CONSUMER WILLINGNESS-TO-PAY FOR ORGANIC BRINJAL (EGGPLANT) IN JAFFNA DISTRICT, SRI LANKA

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ABSTRACT

Increased attention is focusing on the environmental impact of intensive agricultural practices and the health risk associated with pesticide residues. Excessive and careless use of agrochemicals leads to severe damages to the environment and human health. In this context, organic farming is gaining recognition as an environmental friendly production system and attracts researchers interested in analyzing the consumption behavior of organic products. This study examines the willingness–to-pay (WTP) for organic eggplant (brinjal) and the effects of various socio-economic variables on the WTP in Jaffna district, Sri Lanka. A consumer survey measuring WTP for organic eggplant was conducted in the study area. A pre-tested questionnaire was used for data collection by direct interviews. Three hundred fifty households were interviewed, of which, 267 completed questionnaires were used in this study. The survey included questions on demographic characteristics (such as age, education, gender, household size, etc.), and attitudes toward and knowledge about organic products, health hazards and environmental degradation due to agrochemical application. Questions related to premium prices that consumers would be willing to pay for organic eggplant was the primary focus of the survey. Respondents were asked to select their WTP from a set of given choices. Because of the discrete and ordinal nature of the dependent variable, an ordered probit model was constructed to identify the impacts of the relevant explanatory variables on the dependent variable (i.e., WTP for organic eggplant). The results suggest that WTP is significantly and positively affected by household income, the presence of children in the household, information dissemination through either hearing or reading about organic products, whether the family has a history of cancer and whether or not the

household has concerns about pesticide residue in foods. Marketing efforts should be focused on this target group of consumers. Results also indicate that about 88 percent of the respondents would be willing to pay a premium for organic eggplant. This shows the market potential for organic eggplant (brinjal) in the area. The findings of the study will be helpful to producers in assessing market potential for organic eggplant in the Jaffna district. Marketing and pricing strategies can also be developed to effectively create awareness about organic products among consumers.

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CHAPTER ONE

INTRODUCTION

1.1. Background

Modern agriculture depends on the use of chemical fertilizers and pesticides for high crop yields. Although such a technology-based agricultural practice has increased crop productivity and abundance, the resulting ecological and economical impacts have not always been positive. Environmental pollution and food safety associated with agrochemical usage have become a great concern worldwide. Indiscriminate use of agrochemicals and careless application of pesticides have often led to health hazards. The residual effect of pesticides is a source of several health problems including cancer, miscarriages, child deformities, kidney ailments, liver diseases and sterility among men and women. Insufficient knowledge by farmers about proper handling of pesticides, such as mixing of pesticides during spraying time, recommended application levels, method of application, timing of application, etc., can lead to future health problems.

Numerous public opinion surveys (Oracle poll research, 2007; Smaller World Communications, 2002; Opinion Research Corporation for the Food Marketing Institute, 1990) have revealed broad concerns with pesticide residues. Newspapers and television news broadcasts have frequently reported food safety issues. Also, the number of papers devoted to the study of organic food markets has increased (Makatouni, 2002; Lampkin, 2003, 1997; Beharrel and MacFie, 1991; Landell, 1992; Tregear et al., 1994; Lin et al., 1996; Vetter and Christensen, 1996; Thompson and Kindwell, 1998). Public concern over environmental quality and health problems have steadily grown in recent years with an

increased focus on agriculture as the primary source of environmental and health problems worldwide.

Food consumption in most developed countries has increased tremendously in quantity terms, and consumer food choices are broader than in the past. The result is more diversified consumption. For these countries, the market environment, distribution channels, marketing activities, and food quality are also becoming increasingly of greater importance. In addition, consumers are more cognizant of the nutrition, health, and quality of the food they eat. The increasing importance of health and the impact that food production has on the environment and consumer food choices are well documented in the literature (Kleijn et al., 1996; Chupitaz and Keslemont, 1997).

In order to cope with this problem, the Food and Agriculture Organization (FAO) proposed "The World Food Summit Plan of Action" (1999) in recognition of the importance of developing alternative sustainable agriculture practices such as organic farming. The goal of the Action Plan was to reduce environmental degradation while creating income for farmers. Organic farming is an integrated farming system which involves both technical aspects (e.g., soil, agronomy, weed, and pest management) and economic aspects (input, output, and marketing) as well as human health.

As a consequence, production and consumption of organic products have grown in recent years. Briefly, organic farming refers to a farming system which uses organic manure, and avoids or largely excludes the use of synthetic fertilizers, pesticides, and chemicals. In its broadest sense "Organic agriculture is a holistic production management system that avoids use of synthetic fertilizers, pesticides and genetically modified organisms,

minimizes pollution of air, soil and water, and optimizes the health and productivity of interdependent communities of plants, animals and people. The term "agriculture" is used in its wider sense to include crop/livestock systems, organic aquaculture and organic harvesting of non-timber forest products. Agricultural "products" include food, fiber and medicinal and cosmetic raw materials. Finally, "organic agriculture" is not just about production. It includes the entire food supply chain, from production and handling, through quality control and certification, to marketing and trade" (FAO, 2007). A study implemented by FAO (2001) has shown that adequate management of organic farming generates a positive impact on the environment (e.g., reduction of water "contamination," increased soil fertility because of crop rotation, etc.). On the demand side, consumers have positive attitudes towards organic products, since they perceive them as healthier than conventional alternatives (Beharrel and MacFie, 1991).

Since the production of organic food products is a remedy for the prevention of numerous health hazards caused by conventionally produced food products, the global market has experienced an increased growth in organic foods. The leading countries in organic food production are Australia, Argentina and China. The demand for organic food products has also grown rapidly in the United States, Europe, and in some other countries. Respected organic market analysts like Prof. Ulrich Hamm have forecasted annual growth rates of 20% - 30% a year for organic food products. (Geier Bernward, Director of International Relations, IFOAM at the Seminar on the production and exports of organic fruit and vegetables in Bangkok, Thailand, 3-5 November 2003: A seminar organized by FAO, IFOAM and the EarthNet Foundation)[1]. FAO estimated that the

[1] http://www.fao.org/docrep/006/AD429E/ad429e02.htm

international market for organic food reached US $40 billion in 2006 (FAO, 2007). According to 'The World of Organic Agriculture' reports, in the year 2004, land area under organic management was 24,070,010 ha; in 2005 it increased to 26,458,270 ha, and in the year 2007 it has grown to almost 31 million hectares which is 0.7 percent of global agricultural lands (Willer and Yussefi, 2004, 2007).

However, in Sri Lanka, the market for organic products is not well developed. Traditional agricultural practices in Sri Lanka have most of the significant features and ingredients of present day organic farming, as indicated by the above definition of basic organic production standards. In Sri Lanka, organic production means, "No pesticides, herbicides or chemical fertilizers are used". Only environmental friendly sustainable agricultural methods are adopted, along with organic fertilizers. It takes over two to three years before a farm can be certified as organic. The farms are examined on a regular basis by national and international agencies who test soil and product tissue to confirm the absence of chemical residues. The organic products are certified by an independent third party of accredited organic certifiers (e.g., QAI, SKAL, NASAA, IMO, etc.). Sri Lanka follows the International Guidelines set out by the IFOAM - International Federation of Organic Agriculture Movements.

In Sri Lanka, organic farming practices with proper standards were initiated in 1979 by a non government organization, namely, "Gami Seva Sevana" (Jayakody, 2001). By 1999, there were 172 farmers, who were practicing organic farming in Sri Lanka. Their cultivation covered over 550 ha and comprised 0.02 per cent of the total agricultural land in the country (FAO Statistical Database, 2001). These organic producers mainly

produced organic vegetables, spices and fruits for the local market in small quantities and organic tea in large quantities for the international market. As per IFOAM & FiBL[2], in the year 2006, there were 15,215 hectares of land under organic management, with a 0.65% share of total agricultural land and a presence of about 3,300 organic farms.

Although the production of organic food products has considerably increased during the past decade, demand is still low, and there is no reliable data available on what percentage of food expenditure is allocated to such products. The main obstacle for organic production seems to be the difficulty in selling organic products in retail food markets. Organic produce is often characterized by a lack of proper retail venues, shortage in supply, inconsistence is product certification, poor quality products, etc. Food availability and seasonality have also influenced marketing activities, and make it difficult to establish appropriate retail outlets. On the production side, high costs, especially labor costs, and the difficulty of shifting from conventional to organic farming are also limiting factors (Vetter and Christensen, 1996). Furthermore, higher costs of production and retailer margins jointly have resulted in higher prices than consumers are willing to pay for organic food. Though consumers search for more diverse, higher quality, and healthier food products, organic products face problems related to consumer product acceptability, new product uncertainty, high prices, and deficiencies in distribution channels (Roddy et al., 1994).

Further, none of the marketers have adopted successful marketing strategies for the sustenance of the organic market in the country. But, there is a growing trend among

[2] International Federation of Organic Agriculture Movements & Forschungsinstitut für Biologischen Landbau (German: Research Institute of Organic Agriculture)

urban consumers to try organic products from places where they could get an assurance about the quality of the products, as they do not get any chance to consume pesticide free food products (Anuradha, 2004). Also, market features of organic products in Sri Lanka show that it is still in the "introduction stage" of the product life cycle. To achieve a higher degree of market share, organic marketers should introduce their products to appropriate target groups and adopt proper marketing strategies. In most cases, consumer choice is based on the physical appearance of the product, such as color, product damage, freshness, etc.

In the literature, one can find a large body of research regarding consumers' WTP for environmental friendly and/or high quality/safety in food production (Henson, 1996; Fu et al., 1999; Skuras and Vakrou,1999; Govindasamy and Italia, 1999; Gil et al., 2000; Corsi and Noveli, 2002, 2003; Angulo et al., 2003; Smed and Jensen, 2003), as well as for non-food products (Vlosky et al., 1999; Laroche et al., 2001) or services (Tse, 2001). As previous studies have shown, organic food purchases are mainly attributed to consumers' environmental concerns and/or food quality and safety considerations. Thus, WTP for such features of food can be a good predictor of organic food demand. This proposed study is conducted to determine whether consumers are aware of the pesticide residual effect and the extent to which they are willing to pay for organic products. Conceptually, consumers' WTP for a health risk reduction may serve as an indicator of willingness-to-pay for organic products because compared to organic products, conventional products are believed to carry pesticide residues which can cause adverse health effects. Studies by Hammitt (1990) and Williams and Hammitt (2000) showed that compared to conventional buyers, organic produce buyers perceive significant risk

reductions associated with switching to organically grown produce and are willing to pay a higher price to reduce perceived food safety risks. Those who purchase organic produce revealed by their behavior that they are willing to pay a substantial premium to avoid pesticide residues.

This study tries to provide a better understanding of consumers in relation to organic food, assuming that higher prices are the primary limiting factor for increasing organic consumption. Consumers are also segmented according to their living area, taking into account consumers' socioeconomic characteristics and attitudes toward organic food products and environmental concerns. These results will provide important information to producers and retailers about factors affecting consumers' decisions and therefore can improve their marketing strategies in the study area.

Based on other studies (e.g., Sedef Akgüngör et al., 2007; Gil et al., 2000; Corsi and Novelli, 2002; Krystallis, and Chryssohoidis, 2005 and Boccaletti and Nardella, 2000), it is expected that consumers would be willing to pay a premium for organic products. This expectation is based on the idea that these products are healthier, and may diminish negative environmental effects associated with conventional agricultural production. In this study, brinjal (English interpretation is eggplant) is the product under investigation. Eggplant is an important vegetable in peoples' diets in the study area. It is cultivated and available throughout the year because of that the monthly average price of eggplant does not fluctuate very much compared to most of other vegetables (Department of Agriculture, Government of Sri Lanka).

Although there are several economic methodologies to value non market goods, often researchers choose Contingent Valuation Method (CVM) as the most appropriate to assess consumers' willingness-to-pay (Hanemann, 1999). This study also proposes use of the contingent valuation approach. CVM becomes prominent through its application to the problem of valuing environmental amenities and similar commodities which are not directly traded in markets. The goal of CVM is to simulate the same kind of ordered preferences which economic theory argues would be revealed through market behavior if such markets existed (Freeman, 1979). Thus, the application of CVM has been largely limited to public good commodities that are not traded in markets. (Belzer and Theroux, 1995). CVM is primarily used for evaluation of consumer preferences for non-market goods (e.g., un-priced natural resources), it is also useful because the organic eggplant market is a hypothetical market in the study area and organic eggplant is not available in retail outlets.

CVM allows direct estimation of WTP by means of different (direct) elicitation techniques. Consumers simply indicate their WTP without purchasing the (non market) hypothetical product. Direct methods like CVM and experimental markets have raised several concerns about their reliability. A major issue is that consumers may have little information about the risks involved and therefore may provide a wrong monetary evaluation of the benefit from risk avoidance. A possible solution is to inform consumers about the risks involved during the interview or the experiment (Buzby et al., 1995).

