

Not on **TOP** of it

Climate shocks apart, demand-supply mismatches cause price spikes in veggies led by **t**omato, **o**nion and **p**otato

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Three key takes

- **Vegetable inflation in India has been trending up**, with more frequent price spikes in recent years. In fact, vegetable inflation also has been the most volatile in the food category. The inflation volatility is bad for consumers and farmers, and also distracts policymakers in the short term, forcing frequent and repeated price smoothening measures.
- **Demand for vegetables has outpaced supply**. Population growth and demographic transition, income growth and the changing dietary preferences that come with it are some structural factors behind the surge in demand. While vegetable production — including per capita production — has grown, it has not kept pace with the surge in demand.
- Apart from losses due to weather disturbances and pest attacks, post-harvest wastages during storage and transportation further cut the stock available in the market. **Unfavourable risk-reward dynamics and price uncertainty also disincentivise vegetable growers.**

Food inflation is back to haunt the Indian economy. After staying low in the June 2023 quarter, the hump in the September quarter (mainly due to higher vegetable and foodgrain inflation) and an uneven monsoon has changed India's inflation narrative for this fiscal.

But this is not the first time a vegetable price spike has driven up food inflation. Vegetables have 15.5% weight in the food index, which is the highest after cereals and milk, and remains the most volatile component.

Besides, such spikes are frequent in India. The last time it lasted long (in double digits for seven months) was in fiscal 2020 such that the annual average vegetable inflation surged to 21.3%, taking up average food inflation to 6.7%. And back to double digits between March and September 2022, averaging 15%.

But a repeat this fiscal is unlikely.

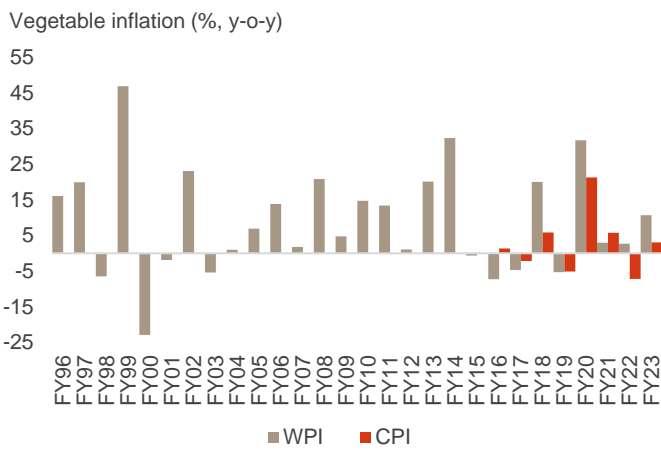
The good news is vegetable price pressure has abated as inflation fell from its peak of 37.4% in July to 3.4% in September with fresh supplies entering the market. Prices of tomatoes (which was a major driving force) and of several other vegetables fell sharply by September. Onion prices, though, remain a pressure point.

The not-so-good news is that vegetable prices can surge afresh.



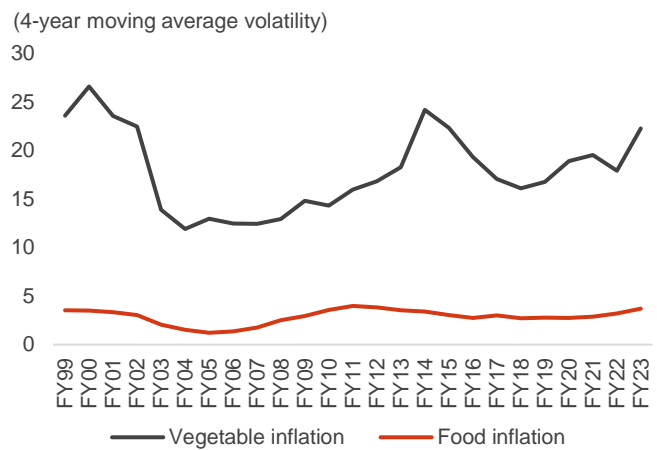
Long-term trends underscore role of high and volatile vegetable inflation

Chart 1: Vegetable inflation has been very volatile in the past 30 years



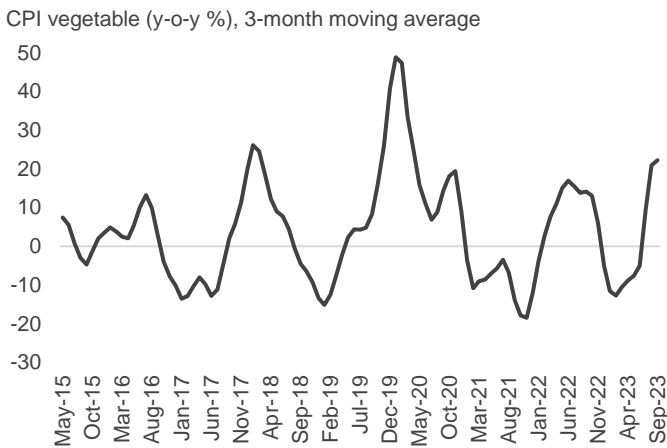
Note: WPI inflation rates for different base years have been used as a combined series

