Radio Sensitization of Farmers towards the Production of Genetically Modified Foods (GMFs) in Lokoja, Nigeria

[1]Mbazu, C. Emmanuel, [2]Oladokun, D. Bolaji, [3]Mohammed, D. James, [4]Unwuchola, A. Anderson & [5]Babatunde, O. Emmanuel

[1]Department of Mass Communication, Global Wealth University, Lome.
[2]Department of Library and Information Technology, Federal University of Technology, Ikot Abasi, Akwa Ibom State.
[3]Department of Mass Communication, Prince Abubakar Audu University, Anyigba, Kogi State.
[4]Department of Mass Communication, Prince Abubakar Audu University, Anyigba, Kogi State.
[5]Department of Mass Communication, Prince Abubakar Audu University, Anyigba, Kogi State.
✉: mbazuemmanuel@gmail.com; +(234) 8168650909

Abstract:
It is no gainsaying that radio bridges the gap between the rural dwellers and the city dwellers in every society. It also acts as an intermediary between development facilitators and the beneficiaries, especially in the area of agriculture. However, it appears that no study has been conducted to investigate the level of farmers' sensitization on radio towards the production of genetically modified foods in Lokoja, hence this present study assesses radio sensitization of farmers towards the production of genetically modified foods in Lokoja, Nigeria. It assessed the level of exposure of farmers to GMF programmes on radio in Kogi State. The study is anchored on the Media Dependency Theory and Elaborative Likelihood Model. Survey research design was employed. Three hundred and eighty copies of questionnaire were distributed, retrieved and analysed. Multistage sampling technique was employed. Instruments used were questionnaire and interview guide. It was found out that farmers in Lokoja of Kogi State are exposed to information on Genetically Modified Foods on radio through Grace FM agricultural programme. They considered such information as not comprehensive enough, even though they attested becoming aware of GMFs via the programme. The study recommends that agricultural stakeholders should harness the potency of radio to inform, educate and enlighten farmers about new ideas as it relates to all areas of agriculture.

Keywords: **Farmers, Genetically Modified Food, Radio, Sensitisation.**

.

INTRODUCTION

It is generally accepted that one of the concepts of life that is constant is change. The human environment and its systems of operations are known to experience changes and evolution owing to civilization and technological advancement. These changes do not leave food and production behind. In the days of old, farming method was crude and limited to the use of hoes and cutlasses for planting and harvesting on a small scale, however, with the development of machines, tractors, harvesters and other equipment were developed and they helped improve food production. Recently, it was discovered that the ability to achieve exponential crop growth has been seriously affected by climate changes that have impacted the environment (Rzymski and Królczyk, 2016). Plant diseases have caused a series of significant hardships for many nations around the world. Since the 1900s, concerns about the scarcity of food became a well-known fear. There were many harmful threats about a potential food shortage in the near future, threats such as the Irish potato famine, pest problems, climate change, and the growing population led many to believe that destruction of the food supply was close at hand (Kharas, 2011).

This fear resulted in the research and development of a new biotechnological method of crop production known as Genetically Modified Foods. Genetically modified organisms (GMOs) are defined as organisms (e.g., plants, microorganisms, or animals) whose genetic material (DNA) has been altered beyond its natural state either by mating or natural recombination (Rzymski and Królczyk, 2016). The World Health Organization defines GMOs as organisms in which the genetic material has been altered in a way that does not occur naturally by mating or natural recombination (WHO, 2017). Genetic modification usually involves changing the genetic makeup of the organism to create new or enhanced traits (Zhang, Wohlhueter and Zhang, 2016). Crops produced by genetic modification (Genetically modified crops) are crops whose DNA has been modified using genetic engineering techniques to introduce new traits to the crop, precisely trait(s) which do not naturally occur in the crop (Fraley et al., 1986 cited in Oluwakemi, Rauf, Seyi and Harry, 2020). The introduced traits can be intended at improving the nutritional value of the crop, prevent pest infestation, provide tolerance to

pesticides/herbicides or increase adaptability to weather and growth conditions (Ojo and Adebayo, 2012).

