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

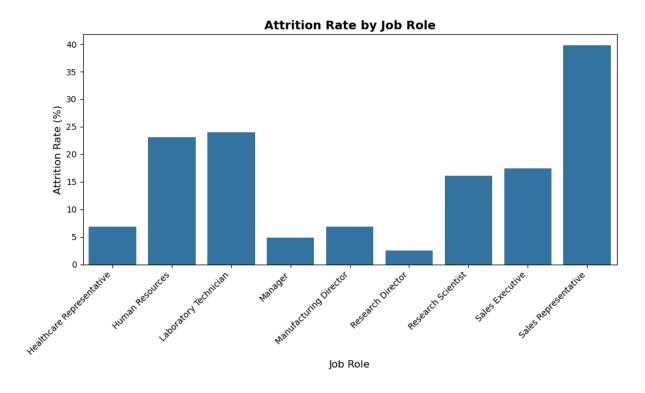
Key Findings:

- 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 and work-life balance are critical: frequent travelers leave at three times the rate of non-travelers, and employees with poor work-life balance leave twice as often as others.
- 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.



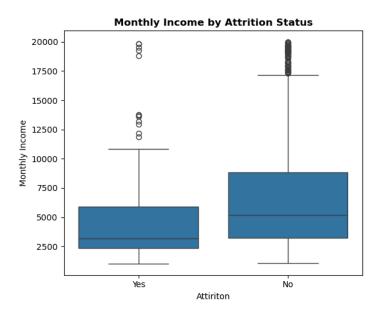
- By Gender: Male employees leave at a slightly higher rate (17%) compared to females (14.8%).
- Overtime: 28.3% of employees report working overtime, which may contribute to burnout and turnover.

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

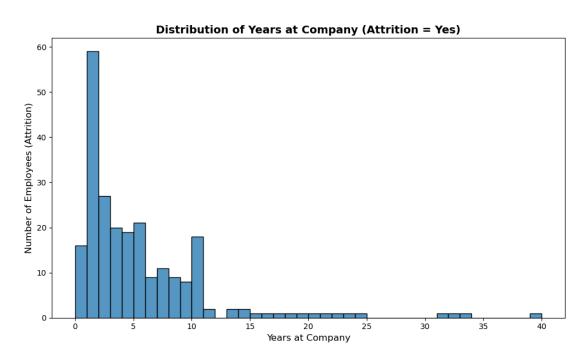
Diagnostic Insights: Why Attrition is Happening

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

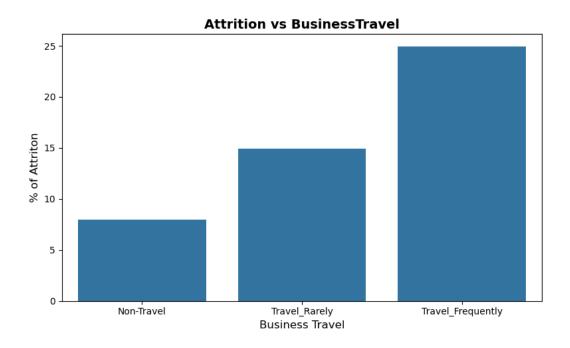
• Salary: Low pay is strongly correlated with attrition. Nearly 80% of attrition occurs among employees earning below their department's average.



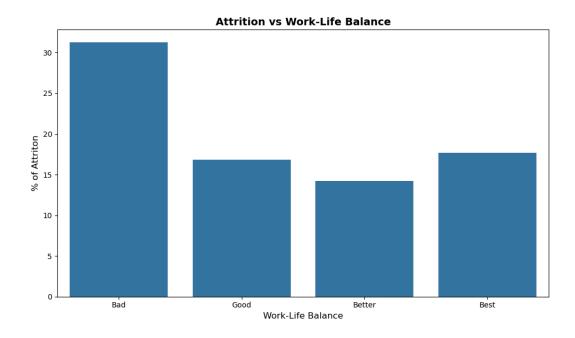
• Tenure: Attrition spikes during the first two years and stabilizes after approximately five years. Early-career support is therefore critical.



• 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.