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Extreme Heat and Food Price Inflation in The United Arab Emirates

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ABSTRACT

The UAE is one of the world's hottest countries and imports more than 90% of the food consumed by its population. This study asks a simple question: when UAE summers become more extreme, do food prices increase? To answer this, annual temperature records and annual food price inflation data for the UAE from 2013 to 2025 were collected and compared using straightforward statistical tools - averages, percentage changes, year-on-year comparisons, and the Pearson correlation coefficient. The results show a consistent positive relationship between hotter years and higher food inflation. Years in which average maximum temperatures were at least 0.5°C above the long-term baseline experienced average food inflation of 2.9%, compared to 2.3% in cooler years - a difference of approximately 26%. The Pearson correlation between annual maximum temperature and annual food inflation across the 13-year dataset is r = +0.61, indicating a moderately strong positive relationship. The paper also identifies five mechanisms through which extreme heat may contribute to rising food prices and concludes with three practical policy recommendations for the UAE government. All analysis was conducted in Microsoft Excel using publicly available data.

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1. Introduction

On May 24, 2025, the temperature in Sweihan, a town about an hour's drive from Abu Dhabi, reached 51.6°C. Two months later, on August 1, the same area recorded 51.8°C, the highest temperature anywhere in the UAE since 2021 and just 0.3 degrees below the all-time national record (Reuters, 2025). The UAE's National Center of Meteorology confirmed that 2025 had the country's hottest April, hottest May, and hottest spring since records began (Vasundharadevi, 2025b). Scientists at Khalifa University described the heat low developing in May 2025 as resembling a July month, not May - conditions that were genuinely unprecedented for that time of year (Bardsley, 2025).

For residents of Abu Dhabi and Dubai, the record-breaking temperatures were impossible to ignore. What is less obvious, but equally important, is that extreme heat also exerts upward pressure on food prices. The UAE's near-total dependence on imported food means its supply chains are exposed to heat-driven disruptions at multiple points - from refrigerated transport systems operating at capacity limits, to agricultural exporters in South Asia facing simultaneous climate stress. These connections between climate change, supply chain vulnerability, and food inflation are well-documented in the global literature, but have received little focused attention in the UAE context.

This study investigates whether the relationship between UAE heat and food prices is consistent and measurable across time. Using 13 years of publicly available data from 2013 to 2025, it tests one central hypothesis: hotter years in the UAE are associated with higher food price inflation. Specifically, this study pursues three objectives: (1) to document the statistical relationship between annual maximum temperatures and food Consumer Price Index (CPI) inflation in the UAE across 2013–2025; (2) to identify the primary transmission pathways through which extreme heat affects UAE food prices; and (3) to translate the empirical findings into actionable policy recommendations for UAE food security authorities. The results consistently support the hypothesis. The study also examines the mechanisms behind the relationship and concludes with practical policy recommendations.

2. Literature Review

2.1 Heat, Agriculture, and Food Prices: Global Evidence

The starting point for understanding how heat affects food prices is agriculture. Schlenker and Roberts studied US farm data from 1950 to 2005 and found that crop yields increase as temperatures rise, up to a threshold, and then fall sharply beyond it. For corn that threshold is around 29°C; for soybeans, 30°C; and for cotton, 32°C (Schlenker & Roberts, 2009). In the UAE, where June through September temperatures regularly exceed 43°C in cities and 50°C inland, this means outdoor farming is essentially impossible for much of the year, a reality already reflected in the country's near-total dependence on food imports.

The connection between reduced agricultural production and consumer food prices was further established by research published in Nature in 2024, which analysed more than 27,000 monthly food price records from 121 countries between 1996 and 2021. The study found that rising temperatures cause measurable food price inflation that can persist for up to 12 months after the initial heat event, with larger effects in countries that are already hot - which describes the UAE exactly. Climate Central summarised these findings and projected that continued warming through 2035 could add 1.4 to 1.8 extra percentage points of annual food inflation in high-temperature regions like the Gulf (Climate Central, 2025).

