HiLL PUBLISHING

International Journal of Food Science and Agriculture, 2025, 9(4), 441-452
https://www.hillpublisher.com/journals/jsfa/
ISSN Online: 2578-3475
ISSN Print: 2578-3467

Analysis of Egg Price Trends and Forecasting in Yobe State, Nigeria

H. Abdulhamid[1,*], Musa A. Aliyu[2], A. Musa[2]

[1]Department of Agricultural Education, School of Vocational Education, Umar Suleiman College of Education, Gashu'a 631101, Yobe State, Nigeria.
[2]Department of Economics Education, School of Art and Social Science, Umar Suleiman College of Education, Gashu'a 631101, Yobe State, Nigeria.

How to cite this paper: H. Abdulhamid, Musa A. Aliyu, A. Musa. (2025). Analysis of Egg Price Trends and Forecasting in Yobe State, Nigeria. *International Journal of Food Science and Agriculture*, 9(4), 441-452.
DOI: 10.26855/ijfsa.2025.12.018

Received: November 28, 2025
Accepted: December 24, 2025
Published: January 22, 2026

Corresponding author: H. Abdulhamid, Department of Agricultural Education, School of Vocational Education, Umar Suleiman College of Education, Gashu'a 631101, Yobe State, Nigeria.

Abstract

Due to their low cost and high nutritional content, eggs are a typical food item that helps middle-class and low-income households satisfy their nutritional needs. In this way, changes in egg pricing will mostly impact middle-class and lower-class households. Therefore, the objectives of this study were to determine the trends in egg pricing in Yobe State, Nigeria, and forecast future egg prices in the study area. The available monthly price per egg from January 2016 to January 2023 was accessed from the National Bureau of Statistics (NBS). ARIMA model (Box-Jenkins method) and descriptive statistics were used to analyse the data. Stata software and Microsoft Excel were utilized for the analysis. The data's stationarity was tested using the Graph and Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). Mean Absolute Percentage Error (MAPE) and a graph were used to assess the model's forecasting accuracy. From January 2016 to December 2021, the price patterns for eggs varied, with the lowest price occurring in January 2016 and the highest price being in June 2020. From January 2022 until the investigation's conclusion, the cost of the eggs in the study area continuously went up. However, with respect to egg prices prediction, the data was not stationary at the level, but it became stationary after the first order difference. Following the estimation of the ARIMA models, ARIMA (1.10) was chosen as the optimal model. Its suitability for predicting egg prices was shown by diagnostic tests (residual plot, Portmanteau test, and Inevitability test). The expected price of eggs would keep rising during the predicted period. Both the graph and the MAPE proved that the forecast was highly accurate. In order to increase supply and, eventually, cut the prices of eggs in the study area, the government should encourage egg imports by eliminating taxes and levies.

Keywords

Egg; Trend; Prices; Forecasting

1. Introduction

The growing economy is driving up the consumption of eggs worldwide, which are consumed by people of all sexes, ages, seasons, and in both urban and rural settings [1]. Eggs are an affordable and highly nutritious food source, widely recognised as a healthy component of human diets; it is rich in high-quality proteins, vitamins, and minerals, making them a valuable dietary recommendation from nutritionists for enhancing health [2]. The complex protein content of eggs, which, together with lipids and carbohydrates, makes up one of the three main macronutrient categories, is primarily responsible for their high utilization [2]. They further mentioned that 90% of dry weight and

100% of dietary energy come from eggs.

One of the problems facing Nigerian agriculture is its capacity to supply enough protein and calories to the nation's steadily expanding population [3]. The Federal Government of Nigeria has previously imported considerable amounts of chilled beef and poultry in an effort to remedy the chronic animal protein consumption shortfall [3]. A reasonably priced source of protein that is rich in essential amino acids is poultry eggs. One crucial area to consider as Nigeria continues its efforts for food security is the price of food in the nation. Investors and stakeholders would want to know if a venture is worth it or not, aside from the question of affordability for its citizens [4]. Okpeke and Ellah stated that due to its high perishability, eggs require more effective marketing and production strategies [5]. Due to the vast number of people employed in egg production, handling, transportation, distribution, and marketing, the product has strong potential to reduce poverty [5]. They further mentioned that Nigeria's chicken sector has recently performed below expectations because of high feed costs brought on by changes in feed supply, increased ingredient prices, inferior feed ingredients, and production inefficiencies.

However, because of its low cost and high nutritional value, eggs are a popular food item that helps middle-class and low-income households satisfy their nutritional needs. In this regard, middle- and low-income families will be the most impacted by changes in egg prices [6]. The market price of eggs in China has been fluctuating for a long time, according to [7], which has an impact on both the income of egg farmers and the food consumption of the populace. He went on to say that the cost of eggs was significantly influenced by the price of chicken and feed, with the price of compound feed having the biggest effect. However, Nigeria has a long history of producing eggs, which today make up around 30% of the country's total poultry production and are a significant part of the poultry subsector [8]. Over time, there has been a significant improvement in both the nation's supply and demand for eggs. Additionally, due to its sustainability, egg production is a key component of numerous youth empowerment initiatives nationwide [8]. They also mentioned that in Nigeria, eggs are the most economical and accessible source of animal protein; nevertheless, their supply has not been able to keep up with the growing demand.

