CONSUMER WILLINGNESS TO PAY FOR THE COLOUR OF COOKING OIL: A COMPARISON OF RURAL AND URBAN CONSUMERS' IN TANZANIA

JADIDA SADICK KAHANGWA

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL AND APPLIED ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2020

ABSTRACT

Colour is considered an important parameter consumers take into account during product evaluation. However, this attribute may be lost or altered during processing of the product. Sunflower is one of the Tanzanian priority crops under the Agricultural Sector Development Programme Phase Two (ASDPII). To ensure food safety, it requires that all cooking oil sold in the market is double refined. This study is about consumer preferences and Willingness to Pay (WTP) for the colour of cooking oil among rural and urban consumers in a developing country. In addition to this, the study also determine the effect of information about the level of refinement on the WTP for the colour of cooking oil. Using the multiple price list format in eliciting consumers WTP, an interval regression model was estimated. The study identified health considerations, naturalness and sensory taste as the most important factors influencing consumer preference and WTP for the colour of cooking oil. The study found that without information, the average WTP for dark, light and very light cooking oil were TZS 3288/litre, TZS 3096/litre and TZS 2756/litre respectively. It was also found that urban consumers reduced their WTP for dark oil after getting information by 30.1% while rural consumers increased their WTP by about 7.2% regardless. On the other hand, both rural and urban consumers increased their average WTP for very light oil by about 26% when they received information. Furthermore, estimates from the interval regression model revealed that very light-coloured cooking oil was discounted in the absence of any information, but that changed once consumers were exposed to information on the level of refinement. With information, urban consumers were willing to pay significantly higher for very light cooking oil followed by light cooking oil and dark cooking oil than their rural counterparts. The study recommended that the government should embark on educating the population to allay fears that pushes them away from very light cooking oil and also government can revisit its policy on double refined cooking oil and make room for consumers who prefer unrefined due to health concerns.

DECLARATION

I, Jadida Sadick Kahangwa, do hereby declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____ _____

Jadida Sadick Kahangwa Date

(MSc Candidate)

Above declaration is confirmed by;

_____ _____

Dr. Roselyne A. Date

(Supervisor)

ACKNOWLEDGEMENT

First, I would like to thank God Almighty for giving me the strength, knowledge, ability and opportunity to undertake this research study and complete it satisfactorily. Without his blessings, this achievement would not have been possible.

In my journey towards this degree, I wish to express my sincere appreciation to my supervisor Dr. Roselyne Alphonce who made this work possible. Her friendly guidance and expert advice have been invaluable throughout all stages of the work and I shall eternally be grateful to her for her assistance.

My deepest gratitude goes to all of my family members. It would not be possible to write this dissertation without the support from them. I would like to thank my dearest father Sadick Kahangwa, my mother Olivia Mkilima and my sister Jasmin Sadick without forgetting my beloved husband Augustino Ngallo. They kept me going on and this work would not have been possible without their input.

I have great pleasure in acknowledging my gratitude to my beloved friend Jonathan Atta-Aidoo. He was always able to put things in perspective and provide inspiration when the rigours of research and dissertation writing seemed too much to handle.

Finally, I would sincerely like to thank all my beloved friends who were with me and support me through thick and thin. Most importantly I would like to thank Ester Cosmas, Ritha Luoga and Getrude Jackson.

DEDICATION

This dissertation is dedicated to my dearest and supportive family especially my parents, my father Mr. Sadick Kahangwa and my mother Olivia Mkilima for their financial, spiritual support and encouragement throughout my education.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABREVIATIONS AND SYMBOLS

ANOVA	Analysis of Variance
ASDP	Agricultural Sector Development Programme Phase
ASPIRES	Agricultural Sector Policy and Institutional Reforms Strengthening
BIDCO	Business and Industrial Development Corporation
FAO	Food and Agricultural Organization of the United Nations
GM	Genetically Modified
HIPM	High-iron Pearl Millet
LPM	Local Pearl Millet
MeTL	Mission Essential Task List
MPL	Multiple Price List
PCA	Principal Component Analysis
TZS	Tanzania shillings
URT	United Republic of Tanzania
WTP	Willingness to Pay

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Food quality, safety and availability are globally considered important aspects for human development (Caballero, 2013). Studies in different parts of the world have shown that consumers value food safety, quality and other attributes (Grunert, 2005), hence are willing to pay more for products with higher perceived quality. The perceived quality of a product is regarded as an important competitive factor for companies, which can increase their market share and profitability (Magnier *et al*., 2016). In this regard individual consumers are usually willing to pay more for products with higher perceived quality (Dawar and Parker, 1994).

Colour plays an important role in people's perception of food and it's also a key aspect of food quality (Bovšková *et al.*, 2014; Fukuda *et al*., 2014; Muneeshwari *et al*., 2017). According to Fukuda *et al*. (2014) colour is considered to be one of the most important parameters which is taken into account during evaluation of a product by consumers; however, this attribute may be lost or altered during processing of the product.

Generally, foods that fall outside the range of acceptable colours are rejected by consumers because colour is not only related to chemical or physical properties (Pedro and Ferreira, 2005; Meléndez-Martínez *et al*., 2007) but also to consumers' perception of quality (Francis, 1995). Most studies (Zampini *et al*., 2008; Wadhwani and McMahon, 2012; Wei *et al.*, 2012) have stated that, the colour of food affects other subjective quality factors such as flavour, odour or sweetness and hence affect p consumers' decision on future purchases

of the product. Therefore, this study aimed at exploring consumers' willingness to pay (WTP) for the colour of cooking oil and how information on the level of refinement affect their WTP for the colour of oil.

Knowing the qualities of cooking oil that are acceptable by consumers will enable the development of quality cooking oils that the end users prefer. Results of this study provide important information to cooking oil producers and processors to help them understand the importance consumers attach to the different measures of quality. Furthermore, the findings of this study contribute to policy reform regarding the level of refinement of cooking oil in Tanzania.

1.2 Problem Statement and Justification

The demand for refined vegetable oil has been on the increase worldwide over the years (Egbuna, 2015). The overall demand for different types of edible oil in Tanzania is estimated to be between 300 000 and 400 000 tonnes annually; this however, is expected to increase at an annual growth rate of 3% due to population growth and changing health concerns (Mgeni *et al*., 2017; Salisali, 2017). The latest estimates revealed that Tanzania produces 352 908 tonnes of sunflower (URT, 2016) but is able to process only 152 850 tonnes into sunflower oil (FAO, 2019), while the remainder is exported mainly to India in form of sunflower cakes. The insufficient production locally to meet growing demand has caused Tanzania to import more than half of the edible oil consumed locally at a cost of US$ 83 million annually (URT, 2016).

To close the importation gap, the government has considered sunflower oil seed as one of her priority crops under the Agricultural Sector Development Programme Phase Two (ASDP-II), and to ensure food safety, it requires that all cooking oil sold in the local market

is double refined (URT, 2016). The process of double refining oil influences the sensory and chemical attributes; unrefined oils have more pronounced colour (darker), flavour (strong smell), nutrition but a shorter storage life (Bendini *et al*., 2012; Gotor and Rhazi, 2016). Hence the level of refinement is likely to influence consumer preferences and WTP. Since oil colour is one of the sensory attributes that can differentiate the level of refinement of cooking oil, and is associated with a sensory effect/palatability of a product (odour/taste), nutrition and safety (Zampini *et al*., 2008; Wadhwani and McMahon, 2012; Wei *et al*., 2012; Gotor and Rhazi, 2016). This study aims at assessing consumer preference for the colour of sunflower cooking oil; and the preference for the colour of sunflower cooking oil when information about the level of refinement is given. We therefore hypothesize that; consumers prefer light to dark coloured oil and that consumers receiving information on the level of refinement are willing to pay an extra price for light coloured oil.

Grunert (2005) indicated that consumer studies conducted in different parts of the world have shown strong preference for food safety and quality, hence consumers are willing to pay more for products with higher perceived quality. Since food colour is related not only to the chemical and physical properties of the food, but also to consumer perception of the product quality (Francis, 1995), foods that fall outside the range of the acceptable colour are usually rejected (Pedro and Ferreira, 2005; Meléndez-Martínez *et al*., 2007). Colour is regarded as an important component of quality throughout the agricultural and food industries (McCaig, 2002).

Labrecque *et al*. (2013) pointed out that little attention has been paid to research on colour even though there are numerous effects of different colours on consumers' choices. In this regard, consumers' perceptions have been overlooked in literature in spite of the fact that

most product assessments by customers are based on colours alone. Some studies that have looked at the effect of colour on consumer choice include Alfnes *et al*. (2006) who indicated that consumers were willing to pay significantly more salmon fillets with colour above the normal redness. Borgogno *et al*. (2015), Funk and Ndubisi (2006), and Singh (2006) studied the colour of meat and indicated that consumers identified and considered colour as an intrinsic quality that positively affected their choices. This study adds on to the limited body of literature on consumer preference for the colour of food by including a developing country perspective with an aspect of both rural and urban consumers. The study goes further and links consumer purchasing habits with their preference and WTP for the cooking oil.

1.3 Objectives of the Study

1.3.1 Overall objective

The overall objective of this study is to assess consumer preference for the colour of cooking oil in urban and rural Tanzania.

1.3.2 Specific objectives

i. To determine consumer WTP for the colour of cooking oil.
ii. To determine the effect of information on the level of refinement on consumer WTP for the colour of cooking oil.
iii. To identify factors influencing consumers' preference for cooking oil.

