Behind India’s Food Inflation and FMCG Dynamics

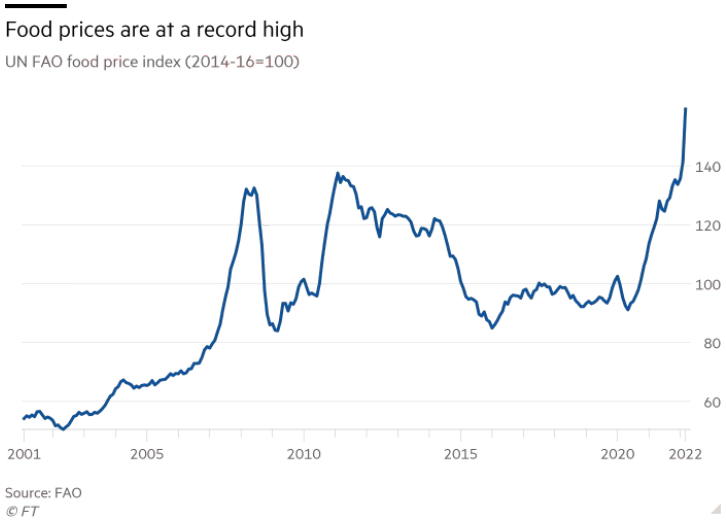
1. Introduction

1.1 Context: Why inflation became a story (2022 - mid 2025)

When the COVID 19 disruptions began to fade in 2022, there was hope for smooth global economic recovery. Instead, the world was hit with a cascade of shocks — each one leaving a visible imprint on India’s food inflation.

The first blow came from geopolitics.

The Russia–Ukraine war, erupting in early 2022, choked the flow of key agricultural commodities. Ukraine’s role as a major exporter of sunflower oil and grains, and Russia’s dominance in fertilizers, meant global prices for these essentials surged almost overnight. The **FAO Food Price Index** climbed to record highs in March 2022, pulling up costs across the global food chain. For India, which relies heavily on imports of edible oils and fertilizers, these shocks translated quickly into higher farm input costs and, inevitably, steeper retail prices.



Monetary policy added another layer of pressure.

Central banks, from the U.S. to Europe, raised interest rates quickly to control rising prices (inflation). The U.S. Federal Reserve's actions made the dollar stronger, which made things more expensive for countries like India that rely on imports. To manage inflation, India's central bank also raised interest rates, but the rupee weakened, making imports even more costly.

Climate events disrupted crop production and raised costs.

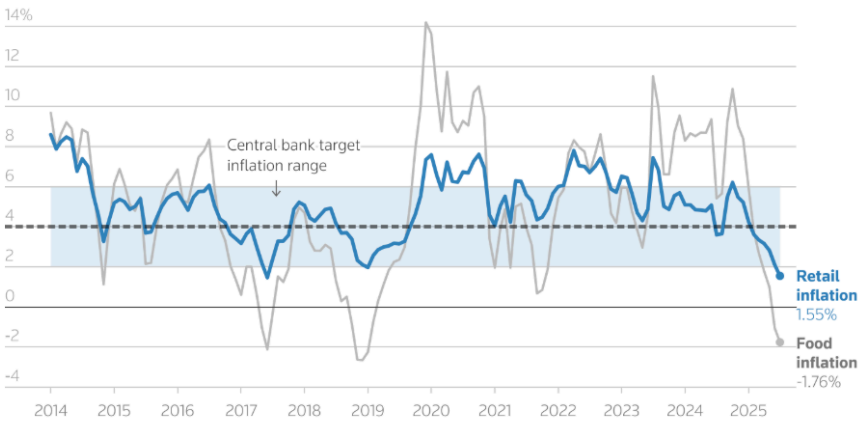
Climate events in 2022 and 2023 made things hotter and harder for farming in India. The monsoon, which is crucial for food production, was affected by La Niña in 2022 and El Niño in 2023. This led to uneven rainfall – some areas got too little rain, while others faced flooding. Heatwaves hit crops like tomatoes, onions, and green vegetables, which are especially sensitive to weather changes. While the damage was usually in specific areas, it was severe enough to cause price hikes for these perishable items.

Policy interventions aimed to stabilize prices had a mixed effect.

To manage volatile prices, the Indian government deployed a mix of export bans, import duty cuts, and buffer stock releases. These moves could cool prices quickly — as seen when customs duties on edible oils were cut — but sometimes tightened supply abroad, fueling geopolitical trade tensions. Wheat exports were banned in 2022 to secure domestic supplies, while rice exports faced multiple restrictions between 2023 and 2024.

The domestic consumers were affected the most.

For urban households, the pinch was visible in everyday shopping baskets — cooking oil bottles that cost less one month and more the next, milk and ghee prices touching decade-highs in 2023, and vegetable prices fluctuating wildly with the weather. In rural areas, where food accounts for a larger share of spending, these swings hit purchasing power harder, forcing substitutions toward cheaper staples and away from protein-rich or perishable items.



India's Retail Inflation trend (Source : Reuters Graphics)

Why This Matters for the FMCG Sector:

By mid-2025, overall inflation had dropped, thanks to lower food prices and a high base effect. However, the previous years showed that in India, food inflation isn't just a number – it affects consumer behavior. People switch brands, downgrade to cheaper options, and change loyalties when food prices rise. For FMCG companies and retailers, understanding these changes is crucial to managing costs, adapting to shifts in demand, and staying on top of new policies.

