(Download Dataset here)

Project Name: Drugs, Side Effects and Medical Condition Report

1. Background and Overview

Business Context: The pharmaceutical industry thrives on providing effective medications for various health conditions. However, understanding the relationships between drugs, their side effects, and the conditions they treat is critical for improving patient outcomes, formulating better medications, and enhancing user trust. This dataset offers insights into drug usage, side effects, ratings, and related medical conditions, enabling a comprehensive analysis of user feedback and medication performance.

Business Problem: High variability in user ratings and frequent side effects create challenges for pharmaceutical companies to improve drug efficacy and patient satisfaction. Addressing these issues is essential to build trust and optimize drug formulations for better outcomes.

Project Objective:

1. Analyze the relationships between drugs, side effects, and medical conditions.

2. Explore user ratings and reviews to identify high-performing medications.

3. Provide actionable insights for improving medication efficacy and patient satisfaction.

2. Data Structure Overview

Dataset Overview:

Dataset Name: Drugs, Side Effects, and Medical Conditions

Dataset Size: 2931 rows and 17 attributes

Primary Features:

drug_name: Name of the medication.

medical_condition: The health condition treated by the drug.

side effects: Common side effects associated with the drug.

generic_name: The non-branded chemical name of the drug.

drug_classes: Drug classification (e.g., antibiotic, antihistamine).

rx_otc: Indicates if the drug is prescription-only (Rx) or over-the-counter (OTC).

pregnancy_category: Risk classification for pregnant women (e.g., A, B, C, D, X).

rating: User ratings for drug effectiveness (1-10).

no_of_reviews: Number of user reviews for each drug.

activity: Status of the drug (active or inactive).

Domain Learning:

Drug Classification: Medications belong to specific classes based on their mechanism of action and targeted medical conditions.

Pregnancy Categories: FDA classifications determine the risk of fetal harm, guiding healthcare professionals in prescribing medications to pregnant women.

Rx vs. OTC: Prescription drugs are regulated and require medical approval, while OTC drugs are accessible without prescriptions.

Assumptions and Caveats

User Bias: Ratings and reviews are subjective and influenced by individual experiences.

Data Completeness: Missing values or errors in the dataset could impact the accuracy of insights.

Market Dynamics: Findings are based on historical data and may not account for recent advancements or market changes.

Research Questions:

What factors influence user ratings for drugs?

Which side effects are most commonly reported across different drug classes?

How do pregnancy categories impact drug ratings and usage?

What patterns can be identified between drug classes and their efficacy?

Hypotheses:

H1: Drugs with higher ratings are associated with fewer reported side effects.

H2: Pregnancy category A drugs have higher ratings compared to category D or X drugs.

H3: OTC drugs receive lower average ratings due to their limited efficacy in severe conditions.

H4: Certain drug classes, such as antibiotics, consistently outperform others in user satisfaction.

3. Executive Summary

Key Findings:

High User Ratings: Drugs for chronic conditions like diabetes and hypertension scored the highest average ratings (>8.0).

Common Side Effects: Headache, nausea, and dizziness were the most frequently reported side effects.

Pregnancy Risk Insights: Drugs in categories D and X exhibited higher cautionary ratings but lower user satisfaction.

OTC Drugs: Over-the-counter medications showed lower ratings due to limited efficacy in severe conditions.

Potential Reasons:

