ASSESSMENT OF CONSUMER AWARENESS AND PREFERENCES FOR QUALITY CERTIFICATION AND ORIGIN-LABELING IN FRUIT SALADS IN KIGALI, RWANDA

MSc. THESIS

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Declaration and Approval

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This thesis is my original work and has not been presented for the award of a degree in any other University.

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Dedication

This thesis is dedicated to my mother for her unconditional support throughout my studies, her discreet affection and for all the sacrifice she has made in educating me. May she live to see the fruits of her effort.

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Abstract

Consumers worldwide are increasingly becoming more concerned and aware about food standards, quality and safety issues. Developing countries including Rwanda have shown poor food quality and considerable deficiencies in vitamins; however, consumption of healthy and inspected fruit salads is among solutions to overcome these problems. Although Rwanda food policies have established regulations in food industry, no empirical evidence exists on consumers' preferences for fruit salad quality specifically for quality certification and origin labeling. This study was conducted in Kigali city and assessed the factors influencing the awareness on origin labeling and consumers' preferences for fruit salads quality through semi-structured questionnaires, from 360 randomly selected fruit salad consumers. Descriptive statistics were used in the characterization of fruit salads consumption. In addition, a binomial logit was applied to assess the factors that influence awareness on origin labeling, while choice experiment (CE) approach and multinomial logit (MNL) were applied to elicit consumer's preferences for fruit salad attributes. Results show that the majority of fruit salads in Rwanda are not certified and non-labeled, and they are only consumed on occasional basis. The main factors that were found to have influence on awareness on origin labeling are residential area, place of purchase, reading of labels and levels of education. Further, consumers had positive preferences for organic fruit salads and inspection of vendor's health. They also had higher positive preferences for fruit salads that comprise vitamins A, C and fats. In addition, consumers had higher preferences for imported than domestic fruit salads, and they had higher preferences for private certification. These results provide useful insights to nutrition policy on encouraging fruit salads consumption and enhancing consumer education on their quality. Further, the findings would guide health sector policy on effective monitoring and regulation of fruit salad sale to ensure safe trading of such foods.

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List of abbreviations

AICR	American Institute for Cancer Research
AERC	African Economic Research Consortium
CE	Choice Experiment
CM	Choice Modelling
CMAAE	Collaborative Masters in Agricultural and Applied Economics
CV	Contingent Valuation
COOL	Country of Origin Labeling
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FAOSTAT	Food and Agricultural Organization Statistical database
FGDs	Focus Group Discussions
GDP	Gross Domestic Product
MINAGRI	Ministry of Agriculture and Livestock (Rwanda)
MNL	Multinomial Logit
MRLs	Maximum Residue Levels
NISR	National Institute of Statistics in Rwanda
RBS	Rwanda Bureau of Standards
RDB	Rwanda Development Board
RHODA	Rwanda Horticulture Development Authority
RUM	Random Utility Model
Rwf	Rwandan Francs

Se	Standard Error
SD	Standard Deviation
SPS	Sanitary and Phytosanitary
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
TV	Television
UK	United Kingdom
UN	United Nations
USA	United State of America
USD	United States Dollars
VIF	Variance Inflation Factor
WCRF	World Cancer Research Fund
WHO	World Health Organization
WTA	Willingness to Accept
WTO	World Trade Organization
WTP	Willingness to Pay

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Consumers worldwide are increasingly becoming more concerned and aware of food quality they consume. Consumers' awareness is the level of knowledge about the product purchased and understanding of consumers' rights. The consumers' concerns on product information have been raised because of food safety scandals that happened in Europe food industry over the last decade (Jaffee, 2004). In order to ensure health and safe food products in their markets, developed countries have established quality standards in fresh produce including fruit salads products. Fruit salad is a mixture of different types of chopped fruits and is usually consumed fresh without processing. Fruit salads are important because they bring diversified vitamins and minerals to the body, dietary fibre and other phytonutrients that may lower the risk of cancer, heart disease and other related health problems (Kader, 2002). They may also offer opportunities for smallholders in creating jobs, poverty alleviation and participating in high-return export markets. However, the increasing importance of food safety has affected the fruit salad industry as consumers are becoming more concerned with quality, safety and traceability of fruits used in making the fruit salads. Globally, there is an upward trend in fruits production; from 256 million tons in 1990 to about 640 million tons in 2011 (FAOSTAT, 2012). Sub-Saharan Africa (SSA) has advantages in fruits production used to make fruit salads such as suitable soils and climate, water for irrigation, low labor costs and relative proximity to growing horticultural markets in Europe and the Middle East. However, SSA producers are facing increasing competition from other producers especially from North Africa and Asia who produce higher quantity and have easier access to European Union (EU) markets. In light of consumers' concerns on food quality, developed countries

have enacted strict food quality standards and safety regulations to ensure consumption of safe food products. Fruit salads in international markets have to comply with safety and quality standards, organic production and low pesticides regulations. Compliance with international standards is important especially for developing countries as it can help them to upgrade their capacity in regulation and monitoring of food value chains, as well as to participate in international markets. Food safety standards in developed countries are serving to shape the expectations of developing countries consumers, especially those with higher incomes and in urban areas (Jaffee, 2004). Those higher income earners are increasingly demanding food products with higher quality standards adapted from developed countries. Increase in consumer income increases demand for safe food products and subsequently increases consumers' willingness to pay (WTP) a higher premium for quality safety attributes (Henson and Reardon, 2005). With the increasing rate of urbanization in developing countries it is expected to raise consumer demand. Urban populations in developing countries are also increasingly becoming more aware of food safety issues and this requires producers and sellers to be more concerned with production techniques, packaging, personal hygiene and other food safety requirements to meet consumers' expectations.

Country of origin in fruit salads is also cardinal since it is considered as a signal of quality where consumers use the origin label to re-identify the quality that they have found appealing in cases of repeated purchase on fresh food (Lusk *et al*., 2006). The consumption of safe fruit salads could make an important contribution to human nutrition given the high prevalence of micronutrient deficiency which contributes to infant and maternal mortality (Rwanda Ministry of Health, 2010). Developing the fruit salad industry could help Rwandan rural farmers to increase their income since fruits are known to generate more revenue as they yield more per unit area cultivated and earn higher prices per unit weight compared to the sale of staple crops such as maize, rice and potatoes among others (RDB/RHODA, 2010).

1.2 Statement of Research Problem

Fruit salads are important sources of different micronutrients such as Vitamin A, Vitamin C and iron. In Rwanda fruit salads industry is not developed; those sold on the market are not certified because the government has not yet set the required mandatory quality standards for fruit salads. This became a serious problem related to food safety issues and brings health problems including diarrhea and vomiting among others. The country has already experienced a temporary ban on exports in fresh produce to the EU market because of a failure to comply with the quality standards at the international market (MINAGRI, 2012). Certification is important since it shows that products meet the quality requirements. However, it entails additional costs, which increase the price of certified products. Most of the studies on certification and origin on food products were done in developed countries (Lusk *et al*., 2006; Brett and Melo, 2010) but little was done in developing countries and Rwanda in particular.

Some studies have been conducted in developing countries on food products quality like in Kenya (Kimenju and Groote, 2005; Ngigi *et al*., 2011) and Tanzania (Alphonce and Alfnes, 2012) have shown that respondents were willing to pay premium price for food products quality. However, little is known about the quality of food products in Rwanda and specifically on fruit salads. Studies in developed countries also focused on Country of Origin Labeling (COOL) for food products; like Loureiro and Umberger (2003) and Sterns *et al*. (2004) in the United States of America (USA) and Angulo and Gil (2007) in Spain. They found out that consumers were willing to pay premium price for COOL; however literature is still limited, particularly for origin in fruit salads industry in Rwanda. Therefore, this study intends to close the gap in literature by providing useful information on fruit salads quality in Rwanda specifically for their quality certification and origin labeling.

1.3 Research objectives

Main objective

The main objective of this study was to assess consumer awareness and preferences for quality certification and origin-labeling of fruit salads in Kigali, Rwanda.

Specific objectives

1. To characterize fruit salads consumption in Rwanda.
2. To assess consumers' awareness on quality certification and origin-labeling of fruit salads.
3. To determine consumer willingness to pay for quality certification and origin-labeling in Rwanda.

1.4 Hypotheses

1. Socio-demographic factors (age, gender, income, education level) do not influence consumers' awareness on quality certification and origin labeling in fruit salads.

2. Consumers are not willing to pay a significant amount of money for quality certification and origin-labeling of fruit salads

1.5 Justification

Research on consumers' preferences for fruit salads quality is important in order to fill the gap in food safety knowledge on consumers' demand side, by assessing their preferences for fruit salads quality in general, particularly for certification and origin labeling. Given the growing importance of fruit salads in the food market, it is important to examine how consumers react to fruit salads quality in order to develop and promote fruit salads industry in Rwanda. The study helps in encouraging farmers to produce fruits of high quality and this will increase the price of fruits thus increasing their incomes. It will also improve on trade of fruit salads since traders will be encouraged to sell marketable products. On the side of consumers, the study contributes to ensuring food safety conditions and prevents risks

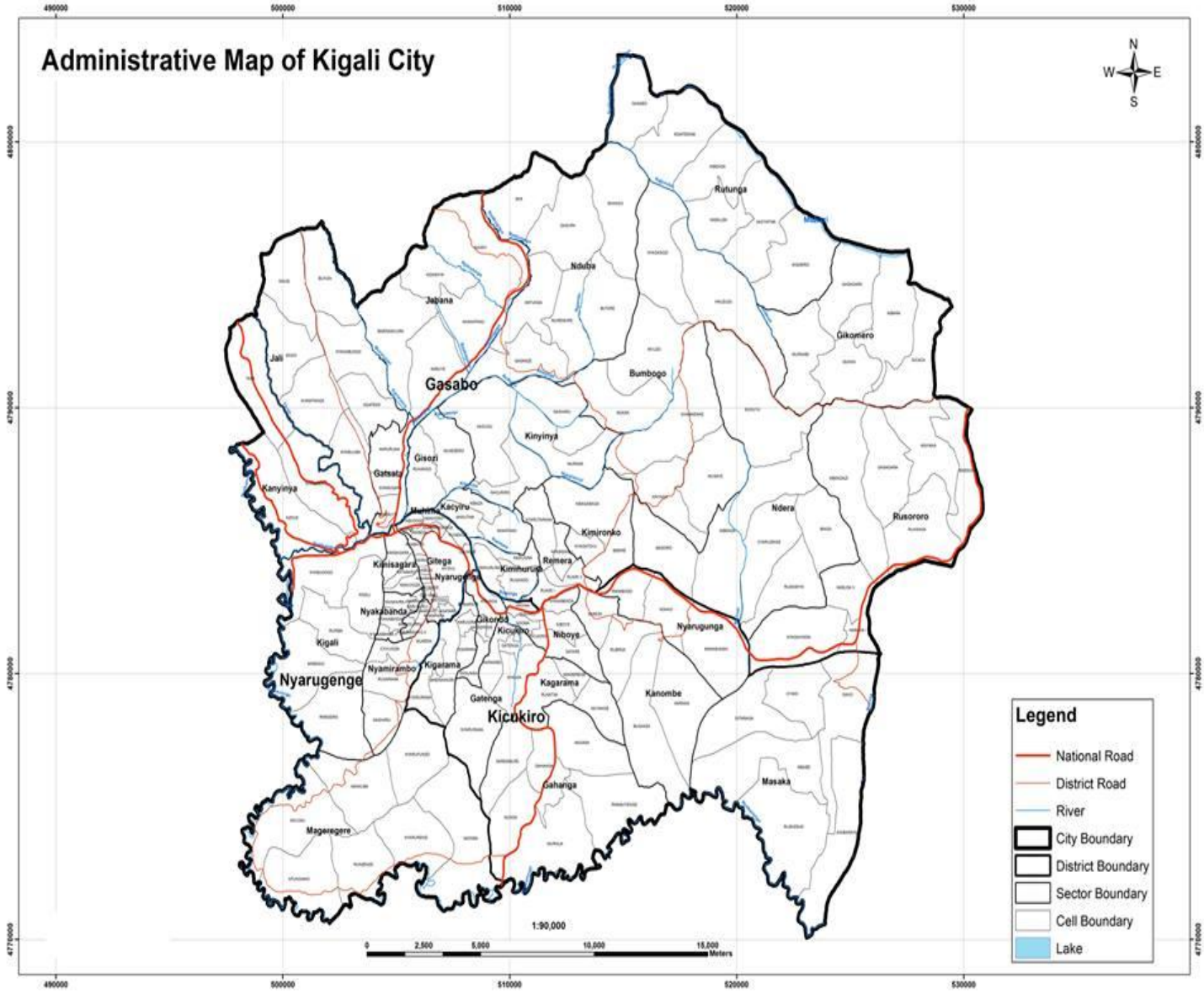
that would arise from the consumption of poor quality fruit salads. With regard to national policy, the findings from this study helps in achievement of MDG one of eradication of extreme poverty and hunger which emphasizes on nutrition aspects (United Nations UN, 2013). Moreover, policy makers will get information in terms of setting standards for fruit salads in Rwanda and improve on food safety conditions.

1.6 Study area

Rwanda is well placed to serve growing global, regional and local demand for fruits (RDB/RHODA, 2010). Rwanda's fertile and diverse terrain offers ideal conditions for a wide range of tropical fruits. With ideal elevation, soil and climate conditions, the country is able to achieve naturally high yields in fruits production (Gikonyo and Wanjau, 2012). This study was conducted in Kigali, Rwanda in East Africa. Figure 1 shows the administrative boundaries of Kigali city. It is subdivided into 3 districts namely Nyarugenge, Kicukiro and Gasabo as shown on Figure 1. Rwanda is an emerging country in East Africa, where agricultural sector contributes a third of the gross domestic product (GDP) (National Institute of Statistics of Rwanda NISR, 2011).

Kigali city is a capital and administrative city where proportion of high income earners is highest in the country (80%) and has highest levels of education (RDHS, 2012). It is the market centre for all fruits produced from all over the country and consumption of fruit salads is likely to be higher in Kigali than in any other area of the country. Kigali city has 1.13 million inhabitants with annual growth rate of 4% where the main source of income is from nonfarm activities, wage income and own businesses (NISR, 2012). Therefore, people staying away from their homes at work are more likely to take fast foods including fruit salads.

Figure 1: Kigali administrative boundaries



1.7 Organization of the study

This thesis is organized into five chapters. Chapter one presented the introduction including background information, problem statement, research objectives, hypotheses, justification of the study and the study area. Chapter two contains literature review, which includes general trend of selected fruits and their nutritional values. It also includes global food standards, fruit salads standards and regulations as well as the review of relevant theoretical and analytical methods. Chapter three includes the analytical framework and the methodology used in this study. Chapter four reports and discusses the results of both descriptive and econometric analysis while in chapter five, a summary of the findings, conclusions and policy implications are presented.

CHAPTER TWO

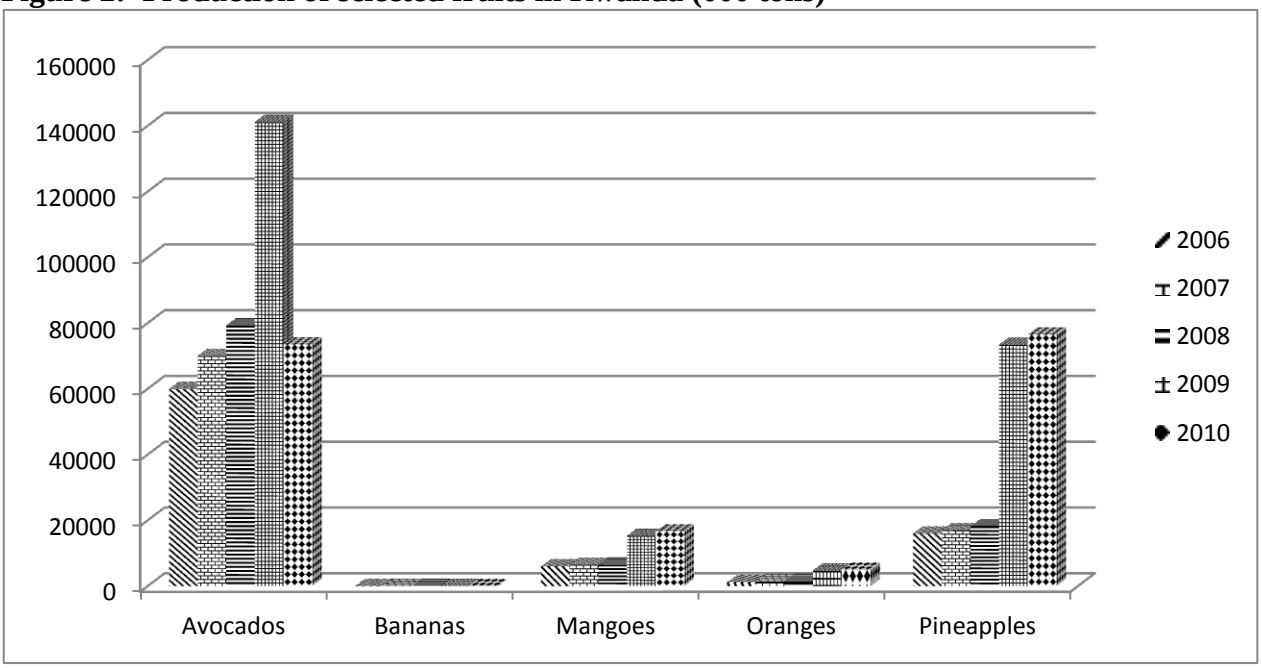
2.0 LITERATURE REVIEW

2.1 General trend in selected fruits

i) Production of selected fruits

Rwanda fruits production is less than 140,000 tons per year as shown by Figure 2. However, the government is encouraging and supporting horticulture production including fruits production by developing processing facilities. Available data show that bananas and avocados are the main fruits produced in the country, where banana's production was 700,000 tons per year (with 28 tons per hectare) and avocados production was 321,000 tons per year (with 21 tons per hectare) (RDB/RHODA, 2010). Pineapples occupied the third place where its production was 49,000 tons per year (with25 tons per hectare). Lastly mangoes production was 9,200 tons per year and citrus fruits production was 7, 300 tons per year. The low production in the country is attributed to many farmers growing fruit products as an additional crop to staple crops and supply little quantity which results in fragmented sourcing and lack of coordinated activities in production. Additionally, high incidence of diseases and pests, lack of production skills and training in post-harvest handling constrain production growth.

Figure 2: Production of selected fruits in Rwanda (000 tons)



Source: FAOSTAT (2012)

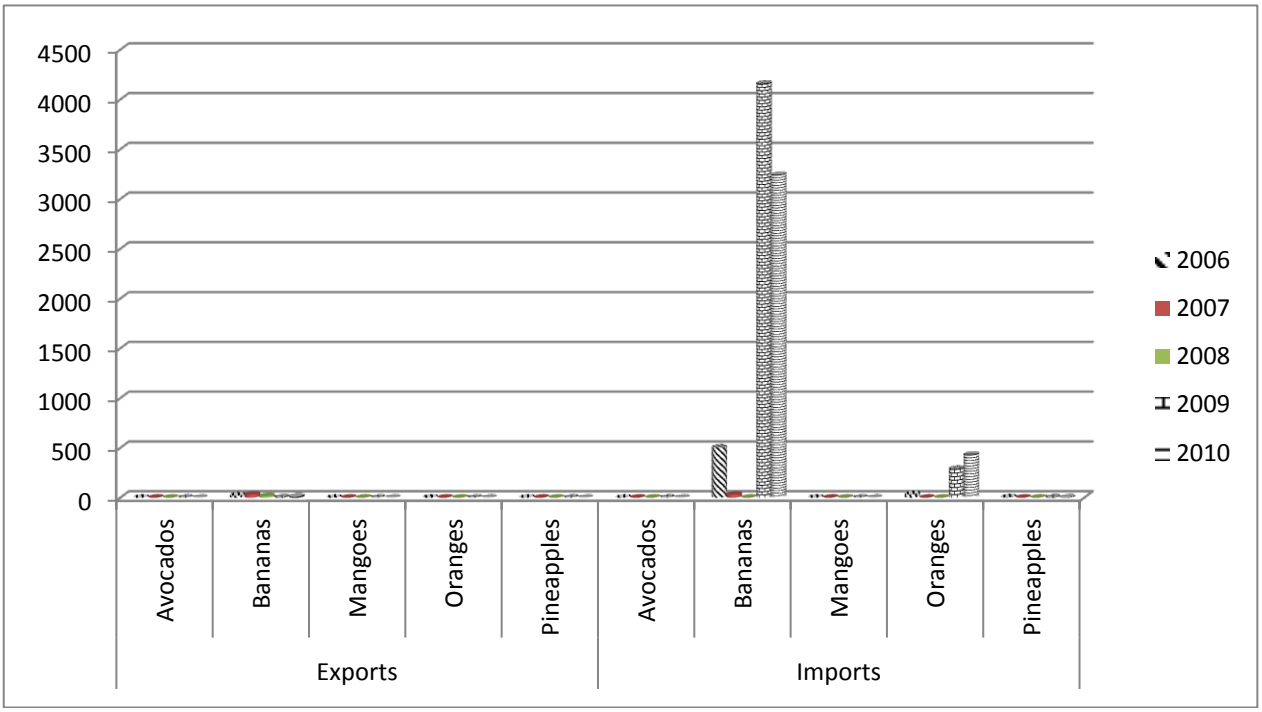
ii) Trade of selected fruits

Trade in fruits remains low in the region because of subsistence orientation among the smallholders and low levels of value added production. In Rwanda, most of the fruits produced are consumed locally (RDB/RHODA, 2010). Rwanda exports in fruit sector are still low; less than 50 tons annually. Rwanda Ministry of Agriculture (MINAGRI) is focusing on increase in fruits production in order to participate in international markets (MINAGRI, 2012). Rwanda's fruit imports are less than 5,000 tons per year as shown by Figure 3.

