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The Consumer Attitude towards the Consumption of Genetically Modified Foods in Zambia: A Case of Kitwe District on the Copperbelt

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Abstract

The purpose of this study was to explore consumer's attitudes towards the consumption of Genetically Modified foods, in Kitwe district of the Copperbelt Province, Zambia and to learn the current government stance and policy on GM foods.The sample comprised of 353 men and women randomly selected. For data collection and analysis, combinations of both quantitative and qualitative research methods were employed, with instruments consisting of questionnaires, semi-structured interviews and document analysis. SPSS software was used for generating graphs for quantitative data. Analysed data showed that, most of the respondent's attitudes towards GM seem to be negative; the biggest issue that drew negativity towards GMO were regarding trust, risk, social norms and the intention to purchase. The public does not trust GMOs because not much tests or research have been done here in Zambia for any side effects.

Keywords: Genetically modified foods, consumption, attitudes, food policy.

CHAPTER ONE

1.1 Introduction

Food is important. That is not a difficult statement to argue or debate; all humans need food to survive. Yet the production of food and food itself is changing; whether the changes are beneficial or not hinges upon public perception. Genetically modified (GM) organisms (GMOs) have been getting a lot of attention recently. Genetically modified organisms are simply "foods whose genetic material has been altered in a manner that does not occur in nature" (WHO, 2014). Some scientists state that GMOs offer benefits regarding worldwide food availability, while others state that GMOs cause negative health effects and are harmful to the environment. The use of gene technology in food production has become interesting due to increased needs of food. With the application of gene technology to plants and animals, goals can be achieved more quickly than by traditional selection. Consequently, ethical dilemmas are opened concerning the eventual negative effects of production of genetically modified food. Like everywhere, some sections of society in Zambia fear that GM foods may cause some common toxic effects such as hepatic, pancreatic, renal, or reproductive effects and may alter the haematological, biochemical, and immunologic parameters. They argue hence force that GMO foods should not be allowed in the country.

In fact, in February this year, the Authority pounced on the unsuspecting chain supermarkets at East Park and Arcades Shopping malls in Lusaka on Tuesday afternoon for selling products containing genetically modified organisms which have not been assessed for their safety as food and feed, thereby contravening provisions of the Biosafety Act No 10 of 2007. Under the regulation of activities relating to genetically modified organisms of the Section 10 Sub-section 1 of the Biosafety Act, it clearly stated that "A person shall not research on, develop, produce, import, export, transit, carry out any contained use, release or place on the market any genetically modified organism or any product of a genetically modified organism or deal in any manner with any genetically modified organism or a product of a genetically modified organism without the prior approval of the Authority."

1.2 Background Information

Debate over genetically modified foods (GMOs) first emerged in 2002 in this country when the then President late Levy Mwanawasa described them as "poison" and refused to allow them in the country despite the drought and hunger situation at the time.

Indeed, in the summer of 2002, Southern Africa faced severe food shortages and Zambia had nearly 3 million starving people (nearly 30% of the then population), the Mwanawasa government elected to reject 35,000 tons of food aid from the US owing to the presence of genetically Research-based evidence in African policy debates. Since then, there has been a blanket ban on GM products. While other governments in Southern Africa accepted milled GMO maize that could not be replanted and therefore eliminated the risk of cross-contamination with existing crops, Zambia remained steadfast in its refusal to accept the maize. President Mwanawasa referred to GMOs as potentially 'toxic' and not subject to sufficient testing. In response, the US argued that it was not able to supply non-GM food aid, and it refused to pay for the milling. The government of Zambia was widely perceived to have decided to let its people starve owing to seemingly irrational fears over the potential effects of GMOs. The decision was received with particular recalcitrance by the WFP, USAID and the Food and Agricultural Organization (FAO) on the grounds that not only did this endanger the lives of starving people, but also the cited reasons should not preclude acceptance of GMOs.

1.3 Statement of the Problem

Despite the global planting of GM foods and their promising benefits, the long-term health risks, environmental impact, and social and economic consequences relating to the cultivation and consumption of these foods remain inadequately assessed and unforeseen and thus, questioned by food safety organizations, environmental groups, and researchers all over the world (Center for Food Safety, 2014). These fears led the then Zambian government in 2002 banning the production, importation and consumption of GM foods in the country describing them as poison. Indeed, there are a lot of uncertainties surrounding the consumption of genetically modified foods. Thus this study seeks to understand the potential health risks of consuming GM foods and learn the current government stance on GM foods and, in so doing providing the benefits of consuming local foods.

1.4 Purpose of the Study

To give more insight on the effects of consuming genetically modified foods in Zambia, particularly Kitwe District in Copperbelt province.

1.5 Research Objective

1. To explain the possible effects of consuming GM foods.
2. To determine the attitudes of people towards the consumption of GMOs.
3. To learn the current government stance and policy on GM foods.

1.6 Research Questions

1. Are there any effects of consuming GM foods?
2. What are the attitudes of people towards the consumption of GMOs?
3. What is the current government stance and policy on GM foods?

1.7 Significance of the study to the society

The study provided the general public with the latest findings on the effects of consuming genetically modified foods. The study prompt farmers, agriculturalist and others to consider growing and promoting local foods in a bid to mitigate the uncertainties surrounding the consumption of genetically modified foods. This information will be vital for stakeholders involved in the promotion of foods, good health and nutrition.

1.8 Scope and Delimitation of the study

The study focused on Kitwe District, and covered different places. The study mostly targeted biotechnology company employees; government officials; research/academicians at CBU; non-governmental organisation (NGO); farmer's organisation. The research in the mentioned target areas was conducted between the month of May and July, 2019.

1.9 Limitation of the study (challenges)

The availability of evidence was affected by both the government of Zambia's effective silence on the issue and prohibitions against doing research in the country, meaning there are no research precedent on the issue and thus a reliance on data from international sources. Added to this, debate was framed entirely by a consideration of evidence, in the absence of Zambia-specific evidence and adequate communication from the government of Zambia. Distance to the target population was another challenge. Attitudes of the respondents presented another challenge. Further, the researcher is a teacher in a practical subject that also required her attention at all times as the research took place during the school calendar.

1.10 Definitions of Terms/ Abbreviations

Genetically modified foods:

Foods whose genetic materials have been altered in a manner that does not occur in naturally.

Traditional foods:

Recipe foods genuinely native to a particular region or that has been present in that region long enough to have evolved through generations.

Diet: the sum of food consumed by a person or other organism.

A dietary change:

is an alternative food sources such as locally produced foods such as sweet potatoes, rice, maize, nshima, as opposed to processed foods.

Food: any substance consumed to provide nutritional support for an organism.

1.11 Abbreviations

AERU	Agribusiness and Economic Research Unit
EPA	Environmental Protection Authority
ERMA	Environmental Risk Management Authority
FAO	Food and Agricultural Organisation
FDA	Food and Drug Administration
FSA	Food Standard Agency
FSANZ	Food Standards Australia and New Zealand
GE	Genetic Engineering
GM	Genetic Modification
GMO	Genetically Modified Organism
HSNO	Hazardous Substances and New Organisms
PG	Pastoral Genomics
PFIB	Pew Initiative on Food and Biotechnology
USA	United States of America
CSO	Central Statistics Office

CHAPTER TWO: LITERATURE REVIEW

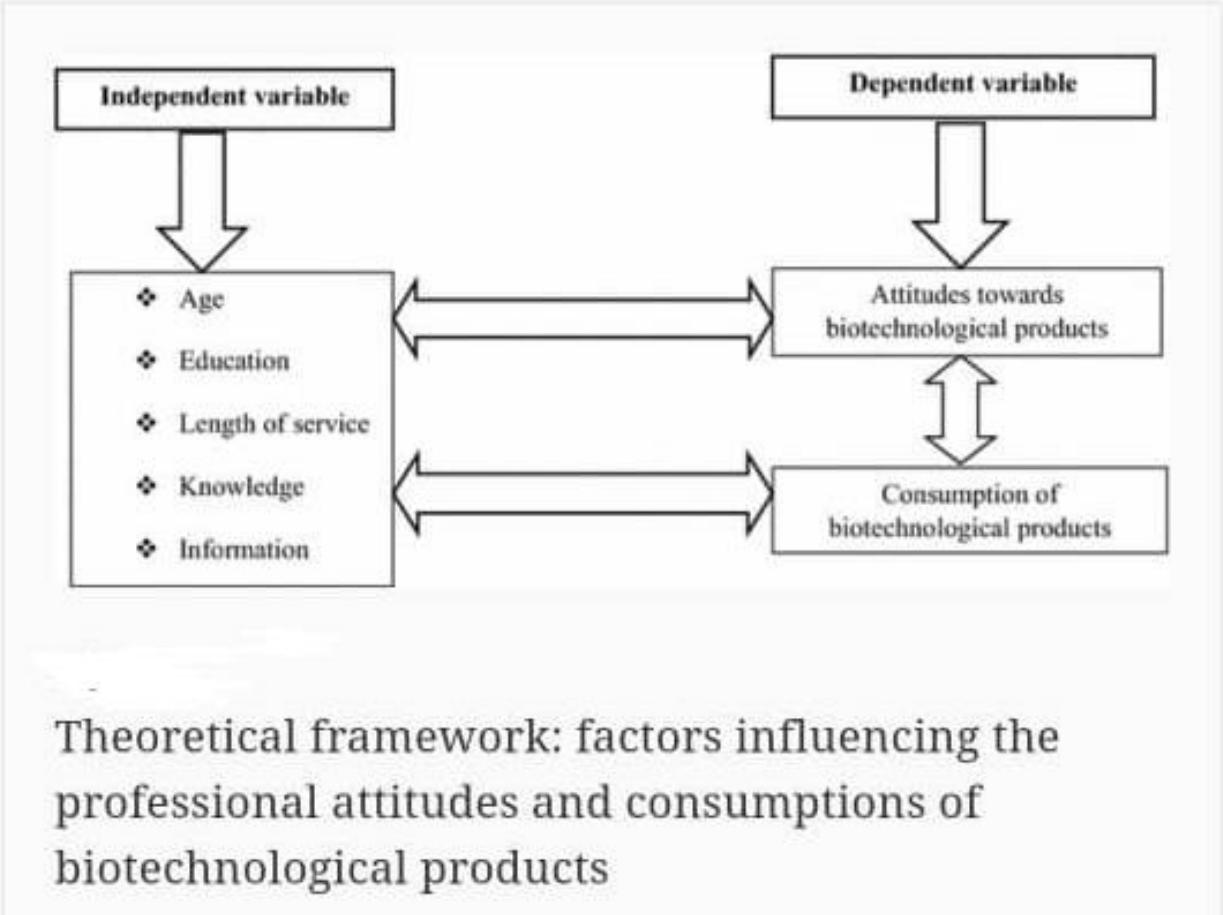
2.1 Introduction

This chapter explores previous research undertaken on consumer attitudes towards GM food and develops a framework to analyse and compare that research with the current study. The chapter is divided into two major parts: 1) global trends on attitudes and consumer issues about GM; and 2) trends about attitudes and consumer issues with GM that are specific to Zambia. While developers of MG foods have highlighted potential benefits, consumers are still sceptical about the benefits. The greatest concern is about ethical and moral values, and environmental, human and animal health risks of consuming them.

2.2 Conceptual Framework

Attitude is a predisposition of a tendency to respond positively or negatively towards certain ideas, object, a person or situation. Consumption is a decision to make full use of an innovation as the best course of action available in found in the unpublished thesis of Roy, in 1977. When an individual takes up a new idea as the best course of action of practice, the phenomenon is name as consumption. In order to develop a conceptual frame model of dependant and independent variables of this study, the conceptual model of Rosenberg and Hoveland is kept in mind. The dependant variables were attitudes and consumptions of genetically modified foods. The independent variables were professional's age, education, and length of service, knowledge and information source. The dependant variables are directly influenced by the independent variables. Consequently, the attitudes and consumption towards genetically modified foods varied with the selected characteristic of respondents. Therefore, it is a prerequisite to pondering the contributing factors of attitudes and consumption towards genetically modified foods.

