

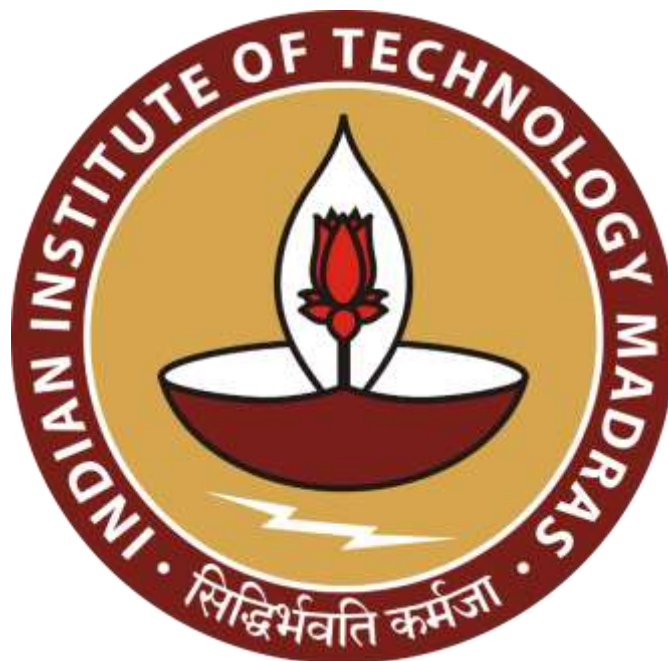
# **Optimizing Inventory Management for Efficient Operations and Profit Maximization in a Pharmacy**

**Midterm Report for the BDM capstone Project**

Submitted by

Name: Yatin Thakral

Roll number: 23f2000574



IITM Online BS Degree Program,  
Indian Institute of Technology, Madras, Chennai  
Tamil Nadu, India, 600036

## **Executive Summary**

Babbar Pharmacy, a small retail pharmacy in Delhi, India, is facing significant challenges in inventory management and profit optimization. The pharmacy deals directly with customers, offering a wide range of prescription and over-the-counter medicines. However, ineffective inventory control has led to issues like excess stock, high holding costs, and frequent stockouts of popular items, which negatively affect customer satisfaction and cash flow. Additionally, a lack of insights into product profitability hampers the pharmacy's ability to optimize pricing and maximize margins.

This project aims to address these challenges by implementing a data-driven approach to inventory and profit management. Through detailed analysis of sales data—including costs, selling prices, quantities sold, and profit margins—I will identify trends and categorize products based on their demand and profitability. Techniques such as ABC analysis and demand forecasting will be used to optimize stock levels, reduce holding costs, and improve stock availability for high-demand items. By leveraging tools like Excel for data visualization and analysis, the project seeks to provide actionable insights to enhance Babbar Pharmacy's operational efficiency and financial performance.

The expected outcome of this project is a systematic inventory management framework, improved profit margins, and data-driven decision-making capabilities for Babbar Pharmacy.

## **Proof of Originality of Data**

### **Details:**

Business Name: Babbar Pharmacy

Owner: Mr. Raj Babbar

Address: A-10, Block B-4, DDA Market, Lawrence Road, Delhi – 110035

### **Letter from Organization:**

All the data is provided by Mr. Raj Babbar who is the owner of Babbar Pharmacy. Please find below letter given from Babbar Pharmacy to validate the authenticity of the data.

<https://drive.google.com/file/d/1AhcpHWcf2UZ6wICgNbRkCo1aZW0QpZOU/view?usp=sharing>

# BABBAR PHARMACY

To Whom It May Concern:

September 22, 2024

This letter serves as official authorization for Mr. Yatin Thakral to conduct research, analysis, and data collection on behalf of Babbar Pharmacy, located at A-10, Block B-4, DDA Market, Lawrence Road, Delhi – 110035. Mr. Thakral is authorized to access sales, inventory, and financial data from our records for the purpose of completing an academic project aimed at optimizing our inventory management and improving profit margins.

Mr. Thakral will have permission to analyze data such as product pricing, sales volume, profit margins, and inventory levels, in adherence to Babbar Pharmacy's confidentiality requirements. This authorization is valid until the completion of the project and the submission of all findings, not later than December 31, 2024.

Should you have any questions or require further verification, please feel free to contact me at +91-9811385634.

Thank you for your cooperation.

Sincerely,



Mr. Raj Babbar

Owner, Babbar Pharmacy

## Images:

To substantiate my claims, I have included visual documentation with images of Babbar Pharmacy and sample bills used by the shop. These images illustrate the store layout and the billing practices in place, providing context for inventory and sales recording methods.





