

# **Consumers' concerns when purchasing fresh vegetables in Trinidad, West Indies. Implications for Extension programs**

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## **Abstract**

Some 130 persons in the Central region of Trinidad were surveyed using systematic random sampling to determine their concerns related to the production and purchasing of fresh vegetables. The study found that there were fairly high levels of concern about pesticide residues, GMO's and the quality of irrigation water used in vegetable production. Advertisement was the most important factor influencing purchasing decisions. There were some differences based on gender on the quality attributes of the products when purchasing (appearance, cleanliness, firmness) and on factors influencing their purchasing decisions (health benefits and flavor). Most respondents were willing to pay more for vegetables produced with a minimum or no pesticides.

Secondary data showed a low quantity of extension programs dealing with pesticide management and Good Agricultural Practices and recommendations included the need to increase greatly programming efforts especially those programs that use the Agro-ecosystem analysis (AESAs) component of Farmer Field Schools (FFS).

**Key Words;** Vegetables, Consumers, Pesticides, Extension Programs

## **Introduction**

The World Health Organization (WHO) advised that the intake of mixed fresh fruit and vegetables should be at least 500 g/day or five servings per day (Steinmetz and Potter, 1996; CDC, 2005). Worldwide, consumers have become more concerned about the nutrition, health, and quality of food they eat (Gil et al., 2000). Ensuring safe food for the protection of human health has become as important as ensuring adequate access to adequate food by all persons. Issues related to food safety often represent consumers' concern regarding residues in food resulting from chemical sprays, inorganic fertilizers, artificial additives and preservatives, which are often linked to farming methods (Yee et al., 2005). Such farming methods are designed to bring about large increases in food in a short time and usually pay little attention to the sustainability of the practices offered for adoption and the impact on the health of those who consume the food produced.

Some 1,690,329 MT of fruits and vegetables were produced in countries of the Caribbean Community (CARICOM) in 2006 (CRNM/UNCOMTRADE, 2006). While consumers in Trinidad have not been clamoring for immediate change towards organically produced foods, there is some emerging interest in some segments of the population. It would appear however, that most consumers are becoming increasingly concerned about the use of pesticides in the production of food grown locally. Two local investigations (Ramroop et al., 2000 and Lopez et al., 1995) determined that some vegetable producers in Trinidad have used excessive amounts of highly toxic chemicals on a regular basis. Moreover, a rapid appraisal of people's perceptions of the quality and safety of foods offered for sale in Trinidad showed that 81.6% of those surveyed were very concerned about the amount of pesticides used in vegetable production (Ganpat, 2004).

In the last decade, among the more adult population, there has been a move toward healthier eating habits and this has meant that leafy vegetables are preferred as well as minimum cooking of all vegetables in order to preserve their nutritive value. Indeed, the majority of consumers surveyed (Ganpat, 2004) were willing to pay more for foods produced with a minimum or no pesticides at all. Further, this investigation found that of those willing to pay more, the majority indicated that they would pay up to 10% more. Given these realities, the Government has sought to promote Integrated Pest Management (IPM) programmes to encourage farmers to use a variety of alternative methods, including biological and cultural methods to control pests and diseases rather than solely relying on toxic synthetic pesticides. Extension officers are expected to plan and execute programs that teach farmers safe use of pesticides as well as good agricultural practices. There is no definite national approach to this problem however and these programs are planned based on officers' perceptions of farmers' needs. In addition, since 2002, Farmer Field Schools have been introduced to empower farmers to make wise crop protection decisions. These however, require significant human and financial resources to conduct and thus only a small number are conducted annually.

As a direct consequence of public's increased awareness about intensive agricultural practices and their potential effect on human health as well as its impact on the environment and other food safety issues, there has been accelerated interest in organically produced food throughout the world. Organic foods are perceived as foods without 'chemicals' and 'growth hormones', foods that are 'not intensively produced' and are 'natural' (Davies et al., 1995). In 2004, the value of the world market for certified organic food was estimated at US\$27.8 billion (Santacoloma, 2007). Since then, it has been growing at roughly at 9% per year (Sahota, 2006). Linked to the whole issue of organic foods is the concurrent interest in foods high in antioxidants.