This shows that fruits consumption in the country is low since the production is also at low levels (Figure 2). However, Rwanda Nutrition Policy is promoting and encouraging fruits consumption in order to overcome vitamins deficiency (Rwanda Ministry of Health, 2010). Fruit imports in the country are currently done by Nakumatt Supermarket which has contracted a Kenyan company to source fresh

fruits in the country. This company is importing fresh fruits such as pawpaw, mangoes and apples from Kenya. It is also importing oranges and mangoes from Burundi (Gikonyo and Wanjau, 2012).

Figure3: Trade of selected fruits in Rwanda (000tons)



Source: FAOSTAT (2012)

2.2 Fruit salads and nutritional issues

Fruit salads are rich in different vitamins (Vitamin A, Vitamin C, minerals such as iron, calcium and magnesium), fibre and fats. They are essential for the good maintenance of human health and also provide energy and proteins to the body (Nakasone and Paul, 1998). Their contribution to dietary intakes depends on the quantities in which they are taken. This study used selected tropical fruits including avocados, bananas, mangoes, pineapples and oranges which can be used in making fruit salads. Those fruits have been chosen because they are among the most outstanding and significant fruits that are produced and have potential for export markets in Rwanda (RDB, 2010). However, their quality and safety standards in the domestic market are not fully developed. The selected fruits used to

make fruit salads in this study are grouped into three categories: fruits rich in Vitamin A, fruits rich in vitamin C and fruit rich in fats. However, the most important vitamins in fruits are vitamin A and C and the country has shown deficiencies in those vitamins (Rwanda Ministry of Health, 2010). Bananas and mangoes are rich in Vitamin A and they are essential for four distinct functions of vision, growth, cell differentiation and reproduction (Guthrie, 1989). Oranges and pineapples are rich in Vitamin C, which is one of the essential nutrients for the normal health of body cells (Guthrie, 1989). Fruits in this category are mainly responsible for collagen (connective protein) formation, dentine formation, tyrosine metabolism, enhancing immune functions and facilitating metabolism of amino acid and drugs (Levine *et al*., 1996). Avocados have high fats content. According to FAO (2003), avocado is among few tropical fruits rich in proteins, minerals (calcium, phosphorus), fibre and fats. The five fruits considered in this study (avocados, bananas, mangoes, pineapples and oranges) were selected since they are the most produced in the country (RDB/RHODA, 2010). In addition, they are the basic fruits (bananas, mangoes, pineapples) and optional fruits (avocados, oranges) used in making fruits salads according to the Codex Standards 99-1981, which presents standards for tropical fruit salads (FAO/WHO, 1981). Rwanda is currently importing fresh fruits such as apples, pawpaw, melons, mangoes, and oranges among others from countries in the region like Kenya, Uganda and Burundi (Gikonyo and Wanjau, 2012). This is an opportunity for the country to import those fresh fruits and make more diversified fruit salads, since its fruits production is still at low levels. Further, Rwanda is importing fresh fruits from Egypt such as grapes, pears, pomogrant, oranges and mangoes (Gikonyo and Wanjau, 2012).

2.3 Global food standards and certification issues

Standards are requirements established by consensus and approved by a recognized body, which provide rules, guidelines or characteristics for products or related processes and production methods (Will and

Guenther, 2007). They are very important in international marketing as they provide consistent and understandable information to the consumer.

2.3.1 Types of standards

According to FAO (2006), there are two types of standards: product and process standards. Product standards are those which involve specifications for the product characteristics to ensure that they do not cause harm or hazards to consumers, while process standards involve operations criteria used to make a product. Standards can also be classified into private and public standards. According to Jill (2010), public and private standards are differentiated according to their functional context, which depends on whose interests are being taken into account when the standard is set and enforced. Public (mandatory) standards involve legal obligation of compliance and enforcement; they are based on a public law and set by the government. They take into consideration the interests of all actors in the economy. According to Okello and Swinton (2010), such standards present an advantage of being less costly compared to private ones. Further, public standards are usually established by governments to protect consumers and farm workers from the hazards of pesticides exposure and to restore consumer confidence by assuring a safe supply of food products and elimination of illegal practices. However, they have some weaknesses in that they are not strict and the enforcement is not well established. Also they may be source of trade disputes when they vary widely between countries since the resource availability as well as implementation of product standards differs across countries (Henson, 2006).

In Rwandan context, standards on food products are provided by RBS which is the only body with powers to approve and publish national standards. Small and Medium enterprises producing food products present their documents and products to RBS for adoption of their standards. Later, RBS conducts regular inspection of the enterprises to ensure implementation of these standards. In the case of

fruit salads, all the enterprises producing these products would be certified by RBS all over the country and this would enhance marketing in terms of assurance of fruit salads quality and safety.

Private (voluntary) standards are well established in developed countries and are increasingly being adopted in some middle income and low-income countries (Henson and Reardon, 2005). With private standards, compliance is not mandatory and there is no legally binding force. They focus on the profits and interests of firms, producers or private bodies and they reflect the interests of consumers (Jill, 2010). Although private standards are voluntary, they may become *de facto* mandatory for suppliers in the case where most markets adopt the standards as a requirement in order to participate effectively in the value chain (Henson and Reardon, 2005). They present advantages of being catalysts for upgrading food safety and quality level and enhancing market competition. Private standards also have potential to stimulate faster harmonization of standards, access to multiple supply chains and greater product differentiation. However, they present some weaknesses in that compliance costs might be high, and particularly in the case of developing countries (Henson, 2006). Therefore, they are seen as reducing the competitiveness of developing countries, marginalizing smallholders and decreasing their opportunities for livelihood developments. Both standards present advantages and weaknesses but their combination could be very beneficial to producers as well as to consumers. They complement each other and contribute to the value chain efficiency which can result in higher quality food products in national and global markets. In Rwanda, there are no private companies providing food products standards. However, private companies are likely to come up with international standards as they target regional and international market with high quality standards. In Rwanda fruit salads industry, these would improve on their value and enhance their marketing at national and international market.

2.3.2 Fruit salads standards

According to joint FAO/WHO report on food standard programmes codex alimentarius commission (1981), fruit salads are made by fruits which are peeled and cut into pieces. The report also presents standards and requirements for tropical fruit salads which include kinds and proportion of fruits to be used, packing media and quality criteria. Further, it presents standards on hygiene and labeling requirements. Fruit salads should contain basic and optional fruits because each fruit has its respective nutrients and vitamins. Basic fruits include at least three of the following fruits: pineapples, pawpaw, mango and bananas. It should also contain one or more optional fruits such as avocados, oranges, passion fruits, guava, melon, litchi, cashew, longan and grapefruit.

Table 1: Proportion of fruits used in making fruit salads

Basic fruits	**Minimum (%)**	**Maximum (%)**
Pineapples	45	65
Mangoes	25	50
Bananas	5	20
Pawpaw	25	50
Optional fruits		
Avocados	5	20
Citrus fruits (oranges, mandarins)	3	15

Source: FAO/WHO (1981)

According to FAO/WHO (1981), fruit salads may be packed with water or other suitable liquid packing medium and may be packed with nutritive sweeteners and processed by heat in an appropriate manner in order to prevent spoilage. The packing media includes water, water and fruit juice, fruit juice or with sugar. Additionally, fruit salads should have appealing colour, normal odour and flavor characteristic of the mixed fruits. Fruit salads meeting the above requirements should also be substantially free from defects that can cause any harm to consumers. The defects found should not exceed the limits presented in Table 2.

Table 2: Defects and allowances for fruit salads

Defects	Maximum limits
Blemishing fruit pieces (consisting of pieces of fruit with dark surface areas, spots penetrating the fruit, and other abnormalities)	2 pieces/100g of drained fruit
Peel (considered a defect only when occurring on those fruits which are peeled)	6.5cm/500g of total content
Seeds (other than Passion fruit seeds)	2g/500g of total content

Source: FAO/WHO (1981)

Concerning hygiene for fruit salads, they should be free from microorganisms such as parasites or any substance originating from microorganisms in amounts which may represent a hazard to health.

In addition, there are international guidelines in the form of Codex General Standard for the Labeling of Prepackaged Foods which are currently used in the food industry. The most recent guidance has been revised in 2010 (FAO/WHO, 2010). The labeling of fruit salads should follow the requirements of prepackaged foods where the following information should be declared; the name of the product, list of ingredients, net contents, name and address of the manufacturer, packer, distributor, importer, exporter or vendor, country of origin, lot identification and storage instructions.

2.3.3 Global regulations

Global regulations have been established since consumers are more consistent information about the food they eat and assurance that the processes used along the agri-food supply chain are adequately regulated (Jaffee and Henson, 2004). They involve agreement between several organizations such as the United Nations (UN), Food and Agriculture Organization (FAO), World Health Organization (WHO), the Codex Alimentarius Commission and the World Trade Organization (WTO) on food governance in formulating and enforcing rules regarding production, manufacturing, trade and distribution.

At national level, food safety regulations include public and private regulations where both interests overlap. According to Henson and Caswell (1999), regulation implies a mix of both public and private actors, such that when complying with legal obligations, private companies require the agreement with the government. Food safety is regarded as an issue of concern to governments as well as private companies because the government cannot leave health issues to private sector as it might concentrate on making profits than considering the wellbeing of people. According to Henson and Hooker (2001), firms that violate food safety regulations may be subject to a range of penalties, product recalls and temporary or permanent restrictions on their activities. For instance, Rwanda has experienced a temporary ban on exports in fresh produce to the EU market because of failure to comply with sanitary and phyto-sanitary standards (MINAGRI, 2012).

2.4 Review of existing knowledge on quality certification and origin labeling

From the literature, different approaches have been used to examine consumer's preferences for fruits quality. Poole and Martinez-Carrasco (2007), employing a second price Vickrey experimental auction method, tested consumer perceptions of fruits quality by evaluating consumers' willingness to pay (WTP) for citrus fruits. Juiciness, sweetness and acidity were the attributes most closely correlated with WTP under conditions of full information and evaluation of different varieties. However, their study excluded credence attributes of the products such as country of origin and quality certification. Hu *et al*., (2009) studied consumers' preferences and WTP for three nonconventional attributes associated with six processed blueberry products through a Choice Experiment (CE) survey in Kentucky. The results indicated that local and organic products received positive WTP across all products.

Many studies have been done on COOL in food products where different authors argued that consumers have right to know the origin of the products that they consume. Loureiro and Umberger (2003) and Sterns *et al*. (2004) found that consumers were willing to pay premium price for COOL. While Verbeke

and Ward (2003) found that consumers place little value to traceability and COOL attributes compared to attributes indicating quality and mandatory standard information. They reported that traceability and COOL have legal importance especially in the case of occurrence of food safety problems. In Rwanda, COOL is considered as a sign of quality because the imported food products are perceived to have higher quality standards than locally produced food products due to the high level of standards of the exporting country.

Loureiro and Umberger (2003) assessed consumer response and WTP for a mandatory COOL program, as well as steak and hamburger labeled as "US Certified beef". They found that respondents were concerned about origin and labeling issues, and were willing to pay a premium for the mandatory COOL program. However, the study shows gaps in knowledge in that it did not show the difference between consumer's preferences for public and private certified beef. Also, the study did not focus on consumer's perceptions towards different countries of origin labels. Sterns *et al*. (2004) analyzed through a Vickrey experimental auction consumers' preferences for COOL for fresh produce in US. The focus was on measuring the degree to which consumers are willing to pay for fresh produce with labeling and the factors that affect the WTP for a given country of origin. They found that consumers preferred products with COOL and were willing to pay a premium for them. The study focused on COOL for fresh produce only and did not take into account their quality assurance.

Menapace *et al*. (2008) investigated the impact of country of origin and geographical indication (GI) labels on consumers' preferences for olive oil. The study used Choice Experiment (CE) in assessing consumers' WTP for olive oil under COOL and GIs as well as oils with other credence attributes. They found that Canadian consumers value both COOL and GI labels but they were willing to pay more for COOL labels than for GI labels.

Lusk *et al*. (2006) stated that COOL is used in place of missing product information. Thus, if a consumer has imperfect information about the quality of the product, country of origin may become a

signal of quality. Additionally, consumers' knowledge with respect to the place of production may also reduce search costs. However, according to Loureiro and Umberger (2007), if country of origin is simply presented to consumers as a generic labeling program identifying the country in which the product is produced; it is not perceived as a signal of quality.

Following this controversy, there was a need to conduct an assessment on consumers' awareness and willingness to pay for origin labeling and quality assurance in fruit salads industry since some consumers prefer domestic products while others prefer the imported ones. From the literature, studies have focused on one aspect either fruits quality assurance or origin; the present study combined both aspects and possibly provides more information on consumers' fruit salads quality perceptions and preferences.

2.5 Review of non-market valuation methods

Non-market goods and services refer to those goods which are not directly bought and sold in the market place. The economic valuation of those goods which do not normally have prices on the market cannot be obtained from the market since those goods are not traded in a market. This was the case in this study where certified and labeled fruit salads are not yet on the market in Rwanda. The research on valuation of non-market goods and services has been developed into two branches: revealed preference (RP) and stated preference (SP) methods.

2.5.1 Revealed preference methods

The RP methods are used for assessing individual's WTP by examining the choice that he/she makes within a market. RP data are obtained from the past behavior of consumers and they reflect real choices observed in the market. They take into account various constraints on individual decisions, such as market imperfections, budgets and time (Louviere *et al.*, 2000). The most widely used RP methods are hedonic pricing and travel cost method. Hedonic Pricing method is used to assess WTP for a specific

attribute measured by comparing the market values of two or more products which only differ in respect to that specific attribute. The implicit price of that specific attribute is measured by comparing the premium price a buyer is willing to pay for a product with that extra attribute compared to the one without it. This method has been used in the property and environment market (Waltert and Schlapfer, 2010; Sue and Wong, 2010). It has also been used in agricultural and food sector (Faye *et al*., 2004; Mishili *et al*., 2007) in cowpea industry. This method is more appropriate where goods have market prices than in this case of hypothetical markets where labeled and certified fruit salads do not have market prices in Rwandan context, since they are not yet on the market.

The travel cost method is used in transport and environmental studies (Iamtrakul *et al*., 2005; Flemming and Cook, 2007). It is used to estimate the values of recreational sites by observing travelers behaviors such as the amount of time and expenses that reflect the economic valuation of that site. The implicit price is measured by the cost incurred to visit that site. This method is suited to the valuation of non-market public goods rather than hypothetical fruit salads.

2.5.2 Stated Preference Methods

SP methods have been developed for valuing non-market goods that have no related or surrogate markets where consumer preferences are elicited using hypothetical scenarios. It is a group of techniques which use individual respondents' statements about their preferences for a specific good or service and to elicit their WTP values. SP methods consist of hypothetical questions by asking respondents to indicate how much they are willing to pay (WTP) for a specific product/attribute or their minimum willingness to accept (WTA) as compensation in exchange for bearing a particular loss, depending on the relevant property right to the good or service (Carson *et al*., 2001). However, RP analysis tries to elicit individuals' WTP from observing their behaviors in real life. They use actual choices made by consumers in related market where the good or service is traded. In this study, fruit

salads are sold on the market but they do not have those specific attributes such as certification origin label. Therefore, SP method was used where consumers were presented with hypothetical fruit salads attributes including quality certification and origin labeling attributes and were asked to indicate their WTP for those attributes. The most widely used SP methods applied to the analysis of consumers' choice and WTP for products are contingent valuation method and choice modeling, which are discussed below.

2.5.2.1 Contingent valuation method

It is the SP technique employed in economic analysis where non-market goods or services are considered as a whole and are used for elicitation of their economic value. Contingent Valuation Method (CVM), consist of asking respondents to state their WTP (or accept compensation) for a specific change or improvement in one attribute using an open ended question. However, according to Haneman (1984), open-ended questions are too difficult to answer because respondents are not used to pay for non-market goods and services. CVM also has a risk in that respondents may have a preference for one alternative over another but fail to estimate the maximum WTP for that good (Hanley *et al*., 2001).

2.5.2.2 Choice Modelling

Choice modelling (CM) is an indirect method for WTP elicitation and it is based on the idea that a good is separable into its attributes or characteristics. CM is a multi-attribute approach, whereby respondents are asked to choose between more than two alternatives, where each alternative is described by multiple attributes. The CM involves a discrete choice experiment (CE), where respondents are asked to state the most preferred alternative from a set of options (Louviere, 2001). It was originally developed by Louviere and Hensher (1982) and Louviere and Woodworth (1983) in transport economics and marketing literature. CE is used in elicitation for consumer preferences of non-market goods or services that are not yet in the market and which cannot be evaluated using RP methods (Louviere *et al*., 2000).

Although, fruit salads are generally sold in Rwanda markets, but this study introduced those with new quality attributes including quality certification and origin labeling. Consumers were presented fruit salads with different attributes and they were choosing the most preferred ones and then show their WTP for those attributes. This modification is what lends the CE to be the appropriate analytical method.

CE has advantages over CVM in that it helps evaluation of multiple attributes; provides more information than CVM in that respondents can express their preferences for a valued good over a set of many other alternatives; and in CE, a status quo option is included in each choice set in order to allow flexibility to consumers when making their choices (Hanley *et al*., 2001). CE is flexible in that it gives many options to respondents; and it frames questions in a way closely similar to a true purchase situation which will lead to the valuation of attributes as well as situational changes. According to Hanley *et al*. (2001), CE helps respondents to make a clear choice between alternatives and provide more information. Additionally CE allows the researcher to estimate the extent to which individuals are prepared to trade-off attributes. This enables the estimation of implicit prices for attributes, which allows measurement of consumer welfare (compensating surplus) associated with changes/improvements in various packages of different products/services.

From the literature, CE method has been mostly applied in studies conducted in developed countries. It has been applied in many areas including environment area; it helps to evaluate different environment quality aspects (Adamowicz *et al*., 1998, Garrod and Willis, 1999, Hanley *et al*., 2001). It is also used in transportation where it helps to evaluate travel time and travel cost attributes (Caussade *et al.,* 2005). Some studies conducted in developing countries that used CE method include (Kassie *et al*., 2009, Otieno *et al*., 2010) in livestock program analysis. CE studies are useful in marketing area, where managers are in constant search of consumers' satisfaction to guide their promotion and selling strategies. In this study, CE is important for improved marketing for fruit salads in Rwanda.