2. Research Objectives

2.1 Primary Aim

To analyze trends in India's food inflation from January 2022 to June 2025 and assess their implications for household purchasing behavior and FMCG/retail strategies.

2.2 Research Questions

1. **Inflation Patterns**
    - Which food categories have experienced **persistent vs. transient** inflation between Jan 2022–Jun 2025?
    - Are there clear **seasonal patterns** (e.g., recurring spikes in onions, tomatoes)?
    - Do certain categories move together, suggesting **substitution or shared supply chain drivers**?
2. **Event Linkages**
    - How have **policy actions** (e.g., wheat/rice export bans, edible oil duty cuts) translated into measurable price changes?
    - How have **climate shocks** (e.g., flooding in tomato belts) amplified price volatility?
3. **Impact on Essentials vs. Discretionary Items**
    - Have price pressures been **more persistent in essentials** (milk, cereals, oils) than in discretionary items (luxury processed foods, imported goods)?
    - Which items are **most resilient** in terms of price stability?
4. **Strategic Implications**
    - Based on inflation behavior, which **categories should FMCG brands prioritize** for resilience strategies?
    - What stock management or pricing policies should retailers adopt for **volatile vs. stable items**?

2.3 Expected Contribution

This report aims to:

- Provide a data-driven map of India's food inflation landscape at a category level over three and a half years.
- Link global market shifts, domestic policy changes, and climate events directly to observable inflation spikes/drops.
- Identify structurally high-risk categories and offer evidence-backed strategic recommendations for FMCG brands and retailers.
- Serve as a replicable framework for ongoing monitoring of inflation dynamics in the food sector.

3. Methodology

3.1 Data Sources

The analysis is grounded in official, publicly available data to ensure reliability and reproducibility.

- **Source**: Ministry of Statistics and Programme Implementation (MoSPI)
- **Series**: All India Item Inflation Rates
- **Frequency**: Monthly

- **Period Covered**: January 2022 – June 2025 (42 months)
- **Geographic Scope**: All-India aggregated data

3.2 Categorization Approach

To simplify interpretation, individual CPI items were grouped into **eight strategic categories** based on consumption role and price behavior:

Category	Examples
Staples	Rice (PDS & non-PDS), Wheat, Atta, Bajra, Jowar
Vegetables	Onions, Tomatoes, Potatoes, Other Vegetables
Fruits	Banana, Mango, Apple, Citrus, Other fruits
Spices	Ginger, Garlic, Chilli, Turmeric
Dairy	Milk, Ghee, Curd, Butter
Meat & Fish	Chicken, Mutton, Fish, Eggs
Luxury/Discretionary	Ice cream, Chocolates, Packaged Snacks, Tea, Coffee
Others	Baby food, Mineral water

3.3 Inflation measure used

- **Primary Metric**: Year-on-Year (YoY) % change in CPI item index.

YoY change smooths short-term month-to-month volatility and captures **seasonal effects in a consistent frame**.

> **YoY Inflation (%) :**
>
> $$\frac{\text{CPI Index}_t - \text{CPI Index}_{t-12}}{\text{CPI Index}_{t-12}} \times 100$$

3.4 Analytical Tools and Techniques

1. **Excel Pivot Tables**
   - Aggregated YoY % changes by category and month.
   - Enabled quick switching between all-item and category views.
2. **Conditional Formatting Heatmaps**
   - **Color scale**: Strong positive inflation (red), mild (orange/yellow), neutral (white), deflation (green).
   - Used to visually detect persistent hot zones (structurally high inflation) and cold zones (deflationary trends).
3. **Correlation Analysis**
   - **Pearson correlation** between categories to identify co-movement patterns and substitution effects.
4. **Volatility Ranking**
   - Calculated **standard deviation of YoY % change** for each item to rank price unpredictability.
   - Highlights risk-prone categories for procurement planning.
5. **Event Overlay**

- Mapped known **policy actions**, **climate events**, and **global market shifts** onto time-series charts.

6. **Extreme Value Identification**
   - **LARGE()** and **SMALL()** functions in Excel to pull top 1–3 spikes and drops per category.
   - Recorded associated months for contextual linkage.

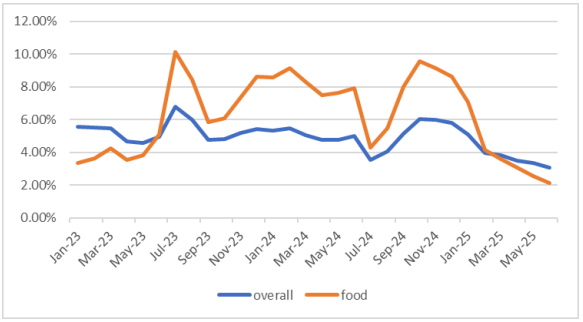
3.5 Analytical Framework

The study follows a **top-down to bottom-up** approach:

1. **Macro-Level**: All-category heatmap and CPI-Food vs Headline CPI comparison.
2. **Category-Level**: Trends, spikes/drops, seasonality patterns.
3. **Cross-Cutting Themes**: Correlation structures, volatility, resilience vs vulnerability.
4. **Strategic Insights**: Translating findings into business recommendations for FMCG brands and retailers.

