



Research Article

**AN ECONOMIC ANALYSIS OF POST HARVEST LOSSES OF SELECTED VEGETABLES
IN ALLAHABAD DISTRICT, UTTAR PRADESH**

***Nitin Barker., Dinesh Kumar and Nahar Singh**

Department of Agricultural Economics & Agribusiness Management SHUATS, Allahabad,
Uttar Pradesh, India

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ABSTRACT

Most vegetables are perishable in nature, and in that post harvest losses and distribution channel plays a vital role in price fixation of vegetables. A substantial quantity of production is subjected to post harvest losses at various stages of its marketing. The quantum of loss is governed by factors like perishable nature, method of harvesting and packaging & transportation etc. The study has examined the nature and extent of post-harvest losses in vegetable supply chain in the Allahabad district of Uttar Pradesh. Multi-purpose random sampling has been used for selection of vegetable growers. The post-harvest losses in vegetables at producers' level and at other levels of the channels were estimated under two heads viz. physical losses and economic losses. It has been found that farmers suffer a physical loss of 8.92 percent which vary from farm to farm. Farm-wise distribution of physical losses reveal that a marginal farmer lost 10.24 percent of his output which was maximum among the considered farm size groups while a large farmer lost 8.26 percent which was minimum. Thus it can be concluded that larger is the farms size larger will be the output and lower will be the proportion of loss.

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INTRODUCTION

Post-harvest technologies greatly influence the level of post-harvest losses and the quality of produce. Post-harvest losses during handling, transport, storage and distribution are the major obstacle in agrarian economy, especially in perishable fruits and vegetables. Besides resulting in low per capita availability and huge monetary losses, these increase transport and marketing costs also (Subrahmanyam, 1986). Many studies have attempted to estimate the postharvest losses at various stages of marketing of fruits and vegetables (Anon, 1982; Anon, 1985, Atibudhi, 1987; Waheed et al., 1986; Aradya et al. 1990; Madan and Ullasa, 1993; Gauraha, 1997; Srinivas et al., 1997; Sreenivasa Murthy et al., 2002; Sudha et al., 2002) and banana in particular (Gajanana et al., 2002; Sreenivasa Murthy et al., 2003). These studies have not separated the loss component explicitly during handling at different stages of marketing nor have included it as a separate item in the marketing margins, costs and price-spread. The requirement for an appropriate procedure for loss assessment was highlighted in a recent study on grapes, as these variations could significantly alter the profit margins and efficiency of marketing (Sreenivasa Murthy et al., 2004). In the present study, the methodology used for quantifying the post-harvest losses in both physical and value terms at various stages of marketing has been validated for selected vegetables. The outcomes have been compared with conventional methods of assessment of marketing margins

and efficiency. The impact of post-harvest losses on producers' net share, marketing margins and marketing efficiency due to separating out the marketing loss has also been quantified.

The specific objectives of this study were: (i) to study the marketing practices for selected vegetables in study area, (ii) to work out the losses in physical and value terms at different stages of selected vegetables marketing in distant markets, and (iii) to envisage the impact of post-harvest losses on farmers' net price, market cost, margins and efficiency.

METHODOLOGY

Sampling Procedure

The multi-purpose random sampling technique was used for the selection of study area and the sampling units. Uttar Pradesh was purposively selected, as it is one of the major producers of vegetables in India. In Uttar Pradesh, the Allahabad district was selected because of its maximum contribution (47 per cent) to the total state production (Statistical Abstract of Uttar Pradesh, 2014). List of all the 20 community development blocks of Allahabad district along with total area under vegetable was procured from current official records available in the District Horticulture office, Allahabad. Two blocks namely Holagarh and Soraon with maximum vegetable area were selected purposively. From the offices of sample blocks, list of village was procured and such villages were sorted out which have maximum vegetable

farms. 8 such villages from Holagarh and 7 villages from Soraon block were selected randomly. After selection, records of the sample villages were obtained and physically verified for the geographical location, number and area of vegetable farms in it and other economic aspects. In some of the sample villages the number of growers was less than 10, in such cases other neighboring villages were attached with it and considered as single unit (village). A village-wise list of all the farmers, having vegetable farms in the sample villages, was prepared along with the size of their operational holdings. Further, these farmers were stratified on the basis of their holding sizes as:

- Marginal farmers with a holding size below 1.00 ha;
- Small farmers with a holding size between 1.00 and 2.00 ha. and
- Large farmers with a holding size 2.00 ha. and above.