Looking at the benefits accrued to the use of GM technology in farming, it is expected that farmers all over the world will adopt the innovations in their production. However, farmers attitudes about GM food are complex and interwoven with the farmers knowledge of the science, lifestyle and public perception. This has been a very big concern as the knowledge and awareness of this technological advance techniques of food production is expected to be promptly promoted and spread to farmers by media outlets, most especially radio which is the most commonly used mass medium in rural areas and mostly accessible to farmers. Farmers in Kogi central zone of Kogi state are expected to be exposed to this level of technological advancement in food production via an agricultural programme tagged Ireyi-Aare which is meant to educate farmers in all spheres of agriculture.

However, such sensitization may not yield positive results in influencing the farmers adoption of GM technology as there are other contending factors affecting GMFs acceptability world over. A study by Chen & Chern (2002) found that consumer acceptance of GM foods was determined by factors including perceived benefits and risks, ideas about GM labelling, environmental impacts, and perceived difference between GM and non-GM products. In addition, Burton et al. (2001) suggest that consumer acceptance of GM food is also determined by whether the new gene is transferred within the same species or cross-species. Farmers will definitely put the above into consideration when employing GM technology in farming because their primary purpose of production is consumption.

Radio bridges the gap between the rural dwellers and the city dwellers. It also acts as an intermediary between development facilitators and the beneficiaries. Grace FM, a radio outfit situated within Lokoja of Kogi State should not be left out in carrying out this information, knowledge and awareness function which is very essential to audience in the area in exposing and influencing them towards the production of Genetically Modified Foods. In this view, radio sensitization of Genetically Modified Foods technology is rapidly increasing with its uses in an array of applications especially in third world countries, including Nigeria. Globally, the cultivation, use, and commercialization of GM crops have been surrounded by many controversies and (negative) attitudes from many sectors, including the audience (Kikulwe, Wesseler & Falck-Zepeda, 2011). Factors responsible for these attitudes include limited knowledge of the scientific principles behind the gene modification technologies, minimal or absence of known potential benefits of GMOs, religious, moral or ethical beliefs and inability to accurately define what constitutes a GMO (Pino, Amatulli, De Angelis & Peluso, 2016). The expression of the views and opinions of the pro and anti-GMO groups in the media has also contributed to misinformation and confusion of potential consumers, users, and growers of GM crops (Rzymski & Królczyk, 2016). In addition, series of issues surrounding GMO appears to have been underreported given rise to further questioning the level of knowledge, attitude of the audience.

Farmers friend, an agricultural programme aired on Grace FM, Lokoja targeted at audience in Lokoja of Kogi State is expected to address several issues bothering on agriculture including the production of Genetically Modified foods. The effectiveness of this programme in meeting up the information needs of audience in all spheres of agriculture specifically information relating to Genetically Modified Foods calls for concerns. It is upon this background that this study examines audience awareness of agricultural information on Genetically Modified Foods on radio and how such information has influenced their production of food with the aim of finding out whether *Farmers friend* (An agricultural program) on Grace FM, Lokoja has sensitized audience on the production of Genetically Modified Foods and how has the sensitization influenced food production among the audience.

Objectives of the Study

The main objective of the study is to examine audience awareness of agricultural information on Genetically Modified Foods on Grace FM and how such information has influenced their attitudes. The specific objectives are to;

1. Find out the level of exposure of audience to Grace FM *Farmers Friend* programme in Lokoja of Kogi State
2. Assess the level of awareness of audience to information on Genetically Modified Foods aired on *Farmers Friend* programme of Grace FM?
3. Examine the kinds of information on Genetically Modified Foods aired on *Farmers Friend* programme of Grace FM?
4. Find out the influence of such information to the audience production decision?

Literature Review

A Brief History of GM Foods

According to Waite (2017, p. 13), Gregor Mendel revealed in 1857 that the trait of plants is carried on from generation to generation in pairs; and in 1869 Friedrich Miescher discovered DNA. It was in the late 1970s, when rediscovering Mendels inheritance characteristics, food scientists realized that cross-breeding could be improved through the modification of the parent DNA or genome of plants. The modification of DNA would allow breeders to reproduce crops that can yield superior harvests. The process was coined genetic engineering or genetic modification and sometimes called GMO. GMO is a process by which a deoxyribonucleic acid (DNA) molecule is transferred from one gene to the next through the process of mutation; the modification of a strain of bacterium or fungi by insertion (Halford, 2003).

