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Time series analysis of egg prices in various market centres of India

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Abstract

The study was undertaken to analyse the trend and seasonality of egg prices in various market centres of India. Secondary data on egg prices for the 28 market centres were collected from the website of National Egg Co-ordination Committee for a period of January 2013 to May 2024. The centred moving average method and linear trend equation model were employed to draw conclusions regarding price index, seasonal variation of egg prices and price trend. When analysed the egg price was minimum during the month of April and maximum in December. The pattern of seasonality was observed to be biphasic in a year. The seasonality in egg prices was found to exist irrespective of the locations of egg markets in India. The egg prices were observed to be higher during Monsoon and Winter seasons and lower during summer season. The intercept values of the fitted egg price trend equation of various market centres ranged from 276.07 paise to 321.58 paise and their slope ranged from 1.30 to 1.62.

Keywords: Egg, price index, seasonality, trend

Introduction

India ranks 2nd in the world in terms of total Egg production (FAO). Poultry is one of the fastest growing sectors among the livestock sector in India. According to the 20th livestock census, the poultry population in India is 851.81 million which has increased by 16.8 percent from the previous livestock census. The total commercial poultry in India is 534.74 million in 2019 and has increased by 4.5% over the previous census. The total Backyard poultry in the country is 317.07 million in 2019, increased by 45.48% over the previous census (20th livestock census). Eggs are considered as important source of protein in the diet of the Asian population and the increasing population, coupled with rising incomes, is expected to result in the continued strong growth in the demand for both eggs and poultry meat (Iddamalgoda *et al*., 2001) [4].

The total egg production in India is 142.77 billion numbers in 2023-24, which has increased by 3.17 per cent compared to the previous year (BAHS, 2024) [2]. The total egg production from commercial poultry is 118.16 billion numbers and backyard poultry are 20.20 billion numbers contributing 85.40% and 14.60% of total production of egg respectively (BAHS, 2023) [1]. The largest producer of egg is Andhra Pradesh which produces 17.85 per cent of the total egg production in the country followed by Tamil Nadu that produces 15.64 per cent of the total egg production. Telangana is the third largest egg producing state in the country with a share of 12.87 per cent of the total egg production in the country followed by West Bengal and Karnataka with a share of 11.37 per cent and 6.62 per cent, respectively (BAHS, 2024) [2]. Eggs are considered as the budget friendly food option compared to other protein sources like meat. The introduction of new hybrid chicken varieties, along with improved management practices and balanced feeding, has led to a remarkable increase in egg productivity among hens (Kathiravan *et al*., 2011) [6].

The per capita availability of eggs reached 103 eggs per annum in the year 2023-24, a six-point jump from 95 eggs per annum of the previous year 2021-22 (BAHS, 2024) [2]. As the demand for eggs continues to rise, an effort was made to examine the trend and seasonality of egg prices at different market centres across India. The per capita egg consumption largely depends on the egg price and other factors such as availability (production/supply), distribution, and seasonality. Therefore, this analysis focuses on exploring the trends and seasonal variations in egg prices at various marketing centres in India.

Methodology

The data on monthly average wholesale prices of egg for 28 market centres *viz.*, Ahmedabad, Ajmer, Allahabad (Consumption Centre - CC), Barwala, Bengaluru (CC), Bhopal, Chennai (CC), Chittoor, Delhi (CC), E. Godavari, Hyderabad, Indore (CC), Jabalpur, Kanpur (CC), Kolkata (CC), Ludhiana, Lucknow (CC), Mumbai (CC), Mysuru, Nagpur, Namakkal, Pune, Raipur, Varanasi (CC), Vijayawada, Vizag, W. Godavari and Warangal of India were collected from National Egg Co-ordination Committee website for the period from January 2013 to May 2024.

To find out the seasonality in egg prices, the Centered moving average method was used as adopted in the previous studies of Mani *et al.* (1995) [7], Mondal and Pandey (1995) [8], Pandian *et al.* (2011) [10], Pandian *et al.* (2016) [9]. The monthly price index was worked out for all the market centres under study and depicted in graph to identify the seasonal variations. A scatter diagram was used to identify

the price trend, with time on the X-axis and monthly egg prices for various centres on the Y-axis. The scatter diagram showed a straight-line relationship, hence the linear trend equation "$P = \alpha + \beta t + \mu$" was used to fit the data, as in previous studies by Pandian *et al.* (2011) [10] and Pandian *et al*. (2016) [9].