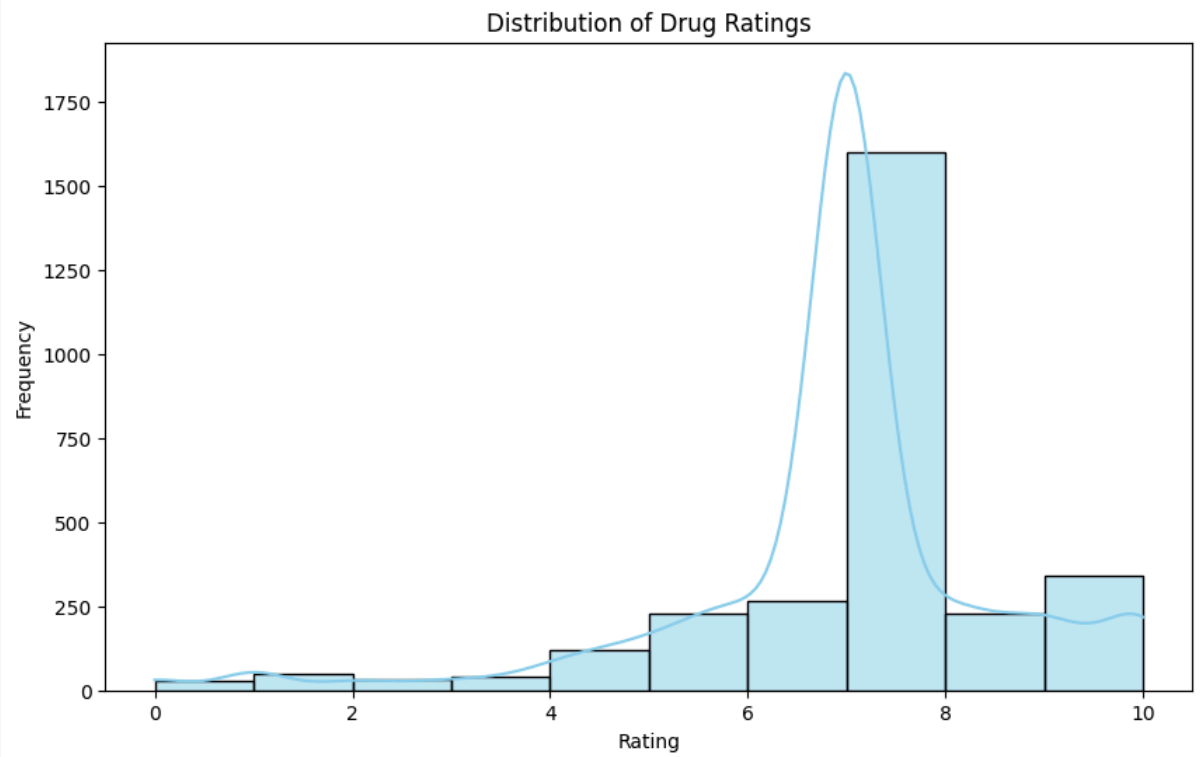
High-rated drugs often address chronic or severe conditions with consistent benefits.

Negative ratings align with adverse effects or poor results in acute conditions.

Side effects contribute significantly to user dissatisfaction.