It is necessary to control weed problems when doing agricultural farming; and most audience use chemical herbicides to protect their crops. Organic farming usually does not use herbicide chemicals to grow crops, but it has been reported that organic audience use herbicides to spray their crops and are ceasing opportunities at niche markets. Organic farming alone may not be able to provide food for the growing masses at an affordable price, at least not without an internationally funded outreach and agreement. Many countries do not have access to the proper environment and resources that are needed to successfully produce exponential

crop growth. Some audience who uses chemical herbicides to protect their crops from weed problems face even greater problems when the weeds become tolerable to the herbicide, causing the farmer to require stronger herbicides, which is not good for the crops or the environment. These stronger herbicides that audience use to protect their crops are toxic to humans, and require the use of hazardous equipment (Halford, 2003).

Halford (2003) also opined that some audience use glysophate in combination with other herbicides or pesticides to protect their plants against weed and insect problems. One such insecticide is a soil bacterium called Bt (bacillus thuringiensis). Bt produces proteins that are toxic to some insects but non-toxic to mammals. However, there are several forms of Bt proteins that are used to protect different varieties of crops. One such Bt protein is the Cry gene, a Bt protein found in maize which contains a minimum amount of fungal toxins (mycotoxins), these have strong carcinogens which may cause throat cancer, especially for grain-fed animals, and are more problematic in tropical countries because of warm and humid storage conditions of the maize grains. However, there is only a small amount of these chemical toxins in the human food chain.

Glyphosate was developed by Monsanto and sold under many commercial names. Glyphosate is taken in through the foliage of the plant and targets the enzymes pathway, causing it to cease from producing amino acids (proteins), resulting in the death of the plant. Flavr Savr tomato, which was acquired by Monsanto, was the first GM foods product to hit the market; it was a success on the market from 1996 up until 1999 when it was withdrawn from the market due to anti-GM foods response (Halford, 2003).

The safety of GM foods has been a major issue because there are concerns about GM foods, such that it could cause an increase in the amount of food allergens present in the food chain. However, it is arguable to state that GM foods and plants are no different14 from other methods of plant breeding that could introduce allergens into the food chain as well. Nevertheless, the regulatory system is taking precautionary steps to make sure that GM foods do not bring about any new allergens into the food chain (Halford, 2003). However, creating regulatory precautions will not guarantee that new allergens will not transcend into the food chain. Evolution itself is a mystery, and the evolutionary changes that are possible after genetic modification may go on undetected, even whilst the controversial debate of GM foods is frontline news.

Media Reporting of GMFs

Biotechnology has remained in active public discussion and debate since the first commercialisation of GM plants in the mid-1990s but consumer/audience knowledge about GMOs has not increased at the same rate as the adoption of GM foods (Wunderlich & Gatto 2015). Globally, consumers are showing limited knowledge and misconceptions of biotechnology and many consumers have reported that they got information about GM food products from the media, Internet, and other news sources (Wunderlich & Gatto 2015). Therefore, these sources of information may not be as reliable as the available scientific evidence. In making a distinction between GMFs familiarity and scientific understanding, they found that those who were not familiar with biotechnology seem to be more resistant to the technology while those with higher scientific knowledge scores tend to have more favourable attitudes toward GMFs.

Existing measures of science literacy tend to focus on textbook knowledge of science but there is the need to bring science closer to people who are not scientists by making science a part of the everyday culture (Priest, 2013). As a measure of designing and evaluating new approaches to building critical science literacy, Priest (2013) suggests that people need to know something about the sociology of science, as well as something about the philosophy of science, to navigate a world full of competing truth claims about science.

In confirmation bias as regarding media exposure, individuals seek to read stories that reinforce their beliefs and attitudes. However, in a study of how individuals select science information online based on four contested science issues, Jang (2014) found that participants tended to choose science information that challenged rather than supported their views concerning stem cell and genetically modified foods. But the study also found that the participants who perceived that they had sufficient science knowledge and were religious showed confirmation-bias by preferring congruent to incongruent information. Similarly, in their examination of how political partisans consume and process media reports about nanotechnology, Yeo, Xenos, Brossard, and Scheufele (2015) found that when cues clarifying the political stakes of nanotechnology are made available, individuals are willing to read information from countervailing sources. When such cues are lacking, however, individuals avoid incongruent information and opt for headlines from attitude consistent sources. Based on this study, confirmation bias and defensive avoidance occur under certain circumstances.