Where,

P: monthly average egg price in paise

α: intercept to be estimated

β: slope to be estimated

t: time in months

μ: error term

Results and Discussion

Seasonal variations in egg price

The monthly price indices of egg for various market centres worked out by centered moving average is shown in Table 1. The table clearly shows that Delhi had the highest monthly price index (113.36) and Namakkal the lowest (104.31) in January. For February, Varanasi recorded the highest price index (98.26) while Barwala had the lowest at 94.92. In March, April, May, and August, the highest price indices were seen in Kolkata (90.68), Chennai (89.55), Chennai (98.5), and Kolkata (95.14), all of which were below 100. In June, Nagpur had the highest price index (109.17), and in July, the highest indices were recorded in Chennai and Chittoor (102.93). The lowest egg price indices were observed in Chittoor in September (96.20) and October (99.70), Vizag in November (108.47), and Chennai in December (108.83). During these months, Barwala had the highest indices in September (102.2), October (107.01), November (118.37), and December (120.68). Among all the egg market centers in India, Barwala recorded the highest price index in December (120.68), while Ajmer had the lowest in April (79.68), reflecting greater price fluctuations across different seasons.

The seasonal variation in egg prices was analyzed by constructing monthly price indices across various market centres in India, with the results shown in Figures 1 and 2. It was found that the average monthly egg price indices in India were above 100 during October, November, December, January, June, and July. The graph revealed a biphasic curve for the average monthly egg price indices. The major phase of the curve began in August (93.29) and steadily rose until December (114.35), then sharply declined until April (84.04). The minor phase of the curve started in April, gradually increasing until June (104.88), before decreasing again by August (93.29). The lowest egg price index occurred in April (84.04), while the highest was in December (114.35). The major phase of the curve occurred during the monsoon and winter seasons, while the minor phase was observed in the summer season. The seasonality in egg price indices, with the lowest prices in summer and the highest in winter, aligns with previous studies by Pandian *et al.* (2011) [10] and Karthikeyan and Nedunchezhian (2014) [5]. This suggests that seasonal fluctuations in egg prices persist despite improvements in production and distribution patterns in India over the years.

Figure 2 depicts the monthly price indices for various egg market centres, and it can be determined that the form of egg price index curves across the months for the various market centres in India was exactly the same, with minimal fluctuations in the values. The egg price indices of numerous Indian cities were observed to go upward or downwards in tandem, with no outliers, and were identical to India's average price trend curve. It shows that egg prices were impacted by the season rather than the region, indicating a well-defined market distribution of eggs across India.

The reasons for the rising trend of egg price indices during August to January and April to June could be increased demand over supply due to festivals (Diwali, Christmas, New Year, etc.), increased consumption to combat the cool climate, and serving special food during holidays/vacations as reported by Pandian *et al.* (2011) [10]. Decreased egg consumption during examination days, school reopening, and the hot season, may have indicated a downward trend in egg price indices from January to April and June to August.

Price Trend

Table 2 shows the trend values obtained by applying a linear trend equation to egg prices in major Indian market centres. The Adjusted R^2 for egg market centres was found to be around 0.50 (0.40 to 0.67), indicating that the trend component of time series explained around 50% of the variation in egg prices. The findings are consistent with the prior study by Pandian *et al.* (2011) [10]. The fitted equations for all market centres exhibited significant F values ($P<0.01$).

The table 2 shows that consumption centres have the greatest intercept values when compared to other centres in India. The intercept of the trend equation varied from 276.07 in Nagpur to 321.58 in Lucknow (CC). The slope of all fitted equations was found to be positive, indicating that egg prices increased over time. Kolkata (CC) has the greatest slope value of the egg price trend equation, at 1.62, indicating an increase of 1.62 paise each month since January 2013. The lowest monthly increase in egg prices was reported in Warangal (1.30 paise), followed by Barwala (1.31 paise), Bhopal (1.31 paise), Hyderabad (1.32), and Jabalpur (1.32 paise). Further, it is peculiar to notice that Kanpur (CC) had lower slope value (1.34), although being the consumption centre. The intercept and slope values of egg price trend equations of various market centres of India is depicted in Figure 3 and 4, respectively.