According to [9], maintaining the economic interests of both egg producers and consumers while also meeting the public's nutritional needs depends on the availability of eggs at fair pricing. They also point out that rising consumer demand, rising production costs, and general price increases are the main causes of price fluctuations for eggs [9]. They further noted that the capacity to predict changes in egg prices precisely and promptly is essential for the market's steady and strong expansion. According to [10], the main objective of time series analysis is to understand and model the relationship between observations. Nonetheless, marketers frequently use time series analysis to examine the long-term patterns in their total sales, according to [11]. Businesses use sales analysis to forecast staff and product requirements, forecast sales trends, and forecast seasonal and annual sales. Time series analysis is very useful in these situations. Hence, this study's goals were to ascertain Yobe State, Nigeria's egg price trends and project the future egg prices in the study area.

2. Materials and Methods

2.1 The Study Area

Yobe State is situated between latitudes 10° and 14° North and longitudes 11° 30′ and 14°45′ East in Nigeria's north eastern geopolitical zone [12]. The state is largely an agricultural state that prioritizes crop, livestock, horticulture, fisheries, gum Arabic, and palm trees. With the bulk of its inhabitants living in rural areas [13]. The state faces desertification threats due to its two major seasons: rainy and dry. The dry season lasts seven months with severe cold and harmattan wind, while the hot climate sets in March and lasts until May/June [14]. The state has hot, dry weather with temperatures between 30 and 42 degrees Celsius [15]. However, the state was projected to have 3,481,567 populations by 2020, according to [16].

2.2 Source and Method of Data Collection

Available secondary data were obtained from the National Bureau of Statistics (NBS) on the monthly price of one egg in naira in the study area between January 2016 and January 2023.

2.3 Methods of Data Analysis

2.3.1 ARIMA model

Descriptive statistics were used to identify the trend of egg prices in the study area, whereas the price of eggs was projected using an ARIMA model (Box-Jenkins approach). The Box-Jenkins approach forecasted the prices of eggs

and identified the appropriate ARIMA (p, d, and q) model parameters [17]. The data were analysed using Stata software and Microsoft Excel.

2.3.2 Test of stationarity

Both informal and formal tests were applied to test the stationarity of the data collected. The formal test used was the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test to evaluate the stationarity of the data at the 0.05 level of significance (adopted from [18]. The informal test used was a descriptive statistic (graph).

2.3.3 ARIMA model for the study

Depending on the adequacy test, any one of the three types of ARIMA models listed below that were taken into consideration for the study might be used to predict the future prices of eggs in the study area.

2.3.4 AR (p) model

The AR (p) model is concerned with the actual egg prices

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \varphi_3 Y_{t-3} + \ldots + \varphi_p Y_{t-p} + \varepsilon_t \quad (1)$$

Where,
Y_t = egg price at time t
$Y_{t-1}, Y_{t-2}, Y_{t-3} \ldots\ldots\ldots Y_{t-p}$ eggs prices at different time lags
φ_0, = constant
$\varphi_1, \varphi_2, \varphi_3 \ldots\ldots\ldots \varphi_p$ are the coefficients
ε_t is the error term

2.3.5 MA (q) model

The error term is the focus of the MA (q) model.

$$Yt = \mu_0 + \epsilon_t + \partial_1 \epsilon_{t-1} + \partial_2 \epsilon_{t-2} + \partial_3 \epsilon_{t-3} + \ldots + \partial_q \epsilon_{t-q} \quad (2)$$

Where,
μ_0 = constant mean of the series
$\partial_1, \partial_2, \partial_3 \ldots\ldots\ldots \partial_q$ = coefficients of estimated error term
ϵ_t = error term

2.3.6 ARMA (p, q) model

The ARMA (p, q) model's general form is given by equations (1) and (2) coupled.

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 Y_{t-2} + \varphi_3 Y_{t-3} + \ldots + \varphi_p Y_{t-p} + \epsilon_t + \partial_1 \epsilon_{t-1} + \partial_2 \epsilon_{t-2} + \partial_3 \epsilon_{t-3} + \ldots + \partial_q \epsilon_{t-q} \quad (3)$$

Adopted from [19] as used by [20].

2.4 Forecasting

The ARIMA model, which has the best estimated accuracy, was used to estimate the monthly price of eggs for six months in the study area between February 2023 and July 2023.

2.5 Forecasting Accuracy

The accuracy power of the ARIMA model chosen for the forecasting was tested using a graph and Mean Absolute Percentage Error (MAPE).

$$\text{MAPE} = \frac{1}{n} \sum_{t=1}^{n} \left| \frac{\hat{Y}\, t - Yt}{Yt} \right| x100 \quad (4)$$

Where,
Yt = Actual price of egg,
$\hat{Y}\, t$ = Predicted price of egg,
n = the total number of observations
Adopted from [17] as used by [20].

3. Results and Discussion

The following section covered Yobe State, Nigeria, egg prices forecasts, and trend analysis.

3.1 Price Trends for Eggs in Naira Per Egg

Figure 1 shows Yobe State's price trends for eggs in naira per egg. It is indicated that the price of an egg was ₦28.75 in January 2016, rose to ₦35 in April, and then dropped to ₦30.50 in May. From May on, the price continued to fluctuate above ₦30.50, reaching ₦40.88 in December of the same year. The price dropped slightly to ₦40.12 in January 2017, then to ₦39.17 in February, then increased to ₦44.23 in April and topped at ₦44.55 per egg in May, before falling to ₦38.89 in October and ₦38.64 per egg in December 2017. The price was unchanged in January 2018, but it rose to ₦39.50 in February, and it continued to fluctuate, reaching ₦44.50 in November after being at ₦35.50 in June. The price then fell to ₦40.41 in January of 2019, but it was more constant in February and March of that year. In June, it dropped to ₦36.43, then rose to ₦40.57 in September, then fell once more to ₦38.22 in October, and finally reached 40.00 in December 2019.