Images of the Pharmacy

BABBAR PHARMACY				
Shop No. 10, Block B-4, CEC DDA Market, Naraina Puri, New Delhi-110028				
Patient Name		Date		
Anil Kumar		25/12/19		
Prescribed by Dr. Varshney				
QTY	PARTICULARS	Batch No.	Exp.	Amount
1	100ml Maltab	1/26	1/26	100
1	100ml Eye Drops	1/26	1/26	440
1	100ml Hydralis	1/26	1/26	350
				890

Image of the official bill

### **Video:**

To gain deeper insights into the daily operations and challenges faced by Babbar Pharmacy, I conducted an interview with Mr. Sanjay Kumar, the primary manager of the pharmacy. The video interview can be accessed via the link below.

<https://drive.google.com/file/d/1rYhuKRpxUeXo1hdSBEGr9ow4n-a5YDi4/view?usp=sharing>

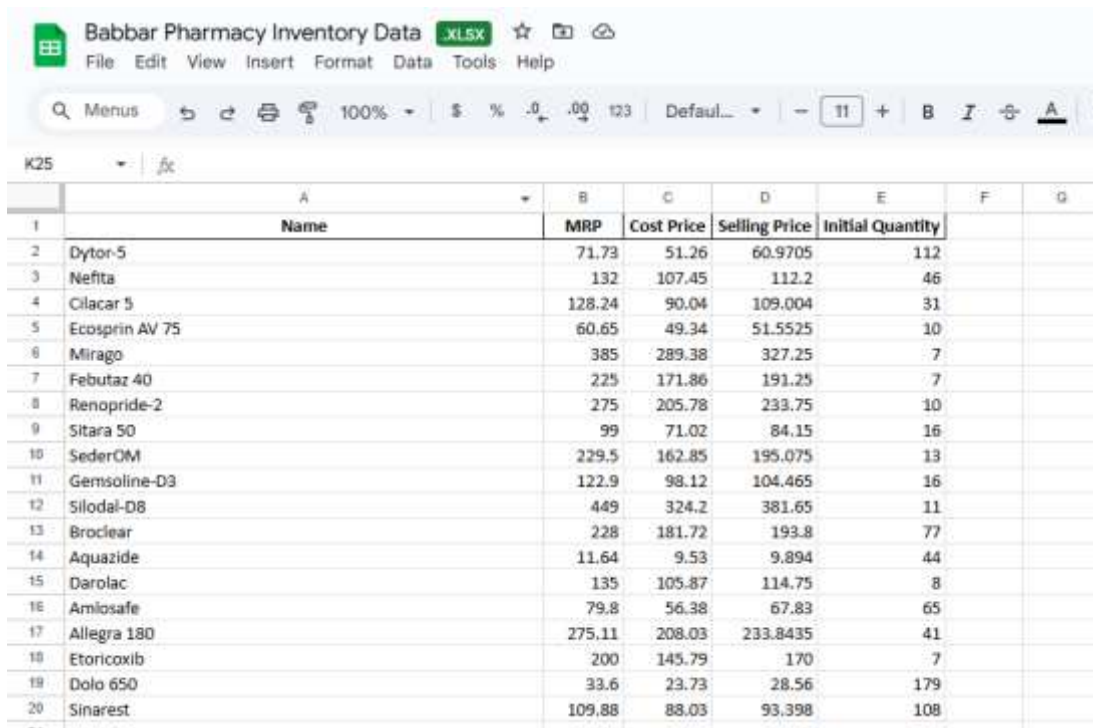
# Metadata

## 1. Data Collection Summary

- **Period Covered:** The dataset spans 30 days, from September 1, 2024, to September 30, 2024.
- **Data Sources:** Data has been recorded in two primary Excel sheets:
  - **Inventory Data:** Details about medicines, including initial stock levels, costs, and pricing.
  - **Sales Data:** Sales transactions recorded over the 30-day period, capturing details like date, time, product, cost price, selling price, and quantity sold.