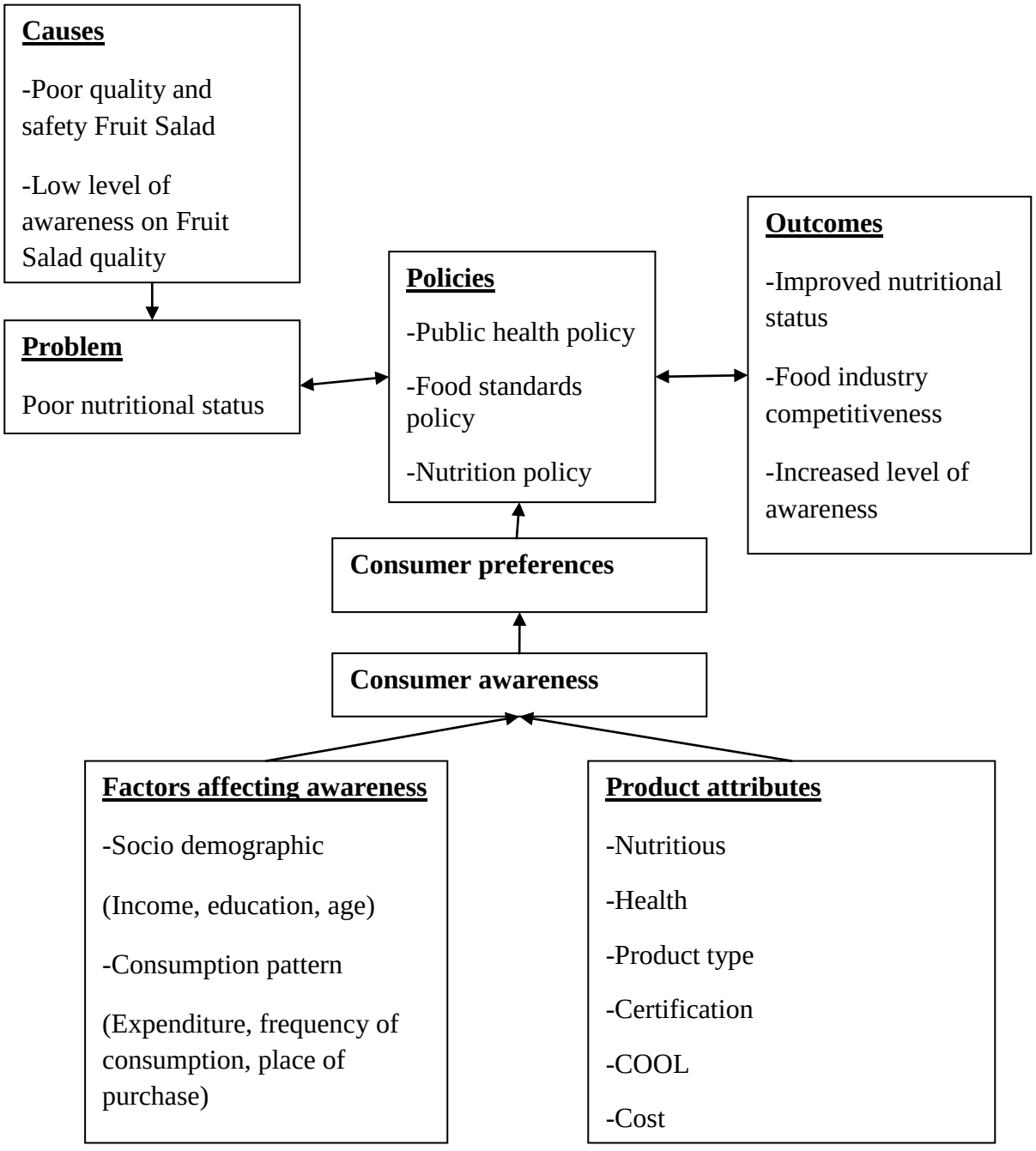
CHAPTER THREE

3.0 METHODOLOGY

3.1 Conceptual framework

Consumer awareness is the understanding and knowledge that a buyer should have of their right as a customer about the product. As shown in figure 4, the causes of poor nutritional status in the country are many and they include the low level of awareness in food products, non developed fruit salads industry and their poor quality. These problems can be handled by assessing consumer awareness and preferences for fruit salads quality. From the literature, (Basarir and Sherif (2012), Rezai *et al*. (2012)), consumers' awareness on food quality is influenced by many factors including those linked to individual's own social and demographic characteristics (age, income, education) and others linked to consumer's consumption patterns (place of purchase, consumption frequency). In addition to that, available information on fruit salad attributes including certification and origin labeling increase consumer awareness and motivates their preferences. When consumers are aware on food product quality, they have complete information and they can make informed choices; therefore, it is possible for a researcher to determine their preferences. Consumer's preferences can be determined through their WTP which is measured through the utility the individual gets from product's attributes. If consumers do not derive any utility from the good, there will not be any interest in that good therefore resulting in zero WTP. The economic valuation of those attributes provide information on most preferred product's attributes and they address different policies including nutrition and public health policy to enhance fruit salad quality. Those policies will help in improving nutritional status through consumption of safe fruit salad and lead to increased level of awareness on fruit salad quality among consumers through consumer's education. They will also lead to fruit salads industry competitiveness at regional and international market.

Figure 4: Conceptual framework for consumers' awareness and preferences in fruit salads



Source**:** Author's conceptualization

3.2 Data types and sampling procedure

3.2.1 Data types

Data used in this study were primary data collected from focus group discussions (FGDs) and the survey. This includes information on fruit salads purchase and consumption behavior, consumers' awareness and perceptions on fruit salads quality including factors likely to influence awareness on origin for fruit salads. Data collected included also consumers' preferences for fruit salads quality determined by the amount of money consumers are willing to pay for different fruit salads attributes as well as they socio-demographic characteristics.

3.2.2 Sampling procedure

The targeted population in this study was fruit salad consumers in Kigali City, Rwanda. Purposive sampling technique was used; it involves the selection of individuals based on assumptions regarding the population of interest, which forms the criteria for selection (Cochran, 1977). Hence, in this study population of interest comprises fruit salads consumers, they were chosen and interviewed because they were buying fruit salads at different places of purchase or they were being served fruit salads at their work places. Data were collected using two stages: in the first stage data were collected at different places of purchase while in the second stage data were collected at different places of work. Places of purchase were purposively selected with respect to their geographical distributions. A large number of consumers were selected from restaurants and supermarkets because they are the potential sellers of fruit salads in the city and few from hotels and open markets. Two hotels, four supermarkets, twelve restaurants and two open markets were selected in Kigali city (200 consumers from Restaurants were interviewed, 60 consumers from supermarkets, 20 consumers in the hotels, and 20 consumers from open markets). Systematic random sampling which consists of selecting sample units at uniform intervals was used; in this study it involved choosing individual consumer in each class where every third consumer

was interviewed. Those places were selected since they were the ones where fruit salads were available and the owners granted permission to conduct research. In the second stage, small enterprises agents which make fruit salads were used since they have regular customers where they distribute fruit salads every day. The enumerators interviewed every third customer who was being served the fruit salad. In this stage, 60 consumers from four different places of work were interviewed. The total sample size was 360.

3.3 Data collection methods

3.3.1 Definition of Attributes and Levels

From the literature (Menapace *et al*., 2008, Wang *et al*., 2010), consumers evaluate product quality according to its characteristics or attributes; those are indicators that can help to characterize it. This study categorized fruit salads quality attributes into compulsory and optional attributes. The compulsory (mandatory) quality attributes are those which involve legal practices and an inspection process conducted by governmental authorities or other private agencies to ensure a product's wholesomeness, safety and adherence to regulations as well as mitigating information asymmetry or imperfect information. They are established for public support to enhance and ensure food safety and quality as well as to increase consumers' confidence in product characteristics. In the fruit salads industry, they include the kind (basic and optional fruits) and proportion of fruits used, quality criteria such as colour, flavor and odour of fruits used. In addition to this, they should be free from objectionable matter with minimum defects and follow the requirements of the Codex General Standards for the Labeling of Prepackaged Foods (FAO/WHO, 2010). The optional or voluntary quality attributes are those which are not mandatory where people can decide to choose them depending on their tastes and preferences. In case of fruit salads, people may choose from fruits used, the way they are packed and their price. This study included the most important attributes related to research objectives, relevant to policy and easy to

understand by consumers. Ruto and Garrod (2009) suggested that, attributes chosen must be relevant to the requirements of the policy makers and under their control for influencing or improving the conditions of the targeted population. In this study attributes chosen inform different policy makers like nutrition policy, public health policy, and trade policy in order to enhance healthy and safe fruit salads with high quality standards in regional and international markets.

Table 3: Fruit salad attributes and their levels

Attribute	**Description**	**Attribute levels**
Type of fruits	Organic or conventional	Organic Conventional
Fruit Mixture	Combination of fruits: (selected fruits are combined into groups according to their content in vitamins)	Fruits rich in Vit. A and fruits rich in Vit. C Fruits rich in Vit. C and fruits rich in Fats Mixture of fruits rich in Vit. A, Vit. C and fats
Vendor's health	Regular inspection to ascertain vendor's personal health and hygiene	Yes No
Certification	Which institution should do safety inspection and certification?	Public agency Private agency Public and private agency
Origin	Show place of production	Domestic Imported
Price	Different prices according to the fruit mixture	1000 1300 1500 (Rwf)

The first attribute was type of fruits and attribute levels chosen are organic and conventional. Organic products are those products produced with emphasize on limited use of artificial chemicals. The basic rules of organic production are that natural inputs are approved and synthetic inputs are prohibited. (FAO, 1999). Conventional products are those produced with non controlled use of chemical pesticides and inorganic fertilizers. The positive sign was expected for organic products since they are natural and perceived by consumers to be safer than conventional products. In addition earlier works reported positive WTP for organic products (Alphonce and Alfnes (2012) in Tanzania, Owusu and Anifori (2013) in Ghana. The second attribute considered is the fruit mixture which is an important attribute that influence consumers' purchase decisions. The attribute levels have been chosen according to the nutritional content (vitamins and fats) in fruits under consideration. It informs nutritionists who are encouraging consumption of foods rich in different vitamins or fortified products with vitamins. Vendor's health is also another attribute chosen since food products need to be sold in a convenient place and by healthy individuals with regular medical inspection. This gives useful information to public health policy makers since in Rwanda Ministry of Health is promoting safe and clean places of purchase of food products. Therefore, a positive sign was expected for vendor's health regular inspection.

Certification is another attribute chosen whereby fruit salads would be inspected and certified to ensure that it is produced in compliance with food safety standards. Certified food products are likely to lower pesticides and they are safe to consume. Certification can be done by public/private agency or combination of both. Public agency presents the advantage of being less costly and takes into consideration the interests of all actors in the economy (Okello and Swinton, 2010). From the literature, Alphonse and Alfnes (2012) reported a positive sign for public certification where consumers were willing to pay for tomatoes produced under stricter food regulations inspected by health officials to meet the standards set by Tanzania Bureau of Standards. In this study also the positive sign was expected

since RBS is enhancing certification for food products in the country. Private agency present advantages of being strict with clear enforcement compared to the public ones, but the compliance costs are high. Wang *et al*. (2010) in USA reported that consumers who had already purchased organic food were willing to pay premium for private certification agency; those consumers had also higher education and income levels. Therefore, in this study the positive sign was also expected since fruit salads consumers interviewed were more educated with higher income levels compared to the rest of the country (NISR, 2012). A combination of both standards also presents an advantage, both standards are complementary and reinforce each other and tend to be less expensive than private standards. Earlier study (Xu and Wu, 2010) reported that consumers in China were willing to pay for food products certified by private agency but with the intervention of the government. The reason was that certifiable food price was not affordable to consumers and there was a need for government funding support. In this study, the positive sign was expected since consumers always prefer cheaper products and trust more private agencies with government intervention (subsidies) especially in food sector. Fruits consumed in Rwanda are produced within the country (domestic products) or outside the country (imported). The positive sign was expected for those who prefer local products; earlier studies conducted by James *et al*. (2009), Alphonce and Alfnes (2012) in Tanzania, showed that consumers often attach additional values to locally produced food. This is because home produced products are considered to be safe and trusted by consumers. COOL might be helpful to trade policy in that it may improve quality standards for domestic products. It also improves international trade in terms of traceability and trust for imported products.

Price/monetary attribute influences consumers' purchase decisions and this enables measurement of economic trade-offs between choice attributes (Hanemann, 1984). Three levels of price were used to represent the range of options that consumers might realistically face. The first level represented the actual price of fruit salad on the market, the second level represented the mixture of two categories of

fruits and the third one represented a combination of all categories which are hypothetical fruit salads (with different quality attributes). The second level was computed as a percentage of the actual price (30%) and the third level was also computed at 50% of the actual price which is the highest price for fruit salads on market in most places of purchase. The study could not use the higher prices compared to existing ones because consumers may not be willing to pay for those expensive fruit salads. A negative sign was expected for consumers' WTP for fruit salad quality, as prices fruit salads increase, consumers will not be willing to pay for them. This is based on consumer theory, as product price increases consumers are less likely to buy that product and vice-versa.

3.3.2 Focus group discussion

Focus group discussions (FGDs) were conducted in the study area, Kigali City before the final survey. The purpose of focus group discussion was to get more information on places of purchase and the way fruit salads are normally prepared and sold in Kigali. In addition, it was to obtain insight on knowledge of fruit salad quality and safety issues and to understand the fruit salad consumers' way of thinking. Participants in the FGDs were involved fruit salad consumers, personnel in Rwanda Organic Agriculture Movement (ROAM), personnel from horticulture sector in Rwanda Development Board (RDB) and from Ministry of Agriculture and Animal Resources (MINAGRI), as well as personnel in Agriculture Production Standards from Rwanda Bureau of Standards (RBS) and a group of trained enumerators. Two groups were formed and they ranged in size of 11 to 12 participants and were conducted by the researcher and a team of enumerators. Groups were composed of two individuals involved in horticulture sector, two enumerators and eight fruit salad consumers. These groups were formed with the aim of identifying different views from experts, perceptions and problems of consumers with respect to fruit salads quality in order to understand the issues related to fruit salad industry in Rwanda. The researcher was the moderator and first explained the research purpose and objectives; and for the role of

facilitator, two participants were chosen to guide others and two other ones were chosen to write the discussions. A checklist of discussion questions was given to the participants. The results got from FGD were used to determine the relevance and understanding of fruit salad attributes and their levels. Results were also used to refine the valuation scenario of the final survey

3.3.3 Experimental design

Generating experimental design for stated choice studies result into the efficient allocation of attribute levels to the design matrix (Choice metrics, 2009). The number of choice tasks each consumer is asked to undertake depends on the total number of choice situations drawn from the experimental design. NGENE software was used in generating experimental design where three steps were used. In the first step, a complete model specification with all parameters to be estimated was determined; it involved all alternatives and attributes to be included for each alternative. The second step, hypothetical choice situations consumers faced with in the stated CE was generated. It consists of a table of numbers in which each row represents a choice situation; the numbers in the table correspond to the attribute levels for each attribute and are placed by their actual attribute levels. The coding scheme was used with (0,1) for an attribute with two levels and (0,1,2) for the one with three levels. After experimental design was generated, the questionnaire was constructed and the table of numbers generated was transformed as to be meaningful to the consumers.

3.3.4 Aspects in the design of Choice Experiment

1. Orthogonality

It is the most applied type of design in discrete choices which minimizes correlation between attribute levels across the choice sets (Rose and Bliemer, 2009). In this study, it was generated using NGENE software and resulted into 36 rows/choice; situations; however, those choices were too large to one

respondent. The blocking procedure was used in order to divide the orthogonal design into smaller designs where 36 choice situations were blocked into 6 blocks/profiles, such that each consumer had to face 6 choice situations instead of 36 choices. The orthogonal design was applied in a pre-test survey on 42 consumers; hence the data were analyzed and gave prior coefficients that were used to generate the efficient design for final survey.

2. Efficient design

A design is efficient when all the parameter estimates have the smallest standard errors and higher asymptotic t-ratios for each of the parameters. The most efficient design gives better estimates of the path worth utilities, which lead to better estimates of the product utility and market share (Kuhfeld *et al*., 1994). In this study, NGENE software was used to generate the efficient design; however it generated 24 rows/choice situations which were too large to one respondent. The blocking procedure was also used which resulted into 6 blocks/profiles and each consumer had to face 4 choice situations instead of 24 choices. This design has been applied in different areas including food products area (Loureiro and Umberger, 2007), in livestock program (Kassie *et al*., 2009).

There are other criteria considered in generation of experimental design which include level balance, minimum overlap and utility balance. Level balance means that attribute levels must appear in equal number of times for each attribute in the efficient design. According to Huber and Zwerina (1996), attribute level balance ensures that the parameters can be estimated well on the whole range of levels, instead of having data points at only one or few of the attribute levels. Minimum overlap minimizes the number of times each level appears in a choice set, means it should be repeated as small as possible. As suggested by Huber and Zwerina (1996), a minimum number of times each level must appear is imposed, thus not allowing for tests of non-linearity in preference. Utility balance, it suggests rules that

minimize the variance of estimates in an optional manner; it ensures that no choices set contains either a dominant alternatives that every rational person would want or a poor alternative that no one would want.

3. Choice experiment design dimensions

CE design generation depends on the number of attributes and levels that have been chosen for the study. According to Xu *et al*. (2004), it is possible to use those already generated in previous studies but in this study, CE design was generated using NGENE software (Choice metrics, 2009). CE design included different choice alternatives, different attributes and levels for each attribute and the number of choice situations presented to each consumer. According to Caussade *et al*. (2005), the CE design should also include not more than nine or ten choice situations. The optimal CE design dimension should include up to six attributes, two to four attributes levels and should include 3 to 5 alternatives. In this study, the efficient design generated had a D-efficiency measure of 86%, which shows a measure of statistical goodness and give information on design content. The higher the D-efficiency, the more the design is efficient. Additionally, the utility balance (B-estimate) was of 86%, meaning absence of dominant alternatives in the choice situation. It is expressed in percentage and an efficient design should have degree of utility balance in the range of 70-90 % (Choice metrics, 2009). A error of 0.24 and S estimate of 740744.85 were also found. A-error is a measure of efficiency, which is expected to result in a design with minimum variances but does not take into account covariances (Scarpa and Rose, 2008). The lower the A-error, the more efficient is the design. The efficient design for fruit salad had 24 rows (24 paired choices/profiles) which were blocked into 6 blocks (profiles); thus one profile had four scenarios. In this study, consumers were randomly given one of the six profile and they were presented with two choice alternatives and asked which alternative they prefer. In the CE procedure, fruit salads consumers were given the opportunity to select between two alternatives of fruit salad; Fruit Salad Type

A and Fruit Salad Type B carrying different prices and different level attributes. In each CE question, a neither option was included to allow flexibility when choosing preferred alternative. This option allowed consumer to choose it in case he/she did not choose any one of the two alternatives given in one scenario (Table 4). During the interviews with the consumers, in the CE section of the questionnaire, they were asked to consider and compare all attributes within one alternative before they make a choice and they were also asked to treat each alternative independently.

Table 4: Example of one of the choice sets used in the CE survey

Suppose that you want to buy a fruit salad and then you go to a place where they sell them. Those fruit salads are labeled and present information on six attributes; type of fruits, fruit mixture, vendor's health, certification, origin labeling and price. One is required to choose the best combination of voluntary features/attributes that should be considered for improving fruit salads quality.

PROFILE ONE

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Domestic	Imported	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public	Public and Private	
Origin labeling	Imported	Domestic	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1000	1500	
Which ONE would you prefer?			

3.3.5 Choice experiment survey

In CE section, fruit salad consumers were presented sets of alternative fruit salads, with brief explanations for each fruit salad attribute and asked them to indicate which option they would prefer. Each fruit salad alternative was defined by a full set of attributes including type of fruit, fruit mixture, vendor's health, certification, origin labeling and price. In this CE section, trained enumerators explained to consumers the importance of fruit salad, compulsory attributes and optional attributes, and the reason they have been chosen as well as their policy implications. This was done to help consumers to understand CE options and enable them to make informed and independent choices which would effectively reflect their preferences. After the choice experiment tasks, consumers were provided an open-ended question which asked them whether they were sure about choices made the specific attributes that they were looking for or the ignored attributes and they were also asked whether there was another factor which influenced them when they were making choices. These questions were included to enable a validation of the choice experiment's results and to elicit the preferences which

influence fruit salad consumers purchasing decisions. The complete list of the profiles/blocks of the choice sets used in this survey is presented in Appendix 4.

