A STUDY OF PRICE BEHAVIOUR OF VEGETABLES IN SOME COLONIES OF DELHI

By

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(Received : January, 1981)

SUMMARY

Random Samples of retailers and wholesalers were selected for studying the behaviour of average retail prices of tomato with respect to wholesale prices. Fractile graphs and concentration curves were drawn for each sample and the concentration ratios were worked out. The behaviour of the average retail prices was not different in East Patel Nagar and Ajmeri Gate Mandies during January-March, 1977. Similarly the price behaviour of tomato was nearly the same in the months of February and March at East Patel Nagar, Mandi. The concentration ratios were very small showing the inelastic nature af retail price of tomato in both the mandies.

INTRODUCTION

Vegetables, being the cheapest source of natural protective food contributing vitamins and mineral salts in the human diet, have special importance in the Indian diet because a large proportion of the Indian population is vegetarian. Besides, with improved cultivation practices and through efficient marketing system, vegetable cultivation can play an important role in the uplift of rural population. In the prevailing marketing system in Delhi vegetables have to pass through several intermediaries such as the wholesaler, the mashakhor (Semi-wholesaler) etc. within a short span before it reaches the consumer. There is a lot of variation in the prices of vegetables at these different

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intermediaries or stages of the marketing. It has been experienced that the share of growers in the consumer's rupee spent on vegetables is generally very small as compared to the share of various other intermediaries operating in the marketing of vegetables. It is, therefore, of considerable importance to study the behaviour of retail prices of vegetables in different localities/colonies with respect to the wholesale price.

Fractile graphical analysis is a method of statistical analysis, proposed by Mahalanobis [1] [2] which can be used for the comparison of data relating to the same population overtime or to any two populations that differ as to geographical region or in any other way. This method can be used for any variate which can be ranked and is particularly more useful in situations where the data do not permit a description in terms of a few parameters relating to the distribution. It also provides a graphical way of testing difference between groups.

In the present paper the method of fractile graphical analysis is used to study ;

(*i*) the behaviour of average retail prices of vegetables in different localities/colonies at a given point of time with respect to wholesale price, and

(*ii*) the behaviour of average retail prices of vegetables in a locality/colony at different points of time with respect to wholesale price.

Data and Sampling Design

For the study, data on the prices of tomato vegetable pertaining to two colonies, namely East Patel Nagar and Ajmeri Gate have been used. Data were collected by the Indian Agricultural Statistics Research Institute under the Project. "A pilot sample survey to evolve a suitable sampling methodology for the estimation of price spread and losses in transit at different stages of marketing of vegetables in Delhi" during 1977.

In Delhi, there is generally a three stage marketing system for vegetables. The growers bring their produce to the wholesalers in the Azadpur Mandi for sale. The produce of the grower is generally purchased by the mashakhors (semi-wholesalers) in the Azadpur Mandi in open auction of the entire lot. The retailers purchase vegetables mostly from mashakhors in units of 5 kg. or its multiples. Consumers purchase the vegetables from retailers. For the collection of data from the

growers and mashakhors, four clusters of two wholesalers each and four clusters of two mashakhors each were selected randomly. Four enumerators were posted for the collection of data on various aspects of marketing. Each enumerator was assigned one cluster of two wholesalers and one cluster of two mashakhors. For the collection of information from retailers regarding the price, the entire Delhi was divided into four zones, namely East, West, South and North. From each zone, two clusters of three colonies each were selected randomly. From each selected colony, two retailers were further selected randomly for the collection of data. One enumerator was assigned the work of data collection from one cluster of three colonies and thus, eight enumerators were posted for this work. For the purpose of this study data collected on the retail prices of tomato from both the selected retailers in East Patel Nagar as well as in Ajmeri Gate were only taken. The sample consisted of sixty days during January to March, 1977.

METHODOLOGY

Many times, data collected cannot be summarised in terms of a few parameters of the distribution. For the comparison of such a data relating to the same population over time or different populations over time, the usual procedures of testing and drawing inference based on few parameters cannot be applied. Mahalanobis [1] [2] suggested the method of fractile graphical analysis for comparing such populations. In the following, we describe the method.

