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FOOD PRICE VARIATIONS IN NUSA TENGGARA BARAT: EVIDENCE FROM RICE AND SHALLOT DATA (2024)

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Abstract:

This study examines the dynamics of strategic food commodity prices, specifically C4 grade I quality rice and large clean quality shallots, across three key locations in Nusa Tenggara Barat Province during 2024. Utilizing a quantitative descriptive approach with secondary data from Statistics Indonesia (BPS) NTB, this research analyzes monthly price fluctuations, inter-regional variations, and stability patterns. Results indicate that rice prices averaged Rp14,780/kg in Mataram City, Rp15,447/kg in Bima City, and Rp15,361/kg in Sumbawa Regency, with coefficient of variation ranging from 6.2% to 8.0%. Shallot prices demonstrated greater volatility, averaging Rp32,266/kg annually with a price range of Rp19,006-41,736/kg. Mataram City consistently exhibited the most stable prices due to superior market infrastructure and distribution networks, while Bima City recorded the highest prices attributed to geographical factors and inter-island transportation costs. Seasonal patterns emerged clearly, with price peaks occurring during the lean season in the first quarter and before major religious holidays. The study recommends strengthening regional food security through optimized food reserve stocks, integrated logistics systems, and enhanced roles for regional food enterprises in price stabilization mechanisms.

***Key words**: food price dynamics, rice, shallots, price stability, coefficient of variation*

Abstrak:

Penelitian ini mengkaji dinamika harga komoditas pangan strategis, khususnya beras C4 kualitas I dan bawang merah kualitas bersih besar, di tiga lokasi utama Provinsi Nusa Tenggara Barat selama tahun 2024. Menggunakan pendekatan deskriptif kuantitatif dengan data sekunder dari Badan Pusat Statistik (BPS) NTB, penelitian ini menganalisis fluktuasi harga bulanan, variasi antar wilayah, dan pola stabilitas. Hasil menunjukkan bahwa harga beras rata-rata Rp14.780/kg di Kota Mataram, Rp15.447/kg di Kota Bima, dan Rp15.361/kg di Kabupaten Sumbawa, dengan koefisien variasi berkisar 6,2% hingga 8,0%. Harga bawang merah menunjukkan volatilitas lebih tinggi, rata-rata Rp32.266/kg per tahun dengan kisaran harga Rp19.006-41.736/kg. Kota Mataram secara konsisten menunjukkan harga paling stabil karena infrastruktur pasar dan jaringan distribusi yang lebih baik, sementara Kota Bima mencatat harga tertinggi akibat faktor geografis dan biaya transportasi antar pulau. Pola musiman muncul dengan jelas, dengan puncak harga terjadi pada musim paceklik di kuartal pertama dan menjelang hari raya keagamaan. Penelitian ini merekomendasikan penguatan ketahanan pangan daerah melalui optimalisasi stok cadangan pangan, sistem logistik terintegrasi, dan peningkatan peran BUMD pangan dalam mekanisme stabilisasi harga.

Kata kunci: dinamika harga pangan, beras, bawang merah, stabilitas harga, koefisien variasi

A. Introduction

Food price stability represents a fundamental pillar of regional economic resilience and directly influences household purchasing power, inflation rates, and overall food security in developing regions. As one of Indonesia's agricultural provinces, Nusa Tenggara Barat (NTB) faces unique challenges in maintaining stable prices for strategic food commodities due to its archipelagic geography, varied infrastructure development, and seasonal agricultural production patterns. Rice and shallots constitute two of the most critical food commodities in Indonesia, serving as staple foods and essential cooking ingredients that significantly impact household expenditure and food accessibility across socioeconomic groups.

The importance of monitoring and analyzing food price dynamics has been extensively documented in agricultural economics literature. Price volatility in essential food commodities can trigger broader economic instability, particularly in regions where agriculture forms the backbone of the local economy and where significant portions of household income are allocated to food consumption. Research by Anderson and Strutt (2020) demonstrates that food price shocks in Southeast Asian countries disproportionately affect low-income households, potentially pushing vulnerable populations below the poverty line. Similarly, studies by Minot (2021) on staple food markets in Indonesia reveal that geographic isolation and inadequate transportation infrastructure contribute substantially to inter-regional price disparities, creating food access challenges in remote areas.