Figure 2.1 Conceptual Framework



2.3. Global trends in perception of genetically modified food

2.3.0 Europe

A survey was conducted in Europe by the European Commission, and sampled 25,000 people, around 1,000 from each member state. The survey found that trends in optimism for biotechnology have been on a continual increase in recent years. For example, figures for those optimistic in the United Kingdom have shot up enormously, from 17 per cent, in 2002, to 50 percent, in 2005. The survey concluded that, Europeans are as supportive of biotechnology as their US and Canadian counterparts (Gaskell, 2005).

The European Commission survey conducted another survey in 2010 in all its member states. The survey found that Europeans are focusing more on safety and usefulness of GM technology and alternatives with more acceptable ethical-moral implications. In the survey support for GM in general was 27% among those who expressed an opinion. However transgenic and cisgenic apples with attributes that included limited use of pesticides had 37% and 55% respectively. The results showed that consumers look at GM food safety and environmental benefits and are making rational decisions (Gaskell, 2010).

In March 2014, the British Department for Environment and Rural Affairs granted permission for Rothamsted Research Station to grow plants enhanced with the same omega-3 fatty acids found in fish oil in a decision branded as a milestone by scientists (Knapton 2014). Although omega-3 is often described as fish oil it is, in fact, made by microscopic marine algae that are eaten or absorbed by fish (Knapton 2014). The Rothamsted scientists have copied and synthesized the genes from the algae and

then spliced them into a plant called Camelia sativa, known as 'false flax', which is widely grown for its seed oil. The crop is among the first 'nutraceuticals' generation, plants whose structure has been altered to boost dietary supplements. The plant oil is being fed to fish such as farmed salmon, to boost their uptake, but it could eventually be used in oils and spreads, such as margarine. However, anti-GM critics claim that omega-3 fish oils have been implicated in raising the risk of prostate cancer and it is not clear whether GM-derived fish oils will be safe for human and animal consumption.

2.3.1 United States of America

Surveys conducted on behalf of the Pew Initiative on Food and Biotechnology (PIFB), from 2001 to 2006, resulted in six key findings:

1. Public knowledge and understanding of biotechnology remains relatively low
2. Consumers know little about the extent to which their foods include GM ingredients
3. While support for GM foods has been stable, opposition has softened and opinions on safety remain split.
4. GM animals have much stronger opposition than do modifications of plants
5. Consumers look to those closest to them as trusted sources of information on GM foods and biotechnology

2.3.2 Japan

Support for biotechnology in Japan has declined (1997 and 2000 polls), although it remains higher than in the US or Europe. The 2000 survey of the Japanese population reveals waning support for biotechnology and GM, in particular. Although a majority of people remain optimistic about biotechnology and its uses, a growing number of people feel that the risks associated with agricultural applications, and even environmental and health applications, are becoming increasingly unacceptable (Macer & Chen, 2000).

2.3.4 China

A consumer survey was conducted in August 2002. Consumers surveyed reported that they had little or no knowledge of biotechnology. Their attitudes toward GM foods were generally positive, especially for GM foods with product-enhancing attributes (Quan, Curtis, McCluskey & Wahl, 2002). Although China has had a strong commitment to biotech research since the early 1990s (Gale, Lin, Lomar, & Tuan, 2000), the country has imposed a regulation - Regulation on the Safety Administration of Agricultural GM Organisms (published on 6 June 2001) - that requires all GM products entering China, for research, production or processing, to have safety certificates from the Chinese Ministry of Agriculture to ensure that they are safe for human consumption, animals and the environment. As of 20 March 2002, labelling is required by the Chinese Ministry of Agriculture's Regulations on Labelling Agricultural GM Biological Products. Implementation of these regulations has been widely reported in China's state-run media. Past experience in Chinese-based media coverage requires us to take this statement with caution. There have been serious food safety concerns about China that have been played down in China, but well reported elsewhere; for example, the Fonterra Chinese melamine milk contamination scandal in 2008.

2.3.5 Australia

In Australia, attitudes towards GM in food and agriculture are less positive than attitudes towards GM in health and medicine. Many people tend to associate GM crops with commercial objectives. The public has shown great support for the development of GM crops that could contribute to humanitarian or environmental objectives. Survey results indicated significant increases in both awareness of and support for GM food crops since 2005(Mohr, Harrison, Wilson, Baghust & Syrette, 2007).

A minority remains strongly opposed to GM food crops, in particular. Their resistance is associated with a number of attitudes and beliefs, including a belief in natural farming practices; opposition to big business and the globalization of commercial agriculture; opposition to the release of unnaturally modified organisms into the ecosystem and health concerns about GM in the food chain. There is more opposition to GM animal products (Mohr, Harrison, Wilson, Baghust & Syrette, 2007) than GM plant products.

There was also a widespread misconception that GM foods are widely prevalent in the Australian food supply system, as well as an associated assumption and concern that GM products are not labelled as they should be and that consumers are being misled into buying GM inadvertently. Support is especially strong for GM biofuel crops, with people readily associating such crops with the looming fuel crisis and the need to combat global warming (Mohr et al, 2007).

2.4 Trends in Africa

The debate on GMOs in Africa emerged in 2002. Since then, African governments have been trying to keep a tricky middle ground between allowing the development of the technology while alleviating fears among its opponents over the impact of GMOs on agriculture, health, the environment and trade, through regulatory mechanisms they can often ill-afford to implement. The debate in Africa has escalated during the past decade, reflecting the rapid worldwide growth of GM technology as a means of obtaining perceived benefits such as greater and better quality crop yields. An estimated 130 million hectares of genetically modified food are being cultivated across 25 countries (Menya, 2011) and the sector grew 7% in 2010, according to the ISAAA, a non-profit body which monitors the sector (ISAAA, 2010). According to research undertaken by the International Food Policy Research Institute (IFPRI), most of soybeans, half of maize, about a third of global cotton production and an increasing share of canola are ‘likely GM’ (Greure, 2010).

Although GM technology has traditionally been confined to Organisation for Economic Cooperation and Development (OECD) nations (most notably the US), developing countries are thought to account for half of the amount of hectares used for GMOs. As a result, the technology’s apparent success has been heralded by those in the sector as an outright solution to food security problems of lesser developed nations, as well as being a way for poor farmers to enter a popular export market (ISAAA, 2010). Nowhere would these alleged benefits be more significant than in Africa. However, as is evidenced by the widespread coverage the government of Kenya received recently for passing legislation which will open the country up to GMO maize imports, GMOs are not only fast growing but also highly controversial, with pertinent political and economic interests at play among those involved in the debate.

2.4.0 GMOs in Southern Africa

The East and Southern African regional economic bloc, COMESA, has provided much of the impetus for the debate through its attempts to draft and implement and regional policy on GMOs, although the

status of GMO acceptance differs across its 19 member states. Both Egypt and South Africa are the most advanced, with Egypt growing commercial maize and South Africa successfully exporting GM maize and soybeans to other African nations. The regional debate about GMOs entered into a new phase in July 2011, when the Kenyan Cabinet cleared the importation of GM maize in order to resolve the country's food shortages, inevitably sparking off a fresh round of arguments in the region over fears that other governments may follow Kenya's lead (Menya, 2011).

Other countries either have only recently approved contained trials of crops such as cotton and maize (e.g. Malawi and Zimbabwe), or do not as yet have any regulatory or scientific capacity to conduct such trials. Only three countries (Malawi, South Africa and Zimbabwe) have established legal mechanisms for the safe development and application of biotechnology; the rest are still at varying stages in the development of their biosafety systems. Although the region can be characterised as maintaining an 'anti-GMO' policy, it is Zambia that is considered the most vehemently opposed, and therefore most 'behind' with regard to establishing national policy instruments and legal frameworks.

Of course, there seem to be a common buy-in by all COMESA member states to develop a regional approach, as well as national policies and frameworks to support this (Nkhoma, 2010). This process is being overseen by the Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA), a specialised agency set up by COMESA in 2009 to support and promote both the productivity and the incomes of farmers in the COMESA region through trade in staple crops. On the basis of COMESA's recognition of the potential contribution biotechnology can make to the lives of farmers and overall food security in the region, ACTESA whose headquarters are in Lusaka is now responsible for leading the development of the biotechnology and biosafety agenda in the COMESA region.

ACTESA is not COMESA's first attempt to support and guide the development of both a regional approach to GMOs and regional capacity to implement any framework. In 2001, the Regional Approach to Biotechnology and Biosafety Policy in Eastern and Southern Africa (RABESA) was initiated by COMESA ministers of agriculture, with the purpose of coordinating a regional response to biotechnology and biosafety issues, focusing particularly on mitigating potential impacts of GMOs on trade and food security through greater awareness, collaboration, understanding and capacity to make informed decisions (COMESA, 2010).

In March 2009, the process of drafting COMESA regional biosafety policies and guidelines on the commercial planting of GMOs, trade in GM products and handling of emergency food aid with GM content began following an agreement by COMESA ministers of agriculture in 2007 to move forward. The draft policy was subject to discussion at a regional RABESA workshop in Nairobi in 2010. A communiqué resulted from the discussions, effectively declaring that COMESA member states had agreed to endorse the (by then revised) regional draft policy and guidelines on planting, trade and emergency food aid, as well as to support the setting-up of a Regional Biosafety and Centralized GMO Risk Assessment Desk and Biosafety Roadmap in order to identify capacity gaps and weaknesses in fellow member states. A national workshop in 2011 built on that of 2010, although there are ongoing concerns that progress will be slowed by the anti-GMO lobby.

2.5 GM Food in Zambia

Indeed, in Zambia, the introduction and development of GMOs is supported largely by those who look set to benefit economically from a change in government policy: namely, international biotechnology companies (such as Biotech) and agencies whose objective it is to pursue foreign interests abroad (e.g.

the US Agency for International Development – USAID); international donors concerned with food security issues (e.g. the World Food Programme – WFP); and farmers whose crop yield – and thereby income – would be enhanced by the use of GMOs (e.g. cotton farmers). These groups are supported by a number of international and national scientists who argue that Zambia stands to benefit more than lose from a sensible application of regulatory mechanisms to lift the government's effective ban on GMOs.

Opponents of GMOs unsurprisingly include international environmental groups such as Greenpeace, as well as regional and national ones such as the Participatory Ecological Land Use Management Association (the PELUM Association). Zambia's leading policy research institute (the Jesuit Centre for Theological Reflection (JCTR) has also been at the forefront of calls to resist international pressure to lift the ban, arguing that introducing GMOs would affect small-scale farmers negatively. The Anti-GMO lobby also includes the Kasisi Agricultural Training Centre (KATC) and the Organic Producers and Processors Association of Zambia (OPPAZ), which support organically based sustainable solutions to food security problems. Other scientists have voiced concerns over Zambia's readiness to introduce GMOs, and therefore advocate for the strengthening of regulations and frameworks prior to lifting the ban. A common criticism of the debate is that there has been little effective input from small scale farmers themselves (Mulumbi et al., 2005).

Indeed, the decision to implement a ban on not only the food aid shipment but also all GMO imports in 2002 came after intense debate in which environmental and other interest groups critical of GMOs were both vocal and influential. While President Mwanawasa was described as having 'bowed' to concerns voiced over the safety of GMOs, the decision appears to have been based on a serious weighing-up of existing knowledge on their effects. After a number of research institutes advised the government not to accept the GM maize, the US funded study tour by a number of Zambian scientists and civil society representatives to the US, India, South Africa and Europe to investigate views about genetic modification in other countries. The delegation's visit yielded a note of caution in relation to accepting GMOs (Clapp, 2005): 'We established from all the countries we visited that GMOs are a health hazard' the team maintained after returning to Lusaka (Kakunta, 2010).

