Effects of menu labelling on consumption behaviour: Evidence from Mahikeng Local Municipality.

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DECLARATION

I hereby declare that, the study "Effects of menu labelling on consumption behaviour: Evidence from Mahikeng Local Municipality, North West Province, South Africa" is my original work and has not been submitted in partial fulfilment for any degree purposes to any other university. All the sources used or quoted have been indicated and acknowledged by means of complete references.

Name: Sobahle Dube

Signature: .....

Date: 05 / 12 / 2017

DEDICATION

To mom and dad, thank you for the love and support and pushing me to be a better man.

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Firstly, I would like to thank GOD for the gift of life and for providing me strength and courage throughout my journey. True to His promises, we have nothing to fear for the future unless we forget how the Lord has led us in the past. Your ways truly are not our ways, you indeed make great plans for our lives, to prosper us and not to harm us. In you we can do all things through Christ who gives us strength.

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ABSTRACT

Menu labelling is believed to be valuable to both the consumer and producer of ready-to-eat food products as food choices become more closely in line with preferences, and uncertainty regarding the nature of product attributes is minimized. One of the benefits of menu labelling is the removal of information asymmetry, which enhances the widespread fight against obesity and coronary heart diseases linked to increased consumption of fast foods. Over the years, these problems have been associated with first world countries. However, globalisation has seen developing countries such as South Africa not being spared from this phenomenon. While fast food consumption is mainly popular in urban areas, the South African case is exacerbated by street food vendors who operate unregulated. In the first world countries, policies aimed at protecting consumers have been promulgated to regulate restaurants and control the prevalence of obesity and related chronic diseases. Despite the reported alarming rates of obesity in South Africa, there is no regulation that requires posting of nutrient information on menus, menu boards and brochures by local restaurants. In a country where there is no menu labelling law, the implications are that consumers are more exposed to unhealthy foods and this is likely to be a persistent challenge, which has become an economic burden to the state. The objectives of the study were therefore, to (i) Determine the effects of menu labelling on the consumption of ready-to-eat foods; and (ii) Investigate consumers' willingness to pay for nutrient information on ready-to-eat foods, using evidence from Mahikeng Local Municipality. Conducting a study of this nature provided an opportunity to ascertain whether South Africa needs to replicate policy procedures that have been introduced in some developed countries to promote healthy eating habits. Using cross-sectional data gathered from 371 households identified through a systematic multistage sampling procedure, the first objective was addressed by estimating an Endogenous Treatment Poisson model (ETPOISSON). The analysis of consumers' willingness to pay for nutrient information was conducted in two related phases. The dichotomous decision of whether or not consumers are willing to pay for nutrient information was analysed using a Probit model, while the level of willingness was analysed through the use of an Ordered Logit model.

The results of the ETPOISSON model indicated that the use of nutrient information (menu labels) has a significant negative effect on fast foods consumption. These findings were further justified by the ATE and ATET results, which reflected that providing consumers with nutrient information can significantly reduce the frequency of consuming ready-to-eat or fast foods by at least one meal within a period of seven days. About 31% of the respondents were not willing to pay for nutrient information, 19% were less willing, 26% were moderately willing, while 24% were more willing to pay. The results of the Probit and Ordered Logit model highlighted that the level of willingness to pay was more related to household budgetary constraints, pointing to the need for diligence on the part of government should it consider introducing menu labelling legislation, which may require consumers to pay a price premium in their quest to access ready-to-eat meals. Drawing from the empirical findings, the study recommends the development of awareness raising programmes to sensitize the community about nutrition information and healthy eating, introduction of mandatory menu labelling legislation to regulate trade and consumption of fast foods as well as the introduction of a sustainable mechanism to account for the costs associated with menu labelling.

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ACRONYMS

AOA	:	American Obesity Association
FAFH	:	Food Away From Home
FDA	:	Food and Drug Administration
KFC	:	Kentucky Fried Chicken
CB	:	Consumer Behaviour
SA	:	South Africa
USDA	:	United States Department of Agriculture
USA	:	United States of America
WTP	:	Willingness to Pay
WHO	:	World Health Organisation

CHAPTER 1: INTRODUCTION

1.1 Background to the study

Menu labelling is beneficial to consumers of ready-to-eat foods as they are made aware of what they are consuming in terms of calorie content, vitamins and the amount of energy derived from such foods. Access to such information enables consumer choices to be more closely in line with preferences, and uncertainty regarding the nature of product attributes is likely to be minimized. Firms, restaurants and food vendors that produce goods with desirable attributes also benefit as they are rewarded for marginal improvements in the quality of various attributes. The problem of non-labelling of menus in fast food outlets is pervasive globally. Consumers find themselves being obese, diabetic and overweight. Such conditions are the most prevalent causes of coronary heart diseases, particularly in developed countries (American Obesity Association, 2003; Manson & Bassuk, 2003).

Recent global figures from the World Health Organisation (WHO) indicate that prevalence of obesity is not just a problem of the developed countries but is also on the increase in the developing world, with over 115 million people suffering from obesity-related problems (Adeboye et al., 2012; Cois & Day 2015; Mkhabela, 2013). South Africa is not spared from this problem, as food away from home (FAFH) is popular among urban dwellers who not only consume fast foods sold by chain outlets, but street food sold by vendors who operate from temporary stands/stalls (Feeley et al., 2009; Steyn & Labadarios, 2011). What this translates to, is that, South Africa's menu labelling problem is bigger than that of developed countries. Food sold by the informal market is popular among lower income earners living in urban areas; whereas, fast foods from chain outlets is mostly consumed by moderate to upper income earners. Steyn and Labadarios (2011) found that Black South Africans were the most frequent consumers of FAFH, with nearly one out of five consuming such foods at least twice a week.

In as much as there is no problem with eating away from home, the challenge has been that most fast food outlets are 'famous' for serving unhealthy meals offered in large portions with high calories and 'negative' nutrients like fat, sugar and salt, but lower supply of vitamins A and C, as well as fruit and vegetables (Sacco *et al.,* 2017; Steyn & Labadarios, 2011). Although

the recommended calorie intake per day is, on average 2000 calories (McGuire, 2011), many of the restaurants have a tendency of serving meals close to, if not more than the recommended daily calorie intake in just one sitting (Wie &Giebler, 2014).

The United States of America (USA) is the first country to introduce policies aimed at responding to risks posed by obesity and health related diseases. One such policy formulated to act as a means of regulating restaurants and controlling the effects of obesity and related chronic diseases, was the Patient Protection and Affordable Care Act of 2010 (USA, 2010). The menu labelling law was first introduced in California State, requiring chain restaurants to post nutritional and caloric information on menu boards, menu brochures or pamphlets at the point of purchase. The conviction held by policy makers is premised on Arkerlof's (1970) economic proposition that labelling policies, if properly introduced and implemented, can avoid market inefficiencies by making information initially held by a producer of a particular food also available to the consumer. Removal of information asymmetry or subsidization of search costs can benefit consumers, as they will be more informed about the exact attributes of the product (Teisl & Roe, 1998). This has had an influence on other developed countries, for instance, Australia, Canada, the United Kingdom, and Brazil, who have adopted similar policies and enacted similar laws requiring food establishments to label their menus (see McGuffin *et al.*, 2013; Oliveira *et al.*, 2012; Reale & Flint, 2016; Sacco *et al.*, 2017 for details). Such policies and laws seek to empower consumers with full information on the nutrient content of purchased ready-to-eat foods (Sacco *et al.,* 2017).

1.2 Problem statement and justification of the study

Food labelling in South Africa is currently coordinated within the provisions of "Regulations Relating to the Labelling and Advertising of Foods" (SA, 2014). These regulations, however, have their authority limited to labelling and advertising of foods but do not extend to ready-to-eat foods sold by restaurants, cafeterias and street vendors. This is a weakness in the food labelling system as fast food providers are not obligated to label their menus in order to inform their consumers.

Several studies (e.g. Bosman *et al.*, 2014; Prinsloo *et al.*, 2012; Temple *et al.*, 2011; Temple *et al.*, 2014; Van De Mwere *et al.*, 2010) have been conducted to study the use of food labels by South African consumers and whether food labelling influences their consumption behaviour.

While a plethora of the literature suggests high levels of fast-foods consumption in urban areas, given the absence of menu labelling law in South Africa, it would be important to determine if there is a need to introduce such legislation and whether its promulgation would have an effect on consumers' fast food consumption behaviour.

South Africa is one of the countries that are bearing the burden of obesity. This indirectly becomes an economic burden to the state as obesity is an important risk factor for the development of hypertension, coronary heart disease, diabetes mellitus and certain cancers. Its prevalence in South Africa is reported by Sartorius *et al.* (2015) to have increased from 23.5% in 2008 to 27.2% in 2012, with a relatively high prevalence in urban areas. This situation is attributed to, among other factors, the consumption of unhealthy diets containing high amounts of unsaturated fats, sodium and sugars. As indicated by Feeley *et al.* (2009) and Steyn and Labadarios (2011), foods containing such nutrients are sold without menu labels mainly by fast food outlets and street vendors.

Food quality attributes, as suggested by Caswell and Mojduszka (1996), can be regarded as having a demand and supply that interact to determine a market clearing price. Therefore, the demand for food safety is determined by consumers' willingness to pay for additional safety, reflecting the value consumers place upon the benefits they derive. With menu labelling considered a form of product differentiation, the marginal cost of providing labelled food by retail outlets is likely to increase, and the associated cost will be reflected in the consumer price. If different food items cannot be discriminated, consumers might tend to buy the cheaper product that could be of lower quality. Thus, in the long run, if no price premium is achieved for the higher-value products, these products might disappear from the food market, resulting in market failure (Akerlof, 1970). Given the above debate, it would also be important to investigate if consumers value menu labels such that they would be willing to pay the price premium that comes with such an intervention.

Despite the general concerns of global food price increase, consumption of fast foods in most countries is attributed to an increasingly urbanized society that has resulted in a culture where dining in fast-food restaurants has become the norm (Tan, 2010). Secondly, the rise in expendable income and a busy and fast-paced lifestyle in most urban settings have led to a willingness to pay for convenience (Brunner *et al.*, 2010). Thirdly, there exists a diverse array of eateries that strive to cater for different types of consumers (Tan, 2010). Furthermore, with

most women participating in the urban labour force, as household members who are responsible for food preparation, women often find themselves having little time to cook; hence, resorting to purchase ready-to-eat meals (Buckley *et al.*, 2007; Carrigan *et al.*, 2006; Lee & Tan, 2007).

Against this backdrop, it was important that the study pursues the importance of menu labelling in fast food outlets in order to curtail problems of obesity in South Africa using evidence from Mahikeng. By virtue of being exploratory in nature and being the first in South Africa (at least to the author's knowledge), the study makes a seminal contribution to the national food policy discourse. The study was guided by the following research questions:

1.3 Research Questions

a) To what extent does menu labelling have an effect on consumers' consumption behaviour?
b) To what extent are consumers of fast foods (or ready-to-eat foods) willing to pay for nutrient information?

1.4 Research Objectives

The main objective of the study was to examine the effects of menu labelling on consumption behaviour using evidence from Mahikeng Local Municipality, North West Province, South Africa

Specifically, the study sought to:

a) Determine the effects of menu labelling on the consumption of ready-to-eat foods.
b) Investigate consumer's willingness to pay for nutrient information on ready-to-eat foods.

1.5 Research hypotheses

Based on the research questions and objectives, the following hypotheses were postulated;

a) There are no significant changes in the consumption behaviour despite the provision of nutrient information on ready-to-eat foods.

b) There is no significant positive relationship between nutrient information on ready-to-eat foods and consumers' willingness to pay for menu labelling.

1.6 Operational definition of key terms

Ready-to-eat foods:	These are foods sold by fast food retailers within the local municipality after value adding processes for profit gains.
Menu label:	The inscription of food content composition on fast food products or ready-to eat foods.
Food label:	A panel found on a package of food (processed or unprocessed), which contains information about nutritional value of the food item.

1.7 Layout of the dissertation

The dissertation layout is as follows:

Chapter 1: ***Introduction,*** in which the background, problem statement and study justification, research objectives, research questions, study hypothesis, definition of operational terms and layout of the dissertation is presented.

Chapter 2: ***Literature review,*** in which consumption of food away from home is discussed. Additional topics covered include: Willingness to pay for fast food products, theories associated with consumption behavior and their relationship to willingness to pay for ready-to-eat fast foods.

Chapter 3: ***Research methodology,*** in which the study area is defined as well as the sampling framework and procedure. The models used to address the study objectives are discussed in detail.

Chapter 4: ***Results and discussion,*** in which the study findings on estimated models are presented and discussed and a comparison is also made with results from similar past studies.

Chapter 5: ***Summary, conclusions and recommendations,*** in which the study is concluded to see if the research questions were answered. Recommendations based on the findings are also formulated for policy and areas for further research are identified.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents a brief review of the literature related to the study. The discussion identifies the underlying factors resulting in consumption of food-away-from-home (FAFH) beginning from a global context. The determinants of consuming food away from home (FAFH) are also discussed so as to identify their influence on food choices. The last section reviews empirical studies on the effects of menu labelling on consumption behaviour.

2.2 Consumption of food-away-from-home: What are the underlying factors?

In the United States of America (USA), consumers spend nearly half of their food dollars on meals and snacks at foodservice facilities such as restaurants, hotels, and schools (Liu, 2013; Stewart *et al.*, 2004). Total away-from-home expenditures, defined to include all food dispensed for immediate consumption outside of the consumer's home, amounted to $415 billion in 2002. That is about 58% greater than annual away-from-home expenditures in 1992 which totalled $263 billion (Stewart *et al.*, 2004).

South Africa is another country with the most number of restaurants operating as full service and quick service establishments. Some of these restaurants have franchises in neighbouring countries like Zimbabwe, Botswana, and Zambia (Blick, 2018). With the increase of disposable income and opening of these various restaurants, food consumed away from home has increased. Tan (2010) argues that, rapid urbanization is the major cause of most food consumed away from home. The most famous sources of food-away-from-home (FAFH) include Steers, Wimpy, Captain DoRegos, McDonalds, Chicken Licken, Kentucky Fried Chicken (KFC), Barcelos, Hungry Lion, Nandos, Debonairs Pizza, Panarottis Pizza Pasta, Roman Pizza, Pizza Perfect, Scooter's Pizza, Fish-aways, Ocean Basket and Something Fishy (Blick, 2018).

While there seems to be a consensus amongst scholars on the trends of obesity increase in South Africa, the alarming reports are those of unhealthy eating amongst urban black women (Puoane *et al.*, 2002). These trends have been linked to the high transition of urbanization amongst the black population. However, most black people in South Africa fall in the low-income groups, such that a bulk of healthy food choices are quite unattainable for most. Temple

et al.'s (2011) study indicates that, switching from a normal South African diet to a healthier one has a likelihood to increase the cost of food. For convenience and affordability, many South Africans find themselves eating or having to make unhealthy food choices.

Due to a lack of stringent laws to regulate the purchase and selling of food, many people find themselves in the food business in South Africa. As a way to alleviate poverty, street vendors and mobile units in schools and University premises sell fast foods to the ever-busy consumers. However, most consumers find themselves purchasing such food oblivious of the nutrient content. It should be noted that despite the classy fast food restaurants already established, food consumed away from home is a phenomena that has expanded to informal settlements such as "Locations".

2.3 Determinants of consumption of food-away-from-home

Socio-demographic factors such as household size, age, gender, education, race and location all tend to have an effect in the decision of consuming food away from home. South Africa has seen a lot of changes with passage of time: globalization, increases in wealth of black middle class, urbanization as well as laws that support equal rights leading to women being exposed to the working world as career women. These factors, amongst others, all have influenced the increased demand for consuming more meals away from home as compared to two or three decades ago (Blick, 2018; Maumbe, 2012). Furthermore, lifestyle changes such as more singles living alone, working class comprised separated family members, busy working schedules that see a lot of people spending more time at work than at home are attributed to the recent increased demand of food consumed away from home (Brunner *et al.*, 2010).

Consumer behaviour demonstrates that, if disposable income of an individual is increased, the demand of his consumption bundle shifts or is also increased such that their tastes and preferences also change. Bai *et al.* (2012); Gould and Villarreal (2006) argue that, there is a positive relationship between increases in disposable income with the frequency of fast foods consumed at any given time. Households with higher income tend to spend more money on leisure, food and type of food than low-income households would. For example in a study in China, the total expenditure elasticity (the effect capturing both the increased participation and

higher demand response) with respect to household income was found to be on average, 1.74, indicating that a 1% rise in income generates an increase in expenditure on FAFH of 1.74%. Moreover, the responsiveness of FAFH demand to increases in income rises for those who are wealthier (Ma *et al.*, 2006). However, Bai *et al.*, (2012) argue that, both the probability of a household deciding to dine out and the expenditure on meals away from home will significantly increase as income rises, but the expenditure level increases at a decreasing rate.

In addition, the quantity of food consumed away from home is determined by affordability and subsidized food. It makes much more sense to consume FAFH if it is relatively cheaper to do so in terms of cost and time, than having to cook at home. For example, in China, while much of the food consumed away from home is paid for by the consumer, a sizable portion is hosted (paid for) by other parties (Bai *et al.*, 2010). Employers in China typically pay all or most of the costs of meals for their employees during working hours. For large organisations, this may be through company owned restaurants, cafeterias, and food shops where meals are provided to employees free or at a charge that is notably below the market price for an equivalent meal. Other employers may provide employees with food coupons or gift cards that can be used to buy meals at nearby food outlets. In most cases, these food coupons are not cashable for employees, so they are not treated as the receivers' income (Bai *et al.,* 2010). The cost of meals covered by the employer has a huge effect on the number of meals that particular employee will consume away from home. The longer the working hours due to increased demand for efficiency with companies wanting to meet deadlines, the longer the period an employee would spend away from home, hence less consumption of home cooked meals.

Household size is also a determinant in FAFH as indicated in some studies (Bai *et al.*, 2010; Binkley 2006). For instance, both the number of children and the number of seniors in the household are significantly and negatively related to the probability of eating out. Meanwhile, households with more seniors also tend to spend less than those with fewer seniors if they dine out (Bai *et al.*, 2010). Stewart *et al.*'s (2004) study indicates that, single person households and multiple adults without children spend more in fast food eateries, as compared to larger households with more children who prefer more of home cooked meals and will seldom consume meals away from home. Therefore, as household size increases, food consumption away from home decreases. Households living in smaller towns show lower expenditures away from home. This may be due to a relative lack of restaurants of all kinds in small areas, rather than to a lack of restaurants specialized in one type of meal or another. An increase in the

percentage of children aged 0–6 causes a decrease in purchasing breakfasts away from home, whereas the consumption of snacks increases. Furthermore, Bhuyan (2005) found that families with children preferred chain restaurants as they were influenced by restaurant advertising.

Amongst the determinants of FAFH, a number of studies (Bai *et al.*, 2010; Davis & You, 2010; Ma *et al.*, 2006; Yen, 2012) have indicated that time valuation especially by working women is important in FAFH demand. Traditional female spouses are responsible for planning meals at home, however with globalisation and introduction of equal rights, most female spouses have become career women. This has resulted in more female spouses spending a lot of time in their respective jobs such that, the propensity to consume more meals not prepared at home is increased due to constraints in time. In particular, fast food may come to represent a convenient meal option, if such a restaurant is reasonably accessible (Stewart *et al.*, 2004). On the contrary, the time taken in full service restaurants for ordering a meal is often more than that of preparing a meal at home, such that dining away from home is theoretically or empirically unjustified.