A second problem, with regard to the product, is the dependence on the analysis and the possibility of extending WTP results to other foods, that is, the results found for specific

risks and food products cannot necessarily be generalized to other risks and products (Caswell, 1998). Within the specific field of CVM analysis, the reliance of this method on consumers' subjective responses makes the results vulnerable to several potential biases. First of all, consumers face hypothetical-purchasing situations: they probably take this scenario less seriously than the real one and therefore may tend to overestimate their true WTP (Blumenshein et al., 1998).

Nevertheless, the selection of appropriate survey and elicitation methods would reduce these biases. Data can be collected through personal face-to-face interviews, mail questionnaires or telephone interviews. Whenever consumers do not have good consumption experiences regarding a product, either through direct use or indirectly through the use of similar products, direct contact with the interviewer would probably help respondents to focus on the risks involved or the risks that could be avoided. The representative consumer in the study area is not particularly acquainted with pesticide-free products, and in any case his or her experience is quite limited, because of the rather recent introduction of these items. A direct elicitation with in-person interviews is well suited for this scenario. Moreover, WTP elicitation using direct monitory choices avoids mental calculations, confusions and delays in answering. This method asks respondents to select the amount they are willing to pay from choices of possible payments, in absolute terms. For this study five classes of price premiums were used (see questionnaire in the appendix).

1.2. Problem Statement

The excessive and careless use of agrochemicals in agriculture can lead to severe damages to the environment and to human health. Thus, there is a need for a new system and new products which can reduce these problems by limiting the application of agrochemicals during the production processes. In general, the risks of harmful environmental and health effects are reduced with the organic farming method than with the conventional farming method. Thus, organic farming is faced with a potential for expansion in order to satisfy growing environmental and health concerns. One interesting feature of organic products is the "price premium" they command in the market. Various consumer reports and academic studies have identified some of the key factors associated with consumers buying organic products, which include income, education, health and nutritional concerns, food-safety concerns, environmental friendliness, etc. However, it is difficult to quantify what exactly consumers are paying for, because the factors that are reported to be important to consumers when purchasing organic products cannot be observed when making purchasing decisions. In fact, consumers may not observe the effect of many of these factors even after consumption. For example, it would take a long time after consumption to realize the effect of pesticide use on the human body or to the environment. It seems that consumers nevertheless create their own perceptions or expectations about products and their qualities, and make purchasing decisions accordingly. Thus, it is important to understand how consumers perceive the quality of the product.

Organic products must have some perceived benefits to those who are willing to pay higher prices. Consumers who do not buy organic products either have different perceptions, or their perceived benefit from organics is not worth the price premium. In order to analyze the effect of such unobservable factors, the information on individuals' perceptions about these factors should be obtained. Such information is not available from typical market data. This requires closer attention and further research on the consumer demand for organic products. It is important that consumer attitudes toward organic farming be addressed if future adoption of this farming method is sought.

1.3. Objectives

The objectives of this study are,

1) to determine the consumers' willingness-to-pay (WTP) for organic eggplant and
2) to identify various socio-economic factors which affect the WTP

Findings of the study will provide insights to producers and retailers with regard to how much the consumer would be willing to pay for organic eggplant in Jaffna district. Brinjal is a highly consumed vegetable in the Jaffna District and the majority of brinjal production in Sri Lanka is targeted for the Jaffna district (Department of Agriculture, Sri Lanka, 2006). Also the results from this study will provide information to producers and retailers about factors that affect consumers' WTP. This will enable producers and retailers to target consumer characteristics and therefore improve their marketing strategies.

1.4. Method

The necessary data for this thesis were collected by direct interviews using structured questionnaires. The collected data were employed in an econometric model called ordered probit using the STATA statistical software package. The detailed description of the methods used will be described in Chapter three.

1.5. Outline of the Thesis

This study focuses on the willingness-to-pay for organic eggplant which has been explored by specifically focusing on the Jaffna District, Sri Lanka. This thesis is divided into five chapters. The first chapter is an introduction to the thesis and mainly describes the background, problem statement and objectives of the study. Chapter two concentrates on a review of the literature; starting with a historical background, followed by an overview of organic farming, description of the study area, an introduction to the Contingent Valuation Method (CVM), and other relevant information (including the hedonic pricing method, travel cost method, willingness-to-pay and willingness-to-accept). Chapter three discusses the survey design and data collection; provides a description of the survey instrument used, an explanation of the data collection procedure to meet the objectives of the study, description of the statistical model used and the theoretical and empirical framework of the study. Chapter four presents and explains the estimated results of the study. Finally, summary, conclusions, and implications are presented in the fifth chapter.

CHAPTER TWO
LITERATURE REVIEW

The main focus of this study is to determine consumer willingness-to-pay (WTP) for organic eggplant and which socio-economic factors affect the WTP. This chapter starts with a brief history of organic agriculture based on theoretical, philosophical and operational perspectives. The Sri Lanka experience follows which discusses information about Sri Lanka's history, development and current situation of organic agriculture. Further insights are provided with an overview of the Jaffna district (study location) and brinjal or eggplant (proposed commodity). Finally the contingent valuation method (CVM) and willingness-to-pay concepts are discussed.

2.1. Overview of Organic Farming

Today, chemical-free foods produced on organic farms are widely welcomed by consumers around the world. Organic farming is the outcome of theory and practice which had its roots in the early years of the 20th century, involving a variety of alternative agricultural production methods. (Guillou and Scharpé, 2001). Organic agriculture is a holistic approach to sustainable production implementing environmental protection measures and considering social standards. In many countries it is known as ecological or biological agriculture, reflecting the reliance on ecosystem management rather than external inputs. Basically it is a cultivation method which excludes the use of chemicals, either as plant protection products or as fertilizers. Primary nutrient sources in

organic farming are animal dung, compost, green manure and oil cakes. Several plant extracts can be used for natural pest control. (IFOAM [3], 2005).

Certified organic agriculture refers to various systems for producing food, feed and fiber according to specific standards, which promote environmental, social and economic health. In order to maintain these standards, independent international certification bodies were established. Inspection and certification work is based on legal country regulations according to the EEC No. 2092/91 or the Swiss Organic Regulation for example and the verification of private standards such as given by Naturland, Biosuisse, Demeter and Bioland.

Organic farming has been defined by the U.S. Department of Agriculture "as a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives (U.S. Department of Agriculture, 2004). The International Federation of Organic Agriculture Movements (IFOAM) defines organic farming as "a whole system approach based upon a set of processes resulting in a sustainable ecosystem, safe food, good nutrition, animal welfare and social justice. Organic production therefore is more than a system of production that includes or excludes certain inputs" (Anon, 2002a). When we think about organic products, "Organic" is a labeling term that denotes products produced under the authority of the Organic Food Production Act. (or OFPA, enacted under title 21 of the 1990 farm

[3] International Federation of Organic Agriculture Movements

bill, and served to establish uniform national standards for the production and handling of foods labeled as "organic."[4])

Organic products can simply be identified as the products that come from organic production processes or from organic farming. Given today's extensive use of pesticides, it is hardly possible for any one to avoid daily exposure to low levels of several different pesticide residues. Researchers have found that there are possible adverse effects on human health arising from continuous long-term, low-level pesticide exposure or chronic exposure. The London Food Commission conducted a toxicological survey on active ingredients currently permitted for use by United Kingdom pesticide manufacturers. Results of the survey showed that of the 426 chemicals listed, 68 were carcinogenic, 61 were mutagenic and 35 had various reproductive effects, ranging from impotency to a variety of birth defects. In total, 40 per cent of the pesticides currently in use were linked with at least one adverse health effects (Tuormaa, 2001).

Pesticides are classified as any substance intended to kill or control pests. These pests destroy up to one third of the world's food crops during the growth, harvesting and storage phases. In a developing country like Sri Lanka, crop losses are even higher. Therefore, the use of pesticides is commonly practiced to eliminate such losses. If these pesticides are misused they may be extremely dangerous. Therefore, correct use and handling of these chemicals is very important. Excessive usage of pesticides to achieve crop protection may lead to unnecessary disturbances in the ecosystem and may have long term adverse effects on the organism living in the environment including man himself (Chandrasekera et al., 1985).

[4] USDA: http://www.nal.usda.gov/afsic/pubs/ofp/ofp.shtml

According to the 1990 World Health Organization (WHO), estimates of occupational pesticide poisonings (i.e., due to handling and spraying on farms), as many as 25 million agricultural workers are affected each year in developing countries. As the World Resources Institute points out, pesticide poisoning is a major occupational hazard for farmers and their families, even leading to death (Wilson, 1998). For example in Sri Lanka, hospital statistics show that on average 14,500 individuals were admitted to government hospitals and around 1,500 individuals a year died from pesticide poisoning during the period 1986-1996 (National Poison Centre, 1997). (However, not all hospital admissions and deaths were due to occupational poisoning, but include cases of self ingestion (suicides), accidental ingestion and homicides as well, but this is a small portion compared to the prior.) Each year, five out of every 1000 agricultural workers in Sri Lanka are hospitalized due to pesticide poisoning from occupational origins (Jeyaratnam, 1987). In 1995 for the Jaffna district, 446 patients were affected by pesticide poisoning comprising 0.88% of total admissions to the hospital and 21% of admissions to the emergency unit. This does not take into account those cases treated at private clinics or those not seeking medical treatment (Senanayake and Karalliedde, 1998).

Apart from these hospital data, various field studies have also confirmed high levels of morbidity from direct exposure to pesticides ranging from faintish feelings, headaches, nausea, diarrhoea[5], muscle twitching, rashes and cramps (Jeyaratnam et al., 1987; Dharmawardena, 1994 and Sivayoganathan et al., 1995). The environmental costs of pesticide use are also high (Chandrasekera et al., 1985 and Wilson, 1998). Numerous

[5] Diarrhoea is a disease, which is passing of increased amounts (more than 300g in 24 hours) of loose stools.

studies in the United States have also documented long-term illnesses arising from exposure to pesticides (e.g., Nielson and Lee, 1987 and Collins et al., 1993). A research study in the Philippines revealed that pesticide use has a negative effect on farmers' health, that farmers' health has a positive effect on productivity, and that there are likely to be social gains from a reduction in insecticide use (Antle and Pingali, 1994). A survey conducted in Sri Lanka also revealed that 91% of the 180 farmers surveyed were aware of pesticide poisoning incidents and nearly 39% reported having known of such an incident within the previous year of this study (Gnanachandran and Sivayoganathan, 1989).

The medical and environmental authorities are becoming increasingly concerned about agro pesticide poisoning and the dangers posed to the environment by the indiscriminate use of pesticides. Thus, organic farming systems have attracted increasing attention over the past two decades and these agricultural systems are perceived to offer some solutions mainly to the environmental and health problems. Governments in some countries have recognized and responded to the potential benefits by encouraging farmers to adopt organic farming practices, either directly through financial incentives or indirectly through support for research, extension and marketing initiatives.

Organic agriculture has developed rapidly worldwide during the last few years and is now practiced in approximately 120 countries of the world (Willer and Yussefi, 2006[6]) and its share of agricultural land and farms is growing everywhere. The market with

[6] **The world of organic agriculture: statistics & emerging trends 2006:** All of the details in this book have been checked by the Research Institute of Organic Agriculture (FiBL), the Foundation Ecology & Agriculture (SOEL) and the International Federation of Organic Agriculture Movements (IFOAM).

organic products is growing at a fast rate, not only in Europe, Japan and North America (which are the major markets) but also in many other countries, including many so called developing countries including Sri Lanka.

Global organic food sales were estimated as US $40 billion in 2006 (FAO 2007). Japan is the third largest market for organic foods and accounts for the bulk of Asia's organic market revenues. According to the latest survey in 2007, by Willer and Yussefi, more than 31 million hectares are currently managed organically by at least 623,174 farms worldwide. If the figures for the area of certified forests and 'wild harvested plants' were included this would add at least another 19.7 million hectares, summing up to more than 51 million hectares in total. The total organic area in Asia is now about 4.1 million hectares, managed by almost 130,000 farms. In Asia, the total area under organic management was only 0.33 percent of that of the six continents of the world in 2001. However, it increased to 4 percent in 2004, a ten-fold increase in a period of three years and in 2005/2006 it expanded to 13%. According to IFOAM (2006), land area under organic management in Asia was the largest in China (3,466,570 ha) followed by Indonesia (52,882 ha), Japan (29,151 ha), Republic of Korea (28,218 ha), Sri Lanka (15,379 ha), Thailand (13,900 ha), Taiwan (1,092 ha), and Malaysia (600 ha). At the same time, the organic sector is still very small, less than 0.5% of the agricultural industry's value in most countries, only exceeding 1% in the countries which have seen the strongest growth in the past years, for example, Germany 4-5% and Switzerland 11-12%. In Sri Lanka, it is 0.65% in the year 2006 (Willer and Yussefi, 2006).

