Understanding consumer preferences within the food system

A research study in the city of Cali, Colombia

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Environmental economics and Natural Resources (ENR)
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Preface

"Understanding consumer preferences within the food system. *A research study in the city of Cali, Colombia*" is a master (MSc) thesis research whose objective is to study the preferences of consumers for food products with varying environmental, social and health attributes by using a discrete choice experiment. I estimate people's Willingness To Pay (WTP) for alternative characteristics of food, and the socio-economic characteristics that determine that WTP .

The thesis is a compulsory part of the Master in Environmental Sciences (MES) programme within the Environmental Economics and Natural Resources (ENR) chair group at Wageningen University & Research (WUR) in The Netherlands. The data collection process was funded by The International Center for Tropical Agriculture (CIAT) located in Colombia; therefore, all the legal rights of this research belong to both the University (i.e., WUR) and the research center (i.e., CIAT).

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Abstract

Following the Food and Agriculture Organization of the United Nations (FAO) definition of a food system, this encompasses all the stages of keeping the human population fed. At a global level, the food system is responsible for around 19-29% of the world's GHG emissions, and is the major cause of deforestation. It also accounts for 20% of energy consumption and it is the biggest consumer of freshwater, using 70% of available resources. This complex system covers multiple stakeholders, both from the supply and demand side. This study focuses on the demand side and the aim is to understand the consumer preferences when choosing food with varying environmental, social and health attributes by using Discrete Choice Experiments (DCE). Consumers value environmental, health and social attributes related with food differently. Agrochemicals (with an impact on both the health of the environment and the human population) along with environmental factors such as deforestation level are the most important attributes when choosing food products. Human health factors are also part of the preferences of consumers but in a less importance. (Non) Social demographic factors do have an effect on the consumers 'interests and therefore in their MWTP for a more sustainable diet.

Keywords: food system, consumer preferences, behavioural economics, Contingent Valuation (CV), Discrete Choice Experiment (DCE), Willingness To Pay, WTP.

1. Introduction

1.1. Problem definition

If you out of curiosity look for the definition of energy, you can find something such as "the strength and vitality required for sustained physical or mental activity"[1]. Human beings are constantly using energy sources to move and do their activities. One of the most important energy sources comes from the daily food intake which is influenced by cultural, economic and social factors, and it depends on the interests, preferences and needs of each individual. Behind each every day meal there is a complex food system operating to produce it and bring it to our table.

According to Mann, D. et al (2018), this food system at a global level is responsible for around 19-29% of the world's GHG emissions, and it is the major cause of deforestation. Also, it accounts for 20% of energy consumption and it is the biggest consumer of freshwater, using 70% of available resources. Additionally, the current food system covers around 30% of all ice-free land in the world. Human population growth is one the main drivers that put the current system and its viability at risk. As specified by the United Nations, in the upcoming thirty years the global population will increase by 2 billion persons, reaching 9,7 billion in 2050 (UN, 2019). Under the current food system, this expected growth will bring increased pressure on Earth's resources, threatening the viability of the coupled human-environment system. There is a need to rethink and adjust the current food system and our consumption patterns in order to match the planetary boundaries, and sustainably manage the available resources. We need a food system that can properly feed the population while taking into account both the human and environmental health. Thus, one of the most considerable challenges nowadays is to act upon the fast-changing demand for food from a bigger and more affluent population to its supply in the time that environmentally and socially sustainable methods are being used (Godfray et al., 2010).

Following the FAO[2]'s definition(FAO, 2016), a food system encompasses all the stages of keeping us fed: growing, harvesting, packing, processing, transforming, marketing, consuming and disposing of food. Thus, it is evident that many stakeholders are involved throughout the entire system. Food supply chains upstream from farms, to the food industry in the midstream segments of processing and wholesale and in the downstream segment of retail, then on to final consumers (Reardon & Timmer, 2012).

Within the supply-side, latest studies such as the research of Bojana Bajželj, demonstrates that current tendencies in yield improvement will not be enough to fulfil the food demand forecast in 2050, and therefore a further expansion of agricultural area will be needed (Bajželj, B et al., 2014). It is important to note that agriculture is the most important driver of biodiversity losses and a significant contributor to climate change and pollution; as a result of this, further expansion is not desirable. The commonly proposed alternative, which is intensification with increased resource use, has adverse effects as well.

Given the objectionable consequences of the aforementioned solutions from the supply-side, we must do better in terms of our consumption choices; so, it is imperative to evaluate and boost the initiatives from the demand side; in other words, the actions coming from the final consumer. Food consumption choices can alter the current supply and lead to a shift. This decision may be affected both for reasons

[1] Oxford Languages definitions.
[2] FAO, an agency of the United Nations, stands for Food and Agriculture Organization.

in the short term, such as income level and nutritional levels of the products, as well as reasons in the long term that involve a more environmentally sustainable diet as well as in strengthening levels of health of the human body. Considering the different options that consumers have when they are deciding what to eat, one of the greatest challenges is to incorporate the environmental factor into their decisions, through product alternatives that have the least environmental impact in terms of their form of production and distribution while the health requirements are fulfilled.

The aim of this study is to understand the consumer preferences when choosing food. This research studies consumers responses in the city of Cali, which is the third-most populous city in Colombia with 2.4 million inhabitants, in relation to health, social and environmental factors and their willingness to pay for those attributes. Thus, the main goal is to evaluate the potential of the demand-side to take centre stage in the shift towards a more sustainable food system. With the outcomes of this research, there will be a better understanding of the consumer's trade-offs between environmental, health and social attributes, thereby informing policy makers and food producers about their client's interest and willingness to pay for more sustainable food.

This work also aims to extend a current investigation lead by The International Center for Tropical Agriculture (CIAT)[3] in relation to carbon footprint and climate risk of the most popular food products consumed in Cali, with the purpose of characterizing the current food consumption in terms of its environmental, social and health consequences.

1.2. State of the art

1.2.1. Literature review

Several studies have been conducted on consumer diets and their impact on both health and the environment. It is important to highlight that several researchers have stressed the importance of understanding the preferences of consumers when buying their food, in order to create strategies from the demand-side that guarantee food availability in the upcoming years, while doing both a sustainable natural resources management and a transition to healthier diets. Tilman and Clark (2014) made a study at global level where they quantified the relationship among diet, environmental sustainability and human health using results for food Life Cycle Assessments (LCA). They have evaluated the potential of environmental impacts of the global dietary transition, and how to alleviate the consequent impacts of the diet-environment-health trilemma. They showed how Greenhouse Gases (GHG) emissions are highly dependent on the consumer's diet and not necessarily a healthier diet minimizes the environmental impacts; thus, it is needed to seek for healthier diet with low GHG emissions.

Along with the consequences of the diets we choose, this choices are influenced by culture, nutritional knowledge, price, availability, taste and convenience (Tilman and Clark, 2014). The authors' conclusion, due to the great challenge of the global dietary transition, is to build joint substantial solutions together with nutritionists, agriculturists, public health professional, educator, policy makers and food industries.

[3] Project's name: Assessing the resilience and environmental sustainability of the Cali city region food system. It belongs to research program on Water, Land and Ecosystems (WLE).

A scenario study of the global land system made in 2014 (Bajželj, B et al., 2014) stressed the idea that food waste and dietary change are the two most prominent demand-side measures and have been shown to have a large potential. The different results for the current trend scenarios and the future scenarios the authors used to do the forecast show that solely when the plan includes relevant elements of demand reductions, then it is plausible to avert an increase in agricultural expansion and therefore the related GHG emissions. These results also are supported by the recent report of the Intergovernmental Panel on Climate Change (IPCC) which stated a significant, but unknown potential for GHG emissions' reduction in agriculture from demand-side measure, while improving the scenario for food security and environmental sustainability (Smith P. et al, 2018).

Supporting the previous research, a study about the diet, health and environment trilemma in 2018 brings up the need to evaluate this issue in a local level, taking into account the social, economic and cultural values of each region. Beyond, they expressed there is a special attention in developing countries where the increased affluence and urbanization is seen as a cause of less healthy and less sustainable diets (Clark, Hill and Tilman, 2018). Globally, as possible results of the adoption of a healthier and more environmental friendly diet, the authors explained the world could see a diet-related GHG emissions reduction by approximately 30% to 60%, a drop of approximately 20% to 35% in cropland use, a considerable reduction of future threats to biodiversity and a lower use of fertilizer inputs. This quantifies the importance of working on how to make more sustainable the consumer's food choices in order to guarantee enough and proper food in the following decades.

Now, understanding that the final consumer is a key stakeholder in the search for more sustainable food systems, numerous studies have been carried out to understand how consumers make more frequent pro-environment, pro-health and pro-social welfare decisions, and what kind of stimuli make them more aware or willing to change their food preferences. A study made in Australia by Mann et al. (2018) strengthen the idea that food choices take an important part to the pressure that human population set on the environment. Contrary to what Tilman and Clark declared in 2014, they argued that diets with improved nutrition profiles lead to lower impact on the environment than the current less healthy diets followed in many Western countries. Whether there is a correlation between health and environment within the food diets' perspective, the goal is to engage people to make both healthy and environmental friendly decisions towards a more sustainable consumption (Mann, D., et al., 2018).

Coming back to the understanding of consumer preferences, the Kollmuss and Ageyman's model has been used in multiple researches as a guideline to explain consumer's engagement in pro-environmental behaviors (Kollmuss and Agyeman, 2002). The pro-environmental behaviour is affected in this model by three main different variables: attitudes, knowledge level and perceived effectiveness or locus of control[4]. The study developed in Australia by Mann et al. (2018) used this model and the conclusions suggest more information, or an increase in the consumers' level of knowledge, is required to help them towards the direction of pro-sustainable eating patterns. Nevertheless, knowledge is just one of a wide range of interventions needed to achieve this shift. Internal (e.g. perceived effectiveness) and external (food availability) barriers exist, so a combination of multiple interventions is mandatory. It is important to point out that, even though plenty theoretical frameworks have been created to explain the interaction between these variables (i.e. environmental knowledge, awareness, attitudes)

[4] Consumer Perceived Effectiveness (CPE) refers to the person's belief that his/her behavior can contribute to environmental preservation.

and the real actions taken by the consumers, no definitive answers have been found (Kollmuss and Agyeman, 2002).

What is commonly expressed within this field is that, even if today there is not an unique response to act upon more sustainable diets and changes in consumer preferences, a change in dietary behaviors in response to the interventions have been done is slow and it needs the participation of diverse stakeholders. This suggestion is bolstered by Godfray et al. in a study of the impact of meat consumption on health and the environment (2018). They said that social norms can change and therefore do change, but a coordination of efforts among civil society, health organizations and government is mandatory. Previous to this coordinated work, a high-quality understanding of the consumption patterns impacts to health and environment should be addressed and deployed to society for a suite of strategies to encourage change (Godfray et al., 2018).

The gap between the attitudes and behavioral intention of consumers was analyzed by Vermeir and Verbeke in 2006. This study explores the decision-making process that includes the consumer's social responsibility (e.g. social, environmental and health aspects) into the individuals needs and desires (Vermeir and Verbeke, 2006). Supported by statements made by the Food Standards Agency (FSA) in the United Kingdom, they expressed the daily consumption habits are driven by "convenience, habits, value of money, personal health concerns, hedonism and individual responses to social and institutional norms" and those practices are prone to be resistant to change. This change also depends on the type of consumers. Within this post-modern society, reflexivity plays a key role. Here, Giddens (1991) argues that the reflexive consumer is able to do an individual risk assessment of his/her own decisions and it is more aligned to cultural norms, and Dupuis (2000) claims that food is a distinct example for these type of consumers since food consumption involves the decision to either eat or not a specific product and let into his/her body. Another type of consumer is described in this study, the ethical consumer. This individual feels responsible for society in many ways such as environmental issues, animal welfare, human rights, labor working conditions, etc. That feeling influences his/her purchase behavior (Vermeir and Verbeke, 2006).

As a general norm, the authors argued that the attitude-behavior gap applies to all consumers. This gap explains that considering just attitudes is frequently a bad predictor of the real behavioral intention, and characteristics as quality, price and brand familiarity are the main attributes to make a decision rather than ethical or reflexive decisions that are priorities for a minority (Weatherell et al., 2003). Thus, sustainable food products still belong to a very small niche of consumers. For the purpose of the study, a consumer behavior model was introduced by Jager (2000) as part of his doctorate thesis. There, the factors for the consumer behavior research towards sustainable food products involves three groups of attributes, beyond the socio-demographic aspects: personal values, needs and motivations (e.g. Involvement), information and knowledge (e.g. Level of whether certainty or uncertainty) and behavioral control (e.g. PCE and product availability).

1.2.2. Knowledge gap

In regard to the current knowledge gap, two main sections were identified as a challenge for deepen research and therefore understanding of the problem: behavioural aspects and geographical context.

Several studies have been conducted to understand how consumers decide what to buy on a daily basis. However, more evidence is crucial for measuring the effectiveness of miscellaneous interventions within the food field (Godfray et al., 2018) to evaluate if the potential and desired changes affect either the conscious, reflective decision- making system or non-conscious, automatic processes of the consumers.

Also, the role of information and knowledge about food consumption impacts into the environment and health is not clearly defined under this context and it represents an opportunity for policymakers to integrate sustainability into official guidelines and therefore measure the adoption rates of healthier and more sustainable diets (Clark, Hill and Tilman, 2018).

On the other hand, most of the existing literature presents a global panorama that, although it helps to have an overall understanding of the current situation, more is needed in local terms, taking into account the different context, norms and values of the society. For the case studies, all the revised papers are developed in a global north frame where product systems and consumer segment are substantially different compared to the global south territory. Hence, the consumer preferences and willingness to pay within a developing context (i.e. Latin America) is still not very known and therefore, it is neither to clear if consumers experience a greater preference for one of the sustainable attributes (i.e. environment, health, social impact) nor the extent and form of their perceived interrelationship (Charry, A. et al, 2019).

Several opportunities have been identified. However, for the purpose of this research, the following topics will be addressed: to give more insights about the consumer preferences and willingness to pay within a developing country, in a local context which is the city of Cali; additionally, evaluate the impact of information and knowledge about food consumption through an extra scenario[5] that let us know the effects in trade-offs among the different attributes.

1.3. Relevance of the research

1.3.1. Scientific relevance

According to Mann, D. et al (2018), the food system at a global level is the responsible for around 19-29% of the world's GHG emissions, and it is the major cause of deforestation. Also, it accounts for 20% of energy consumption and it is the biggest available freshwater consumer with a 70%. Last but not least, the current food system covers around 30% of all ice-free land in the world. These figures give an understanding of the level of urgency that the situation warrants. It is relevant to continue researching, either to create solutions from the supply side and from the demand side, and thus guarantee the availability and quality of food for the existing and future population, opening up a dialogue among the different stakeholders to address the ongoing food system and spur more sustainable consumption patterns, by developing improved strategies and tools to move towards the desire conditions.

[5] To see the different scenarios were used for the data collection, please see the materials & methods section.