Chart 2: Vegetable inflation volatility remains much higher than food inflation



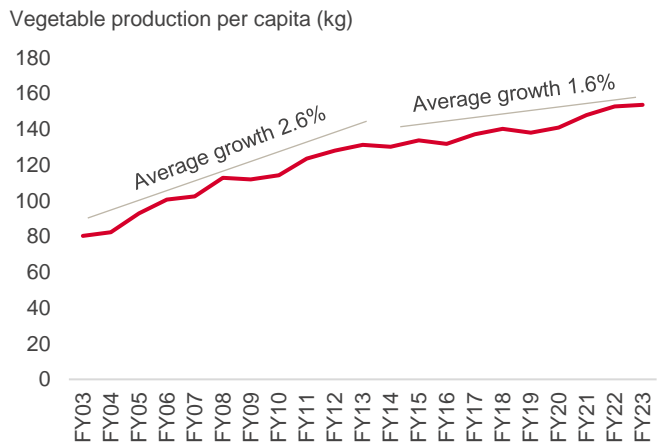
Note: WPI is depicted here since CPI data is not available for this period. Inflation volatility, measured by standard deviation, in both series is similar for recent years

Chart 3: Cobweb influence on vegetable inflation peaks and troughs is evident



Note: FY23 data on vegetable production is a first advance estimate

Chart 4: Per capita vegetable production is on an uptrend, but rising at a slower pace



Source: Ministry of Commerce and Industry (Office of Economic Advisor), National Statistical Office (NSO), CEIC, CRISIL

What the data shows for recent years

1. **Vegetable inflation has trended up in the past four years.** CPI vegetables inflation averaged 5.7% during fiscals 2020 to 2023. It averaged 0% during fiscals 2016 to 2019, with interim periods of sharp deflation and steep inflation, mostly led by weather shocks. In comparison, average food inflation rose to 6.2% during fiscals 2020 to 2023 from 2.8% between fiscals 2016 and 2019.
2. **The frequency of vegetable price spikes has increased.** In the past 100 months, CPI vegetable inflation was above its period average of 3.8% in 49 months. It was above 7% in 35 months, above 10% in 30 months and above 20% in 13 months.
3. **Volatility in vegetable inflation has increased.** Measured by standard deviation, volatility in vegetable inflation, which was already high at 11.1 during fiscals 2016 to 2019, rose to 17.3 during fiscals 2020 to 2023. Food inflation volatility during the periods was much lower, at 2.9 and 3.4, respectively.

Table 1: Recent trends in vegetable inflation

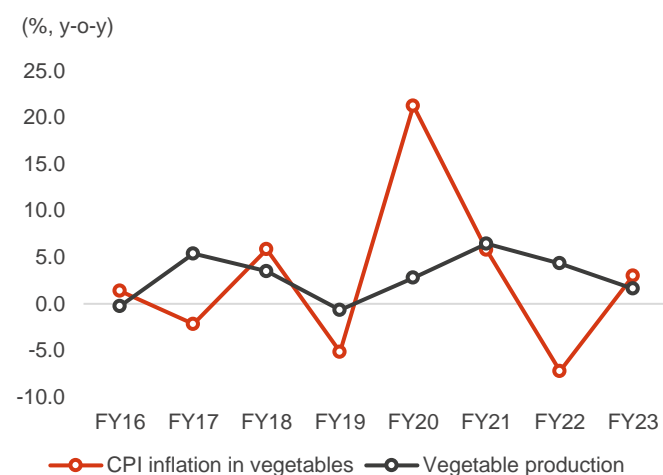
	Average CPI inflation rate (% , y-o-y)	Inflation volatility (measured by standard deviation)
FY16-19	0.0	11.1
FY20-23	5.7	17.3

Source: NSO, CRISIL

What ails vegetables in India?

- High volatility in production and prices
- Supply-demand mismatches

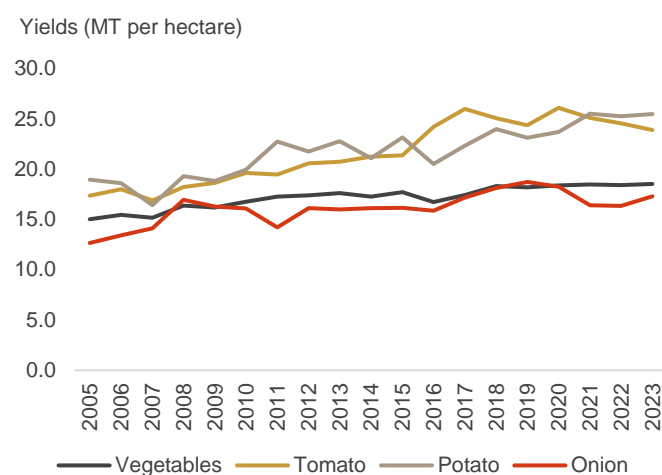
Chart 5: Prices much more volatile than production



Note: FY23 data on vegetable production and area are first advance estimate

Source: NSO, Ministry of Agriculture and Farmers Welfare, CEIC, CRISIL

Chart 6: Yields have stagnated as tomato and onion yields dropped



High volatility in production and prices

In India, both vegetable production and prices have been volatile (Chart 5), the latter exhibiting higher volatility driven by adverse weather events and demand-supply mismatches.