Fear of unknown effects, combined with apparent evidence of negative health impacts, led to Zambia ratifying the Cartagena Protocol (CP) in 2004, which petitions for caution when dealing with potentially harmful and scientifically uncertain matters. A mainstay of the CP's approach to GMOs is the Precautionary Principle, which the CP employs a weak form of. Adherents of the CP hold that in the face of scientific uncertainty, a country should not take action that might adversely affect human and animal health or harm the environment.

The government's Biotechnology and Biosafety Policy ratified by the Cabinet in 2003 and currently being implemented was drawn up in response to the events of 2002 and embodies this approach:

> *'The Precautionary Principle: No approval for transfer, use and release of GMO(s) shall be given unless there is firm and sufficient evidence that the GMO(s) or products thereof pose no risk to human and animal health, biological diversity or the environment. Approval shall not be given where there is reason to believe that harm or damage may result, even when there is lack of scientific evidence or certainty' (MSTVT, 2003).*

The policy, which was later accompanied by related legislation in 2005, was introduced as part of a national Biosafety and Biotechnology Strategy and was intended to address the problems of a lack of national detection, regulation and research capacity as revealed by the 2002 GMO situation. In its final stage of implementation under the auspices of the Ministry of Science, Technology and Vocational

Training (MSTVT), it constitutes the government of Zambia's official response to GMOs, effectively maintaining a ban on them but also, interestingly, stating that it is designed to 'guide the judicious use and regulation of modern Biotechnology for the sustainable development of the nation, with minimum risks to human and animal health as well as the environment, including Zambia's biological diversity' (MSTVT, 2003).

The very existence of a draft policy and the MSTVT's recent activity to facilitate its implementation has meant that the government of Zambia is acknowledging the existence of GMOs as a seemingly inevitable 'fact', which is therefore a sign that it has reneged on its steadfast position during the 2002 food crisis.

Alongside references to environmental and health concerns regarding the effects of accepting GMOs, it is thought that the government of Zambia's primary concern was related to the impact of accepting GM maize on its significant maize exports to the European Union (EU), whose de facto moratorium on new varieties of GMOs effectively prohibited EU members from purchasing this produce given a lack of conclusive evidence regarding its effects. The US, which at the time accounted for 60% of world food aid contributions, blamed the EU for the government of Zambia's decision and subsequent prolonging of severe famine.

Perceived US aggression in pushing both its food aid in order to secure and maintain an important market and protect economic interests is often criticised in the debate for obscuring considerations of the risk faced by large-scale GMO production and consumption. The African GMO debate is also, quite accurately, seen as an arena in which politico-economic rivalries between the EU and US are played out. The concept of 'food sovereignty' plays an instrumental role here, and is described by Nkhoma (2010) as the 'right to healthy and culturally appropriate food produced through ecologically sound and sustainable methods and their right to define their own food and agriculture systems', including the right to food and the rights of farmers.

CHAPTER THREE: METHODOLOGY

3.0 Introductions

This chapter describes the procedure that was followed in conducting the study. The chapter describes the research design, target population of the study, sample size, research instruments used, procedures for data collection and the process of data analysis. The sources of information for this study were mainly gotten from interviews, focus group discussions and observations. Secondary sources such as books and journals were also used. Therefore, the research approach was mainly qualitative. This approach is preferred due to its flexibility and the fact that it allows for a systematic collection of data by penetrating any kind of institution.

3.1 Research Design

This survey used a descriptive research design where both qualitative and quantitative research designs were employed. This is because a survey usually involves the collection of data by interviewing a sample of people selected to accurately represent the population under study (Sidhu, 2006). Survey questions concern people's behaviour, their attitudes towards GM Foods, how and where they live and information about their background. Accordingly, this study opted to use these methods by taking into account the complexity of the research at hand.

The study mainly used qualitative methods of data collection. It was highly descriptive in nature because a descriptive study is easily applicable to a diverse spectrum of social issues and problems of any environment. However Quantitative method of data collection was also employed to yield empirical data to substantiate the qualitative data.

3.2 Target Population

Tuckman (1991) defines population as all members of any well-defined class of people, events or objects. Borg and Gall (1983) state that a target population refers to all the members of a hypothetical set of people, events or objects to which we wish to generate the results of our research. In this study therefore, the population included participants around Kitwe town in different locations which including Chisokone market and Nakadoli Market, Restaurant owners, university students and lecturers, farmers and policy makers.

3.3 Sample Size

Interviews were conducted to extract data from 353 participants representing a response rate of 42 per cent. Using this sample, demographics, knowledge, habits, motives, barriers and finally the health risks of consuming GM food can be compared.

3.4 Sampling Procedure

As much as possible, great care was taken to ensure that equal opportunity is extended to all the members of the target population. The participants were selected using the non-probability sampling procedure. The restaurants were purposely selected, but the customers were randomly selected. The nutritional institutional Centre was also purposely selected.

3.5 Research Instruments

In collecting data for this research, the following instruments were used: semi-structured interview guides for one-on-one and observation schedule and a questionnaire.

3.5.0 Semi-Structured Interview Guides

In this kind of interview, the interviewer asked questions (semi-structured ones) and made comments intended to lead the respondents towards giving data to meet the study objectives. Face-to-face encounters also took place between the interviewees and the researcher in order to gather information on the perceived risks of consuming GM foods.

3.5.1 Observation Schedule

This instrument was used to aid in gathering information that is visible and can be noted without any explanation from the people around. It was mostly to do with things like the physical appearance and the type of food the restaurants owners and customers are preparing and eating respectively. This was done as the researcher went round the target areas.

3.5.2 Questionnaires

Satorre (2012), states that a questionnaire is a research instrument, consisting of a series of questions and other prompts for the purpose of gathering information from the respondents. Apart from that, a

questionnaire also secures standardized results that can be tabulated and treated statistically. It places less pressure on the subject for immediate response and gives more time to the respondents to answer the questions. However, when preparing the questions, the researcher took into consideration social desirability and acquiescent responding of the informants hence, including both closed and open ended questions while bearing in mind the representatives in the sample.

3.6 Data Collection Procedure

To conduct this research, authority was sought from the University. In addition, the market chair person was also approached to request for permission to interview the restaurant owners. Data was collected by administering semi structured interview guides for one-on-one, questionnaires and observation schedule in all the markets. Apart from that permission was also sort from the Vice Chancellor from Copperbelt University to interview the students and lecturers and also distribute questionnaires.

3.7 Data Analysis

In this study, data was analysed mainly qualitatively. The data obtained through interviews and was analysed by coding and categorization of the emerging themes. Some qualitative data was converted manually and summarized in order to obtain concise measures of the data by using descriptive statistics. The data was then presented quantitatively as percentages and in frequency tables using a hand calculator.

3.8 Ethical Considerations

Ethical concerns pertaining to this study will be taken into consideration. All data collected during this study will strictly be confidential and duly kept. The data will be used for no other purpose other than the intended one. Verbal consent was also sought from the respondents and ensured that subjects participate voluntarily. The researcher also maintained an open and honest approach and ensured that the names of the respondents involved are not used in the report.

CHAPTER FOUR. DATA PRESENTATION

4.1 Introduction

This chapter presents the findings on perception and attitudes of respondents on the effects of consuming genetically modified foods and analyses the reasons for and against genetically modified food in Zambia which is the first objective of the study. It also discusses the ethical concerns raised by the debate on GMOs.

4.2 Characteristic of the Sample

4.2.0 Gender

The research had a sample size of 353 respondents. Of the 353 respondents, 52% were females and 48% males; the ratio is in alignment with Kitwe District census statistics' ratio of 51.3% females to 48.7% males.

Source: Kitwe District Census Statistics Office.

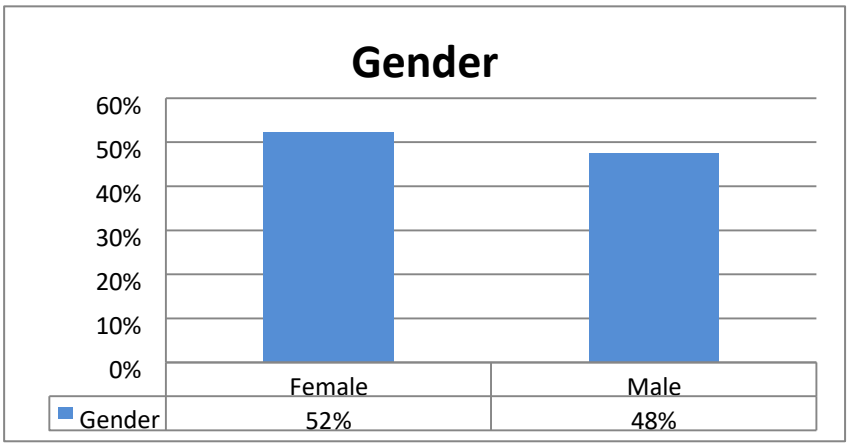


Figure 1 Respondents' gender ratios

4.2.1 Age

The age of respondents ranged from 16 to 80 years with a mean age of 44.44.

Table 1 Respondents' mean age

Year	N	Mean	Std. deviation
2019	353	44.44	17.803

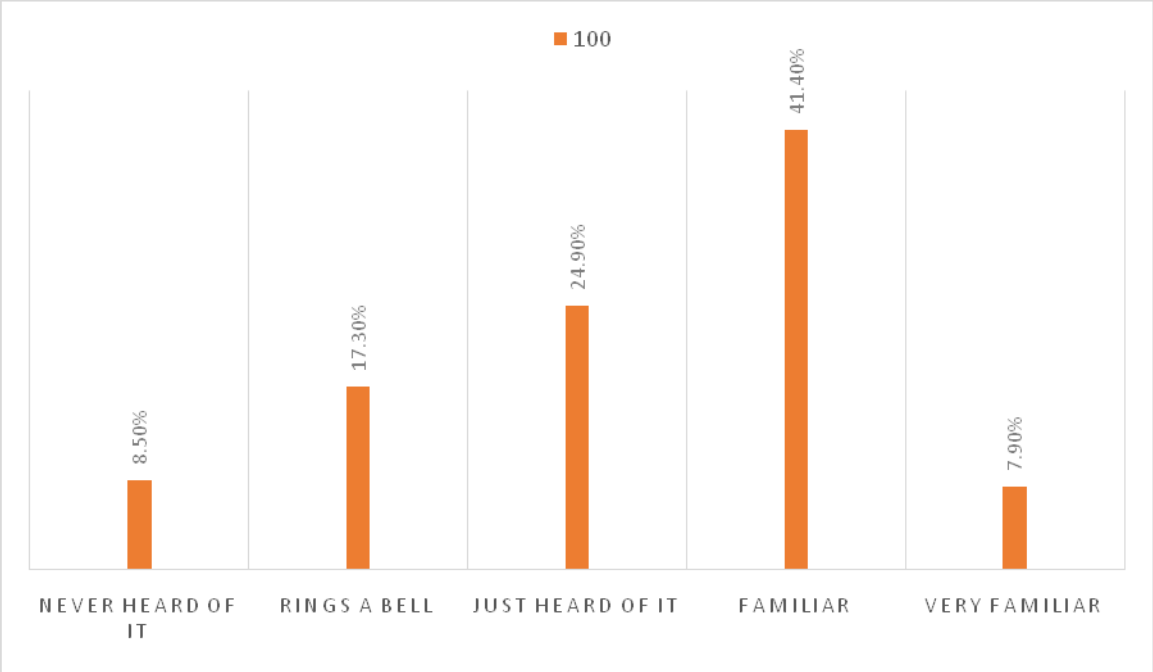
Source: Author's calculations.

4.2.2 Religion

The majority of the respondents had no religion (44.2%) or Christians (38.5%), followed by Hindus (8.2%) and other religions (6.2%). Hindus were over represented in this survey; CSO put Hindu at 2.02% in the 2010 census.

