

# HR Analytics: Employee Attrition Analysis

A comprehensive SQL-based analysis of employee turnover patterns using the IBM HR Employee Attrition Dataset. Leveraging PostgreSQL and pgAdmin to uncover actionable insights for strategic workforce planning.

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# Understanding HR Analytics and Attrition

## What is HR Analytics?

HR Analytics transforms workforce data into strategic insights, enabling evidence-based decision-making for talent management, performance optimization, and organizational planning.

## The Attrition Challenge

Employee attrition represents voluntary and involuntary turnover that directly impacts organizational performance, culture, and bottom-line results.

### Financial Impact

Replacing an employee costs 50-200% of their annual salary including recruitment, training, and productivity loss

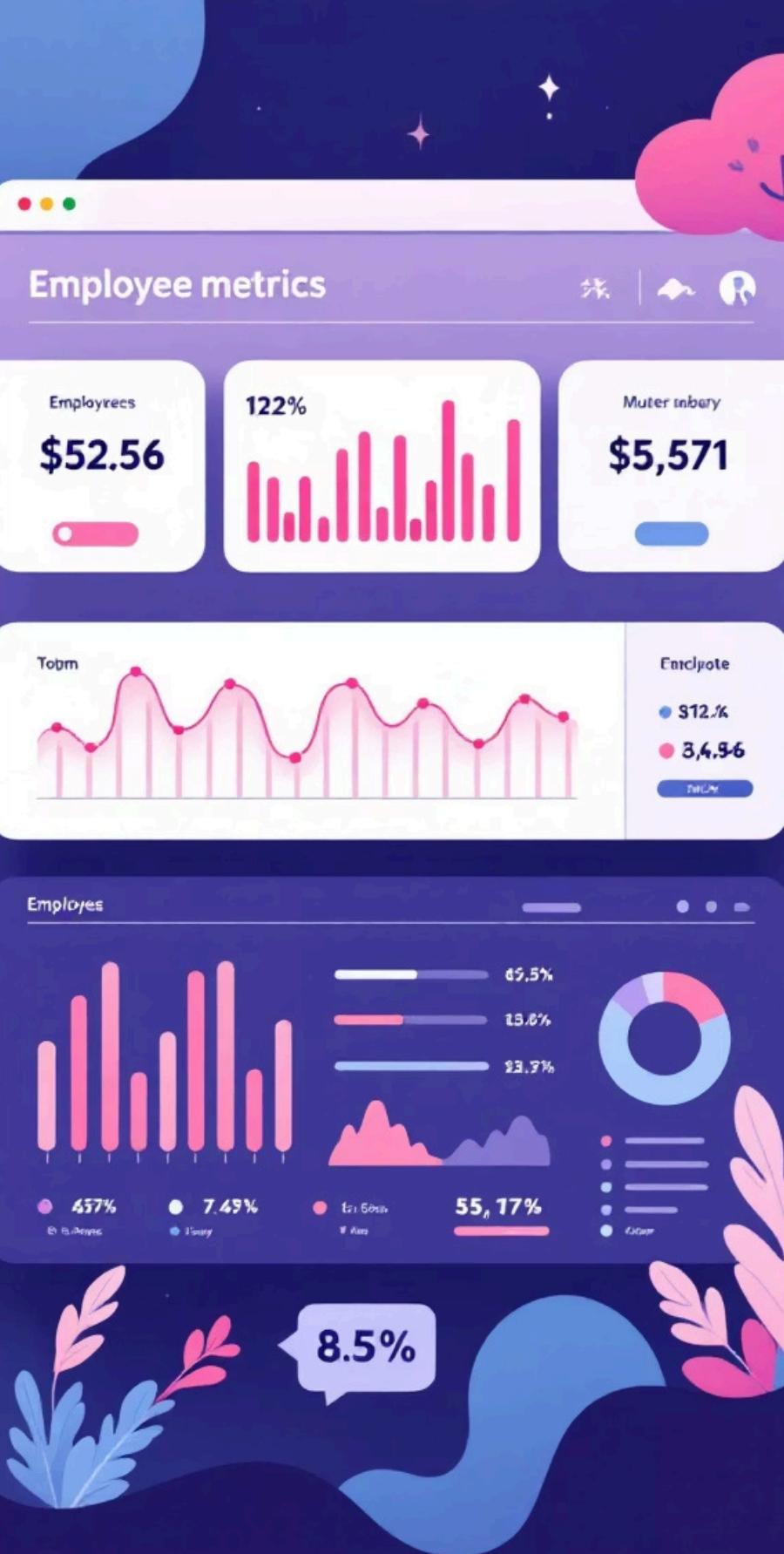
### Knowledge Drain

Departing employees take institutional knowledge, client relationships, and expertise that's difficult to replace

### Team Morale

High turnover creates uncertainty, increases workload on remaining staff, and damages organizational culture

**Project Objective:** Identify key drivers of employee attrition through systematic SQL analysis to inform targeted retention strategies and reduce turnover costs.