The production and prices of vegetables is difficult to predict. Vegetables are grown throughout the year, are more vulnerable to weather shocks and pest attacks, and have no price signalling mechanism (such as minimum support price) or any assured offtake by the government. This is unlike cereals and pulses which are cultivated during two major cropping seasons and have more predictability regarding production and prices.

The lack of price predictability in such a highly volatile and heavy-weight food component brings a large degree of uncertainty to inflation forecasting and requires detailed probing on the factors that drive it.

Several studies¹ have pointed at the dominant role of weather shocks in influencing vegetable production and price spikes. But we believe that demand outpacing supply is also a big factor, keeping prices on the edge.

Supply-demand mismatches

Globally, India ranks high in the production of vegetables, second only to China. But while production has been high, growth has slowed in recent years and falls short — *as government estimates suggest* — of demand.

Demand, on the other hand, is surging because of population growth and demographic transition, higher incomes and changing dietary preferences.

¹ July 2023, Das R and Roy R, 'Unseasonal rainfall and price rise in horticulture crops', Climate-Proofing Agriculture, ICRIER Volume-3, Issue-1; November 2022, Kishore V and Shekhar H, 'Extreme Weather Events and Vegetable Inflation in India', Economic and Political Weekly

In fact, estimates from a Niti Aayog study² highlight the large gaps in supply and demand of vegetables. Demand, here, is not equated with consumption under the assumption that consumption would be lower and based on final availability. For instance, for 2016-17, the estimated demand-supply gap was 4.2 million tonne — that is, actual supply was ~2% short of estimated demand. Beyond that, comparing actual supply with demand forecasts as per the report suggests the gap has only widened.

Supply constrained by slower growth in production, stagnant yields, wastages and losses

- *Slower production growth and stagnant yields:* Vegetable acreage and production (data for 2022-23 is as per first advance estimates) have been rising in absolute terms, but the growth has slowed and yields have stagnated. After a surge in vegetable production in the 2000s, aided by government support through the National Horticulture Mission 2005-06, average per-year production growth dropped to 2.8% in the past decade (on 6.8% in the preceding one). A larger base, plus the impact of more frequent and intense weather shocks, have slowed production growth.

Yields have stagnated, led by a drop in yields of key crops such as tomato and onion (Chart 6). Moreover, yields in India remain much lower than the global levels. As per the Report³ on the Committee for Doubling Farmers’ Income (December 2017), India’s vegetable yield is ~18 metric tonne per hectare, compared with 39.3 in Spain, 32.5 in the US, 27.3 in Italy and above 19 in Brazil and Mexico.

- *Losses and wastages:* Total losses on account of harvesting, packaging, transporting, storage and marketing remain significant and high, in the range of ~4.9% to ~11.6% for various vegetables as per the NABCONS (2022) study⁴. Such losses put further pressure on supply and availability of vegetables for final sale and consumption. Given the perishable nature, losses are higher for vegetables compared with foodgrains, with losses for tomato, onion and potato (TOP) at 10.1%-13.1%, 7.1%-7.5% and 6.0%, respectively. That said, losses have reduced somewhat in recent years. A CRISIL study had estimated that for every 100 kgs of tomatoes produced, only 73 kgs reaches the market and the rest is wasted. A good 67% of the wastage is avoidable, according to the study.
- *Low level of food processing also leads to substantial wastage:* As per various estimates⁵, less than 1% of tomatoes and only 6-7% of onions and potatoes produced in India are used for processing, far lower than global standards.