4. Overall Inflation Landscape

From early 2023 to mid-2025, India's food inflation remained volatile, shaped by the spillover effects of earlier global shocks and recurring domestic disruptions. Although global commodity prices — especially for grains and vegetable oils — began to ease in 2023 after peaking in 2022, the relief was uneven and short-lived for some categories.

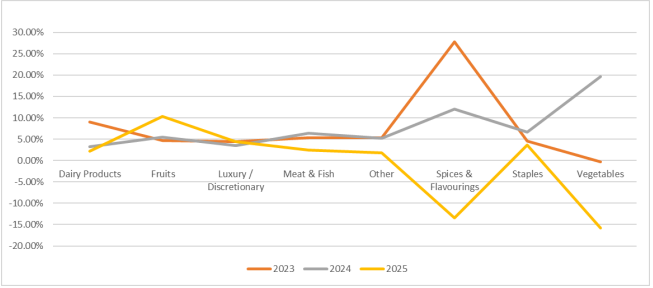


Overall CPI vs Food CPI (YoY)

By early 2025, global prices for select items like vegetable oils saw renewed upward pressure due to rising demand. Domestically, inflation trends were more jagged. Key food categories such as vegetables, fruits, spices, and dairy faced repeated spikes due to erratic weather — including unseasonal rains and localized flooding — which disrupted short-cycle crops and supply chains.

This period highlighted a critical disconnect: easing global prices didn't necessarily translate to lower food inflation in India, particularly for perishables that are highly sensitive to local weather and logistics.

4.1 Annual Category Comparison



Category wise avg YoY (2023-2025)

A cross year comparison highlights how the inflation rotated across food categories :

- **2023:** Spices and dairy drove the sharpest price pressures, while most other categories clustered around 4–6%. Vegetables averaged flat (–0.3%) but masked extreme within-year volatility.
- **2024:** Vegetables became the dominant driver, staples also firmed, while spices cooled to +12%. Dairy and fruits stayed moderate.
- **2025 (Jan–Jun):** Vegetables and spices flipped into deflation, while fruits surged (+10.3%) and dairy remained sticky (+2.2%).

4.2 Food Inflation volatility across categories

	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25
Dairy Products	9.91%	10.86%	10.64%	10.07%	9.77%	9.68%	9.52%	8.85%	8.28%	7.81%	7.17%	6.66%	5.80%	4.95%	4.37%	3.73%	3.07%	2.62%	2.55%	2.40%	2.29%	2.51%	2.62%	2.76%	2.65%	2.89%	2.89%	2.89%	3.18%	3.30%
Fruits	8.54%	6.64%	-1.78%	8.81%	4.17%	2.98%	5.79%	5.66%	6.56%	6.88%	4.94%	4.32%	3.89%	2.69%	3.54%	-2.48%	0.64%	6.87%	6.46%	6.53%	3.87%	7.40%	2.31%	10.99%	9.34%	15.26%	23.26%	11.88%	10.16%	14.84%
Luxury / Discretionary	5.29%	5.54%	5.23%	4.86%	4.46%	4.78%	4.51%	4.48%	4.07%	3.73%	3.62%	3.31%	3.33%	3.26%	3.24%	2.90%	2.97%	2.97%	3.00%	2.97%	3.32%	4.16%	4.79%	4.95%	5.36%	5.53%	5.82%	6.07%	6.07%	6.12%
Meat & Fish	7.96%	6.70%	4.44%	4.60%	5.12%	6.30%	5.26%	5.94%	5.18%	4.92%	3.80%	3.39%	4.31%	6.42%	6.95%	7.11%	7.11%	6.00%	6.63%	6.55%	5.61%	5.65%	6.89%	7.15%	5.70%	4.20%	3.22%	3.49%	2.94%	2.58%
Other	6.25%	5.29%	5.11%	5.56%	6.06%	6.10%	6.18%	6.54%	6.28%	4.45%	2.26%	4.89%	3.83%	5.76%	5.80%	5.69%	5.23%	5.01%	4.79%	4.19%	3.84%	8.24%	5.88%	3.11%	7.88%	3.23%	3.08%	2.86%	2.76%	2.59%
Spices & Flavourings	12.49%	11.71%	10.50%	12.80%	20.28%	28.96%	41.50%	40.44%	37.30%	36.76%	36.43%	39.06%	37.63%	38.87%	28.60%	22.22%	14.99%	10.14%	0.09%	-0.95%	2.75%	4.47%	4.10%	1.06%	-3.49%	-12.77%	-13.27%	-13.46%	-13.89%	-15.91%
Staples	5.96%	5.85%	4.74%	3.79%	3.45%	3.39%	4.05%	3.67%	4.14%	4.85%	5.13%	5.48%	5.49%	5.69%	5.96%	5.85%	6.12%	7.00%	6.94%	6.72%	6.98%	7.53%	7.68%	7.47%	7.25%	6.51%	6.03%	5.93%	5.60%	4.73%
Vegetables	-14.41%	-15.61%	-5.28%	-6.41%	-8.52%	-3.00%	23.85%	12.36%	-5.35%	-4.24%	7.01%	15.96%	16.96%	20.20%	17.46%	16.28%	17.85%	20.50%	5.79%	9.42%	29.19%	32.40%	25.95%	25.97%	10.45%	-0.42%	-4.96%	-6.33%	-7.23%	-10.82%

Category level YOY heatmap (Jan 23 - Jun 25)

- **Spices & Flavorings**:

  Remained persistently high through 2023, peaking at over **41% in July** and **40% in August**. Inflation cooled rapidly in 2024, hitting **zero by July** and slipping into deflation by **August (–0.95%)**. Through early 2025, deep deflation continued, reaching **–15.9% by June**.