## 2. Inventory Data (Sheet 1)

- **Description:** This sheet contains baseline inventory details at the start of the month. Each row represents a unique item, along with its:
  - Name (Name of the medicines)
  - Maximum Retail Price (MRP)
  - Cost Price (price incurred by the pharmacy to acquire stock)
  - Selling Price (Price after 15% discount on MRP)
  - Initial Quantity on Hand (stock count as of the beginning of the data collection period)



The screenshot shows an Excel spreadsheet titled "Babbar Pharmacy Inventory Data". The table contains the following data:

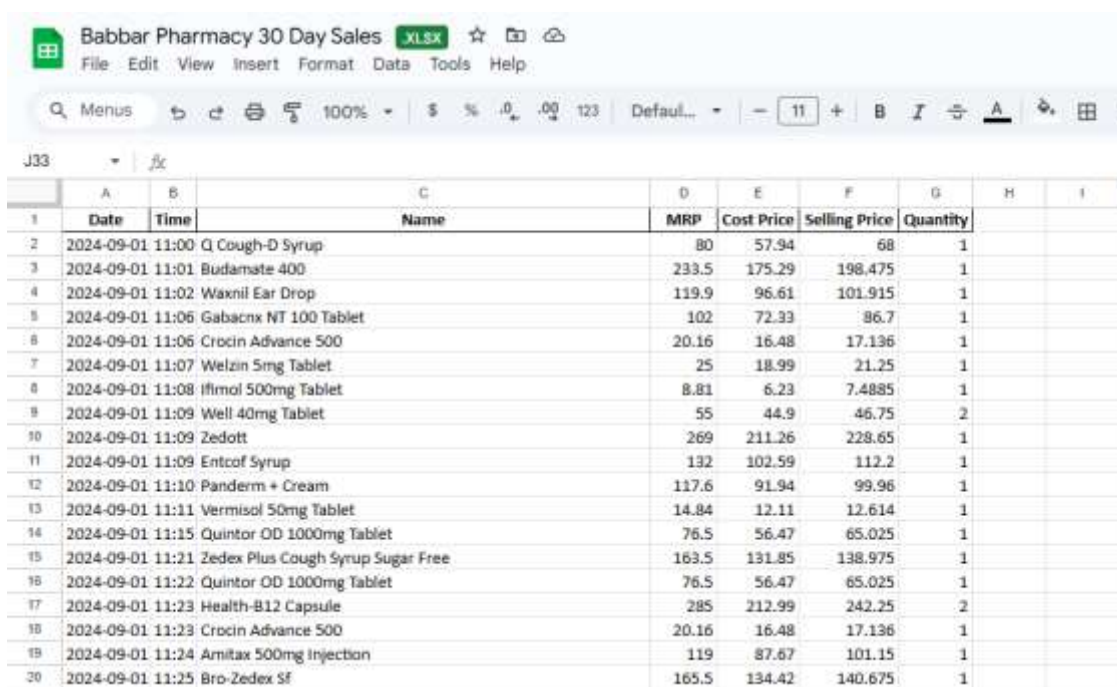
	A	B	C	D	E	F	G
	Name	MRP	Cost Price	Selling Price	Initial Quantity		
2	Dytor-5	71.73	51.26	60.9705	112		
3	Nefita	132	107.45	112.2	46		
4	Cilacar 5	128.24	90.04	109.004	31		
5	Ecosprin AV 75	60.65	49.34	51.5525	10		
6	Mirago	385	289.38	327.25	7		
7	Febutaz 40	225	171.86	191.25	7		
8	Renopride-2	275	205.78	233.75	10		
9	Sitara 50	99	71.02	84.15	16		
10	SederOM	229.5	162.85	195.075	13		
11	Gemsoline-D3	122.9	98.12	104.465	16		
12	Silodal-D8	449	324.2	381.65	11		
13	Broclear	228	181.72	193.8	77		
14	Aquazide	11.64	9.53	9.894	44		
15	Darolac	135	105.87	114.75	8		
16	Amlisafe	79.8	56.38	67.83	65		
17	Allegra 180	275.11	208.03	233.8435	41		
18	Etoricoxib	200	145.79	170	7		
19	Dolo 650	33.6	23.73	28.56	179		
20	Sinarest	109.88	88.03	93.398	108		



- *Link:*  
<https://docs.google.com/spreadsheets/d/1LcDaL7UD14pUGajXNtC5CK1iS6QDnY8G/edit?usp=sharing&ouid=105676261282610959382&rtpof=true&sd=true>

### 3. Sales Data (Sheet 2)

- *Description:* This sheet logs individual sales events over the 30 days, capturing:
  - Date and time of the transaction
  - Name of the medicine sold
  - Medicine prices (MRP, Cost Price, Selling Price)
  - Quantity of units sold in each transaction



The screenshot shows a Google Sheet titled "Babbar Pharmacy 30 Day Sales". The sheet contains a table with the following columns: Date, Time, Name, MRP, Cost Price, Selling Price, and Quantity. The data represents sales transactions over a 30-day period starting from 2024-09-01.

