

## THE EFFECT OF FOOD PRICE VOLATILITY (FPV) ON INFLATION IN PAREPARE CITY

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### ABSTRACT

Food price volatility often occurs and cannot be avoided, including food price volatility that occurs in Parepare City. The effect of movement or changes in food prices appears to influence inflation, which in turn becomes the purpose of this study, namely to analyze the effect of changes in food prices on inflation in Parepare City. The analysis method used is multiple linear regression analysis. The data used is secondary data in the form of monthly time series from July 2018 to June 2021. The independent variables in this study are the food prices of rice, chicken meat, red chili, chicken eggs and granulated sugar. The results showed that the food prices of rice and chicken eggs have an increasing trend while the prices of chicken meat, red chili, and granulated sugar tend to decrease. The coefficient of determination test results shows that changes in food prices simultaneously positively and significantly affect inflation. The t-statistical test shows that partially changes in food prices of rice and chicken meat have a positive and significant effect on inflation while changes in food prices of red chili, chicken eggs and granulated sugar have a positive but insignificant effect on inflation. This research has implications for public policy to develop food prices stabilization policies, such as food reserve policies, market regulations, incentives for food producers, or social assistance programs to alleviate the impact of food inflation.

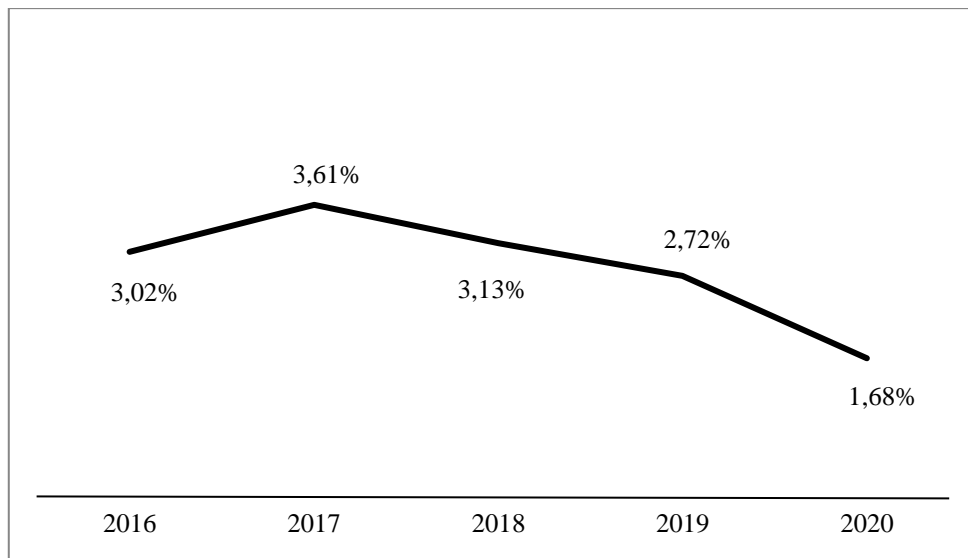
**Keywords:** *food prices, inflation, volatility*

### BACKGROUND

Inflation is a process in which prices increase generally and continuously related to market mechanisms that can be caused by various factors, such as increased public consumption, excess liquidity in the market, or due to the lack of smooth distribution of goods. According to Penangsang et al. (2020) inflation is the process of an event, not just a matter of high-low price levels. A price level that is considered high does not necessarily indicate inflation and inflation is an indicator to see the level of change that is considered to occur if the process of rising prices continues and affects each other. The same thing is expressed by Panjaitan & Wardoyo (2016) that inflation is one of the indicators of economic stability. For developing countries like Indonesia, inflation is an economic issue that is always an important concern. Low and stable inflation will be a stimulator of economic growth. Inflation is often associated with social, political and economic turmoil in a country.

Inflation is one of the economic indicators that can reflect if a region's economy is doing well or poorly. A high inflation rate indicates a slowing in economic growth, but deflation is not always a

good thing. When the region's inflation rate is stable, the economy is said to be improving (Usman et al., 2020).