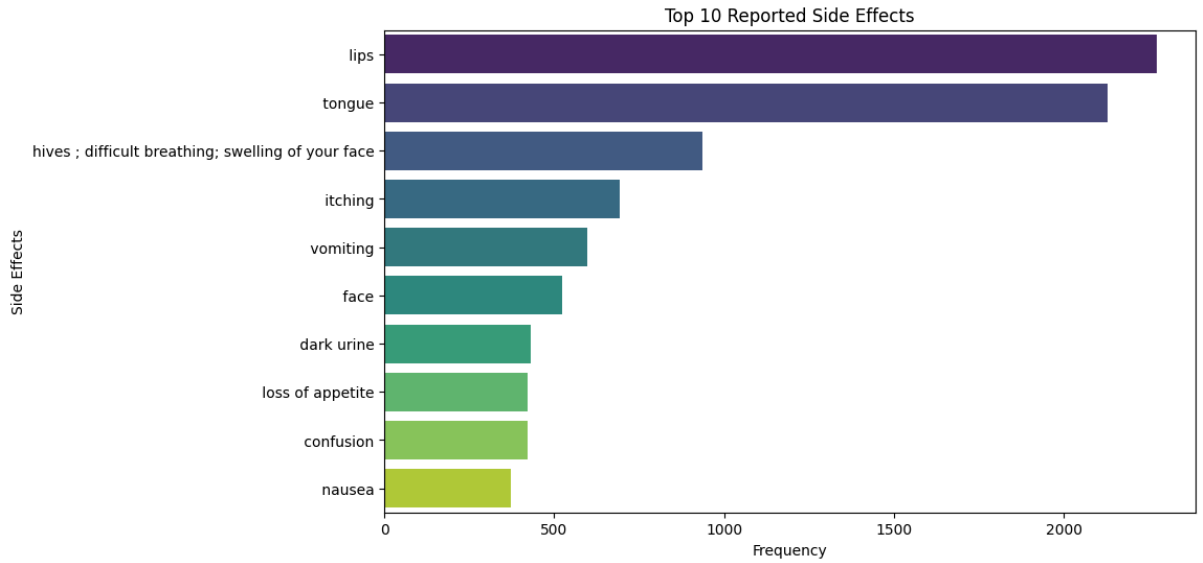
4. Insights Deep Dive

1. Distribution of Drug Ratings



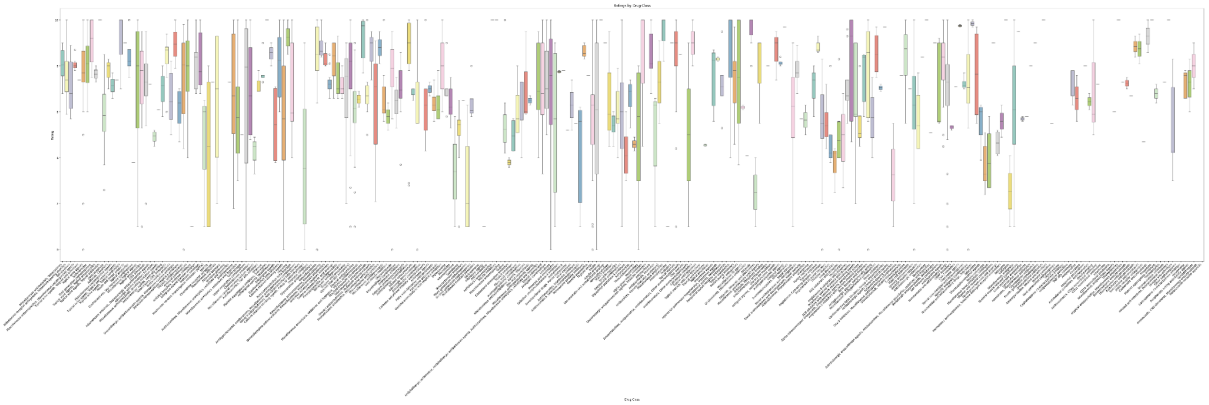
Analysis: This chart helps identify if ratings are skewed or clustered around specific values.

2. Top 10 Reported Side Effects



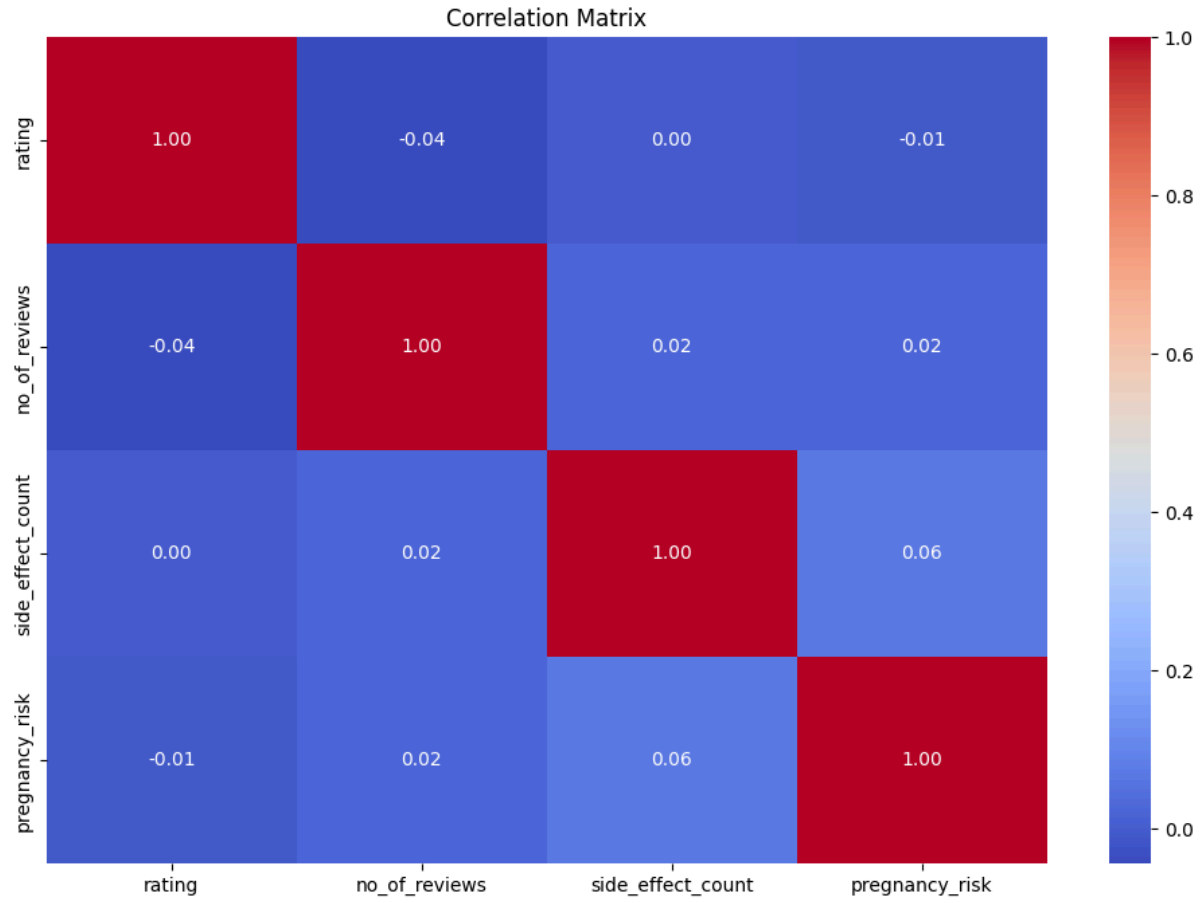
Analysis: This highlights the most common side effects, enabling targeted improvements.