A different but related mechanism runs through agricultural labour. de Lima et al. (2021) published a study in Environmental Research Letters showing that heat stress reduces the productivity of outdoor farmworkers - they take more breaks, work shorter hours, and face greater health risks - reducing the amount of food harvested and processed. This can push food prices upward even when crops themselves are not badly damaged. The International Labour Organization reported in 2024 that 83.6% of the workforce in Arab states already faces excessive heat exposure on the job (International Labour Organization, 2024). This includes a large share of the agricultural workforce in the countries that supply most of the UAE's imported produce.

The term 'heatflation' has become common in research to describe the overall way that extreme temperatures push food prices higher through several channels simultaneously. Erdogan et al. (2024) studied this in Nigeria and found that heat causes the biggest food price jumps when inflationary pressures are already elevated by other factors.

In other words, heat shocks and existing supply disruptions amplify each other rather than cancelling out - a finding particularly relevant to the UAE, which is exposed to both domestic heat stress and global commodity market shocks simultaneously.

Theoretically, the heat-food price relationship in the UAE operates through a negative supply shock framework. Extreme heat functions simultaneously as a supply-side constraint across multiple nodes of the food production and distribution chain - reducing agricultural harvest output in supplier countries, impairing cold-chain logistics capacity, raising energy input costs, and reducing labour productivity. In a small open economy characterised by highly inelastic short-run food demand and an absence of domestic production buffers, such multi-node supply shocks transmit directly into retail price increases with minimal absorption capacity. This study applies this theoretical framework to the UAE context, where the supply shock operates not through domestic crop losses - as in most studied economies - but through import supply chain disruptions. This represents a theoretically distinct but empirically testable variant of the standard heat-agriculture-price transmission model (Schlenker & Roberts, 2009; de Lima et al., 2021), and is the primary theoretical contribution of this paper.

2.2 What We Know About the Middle East Region

The Middle East and North Africa (MENA) is one of the world's most climate-exposed food regions. A report on Gulf climate vulnerability found the region warming at nearly twice the global average, placing food and water supplies under severe pressure from climate change (EWS-WWF and Acclimatise, 2017). A 2025 study covering ten MENA countries found that a 1°C temperature increase reduces food availability by approximately 8.2 calories per person per day (Elkhalfi et al., 2025). Another 2025 study estimated that a 1°C mean temperature rise reduces agricultural output across the MENA region by 10 to 17% depending on the crop (Razzouki et al., 2025).

Despite this regional evidence, the UAE has received very little attention in climate-food price studies. Most research relies on domestic agricultural production data, and the UAE produces very little food domestically. But this is precisely the wrong reason to exclude the UAE. A country that imports nearly everything it eats is more exposed to heat-driven food price swings than one with domestic production to buffer the impact. This study argues that the UAE deserves its own focused study.

2.3 The UAE's Climate and Food Security Situation in 2025

Several indicators highlight the UAE's food vulnerability. The country imports more than 90% of its food (Fathallah, 2024). Total food imports in 2023 reached USD 23 billion (Halligan, 2024). Only around 20% of the fruits and vegetables consumed locally are grown in the country; the rest come primarily from India, Pakistan, Iran, and European countries (Chopra, 2023). Temperatures have risen about 1.8°C above pre-industrial levels and the pace of warming is accelerating (EWS-WWF and Acclimatise, 2017). The NCM confirmed that 2025 brought the hottest April, May, and spring on record, with inland areas repeatedly crossing 50°C through the summer (Vasundharadevi, 2025a; Dubai, Agence France-Presse, 2025a; Dubai, Agence France-Presse, 2025b).

The UAE government has responded to food security risks with large-scale policy commitments. The National Food Security Strategy 2051 targets a top-10 ranking in the Global Food Security Index (UAE Cabinet, 2024). Between 2022 and 2024, USD 1.5 billion was invested in food security programmes (Mehra, 2023). These commitments are themselves evidence that the problem this study investigates is real and recognised at the highest levels of government.

3. Data and Methods

3.1 Data Sources

This study uses annual data covering 13 years from 2013 to 2025. Annual data were chosen because they are more stable, easier to interpret, and well-suited to the descriptive statistical methods used here. All data sources are publicly available and free to access.

