

Organic Fruit Farming: An Empirical Analysis of Consumers' Willingness to Pay in Khyber Pakhtunkhwa Province of Pakistan

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ABSTRACT

Increase in production and Profit maximization shifted the aim of the producer to grow more in order to raise higher revenue, that resulted in a tremendous use of pesticides in apple orchards. From one side the use of pesticides has a positive effect on production, while on the other side it is adversely affected the environment and human health. In recent decades researchers have shifted their focus towards environment friendly organic agricultural products from conventional model of industrial agriculture. This research analyzes the consumers' willingness to pay for

environment friendly organic apple in district swat of Khyber Pakhtunkhwa province, Pakistan for the year 2018-19. Through a contingent valuation method (CVM) data is collected from a random sample of 160 households. Ordinary Least Square (OLS) is employed to investigate the consumers' willingness to pay for organic apples. During the survey period the mean value of willingness to pay is estimated as Rs. 11.23 per kg. Results of the regression analysis shows that income and knowledge have greater effect on willingness to pay while, age, education and health consciousness have significant effect on willingness to pay of consumers. As it is evident from the findings of this study that high income households are aware and able to pay more for pesticides free product than the lower income households. Based on the findings of this study it is recommended that the government may subsidize costly pesticides free product and conduct awareness sessions about the negative effect of chemical on human health and environment through mass media which is most reliable source of information. It is also recommended that government should give incentives for those producers who produce pesticides free product.

Introduction.

In recent decades researchers has shifted their focus towards environment friendly organic agricultural products from conventional model of industrial agriculture. Organic farming is a perspective way of faming that not only preserves the environment but also improves public health, bringing significant benefits to the economy as well (Annunziata. A and R. Vecchio, 2016). Since the main aim of commercialized agriculture has motivated human to produce well above 10,000 new chemicals that has never been part of the natural environment containing heavy metals and “persistent organic pollutants” (Mercati.V., 2015). With the passage of time agricultural development process resulted in tremendous pesticides import. Despite of the fact

that legislations are present, but it has been observed that pesticide are not used in an appropriate manner. Pesticide and other chemicals are mainly used for diseases and pest control and most of the time major portion of these chemical pesticides are wasted, resulting into soil, air and water pollution. Thus, directly and indirectly affect living organisms and human health in the environment.

Agriculture being one of the most important sector of the economy has experienced an incredible and significant development since the inception of Pakistan. This sector witnessed many praiseworthy achievements and realized the level of self-sufficiency (A.A.Al-Zaidi et al, 2011). The aim of production is shifted from self-reliance to profit maximization which resulted in unstable food production system and compromised the earth's capacity to produce more food in the future (FAO, 2012). Hence, the current food production must go fundamental changes towards greater input use efficiency in order to respond to the nutritional needs of the burgeoning population of this world.

World-wide reports show that low intake of vegetables and fruits increase the chances of risk factor for chronic diseases such as heart diseases, cancer, stroke and cataract development. Fruits are the most important and essential component of human diet. According to the united states department of agriculture, the intake of fruits contains 15 percent of niacin, 17 percent of thiamine, 27 percent of Vitamin B6, 30 percent of folate, 48 percent of vitamin A and 91 percent of Vitamin C. Other important nutrients provided by fruits include calcium, potassium, phosphorus and zinc (USDA, 2000). The intake of fruits has been shown to have a significant and positive effect on human health in terms of weight management and obesity management. The nutritional quality of fruits is adversely affected by climatic condition, irrigation, fertilization pesticides, which in turns have negative effect on human health and environment.

Other environmental factors such as soil PH, altitude and plant insect and diseases have also been reported to affect the composition and quality of fruits (O. O. Oguntibeju et al., 2013).

In Pakistan 29 types of fruits are produced and exported to different markets in the world. According to the recent data Pakistan has exported around 783 million tons of fruit. The area under fruit production was 764 million hectares with estimated production of 7 million tons. In Khyber Pakhtun, Pakistan different types of fruits are produced such as apples, guava, peach, melons, pear and plum etc (GoP, 2016). In swat 40 types of apples are produced. It contains 14.9 percent carbohydrate and vitamin A, B and C, 11 percent sugar, 0.4 percent fat 0.3 percent proteins (Syed Asif, 2002).