To conclude, it is important to understand that most of the studies done in this field are very recent, which represents a potential to continue to strengthen through research and new data the solutions that provide more effective results for the context and studied population.

1.3.2. Social relevance

Detecting ways to raise the adoption of healthier and more sustainable diets is a challenge. Nowadays, human beings frequently prefer foods with elevated levels of fats, salt and sugar, and it is easy to find them into the commercial and processed foods, that are present in large quantities in stores; additionally, these kind of products are regularly linked with poor health and massive environmental impacts (Clark, Hill and Tilman, 2018). Within the Colombian context, a developing country where the food production companies see a market opportunity to sell their products, whether they are healthy or not, this study can be helpful to understand what are the drivers to promote a more sustainable diet that helps to improve the consumers' and the environment welfare; thus, to strengthen the policy interventions and tackle the problematic understanding the different cultural, social and economic variables.

A requirement for the design of policies that promote a healthier and more environmentally friendly diet must start from a better understanding of consumer preferences for healthy food and / or due to a lower environmental impact. In this case, a choice experiment allows us to ask people if they want a type of food with certain characteristics (i.e. sustainable, social and health) compared to another type of food at a different price.

1.4. The objective of the research

The aim of this project is to study the preferences of consumers in the city of Cali for food products with varying environmental, social and health attributes by using choice experiments. The study will estimate people's Willingness To Pay (WTP) for alternative characteristics of food, and the socio-economic characteristics that determine that WTP .

1.5. Research questions

1.5.1. General Research Question

For the purpose of this research, the following General Research Question (GRQ) will be answered:

What are the consumer preferences regarding food products with varied attributes in the city of Cali (Colombia) and their Willingness To Pay (WTP) for those characteristics?

1.5.2. Specific Research Questions

To decide on the previous GRQ, the following Specific Research Questions (SRQ) will be used:

SRQ 1: To what extent is the population of Cali willing to pay for food with improved environmental friendly characteristics?

SRQ 2: To what extent is the population of Cali willing to pay for food with improved health characteristics in terms of both human and animal welfare?

SRQ 3: To what extent is the population of Cali willing to pay for food with a social positive impact ?

SRQ 4: Which characteristics of consumers make them more prone to a sustainable diet choice in terms of environment, health and social aspects?

SRQ 5: Does the knowledge of environmental, social and health impacts of the current food system have an effect on the willingness to pay for a more sustainable diet?

1.6. Hypotheses

The following are the hypotheses for this study to be tested:

H1[6]*:* Consumers value environmental, health and social attributes related with food differently.

H2[7]*:* Social demographic factors such as age, gender, education level, social strata and household size have an effect on the willingness to pay for a more sustainable diet.

H3: Non demographic aspects have a different effect on the willingness to pay for a more sustainable diet, where:

- Positive attitude towards buying sustainable food does not have an effect on the WTP.
- Perceived effectiveness (CPE) does have an effect on the WTP.

H4[8]: Additional information given about the impacts on the food system in terms of the environment, the society and the health has a bigger effect on the WTP for a more sustainable diet.

[6] In response to SRQ1, SRQ2 and SRQ3
[7] In response to SRQ4. Same with H3
[8] In response to SRQ5

2. Materials & Methods

2.1. Discrete Choice Experiment

A Discrete Choice Experiment (DCE) is one of the most used techniques for eliciting preferences with the aim to comprehend consumer demand for goods and services, commonly not traded on a defined market, and where it is not plausible to use revealed preference data on the choices made by individuals (Mangham, Hanson & McPake, 2008). This kind of experiments demand respondents to declare their choice over diverse sets of hypothetical alternatives that evoke a real-world decision. For each alternative or scenario, there are several characteristics (e.g. attributes) who guide the individual to decide for a specific alternative.

The theory behind DCE relies on the random utility theory, including the assumptions of economic rationality and utility maximization (Hall et al., 2004). The main assumption is the consumers will choose the alternative that returns the highest individual benefit (i.e. utility). Moreover, as Lancaster stated (1996, p.134), "*the utility yielded by an alternative is assumed to depend on the utilities associated with its composing attribute and attribute levels".* Mathematically,

$$Yiq = Xi\beta i + \varepsilon iq$$

Where Yiq represents the utility of the consumer q for the i_{th} alternative; Xi, is a vector of attributes for the i_{th} alternative that goes along with a set of weights (βi), establishing the relative contribution of each attribute to the benefit linked with the alternative. εiq equals to the unobserved variation in the characteristics of different options and any measurement errors. Each alternative is composed by different attributes at different levels. The levels should indicate the range of situations that respondents might suppose to experience.

By using this approach, then we are able to outline the significance of the attributes that are related with the good or service, and the degree to which respondents are willing to trade one attribute for another one (Drummond et al. 2005). Thus, a DCE presents a logical and direct task and one which more closely matches a real-world decision (Mangham et al., 2009). Since the aim of this study is to evaluate the food preferences of consumers by calculating their willingness to pay, this is the most adequate method to do it.

2.2. Choice experiment design[9]

Definition of attributes, attributes levels and customization

To properly define the attributes and their levels, I conducted a literature review to understand the major impacts of the food system performing and its consequences on the environment, health and social level. In addition, I held several online meetings and focus groups with the research center (CIAT) to contextualize the chosen attributes to the reality of the city of Cali were made. For the purpose of this study, the chosen attributes are as follow:

Deforestation linked to food production: The land use for agricultural and livestock purposes may have an impact on biodiversity levels (amount of fauna and flora), on levels of water availability for human

[9] Section based on the proposed outline in *Choice Experiments for Non-Market Valuation. Francisco Alpízar, Fredrik Carlsson and Peter Martinsson. Economic Issues, Vol.8 , Part 1, 2001*

consumption, in deforestation (felling of trees) and, in the carbon dioxide (CO_2) emissions associated with this deforestation. Producers can reduce that impact. Among the alternatives presented to the consumer, they will have the options of choosing a meal that is potentially linked either to a low, medium or high level of deforestation depending on the food and its form of production. Thus, this first attribute contains 3 levels with the values low, medium and high.

Use of agrochemicals for food production: In agriculture, agrochemicals are used for greater productiveness and less diseases and pests in food. Many times these agrochemicals, whose use is normally unavoidable, have a negative impact at different levels. In the case of this attribute, the objective is to evaluate what is most important for the consumer at the environmental and / or human health level. There are 4 levels available for this attribute, which are the following: negative impact on nature at the local level (e.g. through pollution of rivers and land), negative impact on consumer health (e.g. through the levels of toxins in the human body due to the consumption of these foods), a negative impact at both levels (i.e. nature at the local level and the consumer health) and finally, without any negative impact since agrochemicals were not used for the production of the foods contained in the meal.

Meal Nutritional balance: To maintain a healthy body, the consumption of macronutrients is essential. Macronutrients are those nutrients that supply human bodies with energy and allow them to function properly. A healthy diet should contain these macronutrients, which can be classified into three categories: protein (such as eggs, all kind of meat, dairy, vegetables), carbohydrates (such as rice, potato, banana, vegetables / fruits), and fats (such as oil, avocado, nuts and seeds). For this attribute, three different levels are presented concerning the amount of macronutrients contained in the meal. The first level corresponds to a meal that contains one out of the three necessary macronutrients; the second contains two out of the three macronutrients and the third and last contains three out of the three (i.e. all) necessary macronutrients. It is important to mention this attribute represents the health category without including other nutritional factors such as micronutrients, minerals and vitamins. In order to be as simple and clear as possible with the respondents

Fair Trade: Fair trade refers to an agreement where small producers or peasants receive a fair price for the products they sell, allowing them decent living conditions where there is a guarantee and protection of human rights. Additionally, it is very likely that the marketing and distribution chains will be reduced to achieve these fair prices, making the purchasing process much more local and more direct between producer and final consumer. Although in Colombia the use of labels or certificates is not common or comparable to the current development in Europe, the implementation of peasant markets, where the producer sells directly to the final consumer, and the *trust guarantee labels* where traders commercialize only products from farms with decent working conditions and the payment to farmers is fair, it has been growing in lately in Colombia. In the case of this social attribute, two levels are considered for the study: the meal has a fair trade guarantee or it does not have it.

Monetary value: The average price of a lunch in a restaurant at Cali is around 12,000 Colombian pesos (COP). Taking into account that almost half of the population in the city belongs to the socioeconomic strata 1 (low-low) and 2 (low-medium) and, besides Colombia is a country with a highly price-sensitive population, it is important to re-evaluate the average price found because it can be considered high

for almost half of the population that, socioeconomically speaking, are below the middle stratum (i.e. strata 3). By being a population sensitive to the monetary value, more levels should be considered in this attribute and be more differentiated to evaluate a true trade-off or compensation when choosing different alternatives per choice set . Thus, 7 price levels will be evaluated with a minimum price of 8,000 COP up to a maximum price of 20,000 COP with differences of 2,000 COP between each level (8,000 COP, 10,000 COP, 12,000 COP, 14,000 COP, 16,000 COP, 18,000 COP and 20,000 COP).

Experimental Design

To obtain the optimal combinations of the attributes and their levels and, subsequently, combine these obtained profiles into the choice sets from a statistical perspective, a technique based on the D-optimal criteria for non-linear models was considered for the evaluation of the variables. The possible combinations in this study are calculated as follows:

$$(3\text{^}2)\ x(\ 4\text{^}1)\ x\ (2\text{^}1)\ x(\ 7\text{^}1)\ =\ 504\ \blacksquare$$

Where the base corresponds to the levels of the attributes and the exponents to the number of attributes with that number of levels. This calculation is done by alternative; thus, having two alternatives of meals in this study (i.e. Dish A and Dish B), 1008 combinations of attributes and their levels are possible. Respondents cannot be exposed to so many combinations, so the four principles identified by Huber and Zwerina (1996) were considered for an efficient design of choice experiments in a non-linear model: orthogonality, level balance, minimum superposition and balance in utility. Stata was used to select the efficient combinations by using the DCREATE command who integrates three of the four principles in its calculations to obtain the most efficient ones. Utility balance was not considered as I did not have priors on the targeted parameters of the utility function.

Experimental Context and survey development

With the aim to minimize the level of complexity of the choice experiment and therefore reduce the risk of obtaining information that does not have the optimal quality for the data analysis, priority was given to the five attributes mentioned in the first section when initially there were nine. According to Mazotta and Opaluch (1995), including more than four or five attributes on a card (choice set) can lead to a detriment in the quality of the information collected due to the level of complexity for the respondent, creating confusion at the moment of choosing the alternatives, affecting the variance in the results.

The alternatives for each choice set are two: Dish A and Dish B. The approach chosen to present these alternatives is the generic one, since respondents are less inclined to choose only because of the particular title of an alternative and therefore, this approach makes it possible to evaluate the trade-off between attributes and to be able to calculate the Marginal Rate of Substitution between them, which is one of the objectives of this study. Among the alternatives, instead of having an opt-out scenario, I included the status quo levels for each of the attributes previously described.

Each respondent had 6 choice sets or cards to answer and, per scenario, there were two sets of 6 cards each, seeking to include as many efficient options as possible in the study while not increasing the complexity in the execution of the experiment. Thus, a total of 4 sets of 6 cards each were considered for the collection of information; this means that, of the possible effective combinations, 24 of them were chosen randomly for the execution of this research.

Both the scenarios formulated and the questionnaire with the different cards can be seen in Annexes 1 and 2, in their original language (i.e., Spanish).

Sample and sampling strategy

Taking into account the technological application used for the execution of the survey by the supplier, the first filter for the sample of the population in Cali was made with its database. This database has been created with all the people who voluntarily decide to download the application and participate in surveys or market research that are carried out by LookApp and who receive financial compensation for being part of this service. Within this database, a stratified random sampling strategy was used to select sampling points, using the national socioeconomic stratification system as the stratification variable. The main criterion for selecting the sample was the representativeness by socioeconomic stratum and by age, understanding that by default all the people belonging to the LookApp community are of legal age.

According to the most recent population census carried out in Cali (year 2018) by the National Department of Statistics (DANE), the population of the city reaches almost 2.4 million inhabitants and has the following distribution by socioeconomic stratum:

Table 1 Cali's population by socioeconomic level

Socioeconomic level	Number of households	Population(*)	Index
1	120.101	480.404	20,2 %
2	159.981	639.924	27,0 %
3	188.652	754.608	31,7 %
4	64.222	256.888	10,8 %
5	45.390	181.560	7,6 %
6	15.907	63.628	2,7 %
Total	**594.253**	**2.377.012**	**100 %**

(*) Estimated average of 4 persons/household

Using the formula presented by Louviere et al. (2000) to calculate the minimum sample of respondents and, supported by the calculations made by LookApp with a margin of error (percentage of deviation) of 5.2% and a confidence level of 95% and considering the budget constraint for the data collection (see as a legal support Annex 7) , a representative sample of 350 people is chosen. This amount was surveyed under the first scenario or general scenario; additionally, 60 people were surveyed under scenario 2 or the one that has extra information as an exploratory study. This, in order to test the effect on final consumers' Willingness To Pay when they have greater knowledge or extra information about the (negative) impacts of the food they consume today on the global food system. A total of 4920 observations were collected, 12 observations per individual. This is explained by the importance for choice experiments to analyze not only the alternative chosen by the user (in this case 6 different

times) but to include in the analysis those alternatives that were not chosen (the other 6 left alternatives).

Both the people surveyed in the general scenario and in the additional scenario were selected randomly within the existing database but considering that they are representative (proportional) with the socioeconomic strata presented by DANE.

The sample size is divided by socioeconomic level and scenarios as follows:

Table 2 Sampling size per socioeconomic level and survey scenario

Socioeconomic level	Scenario 1: General	Scenario 2: Extra information given	Ix. Per socioeconomic level
1	70	8	19,0%
2	84	17	24,6%
3	110	21	32,0%
4	38	8	11,2%
5	26	5	7,6%
6	22	1	5,6%
Total	**350**	**60**	**100%**

2.3. Online survey (LookApp)

Several sections were included in the online survey presented to the respondents. These sections are explained below:

First, an initial presentation and legal consent were showed to the respondent where he/she needed to confirm his/her availability to respond the survey. Follow by that, some initial questions were posted in order to know more about their preferences and opinions about environmental, health and social aspects. Questions such as perceived changes in the temperature, healthy food concept and opinions, fair trade definition and some of their regular activities were asked.