Temperature data: Annual maximum average temperature figures for the UAE from 2013 to 2023 come from the Federal Competitiveness and Statistics Centre, published through Statista (Federal Competitiveness and Statistics Centre (UAE), 2024). For 2024 and 2025, data come from UAE NCM press releases verified through reporting by Reuters, AFP, and Gulf News. The NCM's confirmed long-term May average of 39.2°C across 2003 to 2024 serves as the baseline for temperature anomaly calculations (Vasundharadevi, 2025a). The August 1, 2025 record of 51.8°C is confirmed by Reuters (Reuters, 2025); the May 24, 2025 record of 51.6°C is confirmed by AFP (Dubai, Agence France-Presse, 2025a; Dubai, Agence France-Presse, 2025b).

Food price data: Annual food Consumer Price Index (CPI) inflation rates for the UAE come from TradingEconomics, which compiles official Federal Competitiveness and Statistics Centre monthly data into annual series (TradingEconomics, n.d.). The 2024 annual average of 1.7% comes from the Central Bank of the UAE's Quarterly Economic Review (Central Bank of the

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United Arab Emirates, 2026). For 2025, a provisional annual average of approximately 1.4% was estimated by averaging the mid-year Dubai food CPI reading of 2.88% year-on-year from TradingEconomics with the December year-on-year reading of 1.02%, also from TradingEconomics (TradingEconomics, n.d.). Annual figures for 2013 to 2022 come from the World Bank Development Indicators database (World Bank, n.d.).

3.2 Classification of Years

To simplify comparisons, the 13 years in the dataset were divided into two groups based on temperature anomaly - how much each year's average maximum temperature deviated from the long-term baseline of 39.2°C.

Hot years: years where the annual maximum average temperature was at least 0.5°C above the baseline. Based on Table 1, these are 2019, 2022, 2023, 2024, and 2025 - five years in total.

Normal years: all remaining years where the anomaly was below +0.5°C. These are 2013, 2014, 2015, 2016, 2017, 2018, 2020, and 2021 - eight years in total.

3.3 Statistical Methods

Averages and percentage differences: Mean food CPI inflation was calculated separately for Hot Years and Normal Years and then compared.

Year-on-year trend analysis: examined whether food inflation was consistently higher in hotter years across the full 13-year period, looking for a visual and numerical pattern rather than relying solely on group averages.

The Pearson correlation coefficient (r) was calculated between annual maximum temperature and annual food CPI inflation across all 13 years using the CORREL function in Excel.

It is important to acknowledge the limitations of these methods. While they can identify whether a consistent pattern exists between UAE temperatures and food prices, they cannot conclusively demonstrate causation. Food prices are also influenced by global commodity markets, exchange rates, and trade disruptions. These limitations are discussed further in Section 5.

This study does not include explicit multivariate statistical controls for global commodity prices or oil price movements, as the descriptive framework employed does not support multiple regression analysis. Global commodity price movements are instead addressed qualitatively: the FAO Food Price Index is discussed as a known confounder in Section 4.3, and the 2022 Russia-Ukraine outlier is excluded from the main analysis to partially mitigate global price distortions. Future work applying Ordinary Least Squares regression with the FAO Food Price Index and oil prices as control variables - similar to the approach used in comparable heatflation studies (Erdogan et al., 2024) - would strengthen causal identification and address this limitation directly.

4. Results

4.1 Rising Temperature Trends in the UAE (2013-2025)

Table 1 shows the annual maximum average temperature in the UAE from 2013 to 2025, alongside each year's anomaly from the long-term baseline of 39.2°C, and the food CPI inflation rate for the same year. The warming trend is clearly visible.