Age also influences the consumption of FAFH. In their study, Friddle *et al.* (2001) postulate that, "younger people see food service dining as a form of recreation and take much pleasure in trying new restaurants and fresh menu ideas." This suggests that elderly people and the youth may seek time to socialize. One way of doing so is by eating out at different restaurants. Moreover, demands and tastes of certain foods changes as people age. The elderly are more likely to visit casual and fine dining establishments resembling a more 'adult' setting whereas the young are likely to visit those establishments which suit their age groups as they emphasize a lot on class and sophistication, especially with regards to portion size (Friddle *et al.*, 2001). Nonetheless, Stewart *et al.* (2004) found that the impact of aging also varies by market segment. Households with older managers dine at fast food establishments less frequently and as a result spend less money. Age has negative and significant effects on probabilities and levels of expenditures at both full-service and fast-food restaurants, while its negative effect on other facilities is seen only through probability (Yen, 2012).

In South Africa, gender does not seem to influence or determine the demand for FAFH. Blick (2018) reports that, between 2008 and 2012 trends indicate that there are no significant differences between the purchases of fast foods by gender. Blick (2018) further argues that, the share of male fast food consumers decreased between 2011 and 2012 with more women

actively participating in the workforce. As a result there has been less time for preparation of meals and in addition, higher incomes allow for increased meals away from home.

2.4 Effects of menu labelling on consumption behaviour

Several studies have been done on menu labelling, food labels and willingness to pay for information of nutrition labels and food labels. The following discussion entails some of the empirical work that has been embarked on.

Wie and Gibler (2014) conducted a study using fourth year college students from university in the capital city of Sacramento, California. The study aimed to identify college students' perceptions and behaviours related to calorie counts on menus and examined existence of any inconsistencies between perception and behaviour among different levels of nutrition education. Their results indicated that, 54% of respondents always believed that calorie information on menus can assist towards weight maintenance or weight loss. At the same time, 41% of respondents reported a need to see calorie counts on menus at all restaurants. Results from the study indicated that fewer students were aware of the choices they made in relation to food and some of the decisions were based solely on habits. Wie and Gibler (2014) confirm the importance of nutrition education for college students in affecting menu item choices.

Elbel *et al.* (2009) examined the influence of menu calorie labels on fast food choices in the wake of New York City's labelling mandate. Receipts and survey responses were collected from 1156 adults at fast-food restaurants in low-income, minority New York communities. These were compared to a sample in Newark, New Jersey, a city that had not introduced menu labelling. Their study found that 27.7% who saw calorie labelling in New York said the information influenced their choices. However, there were no significant changes in calories purchased after the introduction of calorie labelling.

Contrary to a study by Elbel *et al.* (2011), following the mandatory regulation in Philadelphia to mandatorily post menu information in most chain restaurants, Auchincloss *et al.'s* (2013) study was to determine whether purchase decisions at full-service restaurants varied depending on the presence of labelling. Their cross-sectional study collected 648 customer surveys and transaction receipts at seven restaurant outlets of one large full-service restaurant chain. Two

outlets had menu labelling (case sites); five outlets did not (control sites). Outcomes included differences in calories and nutrients purchased and customers' reported use of nutrition information when ordering. Eight linear regression models were used to separately examine mean differences between purchases at labeled and unlabelled restaurants for: total food and beverage calories; food calories; sodium; carbohydrates; saturated fat; calories from all beverages; calories from alcoholic beverages; and calories from non-alcoholic beverages. To explore demographic and behavioural characteristics associated with self-reported use of nutrition information, logistic regression was used to model the probability of self-reported labelling use among only Philadelphia customers. From their results, the customers at labelled restaurants purchased food with fewer kilocalories compared to customers at unlabelled restaurants. Amongst those that reported that nutrition information affected their order, they purchased less calories, and food with saturated fats. These results indicate differences between the two studies in the same country where a universal menu labelling law was passed.

Similar to studies conducted by Auchincloss *et al.* (2013), Elbel *et al.* (2011) and, Krieger *et al.* (2013) also examined the effect of menu labelling on calories purchased, with the intention also to assess self-reported awareness and use of labels. Different from the other studies, they employed a single-community pre–post–post cross-sectional study which captured data at 3 different time lags. A total of 7325 customers participated in their study. A regulation requiring chain restaurants to post calorie information on menus or menu boards was implemented as the treatment of the study. No significant changes occurred between baseline and 4–6 months post regulation. However, mean calories per purchase decreased from 908.5 to 870.4 at 18 months post-implementation in food chains and from 154.3 to 132.1 in coffee chains. Calories decreased in taco and coffee chains, but not in burger and sandwich establishments. A significant decrease was seen more among women than men in coffee chains. Awareness of labels increased from 18.8% to 61.7% in food chains and from 4.4% to 30.0% in coffee chains. Among customers seeing calorie information, the proportion using it (about one third) did not change substantially over time. After implementation, food chain customers using information purchased on average fewer calories compared to those who reported to having seen nutritional information and not using it. Mean calories per purchase decreased 18 months after implementation of menu labelling in some restaurant chains and among women but not men.

Another study with similar results is that of McCann *et al.* (2013). This study aimed to determine whether the manipulation of nutrition labelling information can influence food

portion size consumption. Normal and overweight men (n = 24) and women (n = 23) were served an identical lunch meal on three separate days, but the information they received prior to consuming the lunch meal was manipulated as follows: ''baseline'', ''high fat/energy'' and ''low fat/energy''. Food and energy intake was significantly increased in the low fat/energy condition compared with both baseline and the high fat/energy condition. An additional 3% (162 kJ) energy was consumed by subjects under the low fat/energy condition compared to baseline. Nonetheless, no differences were observed between the baseline and high fat/energy condition although subjects who consumed most in the low fat/energy condition were found to be mostly men who have a higher body mass index and are overweight. This may be attributed to availability of highly palatable foods labelled as 'low fat or reduced calorie' which may encourage the over-consumption of these products.

Zaffou and Campbell (2016) conducted a study to assess the impact of calorie information presented in different formats on food cost. A sample of 242 participants with diverse demographic characteristics were presented with two different restaurant menus: a sit-down restaurant menu (Olive Garden) and a fast food restaurant menu (McDonalds). The study used Tobit regression to determine effect of different labeling formats on the price. Results revealed that calorie labeling on a restaurant menu had little impact on prices paid by consumers for each food category and also for the price paid for the total meal. The results indicated that, the provision of nutrition information had no significant impact on the profits of restaurants. These findings presented motivation for restaurants to comply with Food and Drug Administration (FDA) regulations which stipulated that calorie information be displayed on menus. Zaffou (2016)'s study further revealed that calorie labeling on a restaurant menu can significantly impact consumer's food selection as defined by calorie count. Furthermore, calorie information is effective at reducing caloric choice at both sit down and fast food restaurants

To determine the effectiveness of providing nutrition information to restaurant customers at the point of selection, Sharma *et al.* (2011) conducted an experimental study in which nine recipes from a restaurant menu were modified and labelled "heart healthy." Analysis of sales data showed that sales of three of these items increased significantly during the intervention, while sales of the other items remained constant. Results of a survey conducted during the study showed that purchase of modified menu items positively correlated with the customers'

level of formal education, their intention to order a healthier item on a return visit, and their belief that healthy meal options provide nutrition at a good value.

Kim *et al.* (2000) conducted a study to examine the impact of consumers' use of food labels on selected nutrient intakes of Americans. Endogenous switching regression techniques were employed to control for heterogeneity in the label use decision. When the nutrient intakes of label users and the expected nutrient intakes of label users in the absence of labels were compared, food label use decreased individuals' average daily intakes of calories from total fat and saturated fat, cholesterol, and sodium by 6.90%, 2.10%, 67.60 milligrams, and 29.58 milligrams, respectively. In addition, consumer nutrition label use was found to increase average daily fibre intake by 7.51 grams.

To incorporate the concept of willingness to pay, Cranfield and Magnusson (2003) used a contingent valuation survey to determine if Canadian consumers would pay a premium for Pesticide Free Production (PFP) food products. Their results indicated that, over 65% of respondents would be willing to pay a 1-10% premium relative to a conventional food product. Five percent of respondents would be willing to pay more than a 20% t premium. Health and environmental concerns, willingness to switch grocery stores and youth were found to be important characteristics of consumers who would be willing to pay higher premiums. This study is similar to the one conducted by Loureiro and Hine (2004) in which they also used a contingent valuation method to analyse whether consumers preferred mandatory or voluntary labelling schemes. In their results, they found that the premium associated with mandatory labelling is lower than expected costs. This indicates that in spite of the concerns surrounding biotechnology, consumers remain fairly confident with the current Food and Drug Administration policy, which does not require mandatory labelling.

Using data collected from food shoppers, Loureiro *et al.* (2006) assessed consumers' valuation of nutritional labels by analysing their willingness to pay a premium for a box of cookies with a nutritional label. The results indicated that on average, the mean willingness to pay (WTP) for a box of cookies with a nutritional label is estimated to be about 11% above the price of the box of cookies without a nutritional label. These results were consistent with prior expectations, since their results indicated that there is a difference between the WTP of individuals suffering

from diet-related health problems (with an estimated mean of 13%) and those who do not suffer any diet-related health problems (with an estimated mean of 9%).

Nonetheless, given that no studies have been conducted in South Africa and elsewhere on the continent on menu labelling, literature on the effects of menu labelling on consumption behaviour in South Africa, in particular is scarce. Mkhabela (2013) conducted a study with the aim of drawing up a list of food pricing strategies that could be used to promote healthy eating and address food insecurity by soliciting expert opinions using the Delphi method. Respondents were drawn from a broad spectrum of the food industry players and data were collected in three rounds. The participants were selected purposively according to their experience in the food industry and marketing of agricultural and food products. In round one, experts designed promising pricing strategies. The pricing strategies were divided into four broad categories and these were: A. Taxes; B. Government interference and insurance; C. Packaging; and D. Price and discounting strategies. The strategies were subsequently evaluated on eight criteria using a time-budget model incorporating Sleep, Leisure, Occupation, Transportation and Home-based activities (SLOTH). Results were analysed using median and inter-quartile deviations scores. The results revealed reasonable consensus among experts and a varied list of promising pricing strategies. These strategies included; offering small gifts, providing price cuts on healthy foods and discounting healthier foods more frequently. Also, it was found that experts gave higher rates to pricing strategies for which the implementation responsibilities could be placed elsewhere.

Bosman *et al.* (2014) conducted a study that sought to determine South African (SA) metropolitan consumers' opinions and beliefs about the food-health link, as well as their opinions and use of health information on food labels. Using stratified randomized sampling, 1,997 respondents were recruited. The data were weighted to represent the metropolitan SA adult population of 10,695,000. A significantly large proportion of respondents agreed to the presence of a food-health link and that health messages on food labels are supported by scientific research. Respondents' opinions on health information on food labels were mostly positive, as confirmed by the average opinions for the different ethnic groups. The results identified a lack of interest, time and price concerns, and habitual purchasing as reasons for not reading food labels. Health-concerned respondents also considered labels as important health information sources

2.5 The Theory of Planned Behaviour

This theory was developed by Icek Ajzen in 1991 and the theory has been widely used in many diverse fields of both science and applied sciences (Borges *et al.*, 2014; Fielding *et al.*, 2008; Patnode *et al.*, 2017). Yet, there has been little evidence on the use of the theory to understand the human behaviour which propels them to buy or not to buy some ready to eat foods sold by the food shops existing along the shopping malls. As such, this study adopted this theory in order to assist in defining the different consumer behaviour in relation to fast food consumptions within the Mahikeng Local Municipal. On the same note, in agricultural science, theory of planned behaviour is key as it assists different people in making a decision which can either promote or reduce their levels of development (López-Mosquera & Sanchez, 2012). In the current study, the theory of planned action will assist in selecting factors associated with willingness to pay.

2.6 Conceptual Framework

Figure 2.1 below illustrates the conceptual framework in which the study is independent and dependent variable are schematically presented.

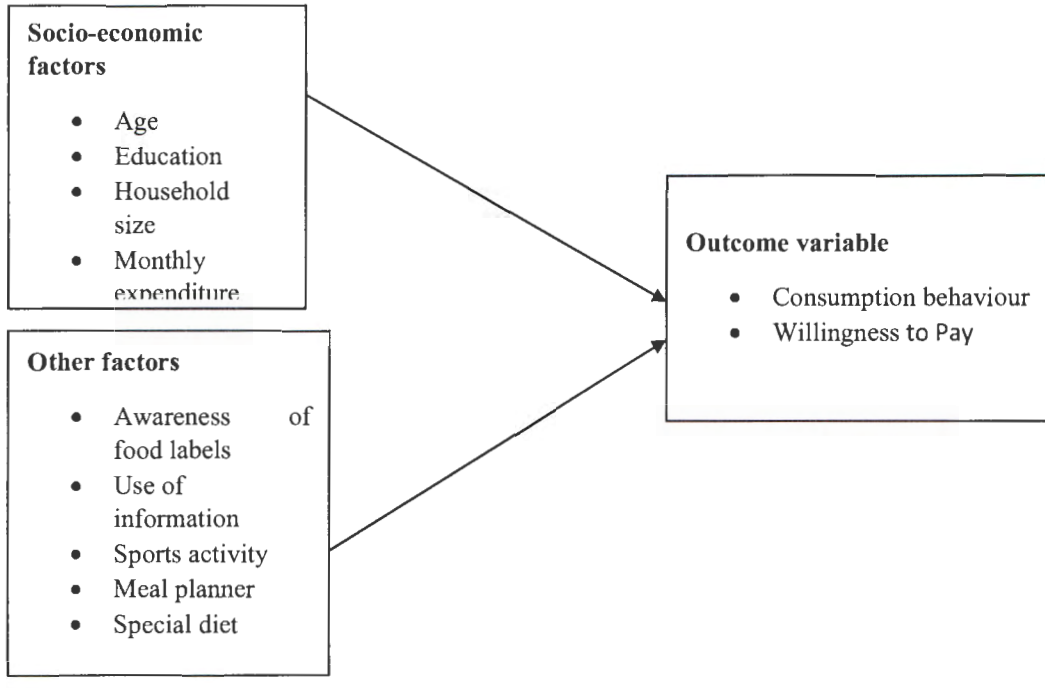


Figure 2.1 Conceptual framework
Source: Adapted from Gracia *et al.*, (2007)

2.5 Summary

In conclusion, various studies have investigated the use of food labels but not the effects of menu labelling on consumer's consumption behaviour in the local context of South Africa. So much emphasis has been placed on food labels in South Africa yet nutritional information studies have mainly been conducted in developed countries like USA and Europe. Considering the difference between such countries and South Africa, it would be interesting to see the different dynamics concerning determinants of food consumption away from home as well as effects of introducing menu labels on consumers' consumption patterns and if consumers would be willing to pay a premium for the provision of such information.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology and justification thereof. The discussion includes methods of data collection and analytical procedures that were followed in attempting to address the specific objectives as outlined in chapter 1. Chapter 3, however, begins with a description of the study area.

3.2 Study area

The study was conducted in Mahikeng Local Municipality (see Figure 3.2). Formerly known as Mafikeng, Mahikeng Local Municipality is part of the larger Ngaka Modiri Molema District Municipality (NMM) situated in the North West Province. NMM covers an area of 31039 km^2 and splits South Africa's international border with the Republic of Botswana. It is comprised of five local municipalities, namely; Mahikeng, Ditsobotla, Ramotshere Moiloa, Tshwaing, and Ratlou. About 34 854 households in NMM district municipality are involved in agricultural production (Statistics SA, 2016). The total area of the Mahikeng Local Municipality is approximately 3 703 km^2. It is divided into 28 wards consisting of 102 villages and suburbs. The population of the Municipality is estimated at 271 501 people. Approximately 75% of the area is rural and under tribal control.

The study was conducted in areas where most fast food consumption takes place. These are areas located within a five kilometre radius where fast food outlets such as Steers, McDonalds and Debonairs pizza make home deliveries for orders placed online or telephonically to cater for those who consume fast foods but would have not physically gone to the outlet for purchase. The five kilometre radius was established from two reference points, the Crossing and Megacity (see Fig 3.2), where the above-named fast food outlets are located.

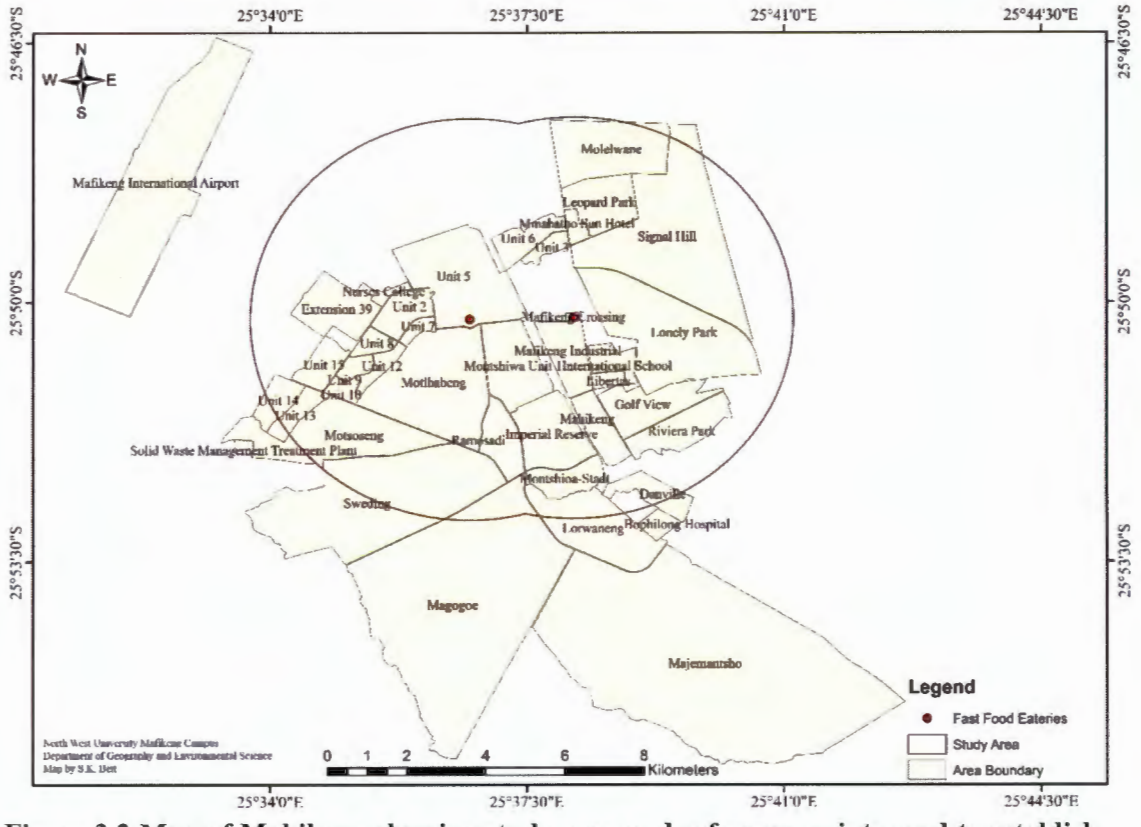


Figure 3.2 Map of Mahikeng showing study area and reference points used to establish the five kilometre radius

Source: North West University Mafikeng campus, Department of Geography and Environmental Science, 2017

3.3 Sampling procedure

Given that the unit of analysis was a household, the sampling procedure was, therefore, based on household population. After establishing the total population of households to be 29 883, based on information provided by StatSA, Mahikeng Local Municipality, using the Krejcie and Morgan (1970) procedure, a total sample size of households to be interviewed was estimated at 380. The Krejcie and Morgan (1970) procedure is depicted as follows:

$$s = X^2 \frac{NP(1-P)}{d^2(N-1)} + X^2P(1-P) \qquad 3.1$$

where

s = required sample size;

X^2 = the table chi-square value for 1 degree of 95% confidence level;

N = population size;

P = population proportion to size assumed to have a probability of 0.5; and

d = degree of accuracy, in this case 50% response distribution.

