HR Data Attrition Analysis Report

1. ## Dataset Description:

    1.1 Source: Internal HR Employee Attrition dataset (1,470 records).

    1.2 Columns:

    - **EmployeeNumber** – Unique identifier for each employee.
    - **Age** – Employee age (18–60 years).
    - **Attrition** – Whether the employee left the company (Yes/No).
    - **Department** – Three departments: Research & Development, Sales, Human Resources.
    - **JobRole** – 9 job categories (e.g., Research Scientist, Sales Executive, Manager).
    - **MonthlyIncome** – Salary ranging from 1,009 to 19,999.
    - **EducationField** – Six fields (Life Sciences, Medical, Technical, etc.).
    - **TotalWorkingYears** – 0 to 40 years.
    - **YearsAtCompany** – 0 to 40 years.
    - **Satisfaction & Engagement Metrics** – JobSatisfaction, EnvironmentSatisfaction, WorkLifeBalance, RelationshipSatisfaction.
    - **Other Features** – BusinessTravel, Gender, MaritalStatus, OverTime, PercentSalaryHike, StockOptionLevel, Promotions, Manager Tenure, etc.

    1.3 Data Quality:

    - No missing values.
    - Clean, consistent, and structured.
    - Rich mix of categorical and numerical variables suitable for HR analytics.

2. ## Operations Performed:

    2.1 Data Cleaning & Exploration

    - Verified dataset size: 1,470 rows × 35 columns.
    - No missing/null values.
    - Checked unique values across categorical features (e.g., 9 JobRoles, 6 EducationFields).
    - Summarized numerical columns (mean, median, standard deviation, IQR).

    2.2 Descriptive Analytics

    - Departmental employee count (bar chart).Job role distribution (pie chart).
    - Age distribution (histogram & boxplot).
    - MonthlyIncome analysis (histogram, boxplot).
    - Satisfaction ratings (bar plots).

    2.3 Relationship Analysis

    - Age vs. MonthlyIncome (scatter/bubble plots).
    - Attrition vs. Overtime & Department.
    - YearsAtCompany vs. Attrition.
    - JobLevel vs. Income distribution.

3. Key Insights:

3.1 Workforce Demographics
- Average age: **37 years**, with most employees between 30–43 years.
- Workforce is **mid-career dominant** with balanced gender and marital status.
- Education fields are diverse, with Life Sciences and Medical backgrounds most common.

3.2 Departmental Insights
- **Research & Development**: Largest department.
- **Sales**: Second largest, but with **higher attrition rates**.
- **Human Resources**: Smallest group, stable retention.

3.3 Income & Compensation
- **MonthlyIncome**: Ranges 1,009–19,999.
- Average ~6,500; median close to mean, but high-income outliers exist (executives).
- Salary closely linked to **JobLevel** and **experience**.
- PercentSalaryHike averages 15%, fairly consistent across employees.

3.4 Employee Satisfaction
- Job Satisfaction, Work-Life Balance, and Environment Satisfaction mostly rated **moderate-to-high**.
- Overtime workers tend to show lower satisfaction and higher attrition.

3.5 Attrition Trends
- Overall attrition rate: **16%**.
- Higher attrition in **Sales roles** and among employees doing overtime.
- Employees with shorter tenure (0–3 years) are more likely to leave.
- Longer-serving employees (10+ years) show better stability.

3.6 Career Progression
- Average **TotalWorkingYears**: 11.
- Average **YearsAtCompany**: 7.
- Average **YearsSinceLastPromotion**: 2.
- Some employees report long gaps in promotions, a potential driver of disengagement.

4. Recommendations:

4.1 Retention Strategies
- Focus on reducing attrition in Sales and Overtime-heavy roles.
- Provide mentorship for employees in their early tenure to improve engagement.

4.2 Career Development
- Strengthen promotion and skill development opportunities to address stagnation.
- Introduce structured leadership programs for mid-career employees.

4.3 Compensation & Benefits
- Monitor pay disparities across job roles to ensure fairness.
- Review overtime policies and offer flexible arrangements to reduce burnout.
- Expand stock option allocations to encourage long-term retention.

4.4 Employee Engagement

- Enhance work-life balance initiatives, especially for high-attrition groups.
- Leverage employee feedback from satisfaction surveys to address workplace concerns.

4.5 Future Analytics

- Develop predictive models for attrition risk.
- Segment employees by satisfaction, income, and tenure for targeted HR policies.
- Explore correlation between training frequency and attrition.

5. Conclusion:

The dataset provides a **comprehensive view of organizational workforce dynamics**, highlighting a predominantly mid-career, moderately satisfied employee base. Compensation structures are systematic, though outliers indicate executive influence. While overall attrition is moderate, specific groups (Sales, overtime workers, early-tenure employees) face higher risks, requiring targeted retention strategies.

The dataset is well-suited for **advanced HR analytics**, including attrition prediction, career path modeling, and workforce planning, enabling the company to strengthen retention, balance experience distribution, and align compensation with long-term business goals.