Regardless of scale, consumer attitude toward organic products is crucial if, further expansion of organic farming system is sought. So, there is need for valuing the willingness-to-pay for organic products. For the statistical compilation of land under organic management, Willer & Yussefi (2006) included continent details regarding development, markets, innovations, standards and legislation of organic agriculture in their publication. El-Hage Scialabba & Hattam (2002) published the study "Organic agriculture, environment and food security" examining the contribution of organic agriculture to ecological health, international markets and local food security. The study also analyzed the prospects for wider adoption of organic agriculture.

The primary focus of a report by Parrott & Marsden (2002) was to identify systems, technologies and methods for organic agriculture that are proving effective in increasing yields, eliminating the need for chemical inputs and increasing farmer's income. This study "World markets of organic fruit and vegetables" is a joint study by the International Trade Centre (ITC, 2001), the Food and Agriculture Organization (FAO) and the Technical Centre for Agricultural and Rural Co-operation (CTA). More market oriented information is available from ITC (1999), which intends to inform developing countries about the market potential of organic products from their home country to the organic market worldwide. A compendium of research on organic farming is entitled "Organic fruit and vegetables from the tropics" (UNCTAD[7], 2003) which covers the production, certification and market access conditions for organically produced fruit and vegetables in the tropics, addressing producers and international trading companies alike.

[7] United Nations Conference on Trade and Development

2.2. Organic Farming: Sri Lanka Perspective

Sri Lanka is an island in the Indian Ocean, off the south-east tip of India. It extends over a surface of about 65,600 km² (6.5 million ha). The population of Sri Lanka in 2003 was estimated by the United Nations at 19,065,000, which placed it as number 53 in population among the 193 nations of the world and its population growth rate was 0.79 per cent annually. The country has a tropical climate, with seasonal monsoons. In late December 2004, a tsunami devastated vast areas along the island's coasts. The economy of Sri Lanka depends largely on agricultural production. Agriculture is the dominant sector of Sri Lanka's economy and accounted for 19 per cent of gross domestic product (GDP) in 2003 (Central Bank of Sri Lanka report[8]). This sector also employs more than one third of the labor force. In Sri Lanka, agriculture is dominated by smallholders as over 64 per cent of the farming families cultivate holdings of less than 0.8 hectares. Around 40 per cent of the cultivated area is occupied by plantation crops such as tea, rubber and coconut (UNESCAP[9], 2006). Out of the total land area of 6.5 million hectares, 1.5 million ha (24 %) are agricultural land; 13.96% of the land is arable[10], 15.24% is used for permanent crops and 70.8% for other agricultural uses (Department of Census & Statistics, 2002). Sri Lanka's economy has for a long time been based on the export of agricultural produce. The value of the exports is around 800 billion Sri Lankan Rupees[11] (Annual Report of Central bank of Sri Lanka, 2006). In recent years, an effort has been made to enter the international market for organic products. Current value of organic exports is around 600 million Sri Lankan Rupees.

[8] Available at : http://www.cbsl.gov.lk/info/10_publication/p_1.htm
[9] United Nations Economic and Social Commission for Asia and the Pacific
[10] arable land is a form of agricultural lane that can be used for growing crops
[11] Exchange rate is approximately Rs.100 = 1 USD

Since age-old production systems can become unsustainable under changing conditions, alternatives and different objectives of production are required for the survival of the population (Hayami and Ruttan, 1995; van der Ploeg and Long, 1994). Now, people are more health conscious than before and therefore seek safe and healthy foods. In response to the changing circumstances of farming in Sri Lanka, a number of non-governmental organizations (NGOs), private companies and international projects have been promoting the dissemination of organic farming. Organic food is safer and healthier (Pimentel et al., 2005) and as a result the demand for organic food is growing. Since the mid-1980s several projects were established growing a variety of organic crops for local and international markets.

In Sri Lanka, organic farming practices with proper standards were initiated in 1979 by a non-governmental organization, namely, "Gami Seva Sevana" (Jayakody, 2001). The organic movement in Sri Lanka started in the 1980s through contact and inspiration of the local NGOs with the Philippine organic agricultural movement. In 1982, a group of local NGO representatives, planters, scientists and environmental officers drafted a Memorandum of Association to create a movement named Lanka Organic Agriculture Movement (LOAM). This can be seen as the official starting point for the dissemination of organic agriculture in Sri Lanka. LOAM was planned to be registered as a company limited by guarantee[12]. The primary objectives of LOAM were to promote organic agriculture, to establish, improve and maintain standards for organic agriculture and to create awareness of organic products among the people of Sri Lanka. In 2001 LOAM was

[12] A company limited by guarantee (CLG) is a private company that does not have share capital. It has members, called guarantors. It cannot distribute its profits and these are generally reinvested back into the company. Because of this, CLGs may apply for charitable status.

registered as an official legal body. Nevertheless activities in the field of organic agriculture continued and evolved to an advanced stage of development within the country. In 1999, the Export Development Board initiated a program for gathering people involved with the growing, trade and research of organic agriculture to discuss the possibility of increasing smallholder organic production in terms of both quantity and quality (UNESCAP, 2006). Recently, the Ministry of Agriculture provided funds of 4.5 million rupees (expected to increase in coming years) for projects which promote organic farming in the country with an ultimate goal of exporting them after certification. Furthermore, the Department of Agriculture is expected to begin a program of producer foundations in 10 agricultural districts to assist provincial departments of agriculture in their efforts to encourage organic production.

The key actors for nurturing organic methods in agriculture have been the traditional peasant communities and the subsistent farmers of indigenous communities. Organic agriculture, in the traditional context, is subsistence farming or non-chemical agriculture. Conservation farming utilizes indigenous knowledge and traditional agricultural equipment and tools, whereas modern organic agriculture is market oriented with production adhering to certain standards or at least accepted norms in cultivation methods and practices.

Modern organic agriculture is practiced based on standards and certification. It differs from IPM and conventional agriculture, particularly on the type of fertilizers and agrochemicals used. In Sri Lanka, IPM is considered as a type of low-external-input and sustainable agricultural method because it uses fewer synthetic, agrochemicals and

resorts to other ways of pest and disease management such as mechanical, cultural and biological. IPM is not an organic method of pest management as it involves the use of chemicals, but at reduced dosages, at fewer frequencies and integrated with other non-chemical methods.

Organic farmers use bio fertilizers made out of compost, cattle dung and other vegetable material. The land is tested and certified to be absent of chemicals, by international certification agencies. The use of chemical insecticides and weedicides is eliminated conforming to strict organic practices. (Tillekeratne, 2003). So far no local certification body has been established on Sri Lanka. International certification organizations like NASAA (National Association of Sustainable Agriculture Australia Ltd.), IMO (Institute for Marketecology, Switzerland), Naturland, (Germany), OFG (Organic Farmers & Growers, United Kingdom) and SKAL (Netherlands) send inspectors to carry out the certification procedure. Their standards, which should be in compliance with EU regulation 2092/91, are the basis for organic certification in Sri Lanka. In 1998-99 representatives from SKAL and IMO have been present in Sri Lanka as residents carrying out inspection work from a local office, thus reducing inspection costs. Nevertheless national activities have been started with local participation in inspection seminars overseas allowing involvement in the internal monitoring system of organic projects in Sri Lanka.

In 1987, the first organic tea estates were certified. Today, there are more than 20 certified organic products. In 1999, 172 farmers were practicing organic farming in Sri

Lanka. Their cultivation covered over 550 ha of land, which was about 0.02 per cent of the total agricultural land in the country (FAO Statistical Database, 2001). According to IFOAM & FiBL[13] (2006), there are 15,215 hectares of land under organic management, with a share of total agricultural land of 0.65% and a presence of around 3,300 organic farms. Organic producers mainly target products such as organic vegetables, spices and fruits for local markets in small quantities. Organic tea is produced in large quantities for the international market. Other certified organic exports include desiccated coconut, cashew nuts, spices (cinnamon, cardamom, nutmeg, pepper, clove, ginger), fruit (mango, papaya, passion fruit), and herbs (citronella, lemon grass).

Sri Lanka exports organic tea and coconut to the UK, Germany and Japan. However, the supply does not match the growing demand in the local and international organic and natural products markets. Organic tea for export is emerging as a major farming activity in Sri Lanka. One research study indicates that there is potential to increase organic tea production by 55% through efficient use of current technology (Jayasinghe and Takashi, 2004). According to UNESCAP (2006), Sri Lanka is one of the major organic tea producers in Asia and one of the leading sources of organic tea.

The Export Development Board of Sri Lanka has provided substantial assistance for the promotion of the organic sector in Sri Lanka by funding new markets for organic products. Other governmental institutes have also launched programs to identify potential areas and producer groups for organic agriculture.

[13] Forschungsinstitut für Biologischen Landbau (German: Research Institute of Organic Agriculture)

Generally, the organic market in Sri Lanka has been described as a "niche market". Though organic agriculture is developing in the country, Sri Lanka's share in the international market is still small. To achieve a larger market share, organic marketers should introduce their products to appropriate target groups by adopting proper marketing strategies. In this process, identification of market potential for various organic products is important, since product attributes may not be familiar to consumers in some areas. Consumer awareness about organic products could increase their willingness-to-pay and thus demand for these organic products. Furthermore, market potential is mainly determined by consumer expectations of product attributes, which are attached to the product such as price, quality, certification, etc. (Kotler et al., 2001). Therefore, producers must identify such qualities and their level of importance in adapting successful promotion campaigns.

Previous studies (Piyasiri and Ariyawardana, 2002; Williges, 2004; Jayasinghe and Takashi, 2004; Jayakody, 2001) have primarily focused on the Southern districts of Sri Lanka, where the ethnically majority fraction of people live. Recently, researchers have started to examine the northern region where, Jaffna district is located. This study focused on consumer willingness-to-pay for organic eggplant in the Jaffna District of Sri Lanka.

2.3. A Brief Overview of the Study Area

Jaffna is one of the 25 districts of Sri Lanka and is located in the northern most part of Sri Lanka. Jaffna district is divided into four areas geographically (Islands, Valikamam, Thenmaradchi and Vadamaradchi). However, no one resides in the islands, since the

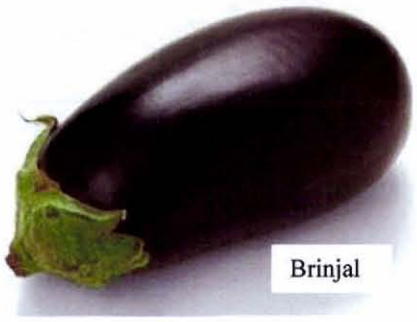
military captured that area. Jaffna's population is concentrated in the remaining three geographical areas. This district is populated by Sri Lankan Tamils and is one of the most densely populated districts of Sri Lanka. The population of Jaffna has decreased because of the displacement of Tamils to other districts of the country and out of the country due to the civil war.

The total area of the Jaffna peninsula is 1,129.9 square km with a population of 738,788 in 2001. However, people migrate to other areas and other countries because of the civil war unstable political situation in the northern part of Sri Lanka. This produces fluctuations in population. About 15% of the land in Jaffna District is classified as High Security Zone, which means that the public cannot enter these areas. Jaffna's dominant geographical feature is a long stretch of water, forming an internal lagoon, which divides the land area almost in half. The terrain of the region is almost flat and of low elevation. Soil type varies from reddish brown to sandy tracts, which has the best potential for cultivation. The Jaffna district lies in the tropical dry zone with temperatures ranging from 26°C to 30°C and annual precipitation ranging from 696 mm to 1125 mm. (Balasundarampillai and Rupamoorthy, 1987).

The agriculture sector, including crops and livestock has contributed around 65 % of the total gross domestic product of the district. Vegetables are being cultivated throughout the year with the help of irrigation from dug wells. Vegetables grown in low elevation such as brinjal (eggplant), tomato, long bean, okra, snake gourd, bitter gourd and other leafy vegetables are being cultivated and available throughout the year.

Intensified agriculture in Jaffna district depends on pesticide use. Today, farmers of this district purchase pesticides to control pests affecting crops. However, many of these farmers are oblivious to the danger of exposure both to themselves and to the environment. The increasing number of deaths by pesticide poisoning and the danger posed to the environment by the indiscriminate use of pesticides are now subjects of concern to the medical and environmental sector in Jaffna District. (Gnanachandren and Sivagoganathan, 1989).

2.4. Eggplant/Brinjal - An Introduction


Brinjal

Brinjal, a popular vegetable of the masses, is native to India. The most common variety, the glossy purple brinjal is a familiar component of Indian, Sri Lankan curries. The botanical name of Brinjal is *Solanum melongena*. This vegetable was known as Malayan purple melon in China. There it was a common food item since 600 BC. The name eggplant developed in the United States, Australia, New Zealand, and Canada. Perhaps the shape of the first varieties that English explorers came across prompted them to call it eggplant. European cultivars were yellow or white and resembled goose or hen eggs. The name aubergine in British English developed based on the French aubergine (as derived from Catalan albergínia). In Indian and South African English, the fruit is known as a "brinjal". The other names are in Bengali, ringna in Hindi, badane in Kannada, waangum in Malayalam, vange in Marathi, baigan in Orriya, kathiri in Tamil, venkaya in Telugu and the other names are aubergine and eggplant.