Households were then stratified according to their location as indicated in Figure 3.2, and the number of households to sample from each location/strata was determined by probability proportional to size (population of households). However, due to lack of a list of households in the identified locations, a situation that would have enabled the researcher to select households to interview randomly, households were selected using a systematic sampling method. Households to be interviewed were selected first by identifying a random starting point and then determining a fixed periodic interval. For each location, the periodic interval was estimated by dividing the household population size in each location [B] by the desired household sample size [C] (see Table 3.1). Each household was represented in the interview by an adult head. After the interviews, 371 households successfully completed the questionnaire while nine were not completed as some respondents withdrew from the study due to undisclosed personal reasons.

Table 3.1: Distribution of sampled households per strata

Location [A]	Population of households [B]	Household sample size [C]
Sweding	3302	42
Imperial reserve	2108	27
Lonely park	2725	35
Molelwane	1006	13
Leopard Park	146	2
Signal Hill	1993	25
Mmabatho Sun	79	1
Unit 6	569	7
Unit 3	395	5
Unit 5	291	4
Extension 39	2837	36
Unit 2	1098	14
Unit 7	697	9
Unit 8	904	11
Unit 15	1154	15
Unit 12	768	10
Unit 9	540	7
Unit 10	694	9
Ramosadi	2192	28
Montshioa	2376	30
Golf view	946	12
Reveria park	810	10
Motsoseng	1148	15
Danville	1040	13
Mafikeng Industrial	65	1
Total	**29883**	**380**

3.4 Data collection

The format of the final survey instrument was adapted from Mayfield (2014), whose work was evaluated by expert reviewers to ensure reliable content, and that cognitive and usability standards were met. The study utilised a similar questionnaire but with modifications to suite the local context and the study's specific objectives. The questionnaire consisted of three main sections. The first section was designed to obtain nutritional information, food related habits regarding frequency of eating, attitudes towards consuming products from fast food outlets, and the types of restaurants frequented. The second and third sections focused on socio-economic and demographic data, respectively. The questions were modelled after instruments used in previous related studies (e.g. Josiam & Foster, 2009). Through the help of 10 trained research assistants, interviews were conducted with heads of sampled households and responses were captured on a tabloid using an online questionnaire. Before the field survey, a pre-test was conducted using 20 households outside the study area. A pre-test was used to improve the reliability of the questionnaire and translation of the questions from English to the local language, Setswana. Questions that were ambiguous were modified accordingly using the responses obtained from respondents. Data was eventually collected between the months of July 2017 to August 2017 and was analysed using STATA 15.

3.5 Empirical methods

3.5.1 Effects of menu labelling on consumption behaviour

Objective 1 sought to determine the effects of menu labelling on the consumption of ready-to-eat foods. To achieve this objective, specific questions were asked to the respondents to capture nutrient information use, which was the dependent variable. Firstly, the respondent was given an array of different meal options from unidentified outlets, which were, however, known to the researcher. After making their choice, a question soliciting their frequency of eating that meal was asked as follows:

- Suppose your disposable income allows you to consume the meal of your choice, how many times would you consume it in a week (7 days)? Indicate the number of days_____

Having received a response to the above question, the researcher provided a nutrient breakdown to the respondent, showing the energy level, quantity of carbohydrates, fat, salt, fibre and protein. After that, the respondent was asked the following questions to check if such information would change his/her future consumption behaviour:

- If the following nutrition information (refer to Questionnaire) was to be provided along with your preferred meal, would you suggest any changes in the nutrient composition such that your consumption is not affected? (see questionnaire for details)
- If the above proposed changes are not put to effect by the supplier, how would the proposed information affect your weekly consumption?

  a. I would still consume the same quantity ☐

  b. I would reduce my consumption ☐

  c. I would increase my consumption ☐

The final question to capture the dependent variable (Y) which was in count form was then captured by the following question:

- If b) or c), how many times in 7 days (one week) would you consume your preferred meal? State the number of times_____

To analyse the effects of nutrient information on consumption behaviour, the following model can be employed:

$$Y = \beta' x + \delta t + \varepsilon \qquad 3.2$$

Where Y represents the number of fast food meals consumed, x the vector of exogenous socio-economic characteristics, and t a dummy variable (t = 1, if the individual uses nutrition information on the menu label when shopping, and 0 otherwise). β and δ are vectors of parameters to be estimated, and ε is an error term. Given that data used in the analysis was non-experimental, equation 3.2 was likely to be subject to misinterpretation because the label use decision was not randomly assigned, but voluntary, thus resulting in self-selectivity bias (Wooldridge, 2010). If the label use decision is not randomly assigned, it is also likely that label users may have systematically different characteristics from non-label users. These

attributes may not be observable to the researcher, implying that the treatment variable (use of nutrient information) may be endogenous (Kenkel & Terza, 2001; Wooldridge, 2010). Selectivity bias and endogeneity may result in inconsistent estimates of the effect of nutrient information use on consumption behaviour.

To correct for such challenges, and considering that the outcome variable was in count form while the endogenous treatment variable was binary, an endogenous treatment poisson regression model (ETPOISSON) was be employed, following the procedure by Terza (1998) and Kenkel and Terza (2001).

The outcome (consumption frequency = Y_j) and treatment equation (use of nutrient information = t_j) are expressed as follows:

$$E(Y_j|x_j, t_j, \varepsilon_j) = \exp(\beta x_j + \delta t_j + \varepsilon_j) \quad 3.3$$

$$t_j = \begin{cases} 1, & \gamma w_j + u_j > 0 \\ 0, & otherwise \end{cases} \quad 3.4$$

The x_j represents covariates used to model the outcome, w_j the covariates used to model the treatment assignment, and error terms ε_j and u_j are bivariate normal with mean of zero and covariance matrix $\begin{bmatrix} \sigma^2 & \sigma\rho \\ \sigma\rho & 1 \end{bmatrix}$. The covariates x_j and w_j are unrelated to the error terms, meaning they are exogenous. Despite that this joint model can be estimated even if the vector of covariates in the outcome and treatment equations are the same, additional variables were included so that the model could be identified via exclusion restrictions. Therefore, based on the literature (e.g. Kim *et al.*, 2000), the outcome and treatment variables were assumed to be affected by the following explanatory variables which are summarised in Tables 3.2 and 3.3, respectively.

3.5.2 Explanatory variables for the outcome and treatment variables

Awareness of food labels

For the purposes of this study, awareness of food labels (see chapter 1 for definition) was perceived as knowledge of dietary information. It was expected that consumers with some form of awareness of food labels, after being exposed to menu labelling would use this awareness to influence their decision to reduce the consumption of ready-to-eat meals they perceived to have negative nutrients or above the daily recommended intake. Kopelman *et al.* (2007) argue that

awareness of food labels does not necessarily inscribe making healthy food choices or guide behaviour. However, this variable was expected to be positively related to use of nutrient information. The variable for awareness of food labels was captured as a dummy, where the value of 1 was given to those who were aware of such labels and a value of zero, otherwise.

Age

The age variable was captured using categories for the different age groups that the respondent fell under. The relationship between age of the respondent and number of fast foods consumed on a weekly basis was expected to be negative. Studies conducted in South Africa have reported higher percentages of fast food consumption amongst the young and middle aged as compared to older consumers who prefer home cooked meals (Bosman *et al.*, 2014; Feely *et al.*, 2009). The variable for age was expected to be negatively related with the number of fast food meals consumed per week for middle aged and older whilst positive for younger headed households. In the treatment function, the expected sign for the age variable was either positive or negative given their different perceptions on perceived risks related to fast foods by different age groups. Age was captured as, 18-40 years = 1, 0 = otherwise.

Household size

Household size was measured using adult equivalents where members with less than 9 years = 0; members 9 to 15 years = 0.7; members 16 to 49 years = 1; members above 49 = 0.7. The relationship between household size and the outcome variable was expected to be either negative or positive. Households with a higher adult equivalent were expected to consume more meals at home as compared to those with a smaller size, perhaps due to affordability. A study conducted in Brazil by Bezerra *et al.* (2013) found that, families that had a high number of members visited fast foods outlets less. Therefore, on the treatment model, household size was expected to have a negative relationship with the treatment variable (use of nutrition information) for the reason that, household with a larger household size are more likely to avert foods that will impact negatively on the health of many members inferring more health cover.

Education

It was expected that the relationship between education and number of ready-to-eat meals consumed would be negative. Education of the household head was captured using different levels of education categories from those who had not obtained any formal education to those who had tertiary education. Education status of household head meant that if a consumer was deemed to have attained above matric, then it meant they had basic knowledge of nutrient information and comprehension of different meal options presented to them such that this would impact negatively on consumption frequency. Whereas for consumers with below matric, it was expected that they were likely not to comprehend nutrient information presented to them and would maintain their frequency of fast foods consumption based on acquired taste and preference than nutrient information. On the same note, the relationship between use of nutrition information and education was expected to be positive.

Monthly expenditure on food

The expected relationship between monthly expenditure on food and the outcome variable was a positive one. Households made up of members who stick to a strict budget often try to make multiple recipes with the same basic family of ingredients, and purchase less of expensive takeaways or fast foods, whilst others are more likely to indulge in more impulsive buying of fast foods (Bezerra *et al.*, 2013). The variable for monthly expenditure on food was captured as R1000 and less = 1, 0, otherwise; R 1001-R1500 = 1; 0, otherwise and R1500 and above = 1, 0, otherwise.

Meal planner

The decision making process is often more complicated when there is need to satisfy, for example, convenience, and time constraints and service where fast foods are concerned. However, it was expected that being involved in planning a meal would be negatively related to the number of fast foods consumed. The expected negative relationship relates to the fact that, consumers who plan their meals are more likely to be health conscious and show a reduction in the frequency of consuming processed foods. It was also expected that, meal planning would be positively related to the treatment variable. This was because the process of planning a meal involves finding knowledge related to the potential benefits and side effects of consuming certain foods. The respondent (household head) was regarded as a meal planner

if he/she was responsible for making household consumption decisions. However, if that decision lies with someone else, then the household head does not qualify as a meal planner. If the respondent was a meal planner or acknowledge making their own meal choices, then they were captured as = 1 and 0, otherwise.

Special diet

The relationship between the number of fast foods consumed per week and being on a special diet was expected to be negative. Certain prescribed diets are specific on the amount of calories and nutrients one can consume. Therefore, consumers on a strict diet (either voluntary or prescribed by a dietician) are expected to eat less or none of negative nutrients. Furthermore, it was expected that, being on a special diet would positively influence the decision of being concerned about nutrient information. Respondents on special diet were given a value of one and zero, otherwise.

Sport activity

A negative sign was expected on the relationship between respondents who are active in sports and the number of fast foods consumed. Most fast foods contain huge quantities of negative nutrients such as sodium and fats as well as sugars. Athletes and/or sportspersons are encouraged to take up healthy nutrients and stick to healthy diets. Satia *et al.*'s (2004) study conducted in North Carolina in America found that physical inactivity led to eating out more in fast food restaurants. Therefore, it was expected that the involvement of the respondent in any sporting activity would give a negative relationship with the number of fast foods consumed. The variable of sport activity was captured as a dummy with 1 given to those who were active in sports and 0, otherwise.

Use of nutrient information

Akbay *et al.*, (2007) reported that, health issues, through changing tastes and preferences, are also considered important determinants of the changing trends in food consumption. In order to assess the consumers' knowledge of nutrient information, the respondents were first given a pictorial view of three meal options without any nutrient information to identify their preferred option. The identity of meal providers was concealed for ethical reasons. After choosing their preferred meal, they were given another picture of the same option, this time showing nutrient information in terms of salt content, fat content and carbohydrate content. The nutrition information was captured using a table requiring them to specify their intention as to whether they would prefer the contents to be reduced, increased or maintained. There was also an option

for them to indicate if they had no idea what had to be done. Selecting an option of either to reduce or increase signified knowledge and use of that particular nutrient, while those who opted to leave it as is and/or did not know were regarded as consumers who could not make use of nutrient information. The expected relationship between use of nutrition information and number of fast food consumed was expected to be negative. Use of nutrient information was further broken down to each nutrient component that is, either a respondent used fat information, used salt information, used protein information , used dietary fibre and used carbohydrates information. These latter variables were included in the treatment function to ascertain which of them significantly contributed or influenced the overall decision to make use of nutrient information.

Table 3.2: Variables included in the treatment equation (Use of nutrient information)

Variable name	**How measured**	**Expected effect on dependent variable**
Dependent variable		
Use of nutrient information	1 = uses nutrient information 0 = does not use nutrient information	N/A
Explanatory variables		
Age	18 – 40 years = 1, 0 = otherwise	+/-
Level of education	1 = Household head with matric and above 0 = Household head without matric	+
Awareness of food labels	1= Aware of food labels 0= Not aware of food labels	+
Special diet	1= On special diet 0= Not on special diet	+
Meal planner	1= Household head is a meal planner 0= Household head is not a meal planner	+
Household size	Adult equivalents.	-
Use of salt information	1= yes, 0 = otherwise	+/-
Use of fat information	1= yes, 0 = otherwise	+/-
Use of carbohydrates information	1= yes, 0 = otherwise	+/-

Table 3.3: Variables included in the outcome equation (number of times respondent consumes ready-to-eat food within 7 days after providing nutrition information)

Variable name	How measured	Expected effect on dependent variable
Dependent variable		
Number of times ready-to-eat food with nutrient information is consumed within 7 days	Count	N/A
Explanatory variables		
Age	18 – 40 years = 1, 0 = otherwise	-
Household size	Adult equivalents.	+/-
Menu labelling policy option	Mandatory or voluntary = 1, 0 = otherwise	+/-
Education	Household head has Matric and above = 1, 0 = otherwise	-
Monthly expenditure on food	If R1000 and less = 1, 0=otherwise If R1501 and above = 1 0=otherwise *If R1001-R1500 = 1, 0, otherwise	+
Awareness of food labels	1= aware 0= not aware	-
Meal planner	1= household head is a meal planner 0= household head is not a meal planner	-
Sports activity	1 = household head is active in sports 0 = household head is not active in sports	-
Use of nutrient information	1 = household head uses nutrient information 0 = = household head uses nutrient information	-

**Refers to reference category*

The *etpoisson* model estimated was expressed as follows:

$$Y_j = \exp(\beta_0 + \beta_1 Awareness - Food\ Label_j + \beta_2 Age_j + \beta_3 Expenditure_j + \beta_4 MealPln_j + \beta_5 Household\ Size_j + \beta_6 Policy_j + \beta_7 Sport - Activity_j + \beta_8 Education_j + \beta_9 Use\ of\ nutrient.Inf_j + \varepsilon_j)$$

$$\beta_9 Use\ of\ nutrient.Inf_j = 1, (\gamma_0 + \gamma_1 Age + \gamma_2 Household\ Size_j + \gamma_3 Use - carb.Inf_j + \gamma_4 Use - fat.Inf_j + \gamma_5 Use - salt.Inf_j + \gamma_6 MealPln + \gamma_7 Education_j + \gamma_8 Awareness - Food\ Label_j + \gamma_9 Sp.Diet_j + u_j) > 0 \quad 3.5$$

3.6 Consumers' level of willingness to pay for nutrient information

To measure how valuable nutrient information was on selected meal options presented to respondents and the willingness to pay for such information, consumers were presented with a bidding scenario. Ideally, one would have preferred to attach exact figures or solicit for price premiums from respondents on their willingness to pay for menu labelling. However, given that this is a new phenomenon in South Africa, getting a price premium for menu labelling was unsuccessful as respondents could not attach definite figures to the concept of menu labelling. Had exact prices been expressed by respondents, the above objective would have been addressed by estimating a double bound probit model, which would have given a mean price consumers were willing to pay for nutrient information (Lopez-Feldman, 2012).

The next best available option for evaluating consumers' willingness and level of willingness to pay was to introduce a hypothetical bid system in which they would evaluate if they wanted to pay for nutrient information and get close estimations as to their level of willingness to pay for menu labels. Hence, respondents were asked a question to find out if they would be willing to pay an additional R10.00 as a premium in support of menu labels, which was the initial bid. This question separated respondent to two categories, those willing to pay the initial bid amount and those who were not willing to pay the initial bid amount. Follow up questions were asked to each category such that the two identical categories were further split into two. The follow up question introduced a lower bid of R5.00 to those who declined the initial bid and a higher bid of R15.00 to those who accepted the initial bid. This line of questioning gave four different categories of the form [no to initial bid and no to lower bid= *nn*, no to the initial bid and yes to

lower bid= *ny*, yes to the initial bid amount and no to the higher bid = *yn;* and lastly, yes to the initial and higher bid amount= *yy*].

3.6.1 Dependent variable

In line with the decision above, the dependent variable was divided into four. The first category was comprised of fast food consumers who were not willing to pay for nutrient information on ready eat fast foods on both bids of the price premium to be levelled on fast foods, whereas the second category was comprised of consumers that were not willing to pay an initial R10.00 bid but were willing to pay a lower bid of R5.00 premium on ready to eat foods for nutrient information. The third category included fast food consumers who were willing to pay an initial bid amount of R10.00 and not willing to pay when that bid amount was set to R15.00, whereas the last category was of consumers that were willing to pay for nutrient information on initial bid of R10.00 and were still willing to pay if that price premium was raised to a R15.00 bid. The four categories were consequently identified as:

0 = Not willing;

1 = less willing;

2 = moderately willing;

3 = more willing.

Based on the setting of the dependent variable, the model was estimated with an Ordered Logit model assuming that (Long, 1997):

$$zi^* = X'\beta + ui \text{ where } \varepsilon i \sim N(0,1) \quad 3.6$$

$$zi = 0 \text{ if } zi^* \leq @0 \quad 3.7$$

$$zi = 1 \text{ if } @0 < zi^* \leq @1 \quad 3.8$$

$$zi = 3 \text{ if } zi^* > @j\text{-}1 \quad 3.9$$

where z^* is an unobservable index and x is a vector of independent variables. The observed counterpart to z^* is z. The @'s are unknown threshold parameters that were estimated along with the other parameters in the model.

