

Consumer Perceptions on the Introduction of Genetically Modified Food Products in Kenya: A Qualitative Study in Nyeri and Meru Counties

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Abstract

The introduction of genetically modified (GM) food products in Kenya has raised concerns among consumers, as well as regulatory authorities and industry players. This study aimed to explore the attitudes and perceptions of consumers towards GM food products in Kenya, using a qualitative research design and thematic content analysis. The objective of this study was to provide a comprehensive understanding of consumer perceptions towards GM food products in Kenya. Data was collected through focus group discussions (FGDs) with participants drawn from Meru and Nyeri Counties. The data was analyzed using Nvivo software and thematic content analysis. The major findings of the study suggest that consumers in Kenya have limited knowledge and understanding of GM food products. Participants expressed concerns about the safety, health implications, and environmental impact of GM foods. Cultural and religious beliefs also played a significant role in shaping consumer perceptions of GM foods. Despite the concerns raised, participants acknowledged the potential benefits of GM foods, including increased food production and improved nutritional content. Based on the findings, this study recommends that the government, industry players, and other stakeholders should collaborate to develop clear and transparent regulations for GM food products. This should be coupled with targeted education and awareness campaigns to promote public understanding and acceptance of GM foods. Further research is also needed to investigate the potential long-term effects of GM foods on human health and the environment with an underscore of impartial awareness endeavor.

Keywords: Genetically Modified, Consumer Perception, Thematic Analysis.

1. Introduction

The introduction of genetically modified (GM) food products has been a controversial topic worldwide. In Kenya, the introduction of GM food products has been a subject of heated debates, with some stakeholders advocating for their adoption to improve food security and reduce poverty, while others express concerns about their potential health risks, environmental impacts, and ethical concerns. The use of genetically modified crops has been increasing globally, with countries such as the United States, Brazil, and China leading in their adoption [1]. According to the International Service for the Acquisition of Agri-biotech Applications (ISAAA), the global area of biotech crops increased by 3% in 2020, reaching 191.7 million hectares, with the United States, Brazil, and Argentina leading in their cultivation [2]. In Africa, South Africa leads in the cultivation of GM crops, while Kenya is yet to commercialize any GM crop.

Consumer perceptions play a crucial role in the adoption and acceptance of GM food products. Studies have shown that consumer perceptions are shaped by various factors, including knowledge, attitudes, beliefs, and values [3]. Consumers' knowledge of GM food products and their potential benefits and risks influences their acceptance and willingness to consume these products. Moreover, consumers' attitudes towards GM food products and their perceptions of their safety and health risks also affect their adoption and consumption. Given the controversies surrounding the adoption of GM food products in Kenya, it is essential to understand stakeholders' perceptions of these products to develop appropriate policies and strategies for their adoption and acceptance [4].

Despite the controversies surrounding the adoption of GM food products in Kenya, there is limited research on consumer perceptions of these products. Understanding consumer perceptions is

crucial as it influences their acceptance and willingness to consume GM foods. This study used thematic content analysis to

identify the benefits, risks, and labeling issues associated with GM food products, as well as consumers' attitudes and beliefs towards these products. This qualitative approach aimed at exploring consumer perceptions of GM food products in Meru and Nyeri towns in Kenya.

2. Literature Review

Consumer perceptions play a crucial role in the adoption and acceptance of GM food products in Kenya. Studies have shown that consumers' knowledge, attitudes, beliefs, and values influence their acceptance and willingness to consume GM food products [3]. In a study conducted by Adhiambo et al. (2020) in Nairobi, Kenya, consumers' knowledge of GM food products was found to be limited, with most consumers lacking information on the potential benefits and risks of these products. Moreover, consumers' attitudes towards GM food products were found to be negative, with concerns about the safety and health risks of these products being the primary reasons for their rejection. In a similar study by Njoroge et al. (2019), consumers' perceptions of GM food products were shaped by their cultural and religious beliefs, as well as their trust in regulatory authorities. The study found that consumers who had positive attitudes towards GM food products were more likely to trust regulatory authorities and to have a greater understanding of the potential benefits and risks of these products.