3. Ratings by Drug Class



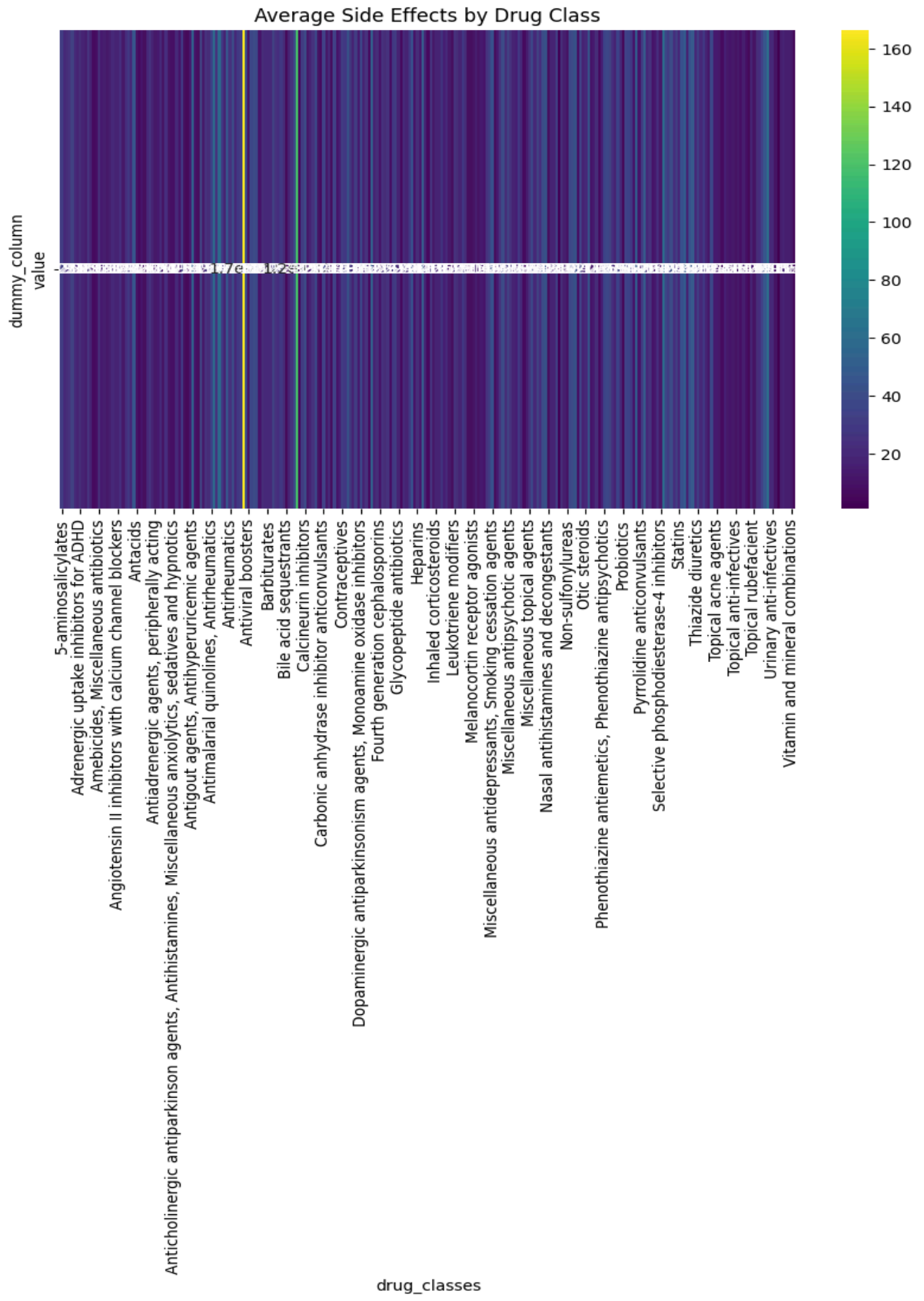
Analysis: Identify which drug classes are performing well or poorly