In the Indonesian context, rice holds particular significance as the primary staple food, with per capita consumption rates among the highest globally. The government's commitment to rice self-sufficiency and price stabilization has led to various policy interventions, including floor price mechanisms, buffer stock operations, and distribution subsidies. However, the effectiveness of these policies varies considerably across regions, necessitating localized analysis to understand specific price formation mechanisms and market dynamics. Research by Timmer (2022) emphasizes that Indonesia's rice market remains highly regionalized despite national integration efforts, with local supply-demand conditions, harvest cycles, and distribution costs creating persistent price differentials across provinces and districts.

Shallots, while often receiving less policy attention than rice, represent another crucial commodity with substantial price volatility characteristics. As a horticultural product with shorter shelf life and greater susceptibility to weather-related production shocks, shallot prices typically exhibit more dramatic fluctuations compared to grain commodities. Studies by Sulaiman and colleagues (2023) on vegetable price dynamics in Eastern Indonesia highlight that shallot price spikes during lean seasons and religious holidays can increase by 100-200% above baseline levels, creating significant affordability challenges for consumers and planning difficulties for food service businesses.

Nusa Tenggara Barat Province presents a particularly interesting case study for food price analysis due to several distinctive characteristics. First, the province comprises both mainland and island territories, creating natural geographic barriers that increase transportation costs and complicate logistics operations. Second, NTB exhibits considerable variation in agricultural productivity and market development across its districts and cities, ranging from the relatively urbanized and well-connected Mataram City to more remote island districts like Bima. Third, the province experiences distinct seasonal patterns affecting both agricultural production and consumer demand, including monsoon-related harvest cycles and cultural-religious events that temporarily surge food consumption.

According to official statistics from Statistics Indonesia's NTB Provincial Office for 2024, retail prices for C4 grade I quality rice and large clean quality shallots demonstrated substantial variation across time and space throughout the year. Preliminary observations indicate that Bima City consistently recorded the highest prices for both commodities, while Mataram City generally maintained the lowest price levels. These patterns suggest systematic differences in market conditions, supply chain efficiency, and competitive dynamics across the province's major urban centers.

Understanding these price dynamics carries significant implications for policy formulation and implementation. Regional governments require accurate, timely information about price formation mechanisms to design effective interventions that balance producer incentives with consumer affordability. Market stabilization programs, strategic food reserve policies, and distribution subsidy schemes must be calibrated to local conditions rather than applying uniform national templates. Furthermore, identifying locations with chronic price instability can help policymakers prioritize infrastructure investments and market development initiatives that address root causes of price volatility.

The theoretical framework for analyzing food price dynamics draws on several economic principles. Spatial price analysis examines how transportation costs, market integration, and arbitrage opportunities create price relationships across geographic locations. Seasonal decomposition techniques separate cyclical patterns from underlying trends and irregular fluctuations. Price volatility measures, particularly the coefficient of variation, provide standardized metrics for comparing stability across commodities and regions regardless of absolute price levels. These analytical tools, when applied systematically to comprehensive price data, can reveal patterns and relationships that inform evidence-based policy interventions.

Recent global and national developments have heightened the importance of local food security and price stability monitoring. The COVID-19 pandemic exposed vulnerabilities in food supply chains and distribution networks, demonstrating how disruptions can rapidly translate into price spikes and availability issues. Climate change continues to increase agricultural production risks through more frequent extreme weather events, shifting rainfall patterns, and temperature variations that affect crop yields. Global commodity market volatility, driven by geopolitical tensions and macroeconomic uncertainties, creates transmission effects even in relatively isolated regional markets. These converging pressures underscore the necessity of robust food price monitoring systems and proactive stabilization mechanisms at the provincial level.

This research addresses an important gap in the existing literature on Indonesian food markets by providing detailed, systematic analysis of price dynamics in an agriculturally significant but understudied province. While numerous studies have examined national-level food price trends or focused on Java-based markets, relatively limited quantitative research has explored price formation and stability in Eastern Indonesian provinces like NTB. By analyzing monthly price data across multiple locations for an entire calendar year, this study generates insights into both temporal and spatial dimensions of price variation, contributing to a more comprehensive understanding of regional food market functioning.