- **Vegetables**:

  Started 2023 in deflation (–14% to –9%), then surged mid-year (**+24% in July**) due to weather shocks. Prices remained elevated through 2024, peaking again at **32.4% in October**, before sharply reversing to **–10.8% by June 2025**.

- **Staples (cereals, pulses)**:

  Displayed relative stability. Inflation stayed between **3–6% in 2023**, rose gradually to **7–8% by late 2024**, and eased back to around **2% by mid-2025**.

- **Dairy Products**:

  High but easing in 2023 (**~10% in H1**, falling to **6–7%** by year-end). Inflation moderated further to **2.5–3% in 2024–25**, reflecting more stable supply conditions.

- **Fruits**:

  Mostly moderate through 2023 and 2024 (**4–10%**), with a temporary dip into deflation in **April 2024 (–2.5%)**. A notable spike occurred in early 2025, hitting **23.3% in March**, before settling back to **12–15% by mid-year**.

- **Meat & Fish**:

  Remained steady throughout, with inflation in the **4–7%** range in 2023–24 and slightly lower in early 2025.

- **Others**:

  Generally stable, around **5–6% in 2023**, softening to **~3%** in 2024–25, with a brief uptick to **8.2% in October 2024**.

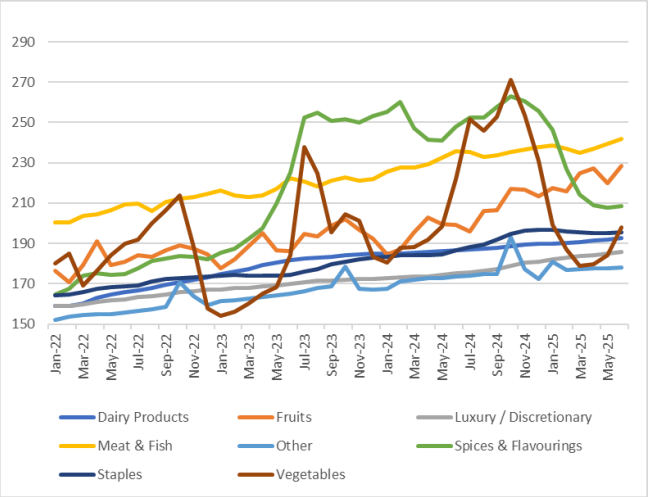
- **Luxury/Discretionary Foods**:

  Inflation drifted lower in 2023 (**from 5.3% to 3.3%**), remained steady in early 2024, and picked up slightly to **~6% by mid-2025**, indicating rising urban demand.

Food vs Overall CPI:
Food inflation consistently ran hotter than overall CPI. In **August 2023**, food inflation peaked near,

compared to**~6.5%**for headline CPI. A similar divergence reappeared in **late 2024**, before both converged to**~2–3% by mid-2025**, helping bring down overall inflation.

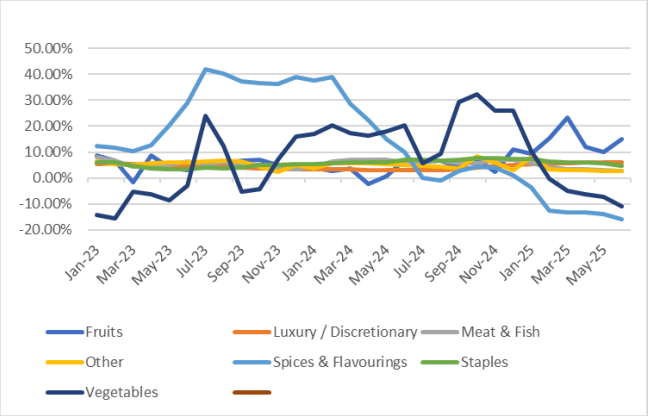
5. Category Deep Dives:



Average CPI month wise across categories (2022-2025)

5.1 Overview

- **Vegetables (Tomato, Onion):** These remained the most volatile. Tomatoes followed their usual mid-year spikes but were unusually muted in 2025 due to better arrivals and government market interventions. Onions showed typical Aug–Oct spikes but were softened in 2025 by export bans and buffer stock releases.
- **Spices (Ginger, Garlic, Jeera):** Prices surged dramatically in late 2023 and early 2024 due to erratic monsoons, pest damage, and low acreage. However, by 2025, they shifted into deep deflation as supply normalized.
- **Fruits (Coconut, Pears, Watermelon, Apple):** Fruit inflation was seasonal but also influenced by weather shocks and global factors. Coconut spiked sharply in early 2025 due to cyclone-related production losses in Kerala/TN. Watermelon and pears saw seasonal spikes, while apples faced storage and transport bottlenecks in winter.
- **Dairy (Milk, Ghee, Butter):** Persistently elevated in 2023, largely due to high feed and fodder costs, and moderated only gradually. Unlike perishables, dairy inflation reflects structural cost stickiness rather than short-term volatility.
- **Beverages (Coffee):** Consistently expensive across years, driven by global price trends and El Niño effects on coffee-growing regions abroad.
- **Snacks & Dry Fruits:** Items like cashew and chips rose with import costs and festive demand, while dry fruits steadily trended up due to higher international prices and duties.
- **Oils:** Edible oil prices remained subdued through 2023–24, aided by improved global supply, but remain vulnerable to geopolitical shocks.
- **Cereals (Rice, Wheat):** Government policy dominated—PDS pricing, MSP hikes, and export restrictions shaped their inflation trends more than market forces.
- **Pulses (Arhar):** Saw sharp spikes in late 2023 due to domestic shortages, later corrected through imports.