4.Correlation Matrix

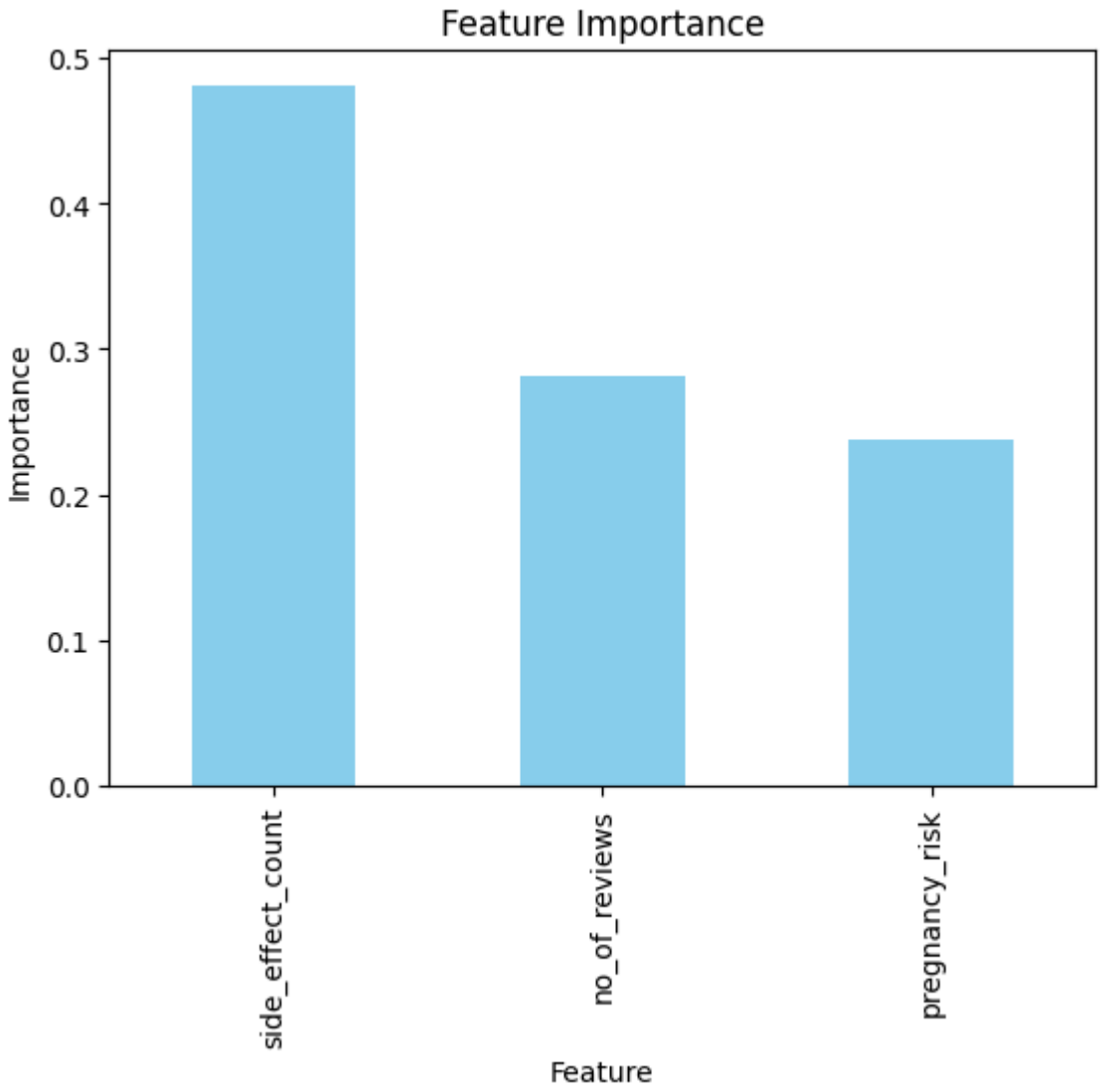


Analysis: Understand relationships between key metrics like ratings and side effect count**.**