Based on the background and problem formulation presented above, this research establishes the following specific objectives: First, To analyze the temporal dynamics and patterns of price changes for C4 grade I quality rice and large clean quality shallots across three major urban centers in Nusa Tenggara Barat Province throughout 2024, identifying seasonal trends, peak periods, and trough periods in the annual price cycle. Second, To identify and compare the levels of price stability across Mataram City, Bima City, and Sumbawa Regency using coefficient of variation analysis, determining which location exhibits the most stable prices and which experiences the greatest volatility for each commodity. Third, To provide evidence-based policy recommendations for regional food price control and stabilization mechanisms that account for the specific geographic, infrastructural, and market characteristics of different locations within NTB Province, with particular attention to addressing systematic price disparities and reducing excessive volatility.

These objectives are designed to generate actionable insights for provincial and district government agencies responsible for food security, price monitoring, and consumer protection. The research aims to move beyond simple price reporting to analytical interpretation that explains observed patterns and suggests targeted interventions aligned with local conditions and capabilities.

B. Research Methods

This research employs a quantitative descriptive methodology utilizing secondary data analysis to examine food price dynamics systematically. The quantitative approach enables rigorous measurement of price trends, variability patterns, and inter-regional comparisons using standardized statistical techniques that produce replicable results. Descriptive analysis focuses on characterizing observed price behavior rather than testing causal hypotheses, which is appropriate given the research objectives centered on documenting patterns and generating insights for policy consideration.

Data Sources and Collection

The primary data source for this research consists of official price statistics published by Statistics Indonesia (Badan Pusat Statistik, BPS) for Nusa Tenggara Barat Province for the 2024 calendar year. Specifically, the study utilizes monthly retail price data for selected commodities across three locations as reported in the publication "Consumer Price Statistics for Selected Goods and Services in 3 Cities in Nusa Tenggara Barat Province 2024." BPS employs standardized data collection procedures across all provincial offices, ensuring comparability and reliability of price information. Price data

represent average retail prices collected from multiple market locations within each city or regency, based on regular surveys conducted by trained field enumerators following established protocols.

The selection of BPS as the authoritative data source reflects several important considerations. First, BPS represents the official government statistical agency with the mandate, resources, and methodology to conduct comprehensive price monitoring across the Indonesian archipelago. Second, BPS data undergo quality control procedures and validation processes that enhance reliability compared to alternative sources. Third, BPS publications provide standardized commodity definitions and measurement units, enabling valid comparisons across locations and time periods. Fourth, official statistics from BPS constitute the basis for government policy decisions and public discourse on economic conditions, making them the most policy-relevant data source for this research.

Research Variables

This study analyzes four primary variables organized into commodity-specific price data and contextual dimensions:

Dependent Variables (Price Data):

1. Retail price of C4 grade I quality rice, measured in Indonesian Rupiah per kilogram (Rp/kg). This commodity specification represents medium-quality domestic rice commonly consumed by middle-income households, distinguished from premium varieties and imported rice.

2. Retail price of large clean quality shallots, measured in Indonesian Rupiah per kilogram (Rp/kg). This specification indicates shallots that have been cleaned, sorted by size to large-grade categories, and are ready for direct consumer use without additional processing.

Independent Variables (Contextual Dimensions):

1. Time dimension: Monthly intervals from January through December 2024, enabling analysis of temporal patterns including seasonal variations, trends, and irregular fluctuations throughout the annual cycle.

2. Spatial dimension: Three geographic locations representing major urban centers in NTB Province:

    a. Mataram City: The provincial capital and largest urban center, located on Lombok Island with the most developed market infrastructure and highest population density.

    b. Bima City: A significant urban center located on Sumbawa Island, representing markets in the eastern portion of the province with different geographic and logistical characteristics.

c. Sumbawa Regency: Representing markets in the central Sumbawa Island region, with intermediate development levels between Mataram and Bima.

The selection of these specific commodities and locations reflects strategic considerations regarding data availability, policy relevance, and analytical value. Rice and shallots together represent both staple grain and perishable horticultural categories, enabling comparison of price behavior across commodity types with different storage characteristics and supply chain requirements. The three locations provide geographic diversity while maintaining data comparability through consistent BPS measurement protocols.

Analytical Techniques

This research employs three complementary analytical techniques to characterize food price dynamics comprehensively:

1. Descriptive Statistical Analysis

Basic descriptive statistics provide foundational characterization of price distributions and central tendencies. For each commodity-location combination, the analysis calculates:

a. Mean (arithmetic average) price across all twelve months, representing the typical price level for the year

b. Standard deviation, measuring the absolute dispersion of monthly prices around the mean

c. Minimum and maximum values, identifying price extremes and the range of variation

d. Monthly price levels, documenting the specific price trajectory throughout the year

These descriptive measures enable initial assessment of price levels, variation magnitudes, and temporal patterns. Comparison of mean prices across locations reveals systematic spatial differences, while comparison of standard deviations indicates relative volatility levels in absolute terms.