The data were collected from selected vegetable growers on actual post-harvest losses on weight basis at the field. The data related to production and marketing practices, post-harvest losses, price received and returns from orchards, during the years 2014-15 and 2015-2016 were collected through personal interview with the help of survey schedule. Five wholesalers and ten retailers were randomly selected from different selected vegetables markets and samples were drawn to estimate the post-harvest losses during transport, and at wholesalers and retailers marketing levels.

Techniques of Data Analysis

Simple average and percentages were used for estimation of Post – harvest losses at different stages of marketing. For estimation of efficiency of marketing the following ratio as suggested by Acharya & Agarwal (2001) was used.

FP = Net price received by the farmer (Rs/kg)
 MC = Total Marketing cost (Rs/Kg)
 MM = Net Marketing Margin (Rs/Kg)

An increased in the ratio represents improved efficiency and vice versa. The technical and pricing efficiency were also examined.

RESULT AND DISCUSSION

Post Harvest Operations in Vegetables

Vegetables after its harvest i.e. after picking undergo through different operations it reaches the end consumers. Any delay or carelessness at any stage causes over ripening which affects the taste and other qualities in an adverse way.

Status on Post Harvest Losses

The post-harvest losses in vegetables at producers’ level and at other levels of the channels were estimated under two heads viz. physical losses and economic losses. The physical loss gives the loss in terms of physical quantity and economic loss estimates the actual loss in value due to physical loss. Estimation of economic loss is important as even some of the vegetables, which are actually considered lost in physical terms, also fetch some price in the market. Thus, the channels, sorted out in the vegetables marketing in the study area were as follows:



*Operating in district market

Table 1 Average Post Harvest Physical Losses at Farm Level (quintals / farm)

Size Group	Total Vegetables drawn	Raw Vegetables (Good Quality)	Degraded / Damaged Vegetables		
			Partially *	Fully	Total
Marginal	35.34 (100.00)	31.72 (89.76)	2.38 (6.74)	1.24 (3.50)	3.62 (10.24)
Small	111.32 (100.00)	100.33 (90.13)	6.78 (6.09)	4.21 (3.78)	10.99 (9.87)
Large	150.70 (100.00)	138.25 (91.74)	8.10 (5.37)	4.35 (2.89)	12.45 (8.26)
All Farms	114.24 (100.00)	104.05 (91.08)	6.51 (5.70)	3.68 (3.22)	10.19 (8.92)

Note - Figures in parentheses are percentage to total vegetables drawn.
 *Degraded but still usable.

Table 2 Average Post Harvest Physical Losses at Farm Level (Quintals/hectare)

Size Group	Total Vegetables drawn	Raw Vegetables (Good Quality)	Degraded / Damaged Vegetables		
			Partially *	Fully	Total
Marginal	145.67	130.75	9.81	5.11	14.92
Small	148.21	133.58	9.03	5.60	14.63
Large	158.73	145.62	8.53	4.58	13.11
All Farms	154.25	140.49	8.79	4.97	13.76

*Degraded but still usable.

$$ME = \frac{FR}{MC+MM}$$

Where,
 ME = Marketing efficiency

Physical Losses

Just after picking the first operation undertaken by the growers or pre harvest contractors was to sort out the

degraded/damaged vegetables. This damage is either due the over ripening, wounding or caused by insect pests or birds. Over damaged vegetables are thrown away but a part of it which are partially damaged i.e. degraded below the standard limit are kept. Such vegetables are usually consumed either at farm level or sold at very low prices to the consumers of very low grade or even to local processors. Average physical loss suffered due to such damages by the sample farmers at farm level are given in table 1 and 2.

