

IBM HR Analytics: Workforce Insights & Attrition

Business Goal

The main goals of this project are to:

1. Describe workforce demographics, satisfaction, and attrition patterns.
2. Diagnose key drivers of attrition using hypothesis testing and statistical analysis.
3. Validate which factors significantly impact attrition, such as salary, overtime, tenure, and travel.
4. Provide actionable HR insights that can improve retention and workforce well-being.

Executive Summary

Attrition Rate: 16.1% overall

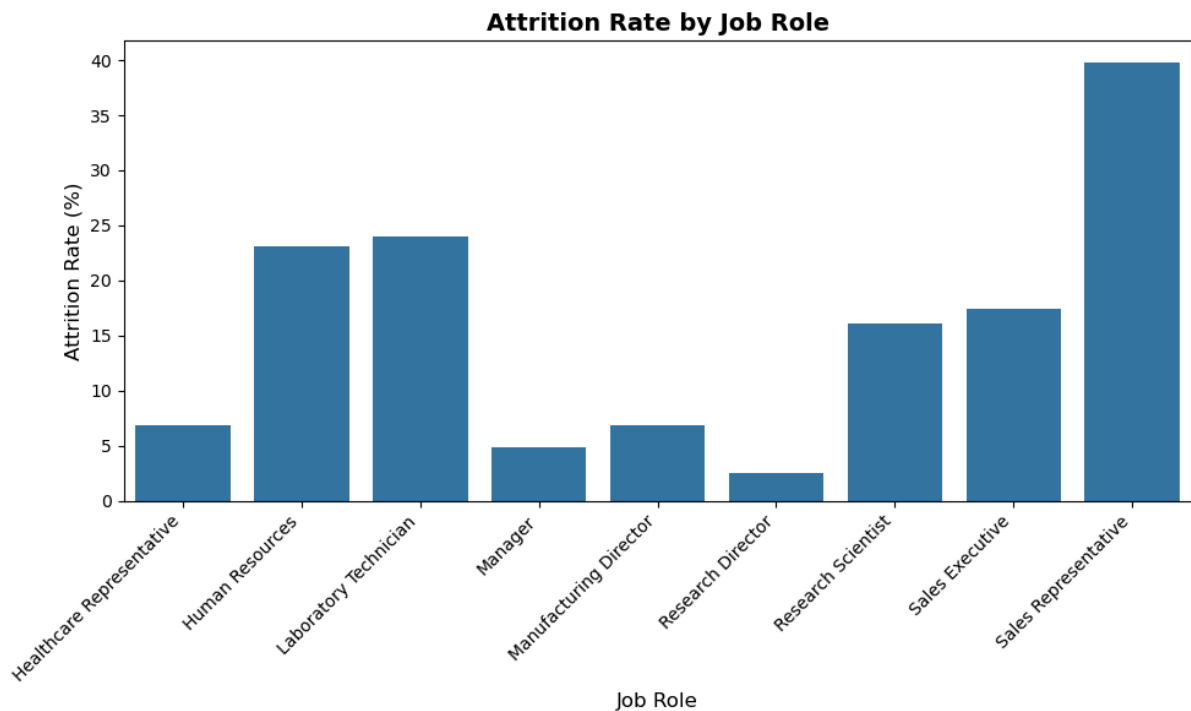
Key Findings:

- Salary is the strongest attrition driver: 34% of employees earning <2,500 leave, compared to only 9% earning 10,000–20,000.
- Early tenure risk: Most attrition occurs in years 1–2.
- Travel & work-life balance are critical: Frequent travelers leave at 3× the rate of non-travelers.
- Job satisfaction: No significant differences across departments (ANOVA $p=0.6$).

Business Implications: Focus on fair pay, early onboarding, and travel/workload policies.

Descriptive Insights: Understanding the Current State

- Overall Attrition: 16.1% of employees leave the organization annually.
- By Age: Employees aged 18–29 have the highest attrition rate at 27.9%.
- By Department and Role: The Sales Department (20.6%) and Sales Representatives (39.8%) show the highest attrition among all departments and job roles.