Consider data on a pair of random variables (Y, X) and (Y', X'). Y and X refer to the study variate and the auxiliary variate in a population P whereas Y' and X' refer to the same variates in a different population P'. The problem is to compare the patterns of relationship of Y with X in the two populations i.e. in symbols, problem is to test whether or not

$$f(X) = f'(X) \text{ for all } X$$

where $f(X) = E(y/X = x)$

and $f'(X) = E(Y'/X = x)$

The method of fractile graphical analysis comprises of the following steps.

Step 1 : Select two independent samples of size n from each population P and P' of size N. Observe Y and X on the sample units. Then for each sample

Step 2(a) : Arrange X in ascending order of their magnitude.

Step 2(b) : Divide the n sampling units into 'g' equal groups of size 'm' each so that $n=mg$. These groups are called fractile groups.

Step 2(c) : Calculate the average of Y for each of 'g' groups i.e. $\bar{Y}_1, \bar{Y}_2, \ldots, \bar{Y}_g$.

Step 2(d) : Plot these averages of Y against the 'g' equidistant points on the X-axis and join them. Let this graph be $G(1)$.

Step 3 : Repeat step 2 (a, b, c) for the second sample and plot the averages of Y against the same 'g' equidistant points on the X-axis of the same chart. Join these points and say this graph G (2).

Step 4 : Similarly obtain G (1, 2), the graph for the combined sample.

Here, the area (e) bounded by G (1) and G (2) gives the measure of error associated with G (1, 2).

Step 5 : Now repeat the steps from step (1) to step (4) for the second population and get G' (1), G' (2) and G' (1, 2). Calculate the area (e') bounded between G' (1) and G' (2) which corresponds to the measure of error associated with G' (1, 2). The area 'S' betwecn G (1, 2) and G' (1, 2) is used as a measure of 'separation' or 'the generalised distance' between the two populations.

It is worth mentioning here that although the samples from population have been assumed to be of the same size n, this is not necessary. Further, it is un-necessary that samples selected from the two populations should be the same. Let n_1 and n_2 be the sizes of the two samples from the first population and n'_1 and n'_2 be the sizes of the two samples from the second population. Then, it is immaterial whether $n_1 = n_2 = n'_1 = n'_2$ or they are all different. This would be so because the graphical measure of the two errors would be given in every case by the two area lying respectively between each pair of graphs G (1) and G (2) or G' (1) and G' (2)

Step 6 : Calculate $T = \frac{S^2}{E^2} \sim \chi^2_g$ where χ^2_g is the value of Chi-square at g d.f., and

where $E^2 = (e)^2 + (e')^2$

The area S between the two curves, say, G (1, 2) and G' (1, 2) is obtained by counting the squares underlying within the two figures when plotted on a graph In the similar way, the area E is worked out :

For calculating the concentration ratio, the following formulae is used

$$C = \frac{2}{g\,\bar{Y}} \sum_{i=1}^{g} i\ \bar{Y}_i - \frac{g+1}{g}$$

where C = concentration ratio

$\bar{Y}_i$ = mean of Y for the $i-$th fractile group and

$$\bar{Y} = \sum_{i=1}^{g} \bar{Y}_i$$

In the forth-coming discussion, we will have the following notations

X — the wholesale price

Y — the retail price

P — East Patel Nagar mandi

P' — Ajmeri Gate Mandi

n — the number of sampled days

Results And Conclusions

This section consists of two parts. First one deals with the study of prices over two different mandies East Patel Nagar and Ajmeri Gate during the period January — March 1977 and second, with the prices in East Patel Nagar Mandi over two periods February and March, 1977.

Behaviour of the Average Retail prices of Tomato at East Patel Nagar and Ajmeri Gate Mandies with the wholesale prices at Azadpur Mandi.

Table 1 provides the average retail prices corresponding to fractile groups for all the samples selected.