1.4 Research Question

What are the factors affecting consumers' preference for cooking oil?

1.5 Hypotheses

i. Colour of cooking oil has no influence on consumer WTP for cooking oil

ii. Information on the level of refinement has no influence on consumers' WTP for the colour of cooking oil.

1.6 Organisation of the Study

This dissertation is organised into five chapters. Chapter one presents the background, problem statement and justification, research objectives, question and hypotheses. Chapter two presents an overview of the edible oil sector of Tanzania, theoretical literature and model, empirical literature and conceptual framework. Chapter three presents study area and study design, source of data and the analytical procedure for analyses. Chapter four presents the discussion of the results. Chapter five finally presents the conclusions and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definition of Willingness to Pay

The concept of consumer' WTP according to Sylivia (2014) refers to the maximum amount a person would be willing to pay or sacrifice in exchange for a good. It is the premium price to be paid by consumers to purchase a product or to enjoy a service (Hui *et al.,* 2013). The aim of a consumer is to maximize utility. Therefore, if the good or service has high utility to the consumer, then the consumer will be willing to pay for such good or service for his/her satisfaction; and if the good or service has little and does not satisfy the consumer's utility, then he willing not be willing to pay for such good or service (Mussa, 2015).

2.2 Edible Oil Sector in Tanzania

There are several types of edible oil on demand in the Tanzanian market, these include; palm oil, sunflower oil, cotton oil, as well as groundnuts oil as well as other vegetable oils. Although palm oil accounts for 64 % of edible oil demand, sunflower oil is the dominant edible oil produced domestically (Dalberg, 2018). The production of sunflower oil in Tanzania has increased over the years from 52 000 metric tons in 2005 to 163 000 metric tons in 2017 (Salisali, 2017). Balchin *et al*. (2018) reported that, a breakdown of the 180 000 metric tons of edible oil produced in Tanzania annually consist of 90 % sunflower oil, 8 % cotton oil and approximately 1.5 % palm oil. However, there are only a few large-

scale processors of edible oils in Tanzania. In the case of sunflower oil, the major players are Mt Meru Millers 4 (producing the Sunola and Singida Fresh brands) and Sunshine – a Chinese factory (producing the Sunbelt brand) in Dodoma; while the major players of palm oil are Murzah Oil (producing Korie and Sundrop brands) and MeTL or East Coast Ltd (producing the Safi brand). BIDCO – a Kenyan investment (producing the Kimbo brand) was resuming production and could be the third major player (Balchin *et al.*, 2018).

In Tanzania emphasis is placed on sunflower oil since it is the largest domestically produced oil. Tanzania accounts for 23.1 % of Africa's total sunflower oil production Yang *et al*., 2017) making it also an important producer in Africa. A report by (Balchin and Mendez-Parra, 2016) listed Tanzania among the ten largest sunflower producers of the world and second largest in Africa after South Africa.

2.3 Theoretical Literature

This study is based on the neoclassical consumer theory which provides the analytical framework for analysing demand behaviour based on utility maximisation subject to a budget constraint (Deaton and Muellbauer, 1980). The utility function measures the satisfaction that the consumer gets from consuming goods and the budget constraint represents the financial limitations of the consumer.

2.4 Theoretical Model

The utility function of an individual may be written as u(x, q) where x= x_1… x_n is a vector of private goods and q= q_1,…q_n is a vector of public goods.

An individual maximises utility subject to income y. The indirect utility function v(p, q, y) is given by:

$v(p, q, y) = \max\{u(x, p)|p.x \leq y\}$ …… (1)

The minimum expenditure function m(p, q, u) is the dual to the indirect utility function given by:

$m(p, q, u) = \min\{p.x|u(x,q) \geq u\}$……..... (2)

The derivative of the expenditure function yields the compensated demand function with subscript indicating partial derivative;

$x_i(p, q, u) = m_{pi}(p,q,u)$ ……...… (3)

The negative of the ratio of derivatives of the indirect utility function yields the Marshallian or ordinary demand curve:

$x_i(p, q, y) = \frac{-Vpi}{Vy(p,q,y)}$ ……..

…… (4)

Welfare measures may be directly calculated from the utility functions. Welfare measures or descriptions of changes in well-being may be explained by the concept WTP.

WTP measures the maximum amount of income the individual will be willing to pay for an improvement in their circumstances (utility maximisation) or maximum amount an individual is willingness to pay to avoid a decline in circumstances. WTP is defined using the indirect utility function as:

$v(p, q^*, y - WTP) = v(p,q,y)$ ……..…….... (5)

Following Haab and McConnel (2002), this indirect utility function can be written as:

$U_{ij} = u(y_j, Z_j, \varepsilon_{ij})$ ……..……...…. (6)

Where i is the dichotomous choice and j is the respondent. The determinants of utility are y_j, the j^{th} respondent's income, Z_j, a vector of respondent characteristics and attributes of the choice and ε_{ij}, unobserved factors.

2.5 Empirical Review

2.5.1 Factors that Influence Consumers' Willingness to Pay (WTP)

Danso-Abbeam *et al.* (2014) used an independent double-hurdle model to determine willingness to pay for farm insurance to smallholder cocoa farmers in Ghana. The study found that marital status, educational attainment, farm land ownership, farmer's awareness of insurance scheme and income of cocoa farm were factors significantly influencing farmers willing to pay for premium insurance. Another study by Anyam *et al.* (2013) in the Lagos Metropolis of Nigeria analysed the factors driving WTP, the effect of attributes on WTP and mean WTP for improved bread by using descriptive statistics and conditional logit regression model. The results revealed that price and the non-monetary attributes namely, bromate label, certification, nutritional label, flavour and texture were significant in explaining consumer's choices.

Muhammad *et al*. (2015) on factors affecting consumers' willingness to pay for certified organic food products in United Arab Emirates used a regression model to identify major determinants of consumers' WTP for the organic food. Age, nationality, education, household size and income were deciding factors for consumers' willingness to pay a higher price for organic food. A study by Nandi *et al.* (2017) in India on the factors influencing consumers' willingness to pay for organic fruits and vegetables used the contingent valuation method to estimate WTP. A binomial logistic regression model was applied to obtain the value of WTP and determined the factors. The results indicated that about 90% of the consumers were willing to pay a premium price ranging between 5% to more than 100% in order to acquire better-quality fruits and vegetables; factors such as family income, size of the family, gender, and other opinion variables such as chemical

residue in conventional foods, trust on retailers, taste, and environmental concerns significantly influence consumers' WTP.

Wang and Huo (2016) studied Chinese consumers' willingness-to-pay price premiums for certified fruits by using a probit model. They observed that, gender, education background and monthly income were the positive deciding factors for consumer WTP a premium price for certified fruits. Also, better knowledge, higher confidence in certified fruits, quality and purchase convenience fostered consumer WTP.

Yang *et al*. (2012) using an interval regression investigated how individual demographic and consumption characteristic impacted consumers' WTP observed that many factors such as age, household head, income, and marital status had a significant impact on WTP, a finding consistent with most previous studies. Although the study revealed that ethical and environmental concerns were not significant factors that influenced WTP of consumers in China.

2.5.2 Effect of colour on consumers' WTP

The evaluation of colour is of upmost importance since colour preferences is closely related to purchasing decisions by consumers (Capenter *et al.,* 2001). Labrecque and Milne (2012) in a research involving medicine's colours showed that colour was about three times more important than retail price in shaping consumers' purchase decisions and that packaging colour also plays an extremely vital role in communicating with customers.

Shen and Gao (2018) revealed that colour significantly affected WTP estimates for certain attribute on food labels. Alfnes *et al.* (2006) indicated that consumers were willing to pay

significantly more for salmon fillets with normal or above-normal redness, as compared with paler salmon fillets. This was because consumers saw the colour of salmon as an indicator of flavour and freshness, and that redness contributes significantly to the overall enjoyment of salmon. A study by Yang and Seo (2016) concluded that, light colour modulates consumers' willingness to eat and their hedonic impressions of foods, especially apples and bell peppers and hence colour had an effect on consumers' WTP.

By using hedonic price analysis to determine consumers' willingness to pay for quality of beef and factors affecting it in Kampala-Uganda, Alinda *et al.* (2016) reported that beef attributes such as bone content, fat content, colour of the lean and the colour of fat significantly influenced the willingness to pay of consumers. The authors concluded that colour played a significant role in determining the willingness to pay of consumers.

Hung and Verbeke (2018) conducted a study of the sensory attributes shaping consumers' willingness to pay for newly-developed processed meat products in Netherlands and Belgium. By using elastic net regularised regression model models and regression tress for the analysis, the authors found that, a better rating of colour positively influenced consumer willingness to pay but darker colour of meat negatively influenced willingness to pay.

García-Torres *et al*. (2016) in their study to analyse consumers' preferences for two types of beef in Spain by comparing them with conventionally produced beef adopted sensory evaluation and conjoint analysis combined with a cluster analysis. The study estimated the conjoint model using OLS and found that the colour of meat was the most important attribute (30.27%) consumers considered in forming preferences followed by origin and price.

Brščić *et al*. (2017) used descriptive statistics, t-test, ANOVA and Principal Component Analysis (PCA) to examine consumer attitudes of 1008 respondents towards both intrinsic and extrinsic attributes of honey in Croatian markets and found that colour played an important role in consumers' preferences. The consumers preferred honey with brighter colour as compared to darker coloured honey. Borgogno *et al*. (2015), in their study on meat, identified colour as one of the intrinsic quality cues strongly associated with customers' expectations while shopping.