	A	B	C	D	E	F	G	H	I
	Date	Time	Name	MRP	Cost Price	Selling Price	Quantity		
2	2024-09-01	11:00	Q Cough-D Syrup	80	57.94	68	1		
3	2024-09-01	11:01	Budamate 400	233.5	175.29	198.475	1		
4	2024-09-01	11:02	Waxnil Ear Drop	119.9	96.61	101.915	1		
5	2024-09-01	11:06	Gabacnx NT 100 Tablet	102	72.33	86.7	1		
6	2024-09-01	11:06	Crocina Advance 500	20.16	16.48	17.136	1		
7	2024-09-01	11:07	Welzin 5mg Tablet	25	18.99	21.25	1		
8	2024-09-01	11:08	Ifimol 500mg Tablet	8.81	6.23	7.4885	1		
9	2024-09-01	11:09	Well 40mg Tablet	55	44.9	46.75	2		
10	2024-09-01	11:09	Zedott	269	211.26	228.65	1		
11	2024-09-01	11:09	Entcof Syrup	132	102.59	112.2	1		
12	2024-09-01	11:10	Panderm + Cream	117.6	91.94	99.96	1		
13	2024-09-01	11:11	Vermisol 50mg Tablet	14.84	12.11	12.614	1		
14	2024-09-01	11:15	Quintor OD 1000mg Tablet	76.5	56.47	65.025	1		
15	2024-09-01	11:21	Zedex Plus Cough Syrup Sugar Free	163.5	131.85	138.975	1		
16	2024-09-01	11:22	Quintor OD 1000mg Tablet	76.5	56.47	65.025	1		
17	2024-09-01	11:23	Health-B12 Capsule	285	212.99	242.25	2		
18	2024-09-01	11:23	Crocina Advance 500	20.16	16.48	17.136	1		
19	2024-09-01	11:24	Amitax 500mg Injection	119	87.67	101.15	1		
20	2024-09-01	11:25	Bro-Zedex Sf	165.5	134.42	140.675	1		

- *Link:*  
[https://docs.google.com/spreadsheets/d/1eHsO9\\_H9ys6e\\_QDwkYuwmx\\_fsgP4OdpM/edit?usp=sharing&ouid=105676261282610959382&rtpof=true&sd=true](https://docs.google.com/spreadsheets/d/1eHsO9_H9ys6e_QDwkYuwmx_fsgP4OdpM/edit?usp=sharing&ouid=105676261282610959382&rtpof=true&sd=true)

## Descriptive Statistics

Descriptive statistics summarize the overall performance of Babbar Pharmacy's inventory and sales over the 30-day period, revealing key trends and insights into stock turnover, revenue generation, and profit margins. This analysis helps in identifying high-demand items, understanding daily sales trends, and categorizing products for better inventory management.

Link: <https://docs.google.com/spreadsheets/d/1sDWXvJKymTyYkq94MrCEBtclER-jS5oG/edit?usp=sharing&ouid=105676261282610959382&rtpof=true&sd=true>

## 1. Inventory and Sales Summary

### 1. Inventory Overview

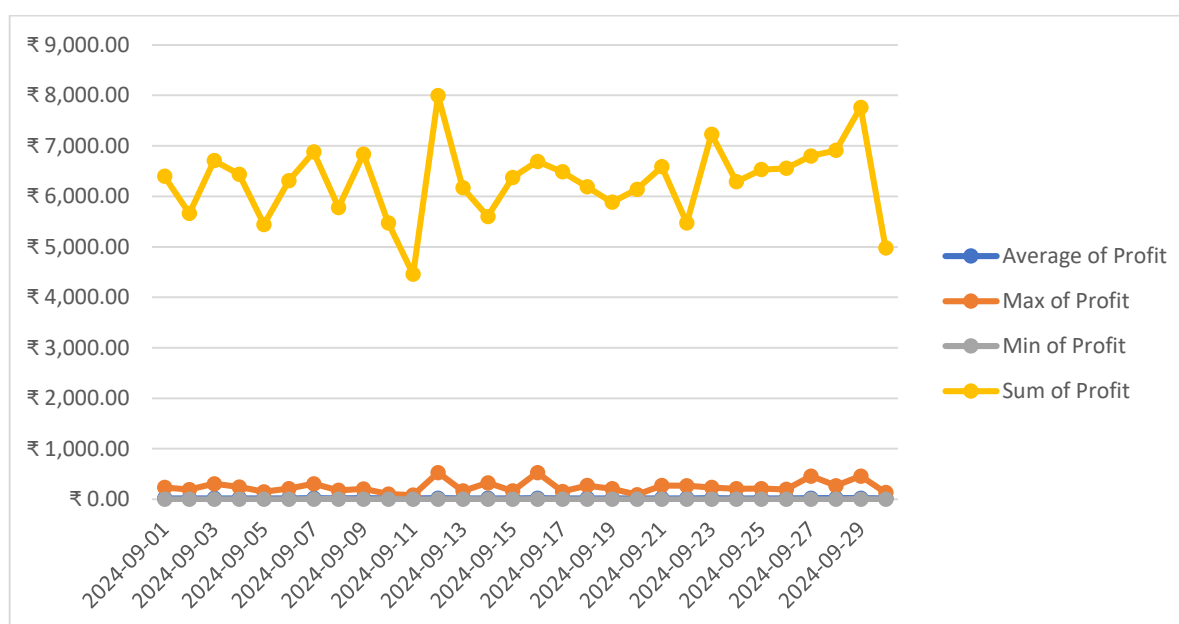
The inventory consisted of **2379 different medicines** with an initial stock quantity totaling **19322 units**. The average selling price of items in stock was ₹134.36, with a mean cost price of ₹120.63, providing an initial profit margin potential across all items.