It is seen from figure 1 that there was ovarlapping of error areas over the entire range indicating that on the basis of available samples, the average retail prices could not be considered

TABLE 1

Average Retail Price of Tomato in (Rs./Kg) At East Patel Nagar and Ajmeri Gate During January-March, 1977

Sl. No.	*Fractil group x*	*East Patel Nagar*			*Ajmeri Gate*		
		Retailer 1 y_1	*Retailer 2* y_i	*Combined* y_i	*Retailer 1* y_i	*Retailer 2* y_i	*Combined* y_i
1.	0-10	2.34	1.99	2.17	2.13	2.39	2.26
2.	10-20	2.31	2.13	2.22	2.26	2.20	2.23
3.	20-30	2.29	2.06	2.18	2.05	2.43	2.24
4.	30-40	2.10	2.11	2.10	2.35	2.36	2.35
5.	40-50	2.58	2.26	2.41	2.43	2.64	2.54
6.	50-60	2.49	2.49	2.37	2.52	2.52	2.52
7.	60-70	2.71	2.71	2.59	2.49	2.46	2.48
8.	70-80	2.80	2.19	2.77	2.65	2.56	2.61
9.	80-90	2.57	2.41	2.38	2.56	2.56	2.56
10.	90-100	2.66	2.46	2.56	2.65	2.65	2.65

TABLE 2

Average Retail Price of Tomato in (Rs./Kg.) At East Patel Nagar in February and March 1977

Sl. No.	*Fractile group* x	*February 1977*			*March 1977*		
		Retailer 1 y_i	*Retailer 2* y_i	*Combined* y_i	*Retailer 1* y_i	*Retailer 2* y_i	*Combined* y_i
1.	0-10	2.55	2.20	2 36	2.40	2.40	2.40
2.	10-20	2.65	2.20	2.42	2.25	2.05	2.15
3.	20-30	2.50	2.20	2.35	2.46	2.26	2.36
4.	30-40	3.00	2.00	2.50	3.25	2.70	2.96
5.	40-50	2.75	2.20	2.46	2.90	2.70	2.80
6.	50-60	2.45	2.20	2.32	2.70	2.70	2.70
7.	60-70	2.36	2.20	2.28	2.40	2.20	2.30
8.	70-80	2.05	2.55	2.30	2.40	2.10	2.25
9	80-90	2.45	2.25	2.35	3.00	2.60	2.80
10.	90-100	2.60	2.20	2.40	2.70	2.70	2.70

different in both the mandies. The error associated with G (1, 2) was more then the error associated with G' (1, 2) in all the fractile groups except 2nd and 3rd indicating that except 2nd and 3rd fractile groups; variability in the average retail prices was more in East Patel Nagar than that in Ajmeri Gate. G'(1,2) was above G (1, 2) upto the 6th fractile group and then in the 9th, so it can be concluded that the average retail price at Ajmeri Gate was higher than in East Patel Nagar. The separation of G (1, 2) and G' (1, 2) was less than the error associated with G' (1) and G' (2). The value of the statistic $T = S^2/E^2$ was .2297 (from Table 3) which shows that the separation was not significant as compared to associated error areas.