Table- 1 depicts the average physical loss under the column "Damaged Vegetables" on per farm basis while table 1.2 indicates the same on per hectare basis. On an average, farmers suffer a physical loss of 8.92 percent which vary from farm to farm. Farm-wise distribution of physical losses reveal that a marginal farmer lost 10.24 percent of his output which was maximum among the considered farm size groups while a large farmer lost 8.26 percent which was minimum. Thus it can be concluded that larger is the farms size larger will be the output and lower will be the proportion of loss. Same trend is approved by the table 1.2

Economic Losses

Price of vegetables varied from season to season; beginning, peak harvesting, and end of the season; day to day; morning to evening or person to person. Prices received by the sample farmers were averaged by their groups for two grades i.e. good quality vegetables and partially damaged vegetables. Table- 3 gives the estimated value of total output and the actual returns. Difference between the two returns given the magnitudes of economic loss in rupee terms on per farm as well as per hectare basis

Reasons for Post Harvest Losses and Its Preventive Measures

1. Maximum losses at harvesting stage are mainly because of the use of traditional methods. To prevent it, it is advisable to adopt some improved methods such as net picking in proper stage of ripening.
2. Owing to tender texture and high moisture content, vegetables are highly susceptible to mechanical injury. Careful picking and handling of vegetables may reduce such losses to some extent.
3. Traditionally, vegetables are kept in open after harvest. Such places are highly prone to insects and fungal attacks. But, some of the progressive farmers store them under cover or in sheds. This practice minimized the loss and hence recommended to all farmers.
4. Post harvest losses occur also because of the non use of proper scientific methods of grading and packing. Vegetables are either packed in proper cartons or wooden baskets in inappropriate manner. But, now days farmers started realizing their fault and trying to correct them.
5. For transportation, generally ordinary trucks, tractors tempos and even traditional carts are used. Also, irresponsible way of loading, unloading, driving, rough roads, unsuitable transport containers, overloading of mixed vegetables and vegetable etc., cause significant injuries. Link roads from villages to the main roads are mostly gravelled type which also causes considerable damages to the vegetables. Use of proper methods and means of transportation may reduce the quantum of losses caused during the transportation.

Table 3 Average Post Harvest Economic Losses in Selected Vegetables at Farm Level

Particulars	Marginal Farms	Small Farms	Large Farms	All Farms
I. Average Price Realized for (Rs. per quintal)				
(i) good quality vegetables	472	444	471	461
(ii) partially damaged vegetables	265	247	212	233
II. Per Farm; (in Rs.)				
1. Average Return				
(a) Estimated from total output *	16,680.48	49426.08	70,979.70	52,664.64
(b) Actual from				
(i) good quality vegetables	14,971.84	44546.52	65115.75	47,967.05
(ii) partially damaged fruit	630.70	1674.66	1,717.20	1516.83
(iii) total return	15,602.54	46221.18	66,832.95	49483.88
[b (i) + b (ii)]				
2. Economic Loss				
[a-b (iii)]	1,077.94 (6.46)	3204.90 (6.48)	4,146.75 (5.84)	3180.76 (6.04)
III. Per Hectare (in Rs.)				
1. Average Return				
(a) Estimated from total output*	68,756.24	65805.24	74761.83	71109.25
(b) Actual from				
(i) good quality vegetables	61719.00	59331.95	68625.79	64765.89
(ii) partially damaged vegetables	2,599.65	2230.41	180836	2338.79
(iii) total return	64318.65	61562.36	70434.15	67104.68
[b(i) + b (ii)]				
2. Economic Loss				
[a-b (iii)]	4437.59	4242.88	4327.68	4004.57

Note: Figures in parentheses are percentage economic loss
* Estimated at the price of good quality vegetables.

Table 3 reveals that due to realization of some sales proceed from partially damaged vegetables reduced the percentage loss from 8.26 (physical loss) to 6.04 (economic loss). In money terms the losses on all the size group of farms are almost equal.

6. Although vegetables is a winter season crop, even it requires, low temperature while transport and storage to check its speed of degradation. In absence of such facilities farmers are bound to sell their produce as soon as possible, otherwise they would suffer a huge loss.