Table 2: Overall total loss estimates in TOP

Category	ICAR CIPHET 2012 (%)	ICAR CIPHET 2015 (%)	NABARD Consultancy Services (NABCONS) 2022 (%)
Tomato	12.0-14.0	12.1-12.8	10.1-13.1
Onion	6.4-8.6	7.9-8.5	7.1-7.5
Potato	7.1-10.9	6.9-7.8	6.0

Note: ICAR CIPHET and NABCONS estimates are comparable over time as they use broadly similar estimation methods

Source: Ministry of Food Processing Industries, CRISIL

² February 2018, ‘Demand & Supply Projections towards 2033, A Working Group Report’, NITI Aayog Chapter I to III (niti.gov.in)

³ December 2017, ‘Report of the Committee for Doubling Farmers’ Income, Volume III Production Enhancement through Productivity Gains’, Committee for Doubling Farmers’ Income, Department of Agriculture, Cooperation and Farmers’ Welfare, Ministry of Agriculture & Farmers’ Welfare

⁴ December 2022, NABCONS, ‘Study to determine post-harvest losses of agri products in India’, Ministry of Food Processing Industries, Government of India. Available at: https://www.mofpi.gov.in/sites/default/files/study_report_of_post_harvest_losses.pdf

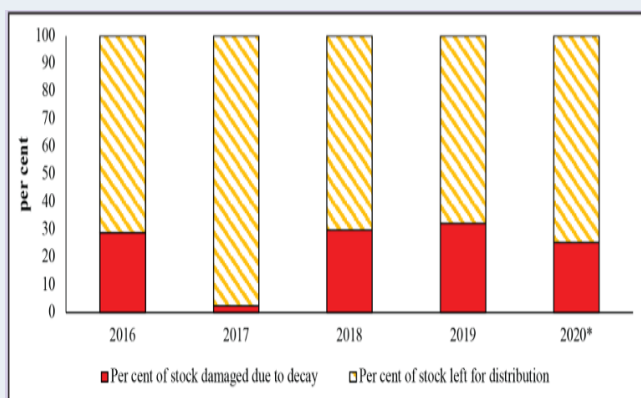
⁵ Pandey, N.K and E.P. Venkatasalam, ‘Potato production in India-an overview,’ ICAR-Central Potato Research Institute; Saxena, R. and R. Kumar, ‘Commodity Profile on Onion’, ICAR-National Institute of Agricultural Economics and Policy Research; Arora, S.K. ‘Status and Trend of Tomato Processing in India’, Agri-India TODAY

At the farm stage, a large proportion of losses (besides harvest losses) occur while sorting and grading, suggesting a need to leverage technology and develop better infrastructure and monitoring systems at this stage.

The data shows some reduction in losses though they remain high. In potato, for instance, increased cold storage could have potentially driven down some losses. This underscores the importance of technological interventions and infrastructure improvements to mitigate losses. This could increase vegetable supply, reducing the shortfall with respect to demand, thus mitigating spikes in inflation.

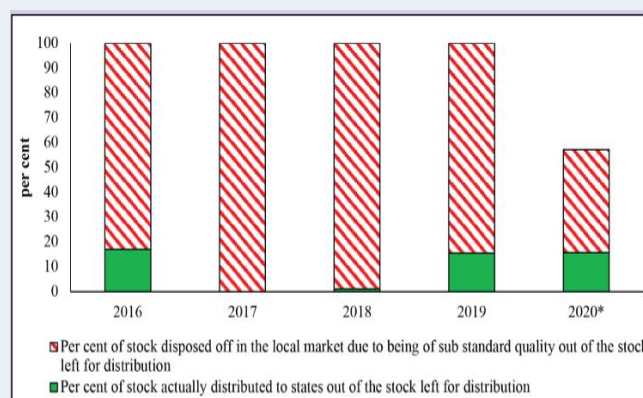
The case of onions: The Economic Survey 2020-21 notes that despite the government's efforts to create a buffer stock for onions, retail prices tend to increase during April to November when there is no fresh stock. This is largely because (unlike in potatoes) much of the stock is stored using traditional methods instead of cold storage, leading to wastage (charts 7 and 8). Wastages are aggravated by adverse weather conditions, such as untimely rainfall and excess moisture.

Chart 7: Onion stock position



Source: Economic Survey 2020-21

Chart 8: Distribution of onion stock



Between fiscals 2003 and 2023, vegetable production grew 2.5 times, while per capita vegetable production, estimated at 154 kg, has risen less than 2 times.

Demand driven by income growth and changing dietary preferences

Studies⁶ show India is experiencing a transition in nutritional requirements, led by higher incomes that facilitate higher consumption of non-cereal (meat, pulses, fruits and vegetables) and processed food items. Calculations by the Australian Bureau of Agricultural and Resource Economics and Sciences predict a 183% increase in vegetable consumption in India between 2009 and 2050, driven by higher income growth in urban households. Demand, thus, has been far outpacing supply. Given the perishable nature of most vegetables, unlike cereals and pulses, imports are not always a feasible option.

⁶ 2019, Pingali, P. et al., 'Transforming Food Systems for a Rising India', Palgrave Studies in Agricultural Economics and Food Policy; 2014, Hamshire, P, et al., 'What India wants: Analysis of India's food demand to 2050', ABARES research report no. 14.16, Canberra

Reasons for price volatility

Given the presence of a supply gap, weather shocks and pest attacks add to the price volatility in the short term.

Fickle weather and frequent pest attacks affect produce

Vegetables are more susceptible to uneven weather compared with foodgrains, various studies indicate.