The price was at ₦37.00 in January 2020, and it went up and down before peaking in June at ₦45.00. In July 2020, it moved slightly lower to ₦44.44, and it continued to go lower until the end of the year (December 2020), when it was at ₦42.17. The price was nearly the same in January 2021 as it was in December 2020, but it went up to ₦42.44 in February and down to 41.56 in March. 2021 had very little price variation, with the egg remaining nearly constant in March, April, May, June, and July until December 2021, when it was valued at ₦41.93. From the start in January 2022, the price of eggs continued to rise. From ₦43.19 in January 2022, it rose to ₦46.01 and ₦46.42 in February and March 2022, respectively, and then to ₦48.75 in April 2022. The price of eggs continued to rise, reaching ₦71.75 in October 2022, ₦73.76 and ₦76.88 in November and December 2022, and finally, in January 2023, the price of an egg in the study area was ₦83.44 per egg. This suggests that egg prices in the study area have been steadily rising, which will impact low- and middle-income consumers' demand for eggs and, inevitably, their protein requirements and health because of their reduced protein consumption as a result of the high egg prices in the study area. This was almost similar to the [21] study, "Analysis of Egg Price Fluctuation and Cause," which used sample data on the monthly price of eggs from January 2000 to June 2018. The price of eggs in China has fluctuated a lot, which has had a big effect on laying hen farmers as well as businesses and related enterprises. [22] also Analyzing Price Trends and Behavioral Dynamics in the Indian Poultry Sector with Reference to Egg Production, and to make an effort to examine the growth performance and seasonal variations in egg pricing throughout India. And compiled average monthly data on egg pricing in India's key markets between January 2009 and December 2012, and found that average egg prices increased by 28% between 2009 and 2012.

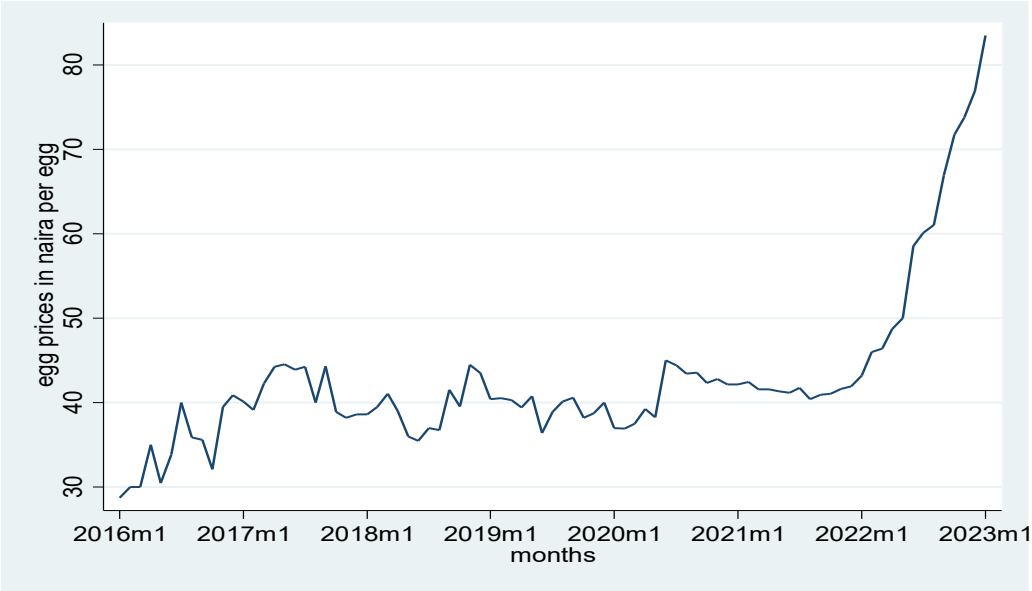

Figure 1. Price Trends for Eggs in Naira per Egg in Yobe State.

3.1.1 Projected egg prices from February to July, 2023, in Yobe state

The following were the steps followed in building an ARIMA model for projecting the egg prices using Box-Jenkins methodology: model identification, model estimation, diagnostic checking, and forecasting.

3.2 Model Identification

Aspects of model identification include identifying stationarity and figuring out the orders of p, d, and q in an ARIMA model.

3.2.1 Test of stationarity

Stationarity of the data collected for the study was tested using two methods: an informal (graphical) test and a formal test (ADF and PP).

3.2.1.1 Graphical test

Figure 2's graph displays an upward and downward trend that fluctuates, indicating that the series was not stable at a level. To make the time series data stationary, it has to be transformed by taking the first-order difference.

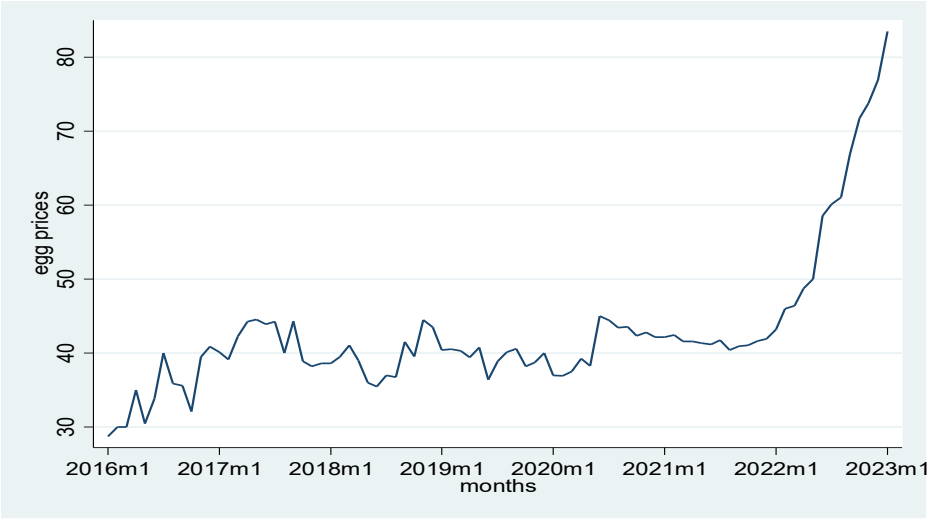

Figure 2. Graph of Egg Prices at the Level. (Source: Author design based on data collected)

(1) Correlogram of autocorrelation of egg prices

Because ACF decayed slowly and died out rapidly, the series was not stationary at a level, as the correlogram in Figure 3 illustrates.