Brinjal is an important commercial vegetable crop. It is a hardy plant compared to other vegetables grown in Sri Lanka. Because of its hardiness, it can be successfully grown in very dry areas under rain-fed conditions or with minimum irrigation facilities. The brinjal plant can be kept for more than one year in its productive stage by pruning at the end of the season. Another important characteristic of this plant is a wide range of colors and shapes of its fruit. For the brinjal crop, fruit color varies from pure white to dark purple or black in different varieties. These characteristics make brinjal a popular vegetable in South Asian countries including Sri Lanka. It is being consumed as a cooked vegetable in various ways. Table 1 shows 2005 monthly per capita consumption data for brinjal and other vegetables in Sri Lanka. In 2006, monthly per capita consumption of brinjal in Sri Lanka was 303.5 grams (0.67 pounds) and represented the largest monthly per capita consumption as compared to other vegetables. While in India, monthly per capita consumption for brinjal is 340 g (0.75 pounds) in 2004/2005[14].

[14] Household Consumption Of Various Goods And Services In India, 2004-05

Table 1: Monthly Per Capita Consumption in Sri Lanka 2006

Vegetable	Quantity (grams)
Brinjal [15]	303.55
Sweet pumpkin	203.67
Carrot	149.57
Long beans	148.38
Beetroot	133.42
Cabbage	121.47
Drumstick	117.98
Leeks	104.89
Bandakka [16]	105.89
Snake gourd	79.48
Ridge gourd	75.89
Ash plantain	74.51
Tomatoes	70.06
Bitter gourd	69.67

Source: Department of Census and Statistics, Sri Lanka, 2006/2007

The raw vegetable contains only 24 kcal per 100 g. Eggplant is a good source of dietary fiber and potassium. It also provides small amounts of calcium, phosphorous, folic acid, sodium and vitamin C. It has substantial amounts of potassium, 100 gms of an edible portion provides 200 mgs of potassium (Table 2). It is high in water content and has about 92 % of moisture. Due to its low calorie content and high potassium content, it is suitable for diabetics, hypertensive and obese patients. Studies from the Institute of Biology of São Paulo State University, Brazil (Instituto de Biociências of the UNESP de Botucatu, São Paulo) showed that eggplant is effective in the treatment of high blood cholesterol hypercholesterolemia and in the control of cholesterol (about 30% reduction). One study in rabbits found that drinking eggplant juice significantly reduced their blood cholesterol while improving blood flow.

[15] Eggplant
[16] Ladies finger

Table 2: Nutritive value per 100 gms of Brinjal [17]

Nutrients	Value	Nutrients	Value
Moisture	92.7 gms	Protein	1.4 gms
Fat	0.3 gms	Minerals	0.3 gms
Fibre	1.3 gms	Carbohydrate	4 gms
Energy	24 kcal	Calcium	18 mgs
Phosphorous	47 mgs	Vitamin C	12 mgs
Sodium	3 mgs	Potassium	200 mgs

More than 4 million acres (16,000 km²) are devoted to the cultivation of eggplant in the world. The average yield of brinjal in Jaffna for the 2005/2006 year was 13-15 t/ha. The national average yield of brinjal is 7.38 t /ha in Sri Lanka. The average yields in the world and Asia are 13.7 t/ha and 12.3 t / ha respectively (Department of Agriculture).

In a study (Sivayoganathan et al., 1995) it was stated, that nearly three-fourths of the farmers (72%) cultivated vegetables in Sri Lanka in 1990. With regard to the cropping pattern, most farmers (92%) grow fruits and vegetables such as brinjal (eggplant), gourds, lady's finger (okra), beans, tomatoes and 27% grew yams and bulbs. Less than 10% grew other types of vegetables. Also, 78% reported that, of the vegetables cultivated, they derived the highest income from fruits and vegetables and the rest (22%) derived the highest income from yams and bulbs (Sivayoganathan et al., 1995)

[17] http://www.bawarchi.com/health/brinjal.html#brinjal2

2.5. Valuing Non-Market Environmental Goods: Introduction to Contingent Valuation Method

A number of techniques have been developed for valuing non-market benefits. The most common methods are discussed in the following sections.

2.5.1. Hedonic Pricing Method

The hedonic price method values an environmental effect by finding a relationship between the effect and a marketed good. Therefore it must be possible to identify a marketed good which includes the attribute of the environmental effect, and also to isolate this attribute from others affecting the price of the marketed good. The most common examples of hedonic pricing are used to measure housing prices stemming from an environmental change. Hedonic pricing has been applied to the housing market especially for waterfront locations and coastal areas. (Garrod and Willis, 1993).

2.5.2. Travel Cost Method (TCM)

The TCM is predominantly used in outdoor recreation modeling, with fishing, hunting, boating, and forest visits among the most popular applications. This method seeks to place a value on non-market environmental goods by using consumption behavior in related markets. Specifically, the costs of consuming the services of the environmental asset are used as a proxy for price. These consumption costs will include travel costs, entry fees, on-site expenditures and outlays on capital equipment necessary for consumption (Hanley and Spash, 1993).

2.5.3. Conjoint Choice Method

In marketing experiments, one wants to know which characteristics of products or services are important to consumers. In a choice experiment, individuals are given a hypothetical setting and asked to choose their preferred alternative among several alternatives in a choice set, and they are usually asked to perform a sequence of such choices. In this analysis, products or services are defined by a limited number of relevant attributes or characteristics each with a limited number of levels. These products, called profiles, have to be evaluated by respondents, who rank or rate them. Product profiles are constructed from product attributes, each defined with a certain number of levels. Thus, when individuals make their choice, they implicitly make trade-offs between the level of the attributes in the different alternatives presented in a choice set. No attribute or level of the good to be valued is involved in this study. Thus, conjoint choice experiments are unnecessary.

2.5.4. Contingent Valuation Method

The hedonic pricing method usually relies on information provided by households when they make their location decisions. TCM, as mentioned earlier, is used to estimate economic use values associated with ecosystems or sites that are used for recreation. This study uses a stated preference technique known as the contingent valuation method (CVM), because it deals with a hypothetical market. It is called "contingent" valuation, because people are asked to state their willingness-to-pay, contingent on a specific hypothetical scenario and description of the environmental service. Since the first application of the contingent valuation method by Davis (1963), it has been widely used

during the last few decades to estimate economic values for a wide range of commodities for which there are no markets (non-use values). Contingent valuation is one of the ways to assign dollar values to non-use values of the environment—values that do not involve market purchases and may not involve direct participation. These values are often referred to as "passive use" values. They include everything from the basic life support functions associated with ecosystem health or biodiversity. Buzby et al. (1995), Kuperis et al. (1999), Govindasamy and Italia (1997), Baker (1999) and Boccaletti and Nardella (2000) are a few examples of food safety and reduced input food product related marketing research that use CV techniques. Much of the work on consumer food safety preferences has utilized the CVM (Baker, 1999).

Whittington (1998) points out that the CVM can be applied to obtain values of pure public goods, goods with both private and public characteristics, and private goods. The CVM is used to estimate economic values for all types of ecosystem and environmental services and has been used to measure values of non-market goods including air quality, water quality, recreation, hazardous waste sites, etc. Although CVM was initially developed to measure the value of non-market goods, it has also been adopted by economists to measure the value of risk reductions, (Donaldson, 1990 and Zethraeus, 1998). Many contingent valuation studies have also determined the value of avoiding symptoms associated with environmental pollution (Alberini et al., 1997).

2.5.4.1. Criticisms of the Contingent Valuation Method

In the literature (Dwyer, 1991; Wilks, 1990 and Diamond and Hausman, 1994), environmental valuers (those that place a monetary value on their environment) and their critics have identified a range of criticisms that may be present in the application of the CVM. Usual encountered problems include:

• Hypothetical bias, which is derived from the use of hypothetical rather than actual markets. This may result in the questions not being taken seriously. Moreover, it is suggested that surveys of respondents simply cannot provide meaningful valuations of unfamiliar goods in unrealistic transaction contexts.

• Strategic bias, which refers to a situation where the responses are aimed by the respondent to influence policy in their desired direction, this is the so called "freerider" behavior.

• Informational bias, where the information presented, or lack of it, biases respondent's answers.

• Embedding effect bias, which refers to a situation where the willingness-to-pay issue is regarded by the respondent within a wider setting than that posed by the interviewer (i.e., where the respondents provide responses that make them feel good whether or not it is their real attitude). Such surveys may elicit "satisfying" rather than accurate answers (Hanemann, 1995).

• Payment instrument bias implies an aversion to higher taxes which may understate the respondent's WTP for the enhanced environmental amenity.

• Compliance bias refers to a situation where the respondent says, what they believe the interviewer wants to hear i.e., a situation when a respondent says yes to an amount in

order to please the interviewer even though the respondent's WTP is less than the amount asked (Mitchell, & Carson, 1989).

• Protest bias. Protest zero valuations occur when a respondent who has a positive WTP for a property gives a low or zero valuation to a question that requests an actual WTP response even though the respondent has a positive WTP for the good. This occurs when the respondent provides no response to an amount asked even though WTP is greater than the amount asked about.

• Question format bias refers to different estimates that may result from a discrete choice question versus an open-ended question. Estimates from discrete choice questions are usually higher than those from open-ended questions. The argument made by some is that if agents had well-defined preferences for the good, both formats should result in similar estimates (Boyle, 1996). The counter argument, which comes from the economic theory on mechanism design, is that incentives for truthful preference revelation are different for these two formats, and as a consequence, one should expect the estimates to be different with the discrete choice question predicted to yield truthful responses (Hoehn & Randall, 1987).

Given the above criticisms, one may question whether a valuation method based on simulation is acceptable for use in property valuation. However it can be noted from the literature (e.g., Epstein, 2000) that contingent valuation continues to have substantial credibility. The continued credibility is because contingent valuation surveys can be designed to avoid many of the pitfalls that characterize simulation. Guidelines to this effect have evolved in response to severe examinations and criticisms. NOAA requested

Nobel laureates Kenneth Arrow and Robert Solow to co-chair a panel of specialists to evaluate the reliability of the contingent valuation method for evaluating non-use values of environmental amenities. The resulting debate set long-time users of the method against important critics. The NOAA Panel, after a lengthy public hearing and a review of many written propositions gave the technique credibility by issuing a statement in 1993 which concluded that: "Contingent Valuation studies can produce estimates reliable enough to be the starting point for a judicial or administrative determination of passive-use value" (Ogunba & Boyd, 2005).The expert panel also suggested guidelines for use to help ensure the reliability of Contingent Valuation surveys. A partial summary of these guidelines is as follows:

- Valuers should use personal interviews rather than mail or phone surveys.
- Valuers should use referenda (discrete choice questions) rather than open ended questions.
- Valuers should use clearly understandable scenarios that accurately describe the change.
- Valuers should provide a careful description of the good being valued and its substitutes.
- Valuers should use follow-up questions to make sure respondents properly understood the setting and choices.
- Valuers should remind respondents that their willingness-to-pay bids would decrease their disposable incomes.

2.5.4.2. Willingness-to-Pay (WTP) and Willingness-to-Accept (WTA)

The CVM examines the preferences of individuals expressed as willingness-to-pay or willingness-to-accept compensation for a given outcome contingent on a hypothetical scenario (Mitchell and Carson 1989). This involves directly asking people, in a survey, how much they would be willing to pay for specific environmental services. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. This preference can then be used to infer the value that individuals place on the non-market benefits in the scenario, and aggregated to the general population that they represent to estimate the value of these goods to society as a whole.

Organic produce consumption is quite sensitive to price. Estes et al. (1994) found that price is ranked by organic produce consumers as the primary reason for not buying more organic products. Closely tied to the issue of price is the concept of willingness-to-pay. Willingness- to-pay refers to the maximum price a consumer would be willing to pay for a particular item. It is commonly measured using self-reports from the consumer rather than actual market data. Consumers who say they are willing to pay more for organic produce than conventional produce range from 49 percent of the population (Harris Poll, 1989) to 81 percent (Weaver et al., 1992), and as many as 83 percent of the American public claim to be willing to pay more for foods grown with fewer chemicals (Morris et al., 1993).

Jolly et al. (1989) determined the willingness-to-pay a premium for apples, peaches, broccoli, and carrots of 30-40¢ per lb. Buzby & Skees (1994) found the range on willingness-to-pay for organic grapefruit was 15-69¢ per lb. During the Alar scare (van Ravenswaay & Hoehn, 1990), willingness-to-pay to avoid Alar (by substituting away from conventionally-grown to organically-grown apples) was 12¢ per lb. Organic baby food commands a premium of 21¢ per jar (Harris, 1997). The amount consumers are willing-to-pay to avoid chemicals varies widely both in terms of percentages and in monetary values.