The hypothetical scenario comes after this section. Here, a description about the context of eating outside home (i.e. in a restaurant) and the characteristics they can find in the restaurant's menu are defined. There is a general overview of the attributes they will see in the next section along with the aim of the survey. In the case of the scenario 2 where extra information is given, this section covers the main current impacts in terms of the environment, the human health and the social aspects within the global food system. Then, the main section of the survey is covered by the choice experiment where 6 cards were shown to each respondent and they needed to choose the best option for them taking into account their utility level. A summary of the attributes and their levels can be found in the following table:

Table 3 Choice experiment: Attributes and levels

Category	Attribute	Levels	Description of levels
Environment	Deforestation linked to food production	Three (3)	Low, medium, high
Environment, health	Use of agrochemicals for food production	Four (4)	Impact on nature, impact on human health, impact on both, impact on none (non-use of agrochemicals).
Health	Meal nutritional balance	Three (3)	One, two, there (out of three)
Social	Fair trade	Two (2)	Yes / No
Economic	Monetary value	Seven (7)	From 8.000 to 20.000 with differences of 2.000 COP (8.000, 10.000, 12.000, 14.000, 16.000, 18.000, 20.000 COP)[10]

Once the cards were finished, the following section refers to a context information and knowledge about the topic, by bringing the OMS definitions for food groups and their level of health; in terms of the environment, a series of statements were evaluated using a Likert Scale in order to measure their opinions and position about non-sociodemographic aspects that might have an impact on the WTP. The final section corresponds to the sociodemographic information of each individual.

Further details about the survey can be found in Annexes 1 and 2. Moreover, an Excel file with the raw data collected from the survey is attached in the Annex 3.

2.4. Statistical analysis

The version 13th of Stata was used to analyse the collected data Based on the purpose of this research, a Choice Model (CM) was chosen for the results interpretation. The outcome of a CM are choices selected by a respondent (e.g. user) from a set of possible alternatives. In this case, the modelling is for discrete choices given that each individual selects a single alternative in each choice set (StataCorp, 2019).

A mix logit model, also known as a mixed multinomial logit model or random-parameter logit model was used to study the collected data from the surveys. This type of model uses random coefficients to model the correlation of choices across alternatives, which relaxes the property of Independence of Irrelevant Alternatives (IIA). The model allows to include fixed coefficients as well. Here, the variable of price is managed as an independent variable with non-random coefficient while the rest of attributes from the choice experiments are managed as an independent variables with random coefficients. The reason of having a fixed parameter for the "price" attribute relies on the reason to ensure the estimated coefficient will always be negative. For valuation purposes, a reduction in the income resulting from goods with higher prices should lead to a reduction in the utility level of the individual. As a random parameter formulation using either a logistic or normal distribution goes from minus to plus infinity, it might be possible that the coefficient will change signs for some respondents and this is not ideal for the study; thus, it should be fixed (i.e., non-random). It is important to mention that the choice made by the respondent is the dependent variable. In order to treat the variables as

[10] Currency exchange, 1 € = 4.177,20 COP (January 15th 2020)

discrete and not continuous, the model starts with "xi", indicating to Stata the type of variables included within it.

Due to the decision of use generic alternatives for this research, all the individual-specific variables were including in the model using the conditional *if*. When a variable is not alternative-specific, such as the attributes used in the CE, but individual-specific, such as the sociodemographic variables or statements that do not change over each alternative but over each individual, the model does not run with these variables and series of conditional were included to evaluate the WTP based on the chosen condition.

Once the mixlogit model was developed, the use of the command nlcom was used to calculate the Marginal Willingness To Pay (MWTP) under the scenario of the model. Nlcom stands for nonlinear combination of estimators and it shows the relation between the attribute coefficient with the price attribute coefficient. It computes point estimates, standard errors, test statistics, significance levels and confidence internvals for (possibly) nonlinear combinations of parameter estimates after any Stata estimation command (e.g. mixlogit) (StataCorp, 2013).

A detailed process with the Stata coding, the complete variables dictionary and executed codes can be seen in the Do-File (Annex 4). In addition to this Annex 4, the Annex 5 comprises a series of screenshots with all the models considered in this research. The variables that are statistically significant are those whose p values are between 0% and 10% (i.e. 0.000 < (P>z) > 0.100). In relation to the coefficients, the initial consideration to be analysed from them are the different signs. When the coefficients are negative, then those decrease the probability of choosing the alternative. Conversely, positive coefficients mean those attributes increases the probability of choosing the alternative. What it is usually expected is to have a negative coefficient for the cost or price attribute, since individuals prefer to expend less money or to have a better cost/benefit ratio due to their utility level that decreases with the money expenditure and due to a budget constraint.

3. Results

3.1. General results

The consumers' preferences for food in the city of Cali vary depending on the attributes and their (non)sociodemographic characteristics. Thus, the MWTP varies over these different categories. To answer the general question of the research, the subsequent paragraphs are answering the results from the Specific Research Questions (SRQ). For further details about the Stata results, please see Annex 5.

Regarding the initial three SRQ, annex 5.1 comprises the general results from the mixlogit model. As it is shown, the p values from the different attributes of the choice experiment are statistically significant for the model[11] (Mean section) but the result of the attribute agrochhum (p value of 0,962). In this case, this attribute should be excluded from the model because it is highly insignificant to the model and it does not help to understand the decision made by the respondent. Regarding the others, those attributes help to understand the decision made by the respondents. The mixlogit model shows a negative coefficient for the price, which complies with the economic theory.

[11] Statistically significant with a maximum value of 10%. This means the results from the sample can be extrapolated to the total universe, or explain the behavior from the population; thus, the study is significant to make inferences about the population in Cali.

With the attributes statistically significant for the model, it is feasible to calculate to what extent the population of Cali is willing to pay for food with improved environmental friendly, human health and social positive impact characteristics.

Because the coefficient of the attribute "price", although is different from zero, is not salient enough (-0,0000279126), the Willingness To Pay calculated using the nlcom command is very high and therefore unreliable (e.g., respondents willing to pay almost 50% extra of the total price of the dish for just one of the attributes). Unfortunately for this research, this result inhibits the interpretation of the WTP estimates in absolute terms, as they are all overestimations of the true WTP. Instead, we shall limit the discussion of these results to ordinal comparisons (i.e., ranking preferences) rather than cardinal (considering both the amount or value, and ranking or order). A comparison among coefficients is correct because the nlcom produces a ratio between coefficients that takes out the inherent scale from each regression. As a result, the unit of measurement is the same for all the results and it is feasible to compare these ratios and identify an order (i.e., ordinal analysis).

Regarding the (non)sociodemographic factors, there are noticeable differences when the model is calculated under each situation; in other words, using the conditional *if* to evaluate every (non)sociodemographic factor in the subsamples, the attributes are valued differently and there are cases when the attribute price is not statistically significant for the subsample, which disables the MWTP calculation. Nonetheless, it is possible to determine certain preferences from the consumers in relation to the dish attributes. Further details can be found in Chapter 3.3. and the Annexes from A5.3 to A5.24.

As an exploratory activity, a subsample of N=60 respondents received extra information about the current impacts in the global food system in terms of environmental, social and human health related factors. Price does not play a role when people know about the current impacts and the relevance of the remaining attributes change compared to the general model. Since the MWTP is not possible to be calculated, then the hypothesis cannot be solved but differences can be identified. In the Annexes A5.25 and A5.26 are the results from Stata.

3.2. Environmental, health & social attributes for food consumers

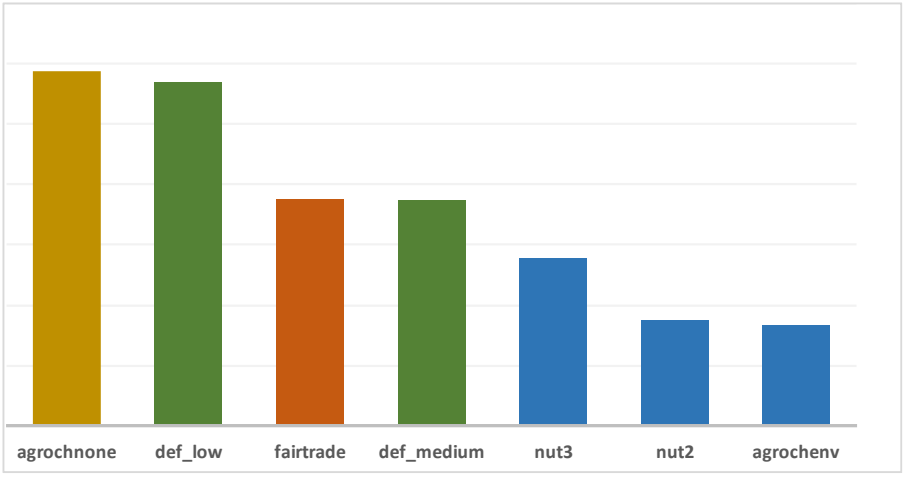

Figure 1 Marginal Willingness To Pay for the general mixlogit model.

From figure 1, the defined environmental characteristics are in green; for the case of human health, the blue attributes represent the category. A particular attribute that combines both human health

and environment characteristics (i.e. agrochnone) is coloured in yellow. Last but not least, social categories are coloured in orange. Since the p value for the attribute agrochhum is not statistically significant, then the MWTP is not calculated. These results show how much the consumers are willing to pay for an extra unit of the attribute. The base is the initial level of each attribute.

People valued environmental, human health and social characteristics related with food differently. Within the environmental category, the lower the deforestation level of the dish, the higher the preference of the consumer for choosing that dish. People prefer dishes with low deforestation level than dishes linked with medium deforestation levels.

In the case of agrochemicals, the base is the agrochemicals used for food production that have an impact on both: human health and the environment. In the case of *agrochenv,* consumers prefer to consume food with this attribute instead of having agrochemicals in their dishes impacting both the health and the nature; so, it does cancel any effect on the human health, remaining the part of the environment. That is the reason why this is considered as part of the health characteristics and coloured in blue since consumers thought about human health over the environment. When the idea is to remove completely the effect of agrochemicals (by not using them) and therefore suppressing the effect on the environment and the human health, the preference is higher, so much that it turns to be the attribute with the highest preference for the respondents when choosing between the different alternatives.

Now, in relation to the other human health attributes, the amount of macronutrients in the dish is important for the consumers. The more nutrients a dish has, the higher the preference for the consumers to choosing that option. Finally, fair trade (i.e. fairtrade) is the top 3 characteristic among the respondents, representing the social factor within this choice experiment.

As it is seen, consumers are willing to pay for more sustainable dishes, but they valued every attribute and therefore, every category[12], differently. It can be deduced that individuals might have a ranking of importance based on the MWTP results, where the removal of agrochemicals for the food production is the most valuable attribute, followed by the idea of having a low level of deforestation instead of a high one linked to the food and, within the top three, the dish with a guarantee of Fairtrade for its production. Attributes related with human health are the least preferred when deciding for food products.

3.3. Effect of social demographic factors in a more sustainable diet choice

Six sociodemographic factors were included in the online survey in order to determine if they have some effect on the choice made by respondents. These factors are as follows: gender, socioeconomic level (i.e. stratum), education level, ethnicity, household composition and age.

Considering gender, there are two extra models as follow: mixlogit model with only female observations and mixlogit model with only male observations. Due to the P value of the price attribute in the “only male” model (P value = 0,75), the MWTP calculation is not coherent to do it because of the weak results of the estimation. In this case, a comparison between the general model and the “only female” model in relative terms is made. As explained at the beginning of this chapter, although the

[12] Environmental, social and human health

actual number in absolute terms for MWTP does not make sense, it is possible to compare female respondents to the general population in terms of preferences order.

Figure 2 shows women rank in a similar way their preferences for the attributes compared to the total population. Two remarks are important for this sociodemographic factor: first, all MWTP are lower for female than the total sample. So, even when only women are also willing to pay for more sustainable dishes, higher values can be seen when modelling for all the observations. Second, fair trade is less important to only women and deforestation, both levels, are in the top three of their preferences along with the *agrochnone* attribute which continues being the most preferred attribute.

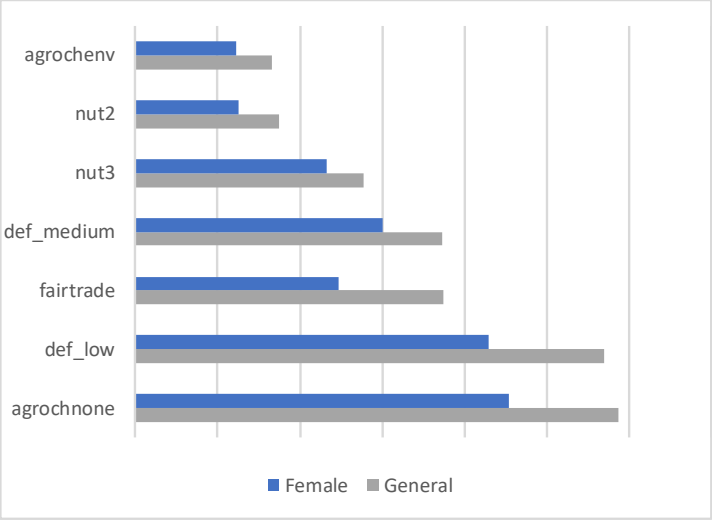

Figure 2 Marginal Willingness To Pay (MWTP) for female gender compared to the MWTP of the general model

Continuing with the socioeconomic level, a MWTP's comparison between all the variables is not possible because of the P values results from all the sectors are statistically insignificant (P value $_{\text{low level}}$ = 0,538, P value $_{\text{medium level}}$ = 0,140 and P value $_{\text{high level}}$ = 0,402). However, a marginal effects interpretation is possible with those attributes statistically significant for the model. Table 4 reflects the variables considered for the marginal effects interpretation.

Table 4 Relevant variables depending on the socioeconomic level

Socioeconomic level	Statistically significant variables
Low (1 & 2)	def_medium, def_low, fairtrade, nut3, agrochenv, agrochnone
Medium (3 & 4)	def_medium, def_low, fairtrade, nut2, nut3, agrochenv, agrochnone
High (5 & 6)	def_medium, def_low

For the respondents who belong to the low socioeconomic level, a change in the deforestation level from high to medium increases the probability to choose a dish in 45%. When the change goes from high to a low level of deforestation, then the probability of choosing a dish increases and it equals 81%. A dish with a fairtrade guarantee increases the probability to choose it in 47%. Another relevant attribute is agrochnone for the low socioeconomic level respondents. Compared with a dish using agrochemicals with an impact on both, the environment and the human health, a dish without any agrochemical increases the probability of choosing that option in 79,58%.

Regarding the respondents within the medium socioeconomic level, agrochnone increases the probability of choosing a dish in 97% when the food in the dish is made with agrochemicals that affect both the environment and the human health. Fairtrade also plays an important role within this level. By having a dish with a fairtrade guarantee increases the probability of choosing a dish in 62%. To finalize with the socioeconomic level, for the consumers with a high socioeconomic level deforestation is the only attribute relevant when deciding for a dish.

People were asked about their education level. For the purpose of this research and looking to have more significant subsamples, three categories were made: people with studies until primary school and high school belong to the category of school. For the case of technical/technological, it remains the same; and, bachelor and postgraduates studies, the category created was University.

The P value from consumers with university studies is statistically significant (P value = 0,079) and the MWTP can be seen in Figure 3. The other two categories present not significant P values so a calculation is not possible (P value $_{school}$ = 0,267 and P $_{value\ technical/technological}$ = 0,613). In the case of university, deforestation gets the highest MWTP when the level is low; after a low deforestation, omitting agrochemicals is the second most valued attribute and near to it is the nutritional balance when the dish, instead of having 1 macronutrient, has all of them. In comparison to the general model, the MWTP of the human health attributes (i.e., nut2 and nut3) is higher for people with university studies than all the respondents. Even when agrochnone is not the most important attribute for them, it is still part of the top 3. For the remaining attributes, the MWTP are higher in the general model than this specific one.