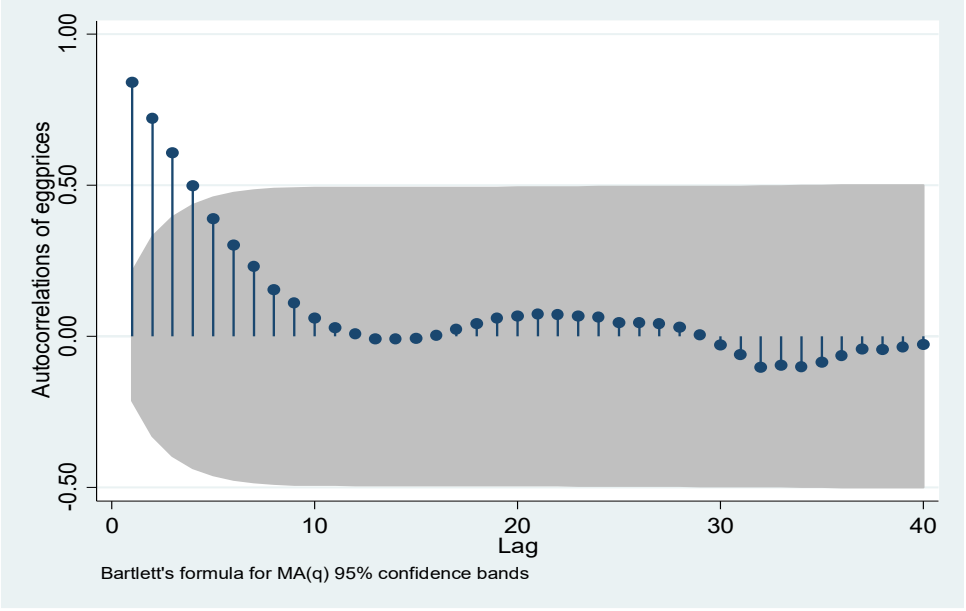

Figure 3. Correlogram of Autocorrelation of Egg Prices. (Source: Authors' design)

(2) Correlogram of partial autocorrelation

Figure 4 shows a spike in the partial autocorrelation function's correlogram, indicating that the data was not stationary at the level; therefore, there is a need for data transformation.

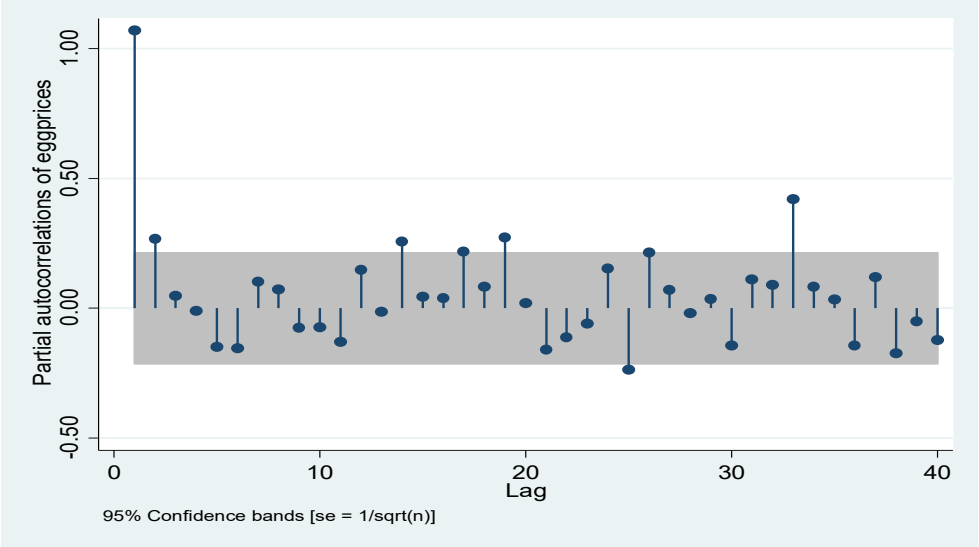

Figure 4. Correlogram of Partial Autocorrelation of Egg Prices.

(3) Graph of egg prices at first order difference

The time series data became stationary following a transformation at first difference, according to the graph in Figure 5. The series exhibited non-seasonality, no trend, and a constant mean with horizontal fluctuations.