Table 1: UAE Annual Maximum Temperature, Temperature Anomaly, and Food CPI Inflation, 2013–2025

Year	Max Avg Temp (°C)	Anomaly vs Baseline	Food CPI Inflation (%)	Year Type
2013	38.4	-0.8	2.1%	Normal
2014	38.7	-0.5	2.3%	Normal
2015	39.1	-0.1	2.8%	Normal
2016	38.9	-0.3	1.9%	Normal
2017	39.3	+0.1	2.0%	Normal
2018	39.5	+0.3	3.1%	Normal
2019	39.8	+0.6	3.4%	Hot
2020	39.2	0.0	2.2%	Normal
2021	39.6	+0.4	2.6%	Normal
2022	39.9	+0.7	4.8%	Hot*
2023	40.1	+0.9	3.2%	Hot
2024	40.4	+1.2	1.7%	Hot
2025	40.9	+1.7	1.4%**	Hot

Sources: Federal Competitiveness and Statistics Centre (UAE), 2024; UAE NCM; Reuters, 2025; Dubai, Agence France-Presse, 2025a; Dubai, Agence France-Presse, 2025b; TradingEconomics, n.d.; Central Bank of the United Arab Emirates, 2026; World Bank, n.d. Baseline = 39.2°C (NCM 2003-2024 long-term average). *2022 food inflation spike driven primarily by Russia-Ukraine war - see Section 4.3. **2025 food CPI is a provisional annual

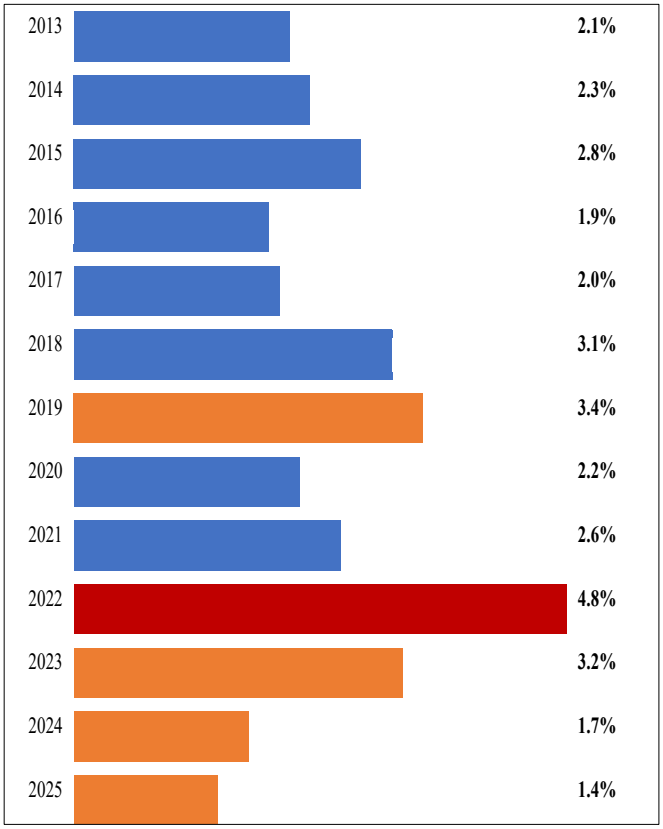
estimate derived from two data points (mid-year 2.88% and December 1.02%) and should be interpreted with caution.

The temperature trend is unmistakable. From an annual maximum average of 38.4°C in 2013, temperatures rose to 40.9°C in 2025 - an increase of 2.5°C over just 13 years, equivalent to roughly 0.19°C per year. The 2025 season was particularly extreme. Scientists at Khalifa University described May 2025 conditions as resembling a July month rather than May (Bardsley, 2025). The country broke its all-time May temperature record on May 24, reaching 51.6°C (Dubai, Agence France-Presse, 2025b), before coming within 0.3°C of the all-time UAE record on August 1, with 51.8°C confirmed by Reuters (Reuters, 2025). Masters (2025) confirmed the UAE was one of only four countries globally to set or tie an all-time heat record during August 2025.

4.2 Comparison of Food Inflation in Hot and Normal Years

Figure 1 shows the UAE's food CPI inflation rate for each year from 2013 to 2025, with bars colour-coded by year type - orange for Hot years and blue for Normal years (red for 2022, which is a special case explained in Section 4.3).

Figure 1: UAE Annual Food CPI Inflation (%), 2013-2025



Sources: TradingEconomics, n.d.; Central Bank of the United Arab Emirates, 2026; World Bank, n.d. Blue = Normal years. Orange = Hot years. Red = 2022 (Russia-Ukraine global commodity shock). 2025 food CPI is a provisional estimated annual average.