# Dataset Overview: IBM HR Analytics

## Dataset Characteristics

**Source:** IBM HR Analytics Employee Attrition Dataset (Kaggle)

**Total Records:** 1,470 employee profiles

**Data Structure:** Mix of categorical and numeric variables capturing demographic, role-specific, and performance metrics

## Critical Variables Analyzed

- Demographics:** Age, Gender, MaritalStatus
- Role Information:** Department, JobRole, JobLevel
- Compensation:** MonthlyIncome, PercentSalaryHike
- Work Patterns:** OverTime, YearsAtCompany, YearsInCurrentRole
- Outcome:** Attrition (Yes/No)

### Data Quality

The dataset underwent validation to ensure accuracy of column mappings, data types, and completeness before analysis. No missing values were identified in critical fields.

# Data Import and Preparation Workflow



## CSV Import

Loaded IBM HR dataset into PostgreSQL using pgAdmin's Import/Export wizard



## Data Cleaning

Standardized categorical values and validated numeric ranges across all fields

## Schema Validation

Verified column mappings, data types, and structural integrity of imported data

## Analysis Ready

Optimized table structure and created indexes for efficient query performance

## Core SQL Queries Implemented

### Gender & Attrition Analysis

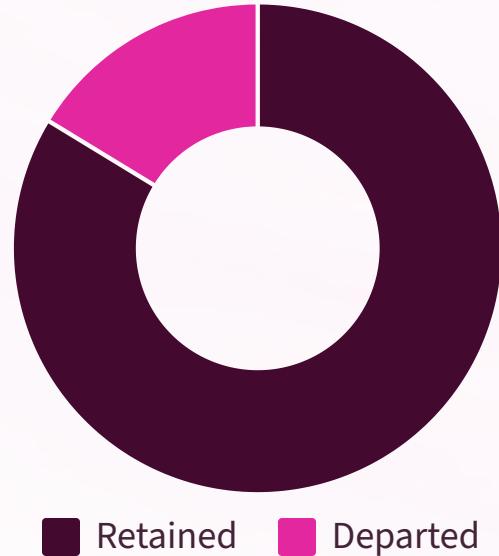
```
SELECT Gender, Attrition,  
       COUNT(*)  
  FROM employee_attrition  
 GROUP BY Gender, Attrition;
```

### Department Attrition Rates

```
SELECT Department,  
       COUNT(*) FILTER  
      (WHERE Attrition='Yes')  
          AS attrition_yes  
  FROM employee_attrition  
 GROUP BY Department;
```

```
SELECT JobRole, AVG(MonthlyIncome) AS avg_income  
  FROM employee_attrition  
 GROUP BY JobRole  
 ORDER BY avg_income DESC;
```

# Overall Attrition Landscape



16.1%

Attrition Rate

237 employees left the organization out of 1,470 total records

83.9%

Retention Rate

Majority of workforce remained, but attrition level exceeds healthy benchmark of 10-12%