**Figure 1.** National Inflation 2016-2020.

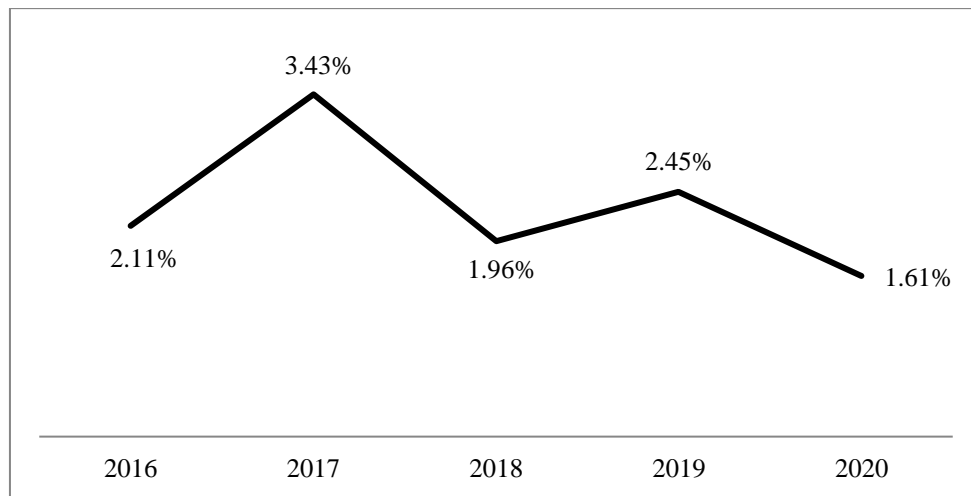
Source: Central Bureau of Statistics (BPS) (2017-2021)

Figure 1 shows that inflation gradually decreased from 2018 (3.13%) to 2020 (1.68%) after experiencing an increase in 2017 (3.61%). National inflation in 2020 is low and below the target range of  $3.0 \pm 1\%$ . The small figure is influenced by domestic demand that has not been strong as a result of the Covid-19 pandemic, adequate supply, and policy synergy between Bank Indonesia and the Government both at the central and regional levels in maintaining price stability (Central Bank of Indonesia, 2021).

South Sulawesi is one of the provinces in Indonesia that contributes to national inflation. As a province with considerable economic activity, changes in the prices of goods and services in South Sulawesi can significantly impact the national inflation rate. The inflation rate in South Sulawesi Province often changes every year. In 2022 there was a combined year on year (yoy) inflation of five cities in South Sulawesi (Bulukumba, Watampone, Makassar, Parepare, and Palopo) of 5.77% with a Consumer Price Index of 114.14. Based on the five CPI cities in South Sulawesi, the highest yoy inflation occurred in Parepare at 6.66% with a CPI of 115.98 and the lowest yoy inflation occurred in Bulukumba at 4.12 with a CPI of 113.51. The main commodities contributing to yoy inflation in December 2022 included gasoline, air transportation, eggs, rice, filter clove cigarettes, house contracts, shallots, oily pastries, tomatoes, and detergent powder/liquid soap.

Parepare City is one of the major cities in South Sulawesi with the second largest population density after Makassar City, which is 1,524.76 per km<sup>2</sup>. Data from the Central Bureau of Statistics (2021) shows that the population of Parepare City is 151.1 (thousand) people. A large enough population causes the demand for food to increase but sometimes the supply of food is not enough to meet demand. Increased growth will increase consumption (as a component of aggregate demand) which will be responded to by price increases. As the rate of global population growth slows down, the growth of food consumption per person resulting from per capita income growth is driving food

consumption per person resulting from per capita income growth is driving food demand. Increased consumption indicates high demand and thus an increase in prices (Fukase & Martin, 2020).



**Figure 2.** Parepare City Inflation 2016-2020

Source: Central Bureau of Statistics (BPS) (2017-2021)

Figure 2 shows that Parepare City's inflation rate in the last five years was highest in 2017 at 3.43%. This figure has increased from the previous year's inflation which was only at 2.11%. In 2018 inflation decreased to 1.96% and then increased again the following year by 2.45%. In 2020 inflation fell again to 1.61%. Inflation that occurred in Parepare City was mostly influenced by price increases in the food, beverage and tobacco commodity groups. Parepare City inflation in 2020 was the fourth highest among all cities and districts in South Sulawesi.