4.2.3 Familiarity

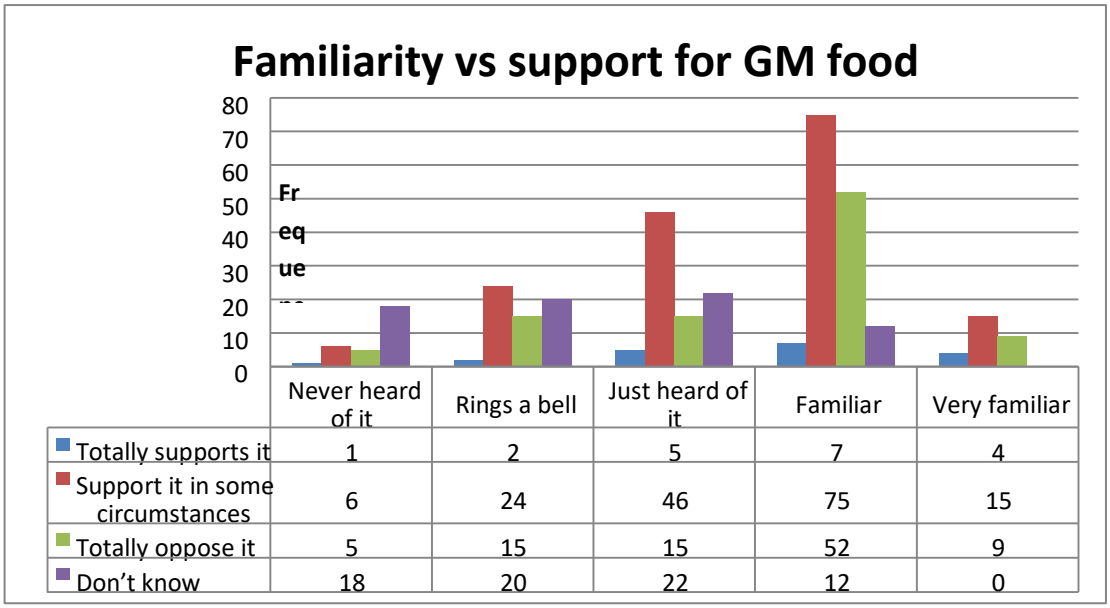
A very small proportion of 8.5% had never heard of GM technology. The bulk of the respondents 41.4% were "familiar" with GM technology. Only 7.9% regarded themselves as "very familiar." Most of the respondents (49.3%) were either "familiar" or "very familiar" with GM. Familiarity has helped us understand if respondents were making rational decisions. Respondents in the category "Never heard of it" were not likely to make rational decisions when they totally agree or disagree on the health risks of consuming GM foods compared to "just heard of it", "familiar" and "very familiar."



Source: Author's calculations.

Figure 2: Respondents familiarity with GM foods

Figure 3 below compares respondent's perception of GM food with their familiarity with GM. Small percentages across all familiarity categories totally supported GM food. "Some respondents with some familiarity with GMO felt that they see no harmful effect of consuming GM foods categories while majority "totally opposed it." The "don't know"/"unsure" frequencies were similar to "never heard of it", "rings a bell", "just heard of it," with fewer for "familiar" and none for the "very familiar" respondents. Respondents who were familiar with GM technology had lots of support compared to the rest of the familiarity categories.

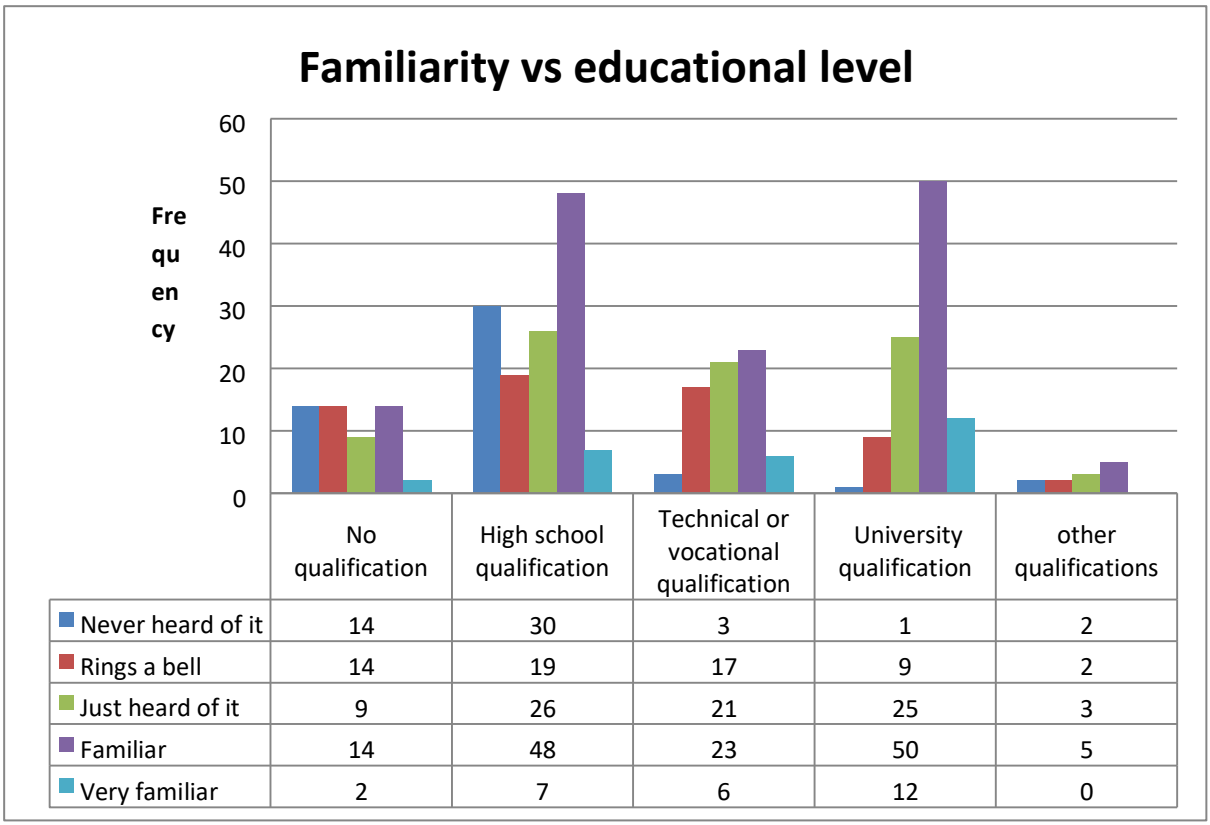


	Never heard of it	Rings a bell	Just heard of it	Familiar	Very familiar
Totally supports it	1	2	5	7	4
Support it in some circumstances	6	24	46	75	15
Totally oppose it	5	15	15	52	9
Don't know	18	20	22	12	0

Figure 3 Familiarity vs support for GM food

Source: Author's calculations.

Figure 4 below compares respondents' familiarity with GM to their educational level. Respondents who are "very familiar" with GM had the least number of respondents with no qualification. Respondents who were "familiar" with GM mostly had either high school, technical or vocational or university qualifications. Respondents who had "never heard of GM" had the least technical or university education. From Figure 4 we can see that educational level appeared to have an influence on familiarity with GM.



	No qualification	High school qualification	Technical or vocational qualification	University qualification	other qualifications
Never heard of it	14	30	3	1	2
Rings a bell	14	19	17	9	2
Just heard of it	9	26	21	25	3
Familiar	14	48	23	50	5
Very familiar	2	7	6	12	0

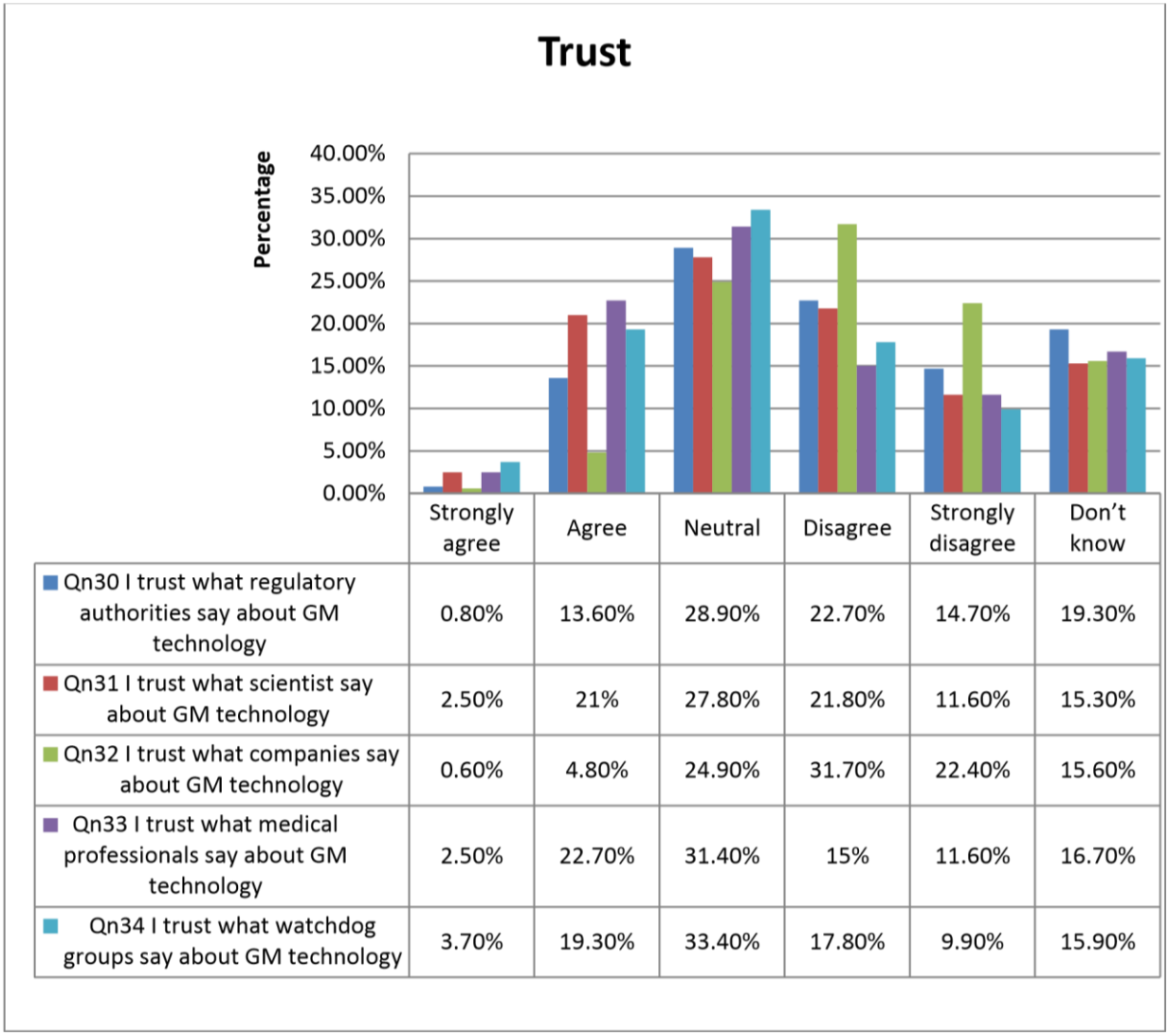
Figure 4 Familiarity vs educational level

4.2.4 Moral values

Moral values can be defined as personal beliefs on how one should live one's life (Thomas 200). Overall 80% responses for this category appeared to trend more towards a negative attitude.

4.2.5 Trust: Trust by definition, referred to the firm belief in the reliability, truth or ability of someone or something (Collins, 2009). In this study, trust refers to the firm belief in the reliability and truth in the information provided by different stakeholders involved in GM food. From Fig 5 below, it can be seen there are very low "strongly agree" responses for trust of authorities, scientist, companies, medical professions and watchdogs. The least trusted stakeholders were regulatory authorities and companies behind the GM food. The body that approved or disapproved the technology was not totally trusted by the people and so were the companies that sold the GMOs. About 19-22% of people agreed with trusting

scientists, medical professions and watchdogs. The greatest negative response was seen on trusting companies. This reflected the public's distrust in biotechnology food.