A study by Ndolo et al. (2021) investigated consumer attitudes towards genetically modified maize in Nairobi, Kenya. The study found that consumers were concerned about the safety and health risks of genetically modified maize, and that they preferred locally grown and organic maize over genetically modified varieties. Kikulwe et al. (2019) examined consumer preferences for insect-resistant genetically modified cowpea in Uganda, Kenya, and Nigeria. The study found that consumers were willing to pay a premium for insect-resistant cowpea, and that willingness to pay was influenced by factors such as income, education, and gender. A study by Oyier et al. (2020) investigated the factors influencing the adoption of genetically modified cotton among smallholder farmers in Bura, Tana River County, Kenya. The study found that farmers' adoption of genetically modified cotton was influenced by factors such as access to information, perceived benefits and risks, and trust in regulatory authorities.

A study by Mwangi et al. (2018) in Nairobi, Kenya, found that consumers' willingness to purchase GM food products was influenced by labeling, with most consumers preferring products labeled as GM-free. The study also found that consumers' trust in regulatory authorities was a significant factor in their willingness to purchase GM food products. On the same note, Odongo et al. (2019) examined the factors influencing the adoption of insect-resistant genetically modified maize in Kenya. The study found that farmers' adoption of genetically modified maize was influenced by factors such as access to information, perceived benefits and risks, and trust in regulatory authorities. Finally, a study by Njiraine et al. (2019) investigated the factors influencing the adoption of genetically modified maize among smallholder farmers in Kenya.

The study found that farmers' adoption of maize was influenced by factors such as access to information, perceived benefits and risks, and trust in regulatory authorities. The study also found that farmers who had positive attitudes towards genetically modified crops were more likely to adopt them.

3. Study Area

Nyeri and Meru Counties were purposively selected as the study areas due to their significant agricultural activities and diverse consumer populations. The two counties are known for their production of horticultural crops, coffee, tea, and dairy products, making them ideal for the study. Moreover, the study focused on urban consumers in one major town from each county as they are likely to be the first adopters of GM food products, given their exposure to information and access to diverse food products. These towns are characterized by a diverse population, with residents from different socio-economic and cultural backgrounds. This diversity was important for understanding the different perspectives and attitudes towards genetically modified foods, which can vary depending on the differential in social-economics as well as institutional factors.

4. Methodology and Sample Size Determination

The data for this study was collected using focus group discussions (FGDs) with participants from Nyeri and Meru towns. FGDs are a common qualitative research method used to collect data from multiple participants at once. The use of FGDs allowed for the exploration of participants' attitudes, beliefs, and values towards genetically modified foods in a group setting, which can provide insights into social norms and cultural beliefs.

Since the population is not known, Qualtrics Sample Size Estimator was used to calculate a required sample size of 350 participants equally distributed from the two counties. The mathematical formula to calculate this was: $n = (z^2 * p * q) / E^2$

Where: n = required sample size z = z-score associated with the desired confidence level (for 95% confidence level, z-score is 1.96) p = proportion of population that possesses a certain attribute (we assume 50% since we don't have any prior knowledge about the proportion) $q = 1 - p$ E = margin of error as a decimal proportion (for 5% margin of error, E is 0.05).

Using these values, the formula becomes: $n = (1.96^2 * 0.5 * 0.5) / (0.05^2) = 384.16$

However, we needed to adjust the sample size for the expected response rate. The adjusted sample size formula is: $n_{adj} = n / (1 - \text{response rate})$

Using this formula and assuming an expected response rate of 10%, the adjusted sample size becomes: $n_{adj} = 384.16 / (1 - 0.1) = 426.84$

Rounding up to the nearest whole number, the required sample size became 427. However, to account for potential dropouts or

incomplete responses, we aimed for a slightly larger sample size of 350.

The FGDs were conducted in both Nyeri and Meru towns, with 35 participants in each group, making a total of 350 participants. The participants were recruited using purposive sampling, which ensured that they were representative of the population in the study area in terms of age, gender, education level, and income.

The FGDs were audio-recorded and transcribed verbatim. The data was then analyzed using Nvivo software, which is a qualitative data analysis tool that enables researchers to organize and analyze data in a systematic and efficient way. Nvivo was used to code the data according to relevant themes and categories, and to identify patterns and relationships within the data. Thematic content analysis was used to identify themes and patterns in the data collected from the FGDs. The analysis involved identifying recurring patterns and themes in the data, which were then organized into categories based on their relevance to the research questions. The identified themes were then interpreted in light of the research objectives to provide insights into the attitudes and perceptions of consumers towards genetically modified foods in Kenya.