A study⁷ in the Economic and Political Weekly highlights the role played by extreme weather events – unseasonal, deficient, or excess rain; heatwaves; cyclones; and floods – in causing supply shortages and spikes in vegetable prices in India. It concludes that cyclones, followed by rain deficiency, have the maximum impact.

A study by the Indian Council for Research on International Economic Relations (ICRIER)⁸ shows the link between inflation pressure in vegetables and unseasonal rain in the pre-monsoon period of March-May. Pest attacks that result from unseasonal rain and heatwaves are also a threat to crops, especially those at the harvest stage.

An April 2022 study⁹ by researchers at the Tata-Cornell Institute for Agriculture and Nutrition on tomato harvests in South India found 13.9% of the produce tended to suffer pre-harvest quality loss due to pest attack and disease, in addition to weather distress.

Prevalence of cobweb pattern in the absence of price signalling

Cobweb phenomenon is when price fluctuations in the absence of price signalling mechanisms lead to fluctuations in supply. Farmers base their sowing decisions on price trends in the preceding season. A drop in prices in one season could therefore result in lower sowing and production shortages in the following season, leading to price spikes. Presence of the cobweb phenomenon in vegetables is evident in Chart 3, which shows a uniform pattern of price rise followed by a dip. Take the recent case of tomatoes price spike. The crash in their prices a few months back would have discouraged farmers from growing it. This resulted in less sowing, which leads to a smaller harvest. And the adverse impact of weather and pests that followed hit tomato production hard and flared tomato prices in July-August.

Such a phenomenon is also evident in pulses¹⁰, though this has seen some correction as improved price signalling (through effective minimum support pricing and other government intervention) has helped to tame price spikes.

Risk-reward equation act as disincentive to growers

Slower growth in area under vegetable production in recent years may also be attributed to rising risk amid volatile and lower returns on production.

Rising risk and higher cost of production: Weather shock is the main risk to vegetable production and the frequency of these shocks has been on the rise. At the same time, cost of production (revised C2) has increased sharply in the past few fiscals, driven by rising global prices for fertilisers, insecticides and pesticides, and fuel.

⁷ November 2022, Kishore V and Shekhar H, 'Extreme Weather Events and Vegetable Inflation in India', Economic and Political Weekly

⁸ July 2023, Das, R and Roy, R 'Unseasonal rainfall and price rise in horticulture crops', Climate-Proofing Agriculture, ICRIER Volume-3, Issue-1

⁹ 2022, Tata-Cornell Institute, 'Study Offers Clues for Reducing Food Loss and Waste in Perishable Supply Chains'. Available at: <https://tci.cornell.edu/?news=study-offers-clues-for-reducing-food-loss-and-waste-in-perishable-supply-chains>

¹⁰ July 2023, CRISIL Quicknomics, 'Taking the Pulse; Moving from Volatility to Stability'

Vegetables need more fertiliser and pesticide than foodgrains. Over 80%¹¹ of area under vegetables is treated with fertilisers and 40%¹² is sprayed with pesticides, against which ~75% area under foodgrains is treated with fertilisers and 23% under pulses is sprayed with pesticides. Hence, for a vegetable grower, fertilisers and pesticides usually occupy 5-30%¹³ of variable input costs across vegetable categories.

The cost of producing onions and potatoes increased 12.7% and 10.4%, respectively, on average during 2011-12 to 2020-2021, while that of foodgrains (paddy, wheat, arhar and gram) saw a much lower increase of 5.8-8.9%¹⁴.

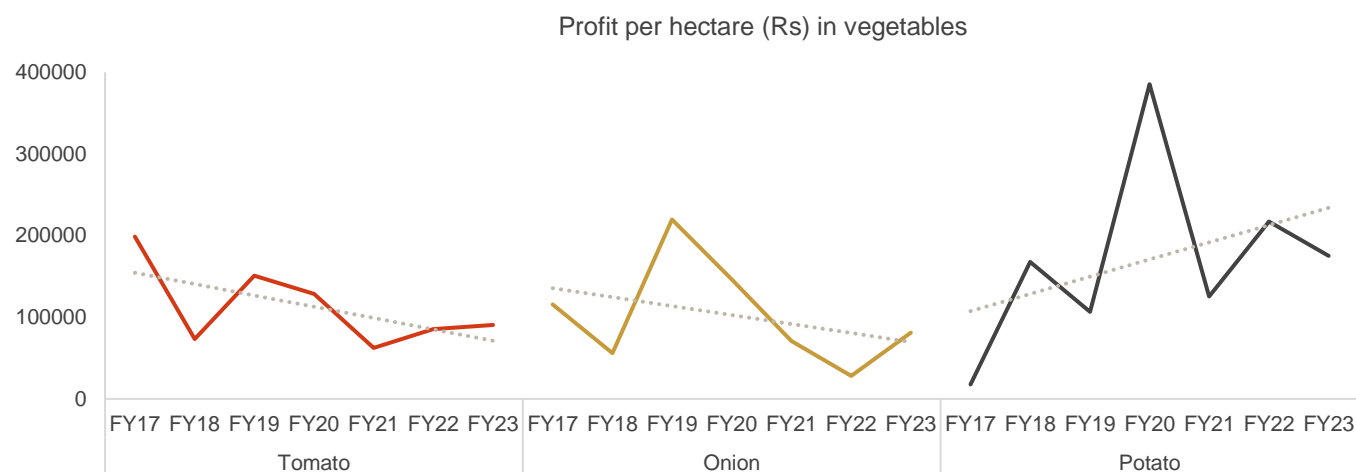
Unfavourable returns to production:

While on an absolute basis, returns (measured by profit per hectare) on vegetable production are higher than on foodgrains, an overall declining trend amid high uncertainty and volatility in returns (Chart 9) makes the risk-reward equation less favourable to vegetable growers.

Absence of a price signalling mechanism or price assurance (akin to minimum support prices for foodgrains) is another disincentive. Meanwhile, returns to foodgrain growers have been either stable or trending up, supported by fewer losses, smaller increases in cost of cultivation, price assurance via minimum support prices and sale assurance due to increasing government procurement over time.

In addition, the Indian government often restricts exports to curb price spikes of TOP by ensuring supply remains within India. While this may be a temporary measure for mitigating the impact of supply shocks, it can lead to income losses for farmers. A recent study by the Centre for Civil Society¹⁵ finds an average farmer suffered losses of \$115.78 per year (21% of their yearly income) due to export bans on onion from January 2015 to March 2020.

Chart 9: Returns for vegetable growers on a broad declining trend



Source: CRISIL MI&A

¹¹ Estimate for 2016-17 as per Fertilizer Statistics 2021-22, The Fertilizer Association of India

¹² 2018, Koli, P and Bhardwaj, N R, 'Status and use of pesticides in forage crops in India', Journal of Pesticide Science

¹³ 2020, Rashmi et al, 'Economic Analysis of Vegetable Production in Nagrota Bagwan Block of Kangra District of Himachal Pradesh', Int.J.Curr.Microbiol.App.Sci. 9(03): 376-382. doi: <https://doi.org/10.20546/ijcmas.2020.903.044>

¹⁴ Directorate of Economics and Statistics, Department of Agriculture and Farmers' Welfare. Note that the annual cost of production for each crop has been arrived at by taking simple averages of state-wise costs

¹⁵ 2022, 'Peeling the Layers: A look at the impact of trade restrictions on onion farmers', Centre for Civil Society

Three TOP inflation trends

- First, tomatoes, onions and potatoes are the most consumed vegetables in India and make up more than a third of the CPI vegetables category. Hence, any sharp movement in TOP prices influences the movement in CPI vegetables inflation. For instance, during fiscals 2020-2023, vegetable inflation surged to 5.7% from nil in the preceding four fiscals, driven by a sharp rise in TOP inflation to 9.1% (Chart 10). Non-TOP vegetable inflation was 4.8%
- Second, a steady climb in TOP inflation has kept vegetable inflation high over time. Non-TOP, in contrast, has mildly trended down (Chart 11)
- Third, volatility in TOP inflation remains significantly high, and much above the overall vegetables category. In a recent study published in the RBI monthly bulletin¹⁶, the Development Research Group notes: “Although TOP forms a small part of the CPI basket, the volatility in headline inflation is significantly driven by the volatility in TOP”.

TOP swings the food inflation basket

Table 3: Comparing inflation volatility

Inflation volatility (Standard deviation)	TOP	Vegetables	Food
FY16-19	23.7	11.1	2.9
FY20-23	35.1	17.3	3.4
FY16-FY23	30.0	14.8	3.6