3.3.6 Data collection

Primary data were collected through a consumer survey conducted through personal face-to-face interviews using semi-structured questionnaires. The face-to-face interview was used in this study because it offered direct interactions with the consumers and provided opportunity to give more clarifications to the respondents as well as to explain more on choice situations. In addition to that, it was preferred to other methods such as telephone interview or mail survey since in the study area some of consumers interviewed did not have telephones and access to internet. Participants were screened for inclusion in the study based on two questions: whether they (1) consume fruit salad and (2) and they are the main shopper of fruit salad that they consume. Only those who answered positively to both questions qualified for the study. The study was undertaken over a two week period from July. Interviews took place between 10:00 a.m. and 5:00 p.m., Monday to Friday and between 9:00 a.m. and 6:00 p.m. on Saturday because in most places fruit salads were not consumed early in the morning and it was easier to get the respondents from their places of purchase. Each questionnaire took an average of one hour to administer. Five enumerators explained the purpose and nature of the study briefly to the respondent 15 years and older who buys and consume fruit salads, and their permission to participate was sought. Those enumerators were trained on how to conduct a CE survey, by explaining consumers how to make choices without influencing them. The questionnaire included four sections: section one included questions regarding consumers' purchasing patterns and consumption behaviors when purchasing fruit salads. Section two included consumers' awareness and perceptions on fruit salads quality and safety; this section presented questions on awareness on quality certification and origin labeling in fruit salads and questions on consumers' perceptions of fruit salads quality. Section three included CE in which fruit

salad consumers were presented sets of alternative fruit salads descriptions, with brief explanations for each fruit salad attribute and asked consumers to indicate which option they would prefer. Section four included questions regarding consumers' demographic characteristics; those characteristics were used to evaluate the individual-specific factors influencing awareness on country of origin in fruit salads.

3.4 Data analysis

This study used a binary logit model. This model was suitable because the dependent variable was binary, consumer was either aware or not of origin labeling for fruit salads consumed.

$$U_i = \beta'_i x + \varepsilon_i \quad (1)$$

The random utility theory is based on assumption which stipulates that for a rational consumer to make choice between two alternatives, s/he will choose an alternative in which s/he derives the highest utility. When the consumer chooses alternative one (U_1) compared to alternative two (U_2), it implies that:

$$U_1 = \beta'_1 x + \varepsilon_1 > U2 = \beta'_2 x + \varepsilon_2 \quad (2)$$

Therefore, the binary logit model is a random utility model in which it is assumed that the random parts of the utility functions are distributed as independent extreme values. This can therefore be specified as follows:

$$Prob\ (Y_i = 1) = \frac{\exp[(\beta')X_i)}{1 + \exp(\beta' X_i)} \quad (3)$$

Where X' is a vector of explanatory (independent) variables hypothesized to influence the awareness of origin in fruit salads, β' is a vector of parameters to be estimated and ε is the random error term.

3.4.1 Analysis of consumers' awareness of origin labeling in fruits salads

Table 5: Description of hypothesized factors influencing awareness on origin labelling in fruit salads

Based on the literature, the study hypothesized seven variables to be included in the binary logit model. These variables have been chosen since they have been found influencing consumers' awareness on food quality in similar research findings.

VARIABLE	DESCRIPTION	EXPECTED SIGN
Residential area	1=High residential area 0=Otherwise (medium and low)	+
Place of purchase	1=Supermarkets 0=otherwise (Hotel/Restaurant, Open market)	+
Consumption frequency	1=Daily 0=Otherwise (Occasionally)	+
Reading labels	1=Yes 0=No	+
Infant members	1=Yes 0=No	+
Education	Number of years of formal schooling of the consumer	+
Income	Monthly income of the consumer in Rwandan Francs (Rwf)	+

Source: Author's survey (2013)

From the literature, income has been found to positively influence awareness on COOL; those who are wealthier are likely to be aware and selective of the food products they consume (Kimenju *et al*., 2005). This may be linked to their higher level of education and more exposure to information. People with

higher income are very concerned with the products and their quality when deciding to buy but those with low income prefer products with low prices. The literature also shows that education had a positive impact on awareness on COOL. Those who are educated are more interested in the origin of their food products and they are likely to read labels displayed on those products for safety reasons. According to Basarir and Sherif (2012) they are more appreciative of positive benefits brought by new products on the markets. In Rwanda, food products sold in supermarkets are labeled and consumers in such places are likely to read labels before they make purchasing decisions. In addition, those who stay in high residential areas are also likely to be more aware of COOL; they are more exposed to various sources of information and possible health problems that may occur from the origin of the product (Ishak and Zabil, 2012).

Presence of infant members has been hypothesized to positively influence awareness on COOL; it increases the likelihood of knowing the origin of food products since the parents are more concerned about food quality and related problems to take care of their children's lives (Gao *et al*., 2011). Females, who are the main shoppers in most households, are also likely to know the origin of food products they purchase. Frequency of consumption has been hypothesized to positively influence awareness on COOL, those who consume fruit salads on a daily basis are more concerned and trust those products they consume and they are likely to know their origin (Barrena and Sanchez, 2010). In this study, the binomial logit model was used in assessing the influence of socio-demographic factors on consumers' awareness on COOL in fruit salads. Explanatory variables used are dummy-coded except education and income which are continuous. The dependent variable is a binary outcome Y_i indicating whether a consumer is aware or not on country of origin of fruit salads. It was specified as $Y_i=1$ where consumer is aware and $Y_i=0$ where consumer in not aware. Binary choices are modelled in terms of probability

distributions defined over the set of outcomes and they can be determined in random utility approach. Therefore, the binomial logit model was empirically estimated as:

$$Pr\ (Yi=1) = \beta_i x+\varepsilon_i \quad (4)$$

Where Yi=1 is the probability of being aware of origin labelling for fruit salads as a signal of quality safety by the i^{th} fruit salad consumer (1= consumer aware, 0= otherwise), βs represents the vector of parameters to be estimated, Xs represent factors such as residential area, place of purchase, consumption frequency, reading labels, infant members, income and education level, which are hypothesized to influence consumer awareness on origin labelling in fruit salads. The ε is the statistical error term.

The functional form is specified as:

$$Y_{i=}\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (5)$$

Further, marginal effects were estimated to measure the effects of variations of the independent variables on the predicted probability of being aware of origin labelling in fruit salad, with all other independent variables being held constant. The binomial logit and the marginal effects were estimated using NLOGIT version 4.0 software (Greene, 2002).

3.4.2 Analysis of CE data

The CE method is based on Lancaster's theory of consumer choice (Lancaster, 1966) which postulates that consumers derive the utility from attributes/characteristics of the good rather than the good itself. The good is not considered as a whole, but it is preferred for its bundle of characteristics. The theoretical foundation of CE is based on random utility theory, which is the probabilistic choice theory and describe discrete choices in utility maximizing framework (McFadden, 1974). It helps in the estimation of economic value of discrete choices. Consumers' WTP for fruit salads in this study was analyzed using

Multinomial Logit model (MNL), which relies on random utility theory (Mcfadden's, 1974). The utility obtained by consumer i from alternative j in choice situation J is expressed as (Revelt and Train, 1998):

$$U_i = \beta_i X_i + \varepsilon_i \quad (6)$$

X_{ij} represents the observed variables relating to the alternative and the decision maker i, β_i is a vector of coefficients of variables for respondent n representing his/her choices. ε_{ij} a random term that is *iid* (Independent and Identically Distributed) extreme value. In that process of utility maximization, the consumer chooses an alternative that yields the highest utility. If the i^{th} consumer (decision maker i) selects type j, then utility which derives from that choice U_{ij} is the highest utility among all J possible options or choices. Selection of one option over another implies that the utility U_{ij} is greater than the utility derived from U_{ia}. The probability that alternative j is chosen by consumer i is given by:

$$Prob_{ij} = Prob\left(U_{ij} + \varepsilon_{ij}\right) > Prob\left(U_{ia} + \varepsilon_{ia}\right), \forall j \neq a \quad (7)$$

Where J is the choice set. The researcher only observes X_{ij} but cannot observe β_{ij} or ε_{ij}.

MNL assumes that the residuals are independently and identically distributed following a Type I Extreme Value distribution and it follows that the difference in error terms has a logistic distribution (Maddala, 2000). Therefore, the probability that consumer i choose alternative j conditional on β_i is given by the Multinomial Logit Model (MNL) as follows (McFadden, 1974):

$$L_{ij}(\beta_i) = \frac{\exp\left(\beta_i X_{ij}\right)}{\sum_{j \in J} \exp\left(\beta_i X_{ia}\right)} \quad (8)$$

where β refers to parameters that weight independent variables in determining the utility; and Xij is a row vector of independent variable values corresponding to the socio-demographics characteristics, of the i^{th} consumer. However the MNL framework imposes homogenous preferences across respondents

(Hausman and McFadden, 1984), by assuming that the individual tastes β_i do not vary over choice situations. Despite this limitation, the study did not use Random Parameter Logit model which allows heterogeneity in preferences since data collected could not fit in the model. The conditional logit model gives the general idea of the effects of the attributes and their levels on product choice. In this study, as one of the fruit salad attributes represent the price, the consumers' marginal WTP or 'part worth' for a specific attribute of the choice options was computed as (Hanemann, 1984):

$$WTP = -\frac{\beta_k}{\beta_p} \quad (9)$$

Where β_k is the estimated coefficient for an attribute level in the choice set J and β_p is the marginal utility of income given by the coefficient of the price attribute. This ratio also referred to as marginal implicit prices can be interpreted as a marginal rate of substitution (MRS) between fruit salad attribute and money. It provides a measure of the relative importance that respondents attach to attributes within the CE design.

Table 6: Description of variables used in the choice experiment analysis

VARIABLE	DESCRIPTION
ORGANIC	Organic fruit salads (1=Yes, 0=Otherwise)
VITCFATS	Fruit salads rich in Vit.C and Fats (1=Yes, 0=otherwise)
VITACFATS	Fruit salads rich in Vit.A, Vit.C and Fats (1=Yes, 0=otherwise)
YES	Vendor's health (1=Yes, 0=otherwise)
PRIVATE	Private Certification (1=Yes, 0=Otherwise)
PUBPRIVATE	Public and Private Certification (1=Yes, 0=Otherwise)
IMPORTED	Imported fruit salads (1=Yes, 0=Otherwise)
PRICE	Fruit salad prices (1000, 1300, 1500 Rwf)

Source: Author's survey (2013)

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter includes three sections: the first section provides characterization of fruit salads consumption in Rwanda; the second section presents consumers' awareness on quality certification and origin labelling. This section also includes factors influencing awareness on country of origin in fruit salads. The third section presents consumers' preferences for fruit salads attributes.

4.1 Characterization of fruit salads consumption in Rwanda

4.1.1 Socio-Demographic characteristics of fruit salads consumers in Kigali, Rwanda

Table 7 summarizes the socio-demographic characteristics of fruit salad consumers. The consumers interviewed were in the range of (20-65) years and the overall mean age was 31. This overall mean age could be explained by the age structure of Rwandan population where 55% of the total population is between (15-64) years with the life expectancy at birth of 59 years for the total population (CIA, 2013). It is in line with national statistics where majority of Rwandan population is below 65 years of age (NISR, 2012). This population is comprised of young people who are the potential consumers of fruit salads in Kigali City and this might encourage investment in this industry.

About a half of consumers interviewed were female and slightly more than half were single while a third were married and the rest were widowed, divorced or separated. This implies that single people should be targeted consumers as they prefer already made and fast foods like fruit salads than married people. From this study, about 29% reside in high residential areas while others reside in either medium or low residential area. As evidenced by the study findings, fruit salads are consumed by different categories of people and this provides the opportunity of their market expansion in the country.

Table 7: Consumers' socio-demographic characteristics and consumption patterns

Characteristic	N(360)	Mean (Std. Error)	Min	Max	Proportion
SOCIO-DEMOGRAPHIC					
Age		31 (6.17)	20	65	-
Education		14 (3.05)	5	21	-
Income		251000 (190665.54)	25000	1500000	-
Gender		0.49 (0.50)	0	1	49% males
Marital status		0.34 (0.47)	0	1	34% married
Infant members		0.38 (0.48)	0	1	38%
Residential area		0.29 (0.45)	0	1	29% high residarea
PURCHASING PATTERNS					
Fruit salad price		1000 (455.44)	400	2000	-
Consumption frequency		0.13 (0.33)	0	1	13% daily
Place of purchase		0.47 (0.5)	0	1	47% supermarket

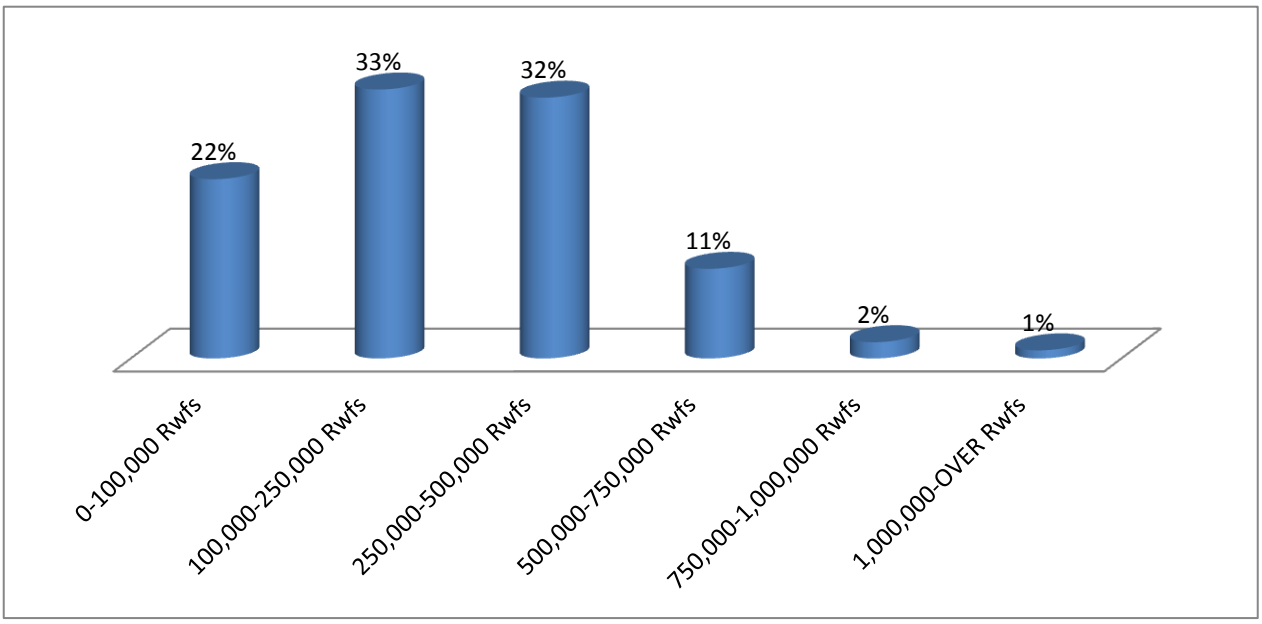
Source: Author's survey, 2013

According to Rwanda Demographic Health Survey (RDHS) report, Kigali City residents have the highest level of education than the rest of the country and had more formal education which is an implication of high consumption of fruit salads than in any other area of the country. According to CIA (2013), about 71% of the total population in Rwanda of age 15 and above can read and write. The data on level of education in Kigali showed that the overall mean years of schooling was 14years, with the minimum of 5 years and the maximum of 21 years. The education level was classified into four categories; about 5% had primary school, 28% had secondary school, 10% had certificate, 13% had diploma, 39% had the first degree and 6% had Masters or Doctor of Philosophy (PhD). This could be an opportunity for investments in fruit salads industry in Kigali city, since more educated consumers are likely to be more informed on fruit salads quality standards. Moreover, they are aware of nutrition content and concerned with labeled and certified fruit salads.

The levels of income in Rwanda show high inequality as many SSA countries. This inequality is shown by Gini coefficient which measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. It ranges from 0 to 1, thus 0 represents perfect equality and 1 represents perfect inequality.

The international average level is 0.44 and most SSA countries are above the average level. Rwanda shows the highest inequality in East African countries with Gini coefficient of 0.51 followed by Kenya 0.47, Uganda 0.44 and Tanzania 0.36 (World Bank, 2013). The results from this study show that the majority (88%) get a monthly income below Rwf500,000 (USD769) and 12% get an income between 500,000 and 1 million while only 0.6% get monthly income above 1 million Rwandan francs (USD1500).

Figure 5: Income distribution of the sampled fruit salads consumers



Source: Author's survey (2013)

According to National Institute of Statistics (NISR, 2012), the poverty line in Rwanda is set at Rwf118,000 (USD 181.5) per adult equivalent per year. The poverty line was set with a reference to a minimum food consumption basket, which was judged to offer the required number of calories for a Rwandan who was likely to be involved in physically demanding work. Individuals below this line are considered as poor. In this study, three quarters of consumers were above that line of poverty which shows opportunity in fruit salads investments in Kigali city since the residents can afford them.

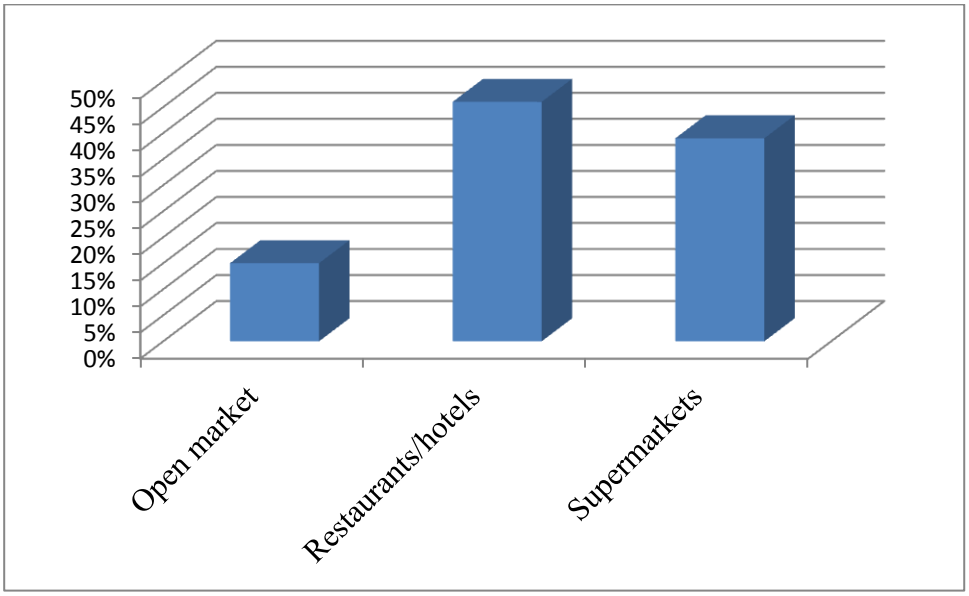
4.1.2 Fruit salads purchasing behaviors in Rwanda

Fruit salads are important in a healthy diet composition; they provide great amounts of micronutrients, fibers and bioactive components with functional properties (WHO, 2003). According to the World Cancer Research Fund/American Institute of Cancer Research (WCRF/AICR) recommended fruit consumption of 400g daily to protect against cancer (WCRF/AICR, 2007). Fruit salad which is a mixture of different fruits; it is nutritious since different fruits provide different vitamins and minerals

such as Vitamin A, Vitamin C and many others. The study targeted different points of sales in order to get different views of all categories of consumers since they had differences in socio-demographic characteristics that may influence awareness on fruit salads quality and their WTP.

Fresh fruit salads in Rwanda are sold in different places such as supermarkets, restaurants, hotels and open markets; they are prepared and packaged within the country, there are no imported fruit salads and the country does not export those products. Respondents in the middle income group were targeted in open markets and restaurants while those in the upper group were more likely to use supermarkets and hotels. The study results show that most of fruit salads are sold in restaurants and hotels followed by supermarkets. These places are believed to be safe and clean since they follow food hygiene standards established by public food authorities and Rwanda Ministry of Health. It is important to investors because it provides clear rules that govern and could facilitate the development of fruit salad market.