Then the probability of observing z given x can be expressed as:

$$Prob\ (z=0) = \Phi(-X'\beta) \quad 3.10$$

$$Prob\ (z=1) = \Phi(\mathbb{Q}1 - X'\beta) - \Phi(-X'\beta) \quad 3.11$$

$$Prob\ (z=2) = \Phi(\mathbb{Q}2 - X'\beta) - \Phi(\mathbb{Q}1 - X'\beta) \quad 3.12$$

$$Prob\ (z=3) = 1 - \Phi(\mathbb{Q}2 - X'\beta) \quad 3.13$$

where $\Phi(.)$ is the standard normal cumulative distribution function such that the sum of probabilities is equal to 1. The Ordered Logit model has been used by others to study consumers' level of acceptance for various products or services (e.g. Onyango & Nayga, 2004). However, prior to estimating the ordered model, it was felt necessary to determine what factors influence the dichotomous decision of willingness to pay for menu labelling. This was accomplished by estimating a binary Probit model. Others (e.g. Nandi *et al.,* 2017; Wu *et al.,* 2012) have used a similar model (binary Logit) for the same purpose. In the Probit model, the three categories of less willing, moderately willing and more willing were combined to generate one category of willing to pay while the not willing category remained unchanged. Hence, the dependent variable was dichotomous. The two models (Probit and Ordered Logit) were estimated using the same set of explanatory variables, which are discussed in the next sub-section and summarised in Table 3.4.

3.5.3 Explanatory variables: justification and expected outcome on variables used

Nutrient information was expected to positively influence consumers' decision on food choices. As a variable, information use is of key interest as studies indicate contradictory findings. For instance, Zymaris (2014) found that in sports active children, despite having knowledge about what to eat in terms of nutrient intake, the subjects under study still consumed considerable amount of calories when compared to non-sporting counterparts. Whilst, You and Nayga (2005) in their study of relationship between FAFH expenditure and television viewing and children's diet, found that, fast food and television viewing negatively affected the quality of children's diet. Therefore, knowledge of calorie content, fat and sodium contents in meal helps with decision making when making food choices. As such, it was hypothesised that use

of nutrient information was likely to positively affect willingness to pay. On the same note, use of fat information was expected to positively influence a consumer's willingness to pay.

New recipes, products and information can influence what one eats. Awareness of food labels was expected to have a negative relationship with consumption patterns of respondents. With awareness on issues of diet, it was hypothesised that the variable would have a positive relationship with consumers' willingness to pay for nutrient information than those respondents who are not aware of food labels. The variable was captured as a dummy such that the value of 1was accorded to those with awareness of food labels and 0, otherwise.

Studies indicate that the level of education can influence dietary behaviour during adulthood (Kearney *et al.*, 2000). In contrast, nutrition knowledge and good dietary habits are not strongly correlated. This is because knowledge about health does not lead to direct action when individuals are not sure of how to apply their knowledge. People may use knowledge of the links between diet and health to change their behaviour, but knowledge alone is unlikely to be effective. Indeed, the level of nutrition knowledge today is relatively high, but many people are not aware of how to apply it nor are they motivated to change. Depending on how people use acquired knowledge, the expected relationship between education level and willingness to pay for the information can either be positive or negative. The variable of education level was captured as a dummy variables such that, 1 was accorded those with matric education and higher and 0, otherwise.

Zymaris (2014) studied the association between sports scheduling and FAFH in growing girls. The study found that female adolescent gymnasts had a better diet quality than non-gymnasts (both athletes and non-athletes) despite having higher average hours per week spent on training. However, there was no discernable relationship between gymnast status and FAFH. Sporting activity and different sports discipline were expected to have a negative influence on FAFH. It was therefore hypothesised that, respondents who are mostly active in sports or who exercise regularly, would be willing to pay for nutrient information and would be less likely to consume FAFH, indicating a positive relationship. The variable for sport activity was captured as a dummy variable with 1 accorded those who were active in sports and 0, otherwise.

Concerns over health and fitness can also influence food choices. Those who are overweight are at high risk for developing diabetes, thereby influencing the consumption of fast foods and need to know more about their health status. An overweight person trying to lose weight by dieting will usually choose different foods than one whose metabolism allows him/her to eat whatsoever without concerns of weight gain. It was hypothesised, therefore, that the variable for special diet would be positive and significant on willingness to pay for nutrition information. Respondents on special diet were accorded a value of 1 and 0, otherwise.

A study on young adults in Johannesburg by Van Zyl *et al.* (2010) reported that the types of fast foods commonly consumed in the study consisted of burgers, pizza, fried chicken and soft drinks. This study also reported that 42% of the employed participants, although earning less than R5, 000 per month, spent more than R200 per month on fast foods, and 31% reported having fast foods 2 to 3 times a month. Households comprised of members who spent on a tight budget, often try to make multiple recipes with the same basic family of ingredients, and purchase less of expensive takeaways or fast food meals, whilst the opposite could be true for high income earners. The study therefore hypothesised that, expenditure on fast foods was likely to have a negative effect on willingness to pay for households who spend less on foods and as well as on the number of meals consumed. The variable for monthly expenditure on food was captured in three categories as: R1000 and less = 1, 0, otherwise; R 1001-R1500 = 1; 0, otherwise and R1500 and above = 1, 0, otherwise.

Household size was measured using adult equivalents where members with less than 9 years = 0; members 9 to 15 years = 0.7; members 16 to 49 years = 1; members above 49 = 0.7. Household size was expected to have a positive impact on the consumers willing to pay for nutrient information for the reason that those who contribute to household income make decisions for consumption of these fast food meals for the dependents. On the same note, it was expected that households with more adult equivalents would consume less of fast foods. Whereas, those with smaller household size were expected to consume more fast foods due to affordability. Paeratakul *et al*,'s (2003) study reported a positive relationship between household size and consumption of fast foods for US children and adults. The expected sign for household size was negative as there is an affinity to consume more fast foods for smaller households with larger households consuming home cooked meals (Akbay *et al*., 2007).

Table 3.4: Summary table of variables included in the Probit and Ordered Logit models to analyse consumers' willingness to pay for nutrient information

Variable name	How measured	Expected effect on dependent variable
Dependent variable		
Probit model	1 = willingness to pay 0 = not willing to pay	N/A
Ordered Logit model	0 = Not willing 1 = Less willing 2 = Moderately willing 3 = More willing	N/A
Explanatory variables		
Gender of Household head	Female = 1 Male = 0	+/-
Age	18 – 40 years = 1, 0 = otherwise	-
Monthly expenditure on food	If R1000 or less = 1, 0=otherwise If R1501 and above = 1, 0=otherwise *If R1001-R1500 = 1, 0= otherwise	+
Policy	Mandatory = 1, 0 = otherwise Voluntary = 1 , 0 = otherwise *No menu labelling policy = 1, 0= otherwise	-
Use of nutrient information	Yes = 1, 0 = otherwise	+/-
Meal Option	Option 1 , 1= if option 1 , 0 = otherwise *Option 2 Option 3, 1= if option 3 , 0 = otherwise	+/-
Level of education	1 = Household head with matric and above 0 = household head without matric	+
Awareness of food label.	1= Has knowledge 0= Has no knowledge	-
Special diet	1= On special diet 0= Not on special diet	-
Sports activity	1 = household head is active in sports 0 = household head is not active in sports	-
Meal planner	1= Respondent is a meal planner 0= Respondent is not a meal planner	+/-
Household size	Adult equivalents	+/-

**Refers to reference category*

Liu *et al.*, (2012) found that age had a negative and significant effect on probabilities and levels of expenditures at both full-service and fast-food restaurants. Young adults like to frequent more stylish establishments for social events to socialize and most of these are fast food outlets.

Whereas with the elderly the inclination is usually towards formal restaurants which normally have less of fast foods as with the ageing population the desire to eat healthy is more profound than their counterparts. It was hypothesised, therefore, that age would have a positive effect on willingness to pay on younger adults. Age was captured as, 18-40 years = 1, 0 = otherwise

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the empirical results of the study. It begins with descriptive statistics, followed by the endogenous treatment poisson model, which was used to estimate consumers' consumption behaviour after being provided with nutrient information. The Probit and Ordered Logit regression results on factors associated with willingness to pay for nutrient information and the level of willingness to pay for nutrient information are presented last.

4.2 Descriptive Statistics

4.2.1 Household demographics of participants

4.2.1.1 Gender

Figure 4.1 below indicates that, of the total households that participated in the study, a greater proportion (60.9%) were female headed, while the remaining 39.1% were male headed. During the interviews it was found that most respondents available to represent their households were females. Reasons for such were that, their spouses (males) were at work and therefore not available for interviews. Furthermore, females were more receptive to the interviewing process as opposed to males. In order to get a representation in gender, second visitations were done on weekends to involve the males, though most of them would insist on their female counterparts to complete the questionnaire on their behalf.

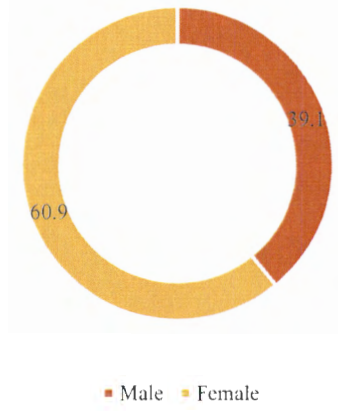
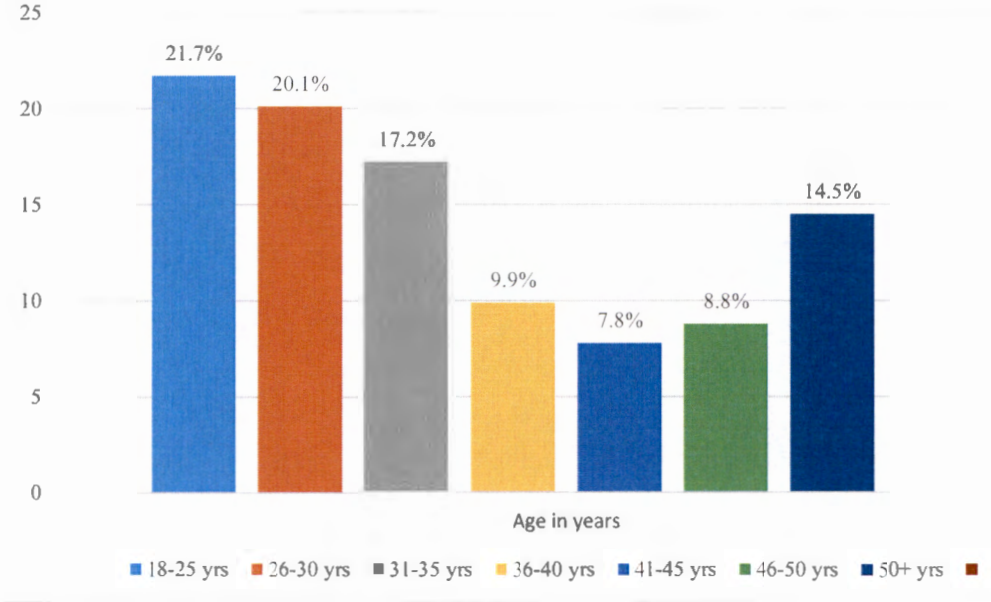


Figure 4.1 Gender of respondents
Source: Field data, 2017

4.2.1.2 Distribution of age by categories

The results in Figure 4.2 below indicates that a majority of the survey respondents were below the age of 35. The category of 18-25 years made up 21.7% of the sample, followed by the categories of 26-30 years and 31-35 years categories which made 20.1% and 17.2%, respectively. Most of the respondents who were older than 35 years fell in the above-50 year age group. These were followed by the categories of 36-40 years, 46-50 years and 41-45 years, which made up 9.9%, 8.8% and 7.8%, respectively. The results depict a scenario in which, a greater proportion of the households is headed by youthful members whilst a smaller proportion is headed by the matured and much elderly population.



(n=371)

Figure 4.2 Age of respondents

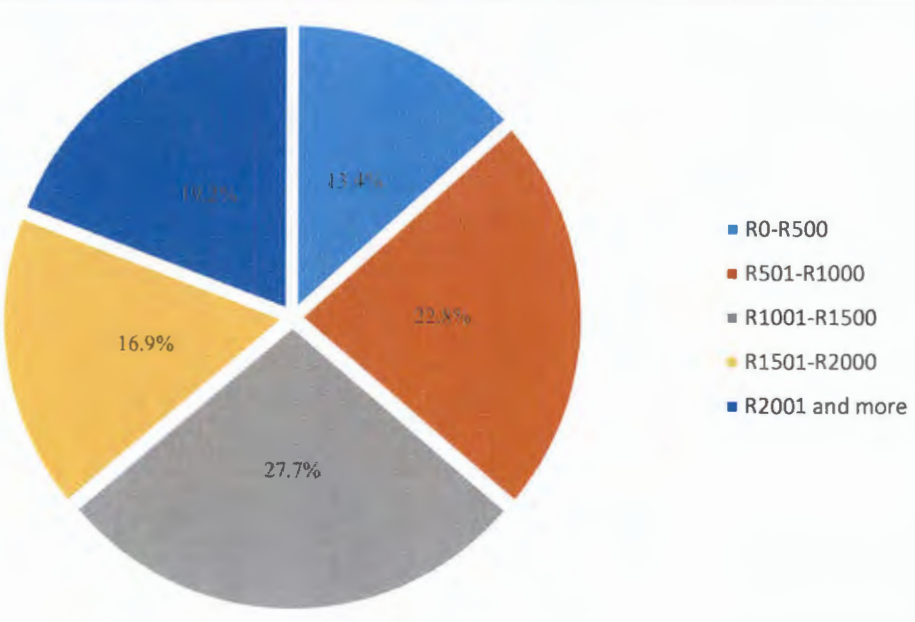
Source: Field data, 2017.

4.2.2. Financial status

4.2.2.1. Household monthly expenditure on groceries

The results from Figure 4.3 indicate that 27.7% of the households reported that, on average they spent between R1001 and R1500 monthly on food consumed by the household. The results indicate that 22.8%, 13.4%, 16.9% of the respondents spent, respectively between R501-R100, R0-R500, R1501-R2000 of their monthly income on groceries. Respondents that spent over

R2001 on groceries made up 19,2% of the sample. In reviewed literature, households which had more disposable income were more likely to frequent fast food outlets when compared to those that had a stringent budget.

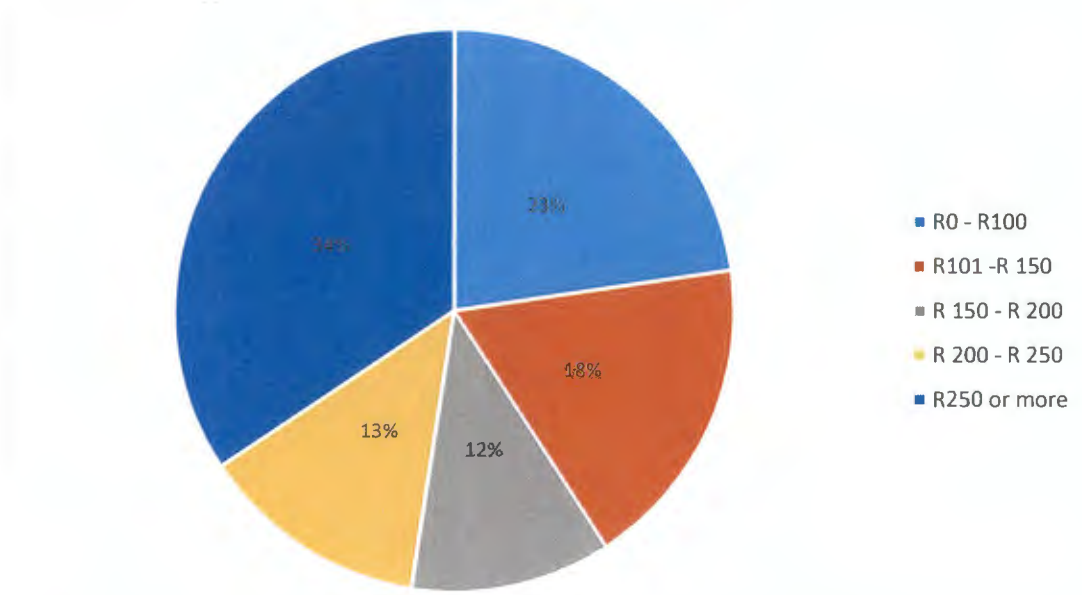


(n= 371)

Figure 4.3 Household monthly expenditure on food
Source: Field Survey, 2017.

4.2.2.2. Household monthly expenditure on fast foods

Figure 4.4 shows that 34.3% of the survey respondents spent more than R250 on fast foods per month, this indicated that fast foods are regarded as an important part of the consumer food basket by a significant number of people, with 11.6% having indicated to spend between R150 and R200. The results further show that, 22.7%, 18.1% and 13.2%, were respondents who spent R0-100, R101-R150 and R200-R250, respectively.



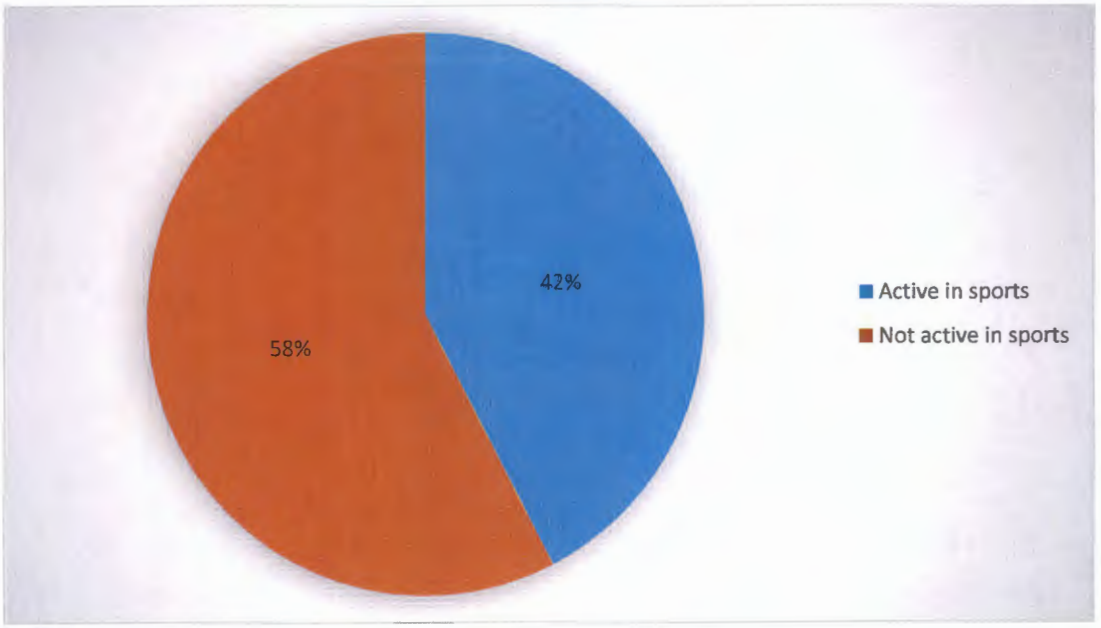
(n=371)

Figure 4.4 Household monthly expenditure on fast foods
Source: Field Survey, 2017.

4.2.3 Lifestyle and nutrition information

4.2.3.1 Are respondents active in sports?

Household heads were questioned about their participation in any form of exercise as a means of keeping fit and practising healthy lifestyles. The results from Figure 4.5 indicate that, 42% of the survey participants were active in some form of physical exercise whilst a larger proportion (58%) reported that they did not engage themselves in any vigorous exercise or sports.