7. Virtually, there is no storage specifically meant for vegetables in Allahabad. Farmers sell it as soon as it is harvested. It may be kept overnight and then sold in the market. Usually, vegetables are harvested in early morning and then sent to the market. Arrangement of cold storage facility in the area may increase the bargaining power of farmers as they may retain their produce for relatively longer period, if not sold at remunerative prices.
8. Retailers too do not have any proper storage facility but they minimize their loss by averaging their prices and sell the degraded vegetables at very low prices either to the poor consumers or to the local processors, who make its processed forms at small scale.
9. Farmer's negligent attitude towards post harvest losses, lack of quality consciousness and absence of fruit processing units in the area are responsible for huge post harvest losses. Lack of quality consciousness on the part of producers increases post harvest losses on one hand and on the other lack of the hygienic awareness among the lower class consumer, save many produce from complete wastage. It reduces quantitative loss of horticulture produce, though it is hazardous for human health.

CONCLUSION

Unfortunately in Global Hunger Index India has secured 98th position among 118 developing countries. Feeding to such a huge population with nutritious food is not only a tough job but also absolute solution to make our run into a better economy with healthy population. Fruits and vegetable are inevitable part of a nutritious diet and that can only be served to the population only when there is proper dissemination to the end users. To maintain a proper diet the quality of these supplements must be maintained and the post harvest losses should be minimised. The study done in Allahabad district of Uttar Pradesh not only provides with the proper post harvest losses scenario but also study the prevalent situation where there is lack of maintenance. There is reasonable physical loss at farm level and the rest occurs in the supply chain which counts more than 10%, it gives more of rescue goals to the supply chain management. This can be minimised not only by shortening the channel and bring contract production and selling of the produce into account but also packing and packaging materials such as sacks, bags, nets, crates, cartons must be used abundantly and should be subsidised by the GOI. Value addition also helps to minimise the loss and maximise the product use efficiency and GOI should take proper steps to expand the Agri-economic zones at various centres and optimise the resource use.

Leaping steps towards economic losses the physical losses in the magnitude of monetary value is much bothering, since the perishable products can't be insured but at farm level the farm products insurance can reduce this vagaries. Also grading according to the quality also fetches better proceed and later left over can be sold to the organic farming community to get organic manure out of the left over which absolutely unused.

References

- Baki-Abdul, A. Aref and John Teasdale Sustainable Production of Fresh Market Tomatoes and Other Summer Vegetables with Organic Mulches, Farmers' Bulletin No 2279. 1997. USDA-Agriculture Research Service, Washington, D.C. 23
p<<http://www.ars.usda.gov/is/np/tomatoes.html>>
- Hardenburg, R.E., A.E. Watada, and C.Y. Wang. The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks. U.S. Dept. of Agriculture, Agricultural Handbook No 66 130 pp. 1986.
- Iqbal, M. Type and extent of post harvest losses in horticultural commodities on Pakistan (pp:33-42).In: Proceedings of National Conference on Post-harvest Technology of Horticulture Commodities, 10-12 September, 1996,Quetta. 1996.
- Kader, A.A. Postharvest Technology of Horticultural Crops, Second Edn. University of California, Division of Agriculture and National Resources. *Publication* 3311. 1992.
- Kohls, R. and Uhl, J. Marketing of Agricultural Products. New York: Mac Milan. Sixth Edition. 1985.
- Raja, M.B and K.M Khokhar. Postharvest horticulture technology and its future prospects (pp:265-277).In :proceeding of first international horticulture seminar, 09-11 January 1992. *Pakistan Agricultural Research Council*, Islamabad, 1993.
- Ryall, A.L. and W.J. Lipton. Handling, Transportation, and Storage of Fruits and Vegetables. Vol.1. Vegetables and Melons. (2nd ed.) AVI Pub. Co., Westport, Connecticut, USA, 587 pp. 1979.
- Ryall, A.L. and W.T. Pentzer. Handling, Transportation, and Storage of Fruits and Vegetables. Vol. 2. Fruits and Tree Nuts (2nd ed.) AVI Pub. Co., Westport, Connecticut, USA. 610 pp. 1982.
- Talukder, S., Bogra and Khaleq-uz-zaman, M.M; Prepackaging, storage losses and physiological changes of fresh tomato as influenced by post harvest treatments, *Pakistan Journal of Biological Sciences*, v. 6(14) p. 1205-1207, 2003.