Profit maximization shifted the aim of the producer to grow more in order to raise higher revenue, that resulted in a tremendous use of pesticides in apple orchards. From one side the use of pesticides has a positive effect on production, while on the other side it has adversely affected the environment and human health. According to a research conducted by the green activist at environment working group (EWG) showed that 98 percent pesticides residuals were found in apples. The use of pesticides caused local asthma, various types of allergies, cancer, HBS and HCV. Studies showed that the nutritional knowledge about consumption of fruits is influenced by age, gender income, marital status and education (O. O. Oguntibeju et al., 2013). Therefore, the study in hand is designed to find out the consumers' perception and awareness regarding the use of pesticides and to analyze consumers' attitude towards pesticides free apples and consumer's willingness to pay for pesticides free apples in the research area.

Methodology

The first section of this chapter focuses on the universe of the study, selection of sample size and data collection. While the second section elaborated the analytical framework, contingent valuation survey design and model specification of the research.

Study Universe

Data used in this research study is collected in district Swat, Khyber Pakhtunkhwa-Pakistan. District Swat situated in the north of the province is selected for this study because it is famous for fruits and vegetables and it plays a vital role in national economy. Because of the favorable climatic conditions many fruits and vegetables like peach, apricot, pear, potato, tomato onion and other vegetables are grown in the area. The total area of district Swat is 5337 square kilometers with a population of approximately 21.61 million. According to the crop census report of Khyber Pakhtunkhwa (2013-14) the area under apple production is 3750 hectares with an estimated of 32000 tons.

Figure 1: District Swat Location



Source: Pakimag.com

Sampling size and Sampling techniques

For this research study a three-stage multisampling technique is used for data collection. In the first stage Tehsil mattaof District swat was purposively selected. In the second stage two villages namely, Bas Khela and Galsha are selected purposively and in third and last final stage a random sample of apple consumers were selected by using Yamani formula as:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where;

n = sample size

N = total house-hold in selected villages

e = possibility of error

Out of the selected sample size the required respondents from each village were selected through proportion allocation technique.

Formula as

$$n_i = N_i/Nn \quad (2)$$

Where,

n_i = No of sampled households from ith village

i= (1, 2) selected villages

n= Total sample size

N_i = Total number of households in ith village

N= Total number of households in selected villages

Table 1: Sample size of the Respondent in the Villages

Distract	Tehsil	Villages	Total no, of Consumers'	Sample size
Swat	Matta	Baskhela	2000	91
		Galsha	1500	69
Total	One tehsil	2 villages	3500	160

Source: Author's own estimation.

As the study in hand focuses on the apple consumers, so a well-prepared questionnaire was prepared for the collection of primary data. The respondents were interviewed face to face in the study area. The questionnaire consists of open ended, qualitative, quantitative and binomial questions.

Conceptual Framework

In Pakistan there is no specific market for pesticides free fruits and vegetables. For such type of products different type of labelling is required to differentiate the product from conventional grown products. This process is complex to make discrimination between pesticides free apples and the one which contains pesticides residuals. In the current research we used Contingent Valuation Method (CVM) for this process. It is a method which is used to find the approximate value for non-market commodity such as air, water, pollution etc. Through CVM we get a hypothetical market value for non-market commodity. CVM method was used by Gil *et al.* (2001) to examined market segmentation and willingness to pay for organic product. This

method was also used by Lendelet *al.* (2013) to analyzed demand for organic produce and willingness to pay for organic tomatoes. This method was also used by Babollahet *al.* (2017) to examined factors effecting on consumer's willingness to pay a premium for pesticides free fruits and vegetables. Victor *et al.* (2013) and Faridet *al.* (2013) used contingent valuation method for the willingness to pay of the consumer's.

Contingent Valuation Survey Designing

Contingent valuation method (CVM) is a technique used to get a market value of non-market valuation of the commodity. CVM is mostly used for valuation of environmental goods and services such as air, water and soil quality that has no market. We use contingent valuation technique to get consumer willingness to pay for pesticides free apples without buying.