### 2. Sales Overview

During the 30-day data collection period, the pharmacy sold **10,185 units** across all products, generating a total revenue of **₹18,50,496.67**. The cost of these sold items was ₹16,61,477.29, resulting in a **total profit of ₹1,89,019.38**.

**Daily Revenue** ranged from **₹46,304 to ₹76,249**, with an average daily revenue of **₹61683.22** and a standard deviation of **₹6637.56**, indicating moderate revenue fluctuation. The highest revenue day was on **September 15, 2024**, likely due to increased demand for seasonal medications.

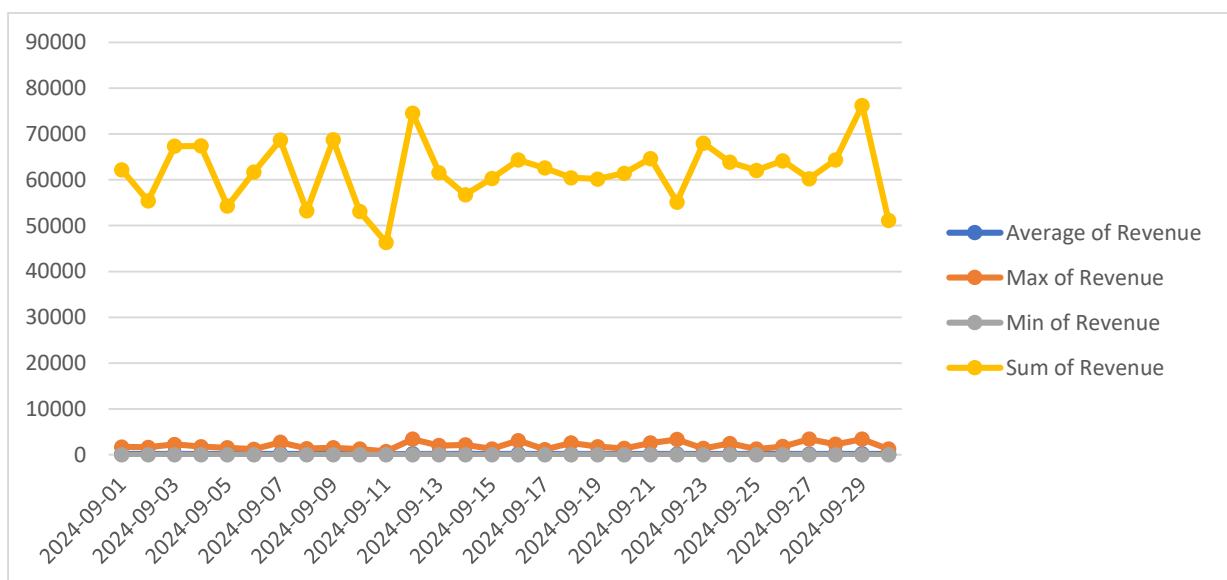
Total Initial Stock	19322
Total Quantity Sold	13773
Total Revenue	₹ 18,50,496.67
Total Cost Incurred	₹ 16,61,477.29
Total Profit	₹ 1,89,019.38
Average Selling Price	₹ 134.36
Mean Cost Price	₹ 120.63



(Line chart of Avg., Max, Min and Sum of Daily Profit)

Average of Daily Revenue	Max of Daily Revenue	Min of Daily Revenue	Std Dev of Daily Revenue
61683.22217	76249.2585	46304.4045	6637.567962