Avg YoY month wise across categories (2023-2025)

5.2 Product-Level Food Price Drivers (2023–2025)

Category	Product(s)	Pattern / Trend	Main Reason(s)	Cause Type
Vegetables	Tomato	Large mid-year spikes in 2023, turning deflationary by mid-2025	- Erratic monsoons in 2023 - Better supply and govt. intervention in 2025	Seasonal + Policy
Vegetables	Onion	Aug–Oct '23 spikes, easing in 2025	- Monsoon shocks + high export duty and later bans; - Buffer stocks softened prices	Seasonal + Policy
Spices	Ginger, Garlic, Jeera	Surged late 2023–early 2024; deflation in 2025	- Weather disruptions, pest attacks, low acreage; - Strong export demand - Supply recovery later	Seasonal + Structural
Fruits	Coconut	Major spike in early 2025	Cyclone-related damage in Kerala/TN	Structural
Fruits	Pears	Two distinct spikes in 2023	Seasonal demand + import delays	Seasonal + Structural
Fruits	Watermelon	Cheap in Jan 2023, spike in Jan 2024	Seasonal + erratic weather	Seasonal
Fruits	Apple	Mild spikes late 2023, early 2024	Harvest gaps + storage bottlenecks	Seasonal
Dairy	Milk, Ghee, Butter	High in 2023, moderating after	- Elevated feed and fuel costs - Demand resilience	Structural
Luxury/ Discretionary	Coffee Powder	Persistently high 2023–25	Global coffee price surge, El Niño disruptions	Structural (Global)
Luxury/ Discretionary	Cashew, Chips	Rise late 2024–25	Higher import costs + festive demand	Structural + Seasonal
Luxury/ Discretionary	Dry fruits (others)	Gradual rise 2023–25	Import cost inflation, weaker rupee	Structural

Category	Product(s)	Pattern / Trend	Main Reason(s)	Cause Type
Staples	Edible oils (mustard, sunflower, soyabean, saffola etc.)	Subdued 2023–mid 2024	Global edible oil supply recovery and import duty concessions	Structural (Global)
Staple	Rice (PDS)	Stable 2023, spike late 2024	PDS price hikes	Policy-driven
Staple	Wheat (overall)	Volatile 2023, easing after	Heatwave damage + 2022 export ban	Seasonal + Policy-driven
Staple	Arhar (Tur)	Spike late 2023–early 2024, easing after	Domestic shortage + later imports	Structural + Policy

6. Category Risk Mapping

6.1 What we mean by Volatility and Persistence

- **Volatility**: Measures how sharply and frequently a category's inflation rate moves up or down. Highly volatile categories (e.g., Vegetables, Spices) can swing from deflation to double-digit inflation within months, making them major drivers of short-term food CPI shocks.
- **Persistence**: Captures how *sticky* inflation is — whether prices stay high for long periods rather than spiking briefly. Persistent categories (e.g., Fruits, Staples) keep food inflation elevated even without dramatic swings.

Together, these two dimensions help separate:

- **Flashpoint categories** → volatile, cause sudden spikes.
- **Drag categories** → persistent, keep CPI higher for longer.

6.2 How we calculated the rankings

- **Volatility**: We computed the **standard deviation** of monthly YoY inflation for each food category. Higher standard deviation = higher volatility.
- **Persistence**: We looked at how consistently categories stayed in positive inflation (above trend/average) across months. Categories with long stretches of elevated inflation scored higher.
- Rankings are relative (1 = highest risk, 8 = lowest).

6.3 Category Rankings (2023-2025)

Volatility Analysis

	2023	2024	2025
Dairy Products	4	5	8
Fruits	3	3	3
Luxury / Discretionary	8	8	7
Meat & Fish	5	6	5
Other	6	4	4
Spices & Flavorings	1	1	2
Staples	7	7	6
Vegetables	2	2	1

Persistent Inflation Analysis

	2023	2024	2025
Dairy Products	2	8	5
Fruits	5	5	1
Luxury / Discretionary	7	7	2
Meat & Fish	4	4	4
Other	3	6	6
Spices & Flavorings	1	2	7
Staples	6	3	3
Vegetables	8	1	8

6.4 Risk Mapping

	High Persistence	Low Persistence
High Volatility	Spices & flavorings	Vegetables
Low Volatility	Staples Dairy Products	Meat & Fish Luxury/Discretionary Others

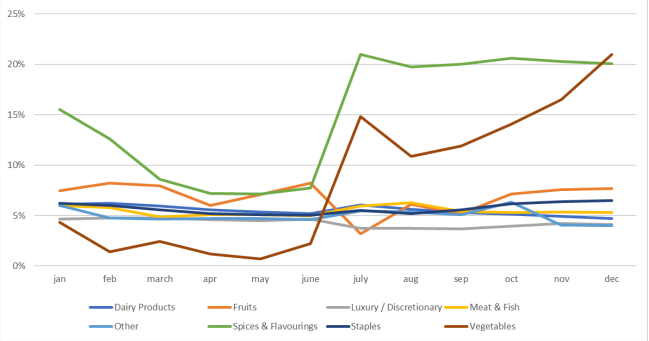
This produces a **4-quadrant map**:

1. **High Volatility & High Persistence (Double Risk):**
   - Categories here are prone to both large swings and prolonged inflation, making them the biggest contributors to uncertainty.
   - Example (2023–24): **Spices** (sharp spikes and sustained double-digit inflation).
2. **High Volatility & Low Persistence (Shock Drivers):**
   - Characterized by frequent swings, but without prolonged inflation. These categories cause temporary stress but tend to normalize.
   - Example: **Vegetables**, with recurring seasonal spikes but eventual deflation.
3. **Low Volatility & High Persistence (Inflation Anchors):**
   - Stable but consistently elevated inflation, often linked to structural or demand-side issues. These categories quietly keep headline inflation higher.
   - Example: **Staples** and **Dairy** (steady mid-single-digit inflation).
4. **Low Volatility & Low Persistence (Low Risk):**
   - Stable and generally benign price movements, contributing little to overall inflation volatility.
   - Example: **Luxury/Discretionary** and **Meat & Fish, Others**.

7. Seasonality in Food Inflation

- Food inflation in India often spikes in predictable periods -e.g., onions in Aug–Oct, tomatoes in June–July, fruits in summer.
- Seasonality helps distinguish **structural inflation** (policy/market failures) from **predictable, cyclical patterns**.
- Policymakers use this to time interventions (buffer stock release, export bans, etc.).

We calculated average monthly CPI patterns to identify months and categories with repeated spikes.



Seasonal pattern across categories in YoY

Key seasonal patterns observed

1. **January – March (Winter to Early Summer)**
    - Prices are relatively steady across most food categories.
    - Perishables like vegetables and fruits are affordable, with good supply from winter harvests.
    - Items like spices and dairy stay expensive, largely due to high input and production costs.
2. **April – June (Summer / Pre-Monsoon)**
    - Summer harvests bring relief in fruits and vegetables — prices dip or stabilize.
    - Structural inflation continues in dairy and spices, but without sharp movement.
    - This period is generally calm, with good availability and manageable prices.
3. **July – September (Monsoon Season)**
    - Heavy rains disrupt supply chains, especially for vegetables — prices shoot up.
    - Spices also see sharp increases, as harvesting and transport are affected.
    - Fruits become more unpredictable, with some varieties going up in price and others easing.
4. **October – December (Post-Monsoon to Winter)**
    - Vegetable prices stay high, partly due to crop damage and seasonal demand.
    - Spices remain expensive, with tight supplies and festive demand pushing them up.
    - Some stability returns by late December as winter harvests begin reaching markets.

Note : This analysis uses three years of data (2023–2025) to highlight recent seasonal trends and supply/demand-driven spikes. While indicative of typical seasonal behaviors, longer-term data (5–10 years) would provide a more robust view of recurring patterns.

8. Correlation Analysis

The overall objective of this step is to understand how different food categories move together, and which are the main drivers of overall inflation. We calculated Pearson correlation coefficients for monthly inflation rates of each category (2023-2025)

	Dairy Products	Fruits	Luxury / Discretionary	Meat & Fish	Other	Spices & Flavourings	Staples	Vegetables
Dairy Products	1.00	-0.49	0.15	0.02	0.29	0.58	-0.78	-0.48
Fruits	-0.49	1.00	0.60	-0.41	-0.28	-0.63	0.32	-0.09
Luxury / Discretior	0.15	0.60	1.00	-0.42	-0.20	-0.55	-0.14	-0.58
Meat & Fish	0.02	-0.41	-0.42	1.00	0.54	0.21	0.31	0.35
Other	0.29	-0.28	-0.20	0.54	1.00	0.37	-0.07	0.24
Spices & Flavourin	0.58	-0.63	-0.55	0.21	0.37	1.00	-0.52	0.22
Staples	-0.78	0.32	-0.14	0.31	-0.07	-0.52	1.00	0.49
Vegetables	-0.48	-0.09	-0.58	0.35	0.24	0.22	0.49	1.00

Correlation matrix

Key Insights :

1. **Strong Positive Correlations**
   - **Fruits and Luxury/Discretionary items** show a high positive correlation, suggesting these categories often rise together, possibly due to shared demand-side drivers like income effects and seasonal consumption.
   - **Spices and Dairy** are also positively correlated, indicating common exposure to input cost pressures (e.g., fodder, logistics) and weather-sensitive supply chains.
   - **Staples and Vegetables** move together moderately, reflecting their mutual vulnerability to seasonal supply shocks, especially during monsoon and post-monsoon periods.
2. **Strong Negative Correlations**
   - **Staples and Dairy** show a strong inverse relationship, likely due to policy buffers (MSP, PDS) keeping staple prices stable, while dairy remains market-driven and cost-sensitive.
   - **Spices and Fruits**, as well as **Vegetables and Luxury items**, are negatively correlated — suggesting that when prices of essentials spike, discretionary categories often move in the opposite direction, likely due to consumer budget reallocation.
3. **Implications**
   - Categories linked to **core nutrition (e.g., vegetables, staples)** tend to co-move under seasonal and climate pressures.
   - **Discretionary and semi-discretionary** categories like fruits and luxury foods respond more to **demand dynamics**, and often inversely to essentials.
   - These relationships highlight **consumer substitution behavior**, the role of **policy in stabilizing key items**, and the **spillover effects** of inflation across food categories.