Ngapo (2017) conducted a study to identify the most important characteristics of fresh pork that determined consumer choice in five Canadian provinces using a hierarchical cluster analysis. Colour was found to be the second most important factor only after the fat cover. Overall, most respondents showed more preference for dark red pork compared to light red pork with their preferences ranging from 1.7 times more to 2.6 times more depending on the provinces.

A study by Chousou *et al*. (2018) sought to gain detailed knowledge about attributes Greek consumers used to evaluate the authenticity of olive oil. By using a covariate in a mixture of uniform and binomial random variables model to interpret the ordinal data in consumer responses, the study found that both intrinsic and extrinsic attributes were regarded as important by the respondents. Of particular importance was the colour and taste of olive oil in determining the authenticity. It is worth noting that colour is more pronounced since it can help determine the authenticity or otherwise even before tasting takes place.

2.5.3 Effect of information on consumers' WTP

Kajale and Becker (2014) examined the effects of information on consumers' willingness to pay WTP for genetically modified (GM) food. By using (Vickrey 1961) second price experimental auction method for elicitation of consumer WTP for GM potato chips and GM soya-chocolate bar. Their results revealed that when students received the combine information, they were willing to pay around 17% to 20% premium for GMF and when received the negative information they demanded around 22% discount for GMF. While the positive- and the no-information formats alone have no considerable effect on consumers' WTP for GM foods.

Bocher *et al*. (2019) used the Heckman two-stage probit model to investigate the effect of nutritional information on consumer preferences and willingness to pay in Rwanda. The study found out that when consumers were given nutritional information their willingness to pay increased significantly. In conclusion, the authors indicated that nutritional information is an important factor influencing the acceptance and willingness to pay for juice.

By using a random effect model to estimate how consumers' willingness to pay is affected by product characteristics, information and a set of control variables in Nigeria, Oparinde *et al*. (2016) found that, the provision of nutritional information resulted in a large and significant price premium being paid by consumers. With the aim to examine whether Chinese consumers valued local fraud-free honey, Ritten *et al*. (2019) conducted a controlled economic laboratory experiment to determine the role information could play in willingness to pay for honey. The authors concluded that, providing honey laundering

information increased the probability of participants being willing to pay the premium by as much as 27 %.

Ortega *et al*. (2015) used news headlines as “information shocks” to assess the effect of information on consumer preferences among U.S consumers. The authors adopted a random-parameters logit to address the issue of heterogeneity in the sample selected which was split into treatment and control groups. The result of the study revealed that the “information shocks” had statistically significant effect on consumer preferences and their WTP for product characteristics.

A study by Chen *et al*. (2015) to investigate the direct effect of negative information on the WTP for eco-labelled and unlabelled fish and indirect effects of negative information on the WTP for substitutes to the fish type adopted a mixed logit model. The study was designed and carried out as a stated choice experiment for Norwegian seafood in France. The result of the study indicated that negative information reduced the WTP with a larger amount than the premiums of the ecolabels regardless of whether fish is eco-labelled or not.

Another study by Lombardi *et al.* (2019) adopted a seemingly unrelated regression model to analyse consumer preferences for insect-based products of 200 Italian consumers. The study was carried out by an experimental design using a non-hypothetical WTP elicitation mechanism, the multiple price list to investigate the effects of the different types of information on consumer choices. The study found out that consumers’ WTP increased significantly when information on the benefit of consuming insects was provided. On the contrary, consumers regarded insect-based products as either equivalent or weakly inferior when they are not provided with information on the benefit of insect-based products.

By using pairwise comparison and seemingly unrelated regression models Bi *et al*. (2016) undertook a choice experiment study comprising 1000 participants to examine the extent to which providing nutrition information and health benefit information to consumers can impact consumers' choice of seafoods in the US. To get a clearer picture of the impact of nutritional information on seafoods, the authors included several types of proteins. The results of the study found that providing information on nutrition and health jointly did not always increase the mean WTP for seafood more than information on either nutrition or health benefit alone. Information on nutrition significantly increased the mean WTP for all seafood types but had no effect on other proteins. On the contrary, information on health benefits only increased the mean WTP for some types of seafood.

Banerji *et al*. (2016) used the hedonic testing method and the Becker DeGroot Marschak mechanism to examine the impact of information on the health benefits of high-iron pearl millet (HIPM) on consumer preferences for pearl millet in India. The study selected a sample of 452 respondents from three rural areas who were then grouped in two three groups; group A, a control group and groups B and C the treatment groups. Unlike participants in group A, participants in groups B and C were provided with information regarding the nutritional benefits of the HIPM variety. Compared with local pearl millet, consumers were willing to pay 6.5 % more for HIPM in the absence of any information. However, when provided with nutritional information, the mean WTP for HIPM increased by 12 % in group B and 7 % in group C relative to group A. The study concluded that the combined positive impact of information on WTP for HIPM and the negative impact of information on WTP for LPM made participants in group B have a WTP of 32.4 % more for HIPM in comparison to LPM whiles those in group C recording a WTP of 28.6 % more for HIPM relative to LPM.

2.5.4 Methods

Estimation of WTP have been classified into different forms by different authors. According to Breidert (2006) on the highest level, methods of estimating WTP can be distinguished based on the data used be it from surveys or observations. Data from observations can be real market data or data from experiments, and these experiments can either be field or laboratory experiments. Surveys for the estimation of WTP can either be through direct surveys or indirect surveys. Marbeau (1987) made a distinction in measurement methods on the highest level based on whether they were monadic tests or competitive test. The author indicated that in the monadic test, price information is elicited without considering a competitive context unlike the competitive test where a competitive context is present. Any differentiation in estimation methods on the highest level according to Balderjahn (2003) should be based on whether they elicit price information at the individual level or at aggregate level. According to Nagle and Holden (2002) distinguishing methods at the highest level should be based on uncontrolled and experimentally controlled measurement of the variables. Further they classify the techniques based on the variable measurement, dividing into measurement of purchase behaviour and measurement of purchase intention.

Several techniques have been utilised in WTP studies. The Vickrey Auction is a special case of laboratory experiment. Developed by Vickrey (1961), this method provides the incentives for consumers to reveal their true WTP through auctions. The auction takes place in a sealed form, and the purchase price is determined by the second highest bid. Participants in a Vickrey auction submits a bid containing how much he or she would be willing to pay in sealed form, for example in a closed envelope (Breidert, 2006). If the

participant has the highest bid, he or she wins the auction. However, the participant only has to pay the price of the second highest bid. Another procedure using auction is the Becker, DeGroot and Marshak Procedure (BDM), in this procedure every participant simultaneously submits an offer price to purchase a product (Wertenbroch and Skiera 2002). Then, a sale price is randomly drawn from a distribution of prices. The possible prices cover an interval from zero to a price greater than the anticipated maximum price, which any bidder would submit (Breidert, 2006). The bidders whose bids are greater than the sale price receive a unit of the good and pay an amount equal to the sale price.

Conjoint analysis is another technique designed to elicit individuals' preferences for types of products. With this technique, different product alternatives, systematically varying the attributes of the product, are presented to the respondents (Breidert, 2006). In conjoint analysis the explicit trade-offs between attributes that provide a more realistic approach and part worth utilities produced that offer a common scale enabling straight comparison (Murphy *et al*., 2000). A contingent valuation (CV) approach is also used to evaluate consumers' response in the absence of a real purchasing situation. The CV method 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. This approach allows a direct estimation of WTP by means of different (direct) elicitation techniques (Boccaletti and Moro, 2000). Hedonic pricing is another approach used to elicit consumers' WTP. This approach incapsulate the relative importance of each of the attributes of a product in determining its price. Hedonic models suggest that the price consumers are willing to pay for a product is a function of its attributes such as taste, texture, colour and flavour (Akankwasa, 2007).

Discrete choice models are also used to analyse respondent's choice between different products (McFadden, 1980; McFadden, 1986). These models take the form of a probit-model or a logit-model depending on whether the random component is normally or logarithmically distributed (Breidert, 2006). Estimates with discrete choice analysis are obtained only at the aggregate level using the data of all respondents. For discrete choice analysis a latent utility structure for the population that is surveyed is estimated instead of the utility structure for each member of the population individually.

A more recent and advantageous WTP elicitation procedure is where participants' WTP are assessed by applying the incentive-compatible, experimental economics method, MPL, in a non-hypothetical setting. This mechanism has the great advantage of being transparent and very simple to understand for participants. Additionally, as participants bid against a random price, competition, affiliation or collusion do not occur (Lusk and Shogren, 2007). In this approach, before eliciting WTP, participants are provided with a reference range of prices for each product category (Lombardi *et al.*, 2019).

2.6 Conceptual Framework

Adapting from Ulimwengu and Sanyal (2011), we conceptualise that four broad categories of factors determine whether a consumer will be willing to pay for the colour of cooking oil. These are socio-economic factors, information/knowledge, product characteristics and consumer perception. Consumers socio-economic factors as well as product characteristics directly influences consumers WTP. On the other hand, the level of refinement influences consumers' perception and hence their WTP. Knowledge or information about the level of refinement informs the consumers WTP decisions. Diagrammatically, this relationship is illustrated in Fig. 1.