An exploratory study of public awareness and knowledge of antioxidants in Trinidad showed that some (60.9%) were unaware of the importance of consuming at least five servings of fruits and vegetables per day. Some 58.2% consumed less than 1 serving of fruits and 44.4% consumed less than 1 serving of vegetables daily (Boodhu and Badrie, 2007).

We believe that to prevent ill-health in the population, strategies should include building a well informed population who can make healthy purchasing decisions, as well as a systematic intervention by Extension to reduce pesticide use by farmers. Consequently, this study was planned to provide further insights into the factors which impact on consumers decisions when purchasing fresh vegetables. The specific objectives of this study were to: 1) examine and describe the concerns that influence householders decisions as they purchase fresh vegetables; 2) examine whether there are differences to these concerns based on gender; 3) determine the factors that influence persons willingness to pay more for fresh produce produced with little or no pesticides, and 4) to evaluate the extent of Extension programming for safer food production.

The results are expected to be useful to policy makers in both the agriculture and health sectors as strategies for the promotion of sustainable agricultural practices whilst ensuring safe food production can be developed.

## **Methodology**

One hundred and thirty persons were surveyed using a structured interview schedule. Content validity was assessed by two experts in the field who suggested some changes which were incorporated into the final instrument which was then pretested. The actual survey was conducted in the town center of the reported fastest growing town in Trinidad, located in the central region. Three interviewers selected persons along the main thoroughfare over a two-day period using a systematic random sampling procedure. Every fourth adult was approached and asked to facilitate the exercise. If there was no cooperation, the next person was approached for interview. Each interview took approximately five minutes to complete. Beyond personal and demographic data, the information collected was based on persons' awareness and concerns about

pesticides as well as the factors they considered when purchasing fresh vegetables. To ascertain the implications for extension programming, reports of country extension programs were analysed for content, targets, quantity and methodologies. Data were summarized, analysed using SPSS (Statistical Packages for the Social Sciences, version 12.0 for Windows) and are presented mainly as descriptives and some correlations.

## **Results and Discussion**

Respondents (n =130) were equally mixed by gender. The majority were less than 50 years with a fair amount (30.8%) who can be considered as young persons. The majority of persons were well educated with some 55% reported having tertiary level education. The majority of annual household incomes were above US\$ 4,000, with 38.5 % above USD 8,000.

### **Places of purchase**

The majority of those interviewed (78%) purchased their produce from the open market. Some 20% purchased from supermarkets, with very few purchasing from roadside vendors (2%).

### **General concerns regarding local fresh produce**

Some 58 % of respondents indicated that they believed eating locally produced vegetables was harmful to their health, while 25% indicated otherwise. A smaller (18%) were unsure. Of those who thought it was harmful to their health, the vast majority were concerned about the safety of the produce (31% were very concerned and 61% were somewhat concerned).

### **Specific concern about pesticide use in vegetables**

Some 69% of respondents indicated they were aware of the quantity and types of pesticides used in vegetable production, while 31% were not. Of those who were aware, 70% expressed some level of concern with 30% indicating that they were not concerned about the pesticides used. This finding is similar to what was found in a study conducted in Bangkok, Thailand, when consumers were asked about their concerns regarding pesticide residues on vegetables and fruits. Over half of the respondents stated that they were very much concerned (Roitner-Schobesberger et al., 2008).

Respondents perceived that most farmers were aware to some extent (64%) about the correct and timely application of pesticides. In Thailand, insufficient farmer training had lead to the injudicious use of pesticides, i.e. the recommended application levels and application frequency are not always followed, nor were pre-harvest intervals strictly observed (Chunyanuwat, 2005). Farmers in developing countries often do not have the training or the equipment to handle pesticides safely. Since 2002, FAO recommended that

pesticides classified as 'extremely hazardous' should not be used in developing countries (Eddleston et al., 2002).

### **Impact on health**

While 28.4% thought that the quality of vegetables produced locally had a significant impact on their health and that of the nation, the majority (50.8%) did not think so. Some 20.8% were unsure.