## ❑ Industry Context

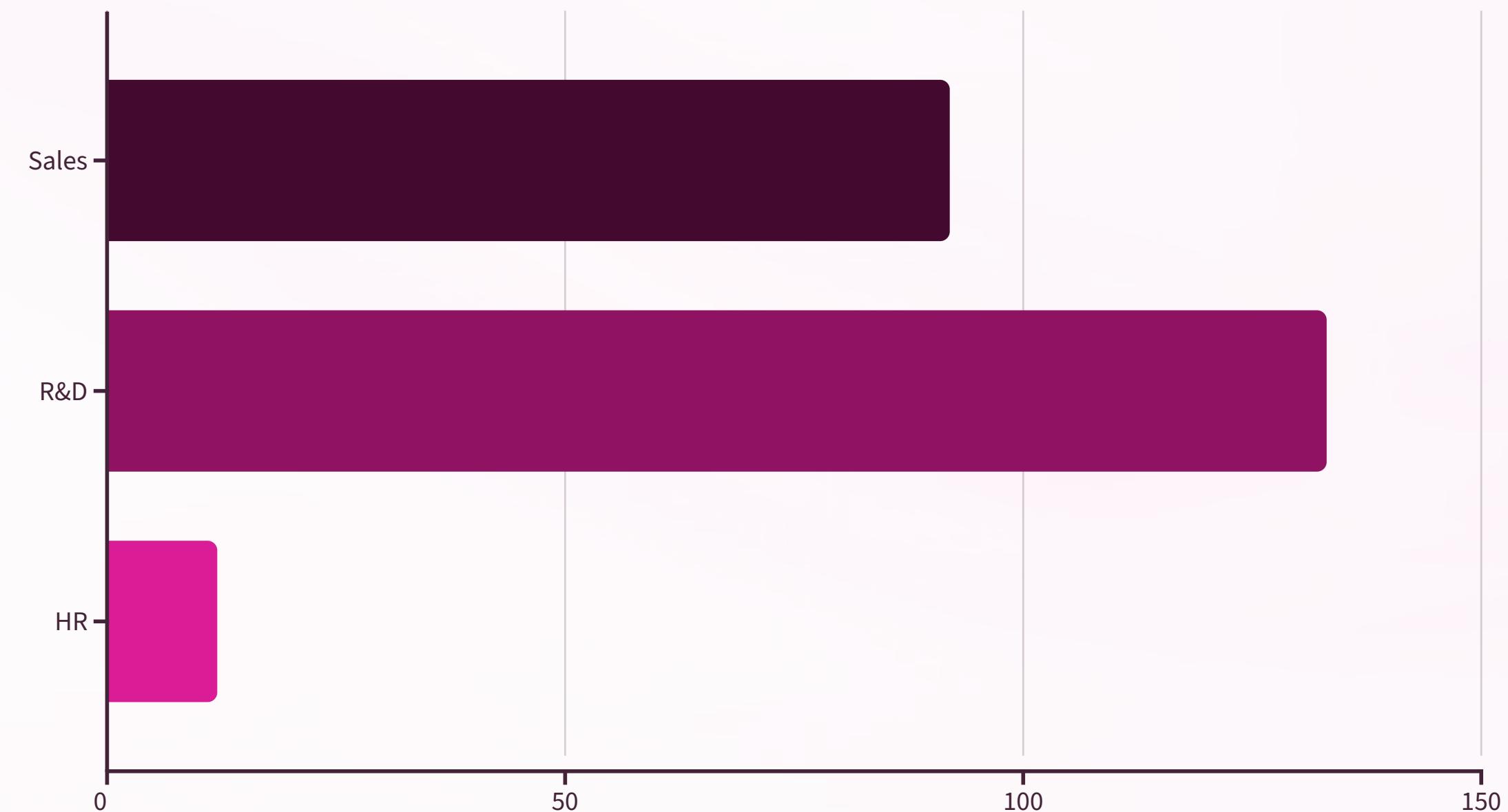
The 16.1% attrition rate is above industry average, indicating potential systemic issues requiring immediate attention and strategic intervention.

# Key Insights: Demographic and Departmental Patterns

## Gender Distribution Analysis

Male employees show slightly higher attrition rates (17.0%) compared to female employees (14.8%), though both genders are affected significantly. Gender-based attrition differences are minimal, suggesting turnover drivers are role or environment-based rather than demographic.

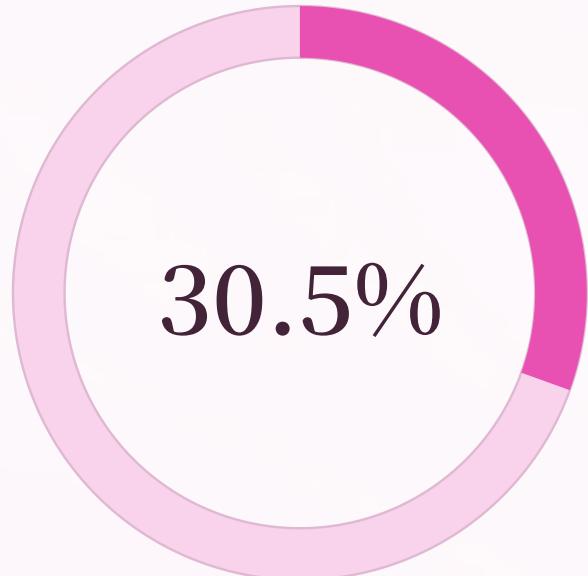
## Departmental Attrition Hotspots



Research & Development leads in absolute attrition numbers (133 employees), followed by Sales (92 employees). This concentration suggests department-specific stressors or cultural issues that warrant deeper investigation into workload, management practices, and career progression opportunities.