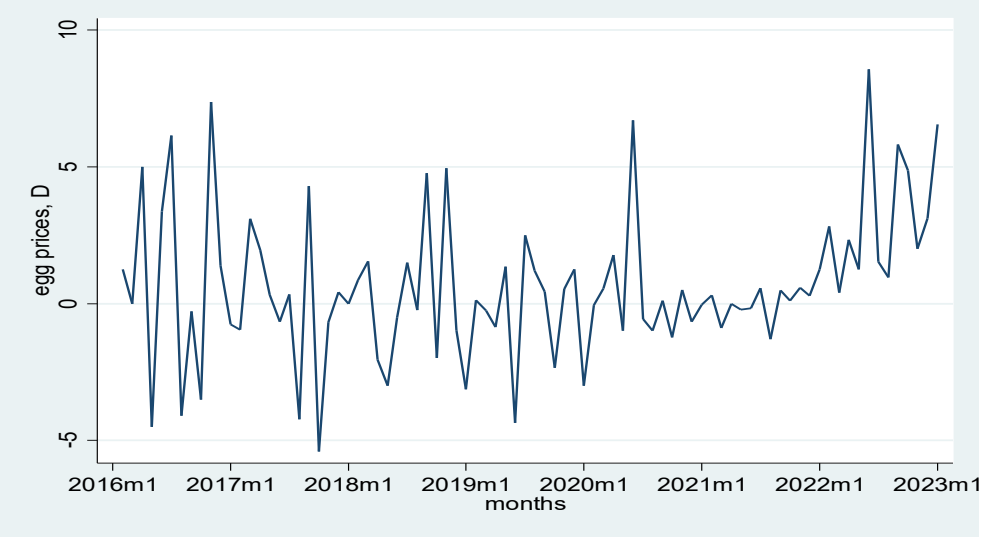

Figure 5. Graph of Egg Prices at First Difference.

3.2.2 Formal test of stationarity

The concept of stationarity at the level and first-order difference was discussed as follows:

3.2.2.1 Test of stationarity at level

Two formal tests were used to confirm the stationarity of the time series data; Augmented Dicky Fuller test (ADF) and the Phillips-Perron test (PP). The time series data were not stationary at the level, according to the ADF test's P-value of 1.0000 and the PP test's P-value of 1.0000 at the level. Consequently, both formal tests verified that the data was not stationary at the level; therefore, there is a need to be differentiated in order to become stationary for the next stage of the ARIMA model building.

3.2.2.2 Test of stationarity at first order differences

Both the Phillips-Perron test (PP) and the Augmented Dicky Fuller test (ADF) confirmed that the time series data were stationary after being differentiated once. P-values of 0.0000 were found by the ADF and PP tests, respectively. These confirmed the data's stationarity for the subsequent stages of the ARIMA model building procedure for forecasting egg prices. This was consistent with research by [20] on trend analysis and forecasting of cowpea (Vigna unguiculata L) prices in Yobe state, Nigeria. They found that the data were not stationary at the level, with an ADF P-value of 0.9697 and a PP P-value of 0.9835, but the data became stationary after applying the first order difference, with an ADF P-value of 0.000 and a PP P-value of 0.000.

3.2.2.3 Determining the order of p.d.q in ARIMA models

To find potential ARIMA candidates for further processing, the Autocorrelation function (ACF) and the Partial Autocorrelation function (PACF) were used to determine the order of p.d.q. in the ARIMA models.

3.2.2.4 Autocorrelation function (ACF)

Since ACF exhibits exponential decay at lag 1, the autocorrelation function plot shown in Figure 6 suggests that lag number one is the optimal value of q (q = 1).

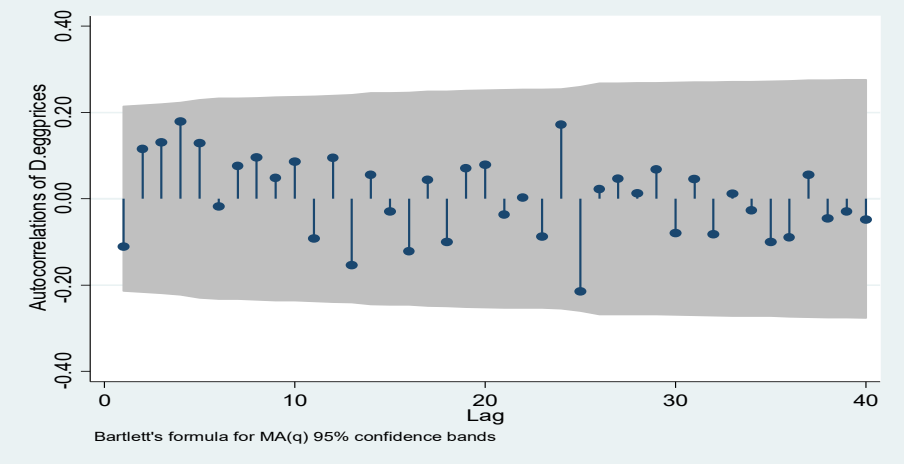

Figure 6. Plot of Autocorrelation Function (ACF). (Source: Authors' design)

3.2.2.5 Partial autocorrelation function (PACF)

One lag was particularly noticeable since it was slightly above the cutoff in Figure 7's Partial Autocorrelation Function. Since lag1 is where the PACF shows exponential decay, lag one was chosen as the ideal value of p, resulting in p = 1.