2. Coefficient of Variation Analysis

The coefficient of variation (CV) provides a standardized measure of price volatility that enables valid comparison across commodities and locations with different mean price levels. The CV is calculated as:

$$CV = (\text{Standard Deviation} / \text{Mean}) \times 100\%$$

This metric expresses volatility as a percentage relative to the average price, overcoming the limitation of standard deviation which cannot be meaningfully compared across series

with substantially different means. Lower CV values indicate greater price stability, while higher values suggest more pronounced volatility. In commodity price analysis, CV values are often interpreted using the following rough guidelines:

a. CV < 10%: Relatively stable prices

b. CV 10-20%: Moderate volatility

c. CV > 20%: High volatility

The CV enables rigorous comparison of stability across the six commodity-location combinations examined in this study, identifying which markets maintain more consistent prices throughout the year.

3. Temporal Pattern Visualization

Graphical presentation of monthly price trajectories provides intuitive insight into temporal patterns that may not be immediately apparent from numerical statistics alone. Line graphs plotting price levels across the twelve-month period enable identification of:

a. Seasonal patterns, including regular cycles of price increases and decreases corresponding to harvest seasons, demand surges, or other recurring factors

b. Trend components, representing underlying directional movements (increasing, decreasing, or stable) over the year

c. Irregular fluctuations and price shocks that deviate from normal patterns

d. Timing of price peaks and troughs, which may correspond to specific events or conditions

Visual analysis complements numerical statistics by revealing the shape and character of price movements, supporting more nuanced interpretation of market dynamics.

Data Processing and Analysis Procedures

The research follows a systematic analytical workflow:

1. Data compilation: Monthly price data for both commodities across all three locations are organized into structured datasets suitable for statistical analysis.

2. Descriptive statistics calculation: Mean, standard deviation, minimum, maximum, and monthly values are computed for each commodity-location series.

3. Coefficient of variation calculation: CV values are derived from descriptive statistics to standardize volatility measures.

4. Comparative analysis: Statistical measures are compared across locations for each commodity to identify spatial patterns and differences.

5. Temporal analysis: Monthly price trajectories are examined to identify seasonal patterns, trends, and notable fluctuations.

6. Integrated interpretation: Findings from descriptive statistics, CV analysis, and temporal patterns are synthesized to develop comprehensive understanding of price dynamics.

7. Policy implications derivation: Analytical findings are translated into practical recommendations for price stabilization and food security enhancement.

This methodological approach provides rigorous yet accessible analysis of food price dynamics, generating insights that balance statistical rigor with policy relevance and practical applicability.

C. Result and Discussion

Rice Price Dynamics

Analysis of C4 grade I quality rice prices across the three study locations throughout 2024 reveals distinct patterns in both absolute price levels and temporal variations. The annual average prices demonstrate clear spatial differentiation, with Mataram City recording the lowest mean price at Rp14,780 per kilogram, followed by Sumbawa Regency at Rp15,361 per kilogram, and Bima City exhibiting the highest average at Rp15,447 per kilogram. This spatial hierarchy persists consistently throughout most of the year, suggesting systematic rather than random factors underlying the price differentials.

The temporal dimension of rice price variation shows that across all three locations, prices reached their annual peak during March 2024, with the highest recorded price of Rp16,666 per kilogram. Conversely, the lowest rice prices occurred during May 2024, bottoming at Rp14,568 per kilogram. This seasonal pattern aligns with typical Indonesian rice market cycles, where prices tend to increase during the early months of the year corresponding to the lean season between major harvest periods, then decline during the main harvest season that typically occurs around April-May in many rice-producing regions.

The price differential between Mataram City and Bima City averages approximately Rp667 per kilogram, representing roughly a 4.5% premium in Bima relative to Mataram. While this may appear modest in percentage terms, the cumulative impact on household food expenditure is significant given rice's role as the primary staple food consumed daily by the vast majority of households. For a typical household consuming 10 kilograms of rice per week, this price differential translates to additional annual expenditure of approximately Rp347,000, representing a meaningful burden particularly for lower-income families.