The monthly increase of egg prices was about 0.75 during the past decade (Pandian *et al*., 2011) [10], was found to be doubled (slope of about 1.50) during the present decade (2013 to 2024). Factors such as rising per capita income, inflation, a higher standard of living, awareness on nutritional status of eggs, taste and preference of consumers might have increased the demand for eggs which might had a positive influence on egg prices of various market centres of India. The discrepancy in egg prices across market centres (production and consuming centres) might be due to marketing costs (transportation, storage, waste, and distribution charges) as well as margins accrued by the egg market functionaries.

Table 1: Monthly egg price indices at various market centres of India

S. No.	Market centres	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Ahmedabad	109.69	97.15	88.83	85.59	92.36	103.52	100.66	93.22	98.43	103.46	112.45	113.92
2	Ajmer	111.94	96.09	85.63	79.68*	89.60	101.88	97.33	93.40	100.73	106.24	116.90	119.55
3	Allahabad (CC)	111.30	97.66	86.29	82.87	92.27	102.45	98.78	92.79	98.98	103.90	115.19	116.79
4	Barwala	113.31	94.92*	81.91*	80.35	89.79	101.52	96.75	91.91	102.20**	107.01**	118.37**	120.68**
5	Bengaluru (CC)	105.59	97.53	89.37	87.67	97.02	108.61	102.37	93.06	97.13	101.11	109.90	110.39
6	Bhopal	110.83	97.00	87.09	82.07	91.03	105.59	101.28	92.47	98.32	103.59	114.23	115.73
7	Chennai (CC)	104.43	97.91	89.33	89.55**	98.50**	109.00	102.93**	94.23	96.28	99.72	108.99	108.83*
8	Chittoor	104.52	97.88	89.23	89.36	98.49	109.16	102.93**	94.12	96.20*	99.70*	109.15	108.96
9	Delhi (CC)	113.36**	96.45	87.25	80.62	88.71*	99.98	96.30*	93.19	100.66	105.35	117.18	119.90
10	E. Godavari	109.20	96.29	88.84	83.15	93.22	104.65	100.24	94.51	100.95	103.78	111.11	113.61
11	Hyderabad	108.78	96.03	86.60	83.37	94.22	107.42	100.91	93.07	98.84	103.28	112.25	114.55
12	Indore (CC)	110.92	97.27	86.48	81.57	90.75	103.81	100.31	93.15	98.96	104.84	114.83	116.27
13	Jabalpur	109.93	96.97	87.02	82.04	92.76	106.50	101.50	92.31	98.60	103.53	113.77	114.33
14	Kanpur (CC)	111.21	96.67	87.93	83.83	89.27	99.38	96.98	95.06	100.44	105.82	115.76	116.78
15	Kolkata (WB)	108.25	96.69	90.68**	84.44	93.14	103.98	100.40	95.14**	101.11	103.12	110.27	112.62
16	Ludhiana	113.06	97.30	85.56	80.36	88.85	100.62	96.55	92.61	101.38	106.07	117.07	119.53
17	Lucknow (CC)	112.65	98.16	88.86	84.32	89.03	99.05*	98.41	93.14	99.10	103.79	115.56	117.20
18	Mumbai (CC)	108.13	96.67	88.87	85.60	94.04	106.62	101.68	93.32	98.18	102.56	111.02	112.78
19	Mysuru	104.93	97.76	89.44	88.37	98.03	109.13	102.08	93.45	96.84	101.26	109.29	109.13
20	Nagpur	109.42	96.77	84.12	81.89	93.64	109.17**	101.16	90.43*	99.01	104.76	114.06	114.57
21	Namakkal	104.31*	97.13	88.82	89.15	97.29	109.15	102.81	94.62	97.10	100.95	108.82	109.18
22	Pune	108.82	97.24	88.17	84.97	94.84	107.40	101.76	90.64	97.65	102.81	112.00	113.06
23	Raipur	111.28	97.46	87.62	83.49	93.44	107.11	101.48	91.41	97.85	102.01	112.65	113.33
24	Varanasi (CC)	111.75	98.26**	88.63	83.15	90.06	100.49	97.70	93.86	100.06	104.52	114.54	116.37
25	Vijayawada	109.31	96.44	88.85	83.35	93.13	104.62	100.31	94.49	100.75	103.67	110.99	113.63
26	Vizag	108.80	97.40	90.06	85.57	94.49	104.24	101.52	94.91	99.71	101.82	108.47*	112.27
27	W. Godavari	109.20	96.29	88.86	83.15	93.18	104.65	100.24	94.51	100.95	103.78	111.12	113.62
28	Warangal	108.67	95.96	87.93	83.69	94.06	107.05	100.92	93.06	98.70	103.06	112.04	114.26
	Overall average	109.41	96.98	87.80	84.04	93.04	104.88	100.22	93.29	99.11	103.41	112.78	114.35
	SD	2.69	0.76	1.89	2.77	2.96	3.27	2.05	1.22	1.63	1.85	2.87	3.32
	Max	113.36	98.26	90.68	89.55	98.50	109.17	102.93	95.14	102.20	107.01	118.37	120.68
	Min	104.31	94.92	81.91	79.68	88.71	99.05	96.30	90.43	96.20	99.70	108.47	108.83