A comparative analysis of media reporting of perceived benefits and risks of biotechnology (DeRosier, et al 2015) found that in Kenyan media, more articles mentioned perceived benefits of GM crops than risks. However, the study points out that when risks are mentioned, new articles contain more references to risks than to benefits. The researchers also found that the sources influence the reporting of perceived risks and benefits while the perceived risks were more reported in Kenyan newspapers than the international newspapers. Another analysis of media framing of GM crops in three mainstream Kenyan newspapers shows that only 34.7% of articles were neutral in tone (Lore, et al, 2013). The study found that boosting agricultural productivity through GM foods was predominant in two of the newspapers while the safety and regulation frames dominated coverage in the other newspaper. The most quoted sources were government officials and scientists who generally spoke in favour of GM foods. The findings in Kenya were similar to another study in Ghana which analysed news media reporting of agricultural biotechnology (Rodriguez & Lee, 2016). The findings show that government officials and representatives of the food industry were the most quoted sources in the media stories. Overall, the media coverage of GM crops was dominated by

food safety and food security and was mostly negative reporting.

Theoretical Framework

Media Dependency Theory

Sandra Ball-Rokeach and Melvin DeFleur proposed the Dependency theory in 1976. The theory is combined with several perspectives like psycho analytics & social system theory, systematic & casual approach and base elements from Uses and Gratification theory but less focus on effects. Media Dependency theory is one of the theories, first of its kind which regards audience as an active part in communication process. The dependency theory is expanded from the theory of Uses and Gratification. According to this theory, there is an internal link between media, audience and large social system. The audience learning from the real life is limited, so they can use media to get more information to fulfil their needs. An extensive use of media generates dependent relation in audience. Also, media can create dependence relationship with target audiences to achieve their goals by using its media power. The choice of the Media Dependency Theory is informed by the idea that since the masses depend on the media to meet their information needs, the conventional media such as radio should leave no stone unturned in relaying to audience information that concerns them. This sensitization function is expected to be performed by Grace 95.5FM Lokoja in educating and informing audience in Lokoja of Kogi State on the production of Genetically Modified Foods, since the station is one of the major community radios in the area.

Elaboration Likelihood Model (ELM)

The Elaboration Likelihood Model (ELM) of persuasion was propounded by Richard E. Petty and John Cacioppo in 1980. The model aims to explain different ways of processing stimuli, why they are used, and their outcomes on attitude change. The ELM proposes two major routes to persuasion: the central route and the peripheral route.

- Under the *central route*, persuasion will likely result from a person's careful and thoughtful consideration of the true merits of the information presented in support of an advocacy. The central route involves a high level of message elaboration in which a great amount of cognition about the arguments are generated by the individual receiving the message. The results of attitude change will be relatively enduring, resistant, and predictive of behaviour.
- On the other hand, under the *peripheral route*, persuasion results from a person's association with positive or negative cues in the stimulus or making a simple inference about the merits of the advocated position. The cues received by the individual under the peripheral route are generally unrelated to the logical quality of the stimulus. These cues will involve factors such as the credibility or attractiveness of the sources of the message, or the production quality of the message. The likelihood of elaboration will be determined by an individual's motivation and ability to evaluate the argument being presented.

The elaboration likelihood model is relevant to this study because it is a two distinct routes for information processing: a central route and a peripheral route. The ELM holds that there are numerous specific processes of change on the "elaboration continuum" ranging from low to high. When the operation processes at the low end of the continuum determine attitudes, persuasion follows the peripheral route. When the operation processes at the high end of the continuum determine attitudes, persuasion follows the central route. So, the Elaboration Likelihood Model will help *Grace FM* to understand the best form of communication route to be used to change farmers attitude towards the production of Genetically Modified foods though *Farmers Friend* Agricultural programme.