### **Deciding attributes for purchase of fresh vegetables**

Respondents were asked to say how often they used each of the six criteria presented to them when deciding to purchase fresh vegetables. Responses were scored (Always=3; Sometimes=2; Never=1) and mean values calculated. All the attributes investigated were important, but to varying extents, as persons made their decisions to purchase fresh vegetable. When ordered in terms of importance, data show that appearance was the top attribute (mean =2.87) with some 86.9% of respondents always using this criterion. Cleanliness of the vegetables was ranked second in order of attributes (mean =2.60) with some 60% always using this criterion. The firmness of the vegetables was also fairly high on the attribute list (mean =2.42). The smell (mean =2.11) and size (mean =2.02) of the vegetables were the lowest in the order.

### **What influenced purchasing decisions?**

To assess what influenced respondents' decisions when purchasing fresh vegetables, seven areas were presented to them and they were asked to indicate the level of influence each area had on their decision. Responses were scored (Strong Influence=3; Some Influence=2; No Influence=1) and mean values calculated. Data show that when deciding to purchase, advertisements had the strongest influence on persons (mean =2.69), followed by the perceived health benefits (mean =2.68). Flavor (mean =2.65), Firmness (mean =2.60) and Nutrition provided (mean =2.51) were also ranked fairly high. Price was ranked low in the order and knowledge of how the vegetables were produced was the lowest ranked (mean =1.31) of the factors that influenced purchasing decisions.

### **Product concerns**

Respondents' level of concern to seven issues were assessed and scored (very concerned =3; somewhat concerned =2; not concerned =1). Mean values were calculated and used to describe consumers' level of concerns about the fresh products they were purchasing. Data show that respondents were most concerned about the level of pesticide residues when purchasing fresh vegetables (mean = 2.60), followed by concerns about whether they were derived from GMO (mean =2.52) and then the quality of the water used for irrigation (mean =2.38). Lower levels of concerns were related to pathogenic microorganisms and use of manure. The lowest level of concern related to bio-terrorism (mean =1.69) and use of preservatives or additives in the product (mean = 1.52).

### **Willingness to pay for healthier fresh produce**

Some 70% were willing to pay up to 25% more (39.2% up to 10% more and 30.8% even higher). Much smaller amounts were willing to pay higher prices (7.7% up to 50% more and 2.3 % will pay twice times more). 19% of respondents indicated that they were unwilling to pay more for vegetables produced with a minimum or no pesticides. In a study of food safety and organic food demand in Italy, 92.6% were willing to pay to eliminate pesticides and 62.8% a higher product price (Canavari et al., 2002). The most important motivation to pay for elimination of pesticides was for both health and environment benefits (76.5%). In a study in Croatia respondents were asked to indicate if they were willing to pay a higher price for ecologically-grown food compared to conventional foods, and how much extra they were willing to pay, 7.5% indicated that they would definitely not pay more money and 9 % did not know whether they would pay premium prices for organic produce (Radman, 2005). Also, most of the consumers (46 %) willing to pay a premium price would pay the 11-20 % extra, 7 % would pay 31-50 % extra, and 5.7% of respondents were willing to pay 51-100% extra for organic products.

In a Spanish study, while 83.7% of the sample would be willing to pay a 5% premium for organic fruit, only 42.2% would pay an increase of 20%. In this same study, consumers were willing to pay an approximate 10% premium for organic food compared with conventional food (an average of 9.5% by women and 11.4% by men). Regular consumers would pay a greater premium, around 15%, an average of 12.6% for women and 18% for men (Ureña et al., 2008).

### **Concerns based on Gender differences**

In this study, we sought to examine whether there were differences in concerns based on gender related to production practices, produce quality and factors influencing purchasing. In the area of production practices, data in Table 1 show that male and female respondents did not differ significantly on their concerns about production practices. They showed similar higher levels of concern about pesticide residues and GMO and lowest concern about bio-terrorism and preservatives and additives in the food.

As far as their concerns related to the quality attributes of the product offered for sale, both categories showed most concern on the appearance, cleanliness and firmness of the product and were significantly different based on gender on these attributes with female respondents showing much more concern than males. Respondents were least concerned about the smell and size of the product and there were no gender differences on their level of concern.