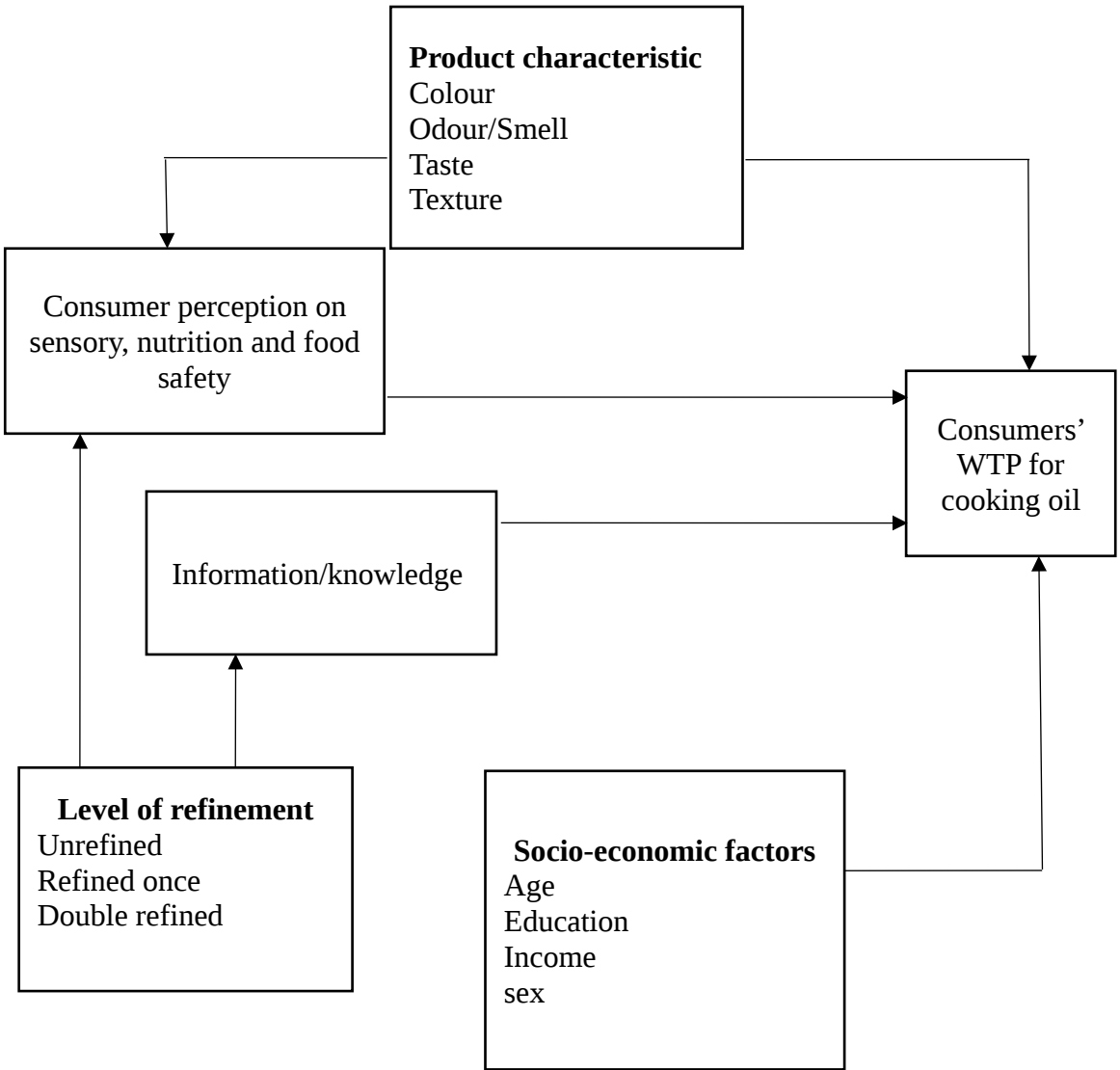
Product characteristic
Colour
Odour/Smell
Taste
Texture
Consumer perception on sensory, nutrition and food safety
Consumers' WTP for cooking oil
Information/knowledge
Level of refinement
Unrefined
Refined once
Double refined
Socio-economic factors
Age
Education
Income
sex

Figure 1: Conceptual framework showing factors that affect consumer WTP for cooking oil

Source: Adapted and modified from Ulimwengu and Sanyal (2011)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

To ensure a good representation of consumers with different socio-economic characteristics, a total of 480 consumers were randomly selected from two urban towns (Morogoro and Dodoma) and four rural towns, two small (Msanga and Matombo) and two big (Turiani and Hombolo). In three types of retail outlets – supermarkets, retail shops and or the local food market .The consumers were randomly selected in three retail outlets.

Since the study targeted food decision makers, only consumers who had bought oil in the past year and were involved in food decision making participated in the experiment. The respondents were interviewed as they exited the shopping premises. Because the majority of the food decision makers are women (Ilkay, 2013), two-thirds of the samples were women. The interviews were conducted on both the day when the periodic market took place and on a non-market day in order to capture a whole range of consumer diversity.

3.2 Study Design

In total, 480 respondents were randomly selected at either a supermarket or a normal retail shop at a traditional local market in two urban and four rural town in Tanzania. The selection of the towns was based on their size and distance from the primary mega city Dar es Salaam. Two urban cities (Morogoro and Dodoma); and four rural towns (two small and two big) were chosen East to West swath from the primary mega city. Morogoro town was chosen as a secondary city closer to the primary mega city, while Turiani was chosen as a

big rural town close to the primary mega city and Matombo as a small rural town close to the primary mega city. Dodoma was chosen as a tertiary town away from the primary mega city, while Hombolo was randomly selected as a big rural town away from the primary mega city and Msanga as a small rural town away from the primary mega city. The rural and urban towns were selected to be able to compare preferences and purchasing habits of urban and rural consumers.

Further in the six towns, the two urban towns; and the two big and two small rural towns; using a between sampling design, consumers were subjected to two treatments based on information on the level of refinement, no information and Information on the level of refinement (double and single refined).

The respondents were asked screening questions and interviewed as they exited the shopping premises. Only consumers involved in food decision making and who had purchased cooking oil in the past year, participated in the study. Because majority of the food decision makers are women, more than half of the sample were women.

3.3 Analytical Procedure

3.3.1 Eliciting consumer preferences and WTP

The study adopted the multiple price list (MPL) format in eliciting consumers WTP (Anderson *et al.,* 2006). MPL is a technique used for non-market valuation and is an extension of the real dichotomous choice method (Lusk *et al*., 2011). MPL confronts the respondent with a column of ordered prices in a table, one price per row, where he/she should answer “yes” or “no” for each price; the selected price indicates the maximum WTP of the respondent for that specific product (Andersen *et al*., 2006).

The price lists had a new price point for every TZS 100. Using the MPL method each participant participated in a hypothetical experiment where they were asked to indicate their willingness to pay for three 250ml bottles of sunflower oil varied only by the colour of oil. By selecting up to the maximum price that they are WTP, we are able to assess the interval containing their true WTP. In the analysis however, the 250ml measurement was converted into litres for easy comprehension and also to reflect the existing market conditions since cooking oils in the markets are sold per litres. Following standard measurement scale, 1 litre was equivalent to 1000ml.

The main advantage enjoyed by MPL for which it was adopted for this study is that, MPL is transparent to subjects, as easy to understand among illiterate consumers, simulates the situation a consumer faces in the store, and provides simple incentives for truthful revelation (Anderson *et al.,* 2007; Alphonce and Alfnes, 2017).

Interval Regression Model

The analysis follows common practice used in multiple price list (MPL) studies and estimate an interval regression model (e.g., Andersen *et al*., 2006; Klain *et al*., 2014; Alphonce and Alfnes, 2017). Interval regression was used because the exact WTP is not known, only an interval around the WTP. The interval regression is adopted because it has been useful to solve the problems of zero answers, skewness, outliers, and the heaping effect present in their data set. The interval regression model is used to investigate how the WTP for cooking oil depends on the oil colour, information on the level of refinement, and on socio-economic characteristics.

The general model was specified as follows:

$WTP_i=\alpha X_i + \beta Z_i + \varepsilon_i$ ……...……..……. (8)

wheae WTP is a latent variable for WTP identified by an upper and lower limit; the subscript *i* for respondent, α and β are coefficient vectors; X is the vector of socio-economic variables; Z is the vector of normative and affective variables (in this study: oil colour, information on level of refinement and area of residence) and ε is the error term.

The model was specified as follows:

$WTP = \beta_0 + \beta_1 Color_i + \beta_2 Info + \beta_3 Educ + \beta_4 Age + \beta_5 Colour_i ## Info + \beta_{6i} lnIncome + \beta_7 Educ ## Information + \beta_8 Area$ ……..……..……..….(9)

Where *WTP* is a latent variable for willingness to pay identified by an upper and lower limit; colour is the colour of the oil, info is level of information available to the respondent (1=information and 0=no information), Area is the place of residence of respondent (1=urban and 0=rural), Educ is the level of education of the respondent, Age is the age of respondent, and lnIncome is the monthly income; β_1 β_2 β_3 β_4 β_5 $\beta_6$$\beta_7$and $\beta_8$are the coefficients of the variables.