	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Qn30 I trust what regulatory authorities say about GM technology	0.80%	13.60%	28.90%	22.70%	14.70%	19.30%
Qn31 I trust what scientist say about GM technology	2.50%	21%	27.80%	21.80%	11.60%	15.30%
Qn32 I trust what companies say about GM technology	0.60%	4.80%	24.90%	31.70%	22.40%	15.60%
Qn33 I trust what medical professionals say about GM technology	2.50%	22.70%	31.40%	15%	11.60%	16.70%
Qn34 I trust what watchdog groups say about GM technology	3.70%	19.30%	33.40%	17.80%	9.90%	15.90%

4.2.6 Risk

Risk can be described as a situation involving exposure to danger (Oxford, 2009). In this study risk meant the dangers animals, humans and the environment were likely to be exposed to as a result of consuming GM food. From Figure 6, below, about 40% of the respondents "agree" or "strongly agree" that GM food can pose significant risk to the environment, humans and animals. About 10% "disagree" or "strongly disagree" that GM food poses risk to environment, humans and animals. About 22% were "unsure" or did not know if GM posed a risk to the environment, humans and animals. This showed a strong feeling that GM technology carried a significant risk to humans, the environment and animals.

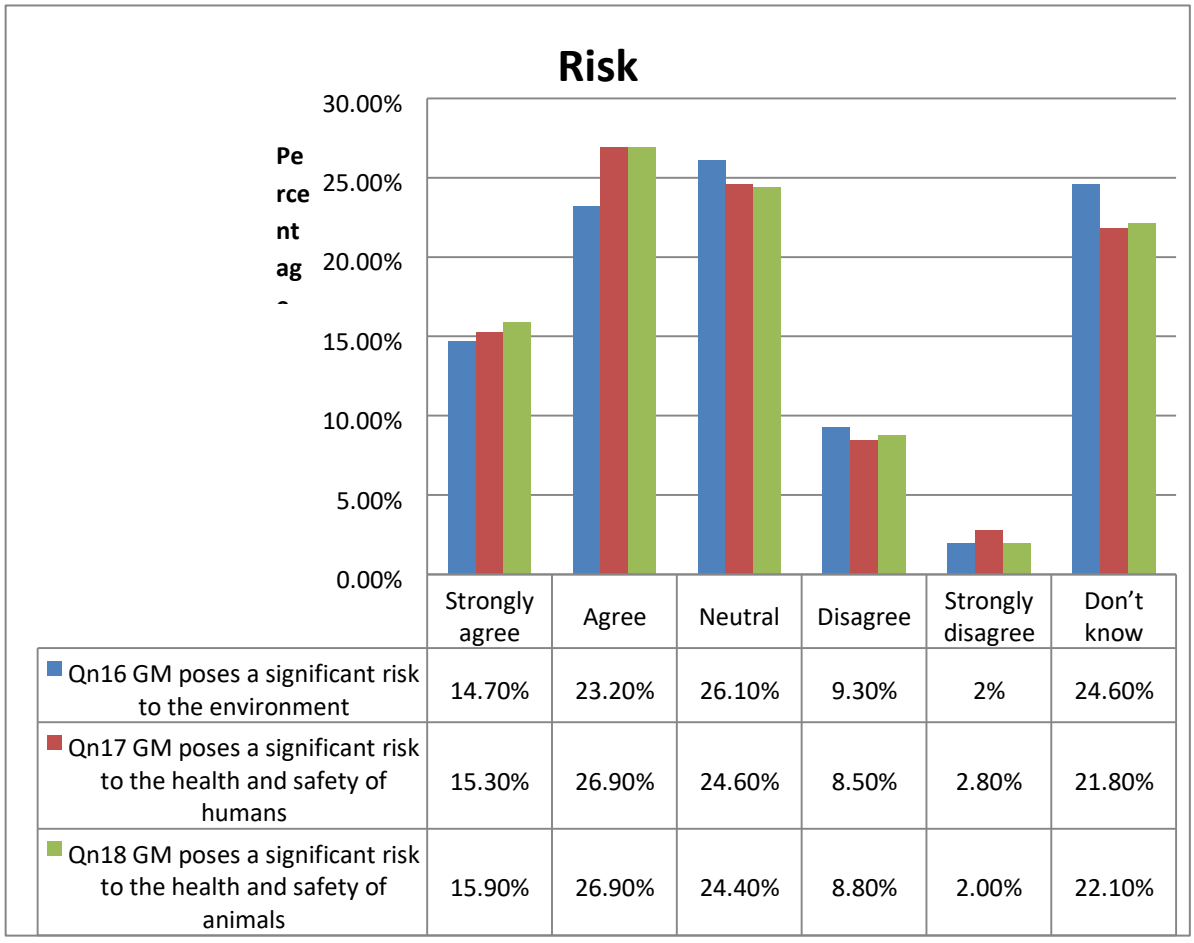


Figure 6 Risk

Table 2 Descriptive statistics for risk

Category		2019 Descriptive statistics				
	Key Questions	N	Min.	Max.	Mean	Std. Dev.
Risk	GM is a Risk to the environment	266	1	5	2.5	1.0
	GM is a health and safety risk humans	276	1	5	2.4	1.0
	GM is a health and safety risk animals	275	1	5	2.4	1.0

Respondents see GM being a risk to humans, animals and environment.

4.2.6 GM Food benefits

A benefit can be defined as an advantage or profit gained from something (Oxford, 2009). In this study a benefit can be described as an advantage gained from using GM technology. For this section, the bulk of respondents were either "neutral" or "don't know" about the benefits. This suggested that despite being familiar with GM technology respondents were still unsure of the benefits.

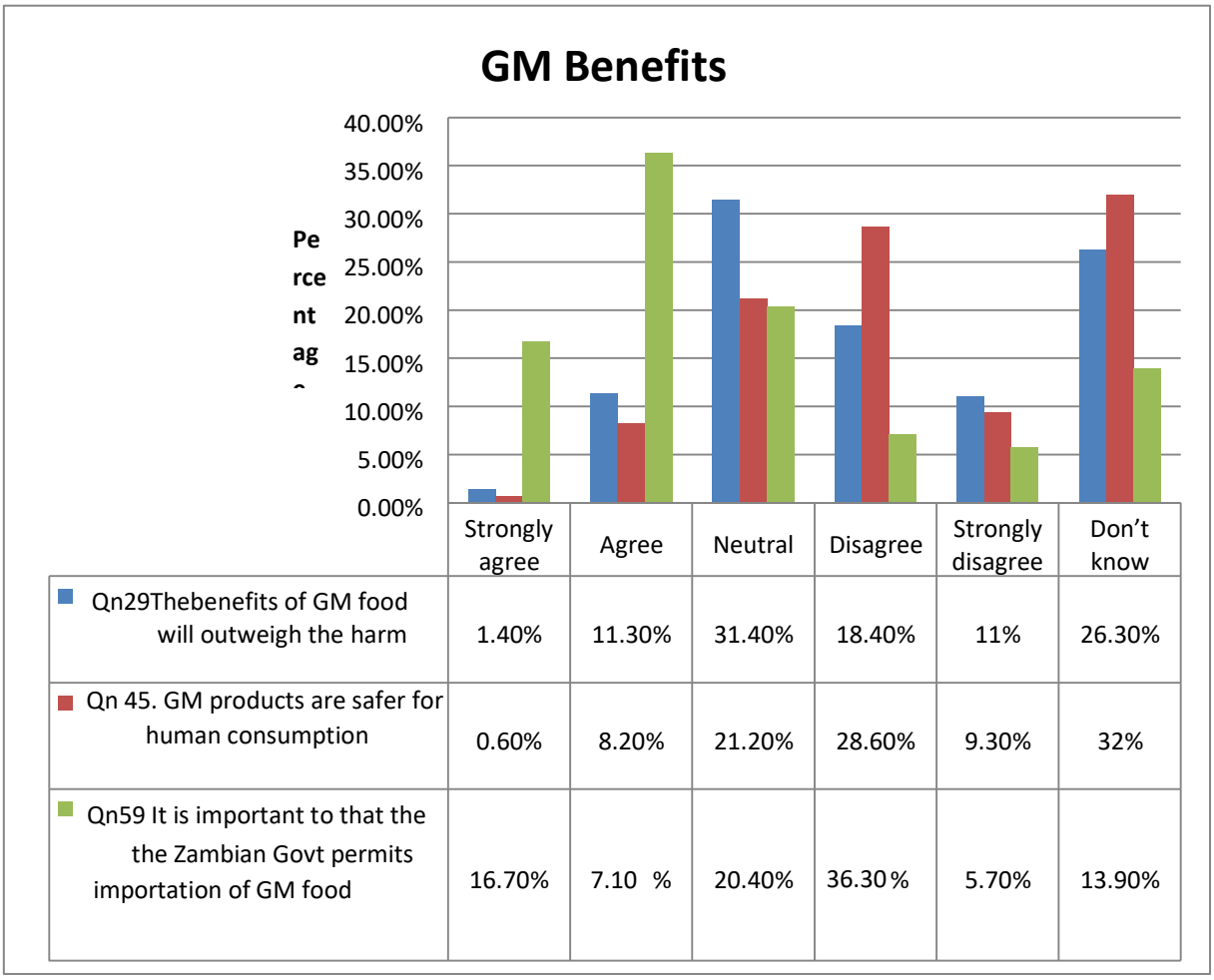


Figure 7 GM benefits

4.2.7 Social norms

Social norms can be described as what society perceived to be normal (Marshall, 1998). In this study social norms can be defined as the community's perception of GM food. In Figure 8 below, society's general perception of GM food was negative. However, about 53% of the respondents believed it was important to evaluate each potential on a case by case basis rather than totally supporting it or totally opposing all applications of GM food. There was a very low percentage of responses in the "strongly agree" category, 1.4% for Qn35 and 0.6% for Qn36. The "strongly disagree" category had 11% for Qn35 and 9.3% for Qn36.