Coefficient of variation analysis provides insight into relative price stability across the three locations. Mataram City demonstrates the lowest CV at 6.2%, indicating relatively stable prices throughout the year with limited deviation from the annual mean. Sumbawa Regency shows intermediate stability with a CV of 7.1%, while Bima City exhibits the

highest volatility at 8.0%. All three locations maintain CV values below 10%, suggesting that rice prices in NTB Province generally remain within the "relatively stable" category according to standard volatility classifications. However, the notable difference between Mataram's 6.2% and Bima's 8.0% indicates that consumers and businesses in Bima face substantially greater price uncertainty and variation compared to those in the provincial capital.

Several interconnected factors explain these observed spatial patterns in rice prices. Geographic location and transportation infrastructure play crucial roles. Mataram City, as the provincial capital located on Lombok Island, benefits from superior port facilities, road networks, and market infrastructure that facilitate efficient rice distribution from production areas within Lombok and from inter-island suppliers. The concentration of wholesale markets, rice mills, and distribution networks in Mataram creates competitive market conditions that tend to moderate prices and reduce volatility.

In contrast, Bima City's location on Sumbawa Island introduces additional logistical challenges and costs. Rice supply to Bima typically involves inter-island transportation via sea freight, adding shipping costs, loading and unloading expenses, and time delays that contribute to higher final retail prices. The smaller market size in Bima compared to Mataram may also result in fewer wholesale suppliers and less competitive pressure to minimize margins. Additionally, Bima's geographic position in the eastern portion of NTB Province places it farther from major rice production centers in Java and Sulawesi, potentially increasing procurement costs for traders and retailers.

Market structure considerations also influence price formation and stability. Mataram's larger population and more developed economy support a greater number of rice retailers, wholesalers, and market intermediaries. This enhanced market thickness promotes competition and provides consumers with more shopping options, constraining individual vendors' ability to charge premium prices. The presence of modern retail formats including supermarkets and minimarkets in Mataram adds competitive pressure on traditional markets. Conversely, Bima's smaller and more concentrated retail sector may exhibit less competitive intensity, enabling higher markups and greater price dispersion across vendors.

Storage and inventory management capabilities differ across locations, affecting price stability. Mataram benefits from more extensive warehousing infrastructure and better access to cold storage facilities that enable traders to hold larger buffer stocks. These inventory capacities allow market participants to smooth supply fluctuations by releasing stocks during scarcity periods and accumulating stocks during abundant supply periods, thereby dampening price volatility. Limited storage infrastructure in smaller cities like Bima constrains this stabilizing mechanism, contributing to greater price sensitivity to short-term supply variations.

Government policy implementation and market intervention effectiveness also vary spatially. Bulog, Indonesia's state logistics agency responsible for rice market operations and price stabilization, maintains more extensive operational presence and inventory holdings in provincial capitals like Mataram compared to secondary cities. This differential presence affects the speed and magnitude of government responses to price

movements, potentially contributing to greater stability in locations with stronger institutional presence.

The seasonal price pattern observed across all locations reflects fundamental supply-demand dynamics in agricultural markets. The price peak in March corresponds to the lean season when carry-over stocks from the previous harvest period diminish while the new harvest has not yet reached markets in substantial volume. Household demand remains constant throughout the year, but supply constraints during this period create upward price pressure. The subsequent price decline during May reflects the main harvest period when fresh rice supplies flood markets, increasing availability and moderating prices. This seasonal cycle is endemic to agricultural commodities with discrete harvest periods and represents a natural market phenomenon that stabilization policies aim to moderate but cannot entirely eliminate.

Weather conditions and climate variability can amplify or dampen these seasonal patterns. While the data do not include specific weather information for 2024, variations in rainfall, temperature, and extreme weather events during critical growing periods can affect harvest timing and yield outcomes, consequently influencing price trajectories. The relatively moderate volatility observed in 2024 suggests that the province did not experience major production shocks or severe weather disruptions during the year.

From a policy perspective, the finding that Mataram maintains substantially more stable prices than Bima suggests that investments in market infrastructure, transportation networks, and institutional capacity generate tangible benefits in terms of price stability and consumer welfare. The 30% higher coefficient of variation in Bima compared to Mataram (8.0% versus 6.2%) indicates significant scope for improvement through targeted interventions addressing the systematic factors underlying this differential.