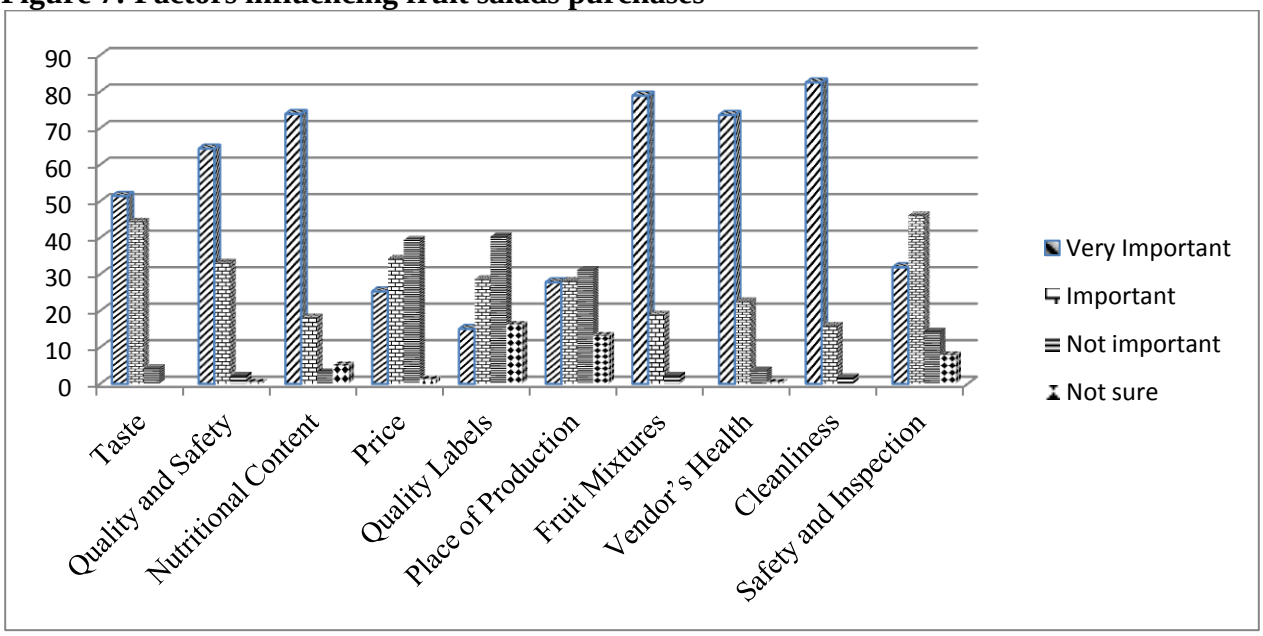
Figure 6: Place of purchase of fruit salads in Rwanda



Source: Author's survey (2013)

The survey included several variables to assess the importance of various characteristics on fruit salads choice. This section was included to provide market information to retailers and other agents in fruit salads industry. Results in Figure 7 show that cleanliness of point of sale, fruit mixture, nutritional content, vendor's health and hygiene and fruit salads quality and safety are the most important factors considered in fruit salad purchasing decision.

Figure 7: Factors influencing fruit salads purchases



Source: Author's survey (2013)

These findings are consistent with those of Lusk and Briggeman (2009) who found that food safety and nutritional content are the most important food value because of health consciousness. However, these results are in contrast with findings for Kasapila and Shawa (2001) in Malawi who reported that price was a major determinant of food products purchase. This could be explained by differences in attitudes between higher and lower income consumers in terms of perceived options available. In this study therefore, majority of the fruit salads consumers were higher income earners since the majority (76%)

are above the line of poverty according to NISR (2012). This could be the reason why price was not the first factor considered when purchasing fruit salads.

Fruit salads consumers were given list of fruits available on Rwandan markets and were asked to choose the fruit mixture that they prefer. Those fruits were grouped into three categories; fruits rich in vitamin A such as bananas, mangoes, pawpaw and fruits rich in vitamin C such as apples, oranges, pineapples and watermelon. Avocados were in group of fruits rich in fats.

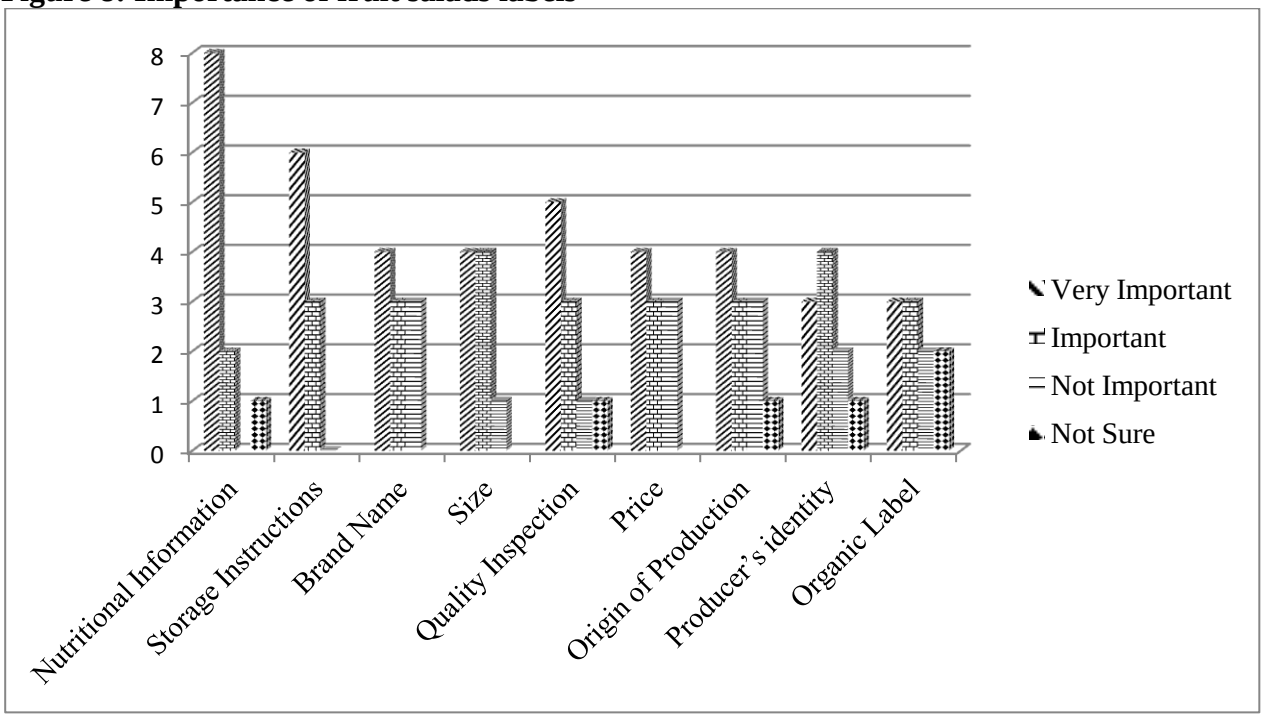
The preferences on fruit mixture were that the majority (81%) reported that they prefer fruit salads rich in Vitamins A, C and fats, 12% prefer fruit salads rich in Vitamin C and fats while 7% prefer fruit salads rich in vitamin A and C. This responds to the Rwanda Nutrition Policy which emphasizes the fight of malnutrition in Rwandan population. The results show that only 13% consume them regularly (daily) while others consume them occasionally. Fruit salads market is not well developed and it does not respond to the demand as they are not enough. On the average fruit salads price was 1000Rwf (USD 1.5) and the average on monthly expenses of fruit salad was 6315 Rwf (USD10).

4.1.3 Fruit salads labels in Rwanda

Quality labels are a way of communication of product quality to the consumers; they help consumers to choose products that meet their needs and the specified standards. In addition, quality labels guarantee the product quality and its origin. RBS has developed mandatory food standards with a section on labeling of the product which include information on the name of product, the name and address of the manufacturer, the expiry date, the batch number, ingredients, storage conditions, the weight (for solid products) or volume (for liquid products) and country of origin (RBS, 2010). In Rwanda, very few fruit salads are labeled and do not displays complete information about the required labels. This is shown by results that only 10% of fruit salads sold in Kigali have labels and few supermarkets are selling labeled

fruit salads. The available labels on fruit salads only display information on price and fruit mixture but they do not show nutritional content, quality inspection or country of origin. As shown in Figure 8 the importance of information available on the fruit salad package was ranked by consumers as follows: nutritional information (8%) and storage instruction (6%) were the most important labels followed by quality inspection or certification indicator with 5%. These findings are consistent with those of Grunert and Willis (2007), who found that consumers had higher interest of nutritional information on food packages. Slightly lower attention was given to information regarding origin of production 4% and organic fruit salad 3%. Producer's identity (3%) was found to be the last information in which consumers were interested. These results show that fruit salad labels in Kigali should include nutritional information, storage instruction, quality inspection, price, size and origin of production.

Figure 8: Importance of fruit salads labels



Source: Author's survey (2013)

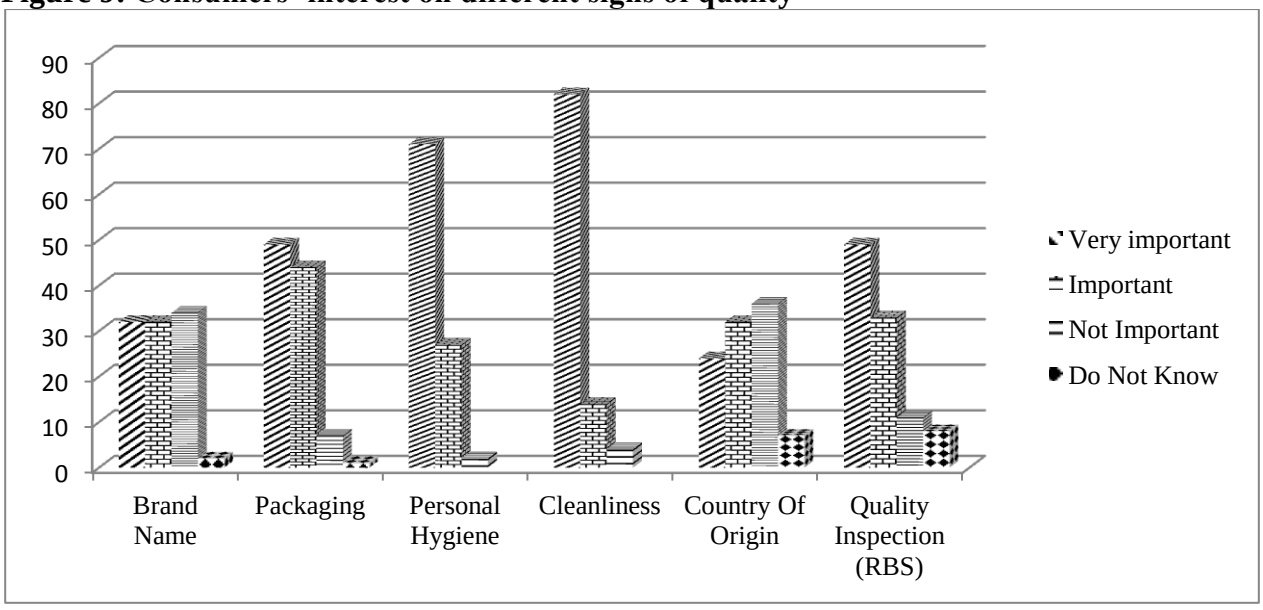
4.1.4 Perceptions on fruit salads quality in Rwanda

4.1.4.1. Fruit salads quality in Rwanda

Fruit salads sold in Rwanda are not inspected and they do not present any information on quality inspection or certification. This implies that fruit salads traders in Rwanda do not follow standards; this is a serious problem for consumers since they are the ones who are suffering from those un-inspected fruit salads which do not meet safety requirements.

The results (Figure 9) from the survey show that cleanliness of point of sale (82%) and personal hygiene (71%) were given higher importance followed by packaging (48%) and quality inspection (49%). Country of origin was less important factor considered as a signal of quality.

Figure 9: Consumers' interest on different signs of quality



Source: Author's survey (2013)

The opinion on different aspects of fruit salads; was rated based on a four-point Likert scale, including strongly agree (1), agree (2), disagree (3) and uncertain (4). Most of the respondents (63%) strongly agreed that certified fruit salads are safe to consume followed by domestic fruit salads (56%). This

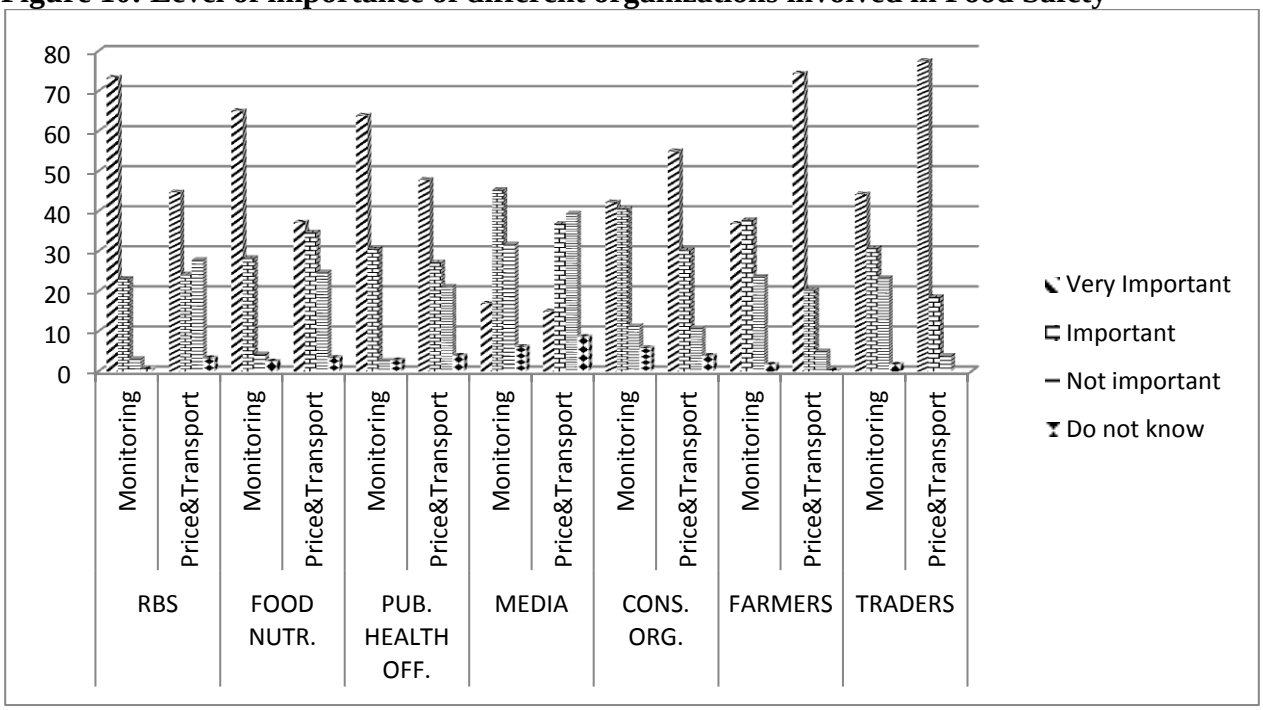
implies that RBS should establish standards on certification of domestic fruit salads since consumers believe in their safety. Consumers have also shown trust on imported fruit salads since 57% agree that they are safe but they are not familiar with them since the country does not actually import those fruit salads. There should be increase in fruit salads imports in the country in order to meet the recommended daily fruits consumption (400 grams per day) and overcome micronutrients deficiency in Rwanda. Consumers were also asked the extent of their trustfulness on the point of sale of fruit salads, the rating for each statement was based on a four-point Likert scale, including highly trust (1), somehow trust (2), don't trust at all (3), not sure (4). Most of the consumers (92%) highly trusted fruit salad made at home followed by those sold in restaurants and hotels (33%) and those sold in supermarkets (28%). Only 8% fruit salad consumers highly trust open markets. This is consistent with research done by Zaibet *et al.* (2004) in Tunisia where they reported that consumers highly trust homemade food products. Respondents reported that in most cases food-borne diseases were caused by food prepared elsewhere other than home because homemade food products are believed to be hygienically prepared.

About food safety information, fruit salad consumers were asked if they have heard or read about possible health problems related to consumption of unsafe fruit salad; only 52% agreed that they are familiar with illnesses related to fruit salads. Only 17% indicated that they have experienced food-borne illnesses where diarrhea (7%) and nausea (6%) were the most food-borne illness experienced followed by stomach pain (6%) and vomiting (4%). Diarrhea continues to be a cause of most deaths in Africa; where more than 10% of all deaths caused in Africa by infectious diseases are caused by diarrhea and 70% of all incidents of diarrhea are caused by contaminated food (WHO, 2004). Therefore, public health strategies should be put in place to fight against food borne diseases specifically diarrhea caused by uninspected food products.

4.1.4.2. Importance of different organizations involved in food safety

To understand the level of trust from different organizations in case of scandals caused by fruit salads, each respondent was requested to indicate whether they trust the mentioned organization or not.

Figure 10: Level of importance of different organizations involved in Food Safety



Source: Author's survey (2013)

Food scientists (95%), public food authorities (84%), consumer organizations (76%) and supermarkets (56%) were the most trusted in case of food scandals on fruit salads while politicians (17%), media/press (47%) and farmers (47%) were the least trusted organizations. This implies that policy makers in health sector should put much effort in building capacity of these organizations for them to perform their duties efficiently.

In terms of regulation, monitoring of work license and formal training on preparation of fruit salads, the most important organizations were RBS (73%), Food Nutritionists (65%) and Public Health Officials (64%). This means that RBS should establish standards and training on food safety education. In

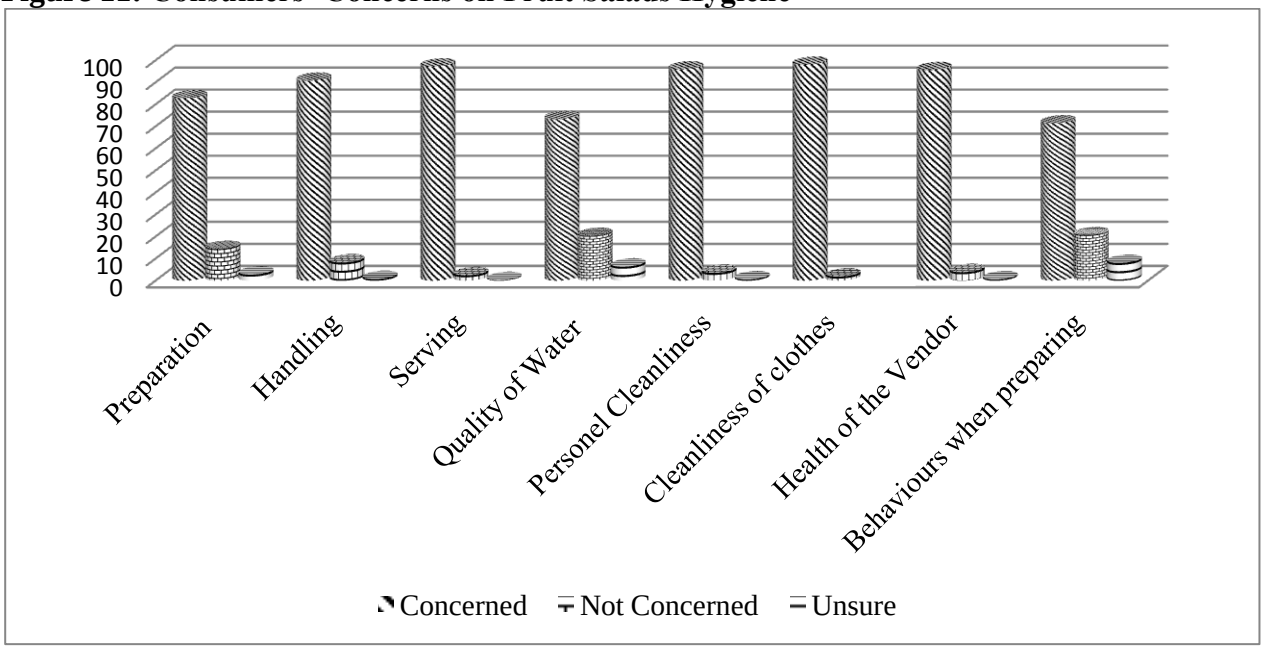
addition to this, Food Nutritionists and Public Health Officials should help in strengthening and supervising the enforcement of rules regarding work license and regulation in fruit salads industry.

Regarding the role played by different organizations in price regulation and transportation of fruit salads, traders (77%) and farmers (74%) followed by consumer organizations (55%) were given higher importance while media (15%) was less important. This implies that traders, farmers and consumer organizations should take an important part when fixing prices and transport of fruit salads. However, consumer's organization in Rwanda is still at the infant stage unlike in other African countries such as Nigeria, Cameroon and Benin where they are directly involved in making decisions about food safety programs, and perform functions carried out by government organizations in some regions (DeWaal and Robert, 2005).

4.1.4.3. Fruit salad hygiene in Rwanda

In Rwanda, hotels and restaurants selling fruit salads in Rwanda follow hygiene directives from the Ministry of health. This is evidenced by the consumers' concerns where the higher importance was given to personal cleanliness and serving. On the other hand, consumers were less concerned with quality of water used when preparing fruit salads since they are prepared during their absence. Fruit salads traders in Kigali should be encouraged to put more emphasis on personal cleanliness and serving them in order to improve their hygiene and enhance consumers' trust.