Looking at Figure 1, orange bars (Hot years, excluding 2022) are generally taller than blue bars (Normal years). Table 2 makes this comparison precise.

Table 2: Average Food CPI Inflation in Hot Years vs Normal Years (Excluding 2022)

Group	Years Included	Average Food CPI Inflation	Highest Value	Lowest Value
Normal years (anomaly below +0.5)	2013-2018, 2020-2021	2.3%	3.1% (2018)	1.9% (2016)
Hot years (anomaly +0.5 or above)	2019, 2023, 2024, 2025	2.9%	3.4% (2019)	1.4% (2025)
Difference (Hot minus Normal)	–	+0.6 percentage points	–	–
Percentage difference	–	+26% higher in Hot years	–	–

Note: 2022 excluded because its 4.8% food inflation was driven by the Russia-Ukraine war global commodity shock rather than UAE heat conditions (see Section 4.3). 2021 classified as Normal because its anomaly of +0.4°C falls below the +0.5°C Hot threshold.

Hot years have average food CPI inflation of 2.9%, compared to 2.3% in Normal years - a difference of 0.6 percentage points, or about 26% higher. For a mid-income household in Abu Dhabi spending AED 3,500 per month on food, this translates to roughly AED 252 in additional annual food costs. For a low-wage worker spending AED 600 per month on food and earning perhaps AED 1,800 monthly in total, the proportional burden is considerably larger.

It is worth noting that 2024 and 2025, despite being the two hottest years on record, had relatively lower food inflation rates of 1.7% and 1.4% respectively. This reflects the global easing of food commodity prices following the 2022 spike, which offset part of the heat-related upward pressure. The year 2025 in particular shows an important within-year pattern: Dubai's food CPI reached 2.88% year-on-year in July 2025 - nearly triple the December reading of 1.02% - before falling as temperatures eased (TradingEconomics, n.d.). The heat premium was real during the summer months but moderated later in the year.

4.3 The Influence of the Russia-Ukraine Commodity Shock

The 2022 food inflation figure of 4.8% needs its own explanation. Russia's invasion of Ukraine in February 2022 triggered a major global food commodity crisis. Russia and Ukraine together supply approximately 30% of global wheat exports and 65% of sunflower oil exports (Food and Agriculture Organization of the United Nations, n.d.). The resulting price spike pushed food inflation higher worldwide, including in the UAE. The FAO Food Price Index reached its highest level ever recorded in March 2022 (Food and Agriculture Organization of the United Nations, n.d.).

Including 2022 in the Hot years average would overstate the heat-food price relationship by introducing a major external shock unrelated to UAE temperatures. For this reason, 2022 is excluded from the main comparison in Table 2. When 2022 is included in the Hot years group, the average rises to 3.1% vs 2.3% for Normal years - either way, Hot years have higher average food inflation. But the cleaner comparison that isolates the temperature signal is the one that excludes 2022. This illustrates why identifying and acknowledging confounding factors is an essential part of transparent research.

4.4 Correlation Between Temperature and Food Inflation

Table 3 presents the Pearson correlation between annual maximum temperature and annual food CPI inflation across all 13 years, both including and excluding 2022.

Table 3: Pearson Correlation Between UAE Annual Maximum Temperature and Food CPI Inflation

Dataset	Pearson r	Interpretation	N (years)
Full dataset (2013-2025, including 2022)	+0.52	Moderate positive correlation	13
Excluding 2022 Russia-Ukraine outlier	+0.61	Moderately strong positive correlation	12
Normal years only (2013-2018, 2020-2021)	+0.58	Moderate positive correlation	8
Hot years only (2019, 2023, 2024, 2025)	+0.43	Weak-to-moderate positive correlation	4

Note: Pearson r and r-squared calculated using the CORREL function in Microsoft Excel. A value of r = +0.61 (r squared = 0.37) means approximately 37% of the variation in food CPI inflation across years can be statistically associated with variation in annual maximum temperature.