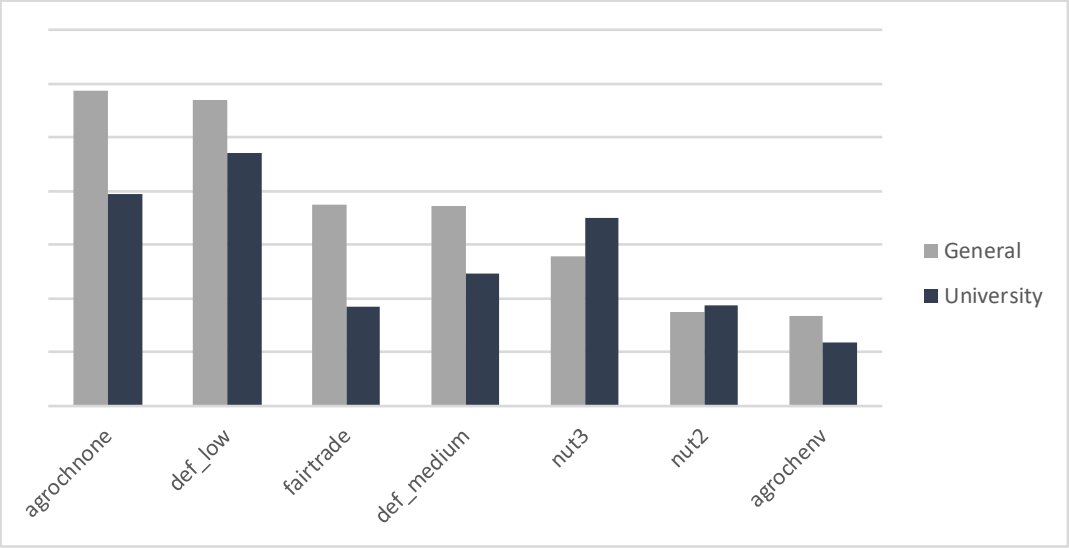

Figure 3 Marginal Willingness To Pay (MWTP) for consumers with university studies compared to the MWTP of the general model

Next, the ethnicity was taken into account. Three different ethnic groups are present in the city of Cali: Black, afro-colombian, raizal and palenquera group as the main one; then, there are indigenous people and gypsy in a less percentage. All of these three ethnicities were grouped into the category “ethnic”. The rest of the population do not belong to an ethnic group. For this particular factor, the price attribute is statistically significant (P value = 0,069) just for those who do not belong to an ethnic group. Special attention is made in the case of the ethnic group, since most of the attributes are not statistically significant, except for those related with agrochemicals.

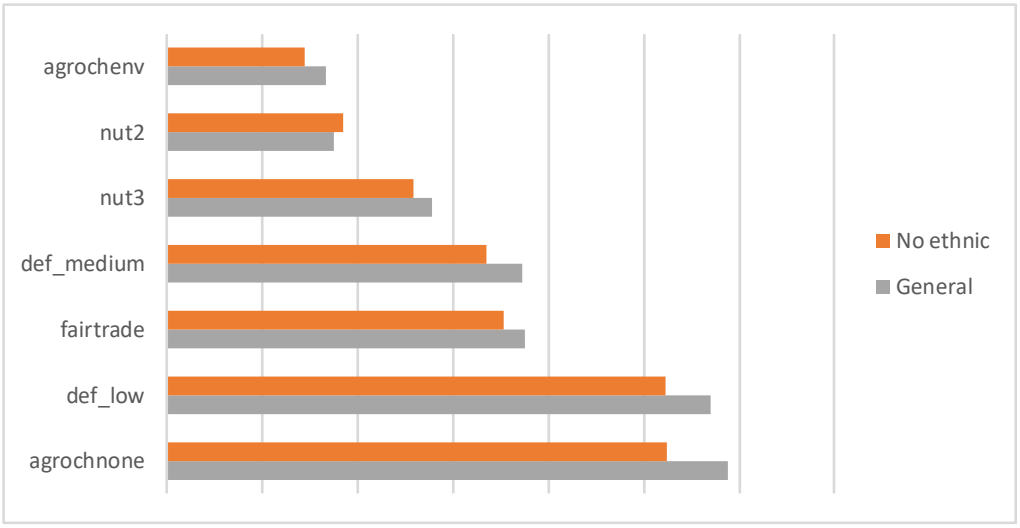

Figure 4 Marginal Willingness To Pay (MWTP) for consumers who do not belong to any ethnicity compared to the MWTP of the general model

Figure 4 displays for almost all of the attributes the MWTP is higher in the general model compared to the model without observations of respondents who belong to an ethnical group but *nut2*. In other words, it is most important for this group a dish with two macronutrients instead of one than for all the respondents. Meals without the use of agrochemicals, along with a low level deforestation and a fair trade guarantee are the most preferred characteristics when choosing the dishes for this subgroup.

Now, in relation to the household composition, three categories are analyzed: people living alone, people living with adults and people living with sensitive people which means people under legal age (< 18 years old) and elderly people (> 65 years old). Due to a small subsample of people living alone, a model is not possible to run. Regarding the other two groups, the price attribute for those living in a sensitive household is highly insignificant to make the choice (P value = 0,65). Thus, the MWTP is just relevant to be calculated, in relative terms, for the people living with adults only. Figure 5 shows a comparison of these results and the general model. As it is seen, the ranking of preferences for the people living with adults is similar to the female group, where agrochnone is the most relevant characteristic followed by a low and medium deforestation levels. The general model shows higher MWTP than the model of household composition of just adult population.

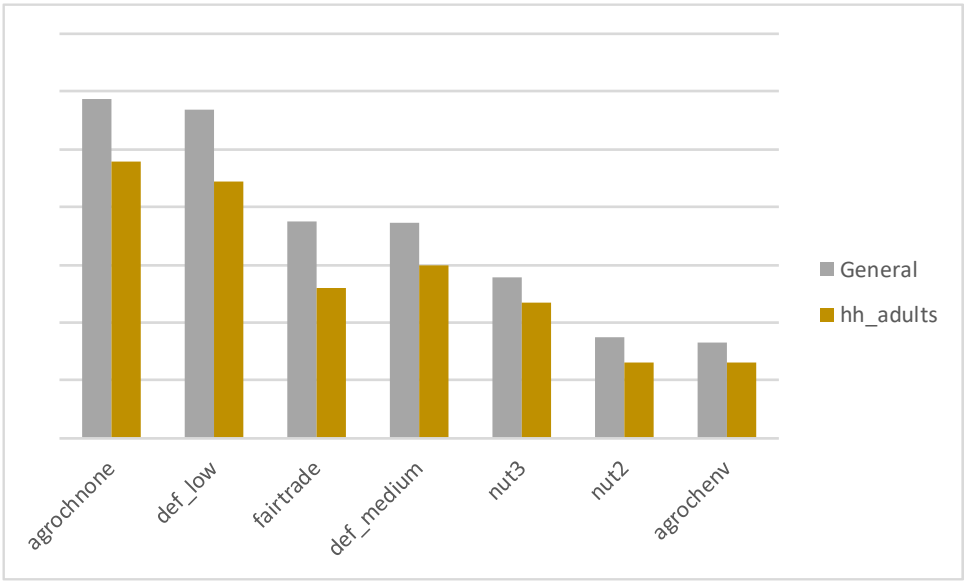

Figure 5 Marginal Willingness To Pay (MWTP) for consumers who are living with adults compared to the MWTP of the general model

For the last socioeconomic factor of this study, the age was another factor with interesting results. The sample was divided into four different age groups: the young people (i.e., from 18 to 24 years old); then, young adults (i.e., from 25 to 34 years old). The biggest group is for the adults (i.e., from 35 to 54 years old). The last group corresponds to the old adults, over 55 years old. None of the models based on age have statistically significant the price variable (P value $_{\text{young people}}$ = 0,899, P value $_{\text{young adults}}$ = 0,271, P value $_{\text{adults}}$ = 0,249, P value $_{\text{old adults}}$ not possible to calculate due to the very small sample); therefore, a MWTP calculation is not considered and the age is not relevant when deciding for an alternative.

3.4. Effect of non-demographic factors in a more sustainable diet choice

Two non-demographic factors were asked in the survey using the Likert Scale methodology: positive attitude and Consumer Perceived Effectiveness (CPE). Up to now, those factors are two of the most mentioned ones in the developed behavioural economics literature.

In the case of positive attitude, the following statement was evaluated using a 5-point scale, going from totally disagree to totally agree; “If a food product seems to be more sustainable and environmental friendly, I will consider in buying it instead of other because it is better”. The analysis made considers the people with a positive attitude when they were agree or totally agree on the statement. The hypothesis for this non-socio demographic factor states there is not an effect on the MWTP. Nevertheless, figure 6 shows people with positive attitude have a preference for more sustainable food, even when their MWTP are lower compared to the general model. The environmental factors (i.e., def_low, def_medium) are the two most preferred attributes for choosing a dish and the human health related attributes (i.e., nut2, nut3, agrochenv) are the least preferred ones.

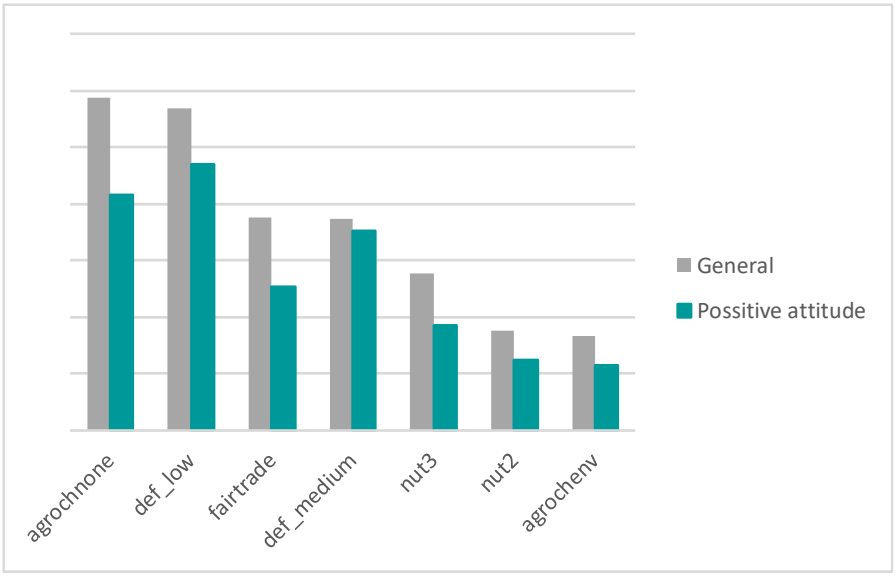

Figure *6* Marginal Willingness To Pay's comparison between the general mixlogit model and people with positive attitudeAbout the CPE, this was the statement used with the same 5-point scale as the positive attitude factor: "My behaviour and actions when consuming and buying food can definitely contribute to the care and improvement of the environment". For this factor, the initial assumption is that it does have an effect on the WTP. Unfortunately, even when the P values of the price variable are statistically significant (P value $_{CPE+}$ = 0,004 and P value $_{CPE-}$=0,018), the coefficient is positive for the subsample with a disagreeability on the CPE.

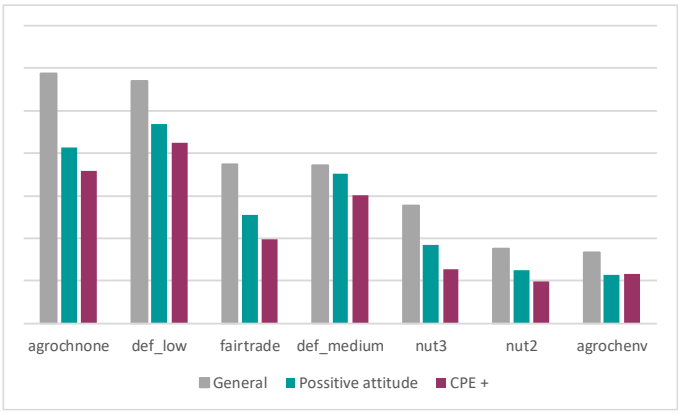

Figure 7 Marginal Willingness To Pay's comparison between the general mixlogit model and people with positive attitude and positive CPE

3.5. Effect of information level in a more sustainable diet choice

Two different scenarios were used with the sample. The base scenario (N=350 respondents) did not include additional information about the current impacts on the environment, the human health and the social aspects in the food system. On the contrary, 60 respondents received extra information with relevant examples of the impacts with the idea to evaluate if the knowledge, in this case the extra information given, does have an effect on the MWTP. Unfortunately, a conclusion is not possible to make in this case, due to a lack of significance of the P values when doing the mixlogit model (P value $_{extra\ info}$ = 0,611 and P value $_{without\ extra\ info}$ = 0,404).

4. Discussion

4.1. Findings versus literature review

Consumer behavior can be understood as a decision on how to distribute available resources (i.e., money, effort, time) in consumption-related products. It covers *what, where, when, why and how often* they buy the products, as well as their own evaluation once they bought it and use it, and the way to dispose it (Schiffman & Kanuk, 2010). According to the existing literature, a growing concern regarding the environmental issues and topics related with the human health has been generating the emergence of a new consumer niche in the market, where they are demanding new types of products and, in most of the cases, these demands are reflected in a premium price for more sustainable products (Finisterra, Barata & Leal, 2009). This behaviour has been strengthened worldwide due to an income level increase and also because of a rising demand for these type of products (Salgado, Subirá & Beltrán, 2009).

Taking into account the results from the first hypothesis, it is clear the consumers are willing to pay for a more environmental friendly, healthier and with a positive social impact dish. Indeed, their behavior shows a trend for preferring more sustainable meals. However, the ranking of preferences sometimes differ from the literature, due to an initial understanding that health attributes are often the most valued characteristics rather than the environmental and the social ones. Health attributes are classified in this study in the last part of the consumer ranking, while the environment and the social impact are leading it. This finding contradict the literature, and further research is recommended in order to understand if the trend is common in other communities or contexts within Colombia or the region.

Regarding the socio-demographic factors, a series of studies have carried out showing interesting results. Regarding age, there is not a consensus about the effect on food consumption with environmental friendly attributes. Some researchers suggest there is a positive relationship between WTP and age (Padel and Foster, 2005; Roitner-Schobesbrger et al., 2008 cited by Shafie and Rennie, 2012). On the other hand, different studies show a negative correlation between both variables; thus, the younger the person, the more prone is to buy sustainable products (Yiridoe, Bontiankomah and Martin, 2005). In the case of this study, a conclusion cannot be made about age since the factor did not play a role (i.e., it was not statistically significant) when choosing the different alternatives.