3.3.2 Garret ranking technique

To identify the factors affecting consumers' preferences for cooking oil, the Garret Ranking Technique was used to decide the major factors that affect consumers' buying decision of cooking oil. To find out the most important factors that affect consumers' buying decision of cooking oil, respondents were asked to assign ranks to identified factors that influenced buying decisions. This method was used to complete the ranking of the various factors based on the ratings of respondents that are converted into certain ranks (Dhanavandan, 2016). The order of merit given by respondents was converted into ranks using the formula as follows:

Percentage position = $\frac{100\left(R_{ij}-0.50\right)}{N_j}$ ……

(7)

Where Rij = Rank allotted for ith problem by the jth individual and Nj = Number of problems ranked by the jth individual.

The results of the percentage position are then converted into Garrett Values using the Garrett ranking conversion table (Ismanto *et al*., 2018). The alternative ranking was done based on the highest average value.

The factors to be ranked were given as

Table 1: Factors influencing the preference for cooking oil

S/N	Reasons for choice of Sunflower Cooking oil	Meaning
1.	Sensory Taste	It has good sensory taste
2.	Cleaner	It is cleaner
3.	Natural	It has no artificial chemicals/preservatives added
4.	Healthier	It is healthier
5.	Reliability	It is always reliable to use
6.	Price	It has affordable price
7.	Availability /accessible	It is easily available

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Respondents

A total of 480 respondents participated in the study out of which 173 were from rural communities and 307 from urban communities. The study sets out to compare rural and urban dwellers willingness to pay for cooking oil hence we proceeded with separate results for rural and urban and then draw comparisons.

Respondents from both rural and urban samples comprise of 23 % males and 77 % females making it an even representation in both the rural and urban categories. Rural respondents were 78% female and 22% male while urban respondents were 76% female ad 24% male (Table 2). The gender representation in our sample was biased towards women and hence not consistent with the census gender distribution of 48.7 males and 51.3 females (URT, 2013). The oversampling of females in this study was motivated by the fact that the study was interested in food decision makers in the household, and in Tanzanian women do most of households shopping and takes majority of food decision in the household (Alphonce and Alfnes, 2012).

Rural and urban respondents together had the mean age of 37.8 years with a minimum of 18 years and a maximum of 76 years. Rural respondents had mean age of 37.5 years with a minimum of 18 years and a maximum of 76 years while urban respondents had a mean age of 38 years with a minimum of 18 years and a maximum of 68 years (Table 2).

Table 2 indicates that 9% of rural respondents had no formal education compared to 1% of urban respondents with an overall of 4% being uneducated. Respondents with primary education to diploma dominated both rural and urban respondents being 88% and 76% respectively with an overall of 81% and those who had undergraduate and above from both rural and urban were 3% and 22% respectively with an overall of 15%. By implication, education could influence the results since urban consumers were more educated.

The average monthly income for rural consumers was TZS 491 185 while that of urban consumers was TZS 998 954. The large difference in monthly income was due to the relatively higher wages enjoyed in urban centres. The pooled average monthly income was TZS 815 946. Monthly income of consumers in general ranged from TZS 30 000 to TZS 27 million. The median monthly income in the pooled data was TZS 450 000. The median monthly income of the rural respondents was TZS 300 000 whiles the median income of urban respondents was TZS 600 000 (Table 2).

Table 2: Socio-economic characteristics of respondents

Variables	Means/Percentages/Max/Min		
	Pooled	**Rural**	**Urban**
Sex			
Male (%)	23	22	24
Female (%)	77	78	76
Age			
Mean (years)	37.8 (10.99)	37.5 (11.07)	38 (10.94)
Min (years)	18	18	18
Max (years)	76	76	68
Education level			
No education (%)	4	9	2
Primary to diploma	81	88	76
(%)	15	3	22
University education			
(%)			
Monthly Income			
Mean (TZS)	815 946 (1 511	491 185 (733	998 954 (1 783
	863)	144)	120)
Median (TZS)	450 000	300 000	600 000
Min (TZS)	30 000	30 000	30 000
Max (TZS)	27 000 000	7 000 000	27 000 000
Information			
Information (%)	30	32	30
No information (%)	70	68	70

Standard deviations in parentheses

To be able to attribute any change in consumer WTP to the information treatment, we had to compare and determine if there were any statistically significant differences in the socio-economic characteristics of those with and without information. Overall, there was no significant difference in the age of those who received information and those without information. No difference in age was recorded for urban consumers but, rural consumers who were not given information were about 2.5 years older than those who received information (Table 3).

In terms of the education level of consumers, we found that consumers that received information were on average more educated than those that did not receive information. The difference in education level was statistically significant in all categories of consumers. We further found that there was no significant difference in the income level of consumers who received information and those without information in the pooled and urban samples, but not among rural consumers without information. Rural consumers had a significantly higher monthly income than their counterparts who were given information.

Table 3: Socio-economic characteristics based on the two treatment groups

		Means		
Variables		**With information**	**Without information**	**Difference**
Age	Pooled	37.5	37.9	0.48
	Rural	35.7	38	2.5**
	Urban	38.5	37.8	-0.7
Education level	Pooled	1.2	1.1	-0.1***
	Rural	0.96	0.93	-0.03***
	Urban	1.3	1.2	-0.1***
Monthly	Pooled	861 293	796 384	-64 909
income (TZS)	Rural	385 152	540 169	155 017**

	Urban	1 147 326	936 966	-210 360

Note: ***, ** and * denote significance levels at 1 %, 5 % and 10% respectively.

4.2 Consumer Average Willingness to Pay for the Colour of Cooking Oil

Consumers seem to have a preference for the colour of cooking oil. Without any information, consumers expressed high preference for dark coloured compared to light coloured and very light-coloured cooking oils. Consumers on average were willing to pay TZS 3288/litre for dark-coloured cooking oil, TZS 3096/litre for light-coloured cooking oil and TZS 2756/litre for very light-coloured cooking oil which is slightly below the market price for a litre of sunflower oil.

Specifically, rural consumers expressed high preferences for dark coloured cooking oil at TZS 3160/litre compared to TZS 2980/litre for light coloured and TZS 2604/litre for very light-coloured cooking oil (Table 4). Urban consumers similarly expressed high preference for dark coloured cooking oil at TZS 3360/litre compared to TZS 3156/litre for light and TZS 2836/litre for very light-coloured cooking oils. Urban consumers were found to have higher average WTP than rural consumers however, the difference between the average WTP were not statistically significant. Consumer preference on colour of cooking oil however changed when information on the level of refinement was provided.

Generally, the WTP for the various colours of the cooking oil witnessed some changes when consumers were provided with information on the level of refinement. Table 4 shows WTP for dark-coloured cooking oil reduced by 17%, that is, consumers were now willing to pay TZS 548/litre less for dark-coloured cooking oil. This difference was statistically significant implying that the availability of information reduced consumers' WTP for dark-coloured cooking oil given information. However, consumers' WTP for light-coloured cooking oil increased by 6%. We observed from the results that when information was

provided, consumers were now willing to pay TZS 176/litre more but this difference was not significant. Also, we observed a 27% increase in consumers' WTP for very light-coloured cooking oil when information on the level of refinement was made available (Table 4). In essence, consumers on the whole were willing to pay TZS 736/litre more for very light-coloured cooking oil. The difference in WTP was significant at 5% confidence level. Our results are consistent with the findings of (Oparinde *et al.*, 2016) who found that, the availability of nutritional information resulted in a large and significant price premium being paid by consumers.

The changes in WTP among rural consumers was however mixed. Rural consumers, when given information on the level of refinement were willing to pay 7% more for dark-coloured cooking oil, that is, rural consumers were willing to pay TZS 228/litre more for dark-coloured cooking oil, this increase in WTP was however not significant. Moreover, the WTP for light-coloured cooking oil by rural consumers when given information increased by 10%. Rural consumers when given information were now willing to pay TZS 308/litre more for light-coloured cooking oil. The difference was however not significant. However, there was a significantly higher increase in the WTP for very light-coloured cooking oil (27% more) among rural consumers when information was provided. We observed that rural consumers were willing to pay TZS 692/litre more for very light-coloured cooking oil when provided with information (Table). This result is similar to the findings of (Kajale and Becker, 2014) who reported that students who received information were willing to pay around 17% to 20% premium for genetically modified foods.

Urban consumers when provided with information on the level of refinement reduced their WTP for dark-coloured cooking oil by 30%, that is, they were now willing to pay TZS 1012 less per litre for dark-coloured cooking oil. This reduction in WTP was highly significant. On the other hand, urban consumers were now willing to pay 3% more for

light-coloured cooking oil, that is, they were willing to pay TZS 100/litre more (p=0.01); and 27% more for very light-coloured cooking oil, that is TZS 768/litre more (p=0.01) when given information on the level of refinement as indicated in Table 4. The results were however insignificant for light coloured but highly significant for dark and very light-coloured cooking oil. These findings are consistent with (Ritten *et al*., 2019) who reported that providing information about honey laundering to honey consumers led to a 27% increase in their WTP premium for honey.