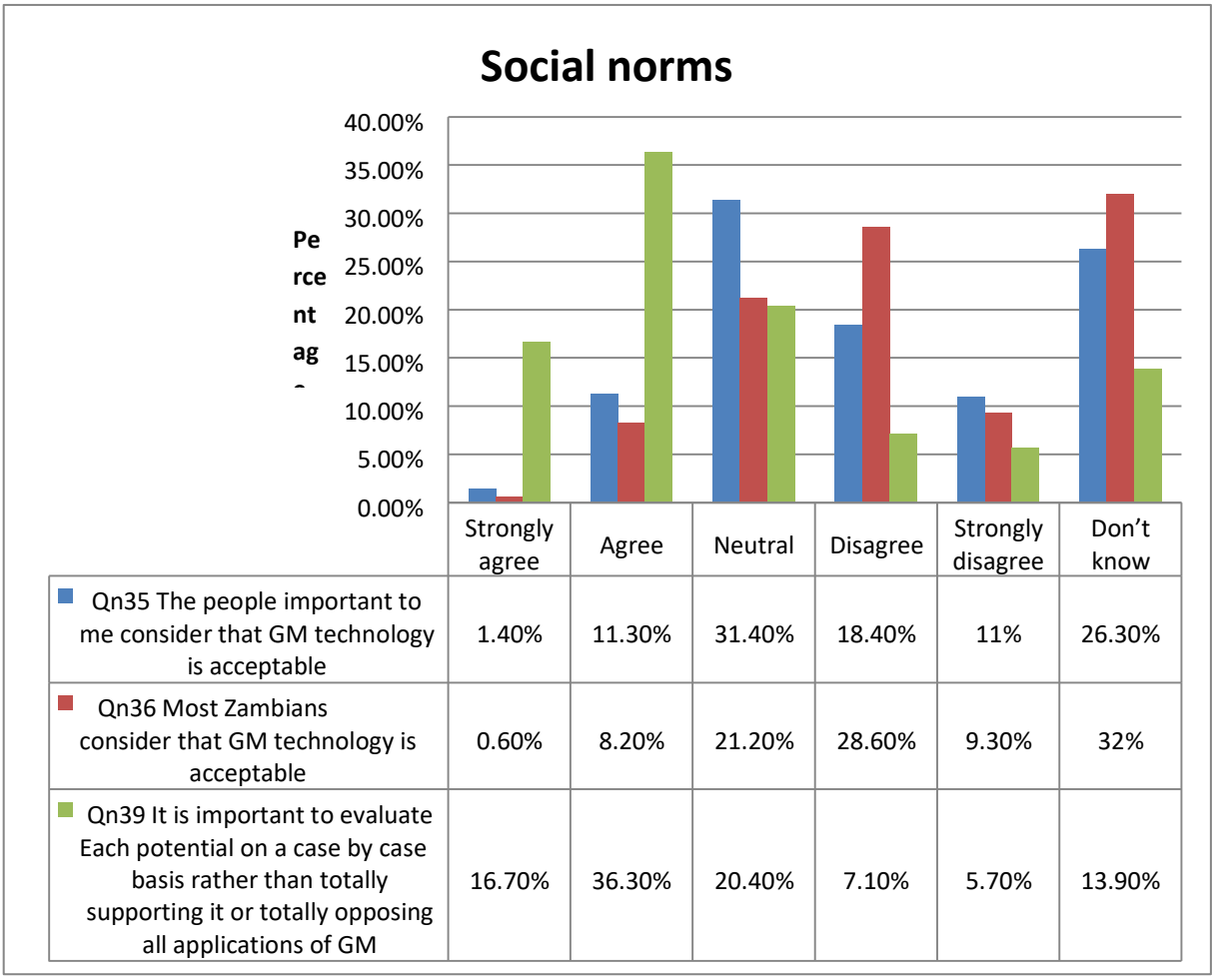


Figure 8 Social norms

Table 3 below shows that Zambian community has got a negative perception of GM food.

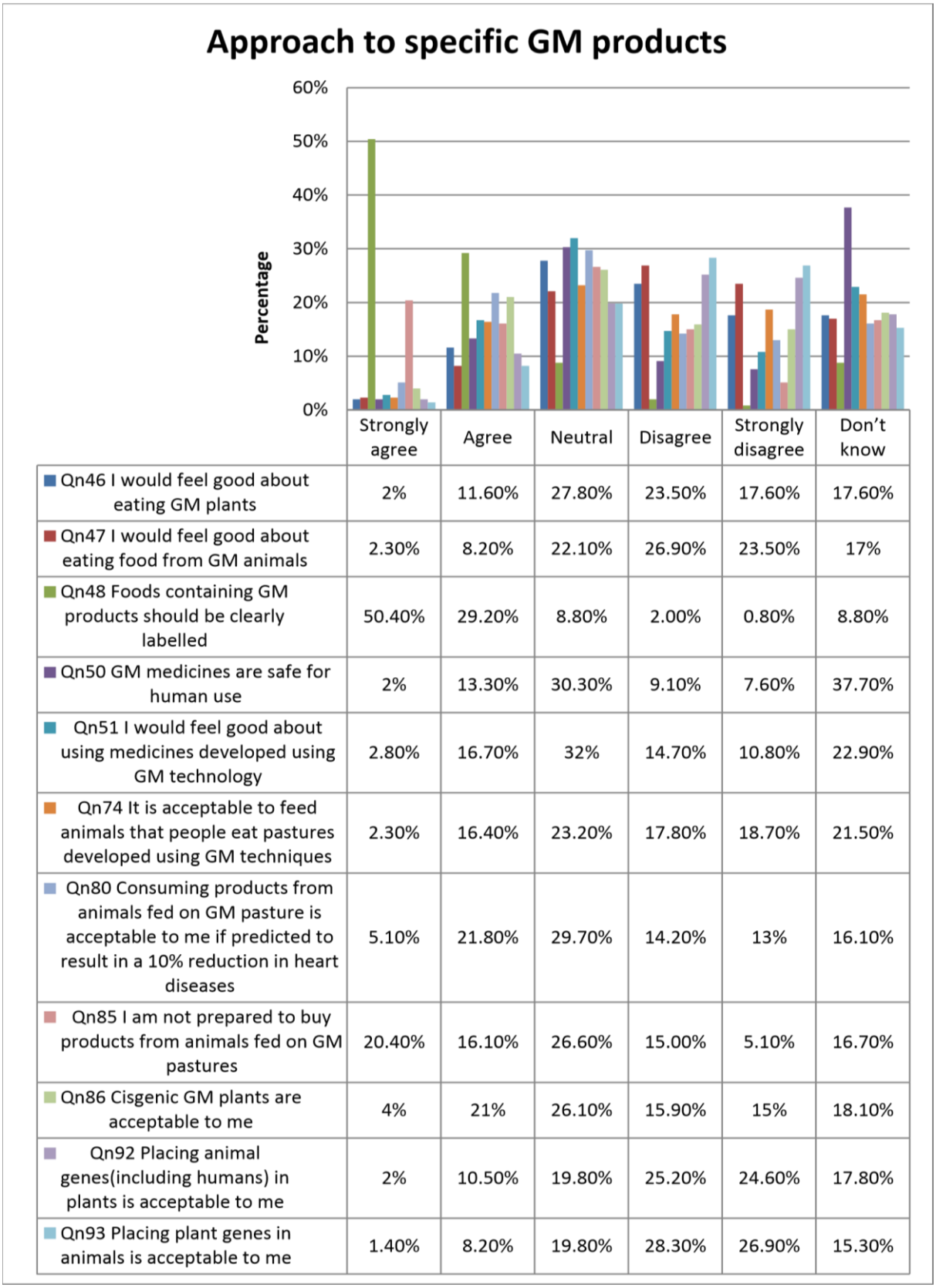
Table 3 Descriptive statistics for social norms

Category		2019 Descriptive statistics				
	Key Questions	**N**	**Min.**	**Max.**	**Mean**	**Std. Dev.**
Social Norms	Qn35 People important to me accept GM food	260	1	5	3.4	1.0
	Qn36 Most Zambians accept GM food	240	1	5	3.6	0.9

4.2.8 Approach to specific GM products

Approach to specific GM products referred to how consumers make choices about GM products based on their attributes. In Figure, 19 below, the only positive response was Qn48 "Food containing GM products should be clearly labelled." The rest of the questions showed negative trends. However, Qn80 "Consuming products from animals fed on GM pasture is acceptable to me if predicted to result in 10%

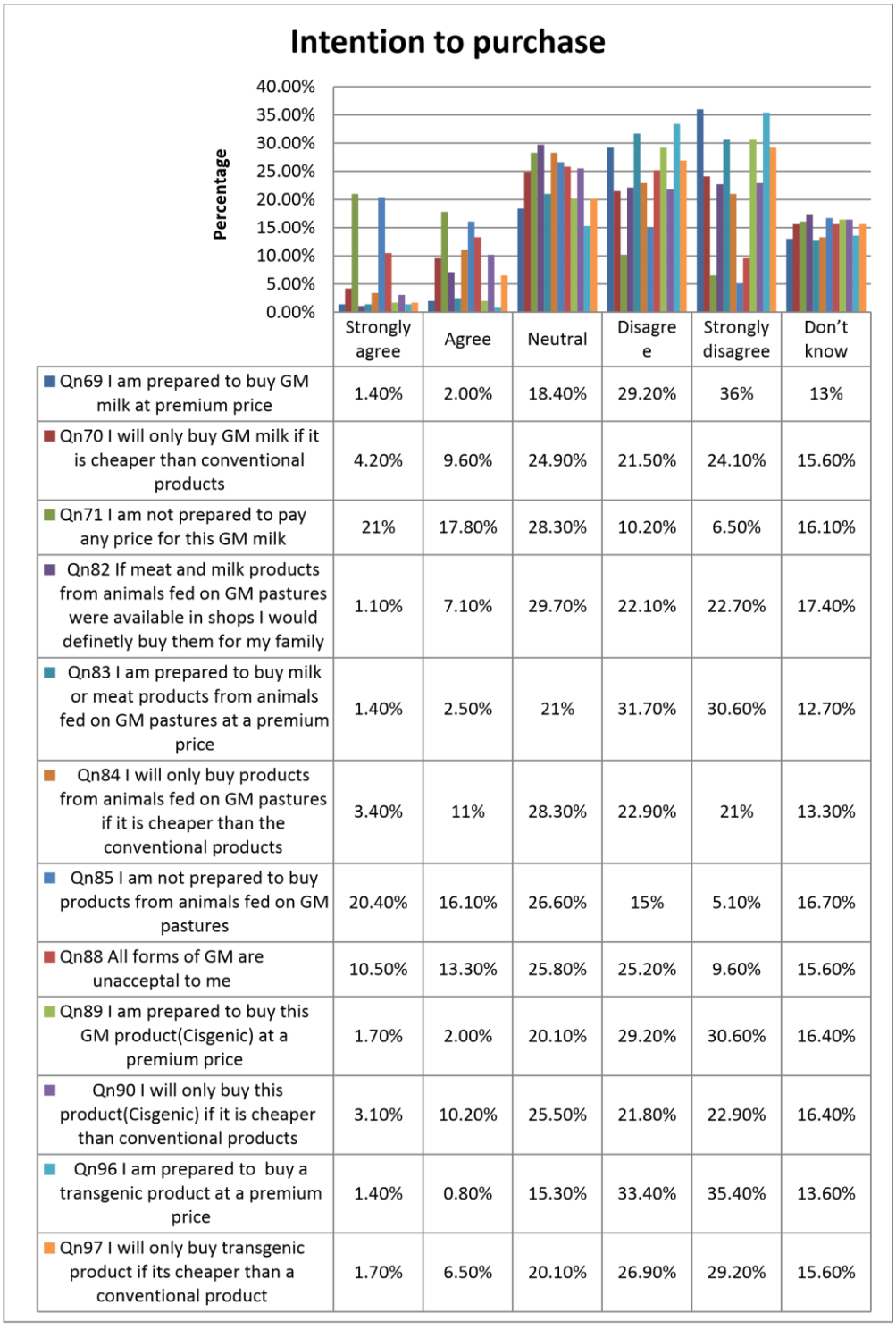
reduction in heart diseases" was the least negative followed by Qn86 "Cisgenic plants are acceptable to me." This shows even if the attitudes were negative some GM applications can be more acceptable than others.



	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Qn46 I would feel good about eating GM plants	2%	11.60%	27.80%	23.50%	17.60%	17.60%
Qn47 I would feel good about eating food from GM animals	2.30%	8.20%	22.10%	26.90%	23.50%	17%
Qn48 Foods containing GM products should be clearly labelled	50.40%	29.20%	8.80%	2.00%	0.80%	8.80%
Qn50 GM medicines are safe for human use	2%	13.30%	30.30%	9.10%	7.60%	37.70%
Qn51 I would feel good about using medicines developed using GM technology	2.80%	16.70%	32%	14.70%	10.80%	22.90%
Qn74 It is acceptable to feed animals that people eat pastures developed using GM techniques	2.30%	16.40%	23.20%	17.80%	18.70%	21.50%
Qn80 Consuming products from animals fed on GM pasture is acceptable to me if predicted to result in a 10% reduction in heart diseases	5.10%	21.80%	29.70%	14.20%	13%	16.10%
Qn85 I am not prepared to buy products from animals fed on GM pastures	20.40%	16.10%	26.60%	15.00%	5.10%	16.70%
Qn86 Cisgenic GM plants are acceptable to me	4%	21%	26.10%	15.90%	15%	18.10%
Qn92 Placing animal genes(including humans) in plants is acceptable to me	2%	10.50%	19.80%	25.20%	24.60%	17.80%
Qn93 Placing plant genes in animals is acceptable to me	1.40%	8.20%	19.80%	28.30%	26.90%	15.30%

4.2.9 Intention to purchase

Intention to purchase can be defined as an individual's intention to buy a specific product or brand (Hoad, 1996). In this study it was defined as an intention to purchase a specific GM food. The results in Figure 10, below, show there was a negative response from respondents when prompted with questions concerning purchasing GM products. Intention to purchase was characterised by very low "agree" and "strongly agree" responses, and high "disagree" and "strongly disagree" responses. This reflected the stronger feelings and sentiments attached to the purchasing of GM food products. This showed that as long as the DNA was altered some respondents have no intention to purchase GM food products.