**- Highest price; *- Lowest price

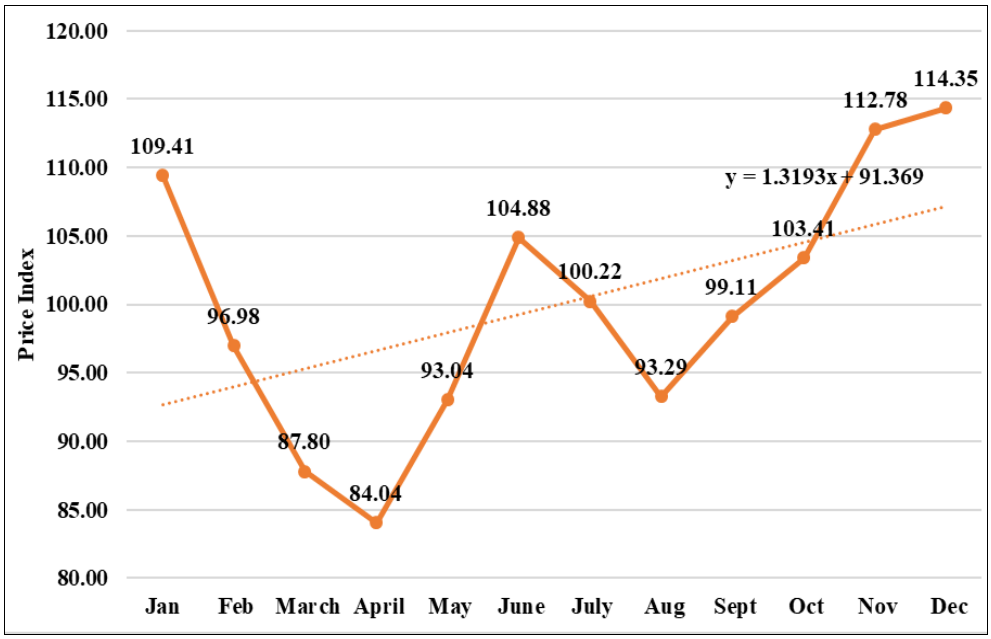

Fig 1: Average monthly egg price indices in India for the period from January 2013 to May 2024