Table 4: Average WTP for the colour of cooking oil (in TZS)

Colour of cooking oil		**Pooled WTP**	**Rural WTP**	**Urban WTP**
Dark	Without information	3288	3160	3360
	With information	2736	3388	2348
	Percentage change	-16.8***	7.2	-30.1***
Light	Without information	3096	2980	3156
	With information	3272	3288	3260
	Percentage change	5.7	10.3	3.3
Very light	Without information	2756	2604	2836
	With information	3488	3296	3604
	Percentage change	26.6***	26.6***	27.1***

Note: ***, ** and * denote significance levels at 1 %, 5 % and 10% respectively.
All values are converted to litres (by multiplying original values by 4, that is 4 X 250ml = 1000ml = 1litre)

4.3 Factors Influencing Consumer Preference for Sunflower Cooking Oil

In line with our descriptives when controlling for income, age and education, the oil colour does influence the WTP for cooking oil. Consumers ordinarily preferred dark to light and very light-coloured cooking oil, where consumers significantly discounted very light-coloured cooking oil. Without any information, consumers were willing to pay TZS 680/litre less (p=0.01) for very light-coloured cooking oil compared to dark-coloured cooking oil. Rural consumers were willing to pay TZS 684/litre less (p=0.01) for very light-coloured cooking oil while urban consumers were willing to pay TZS 672/litre less

(p=0.01) for very light-coloured cooking oil (Table 5). The seemingly high preference for dark-coloured cooking oil can be attributed to the fact that sunflower oil is widely produced by local processors, and these local brands are usually cheaper and perceived to be more natural and healthier. The perception that industrial products contain chemicals, also feed into the reasons why dark-coloured cooking oil are preferable to consumers. Consumers also associate dark-coloured cooking oil with healthiness and argue that it is fuller since it is believed to contain most of its natural elements. Our results are a confirmation of the findings of (Capenter *et al*., 2001; Borgogno *et al*., 2015) all of whom indicated that colour was as a significant factor that influenced consumers' WTP for a product.

However, when consumers were given information about the level of refinement, their willingness to pay for very light-coloured and light-coloured cooking oils increased significantly. In the pooled model, consumers when given information were willing to pay TZS 1712/litre more (p=0.01) for very light-coloured cooking oil and TZS 888/litre more (p=0.01) for light coloured cooking oil. The shift in willingness to pay can be attributed to the fact that consumers were willing to change their perception when provided with the needed information. The amount urban consumers were willing to pay when given information was drastically higher than the amount in the pooled results. Urban consumers were willing to pay TZS 2540/litre more (p=0.01) for very light cooking oil and TZS 1464/litre more (p=0.01) for light coloured cooking oil. Rural consumers on the other hand were willing to pay TZS 508/litre more for very light and TZS 60/litre more for light cooking oil albeit statistically insignificant. From Table 5, both rural and urban consumers expressed their willingness to increase the amount they paid for light-coloured and very light-coloured cooking oils when they were provided with information on the level of

refinement. However, urban consumers paid higher premiums for both light-coloured and very light-coloured cooking oils than their rural counterparts.

The difference in the degree of change in consumers' willingness to pay between rural and urban consumers can be attributed to the educational and income levels of the consumers. This is further seen in Table 5, where there is an interaction between education and information. Rural consumers with university education when given information discounted dark-coloured cooking oil by TZS 748/litre compared to uneducated rural consumers and hence expressed their desire to pay higher premiums for light-coloured and very light-coloured cooking oil. Urban university level educated consumers similarly discounted dark cooking oil by TZS 263/litre compared to uneducated urban consumers thereby expressing their desire to pay a premium for both light-coloured and very light-coloured cooking oils. Our result are consistent with that of Bi et al. (2016) who reported that the provision of nutritional information significantly increased the mean WTP for seafoods. From our results, both rural and urban consumers gave more credence to the two extreme colours of oil that is, dark and very light. After receiving information Our results are consistent with the results of (Otega *et al*., 2014; Bi *et al*., 2016; Lombardi *et al*., 2019) who found that introducing consumers to nutritional information about a product led to increased WTP premiums. Our results revealed that educated and uneducated consumers responded differently when they were provided with information on the level of refinement.

WTP for cooking oil is also influenced by the monthly income of consumers. It was estimated that, a 1% increase in income leads to a 0.28% increase in consumers WTP. Rural consumers were estimated to increase their WTP for cooking oil by 0.41% for every 1% increase in monthly income, while Urban consumers increased their WTP by 0.21% for

every 1% increase in their monthly income albeit insignificant. Our results are consistent with that of (Danso-Abbeam *et al.,* 2014) who reported that increased income led to increased WTP premium. Despite the seemingly small increase in WTP by urban respondents, it is worth noting that in absolute terms urban respondents increased their WTP than rural cosumers, which could be attributed from the difference in income rather than geographical location (the average income for urban consumers was significantly higher than that of rural consumers).

Age was estimated to have a negative impact on consumers WTP for the cooking oil. Older consumers were expected to reduce their WTP for cooking oil, this can be due to the fact that older consumers tend to stay away from oily foods due to potential health risks. Our result is consistent with the finding of Bi *et al.* (2016) who found that older consumers were willing to pay less for chicken breast and oysters due to health concerns. Age was however not a significant factor in either the rural or urban consumer models.

Education although insignificant was estimated to positively affect consumers' WTP in general, urban consumers with primary education and up to a diploma were willing to pay TZS 1328 more per litre for cooking oil than their uneducated consumers. Our result is similar to that of (Wang and Huo, 2016) who indicated that education was a positive deciding factor for consumers WTP a premium for certified fruits.

Table 5: WTP for colour of cooking oil

Variables	Pooled	Rural	Urban
Constant	353.7	302.9	231.9
	(0.134)	(0.356)	(0.5)
Very light-coloured cooking oil	-680***	-684***	-672***
	(0.000)	(0.000)	(0.006)
Light-coloured cooking oil	-196	-188	-200
	(0.274)	(0.453)	(0.410)
Information on the level of refinement	-260	72	76
	(0.692)	(0.913)	(0.962)
Age of respondent	-2.7*	-3.2	-2.2
	(0.052)	(0.104)	(0.267)
Education level of respondent			
Primary to diploma	452	-104	1328*
	(0.222)	(0.502)	(0.05)
University education	208	1888*	912
	(0.622)	(0.098)	(0.202)
Natural log of Monthly Income	28.2*	41.3*	21.2
	(0.081)	(0.07)	(0.355)
Very light-coloured oil##information	1712***	508	2540***
	(0.000)	(0.249)	(0.000)
Light-coloured oil##information	888***	60	1464***
	(0.007)	(0.894)	(0.001)
Information##level of education			
Primary to diploma	-112.4	105.7	-412.6
	(0.483)	(0.494)	(0.3)
University education	-107.9	-748**	-263.2
	(0.538)	(0.026)	(0.962)
Model diagnostics			
Prob > chi-squared	0.0001	0.0012	0.0000
LR chi-squared (11)	39.1	30.78	40.18

Note: ***, ** and * denote significance levels at 1 %, 5 % and 10% respectively. Values in the parenthesis are p-values.
All values are converted to litres (by multiplying original values by 4, that is 4 X 250ml = 1000ml = 1litre)

Furthermore, in line with (Alfnes *et al*., 2006; Chousou *et al*., 2018; Hung and Verbeke, 2018) using Garrett ranking, this study also found that health, naturalness and sensory taste were the most important attributes influencing consumer preferences for sunflower cooking oil (results are presented in Table 7).

Overall, health was reported by 53.7% of consumers to be the most important factor. Both urban (55.5%) and rural (50.4%) consumers ranked health as the most important factor that influenced their preference for sunflower cooking oil. Naturalness was ranked as the second most important factor that influenced preferences. We inferred that consumers linked the naturalness of cooking oil with its colour and this implied that, the darker the oil, the more natural it was perceived to be. We observed that 49.8% of rural consumers and 49.5% of urban consumers ranked naturalness of the oil as the second most important factor, this is because consumers inadvertently link healthy food with the naturalness of that food (Siipi, 2013). By implication sunflower oil which appeared more natural (darker) was deemed to be healthy. Sensory taste was the third most important factor that influenced consumers' preferences, 48.3% and 47.7% of rural and urban consumers ranked sensory taste as the third most important factor.

The fourth, fifth, and sixth important factors influencing consumer preference are availability, price, and reliability. The percentage of rural consumers that ranked the factor in their respective level of importance were 42.7%, 42.2%, and 41.8%. Urban consumers ranked price (42.7%), availability (40.1%), and reliability (39.4%) as the fourth, fifth, and seventh important factors influencing consumer preferences.

The least important factor observed were cleanliness of the cooking oil, which is contrary to a study by Aksoydan (2007), who found cleanliness as the most important factor that affected consumer choice.

Table 6: Factors influencing consumers preferences for sunflower cooking oil

Factor	Area	Total Score	Mean Score	Garrett's Rank
Healthier	Pooled	25 767	53.7	1
	Rural	8724	50.4	1
	Urban	17 043	55.5	1
Natural	Pooled	23 799	49.6	2
	Rural	88 613	49.8	2
	Urban	15 186	49.5	2
Sensory Taste	Pooled	23 002	47.9	3
	Rural	8363	48.3	3
	Urban	14 639	47.7	3
Price	Pooled	20 412	42.5	4
	Rural	7292	42.2	5
	Urban	13 120	42.7	4
Availability	Pooled	19 689	41	5
	Rural	7378	42.7	4
	Urban	12 311	40.1	5
Reliability	Pooled	19 336	40.3	6
	Rural	7238	41.8	6
	Urban	12 098	39.4	7
Cleaner	Pooled	19 271	40.2	7
	Rural	7037	40.7	7
	Urban	12 234	39.9	6

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The objective of the study was to assess consumer preference for the colour of cooking oil. The study found out that respondents from both rural and urban Tanzania considered

health, naturalness and sensory taste as the three most important factors influencing their preferences for cooking oil. On the other hand, cleanness was the least considered attribute among rural consumers while availability was the least among urban consumers.

