between the two variables.

## Key Observations from the Heatmap:

- **Top Negative Correlations with Attrition (i.e., Retention Factors):**

Feature	Correlation	Interpretation
TotalWorkingYears	-0.17	More experienced employees are less likely to leave.
YearsAtCompany	-0.14	Longer tenure is linked to lower attrition.
MonthlyIncome	-0.17	Higher-paid employees tend to stay longer.
YearsWithCurrManager	-0.16	Stable management relationships reduce attrition.
Age	-0.16	Older employees are less likely to leave.
JobLevel	-0.17	Higher job levels correlate with better retention.

These suggest that **tenure, income, job level, and experience are major retention factors**

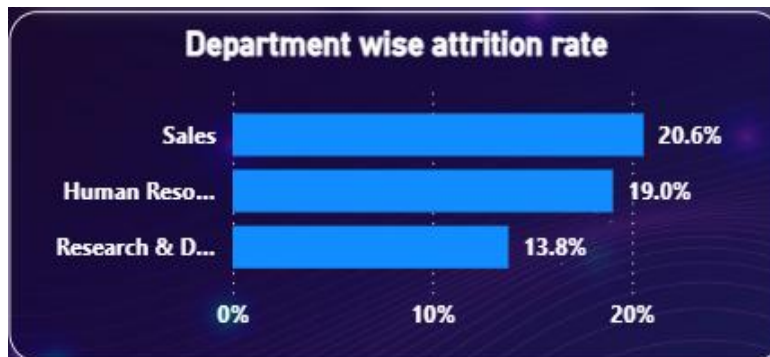
- **Top Positive Correlations with Attrition (i.e., Attrition Risk Indicators):**

Feature	Correlation	Interpretation
NumCompaniesWorked	+0.13	Employees who have changed jobs more often are more likely to leave.
DistanceFromHome	+0.03	Slightly higher attrition when employees live farther from work.

These may suggest **instability or dissatisfaction**, especially when employees have a history of frequent job changes.

# Microsoft Power Bi

## 1.Department wise attrition rate.

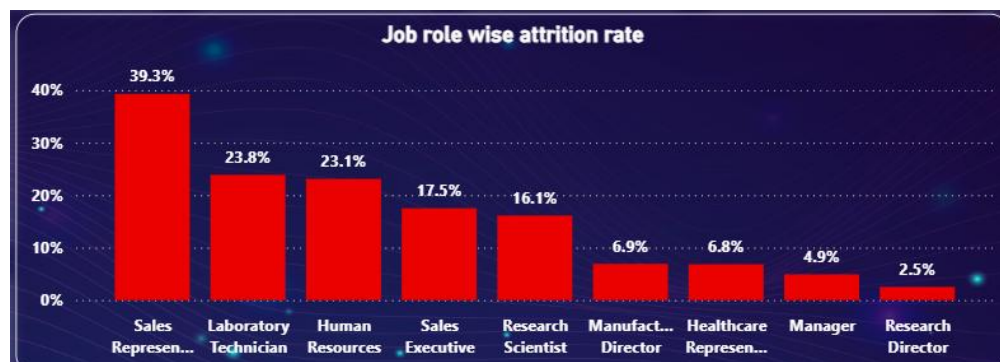


Sales Department & Human Resources Department has the highest(20.6%) and second-highest(19%) attrition rate.

### Remedy:-

- Conduct exit interviews to understand why employees are leaving.
- Analyze workloads, compensation, and employee engagement initiatives in high attrition departments.

## 2.Jobrole wise attrition rate.



Sales Representative (39.3%),Laboratory Technician (23.8%) and Human Resources (23.1%), these roles show high attrition rates, suggesting issues that may need addressing, such as job satisfaction, workload, or career advancement opportunities.

### Remedy:-

- Implement targeted initiatives such as improved training, mentoring, performance incentives, and better work-life balance to enhance job satisfaction in high attrition areas.

### 3.Age group wise attrition.

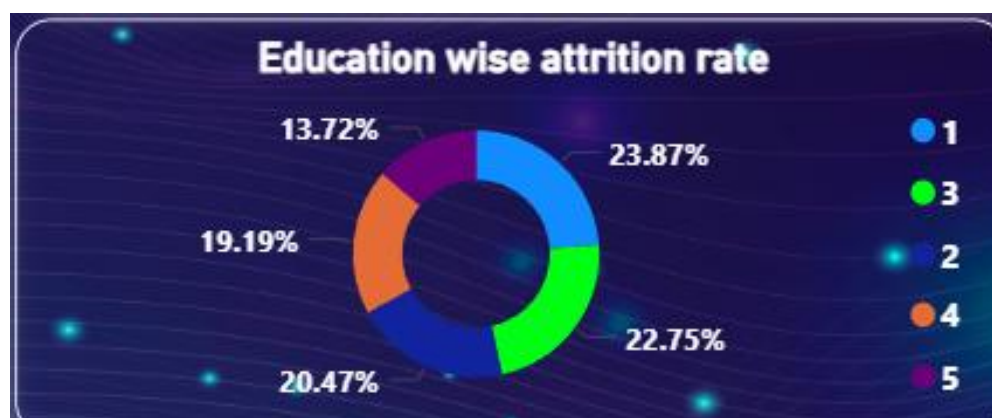


Age group of 18-25 & 26-35 shows significant attrition rates.

