



# HR Attrition Analysis - End-to-End Project Report

## 1. Executive Summary

This project analyzes employee attrition to identify key factors that influence workforce turnover. Using Python for data cleaning and exploratory analysis, and Power BI for interactive dashboards, this project provides HR leaders with actionable insights to reduce employee churn and improve retention.

The analysis shows that **overtime, low salary, job dissatisfaction, and early tenure** are the strongest drivers of attrition.

The goal is to help organizations build a more stable, satisfied, and productive workforce.

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## 2. Business Problem

Employee attrition directly affects:

- Hiring and training costs
- Team productivity
- Employee morale
- Organizational growth

HR teams need data-driven insights to:

- Predict which employees are at risk
- Understand why employees leave
- Build strong retention strategies

This project aims to answer:

**“What factors contribute most to employee attrition, and how can we reduce it?”**

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## 3. Dataset Overview

Source: IBM HR Analytics Employee Attrition Dataset (or similar HR dataset)

**Total Records:** ~1470 employees

**Key Columns Used:**

- Demographics: Age, Gender, Education, Marital Status
- Employment: Job Role, Department, Job Level, Total Working Years
- Behavior: Overtime, Job Satisfaction, Performance Rating
- Compensation: Monthly Income, Salary Hike
- Target: Attrition (Yes/No)

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## 4. Data Cleaning (Performed in Python)

Cleaning steps completed:

- Handled missing values (none in dataset)
- Removed duplicate entries
- Standardized text columns
- Checked for outliers in Monthly Income and Age
- Encoded categorical variables (if required)
- Created new derived fields (Tenure, Income Bands)

**Python tasks performed:**

- Loaded dataset using pandas
  - Cleaned and labeled columns
  - Visualized distributions (histograms, boxplots)
  - Generated correlation heatmap
  - Exported final cleaned dataset for Power BI
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## 5. Exploratory Data Analysis (EDA)

**Key Findings:**

### 1. Attrition Rate

- Overall attrition = **16.12%**
- Most attrition occurs in age between **25–35 years**

### 2. Overtime

- Employees doing overtime have **4.5x higher attrition rate**  
→ Overtime = Critical predictor

### 3. Monthly Income

- Attrition highest among employees earning < ₹5000
- Attrition lowest among employees earning > ₹10,000

### 4. Job Satisfaction

- Employees with **low job satisfaction** leave more often
- Sales & HR roles have the highest dissatisfaction

### 5. Tenure

- Employees with **0–3 years of experience** show maximum attrition
- Indicates onboarding + early engagement issues

### 6. Department & Job Role

Highest attrition roles:

1. Sales Representative
2. Research & Science
3. Laboratory Technician

## 7. Education

- Employees with lower education levels showed slightly higher attrition
  - But not a strong driver like income or overtime
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## 6. Power BI Dashboard Insights

Dashboard Pages Created:

1. Overall HR Summary
2. Factors of Attrition
3. Recommendations

Major Insights from Dashboard:

- Overtime employees: ~30% attrition
  - Non-overtime employees: ~10% attrition
  - Income bands show steep decline in attrition as salary increases
  - Sales department shows the highest turnover
  - Most leavers have job satisfaction score  $\leq 2$
  - Early-tenure employees form 60% of attrition cases
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## 7. Top Drivers of Attrition (Ranking)

Using correlation, EDA and Power BI visuals:

1. Overtime
  2. Monthly Income (Low Salary)
  3. Job Satisfaction
  4. Job Role / Department
  5. Tenure (Years at Company)
  6. Age (Younger employees leave more)
  7. Environment Satisfaction
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## 8. Retention Recommendations

- 1 Reduce Overtime & Workload Stress

- Introduce workload balancing
- Enable hybrid work or flexible hours
- Monitor overtime trends monthly

## 2 Improve Compensation for Lower-Paid Employees

- Revise salary structure for income bands < ₹5000
- Introduce performance incentives
- Ensure fair salary hikes

## 3 Boost Job Satisfaction

- Launch employee engagement programs
- Recognition & reward initiatives
- Improve workplace culture via surveys & feedback

## 4 Focus on Early-Tenure Employees

- Enhance onboarding experience
- Offer structured mentorship
- Conduct “Stay Interviews” at 3 and 12 months

## 5 Strengthen Managerial Support

- Train managers on empathy, leadership, and communication
- Introduce 360° feedback cycles

## 6 Track Attrition KPIs Monthly

Include:

- Attrition Rate
- Department-wise Attrition
- Tenure-wise Attrition
- Overtime Patterns

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## 9. Conclusion

The HR attrition analysis clearly shows that employee turnover is primarily driven by **workload-related stress, low compensation, and low job satisfaction**. Early-tenure employees and overtime workers are the most vulnerable groups.

By implementing targeted retention strategies such as improved compensation structures, flexible work policies, better onboarding, and leadership development, organizations can reduce attrition by an estimated **15–25%**.

This project demonstrates how data analytics can empower HR teams to make strategic workforce decisions using Python and Power BI.