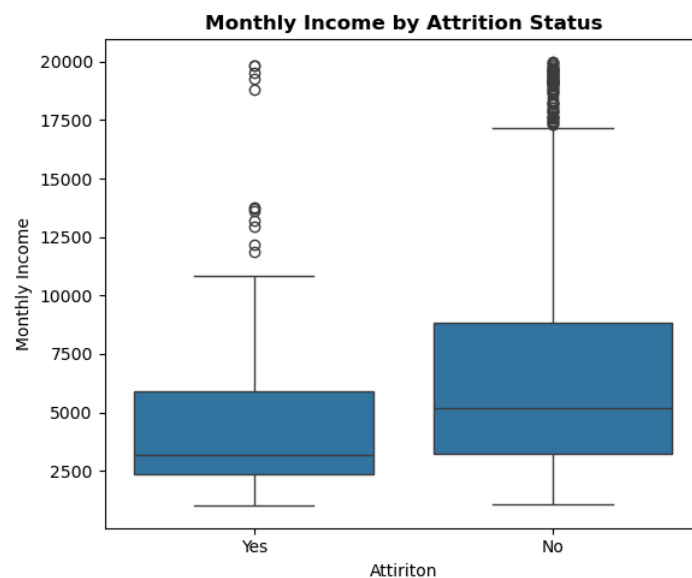
- By Gender: Male employees leave at a slightly higher rate (17%) compared to females (14.8%).
- Overtime: 28.3% of employees report working overtime, which may contribute to burnout and turnover.

These descriptive statistics provide a baseline understanding of who is leaving and under what conditions.

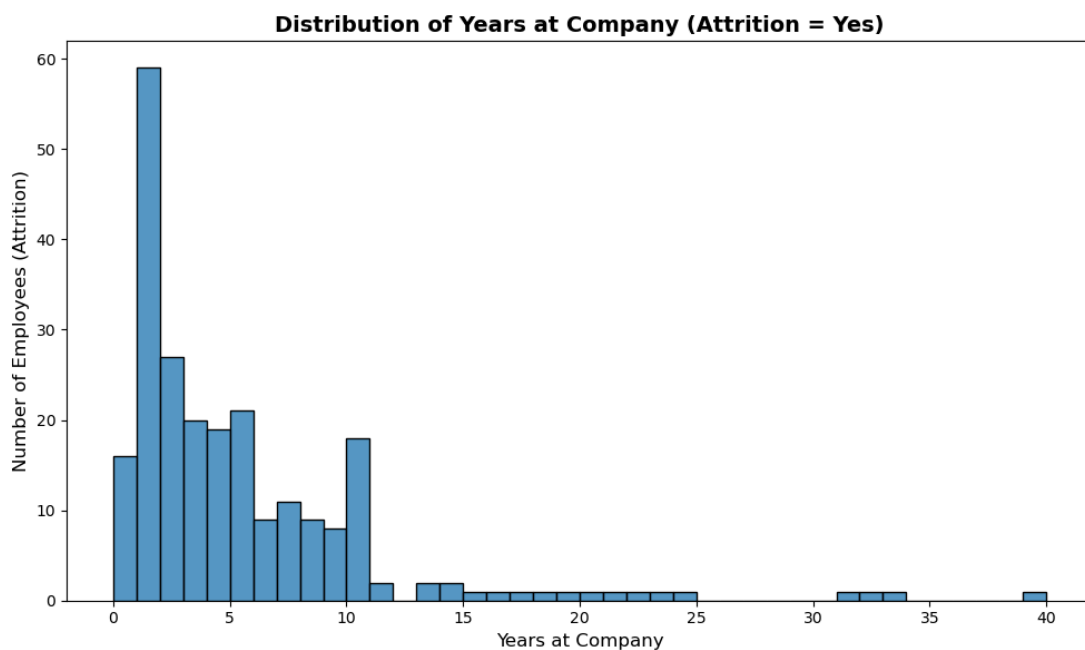
Diagnostic Insights: Why Attrition is Happening

To understand the drivers of attrition, we examined salary, tenure, travel, work-life balance, and job satisfaction:

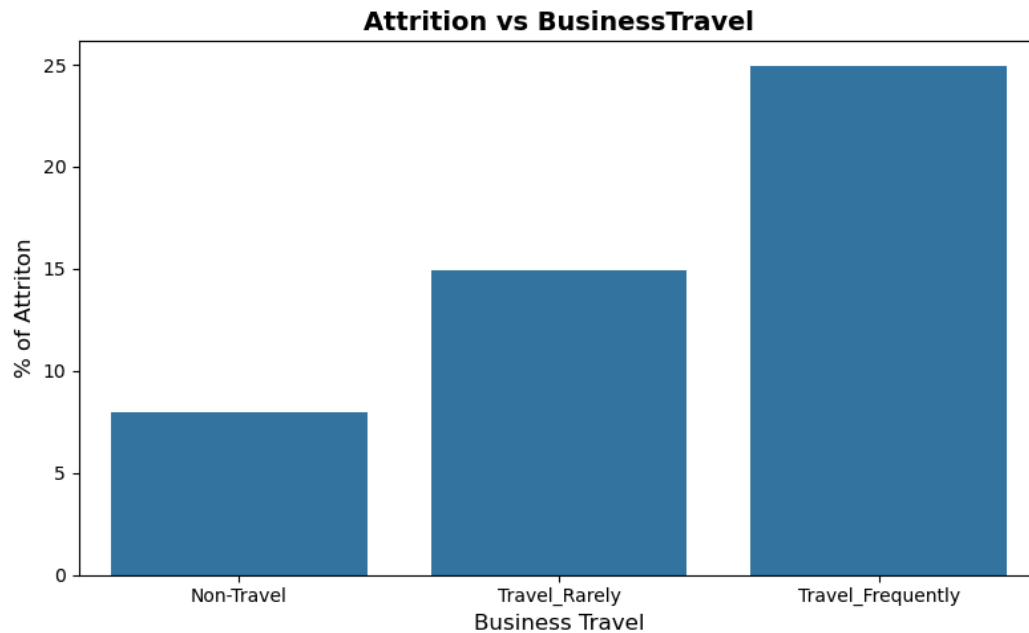
- **Salary:** Low pay is strongly correlated with attrition. Nearly 80% of attrition occurs among employees earning below their department's average.