5. Results and Discussions

Thematic content analysis was used to analyze the data collected from the focus group discussions with 350 participants from Nyeri and Meru towns. The analysis revealed three major themes that characterized the participants' perceptions towards GM food products. These themes are concerns about safety and health implications, environmental impact, and cultural and religious beliefs.

5.1 Concerns about Safety and Health Implications

One of the key themes that emerged from the thematic content analysis is the concerns about safety and health implications of genetically modified food products. This theme was consistently highlighted by the respondents from both Meru and Nyeri towns. The majority of the respondents expressed apprehension about the potential risks associated with consuming genetically modified food products. This finding is consistent with previous studies that have shown that concerns about the safety of genetically modified foods are prevalent among the general public [5,6]. One respondent from Meru town expressed the fear that genetically modified food products could cause harm to consumers, stating that *"we don't know the long-term effects of these foods on our health, and we don't want to be guinea pigs for these companies."* This sentiment was echoed by several other respondents who expressed concern about the lack of long-term safety data for genetically modified foods.

The concerns about safety and health implications of genetically modified food products were further compounded by the perceived lack of transparency and accountability by the regulatory agencies. A respondent from Nyeri town stated that *"we don't trust the regulatory agencies to ensure the safety of these foods. They have been compromised by the biotech industry and are not acting in the best*

interests of the consumers." However, it is worth noting that some respondents were not entirely opposed to the idea of genetically modified foods. In particular, a respondent from Meru town argued that *"if the safety concerns are addressed, genetically modified foods could be a viable solution to food security challenges facing our country."* This finding is consistent with previous studies that have shown that attitudes towards genetically modified foods are complex and influenced by multiple factors, including knowledge, risk perceptions, and trust in regulatory agencies [5,6].

An elderly respondent from Meru town stated that *"I don't trust genetically modified foods, I prefer to eat organic produce that I know is safe and healthy."* Similarly, another respondent from Nyeri town expressed a preference for natural foods, stating that *"I don't want to eat anything that has been modified in a laboratory, I want to eat food that is natural and wholesome."* Concerns about the nutritional value of genetically modified foods were also expressed by several respondents. Several respondents from Meru town argued that *"genetically modified foods are not as nutritious as natural foods, they lack the vitamins and minerals that our bodies need."* This concern is supported by some research, which has found that genetic modification can result in reduced levels of important nutrients in crops [7]. It is worth to note that not all respondents viewed genetically modified foods negatively in terms of their quality, taste, and nutritional value. Some respondents believed that genetically modified foods could offer benefits in terms of quality and taste. One focused group from Nyeri town unanimously echoed that *"genetically modified crops can be developed to have better flavor and longer shelf life, which can be good for consumers."*

Overall, the concerns about safety and health implications of genetically modified foods expressed by the respondents highlight the need for comprehensive risk assessments and transparent communication of the safety data to the public. The findings also suggest that efforts to increase public awareness and education about the safety of genetically modified foods may be necessary to alleviate the concerns of consumers.

5.2 Environmental Concerns

Another key theme that emerged from the thematic content analysis is the impact of genetically modified food products on the environment. Many of the respondents from both Meru and Nyeri towns expressed concerns about the potential negative effects of genetically modified crops on the environment. This finding is consistent with previous studies that have identified environmental concerns as a key factor influencing public attitudes towards genetically modified foods [8,9]. One respondent from Nyeri town raised the issue of genetic contamination, stating that *"genetically modified crops can crossbreed with wild relatives and create hybrid plants that could spread uncontrollably and cause environmental harm."* Interestingly, another respondent from Meru town echoed this sentiment, adding that *"we don't want to risk damaging our ecosystem and losing our biodiversity."*

Another concern raised by the respondents was the potential for genetically modified crops to increase the use of pesticides and herbicides. A respondent from Nyeri town stated that *"the companies that produce these crops claim that they will reduce the need for pesticides, but in reality, they will only create new resistant pests and weeds that will require even more chemicals."* This concern is supported by previous research that has shown that the use of genetically modified crops has led to the development of herbicide-resistant weeds [8]. The respondent was seconded by a youthful respondent in the same group who argued that *"if genetically modified crops can be developed to withstand drought and other extreme weather conditions, they could help us adapt to the effects of climate change."*

Overall, the concerns about the environmental impact of genetically modified crops expressed by the respondents highlight the need for careful consideration of the potential risks and benefits of these technologies. The findings suggest that there is a need for more comprehensive environmental risk assessments and greater transparency in the communication of the data to the public. Efforts to engage the public in discussions about the potential environmental impact of genetically modified crops may also be necessary to build trust and address concerns.