It is clear that people are willing to pay for non-use, or passive uses of environmental benefits. However, these benefits are likely to be implicitly treated as zero unless their dollar value is somehow estimated. So, how much are these benefits worth? Since people do not necessarily reveal their willingness-to-pay through their purchases or by their behavior, the only option for estimating a value is by asking them questions. (Frykblom, 1998).

CHAPTER THREE

SURVEY DESIGN AND DATA COLLECTION

This chapter discusses the methodology that was adopted in the survey and the statistical and mathematical model that was used to estimate the results. Section 3.1 "Theoretical Framework", describes the theory underlying this study. It is followed by section 3.2 "Model Selection" which provides details of the model and also justifies the model selection. Section 3.3 "Empirical Framework", discusses the underlying econometric theory. Section 3.4 "Methods and Data", explains how the data was collected and used in the statistical model to obtain the estimated results.

3.1. Theoretical Framework

This study uses the Contingent Valuation Method (CVM) which allows direct estimation of willingness-to-pay (WTP) by means of different elicitation techniques. Consumers simply indicate their WTP without purchasing the hypothetical (non-market) product, organic eggplant, for this study. The importance of price as a barrier to purchase organic products is shown by prior research that assess the consumers' willingness-to-pay a premium for safer products (e.g., Govindasamy and Italia, 1999, Loureiro and Hine, 2002). Organic food is most frequently perceived as a commodity produced without chemicals and grown as natural (Williams and Hammit, 2001) and considered safer than conventionally grown products (Pimentel et al., 2005)

Willingness-to-pay analysis can be cast in the context of a consumer choice problem. Suppose a consumer who purchases and consumes a conventionally produced food product encounters the same food product in the form of organic produce, and the consumer shifts from purchasing the conventional product to the organic product. Presumably this occurs, because choice of the organic product increases (or at least does not decrease) the utility of the consumption, *ceteris paribus*. If utility does not change, then a consumer would not be, rational and willing to pay more, as an increase in price results in a lower level of utility compared to the base level of utility. If utility does increase, then a consumer may be willing to pay more for the organic product, provided the price increase does not lower utility beyond the base level. Willingness-to-pay is driven by the extent to which utility changes via consumption choice. In this context, an individual's willingness-to-pay is a function of the change in utility arising from consumption choice. $WTP = f(\Delta U)$, where ΔU is the change in utility with $f' > 0$.

The larger the increase in utility, the larger the maximum amount a consumer would be willing to pay. Also recognize that WTP is likely to vary across individuals. To capture this, consumer (and household) characteristics can be included as factors affecting willingness-to-pay. Economic theory would suggest that a consumer's WTP is influenced by the individual's tastes and preferences, income, attitudes towards and perceptions of the different forms of products (e.g., organic), as well as household and demographic characteristics. Then the relationship between WTP and factors affecting WTP can be used to predict the probability of a consumer's WTP being greater than a specified lower bound and less than a specified upper bound. The difference in these probabilities indicates the chance that the consumer's WTP will be between these defined levels.

3.2. Model Selection

Given the ordinal nature of the data describing WTP, the appropriate model falls in the group of models called qualitative choice models. Among these feasible models, the ordered probit model was chosen for this study involving analysis of an equation with a discrete dependent variable. Because WTP analysis takes the form of a multiple response variable that has intrinsic order this implies that the outcome associated with a higher value of the dependent variable is ranked higher than the outcome associated with a lower value of the dependent variable (Pindyck and Rubinfeld, 1991).

Though OLS estimation is popular, despite the severe limitations that the procedure exhibits comparing multinomial logit or probit, when it comes to analyzing data with categorical dependent variables it turns out to be not an appropriate method. It would treat the difference between a 4 and a 3 the same as that between a 3 and a 2 (if the responses are coded as 0, 1, 2, 3, or 4) whereas in fact they are only ranking. This would fail to account for the ordinal nature of the dependent variable. (Borooah, 2002, Greene, 2002). Also the OLS approach has the potential for heteroskedasticity of the error term which is a direct result of the discrete dependent variable. According to Aldrich and Nelson, these limitations are present whether the dependent variable is dichotomous (0,1) or polytomous (e.g., 0, 1, 2, ..., w). So, the OLS estimates might not be efficient (Green, 2002, Kmenta, pp. 426-27; Johnston, p. 424; McKelvey and Zavoina).

Probit estimation portrays a more complex relationship between regressors and the dependent variable. First, the model distinguishes between a dependent variable of theoretical importance which is not observed and the observed dependent variable (with

the preference ratings). Second, the model then conjectures that the independent variables are linearly related to the unobserved dependent variable, which in turn is related to the observed dependent variable via the cut-off or threshold variables (Maddala, 1999, Pindyck and Rubinfeld, 1991). In other words, a change in the form of the product affects consumers' utility function first, and then their preference ratings through the threshold variable.

Because of these reasons, an ordered-probit model was selected. All the analysis used the STATA statistical software.

3.3. Empirical Framework

Following Greene (2002), the ordered probit model can be specified as built around a latent variable as follows:

$Y^* = X\beta + \varepsilon$,

where Y^* is the consumer's latent (or unobserved) willingness-to-pay, X is a vector of explanatory variables thought to influence willingness-to-pay, β is a vector of parameters reflecting the relationship between willingness-to-pay and variables in X and ε is an independently and identically distributed error term with mean zero and unit variance.

Because the exact value is difficult to observe, the WTP is a latent variable, which (though conceptually useful) is unobservable either in principle or practice. The above equation is a latent regression, which as it stands cannot be estimated. However what can

be observed is a person's WTP in choices[18] and a variable Y can be associated with this WTP choices, such that Y = 0,1,2,3,4 for each choice respectively. The categorization of persons in the sample according to the 5 WTP levels is implicitly based on the values of the latent variable Y*, in conjunction with threshold values. If a consumer's Y_i* falls within a certain range, their WTP is assigned a numerical value that reflects the category in which their unobserved willingness-to-pay lies.

Threshold parameters represent points at which the change in utility is sufficiently high to merit a consumer being willing to pay more for the selected good. But the threshold levels that determine whether a person responds 1 or 2, etc., are unknown. While threshold parameters are unobserved, they can be statistically estimated.

$y = 0$ if $y^* \leq 0$

$y = 1$ if $0 < y^* \leq u1$

$y = 2$ if $u1 < y^* \leq u2$

$y = 3$ if $u2 < y^* \leq u3$

$y = 4$ if $u3 < y^*$

u1, u2, u3 are unknown/threshold parameters be estimated along with the β of the equation.

[18] Choices for survey question on WTP:

Choice 1:	No
Choice 2:	Yes, I would pay between Rs.1-9 more for the organic brinjal
Choice 3:	Yes, I would pay between Rs. 10-19 more for the organic brinjal
Choice 4:	Yes, I would pay between Rs .20-29 more for the organic brinjal
Choice 5:	Yes, I would pay more than Rs. 30 more

The threshold concept is central to the economic theory of consumer behavior (Doyle, 1977). This theory asserts that a buyer responds (buys or rates alternatives) when utility exceeds a threshold or critical level of "satisfaction." For example, variations in the independent variables would cause switches in a consumer's preference ratings when utility reaches certain levels.

The probability of a WTP being in a particular category can now be written as below and the figure 1 shows the implications of the structure (Greene, 2002).

$$\text{Prob}(y=0/x) = \text{Prob}(y \leq 0) = \text{Prob}(x\beta + \gamma \leq 0) = \text{Prob}(\gamma \leq -x\beta)$$
$$= \Phi(-x)$$

$$\text{Prob}(y = 1/x) = \text{Prob}(0 < y^* \leq u1) = \text{Prob}(0 < x\beta + \gamma \leq u1) = \text{Prob}(-x\beta < \gamma \leq u1 - x\beta)$$
$$= \Phi(u1 - x\beta) - \Phi(-x\beta)$$

$$\text{Prob}(y = 2/x) = \Phi(u2 - x\beta)) - \Phi(u1 - x\beta)$$

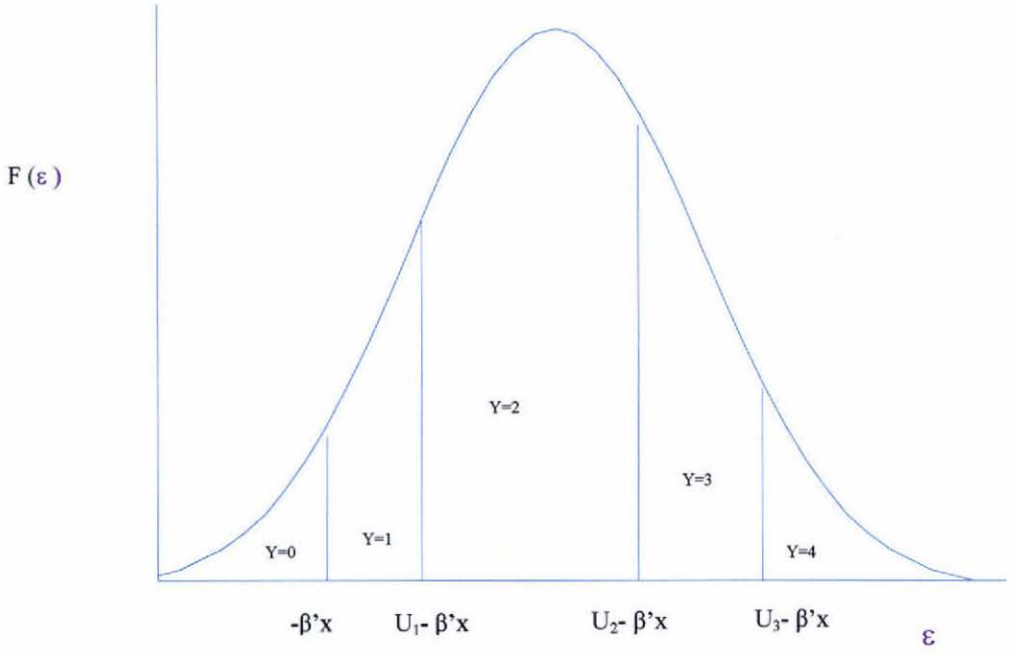


Fig 1: Probabilities in the Ordered Probit Model

where Φ is a cumulative density function (CDF), which measures the probability of WTP being less than the respective threshold level. There are two broad and often used CDF choices: (i) the logistic density function and (ii) the standard normal density function. If Φ is the logistic density then the resulting probability model is the ordered logit, and if, Φ is the standard normal density the resulting probability model is the ordered probit. Both of these distributions are similar except in the tails. The logistic distribution has heavier tails than the standard normal. As Green (2000) points out "it is difficult to justify the choice of one distribution over the other on theoretical grounds, in most applications, it seems not to make much difference" Since the distributions are similar, the results derived using the two models will be quite similar. An ordered probit model was used here.

A natural question is to ask how the probabilities of the various outcomes would change when the value of one of the variables influencing the outcomes changes. For example if age is a factor which influences willingness-to-pay choices then how would a person's probability of being at the different WTP choices be affected if he or she was a year older or younger? Aldrich and Nelson state that the regression coefficient determines the direction of the effect, but not the magnitude of the effect. The magnitude of the ordered probit coefficient does not have a simple interpretation, but its sign and statistical significance agree with the linear regression results (Wooldridge, 2001). To get an idea of the above question, the marginal effect can be estimated. Marginal effects will indicate how a change in an explanatory variable affects the predicted probability that consumers are willing-to-pay each of the WTP classes. The marginal effect of a dummy variable can

be calculated as the difference in the probability of interest with the relevant dummy variable turned "on" and "off".

The marginal effect of the probabilities for a person of a small change in X can be given as,

$$ME_{(Y=0)} = \frac{\delta \Pr(Y=0/x)}{\delta_x} = -\Phi(x\beta)\beta$$

$$ME_{(Y=1)} = \frac{\delta \Pr(Y=1)}{\delta_x} = [\Phi(-x\beta) - \Phi(u1-x\beta)]\beta$$

3.4. Methods and Data

This study was conducted in three geographical divisions Thenmaradchi, Vadamaradchi, and Valikamam of Jaffna district, Sri Lanka. Currently, organic brinjal is not available in the marketplace for this study area. Hence, they are hypothetical products. As such, consumers' actual decisions to purchase and pay a premium cannot be observed. To address this issue, a contingent valuation (CV) survey was developed to gather consumers' willingness-to-pay values. Much of the work on consumer food safety preferences has utilized the CVM (Baker, 1999). The data for this study was collected from a consumer survey. The main purpose of the survey was to collect data on individual WTP for organic eggplant and on the explanatory variables that are believed to affect individual WTP.