(n=371)

Figure 4.5 Respondents' sports activity

Source: Field Survey, 2017.

4.2.3.2 Choice of menu labelling policy

Table 4.1 Menu labelling policy preferences

Menu labelling policy	Frequency	Percentage
Mandatory	239	64.42
Voluntary	86	23.18
Do not care about menu labels	46	12.40
Total	371	100.00

(n=371)

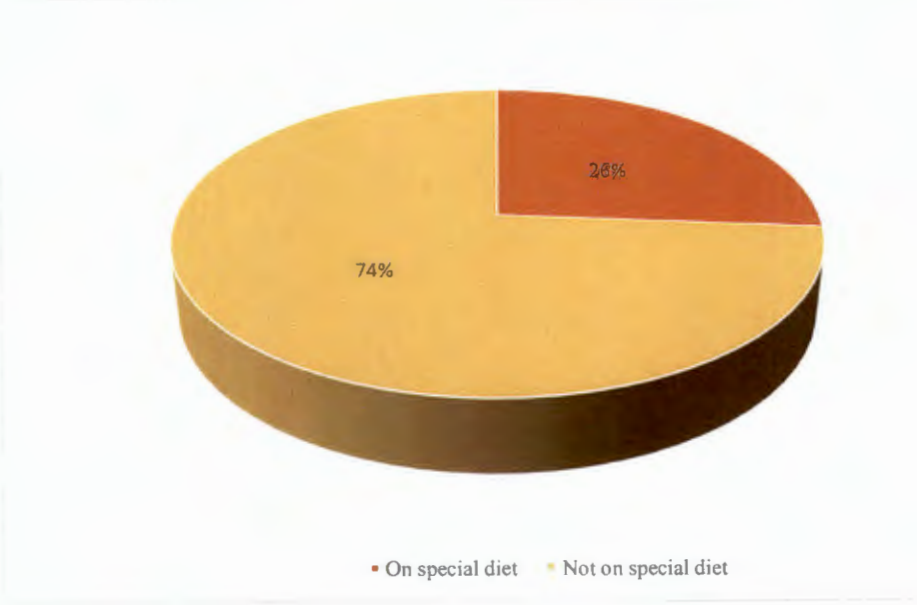
Source: Field data, 2017

Explanations were provided to respondents describing the stipulations of three menu labeling policy alternatives. A mandatory menu labelling policy meant that, respondents preferred the inaction of a law regulating fast foods such that, they were required by law to post all nutrition information on selected menus on point of purchase on menu boards and brochures to enable the consumer to make an informed menu selection. A voluntary policy entailed having the respondent or consumer given nutrition information upon request for their selected food items. Lastly, where consumers would choose the 'Do not care about menu labels' meant, the customer did not need to know what nutrition information was attached to which menu, all they were interested in is consumption without worrying about nutrient content. Questions which solicit which menu labelling policy consumers preferred amongst the three alternatives were asked thereafter. Frequencies on responses of which labelling policy respondents opted for, are

tabulated in Table 4.1. From the results in Table 4.1 respondents who opted for a mandatory menu labelling policy were 239 in total and these constituted a total of 64.42% of the total sampled households, whilst 86 (23.18%) opted for a voluntary menu labelling policy and 46 (making 12.4% of sampled households) did not care about menu labelling policies meant to regulate the food industry.

4.2.3.3. Special diet

Diet forms an integral part of one's consumption behaviour, particularly in relation to the consumption of fast foods. Consumers who are strict on diet principles have a tendency of reducing the amount of fast foods they consume. Furthermore, due to factors such as existing health conditions, some consumers are under strict instructions from dieticians to avoid consuming particular foods. When asked whether or not if the respondent was on any special diet, only 26% of the respondents reported to being on a special diet which influenced their consumption of fast foods whilst a larger proportion of 74% were not on any form of diet as depicted in Figure 4.6



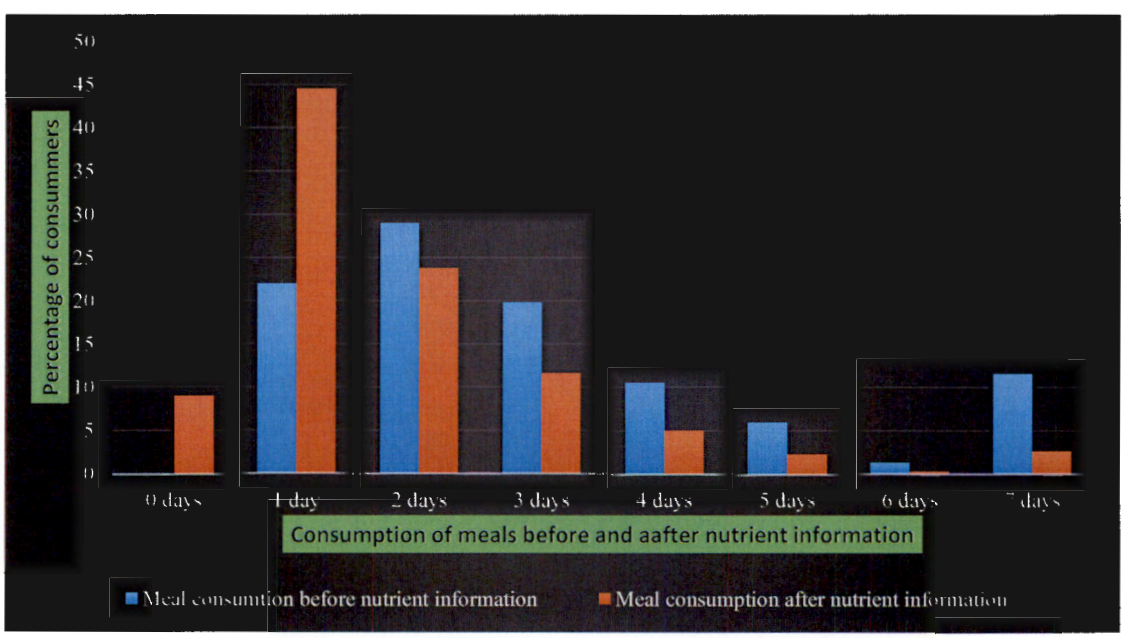
(n=371)

Figure 4.6 Proportion of household members on special diet
Source: Field data, 2017.

4.2.3.4 Weekly meal option consumption

In order to determine if the provision of nutrient information had any significant influence in consumer increasing or decreasing their consumption of fast foods, respondents were given a pictorial view of their meal options without nutrition information and asked how many times they would consume their favourite meal option. It is worth noting that 11.5% of respondents reported that they would consume their favourite meal every day of the week before nutrient information was presented. On the same note, there was a significant change after providing them with nutrient information, such that only 2.6 % were still willing to consume their favourite meal in all 7 days. A similar trend was also noticed amongst those who had initially opted to consume their favourite meal once in 7 days constituting only 22%, however after provision of nutrient information the consumption of fast foods once a week increased to 44.5%.

Overall, the graph in Figure 4.7 indicated a reduction in the consumption of fast food meals based on provision of nutrient information on each selected meal option. After being shown the nutrient information, 8.9% decided that they would stop consuming fast foods altogether.



(n=371)

Figure 4.7 Effects of nutrition information on weekly consumption of fast foods
Source: Field data, 2017.

4.2.4 Fast food consumers' willingness to pay for nutrient information

In order to estimate the level of willingness to pay for nutrient information on ready to eat foods, consumers were asked if they would be willing to pay for nutrient information or not as indicated in the table below. Only 31.27% indicated that they would not like to pay anything towards menu labels while the other 68.73% depicted a likelihood towards paying for nutrient information. Those who had said "no" to the first bid value were asked follow up questions with a lower bid to ascertain the level of willingness or unwillingness.

4.2.4.1. Dependent variable

Table 4.2: Consumers' level of willingness to pay for menu labels

Willingness to pay for nutrient information	Frequency	Percentage
No	116	31.27
Yes	255	68.73
Level of willingness for those willing to pay(yes responses)		
Less willing (ny)	72	19.41
Moderately willing (yn)	95	25.61
More willing (yy)	88	23.71

(n=371)

Source: Field data, 2017.

The results indicate that, of the total of 371 responses gathered, 255 were willing to pay for nutrient information on ready to eat foods. The proportions were distributed in such a way that, 25.62% were moderately willing to pay for nutrient information while 23.71% and 19.41% were respondents who were more willing and less willing to pay for nutrient information, respectively. In short, the results indicate that consumers of fast foods value menu labels and would like to pay towards menu labels if and only they ascertain the feasibility of menu labels since they are a new phenomenon in the food industry.

4.2.4.2 Categorical variables included in the regression model

Table 4.3 Descriptive statistics for categorical variables

Categorical variables

Variable	Unit	A % of total sample (n=371)	B % of [A] from Z=0 (n=116)	C % of [A] from Z=1 (n=72)	D % of [A] from Z=2 (n=95)	E % of [A] from Z=3 (n=88)	Chi-square value
Household head is aware of food labels	Yes	58.76	53.45	54.17	62.11	65.91	4.2722
	No	41.24	46.55	45.83	37.89	34.09	
Household head has matric education	Yes	92.99	94.83	90.28	91.58	94.32	1.9422
	No	7.01	5.17	9.72	8.42	5.68	
Household head is active in sports	Yes	43.67	42.24	44.44	40.00	48.86	1.5989
	No	56.33	57.76	55.56	60.00	51.14	
Household head is a meal planner	Yes	78.44	68.97	81.94	82.11	84.09	9.0953
	No	21.56	31.03	18.06	17.89	15.91	
Household head is on special diet	Yes	26.15	25.00	22.22	27.37	29.55	1.2531
	No	73.44	75.00	77.78	72.63	70.45	
Household head uses fat information	Yes	77.90	76.72	83.33	77.89	75.00	1.7575
	No	22.10	23.28	16.67	22.11	25.00	
Household head uses salt information	Yes	50.67	50.00	50.00	52.63	50.00	0.1958
	No	49.33	50.00	50.00	47.37	50.00	
Household head uses carbohydrate information	Yes	40.97	40.52	40.28	41.05	42.05	0.0665
	No	59.03	59.48	59.72	58.95	57.95	
Household spends R1000 and less	Yes	36.12	31.03	38.89	40.00	36.36	2.1616
	No	63.88	68.97	61.11	60.00	63.64	
Household spends R1501 and above	Yes	36.12	31.90	37.50	33.68	43.18	3.1025
	No	63.88	68.10	62.50	66.32	56.82	
Household head has 18-40 years of age	Yes	69.00	68.97	61.11	72.63	71.59	2.9570
	No	31.00	31.03	38.89	27.37	28.41	

Source: field data 2017

[A]= total sample; Z=0 indicates no willingness to pay; Z=1 indicates less willing to pay; Z=2 indicates moderately willing to pay; and Z=3 indicates more willing

After running preliminary analysis on the categorical variables for the ordered logit regression model, it was established that there were no significant differences between levels of

willingness to pay for nutrient information according to age of the respondents, education level, use of nutrition information, being a meal planners, being active in sports, and being on a special diet. For example, the variable for education showed no significant difference across all levels of willingness to pay such that, for those with matric, 94.83% were not willing to pay, 90.28% were less willing to pay, while 91.58% were moderately willing to pay and 94.32% were more willing to pay for nutrient information. These results indicated no significant differences across all levels on whether the respondent had matric or not.

Sports activity is important in deciding the fitness levels and nutrient requirements of a sports man. From the results shown in Table 4.3, the chi^2 values indicated that there were no significant differences amongst respondents who were active in sports across all categories of willingness to pay. The results indicated that 42.24%, 44.44%, 40% and 48.86% were the percentage proportions across all four categories of willingness to pay which were not willing, less willing, moderately willing and more willing to pay for nutrient information respectively.

From the results indicated in Table 4.3 there were no significant differences across all the categories of levels of willingness to pay for nutrient information for respondents who were reported to being users of nutrient information. The chi-square value of 0.1958 indicated that, across all levels, 50% were not willing to pay for nutrient information, 50% were less willing to pay for nutrient information, 52.63% were moderately willing to pay and 50% were more willing to pay for nutrient information.

Age of the respondents also did not show any significant differences across all levels of willingness to pay as indicated by the chi-square value of 2.9570. Amongst the age category 18-40 years, 68.97% were not willing to pay, 61.11% were less willing to pay, whilst 72.63% were moderately willing and 71.59 were more willing to pay for nutrient information.

4.2.4.3 Continuous variables included in the regression model

One way Anova was estimated to analyse the mean difference in household size according to the different categories of willingness to pay for nutrient information. Based on the F-value (0.73), which was not statistically significant, Table 4.4 indicates that there were no significant differences in household size across all the categories of levels of willingness to pay for nutrient information for household size.

Table 4. 4 Descriptive statistics for continuous variables

Continuous variables							
Variable	Unit	Total sample mean (n=371)	Mean for Z=0 (n=116)	Mean for Z=1 (n=72)	Mean for Z=2 (n=95)	Mean for Z=3 (n=88)	F-value
Household size	Adult equivalent	1.762	1.771	1.683	1.862	1.708	0.73

4.3 ETpoisson model results of effects of nutrient information on consumption behaviour

Prior to estimating the ETPOISSON model, it was found necessary to check if the outcome variable follows a poisson distribution. Theory suggests that in a poisson distribution, the mean and variance should be more or less the same (Long, 1997). The detailed summary of the outcome variable showed a variance of 2.347155 and a mean of 1.93531; hence, the difference was 0.4, which is very marginal. To confirm if these results satisfy the Poisson distribution, a 'normal' poisson model (for the outcome function only) was estimated followed by the *estat gof* Stata command. The post estimation results produced a Deviance goodness-of-fit with a χ^2-value of 309.6903 (360 df), p-value = 0.9741. The Pearson goodness-of-fit χ^2-value was 312.1902 (360 df), p-value = 0.9673. The non-significance of the χ^2-values was observed to suggest that the outcome variable indeed had a poisson distribution. Hence, a poisson model was appropriate. However, given the likelihood of selectivity bias and endogeneity as discussed in Chapter 3, an ETPOISSON model had to be used, and the results are presented in Table 4.5.

Under the measures of model fit in Table 4.5, the significant Wald χ^2-value (114.02) suggests that, collectively the regressors had a strong influence on the use of nutrient information by heads of household and the frequency of consuming ready-to-eat meals in the study area. Hence, the model fitted the data reasonably well. The second significant Wald χ^2-value (8.33) indicates that the null hypothesis of no correlation between the treatment errors and the outcome errors can be rejected. Furthermore, the estimated correlation between the treatment-assignment errors and the outcome errors is negative 0.8967723, indicating that unobservable factors that influence the level of fast foods consumption tended to occur with unobservables that also influenced the likelihood of consumer use of nutrient information; hence, justifying the use of a treatment regression model.

Table 4.5 ETpoisson model estimates of factors that influence consumers' consumption of fast foods given nutrient information (2017)

Variables	Outcome function			Treatment function		
	Coeff.	Robust Std. Errors	z-value	Coeff.	Robust Std. Errors	z-value
Monthly expenditure on food						
R1000 and Less (Yes=1) [a]	0.0741269	0.0918208	0.81			
R1501 and above (Yes=1)[a]	0.0482292	0.0915871	0.53			
Household demographics						
Household size (Adult equivalent)	-0.0611893	0.0465277	-1.32	0.1754692	0.1405516	1.25
Age of household head (18 to 40 = 1) [a]	0.058748	0.0894957	0.66	-0.1807107	0.2988137	-0.60
Education level of household head (Metric and above = 1) [a]	0.1305494	0.1405147	0.93	0.5351934	0.4397175	1.22
Lifestyle, nutrition and health						
Household head is active in sports (Yes=1) [a]	-0.0708422	0.0749161	-0.95			
Household head is a meal planner (Yes =1) [a]	-0.140963	0.0916325	-1.54	-0.3923335	0.338753	-1.16
Awareness of food label (Yes = 1) [a]	-0.5740002***	0.0772875	-7.43	4.926575***	0.3807294	12.94
Household head is on special diet (Yes = 1) [a]				-0.18748	0.3546027	-0.53
Preferred menu labelling policy by Household head (Mandatory & Voluntary =1) [a]	-0.2171158***	0.0754659	-2.88			
Household head uses fat information (Yes=1)[a]				0.540537	0.3584695	1.51
Household head uses carbohydrates information (Yes=1)[a]				-0.89322223***	0.2884717	-3.10
Household head uses salt information (Yes=1)[a]				-0.1917411	0.3511675	-0.55
Impact variable						
Use of nutrition information	-0.4294494**	0.1734922	-2.48			
Constant	1.522841***	0.2433329	6.26	0.9977571***	0.5804782	1.72
Combined model indicators						
/athrho	-1.455486	0.5043415	-2.89			
/lnsigma	-4.41593	4.816462	-0.92			
rho	-0.8967723	0.0987498				
sigma	0.0120833	0.0581988				
Measures of model fit						
Observations	371					
Wald χ^2 (10)	114.02***					
Log pseudo likelihood	-632.47846					
Wald test of independent equations (rho = 0): χ^2 (1)	8.33***					

[a] $\partial y/\partial x$ is for discrete change of dummy variable from 0 to 1

*, **, and *** denote significance at the 10%, 5%, and 1% levels of probability, respectively.

4.3.1 Treatment function results

The results of the treatment function indicate that the use of nutrient information (which is an indicator of food safety concern) was significantly influenced by awareness of food label and access to nutrient content on carbohydrates.

Among the three types of nutrient information shared with respondents, the treatment function results indicate that, although not significant, information on fat content positively influenced

the use of nutrient information on ready-to-eat foods. Surprisingly, knowledge of carbohydrates content was found to be significant ($p<0.01$) and negatively related to the use of nutrient information, implying that consumers were less concerned about starch content in fast foods. This could be related to lack of knowledge on the consequences of excessive consumption of carbohydrates, which can also lead to human health problems, such as increased body weight.

Information on salt content was also surprisingly negative and not significant as a factor influencing the overall use of nutrient information by respondents. This is despite several campaign programmes on salt reduction on processed foods implemented by South Africa through a World Health Organisation (WHO) initiative. These findings are contrary to those of De Kock *et al.* (2016) on attitudes and perceptions towards reducing salt consumption. Worth noting, however, is the fact that De Kock *et al.*'s (2016) study focused on food in general and not particularly on fast foods or ready-to-eat meals.

4.3.2 Outcome function results

Table 4.5 indicates that the outcome variable (frequency of consuming ready-to-eat foods with 7 days) was significantly influenced by awareness of food label, perceptions on policy options and the use of nutrient information. The estimated coefficient for awareness of food labels indicates that the difference in the logs of expected counts was expected to be 0.574 units lower for household heads who were aware of food labels compared to their counterparts with limited or no awareness of food labels. The implication is that availing nutrient information at points of sale would make such household heads reduce their consumption rate of ready-to-eat foods. These results conform to previous findings made by Bargiota *et al.* (2013) in the Netherlands and Greece, respectively.

The estimated coefficient for policy choice on menu labelling indicates that the difference in the logs of expected counts was expected to be 0.217 units lower for those who opted for either a compulsory or voluntary policy compared to those who opted for not having a policy at all. These results imply that those who preferred either a compulsory or voluntary menu labelling policy were more likely to reduce their consumption of ready-to-eat meals in the future.