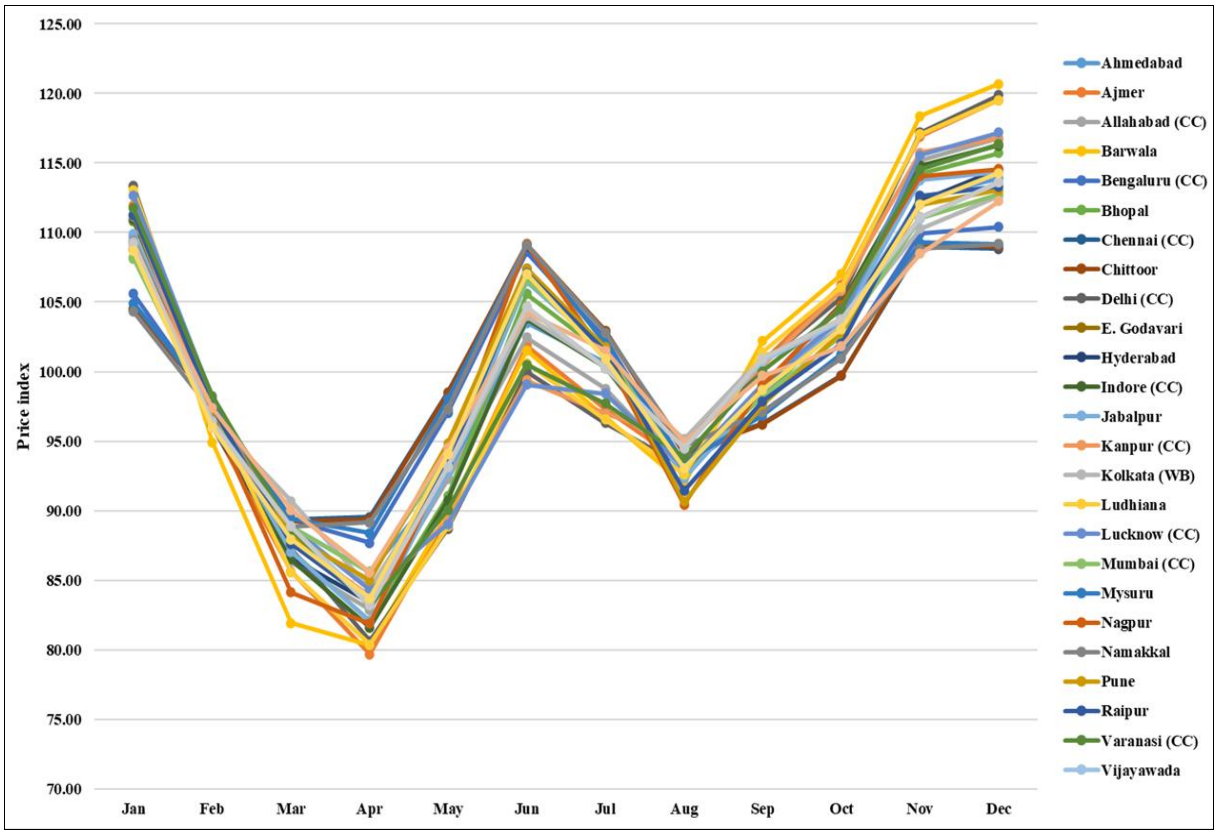

Fig 2: Monthly egg price indices at various production and consumption centres in India

Table 2: Linear trend equation of egg prices in major market centres of India n = 137

S. No.	Market centres	Linear trend equation	F value	R square	Adjusted R^2	SE
1	Ahmedabad	P = 310.42+ 1.48t + μ	196.86	0.5932	0.5902	48.74
2	Ajmer	P = 277.68 + 1.38t + μ	128.57	0.4878	0.4840	56.37
3	Allahabad (CC)	P = 301.21 + 1.53t + μ	161.71	0.5450	0.5416	55.54
4	Barwala	P = 279.42 + 1.31t + μ	93.36	0.4088	0.4045	62.86
5	Bengaluru (CC)	P = 302.28 + 1.50t + μ	248.59	0.6481	0.6455	44.18
6	Bhopal	P = 303.35 + 1.31t + μ	129.00	0.4886	0.4848	53.36
7	Chennai (CC)	P = 313.37 + 1.52t + μ	278.71	0.6737	0.6713	42.27
8	Chittoor	P = 306.38 + 1.52t + μ	278.75	0.6737	0.6713	42.26
9	Delhi (CC)	P = 294.63 + 1.40t + μ	126.71	0.4842	0.4803	57.53
10	E. Godavari	P = 282.83 + 1.44t + μ	211.02	0.6098	0.6070	45.84
11	Hyderabad	P = 283.92 + 1.32t + μ	161.65	0.5449	0.5415	48.07
12	Indore (CC)	P = 292.43 + 1.40t + μ	150.45	0.5271	0.5236	53.00
13	Jabalpur	P = 300.93 + 1.32t + μ	144.30	0.5167	0.5131	51.01
14	Kanpur (CC)	P = 313.81 + 1.34t + μ	126.56	0.4839	0.4800	55.02
15	Kolkata (CC)	P = 315.53 + 1.62t + μ	242.87	0.6427	0.6401	48.25
16	Ludhiana	P = 276.29 + 1.37t + μ	126.64	0.4840	0.4802	56.26
17	Lucknow (CC)	P = 321.58 + 1.52t + μ	155.78	0.5357	0.5323	56.55
18	Mumbai (CC)	P = 317.43 + 1.56t + μ	228.42	0.6285	0.6258	47.80
19	Mysuru	P = 306.11 + 1.49t + μ	254.99	0.6538	0.6513	43.30
20	Nagpur	P = 276.07 + 1.55t + μ	160.76	0.5436	0.5402	56.53
21	Namakkal	P = 301.85 + 1.35t + μ	239.68	0.6397	0.6370	40.45
22	Pune	P = 311.85 + 1.58t + μ	217.66	0.6172	0.6144	49.47
23	Raipur	P = 299.83 + 1.37t + μ	169.15	0.5561	0.5529	48.59
24	Varanasi (CC)	P = 317.24 + 1.53t + μ	169.11	0.5561	0.5528	54.45
25	Vijayawada	P = 282.33 + 1.46t + μ	219.36	0.6190	0.6162	45.75
26	Vizag	P = 295.18 + 1.43t + μ	234.38	0.6345	0.6318	43.35
27	W. Godavari	P = 282.83 + 1.44t + μ	210.70	0.6095	0.6066	45.87
28	Warangal	P = 288.32 + 1.30t + μ	161.08	0.5440	0.5407	47.41