In the case of education level and socioeconomic level (linked with the income level), the research does not show any particular result compared to the general model and the absolute MWTP does not make sense due to the very small price coefficient. Nonetheless, and based on previous studies, education level and income level are factors that have been increasing attention when analyzing the consumer behavior and how they are buying products with a lower environmental impact. Consumers with a higher education level and therefore a better and broader access to information, are expected to act in a more conscious way respect to the environment (Finisterra et al., 2009). According to Chekimaa et al. (2016), the factors that push the purchase of more sustainable products are much more in the case of individuals with a high education level. This is confirmed by several studies where a positive relation between education variable and environmental friendly attitudes are tested and confirmed (e.g., Jaramillo, Vargas and Guerrero, 2015; Roberts, 1996;Zimmer, 1994).

When considering the income level, there is a positive effect on the consumption of products with environmental characteristics. This is supported by the statement that an individual with a higher

income level can overcome easily the premium price linked to these type of food products (Straughan and Roberts, 1999; Villanueva, Vargas López and Guerrero, 2015). However, the income level tend to be correlated with the amount of these goods rather than the willingness to really access to them; thus, households with a high income level do not necessary show a higher purchase level (Fotopoulos and Krystallis, 2002).

Finally, there are some studies with the aim to validate the relation between the amount of children in the household and the environmental behavior, showing a positive relationship between them (Fotopoulos and Krystallis, 2002; Thompson and Kidwell, 1998). Grunert (1991) found out that household size has a positive effect on environmental awareness and positive attitude towards environmental quality. Unfortunately, this MSc thesis do not support the existing literature and a bigger sample should be considered in order to obtain more reliable conclusions.

4.2. Strengths of the study

In terms of the methodology used, including the experimental design and the statistical analysis, this study presents a strong statistical model (i.e., mixlogit) when conducting a choice experiment research. The mixlogit model is one of the most advanced and well developed models to analize consumers' choices. In this regard, it is positive to have worked with this model and include a very detail questionnaire who allows the CIAT and future studies to have a solid database to propose strategies to the policy makers in order to propel a more sustainable food system, in this case, from a demand point of view.

Now, when contemplating the knowledge gap, an reduction on it has been made in the case of having now more insights about the consumer preferences and willingness to pay within a developing country as well as having information of a local context study rather than global or regional data. On the contrary, in the case of evaluating the impact of knowledge about food consumption impacts when choosing for the alternatives, this gap could not be minimized with this study and it is part of the improvements for further researches.

4.3. Weaknesses of the study

When focusing on the methodology used, one of the biggest opportunities of this study relies on the lack of time and space due to the external circumstances of having face to face focus groups prior the launching of the questionnaire to define attributes and levels, particularly with the price attribute. The coefficient of this specific attribute was not salient enough to the respondent choice. This could mean many things, but most importantly it shows that price concerns were not central to the decision to choose one or the other dish. This finding hints to the saliency of the environmental, health and social dimensions faced by the respondents. If this study would have the possibility of having a bigger sample size (i.e., bigger budget) and the feasibility of collecting the data in the field (i.e., not online), the lack of saliency for the consumers would have noticed.

Unfortunately, the COVID-19 conditions also did not allow us to conduct the survey face to face; instead, an online survey was developed and some of the behaviors and way to respond of the consumers are missing for the purpose of this investigation. So, the way they interpreted the questions and possible biases due to the "social desirability" or the "right answer" when they were answering (i.e., answer socially accepted instead of their own opinion or preference) affect the confidence level when performing online surveys.

5. Conclusions & Recommendations

The main objective was to study the preferences of the consumers in the city of Cali for food products regarding several environmental ,social and health characteristics by using choice experiments. Consumers value environmental, health and social attributes related with food differently. Agrochemicals (with an impact on both the health of the environment and the human population) along with environmental factors such as deforestation level are the most important attributes when choosing food products. Human health factors are also part of the preferences of consumers but in a less importance.

Social demographic factors such as age, gender, education level, social level (i.e., stratum) and household size do have an effect on the consumers 'interests and therefore their MWTP for a more sustainable diet. Even when an absolute analysis is not possible due to the coefficient of the price attribute, a ranking of preferences is identified depending on the different subgroups according to these factors.

In the case of non-demographic aspects (i.e., positive attitude and CPE), both concepts do have an effect on the MWTP, showing that people with a positive attitude have a higher MWTP compared to the people with a positive Consumer Perceived Effectiveness.

To conclude with the initial hypotheses, a conclusion of the impact of additional information given about the impacts in the food system in terms of the environment, the society and the health is not possible to do due to the weak results of the price coefficient when performing the mixlogit model for this subsample. This study brings new knowledge in terms of choice experiment case studies under the developing country and local context level and further studies with a significant sample should be considered to understand the role of knowledge and extra information on the consumers' purchase decisions in relation to food products.

Further studies should considered, along with a bigger sample size, the idea to elaborate surveys face to face, an increase the amount of focus groups when evaluating the price ranges. Thus, an absolute terms analysis could be made.

By knowing the ranking of preferences by sociodemographic factor, or considering what is more relevant for consumers in terms of environmental, social and health aspects, policy makers can develop better and more accurate communication strategies to boost the needed change in the current food system and pave the way to a more sustainable food system.

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7. Annexes

Annex 1: Online survey template (general scenario)

1. Online survey_General scena

Annex 2: Online survey template (second scenario)

2. Online survey_Second scenar

Annex 3: Raw data results

3. Food choices Cali STATA.xlsx

Annex 4: Stata Do file & Stata database

4. DCE Cali food final_v2.0.dta

4. Do_DCE_Cali_food_fir

Annex 5: Stata screenshots models

A5.1 Mixlogit model for both scenarios (Sample N=410). General case

```
. xi: mixlogit choice price, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -1540.6777  (not concave)
Iteration 1:   log likelihood = -1535.8751  (not concave)
Iteration 2:   log likelihood = -1534.1575
Iteration 3:   log likelihood = -1521.5118
Iteration 4:   log likelihood = -1520.0024
Iteration 5:   log likelihood = -1519.9343
Iteration 6:   log likelihood =  -1519.934
Iteration 7:   log likelihood =  -1519.934

Mixed logit model                               Number of obs   =       4920
                                                LR chi2(8)      =      44.44
Log likelihood =  -1519.934                     Prob > chi2     =     0.0000
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0279176	.0162301	-1.72	0.085	-.059728	.0038927
def_medium	.5199561	.1505636	3.45	0.001	.2248569	.8150553
def_low	.7948398	.1405763	5.65	0.000	.5193153	1.070364
fairtrade	.523194	.0778615	6.72	0.000	.3705882	.6757998
nut2	.2444896	.1068176	2.29	0.022	.035131	.4538483
nut3	.386995	.0957979	4.04	0.000	.1992346	.5747554
agrochhum	-.0041142	.0866775	-0.05	0.962	-.173999	.1657705
agrochenv	.2322625	.0964599	2.41	0.016	.0432046	.4213203
agrochnone	.8200429	.1353858	6.06	0.000	.5546915	1.085394
SD						
def_medium	-.0188374	.2229673	-0.08	0.933	-.4558453	.4181706
def_low	.7489196	.1323445	5.66	0.000	.4895291	1.00831
fairtrade	.520105	.1056495	4.92	0.000	.3130358	.7271743
nut2	-.5694404	.1343332	-4.24	0.000	-.8327285	-.3061522
nut3	-.2859985	.2283372	-1.25	0.210	-.7335312	.1615342
agrochhum	-.0048955	.1789061	-0.03	0.978	-.355545	.345754
agrochenv	.1445494	.2197746	0.66	0.511	-.2862009	.5752996
agrochnone	.8691337	.1670506	5.20	0.000	.5417205	1.196547

A5.2 WTP's calculation using the nlcom command with the results from A5.1

```
. nlcom -(_b[def_medium]/_b[price])

       _nl_1:  -(_b[def_medium]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	18.62464	8.634962	2.16	0.031	1.700425	35.54886

```
. nlcom -(_b[def_low]/_b[price])

       _nl_1:  -(_b[def_low]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	28.47088	13.69314	2.08	0.038	1.63282	55.30894

```
. nlcom -(_b[fairtrade]/_b[price])

       _nl_1:  -(_b[fairtrade]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	18.74062	10.65682	1.76	0.079	-2.146366	39.62761

```
. nlcom -(_b[nut2]/_b[price])

       _nl_1:  -(_b[nut2]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	8.757531	6.146001	1.42	0.154	-3.28841	20.80347

```
. nlcom -(_b[nut3]/_b[price])

       _nl_1:  -(_b[nut3]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	13.86202	8.562773	1.62	0.105	-2.920704	30.64475

```
. nlcom -(_b[agrochhum]/_b[price])

       _nl_1:  -(_b[agrochhum]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	-.1473707	3.128988	-0.05	0.962	-6.280075	5.985334

```
. nlcom -(_b[agrochenv]/_b[price])

       _nl_1:  -(_b[agrochenv]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	8.319558	5.174093	1.61	0.108	-1.821477	18.46059

```
. nlcom -(_b[agrochnone]/_b[price])

       _nl_1:  -(_b[agrochnone]/_b[price])
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_nl_1	29.37364	15.50233	1.89	0.058	-1.010371	59.75766

A5.3 Model when the gender is male

```
. xi: mixlogit choice price if gend==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -756.42631  (not concave)
Iteration 1:   log likelihood = -755.99094  (not concave)
Iteration 2:   log likelihood = -754.61275  (not concave)
Iteration 3:   log likelihood = -751.24901
Iteration 4:   log likelihood = -747.96164
Iteration 5:   log likelihood = -743.09542
Iteration 6:   log likelihood =  -742.6545
Iteration 7:   log likelihood = -742.65185
Iteration 8:   log likelihood = -742.65185

Mixed logit model                               Number of obs   =       2388
                                                LR chi2(8)      =      29.49
Log likelihood = -742.65185                     Prob > chi2     =     0.0003
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0075629	.0237423	-0.32	0.750	-.054097	.0389712
def_medium	.4033097	.2241792	1.80	0.072	-.0360735	.842693
def_low	.6547298	.2115545	3.09	0.002	.2400906	1.069369
fairtrade	.5194323	.1156613	4.49	0.000	.2927403	.7461242
nut2	.2241918	.1591691	1.41	0.159	-.0877739	.5361574
nut3	.2789992	.14335	1.95	0.052	-.0019617	.5599602
agrochhum	-.1355763	.1280258	-1.06	0.290	-.3865023	.1153496
agrochenv	.2267351	.1427119	1.59	0.112	-.0529751	.5064452
agrochnone	.692287	.2041713	3.39	0.001	.2921186	1.092455
SD						
def_medium	.0853465	.4301774	0.20	0.843	-.7577858	.9284789
def_low	.7805857	.1868661	4.18	0.000	.4143349	1.146837
fairtrade	.6351979	.1490049	4.26	0.000	.3431536	.9272422
nut2	.6370156	.1938962	3.29	0.001	.256986	1.017045
nut3	-.345004	.3406849	-1.01	0.311	-1.012734	.3227261
agrochhum	.0438645	.2531137	0.17	0.862	-.4522292	.5399582
agrochenv	-.1477062	.2447192	-0.60	0.546	-.627347	.3319346
agrochnone	1.052555	.2457104	4.28	0.000	.5709712	1.534138

A5.4 Model when the gender is female

```
. xi: mixlogit choice price if gend==0, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -781.25204  (not concave)
Iteration 1:   log likelihood = -780.65498  (not concave)
Iteration 2:   log likelihood = -780.14994  (not concave)
Iteration 3:   log likelihood = -779.44622  (not concave)
Iteration 4:   log likelihood = -778.33439  (not concave)
Iteration 5:   log likelihood =  -776.7688
Iteration 6:   log likelihood = -774.42352
Iteration 7:   log likelihood = -774.30462
Iteration 8:   log likelihood = -774.30364
Iteration 9:   log likelihood = -774.30364

Mixed logit model                               Number of obs   =       2532
                                                LR chi2(8)      =      14.57
Log likelihood = -774.30364                     Prob > chi2     =     0.0681
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0413909	.0219765	-1.88	0.060	-.0844639	.0016822
def_medium	.621123	.204942	3.03	0.002	.219444	1.022802
def_low	.889311	.1897857	4.69	0.000	.5173379	1.261284
fairtrade	.5097833	.1030618	4.95	0.000	.3077859	.7117806
nut2	.2591809	.1437418	1.80	0.071	-.022548	.5409097
nut3	.4821266	.1285788	3.75	0.000	.2301167	.7341365
agrochhum	.1148943	.1185573	0.97	0.332	-.1174737	.3472623
agrochenv	.2533655	.1360599	1.86	0.063	-.0133071	.520038
agrochnone	.939978	.1724825	5.45	0.000	.6019185	1.278038
SD						
def_medium	-.0201413	.2720915	-0.07	0.941	-.5534308	.5131482
def_low	.7484396	.1801876	4.15	0.000	.3952783	1.101601
fairtrade	.4060894	.1654978	2.45	0.014	.0817197	.7304591
nut2	.4966302	.1922294	2.58	0.010	.1198675	.8733929
nut3	.1461543	.3640129	0.40	0.688	-.5672979	.8596066
agrochhum	.0228544	.2243389	0.10	0.919	-.4168418	.4625505
agrochenv	.3989732	.1961138	2.03	0.042	.0145972	.7833492
agrochnone	-.4730144	.3119921	-1.52	0.129	-1.084508	.1384789

A5.5 Model when there is a low socioeconomic level (1 &2)

```
. xi: mixlogit choice price if estrato_bajo==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -674.11932  (not concave)
Iteration 1:   log likelihood = -672.87673  (not concave)
Iteration 2:   log likelihood =  -672.5165  (not concave)
Iteration 3:   log likelihood =  -667.6263
Iteration 4:   log likelihood = -667.24678
Iteration 5:   log likelihood = -665.19792
Iteration 6:   log likelihood = -665.18083
Iteration 7:   log likelihood = -665.18082

Mixed logit model                               Number of obs   =       2148
                                                LR chi2(8)      =      18.42
Log likelihood = -665.18082                     Prob > chi2     =     0.0183
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0148494	.0241398	-0.62	0.538	-.0621626	.0324638
def_medium	.4562395	.2298775	1.98	0.047	.0056878	.9067912
def_low	.8081416	.2191204	3.69	0.000	.3786735	1.23761
fairtrade	.4677136	.1144443	4.09	0.000	.2434068	.6920203
nut2	.1389009	.1582653	0.88	0.380	-.1712934	.4490953
nut3	.2601248	.1560359	1.67	0.095	-.0456998	.5659495
agrochhum	-.0887862	.1313624	-0.68	0.499	-.3462517	.1686794
agrochenv	.2979373	.1482716	2.01	0.044	.0073304	.5885443
agrochnone	.7958319	.1911099	4.16	0.000	.4212634	1.1704
SD						
def_medium	.1162838	.3258662	0.36	0.721	-.5224022	.7549698
def_low	.88213	.1927012	4.58	0.000	.5044426	1.259817
fairtrade	.5035574	.1635381	3.08	0.002	.1830285	.8240862
nut2	.4848088	.2197623	2.21	0.027	.0540827	.915535
nut3	-.4408247	.3572719	-1.23	0.217	-1.141065	.2594154
agrochhum	-.0167603	.1707033	-0.10	0.922	-.3513326	.3178121
agrochenv	.1093528	.2621476	0.42	0.677	-.4044471	.6231527
agrochnone	.4098711	.3539913	1.16	0.247	-.2839392	1.103681