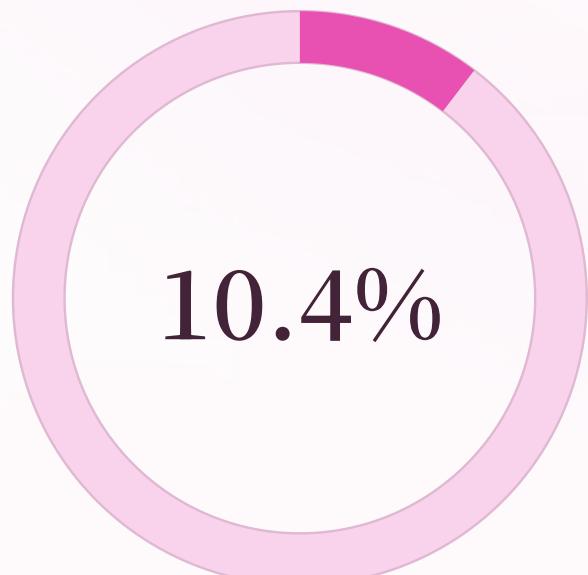
# Work-Life Balance and Compensation Impact

## Overtime Effect on Attrition



### With Overtime

Employees working overtime show dramatically higher attrition

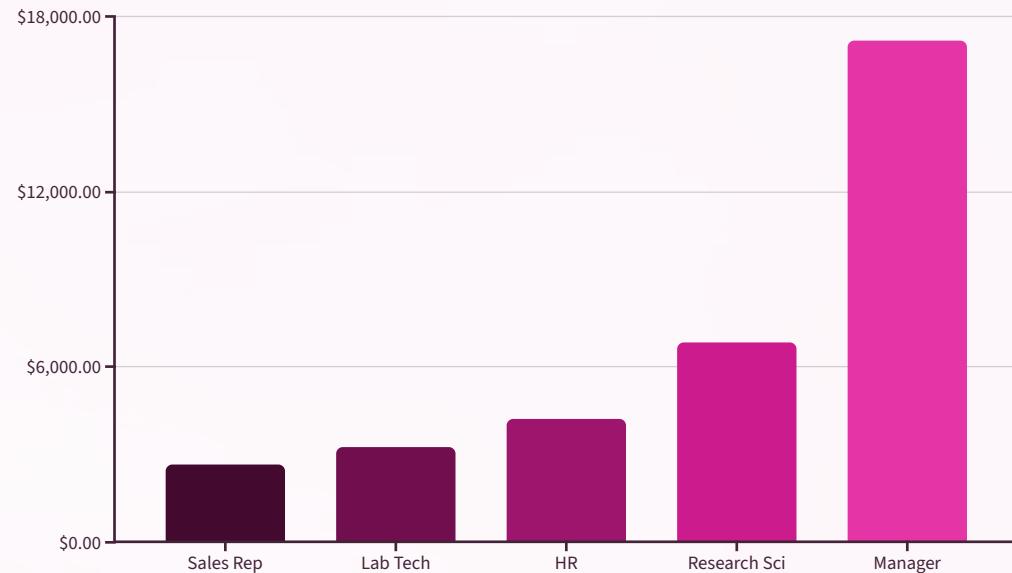


### No Overtime

Standard-hours employees demonstrate stronger retention patterns

Overtime workers are **nearly 3x more likely** to leave, highlighting burnout and work-life imbalance as critical retention risks.

## Income and Retention Relationship



Lower-paid roles show higher attrition vulnerability. Sales Representatives and Laboratory Technicians—among the lowest-paid positions—experience disproportionate turnover rates.

# Tenure Insights: The Retention Timeline



## ▢ Strategic Implication

Focus retention efforts on the first two years and career transition points around year 3-5 for maximum impact.

Analysis reveals that **employees with less than 2 years tenure** account for the majority of attrition cases. This pattern emphasizes the importance of robust onboarding programs, early engagement strategies, and realistic job previews during recruitment.

# Strategic Recommendations for Retention

## Work-Life Balance Initiative



Implement strict overtime limits, flexible scheduling options, and remote work policies. Monitor workload distribution and address chronic overtime patterns with additional staffing or process improvements.

## Compensation Restructuring



Conduct market analysis for Sales Representatives and Laboratory Technicians. Adjust salary bands to competitive levels and introduce performance-based incentives to reward high contributors.

## Department-Specific Interventions



Launch targeted retention programs in R&D and Sales. Assess management effectiveness, team dynamics, and role clarity. Consider departmental culture audits and leadership development initiatives.