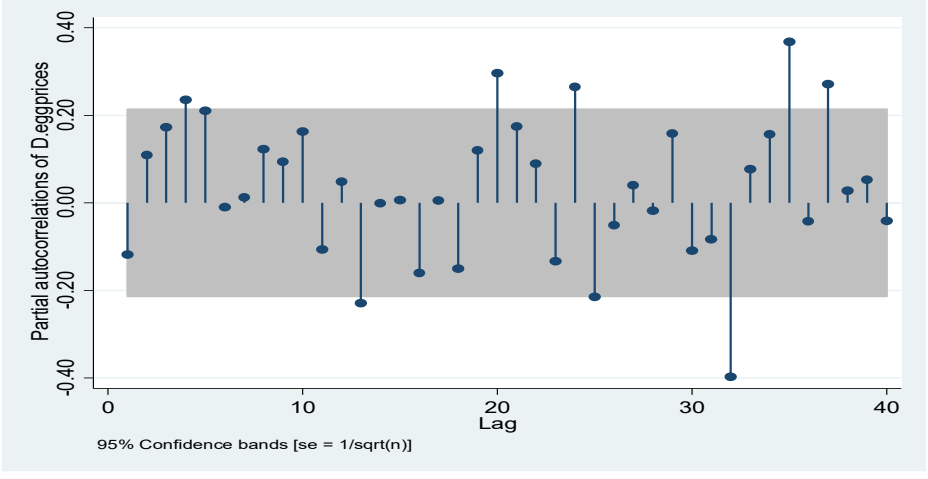

Figure 7. Plot of Partial Autocorrelation Function (PACF). (Source: Authors' Design)

Note: Three possible models were identified by using the partial autocorrelation function and autocorrelation functions: ARIMA (1.1.1), ARIMA (1.1.0), and ARIMA (0.1.1).

3.3 Models Estimation

Table 1 displays the estimate for the ARIMA (1.1.1) model.

Table 1. Estimate of ARIMA (1.1.1) Model

D.eggprices	Coefficient	Std. Err.	z	P>|z|
Constants	.6447113	.2992896	2.15	0.031
ar L1.	-.4249965	.716977	-0.59	0.553
ma L1.	.3059567	.7687452	0.40	0.691
Sigma	2.690288	.2009187	13.39	0.000
Log likelihood = -202.3318				
AIC = 412.6636				
BIC = 422.3869				

Source: Authors' computation

3.3.1 ARIMA (1.1.0) model

Table 2 displayed estimated values of the ARIMA (1.1.0) model.

Table 2. Estimate of ARIMA (1.1.0) Model

D.eggprices	Coef.	Std. Err.	z	P>|z|
Constant	.6436043	.2912862	2.21	0.027
Ar L1.	-.1165169	.1081336	-1.08	0.281
Sigma	2.694926	.2003775	13.45	0.000
Log likelihood = -202.4822				
AIC = 410.9644				
BIC = 418.2568				

Source: Authors' computation

3.3.2 ARIMA (0.1.1) model

Table 3 displayed the ARIMA (0.1.1) model's estimated values.

Table 3. Estimated ARIMA (0.1.1) Model

D.eggprices	Coef.	Std. Err.	z	P>|z|
Constant	.6437179	.2943163	2.19	0.029
ma L1.	-.0917192	.110023	-0.83	0.404
Sigma	2.698914	.198786	13.58	0.000
Log likelihood = -202.5941				
AIC = 411.1883				
BIC = 418.4807				

Source: Authors' computation

3.4 Model Selection Criteria

Table 4 displayed the model selection criteria. Models Y and Z were the most effective models based on the number of significant variables. However, based on the sigma square, Model X was the best model because of the smallest value of sigma square. Additionally, Model X was the best model according to log likelihood; the higher the log likelihood number, the better. But according to the Akaike (AIC) Model Y was the best since it had the lowest AIC

value. In a similar vein, Y remained the best model according to the Bayesian Information Criterion (BIC), because it had the lowest values of all the models identified. As a result, Model Y (ARIMA (1.1.0)) was chosen for diagnostic checking during the model-building phase because it was the best model among the ARIMA candidates found.

Table 4. Model Selection Criteria

Criteria	Model			Best Model
	Model X Arima (1.1.1)	Model Y Arima (1.1.0)	Model Z Arima (0.1.1)	
Number of Significant Variables	1/3	½	½	Y, Z
Sigma SQ	2.690288	2.694926	2.698914	X
Log Likelihood	-202.3318	-202.4822	-202.5941	X
Akaike (AIC)	412.6636	410.9644	411.1883	Y
Bayeseian (BIC)	422.3869	418.2568	418.4807	Y
Best Model				Y

Source: Authors' Computation

3.5 Diagnostic Test

Residual plot, portmanteau test, and Inevitability test (AR root graph) were utilized to confirm whether the model's residuals chosen for study are stable (white noise).

3.5.1 Residual plot

Figure 8's residual plot verified that the residuals calculated using the selected model, ARIMA (1.1.0) are white noise, which means that the error is centered on the mean. This implied that the model showed no signs of error autocorrelation. As a result, the model is suitable for predicting the value of egg prices in the study area.

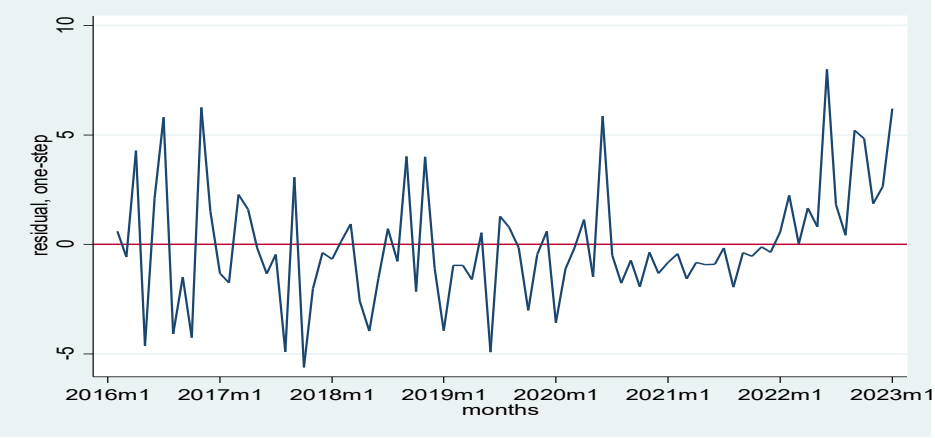

Figure 8. Residual plot. (Source: Authors' Design)

3.5.2 Portmanteau test

The residuals in this instance are stable, as indicated by the portmanteau test's p-value of 0.7000, which was higher than 0.05. Therefore, the selected ARIMA (1.1.0) model is appropriate for predicting the future prices of eggs in the study area.