9. Consumer Behavior Insights

Drawing insights from Tikariha & Behera (2025) along with our analysis, we can interpret consumer responses as follows :

1. Price sensitivity and Purchase Adjustments
   - High volatility in **vegetables, spices, and fruits** (especially during monsoon or late-season periods) makes consumers more reactive to price changes.
   - Inflation amplifies this effect: consumers reduce purchase frequency, buy smaller pack sizes, or substitute with cheaper alternatives, mirroring the 58–60% reductions seen in the study.
   - Categories with **low volatility, like staples**, show more stable demand; consumers prioritize these essentials even under price stress.
2. **Substitution & Brand Switching Patterns**
   - Negative correlations between **staples and discretionary/luxury categories** suggest that when prices rise in non-essential items, consumers shift toward cheaper or private-label alternatives (about 60% as seen in the study) without impacting core staples.

- Similarly, dairy and spice correlations indicate that **linked categories may experience joint switching**—for example, if spice prices spike, consumers may also adjust purchasing of related condiments or flavorings.

3. **Impact of Seasonality on Consumer Behavior**
   - Seasonal price spikes (monsoon disruptions in vegetables, post-monsoon spikes in spices) trigger **opportunistic buying** and substitution.
   - Early-season surpluses (winter harvest in fruits/vegetables) encourage stockpiling and larger pack purchases, while late-season scarcity drives selective spending.
4. **Promotional Reliance & Value-Seeking Behavior**
   - About 60-70% of consumers often look for discounts, cashback, and combo packs to offset inflation, particularly in **moderately volatile categories** like dairy and packaged snacks.
5. **Income-Segment Differentiation**
   - Low and middle income groups are most sensitive to volatility and price changes, often switching brands or substituting across correlated categories.
   - High-income segments show selective reductions in discretionary spending but maintain loyalty to staples and premium brands, consistent with both our correlation and volatility insights.
6. **Analytical, Opportunistic Consumer Mindset**
   - Consumers actively **compare prices across correlated categories** and adjust purchasing behavior strategically.
   - High correlation clusters (like meat & fish with “other” essentials) can predict joint purchase behavior under inflation, enabling brands to anticipate consumer shifts and optimize stock, pricing, and promotions.

10. Strategies for Retailers and FMGC Brands

10.1 Existing Strategies, Effectiveness and Gaps

Existing Strategy	Why It Does/ Doesn’t Work	Evidence / Insight
Smaller Pack Sizes	Works to keep products affordable. However, consumers may feel value is reduced.	25% of respondents in the paper shifted to smaller pack sizes; still 60% reduced purchase volume, showing partial effectiveness.
Promotional Offers & Discounts	Drives purchases during inflation, works for price-sensitive consumers.	76% of respondents actively seek discounts; cashback and combo offers are more effective than flat discounts.
Private Label / Value Brands	Captures price-sensitive segments but risks brand dilution for premium brands.	58% switched to lower-cost alternatives; 74% substituted branded items with cheaper alternatives at least occasionally.
Loyalty Programs	Encourages repeat purchases but often generic, not inflation-sensitive.	Consumers still show high brand switching (62%) during price hikes, indicating loyalty programs are not fully effective.
Digital Commerce / Quick Commerce Channels	Expands reach and convenience, especially in urban areas.	Online FMCG sales growing, but rural consumers less integrated into these channels, limiting coverage.

Existing Strategy	Why It Does/ Doesn't Work	Evidence / Insight
Tiered Pricing / Regional Pricing	Partially applied, but not dynamic or predictive enough; lacks clear communication to consumers.	Middle and low income groups show highest price sensitivity; 85% notice price increases.

10.2 Recommedations / Modifications

1. **Micro-SKUs & Pack Sizes**
   - Introduce smaller pack sizes for staples like oil, ghee, and spices to make them more affordable.
   - Launch mid-sized "bridge packs" (e.g., 750ml oil) to give shoppers flexible options.
   - Pair small packs with combo offers or cashback to reinforce value without relying on heavy discounts.
2. **Event-timed Promotions**
   - Align promotions with predictable consumer spending periods (e.g., monsoon for sauces, post-harvest for spices).
   - Emphasize messaging that highlights "value per pack" instead of flat price cuts.
   - Time promotions to feel relevant, which increases consumer engagement and conversion.
3. **Forward Contracts & Dual Formulations**
   - Secure raw materials in advance using forward contracts to manage cost volatility.
   - Use dual formulations (e.g., oil blends) to maintain quality while adjusting for price changes.
   - Communicate these measures to consumers to build trust in pricing decisions.
4. **Value Lines & Occasion Kits**
   - Launch budget-friendly product lines (e.g., value spice blends or fortified oils) for price-conscious buyers.
   - Create seasonal kits (e.g., paste + canned tomato + masala) for festive or regular cooking needs.
   - Differentiate these clearly from premium SKUs to protect brand image and avoid cannibalization.
5. **Transparent Communication**
   - Share clear reasons for price changes (e.g., raw material cost rises, import duties).
   - Highlight that products still offer strong value despite inflation.
   - Builds credibility, especially with middle-income consumers (₹20,000–₹40,000/month) who are most price-sensitive.
6. **Private Labels & Assortment Elasticity (Retailers)**
   - Offer tiered product ranges across categories—economy, mid-range, and premium.
   - Expand private label offerings for staples like flour, dal, and spices to capture down-trading shoppers.
   - Helps retain customers shifting to lower price points while keeping aspirational options for premium buyers.
7. **Dynamic Inventory & Endcaps**
   - Offer substitutes for high-cost fresh ingredients (e.g., tomato puree when fresh tomatoes are expensive).
   - Highlight these alternatives on endcaps and signage.