Chart 10: TOP driving higher inflation in vegetables

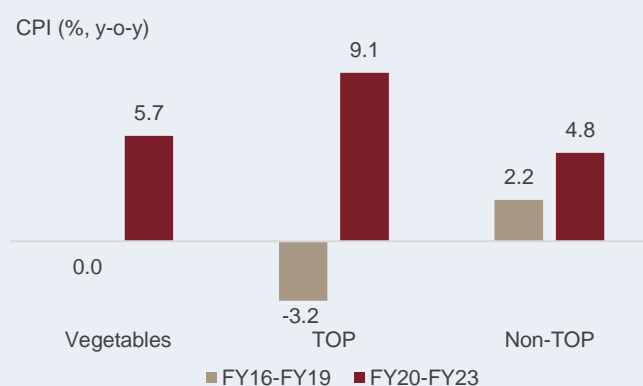
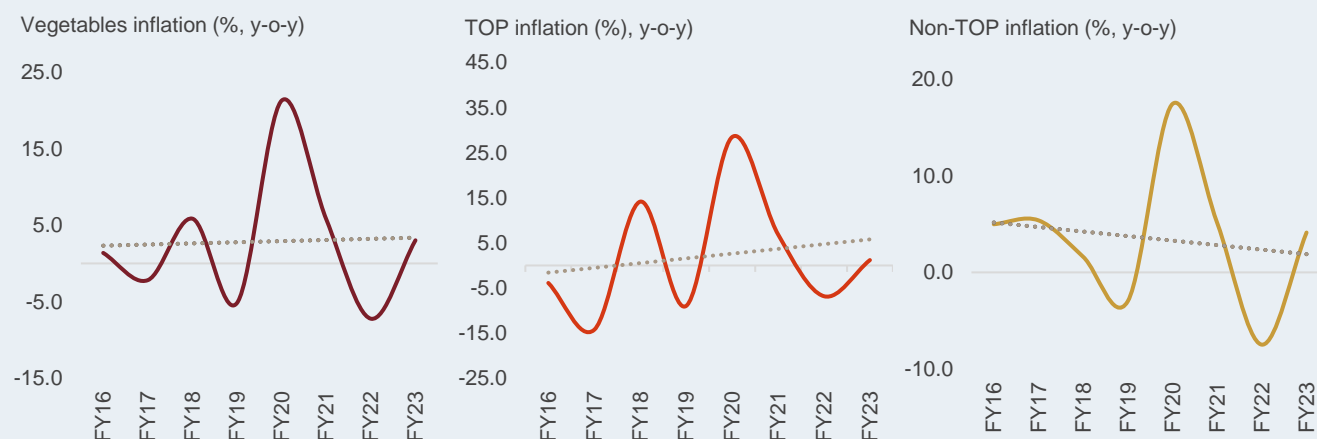


Chart 11: TOP inflation has trended up, keeping vegetables inflation elevated



Source: NSO, CEIC, CRISIL

TOP inflation hit a peak of 132% in December 2019, led by sky-high onion prices as unseasonal and prolonged rains led to poor onion harvest. In July 2023, TOP inflation shot up once again, this time to 52.6% due to tomato prices.

Interestingly, the sharpest drop in vegetable production growth in recent years is seen in the TOP category. Over the past decade (fiscals 2014-2023), TOP production growth slowed to 3.4% from 8.9% in the preceding decade. For the remaining vegetables, production growth slackened at a slower pace of 2.2% from 5.3%.

Implications of price volatility in vegetables

- **On policy:** Inflation shocks due to vegetable price spikes can distract policy in the short term as projections go haywire. Though transient (since vegetables are short-duration crops), the uncertainty on the extent and duration of the spike can bring hawkishness to inflation-targeting monetary policy. For instance, in the recent occurrence, first tomatoes, then onion prices firmed up while other vegetable prices also simmered. This spike has bumped up inflation in the second quarter and, in part, in the third quarter of this fiscal. Moreover, since these spikes were caused by supply-side factors, fiscal policy needs to be on its toes in trying to mitigate price rise even though monetary policy remains vigilant
- **On consumers:** Since vegetables are essential and high-frequency-purchase items across rural and urban areas, a surge in their prices can distort household budget; keep inflation expectations high; and dent purchasing power for discretionary items
- **On farmers:** Uncertainty on prices amid absence of price signalling affects production decisions. Production of vegetables can, as a result, fall prey to a cobweb pattern wherein prices in one cropping season guide sowing decisions in the following season. A drop in prices in one season could therefore result in production shortages in the following season, leading to price spikes and volatility

Policy imperatives

We highlight three areas that call for policy actions to improve supply and reduce volatility in vegetable prices.

- **Improving productivity to enhance yields and incomes:** Vegetable production in India needs improved efficiency and productivity that can enhance profitability, reduce risks, and ensure steady and gradual growth in the income of growers. Experts suggest a variety of techniques to improve productivity of vegetable crops.

One such is to adopt a hybrid technology that can revolutionise the production of vegetable crops. Demand for hybrid seeds is continuously increasing and hybrids of tomato, chilli, cucumber and muskmelon are being produced at several locations in the country. The Indian Council of Agricultural Research¹⁷ has so far recommended the cultivation of more than 50 hybrids. At present, the area under vegetable hybrids accounts for just 10% of the total area. Adoption of hybrid varieties is said to potentially increase yields by 1.5-3 times, which would convert into higher income from the same cropped area.

Separately, ICRIER (in the aforementioned study) prescribes promotion of polyhouse cultivation for tomatoes and perishable vegetables to ensure supply during adverse weather conditions.

¹⁶2023, Padhi P, Shekhar H and Handa A, 'Anatomy of Price Volatility Transmission in Indian Vegetables Market'.