Generally, data can be collected through personal face-to-face interviews, mail questionnaires or telephone interviews. In-person interviews was chosen because, under the right circumstances, such interviews offer many advantages to validate data

collection. Compared with telephone-administered interviews, in–person interviews have the advantage that the interviewer can see how a respondent is reacting and can help clarify questions and response options. Compared with self-administered surveys, in-person interviews benefit from the interviewer's role in enhancing the respondent's participation by guiding questioning, answering the respondent's questions and clarifying the meaning of responses. (Oishi, 2002)

Particularly, whenever consumers do not have consumption experience regarding the product, either through direct use or indirectly through the use of similar products, direct contact with an interviewer would probably be helpful. The representative consumer in the Jaffna District is not particularly acquainted with organic eggplant products, and his/her experience with this product may be quite limited. Direct elicitation with in-person interviews works well in this case.

A field questionnaire was carefully prepared with regard to the objectives of the study and used to interview respondents in order to gather data on willingness-to-pay for organic eggplant. The survey was pre-tested on a group of randomly selected individuals, before distribution. Returned pre-tests were examined and revisions were made in areas where respondents appeared to have difficulty in answering questions. The revised questionnaire was used to interview three hundred and fifty respondents. Out of this, 267 completed questionnaires were used in the study.[19]

The survey was conducted at different shopping centers in Jaffna to capture a wide variety of consumers, during weekend and weekday periods throughout the morning,

[19] http://www.macorr.com/ss_calculator.htm : sample size calculator was used to calculate the sample size approximately using confidence interval (95%), level of error (5%) and the population.

afternoon and evening hours. Respondents were approached at random as they entered the shopping center. A broad introduction about agrochemical usage and the resulting environmental and health problems were explained before interviewing respondents. Reference was made to the fact that the current high levels of agrochemical usage can lead to a high probability of environmental degradation and health hazard. Special attention was given to ensure that the same information was provided to all respondents. Respondents were asked to answer several questions (see appendix for a copy of the questionnaire and a Committee on Human Subject Approval form). Questions related to the premium prices[20] that consumers would be willing to pay for organic eggplant and the consumer risk perceptions were the primary focus of the survey.

The questionnaire included demographic characteristics such as age, income, education, gender, household size etc; attitudes towards and knowledge about organic products; and other relevant details needed for the study. Some questions were posed using the Likert scale[21] response (where a one equals strongly agree and five equals strongly disagree). In the last section, WTP was elicited by asking respondents to indicate how much above the regular price (i.e., premium) they would be willing to pay for organic eggplant, choosing from 5 classes of premiums: 0, between SLR[22].1-9, 10-19, 20-19 and 30 or more.

Some prior WTP surveys used payment cards (Gerking et al., 1988) or open-ended WTP questions (Smith and Desvousges, 1987). Others gave premium price choices in percentages (Boccaletti & Nardella, 2000). Here in contrast, respondents were asked to

[20] A premium is a sum of money paid in addition to the regular price. Premium price = regular price + premium
[21] When we want to know respondents' feelings or attitudes about something, we consider asking a Likert-scale question. This is an attitude measurement used in research, where, in place of a numerical scale for answers, answers are given on a scale ranging from complete agreement on one side to complete disagreement on the other side, with no opinion in the middle
[22] Exchange rate: approximately SLRs.100=US$1.

indicate their WTP in actual monetary amounts, where they selected among the given choices as follows:

Suppose eggplant regularly costs Rs. 120/kg , for each kg you purchase, would you be willing to pay slightly more for organic product

Choice 1: No
Choice 2: Yes, I would pay between Rs.1-9 more for the organic brinjal
Choice 3: Yes, I would pay between Rs. 10-19 more for the organic brinjal
Choice 4: Yes, I would pay between Rs .20-29 more for the organic brinjal
Choice 5: Yes, I would pay more than Rs. 30 more

These are widely believed to be less cognitively demanding and easier for respondents to answer than open-ended questions. The selected responses were then coded as WTP=0 if "No" was selected, WTP=1 if the first WTP category (Rs.1-9) was selected, WTP=2 for the second category (Rs.10-19), WTP=3 for the third category (20-29) and WTP=4 for the fourth category (Rs.30 or more).

Descriptions of the explanatory variables included in the empirical model are provided in Table 3. Variables hypothesized to influence a consumer's WTP for organic eggplant include demographic characteristics, family cancer history, knowledge about organic products, and perceptions and attitudes toward pesticide risks. Household size, age, and education were measured cardinally while other variables such as household income, gender, households with children, heard, read, harm, family cancer history, geographic division of residence, external appearance and concern about pesticide were measured categorically. Most of the variables are represented by binary variable except education, age and household size.

Table 3: Description and Summary Statistics of Explanatory Variables

Variable definition	Variable Name	Mean	Min	Max
Monthly Household income (SL Rs.)				
1= <=19999, 0 otherwise	in1	.3333333	0	1
1= 20000-39999, 0 otherwise	in2	.3370787	0	1
1= more than 40000, 0 otherwise	in3	.329588	0	1
Gender of Respondent				
1=Male, 0 =Female	gen	.7715356	0	1
Household with children (lees than 12 years)				
1= Yes, 0 otherwise	famiwithch~d	.6367041	0	1
Age of respondent	age	47.33708	23	80
Has respondent heard of organic products				
1= Yes, 0 otherwise	heard	.576779	0	1
Household size	nfm	3.423221	1	8
Has respondent read articles about organic products	read	.4644195	0	1
1= Yes, 0 otherwise				
Feel pesticide residue will harm health and environment	harm	.9026217	0	1
1= Yes, 0 otherwise				
Education in years	ed	12.34082	2	18
Family cancer history				
1=if respondent or family member has cancer, 0 otherwise	canhistory	.082397	0	1
Respondents geographic division of residence				
1= Vadamarachchi, 0 otherwise	urbanjaff1	.4906367	0	1
1= Thenmarachchi, 0 otherwise	urbanjaff2	.3445693	0	1
1=Valikamam, 0 otherwise	urbanjaff3	.164794	0	1
Give importance to external appearance				
1=strongly agree & agree, 0 otherwise	exappear12	.7640449	0	1
1=neutral, 0 otherwise	exappear3	.093633	0	1
1=disagree & strongly disagree, 0 otherwise	exappear45	.2359551	0	1
Concern about pesticide residue in food				
1= Strongly agree, 0 otherwise	concpest1	.0374532	0	1
1=Agree & Neutral 0 otherwise	concpest23	.8913858	0	1
1=Strongly disagree & disagree, 0 otherwise	concpest45	.071161	0	1

As mentioned earlier, note that respondents were asked to indicate their WTP in actual monetary amounts, as opposed to percentage amounts. This helps to eliminate respondent's need to make mental calculations, and to be reflective of a retail market situation. Table 4 also shows the WTP categories as a percent of the base value to facilitate comparison with other studies.

CHAPTER FOUR

RESULTS AND DISCUSSION

The data were collected based on the methods described in the previous chapter and analyzed using an ordered probit procedure in the STATA econometric software. Estimated results from the survey data are presented in this chapter.

The response frequencies and percentiles for the WTP choices are presented in Table 4. Examining the WTP sample distribution, this result clearly suggests that 88.01% of the respondents would be willing to pay a premium. This provides assurance to producers who are concerned about the market potential for organic eggplant. Survey responses also indicate that 44.94% would be willing to pay Rs.1-9 above the regular price, while 25.84 % would be willing to pay Rs.10-19. Those willing to pay more than Rs.19 comprised 17.23% of the sample. Only 11.99% of respondents were not willing to pay anything. This may stem from respondents who perceive the "organic" characteristic as being intrinsic to the product and not as added value. Also, others may not be familiar with organic products, therefore showing no positive response.

Table 4: The Response Frequencies and Percentiles for the WTP Choices

WTP	WTP as a percent of base value	Frequency	Percent	Cumulative frequency
0 (No)	0%	32	11.99	11.99
1 (Rs.1-9)	1-7%	120	44.94	56.93
2 (Rs.10-19)	8-16%	69	25.84	82.77
3 (Rs.20-29)	17-24%	25	9.36	92.13
4 (Rs.30 or more)	25% or more	21	7.87	100.00
Total		267	100.00	

Parameter estimates and summary statistics of the ordered probit model are presented in Table 5. Interpretation of a qualitative dependent variable model, such as an ordered probit model, is not simple. The estimated coefficient affects the probability that a certain value of the dependent variable occurs. A positive sign means that higher values of the explanatory variable increase the probability of higher values of the dependent variable. Likewise, a negative sign indicates that higher values of the explanatory variable decrease the probability of higher values of the dependent variable.

STATA output consists of 3 important sections. The first section of the output shows the values of the log-likelihood at each stage of the iterative process. Iteration 0 is the resulting model where all slope parameters are set to zero. The first log-likelihood value is treated as the restricted log-likelihood ($LogL_R$), which is comparable with the maximized log-likelihood (LogLu), in a test of the overall significance of explanatory variables. This is the likelihood ratio test statistic reported in the second section of the output. The test is as follows,

$$LR = -2(LogL_R) - (LogLu) = -2\,(-369.833 + 309.475) = 120.7146$$

Table 5: Results and Parameter Estimates of the Ordered Probit Model

Iteration 0: log likelihood = -369.83262
Iteration 1: log likelihood = -310.32935
Iteration 2: log likelihood = -309.4784
Iteration 3: log likelihood = -309.47532
Iteration 4: log likelihood = -309.47532

Number of obs	=	267		
LR chi2(17)	=	120.71		
Prob > chi2	=	0.0000		
Log likelihood	=	-309.47532	Pseudo R2	= 0.1632

WTP	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
in2	.4263222	.1792655	2.38	0.017	.0749683	.7776761
in3	.4448725	.2039111	2.18	0.029	.0452141	.8445308
gen	.2648914	.1689778	1.57	0.117	-.066299	.5960818
famiwithch~d	.8382068	.1559676	5.37	0.000	.5325159	1.143898
age	-.0030901	.0059548	-0.52	0.604	-.0147612	.008581
heard	.4889707	.1538718	3.18	0.001	.1873875	.7905539
nfm	-.0769489	.0570813	-1.35	0.178	-.1888262	.0349284
read	.3460292	.1410434	2.45	0.014	.0695892	.6224691
harm	.0466594	.2511878	0.19	0.853	-.4456596	.5389785
ed	.0239326	.0301424	0.79	0.427	-.0351454	.0830106
canhistory	1.449287	.2609971	5.55	0.000	.9377415	1.960832
urbanjaff1	-.2504421	.2536818	-0.99	0.324	-.7476493	.2467651
urbanjaff2	.1235564	.2253243	0.55	0.583	-.3180711	.5651838
exappear3	-.1125741	.3045822	-0.37	0.712	-.7095443	.4843962
exappear45	.2541795	.2077857	1.22	0.221	-.1530729	.6614319
concpest1	1.080672	.4594497	2.35	0.019	.1801667	1.981177
concpest23	.5332953	.2961119	1.80	0.072	-.0470732	1.113664
/cut1 |	.4728696	.6172245			-.7368681	1.682607
/cut2 |	2.231372	.6296173			.997345	3.465399
/cut3 |	3.224489	.6375326			1.974948	4.47403
/cut4 |	3.836405	.64539			2.571464	5.101346

Model significance was verified by calculating the chi squared statistics resulting from the restricted and unrestricted log-likelihood functions. A likelihood ratio test was used to test the null hypothesis that the estimated coefficients were jointly zero. The likelihood

ratio statistics is distributed as Chi-square with 17 degrees of freedom. The p value is 0.000, which indicates that the model is statistically significant at 1% or above. The null hypothesis that the estimated coefficients are jointly equal to zero is rejected at the one percent level, based on the calculated chi-squared value. This measure indicates that the model has satisfactory explanatory power and fits the data reasonably well. Because the number of explanatory variables in the model is 17, this statistic is distributed as chi square (17) under the null hypothesis that none of the variables have an effect. The p value of the test statistic, being less than 0.01 is indicative of strong overall significance.

Also shown in the second section of output is the Pseudo-R^2, which is defined as:

$$\text{Pseudo } R^2 = 1 - (\text{LogLu} / \text{LogL}_R)$$

The estimated model exhibits a McFadden's R^2 of about 0.16, which is consistent with the generally low R^2 value observed in cross sectional models. The conventionally computed R^2 is of limited value in the qualitative response model. In most practical applications, the R^2 is low and the use of the coefficient of determination as a summary statistic should be avoided in models with qualitative dependent variables (Gujarati, 1995)

Cross sectional data, like that used here, typically result in a low pseudo R^2 (Kmenta, J, 1997). While pseudo R-squares cannot be interpreted independently or compared across datasets, they are valid and useful in evaluating multiple models predicting the same outcome on the same dataset. In other words, a pseudo R^2 statistic without context has little meaning. A pseudo R^2 only has meaning when compared to another pseudo R^2 of

the same type, on the same data, and predicting the same outcome. In this situation, the higher pseudo R^2 indicates which model better predicts the outcome. (Bruin, J. 2006)

The bottom portion of the output shows the threshold parameters, cut 1, cut 2, cut 3, cut 4, by STATA. There are 5 possible outcomes and the model contains 4 cut points. The threshold variables can be interpreted as the numerical linkages between the utility function of respondents and the WTP. According to Maddala (1999), the threshold coefficients or γ's, should exhibit the following relationship $\gamma_1 \leq \gamma_2 \leq \gamma_3 \leq \gamma_4$, and be positive. Failure to exhibit any of these conditions would imply specification error of the model. All threshold coefficients for this analysis were positive and in the order explained above, implying that there is no specification errors.