In 2021 Parepare City experienced quite low inflation, which was below 1.00%. Based on BPS data (2021), the highest inflation in Parepare City in 2021 occurred in April, which was 0.92% and the lowest inflation in May was 0.87%. In April, which was 0.92% and the lowest inflation in May was 0.87%. Parepare City inflation is always below 10% so it can be said that the inflation that occurs in Parepare City is mild inflation. Price volatility in food commodities is the biggest contributor to the national inflation rate (Penangsang et al., 2020). This is similar to Parepare City, where inflation is often caused by an increase in the food, beverage, and tobacco groups. Based on Rahmanta & Maryunianta (2020), fluctuations in food prices occur rapidly, so there is a need for a food price stability policy. The implementation of this policy will provide three benefits, namely (1) Farmers as producers, are protected from price declines that enable them to act more efficiently; (2) Protecting low-income middle and lower-class consumers from price increases can be a social safety net; and (3) Encouraging investment and economic growth by creating more stable macroeconomic conditions.

Based on the description above, the research regarding the effect of food price volatility on inflation is interesting, where the food prices include rice, chicken meat, red chili, eggs and sugar in Parepare City. The selection of these five foodstuffs is based on the consideration that these five foodstuffs are part of the ten foodstuffs that make a dominant contribution to the development of inflation according to the Strategic Food Price Information Center (SFPIC).

## RESEARCH METHODS

The data collection method used in this research is the documentation method in the form of secondary data sets obtained from the Parepare City Statistics Agency and the Strategic Food Price Information Center. Monthly inflation data for Parepare City from July 2017 to June 2021 was obtained from the Central Bureau of Statistics of Parepare City. Data on the development of average monthly prices of the research focus foodstuffs (rice, chicken meat, cayenne pepper, chicken eggs, and sugar) from July 2017 to June 2021 were obtained from the Strategic Food Price Information Center (SFPIC). These five commodities are the main commodities that contributed to inflation in 2017-2021 in Pare-Pare City (Central Bureau of Statistics of Parepare City, 2022).

This study used multiple linear regression analysis which aims to analyze the effect of changes in food commodity prices on inflation in Parepare City. Multiple linear regression analysis is a method or technique of analyzing research hypotheses to test whether there is an influence between several variables with other variables expressed in the form of mathematical equations (regression) (Tenriawaru et al., 2023). The variables measured in this study consist of dependent variables and independent variables. The dependent variable in this study is Parepare City Inflation. The independent variables in this study consist of changes in the price of rice, chicken meat, red chili, chicken eggs and sugar. The analysis is done with several stages: stationarity testing, cointegration, classical assumptions and statistical tests. The test model using multiple linear regression method is done with the following equation:

$$INF = \beta_0 + \beta_1BR + \beta_2DA + \beta_3CM + \beta_4TA + \beta_5GP + e$$

Information:

INF : Inflation (%)

$\beta_0$  : Intercept

$\beta_1, \dots, \beta_5$  : Regression Coefficient

BR : Volatility of Rice Prices (Rp/Kg)

DA : Volatility of Chicken Meat Prices (Rp/Kg)

CM : Volatility of Red Chili Prices (Rp/Kg)

TA : Volatility of Chicken Egg Prices (Rp/Kg)

GP : Volatility of Sugar Prices (Rp/Kg)

## RESULT AND DISCUSSION

One of the requirements that must be met in modeling time series data is stable or stationary data from the variables in the regression equation. Testing is done by conducting a unit root test. The test results can be seen in Table 1.

**Table 1.** Unit Root Test (in Level) on the Effect of Price Volatility on Inflation (July 2017 - June 2021)

Variable	ADF Value	Critical Values MacKinnon (5%)	Prob.	Note
Rice	-7.078991	-2.941145	0.0000	Stationary
Chicken Meat	-8.900637	-2.926622	0.0000	Stationary
Red Chili	-6.949021	-2.925169	0.0000	Stationary
Chicken Eggs	-7.094077	-2.929734	0.0000	Stationary
Sugar	-5.634132	-2.925169	0.0000	Stationary
Inflation	-3.508363	-2.931404	0.0124	Stationary

Table 1 shows that all the variables used in the model are stationary at the level. This can be seen from the ADF value of each variable is smaller than the MacKinnon critical value (5%). In accordance with Sarungu & Endah (2013) which states that the data is said to be stationary if the absolute value of the ADF statistic is smaller than the MacKinnon critical value. Because the data is stationary at the level level, integration testing at level one or two does not need to be done and the regression model can be said to be valid.