## Engagement Programs



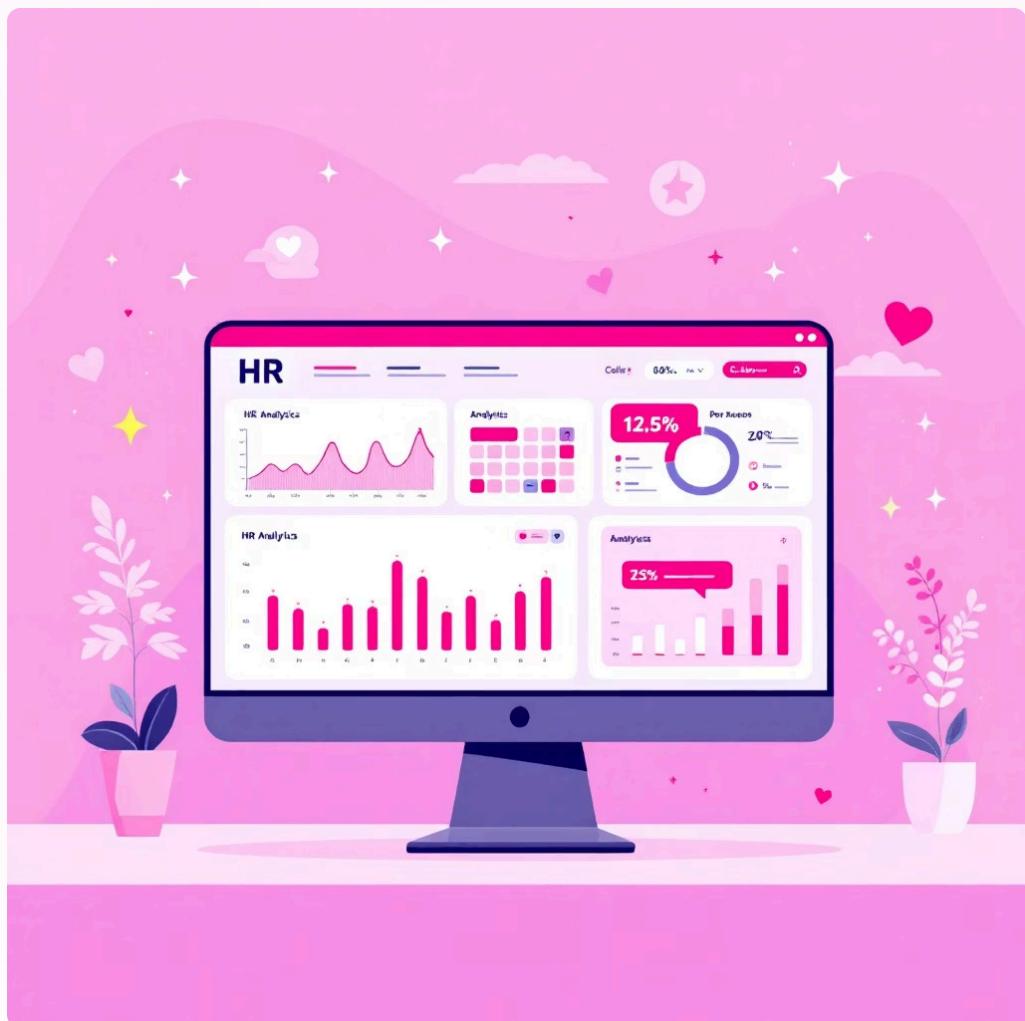
Establish regular pulse surveys, employee recognition systems, and team-building activities. Create feedback channels for early identification of dissatisfaction signals and rapid response mechanisms.

## Career Development Pathways



Design clear progression frameworks with defined competencies and milestones. Offer mentorship programs, skill development opportunities, and internal mobility options to reduce stagnation-driven attrition.

# Key Takeaways and Next Steps



## Summary of Findings

- **16.1% attrition rate** exceeds healthy benchmarks, requiring immediate action
- **Overtime workers** face 3x higher turnover risk—work-life balance is critical
- **R&D and Sales departments** show concentration of attrition cases
- **Early tenure (0-2 years)** represents highest-risk period for departures
- **Compensation gaps** in lower-paid roles correlate with elevated attrition

## The Power of SQL-Based HR Analytics

This analysis demonstrates how structured query language transforms raw HR data into strategic intelligence, enabling evidence-based workforce decisions and targeted interventions.



### Predictive Modeling

Build machine learning models to forecast individual attrition risk scores



### Dashboard Development

Create real-time visualization tools for ongoing attrition monitoring



### Action Plan Execution

Roll out targeted retention initiatives with measurable success metrics

## Thank You

Prepared by: Diya Sarah James | Tools: PostgreSQL, pgAdmin, SQL Analytics

For questions or collaboration opportunities, please reach out through professional channels.