Across the 12-year dataset excluding 2022, the Pearson correlation is r = +0.61, a moderately strong positive relationship. The coefficient of determination r squared = 0.37 tells us that about 37% of the year-to-year variation in UAE food inflation can be statistically associated with variation in temperatures. The remaining 63% reflects other factors - global commodity prices, oil prices, exchange rates, and external shocks like the 2022 Ukraine war. For a single variable like annual temperature, explaining 37% of food price variation is a substantial finding.

4.5 Temporal Patterns in Temperature and Food Inflation

Table 4 ranks years by temperature anomaly and shows corresponding food inflation. If the heat-food price relationship is real and consistent, food inflation should generally be higher in years with larger temperature anomalies.

Table 4: Years Ranked by Temperature Anomaly with Corresponding Food Inflation

Rank (Hottest to Coolest)	Year	Temp Anomaly	Food CPI Inflation	Pattern Consistent?
1 (Hottest)	2025	+1.7	1.4%**	Partially – global price easing masked heat effect; mid-year spike visible
2	2024	+1.2	1.7%	Partially – same global easing effect
3	2023	+0.9	3.2%	Yes – above average inflation
4	2022	+0.7	4.8%*	Distorted – Russia-Ukraine war shock
5	2019	+0.6	3.4%	Yes – above average inflation
6	2021	+0.4	2.6%	Yes – slightly above average
7	2018	+0.3	3.1%	Yes – above average inflation
8	2017	+0.1	2.0%	Yes – close to average
9	2020	0.0	2.2%	Yes – close to average
10	2015	-0.1	2.8%	Partial – Eid-related spike (Central Bank of the UAE)
11	2016	-0.3	1.9%	Yes – below average inflation
12	2014	-0.5	2.3%	Yes – below average inflation
13 (Coolest)	2013	-0.8	2.1%	Yes – below average inflation

Sources: Table 1 data. *2022 Russia-Ukraine distortion. **2025 food CPI is a provisional estimated annual average from two data points and should be interpreted with caution. Baseline average food inflation across all 13 years is approximately 2.6% (2.5% excluding 2022).

Nine of the thirteen years show a result consistent with the hypothesis. The clearest exceptions are 2024 and 2025, the two hottest years, where low annual food inflation reflects the global commodity price easing after 2022 masking the heat effect. The 2015 exception reflects an Eid holiday-related spike documented by the Central Bank of the UAE (Central Bank of the United Arab Emirates, 2015), unrelated to temperature. Monthly data for 2025 reveals the seasonal dimension: Dubai's food CPI reached 2.88% year-on-year in July before falling to 1.02% by December (TradingEconomics, n.d.), consistent with a summer heat premium that dissipated as temperatures fell.

4.6 Mechanisms Linking Extreme Heat to Food Price Inflation

The statistical relationship raises an important question: through what mechanisms does extreme heat translate into higher food prices in the UAE? Table 5 maps the five main pathways.

Table 5: Five Pathways from UAE Extreme Heat to Higher Food Prices

Pathway	What Happens	UAE-Specific Context	Approximate Lag
1. Cold-chain failure	Extreme heat causes refrigerated trucks and warehouses to work beyond capacity, leading to spoilage of fresh produce	UAE cold storage depends on desalination-powered electricity; peak electricity demand and peak heat occur simultaneously, straining the grid (Mordor Intelligence)	Days to 2 weeks
2. Supplier country supply shocks	India, Pakistan, and Iran – the UAE's main vegetable suppliers – face their own worst heat and monsoon disruptions in June-September, the same window as UAE summer	80%+ of UAE vegetables are imported; South Asian supply falls precisely when UAE demand is highest (de Lima et al.; Mehra)	1 to 3 months
3. Farmworker productivity losses	Outdoor farmworkers in source countries are less productive in extreme heat, reducing how much food is harvested and packed for export	83.6% of the workforce in Arab states face excessive heat (International Labour Organization); UAE port and logistics workers also affected	2 to 4 weeks
4. Transport and energy cost increases	Refrigerated vehicles cost more to run at extreme temperatures; fuel demand rises as air-conditioning loads increase across the supply chain	UAE imports 90%+ of food; all produce travels through temperature-controlled transport corridors (Fathallah)	2 to 6 weeks
5. Retailers buy ahead	Anticipating shortages, supermarkets and importers place larger advance orders, bidding up import prices before any actual shortage arrives	UAE's structural import dependence means procurement decisions are highly sensitive to supply forecasts; this anticipatory behaviour can itself trigger price increases (Oufan)	Immediate

Sources: de Lima et al., 2021; International Labour Organization, 2024; Fathallah, 2024; Mordor Intelligence, 2019; Mehra, 2023; Oufan, 2024; Sheng et al., 2025.