### Cointegration Test

Stationary data indicates the existence of a long-term equilibrium relationship in the model used. Cointegration test is one of the tests conducted on time series data. The cointegration test results can be seen in Table 2.

**Table 2.** Cointegration Test on the Effect of Price Volatility on Inflation (July 2017-June 2021)

Trace Statistic	0.05 Critical Value	Prob.	Note
227.4874	95.75366	0.0000	Cointegrated

Table 2 shows that the trace statistic value of all observed variables (227.4874) is greater than its critical value (95.75366) and the probability (0.0000) is smaller than the confidence degree used (0.05). Based on these values, it can be concluded that there is a long-term effect of changes in the prices of rice, chicken meat, red chili, chicken eggs and sugar on inflation. This is in accordance with Atmaja et al. (2015) which states that there is cointegration if the trace statistic value is greater than the critical value at a 5% confidence degree or the probability value is smaller than the confidence degree value (0.05).

### Statistic Test

Multiple linear regression is used to test the effect of independent variables on dependent variables. The test results can be seen in Table 3.

**Table 3.** Multiple Linear Regression of the Effect of Food Price Volatility on Inflation (July 2017 - June 2021)

Model	Coeffisient	t-value	Sig.
(Constant)	0.190	2.321	0.025
Rice	0.001	2.485	0.017
Chicken Meat	7.939E-5	2.806	0.008
Reed Chili	1.737E-5	1.294	0.203
Chicken Eggs	1.027E-5	0.245	0.808
Sugar	9.697E-5	0.783	0.438

Based on the table 3, the test results obtained the multiple linear regression model equation as follows:

$$INF = 0.190+0.001BR+7.939E-5DA+1.737E-5CM+1.027E-5TA+ 9.697E-5GP + e$$

The model showed the intercept or constant value and the direction of the relationship as well as the regression coefficients. Based on the model, it can be seen that the constant value is 0.190. The five independent variables have a positive direction of relationship to the dependent variable, as seen from the coefficient value of each variable which is positive. seen from the coefficient value of each variable which is positive. The coefficient of variable X1 (rice price) is 0.001. The coefficient of variable X2 (chicken meat price) is 7.939E-5, which is equivalent to 0.00007939. The coefficient of variable X3 (red chili price) is 1.737E-5, which is equivalent to 0.00001737. The coefficient of variable X4 (chicken egg price) is 1.027E-5, which is equivalent to 0.00001027 and the coefficient of variable X5 (granulated sugar price) is 9.697E-5, which is equivalent to 0.00009697. Statistical tests on multiple linear regression models are then carried out to test whether the relationship formed in the model is significant or not.

**Determination Coefficient Test (R<sup>2</sup>)**

The coefficient of determination test shows how well variable X can explain the model in regression. Nahrowi dan Usman in Leiley et al. (2020) explained that the coefficient of determination ranges from 0 - 1, the closer to 1, the better the independent variable in explaining the diversity of the model.

**Table 4.** Determination Coefficient Test on the Effect of Food Price Volatility on Inflation (July 2017 - June 2021)

R	R Square (R <sup>2</sup> )	Adjusted R Square
0.532	0.783	0.198

Table 4 shows that the R2 value is 0.783. This means that 78.3% of inflation is influenced by the price volatility of rice, chicken meat, red chili, chicken eggs and sugar. While the other 21.7% is influenced by other variables that are not included in the regression model in the research.

**F-Statistical Test**

The F-Statistical Test shows whether together the independent variables have a significant effect on the dependent variable. The degree of confidence used in this study is 0.05. Together the

independent variables affect the dependent variable when the significance value of the test results shows a number smaller than 0.05.

**Table 5.** F-Statistical Test on the Effect of Food Price Volatility on Inflation (July 2017 - June 2021)

Model	F	Sig.	Note
Regression	3.318	0.013	Affected

Table 5 shows that the calculated F value is 3.318 with a significance of 0.013. This value indicates that simultaneously the independent variable affects the dependent variable because  $0.013 < 0.05$ . This is in line with the research of Lesnussa et al. (2018) which stated that if the significance value of the calculation results is smaller than the degree of confidence used, the hypothesis stating that all independent variables simultaneously have a significant effect on the dependent variable is accepted.