Regarding the menu labelling impact on consumption behavior, the estimated coefficient for use of nutrient information indicates that the difference in the logs of expected counts is expected to be 0.429 units lower for household heads that use nutrient information compared

to their counterparts who are not concerned about or do not value nutrition information. This result implies that access to and use of nutrition information can significantly reduce the level of fast foods consumption or at least increase the demand of alternative nutritious foods. This argument is justified by the average treatment effects (ATE) and average treatment effects on the treated (ATET) results presented in the next sub-sections.

4.4 Average treatment Effect (ATE)

The estimated ATE of food-safety-concern on the number of meals consumed weekly, as shown in Table 4.6, was negative 1.00, implying that an average household will decrease its consumption of fast foods by one unit when it uses nutrition information posted on the menu labels.

Table 4.6 Average treatment effect results.

	Contrast	Unconditional Standard Errors	[95% Confidence interval]
Use of nutrition information (1 vs 0)	-1.002803	.4819064	-1.947322 -.0582832

4.5 Average treatment effect on the treated (ATET)

Table 4.7 Average treatment on the treated results.

	Margin	**Unconditional Stand. Err.**	**z-value**	**P>|z|**	**[95% Conf. Interval]**
Constant	-0.9846856	.4787327	-2.06	0.040	-1.922985 -0.0463867

The estimated ATET of food-safety-concern on the number of fast food meals consumed weekly, as shown in Table 4.7, was negative 0.98, implying that, the average household in the treated population will consume almost 1 fast food meal less than it would if it had no access to nutrient information.

4.6 Probit regression results of factors affecting consumers' willingness to pay for nutrient information

The results of a probit regression model, which was used to analyse factors affecting consumers' willingness to pay for nutrient information, are presented in Table 4.8. The overall estimated model was statistically significant as the estimated Wald χ^2-value was significant at the one percent level of probability. The model also correctly predicted 76.82% of the consumers' willingness to pay for nutrient information, suggesting that the model fitted the data reasonably well. In attempting to remedy the effects of heteroscedasticity, largely common with cross-sectional data, the model was estimated with robust standard errors. With the model showing a mean VIF of 1.39, it can be concluded that there was no multicollinearity; hence, the variables were reasonably independent of one another.

Several factors were found to have a significant effect on consumers' willingness to pay for nutrient information for fast foods in Mahikeng Local Municipality. These were monthly expenditure on food, food policy choice, whether the household head is a meal planner, and household head's choice of fast food. Other estimated factors such as education, gender, age, household size, and being active in sports were found not to significantly influence the decision to pay for nutrient information on ready to eat foods.

Table 4.8 Probit model estimates of factors that influence consumers' willingness to pay for nutrient information in Mahikeng Local Municipality (2017)

Variable	Coefficient	Robust Std. Error	VIF	Marginal effects		
				∂y/∂x	Std Error	z-value
Monthly expenditure on food						
R1501 and above (Yes=1)[a]	0.0039748	0.1704731	1.30	0.0013755	0.05898	0.02
R1001 – R1500 (Yes=1)[a]	-0.3377919*	0.1812123	1.32	-0.1209057*	0.06657	-1.82
Household demographics						
Gender of household head (Female =1)[a]	0.1192672	0.1567201	1.19	0.041551	0.05495	0.76
Household size (Adult equivalent)	0.0280383	0.3279226	1.06	0.0097056	0.11352	0.09
Age of household head (41 & above = 1)[a]	-0.1514735	0.1605612	1.11	-0.0531838	0.05709	-0.93
Education level of household head (Metric and above = 1)[a]	-0.4072708	0.3307262	1.08	-0.1260336	0.08888	-1.42
Lifestyle, nutrition, & health						
Household head is active in sports (Yes=1)[a]	0.0663577	0.1441797	1.05	0.0229156	0.0497	0.46
Household head is a meal planner (Yes =1)[a]	0.4381989**	0.1765625	1.11	0.1597775**	0.0667	2.40
Awareness of food labels (Yes = 1)[a]	0.0274098	0.1556625	1.16	0.0095	0.054	0.18
Preferred menu labelling policy by Household head (Mandatory =1)[a]	1.219948***	0.2321714	2.65	0.4330972***	0.07906	5.48
Preferred menu labelling policy by Household (Voluntary =1)[a]	1.148482***	0.260431	2.52	0.3163777***	0.05501	5.75
Meal choice of fast food by Household head (Cheese, beef burger, chips & fizz drink = 1)[a]	0.3498882**	0.1774865	1.56	0.1188717**	0.05896	2.02
Meal choice of fast food by Household head (Pizza & fizz drink =1)[a]	.0614615	0.1891505	1.53	0.0211395	0.06462	0.33
Food safety concern (Yes = 1)[a]	0.094075	0.3572738	1.10	0.0317995	0.11775	0.27
Constant	-0.6390286	0.427508				
Observations	371					
Wald Chi^2(14 df)	45.73***					
Pseudo R^2	0.1253					
Mean VIF	1.39					
Correct classification	76.82%					
Log pseudo likelihood	-201.58861					

Note: [a]∂y/∂x is for discrete change of dummy variable from 0 to 1
*, **, and *** denote significance at the 10%, 5%, and 1% levels of probability, respectively.

The results indicate that the estimated coefficient for household monthly food expenditure (R1001 – R1500) was found to be significantly influencing consumers' willingness to pay for nutrient information ($p<0.1$). This is the group of consumers that constitutes the highest proportion as shown in Figure 4.3. The significant negative estimate suggests that, consumers in this expenditure bracket, as opposed to those who spend R1000 or less/month on food (reference category), were less likely to be willing to pay for nutrient information. Monthly food expenditure was used as a proxy for monthly income, given the difficulty of obtaining

reliable income information through household surveys. A unit increase in monthly expenditure (above R1001-R1500 bracket) would decrease the consumers' probability of willingness to pay by 12 percentage points. These results are contrary to those of Du Preez *et al.* (2011) who found income to be a positive and significant factor on WTP. A probable explanation could be that, households in this expenditure bracket are relatively low income earners and could find it difficult to pay for nutrition information as it would be an additional cost to their already strained budgets. Amoateng and Setlalentoa (2015) found that, the average monthly expenditure on food items for Mahikeng is about R700.00 per month.

The estimated coefficient for meal planning was found to be statistically significant and positively linked to consumers' willingness to pay for nutrition information ($p<0.05$). The explanation could be that household heads who are responsible for meal planning, take into consideration the nutrient composition of whatever form of meal that is consumed by the household. The nutrient information is likely to influence their purchasing decisions, particularly when it comes to fast foods. For a household head changing from being a non-meal planner to a meal planner, the probability of that individual to be willing to pay for nutrient information is likely to increase by 16 percentage points. While these findings seem to conform to *a priori* expectations, they are inconsistent with those of Drichoutis *et al.* (2007) who found that in Greece, meal planners are less likely to use nutrition labels as they assign greater value to taste resulting in them being less likely to be willing to pay for nutrition labels.

Choice of policies relating to menu labelling were found to be statistically significant at the 1% level of probability. Respondents were asked to select a menu labelling policy of their choice from three options (mandatory, voluntary, and no policy) for regulating the fast food industry in South Africa. The last option (no policy) was used as a reference in the model. The results indicated that respondents who opted for mandatory or voluntary policies, as opposed to having no policy at all, were significantly more likely to be willing to pay towards the implementation of their policy options with a predicted probability of 43 and 31.6 percentage points, respectively. These results suggest that consumers prefer to have policies put in place to influence exposure to menu labels. If there are policies or laws in place, then consumers would more likely be willing to pay for nutrition labels since their concern for fast food contents would be greater than those who do not care about labelling and are more concerned about attributes such as taste. In a related study by Loureiro and Hine (2004) it was also found that consumers who were concerned over genetically modified foods had higher estimates for WTP

for mandatory and voluntary menu labelling policies. The opposite is true if no policy is put in place, as consumers would be less willing to pay for a "ghost" service because in their minds it would be abstract.

The estimated coefficient for meal option 3 was also found to have a positive and significant effect on consumers' willingness to pay for nutrition information ($p<0.1$). According to Table 4.8, respondents who chose meal option 3 (beef burger and fizzy drink) were more likely to pay for nutrient information on their selected meal when compared to meal options 1 (pizza and fizzy drink) and 2 (chicken wrap and fizzy drink). The choice of meal option 3 as opposed to other options increased consumers' willingness to pay for nutrition information by a predicted probability of 11.9 percentage points. A justification for this result could be that, meal option 3 had the highest percentage in terms of preference with 42.05 % compared to 31% and 26.95% for meals 1 and 2, respectively.

Gender, household size, age, concern over food safety, education and awareness of food label were found to be statistically insignificant. Worth noting, nonetheless, is the observation that in most studies, age and gender of household head were highly significant with regards to willingness to pay for nutrient information. For instance, one would expect that older people would be more conscious when it comes to nutrition labels; hence, they would be willing to pay for such information (Posri *et al.,* 2006). However, in this study, the estimated coefficient for age was found to be negative, indicating that household heads in the age bracket of 41 and above were less likely to be willing to pay for menu labels. While the estimated coefficient for age was not significant, the findings appear to be similar to those of Loureiro and Hine (2002) where it was found that consumers' age had a negative effect on WTP for organic products. Young individuals were willing to pay a premium for organic products than their older counterparts. From the data collected, older respondents reported to have less consumption of fast foods. On average, older respondents were reported to have a fast food consumption level of 30.91% in comparison to the younger respondents at 69.09%, making the younger respondents to be more willing to pay towards menu labelling. On the contrary, younger consumers in general are not health conscious and are usually motivated by food tastes (Elbel *et al.*, 2011) and cravings more than healthy reasons (Galloway *et al.*, 2010; Hekler *et al.*, 2010).

4.7 Ordered logit estimates of factors that influence consumers' level of willingness to pay for nutrient information

After estimating the Probit model, an Ordered Logit model was estimated to study the respondent's level of willingness to pay for nutrient information. The brant test was computed to ensure that the proportional odds assumption was not violated. Had this assumption been violated, the Generalized Ordered Logit model would have been considered as an option. However, the brant test produced a χ^2-value of 26.53 ($p = 0.55$), suggesting that the proportional odds assumption was not violated. The overall model showed an estimated χ^2-value of 49.69 ($df = 14$), which was significant at the 1% level of probability, indicating that the model fitted the data reasonably well. As with the Probit model, the Ordered Logit model was estimated with robust standard errors to counter the effects of heteroscedasticity. The results of the ordered logistic regression are summarized in Table 4.9.

The estimated coefficients that were found to be significant are the same as those for the Probit model, meaning that factors influencing the dichotomous decision of willing or not willing to pay for nutrient information were the same as those influencing the extent of willingness to pay for nutrient information. Significant factors influencing the extent of willingness to pay were monthly expenditure on food, meal planning, menu labelling policy option, and meal option. The discussion of the Ordered Logit regression results focus on the marginal effects, indicating how each significant coefficient influences the level of willingness to pay for nutrient information.

Monthly expenditure on food for households spending an equivalent of R1001 - R1500 was found to be statistically significant ($p<0.01$). The marginal effects of the estimated coefficient for monthly expenditure indicated that, for such consumers, a unit increase outside this expenditure bracket, would reduce the probability to be moderately or more willing to pay for nutrition information by 4.43 and 7.34 percentage points, respectively. The same unit increase outside this expenditure bracket, would increase the probability of not willing or to be less willing to pay for nutrition information on fast foods by 10.33 and 1.44 percentage points, respectively.

The results in Table 4.9 also indicate that meal planning is a significant factor for willingness to pay for nutrient information ($p<0.05$). The marginal effects indicate that being a meal planner increased the probability to be moderately or more willing to pay for nutrient

information by 9.41 and 6.2 percentage points, respectively. Again, being a meal planner reduced the probability of not willing or to be less willing to pay for nutrient information by 14.2 and 1.4 percentage points, respectively. These results are in line with *a priori* expectations, as it would make economic sense that consumers who plan their meals are more willing to pay for information that influences their food choices.

The results further indicated that different meal categories attract different responses in terms of willingness to pay for nutrition information. For instance, household heads who opted for a burger meal had a positive and significant willingness to pay for nutrient information relative to those who opted for other alternatives such as a pizza or chicken wrap meal. Meal option 3 (burger) was the most popular with a selection frequency of 42.05% while options 1 and 2 had 31% and 26.95%, respectively. When considering the marginal effects, preference for meal option 3 was found to increase the probability to be moderately or more willing to pay for nutrient information by 8.42 and 4.05 percentage point, respectively. The same preference for meal option 3, as opposed to other meal options, reduces the likelihood of not willing to pay or to be less willing to pay for nutrition information by 22.06 and 10.27 percentage point, respectively.

Furthermore, the results provided evidence that, consumers who preferred to have a policy introduced to regulate the manufacturing, distribution and selling of fast foods, would also be willing to pay for the implementation of menu labelling policies governing the industry. Currently, South African restaurants operate under a liberal system, which does not require them to post information related to menu labels. The results in Table 4.9 suggest that opting for a mandatory policy, as opposed to having no policy at all, increased the probability of consumers to be moderately or more willing to pay for nutrition information by 16.75 and 27.47 percentage points, respectively. The same choice of a mandatory policy, as opposed to having no policy at all, reduced the likelihood of not willing to pay or be less willing to pay for nutrition information by 42.4 and 1.77 percentage points, respectively. These results are consistent with those of Loureiro and Hine's (2004) study in the US which found higher WTP for mandatory than a voluntary policy. It is important to note that, the results from descriptive statistics indicate that when asked which policy they preferred, 64.42% respondents were willing to pay for a mandatory policy whilst 23.18% opted for a voluntary policy and only 12.40% did not care about having a menu labelling policy for fast foods.

The results also indicate that preference for a voluntary labelling policy, increases the probability of consumers to be moderately or more willing to pay for an introduction of such a policy by 5.04 and 32.7 percentage points, respectively. Preference for the same voluntary policy reduces the probability of consumers not to be willing or to be less willing to pay for nutrition information by 27.4 and 10.3 percentage points, respectively.

Table 4.9 Ologit estimates of factors that influence consumer's level of willingness to pay for nutrient information in Mahikeng Local municipality (2017)

Variable	β	Robust standard Errors	Marginal effects							
			P(Z=0) dy/dx	Std. error	P(Z=1) dy/dx	Std. error	P(Z=2) dy/dx	Std. error	P(Z=3) dy/dx	Std. error
Monthly expenditure on food										
R1501 and above (Yes=1) [a]	0.1240446	0.227073	-0.025684	0.04661	-0.0052869	0.0102	0.0104221	0.01865	0.0205488	
R1001 – R1500 (Yes=1) [a]	-0.4770903*	0.2556465	0.1033477**	0.05741	.0143575**	0.00703	-0.0442636**	0.02623	-0.0734416**	0.03662
Household Demographics										
Gender of household head (Female =1) [a]	0.278295	0.2078311	-0.0587008	0.04428	-0.0105517	0.00791	0.0244203	0.01902	0.0448322	0.03293
Household size (Adult equivalent)	0 .006114	0.4737781	-0.0012751	0.09881	-0.000251	0.01945	0.0005234	0.04056	0.0010027	0.07769
Age of household head (41 & above = 1) [a]	-0.2833607	0.2119924	0.0603138	0.04581	0.010095	0.00735	-0.0253967	0.0201	-0.0450121	0.03273
Education level of household head (Metric and above = 1)	-0.2926776	0.3782859	0.0577655	0.07026	0.0152351	0.02375	-0.0214731	0.02306	-0.0515274	0.07109
Lifestyle, nutrition & health										
Respondent is active in sports (Yes=1) [a]	0.1833174	0.195935	-0.0380376	0.04052	-0.0077066	0.0086	0.0154752	0.01652	0.0302691	0.03256
Respondent is a meal planner in the household (Yes =1) [a]	0.6407741**	0.2708319	-0.1420891**	0.06327	-0.0141204**	0.00714	0.0620824**	0.0302	0.0941271**	0.03451
Awareness of food label (Yes = 1) [a]	0.2632565	0.2075324	-0.0553737	0.04366	-0.010173	0.00845	0.0229529	0.01845	0.0425937	0.03351
Preferred menu labelling policy (Mandatory =1) [a]	1.958322***	0.3725979	-0.4245268***	0.07799	-0.0177163***	0.01923	0.1675223***	0.03321	0.2747208***	0.04552
Preferred menu labelling policy (Voluntary =1) [a]	1.637569***	0.395524	-0.2741797***	0.05421	-0.1033085***	0.02971	0.0504729***	0.02064	0.3270153***	0.08516
Meal choice of fast food (Cheese, beef burger, chips & fizzy drink = 1) [a]	0.5016631**	0.2387878	-0.1026564**	0.04814	-0.0220571**	0.01217	0.0405237**	0.01973	0.0841898**	0.04049
Meal choice of fast food (Pizza & fizzy drink =1) [a]	0.3737527	0.2775849	-.0755536	0.05394	-0.0176119	0.01554	0.0293262	0.02013	0.0638392	0.04947
Food safety concern (Yes = 1) [a]	0.672032	0.4870458	-0.1214112	0.07363	-0.0430261	0.04032	0.0352342	0.01141	0.1292031	0.1067

Thresholds		
Cut 1	1.596596	
Cut 2	2.540744	
Cut 3	3.805661	
Measures of fit		
Log pseudo likelihood	-475.4258	
Wald Chi^2(14 df)	49.69***	
Pseudo R^2	0.0659	
Brant Chi^2	0.544	
Observations	371	

Note: *, ** and ***means significant at 10%, 5% and 1% levels, respectively
Z=0 denotes not willing; Z=1 denotes less willing; Z=2 denotes moderately willing; and Z=3 denotes more willing
[a]dy/dx is for discrete change of dummy variable from 0 to 1

4.8 Summary of the chapter

This chapter presented the study findings and the discussion associated with menu labelling and its effect on consumption behaviour as well as factors that influence willingness to pay and level of willingness to pay for nutrient information. The following chapter presents conclusions and policy recommendations, and concludes by highlighting areas for further research.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Recap of research objectives and methodology

Menu labelling is believed to be beneficiary to both the consumer and producer of ready-to-eat food products as food choices become more closely in line with preferences and uncertainty regarding the nature of product attributes is minimized. One of the benefits of menu labelling is the removal of information asymmetry, which enhances the widespread fight against obesity and coronary heart diseases linked to the increased consumption of fast foods. Over the years, these problems have been associated with first world countries. However, globalisation has seen developing countries such as South Africa not being spared from this phenomenon.

While fast food consumption is mainly common in urban areas, the South African case is exacerbated by the presence of street food vendors who operate unregulated. In the first world countries, policies and regulations aimed at protecting consumers have been promulgated to regulate restaurants and control the prevalence of obesity and related chronic diseases. In the USA, for instance, menu labelling legislation was first introduced in California, compelling major fast food outlets to provide nutrient information on menu boards and brochures at points of purchase. Other countries that have introduced similar regulations include Australia, Canada, the United Kingdom and Brazil.