(p values for the intercept, slope and F values for all the centres are <0.01)
P - Wholesale / Retail price per egg in paise
t - Time in months (t = 1 for January 2013, t = 2 for February 2013……., t = 137 for May 2024)
μ - Error term

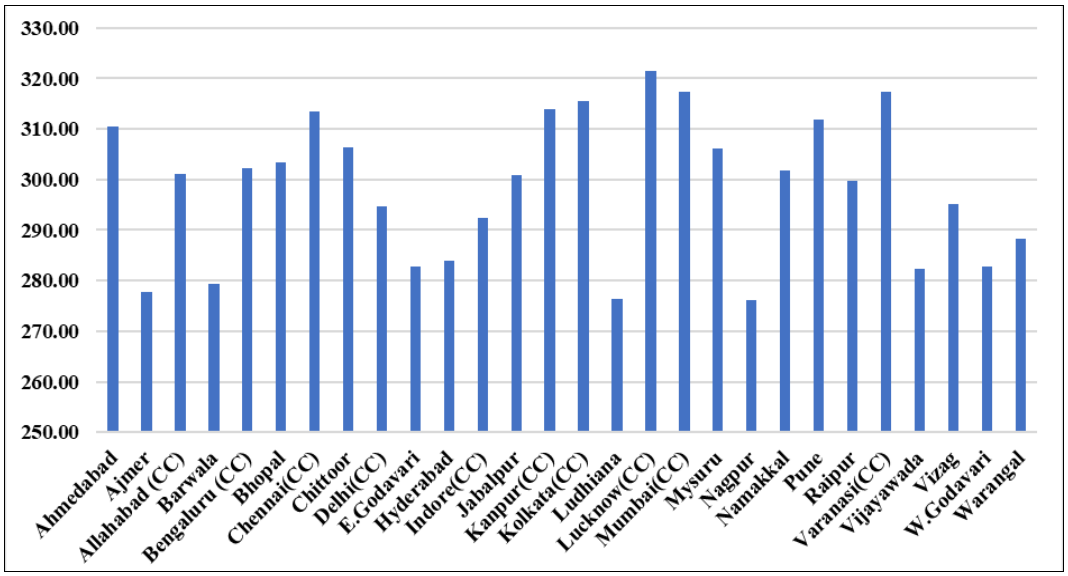

Fig 3: Intercept values of trend equations of egg prices in various market centres of India