Table 5 presents estimates of each element of the β vector, associated standard errors, p values, and the confidence intervals. Based on the p values, 4 variables are significant at 5% level and 3 are significant at 1% level. Coefficients for income 2, income 3, family with children, heard, cancer history, read, and concpest1 (concern about pesticide) are statistically significant at the 5% level and positive. Among the other explanatory variables, age, household size, urbanjaff1 and exappear3 (external appearance) are the variables with negative statistically insignificant coefficients. Since the ordered probit model is non-linear, the estimated coefficients are not marginal effects. As such, coefficient estimates and marginal effect are discussed separately.

Table 6 shows the marginal effects for the five WTP categories evaluated at the sample means of the data. Marginal effects are calculated from the estimated model, since

estimated coefficients affect marginal probabilities. The marginal effect is used to measure the change in probability of each WTP outcome with respect to a change in each explanatory variable. So, results of the ordered probit models can be interpreted by using the partial change or marginal effect on the probability of an ordinal outcome. In doing so, the independent variables, other than the one being examined, are held constant at their mean values. Interpretation of the marginal effects for continuous variables is straightforward; *ceteris paribus*, a one unit change in the explanatory variable will result in an increase or decrease in the probability equal to the size of the marginal effect. In the case of a binary variable, the marginal effect is the change in the probability based on whether a respondent falls into that category or not. When calculating marginal effects, all remaining variables assume their respective average values. As such, the marginal effects show the change in the probability for each WTP category for an average consumer, according to the variable being considered.

For each row in Table 6, the sum of marginal probabilities is equal to zero. The sum of marginal probabilities is always zero because an increase in the probability in one category must be off set by corresponding probability decrease in another category or categories.

Table 6: Marginal Effects from the Estimated Ordered Probit Model

	WTP = 0	WTP = 1	WTP = 2	WTP = 3	WTP = 4
			Marginal Effects		
in2	-.0478511	-.1188689	.0788886	.0513512	.0364802
in3	-.0494857	-.1245442	.081697	.0537909	.0385419
gen	-.0366002	-.0641578	.0548679	.0285428	.0173473
famiwithchild	-.1261898	-.1811757	.1673498	.0858047	.0542111
age	.0003822	.0008189	-.0006163	-.0003551	-.0002297
heard	-.064782	-.1217982	.09774	.0540924	.0347477
nfm	.0095173	.0203927	-.0153462	-.0088434	.0057205
read	-.0422832	-.0919473	.0676005	.0400179	.0266121
harm	-.0059389	-.0121153	.0094246	.0052782	.0033514
ed	-.0029601	-.0063425	.004773	.0027505	.0017792
canhistory	-.0770053	-.4236092	.0473685	.1712871	.2819589
urbanjaff1	.0311948	.0658594	-.0497285	-.0286728	-.0186528
urbanjaff2	-.0148497	-.0333492	.0242566	.0144158	.0095265
exappear3	.0149271	.0283098	-.0231027	-.0124363	-.0076979
exappear45	-.0284229	-.0714129	.0476905	.0307023	.0214431
concpest1	-.0630432	-.3344584	.0728513	.1412305	.1834197
concpest23	-.089597	-.1019594	.1140863	.0500229	.0274472

Examining Tables 5 and 6, the effect of changes in explanatory variables on WTP can be interpreted. Beginning with income, it can be seen, that the estimated signs associated with both incomes 2 and 3 were positive implying that consumers in the higher income group were willing to pay a higher price for organic eggplant than the consumers in lower income group. The positive sign on income is common to basically all similar previous studies (Boccaletti and Nardella, 2000; Misra et al., 1991; Govindasamy et al., 2001.

Marginal effects vary according to the income variable used. The marginal effects for the first two WTP categories are negative and the remaining are positive. For income3 and income2, the probability of paying a premium for WTP choice 4 (greater than Rs.30 or more) increases for organic eggplant by .0385419 and .0364802 respectively. *Ceteris paribus*, there is a higher probability of being unwilling to pay a high premium for organic eggplant when household income is lower. The highest income category has the strongest marginal effects and individuals within the highest income category showed a strong propensity to pay high premiums. Van Ravenswaay and Hoehn (1991a) and Park and Lohr (1996), also found income to have a positive and significant effect for pesticide residue-free (PRF) produce.

It was also expected that the presence of children in the family to positively affect WTP and be significant as found by Rizzardi (1991), Reicks et al. (1997), and Thompson and Kidwell (1998). The positive coefficients imply that families with children are willing to pay more for organic eggplant than families without children. The marginal effects of the first two WTP choices are negative and for the other choices are positive which suggests that the probability of being willing to pay no premium or a premium Rs.1-9 decreases while the probability of other WTP categories increases when the household has children. For the family with children variable, the probability of paying a premium for WTP choice 2 (Rs.10-19) increases by .1673498.

Govindasamy & Italia (1997b) found that those who primarily read food safety articles are more concerned about risk and are more willing to pay a premium for organic

produce. Zellner & Degner (1989) found that in Des Moines, Iowa, where regional information was available, willingness-to-pay was higher than in other cities without this information. In this current study, the read coefficient is positive and implies that respondents who gather information by reading tend to pay a higher premium than others. Therefore, more information makes the individual more confident in regards to organic products, and increases their WTP. Examining the marginal effect, the first two WTP categories are negative and the remaining categories are positive. For the read variable, the probability of paying a premium for WTP choice 4 (Rs. 30 or more) increases by 0.0266121 for the organic eggplant product.

The variable heard is an overall indicator of the degree of diffusion of general information on organic products. A positive coefficient for the heard variable implies that those who were somewhat familiar with organic products had a significantly higher willingness-to-pay. Variables read and heard increase the probability of paying higher WTP choices and reduce the probability of either being unwilling to pay a premium (WTP=0) or willing to pay a premium of Rs.1-9. For the heard variable, the probability of paying no premium decreases by 0.064782.

In this study, education (ed) is not a significant variable (see Table 5). Additional years of formal education do not significantly increase the probability of higher WTP for organic eggplant. Instead, hearing and reading are important factors which in terms of significantly affecting WTP. Previous studies (Van Ravenswaay and Hoehn, 1991; Buzby et al., 1995) provide evidence on the effect of education on willingness-to-pay. However,

the concern over pesticide risks is mixed, with some studies finding a positive relationship, some showing a negative relationship, and others, finding little or no association

This study also found that concern over pesticide residue is an important indicator of consumer willingness-to-pay for organic eggplant. Consumers who held negative perceptions about pesticides have a higher willingness-to-pay for the organic produce. The positive sign for the concpest1 variable supports the hypothesis that the probability of consumer willingness-to-pay a premium for organic eggplant increases as the respondents strongly agreed that they are concerned about pesticide residues in foods. Examining the marginal effects, concpest1, concpest23 reduce the probability of being unwilling to pay a premium (WTP = 0) or willing to pay a premium of Rs.1-9. However, these variables increase the probability of being willing to pay a premium of Rs.10-19 or higher. For example, concpest1 increases the probability of paying a premium of Rs. 30 or more by 0.1834197.

Results are consistent with the notion that respondents who are concerned with the impact of pesticides on health and seek out information on the foods they purchase are in all likelihood, consumers who would pay a higher price to avoid pesticides. Generally, consumers are concerned with being exposed to pesticides, the effect of pesticides on their health and the health of the environment. Sachs et al. (1987) found that the number of people with concerns about consuming pesticides is increasing. Goldman & Clancy (1991) reported that consumers utilizing organic produce rated protection from pesticide

residues in food as the second most important reason for supporting organic agriculture out of a list of seven commonly-cited reasons for supporting organic agriculture, since they perceive organic products as a comparatively safer product regarding pesticide residues.

Place of residence (urbanjaff) variables are statistically insignificant in this study. Urbanjaff3 is categorized as urban area comparing to urbanjaff1 and urbanjaff2. Urbanjaff1 is more rural than other areas. Residing in Vadamaradchi (urbanjaff1) decreases the probability of being willing to pay a premium Rs.10-19 or more. Living in Thenmaradchi reduces the probability of being unwilling to pay a premium (WTP 0) or willing to pay a premium of Rs.1-9. However, the probability for willingness-to-pay a premium of Rs.10-19 or higher increases relative to individuals who reside in Valikamam. For example, living in Thenmarachchi increases the probability of being willing to pay a premium of Rs.30 or more by .0095265.

Cancer history is also another important variable in the study. It significantly affects the WTP and has a positive coefficient. This variable can be interpreted as families which have a history of cancer will be willing to pay more for organic eggplant. Cancer history decreases the probability of being unwilling to pay (WTP 0) or willing to pay a premium of Rs.1-9. However, it increases the probability of willingness-to-pay a premium of Rs10-19 or more. The variable cancer history increases the probability of paying a premium of Rs. 30 or more by 0.2819589.

Age was treated as a continuous variable but was not a significant variable in the estimated model. The negative coefficient can be interpreted as older respondents are less willing to pay than younger respondents. The negative effect of age is consistent with the findings of Underhill and Figueroa (1996). WTP for organic eggplant is lower for older respondents who are often on a fixed budget and couldn't pay more even if they wanted to. Also, many older respondents commented that at their age, food safety risks would not affect their life expectancy. Perhaps, those who are older are less worried about health risks from pesticide because of the long lag times between exposure (cause) and disease (effect). Younger respondents seem slightly more willing to pay due to their greater environmental consciousness.

The coefficient for gender (gen) is positive but not statistically significant. The positive sign for the gender coefficient indicates that female respondents were less likely to pay more than male counterparts. Male respondents are less likely to be willing to pay no premium or a small premium, but more likely to pay a premium of Rs.10-19 and more. In the study area, traditionally, males tend to be the primary food shoppers for the household and may be more aware of food issues.

Family size or household size (variable nfm) was included as a separate variable because it affects the amount of income available per person. Larger households generally have less discretionary income per resident than smaller households and consider paying a premium for organic produce a luxury. The negative coefficient suggests that the willingness-to-pay decreases as household size increases. A survey by the Food

Marketing Institute (1997) found that single-person households were more concerned about the availability of organic produce than multiple-person households.

External appearance (variables exapper3 and exappear45) are not significant variables in the study. Respondents who said they are neutral to external appearance when they shop had negative coefficients. Those who disagree or strongly disagree have positive coefficients, which imply this latter group is more willing to pay Rs. 10-19 or a higher premium.

Overall, consumers across the study area who are more willing to pay for organic eggplant can be described as having higher incomes, have children in the families , have family history of cancer, have obtained information about organic eggplant (through hearing or reading), and are concerned with pesticide residues in foods. Naturally, producers would like to earn as much as possible for their product. If higher premiums are sought, marketing efforts will have to focus on the fraction of consumers who are willing-to-pay higher premiums.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

This chapter begins with a summary of the findings (section 5.1). Section 5.2 follows and describes possible policy implications. Section 5.3 then deals with recommendations and the scope of future research. Finally in section 5.4, reliability and limitations of this research effort are presented.

5.1. Summary

This study on consumer willingness-to-pay for organic eggplant was carried out in Jaffna district, Sri Lanka. Organic farming practices as a production system is becoming increasingly popular among producers and consumers. The term "organic" denotes a method of production which excludes chemical inputs and is likely to play a major role in the future of agriculture. Organic products are generally higher priced than their conventional counterparts in most areas. As such, one of the expected obstacles to organic eggplant promotion in Jaffna district is the anticipated gap between conventional and organic food prices. In this study, the market potential for organic eggplant was investigated in Jaffna district, Sri Lanka. Two issues were explored that can affect the future development of organic production in Jaffna district which might help producers adopt adequate pricing strategies in domestic markets. The first was to detect market segments of potential organic eggplant consumers. The second issue was the identification of the willingness-to- pay for organic eggplant.

The objective of this study is to determine and quantify consumer willingness-to-pay for organic eggplant and also to determine the effects of socio-demographic factors on the willingness-to-pay for organic eggplant in Jaffna district, Sri Lanka. Data were collected by face-to-face interviews using structured, pre-tested questionnaires from 350 respondents. Two hundred sixty seven completed responses were used for the estimation procedure. An ordered probit model was formulated and used to estimate consumer willingness-to-pay for organic eggplant. A variety of factors (including income, families with children, hearing and reading about organic production, history of cancer in the household, and concern over pesticide residues.) appear to affect the willingness-to-pay for organic eggplant.