3.5.3 Inevitability test

The fact that the AR root in Figure 9 was inside the unit circle verified that the process is stable and the residuals are white noise. This suggests the ARIMA (1.1.0) model selected was suitable for predicting the price of eggs in Yobe State, Nigeria, in the future.

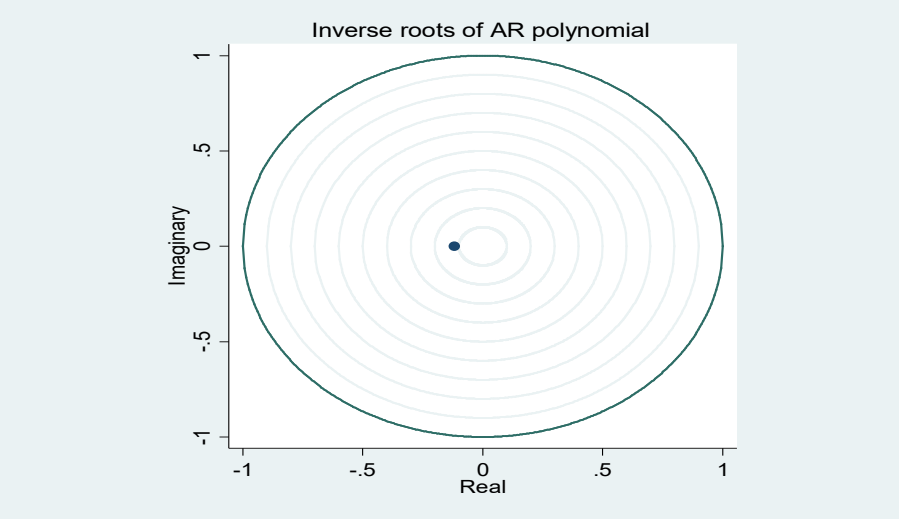

Figure 9. AR Root Graph.

Note: Given that all diagnostic test residual plots, portmanteau tests, and AR root graphs proved that the residuals are white noise, the ARIMA (1.1.0) model was successful in forecasting the future value of egg prices in the research area.

3.6 Forecasting

Table 5's forecasted egg prices indicated that egg prices would likely continue to rise in the study area. This might be explained by the general increase in commodity prices in Nigeria. This was similar to that of [23] in their study, "Time Series Analysis of Egg Prices across Nigeria for Sustainable Food Security," they used the Auto Regressive Integrated Moving Average (ARIMA) model to analyze the monthly prices of medium-sized eggs in each of Nigeria's six geopolitical regions from 2016 to 2019 in order to predict future egg prices in each of the six regions. Their findings also indicate that the cost of eggs is expected to continue to rise consistently in all regions of the nation until 2022, which may have an impact on the typical Nigerian's capacity to purchase this high-protein, high-vitamin, and high-mineral meal.

Table 5. Forecasted eggs Prices in the Study Area from February to July 2023 (*)

Month	Forecasted eggs prices
February	83.39425
March	84.11817
April	84.75242
May	85.39711
June	86.04059
July	86.68421

Source: Authors' estimation

*The absence of a price control system may cause the predicted egg prices to vary by ± 5%.

3.7 Forecasting Accuracy

Graph and Mean Absolute Percentage Error (MAPE) were used to evaluate the forecasting accuracy of the model.

3.7.1 Mean absolute percentage error (MAPE)

The mean absolute percentage error (MAPE) of the predicted egg price in the study area was 4.70%. Hence, this illustrates how well the ARIMA (1.1.0) model forecasted the future value of egg prices.

3.7.2 Graphical presentation of actual and forecasted egg prices in Yobe State

On the graph in Figure 10, the blue line shows the actual egg price, while the red line shows the predicted egg price. The graph demonstrated that the actual price and the predicted price have a positive correlation.

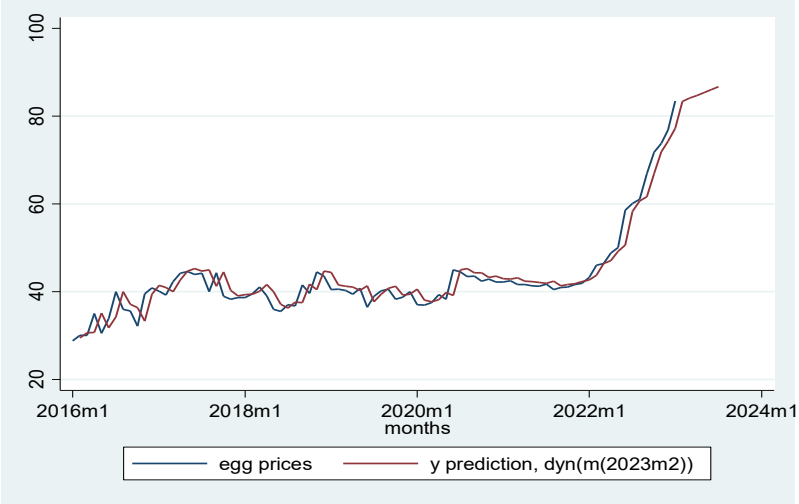

Figure 10. Graphical presentation of actual and forecasted egg prices.