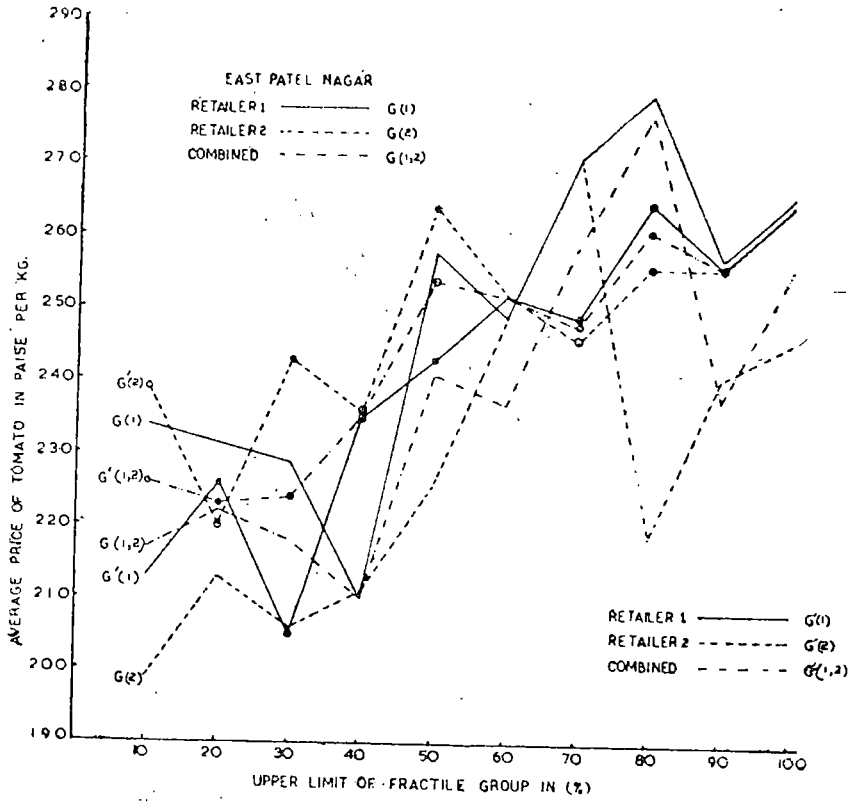

Figure 1. Fractile graphs for average retail prices of tomato in East Patel Nagar and Ajmeri Gate.

CONCENTRATION CURVES AND CONCENTRATION RATIOS

Figure 2 presents the concentration curves of the average retail prices in Ajmeri Gate and East Patel Nagar mandies. In both the graphs all the curves lie nearer to the line of equal distribution $y = x$, showing in-elastic nature of the retail prices. Table 4 gives the concentration ratios for the independent and combined samples of East Patel Nagar and Ajmeri Gate retailers. It was seen that these concentration ratios were lying between 0.023 and 0.043 confirming the conclusion given above i.e. all the curves had almost the equal concentration and showed inelastic nature of the average ratail prices of tomato.

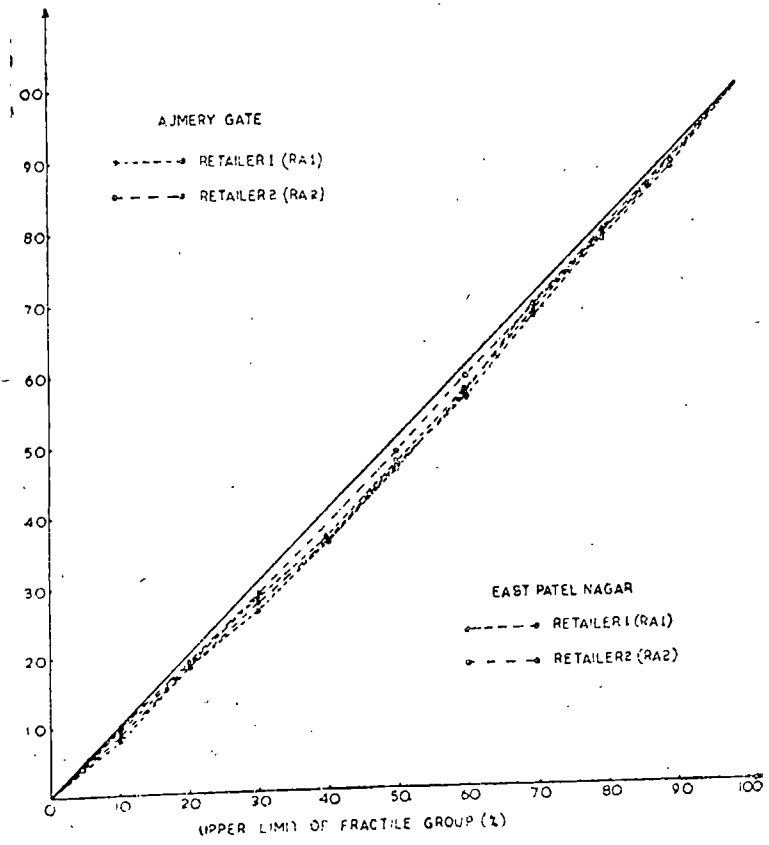

Figure 2. Concentration curves for average retail prices of tomato at Patel Nagar and Ajmeri Gate during January-March 1977.