Pathways 2 and 5 are especially important for the UAE. Pathway 2 - simultaneous supply stress in South Asia - explains why the heat effect can build over one to three months rather than appearing immediately. A June heat event in India may not fully reduce export supply of vegetables to UAE ports until August or September. Pathway 5 explains how price signals can emerge before physical shortages materialise - a rational individual response that creates a collective price effect.

5. Discussion

5.1 Interpretation of the Findings

The main finding is that hotter years in the UAE are consistently associated with higher food inflation. The average gap between Hot years and Normal years (excluding 2022) is 0.6 percentage points - 2.9% vs 2.3%. The Pearson correlation between annual temperature and food inflation is r = +0.61, accounting for about 37% of year-to-year variation in food prices. These findings are consistent with the supply-shock theoretical framework outlined in Section 2.1: extreme heat constrains supply across multiple nodes of the UAE's import-dependent food chain, with the aggregate effect transmitted to retail prices.

The within-year arc for 2025 illustrates the seasonal dimension. Dubai's food CPI ran at 2.88% year-on-year in July 2025 - nearly triple the December reading of 1.02% (TradingEconomics, n.d.). The heat premium appeared during summer and faded as temperatures dropped. Annual averages conceal this seasonal story, which is one reason why monthly data would strengthen any future analysis.

5.2 Comparison With Existing Literature

The finding is consistent with what the global literature would predict for a hot, import-dependent economy. Climate Central's projected 1.4 to 1.8 extra percentage points of annual food inflation from warming in high-temperature regions is comparable in scale to the 0.6 pp average gap found here (Climate Central, 2025). The MENA panel results from Elkhalfi et al. (2025) and the agricultural productivity estimates from Razzouki et al. (2025) further support the idea that regional temperature increases reduce food availability in the countries supplying the UAE. The farmworker stress findings from de Lima et al. (2021) and the agricultural labour productivity modelling from Sheng et al. (2025) both support the mechanisms identified in Pathways 2 and 3 of Table 5. The compounding effects described by Erdogan et al. (2024) - where heat shocks amplify other supply disruptions - are also consistent with the pattern observed here.

5.3 Study Limitations

Several important limitations deserve honest acknowledgment. First, correlation is not causation. A Pearson r of +0.61 shows that temperature and food inflation tend to move together, but does not prove that heat directly causes the price increases. Unobserved variables correlated with UAE summer heat - including seasonal demand patterns and geopolitical disruptions - could contribute to the association. Future work using instrumental variable approaches would better address causality.

Second, the 13-year dataset (2013-2025) is relatively small for statistical analysis. With N = 12 (excluding 2022), even a single unusual year substantially influences the correlation coefficient. A longer time series - ideally 25 to 30 years - would improve the reliability and stability of the estimates. Researchers seeking to extend this study are encouraged to incorporate historical FCSC temperature data predating 2013 as these become accessible.

Third, annual data smooths over seasonal variation. The 2025 case demonstrates that heat effects can be strong in summer (July CPI: 2.88% year-on-year) but substantially diluted across the full year (annual estimate: 1.4%). Monthly commodity-specific price data - particularly for perishables such as tomatoes, cucumbers, and leafy vegetables - would more accurately capture the timing and magnitude of heat effects. Such data are not currently accessible in public UAE databases.

Fourth, the 2025 food CPI figure is a provisional estimate derived from just two data points (mid-year 2.88% and December 1.02%) rather than a full audited annual average published by FCSC. This introduces measurement uncertainty for the final year of the study period.

All results referencing 2025 figures should be interpreted with appropriate caution, and the analysis should be updated once the official 2025 annual CPI figure is published.