Materials and Methods

In this study, both the qualitative and quantitative methods were combined using descriptive survey. There is no official record of the actual numbers of audience as regards to farmers, but going by Varrela (2020) assertion that 70% of Nigerians practice crops farming, it can be deduced that 70% of people living in the formed the population of the study. Based on the 2006 population census, the population of people in Lokoja is one hundred and nine-five thousand, two hundred and sixty-one (195,261) which is projected at 741,000 using the national population growth rate of 7.08 % and going by Varrela (2020) assertion that 70% of Nigerians practice crops farming, 70% of 741,000 is 518,700. The population of the study therefore is 518,700. Multistage sampling technique was used to select the samples for this study. First stage, stratified sampling was used to categorized the audience into five strata based on the ten council wards that make up Lokoja local government. The Council wards are Eggan, Kakanda,Kupa North East,Kupa South West, Lokoja A, Lokoja B, Lokoja C, Lokoja D, Lokoja E and Oworo. The instruments used in collecting data for this study are the questionnaire for 380 respondents and interview schedule; interview was used to source for more primary data from the producer and presenter to get the opinion of the producer/presenter of the programme on how they carry out the programme and whether issues of Genetically Modified Foods are being discussed in the programme.

Discussion of Findings

What is the level of exposure of audience to Grace FM *Farmers Friend* programme in Lokoja of Kogi State?

Research objective one is about the level of exposure or access to *Farmers Friend* agricultural programme among audience in Lokoja of Kogi State. Shows that first of all, the respondents were all farmers and majority of them (340 out of 380) listened to Grace 95.5 FM, this shows that among the (340 out of 380) who listened to Grace 95.5FM, 96.6% of them were exposed to *Farmers Friend* agricultural programme and they all gave correct responses to the day and time of transmission of the programme as reported. They equally attested that they listened to *Farmers Friend* agricultural programme at regular basis as was analyzed it was found that the programme interesting to them. Findings here revealed that audience in Lokoja of Kogi State are exposed to *Farmers Friend* agricultural programme on Grace 95.5FM; they acknowledged the actual date and time of

transmission of the programme; they listened to the programme on regular basis and found the programme very interesting. Affirming this, the producer of the *Farmers Friend* agricultural programme in an interview said the programme are run every Thurday of every week with different episode. Each week, different topics are brought on board and discussed while audience make their contributions via phone-in. The programme last for one hour between 10am to 11am every Thurday. He further revealed the efforts put in place to get the programme to the audience when he noted that "We have done a lot in exposing our audience to the programme; we have jingles that announces the programme every day. It helps us to remind them to always tune in to the programme and I must say we are enjoying massive followership. This implies that radio stations are unarguably the most effective means of reaching farmers in terms of information dissemination and Grace FM is not lagging behind in this regard. This is to say that radio is still an effective way of reaching people at the rural areas. The contribution of radio to development, (that is, making life better for people), is well acknowledged by media scholars and radio enthusiasts. In support of this findings, Moemeka (2008) noted that radio is the most accessible of all information and knowledge-sharing sources and instruments on the African continent.

What is the level of awareness of audience to information on Genetically Modified Foods aired on *Farmers Friend* programme of Grace FM?

Research objective two is about audience level of awareness to information on Genetically Modified Foods aired on *Farmers Friend* programme of Grace FM. Data analyzed provided answers to the research question. The data shows that majority of the audience sampled (85.7%) listened to information on Genetically Modified Foods on the *Farmers Friend* agricultural programme, although it was to some extent. Meanwhile, they noted that the information was not comprehensive enough. They attested that they never heard of GMFs outside *Farmers Friend* programme. The few ones who heard of GMFs outside *Farmers Friend* agricultural programme equally heard it from other radio platforms. It went further to reveal that the majority of audience in Lokoja despite being exposed to GMFs information on *Farmers Friend* agricultural programme of Grace 95.5FM, still had little knowledge of it. Findings here revealed that the audience in Lokoja of Kogi State is exposed to information on Genetically Modified Foods from the *Farmers Friend* agricultural programme to some extent. This finding contradicts the finding of the study carried out by Chagwena, Sithole, Masendu, Chikwasha & Maponga (2019) which revealed poor level of knowledge on GM foods among respondents in Zimbabwe. This is to say that *Farmers Friend* programme has done what Zimbabwe media outlets could not do. This finding also contradicts that of Ridwan, Suleiman and Fatonji (2014) which holds that radio is not yet a tool of diffusion of agricultural innovations among peasant audience in Lagos.