For both categories, the higher order factors influencing purchase were advertisement, perceived health benefits and flavor, with price and knowledge of how the vegetables were produced being the least

influential. There significant differences based on gender on the issues of health benefits and flavor. Again, females were more concerned than males on both issues. Rappoport et al., (1993) reported women tended more towards healthy food while men placed more importance on a food's intrinsic pleasure. Fagerli and Wandel (1999) reported that women were more disposed towards changes in diet than men and also possessed greater knowledge of the effects of food on health.

There were no gender differences in response to the extent of the increased price that consumers were willing to pay for vegetables produced with a minimum or no pesticides. This is different to a study in Spain which found that men were more inclined to pay a higher price for organic food than women (Ureña et al. 2008).

Table 1: Differences in production concerns, quality attributes, purchasing factors and willingness to pay increased price based on gender

| <b>Concerns/Attributes</b>             | <b>Male<br/>(n=65)</b> | <b>Female<br/>(n=65)</b> | <b>t value</b> | <b>P</b> |
|--|------------------------|--------------------------|----------------|----------|
| <b>Concerns related to production</b>  |                        |                          |                |          |
| Pesticide residues                     | 2.60±0.06              | 2.60±0.06                | 0.00           | 1.00     |
| GMO                                    | 2.46±0.08              | 2.58±0.07                | -1.12          | 0.33     |
| Irrigation Water quality               | 2.28±0.07              | 2.48±0.07                | -2.11          | 0.20     |
| Pathogenic microorganisms              | 1.98±0.07              | 1.94±0.09                | 0.040          | 0.06     |
| Use of manure                          | 1.77±0.09              | 1.97±0.08                | -1.65          | 0.13     |
| Bio-terrorism                          | 1.65±0.09              | 1.74±0.08                | -0.80          | 0.10     |
| Preservatives/additives                | 1.51±0.08              | 1.54±0.07                | -0.30          | 0.38     |
| <b>Quality Concerns of the product</b> |                        |                          |                |          |
| Appearance                             | 2.83±0.05              | 2.91±0.04                | -1.30          | 0.01**   |
| Cleanliness                            | 2.51±0.06              | 2.69±0.06                | -2.18          | 0.00***  |
| Firmness                               | 2.37±0.06              | 2.48±0.06                | -1.24          | 0.04*    |
| Smell                                  | 2.17±0.80              | 2.05±0.08                | 1.01           | 0.55     |
| Size                                   | 2.05±0.07              | 1.98±0.07                | 0.65           | 0.07     |
| <b>Factors influencing purchase</b>    |                        |                          |                |          |
| Advertisement                          | 2.70±0.06              | 2.69±0.06                | 0.00           | 1.00     |
| Perceived Health benefits              | 2.62±0.07              | 2.74±0.05                | -1.41          | 0.01**   |
| Flavor provided                        | 2.57±0.07              | 2.74±0.05                | - 2.05         | 0.00***  |
| Nutritional value                      | 2.47±0.06              | 2.55±0.07                | - 0.99         | 0.31     |
| Price                                  | 2.12±0.09              | 2.08±0.10                | 0.38           | 0.27     |
| Knowledge of how produced              | 1.29±0.06              | 1.32±0.07                | - 0.32         | 0.41     |

\* : p<0.05; \*\*: p<0.01; \*\*\*: p<0.001

### Factors related to the extent of the increased price persons were willing to pay

Correlation results (Table 2) show that age, household income, level of concern about the safety of the produce and level of concern about the types and quantity of pesticide used were related to the extent of the increased price they were willing to pay for vegetables produced with a minimum or no pesticide.

Posri et al., 2007, in a study in Northern Thailand found that willingness to pay for safe vegetables increases with age and income. Another factor often mentioned as limiting the market share of organic products is price, especially the price difference between organic and conventional products (Lohr, 2001; Zanoli, 2004; Padel and Foster, 2005).