4. Conclusion

The pricing trends for eggs fluctuated from January 2016 to December 2021, with January 2016 being the lowest price and June 2020 having the highest between these periods. However, the prices of the eggs in the study increased progressively from January 2022 until the completion of the investigation. With respect to forecasting, both the formal and informal tests of data stationarity demonstrated that the data were not stationary; nonetheless, both tests verified the data's stationarity after applying the first-order difference. Following the evaluation of the ARIMA models, the optimal model, ARIMA (1.10), was chosen. It underwent diagnostic testing and demonstrated its suitability for egg price forecasting. Over the course of the projected period, the anticipated prices of eggs will continue to rise.

5. Recommendations

(1) In order to improve the availability of eggs and potentially lower the price of eggs for consumers, poultry farmers in the research area should boost their egg production.
(2) The government should promote egg imports by removing taxes and levies on them, increasing supply, and inevitably lowering the study area's egg prices.

Acknowledgments

The authors are grateful to their family and colleagues for the success of this research work.

Conflict of Interest

The authors declare no conflicts of interest.

References

[1] Mahendra P, Judit M. The role of eggs as an important source of nutrition in human health. Int J Agric Sci. 2021;5(1):180-182.

[2] Marius GU, Roxana NR, Ioana CC, et al. Unlocking the power of eggs: Nutritional insights, bioactive compounds and the advantages of omega-3 and omega-6 enriched varieties. Agric. 2025;15(242):1-29.

[3] Olaniyi OZ, Adelayo A, Olojede MO, Adedamola R. Determinants of the household consumption of eggs in Oyo State: A case study of Ibarapa Central Local Government. J Mark Consum Res. 2015;18:1-7.

[4] Waidor TK, Akpojaro J. Time series analysis of egg prices across Nigeria for sustainable food security. Comput Inf Syst Dev Inform Allied Res J. 2022;13(1):1-13.

[5] Okpeke MY, Ellah GO. Analysis of poultry eggs marketing in South-South part of Nigeria: A case study of Ika South Local Government Area, Delta State, Nigeria. Glob J Agric Res. 2017;6(3):1-15.

[6] Isik M, Gul M. Analysis of seasonal fluctuations in egg prices in Turkiye. Sci Pap Ser Manag Econ Eng Agric Rural Dev. 2024;24(1):1-11.

[7] Jiacong L. Study on influencing factors of egg price fluctuation. In: Proceedings of the 7th International Conference on Economic Management and Green Development; 2023:1-6.

[8] Sunday BA, Veronica SN. Trend analysis and macroeconomic variable determinants of egg production in Nigeria. J Agric Prod. 2022;3(2):100-109.

[9] Mo L, Jiang M, Fang X, Shi X. A novel hybrid STL-based model for egg price forecasting. 2023:1-18.

[10] Roa SS. A course in time series analysis [Internet]. 2022 [cited 2025 May 15]. Available from: https://web.stat.tamu.edu/~suhasini/teaching673/time_series.pdf

[11] Jonath J. Introduction to time series analysis and its applications [Internet]. India: Christ University; 2022 [cited 2025 May 15]. Available from: https://www.researchgate.net/publication/362389180_introduction_to_time_series_analysis_and_its_applications

[12] Tee NT, Orsar T, Buhg JO. Prioritization and cost and returns analysis of selected non timber forest product in Yobe, Nigeria. J Dev Agric Econ. 2014;6(12):481-489.

[13] World Bank Group. North East Nigeria recovery and peace building assessment. Volume III: State reports. Washington, DC: International Bank for Reconstruction and Development; 2016.

[14] Danlami D, Gwari MB, Suleiman SS, Bara AA. Temporal and spatial variations of ground surface visibility during Harmattan season in North-Eastern Nigeria. Ceylon J Sci. 2018;47:337-346.

[15] Jonah SE, Baba GS, Umar ASS. Analysis of profitability of sesame production in Yobe state, Nigeria. Am J Econ. 2020;4(2):46-69.

[16] National Bureau of Statistics (NBS). 2021 demographic statistics bulletin. Abuja: NBS; 2021.

[17] Rahul KS, Shishir KP, Bidyadhara B. Application of Box-Jenkins ARIMA (p, d, q) model for stock price forecasting and detect trend of S and P BSE stock index: An evidence from Bombay Stock Exchange. Sch J Phys Math Stat. 2020;7(7):110-125.

[18] Din MA. ARIMA by Box Jenkins methodology for estimation and forecasting models in higher education. ATINER'S Conf Pap Ser. 2016:EMS2015-1846.

[19] Akenbor AS, Nwandu PI. Forecasting cotton lint exports in Nigeria using the autoregressive integrated moving average model. J Agric Food Sci. 2021;19(1):150-162.

[20] Hamisu A, Justice OI, Abdu TK, Jacob SF. Trend analysis and forecasting of cowpea (Vigna unguiculata L) prices in Yobe State, Nigeria. Sci Pap Ser Manag Econ Eng Agric Rural Dev. 2025;25(1):467-476.

[21] Wu Y, Fu Q. Analysis of egg price fluctuation and cause. J Agric Sci. 2018;10(11):1-7.

[22] Karthikeyan R, Nedunchezhian RV. Analyzing price trends and behavioral dynamics in the Indian poultry sector with reference to egg production. Int J Agric Sci. 2024;14(9):1-6.

[23] Tamaramiebi WK, Jackson A. Time series analysis of egg prices across Nigeria for sustainable food security. Comput Inf Syst Dev Inform Allied Res J. 2022;13(1):1-13.