Shallot Price Dynamics

Shallot prices demonstrate markedly greater volatility compared to rice across all three study locations, reflecting the distinct characteristics of horticultural products versus grain commodities. The annual average price across all locations reached Rp32,266 per kilogram, substantially higher than rice prices in absolute terms. However, shallot prices exhibited dramatic variation throughout the year, with prices ranging from a minimum of Rp19,006 per kilogram to a maximum of Rp41,736 per kilogram. This represents a price range exceeding 100% from minimum to maximum, demonstrating the extreme price swings that characterize fresh vegetable markets.

Spatial price patterns for shallots mirror those observed for rice but with more pronounced differentials. Mataram City again recorded the lowest average price at Rp28,451 per kilogram, while Bima City exhibited the highest mean price at Rp34,644 per kilogram. The intermediate position is occupied by Sumbawa Regency with an average price of Rp33,532 per kilogram. The price premium in Bima relative to Mataram amounts to approximately Rp6,193 per kilogram or roughly 22%, substantially larger in percentage terms than the rice price differential. This wider gap reflects the greater logistical challenges and risks associated with transporting and marketing a perishable commodity with shorter shelf life compared to dried grains.

Temporal analysis reveals a pronounced seasonal pattern in shallot prices. The annual price peak occurred during April-May 2024, coinciding with the period immediately preceding and during the Eid al-Fitr holiday celebration. This timing reflects the sharp surge in shallot demand associated with increased cooking and food preparation activities surrounding major religious holidays when households prepare special meals and host guests. The combination of heightened demand and potentially constrained supply during this period generates upward price pressure that can double or even triple prices relative to baseline levels.

Following the holiday period, shallot prices declined substantially, reaching their annual trough during August 2024. This price correction reflects both the normalization of demand following the holiday surge and the arrival of main harvest supplies from production regions. The timing aligns with typical shallot planting and harvest cycles in Indonesia, where main season production generally peaks during mid-year months, flooding markets with fresh supplies that depress prices to annual lows.

Coefficient of variation analysis for shallots reveals extremely high volatility across all locations. While precise CV values for each location are not specified in the data presentation, the observation that prices ranged from Rp19,006 to Rp41,736 with an annual mean of Rp32,266 implies a provincial-level CV exceeding 20%, well into the "high volatility" classification. This contrasts sharply with rice's relatively stable CV values below 10%, highlighting the fundamental differences in market dynamics between storable grains and perishable horticultural products.

Several interconnected factors drive the substantially higher volatility observed in shallot markets compared to rice. Production risk represents a primary source of supply uncertainty. Shallots are more susceptible to weather variations, pest and disease outbreaks, and other production shocks compared to rice. The shorter growing cycle for shallots (approximately 60-70 days) means that adverse conditions during critical growth stages can rapidly affect yields with limited opportunity for recovery. Furthermore, shallot production in Indonesia tends to be concentrated in specific regions with suitable climatic conditions, creating geographic concentration that amplifies the impact of localized production problems on national and regional supply.

Storage limitations constrain market participants' ability to smooth supply across time periods. While rice can be stored for extended periods (months to years) with relatively simple warehousing, shallots have limited shelf life even under optimal conditions. Fresh shallots typically remain marketable for several weeks to a few months, depending on storage conditions and post-harvest handling practices. This storage constraint means that harvest-period supplies must be marketed relatively quickly, creating price collapses when production exceeds immediate demand. Conversely, during off-season periods when fresh supplies diminish, prices can spike dramatically as available stocks dwindle and quality deteriorates.

Demand characteristics also contribute to price volatility. Shallot consumption exhibits greater elasticity compared to staple foods like rice, meaning that consumers readily adjust purchase quantities in response to price changes. When prices surge, households can reduce consumption, substitute with alternative ingredients, or defer non-urgent purchases. This demand responsiveness creates feedback effects that can amplify price

movements in either direction. Additionally, the pronounced demand spikes associated with religious holidays and festive occasions create predictable but concentrated pressure on supply that generates dramatic seasonal price peaks.

Market structure in shallot supply chains differs from rice markets in ways that affect price transmission and volatility. Shallot marketing typically involves more intermediary steps from farmer to final consumer, including local collectors, wholesale traders, inter-regional traders, and retailers. Each intermediary layer adds margins and introduces information asymmetries that can slow price adjustments and create greater dispersion. The perishability constraint also creates urgency in marketing decisions that may reduce farmers' bargaining power and enable traders to capture larger shares of the final retail price.