Table 2: Correlation between selected factors and the extent of the increased price they were willing to pay for vegetables produced with a minimum or no pesticides

| <b>Factors</b>   | <b>How much more willing to pay (Spearman's Rho )</b> | <b>Significance p-value</b> |
|--|---|-----------------------------|
| Gender (Male =1; Female = 2)   | -.017   | .847                        |
| Age (18-34 =1; 35-49 =2; 50-65 =3; >65 =4)   | .247  | .005**                      |
| Annual Household income \$US (<\$4,000 =1; 4,000 - 8,000 =2; >8,000 =3)                    | .188  | .03*                        |
| Level of education (Primary level =1; Secondary =2; Tertiary =3)                           | .106  | .229                        |
| Level of Awareness of pesticide used (Very=3; Somewhat=2; Unaware=1)                       | -.110   | .214                        |
| Level of concern about the safety of produce (very=3; somewhat=2; No=1)                    | .188  | .03*                        |
| Level of concern about the type and quantity of pesticides used (very=3; somewhat=2; No=1) | -.19  | .03*                        |

\* : p<0.05; \*\*: p<0.01; \*\*\*: p<0.001

Linear regression analysis of the independent variables examined in this study showed that these variables accounted for a small 11% of the variation in the increased price persons were willing to pay for vegetables produced with a minimum or no pesticides.

## **Extension Programs for Good Agricultural Practices**

The Pesticide and Toxic Chemical Control Board (PTCCB) which is the regulating agency for pesticide use in the country regularly lists the chemical pesticides which may be sold in the country. Unfortunately enforcement of regulations is weak and many pesticides banned in developing countries can be found on the local market. Usually, these are the more toxic chemicals and because of the high incidence of pests and diseases, farmers tend to have a preference for these products. The sale of pesticides by agro-shops is however coming under some scrutiny. A recent survey (Caruth, 2009) found that pesticide shop owners were very knowledgeable about pests and pesticides. However, in reality they left the running of the shop to hired help, many of whom had little or no formal training in all areas related to their job as pesticide resellers; the nature of pesticides, mode of action and toxicity. It was also determined that most of these shops were concentrated in vegetable producing areas and that they are often first source of information by farmers regarding pesticide use.

A review of programs for farmer education conducted by the eight agricultural counties in Trinidad as well as at the centralized Farmers Training Centre (FTC) and its associated outreach venues was done. It showed that during the period of study the FTC would have conducted ten courses which would have dealt with pesticide use and Good Agricultural Practices. This represents just about 5% of total courses conducted annually. Furthermore the target would have been mainly persons interested in farming and very small numbers of practicing farmers. This would have meant low immediate impact, but potentially greater impact when these persons do enter farming. The classroom style teaching method with very little experiential learning or teaching aids would have further diminished the extent of learning possible.

At the county agricultural offices, less than ten percent of educational programs either deal specifically with pesticides management or have components that deal with these issues. This is clearly insufficient and farmers resort to agro shops for advice. This situation leaves much room for continued injudicious use of pesticide and its consequent ill effects on the environment and health of consumers.

## **Conclusion**

There is a fairly high level of concern about pesticide residues, GMO's and the quality of irrigation water used in vegetable production and advertisement is the most important factor influencing purchasing decisions. Actual knowledge of how the vegetables were produced has much lower influence simply because consumers do not know. Gender-wise, males and females differed to some extent on the quality attributes of the products (appearance, cleanliness, firmness) and on two factors influencing their purchasing decisions (health benefits and flavor). Respondents were willing to pay for vegetables produced

with a minimum or no pesticides and this was related to their age, household income, and extent of safety concerns and types and quantity of pesticides used in production.

While these results are informative, they are taken in the context that they are from a sample of respondents in the central areas of the country and a wider study across the entire country could be useful to validate these findings nationally. They however, point in the direction that people are concerned and that they do consciously make their purchasing decisions based on some criteria.

These findings suggest the need for greater public education about the use of pesticides and all other inputs in vegetable production which may be injurious to person's health. Concurrently, specific measures to reduce the use of harmful inputs in vegetable production at the policy level with associated enforcement of regulations must be designed and implemented. The education of farmers and Pesticide shop retailers must also be placed higher on the priority list of Extension programs.

All stakeholders however have a part to play in maintaining the good health of the population; government; farmers and citizens must all take decisive action to secure better quality of life for all.

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