	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Qn69 I am prepared to buy GM milk at premium price	1.40%	2.00%	18.40%	29.20%	36%	13%
Qn70 I will only buy GM milk if it is cheaper than conventional products	4.20%	9.60%	24.90%	21.50%	24.10%	15.60%
Qn71 I am not prepared to pay any price for this GM milk	21%	17.80%	28.30%	10.20%	6.50%	16.10%
Qn82 If meat and milk products from animals fed on GM pastures were available in shops I would definetly buy them for my family	1.10%	7.10%	29.70%	22.10%	22.70%	17.40%
Qn83 I am prepared to buy milk or meat products from animals fed on GM pastures at a premium price	1.40%	2.50%	21%	31.70%	30.60%	12.70%
Qn84 I will only buy products from animals fed on GM pastures if it is cheaper than the conventional products	3.40%	11%	28.30%	22.90%	21%	13.30%
Qn85 I am not prepared to buy products from animals fed on GM pastures	20.40%	16.10%	26.60%	15%	5.10%	16.70%
Qn88 All forms of GM are unacceptal to me	10.50%	13.30%	25.80%	25.20%	9.60%	15.60%
Qn89 I am prepared to buy this GM product(Cisgenic) at a premium price	1.70%	2.00%	20.10%	29.20%	30.60%	16.40%
Qn90 I will only buy this product(Cisgenic) if it is cheaper than conventional products	3.10%	10.20%	25.50%	21.80%	22.90%	16.40%
Qn96 I am prepared to buy a transgenic product at a premium price	1.40%	0.80%	15.30%	33.40%	35.40%	13.60%
Qn97 I will only buy transgenic product if its cheaper than a conventional product	1.70%	6.50%	20.10%	26.90%	29.20%	15.60%

4.2.10 Changing attitudes over time

Participants were also asked to rate their attitude over a period of time between the time they first heard about GM and the present. Most participants felt their attitude had not changed, the main reason being that there have not been any outstanding developments coming out of GM to influence a significant change in attitude. Some participants were surprised that people were still researching GM; they thought GM had died out.

4.3 Summary

Most of the participants preferred a total ban on GM, while a handful preferred tighter regulations that made biotech companies more accountable. Only a few participants were in totally in favour of GM. The main reason why most people wanted a total ban was mainly for the protection of human potential health risks and non-GM markets. There was fear of environmental risks that come with GM crops as well as health and safety of people and animals. Tampering with DNA was thought to be unethical and too dangerous. There was also a question about the necessity for GM.

Participants who preferred tighter regulations and accountability of biotech companies emphasised that it was taking too long to prove that GM was the ultimate technology as many scientists thought it would be. Therefore, there was a need for a cautious approach. It was also suggested that supermarkets should put GM products on separate shelves with clear labels so that people can make informed choices.

There were a few participants who were totally for GM food products. Their reasons included fear of being left out if GM turned out to be beneficial. Zambia like other southern African countries will play the catching up game they said. Therefore, they felt it was necessary to position ourselves to be competitive. Participants also highlighted that GM could turn out to be a cheap source of food, benefiting struggling families especially today when not everybody can afford the available food.

Chapter Five

Discussion

5.1Introduction

This chapter presents the discussion of the findings in detail. Analysis of the results will give us an indication on how the Zambian public attitudes towards GM food are and how they perceive GM food to be hazardous to human, animals' health and the environment.

5.2 Demographic information

The survey results showed that there were (38.5%) Christians followed by Hindus (8.2%) and other religions (6.2%). Christians were under represented in this survey; CSO put Christians in Kitwe at 72.02% in the 2010 census. However, the differences in demographic composition were believed to be not significant enough to affect the results.

5.3 Moral values

The most common questions asked by focus group participants were, "Why do we really need GM food and what kind of GM products are necessary?" This research found that, for many respondents, their moral values affected their willingness to accept GM food more than their specific knowledge about the technology. Overall, Zambians believed GM was morally wrong because it involved tampering with an

organism's genetic makeup. In general, public attitudes on moral values regarding GM food have remained constantly negative since 2002.

5.4 Image

Most of the participants who took part in the survey overwhelmingly demanded labels for GM food products. Zambians might find it hard to accept unlabelled food products coming from cows grazing GM pasture, and this could have some implications on other markets. It was important to note that Zambians considered GM to have a negative impact on its clean image of the country. This calls for the government and developers to reassure and guarantee GM food safety and no economic loss on the country's niche markets before allowing it to be imported and consumed.

5.5 Trust

Trust was very important in GM technology. Consumers first needed to trust the scientists who were developing the technology and the companies who sold the products, and the government who regulated and approved the technology. From the survey and trust was one of the major reasons for participants' concern.

The lack of trust in regulatory authorities and companies meant that whatever information was coming from developers was not likely to make an impact even if they had approval from the regulatory authorities. The main reason for not trusting companies was that biotechnology companies were viewed as focused only on making money. The government was not trusted; mainly because participants' believed the government was approving the importation of GM products without rigorously testing it. Respondents believes that, there seems far more researchers developing new modifications than there are researchers studying the potential impact of these organisms on the ecosystems into which they are to be released. Zambians were not likely to trust biotechnology companies and the government's ability to make good decisions for them about this technology.

5.6 Risk

The survey results strongly indicated that Zambians considered GM food to be very risky. GM food was considered to be a health and safety risk to people and animals, a risk to the environment and also an economic risk. Most participants considered GM food a risk because of lack of data concerning its 100% safety, unknown future effects and that GM food has not been around for a long enough period to see any side effects. Participants believed there was not enough evidence to prove GM food safety. The study has shown that consumers increasingly perceived GM food products as risky. Consumers were not willing to put themselves to an unknown ordinary GM food risk when the country can easily grow or import food produced through conventional methods.

While GM was considered risky it was interesting to note that consumers were more likely to accept GM that benefitted human health. It seemed consumers were making rational decisions by weighing benefits against harm. Consumers seemed likely to accept GM products that will benefit human health, compared to ordinary GM food with no health benefits.

5.7 Benefits

Most participants argued that the previous generation of GM crops had shown no obvious benefits for Zambians. Despite the claims that GM might be needed to feed the world, participants argued that, they

found no yield benefit when the USA was compared to Western-Europe other economically developed countries of the same latitude which do not grow GM crops. We found no benefit from the traits either. (for example, Heinemann et al., 2013, p.15). Most interviewed farmers shared the same feelings about GM food. It seems Zambians were more likely to tolerate GM food with health benefits more than just for food.

5.8 Social norms

Social norms can be described as what society perceived to be normal. One would expect individuals to comply with social norms so as to be accepted by society. Social norms can, to some extent, influence decisions made by individuals. This study's results showed that there was a general assumption that most Zambians have a negative attitude towards GMOs. Only 0.6% of respondents strongly believed that GM products would be acceptable by the majority of Zambians. This showed that most of respondents were not expecting GM products to be acceptable. This shows that the majority Zambians would still not accept GMO products.

5.9 Specific product approach

The results showed that Participants would not trust claims made by the sellers of GM products. Participants in the survey did not believe that those close to them would recommend they purchased GM products. The acceptability of GM also appeared to depend on the organism being modified. The use of the technology on humans and animals received greater opposition than its use on plants and micro-organisms. Use of GM where it benefitted human health received less opposition.

5.10 Intention to purchase

Intention to purchase can be used as an indication of the potential acceptance of GM products on the market. The survey results showed that most of the participants had little or no intention of purchasing GM food products either for themselves or their families. The results showed that Zambians were not likely to knowingly purchase GM food unless it benefitted their health. This could be a challenge to companies developing GM pasture as the general public was expressing no intention to purchase GM food. As milk coming from cows fed with GM pasture can be viewed as GM food by the public, this might be met with serious resistance. The study also showed that participants were not willing to purchase products coming from animals fed on GM pastures.

5.11 Summary

The study results highlighted the main areas of concern as food safety risks, health risks, environmental risks and the wrongness of tampering with genetic makeup of an organism. Participants were also concerned with the impact of the technology on the economic advantage of Zambia's image. Participants believed that large biotechnology companies were out to make profits at the expense of the environment and public safety. Most of the participants believed GM food had failed to produce any tangible benefits and was not a topic of concern at the moment. Most of the participants were unaware that the Zambian government was making progress towards the importation and consuming of GM food technology.

Most Zambians, particularly in Kitwe towns believed that, meat, milk and other products from animals that have been fed GM feed should also were required to be labelled as GM. This is because; a lack of information on food labels was likely to give a perceived lack of choice and control over GM food.

The study results have shown that public concern on GM pasture is mainly on safety, absence of benefits, uncertainty and trust. GM is perceived as un-natural and makes many consumers feel it is not good for human health and the environment also consumers don't trust the developers of the technology. Suspicions are that it is driven by big companies who are driven by profits. These are likely to be the main reasons why many people are still skeptical about the safety of GMOs.

Chapter Six
Conclusions

The study found that the Zambian public's attitudes towards GM food seem to be negative. The public seemed to be making informed decisions about GM, given the fact that of the participants sampled, only 8.5% had never heard of GM, the rest had some level of familiarity with GM. The biggest issues that drew negativity toward GM were regarding trust, risk, social norms and intention to purchase GM food.
Trust seem negative and appeared to be trending towards becoming more negative. It was going to be hard to generate positive attitudes without trust. This demanded that scientists, regulating authorities and companies be transparent and reassure the public about the safety of GM products. Information about the GMOs will need to be balanced, not only by showing the benefits but also by highlighting potential risks.
Respondents believed GM was too risky as not enough tests had been done to test for any side effects. The public demanded rigorous testing to reassure them of its safety. While rigorous testing might give reassurance, more people also believed it was morally wrong to alter the genetic make-up of an organism. The pubic also showed no intention to knowingly purchasing GM products. The challenge that companies developing GM food products were likely to face will be in trying to convince the public that feeding on GM food will not risky their health. The public had no intention of purchasing food with altered DNA. While GM might present a great opportunity for the future public acceptability stands in its way.

6.1 Concluding remarks

Food safety and environmental protection were one of the main concerns. The Zambian public did not appear to be willing to embrace genetically modified food products. Biotechnology companies, government regulating bodies and scientists have to address the issues highlighted about environmental concerns, food safety and economic risks to build positive attitudes.

6.2 Research Limitations

The only use of online respondents in the survey could have limited sampling to people with internet access only. However, the research budget limited the researcher to the cheap and faster method.

6.3 Future research

Research on the reaction of International Community on Zambia's rejection of GM products a measure of the economic risk. Also of great interest will be research on GM safety to environment, and humans.

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Appendices

Appendix A

A.1Research questionnaire

I am a student at Rockview University conducting a survey. The purpose of the survey is to establish your perception on the effects of consuming Genetically Modified food. This survey will take about 20 minutes to complete.

- The questionnaire is anonymous, and you will not be identified as a respondent.
- Participation is voluntary and you may at any given time withdraw from participating.
- If you complete the questionnaire, however, it will be understood that you have consented to participate in the project and consent to publication of the results of the project with the understanding that anonymity will be preserved.

BACKGROUND INFORMATION (Please select the appropriate box)

1. **In which region do you live? :**					
□	Copperbelt	□	Northern	□	Southern
□	Western	□	Northwestern	□	Muchinga
□	Luapula	□	Lusaka	□	Central
□ Eastern					
2.**Gender:**		□ Male	□ Female		

3.**Age:** _____ years old			

4. **Ethnicity:** (tribe)
…….