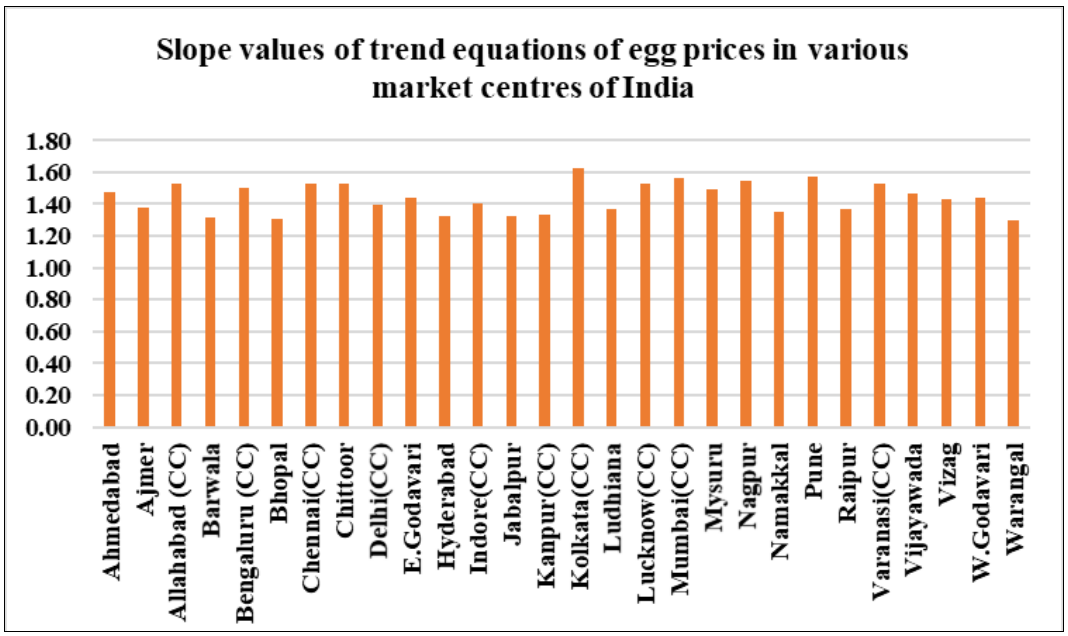

Fig 4: Slope values of trend equations of egg prices in various market centres of India

Conclusion

The pattern of seasonality was observed to be biphasic in nature. The egg prices were observed to be higher during Monsoon and Winter seasons and lower during summer season. The egg price index was found to be the highest during the month of November and December and the lowest during the month of April. The seasonal variations in egg price index are almost similar irrespective of the location of the market. The reason for uniformity in price behaviour might be due to the organized egg marketing approach and uniform price determination methods by National Egg Coordination Committee. The positive slope of price trend equation indicates that egg prices increase over time. Factors such as rising per capita income, inflation, a higher standard of living, awareness on nutritional status of eggs, taste and preference of consumers might have increased the demand for eggs which might had a positive influence on egg prices of various market centres of India.

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References

1. Department of Animal Husbandry, Dairying and Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India. Basic Animal Husbandry Statistics (2023). New Delhi: Government of India; 2023.
2. Department of Animal Husbandry, Dairying and Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India. Basic Animal Husbandry Statistics (2024). New Delhi: Government of India; 2024.
3. Department of Animal Husbandry, Dairying and

Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India. 20th Livestock Census. New Delhi: Government of India; 2019.
4. Iddamalgoda A, Hayashi S, Goto E, Sugiyama M, Oguri K. Current Asian trends in egg production and consumption: a demand analysis of selected countries. World's Poultry Science Journal. 2001;57(1):49-54.
5. Karthikeyan R, Nedunchezhian VR. An analysis of price trends and its behavioral patterns of the Indian poultry market with reference to egg. Afr J Agric Res. 2014;9(1):8-13.
6. Kathiravan G, Selvam S. Productivity dynamics of livestock in southern peninsular India: A compound growth rate analysis. Veterinary World. 2011;4(2):68-74.
7. Mani V, Subramanian SR, Shanmugasundaram S. Forecasting of egg production and wholesale egg price in Coimbatore district of Tamil Nadu. Indian Journal of Animal Sciences. 1995;65(10):1148-1153.
8. Mondal PK, Pandey UK. Time series analysis of buffalo prices in Haryana. Indian Journal of Animal Sciences. 1995;65(11):1263-1268.
9. Pandian A, Shree JS. Time series analysis of spatial and temporal variation in egg prices of Tamil Nadu. Indian Journal of Poultry Science. 2016;51(1):120-122.
10. Pandian ASS, Senthil Kumar G, Prabu M, Selvakumar KN, Saraswthi S. Time series analysis of wholesale and retail egg prices in major market centres of South India. Indian Journal of Animal Research. 2011;44(3):38-42.
11. Food and Agriculture Organization. FAOSTAT [Internet]. Available from: https://www.fao.org/faostat/en/#rankings/countries_by_commodity