Figure 11: Consumers' Concerns on Fruit Salads Hygiene



Source: Author's survey (2013)

4.2 Awareness on quality certification and origin labeling in fruit salads

4.2.1 Awareness of quality certification

Results show that slightly more than a half of fruit salad consumers (53%) have heard of quality certification. This means that, although fruit salads in Rwanda are not certified, more than a half of consumers interviewed recognize quality assurance in fruit salads. This is attributed to the fact that consumers interviewed had high levels of education thus they were more informed. RBS provides national standards and international standards based solutions for consumers' protection and trade promotion for many food products in the country such as fruit juice, honey and mineral water among others. However fruit salads standards are not yet established (RBS, 2011). With regard to the source of information; a third of consumers received information on fruit salad quality certification from media, 11% from school and 7% from meetings/seminars. A small percentage (5%) reported that they observed them out of the country since in Rwanda they do not exist. These findings are consistent with the results

found by Shim *et al*. (2011) in Korea where they reported that the majority of the respondents got information on food products quality through mass media such as television, radio and news paper. In this study, the main reason was that consumers were motivated by high quality of certified fruit salads. However, consumers who were not aware reported that certified fruit salads were not available on the market. This indicates that, consumers' education is needed on food products quality and safety specifically quality certification and it can be transmitted through media such as radio and television.

4.2.2 Awareness of Origin labeling in fruit salads

The study examined the origin labeling in fruit salads where a third of consumers interviewed (37%) have heard about origin labeling in fruit salads and this indicates that fruit salads in Rwanda are produced locally and consumers are not familiar to imported ones. The information on origin labeling in fruit salads was from media (26%), meeting/seminars (5%), observation (5%) and school (3%). According to survey results, the motivation was the high quality of origin labeled fruit salads (24%). The main reason of non awareness on origin labeled fruit salads was that they were not informed while others reported that origin labeled fruit salads are not available on the market. For origin labeling, data were collected in order to assess the effects of their socio-demographic characteristics on consumers' awareness on origin in fruit salads.

4.2.2.1 Factors influencing awareness on origin labeling for fruit salads in Rwanda.

The awareness on country of origin in fruit salad is a dependent variable; the relative importance of factors that are likely to influence the awareness on country of origin in fruit salad was assessed using the binary logit model that allows the inclusion of purchasing behaviors and socio-demographic characteristics into the model. This includes residential area, place of purchase, frequency of consumption, read labels, presence of infant members, gender, education and income among others.

Before estimation of the econometric model, the independent variables were tested for the presence of multicollinearity using the variance inflation factor (VIF) as follows:

$$VIF_i = \frac{1}{1 - R_i^2} \quad (10)$$

A common rule of thumb is that if VIF (β_i)>5, then correlation among explanatory variables is high (Greene, 2002). In this study, the mean VIF was 1.19. Each of the independent variables also had VIF of between 1.03 and 1.57 as shown in table 8. Since all the VIF for the independent variables were <5, this indicated that there was no linear relationship among explanatory variables. This is the justification for the inclusion of these variables in the binomial logit model.

Table 8: Variance inflation factors for consumers' characteristics

Variable	Description	VIF
RESAREA	Place of consumers' residence (1=high, 0=medium or low residential area)	1,09
PLACEPUR	place where consumers normally buy fruit salads (1=supermarkets, 0=restaurants/hotels)	1,03
CONSFREQ	Number of times consumers usually take fruit salads (1=daily, 0=occasionally)	1,18
READLABE	Consumers' habit of reading labels displayed on fruit Salads (1=Yes, 0=No)	1,03
INFANTME	Presence of infant members in the household (1=Yes, 0=No)	1,16
EDUC	Number of years of formal schooling	1,27
INCOME	Monthly income of the consumer in Rwandan francs (Rwf)	1,57
Mean VIF		1.19

The binary logit results on consumer awareness on origin for fruit salads are shown in Table 9 The variables residential area, place of purchase, read labels and education were found to influence significantly awareness on COOL for fruit salads in the study area.

Table 9: Binomial logit estimates of factors influencing consumers' awareness on origin in fruit salads

Variable	Coefficient	Standard error	P-value
RESIDAREA	0.147	0.056	0.009***
PLACEPURCH	0.094	0.050	0.059*
CONSFREQU	0.062	0.079	0.432
READLABELS	0.324	0.083	0.000***
INFANTME	0.014	0.054	0.788
EDUCATION	0.016	0.009	0.068*
INCOME	3.52E-08	0.000	0.829
CONSTANT	-0.0137		

Note: ***, **, * indicate statistical significance at 1%, 5% and 10% level respectively.

The level of significance of each variable was tested using the null hypothesis which states that explanatory variables have no effect on consumer awareness on COOL in fruit salads. In this case, p-values which show the lowest significance level at which the null hypothesis can be rejected were used (Gujarati, 2007). The levels of significance used were 1% (p-value<0.01) indicates that variable is highly significant, 5% (p-value<0.05) where variable is significant and 10% (p-value between 0.05 and 0.1) indicates that variable is weakly significant.

The residential area (RESIDAREA) was found to have a positive influence on awareness of COOL for fruit salads; at one percent level of significance. It implies that in Kigali those who stay in high residential area were more likely to be aware of COOL for fruit salads. These results are in line with those reported by Ishak and Zabil (2012) who found a positive significant relationship between

residential area and level of awareness in quality for food products. They reported that in urban areas, consumers have shown high level of awareness compared to sub urban areas. This indicates that there is need to improve on the labeling program by concerned authorities on food products specifically fruit salads in order to enhance awareness of labeled food products.

Place of purchase (PLACEPURCH), supermarket as a place of purchase was found to influence positively consumers' awareness on country of origin for fruit salads. It was significant at 10% level of significance. In Rwanda, supermarkets are used by a big number of people with high levels of education because it is where the products are labeled and believed to be safe. As fruit salads labels are available in the supermarkets, consumers were likely to know their origin. This is an implication that labeling program in fruit salad industry should be strengthened and applied in different market places.

The variable reading labels (READLABELS) was found to be another important factor influencing awareness on COOL for fruit salads and had a positive sign as expected. There was a positive correlation between read labels and it was significant at 1% probability level. The results show that all those who bought labeled fruit salads (10%) were reading labels. This indicates that in Kigali, consumers were interested in reading fruit salad labels and knowing their origin. There is need to promote consumers' education and improve on advertisement program.

As expected, results show that education (EDUCATION) influenced awareness on COOL for fruit salads significantly at 10% level and had a positive sign. It implies that more educated people are more aware of country of origin of the fruit salads. Studies found that higher educated consumers attached more importance on reading information given on food labels, thus they are likely to be aware of food products origin (Kumar and Ali, 2011). Kimenju *et al*. (2005) also reported that higher educated consumers were more likely to be aware of food quality in Kenya because they are more exposed to

various information sources that increase their level of awareness. According to RDHS (2012), Kigali City has the highest level of education; it implies that those highly educated consumers were likely to be aware of origin of fruit salads. This is a response to the government policy of universal primary education that is improving literacy rate.

Consumption frequency (CONSFREQU); was expected to influence positively awareness on COOL, but it was not significant. This could be explained by the fact that the majority (90%) of fruit salads sold on the market are not labeled and do not show their origin. As the frequency of consumption of fruit salads increases, the more the consumer is likely to be aware of COOL. In addition to this, there are no imported fruit salads in the country; all fruit salads sold are prepared and packaged within the country.

Infant members (INFANTME); presence of young children was expected to positively influence awareness on COOL but it was not significant. This implies that people with children are familiar with fruits and fruit salads because they make them for the young and this increases the probability of awareness on COOL that leads to a positive relationship between the two variables.

Income (INCOME) was expected to influence positively awareness on COOL in fruit salads, but it was not significant. The positive relationship between the two variables implies that people with high income are selective in buying fruit salads which leads them to be aware of COOL. This is in contrast to the findings of Basarir and Sherif (2012) in United Arab Emirates, where they reported that higher income respondents read labels less frequently; thus they are not likely to know the origin of the food products. From the variables that were hypothesized to influence awareness on COOL for fruit salads, the variables that were significant were residential area, place of purchase, read labels and education, significantly influenced the level of awareness of COOL for fruit salads. Therefore it is important for

policy makers in health sector particularly in food industry to note that socio-demographic factors do influence consumers' awareness on origin of fruit salads.

The results show that binomial logit model have similar coefficients with marginal effects (Table 9). The marginal effects coefficient show that, holding other variables constant, the probability of being aware on COOL increases by 15% as the fruit salad consumer changes from low to high residential area. This implies that the probability of being aware on COOL is 15% greater for consumers in high residential area than low or medium residential consumers. The probability of being aware on COOL due to the place of purchase was 9% greater for those who purchase in supermarkets than those who purchase in other places (restaurants, hotels, open markets). The likelihood of being aware increases by 9% as the consumer changes from other places to supermarkets.

With regard to the variable read labels, the marginal effect of 0.32, holding other variables constant. This implies that the probability of being aware on COOL increases by thirty two percent for those who read labels than those who do not read. This means that those who read labels are more likely to know the origin of fruit salads and therefore food labeling program is necessary in fruit salads industry in Rwanda. Consumers will be able to know nutritional information and trace the origin of what they consume. The results for marginal effect also show that being educated increase the probability of being aware on COOL by 2%. Hence higher educated consumer would more likely to know the origin of fruit salads that he/she consume.

4.3 Consumer preferences for quality certification and origin labelling for fruit salads in Rwanda

The MNL is based on RUM, it is the basic and the most widely used model for predicting choice behavior of individuals in discrete choice situations (Rose *et al*., 2009). The RUM shows that in a given choice situation with multiple alternatives, a rational individual will choose the alternative that generates

the highest utility. MNL specifications are easy and simple to estimate; they are used to analyze the choice of an individual among a set of alternatives. The results for MNL model on preferences for fruit salads attributes are presented in Table 10.

Table 10: MNL estimates of preferences for fruit salads attributes

Variable	Coefficient	Standard error	P-value
ORGANIC	0.197	0.109	0.069*
VITCFATS	0.311	0.175	0.075*
VITACFATS	0.570	0.107	0.000***
YES	0.757	0.085	0.000***
PRIVATE	0.971	0.272	0.000***
PUBPRIVATE	0.855	0.121	0.000***
IMPORTED	0.289	0.096	0.002***
PRICE	-0.0004	0.0001	0.000***
Log Likelihood	-1226.768		
N Respondents	360		
N Choices	1440		

Note: Statistical significance at 1%, 5% and 10% are shown by ***, **, and * respectively.

The positive sign on the coefficients of most fruit salad attributes demonstrates that consumers were willing to pay more for those attributes. This implies that consumers in Rwanda are interested in quality and safety of fruit salads. In this study consumers in Kigali city have positive preferences for organic fruit salads as it was expected. However, consumers indicated that production and the markets for organic fruit salads in Rwanda are not well developed. As it was mentioned in the focus group discussions, consumers are interested more in natural products and need more information; about how organic production and processing is different from conventional products and how they can be

distinguished to make informed choices. Concerning content of vitamins in fruit salads, consumers showed higher preferences for fruit salads rich in vitamin A, vitamin C and fats compared to those rich in Vitamin C and Fats only. This may be due to the fact that consumers interviewed had high level of education and understanding about the importance of vitamins. In addition to this, in Rwanda Nutrition Policy, consumption of fruits and vegetables is promoted and encouraged in order to overcome micronutrients deficiency (Rwanda Ministry of Health, 2010). Those results are similar to those reported by Banterle *et al*. (2012) who found that consumers in Italy preferred food products with higher vitamin content. This was related to the fact that vitamins are emphasized in advertising and in other types of messages aimed at promoting food knowledge. This indicates that consumers' education on the importance of consumption of food rich in vitamins should be emphasized.

The results revealed that consumers have positive preference for vendor's health; this implies that they have got higher confidence in fruit salads sold by traders with regular medical inspection. This might be the reason for high proportion of consumers who buy fruit salads from supermarkets, hotels and restaurants than from open markets as they are considered to be safer. These results are similar to those reported by Jabbar and Admassu (2009) in Ethiopia where consumers showed high preferences for hygiene of premises and personnel in food products. Compared to certification provided by combination of public and private agencies, consumers showed higher positive preference for private certification. This is due to the fact that, RBS introduced national standards on food quality; however lack of technical and institutional capacity to control and ensure compliance made these standards ineffective (ITC, 2008). In addition to this, certification offered by private agencies present advantages of being stringent with clear enforcement. These results are similar to those reported by Wang *et al*. (2010) in USA where farmers had higher preferences for organic apples certified by private Northeast Organic Farming Association. However, these results are in contrast with what was reported by Alphonce and

Alfnes (2012) in Tanzania where consumers showed positive WTP for tomatoes certified by Tanzania Bureau of Standards.

Concerning the country of origin in fruit salads, consumers showed positive preferences for imported fruit salads than domestic ones and this was contrary to prior expectations. Consumers have got trust in imported fruits since they are for high quality and believe that imported fruit salads will be also of high quality as those imported countries have higher food safety controls and regulations. These results are in contrast with those reported by Carpio and Massa (2008) in South Carolina who reported that consumers had a strong preference for locally grown products. The reason was support of their local farmers and their economy. The marginal utility of price is statistically significant and negative; this is consistent with law of demand which states that, the higher the price, the lower the demand and vice-versa. This means that as fruit salad price increases, consumer's utility decreases as they consume less of it.

Table 11 shows consumers' WTP for different fruit salads attributes. The WTP values show that consumers were willing to pay positive premium for all attributes used in choice analysis.

Table 11: Marginal WTP values for fruit salads attribute (Rwf)

Variable	Coefficient	Standard error	P-value
ORGANIC	501.427	316.228	0.112*
VITCFATS	789.968	413.388	0.056**
VITACFATS	1445.245	342.694	0.000***
YES	1920.567	549.202	0.000***
PRIVATE	2462.789	804.453	0.002***
PUBPRIVATE	2167.325	492.646	0.000***
IMPORTED	733.050	260.761	0.004***

Note: Statistical significance at 1%, 5% and10% are shown by ***, **, and * respectively.

Fruit salads consumers in Kigali were willing to pay Rwf501.42 (USD0.77) for the inclusion of organic attribute indicated on fruit salad label. Consumers were also willing to pay Rwf1445.24 (USD2.22) for inclusion of Vitamin A, vitamin C and fats content label on fruit salads compared to 789.96 Rwf (USD1.21) for inclusion of vitamin C and fats.

In addition, consumers were willing to pay Rwf1920.56 (USD3) for inclusion of vendor's health certificate on fruit salad label. Consumers were also willing to pay Rwf2462.78 (USD3.78) and Rwf2167.32 (USD 3.33) for the inclusion of private certification and combination for both public and private certification respectively. Lastly, consumers were willing to pay Rwf733.05 (USD1.12) for the inclusion of country of origin indicator on fruit salad label. In Rwanda, the mean household consumption aggregate per adult equivalent was Rwf123,891 (USD 190, 60) in 2011. However, households' consumption aggregate per adult equivalent was 324, 844Rwf (USD499.76) in Kigali city which is higher than that in other provinces (NISR, 2012). This is evidence that consumers in Kigali city can afford labeled and certified fruit salads.

The results showed that based on WTP values, consumers are willing to pay more for certification, followed by vendor's health, vitamins content, country of origin and lastly organic fruit salads. The results also indicated that consumers were willing to pay relatively higher amount for certification to be included as a fruit salad attribute. This could be explained by the higher need of safe fruit salads since the results from the focus group discussion results show that certified fruit salads are not available on the market. The results also reveal that consumers have got higher preferences for private certification than combination of public and private certification agency. This could be explained by the fact that in developing countries, the capacity of the government to regulate standards for fresh produce is minimal and inspection services lacked skilled personnel (Byanyima, 2009). In Rwanda, standards remain a substantial obstacle to the commercialization of Rwandan agriculture and this implies consumers'

preferences for private companies in certification for fruit salads. Consumers showed higher preferences for inspection of vendor's health. The part worth for vendor's health inspection indicates that consumers derived higher utility from buying fruit salads from cleaner point of sales and most consumers were sensitive to this attribute. This reveals that vendor's health is among the most concerns on fruit salads hygiene. Results from the study showed that consumers got preferences of higher vitamins content in fruit salad (Vitamin A, C, fats) compared to Vitamin C and fats content. The reason could be the high level of understanding of dietary intake and nutritional information as most of consumers interviewed had higher level of education (RDHS, 2010).

Consumers showed preferences for inclusion of country of origin in fruit salad labels. This could be attributed to the fact that there are many high quality fruits imported from different countries such as Kenya, Uganda, Egypt and South Africa (Gikonyo and Wanjau, 2012). Therefore, people are familiar to imported fruits with high standards and this is likely to increase trust for imported fruit salads.

Consumers also showed WTP additional amount for inclusion of organic indicated on fruit salad label and willing to pay a positive premium. However, this premium was the lowest among the premiums consumers were willing to pay for other attributes and this could be attributed to the lack of information on organic products. According to Giannakas (2002), organic products are credence goods, consumers may not know whether a product is produced using organic or conventional methods, even after repeated purchase and consumption, unless it is indicated. Thus, when consumers cannot clearly recognize those products, their price premium can confuse and/or affect the individual's purchasing decision, in favor of the cheaper products.

Interaction terms between the main effects and the socio-demographic variables were estimated; the interacted variables allowed differentiation among consumers and offer opportunities for more adapted

marketing strategies depending on consumers' preferences. Many interacted variables were considered, but only significant ones were included in the final model. The results of this model under each product are presented in Table 12.

Table 12: MNL with interactions estimates for fruit salads attributes

Variable	Coefficient	Standard Error	P-value
ORGANIC	0.197	0.109	0.069*
VITCFATS	0.311	0.175	0.075*
VITACFATS	0.570	0.107	0.000***
YES	0.757	0.085	0.000***
PRIVATE	0.971	0.272	0.000***
PUBPRIVATE	0.855	0.121	0.000***
IMPORTED	0.289	0.096	0.002***
EDPRIV	0.307	0.319	0.335
INCOMIMP	0.172	0.120	0.153
GENORG	-0.620	0.122	0.000***
PRICE	-0.0004	0.0001	0.000***
Log Likelihood	-1226.768		
N (Respondents)	360		
n (Choices)	1440		

Note: Statistical significance at 1%, 5% and 10% are shown by ***, **, and * respectively.

Although most consumers have shown higher preferences for certification offered by private agencies in fruit salads, the preference was higher among more educated consumers than in less educated consumers. This means that education increases the probability of preference for certification from private company to increase by 31%. It could be explained by the fact that those who are educated have

more information on different organizations involved in certification process of food products and they are likely to have knowledge on differences between private and public-private company certification.

Income shifts 17% upwards the probability of preferences for imported fruit salads. This indicates that although most consumers showed preferences for imported fruit salads, this preference was high in higher income earners. This could be explained by the fact that those products are more expensive than the local ones, thus they are considered as luxuries affordable by higher income earners. In Rwandan context, this could be the case since interviewed consumers have higher income and imported fruit salads are considered as luxury products. This is consistent with consumer theory, where demand for luxury goods increases as income rises. These results are also similar to those reported by Alphonce and Alfnes (2012) in Tanzania where consumers in the high-income group were willing to pay for imported food products and this was influenced by their purchasing power, knowledge and experience.

Gender reduces the probability of preferences for organic fruit salads by 62%. Consumers showed positive WTP for organic fruit salads, however, males consumers showed less preference for organic fruits salads compared to females. This may be due to the fact that females are likely to change shopping habits and they are more interested in trying and tasting new products on the market. In addition, females are the main shoppers in most households and they are likely to be more informed about food quality and safety issues. Those results are in line with findings from Loureiro and Umberger (2004) and Onyango *et al*. (2006) in USA who reported that women were likely to buy organic foods. This because female shoppers were more concerned about food safety issues.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Summary

Food safety scandals have raised consumers' concerns on food product quality and safety information. This has led to establishment of quality standards in food products, including fresh produce such as fruit salads. A number of efforts have been made to ensure fruit salads quality and safety standards; one of the most relevant has been the promotion of quality labels with quality certification and origin in food products. Fruit salads are important and nutritious as they provide different vitamins and minerals, which help the body to meet its needs. They are also needed in Rwanda to help overcoming the problem of vitamins deficiency in the country.