Behaviour of the average retail prices of tomato at the Patel Nagar Mandi with the wholesale prices at Azadpur Mandi in February and March, 1977.

Table 2 presents the fractile groups and corresponding averages of retail prices for the selected samples. Figure 3 shows that there was overlapping of error areas over the entire range indicating that the average retail prices over two periods were not different. Further, the error associated with G (1, 2) was more than the error associated with G' (1, 2) in eight fractile groups indicating that the variability in the average retail prices was more in February as compared with that in March. As G (1, 2) lies above G' (1, 2) in all the fractile groups except 1st, 2nd and 7th, the average retail price in February could be considered more than in March. From Table 3, it is seen that the separation was more than either of the two associated error areas and T was .2901 indicating that the seperation was not found significant. A cyclical trend was observed in the average retail prices in both the periods.

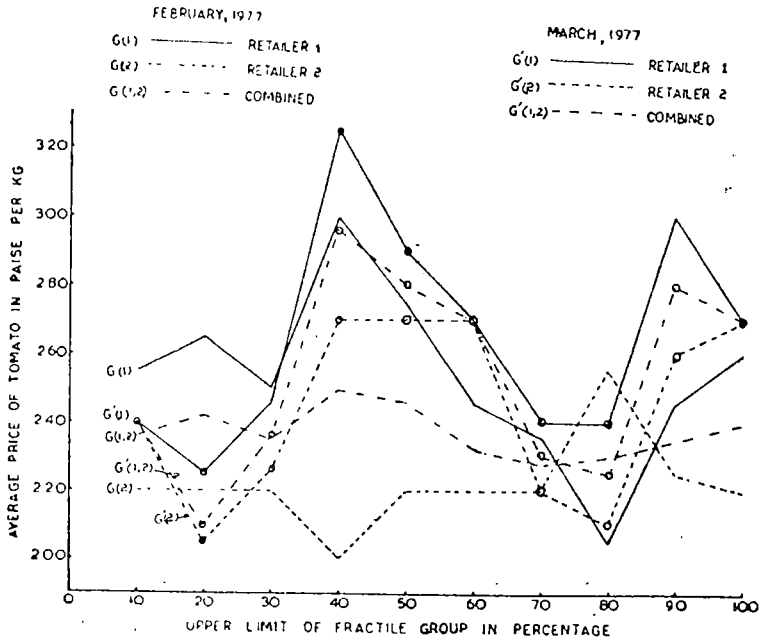

Figure 3. Fractile graphs for ratail prices of tomato at East Patel Nagar during February and March, 1977.

TABLE 3

Error Areas Associated with Graphs

Sl. No	*East Patel Nagar and Ajmeri Gate*			*East Patel Nagar February and March 1977*		
	S	*e'*	*e*	*S*	*e*	*e'*
1.	10	53	23	24	80	16
2.	6	41	44	26	75	39
3.	30	20	27	45	112	72
4.	38	30	22	79	164	76
5.	28	57	20	71	79	22
6.	13	44	4	6	40	19
7.	28	31	13	5	40	49
8.	17	46	10	40	40	69
9.	28	57	1	75	60	39
Total	188	379	164	370	689	403

CONCENTRATION CURVES AND CONCENTRATION RATIOS

Figure 4 gives the concentration curves of the average retail prices in both the months. The separation between G (1, 2) and G' (1, 2) was not significant as compared with the two associated error areas. G (1, 2) pnd G' (1, 2) both lie nearer to the line of equal distribution $y = x$ indicating the inelastic nature of the average retail prices. The area between $y = x$ and G (1, 2) or G' (1, 2) supply a measure of concentration. Thus, it is seen that the concentration of the average retail prices in February was more than that in March as G (1, 2) lies above G' (1, 2). From Table 4, the concentration ratios wers seen lying between 0.012 to 0.118.