The study found that without information, the average WTP was TZS 3288/litre for dark cooking oil; TZS 3096/litre for light cooking oil and TZS 2756/litre for very light cooking oil. Both rural and urban consumers placed a high preference on dark-coloured cooking oil in the absence of information. However, the study further discovered that, consumers shifted their preferences when given information on the level of refinement. Information was however more influential in changing the preferences of urban consumers than rural consumers. Upon receiving information on the level of refinement, the average WTP was TZS 2736/litre for dark, TZS 3272/litre for light and TZS 3488/litre for very light cooking oils. The results also revealed that urban consumers reduced their WTP for dark cooking oil by 30.1% after getting information on the level of refinement while rural consumers increased their WTP by about 7.2%, regardless. Despite still having high preference for dark cooking oil, rural consumers increased their WTP for very light oil by about 26.6%, an increment close to the percentage change for urban consumers.

Our interval regression model reported that very light-coloured cooking oil was discounted in the absence of any information, but that changed once consumers were exposed to information on the level of refinement. Given information, urban consumers were willing to pay significantly higher for very light cooking oil followed by light cooking oil and dark cooking oil. This was however not the case for rural consumers, although both rural and urban consumers were willing to pay more for very light and light cooking oil when given information. Education had a positive impact on the WTP of urban consumers, and high education seem for further influence WTP when information about the level of refinement is given, whiles age had a negative impact on WTP for both rural and urban consumers.

5.2 Recommendations

i. Most rural consumers placed less priority on very light (double-refined) cooking oil due to the perception about chemical usage and the nutritional level of such oil. If the policy of refinement is to push through, the government must embark on education campaigns to educate consumers on refinement in order to ensure there is no loss in consumer welfare.

ii. The Government must consider revisiting its double-refined policy and make room for unrefined cooking oil as well, due to important concerns such as healthiness and preference for naturalness raised by consumers that showed very high preference for unrefined cooking oil.

REFERENCES

Akankwasa, K. (2007). Consumer acceptability and willingness to pay for introduced dessert bananas. Dissertation for Award of MSc Degree in Agribusiness Management at Makerere University, Uganda. 71pp.

Aksoydan, E. (2007). Hygiene factors influencing customers ‘choice of dining-out units: findings from a study of university academic staff. *Journal of Food Safety* 27(3): 300-316.

Alfnes, F., Guttormsen, A. G., Steine, G. and Kolstad, K. (2006). Consumers' willingness to pay for the color of salmon: a choice experiment with real economic incentives. *American Journal of Agricultural Economics* 88(4): 1050-1061.

Alinda, F., Kavoi, M. M. and Mugisha, J. (2016). Consumer willingness to pay for quality beef in Kampala, Uganda. *Journal of Agriculture, Science and Technology* 17(2): 1-24.

Alphonce and Alfnes, (2012). Consumer willingness to pay for food safety in Tanzania: an incentive-aligned conjoint analysis. *International Journal of Consumer Studies* 36(2012): 394–400.

Alphonce, R. and Alfnes, F. (2017). Eliciting consumer WTP for food characteristics in a developing context: Application of four valuation methods in an African market. *Journal of Agricultural Economics* 68(1): 123-142.

Andersen, S., Harrison, G. W., Lau, M. I. and Rutström, E. E. (2006). Elicitation using multiple price list formats. *Experimental Economics* 9(4): 383-405.

Anderson, S., Harrison, G. W., Lau, M. I. and Elisabet, R. E. (2007). Valuation using multiple price list formats. *Applied Economics* 39(6): 675-682.

Anyam, E. O., Fashogbon, E. A. and Oni, A. O. (2013). Consumers' Willingness to Pay for Safety Attributes of Bread in Lagos Metropolis, Nigeria: International Conference of the African Association of Agricultural Economists, Hammamet, Tunisia Credence Attribute Claim Verification. *Journal of Agricultural and Resource Economics* 35(2): 261–280.

Balchin, N., Kweka, J., and Mendez-Parra, M. (2018). Tariff Setting for Development of Edible Oil Sector in Tanzania. In: *Proceedings of the Agricultural State Actors Forum (ANSAF), Dar es Salaam, Tanzania*. 79pp.

Balderjahn, I. (2003). *In H. Diller and A. Hermann* (*Eds.*), *Handbuch Preispolitik: Strategien - Planung - Organisation - Umsetzung*, chapter "Erfassung der Preisbereitschaft". Wiesbaden: Gabler. pp. 387-404.

Banerji, A., Birol, E., Karandikar, B. and Rampal, J. (2016). Information, branding, certification, and consumer willingness to pay for high-iron pearl millet: Evidence from experimental auctions in Maharashtra, India. *Food Policy* 62: 133-141.

Bendini, A., Valli, E., Barbieri, S. and Toschi, T. G. (2012). Sensory analysis of virgin olive oil. In: *Olive Oil—Constituents, Quality, Health Properties and Bioconversions*, ed. Boskou. Intech, Rijeka, Croatia. pp110-130.

Bi, X., House, L. and Gao, Z. (2016). Impacts of nutrition information on choices of fresh seafood among parents. *Marine Resource Economics* 31(3): 355-372.

Boccaletti, S. and Moro, D. (2000). Consumer Willingness-To-Pay for Gm Food Products in Italy. *AgBioForum* 3(4): 259-267.

Bocher, T., Sindi, K., Nshimiyimana, J. C. and Low, J. (2016). *Consumer's preferences and willingness to pay for biofortified juice in Rwanda: Does the nutritional information matter?* (No. 310-2016-5349).

Borgogno, M., Favotto, S., Corazzin, M., Cardello, A. V. and Piasentier, E. (2015). The role of product familiarity and consumer involvement on liking and perceptions of fresh meat. *Food Quality and Preference* 44: 139–147.

Bovšková, H., Mikova, K. and Panovská, Z. (2014). Evaluation of egg yolk colour. *Czech Journal of Food Sciences* 32(3): 213-217.

Breidert, C., Hahsler, M., and Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. *Innovative Marketing* 2(4): 8-32.

Brščić, K., Šugar, T. and Poljuha, D. (2017). An empirical examination of consumer preferences for honey in Croatia. *Applied Economics* 49(58): 5877-5889

Caballero, J. A. (2013). Foreign bank behavior during financial crises. [Foreign Bank Behavior During Financial Crises - Open ...openknowledge.worldbank.org ›] site visited .on 12/08/2019.

Carpenter, C. E., Cornforth, D. P. and Whittier, D. (2001). Consumer preferences for beef colour and packaging did not affect eating satisfaction. *Meat Science* 57: 359–363.

Chen, X., Alfnes, F. and Rickertsen, K. (2015). Consumer preferences, ecolabels, and effects of negative environmental information. *AgBioForum* 18(3): 327-336.

Chousou, C., Tsakiridou, E. and Mattas, K. (2018). Valuing consumer perceptions of olive oil authenticity. *Journal of International Food and Agribusiness Marketing* 30(1): 1-16.

Dalberg, M. K. (2018). Tanzania's sunflower sector is paving the way for future industrialization and sustainable growth [

www.dalberg.com] sited visited on 10/04/2020.

Danso-Abbeam, G., Addai, K. N. and Ehiakpor, D. (2014). Willingness to pay for farm insurance by smallholder cocoa farmers in Ghana. *Journal of Social Science for Policy Implications* 2(1): 163 – 183.

Dawar, N. and Parker, P. (1994). Marketing universals: consumers' use of brand name, price, physical appearance, and retailer reputation as signals of product quality. *Journal of Marketing* 58(2): 81-95.

Deaton, A., and Muellbauer, J. (1980). *Economics and consumer behavior*. Cambridge university press. 430pp.

Dhanavandan, S. (2016). Application of Garrett Ranking Technique: Practical Approach. *International Journal of Library and Information Studies* 6(3): 135 – 140.

Egbuna, S. O. (2015). Optimization of the effects of degumming parameters on the removal of phosphotides and the stability of refined palm oil. *International Journal of Scientific Research Engineering and Technology* 4(9): 958-972.

Francis, F. J. (1995). Quality as influenced by color. *Food Quality and Preference* 6(3): 149-155.

Fukuda, S., Yasunaga, E., Nagle, M., Yuge, K., Sardsud, V., Spreer, W. and Müller, J. (2014). Modelling the relationship between peel colour and the quality of fresh mango fruit using Random Forests. *Journal of Food Engineering* 131(1): 7-17.

Funk, D. and Ndubisi, N. O. (2006). Colour and product choice: A study of gender roles. *Management Research News* 29(1/2): 41–52.

García-Torres, S., López-Gajardo, A. and Mesías, F. J. (2016). Intensive vs. free-range organic beef. A preference study through consumer liking and conjoint analysis. *Meat Science* 114: 114-120.

Gotor, A. A. and Rhazi, L. (2016). Effects of refining process on sunflower oil minor components: a review. *OCL* 23(2): 207-219.

Grunert, K. G. (2005). Food quality and safety: Consumer perception and demand, *European Review of Agricultural Economics* 32(3): 369-391.

Haab, T. C. and McConnell, K. E. (2002). *Valuing environmental and natural resources: the econometrics of non-market valuation*. Edward Elgar Publishing. [www.naturalcapital.vn › wp-content › uploads › 2017/02PD] site visited of 10/09/2019.