Despite the reported alarming rates of obesity in South Africa, there is no regulation that requires posting of nutrient information on menus, menu boards and brochures by local restaurants. This was found to be a weakness in the food labelling system as fast food providers are not obligated to label their menus in order to inform their consumers. In a country where there is no menu labelling law, the implications are that consumers are more exposed to unhealthy foods and this is likely to be a persistent challenge, which has become an economic burden to the state. This study therefore, sought to provide answers to the following questions: (i) Would menu labelling have a significant effect on the consumption of ready-to-eat foods by consumers? (ii) Would consumers be willing to pay for nutrient information on ready-to-eat foods? Conducting a study of this nature provided an opportunity to ascertain whether South Africa needs to replicate policy procedures that have been introduced in

some developed countries to promote healthy eating habits. The specific objectives were, therefore, to: (i) Determine the effects of menu labelling on the consumption of ready-to-eat foods; and (ii) Investigate consumers' willingness to pay for nutrient information on ready-to-eat foods, using evidence from Mahikeng Local Municipality.

Using cross-sectional data gathered from 371 households identified through a systematic multistage sampling procedure, the first objective was addressed by estimating an Endogenous Treatment Poisson model (ETPOISSON). The outcome variable was the number of times (within seven days) a respondent indicated he/she would consume ready-to-eat meals after being presented with nutrient information. The use of nutrient information in deciding the number of times (within 7 days) a respondent would consume ready-to-eat meals, was considered a dichotomous treatment factor. Given that data used in the analysis was non-experimental, the use of nutrient information was therefore not randomly assigned; hence, a likelihood that nutrient information users could have systematically different characteristics from non-users. Considering that such attributes may not be observable to the researcher, the above conditions would have led to selectivity bias and endogeneity; hence, the reason to use the ETPOISSON model.

The analysis of consumers' willingness to pay for nutrient information was conducted in two related phases. The dichotomous decision of whether or not the consumer is willing to pay for nutrient information was analysed using a Probit model, while the level of willingness was analysed through the use of an Ordered Logit model. Regarding the Ordered Logit model, the first category comprised of fast food consumers who were not willing to pay for nutrient information on ready eat fast food. The second category compromised of consumers that were not willing to pay an initial R10.00 bid but were willing to pay a lower bid of R5.00 premium for nutrient information. The third category included fast food consumers who were willing to pay an initial bid amount of R10.00 for nutrient information, but were not willing to pay when the bid amount was set to R15.00. The last category had consumers who were willing to pay for nutrient information on an initial bid of R10.00 and were still willing to pay when the price premium was raised to a R15.00 bid. The explanatory variables in all models included demographic, socio-economic as well as perception related factors.

The remaining sections of the chapter are organised as follows: Section 5.2 presents conclusions of the study drawn from empirical results, Section 5.3 presents policy recommendations while Section 5.4 highlights some of the limitations of the study. The chapter concludes with Section 5.5, which discusses some of the suggested areas for further research.

5.2 Conclusions

5.2.1 Effect of nutrient information on consumption behaviour

The results of the ETPOISSON model indicated that the use of nutrient information (menu labels) has a significant negative effect on fast foods consumption. Among six nutrients whose information was shared with respondents, it was found that fat, carbohydrates, and salt content were more important towards influencing consumption behavior. However, among these three, the use of nutrient information itself was found to be positively (but not significantly) influenced by knowledge of fat content in meals. Surprisingly, knowledge of carbohydrates content was found to be negatively and significantly related to the use of nutrient information, implying that consumers were less concerned about starch content in fast foods. These results are a cause for concern given that excessive consumption of carbohydrates can also lead to human health problems.

Overall, the study rejects the first null hypothesis and concludes that access to and use of nutrient information can significantly reduce the consumption of unhealthy foods. These findings were further justified by the ATE and ATET results, which reflected that providing consumers with nutrient information can significantly reduce the frequency of consuming ready-to-eat or fast foods by at least one meal in a period of seven days.

5.2.2 Consumers' willingness to pay for nutrient information

The aim was to solicit the exact price premium that consumers would want to pay for the provision of nutrient information. However, the major finding was that, the process of attaching a price premium was made complex by some consumers' inability to understand nutrient composition and the daily recommended nutrient intake. These factors resulted in difficulties in estimating different

price premiums consumers felt would be reasonable to pay as an additional cost to their meal option. Therefore, as an alternative to estimate the level of willingness to pay, a bidding method was introduced. Major findings indicated that 30.46% of the respondents were not willing to pay for nutrient information whilst a greater proportion of 69.01% were willing to pay. From the sampled respondents, 19.41% were less willing to pay for nutrient information, whilst 25.88% were moderately willing to pay and 23.72% were more willing to pay. The higher proportion of respondents amongst those willing to pay for nutrient information fell within the category of moderately willing to pay. This was an indication that, while most consumers were not quite sure about the price premium, they still valued the provision of nutrient information. Hence, the second null hypothesis is also rejected as it is concluded that consumers are willing to pay for nutrient information.

5.2.3 Factors affecting consumers' willingness to pay for nutrient information

Factors affecting the dichotomous decision of whether or not a consumer is willing to pay for nutrient information included monthly expenditure on food, whether the household head is a meal planner, and household head's choice of fast food. A major finding was that consumers showed a significant willingness to pay for nutrient information for meal options that could be ordered online or telephonically and have a delivery system in place.

The Ordered Logit results provided evidence that the same factors affecting willingness to pay for nutrient information were the same factors influencing the level of willingness. The results indicated that low income households in the food expenditure bracket of less than R1000.00 per month were either not willing or less willing to pay for nutrient information. This was understood to be related to household budgetary constraints given that the average monthly food expenditure in the study area was estimated by other researchers at R700. Such results point to the need for introducing menu labelling policies or legislation in a manner that will not burden consumers, but put their circumstances into consideration.

5.3 Policy Recommendations

The study found that diverse determinants do affect the consumer's consumption behavior of ready to eat agro-processed foods and their willingness to pay for nutrient information. Therefore, in order to create a balance, a number of policy recommendations are suggested:

- **Development of awareness raising programmes to sensitize the community about nutrition information and healthy eating**

  Drawing from the ETPOISSON results, which reflected that excessive intake of certain nutrients was not considered important in food consumption decision making by most respondents, the need to sensitize communities about the content of fast foods they are exposed to on a daily basis cannot be over emphasized. This is paramount considering that not only the consumers will make informed choices on which foods to consume, but such menu labelling will also assist the seller to improve on quality. Therefore, it is necessary to engage communities on health campaigns by various health and agricultural stakeholders. One such initiative meant to educate people on nutrition information is the ongoing salt reduction campaign which had the first set of target results in June 2016 and the second is expected in June 2019. Such initiatives also call for the establishment of a forum to constantly engage private investors in the food industry with policy custodians and consumer associations on the importance of nutrient information.

- **Introduction of mandatory menu labelling legislation to regulate trade and consumption of fast foods.**

  Having established a consultative forum with relevant stakeholders, including consumer associations and fast food traders, government should introduce a menu labelling legislation to regulate trade and consumption of fast foods in South Africa. Whether menu labelling should be mandatory or voluntary that will be an outcome of the consultative process Such an initiative, as established in this study will give consumers a chance to make informed decisions at points of purchase, enabling them to make better food choices while creating a derived demand for the production of quality products.

- **Introduction of a sustainable mechanism to pay for menu labelling:**

  If menu labelling is to be properly executed in South Africa, government may, in the initial stages, consider subsidizing the costs linked to menu labels. However, in the long term, if consumers and traders value the introduction of menu labelling, a sustainable mechanism should be designed such that both parties make a fair contribution towards such an initiative. If introduced, the menu labelling legislation should apply to all fast foods in both formal and informal outlets. The relevant public departments should monitor and enforce adherence to menu labelling laws throughout all provinces of South Africa.

5.5 Limitations of the study

The current study was faced with limitations as menu labelling is a new phenomenon for most consumers in South Africa. Previous studies have mainly focused on food labels, but not menu labelling. This had limitations such that, when presented with questions on willingness to pay for nutrient information, precise premiums that consumers were willing to pay could not be attached to their meal options.

The study was conducted in one municipality due to financial constraints, covering 70% of tribal/rural areas and only 30% of the urban area. This was a limitation in the sense that, in as much as consumption of fast foods exists in such rural settings, the frequency of such consumption patterns was limited to the number of fast food traders operating in the area.

5.6 Areas for further research

- There is need to undertake similar studies in the country's different provinces in order to get much information on consumption behavior and willingness to pay for nutrient information. Such an approach is paramount as it will provide balanced information that can easily be generalised.

- There is also need to consider using longitudinal data if proper consumption behaviour and related determinants of willingness to pay are to be explored over a period of time.

- If the South African government, in consultation with stakeholders, decides to introduce menu labelling legislation, it would be important to determine the type of menu label(s) that would convey the message in a manner that is comprehensible to all consumer segments.

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APPENDICES

APPENDIX A

MENU LABELLING QUESTIONNAIRE

Effects of menu labelling on consumption behaviour: Evidence from Mahikeng Local Municipality

Note to respondents: The information captured in this questionnaire is strictly confidential and will be used for research purposes at North West University, Mafikeng Campus. Participation in the survey is voluntary and respondents are free to withdraw from the study at any time if they so wish.

Questionnaire No: .....

(Tick the appropriate with an X for your response)

SECTION A: FINANCIAL INFORMATION

What are your sources of income? (*Can have answers for more than one source)*
Metswedi ya lotseno lwa gago ke efe? (O ka nna le dikarabo tse di fetang e le nngwe)

- ☐ **Remittances** (Madi a o a neetsweng)
- ☐ **Grant** (Kabelo)
- ☐ **Salary/wages/commission** (Lotseno)
- ☐ **Pension** (Phenšene)
- ☐ **Sales of farming products and services** (Thekiso ya tsa temo)
- ☐ **Income from a business** (Lotseno lwa kgwebo)

How much do you spend on food consumed by the household per month? *O dirisa bokae mo go rekeng dijo tse di jewang ke ba lelapa mo kgweding?*

- ☐ R0 – R 500
- ☐ R501 – R 1 000
- ☐ R 1 001- R1 500
- ☐ R 1 501- R 2 000
- ☐ R 2 000 and more (le go feta)?

How much do you spend on fast foods per month?
O dirisa bokae mo go rekeng dijo tse di gadikilweng mo kgweding?

- ☐ R0 – R100
- ☐ R 101 - R 150
- ☐ R 150 - R 200
- ☐ R 200 – R 250
- ☐ R 250 and more (le go feta)

Do you share any of the fast food meals with family members and friends? If answer is yes, how many family members do you share with?
A o aroganya dingwe tsa dijo tse di gadikilweng le ditokololo tsa lelapa kana ditsala? Fa karabo e le ee, o aroganya le batho ba le bakae?

- ☐ 1= **No** (Nnyaa)
- ☐ 2= **Yes** (Ee) _____

SECTION B: USE OF NUTRIENT INFORMATION

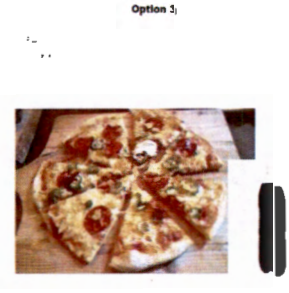
Which of the following fast foods outlets do you prefer?
Ke dijo tse feng tse di gadikilweng tse di latelang tse o ka di tlhophang?

- ☐ Steers
- ☐ McDonalds
- ☐ KFC
- ☐ Debonairs pizza
- ☐ Fishaways
- ☐ Spur
- ☐ Wimpy
- ☐ Chicken Licken
- ☐ Other (specify*) (E nngwe- tlhagisa)* _____

What is the reason for your selection?
Lebaka la tlhopho ya gago ke eng?

- ☐ Convenience (Tshiamelo)
- ☐ Service (Tirelo)
- ☐ Distance from home (Sekgala sa legae)
- ☐ Minimal waiting time (Nako ennye ya go ema)
- ☐ Food tastes better (tatso e botoka ya dijo)
- ☐ Better portion sizes (bogolo jwa dikarolo tse di botoka)
- ☐ Affordability (Tlhwatlhwa e e siameng)
- ☐ Any other reason (please specify)(lebaka le lengwe gape)(tlhagisa) _____

Using the following meal options as typical fast food to consume which one would you choose?
Fa o dirisa dijo tse di latelang jaaka e le tse di tlwaelegileng go jewa, o ka itlhophela tse feng?



Suppose your income allows you to consume the meal of your choice, how many times would you consume it in a week (7 days)? Indicate the number of days_____
Fa gotwe lotseno la gago le go letla gore o je dijo tse o di ratang, o ka di ja ga kae mo bekeng (Malatsi a supa)? Tlhagisa palo ya malatsi _____

If the following nutrition information was to be provided along with your preferred meal, would you suggest any changes in the nutrient composition such that your consumption is not affected? (*Can have answers for more than one nutrient)*
Fa tshedimosetso e e latelang ya dikotla e ne ka neelwa ga mmogo le dijo tse o di tlhophileng, a o ka tshitsinya diphetogo dingwe mo kopanong ya dikotla e be tsa gago di sa amege? (O ka nna le dikarabo tse di fetang e le nngwe)

Option 1

Cheese and beef burger(100g)
Fried chips 80(g)

Nutrient	Contained per serving
Energy	4888 (kJ)
Fat	54.5 (g)
Protein	44.5 (g)
Carbohydrates	103.7 (g)
Salt	2.7 (g)
Dietary fiber	0.8 (g)

Option 2

Chicken wrap
Fried chips (135g)

Nutrient	Contained per serving
Energy	3686 kJ
Fat	41.0(g)
Protein	29.8(g)
Carbohydrates	72.3 (g)
Salt	0.03 (g)
Dietary fibre	5.7(g)

Option 3

Pizza

Soft drink

Nutrient	
Energy	7 404 (kJ)
Fat	99.36 (g)
Protein	74.16 (g)
Carbohydrates	246 (g)
Salt	3.7 (g)
Dietary Fiber	21.36 (g)

Do you understand the nutrient information provided in the meal options?
A o tlhaloganya tshedimosetso ya dikotla e o e neilweng?

☐ Yes = 1
☐ No = 0

	Option 1				Option 2				Option 3			
Nutrition information	Reduce	Increase	Maintain	Don't know	Reduce	Increase	Maintain	Don't know	Reduce	Increase	Maintain	Don't know
Energy (kJ) *(Maatla)*												
Fat *(Mafura)*												
Protein *(Poroteine)*												
Carb(*Dikhabohae terete)*												
Sodium *(Letswai)*												
Dietary fibre *(Lenaanenjo la faeba)*												

If the above proposed changes are not achieved by the supplier, how would the proposed information affect your weekly consumption?
Fa diphetogo tse di fa godimo tse di tshitsintsweng ke morekisi di sa diragatswa, tshedimosetso e e tshitsintsweng e ka ama jang tsela e o jang ka yona mo bekeng?

☐ I would still consume the same quantity (*Ke ka tswelela go ja jalo)*
☐ I would reduce my consumption (*Ke ka fokotsa tsela e ke jang ka yona*)
☐ I would increase my consumption (*Ke ka oketsa tsela e ke jang ka yona)*

If answer is (b) or (c), how many times in 7 days (one week) would you consume your preferred meal? State the number of times_____
Fa karabo e le (b) kgotsa (c), o ka ja dijo tsa gago ga kae mo bekeng? Tlhagisa palo ya malatsi

---

Which menu labelling policy would you choose? Assume there are NO extra costs to you as the consumer. (Tick one)
Ke pholisi e feng ya go tshwaiwa ga dijo e o ka e tlhophang? Tsaya gore ga gona madi a o wa duelang go tlaleletsa jaaka moreki. (Tshwaya e le nngwe)

☐ **I would choose a mandatory labelling policy, meaning that all ready to eat food at point of purchase would be required to have a label.**

Ke ka tlhopha pholisi ya taolelo ya dijo tse di tshwailweng, go raya gore dijo tsotlhe tse di baakanyeditsweng go jewa kwa di rekiswang teng, di tlhokwa gore di tshwaiwe.

☐ **I would choose a voluntary labelling policy, meaning that nutrient composition and information for all ready to eat food should be made available on request.**
Ke ka tlhopha pholisi ya dijo tse di tshwailweng fa ke kopa jalo, go raya gore kopano ya dikotla le tshedimosetso ya dijo tse di baakantsweng go jewa di tla nna teng fa ke di kopa.

☐ **I would not care about menu labelling, all risk related to nutrient information on ready to eat food is minimal**
Ke ka se kgatalele go tshwaiwa ga dijo, mathata otlhe a a amanang le tshedimosetso ya dikotla mo dijong tse di baakanyeditsweng go jewa e nnye.

Would you be willing to pay R10.00 extra, on your preferred meal for provision of nutrient content information?
A o ka ikemisetsa go duela R10.00 go oketsa madi a o a ntshitseng gore o neelwe tshedimosetso ya dikotla?

☐ Yes = 1
☐ No = 0

If Yes, would you be willing to pay an extra R15.00 or more? *Fa o dumela, a o ka ntsha R 15.00 kana go feta?*

☐ Yes =1
☐ No= 0

If No, would you be willing to pay R5.00 for nutrient information?
Fa o gana, a o ka ntsha R5.00 gore o bone tshedimosetso ya dikotla?

☐ Yes=1
☐ No = 0

SECTION C: FOOD EATING HABITS AND LIFESTYLE

Are you registered under any gym or health fitness center? *A go na le lefelo le o ikwadisitseng kwa go lona gore o ikatise?*

☐ **Yes** (Ee) = 1
☐ **No** (Nnyaa) = 2

Are you active in any sports activity regularly?
A o ikatisa ka gale?

☐ **Yes** (Ee) = 1
☐ **No** (Nnyaa) = 0

If 1, how many times in a week?
Fa karabo e le 1 kgotsa 2, o ikatisa ga kae mo bekeng?

- ☐ Once per week
- ☐ 2-3 times
- ☐ 4-6 times
- ☐ Everyday

Are you or any member of the family in any special diet currently?
(A o ja ka tsela e kgetegileng kgotsa tokololo nngwe ya lelapa e ja ka tsela e kgetegileng?)

- ☐ 1=Yes (Ee)
- ☐ 0=No (Nnyaa)

Are you responsible for deciding what type of meal to consume?
A ke wena o tsayang maikarabelo/ tshwetso ya gore o ja dijo tse di ntseng jang?