#### Remedy:-

- HR should investigate the reasons behind the high attrition in the 26-35 age group. Surveys and feedback sessions could help identify specific concerns or desires.
- Implement targeted initiatives that cater to the career aspirations of younger employees, such as mentorship programs, training, and clear pathways for advancement.

### 4.Education wise attrition rate.

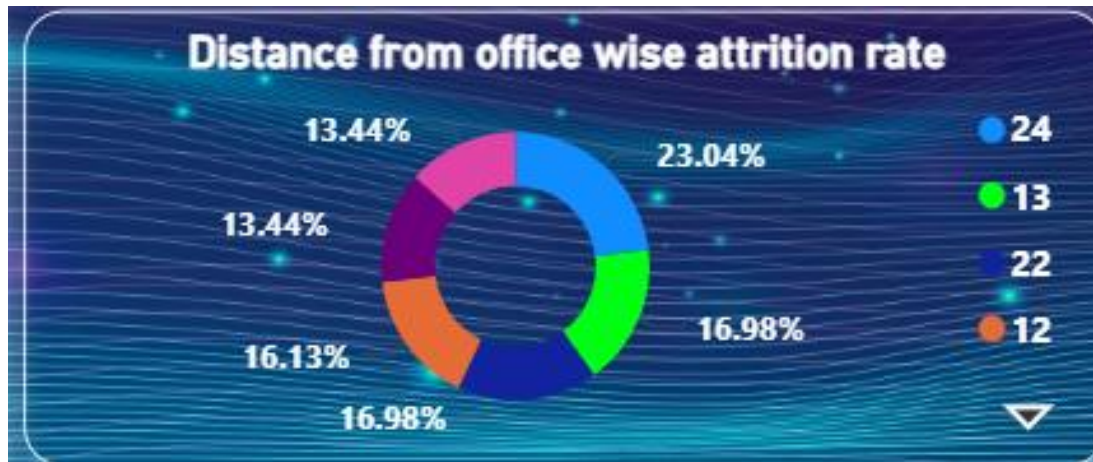


Education level 1,2,3 has highest attrition rate.

#### Remedy:-

- Offer opportunities for advancement and further education to employees to ensure alignment with employer expectations.

## 5. Attrition rate due to distance from office.



Employees, who live away from the office are tends to attrite more.

### Remedy:-

- Offering transportation benefits, carpooling programs, or subsidies.
- Implementing remote work, hybrid models, or flexible hours for roles that allow it.
- For critical roles, considering assistance for employees willing to move closer.



# Strategic business recommendations for attrition reduction

Employee attrition, particularly at the rate of 16.1% (237 out of 1473 employees), represents a significant cost to the business in terms of recruitment, training, lost productivity, and institutional knowledge. Addressing the root causes identified in the analysis is crucial for long-term organizational health and profitability.

- For roles with lower average incomes, explore non-monetary benefits, professional development opportunities, and clear career progression paths that demonstrate long-term value and growth potential within the company.
- Strengthen the onboarding process and first-year experience to ensure new hires feel supported, engaged, and see a clear future with the company. Implement mentorship programs and celebrate early achievements to foster stronger workplace bonds and reduce early attrition (within the first 2-3 years in a role).
- For employees at education levels 1, 2, and 3, offer robust training grants, further education opportunities, and skill-development programs to align their capabilities with employer expectations and open doors to higher-level, better-paying roles.
- Develop strategies to reduce unnecessary overtime, such as reviewing staffing levels, optimizing processes, and ensuring fair compensation or meaningful recognition for unavoidable extra hours.
- Given that low job satisfaction and short tenure with current managers correlate with attrition, invest in leadership development programs. Train managers on effective communication, employee recognition, workload balancing, and career development conversations to build stronger, more stable relationships with their teams.
- Re-evaluate hiring strategies in relation to employee proximity to the office, especially if "Distance from Office" continues to be a factor. Explore establishing satellite offices or expanding remote hiring pools to attract and retain talent who prefer shorter commutes.
- Implement a robust system for continuous monitoring of attrition metrics across all identified factors (department, job role, age, education, marital status, job satisfaction, tenure, income, etc.). Regularly conduct exit interviews, stay interviews, and employee engagement surveys to gather real-time feedback and adapt retention strategies proactively.

## Technologies Used

- **Python:** For data cleaning, statistical analysis, and correlation insights. (Specific libraries like Pandas, NumPy, Matplotlib, Seaborn would be listed here if used).
- **Microsoft Power BI:** For interactive data visualization and dashboard creation.