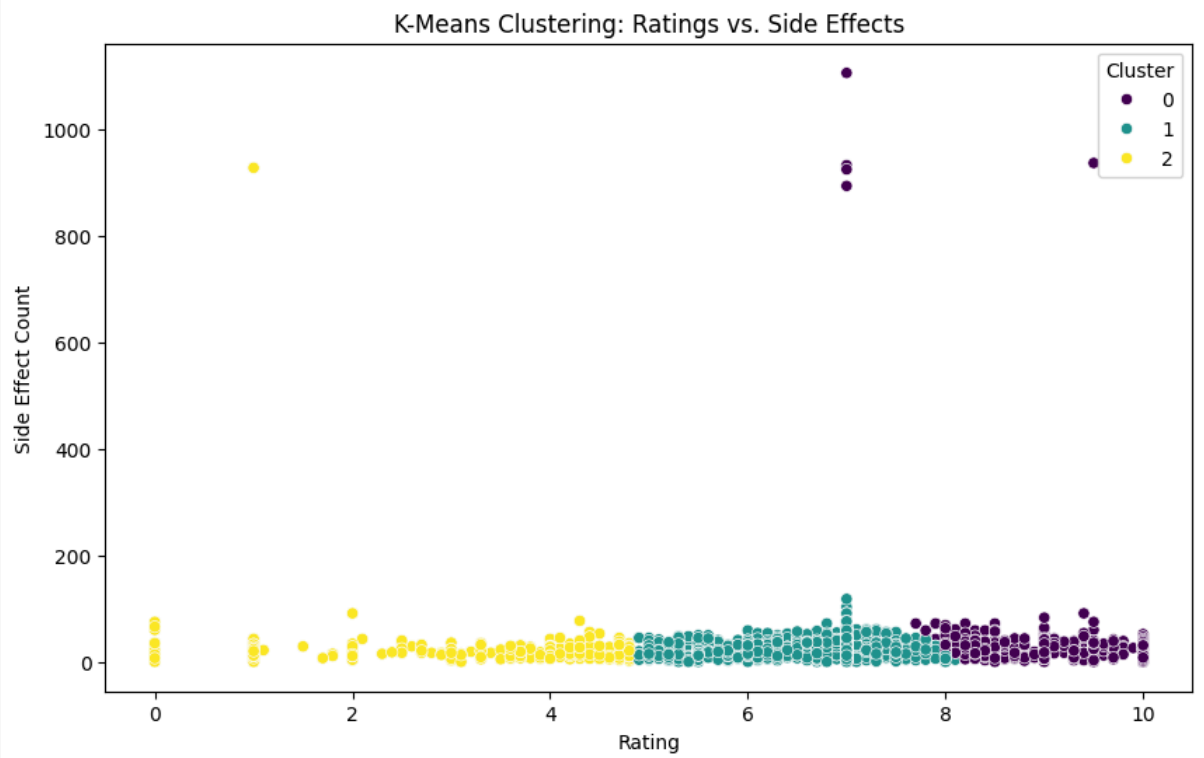
Average Side Effects by Drug Class:



Feature Importance



Ratings vs. Side Effects scatterplot



5. Recommendations

1. Enhance Chronic Condition Drug Profiles

Focus on medications for chronic illnesses as they exhibit higher user satisfaction and long-term benefits.

Increase research investments in underperforming drug classes like painkillers**.**

2. Mitigate Common Side Effects

Reformulate high-impact drugs to reduce headache, nausea, and dizziness incidences.

Introduce user guides to educate patients on managing mild side effects.

3. Improve OTC Drug Effectiveness

Develop stronger formulations for OTC drugs to bridge the gap in treating severe conditions.

Enhance marketing campaigns to rebuild trust among dissatisfied users.

4. Address Pregnancy Risks

Emphasize developing safer alternatives for categories D and X medications.

Improve labelling and awareness campaigns around pregnancy-related risks.

6. Conclusion

The analysis provided key insights into the pharmaceutical dataset, highlighting factors influencing drug ratings and user satisfaction. High ratings are linked to chronic condition medications, while common side effects and high pregnancy risk categories negatively impact user experience. By focusing on safer formulations, enhanced OTC drugs, and reducing side effects, pharmaceutical companies can improve patient outcomes and trust.