A5.6 Model when there is a medium socioeconomic level (3&4)

```
. xi: mixlogit choice price if estrato_medio==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -657.34496  (not concave)
Iteration 1:   log likelihood = -657.20076  (not concave)
Iteration 2:   log likelihood = -655.38154  (not concave)
Iteration 3:   log likelihood = -654.66007
Iteration 4:   log likelihood = -654.54273
Iteration 5:   log likelihood =  -649.4921
Iteration 6:   log likelihood = -649.35456
Iteration 7:   log likelihood = -649.17306
Iteration 8:   log likelihood = -649.17135
Iteration 9:   log likelihood = -649.17134

Mixed logit model                               Number of obs   =       2124
                                                LR chi2(8)      =      16.18
Log likelihood = -649.17134                     Prob > chi2     =     0.0398
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0364485	.0247186	-1.47	0.140	-.0848962	.0119991
def_medium	.55777	.2256298	2.47	0.013	.1155437	.9999962
def_low	.792738	.2071928	3.83	0.000	.3866475	1.198829
fairtrade	.6198796	.1297837	4.78	0.000	.3655084	.8742509
nut2	.3637499	.1635285	2.22	0.026	.0432399	.6842598
nut3	.4910164	.1458967	3.37	0.001	.2050642	.7769686
agrochhum	.103631	.1332999	0.78	0.437	-.1576319	.364894
agrochenv	.2635537	.1447128	1.82	0.069	-.0200782	.5471856
agrochnone	.9733847	.2159984	4.51	0.000	.5500356	1.396734
SD						
def_medium	-.4127984	.2196487	-1.88	0.060	-.843302	.0177052
def_low	.5464417	.2636804	2.07	0.038	.0296377	1.063246
fairtrade	.6382716	.1701808	3.75	0.000	.3047233	.9718199
nut2	-.4850797	.2075551	-2.34	0.019	-.8918803	-.0782792
nut3	-.4297766	.318746	-1.35	0.178	-1.054507	.1949541
agrochhum	-.2774558	.3160334	-0.88	0.380	-.8968699	.3419583
agrochenv	-.066872	.3177527	-0.21	0.833	-.6896559	.5559118
agrochnone	.9885531	.2795114	3.54	0.000	.4407209	1.536385

A5.7 Model when there is a high socioeconomic level (5&6)

```
.
. xi: mixlogit choice price if estrato_alto==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -204.57935  (not concave)
Iteration 1:   log likelihood = -202.35207  (not concave)
Iteration 2:   log likelihood = -201.73209  (not concave)
Iteration 3:   log likelihood =  -201.3235
Iteration 4:   log likelihood = -200.04367
Iteration 5:   log likelihood = -198.94601
Iteration 6:   log likelihood =  -198.4637
Iteration 7:   log likelihood = -198.44492
Iteration 8:   log likelihood =  -198.4449

Mixed logit model                               Number of obs   =        648
                                                LR chi2(8)      =      12.66
Log likelihood =  -198.4449                     Prob > chi2     =     0.1240
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0497069	.0593463	-0.84	0.402	-.1660235	.0666096
def_medium	1.204452	.5956621	2.02	0.043	.0369752	2.371928
def_low	1.310737	.5464488	2.40	0.016	.2397175	2.381758
fairtrade	.3028638	.2544005	1.19	0.234	-.1957521	.8014797
nut2	.0573265	.3872302	0.15	0.882	-.7016308	.8162838
nut3	.4758488	.3190752	1.49	0.136	-.1495272	1.101225
agrochhum	-.1101511	.32419	-0.34	0.734	-.7455519	.5252497
agrochenv	.1111798	.3257729	0.34	0.733	-.5273234	.749683
agrochnone	.4893332	.416423	1.18	0.240	-.326841	1.305507
SD						
def_medium	-.0416539	.3114179	-0.13	0.894	-.6520217	.5687139
def_low	.9348828	.4003385	2.34	0.020	.1502338	1.719532
fairtrade	.7623639	.3167192	2.41	0.016	.1416056	1.383122
nut2	.9722569	.3498861	2.78	0.005	.2864927	1.658021
nut3	.0554818	.3376365	0.16	0.869	-.6062735	.7172371
agrochhum	.8665889	.4184646	2.07	0.038	.0464134	1.686764
agrochenv	-.4955459	.4049978	-1.22	0.221	-1.289327	.2982352
agrochnone	-.9655786	.497392	-1.94	0.052	-1.940449	.0092918

A5.8 Model when the individual belongs to an ethnic group

```
. xi: mixlogit choice price if ethnic==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -187.31028  (not concave)
Iteration 1:   log likelihood = -184.98206  (not concave)
Iteration 2:   log likelihood = -184.59275  (not concave)
Iteration 3:   log likelihood = -184.41782
Iteration 4:   log likelihood = -183.48233
Iteration 5:   log likelihood = -182.71368
Iteration 6:   log likelihood = -182.67887
Iteration 7:   log likelihood = -182.67868
Iteration 8:   log likelihood = -182.67868

Mixed logit model                               Number of obs   =        600
                                                LR chi2(8)      =       9.58
Log likelihood = -182.67868                     Prob > chi2     =     0.2958
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.0123285	.0750192	0.16	0.869	-.1347065	.1593634
def_medium	.7838761	.7758327	1.01	0.312	-.7367281	2.30448
def_low	.9598204	.7428137	1.29	0.196	-.4960677	2.415708
fairtrade	.2736656	.3195519	0.86	0.392	-.3526447	.8999759
nut2	-.059679	.4418284	-0.14	0.893	-.9256467	.8062887
nut3	.3166628	.3882015	0.82	0.415	-.4441981	1.077524
agrochhum	-.0982188	.2889151	-0.34	0.734	-.664482	.4680443
agrochenv	.7532885	.4423967	1.70	0.089	-.1137931	1.62037
agrochnone	1.279122	.636444	2.01	0.044	.0317148	2.526529
SD						
def_medium	-.39086	.5577658	-0.70	0.483	-1.484061	.7023409
def_low	1.017951	.5254027	1.94	0.053	-.0118197	2.047721
fairtrade	.6481826	.3769119	1.72	0.085	-.0905512	1.386916
nut2	.3370288	.4203003	0.80	0.423	-.4867445	1.160802
nut3	1.334427	.5747251	2.32	0.020	.207986	2.460867
agrochhum	.3706508	.3438523	1.08	0.281	-.3032873	1.044589
agrochenv	.7262702	.4085737	1.78	0.075	-.0745196	1.52706
agrochnone	1.433006	.7456704	1.92	0.055	-.0284807	2.894494

A5.9 Model when the individual does not belong to an ethnic group

```
. xi: mixlogit choice price if ethnic==0, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -1350.6439  (not concave)
Iteration 1:   log likelihood = -1339.1707
Iteration 2:   log likelihood = -1332.7091
Iteration 3:   log likelihood = -1332.4734
Iteration 4:   log likelihood = -1332.4697
Iteration 5:   log likelihood = -1332.4697

Mixed logit model                               Number of obs   =       4320
                                                LR chi2(8)      =      38.32
Log likelihood = -1332.4697                     Prob > chi2     =     0.0000
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.031078	.0170833	-1.82	0.069	-.0645606	.0024046
def_medium	.5205353	.1579801	3.29	0.001	.2109001	.8301706
def_low	.8116109	.1478326	5.49	0.000	.5218644	1.101357
fairtrade	.5487555	.0841011	6.52	0.000	.3839204	.7135906
nut2	.2862145	.1151554	2.49	0.013	.0605139	.511915
nut3	.4019954	.1028874	3.91	0.000	.2003399	.6036509
agrochhum	.0250107	.0938967	0.27	0.790	-.1590235	.2090449
agrochenv	.2244832	.1032852	2.17	0.030	.022048	.4269185
agrochnone	.8150401	.1397882	5.83	0.000	.5410604	1.08902
SD						
def_medium	.116612	.2636501	0.44	0.658	-.4001327	.6333567
def_low	.7641193	.1403925	5.44	0.000	.4889551	1.039284
fairtrade	.5677026	.1133286	5.01	0.000	.3455826	.7898226
nut2	.6109701	.1430001	4.27	0.000	.3306951	.8912452
nut3	.1856107	.324702	0.57	0.568	-.4507936	.822015
agrochhum	.1340785	.1979874	0.68	0.498	-.2539697	.5221267
agrochenv	-.1985338	.1883151	-1.05	0.292	-.5676246	.1705571
agrochnone	.7463447	.1897761	3.93	0.000	.3743905	1.118299

A5.10 Model when the individual did studies until high school

```
. do "C:\Users\mesa001\AppData\Local\Temp\STD00000000.tmp"

. xi: mixlogit choice price if educacion_colegio==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood =  -550.3118  (not concave)
Iteration 1:   log likelihood = -548.65712
Iteration 2:   log likelihood = -546.23793
Iteration 3:   log likelihood =  -545.2087
Iteration 4:   log likelihood = -545.18408
Iteration 5:   log likelihood = -545.18407

Mixed logit model                               Number of obs   =       1740
                                                LR chi2(8)      =      10.34
Log likelihood = -545.18407                     Prob > chi2     =     0.2418
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0300471	.0270654	-1.11	0.267	-.0830944	.0230001
def_medium	.4776414	.254293	1.88	0.060	-.0207637	.9760465
def_low	.5863634	.2306435	2.54	0.011	.1343104	1.038416
fairtrade	.6209266	.1316661	4.72	0.000	.3628658	.8789875
nut2	-.0042451	.1686395	-0.03	0.980	-.3347725	.3262823
nut3	-.0104587	.1516298	-0.07	0.945	-.3076476	.2867302
agrochhum	-.3298232	.1471487	-2.24	0.025	-.6182294	-.041417
agrochenv	.1429687	.1593755	0.90	0.370	-.1694015	.4553388
agrochnone	.6198299	.2056195	3.01	0.003	.216823	1.022837
SD						
def_medium	.0437146	.381508	0.11	0.909	-.7040274	.7914566
def_low	.5745647	.2396145	2.40	0.016	.104929	1.0442
fairtrade	.6689303	.1646898	4.06	0.000	.3461442	.9917164
nut2	.5093552	.2460644	2.07	0.038	.0270779	.9916326
nut3	.0034883	.3358129	0.01	0.992	-.6546929	.6616694
agrochhum	-.0117569	.1976593	-0.06	0.953	-.399162	.3756482
agrochenv	-.0095814	.3481605	-0.03	0.978	-.6919635	.6728007
agrochnone	.3302766	.377104	0.88	0.381	-.4088336	1.069387

A5.11 Model when the individual did technical/technological studies

```
. xi: mixlogit choice price if education_level==3, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -430.09947  (not concave)
Iteration 1:   log likelihood = -429.65269  (not concave)
Iteration 2:   log likelihood = -428.57932  (not concave)
Iteration 3:   log likelihood = -426.60868  (not concave)
Iteration 4:   log likelihood = -423.93891  (not concave)
Iteration 5:   log likelihood = -421.96653
Iteration 6:   log likelihood =  -421.1262
Iteration 7:   log likelihood =  -421.1137
Iteration 8:   log likelihood = -421.11369

Mixed logit model                               Number of obs   =       1404
                                                LR chi2(8)      =      18.32
Log likelihood = -421.11369                     Prob > chi2     =     0.0189
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.0170328	.0336953	0.51	0.613	-.0490087	.0830743
def_medium	.4019605	.3082999	1.30	0.192	-.2022962	1.006217
def_low	.5978361	.2848272	2.10	0.036	.0395851	1.156087
fairtrade	.5595216	.1639762	3.41	0.001	.2381342	.8809091
nut2	.3790187	.2185954	1.73	0.083	-.0494205	.8074579
nut3	.3825301	.2036157	1.88	0.060	-.0165493	.7816094
agrochhum	.114488	.1688557	0.68	0.498	-.2164631	.4454391
agrochenv	.2940268	.1954717	1.50	0.133	-.0890907	.6771444
agrochnone	1.044407	.3009721	3.47	0.001	.4545131	1.634302
SD						
def_medium	.258792	.3832348	0.68	0.499	-.4923344	1.009918
def_low	1.014958	.3108017	3.27	0.001	.4057977	1.624118
fairtrade	.4307248	.2314489	1.86	0.063	-.0229068	.8843563
nut2	.6112978	.28384	2.15	0.031	.0549816	1.167614
nut3	.7722336	.2684862	2.88	0.004	.2460104	1.298457
agrochhum	-.0238177	.2843616	-0.08	0.933	-.5811563	.5335208
agrochenv	-.3734078	.3101916	-1.20	0.229	-.9813721	.2345565
agrochnone	-1.089723	.3443912	-3.16	0.002	-1.764717	-.4147283

A5.12 Model when the individual did University studies

```
. xi: mixlogit choice price if educacion_universidad==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -541.99793  (not concave)
Iteration 1:   log likelihood = -540.60921  (not concave)
Iteration 2:   log likelihood = -540.36488
Iteration 3:   log likelihood = -539.23931
Iteration 4:   log likelihood = -537.00555  (not concave)
Iteration 5:   log likelihood = -536.44961  (not concave)
Iteration 6:   log likelihood = -535.57373
Iteration 7:   log likelihood = -532.05661
Iteration 8:   log likelihood = -531.55564
Iteration 9:   log likelihood = -531.55285
Iteration 10:  log likelihood = -531.55285

Mixed logit model                               Number of obs   =       1776
                                                LR chi2(8)      =      22.08
Log likelihood = -531.55285                     Prob > chi2     =     0.0048
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.049974	.0284576	-1.76	0.079	-.10575	.0058019
def_medium	.6182357	.2703686	2.29	0.022	.088323	1.148148
def_low	1.177705	.2556688	4.61	0.000	.6766039	1.678807
fairtrade	.4634819	.1430115	3.24	0.001	.1831845	.7437792
nut2	.4657145	.2016194	2.31	0.021	.0705478	.8608812
nut3	.8755373	.1789777	4.89	0.000	.5247475	1.226327
agrochhum	.24719	.1614934	1.53	0.126	-.0693313	.5637112
agrochenv	.2951542	.168346	1.75	0.080	-.0347979	.6251063
agrochnone	.9818973	.247267	3.97	0.000	.4972629	1.466532
SD						
def_medium	.2219276	.3203352	0.69	0.488	-.4059179	.849773
def_low	.6806951	.2673038	2.55	0.011	.1567892	1.204601
fairtrade	.6349408	.1737095	3.66	0.000	.2944764	.9754051
nut2	.6917203	.2620976	2.64	0.008	.1780185	1.205422
nut3	-.2518845	.375041	-0.67	0.502	-.9869514	.4831824
agrochhum	-.5565355	.3029529	-1.84	0.066	-1.150312	.0372413
agrochenv	-.1272595	.3116768	-0.41	0.683	-.7381347	.4836157
agrochnone	-1.048961	.267222	-3.93	0.000	-1.572707	-.5252159

A5.13 Model when the household is composed by sensitive people (i.e. under legal age, elderly people)