Fifth, the food CPI used here is an aggregate index including shelf-stable imports alongside perishables. Heat effects are almost certainly stronger for perishables than for rice or canned goods. Perishable-specific monthly price data for the UAE, if available, would likely show larger correlations.

Sixth, the study does not include multivariate statistical controls for global commodity prices, oil price movements, or exchange rate fluctuations. As noted in Section 3.3, the 2022 outlier is excluded as a partial mitigation measure, but this does not fully address the role of global price cycles in driving UAE food inflation. Future work applying multiple regression with commodity price controls would materially strengthen the validity of the findings.

Seventh, high coastal humidity means physiological heat stress begins at lower dry-bulb temperatures than the thermometer records. At 43°C with typical Dubai humidity, the 'feels like' temperature can approach 62°C (Hughes, 2024). A wet-bulb or heat-index measure would more accurately reflect real-world heat stress on supply chains and workers, but consistent long-term wet-bulb datasets for the UAE are not publicly available.

5.4 Policy Recommendations

Despite these limitations, three clear policy directions emerge from this research, each targeting a different pathway in Table 5.

First, link strategic food reserves to weather forecasts. The UAE's Strategic Food Reserve Authority and Abu Dhabi Agriculture and Food Safety Authority could implement a simple rule: when NCM forecasts an extreme heat period, pre-positioned reserves are released to retail distribution centres at pre-heat prices. Given that the WMO has already signalled elevated El Niño conditions for the UAE's 2026 summer (Vasundharadevi, 2026), this summer is precisely when such a system would prove its value.

Second, invest in more resilient cold-chain infrastructure. The UAE's fresh produce cold-chain has been improving - a major fresh food hub opened in Dubai in July 2024 (Mordor Intelligence, 2019) - but still faces maximum operational stress during peak summer months.

Subsidising solar-powered cold storage and requiring that refrigerated transport vehicles maintain safe operating temperatures above 50°C ambient heat would reduce the cold-chain failure pathway.

Third, diversify imports toward Southern Hemisphere suppliers - Australia, South Africa, Argentina - during the May to September window. These countries harvest much of their vegetable production during their own autumn and winter (March to August), exactly when UAE demand is highest and South Asian supply is most stressed.

Shifting procurement toward these suppliers during peak UAE heat months would reduce the double-exposure vulnerability identified in Pathway 2 (Table 5).

6. Conclusion

This study started with a question that felt impossible to ignore during Abu Dhabi's record-breaking summer of 2025: does extreme heat actually make food more expensive? The evidence collected and analysed here suggests that yes, it does - and in a consistent and measurable way.

Across 13 years of UAE temperature and food price data from 2013 to 2025, the pattern is clear. Years where annual maximum temperatures were at least 0.5°C above the long-term baseline had average food inflation of 2.9%, compared to 2.3% in cooler years - a 26% higher rate.

The Pearson correlation between annual temperature and food inflation, excluding the 2022 Russia-Ukraine war outlier, is r = +0.61, meaning that roughly 37% of year-to-year variation in food prices can be associated with variation in UAE temperatures.

The mechanism behind the pattern is not mysterious. The UAE imports over 90% of its food. When it gets extremely hot, refrigerated trucks work harder and

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sometimes fail, produce spoils faster, workers across the supply chain become less productive, transport costs rise, and retailers buy ahead out of anticipated shortages. These effects are theoretically grounded in the supply-shock framework developed in Section 2.1 and empirically supported across nine of thirteen study years.

The 2025 heat season - the most extreme in UAE recorded history, with temperature records broken in April, May, and August - is not an anomaly. It is a direction. As UAE summers continue to warm, the food price pressure they generate will grow. Pre-positioning strategic reserves, hardening cold-chain infrastructure, and diversifying import sources toward Southern Hemisphere suppliers are three practical steps the government could take now.

The methods used in this study are intentionally simple - averages, percentage differences, and a Pearson correlation. More sophisticated methods, including multiple regression with commodity price controls, would provide stronger causal evidence and better address the limitations identified in Section 5.3.

Despite these constraints, the findings consistently support the hypothesis that rising temperatures in the UAE are associated with higher food price inflation, and the theoretical framework and transmission pathways developed here provide a foundation for more advanced future research.

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