Government intervention in shallot markets remains less developed compared to rice. While Indonesia has historically prioritized rice price stabilization through various programs including Bulog operations, floor price policies, and strategic reserves, equivalent mechanisms for horticultural products like shallots are limited or absent. Import policies occasionally adjust tariffs or quotas for shallots in response to domestic price spikes, but these interventions tend to be reactive rather than proactive, and their effectiveness in rapidly moderating prices is constrained by implementation lags and limited scale.

The systematic price premium in Bima compared to Mataram, approximately 22% for shallots versus 4.5% for rice, reflects the amplified impact of transportation and logistics costs for perishable products. Shallots require more careful handling, faster transportation, and potentially refrigerated storage to maintain quality during inter-island shipment. The risk of spoilage and quality deterioration during transport increases costs and uncertainty, which market participants incorporate into pricing decisions through higher markups and risk premiums.

From a consumer welfare perspective, the extreme volatility in shallot prices creates significant challenges for household budget management and food security, particularly for lower-income families. When prices spike to Rp41,736 per kilogram, shallots become unaffordable for many households, forcing consumption reductions or complete substitution with alternative ingredients. This volatility also affects food service businesses, traditional market vendors, and other commercial entities that use shallots as essential inputs, creating planning difficulties and profit uncertainties.

Comparative Analysis and Market Integration

Comparing the price dynamics of rice and shallots reveals fundamental differences in market behavior between storable staple foods and perishable horticultural products. Rice exhibits relatively stable prices with moderate seasonal variation and limited spatial dispersion, reflecting its characteristics as a storable commodity with well-developed marketing infrastructure and active government price support mechanisms. Shallots demonstrate extreme volatility, pronounced seasonal swings, and wider spatial price differentials, reflecting perishability constraints, limited storage options, concentrated production, and minimal policy intervention.

Despite these differences, both commodities exhibit consistent spatial hierarchies with Mataram maintaining the lowest prices and Bima recording the highest prices throughout the year. This pattern suggests systematic structural factors affecting all food commodities rather than product-specific circumstances. The geographic advantages of the provincial capital including superior infrastructure, larger market size, greater competition, and stronger institutional presence create a generally more favorable price environment for consumers across different food categories.

The persistence of substantial price differentials throughout the year indicates incomplete market integration across NTB Province's urban centers. In perfectly integrated markets, spatial price differences would be limited to transportation costs and normal marketing margins, with arbitrage opportunities quickly eliminated by traders shipping commodities from low-price to high-price locations. The observed persistent differentials exceeding plausible transportation costs suggest barriers to market integration including limited trader activity, information asymmetries, capital constraints limiting arbitrage operations, or insufficient transportation and storage infrastructure connecting the locations.

Seasonal patterns in both commodities demonstrate the importance of production cycles and harvest timing in price formation. Even for storable commodities like rice, seasonal patterns persist due to storage costs, capital constraints that limit traders' willingness to hold large inventories, and consumer preferences for fresh rather than aged products. For perishable products like shallots, these seasonal effects are dramatically amplified by storage limitations and spoilage risks. The temporal synchronization of price movements across locations indicates that all markets respond to common underlying supply and demand factors rather than operating in isolation.

The pronounced price spike during the Eid al-Fitr period for shallots illustrates how cultural and religious factors interact with agricultural supply patterns to generate predictable but extreme price movements. This pattern creates both challenges and opportunities for policy intervention. The predictability enables anticipatory actions including encouraging production timing to increase supplies during high-demand periods, facilitating imports to supplement domestic supplies, or implementing temporary price controls or subsidies. However, the short-duration and high-magnitude nature of these spikes complicates intervention design and may limit effectiveness of responses that require extended implementation periods.

From a food security perspective, the findings indicate that households in different NTB locations face substantially different food price environments. Bima residents consistently pay significant premiums for both rice and shallots compared to Mataram residents, reducing purchasing power and potentially constraining food access and diet quality. These disparities occur within a single province under common governance, suggesting substantial scope for policy interventions to reduce spatial inequities through infrastructure development, market system improvements, and targeted distribution programs.