5. **Religion:** (Select one)

□ No religion □ Christian □ Buddhist □ Muslim
□ Hindu □ ATR□ Other, _____

6. **How important is religion in your life?: (Select one)**

□ Not applicable / of no importance □ slightly important
□ Moderately important □ Very important

How important is spirituality in your life?: (Select one)

□ Not applicable / of no importance □ Slightly important
□ Moderately important □ Very important

7. **From all sources your personal before tax, income for the last tax year was : (Select one)**

□ Less than K2500 □ K2500 – K5000
□ K5000– K7000 □ K7000 - K10000
□ More than K10,000 □ I prefer not to say

8. **What is your highest completed educational qualification? (Select one)**

❑ No qualification
❑ High school qualification (G10, 11, or 12)
❑ Technical or vocational qualification
❑ University qualification (Diploma, Bachelor's or higher degree)
❑ Other, please specify: _____

9. **On a scale 1-5, please rate your familiarity with genetic modification. 1- Never heard of it, 2- Just heard of it, 3-Familiar, 4-I prefer not to say, 5-very familiar. (Please select one)**

❑ 1
❑ 2
❑ 3
❑ 4
❑ 5

Genetic Modification

Genetic Modification (GM) involves the chemical altering of an organism's genetic code in a laboratory. Using GM, scientists can alter plants, animals and micro-organisms to enhance desired qualities, remove undesired qualities, or to give them new qualities. Two main uses of GM technology have been in medicine (e.g. to produce insulin for diabetics) and in agriculture for food production (e.g. most widely used are GM Maize, Canola and soya beans).

Please select the box next to the statement that best represents your thoughts and feelings about Genetic Modification (GM)

10. **In terms of the use of GM products for food production, I …**

❑ Totally support it

- ❑ Support it in some circumstances
- ❑ Totally oppose it
- ❑ Don't know/Unsure

11. In terms of the use of GM products for medical applications, I ….

- ❑ Totally support it
- ❑ Support it in some circumstances
- ❑ Totally oppose it
- ❑ Don't know/Unsure

12. What is your main concern about GM technology?

- ❑ I do not have any major concerns about GM technology
- ❑ My main concern is that GM is in principle unethical, disrespects nature or is against God
- ❑ My main concern is the potential risk that GM poses to the health and safety of humans, animals, or the environment

13. Have you ever consumed any GM food products? (select one)

- ❑ Yes
- ❑ No
- ❑ Don't know/Unsure

14. Have you ever used any GM medicines? (select one)

- ❑ Yes
- ❑ No
- ❑ Don't know/Unsure

In the questions that follow, you are presented with a statement. Please indicate your level of agreement or disagreement with each of the statement by selecting the appropriate number on the scale.

Your thoughts about GM

Please indicate your level of agreement by selecting the most appropriate number

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
18	GM poses a significant risk to the environment	1	2	3	4	5	dk
19	GM poses a significant risk to the health and safety of humans	1	2	3	4	5	dk
20	GM poses a significant risk to the health and safety of animals	1	2	3	4	5	dk

21	The production of GM crops and animals in New Zealand will benefit our economy	1	2	3	4	5	dk
22	GM crops can be grown organically	1	2	3	4	5	dk
23	Using GM technology fits with my Cultural and spiritual beliefs.	1	2	3	4	5	dk
24	Using GM technology fits with my basic moral principles.	1	2	3	4	5	dk
25	GM technology is unnatural.	1	2	3	4	5	dk
26	GM technology is "playing God."	1	2	3	4	5	dk
27	GM technology is disrespectful to nature.	1	2	3	4	5	dk
28	GM technology will help cure the world's major diseases.	1	2	3	4	5	dk

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
29	GM technology will help solve the world's food problems.	1	2	3	4	5	dk
30	GM products are environmentally friendly	1	2	3	4	5	dk

31	The benefits of GM technology will outweigh any harm.	1	2	3	4	5	dk
32	I trust what the regulatory authorities say about GM technology.	1	2	3	4	5	dk
33	I trust what scientists say about GM technology.	1	2	3	4	5	dk
34	I trust what companies say about GM technology.	1	2	3	4	5	dk
35	I trust what medical professionals say about GM technology.	1	2	3	4	5	dk
36	I trust what watchdog groups	1	2	3	4	5	dk

	Statement	**Strongly agree**	**Agree**	**Neutral**	**disagree**	**Strongly disagree**	**Don't know**
37	The people important to me consider GM technology is acceptable.	1	2	3	4	5	dk
38	Most Zambians consider that GM technology is acceptable.	1	2	3	4	5	dk
39	Producing GM products fits with Zambia's image.	1	2	3	4	5	dk
40	Producing GM products fits with Zambia's image of marketing						

	healthy food.	1	2	3	4	5	dk
41	It is necessary to evaluate each potential application of GM on a case-by-case basis rather than totally supporting or totally opposing all applications of GM.	1	2	3	4	5	dk
42	It is acceptable to genetically modify Micro-organisms (e.g. bacteria) for human benefit.	1	2	3	4	5	dk
43	It is acceptable to genetically modify plants for human benefit.	1	2	3	4	5	dk
44	It is acceptable to genetically modify animals (e.g. cows, sheep) for human benefit.	1	2	3	4	5	dk
45	It is acceptable to genetically modify humans in order to cure or eradicate genetic diseases.	1	2	3	4	5	dk

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
46	It is acceptable to genetically modify humans in order to enhance human capabilities (i.e. physical and mental attributes or abilities).	1	2	3	4	5	dk
47	GM food products are safe for human consumption.	1	2	3	4	5	dk
48	I would feel good about eating food from GM plants.	1	2	3	4	5	dk
49	I would feel good about eating food						

	from GM animals.	1	2	3	4	5	dk
50	Foods containing GM products should be clearly labelled.	1	2	3	4	5	dk
51	Zambia should not allow the importation of GM food crops for at least the next five years.	1	2	3	4	5	dk
52	GM medicines are safe for humans to use.	1	2	3	4	5	dk
53	I would feel good about using medicines developed using GM technology.	1	2	3	4	5	dk
54	Modifying micro-organisms (e.g. bacteria) using GM technology fits with my cultural and spiritual beliefs.	1	2	3	4	5	dk
55	Modifying micro-organisms (e.g. bacteria) using GM technology fits with my basic moral principles.	1	2	3	4	5	dk

Your thoughts on a GM Milk Product

Scientists in the world are researching on possibility of producing cows that produce milk tailored to be an equivalent of approved human therapeutic drug.

Please answer the next set of questions about the GM Milk product described above.

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
56	If GM milk product were available in the shops, I would definitely buy it for myself.	1	2	3	4	5	dk
57	If GM milk product were available in the shops, I would definitely buy it for my family or the people that I live with.	1	2	3	4	5	dk
58	If I suffered from a disease that can be treated by GM milk, I would definitely buy this product.	1	2	3	4	5	dk
59	I would feel good about purchasing						

	GM milk for myself.	1	2	3	4	5	dk
60	GM milk will be a useful product to develop.	1	2	3	4	5	dk
61	I would trust the claims made about GM milk by the people selling it.	1	2	3	4	5	dk

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
62	The people important to me would want me to purchase GM milk.	1	2	3	4	5	dk
63	Thinking about GM milk makes me feel happy.	1	2	3	4	5	dk
64	Thinking about GM milk makes me feel sad.	1	2	3	4	5	dk
65	Thinking about GM milk makes me feel pleased.	1	2	3	4	5	dk
66	Thinking about GM milk makes me feel angry.	1	2	3	4	5	dk
67	Thinking about GM milk makes me feel hopeful.	1	2	3	4	5	dk
68	Thinking about GM milk makes me feel disgusted.	1	2	3	4	5	dk
69	Modifying animals using GM technology fits with my cultural and spiritual beliefs.	1	2	3	4	5	dk
70	Modifying animals using GM technology						

	fits with my basic moral principles.	1	2	3	4	5	dk
71	I am prepared to buy GM milk at a premium price.	1	2	3	4	5	dk
72	I will only buy GM milk if it is cheaper than the conventional products.	1	2	3	4	5	dk
73	I am not prepared to pay any price for this GM milk.	1	2	3	4	5	dk

Genetically Modified pasture

Scientistsare developing a genetically modified rye grass pasture that produce 25% more feed, more protein for livestock and have improved drought resistance. The trials are being done overseas.

Your thoughts about GM Pastures

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
74	The spread of GM pasture can be controlled.	1	2	3	4	5	dk
75	GM pastures are environmentally friendly.	1	2	3	4	5	dk
76	It is acceptable to feed animals that people eat (e.g. cows, sheep) pastures developed using GM techniques.	1	2	3	4	5	dk
77	Feeding animals GM pasture with high levels of available energy is an acceptable way to increase animal production.	1	2	3	4	5	dk
78	Feeding animals GM pasture is acceptable if it results in human health benefits.	1	2	3	4	5	dk
79	Feeding animals GM pasture is acceptable if it reduces the						

	production of greenhouse gases (methane) responsible for climate change.	1	2	3	4	5	dk
80	Modifying plants using GM technology fits with my cultural and spiritual beliefs.	1	2	3	4	5	dk
81	Modifying plants using GM technology fits with my basic moral principles.	1	2	3	4	5	dk

The following questions seek your thoughts about the products (e.g., milk and meat) from animals fed on GM pastures.

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
82	Consuming products from animals fed on GM pastures is acceptable to me if predicted to result in reduction in of health issues.	1	2	3	4	5	dk
83	If milk and meat products from animals fed on GM pastures were available in the shops, I would definitely buy them for myself.	1	2	3	4	5	dk
84	If meat and milk products from animals fed on GM pastures were available in the shops, I would definitely buy them for my family or the people that I live with.	1	2	3	4	5	dk
85	I am prepared to buy milk or meat products from animals fed on GM pastures at a premium price.	1	2	3	4	5	dk
86	I will only buy products from animals fed on GM pastures if it is cheaper than the conventional	1	2	3	4	5	dk

	products.						
87	I am not prepared to pay any price for products from animals fed on GM pastures.	1	2	3	4	5	dk

Transgenic and Cisgenic Genetic Modification

Genetic Modification involves transferring genes from one organism and inserting them into another, the inserted gene sequence may come from another related species, or from a completely different species.

Cisgenic refers to the process which genes are artificially transferred between organisms that are sexually compatible or belong to the same species. For example, transferring genes from one grass plant to another.

Transgenic refers to the process by which genes are transferred between totally unrelated species that are not sexually compatible, for example transferring human genes into a cow.

Your thoughts about cisgenics

	Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**	**Don't know**
88	Cisgenic plants are acceptable to me.	1	2	3	4	5	dk
89	Cisgenic animals are acceptable to me.	1	2	3	4	5	dk
90	All forms of GM are not acceptable to me.	1	2	3	4	5	dk
91	I am prepared to buy this GM product at a premium price.	1	2	3	4	5	dk
92	I will only buy this GM product if it is cheaper than conventional products.	1	2	3	4	5	dk
93	I am not prepared to pay any price for this GM product.	1	2	3	4	5	dk

Your thoughts about transgenics

	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
93	Placing animal (including human) genes in bacteria is acceptable to me	1	2	3	4	5	dk
94	Placing animal (including human) genes in plants is acceptable to me	1	2	3	4	5	dk
95	Placing plant genes in animals is acceptable to me	1	2	3	4	5	dk
96	Any GM organisms is acceptable to me	1	2	3	4	5	dk
97	I am prepared to buy a transgenic product at a premium price.	1	2	3	4	5	dk
98	I will only buy a transgenic product if it is cheaper than a conventional product.	1	2	3	4	5	dk
99	I am not prepared to pay any price for this GM product.	1	2	3	4	5	dk

We would like to thank you for taking your time to complete our survey. Your opinions and responses are gratefully received and extremely important to us. Click the submit button to send your survey then close the window to exit.