- ☐ 1=Yes (Ee)
- ☐ 0=No (Nnyaa)

If No, which of the following best describes you? *Fa karabo e le nnyaa, ke tse feng tse di latelang tse di go tlhalosang botoka?*

- ☐ **I choose to eat healthy at home rather than in restaurants** (Ke tlhopha go ja dijo tse di itekanetseng kwa gae, e seng kwa marekisetsong)
- ☐ **I dine in restaurants as an indulgence** (Ke ja kwa marekisetsong ka ntlha ya boineelo)
- ☐ **I dine in restaurants as a necessity** (Ke ja kwa marekisetsong ka ntlha ya tlhoko)
- ☐ **I dine in restaurants for convenience** (Ke ja kwa marekisetsong ka ntlha ya tshiamelo)

SECTION D: DEMOGRAPHIC INFORMATION

	Gender	Age	Level of education of respondent	Ethnicity
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

NB: Use the codes below

Gender	Level of education	Ethnicity
0 = male 1 = female	1 = no formal education 2 = primary education 3 = secondary education 4 = matriculated 5 = tertiary education	1= Black 2= White 3= Indian 4= Coloured

APPENDIX B

ETPOISSON, AVERAGE TREATMENT EFFECTS (ATE) AND AVERAGE TREATMENT EFFECTS ON THE TREATED (ATET) RESULTS

Poisson regression with endogenous treatment — Number of obs = 371
(24 quadrature points) — Wald chi2(10) = 114.02
Log pseudolikelihood = -632.47846 — Prob > chi2 = 0.0000

	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
count_2						
dhk	-.5740002	.0772875	-7.43	0.000	-.725481	-.4225195
mealpln	-.1409693	.0916325	-1.54	0.124	-.3205656	.0386271
spactivity	-.0708422	.0749161	-0.95	0.344	-.2176751	.0759907
hhldsize	-.0611893	.0465277	-1.32	0.188	-.1523819	.0300033
edu_or_not	.1305494	.1405147	0.93	0.353	-.1448544	.4059532
MExp_1_2	.0741269	.0918208	0.81	0.419	-.1058385	.2540922
MExp_4_5	.0482292	.0915871	0.53	0.598	-.1312782	.2277365
age_18_40	.058748	.0894957	0.66	0.512	-.1166605	.2341564
pol_mand_or~l	-.2171158	.0754659	-2.88	0.004	-.3650262	-.0692054
1.concern_f~y	-.4294494	.1734922	-2.48	0.013	-.7694878	-.089411
_cons	1.522841	.2433329	6.26	0.000	1.045917	1.999765
concern_foo~y						
dhk	4.926575	.3807294	12.94	0.000	4.180359	5.672791
spdiet	-.18748	.3546027	-0.53	0.597	-.8824886	.5075286
mealpln	-.3923335	.338753	-1.16	0.247	-1.056277	.2716103
hhldsize	.1754692	.1405516	1.25	0.212	-.1000069	.4509453
edu_or_not	.5351934	.4397175	1.22	0.224	-.3266372	1.397024
age_18_40	-.1807107	.2988137	-0.60	0.545	-.7663747	.4049534
Use_fat_info	.540537	.3584695	1.51	0.132	-.1620503	1.243124
Use_Carb_info	-.8932223	.2884717	-3.10	0.002	-1.458616	-.3278282
Use_salt_info	-.1917411	.3511675	-0.55	0.585	-.8800167	.4965345
_cons	.9977571	.5804782	1.72	0.086	-.1399593	2.135473
/athrho	-1.455486	.5043415	-2.89	0.004	-2.443977	-.4669948
/lnsigma	-4.41593	4.816462	-0.92	0.359	-13.85602	5.024161
rho	-.8967723	.0987498			-.9850391	-.435768
sigma	.0120833	.0581988			9.60e-07	152.0427

Wald test of indep. eqns. (rho = 0): chi2(1) = 8.33 Prob > chi2 = 0.0039

```
. lincom [count_2]_b[1.concern_food_safety],eform

 ( 1)  [count_2]1.concern_food_safety = 0
```

	exp(b)	Std. Err.	z	P>|z|	[95% Conf.	Interval]
(1)	.6508674	.1129204	-2.48	0.013	.4632503	.9144697

```
. margins r.concern_food_safety,vce(unconditional)contrast(nowald)

Contrasts of predictive margins

Expression   : Potential-outcome mean, predict()
```

	Unconditional			
	Contrast	Std. Err.	[95% Conf.	Interval]
concern_food_safety (1 vs 0)	-1.002803	.4819064	-1.947322	-.0582832

```
. margins,predict(cte)vce(unconditional) subpop( concern_food_safety)

Predictive margins                                Number of obs    =        371
                                                  Subpop. no. obs  =        353

Expression   : Conditional treatment effect, predict(cte)
```

	Unconditional					
	Margin	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_cons	-.9846856	.4787327	-2.06	0.040	-1.922985	-.0463867

APPENDIX B

POISSON REGRESSION

Poisson regression

Number of obs	=	371
LR chi2(10)	=	99.06
Prob > chi2	=	0.0000
Pseudo R2	=	0.0784

Log likelihood = -582.6414

count_2	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dhk	-.5718748	.0798163	-7.16	0.000	-.7283118	-.4154378
mealpln	-.1413737	.0889882	-1.59	0.112	-.3157874	.03304
spactivity	-.0707649	.0763065	-0.93	0.354	-.220323	.0787931
hhldsize	-.0611252	.0460489	-1.33	0.184	-.1513793	.0291289
edu_or_not	.1320706	.1509042	0.88	0.381	-.1636963	.4278375
MExp_1_2	.074224	.0951432	0.78	0.435	-.1122532	.2607011
MExp_4_5	.048242	.0955304	0.50	0.614	-.1389942	.2354783
age_18_40	.0583494	.0851549	0.69	0.493	-.1085512	.22525
pol_mand_or~l	-.2170235	.0772523	-2.81	0.005	-.3684353	-.0656116
concern_foo~y	-.4481137	.1320237	-3.39	0.001	-.7068754	-.1893519
_cons	1.538346	.2330712	6.60	0.000	1.081535	1.995157

```
. estat gof

        Deviance goodness-of-fit =  309.6903
        Prob > chi2(360)         =    0.9741

        Pearson goodness-of-fit  =  312.1902
        Prob > chi2(360)         =    0.9673
```

APPENDIX *C*

PROBIT MODEL AND MARGINAL EFFECTS

```
. probit will_or_not MExp_4_5 md3 gender hhldsize_lgd age_41_and_above edu_or_not spactivity mealpln dhk poll pol2 Option_
> 3 Option_1 concern_food_safety_1 , robust

Iteration 0:   log pseudolikelihood =  -230.4723
Iteration 1:   log pseudolikelihood = -201.67294
Iteration 2:   log pseudolikelihood = -201.58861
Iteration 3:   log pseudolikelihood = -201.58861

Probit regression                                 Number of obs     =        371
                                                  Wald chi2(14)     =      45.73
                                                  Prob > chi2       =     0.0000
Log pseudolikelihood = -201.58861                 Pseudo R2         =     0.1253
```

will_or_not	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
MExp_4_5	.0039748	.1704731	0.02	0.981	-.3301464	.338096
md3	-.3377919	.1812123	-1.86	0.062	-.6929615	.0173777
gender	.1192672	.1567201	0.76	0.447	-.1878984	.4264329
hhldsize_lgd	.0280383	.3279226	0.09	0.932	-.6146782	.6707549
age_41_and_above	-.1514735	.1605612	-0.94	0.345	-.4661676	.1632206
edu_or_not	-.4072708	.3307262	-1.23	0.218	-1.055482	.2409406
spactivity	.0663577	.1441797	0.46	0.645	-.2162293	.3489448
mealpln	.4381989	.1765625	2.48	0.013	.0921427	.784255
dhk	.0274098	.1556625	0.18	0.860	-.2776831	.3325027
poll	1.219948	.2321714	5.25	0.000	.7649008	1.674996
pol2	1.148482	.260431	4.41	0.000	.638047	1.658918
Option_3	.3498882	.1774865	1.97	0.049	.002021	.6977554
Option_1	.0614615	.1891505	0.32	0.745	-.3092666	.4321896
concern_food_safety_1	.094075	.3572738	0.26	0.792	-.6061688	.7943189
_cons	-.6390286	.427508	-1.49	0.135	-1.476929	.1988718

```
. mfx

Marginal effects after probit
      y  = Pr(will_or_not) (predict)
         =  .7029063
```

variable	dy/dx	Std. Err.	z	P>|z|	[	95% C.I.	]	X
MExp_4_5*	.0013755	.05898	0.02	0.981	-.114215	.116966		.361186
md3*	-.1209057	.06657	-1.82	0.069	-.251379	.009568		.277628
gender*	.041551	.05495	0.76	0.450	-.066156	.149258		.609164
hhldsi~d	.0097056	.11352	0.09	0.932	-.212787	.232198		.197199
age_41~e*	-.0531838	.05709	-0.93	0.352	-.165075	.058708		.309973
edu_or~t*	-.1260336	.08888	-1.42	0.156	-.300229	.048162		.929919
spacti~y*	.0229156	.0497	0.46	0.645	-.074487	.120318		.436658
mealpln*	.1597775	.0667	2.40	0.017	.029043	.290512		.784367
dhk*	.0095	.054	0.18	0.860	-.096347	.115347		.587601
poll*	.4330972	.07906	5.48	0.000	.278151	.588043		.644205
pol2*	.3163777	.08501	5.75	0.000	.208556	.4242		.231806
Option_3*	.1887117	.05896	2.02	0.044	.003113	.234431		.420485
Option_1*	.0211395	.06462	0.33	0.744	-.105513	.147792		.309973
concer~1*	.0317995	.11775	0.27	0.787	-.19899	.262589		.048518

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. estat classification

Probit model for will_or_not
```

Classified	True D	True ~D	Total
+	242	73	315
-	13	43	56
Total	255	116	371

```
Classified + if predicted Pr(D) >= .5
True D defined as will_or_not != 0
```

Sensitivity	Pr(+| D)	94.90%
Specificity	Pr(-|~D)	37.07%
Positive predictive value	Pr(D| +)	76.83%
Negative predictive value	Pr(~D| -)	76.79%
False + rate for true ~D	Pr(+|~D)	62.93%
False - rate for true D	Pr(-| D)	5.10%
False + rate for classified +	Pr(~D| +)	23.17%
False - rate for classified -	Pr(D| -)	23.21%
Correctly classified		76.82%

APPENDIX D

ORDERD LOGIT REGRESSION MODEL, MARINAL EFFECTS, BRANT TEST OF PARALLEL REGRESSION

```
. ologit depvar_1 MExp_4_5 md3 gender hhldsize_lgd age_41_and_above edu_or_not spactivity mealpln dhk poll pol2 Option_3 O
> ption_1 concern_food_safety_1 , robust

Iteration 0:   log pseudolikelihood =  -508.9506
Iteration 1:   log pseudolikelihood = -475.67759
Iteration 2:   log pseudolikelihood = -475.42611
Iteration 3:   log pseudolikelihood =  -475.4258
Iteration 4:   log pseudolikelihood =  -475.4258

Ordered logistic regression                     Number of obs     =        371
                                                Wald chi2(14)     =      49.69
                                                Prob > chi2       =     0.0000
Log pseudolikelihood =  -475.4258               Pseudo R2         =     0.0659
```

depvar_1	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
MExp_4_5	.1240446	.227073	0.55	0.585	-.3210103	.5690995
md3	-.4770903	.2556465	-1.87	0.062	-.9781482	.0239675
gender	.278295	.2078311	1.34	0.181	-.1290465	.6856365
hhldsize_lgd	.006114	.4737781	0.01	0.990	-.9224739	.934702
age_41_and_above	-.2833607	.2119924	-1.34	0.181	-.6988582	.1321368
edu_or_not	-.2926776	.3782859	-0.77	0.439	-1.034104	.4487492
spactivity	.1833174	.195935	0.94	0.349	-.2007083	.567343
mealpln	.6407741	.2708319	2.37	0.018	.1099534	1.171595
dhk	.2632565	.2075324	1.27	0.205	-.1434995	.6700126
poll	1.958322	.3725979	5.26	0.000	1.228044	2.688601
pol2	1.637569	.395524	4.14	0.000	.8623564	2.412782
Option_3	.5016631	.2387878	2.10	0.036	.0336477	.9696785
Option_1	.3737527	.2775849	1.35	0.178	-.1703036	.9178091
concern_food_safety_1	.672032	.4870458	1.38	0.168	-.2825601	1.626624
/cut1	1.596596	.5903075			.4396143	2.753577
/cut2	2.540744	.6066104			1.35181	3.729679
/cut3	3.805661	.6192017			2.592048	5.019274

```
. mfx compute,predict (outcome (0))

Marginal effects after ologit
      y  = Pr(depvar_1==0) (predict, outcome (0))
         =  .29642416
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
MExp_4_5*	-.025684	.04661	-0.55	0.582	-.117035	.065666	.361186
md3*	.1033477	.05741	1.80	0.072	-.009165	.21586	.277628
gender*	-.0587008	.04428	-1.33	0.185	-.145498	.028096	.609164
hhldsi~d	-.0012751	.09881	-0.01	0.990	-.194939	.192389	.197199
age_41~e*	.0603138	.04581	1.32	0.188	-.029462	.15009	.309973
edu_or~t*	.0577655	.07026	0.82	0.411	-.07994	.195471	.929919
spacti~y*	-.0380376	.04052	-0.94	0.348	-.117449	.041373	.436658
mealpln*	-.1420891	.06327	-2.25	0.025	-.266098	-.01808	.784367
dhk*	-.0553737	.04366	-1.27	0.205	-.140942	.030195	.587601
poll*	-.4245268	.07799	-5.44	0.000	-.577389	-.271664	.644205
pol2*	-.2741797	.05421	-5.06	0.000	-.380427	-.167933	.231806
Option_3*	-.1026564	.04814	-2.13	0.033	-.197009	-.008304	.420485
Option_1*	-.0755536	.05394	-1.40	0.161	-.181266	.030159	.309973
concer~1*	-.1214112	.07363	-1.65	0.099	-.265718	.022895	.048518

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. mfx compute,predict (outcome (1))

Marginal effects after ologit
      y  = Pr(depvar_1==1) (predict, outcome (1))
         =  .22350635
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
MExp_4_5*	-.0052869	.0102	-0.52	0.604	-.025274	.0147	.361186
md3*	.0143575	.00703	2.04	0.041	.000585	.02813	.277628
gender*	-.0105517	.00791	-1.33	0.182	-.026049	.004946	.609164
hhldsi~d	-.000251	.01945	-0.01	0.990	-.038365	.037863	.197199
age_41~e*	.010095	.00735	1.37	0.169	-.004301	.024491	.309973
edu_or~t*	.0152351	.02375	0.64	0.521	-.03132	.061791	.929919
spacti~y*	-.0077066	.0086	-0.90	0.370	-.02457	.009157	.436658
mealpln*	-.0141204	.00714	-1.98	0.048	-.028106	-.000134	.784367
dhk*	-.010173	.00845	-1.20	0.229	-.026731	.006385	.587601
poll*	-.0177163	.01923	-0.92	0.357	-.055405	.019972	.644205
pol2*	-.1033085	.02971	-3.48	0.001	-.161538	-.045079	.231806
Option_3*	-.0220571	.01217	-1.81	0.070	-.045905	.00179	.420485
Option_1*	-.0176119	.01554	-1.13	0.257	-.048074	.01285	.309973
concer~1*	-.0430261	.04032	-1.07	0.286	-.122058	.036006	.048518

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. mfx compute,predict (outcome (2))

Marginal effects after ologit
      y  = Pr(depvar_1==2) (predict, outcome (2))
         =  .27332815
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
MExp_4_5*	.0104221	.01865	0.56	0.576	-.026138	.046983	.361186
md3*	-.0442636	.02623	-1.69	0.092	-.095673	.007146	.277628
gender*	.0244203	.01902	1.28	0.199	-.012864	.061704	.609164
hhldsi~d	.0005234	.04056	0.01	0.990	-.078977	.080023	.197199
age_41~e*	-.0253967	.0201	-1.26	0.207	-.064802	.014008	.309973
edu_or~t*	-.0214731	.02306	-0.93	0.352	-.066668	.023722	.929919
spacti~y*	.0154752	.01652	0.94	0.349	-.016899	.04785	.436658
mealpln*	.0620824	.0302	2.06	0.040	.002886	.121279	.784367
dhk*	.0229529	.01845	1.24	0.213	-.013206	.059112	.587601
poll*	.1675223	.03321	5.04	0.000	.102438	.232606	.644205
pol2*	.0504729	.02064	2.45	0.014	.010014	.090932	.231806
Option_3*	.0405237	.01973	2.05	0.040	.001845	.079202	.420485
Option_1*	.0293262	.02013	1.46	0.145	-.01013	.068782	.309973
concer~1*	.0352342	.01141	3.09	0.002	.012871	.057597	.048518

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. mfx compute,predict (outcome (3))

Marginal effects after ologit
      y  = Pr(depvar_1==3) (predict, outcome (3))
         =  .20674133
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
MExp_4_5*	.0205488	.03814	0.54	0.590	-.0542	.095298	.361186
md3*	-.0734416	.03662	-2.01	0.045	-.145224	-.001659	.277628
gender*	.0448322	.03293	1.36	0.173	-.019719	.109383	.609164
hhldsi~d	.0010027	.07769	0.01	0.990	-.151275	.153281	.197199
age_41~e*	-.0450121	.03273	-1.38	0.169	-.109156	.019132	.309973
edu_or~t*	-.0515274	.07109	-0.72	0.469	-.190864	.087809	.929919
spacti~y*	.0302691	.03256	0.93	0.352	-.033538	.094076	.436658
mealpln*	.0941271	.03451	2.73	0.006	.02648	.161774	.784367
dhk*	.0425937	.03351	1.27	0.204	-.023085	.108272	.587601
poll*	.2747208	.04552	6.04	0.000	.185509	.363933	.644205
pol2*	.3270153	.08516	3.84	0.000	.160097	.493933	.231806
Option_3*	.0841898	.04049	2.08	0.038	.004839	.163541	.420485
Option_1*	.0638392	.04947	1.29	0.197	-.03312	.160799	.309973
concer~1*	.1292031	.1067	1.21	0.226	-.079921	.338328	.048518

(*) dy/dx is for discrete change of dummy variable from 0 to 1

. brant

Brant test of parallel regression assumption

	chi2	p>chi2	df
All	26.53	0.544	28
MExp_4_5	0.58	0.747	2
md3	1.19	0.551	2
gender	0.65	0.722	2
hhldsize_lgd	4.17	0.124	2
age_41_and_above	2.32	0.313	2
edu_or_not	1.67	0.434	2
spactivity	1.26	0.531	2
mealpln	1.43	0.488	2
dhk	1.46	0.482	2
pol1	0.24	0.889	2
pol2	1.10	0.578	2
Option_3	1.86	0.395	2
Option_1	1.22	0.543	2
concern_food_safety_1	2.28	0.320	2

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared	
will_or_not	1.19	1.09	0.8406	0.1594	
MExp_4_5	1.30	1.14	0.7704	0.2296	
md3	1.32	1.15	0.7586	0.2414	
gender	1.19	1.09	0.8376	0.1624	
hhldsize_lgd	1.06	1.03	0.9469	0.0531	
age_41_and_above	1.11	1.05	0.8999	0.1001	
edu_or_not	1.08	1.04	0.9278	0.0722	
spactivity	1.05	1.03	0.9514	0.0486	
mealpln	1.11	1.05	0.9032	0.0968	
dhk	1.16	1.08	0.8632	0.1368	
pol1	2.65	1.63	0.3779	0.6221	
pol2	2.52	1.59	0.3970	0.6030	
Option_3	1.56	1.25	0.6391	0.3609	
Option_1	1.53	1.24	0.6518	0.3482	
concern_food_safety_1	1.10	1.05	0.9108	0.0892	
Mean VIF	1.39				

	Eigenval	Cond Index
1	8.4407	1.0000
2	1.0983	2.7722
3	1.0232	2.8722
4	0.9723	2.9464
5	0.9578	2.9687
6	0.7297	3.4010
7	0.5627	3.8731
8	0.5119	4.0608
9	0.3842	4.6874
10	0.3257	5.0911
11	0.3154	5.1736
12	0.2462	5.8553
13	0.1929	6.6155
14	0.1340	7.9367
15	0.0812	10.1974
16	0.0241	18.7041

Condition Number 18.7041
Eigenvalues & Cond Index computed from scaled raw sscp (w/ intercept)
Det(correlation matrix) 0.1226