What are the kinds of information on Genetically Modified Foods aired on *Farmers Friend* programme of Grace FM?

Research objective three is about the kind of information on Genetically Modified Foods aired on *Farmers Friend* agricultural programme. The analysed data revealed that the kind of information on GMFs aired on *Farmers Friend* agricultural programme were positive. Farmers were exposed to information which explained that GMFs help to solve important food challenges and help to fight diseases; GMFs increase food production and make farming easier; Audience in rural areas lacks the required technology to handle GMFs as well as Government should make GMFs technology available to audience. This is against the finding of a study conducted by Munro, Hartt and Pohlkamp (2015) which revealed that although, the broad analysis of social media mention shows some supportive discussion of GMOs, the narrow analysis of the more egalitarian social media tool (Twitter), demonstrates an almost unanimous negative attitude towards GMOs. In the case of this study, *Farmers Friend* agricultural programme on Grace FM portrayed a positive attitude towards GMFs.

What is the influence of such information to audience production decision?

Research objective four is about the influence of GMFs information to audience production decision. Findings revealed that information gotten from *Farmers Friend* agricultural programme on GMFs was useful to the respondents and such information changed their perceptions about GMFs. This shows that the perception created by the programme concerning GMFs was positive. However, the respondents noted that they did not apply the information gotten on GMFs in the production of their farm products. The few farmers who applied the information gotten on GMFs in the production of their farm products did that to a low extent. The producer of the programme did not give a clear stand on whether the programme was able to influence its audience. I think so; the audience should be in the position to give you valid information concerning that but I think satisfactorily we have done and still doing our best, he said. This revealed that although farmers in Lokoja considered information on GMFs gotten from *Farmers Friend* agricultural programme useful. They agreed that the programme created in them a positive perception about GMFs but the programme did not influence them to the extent of applying such information in the production of farm products. This finding contradicts that of Waite (2017) when he noted that the benefits and disadvantages of GM foods do affect the purchasing decisions of the educated consumer. But in this case audience in Lokoja are not influenced by the information gotten from *Farmers Friend* agricultural programme. There are factors which may have necessitated this ranging from their inability to acquire the required tools needed for GMFs production to lack of interest in using such information. Findings from the study of Taylor, Joy, Keegan & Mary (2016) is related to this finding when it revealed that message source had limited influence on respondents' attitudes toward GM foods.

Conclusion

This study has established that the issues of Genetically Modified Foods were not underreported and poorly covered in *Farmers Friend* programme on Grace 95.5FM, Lokoja and the programme has created a positive perception of GMFs among audience in Lokoja of Kogi State. The respondents attested that they were exposed to *Farmers Friend* agricultural

programme on Grace 95.5FM, Lokoja; they acknowledged the actual date and time of transmission of the programme; they listened to the programme on regular basis and found the programme very interesting. As a result of the programme, they became exposed to information on Genetically Modified Foods to some extent. However, they considered such information as not comprehensive enough. Even though the respondents considered information on GMFs gotten from *Farmers Friend* agricultural programme useful, and also agreed that the programme had created in them a positive perception about GMFs, they believed they are not influenced to applying such information in the production of farm products. This is to say that even though *Farmers Friend* agricultural programme on Grace 95.5FM, Lokoja has done much in sensitizing audience about the production of Genetically Modified Foods, the efforts of the producer of the programme has not yielded much results in influencing the audience to applying GMFs information in the production of their farm products. Based on this, it can therefore be concluded that radio has become a tool of diffusion of agricultural innovations among audience in Lokoja, Kogi State, however, a lot still need to be done to be able to fully influence the target audience to adopting such innovations.