Model Specification

Because of open ended question in the questionnaire we use linear regression model in which our dependent variable is consumer's willingness to pay a price premium while the independent variables include age, education, gender, marital status, income, house hold size, health consciousness and knowledge about chemicals. This model was used by Arcadioet *al.* (2012) and Jesse's (2012).

$$WTP_j = \beta_o + \sum_{i=1}^n \beta_i X_i + e_j \quad (3)$$

Where as

WTP is the specified WTP for pesticides free apple

β_o = constant

β_i = Coefficient of X_i indicates changes in WTP due to one-unit variation in X_i

$J = (1, 2, 3, \dots, 160)$ is the total number of respondents

$i = (1, 2, 3, \dots, n)$ total number of independent variables

X = is a set of socio economic and demographic variables where the variables includes income, age, knowledge, gender, marital status, education, consciousness of health, and house hold size.

e = error term

The model is estimated through ordinary least square (OLS) estimation method.

RESULTS AND DISCUSSION

Consumer Perception About Willing to Pay Price Premium

The data is collected from the respondents through binomial questions such as; are you willing to pay (WTP) for pesticides free apple in the area?? If the respondents are willing to pay a price premium and their response is yes and is denoted by 1 and if the respondents who is not willing to pay a price premium (WTP) their response is no, denoted by 0.

Table 2: Consumer's Response towards Willingness to Pay Price Premium

Category	Gender		Total	Percent
	Male	Female		
No	63	10	73	45.6
Yes	73	14	87	54.4
Total	136	24	160	100

Source: Author's own estimation.

Table 2 shows the respondents who are not willing to pay a price premium for pesticides free apple in the research area were 73 (45.6%) in which 63 are males and 10 females. The respondents whose perception is positive towards WTP are 87 (54.4%), in which 73 are males and 14 are females. The minimum willingness to pay a price premium was Rs. 0 and maximum is Rs. 80 per kg. The mean value of willing to pay a price premium is Rs 11.23 per kg and standard deviation is 15.60 as shown in table 3.

Table 3: Mean Willingness to Pay a Price Premium.

Observation	Minimum WTP	Mean WTP	Maximum WTP	Standard deviation
160	0	11.2312	80	15.60

Source: Author's own estimation.

Regression Analysis Results for Willingness to Pay (WTP)

After the descriptive statistics of respondents, OLS method is used to measure the willingness to pay (WTP) model for pesticides free apple in the research area. Results of the regression analysis shows relationship between WTP and socio-economic characteristics of the sampled respondents, as below:

Table 4: Estimated OLS Model for WTP of Pesticides Free Apple.

Variables	Simple linear model		
	Coefficient	T value	P value
Constant	-3.914039	-1.92	0.057
Gender	3.304674	1.31	0.193
Marital status	- .6893725	- 0.52	0.607

Knowledge	4.183993	3.51	0.001
Health	2.626433	2.48	0.014
Age	1.31448	2.23	0.027
Education	1.100439	2.23	0.027
Income	3.604483	4.33	0.000
House hold size	- . 5665645	- 0.82	0.413
R-squared	0.7785	Adjusted R squared	0.7652
F- value	0.000		

Source: Author's own estimation.

In our results most of the consumers are willing to pay a price premium for pesticides free apple. Those factors which affects consumers willing to pay are age, education knowledge, health and income. The results show that 54.4% of the respondents are willing to pay price premium for pesticides free apple. Similar study was conducted by (Babollahet *al*, 2017) having greater similarities to our findings with 97% WTP of the consumer. The estimated mean value of WTP is Rs11.23 per kg up to a maximum of Rs80 per kg in the study. This result is similar to the findings of Lendelet *al*, (2013) where they found that the mean WTP were high for organic products than conventional product. Relevant study was also conducted by (Sukantet *al*, 1991) in which out of total selected respondents 87% were willing to pay price premium up to a maximum of 10%. The findings of Joyce *et al*, (2011) are also in line to our findings where they found 78% of their respondents were willing to pay a price premium for organic products.

Gender

The coefficient of gender is positive and statistically insignificant which show that gender has no effect on our model willing to pay a price premium (WTP) for pesticides free apple. The p-value of gender is 0.191 which is insignificant. This result is in line with the findings of Shashikiran *et al*, (2014).