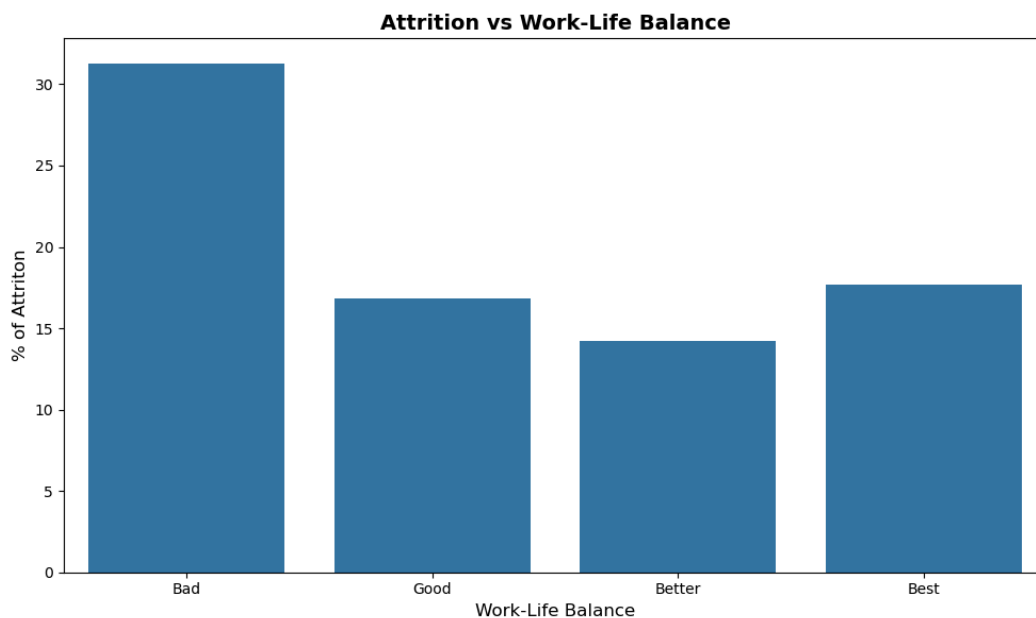
- **Tenure:** Attrition spikes during the first two years and stabilizes after approximately five years. Early-career support is therefore critical.



- Travel: Frequent travelers experience attrition of roughly 25%, compared to 8% for non-travelers.



- Work-Life Balance: Employees reporting poor work-life balance face double the attrition risk.



- Job Satisfaction: Department-level differences in job satisfaction are not significant (ANOVA $p=0.6$).

These insights suggest that compensation, workload, and travel policies are key levers for retention.

Statistical Validation

To validate our findings, we applied several statistical tests:

- T-test (Income vs Attrition): The difference in income between employees who leave and those who stay is highly significant ($p \approx 4e-13$).
- ANOVA (Job Satisfaction by Department): No significant differences were found ($p=0.6$).
- Chi-square (Overtime vs Attrition): No statistically significant association was observed.

These tests confirm that salary and tenure are strong predictors of attrition, while department-level satisfaction and overtime are less predictive.

Recommendations

Based on the analysis, I recommend the following strategies to reduce attrition and improve employee retention:

1. Compensation: Address below-average earners and monitor pay equity across roles to ensure fair compensation.
2. Onboarding & Early-Career Support: Implement targeted retention programs during the first one to two years of employment.
3. Workload & Travel: Introduce flexible policies to reduce attrition among frequent travelers and employees experiencing poor work-life balance.
4. Ongoing Monitoring: Continuously track attrition trends and evaluate the effectiveness of retention interventions.

By focusing on these areas, organizations can improve employee retention, reduce turnover costs, and foster a more engaged and satisfied workforce.