```
.
. xi: mixlogit choice price if hh_sensitive==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -336.38889  (not concave)
Iteration 1:   log likelihood =  -332.1272
Iteration 2:   log likelihood = -330.40034
Iteration 3:   log likelihood = -329.11931
Iteration 4:   log likelihood = -329.03386
Iteration 5:   log likelihood = -329.03337
Iteration 6:   log likelihood = -329.03337

Mixed logit model                               Number of obs   =       1140
                                                LR chi2(8)      =      14.66
Log likelihood = -329.03337                     Prob > chi2     =     0.0662
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.0191991	.0423503	0.45	0.650	-.063806	.1022042
def_medium	.3038804	.3836832	0.79	0.428	-.4481249	1.055886
def_low	.5742175	.3587673	1.60	0.109	-.1289535	1.277388
fairtrade	.9222754	.2269075	4.06	0.000	.4775449	1.367006
nut2	.3828221	.2724688	1.41	0.160	-.1512068	.9168511
nut3	.2493805	.2498017	1.00	0.318	-.240222	.7389829
agrochhum	-.0807918	.2079716	-0.39	0.698	-.4884088	.3268251
agrochenv	.3218979	.2414895	1.33	0.183	-.1514127	.7952086
agrochnone	1.200935	.3778818	3.18	0.001	.4603005	1.94157
SD						
def_medium	-.6049704	.4303483	-1.41	0.160	-1.448437	.2384967
def_low	1.269582	.4537264	2.80	0.005	.3802951	2.15887
fairtrade	.8753994	.3096486	2.83	0.005	.2684993	1.482299
nut2	.6373726	.2948759	2.16	0.031	.0594265	1.215319
nut3	-.5972451	.4028978	-1.48	0.138	-1.38691	.1924201
agrochhum	-.1708425	.3446317	-0.50	0.620	-.8463081	.5046231
agrochenv	-.2014183	.3870204	-0.52	0.603	-.9599643	.5571277
agrochnone	1.387284	.4825717	2.87	0.004	.4414607	2.333107

A5.14 Model when the household is composed by adults

```
. xi: mixlogit choice price if hh_adults==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -1072.4458  (not concave)
Iteration 1:   log likelihood = -1068.8056  (not concave)
Iteration 2:   log likelihood = -1067.6941
Iteration 3:   log likelihood = -1062.8918
Iteration 4:   log likelihood = -1062.7902
Iteration 5:   log likelihood = -1062.7668
Iteration 6:   log likelihood = -1062.7667
Iteration 7:   log likelihood = -1062.7667

Mixed logit model                               Number of obs   =       3348
                                                LR chi2(8)      =      19.80
Log likelihood = -1062.7667                     Prob > chi2     =     0.0111
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0320579	.0183222	-1.75	0.080	-.0679688	.003853
def_medium	.4783011	.1743258	2.74	0.006	.1366288	.8199734
def_low	.7133973	.1625324	4.39	0.000	.3948396	1.031955
fairtrade	.4166775	.0872619	4.78	0.000	.2456473	.5877077
nut2	.2093761	.1226004	1.71	0.088	-.0309163	.4496685
nut3	.375832	.109967	3.42	0.001	.1603006	.5913634
agrochhum	.0280226	.1029005	0.27	0.785	-.1736586	.2297038
agrochenv	.2105736	.114467	1.84	0.066	-.0137775	.4349247
agrochnone	.7660858	.1519184	5.04	0.000	.4683312	1.06384
SD						
def_medium	-.0072336	.292115	-0.02	0.980	-.5797684	.5653012
def_low	.6681912	.1517458	4.40	0.000	.3707749	.9656075
fairtrade	.433893	.1307934	3.32	0.001	.1775427	.6902433
nut2	.4059738	.1715772	2.37	0.018	.0696887	.7422589
nut3	.1963912	.4049212	0.49	0.628	-.5972398	.9900222
agrochhum	.1591488	.179459	0.89	0.375	-.1925843	.5108819
agrochenv	-.3031061	.2000202	-1.52	0.130	-.6951385	.0889264
agrochnone	.7250259	.2103471	3.45	0.001	.3127531	1.137299

A5.15 Model when individuals are age_young

```
. xi: mixlogit choice price if age_young==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -557.32251  (not concave)
Iteration 1:   log likelihood = -555.74954  (not concave)
Iteration 2:   log likelihood = -551.31528  (not concave)
Iteration 3:   log likelihood = -548.84162
Iteration 4:   log likelihood = -546.62395
Iteration 5:   log likelihood =  -543.6859
Iteration 6:   log likelihood = -543.55026
Iteration 7:   log likelihood = -543.54999
Iteration 8:   log likelihood = -543.54999

Mixed logit model                               Number of obs   =       1752
                                                LR chi2(8)      =      29.29
Log likelihood = -543.54999                     Prob > chi2     =     0.0003
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.0038163	.0300969	0.13	0.899	-.0551725	.0628051
def_medium	.1003457	.3038213	0.33	0.741	-.495133	.6958244
def_low	.5042802	.2663415	1.89	0.058	-.0177394	1.0263
fairtrade	.5072827	.1479968	3.43	0.001	.2172142	.7973511
nut2	.4502304	.2141863	2.10	0.036	.030433	.8700278
nut3	.5838569	.1818626	3.21	0.001	.2274128	.940301
agrochhum	.0347817	.1561649	0.22	0.824	-.2712959	.3408593
agrochenv	.0545381	.1767732	0.31	0.758	-.2919309	.4010071
agrochnone	.5696758	.2312121	2.46	0.014	.1165084	1.022843
SD						
def_medium	.1283288	.3570933	0.36	0.719	-.5715613	.8282189
def_low	.976636	.213122	4.58	0.000	.5589246	1.394347
fairtrade	.6031984	.1583181	3.81	0.000	.2929006	.9134961
nut2	.9092157	.211306	4.30	0.000	.4950635	1.323368
nut3	.3017071	.3884039	0.78	0.437	-.4595505	1.062965
agrochhum	-.0571563	.2660395	-0.21	0.830	-.5785841	.4642714
agrochenv	-.1447532	.28372	-0.51	0.610	-.7008343	.4113278
agrochnone	.6146264	.2720805	2.26	0.024	.0813584	1.147894

A5.16 Model when individuals are age_young_adult

```
.
. xi: mixlogit choice price if age_adult_young==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -533.59364  (not concave)
Iteration 1:   log likelihood = -527.01549  (not concave)
Iteration 2:   log likelihood = -524.55385
Iteration 3:   log likelihood = -519.64504
Iteration 4:   log likelihood = -519.40554
Iteration 5:   log likelihood = -519.40246
Iteration 6:   log likelihood = -519.40246

Mixed logit model                               Number of obs   =       1776
                                                LR chi2(8)      =      28.73
Log likelihood = -519.40246                     Prob > chi2     =     0.0004
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0327847	.0297901	-1.10	0.271	-.0911722	.0256029
def_medium	.785537	.2654461	2.96	0.003	.2652723	1.305802
def_low	1.192022	.2746303	4.34	0.000	.6537563	1.730287
fairtrade	.5990353	.1514576	3.96	0.000	.302184	.8958867
nut2	.2956545	.1913273	1.55	0.122	-.0793401	.670649
nut3	.5848367	.1913541	3.06	0.002	.2097894	.9598839
agrochhum	.2095669	.1656839	1.26	0.206	-.1151675	.5343013
agrochenv	.5371255	.1784512	3.01	0.003	.1873675	.8868834
agrochnone	1.031705	.259945	3.97	0.000	.522222	1.541188
SD						
def_medium	-.142348	.3253379	-0.44	0.662	-.7799985	.4953025
def_low	1.068882	.2423643	4.41	0.000	.5938564	1.543907
fairtrade	.8044951	.2086424	3.86	0.000	.3955634	1.213427
nut2	.2031205	.2778098	0.73	0.465	-.3413767	.7476177
nut3	-.5609099	.2867038	-1.96	0.050	-1.122839	.0010193
agrochhum	.5823505	.2782433	2.09	0.036	.0370037	1.127697
agrochenv	.1640454	.3240507	0.51	0.613	-.4710824	.7991732
agrochnone	1.485225	.3510769	4.23	0.000	.7971265	2.173323

A5.17 Model when individuals are age_adults

```
. xi: mixlogit choice price if age_adults==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -405.08424  (not concave)
Iteration 1:   log likelihood = -404.76448  (not concave)
Iteration 2:   log likelihood = -404.66435  (not concave)
Iteration 3:   log likelihood = -403.97254
Iteration 4:   log likelihood = -403.24834
Iteration 5:   log likelihood = -403.24304
Iteration 6:   log likelihood = -403.24304

Mixed logit model                               Number of obs   =       1296
                                                LR chi2(8)      =       3.61
Log likelihood = -403.24304                     Prob > chi2     =     0.8905
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0348323	.030218	-1.15	0.249	-.0940585	.0243939
def_medium	.6391528	.27636	2.31	0.021	.0974972	1.180808
def_low	.6560042	.2564597	2.56	0.011	.1533524	1.158656
fairtrade	.5360733	.1346182	3.98	0.000	.2722265	.7999202
nut2	-.0363269	.1872071	-0.19	0.846	-.4032461	.3305923
nut3	.0180756	.1731939	0.10	0.917	-.3213781	.3575293
agrochhum	-.3290541	.1670171	-1.97	0.049	-.6564015	-.0017066
agrochenv	.173968	.1813309	0.96	0.337	-.1814341	.52937
agrochnone	.7593922	.2378605	3.19	0.001	.2931942	1.22559
SD						
def_medium	-.0350856	.3306674	-0.11	0.915	-.6831817	.6130106
def_low	-.3033151	.3956446	-0.77	0.443	-1.078764	.4721339
fairtrade	.2937004	.2634956	1.11	0.265	-.2227415	.8101423
nut2	.5460872	.2625698	2.08	0.038	.0314599	1.060714
nut3	-.0534978	.5190219	-0.10	0.918	-1.070762	.9637664
agrochhum	.0332955	.2026248	0.16	0.869	-.3638418	.4304329
agrochenv	.4616405	.2870606	1.61	0.108	-.100988	1.024269
agrochnone	.2190192	1.02648	0.21	0.831	-1.792845	2.230883

A5.18 Model when individuals buy their food in low cost modern markets

```
. xi: mixlogit choice price if lowcost_market==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -421.69186  (not concave)
Iteration 1:   log likelihood = -421.39813  (not concave)
Iteration 2:   log likelihood = -419.50826  (not concave)
Iteration 3:   log likelihood = -417.22252
Iteration 4:   log likelihood = -417.03972
Iteration 5:   log likelihood = -414.91863
Iteration 6:   log likelihood = -414.61469
Iteration 7:   log likelihood = -414.61325
Iteration 8:   log likelihood = -414.61325

Mixed logit model                               Number of obs   =       1344
                                                LR chi2(8)      =      14.13
Log likelihood = -414.61325                     Prob > chi2     =     0.0785
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0618889	.0352173	-1.76	0.079	-.1309134	.0071357
def_medium	.4763981	.3346516	1.42	0.155	-.1795069	1.132303
def_low	.7355134	.3047671	2.41	0.016	.1381808	1.332846
fairtrade	.6835387	.1882062	3.63	0.000	.3146614	1.052416
nut2	.6846022	.2598679	2.63	0.008	.1752704	1.193934
nut3	.8213825	.2629727	3.12	0.002	.3059655	1.3368
agrochhum	.1060808	.1793546	0.59	0.554	-.2454478	.4576094
agrochenv	.1961042	.2032509	0.96	0.335	-.2022602	.5944687
agrochnone	.7866374	.2996189	2.63	0.009	.1993951	1.37388
SD						
def_medium	.6094187	.2822909	2.16	0.031	.0561388	1.162699
def_low	1.044406	.3078523	3.39	0.001	.4410268	1.647786
fairtrade	.7115477	.2682666	2.65	0.008	.1857549	1.237341
nut2	-.6643799	.2876583	-2.31	0.021	-1.22818	-.1005799
nut3	.9538915	.3555841	2.68	0.007	.2569595	1.650823
agrochhum	-.1179783	.4977114	-0.24	0.813	-1.093475	.8575181
agrochenv	-.4144454	.3267931	-1.27	0.205	-1.054948	.2260573
agrochnone	-1.080148	.3773543	-2.86	0.004	-1.819749	-.3405472

A5.19 Model when individuals buy their food in traditional markets

```
.
. xi: mixlogit choice price if traditional_market==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -522.21439  (not concave)
Iteration 1:   log likelihood = -521.43731  (not concave)
Iteration 2:   log likelihood = -519.97744  (not concave)
Iteration 3:   log likelihood = -518.14717
Iteration 4:   log likelihood = -517.00206
Iteration 5:   log likelihood = -516.94299
Iteration 6:   log likelihood = -516.90864
Iteration 7:   log likelihood =  -516.9085
Iteration 8:   log likelihood =  -516.9085

Mixed logit model                               Number of obs   =       1632
                                                LR chi2(8)      =      10.47
Log likelihood =  -516.9085                     Prob > chi2     =     0.2339
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0198115	.0254561	-0.78	0.436	-.0697047	.0300816
def_medium	.3722039	.2531836	1.47	0.142	-.1240267	.8684346
def_low	.7198551	.2271782	3.17	0.002	.2745941	1.165116
fairtrade	.5316924	.1335864	3.98	0.000	.2698679	.793517
nut2	.1598916	.1837694	0.87	0.384	-.2002898	.520073
nut3	.145006	.1633366	0.89	0.375	-.1751278	.4651398
agrochhum	-.1195171	.1497666	-0.80	0.425	-.4130542	.1740201
agrochenv	.2243541	.1674707	1.34	0.180	-.1038824	.5525906
agrochnone	.6070526	.2027193	2.99	0.003	.2097301	1.004375
SD						
def_medium	-.2195457	.4742083	-0.46	0.643	-1.148977	.7098855
def_low	.7802563	.2399386	3.25	0.001	.3099853	1.250527
fairtrade	.6135776	.169467	3.62	0.000	.2814284	.9457269
nut2	-.4436271	.2481235	-1.79	0.074	-.9299402	.0426861
nut3	-.0167057	.4836197	-0.03	0.972	-.9645829	.9311716
agrochhum	.0555229	.206497	0.27	0.788	-.3492039	.4602496
agrochenv	-.0254758	.2381103	-0.11	0.915	-.4921634	.4412117
agrochnone	-.495791	.297707	-1.67	0.096	-1.079286	.0877039