Results of this survey based on 267 randomly selected households in Jaffna district suggest that the majority of the respondents (88.01%) are willing to pay a premium to purchase organic eggplant (see Table 4). Of this proportion, 44.94% of them would be willing to pay Rs.1-9 (1-7%) above the regular price, while 25.84 % would be willing to pay a premium of Rs.10-19 (8-16%). Those willing to pay more than Rs.19 comprised 17.23% of the sample. Only 11.99% were not willing to pay anything. Consumer reluctance to pay a higher price poses an interesting issue. It is possible that consumers consider food safety as a public good. Therefore, they expect the government is obligated to ensure that a product in the market is free of pesticide residues.

The majority of the respondents are willing to pay a higher premium to buy organic eggplant; especially those from higher earning households, households with children and have a family history of cancer. The results also suggest that respondents who exhibit

concern with pesticide residues in their food and those who gather information about organic products by reading food safety reports in the media or hearing about organic products are willing to pay higher premiums. Results of this study are consistent with previous studies examining willingness-to-pay in finding that health and environmental concerns are important factors in determining consumer willingness-to-pay for organic products.

5.2. Marketing Implications

From the findings, a profile of the household most likely to purchase organically grown produce can be constructed. This enables marketing efforts to focus on target consumers or those consumers matching this profile. For example, it was found that people with higher income tend to pay a higher premium for organic eggplant. Marketing efforts can focus on supermarkets where these high income groups of people usually shop. Thus, these super markets are more likely to be successful in selling organic eggplant. A strategy for organic eggplant producers would be to market their products to super markets. Also, if obtaining a premium was a goal for retailers introducing organic produce, urban areas of Jaffna district with their high proportion of working individuals and families seem to be likely target areas. On the other hand, communities which have a high population of retired individuals probably have a lower willingness-to-pay for organic products than younger communities.

The proportion of respondents who indicated that they would pay a premium for organic eggplant in the study area is about 88.01%. This suggests that there is market potential for organic eggplant in the study area. This is an encouraging sign for prospective

producers of organic eggplant. It's obvious that the additional production costs for organic products will be crucial to the success of any organic market. The added willingness-to-pay must compensate for the higher production costs for organic eggplant. Considering the organic eggplant market in Jaffna district, if the added costs exceed 25% (more than Rs.30) as compared to the price of regular eggplant, then the market for organic eggplant would probably experience slow growth.

The results also provide insights for the government or NGO's who seek to promote organic farming in the study area. Based on WTP results, an optimal price support scheme or guaranteed price scheme can be implemented or advocated. As the organic produce market expands, public perception and awareness characteristics that influence the likelihood of willingness-to-pay for organic produce will enable the organic market's growth to continue.

Adoption of consumer awareness programs helps the initial promotion of the organic product market. Reading and hearing about organic products are significant variables in this study suggesting that increased consumer awareness by disseminating information can effectively increase the WTP for organic eggplant in the study area. It was observed that when consumers gain information about the health benefits from organic products, they are more willing to pay higher prices for these benefits.

Attitudes toward environmental and health issues are key factors explaining willingness-to-pay, and should be considered when designing appropriate promotion strategies by producers or marketers. Family cancer history and concern about pesticide residues in

food are also statistically significant variables in the study. Therefore, promotional campaigns focusing on health and environment risks using consumer concerns about pesticide residues can increase consumption of organic products and increase consumer WTP.

5.3. Recommendations and Scope of Future Research

Results suggest some recommendations for consumers and prospective organic eggplant producers. Currently, there is no market for organic eggplant in Jaffna district. Thus, an important task is to increase consumers' knowledge of what an organic product is and the benefits gained by consuming organic products. Results from this study suggest that target consumers represent potential for market growth. Knowledge of their socio-demographic characteristics is important for identifying these potential consumers. Thus specific-marketing strategies should identify consumers who are willing to pay higher premiums. However, in the long term, it is advisable to reduce the expected gap between conventional and organic production costs. This is likely to occur as the efficiency of organic production increases. Information presented in this study about the maximum premium, potential consumers are willing to pay for organic eggplant is useful in determining short term market potential.

Contributions from academics, researchers, scientists, extension workers and other professionals in the field of organic production are essential in order to educate producers and consumers about the negative impacts on human health from using hazardous chemicals incorrectly and the negative effects of these chemicals on the environment.

This will help reduce damages done by farming communities in the long run. The future investment required to clean our soil and water resources will be significant. Environmental pollution today will likely leave restoration of the environment to future generations at their cost for their survival. Therefore it seems logical that the cost for cleaning the environment needed in the future should be added to the cost of conventional production today.

Introducing or promoting alternative production systems like IPM (Integrated Pest Management) or other intermediate systems (e.g., clean tea in Vietnam (Tran, 2008)) during the transitional period would help producers in the adjustment process. Since, the price of the IPM product lies between the conventional and organic prices, this would also assist consumers transitioning to higher organic product prices.

Government subsidy programs during conversion would be an incentive for small farmers. These will provide an opportunity to compensate added cost for the organic production initially. Government also can introduce a guaranteed price system[23] for organic eggplant and for other organic products during initial promotion. This might ensure a safe market environment for the consumers and producers.

To help reduce the expected market price of organic eggplant, government involvement in establishing a local certification system under third country registry is needed. The cost for international inspection increases overhead costs and thus the cost of production. To

[23] Guaranteed Price Scheme is a program, introduced in Sri Lanka in 1942 for rice. By this program government agreed to purchase rice and some other products at set prices.

encourage consumption and adoption of organic production methods, it may be necessary to reduce the costs of production in transitioning from conventional to organic production.

There is a room for substantial improvement in the survey design for future studies such as:

- WTP choices can be split up into small ranges. For example, the choices could be, Rs.1-4, Rs.5-9, Rs. 10-14, etc. instead of Rs.1-9, Rs.10-19, etc., which would give more specific estimates.
- More information could be obtained with a comparison by simply adding a question regarding the WTP for other vegetables (e.g., sweet pumpkin which is the second highly consumed vegetable in the study area).
- "Quantities of organic eggplant that consumers would be willing to buy" could be obtained by adding an additional question.

This study can be expanded to other organic products and for other locations in Sri Lanka. It may also be helpful to determine the farmers' willingness-to-accept (WTA) value for organic eggplant production in Jaffna district. Another area of interest may be to extend the study to estimate the demand for organic eggplant in the Jaffna district by obtaining information about consumption quantities that consumers would be willing to purchase at selected premium prices. Previous studies and this current study revealed that a small proportion of consumers are not willing to pay a premium for organic products. It

would be interesting to examine the reasons why these consumers are not willing to pay a premium.

5.4. Reliability and Limitations

All data used in this thesis were primary data collected through direct interviews. To increase reliability, the survey was pre-tested on a focus group. Feed back from the pre-tests helped determine final questions for the survey where problematic and confusing questions were either corrected or dropped from the final survey.

The CVM is hypothetical in nature, cast in a non-market environment, respondents face no budget constraint, no actually purchase in the market and respondents may rely on personal experience rather than the information provided to them. Because of the hypothetical-purchasing situation, survey respondents probably take this scenario less seriously than if faced with actual purchasing situations. Therefore, they may tend to overestimate their true WTP (Blumenshein et al., 1998). For this study, concerns about hypothetical bias are minimal because it is not difficult for consumers to relate to the scenario of consumption (Buzby et al., 1995). Nevertheless, the selection of appropriate survey and elicitation methods would reduce these biases. A major issue from the literature concerns consumers who may have little information about the risks involved and therefore they respond by giving the wrong monetary value of the benefit from risk avoidance (Buzby et al., 1995; Fox et al., 1995). To minimize this error, consumers were informed about the risks involved during the interview.

This study is one of the first analytical attempts to measure consumers' willingness-to-pay for organic eggplant in Jaffna district. Conclusions and implications drawn from this study are also limited by the geographical coverage of the survey. Attempts to generalize and apply the results of this study to a broader context should be exercised with caution mainly because of the civil war in Sri Lanka. There are also variations in market prices from northern Sri Lanka to other areas of the country. In addition, the survey did not collect any information on why some consumers are unwilling to pay a higher price for organic eggplant. The availability of this information would provide further insights into the consumer decision-making process.

APPENDIX

Consent letter to Participate in Willingness to Pay Study

Vanathy Kandeepan
Primary Investigator
0212223861 (Sri Lanka)
0018089447971 (Hawaii)

This research project is being conducted for my thesis to fulfill my master's degree. The purpose of the project is to estimate consumers' willingness to pay for organic brinjal. You are being asked to participate in this survey because you are in the survey area.

Participation in the project will consist of filling out a questionnaire on background information about yourself and your family and some other details relevant to the survey or the short interview with the investigator. Interview questions will focus on willingness to pay for organic brinjal. Data from the interview will be summarized and later analyzed. No personal identifying information will be included with the research results. The questionnaire and interview will take about 15 minutes for completion. Approximately 150 people will participate in the study.

The investigator believes there is no risk to participating in this research project, at the same time participating in this research may yield no direct benefit to you.

Research data will be confidential to the extent allowed by law. Agencies with research oversight, such as the UH Committee on Human Studies, have the authority to review research data. All research records will be stored in a locked file in the primary investigator's office for the duration of the research project. All other research records will be destroyed upon completion of the project.

Participation in this research project is completely voluntary. You are free to withdraw from participation at any time during the duration of the project with no penalty, or loss of benefit to which you would otherwise be entitled.

If you have any questions regarding this research project, please contact the researcher, Vanathy Kandeepan at 0212223861 or email the researcher at vanathy@hawaii.edu

If you have any questions regarding your rights as a research participant, please contact the UH Committee on Human Studies at (808)956-5007.

Copy to Participant

Questionnaire

1. Personal Information

Head of household:

G.S. Division:.....

Gender: Male☐ Female☐

What year were you born:.....

Highest level of education completed: O/L ☐ A/L ☐ Under Grad. ☐

Graduate ☐ Other(specify) .....

Occupation:.....

Total household monthly income:

(1) less than Rs. 10,000 ☐ (2) Rs. 10,000 – Rs 14,999 ☐

(3) Rs. 15,000 – Rs 19,999 ☐ (4) Rs. 20,000 – Rs 29,999 ☐

(5) Rs. 30,000 – Rs 39,999 ☐ (6) Rs. 40,000 – Rs 49,999 ☐

(7) Rs. 50,000 – Rs 59,999 ☐ (8) Rs. 60,000 – Rs 69,999 ☐

(9) Rs. 70,000 – Rs 79,999 ☐ (10)Rs. 80,000 – Rs 89,999 ☐

(11) Rs. 90,000 – Rs 99,999 ☐ (12) More thas Rs.100,000 ☐

Marital Status: Married☐ Single☐ Divorced ☐

Family members	Gender	Age	Occupation	Education (highest level completed)	Monthly Income
1.	.....	.....	.....	.....	.....
2.....	.....	.....	.....	.....	.....
3.....	.....	.....	.....	.....	.....
4.....	.....	.....	.....	.....	.....
5.....	.....	.....	.....	.....	.....
6.....	.....	.....	.....	.....	.....
7.....	.....	.....	.....	.....	.....

Household head and Family members	vegetarian/non vegetarian	Number of occasions per week eating outside the home	Number of days per week respondent eat vegetarian
1. Household head	.....	.....	.....
2.....	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....

5.	.....	.....	.....
6.	.....	.....	.....
7.			

2. How much do you spend for vegetables per month? .....

3. Do you prefer to eat brinjal? Yes / No

4. Are you familiar with organic brinjal? Yes / No

5. Have you ever eaten organic brinjal? Yes / No

6. Do you feel pesticide residue products will harm your health (cause cancer)? Yes / No

7. Are you / any family member suffering from cancer? Yes / No

8. Do you feel farmers in Jaffna apply more pesticides than recommended levels? Yes / No

9. Have you read any articles from news papers or magazines stating that pesticides can cause cancer? Yes / No

10. Attitudinal Questions (Circle choice that applies)
    1. I feel the use of chemicals in agriculture has negative effects on the environment
       Strongly agree☐ Agree☐ Neutral☐ Disagree☐ Strongly ☐ disagree

    2. I am concerned about pesticide residues in our food supply
       Strongly agree☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly ☐ disagree

    3. External appearance of the vegetable is important to me
       Strongly agree☐ Agree☐ Neutral☐ Disagree☐ Strongly ☐ disagree

11. Suppose brinjal regularly costs Rs. 120/kg (current market price) , for each kg you purchase, would you pay slightly more for organic product (Select one)
    1. No
    2. Yes, I would be willing to pay between Rs.1-9 more per kg for the organic brinjal
    3. Yes, I would be willing to pay between Rs. 10 and 19 more per kg for the organic brinjal
    4. Yes, I would be willing to pay between Rs .20 and 29 more per kg for the organic brinjal
    5. Yes, I would be willing to pay more than Rs. 30 more per kg

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