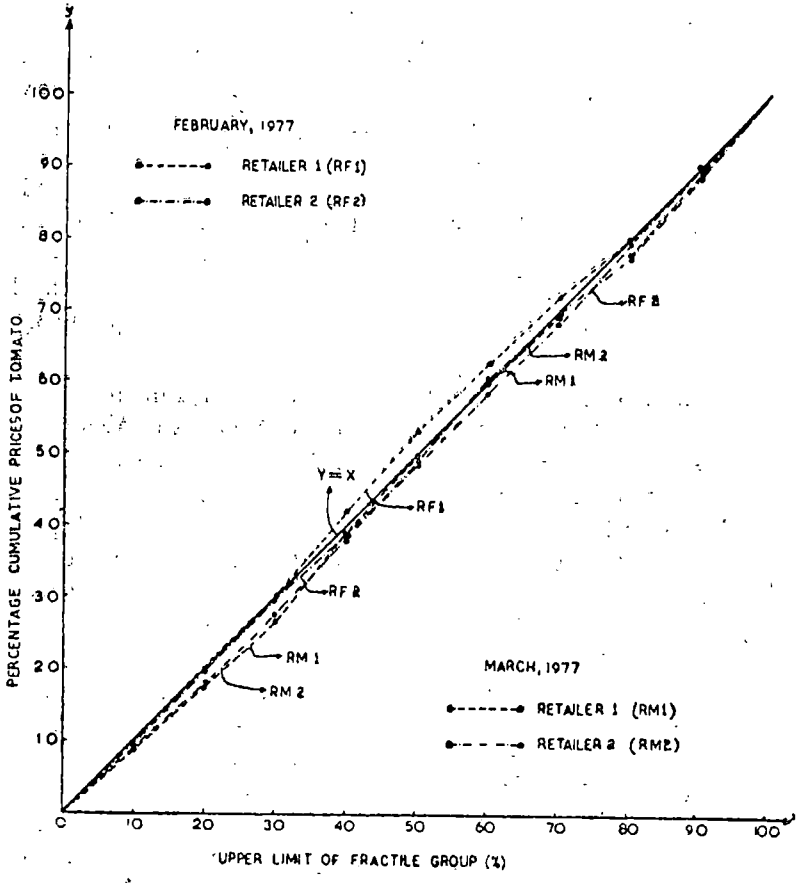

Figure 4. Concentration curves for average retil prices of tomato at East Patel Nagar in February and March, 1977.

TABLE 4

Concentration Ratio

Curve (East Patel Nagar and Ajmeri Gate	*Concentration Ratio*	*Curve (East Patel Nagar Feb. and March, 1977)*	*Concentration Ratio*
G (1)	0.036	G (1)	0.021
G (2)	0.040	G (2)	0.012
G (1, 2)	0.038	G (1, 2)	0.118
G' (1)	0.043	G' (1)	0.019
G' (2)	0.023	G' (2)	0.017
G' (1₄ 2)	0.033	G' (1, 2)	0.018

CONCLUSIONS

In the study of the prices of tomato at Ajmeri Gate and East Patel Nagar, during January-March 1977, it was observed that the average retail prices were not significently different in both the mandies. However, the variability in the average retail prices was more in East Patel Nagar as compared to that in Ajmeri Gate. The average retail prices in Ajmeri Gate were higher than in East Patel Nagar. Concentration curves showed the in-elastic nature of the average retail prices in both the mandies. The concentration ratios varied from ·023 to ·043.

In the study of the average retail prices of tomato at East Patel Nagar with respect to the wholesale prices in Azadpur in the months of February and March, 1977, it was concluded that the average retail prices over two months were not significantly different. However, the variability in the average retail prices was more in February than in March. Concentration curves were nearer to the line of equal distribution $y = x$ and the concentration ratios were found to be in the range 0.012 to 0.118.

Thus, the behaviour of the average retail prices of tomato was not different in East Patel Nagar and Ajmeri Gate Mandies during January-March, 1977. Similarly, the price behaviour of tomato was nearly the same in the months of February and March at East Patel Nagar Mandi. The concentration ratios were very small and were near to zero, showing the inelastic nature of the retail prices of tomato in both the mandies.

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