The price volatility variables of rice, chicken meat, red chili, chicken eggs and sugar simultaneously significantly affect inflation. This means that when the price of the five foodstuffs increases simultaneously, it will be followed by an increase in inflation. High price fluctuations in rice, broiler chicken meat, red chili, eggs, and sugar may indicate market supply or demand instability. This can affect consumer purchasing power and disrupt price stability. The implication is that it is important to maintain stable supply and control price fluctuations to not negatively impact inflation. In addition, these five commodities are an important part of household consumption. If these prices fluctuate, it can affect overall household spending and consumption. If these prices continue to rise, consumers will find it difficult to fulfill their daily needs, leading to inflation. This is in line with Yuliati & Hutajulu (2020) research on the effect of food commodity prices on inflation, which shows that price changes that occur in food commodities can contribute to inflation.

**Partial Test (Statistical t-Test)**

The t statistical test is used to determine whether the independent variables partially have a real effect or not on the dependent variable. The degree of confidence used is 0.05. If the significant value is smaller than the degree of confidence, the hypothesis is accepted, which means that an independent variable partially or individually affects the dependent variable (Lesnussa et al., 2018).

**Table 6.** Statistical t-Test on the Effect of Food Price Volatility on Inflation (July 2017 - June 2021)

Model	Coeffisient	t	Sig.	Information
Rice	0.001	2.485	0.017	Affected
Chicken Meat	7.939E-5	2.806	0.008	Affected
Red Chili	1.737E-5	1.294	0.203	Not Affected
Chicken Eggs	1.027E-5	0.245	0.808	Not Affected
Granulated Sugar	9.697E-5	0.783	0.438	Not Affected

Based on testing the regression model (Table 6), it can be seen that two of the five independent variables have a significant effect on inflation as the dependent variable. These variables are price changes in the commodities of rice and chicken meat, while the price changes of red chili, chicken eggs and sugar do not have a significant effect on inflation in Parepare City. This can be seen from

the significance value of each independent variable which when the value is  $< 0.05$ , it can be concluded that the variable has a significant effect on inflation.

The results of data analysis showed that the rice price volatility variable has a significant effect on inflation seen from its significance which has a value of  $0.017 < 0.05$  with a regression coefficient of  $0.001$ . This figure means that a 1% increase in rice prices will push inflation by  $0.001\%$ , assuming that the other independent variables are constant. Furthermore, it also showed that the higher the price of rice at the consumer level, the higher the inflation. Rice is an important staple food in many countries, including Indonesia. If rice prices fluctuate, this can directly impact people's consumption. Increasing rice prices can lead to an increase in the cost of living and lower consumer purchasing power. The implication is that rice price changes can affect inflation and people's welfare. Rice has an important role in inflation as it is a commodity that has a significant weight in the consumer price index. The results of this analysis are in line with the results of research by Setiawan & Hadianto (2014) which states that price shocks in rice food will have an impact on increasing inflation. The effect of rice prices on inflation is thought to be because rice is a food commodity consumed directly by the community so its consumption value is much higher than other foodstuffs. Price changes in rice generally will not reduce people's purchasing power because rice is a staple food that must be available. Based on data from the Central Bureau of Statistics (2021) in 2020 rice contributed  $0.0516\%$  to inflation in Parepare City.

Furthermore, the chicken meat price volatility variable has a significance value of  $0.008 < 0.05$  with a regression coefficient value of  $7.939E-5$  which means that the variable change in chicken meat prices has a positive and significant effect on inflation. An increase of 1% in the price of chicken meat will push up inflation by  $0.00007939\%$  assuming that the other independent variables are constant. This showed that the higher the price of chicken meat at the consumer level, the higher the inflation. Chicken meat is an important source of animal protein in public consumption. If chicken meat prices fluctuate, this can have a direct impact on people's food consumption and eating habits. An increase in the price of chicken meat can lead to an increase in the cost of living and reduce consumer purchasing power. The implication is that changes in chicken meat prices can affect inflation as well as people's welfare. In addition, the results of this analysis are in line with the research of Setiawan & Hadianto (2014) which states that shocks to chicken meat prices will have an impact on increasing inflation. The effect of chicken meat prices on inflation is thought to be because chicken meat is a food item that is consumed directly by the public so that its consumption value tends to be high. Based on data from the Central Statistics Agency (2021) in 2020 chicken meat contributed  $0.0371\%$  to inflation in Parepare City.