This study characterized fruit salads consumption in Rwanda, assessed consumers' awareness on quality certification and origin labeling as well as the factors influencing consumers' awareness on COOL for fruit salads. The study also assessed consumers' preferences for quality certification and origin labeling in fruit salads. The results show that fruit salads in Rwanda are not labeled and not even certified; they are sold in different places such as hotels, restaurants and supermarkets.

The results also showed that residential area, place of purchase, reading labels and education significantly influenced consumers' awareness on origin for fruit salads in the study area. Consumers valued most fruit salad certification and valued less COOL in fruit salads; thus fruit safety assurance is the main driving force for consumers' WTP rather than the country of origin. Organic fruit salads received the lowest premium due to non availability and lack of information on organic fruit salads in the country.

5.2 Conclusions

The results from this study revealed that consumers in Rwanda are interested in food quality and could play a role in the process of compliance to quality standards. The emphasis should be put in supermarkets, restaurants and hotels since those places are frequented by higher educated and higher income earners who are willing to pay premium for high quality fruit salads. In addition to this, those fruit salads sold in open markets should also be labeled in order to consider low income earners.

Consumers showed positive preferences for organic fruit salads but this type of fruit salads was most preferred by females. This shows an opportunity in marketing to increase consumption of organic fruit salads as females are main shoppers in most households.

In terms of fruit salads certification, private companies were the most preferred compared to combined public and private certification. However, certification offered by private companies was preferred by higher educated consumers. This shows that there could be opportunity investments in private companies offering private certifications.

Fruit salads imported from other countries were the most preferred compared to locally produced ones and these were chosen by high income earners. The positive preferences for imported fruit salads show that there is opportunity for foreign investments in fruit salads industry in Rwanda. Therefore, consumers were willing to pay more for quality certification followed by vendor's health and fruit mixture while imported and organic were the last attributes. This could be an opportunity for agribusiness managers in this industry to introduce improved fruit salads with these quality attributes.

5.3 Policy implications

The study found out that only a half of consumers interviewed are aware on quality certification and a third are aware on origin in fruit salads. In order to raise this awareness, there is a need to improve on

consumer education through advertisement in media, as it is the main source of information awareness of food quality. The adverts could focus on food quality by showing the importance of different vitamins to the body as well as consumption of certified and labeled fruit salads.

There is also need for regular inspection and training on fruit salad standards and how they are prepared. This would help in trade as those standardized products can be exported to other countries; it would also improve on fruit salad industry to be competitive on regional and international markets.

Empirical results from this study show that fruit salads sold in the country are not labeled. RBS should establish a comprehensive labeling program with regular inspection and certification system in order to increase consumers' trust in fruit salads. The higher preferences for quality certification in fruit salads shown in this study imply that RBS should formulate quality and safety standards based on international standards but suitable for domestic market following attributes preferred by consumers.

Rwanda Ministry of Agriculture should encourage organic fruits production by subsidizing fruits farmers and agribusiness investors in organic fruits production. Moreover, Rwanda Organic Agriculture Management (ROAM) which is a private company producing organic products in the country, should focus and increase organic fruits production used to prepare organic fruit salads since consumers are willing to pay a positive premium for them.

5.4 Contributions to knowledge

This study adds to the current body of literature on food quality and safety. The study provides empirical evidence on importance given to quality labels including nutritional content as well as quality certification and origin in fruit salads. Inclusion of these attributes give the information on most preferred attributes in fruit salad industry and also shows the empirical estimation of economic value that consumers give to those quality attributes in Rwanda.

The incorporation of consumer's perceptions and estimation of their WTP for different quality attributes using CE, is important and inform policy makers in developing fruit salad industry in the country. Moreover, the analysis of both consumers' awareness and preferences is important and possibly new in Rwanda food industry.

5.5 Suggestions for further research

Further research may use Random Parameter logit model as an improvement to the MNL used in this study since the data obtained could not fit in the model. This would help to know heterogeneity in consumers' preferences, so it will give more information on consumers' preferences in their different categories.

An improvement on this study may include comparison of consumers' perceptions and WTP for imported fruit salads depending on countries of origin. This is in order to provide information to policy makers such as MINAGRI and RBS when deciding importing countries for fruit salads as countries are not on the same level of food quality standards.

This study was done in Kigali city; it would be important to determine if consumers' preferences for fruit salad attributes found in this study apply to consumers in other parts of the country. This will help to develop and strengthen fruit salads industry in the country.

REFERENCES

Adamowicz W.L., Boxall P. and Louviere J. (1998). 'Stated preference approaches for measuring passive use values: Choice experiments and contingent valuation'. *American Journal of Agricultural Economics*, 80(1):64-75.

Alphonce R. and Alfnes F. (2012). Consumer willingness to pay for food safety in Tanzania: an incentive-aligned conjoint analysis. *International Journal of Consumer Studies* ISSN 1470-6423.

Angulo A.M and Gil J.M. (2007). Food safety and consumers' willingness to pay for labeled beef in Spain. *Food Quality and Preferences.* 18:1106–1117 (2007).

Barrena R. and Sánchez M. (2010). Frequency of consumption and changing determinants of purchase decision: from attributes to values in the organic food market. *Spanish Journal of Agricultural Research* 2010 8(2), 251-272. Available online at www.inia.es/sjar ISSN: 1695-971-X.

Banterle A., Cavaliere A. and Ricci E.C (2012). Food labeled Information: An Empirical Analysis of Consumer Preferences. *Proceedings of the 6th International European Forum on System Dynamics and Innovation in Food Networks*, *organized by the International Center for Food Chain and Network Research*, University of Bonn, Germany.

Bazarir A. and Sherif S. (2012). Consumers' awareness of food labeling: A case study of United Arab Emirates. *African Journal of Agricultural Research* Vol. 7(28), pp. 4021-4028, 24 July, 2012. Available online at http://www.academicjournals.org/AJAR. (Accessed on 28 September 2013)

Brett D.F. and Melo O. (2010). The impact of health, environmental and social attributes of salmon choice in the United States. *Selected Paper Prepared for presentation at the 1st Joint EAAE/AAEA Seminar* "The Economics of Food, Food Choice and Health" Freising, Germany, September 15 – 17, 2010.

Byanyima M. (2009). Ground Control, Making the grade in agriculture. *Published by Africa Research Institute.* ISBN No. 978-1-906329-08-2.

Carson R.T., Flores N.E. and Meade N.F. (2001). Contingent valuation controversies and evidence. *Environmental and Resource Economics*, Vol. 19, pp. 173-210.

Carpio C.E and Massa O.I (2008). Consumer Willingness to Pay for Locally Grown Products: The Case of South Carolina. *Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting.* Dallas, TX, February 2-6, 2008.

Caussade S., Ortuzar J.D., Rizzi L.I. and Hensher D.A. (2005). 'Assessing the influence of design dimensions on stated choice experiment estimates', *Transportation Research Part B,* 39(7):621-640.

Choice Metrics (2009). 'The Cutting Edge in Experimental Design', Ngene 1.0 User Manual and Reference Guide.

CIA, (2013). *The World Factbook*. Washington D.C

Cochran W. G. (1977). *Sampling Techniques*, third edition, Wiley, New York.

DeWaal C.S. and Robert N. (2005). Global Local Food Safety Around the World, Center for Science in the Public Interest.

FAO (1999). Organic Agriculture. http://www.fao.org/unfao/bodies/COAG/COAG15/X0075E.htm.

FAO (2003). Tropical fruits-Their nutrient values, Biodiversity and contribution to health and nutrition. Third Session, Puerto de la Cruz, Spain, 11 – 15 December 2003.

FAOSTAT (2010). Food and Agricultural Organization Statistical Databases. http://faostat3.fao.org/home/index.html#compare (Accessed on 25 February 2013).

FAOSTAT (2012). Food and Agricultural Organization Statistical Databases.

http://faostat3.fao.org/home/index.html#compare (Accessed on 25 February 2013).

Faye A., Jooste J., Lowenberg-DeBoer and Fulton J. (2004). The influence of cowpea characteristics on cowpea prices in Senegal. *Agrekon*, Vol 43, No 4.

Fleming Christopher M. and Averil Cook (2007). The Recreational Value of Lake McKenzie: An Application of the Travel Cost Method.

Gao Z., Lisa O. H., Gmitter F.G., Valimd M.F., Plottoe A. and Baldwinf E.A. (2011). Consumer Preferences for Fresh Citrus: Impacts of Demographic and Behavioral Characteristics. *International Food and Agribusiness Management Review Volume 14, Issue 1, 2011*.

Garrod G.D. and Willis K.G. (1999). Economic valuation of the environment, methods and case studies, Edward Elgar, Cheltenham.

Giannakas K. (2002). Information asymmetries and consumption decisions in organic food product markets. *Canadian Journal of Agricultural Economics*. 50(2002): 35-50.

Gikonyo A. and Wanjau G. (2012). Horticultural Crops Development Authority, *Report on Rwanda Market Survey*, 2012.

Guthrie H.A. (1989). Introductory Nutrition. 7th edition, Times mirror/ Mosby College Publishers, St Louis, Toronto, Boston, Los Altos.

Greene W.H. (2002). LIMDEP version 8.0/Nlogit version 3.0.Econometric Modelling Guide. Plainview, NY: Econometric Software

Grunert K.G. and Wills J.M. (2007). A review of European research on consumer response to nutrition information on food labels. *Journal of Public Health* (2007) 15:385–399.

Hanemann W.M. (1984). "Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses". *American Journal of Agricultural Economics*, Vol. 66, no. 3, pp. 332-341.

Hanley N., Mourato S. and Wright R.E. (2001). 'Choice modelling approaches: A superior alternative

for environmental valuation?' *Journal of Economic Surveys*, 15(3):436-462.

Hausman J. and McFadden D. (1984). 'Specification tests for the multinomial logit model', *Econometrica*, 52(5):1219-1240.

Henson S. (2006). The Role of Public and Private Standards in Regulating International Food Markets. IATRC Summer Symposium, Food Regulation and Trade: Institutional Framework, Concepts of Analysis and Empirical Evidence. Bonn, Germany.

Henson S. and Caswell J. (1999). Food safety regulation; an overview of contemporary issues, Food Policy 24(6), pp589-603

Henson S.J. and Hooker N.J. (2001). Private sector management of food safety: public regulation and the role of private controls.International Food and Agribusiness Management Review 4, pp 7-17.

Henson S. and Reardon T. (2005). Private agri-food standards: Implications for food policy and the agri-food system. *Food Policy, Volume 30, Issue 3*, June 2005, Pages 241- 253.

Hu W., Woods T. and Bastin S. (2009). ''Consumers' Acceptance and Willingness to Pay for Blueberry Products with Non-conventional Attributes. '*Journal of Agricultural and Applied Economics*, 41(2009):1-14.

Huber J. and Zwerina K. (1996). 'The importance of utility balance in efficient choice designs'. *Journal of Market Research*, 33(3):307-317.

Iamtrakul P., Teknomo K. and Hokao K. (2005). Public Park Valuation using Travel Cost Method. Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, pp. 1249 - 1264, 2005.

International Trade Centre (2008). Overview of organic agriculture in Rwanda and options for policy and trade development. Palais des Nations, 1211 Geneva 10, Switzerland.

Ishak S. and Zabil N.F.M. (2012). Impact of Consumer Awareness and Knowledge to Consumer Effective Behavior. *Asian Social Science*; Vol. 8, No. 13; 2012.

Jabbar M.A. and Admassu S.A. (2009). Assessing consumer preferences for quality and safety attributes of food in the absence of official standards: the case of beef in Ethiopia. *Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China*, August 16-22, 2009.

Jaffee S. (2004). "From Challenge to Opportunity: The transformation of the Kenyan fresh vegetable trade in the context of emerging food safety and other standards." *Agriculture and Rural Development Discussion Paper 1*, World Bank. Washington, DC.

Jaffee S. and Henson S.J. (2004). Standards and Agri-food Exports from Developing Countries: Rebalancing the Debate, World Bank. *Policy Research Working Paper 3348, Washington DC*: The World Bank.

James J.S., Rickard B. J. and Rossman W.J. (2009). Product Differentiation and Market Segmentation in Applesauce: Using a Choice Experiment to Assess the Value of Organic, Local, and Nutrition Attributes. *Agricultural and Resource Economics Review* 38/3.

Jill E. Hobbs (2010). Public and Private Standards for Food Safety and Quality: International Trade Implications. *The Estey Centre Journal of International Law and Trade Policy*. Volume 11 Number 1 2010/p. 136-152.

Joint FAO/WHO (1981). Food Standard Programme Codex Alimentarius Commission: Food & Agriculture Organization. www.fao.org (Accessed on 25 November 2013).

Joint FAO/WHOCAC (2010). Food labelling: Food & Agriculture Organization. Available at www.fao.org (Accessed on 27 November 2013).

Kader A. (2002). Quality parameters of fresh-cut fruits and vegetable products. Fresh cut-fruits and vegetables. Science, Technology and Market. Boca Raton, Florida, CRC Press LLA.

Kasapila W. and Shawa P. (2011) "Use and Understanding of Nutrition Labels among Consumers in

Lilongwe (Malawi)", *African Journal Of Food, Agriculture, Nutrition and Development*, Vol. 11(5), pp. 5171-5186.

Kassie G.T., Abdulai A. and Wollny C. (2009). 'Valuing traits of indigenous cows in Central Ethiopia, *Journal of Agricultural Economics*, 60(2):386-401.

Kimenju S.C. and Hugo De Groote (2005). Consumers' Willingness to Pay for Genetically Modified foods in Kenya. *Paper prepared for presentation at the 11thInternational Congress of the EAAE (European Association of Agricultural Economists)*, The Future of Rural Europe in the Global Agri-Food System, Copenhagen, Denmark, August 24-27, 200.

Kimenju S.C., Hugo de Groote, Karugia J., Mbogoh S. and Poland D. (2005). Consumers' awareness and attitudes toward GM foods in Kenya.

Kuhfeld W.F., Tobias R.D. and Garratt M. (1994). 'Efficient experimental design with marketing research applications'. *Journal of Marketing Research Vol. XXXI* (November 1994), 545-557.

Lancaster K.J. (1966). 'A New Approach to Consumer Theory', *Journal of Political Economy*. 74 (2): 132-57.

Levine M., Rumsey S., Wang Y., Park J., Kwon O., Xu W. and Amano N. (1996). Vitamin C in present knowledge in nutrition. Seventh Edition.

Loureiro M.L. and Umberger W.J. (2003). "Estimating Consumer Willingness-to-Pay for Country-of-Origin Labels for Beef Products" Selected Paper presented at the American. Agricultural *Economics Association, Annual Meeting*, July 28-31, 2002, Long Beach, CA.

Loureiro M.L. and Umberger W.J. (2004). A Choice Experiment Model For Beef Attributes: What Consumer Preferences Tell Us. *Selected Paper Presented at the American Agricultural Economics Association Annual Meetings. Denver, Colorado* August 1-4, 2004.

Loureiro M.L. and Umberger W.J. (2007). A choice experiment model for beef: What US consumer responses tell us about relative preferences for food safety, country-of-origin labeling and traceability, *Food Policy,* 32.

Louviere J.J., Hensher D.A. and Swait J.D. (2000). Stated Choice Methods: Analysis and Applications, Cambridge University Press, Cambridge.

Louviere J.J. (2001). 'Choice Experiments: an overview of concepts and issues', in J. Bennett and R. Blamey (eds.), The Choice Modelling Approach to Environmental Valuation, Edward Elgar, Cheltenham.

Louviere J.J. and Hensher D. (1982). 'On the design and analysis of simulated choice or allocation experiments in travel choice modelling', *Transportation Research Record,* 890:11-17.

Louviere J.J. and Woodworth G. (1983). 'Design and analysis of simulated consumer choice or allocation experiments: An approach based on aggregate data', *Journal of Marketing Research*, 20(4):350-367.

Lusk J. L. and Briggeman B. C. (2009). Food values. American Journal of Agricultural Economics, 91(1), 184-196.

Lusk J.L., Brown J., Mark T., Proseku I., Thompson R. and Welsh J. (2006). Consumer behavior, public policy, and country-of-origin labeling, *Review of Agricultural Economics*, Vol. 28, n. 2.

Maddala G.S. (2000), *Introduction to Econometrics*, third edition, Prentice-Hall, Inc., Upper Saddle River, New Jersey.

McFadden D. (1974)."Conditional logit analysis of qualitative choice behaviour,"in Frontiers of Econometrics, P. Zarembka, ed., Academic Press, London, U.K., pp. 105-142.

Menapace L., Colson G., Grebitus C. and Facendola M. (2008). Consumer preferences for extra virgin

olive oil with country-of-origin and geographical indication labels in Canada. *Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Orlando, FL,* July 27-29, 2008.

MINAGRI (2012). 'Strategic Issues Paper, June 2011-July 2012'. Kigali: Ministry of Agriculture and Animal Resources.

Mishili F.J., Fulton J., Shehu M., Kushwaha S., Marfo K., Jamal M., Chergna A. and Lowenberg-DeBoer J. (2007). Consumer Preferences for Quality Characteristics Along the Cowpea Value Chain in Nigeria, Ghana and Mali. Working pp.06-17, January, Dept. of Agricultural Economics, Purdue University.

Nakasone H.Y. and Paul R.E. (1998). *Tropical Fruits.* Oxford University Press, USA.

Ngigi M.W., Okello J.J., Lagerkvist C.L., Karanja N.K. and Mburu J. (2011). Urban Consumers' Willingness to Pay for Quality of Leafy Vegetables along the Value Chain: The Case of Nairobi Kale Consumers, Kenya. *International Journal of Business and Social Science,* Vol. 2 No. 7, 2011.

National Institute of Statistics of Rwanda (NISR), Ministry of Health (MOH) [Rwanda], and ICF International (2012). *Rwanda Demographic and Health Survey 2010*. Calverton, Maryland, USA: NISR, MOH, and ICF International.

NISR (2011). 'Gross Domestic Product and its Structure by Activity'. National Institute of Statistics of Rwanda.

NISR (2012). The evolution of poverty in Rwanda from 2000 to 2011: Results from the household surveys (EICV). *Government report.*

Okello J.J. and Swinton S.M. (2010). From circle of poison to circle of virtue: pesticides, export standards and Kenya's green bean farmers. *Journal of Agricultural Economics,* 61(2) 209–224.

Onyango B., Hallman W. and Bellows A. (2006). Purchasing Organic Food in U.S. Food Systems: A

Study of Attitudes and Practice. *Selected Paper American Agricultural Economics Association Annual Meeting, July 23-26, 2006 Long Beach, California*.

Otieno J.D., Ruto E. and Hubbard L. (2011). Cattle Farmers' Preferences for Disease-Free Zones in Kenya: An application of the Choice Experiment Method. *Journal of Agricultural Economics*, Vol. 62, No. 1, 2011, 207–224.

Owusu V. and Anifori M.O. (2013). Consumer Willingness to Pay a Premium for Organic Fruit and Vegetable in Ghana. *International Food and Agribusiness Management Review.* Volume 16, Issue 1, 2013.

Poole N. and Martínez C.L. (2007). Information and WTP: fruit quality perceptions and consumer satisfaction. *Paper prepared for presentation at the Mediterranean Conference of Agro-Food Social Scientists. 103rd EAAE Seminar 'Adding Value to the Agro-Food Supply Chain in the Future Euro Mediterranean Space*'. Barcelona, Spain, April 23rd - 25th, 2007.

Rezai G., Teng P.K., Mohamed Z. and Shamsudin M.N (2012). Consumers' awareness and consumption intention towards green foods. African Journal of Business Management Vol. 6(12), pp. 4496-4503, 28 March, 2012. Available online at http://www.academicjournals.org/AJBM. (Accessed on 30 March, 2014).

RBS (2010).Quarterly Newsletter, Issue 8, July-September 2010. Available at www.rwanda- standards.org. (Accessed on 26 October 2013).

RBS (2011). Catalogue of Rwanda Standards. Available at www.rwanda-standards.org. (Accessed on 26 October 2013).

RDB/RHODA (2010). Investment Opportunities in Rwanda's Horticulture Sector. Rwanda Development Board and Rwanda Horticulture Development Authority.

Revelt D. and Train K. (1998). 'Mixed logit with repeated choices: Household's choices of appliance efficiency level', *The Review of Economics and Statistics*, Vol. 80, (1998) pp. 647– 657.

Rose J.M. and Bliemer M.C.J. (2009). 'Constructing efficient stated choice experimental designs. *Transport Reviews*, 29(5):587-617.