Policy Implications and Recommendations

The analytical findings generate several important implications for food security policy and market regulation in Nusa Tenggara Barat Province. First, the systematic price

premiums and higher volatility in Bima City and Sumbawa Regency compared to Mataram indicate that peripheral locations would benefit disproportionately from investments aimed at improving market integration and reducing marketing costs. Priority areas include transportation infrastructure (roads, ports, and shipping services), storage facilities (warehousing and cold storage), and market information systems that reduce information asymmetries and facilitate more efficient price discovery and arbitrage.

Second, the extreme volatility in shallot prices suggests the need for horticultural price stabilization mechanisms beyond the existing rice-focused programs. Potential interventions include establishing strategic horticultural reserves that can be released during price spikes, facilitating producer cooperatives and contract farming arrangements that provide income stability for farmers while ensuring more predictable supplies for markets, and developing futures or options markets that enable price risk management by market participants. Given budget and implementation capacity constraints, initial efforts might focus on high-impact products like shallots and during predictable high-risk periods such as major holiday seasons.

Third, strengthening regional food security requires more balanced attention to infrastructure development across the province rather than concentrating investments in the provincial capital. While Mataram's superior market conditions benefit residents of the provincial capital, this creates widening inequities with peripheral areas. Deliberate efforts to develop market infrastructure, strengthen distribution networks, and support commercial development in cities like Bima can reduce systematic disadvantages faced by residents of these locations. This may include developing regional distribution centers, supporting regional wholesale markets, and ensuring transportation network quality and capacity throughout the province rather than primarily connecting peripheral areas to Mataram.

Fourth, enhanced market monitoring and early warning systems would enable more timely and effective policy responses to emerging price pressures. While BPS provides valuable regular price data, supplementing this with more frequent monitoring, leading indicators of supply conditions, and predictive modeling could enable anticipatory rather than reactive interventions. Modern information technology including mobile applications, online market information platforms, and data analytics capabilities offer opportunities to enhance market transparency and responsiveness at relatively modest cost.

Fifth, addressing underlying production variability represents a complementary approach to market-side interventions. Supporting agricultural productivity improvements, climate-resilient farming practices, irrigation infrastructure development, and pest and disease management systems can reduce production risk and supply volatility at the source. For shallots specifically, promoting production diversification across multiple growing regions and harvest timing can create more continuous supply flows that moderate seasonal price swings. Extension services, farmer training programs, and agricultural research and development investments constitute foundational elements of long-term food security that complement market-focused interventions.

Sixth, the role of regional food enterprises (Badan Usaha Milik Daerah or BUMD) in food distribution and price stabilization deserves strengthening. These entities, with

appropriate capitalization and professional management, can serve as market stabilizers by purchasing supplies during abundant periods and releasing them during scarcity periods, directly competing with private traders to ensure competitive market conditions, and serving remote or underserved markets where private sector participation remains limited. However, effective BUMD operation requires avoiding political interference, ensuring commercial viability considerations balance social objectives, and maintaining professional standards in procurement, storage, and distribution operations.

Seventh, consumer protection measures including price monitoring, anti-hoarding enforcement, and competition policy implementation can address market power abuses that contribute to excessive prices or volatility. While market forces should generally determine prices, regulatory oversight remains important to prevent collusion, artificial scarcity creation, or other anticompetitive practices that harm consumers. Enforcement capacity and legal frameworks for these functions require continuous development and adequate resource allocation.

Finally, regional cooperation and coordination across districts and cities within NTB Province can generate economies of scale and scope in addressing food security challenges. Shared approaches to strategic reserve management, coordinated infrastructure development, joint procurement initiatives, and harmonized regulatory frameworks can enhance effectiveness while reducing costs compared to fragmented district-level efforts. Provincial government leadership in facilitating this coordination, while respecting local autonomy and specific needs, represents an important governance function for effective food security management.

D. Conclusion

The study reveals that rice and shallot prices in Nusa Tenggara Barat Province throughout 2024 experienced noticeable seasonal fluctuations, reflecting the influence of harvest cycles and local supply dynamics. Among the three observed regions, Mataram City demonstrated relatively stable price movements compared to Bima City and Sumbawa Regency, indicating better market access and distribution efficiency. The main factors contributing to price disparities among these cities include transportation costs, logistical distribution networks, and variations in harvest timing. Therefore, effective price stabilization efforts should focus on improving distribution efficiency, strengthening local food stock management, and enhancing regional coordination to ensure sustained price stability and consumer affordability throughout the year.

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