A5.20 Model when individuals buy their food in the modern market

```
.
. xi: mixlogit choice price if modern_market==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -586.24332  (not concave)
Iteration 1:   log likelihood = -580.06696  (not concave)
Iteration 2:   log likelihood = -579.09224  (not concave)
Iteration 3:   log likelihood =  -578.4936
Iteration 4:   log likelihood = -575.59087
Iteration 5:   log likelihood = -575.29088
Iteration 6:   log likelihood = -574.49057
Iteration 7:   log likelihood = -574.48658
Iteration 8:   log likelihood = -574.48658

Mixed logit model                               Number of obs   =       1944
                                                LR chi2(8)      =      26.06
Log likelihood = -574.48658                     Prob > chi2     =     0.0010
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0070066	.0299418	-0.23	0.815	-.0656915	.0516783
def_medium	.7211141	.2692409	2.68	0.007	.1934117	1.248817
def_low	.9841584	.2609238	3.77	0.000	.4727571	1.49556
fairtrade	.4774414	.1325348	3.60	0.000	.217678	.7372048
nut2	.0945206	.1791243	0.53	0.598	-.2565565	.4455978
nut3	.4607419	.1587567	2.90	0.004	.1495844	.7718993
agrochhum	-.0035023	.1472213	-0.02	0.981	-.2920508	.2850461
agrochenv	.3029915	.1762574	1.72	0.086	-.0424667	.6484496
agrochnone	1.211799	.2562392	4.73	0.000	.709579	1.714018
SD						
def_medium	-.0764415	.2591721	-0.29	0.768	-.5844094	.4315264
def_low	.6704697	.2476829	2.71	0.007	.18502	1.155919
fairtrade	.6446346	.1728002	3.73	0.000	.3059525	.9833168
nut2	.6362471	.2477	2.57	0.010	.150764	1.12173
nut3	-.3136298	.296982	-1.06	0.291	-.8957038	.2684443
agrochhum	.1540664	.5203289	0.30	0.767	-.8657595	1.173892
agrochenv	.6155362	.2944084	2.09	0.037	.0385065	1.192566
agrochnone	.9389233	.3269421	2.87	0.004	.2981285	1.579718

A5.21 Model when there is a positive relationship with the CPE variable

```
. xi: mixlogit choice price if cpe>=4, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -1056.6428  (not concave)
Iteration 1:   log likelihood = -1054.0212  (not concave)
Iteration 2:   log likelihood = -1049.6658  (not concave)
Iteration 3:   log likelihood = -1044.2946
Iteration 4:   log likelihood = -1039.4224
Iteration 5:   log likelihood = -1038.8035
Iteration 6:   log likelihood = -1034.6241
Iteration 7:   log likelihood = -1034.5206
Iteration 8:   log likelihood = -1034.5205
Iteration 9:   log likelihood = -1034.5205

Mixed logit model                               Number of obs   =       3516
                                                LR chi2(8)      =      43.96
Log likelihood = -1034.5205                     Prob > chi2     =     0.0000
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.0637121	.022362	-2.85	0.004	-.1075408	-.0198833
def_medium	.9631253	.2062371	4.67	0.000	.5589079	1.367343
def_low	1.353041	.208532	6.49	0.000	.9443262	1.761757
fairtrade	.6293458	.1060282	5.94	0.000	.4215344	.8371572
nut2	.3147167	.1372416	2.29	0.022	.045728	.5837053
nut3	.4027978	.1275392	3.16	0.002	.1528255	.65277
agrochhum	-.0390557	.1085628	-0.36	0.719	-.2518348	.1737235
agrochenv	.3705685	.1234392	3.00	0.003	.1286322	.6125049
agrochnone	1.142973	.1956425	5.84	0.000	.7595209	1.526426
SD						
def_medium	.1162079	.2381243	0.49	0.626	-.3505071	.5829229
def_low	.9569029	.1668098	5.74	0.000	.6299616	1.283844
fairtrade	.5603544	.133583	4.19	0.000	.2985365	.8221723
nut2	.7373147	.1730596	4.26	0.000	.3981241	1.076505
nut3	.5827911	.2561825	2.27	0.023	.0806826	1.0849
agrochhum	-.1235251	.2115415	-0.58	0.559	-.5381389	.2910887
agrochenv	-.1142527	.2201998	-0.52	0.604	-.5458363	.3173309
agrochnone	-1.185642	.2214633	-5.35	0.000	-1.619702	-.7515816

A5.22 Model when there is a negative relationship with the CPE variable

```
. xi: mixlogit choice price if cpe<=2, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -85.403263  (not concave)
Iteration 1:   log likelihood = -83.579529  (not concave)
Iteration 2:   log likelihood = -83.390641
Iteration 3:   log likelihood = -82.715839
Iteration 4:   log likelihood = -82.456895
Iteration 5:   log likelihood = -82.383681
Iteration 6:   log likelihood = -82.382316
Iteration 7:   log likelihood = -82.382315

Mixed logit model                               Number of obs   =        276
                                                LR chi2(8)      =       6.17
Log likelihood = -82.382315                     Prob > chi2     =     0.6277
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.2140877	.0905772	2.36	0.018	.0365597	.3916157
def_medium	-1.102957	.8043496	-1.37	0.170	-2.679454	.4735388
def_low	-1.187078	.7296186	-1.63	0.104	-2.617104	.2429483
fairtrade	.1245991	.3944725	0.32	0.752	-.6485527	.897751
nut2	.2751587	.5703728	0.48	0.630	-.8427513	1.393069
nut3	-.0468302	.407657	-0.11	0.909	-.8458232	.7521628
agrochhum	.157589	.4112756	0.38	0.702	-.6484963	.9636744
agrochenv	-.0584743	.5387199	-0.11	0.914	-1.114346	.9973973
agrochnone	1.065155	.7213748	1.48	0.140	-.3487131	2.479024
SD						
def_medium	.1507386	.6373427	0.24	0.813	-1.09843	1.399907
def_low	.1041591	.6055814	0.17	0.863	-1.082759	1.291077
fairtrade	.8410873	.5173562	1.63	0.104	-.1729123	1.855087
nut2	.9359124	.7857969	1.19	0.234	-.6042212	2.476046
nut3	-.0183845	.5927931	-0.03	0.975	-1.180238	1.143469
agrochhum	-.6194235	.5797352	-1.07	0.285	-1.755684	.5168366
agrochenv	1.022534	.8211023	1.25	0.213	-.5867973	2.631864
agrochnone	1.106028	.7886387	1.40	0.161	-.4396756	2.651731

A5.23 Model when there is a positive relationship with the positive attitude variable

```
. xi: mixlogit choice price if possitiveattitude>=4, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood =  -1047.072  (not concave)
Iteration 1:   log likelihood = -1038.3758  (not concave)
Iteration 2:   log likelihood = -1035.1548
Iteration 3:   log likelihood = -1029.7233
Iteration 4:   log likelihood =  -1029.571
Iteration 5:   log likelihood = -1029.5706
Iteration 6:   log likelihood = -1029.5706

Mixed logit model                               Number of obs   =       3528
                                                LR chi2(8)      =      36.14
Log likelihood = -1029.5706                     Prob > chi2     =     0.0000
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.050993	.0211802	-2.41	0.016	-.0925054	-.0094806
def_medium	.8966624	.1942426	4.62	0.000	.5159539	1.277371
def_low	1.195448	.1872752	6.38	0.000	.8283956	1.562501
fairtrade	.6482441	.1016967	6.37	0.000	.4489222	.8475659
nut2	.3188892	.131014	2.43	0.015	.0621064	.575672
nut3	.4721136	.1268375	3.72	0.000	.2235166	.7207106
agrochhum	.0023737	.1055471	0.02	0.982	-.2044947	.2092422
agrochenv	.2929972	.1192203	2.46	0.014	.0593297	.5266646
agrochnone	1.05698	.1825259	5.79	0.000	.6992361	1.414724
SD						
def_medium	-.0548974	.2219482	-0.25	0.805	-.4899079	.3801132
def_low	.8427871	.1750523	4.81	0.000	.4996909	1.185883
fairtrade	.5881808	.1366294	4.30	0.000	.3203921	.8559696
nut2	.566106	.1879393	3.01	0.003	.1977517	.9344602
nut3	.6136839	.2819765	2.18	0.030	.0610202	1.166348
agrochhum	-.0408121	.225156	-0.18	0.856	-.4821098	.4004855
agrochenv	-.0784936	.2715355	-0.29	0.773	-.6106934	.4537062
agrochnone	1.03877	.2056158	5.05	0.000	.6357705	1.441769

A5.24 Model when there is a negative relationship with the positive attitude variable

```
. xi: mixlogit choice price if possitiveattitude<=2, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -176.10419
Iteration 1:   log likelihood = -176.05549
Iteration 2:   log likelihood = -175.38764
Iteration 3:   log likelihood = -175.38272
Iteration 4:   log likelihood = -175.36738
Iteration 5:   log likelihood = -175.36707
Iteration 6:   log likelihood = -175.36707

Mixed logit model                               Number of obs   =        516
                                                LR chi2(8)      =       0.51
Log likelihood = -175.36707                     Prob > chi2     =     0.9999
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.0223556	.038892	0.57	0.565	-.0538713	.0985826
def_medium	.2382925	.3972249	0.60	0.549	-.540254	1.016839
def_low	.0873551	.3143489	0.28	0.781	-.5287574	.7034677
fairtrade	.028119	.1802781	0.16	0.876	-.3252197	.3814576
nut2	-.4288699	.2924326	-1.47	0.142	-1.002027	.1442874
nut3	-.2324165	.246792	-0.94	0.346	-.71612	.2512871
agrochhum	-.2112066	.233325	-0.91	0.365	-.6685151	.246102
agrochenv	-.32896	.2537768	-1.30	0.195	-.8263533	.1684334
agrochnone	.0308065	.2944414	0.10	0.917	-.546288	.607901
SD						
def_medium	.0058657	.2717429	0.02	0.983	-.5267407	.538472
def_low	.009377	.3113018	0.03	0.976	-.6007634	.6195174
fairtrade	.1377561	.4671511	0.29	0.768	-.7778431	1.053355
nut2	-.1488789	.8075308	-0.18	0.854	-1.73161	1.433852
nut3	-.0094649	.233186	-0.04	0.968	-.466501	.4475712
agrochhum	.048253	.3064051	0.16	0.875	-.5522899	.6487959
agrochenv	-.2099344	.4599442	-0.46	0.648	-1.111409	.6915398
agrochnone	-.1244412	.3104526	-0.40	0.689	-.7329172	.4840348

A5.25 Model for the second scenario (extra information given)

```
. xi: mixlogit choice price if extrainfo==1, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -178.24351  (not concave)
Iteration 1:   log likelihood = -178.20933  (not concave)
Iteration 2:   log likelihood = -173.77633
Iteration 3:   log likelihood = -172.19398
Iteration 4:   log likelihood = -168.48003
Iteration 5:   log likelihood = -168.34134
Iteration 6:   log likelihood = -167.81948
Iteration 7:   log likelihood = -167.81159
Iteration 8:   log likelihood = -167.81158

Mixed logit model                               Number of obs   =        720
                                                LR chi2(8)      =      20.81
Log likelihood = -167.81158                     Prob > chi2     =     0.0077
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	.047863	.094175	0.51	0.611	-.1367167	.2324427
def_medium	1.265424	.4020548	3.15	0.002	.4774113	2.053437
def_low	1.414502	.6611427	2.14	0.032	.118686	2.710318
fairtrade	1.076443	.4727796	2.28	0.023	.1498119	2.003074
nut2	.0637496	.7993674	0.08	0.936	-1.502982	1.630481
nut3	.0416505	.6712671	0.06	0.951	-1.274009	1.35731
agrochhum	.6277449	.6838315	0.92	0.359	-.7125401	1.96803
agrochenv	.8296728	.6576001	1.26	0.207	-.4591997	2.118545
agrochnone	1.450726	.5462095	2.66	0.008	.3801748	2.521277
SD						
def_medium	-.7092878	.6047834	-1.17	0.241	-1.894641	.4760658
def_low	.5145151	.6923191	0.74	0.457	-.8424054	1.871436
fairtrade	1.776636	.6058347	2.93	0.003	.5892219	2.96405
nut2	-.6825834	.5072618	-1.35	0.178	-1.676798	.3116314
nut3	.1942164	.5181706	0.37	0.708	-.8213792	1.209812
agrochhum	-.6361534	.73084	-0.87	0.384	-2.068574	.7962667
agrochenv	-.5361353	.4643443	-1.15	0.248	-1.446233	.3739627
agrochnone	1.234886	.7235508	1.71	0.088	-.1832471	2.65302

A5.26 Model for the general scenario (no extra information given)

```
. xi: mixlogit choice price if extrainfo==0, rand (def_medium def_low fairtrade nut2 nut3 agrochhum agrochenv agrochnone) gr(choiceset) id(user)

Iteration 0:   log likelihood = -1346.7954  (not concave)
Iteration 1:   log likelihood = -1345.9004  (not concave)
Iteration 2:   log likelihood = -1342.0672
Iteration 3:   log likelihood = -1333.6424  (not concave)
Iteration 4:   log likelihood = -1332.3974
Iteration 5:   log likelihood =  -1331.968
Iteration 6:   log likelihood = -1331.7483
Iteration 7:   log likelihood =  -1331.748
Iteration 8:   log likelihood =  -1331.748

Mixed logit model                               Number of obs   =       4200
                                                LR chi2(8)      =      31.89
Log likelihood =  -1331.748                     Prob > chi2     =     0.0001
```

choice	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean						
price	-.017379	.0208371	-0.83	0.404	-.0582189	.023461
def_medium	.395519	.2520624	1.57	0.117	-.0985141	.8895522
def_low	.6828112	.2042876	3.34	0.001	.2824148	1.083208
fairtrade	.383936	.1019044	3.77	0.000	.1842071	.5836649
nut2	.2082679	.1559942	1.34	0.182	-.0974752	.514011
nut3	.4859843	.1107285	4.39	0.000	.2689605	.7030081
agrochhum	-.0052209	.0950507	-0.05	0.956	-.1915169	.181075
agrochenv	.202706	.1173202	1.73	0.084	-.0272375	.4326494
agrochnone	.6898215	.1728354	3.99	0.000	.3510702	1.028573
SD						
def_medium	.0037136	.177565	0.02	0.983	-.3443073	.3517346
def_low	.6421241	.1551405	4.14	0.000	.3380542	.9461939
fairtrade	-.3072504	.1438715	-2.14	0.033	-.5892333	-.0252674
nut2	.5246986	.1510349	3.47	0.001	.2286757	.8207214
nut3	-.5014497	.2000088	-2.51	0.012	-.8934597	-.1094397
agrochhum	-.0178736	.1757713	-0.10	0.919	-.3623791	.3266318
agrochenv	.0356817	.1912296	0.19	0.852	-.3391215	.4104848
agrochnone	.9019246	.1685747	5.35	0.000	.5715242	1.232325

Annex 6: MWTP calculations in Excel

6. MWTP Calculations v3.0.xlsx

Annex 7: LookApp invoice

7. LookApp invoice.pdf