Row Labels	Average of Revenue	Max of Revenue	Min of Revenue	Sum of Revenue
2024-09-01	170.3986151	1717.374	5.916	62195.4945
2024-09-02	175.3096218	1645.6	6.2305	55397.8405
2024-09-03	192.9098868	2269.5	7.7265	67325.5505
2024-09-04	181.2555309	1759.5	2.7625	67427.0575
2024-09-05	179.0787294	1534.335	7.65	54260.855
2024-09-06	170.042219	1214.0125	5.916	61725.3255
2024-09-07	204.3323601	2702.898	5.865	68655.673
2024-09-08	172.2972006	1343	4.08	53239.835
2024-09-09	201.5627933	1516.7655	6.2305	68732.9125
2024-09-10	174.0525492	1241.68	6.2305	53086.0275
2024-09-11	146.0706767	719.95	5.916	46304.4045
2024-09-12	198.3452846	3422.1	7.616	74577.827
2024-09-13	190.6715263	2014.5	7.616	61586.903
2024-09-14	186.700403	2169.914	4.08	56756.9225
2024-09-15	182.8099636	1275	6.0775	60327.288
2024-09-16	200.4539642	3102.5	10.2425	64345.7225
2024-09-17	167.7995483	1134.75	4.471	62589.2315
2024-09-18	178.877747	2576.061	7.4885	60460.6785
2024-09-19	189.2438931	1767.15	8.5	60179.558
2024-09-20	177.5308035	1382.95	8.534	61425.658
2024-09-21	170.1512553	2576.061	6.2645	64657.477
2024-09-22	180.2283889	3335.7315	7.616	55149.887
2024-09-23	184.261019	1382.95	2.4225	67992.316
2024-09-24	185.5759041	2483.36	7.616	63838.111
2024-09-25	177.7955716	1233.0525	5.916	62050.6545
2024-09-26	180.1941025	1801.932	5.916	64149.1005
2024-09-27	173.1609253	3404.25	7.7265	60260.002
2024-09-28	183.9018471	2312	2.7625	64365.6465
2024-09-29	202.2526751	3404.25	4.08	76249.2585
2024-09-30	170.61149	1241.68	6.2305	51183.447
<b>Grand Total</b>	<b>181.7062711</b>	<b>3422.1</b>	<b>2.4225</b>	<b>1850496.665</b>



(Line chart of Avg., Max, Min and Sum of Daily Revenue)



## 2. Product-Level Summary Statistics

### Top-Selling Products by Quantity

The most popular products by quantity sold included:

Name	Total Units Sold	Total Revenue	Total Profit
Lacne	59	24372.9	1531.64
Foxtum 300mg Tablet	21	23829.75	3210.06
Betadine Gargle	86	22222.4	1482.64
Jupicef 500mg/125mg Tablet	69	19647.75	2883.51
Allegra 180	80	18707.48	2065.08
WE-Sita D Tablet	75	15873.75	2376
Sitara-D 100/10 Tablet	84	15547.35	655.83
Oxyspray Nasal Spray	66	14754.3	535.26
Drotin DS	65	13635.1475	978.9975
Allegra M	58	13598.912	1233.312
Ciplox TZ	84	13473.18	1572.9
Oflox oz	83	12836.5725	481.1925
Clingen Forte	75	12431.25	495.75
Drotin-M	65	11765.4875	1982.3375
Zedex Cough Syrup	77	11404.6625	842.5725

### Top Revenue Generators

The highest revenue-generating products were:

Name	Total Units Sold	Total Revenue	Total Profit
Lacne	59	24372.9	1531.64
Foxtum 300mg Tablet	21	23829.75	3210.06
Betadine Gargle	86	22222.4	1482.64
Jupicef 500mg/125mg Tablet	69	19647.75	2883.51
Allegra 180	80	18707.48	2065.08
WE-Sita D Tablet	75	15873.75	2376
Sitara-D 100/10 Tablet	84	15547.35	655.83
Oxyspray Nasal Spray	66	14754.3	535.26
Drotin DS	65	13635.1475	978.9975
Allegra M	58	13598.912	1233.312
Ciplox TZ	84	13473.18	1572.9
Oflox oz	83	12836.5725	481.1925
Clingen Forte	75	12431.25	495.75
Drotin-M	65	11765.4875	1982.3375
Zedex Cough Syrup	77	11404.6625	842.5725

## High-Profit Products

The highest profit margins were observed for:

Name	Total Units Sold	Total Revenue	Total Profit
Foxtum 300mg Tablet	21	23829.75	3210.06
Jupicef 500mg/125mg Tablet	69	19647.75	2883.51
WE-Sita D Tablet	75	15873.75	2376
Allegra 180	80	18707.48	2065.08
Drotin-M	65	11765.4875	1982.3375
Ellepra-M Tablet	79	11341.635	1838.725
Ciplox TZ	84	13473.18	1572.9
Lacne	59	24372.9	1531.64
Betadine Gargle	86	22222.4	1482.64
Xoxe-CV Tablet	20	9847.25	1430.25
Alex Syrup	60	7522.5	1305.3
Zerodol Spas Tablet	81	10954.035	1292.355
Drotin	68	8089.688	1273.368
Allegra M	58	13598.912	1233.312
Seroflo 250 Symbrobreath	13	11162.931	1170.871

## ABC Analysis

Name	Total Units Sold	Total Revenue	Total Profit	Cumulative Revenue	Cumulative Profit	ABC Category
Lacne	59	24372.9	1531.64	24372.9	1.32%	A
Foxtum 300mg Tablet	21	23829.75	3210.06	48202.65	2.60%	A
Betadine Gargle	86	22222.4	1482.64	70425.05	3.81%	A
Jupicef 500mg/125mg Tablet	69	19647.75	2883.51	90072.8	4.87%	A
Allegra 180	80	18707.48	2065.08	108780.28	5.88%	A
WE-Sita D Tablet	75	15873.75	2376	124654.03	6.74%	A
Sitara-D 100/10 Tablet	84	15547.35	655.83	140201.38	7.58%	A
Oxyspray Nasal Spray	66	14754.3	535.26	154955.68	8.37%	A
Drotin DS	65	13635.1475	978.9975	168590.8275	9.11%	A
Allegra M	58	13598.912	1233.312	182189.7395	9.85%	A
Ciplox TZ	84	13473.18	1572.9	195662.9195	10.57%	A
Oflox oz	83	12836.5725	481.1925	208499.492	11.27%	A
Clingen Forte	75	12431.25	495.75	220930.742	11.94%	A
Drotin-M	65	11765.4875	1982.3375	232696.2295	12.57%	A
Zedex Cough Syrup	77	11404.6625	842.5725	244100.892	13.19%	A
Ellepra-M Tablet	79	11341.635	1838.725	255442.527	13.80%	A
Broclear	58	11240.4	700.64	266682.927	14.41%	A
Seroflo 250 Symbrobreath	13	11162.931	1170.871	277845.858	15.01%	A
Zerodol Spas Tablet	81	10954.035	1292.355	288799.893	15.61%	A
Unigef 250mg Tablet	9	10948.374	1038.204	299748.267	16.20%	A
Ivf M 150IU Injection	9	10266.3	955.98	310014.567	16.75%	A
Novegrow	8	9933.44	832.64	319948.007	17.29%	A
Allegra 120 mg	44	9900.528	535.128	329848.535	17.82%	A
Xoxe-CV Tablet	20	9847.25	1430.25	339695.785	18.36%	A
Sumo	76	9625.4	1016.12	349321.185	18.88%	A
Grilinctus-LS Syrup	91	9358.5765	397.8065	358679.7615	19.38%	A

(Snapshot of the ABC Analysis)

ABC Category	Medicines	Percentage
A	336	17.45%
B	501	26.03%
C	1088	56.52%
<b>Grand Total</b>	<b>1925</b>	<b>100%</b>

Based on ABC analysis, items were categorized into three classes:

#### 1. Category A:

- Only **17.45%** medicines contribute to **70%** of the revenue
- **Interpretation:** These medicines are the top revenue-generating items, though they make up a relatively small percentage of the total stock. Category A medicines are high-priority items and should receive the most attention in terms of inventory management to avoid stockouts, as they significantly impact revenue.

#### 2. Category B:

- Only **26.06%** medicines contribute to next **20%** of the revenue
- **Interpretation:** Category B medicines contribute moderately to revenue, with a slightly larger inventory count than Category A. These should be managed with regular reviews and balanced stock levels to maintain availability without overstocking.

#### 3. Category C:

- Only **56.52%** medicines contribute to next **10%** of the revenue
- **Interpretation:** These medicines represent the majority of the inventory but contribute minimally to revenue. They are low-priority items in terms of revenue impact and may require periodic stock checks rather than intensive management.

### Detailed Explanation of Analysis Process/Method

➤ **Data Collection:** Thirty days of sales data and comprehensive inventory data were collected from Babbar Pharmacy, a small retail pharmacy in Delhi. The data was structured into two sheets within Microsoft Excel: one capturing inventory details, including medicine names, MRPs, cost prices, selling prices, and initial stock quantities, and another detailing daily sales with columns for dates, times, item names, quantities sold, and revenue.

➤ **Data Cleaning and Preparation:** Initially, the data was meticulously examined to ensure uniformity and clarity. Any inconsistencies, missing values, or outliers were identified and corrected, allowing for accurate analysis. The data structure was then organized, with calculated columns for revenue, profit, and cumulative percentages, which are necessary for further analysis.