Marital Status

The coefficient of marital status is negative and statistically insignificant. The results show that marital status had no effect on the dependent variable which means that it did not influence the willingness to pay a price premium (WTP) for pesticides free apple in our model. Our results are in line with the studies of (Victor *et al* 2013) and (Shashikiran *et al*, 2014).

Knowledge

The coefficient of knowledge is positive and statistically significant having p value of 0.001. The result shows that people who are aware of the hazardous effect of chemical on human health are willing to pay price premium of Rs 4.1. Related study was conducted by (Sarma *et al*, 2016) and our results is in line with his findings. Our study is also supported by (Marin *et al*, 2013) most results are in correspondence to our findings which highlighted that knowledge is important factor for WTP. Due to knowledge 45.5% of the consumers are willing to pay price premium.

Health

The coefficient of health is positive correlated with willingness to pay a price premium (WTP) and statistically significant at 5% significance level with a p value of 0.014. The estimated coefficient showed that people who are health conscious shows more willingness to pay a price premium of Rs 2.62 than those who are not health conscious. Related study was conducted by

(Marine *et al*, 2013) and their results are in line with our findings. Health conscious consumers are willing to pay a price premium of 62.5% more for organic apples than those who are not health conscious.

Age

The results showed that coefficient of age was positive and statistically significant at 5% confidence interval having p value of 0.027 during study period. The estimated positive coefficient of age shows that as age is increased by one year the willingness to pay a price premium (WTP) is increased by Rs 1.31 than the lower age. Similar study was conducted by (Sukantet *al*, 1991) his results were same as our findings. The respondents whose age were between 36 to 60 years pay less price premium than the respondents whose age are more than 60 years which indicates that older consumers are more health conscious and are willing to pay more as compared to their younger counter parts. Related study was conducted by Shashikiranet *al*, (2014) and his results are in line with our findings. This study is also supported by (Ghorbaniet *al*, 2016). Their findings of willingness to pay a price premium (WTP) is in line with our results and show that age was significant and positive correlated. This indicates that with the age the WTP of the respondents also increase, these results have similarity with our findings.

Education

The estimated coefficient of education is positive and statistically significant having p value of 0.027. The positive coefficient shows that increase in education level or one-year education also increase the willingness to a price premium of Rs 1.1 as compared to those whose education level is low keeping all other variables constant. These results are in accordance with the

findings of (Lendelet *al*, 2013) which showed that the WTP of primary education level is 84% less than the tertiary education level. Similar study was also conducted by (Sarma *et al*, 2016) which showed that the coefficient of education was positive and statistical significant ($p < 0.05$) and their results are also in accordance with our findings.

Income

The coefficient of income is positive correlated with willingness to pay a price premium (WTP). The estimated p value was 0.000 which is statistically highly significant. The positive coefficient showed that increase in income of one thousand also increase the willingness to pay a price premium of RS 36.6. Similar study was conducted by Victor *et al*, (2013) their findings showed that income was statistically significant and positive related with willing to pay which is in line with our findings.

House-Hold Size

The coefficient of house hold size is negative and statistically insignificant. The estimated house hold size has no relationship with willingness to pay (WTP) a price premium in the study area. This study was supported by (Victor *et al*, 2013) and their finding are in line with our results. The coefficient of determination for overall model (R-squared) showed that 77% variations occurred in the model due to independent variables. The F- value is statistically highly significant which show that the overall model is significant.

CONCLUSIONS AND RECOMMENDATIONS

This research is conducted in distract Swat to analyze consumers' willingness to pay a price premium (WTP) for pesticides free apples in district swat. The mean value of consumers'

willingness to pay for pesticides free apples was Rs 11.23 per kg for pesticides free apple. Regression analysis shows that most parameters of the research were statistically significant such as age, education, health, knowledge and income. These parameters highly influence the consumers willing to pay price premium (WTP) for pesticides free apples in the study area. As it is evident from the findings of this study that high income households are aware and able to pay more for pesticides free product than the lower income households, so the government may subsidize costly pesticides free product. It also recommended that government may conduct the awareness sessions about the negative effect of chemical pesticides through mass media which is most reliable source of information. This study also recommends that government should give incentives for those producers who produce pesticides free product. It is recommended that the government should increase an educational program for the producers to decrease the use of hazardous chemicals which has negative effect on human health and environment.

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