Rose J. M., Scarpa R. and Bliemer M. C. J. (2009), 'Incorporating model uncertainty into the generation of efficient stated choice experiments: A model averaging approach', Paper presented at the International Choice Modelling Conference, March 30 – April 01, Yorkshire.

Ruto E. and Garrod G. (2009). 'Investigating farmers' preferences for the design of agri-environment schemes: A choice experiment approach', *Journal of Environmental Planning and Management*, 52(5):631-647.

Rwanda Ministry of Health (2010). Rwanda Ministry of Health Annual Report July 2009-June 2010.

Scarpa R. and Rose J.M. (2008). 'Design efficiency for non-market valuation with choice modelling: How to measure it, what to report and why', *The Australian Journal of Agricultural and Resource Economics*, Vol. 52, (2008) pp. 253–282.

Shim S.M., Seo S.H., Lee Y., Moon G.I, Kim M.S. and Park J.H. (2011). Consumers' knowledge and safety perceptions of food additives: Evaluation on the effectiveness of transmitting information on preservatives. *Food Control* 22 (2011) 1054-1060.

Sterns J., House L., VanSickle J. and Wysocki A. (2004). "COOL and Consumers' Willingness to Pay in the Fresh Produce Industry-Some Initial Impressions from the Field" *Selected Paper Prepared for Presentation at the Southern Agricultural Economics Association Annual Meeting*, Tulsa, Oklahoma.

Sue W. and Wong W. (2010). The Political Economy of Housing Prices: Hedonic Pricing with regression Discontinuity. *Journal of Housing economics*; Vol. 19 (2). Pp; 133-144.

United Nations (2012). The Millennium Development Goals Report. New York, USA.

Verbeke W. and Ward R.W. (2003). Importance of EU Label Requirements: An Application of Ordered

Probit Models to Belgium Beef Labels. *Paper prepared for presentation at the American Agricultural Economics Association Annual Meetings.* Montreal, Canada, July 27-30, 2003.

Xu H., Cheng S-W. and Wu C.F.J. (2004). 'Optimal projective three-level designs for factor screening and interaction detection'. *Technometrics*, 46(3):280-292.

Xu L. and Wu L. (2010). Food safety and consumer willingness to pay for certified traceable food in China. Available at (www.interscience.wiley.com). (Accessed on 20 September 2013).

Waltert F. and Schlapfer F. (2010). Landscape amenities and local development: A review of migration, regional economic and hedonic pricing studies. *Ecological economics*, Vol. 70 (2).

Wang Q., Sun J. and Parsons R. (2010). Consumer Preferences and Willingness to Pay for Locally Grown Organic Apples: Evidence from a Conjoint Study. *Hortscience* 45(3):376–381.

Will M. and Guenther D. (2007). Food Quality and Safety Standards.GTZ, 2nd edition, Division 45, Agriculture, Fisheries and Food.

World Bank (2013). World bank development Indicators. Available at *databank.worldbank.org.* (Accessed on 15 October 2013).

World Cancer Research Fund / American Institute for Cancer Research. Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective. Washington, DC: AICR, 2007.

Zaibet L., Batcha SM., Lajimi A. and Abbassi M. (2008). Consumers' Perception of Food Product Quality in Tunisia. *Journal of International Food and Agribusiness Marketing.*

APPENDICES

Appendix 1: Survey Questionnaire

ASSESSMENT OF CONSUMER AWARENESS AND PREFERENCES FOR QUALITY CERTIFICATION AND ORIGIN-LABELING IN FRUIT SALADS IN KIGALI, RWANDA

INTRODUCTION TO THE RESPONDENT

This research is being undertaken by the Department of Agricultural Economics, University of Nairobi, Kenya. The purpose of this study is to get consumers' awareness, perceptions and preferences on fruit salad quality in Rwanda. Fruit salad is a mixture that consists of different types of fruits which are peeled and cut into small pieces; it can contain two fruits or several different fruits. Labeled and certified fruit salads are healthy and safe to consume and can serve to overcome micronutrient deficiencies. Respondents for this survey shall be fruit salad consumers or decision makers in the household (household head) who must be at least 15 years old. The information gathered will be used to guide policies targeting improved fruit salad safety and quality in marketing. When answering, please remember that there are no correct or wrong answers. I can assure you that your identity and answers will remain confidential and only be used for academic purposes and policy making. For any other clarification please contact Ms UWAMARIYA Beatrice (beanunu@yahoo.fr, +250788516435). The interview will require about one hour to administer. I am looking forward your honest opinion.

Screening questions

1. Do you consume fruit salads? 1. YES 2. NO
2. Are you the main shopper of fruit salads that you consume? 1. YES 2. NO

IDENTIFICATION

Date of interview:

Enumerator:

Entered by: Date of data entry:

Fill in the correct information

I. Location	II. Point of interview	
1.District	1.Home/Residential area	5.Supermarket
2.Sector	2.Open market	6.Place of work
3.Village	3.Specialty store	7. Other, specify……..
4.Cell	4.Restaurant/hotel	
5. Zone		

SECTION A: FRUIT SALADS PURCHASE AND CONSUMPTION BEHAVIOUR

1. Where do you normally buy fruit salads? (1=open market, 2=roadside market, 3=restaurants/hotels, 4=supermarket, 5= other, specify……)
2. Which fruit mixture do you prefer for a salad?.....

Fruits	1.Avocados 2.Apples 3.Bananas 4.Mangoes 5.Oranges 6.Pineapples 7.Papaya 8.Watermelon
Fruits mixture	

3. How frequently do you and your household consume fruit salads? (1=daily, 2=weekly, 3=occasionally, 4=other, specify……)
4. At what price do you normally buy fruit salads?.....)
5. How much do you spend on fruit salads per month?.....)
6. How important do you normally consider the following aspects when you buy fruit salads?

Fruit purchase factor	1=very important	2=important	3=not important	4=not sure
Taste				

Quality and safety				
Nutritional content				
Price				

7. How important do you consider the following aspects in your fruit salads purchase decision?

Quality and safety aspects	1= very important	2= important	3= not important	4=not sure
Quality labels				
Origin/place of production				
Fruit mixtures				
Vendor's health and hygiene				
Cleanliness of point of sale				
Quality and safety inspection				

8. Do the fruit salads you buy have labels? (1=YES, 0=NO). If NO, go to section B

9. Do you read fruit salads labels? 1=YES 0=NO

10. How important are these aspects to you in fruit salads package label?

Label aspect	1=very important	2=important	3=not important	4=not sure
Nutritional information				
Storage instructions				
Brand name				
Size/Quantity				
Quality inspection/certification indicator				
Price				
Origin of production				
Producer's identity				
Organic/non-organic label				

SECTION B: AWARENESS AND PERCEPTIONS ON FRUIT SALAD QUALITY AND SAFETY

11. Are you aware of quality certification in fruit salads? 1=YES 0=NO

If YES what was your main source of information? 1. Radio, 2.TV, 3.News paper, 4.Meetings/seminars, 5.School, 6.Other, specify.....)

If NO, what are the reasons?.....)

If YES, what are the motivations of consuming certified fruit salads?.....

12. Are you aware of origin labeling in fruit salads? 1=YES 0=NO

If YES, sources of information? 1. Radio, 2.TV, 3.News paper, 4.Meetings/seminars, 5.School, 6.Other, specify..... ……)

If NO, what are the reasons?.....)

If YES, what are the motivations of consuming fruit salads that you know the country of origin?.....)

13. How important do you consider the following as a signal of quality?

	1=very important	2=important	3=not important	4=don't know
Brand name				
Packaging				
Personal hygiene				
Cleanliness of the point of sale				
Country of Origin				
Quality inspection (RBS)				

14. What is your opinion on the following aspects of fruit salads?

Statement	1=strongly agree	2=agree	3=disagree	4=uncertain
Certified fruit salads are safe to consume				
Domestic fruit salads are safe to consume				
Imported fruit salads are not safe to consume				

15. To what extent do you trust the following statements of fruit salads?

	1=highly trust	2=somehow trust	3=don't trust at all	4=not sure
Fruit salads in supermarkets are safe to consume				
Fruit salads sold on open markets are safe to consume				
Fruit salads sold in restaurants/hotels are safe				
Only fruit salad made at home are safe				

16. Have you heard or read about possible health problems related to consuming unsafe fruit salads? (1=YES, 0=NO).
    If YES, specify the health problems (1. Diarrhea 2.Vomiting 3. Stomach pain 4.Nausea)
17. In the case of food scandal on fruit salads (e.g., poisoning), do you trust the information on food quality from the following persons or organizations?

	1=Trust	2=Do not trust
Farmers		
Public food authorities/officers		
Food scientists		
Media/press (e.g., TV, radio)		
Supermarkets		
Consumer organizations		
Politicians		

18. What role should play the following organizations on monitoring license, regulation and formal training for traders on preparation of fruit salads:

	1=very important	2= important	3=not important	4=don't know
Rwanda Bureau of standards (RBS)				
Food nutritionist				
Public health officials				
Media-Radio, TV				
Consumer organizations				
Farmers				
Traders				

18. What role should play the following organizations on price regulation and transportation of fruit salads :

	1=very important	2= important	3=not important	4=don't know
Rwanda Bureau of standards (RBS)				

Food nutritionist				
Public health officials				
Media-Radio, TV				
Consumer organizations				
Farmers				
Traders				

19. In fruit salads marketing, how concerned are you with the following fruit salad hygiene practices and aspects of vendor's personal hygiene?

	Relative importance (1=very concerned, 2=somewhat concerned, 3=not concerned, 4=unsure)
Fruit salad hygiene practices	
Preparation and storage	
Handling	
Serving	
Quality of water and fruits used	
Vendor's hygiene	
Personal cleanliness	
Cleanliness of clothes, hands and fingernails	
Health of vendor	
Behaviours while preparing fruit salads (coughing)	

20. Have you experienced food-borne illnesses due to consumption of fruit salads?
    1. YES 0. NO.
    If YES, which one? (1.Diarrhea 2.Vomiting 3.Stomach pain 4.Nausea)

SECTION C: CHOICE EXPERIMENT ON FRUIT SALADS

The current study categorizes fruit salads quality attributes into compulsory and optional attributes. The compulsory quality attributes are those which involve legal practices and an inspection process conducted by governmental authorities or other agencies to ensure a product's safety and adherence to standard regulations. In the fruit salad industry, they include safety management practices such as quality of fruit used, process standards (non use of additional chemicals), labeling program (e.g; labeled products with all information about the product), conditions of sale (e.g; non use of plastic bags) and others. The optional or voluntary quality attributes are those which are not mandatory and consumers have choice over them. They include fruit mixture, packaging, labeling, price and others.

Suppose you are asked to provide you opinions on fruit salads. You are required to choose the best combination of voluntary features/attributes that should be considered for improving fruit salads quality.

Voluntary features of fruit salads

ATTRIBUTE	DESCRIPTION	ATTRIBUTE LEVELS
Type of fruits	Organic or conventional	Organic, Conventional
Fruit Mixture	Combination of fruits: (Selected fruits are grouped into 3 according to their composition)	Vit. A and Vit. C Vit.C and Fats Vit.A, Vit. C and fats
Vendor's health	Regular inspection to ascertain vendor's personal health and hygiene	Yes, No
Certification	Which institution should do safety inspection and certification?	Public(e.g. RBS), Private (e.g. Consumers org.) Public and private agency
Origin labeling	Show place of origin and producer identity	Domestic, Imported
Price	Different prices according to the fruit mixture	1000, 1300, 1500 Rwf

Questions on choice experiment responses

22. How sure are you about the choices you made in the fruit salads options? (1=very sure, 2=sure, 3=probably sure, 4=not sure)

23. Were you considering and comparing all attributes before you made a choice? (1=YES, 0=NO)

24. Are there specific attributes that you were looking for in each choice option before you made each decision? (1=YES, 0=NO). If YES, please list them …….

25. Are there specific attributes that you were ignoring for in each choice before you made each decision? (1=YES, 0=NO). If YES, please list the ignored attributes……)

26. Is there any other factor that influenced your responses to the choice experiment questions besides the information given?.....)

SECTION D: SOCIO-DEMOGRAPHIC CHARACTERISTICS

27. Household composition and age structure

Member	Age	Age category (1=young children<5years, 2=adolescents 13-17years, 3=adults18-59 years, 4=elders>60years)
Respondent		
Male members (how many)		
Female members (how many)		

Respondent information

28. Gender	1.Male 0.Female
29. Marital status	1.Single 2.Married 3.Widowed 4.Divorced 5.Separated
30. Main occupation	1.Trader 2.Civil servant 3.Teacher 4.Taxi driver 5.Crop farmer 6.Motocycle operator 7.Other, specify……
31. Formal education level	1.None 2.Primary 3.Secondary 4.Certificate 5.Diploma 6. Degree 7.Other, specify……
Years of formal schooling completed	

32. Average household monthly net income

Income category	Tick category	Average amount
0-50,000		
50,000-100,000		
100,000-200,000		
200,000-300,000		
300,000-over		

Thank you for your participation!

Appendix 2: Checklist questions used in the focus group discussions
UNIVERSITY OF NAIROBI

ASSESSMENT OF CONSUMER AWARENESS AND PREFERENCES FOR QUALITY CERTIFICATION AND ORIGIN-LABELING IN FRUIT SALADS IN KIGALI, RWANDA.

FOCUS GROUP DISCUSSION QUESTIONNAIRE

JUNE, 2013

The purpose of focus group discussion is to obtain preliminary insights on knowledge of fruit salad quality and safety issues that are relevant to choice experiment design procedure.

Questions for discussion

1. Are you aware of quality certification and origin labeling in fruit salads?
2. What would you consider to be safe fruit salads and what are the main quality and safety issues/challenges in fruit salads?
3. Where do you normally buy fruit salads? (1=open market, 2=roadside market, 3=restaurants/hotels, 4=supermarket, 5= other, specify……)

4. How much do you purchase fruit salad?

5. How important do you normally consider the following aspects when you buy fruit salads?

1. Price 2. Nutritional issues 3. Quality inspection label 4. Country of origin

5. Organic/ecological production 6. Health of the vendor

6. In your opinion, how should the following (farmers, households, retailers) enhance fruit salad quality and safety?

7. What is the importance of fruit salads in human life?

Consider the attributes of fruit salads as described below:

ATTRIBUTE	**DESCRIPTION**	**ATTRIBUTE LEVELS**
Type of fruits	Organic or conventional	Organic Conventional
Fruit Mixture	Combination of fruits: (–Selected fruits are grouped according to their vitamins content. Fruits rich in Vit.A,(bananas, mangoes) fruits rich in Vit.C(oranges, pineapples) and fruits with fats(avocados)	Fruits rich in Vit. A and fruits rich in Vit.C Fruits rich in Vit.C and fruits rich in Fats A mixture of fruits rich in Vit.A, Vit. C and fats
Vendor's health	Regular inspection to ascertain vendor's personal health and hygiene	Yes No
Certification	Which institution should do safety inspection and certification?	Public agency Private agency Public and private agency
Origin labeling	Show place of origin and producer identity	Domestic Imported
Price (400 grams)	Different prices according to the fruit mixture	1000 1300 1500 (Rwf)

Do these attributes adequately describe fruit salads?

Appendix 3: Choice experiment design syntax

1. **Orthogonal design for pre test survey**

Design

; alts = alt1, alt2

; rows = 36

; block = 6

; orth = sim

; model:

U(alt1) = b0+b1*x1[0,1]+b2*x2[0,1,2]+b3*x3[0,1]+b4*x4[0,1,2]+b5*x5[0,1]+b6*x6[0,1,2]/

U(alt2) = b1*x1 +b2*x2 +b3*x3 +b4*x4 +b5*x5 +b6*x6$

2. **Efficient design for actual survey**

Design

;alts = alt1, alt2

;rows = 24

;block = 6

;eff = (mnl,d)

;model:

U(alt1) = b1[1.007]*x1[0,1]+b2[0.468]*x2[0,1,2]+b3[0.991]*x3[0,1]+b4[0.583]*x4[0,1,2]+b5[0.498]*x5[0,1]+b6[-0.0006]*x6[0,1,2]/

U(alt2) = b1 *x1 +b2 *x2 +b3 *x3 +b4 *x4 +b5 *x5 +b6 *x6$$

Appendix 4: List of all choice sets used in the choice experiment survey

PROFILE ONE

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Domestic	Imported	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public	Public and Private	
Origin labeling	Imported	Domestic	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1000	1500	
Which ONE would you prefer?			

PROFILE TWO

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Imported	Domestic	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Domestic	Imported	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Domestic	Imported	
Price	1300	1300	
Which ONE would you prefer?			

PROFILE THREE

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Imported	Domestic	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	Yes	No	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Domestic	Imported	
Price	1300	1300	
Which ONE would you prefer?			

PROFILE FOUR

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Imported	Domestic	
Price	1300	1300	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	Yes	No	
Certification	Public	Public and Private	
Origin labeling	Imported	Domestic	
Price	1000	1000	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	No	Yes	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1500	1000	
Which ONE would you prefer?			

PROFILE FIVE

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C	Vit A, C, fats	
Vendor's health	No	Yes	
Certification	Public and Private	Public	
Origin labeling	Imported	Domestic	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	Yes	No	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1300	1300	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Domestic	Imported	
Price	1500	1000	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Private	Private	
Origin labeling	Imported	Domestic	
Price	1000	1500	
Which ONE would you prefer?			

PROFILE SIX

Scenario 1

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C, Fats	Vit A, C	
Vendor's health	Yes	No	
Certification	Public	Public and Private	
Origin labeling	Domestic	Imported	
Price	1000	1500	
Which ONE would you prefer?			

Scenario 2

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit A, C	Vit A, C, Fats	
Vendor's health	Yes	No	
Certification	Public and Private	Public	
Origin labeling	Domestic	Imported	
Price	1300	1300	
Which ONE would you prefer?			

Scenario 3

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Organic	Conventional	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Public	Public and Private	
Origin labeling	Imported	Domestic	
Price	1300	1300	
Which ONE would you prefer?			

Scenario 4

Fruit Salad Attribute	Fruit Salad type A	Fruit Salad Type B	Neither
Type of fruits	Conventional	Organic	
Fruit Mixture	Vit C, Fats	Vit C, Fats	
Vendor's health	No	Yes	
Certification	Private	Private	
Origin labeling	Domestic	Imported	
Price	1300	1300	
Which ONE would you prefer?			

Appendix 5: Binomial Logit Command

```
LOGIT; Lhs=AWARECOO
   ;Rhs=ONE,RESIDAREA,PLACEPURCH,CONSFREQU,READLAB,INFANTME,EDUC,INCOME
   ;Marginal effects$
```

Appendix 6: Multinomial Logit Commands

1. Parameters for fruit salads attributes

```
Sample; all$
--> RPLOGIT; Lhs=CHOICE
   ;CHOICES=1,2,3
   ;Rhs=ORGANIC,VITCFATS,VITACFAT,YES,PRIVATE,PUBPRIV,IMPORTED,PRICE
   ;FCN=ORGANIC(N),
         VITCFATS(N),
         VITACFAT(N),
         YES(N),
         PRIVATE(N),
         PUBPRIV(N),
         IMPORTED(N),
         PRICE(C)
   ;pds=4
   ;halton
   ;pts=100$
```

2. Willingness to pay estimates

```
WALD; Labels=b1,
                b2,
                b3,
                b4,
                b5,
                b6,
                b7,
                b8,
                b9,
                b10,
                b11
        ;start=b
        ;Var=Varb
        ;Fn1=-1*(b1/b11)
        ;Fn2=-1*(b2/b11)
        ;Fn3=-1*(b3/b11)
        ;Fn4=-1*(b4/b11)
        ;Fn5=-1*(b5/b11)
        ;Fn6=-1*(b6/b11)
        ;Fn7=-1*(b7/b11)
        ;Fn8=-1*(b8/b11)
        ;Fn9=-1*(b9/b11)
        ;Fn10=-1*(b10/b11)$
```

3. Interactions estimates

```
create;GENORG=GENDER*ORGANIC$

create;INFAORG=INFANTME*ORGANIC$

create;EDPRIV=EDUCGROU*PRIVATE$

create;EDPVPB=EDUCGROU*PUBPRIV$

create;INCOMIMP=INCOMEGR*IMPORTED$

create;AGEORG=AGE*ORGANIC$

sample;all$

NLOGIT; Lhs =CHOICE

   ;Choices =1,2,3

;Rhs=ORGANIC,VITCFAT,VITACFAT,YES,PRIVATE,PUBPRIV,IMPORTED,EDPRIV,INCOMIMP,GENORG,PRICE$
```