The analysis results show that the red chili price volatility variable has a significance value of  $0.203 > 0.05$  with a regression coefficient value of  $1.737E-5$ . This showed that the price of red chili had a positive but insignificant effect on inflation. Based on conditions in the field which show that the increase in the price of red chili in Pare-Para City changes relatively very quickly and is influenced by climate and rainfall, on the other hand red chili is a commodity whose demand and price tend to increase when quantities are limited. The results of this analysis are not in line with the results of research by Setiawan & Hadianto (2014) which states that the price shock of curly red chili will have an impact on increasing inflation. The suspicion that the volatility of red chili prices does not affect inflation is that the rate of price development is so high and constantly fluctuating. Prices in Parepare City depend on available stocks, so various disturbances such as drought and distribution



delays will create high price fluctuations. Based on data from the Central Statistics Agency (2021) in 2020 red chili made a significant contribution to inflation in Parepare City, namely 0.1473%.

The analysis showed that the chicken egg price change variable has a significance value of  $0.808 > 0.05$  with a regression coefficient value of  $1.027E-5$ . This shows that chicken egg prices have a positive but insignificant effect on inflation. Chicken eggs are a staple and affordable food consumed by many people, and the city of Pare-Pare is no exception. Due to its wide consumption, changes in the price of chicken eggs will affect many households. An increase in the price of chicken eggs can lead to an increase in the cost of living for consumers and reduce purchasing power. Conversely, decreasing the price of chicken eggs can help curb inflation. The results of the analysis are in line with Andira (2020)'s research which states that the price of chicken eggs has a positive but insignificant effect on the inflation rate. This may be based on market prices that follow the demand trend in the community. At certain times the price will jump up when demand increases but returns to normal when public demand stabilizes. Based on data from the Central Statistics Agency (2021) in 2020 chicken eggs contributed 0.0586% to inflation in Parepare City.

The analysis showed that the sugar price volatility variable has a significance value of  $0.438 > 0.05$  with a regression coefficient value of  $9.697E-5$ . This shows that the price of granulated sugar has a positive but insignificant effect on inflation. Granulated sugar is widely used in various food and beverage industries and daily household activities. Changes in the price of granulated sugar will impact the industry's production costs and may affect the selling price of the final product. Consumers will also feel that an increase in the price of granulated sugar can lead to an increase in the price of products that use sugar as a raw material. This can lead to an increase in the cost of living for consumers and potentially increase inflation. In addition, granulated sugar is one of the important raw materials in the food and beverage industry. An increase in the price of granulated sugar will affect production costs in this industry, which in turn can impact the selling price of these products. If the prices of food and beverage products rise due to an increase in granulated sugar, consumers will experience increased costs and may contribute to inflation. An increase in the price of granulated sugar can also disrupt food availability and accessibility for people who depend on products containing granulated sugar. The implication is that high sugar price fluctuations can impact food security and cause inflationary volatility. The results of this analysis are in line with the results of research by Andira (2020) which states that the price of granulated sugar has a positive but insignificant effect on the inflation rate. It is suspected that the price of granulated sugar has no effect on inflation because the price of granulated sugar tends to follow the demand trend. Although granulated sugar is a commodity that is consumed directly by the public on a daily basis, the level of consumption is not as large as rice, which is a staple food that is consumed by the public every day. Based on data from the Central Statistics Agency (2021) in 2020, granulated sugar contributed 0.0124% to inflation in Parepare City.

## CONCLUSION AND SUGGESTION

The price volatility of rice and chicken meat commodities has a positive and significant effect on changes in inflation in Parepare City while the other three commodities namely red chili, chicken eggs and sugar have a positive but insignificant effect on inflation in Parepare City. The effect of rice food price volatility on inflation is thought to be due to the fact that rice is a food commodity that is consumed directly by the community so that its consumption value is much higher than other

commodities. Price volatility in rice generally will not reduce people's purchasing power because rice is a staple food that must be available. Similarly, the effect of volatility in chicken meat food prices on inflation is expected because chicken meat is a commodity that is consumed directly by the community so that its consumption value tends to be high. Therefore, the government needs to develop food price stabilization policies, such as food reserve policies, market regulations, incentives for food producers, or social assistance programs to alleviate the impact of food inflation.

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