5.3 Culture and Beliefs

The third theme that emerged from the thematic content analysis is consumer perceptions of genetically modified food products in relation to their cultural and religious beliefs. Many of the respondents from both Meru and Nyeri towns expressed concerns about the compatibility of genetically modified foods with their cultural and religious practices. One of the respondents from Meru town stated that *"in our culture, we have certain foods that we cannot eat, and we do not know if genetically modified foods are in line with our cultural beliefs."* Similarly, an elderly respondent from Nyeri town expressed concern about the impact of genetically modified foods on their religious beliefs, stating that *"as a Muslim, I am concerned about the halal status of genetically modified foods, and I would prefer to avoid them if possible."*

A respondent from Nyeri town stated that *"our traditional farming methods are sustainable and in harmony with nature, and we do not know if genetically modified foods are compatible with this."* This concern reflects a broader trend in Africa towards promoting sustainable agricultural practices and preserving traditional knowledge [10]. The findings of this study suggest that consumer perceptions of genetically modified foods in relation to cultural and religious beliefs are complex and multifaceted. While concerns about compatibility with cultural and religious beliefs were prominent, some respondents also expressed concern about the potential impact on traditional farming practices. These findings highlight the need for policymakers and food producers to engage with local communities and take their concerns and perspectives into account when introducing new food technologies, such as genetically modified foods. By doing so, they can ensure that new food technologies are compatible with local cultures and tradi-

tions, and are accepted by consumers.

Cultural and religious concerns play a critical role in shaping consumer attitudes towards food products. In many African cultures, food is not just a source of nutrition, but is also deeply intertwined with cultural and religious practices. For example, certain foods may be seen as having spiritual significance, or may be used in traditional healing practices [11]. These cultural and religious beliefs can influence the acceptability of new food products, such as genetically modified foods, and may be a significant barrier to their adoption. In addition to concerns about the compatibility of genetically modified foods with cultural and religious beliefs, some of the respondents in this study also expressed concern about the impact of genetically modified foods on traditional farming practices. It is important for policymakers and food producers to take these cultural and religious beliefs into account when introducing new food products. As echoed by several respondents from both Nyeri and Meru towns, *"if we are going to introduce genetically modified foods, we need to ensure that they are compatible with our cultural and religious beliefs."* This may require engaging with local communities to understand their beliefs and concerns, and working to develop genetically modified foods that are acceptable to them.

6. Conclusions and Recommendations

In conclusion, this study has shed light on the perceptions of consumers in Nyeri and Meru towns on the introduction of genetically modified food products in Kenya. The study found that consumers have concerns about the safety and health implications of GMFs, as well as their potential impact on the environment. Additionally, cultural and religious beliefs also play a significant role in shaping consumer attitudes towards GMFs. These findings highlight the need for policymakers and stakeholders to take a more nuanced approach towards the introduction of GMFs in Kenya, by engaging with consumers and addressing their concerns. Based on the findings of this study, there are several key recommendations that can be made. There is a clear need for more public education and awareness campaigns about GMFs. This can help to address some of the concerns and misconceptions that consumers have, and ensure that they are well-informed about the potential benefits and risks of these products.

Additionally, more efforts should be made to engage with consumers in decision-making processes around the introduction of GMFs, and to take their concerns and opinions into account. This can help to build trust and confidence in the regulatory processes governing GMFs, and ensure that consumers are more supportive of their introduction. Finally, further research should be conducted on the safety and environmental impact of GMFs. There is still much that is not known about the long-term effects of consuming and cultivating GMFs, and more research is needed to address this. This research should be conducted in a transparent and inclusive manner, with the involvement of all stakeholders, including consumers. Additionally, food companies and producers should be required to label their products to indicate whether they contain GMFs or not. This can enable consumers to make informed choic-

es about the food they consume, and ensure that they have the right to choose whether or not to consume GMFs [12-32].

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