¹⁷ 2019, De, L.Cl. et al., 'Agri-Horticultural Interventions for Doubling of Farmer's Income', International Journal of Current Microbiology and Applied Sciences

Backed by government incentives, there is also scope for private sector investment in research and development to create high-yielding, and climate- and disease-resistant crop/seed varieties. A 2018 study¹⁸ found that India spent only 0.54% of agriculture gross value added on agriculture research and education for the year (2014-15) against the 2% public investment for the same recommended by the World Bank. While India's agricultural research and development spend since increased to 0.62% in 2017-18¹⁹, it continued to remain below the recommended World Bank level.

Separately, the government can also implement or facilitate capacity-building programmes for farmers to train them for these advanced techniques.

- **Improving post-harvest infrastructure to cut losses:** Improving the efficiency of supply chains can reduce losses that occur during cold storage, transportation, and marketing. Significantly increasing food processing to meet demand during supply glut can also cut post-harvest losses.

Cold storage is an effective way to increase the shelf life of food and avoid losses. Providing access to cold storage facilities in vegetable-producing districts can help reduce spoilage and allow the government to store vegetables for times when supply is hit. The Integrated Cold Chain and Value Addition Infrastructure scheme, operational since 2008, is a step in the right direction²⁰. However, a 2021 study by NABARD researchers estimated about three quarters of cold storage facilities in India are used for storing potatoes, indicating a need to expand storage capacities for other vegetables such as onions. Storage capacity is also relatively concentrated in a few states²¹.

Reducing losses during key stages such as sorting/grading and transport is also critical. As mentioned earlier, a large proportion of losses occur during sorting/grading at the farm level itself, highlighting the need to leverage better techniques during this stage. The FAO found the use of plastic crates for transportation instead of sacks reduced losses of tomatoes by 87%.²²

Increasing processing of vegetables will also help mitigate post-harvest wastage and price volatility by enabling storage. As highlighted earlier, the level of vegetable processing in India is relatively low, though there have been recent efforts to increase processing capacity. While the Mega Food Parks scheme under the Kisan SAMPADA Yojana has now been discontinued, it has resulted in the creation of 24 Mega Food Parks wherein farmers, processors and retailers are brought together via the provision of end-to-end infrastructure (collection centres, cold chain, processing units)²³. Policy push such as the provision of 100% foreign direct investment and incentives under the Performance-Linked Incentive scheme are also likely to benefit the overall food processing sector. In order to facilitate a change in consumer attitudes towards processed vegetables, research must also be conducted on retaining nutrients during processing. As per the ICRIER report, at least 10% of the produced tomatoes need to be processed into paste/puree to cater to demand where there is shortage of fresh produce. This is also applicable to ginger and garlic.

¹⁸ 2018, Gulati et al., 'Agriculture Extension System in India: Review of Current Status, Trends and the Way Forward', ICRIER. Available at: <https://icrier.org/pdf/Agriculture-Extension-System-in-India-2018.pdf>

¹⁹ 2021, Press Bureau of India, Ministry of Agriculture & Farmers Welfare, 'Research and Development (R&D) in Agriculture Sector. Available at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1695626#:~:text=The%20public%20spending%20on%20agricultural,about%200.62%25%20a t%20current%20prices.>

²⁰ Ministry of Food Processing Industries, Cold Chain Scheme (PM Kisan SAMPADA Yojana), Available at: <https://www.mofpi.gov.in/Schemes/cold-chain>

²¹ Sep- Dec 2021, Tiwari, A., Afroz S.B., Kumar, V, 'Market Vulnerabilities and Potential of Horticulture Crops in India: With special reference to TOP crops', Ind. Jour. Agril. Mktg., 35(3). Available at: <https://www.nabard.org/auth/writereaddata/tender/2709225958market-vulnerabilities-and-potential.pdf>

²² 2019, 'The State of Food and Agriculture: Moving forward on food loss and waste reduction', Food and Agriculture Organization

²³ Ministry of Food Processing Industries, Mega Food Park Scheme. Available at: <https://www.mofpi.gov.in/Schemes/mega-food-parks>

- **Policy intervention to tame price spikes and volatility:** Operation Greens, a project under the Ministry of Food Processing Industries, aims to stabilise supply of vegetables by the creation of farmgate infrastructure, development of agri-logistics, creation of storage capacity-linking consumption centres, and increasing food processing capabilities; these are long-term intervention measures. In the short term, by providing subsidy on transportation and hiring storage facilities for TOPs, the scheme aims to reduce post-harvest losses and protect growers from making distress sales. What started as an annual budgetary allocation of Rs 500 crore in 2019 for the TOP category saw expanded coverage to 22 perishable crops and an increased annual allocation to Rs 214 crore in the 2024 budget. However, the scheme is underway and will take some time to bear fruit.

Meanwhile, the government is likely to short-term measures such as restricting hoarding (especially of onions), facilitating imports, and selling subsidised vegetables to ease price spikes.

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