- **Descriptive Statistical Analysis:** A set of descriptive statistics was computed to provide an overview of Babbar Pharmacy's operations. Key measures included total revenue, mean selling price, profit margins, and stock levels. This provided a foundational understanding of product-level profitability and demand patterns, assisting in identifying which items were most crucial to the pharmacy's revenue stream.
- **Data Visualization:** Line charts were utilized to visualize and simplify the understanding of key metrics. These charts depicted revenue trends over time, revealing peak sales periods and daily fluctuations in sales volumes, which could be used to optimize staffing and inventory levels.
- **ABC Analysis:** To identify the most valuable inventory items, an ABC analysis was conducted based on cumulative revenue contributions. The steps were as follows:
  - Products were sorted in descending order of revenue.
  - Cumulative percentages of total revenue were calculated to categorize items: "A" for the top 70% of revenue, "B" for the next 20%, and "C" for the final 10%.
- **Key Insights and Decision-Making:** By leveraging these analyses, the project aims to support data-driven decision-making, including optimizing stock levels, reducing holding costs, and improving product availability. Expected outcomes include a structured inventory management framework and improved financial performance, aligning with Babbar Pharmacy's objectives of enhancing customer satisfaction and profitability.

## **Results and Findings**

Based on the analysis conducted using graphs and charts, several significant insights have emerged that highlight revenue trends, top-performing products, and key areas for inventory optimization.

### **1. Key Revenue Contributors**

- Medications like *Lacne*, *Foxtum*, *Betadin*, and *Allegra* emerged as primary revenue drivers for Babbar Pharmacy. These medicines generated a substantial portion of total revenue due to consistent sales and moderately high selling prices, indicating stable demand.
- Notably, high-demand medications, often prescribed for chronic conditions, showed steady sales throughout the month, contributing significantly to the pharmacy's consistent revenue stream.

### **2. High-Profit Margin Products**

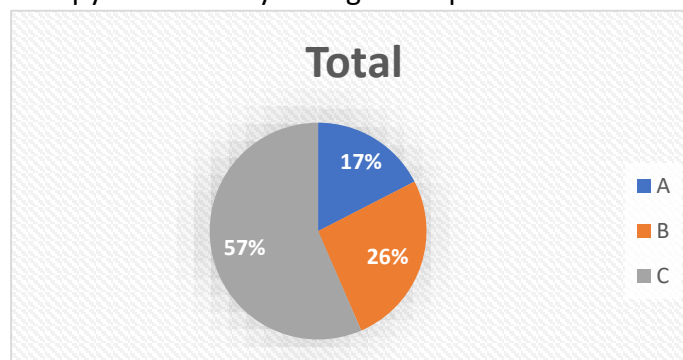
- Among all SKUs, certain high-value medications such as *Foxtum*, *Jupicef* and *WE Sita-D* exhibited the highest profit margins, though they were sold in smaller quantities. These items, though less frequently sold, provide a

substantial profit per unit, indicating that they are valuable additions to the inventory in terms of profitability.

- The analysis suggests a balanced approach to inventory management for these products, focusing on stock availability while maintaining profitability.

### 3. ABC Analysis Findings

- **Category A** (Top 17.45% of items): These items contribute to 70% of revenue, underscoring their critical role in the pharmacy's financial performance. Items in this category are high-priority, requiring close inventory management to prevent stockouts and ensure customer satisfaction.
- **Category B** (Next 26.06% of items): Contributing to 20% of revenue, Category B items provide moderate revenue and support overall business stability. Regular stock reviews and controlled replenishment are recommended to maintain availability without over-investing in inventory.
- **Category C** (Remaining 56.52% of items): Though these items comprise the majority of the inventory, they contribute only 10% to revenue, making them low-priority. Periodic stock checks are sufficient to ensure these items do not occupy unnecessary storage or capital.



### 4. Revenue Trend Analysis

- Daily revenue ranged from ₹46,304 to ₹76,249, with an average of ₹61,683.22. Although the revenue showed moderate daily fluctuations, it maintained a stable pattern throughout the month.
- The peak revenue observed on September 15, 2024, indicates potential increased demand for specific medications, possibly due to a health trend or a seasonal spike in illnesses during that period.

In summary, the analysis highlights the essential contribution of high-demand medicines to Babbar Pharmacy's revenue, the profitability of specific high-margin products, and the importance of targeted inventory management for high-value items (Category A). Effective categorization and replenishment strategies for Category B and C items will further enhance profitability and stock efficiency.