- Supports basket value retention even when shoppers reduce trip frequency (e.g., 52% of consumers).

8. **EDLP (Everyday Low Pricing) & Bundles**
    - Maintain stable pricing on key everyday items to build shopper trust.
    - Offer smart bundles (e.g., atta + oil + dal) paired with cashback or value-based offers.
    - Encourages larger basket sizes and repeat visits, especially for essentials.
9. **App Nudges & Digital Cross-Sell**
    - Use app notifications or in-cart suggestions to promote lower-cost or value options.
    - Personalize nudges based on previous purchase behavior to make them more relevant.
    - Guides budget-conscious shoppers toward affordable options while maintaining revenue.

10.3 Implementation and Monitoring Strategies

1.Phased Rollout

- Start with a few high-impact SKUs or regions to test smaller pack sizes, combo offers, or app nudges.
- Measure customer response and adjust before scaling nationwide.

2. Data-Driven Decision Making

- Track sales data, basket size, and trip frequency pre- and post-implementation.
- Use app analytics or loyalty programs to monitor adoption of new promotions, bundles, and value packs.

3. Consumer Feedback Loops

- Collect feedback via surveys, in-store QR codes, or app prompts on new packs, bundles, and promotions.
- Use insights to refine pack sizes, promotion timing, and messaging.

4. Marketing & Communication

- Clearly communicate value and reasons for price changes through packaging, social media, and in-store displays.
- Highlight affordability, nutritional benefits, or festival relevance to strengthen perception of value.

5. Supplier & Inventory Management

- Co-ordinate with suppliers for forward contracts and dual formulations to maintain consistent supply.
- Implement inventory dashboards for retailers to track high-inflation items and recommended substitutions.

6. Key Performance Indicators (KPIs)

- Sales volume, revenue, and basket size for targeted SKUs.
- Brand loyalty and private label adoption rates.
- App engagement metrics (click-through, offer redemption).
- Frequency of trips and substitution behavior.

7. Iterative Improvement

- Evaluate results monthly/quarterly.
- Scale strategies that work; modify or replace underperforming tactics.

11. Conclusion and Key Takeaways

This study provides a comprehensive view of how inflation affects consumer behavior in the FMCG sector. Our **seasonal analysis** highlighted predictable periods of price spikes in categories like vegetables, spices, and oils, indicating opportunities for event-timed promotions. The **volatility assessment** identified categories such as fresh produce and certain staples as highly sensitive to market fluctuations, while **persistent inflation trends** in packaged foods and hygiene products showed steady price increases affecting long-term consumer choices.

Through **correlation analysis**, we observed that income levels and purchase frequency strongly influence brand switching and substitution behavior, with middle-income households exhibiting the highest price sensitivity. **Trend analysis across categories** revealed that essentials like oil and dal maintain steady demand despite inflation, whereas non-essentials (snacks, cosmetics) see sharper reductions in purchase volume.

Consumer insights, supported by Tikariha & Behera (2025), confirmed a shift toward value-for-money products, private labels, and smaller pack sizes, with 62% of consumers switching brands and over 50% reducing purchase frequency. Current strategies such as cashback, combo offers, EDLP, and micro-SKUs partially mitigate these effects, but our analysis shows additional opportunities for **dynamic pricing, personalized digital nudges, transparent communication, and innovative value-focused products** tailored to Indian consumption patterns.

Overall, the combined insights from **seasonal trends, volatility, persistent inflation, correlation patterns, category-specific behavior, and consumer surveys** provide a robust framework for FMCG brands and retailers to protect market share, maintain engagement, and support consumers during inflationary periods.

12. Future Research and Limitations

1. **Data Limitations**
    - Limited granularity in regional price data for some categories.
    - Missing or inconsistent historical records for certain micro-SKUs and private label products.
2. **Consumer Insights Gaps**
    - Behavioral analysis primarily based on surveys; real-time purchase data could refine insights.
    - Limited segmentation by age, household size, or urban/rural split.
3. **Temporal Constraints**
    - Short observation period for some high-volatility categories may not capture long-term trends.
    - Seasonal and festival effects could differ year-to-year, affecting generalizability.
4. **Scope Limitations**
    - Focused on FMCG and retail, other categories (like electronics, apparel) not analyzed.
    - Didn’t explore supply chain shocks or policy changes in detail, which can impact prices and promotions.

Future Research Opportunities

- Incorporate real-time POS and e-commerce transaction data for finer granularity.
- Study cross-category substitution and basket-level price elasticity more deeply.
- Examine long-term effectiveness of dynamic pricing, digital nudges, and personalized promotions.
- Extend analysis to regional, urban-rural, and socio-economic segments for more tailored strategies.