Hui, L. C., May, W. C., Wei, S. O., Li, K. W. (2013). Research on consumers' willingness to pay for organic products: A research project submitted in partial fulfillment of the requirement for the degree of Bachelor of Economics (Hons) Global economics Universality Tunku Abdul Rahman: Faculty of Accountancy and Management Department of economics [http://eprints.utar.edu.my/] site visited on 20/10/2019.

Hung, Y. and Verbeke, W. (2018). Sensory attributes shaping consumers' willingness-to-pay for newly developed processed meat products with natural compounds and a reduced level of nitrite. *Food Quality and Preference* 70: 21-31.

Ilkay, J. (2013). Identifying motives of mothers who purchase healthy convenience snacks for their children: A phenomenological study. *Journal of Business Studies Quarterly* 5(2): 237-342.

Ismanto, H., Azhari, S. and Arsyad, L. (2018). Ranking Method in Group Decision Support to Determine the Regional Prioritized Areas and Leading Sectors using Garrett Score. *International Journal of Advanced Computer Science and Applications* 9(11): 94-99.

Kajale, D. B. and Becker, T. C. (2014). Effects of information on young consumers' willingness to pay for genetically modified food: Experimental auction analysis. *Ecology of Food and Nutrition* 53(3): 292-311.

Klain, T. J., Lusk, J. L., Tonsor, G. T. and Schroeder, T. C. (2014). An experimental approach to valuing information. *Agricultural Economics* 45(5): 635-648.

Labrecque, L. I. and Milne, G. R. (2012). Exciting red and competent blue: The importance of color in marketing. *Journal of Academy of Marketing Science* 40(5): 711–727.

Labrecque, L., vor dem Esche, J., Mathwick, C., Novak, T. and Hofacker, C. (2013). Consumer Power: Evolution in the Digital Age. *Journal of Interactive Marketing* 27: 257–269. 10.1016/j.intmar.2013. 09.002.

Liu, Z., Lei, S. H., Guo, Y. L. and Zhou, Z. A. (2020). The interaction effect of online review language style and product type on consumers' purchase intentions. *Palgrave Communications* 6(1): 1-8.

Lombardi, A., Vecchio, R., Borrello, M., Caracciolo, F. and Cembalo, L. (2019). Willingness to pay for insect-based food: The role of information and carrier. *Food Quality and Preference* 72: 177-187.

Lusk, J. L., and Shogren, J. F. (2007). *Experimental Auctions: Methods and Applications in Economic and Marketing Research*. Cambridge University Press. 304pp.

Lusk, J. L., Costanigro, M., McCluskey, J. J., Roosen, J. and Shogren, J. F. (2011). Hedonic price analysis in food markets. *The Oxford Handbook of the Economics of Food Consumption and Policy*. pp153-161.

Magnier, L., Schoormans, J. and Mugge, R. (2016). Judging a product by its cover: Packaging sustainability and perceptions of quality in food products. *Food Quality and Preference* 53(1): 132-142.

Marbeau, Y. (1987). What Value Pricing Research today? *Jounal of the Market Research Society* 29(2): 1-9.

McCaig, T. N. (2002). Extending the use of visible/near-infrared reflectance spectrophotometers to measure colour of food and agricultural products. *Food Research International* 35(8): 731-736.

McFadden, D. (1980). Econometric Models for Probablistic Choice Among Products. *The Journal of Business* 53(3): 5-16.

McFadden, D. (1986). The Choice Theory Apporach to Market Research. *Marketing Science* 5(4): 1-9.

Meléndez-Martínez, A. J., Vicario, I. M. and Heredia, F. J. (2007). Rapid assessment of vitamin A activity through objective color measurements for the quality control of orange juices with diverse carotenoid profiles. *Journal of Agricultural and Food Chemistry* 55(8): 2808-2815.

Mgeni, C. P., Sieber, S., Amjath Babu, T. S. and Mpenda, Z. T. (2017). Can Sub-Saharan Africa Become Food Self-Sufficient? Supply Response Analysis of Sunflower Oil Producers in Tanzania'. Paper prepared for Tropentag 2017: Future Agriculture: Socio-ecological transitions and bio-cultural shifts, 20-22 September 2017, Bonn, Germany.

Muhammad, S., Fathelrahman, E. and Ullah, R. U. T. (2015). Factors affecting consumers' willingness to pay for certified organic food products in United Arab Emirates. *Journal of Food Distribution Research* 46(1): 37–45.

Muneeshwari, P., Hemalatha, G., Kanchana, S., Pushpa, G., Mini, M. L. and Chidambaranathan, N. (2017). Physico Chemical Quality and Stability of Refined

and Virgin Oils. *International Journal for Pure Applied Bioscience* 5(2): 11182 – 1191.

Murphy, M., Cowan, C., Henchion, M. and Reilly, S. (2000). Irish consumer preferences for honey: A conjoint approach. *British Food Journal* 102(8): 585 – 598.

Mussa, J. (2015). *Residents' willingness to pay for improved solid waste management in Dodoma municipality, Tanzania*. Dissertation for Award Degree Master of Science in agricultural economics of Sokoine University of Agriculture. Morogoro, Tanzania.75ppp.

Nagle, T. T. and Holden, R. K. (2002). *The Strategy and Tactics of Pricing.* Prentice Hall. [www.worldcat.org › title › oclc] site visited on 12/10/2020.

Nandi, R., Bokelmann, W., Gowdru, N. V. and Dias, G. (2017). Factors influencing consumers' willingness to pay for organic fruits and vegetables: Empirical evidence from a consumer survey in India. *Journal of Food Products Marketing* 23(4): 430-451.

Ngapo, T. M. (2017). Consumer preferences for pork chops in five Canadian provinces. *Meat Science* 129: 102-110.

Oparinde, A., Banerji, A., Birol, E. and Ilona, P. (2016). Information and consumer willingness to pay for biofortified yellow cassava: evidence from experimental auctions in Nigeria. *Agricultural Economics* 47(2): 215-233.

Ortega, D. L., Wang, H. H. and Olynk Widmar, N. J. (2015). Effects of media headlines on consumer preferences for food safety, quality and environmental attributes. *Australian Journal of Agricultural and Resource Economics* 59(3): 433-445.

Pedro, A. M. and Ferreira, M. M. (2005). Non-destructive determination of solids and carotenoids in tomato products by near-infrared spectroscopy and multivariate calibration. *Analytical Chemistry* 77(8): 2505-2511.

Ritten, C. J., Thunström, L., Ehmke, M., Beiermann, J., and McLeod, D. (2019). International honey laundering and consumer willingness to pay a premium for local honey: an experimental study. *Australian Journal of Agricultural and Resource Economics* 63(4): 726-741.

Salisali, B. M. (2017). *Fiscal Policy Study on Edible Oil Sector in Tanzania*. Draft consultancy report prepared for the Tanzania Private Sector Foundation. Tanzania. June 2017.

Shen, M., Shi, L. and Gao, Z. (2018). Beyond the food label itself: How does color affect attention to information on food labels and preference for food attributes? *Food Quality and Preference* 64: 47-55.

Siipi, H. (2013). Is natural food healthy? *Journal of Agricultural and Environmental Ethics* 26(4): 797-812.

Singh, S. (2006). Current research development: Impact of color on marketing. *Management Decision* 44(6): 783–789.

Ulimwengu and Sanyal, (*2011*). Factors *determine willingness to pay*. [www.scielo.org.za › scielo] site visited of 10/09/2019.

URT (2013). *Population and Housing Census*. Population distribution by Gender. Key findings, Dar es Salaam, Tanzania. 127pp.

URT, United Republic of Tanzania (2016). Sun*flo*wer Sector Development Strategy 2016–2020. [http://www.mit.go.tz/uploads/files/Tanzania%20Sunflower%20Strategy.pdf] site visited on 15/04/2019.

Vickrey, W. (1961). Counter speculation, Auctions, and Competitive Sealed Tenders. *Journal of Finance* 16(1): 8-37.

Wadhwani, R. and McMahon, D. J. (2012). Colour of low-fat cheese influences flavour perception and consumer liking. *Journal of Dairy Science* 95(5): 2336-2346.

Wang, L. and Huo, X. (2016). Willingness-to-pay price premiums for certified fruits—A case of fresh apples in China. *Food Control* 64: 240-246.

Wei, S. T., Ou, L. C., Luo, M. R. and Hutchings, J. B. (2012). Optimisation of food expectations using product colour and appearance. *Food Quality and Preference* 23(1): 49-62.

Wertenbroch, K. and Skiera, B. (2002). Measuting Consumers' WiUingness to Pay at the Point of Purchase. *Journal of Marketing Research* 39(2): 228-241.

Yang, L. Y. and Seo, H. (2016). Effects of Light Color on Consumers’ Acceptability and Willingness to Eat Apples and Bell Peppers. pp3-11.

Yang, S., Hu, W., Mupandawana, M. and Liu, Y. (2012). Consumer Willingness to Pay for Fair Trade Coffee: A Chinese Case Study. *Journal of Agricultural and Applied Economics* 44(1): 21–34.

Yang, S., Li, G., Saleh, A. S., Yang, H., Wang, N., Wang, P. and Xiao, Z. (2017). Functional characteristics of oleogel prepared from sunflower oil with β-sitosterol and stearic acid. *Journal of the American Oil Chemists' Society* 94(9): 1153-1164.

Zampini, M., Wantling, E., Phillips, N. and Spence, C. (2008). Multisensory flavour perception: Assessing the influence of fruit acids and colour cues on the perception of fruit-flavoured beverages. *Food Quality and Preference* 19(3): 335-343.