Recommendations

1. Since *Farmers Friend* agricultural programme on Grace 95.5FM, Lokoja has done much in sensitizing audience about the production of Genetically Modified Foods, all agricultural stakeholders should harness the potency of the radio station to inform, educate and enlighten audience in the area about new ideas as it relates to all areas of agriculture.
2. Based on the fact that radio is the major source of agricultural information to audience in Lokoja, Kogi State, it is important to recommend that radio should be used as a tool for continuous sensitization of audience on all matters that concerns them.
3. Audience should change their attitudes and perceptions towards the production of GMFs and harness their knowledge of the technology when carrying out their farming activities.
4. The usefulness and economic importance of GMFs should be repeatedly emphasized by the producer of *Farmers Friend* programme. This may encourage the application of GMFs among audience in Lokoja, Kogi State.
5. The government should provide support for radio producers to carry out more sensitization on Genetically Modified Foods among audience.

References

Baridam, D. M. (1995). *Research methods in administrative science*. Port Harcourt: Paragraphics.

Chagwena, D., Sithole, B., Masendu, R., Chikwasha, V. and Maponga, C. (2019). Knowledge, Attitudes and Perceptions towards Genetically Modified Foods in Zimbabwe. *Afr. J. Food Agric. Nutr. Dev. 2019; 19(3): 14752-14768.*

DeRosier, C., Sulemana, I., James, H.S., Valdivia, C., Folk, W., & Smith, R.D. (2015). A comparative analysis of media reporting of perceived risks and benefits of genetically modified crops and foods in Kenyan and international newspapers. *Public Understanding of Science 24*(5):563–581.

Francis, C., Pirkis, J., Dunt, D., Blood, R. W. & Davis, C. (2012). Improving mental health literacy: A review of the literature. Australia: Department of Health and Ageing, Australia: Wadswith.

Halford, N. (2003). Genetically Modified crops. (Ed.). London: Imperial College Press.

Huang, Y. (2018). Understanding consumer acceptance of genetically modified foods in Canada: an exploration of the influence of culture on consumer planned behaviors. A study submitted to the college of graduate and postdoctoral studies in partial fulfillment of the requirements for the degree of Master of Science in the department of management and marketing university of Saskatchewan, Saskatoon

Jang, M.S. (2014). Seeking congruency or incongruency online? Examining selective exposure to four controversial science issues. *Science Communication. 36*(2). 143-167.

Kharas, H. (2011). The challenge of high and rising food prices. *The Brown Journal of World Affairs*, *18* (1). 97-106. Retrieved from http://search.proquest.com/docview/1239068420?accountid=15150

Kikulwe, E. M., Wesseler, J. and Falck-Zepeda, J. (2011). Attitudes, perceptions, and trust: Insights from a consumer survey regarding genetically modified banana in Uganda. *Appetite 57(2). 401-413.*

Lore, T.A., Imungi, J.K., & Mubuu, K. (2013). A framing analysis of newspaper coverage of genetically modified crops in Kenya. *Journal of Agricultural & Food Information* 14(2). 132-150.

Moemeka, A. A. (Ed.) (2008). *Communicating for development: A new pan-disciplinary perspective.* State University of New York Press.

Ojo, E. O. and Adebayo, P. F. (2012). Food security in Nigeria: An overview. *European Journal of Sustainable Development 1*(2). 199-222.

Oluwakemi, H. O., Rauf, R. I., Seyi, E. A. and Harry, K. (2020). Readiness of the Nigerian public for the introduction of genetically modified crops into the food market. *African Journal of Biotechnology, 2020. 19*(7). 426-438.

Pino, G., Amatulli, C., De Angelis, M. and Peluso, A. (2016). The influence of corporate social responsibility on consumers attitudes and intentions toward genetically modified foods: Evidence from Italy. *Journal of Cleaner Production 112.* 2861-2869.

Priest, S. (2013). Critical science literacy: What citizens and journalists need to know to make sense of science. *Bulletin of Science, Technology & Society. 33*(5-6). 138-145.

Ridwan, A.A., Suleiman, H.B., & Fatonji, S.S. (2014). Radio as a tool of diffusing agricultural innovations in

Lagos. *Arabian Journal of Business and Management Review (OMAN Chapter) 3, 11*.

Rodriguez, L. & Lee, S. (2016). What can be gleaned from news coverage to improve science reporting and enhance public literacy about agricultural biotechnology in Ghana? *Journal of Agricultural & Food Information 17*(2-3). 91-109.

Rzymski, P. and Królczyk, A. (2016). Attitudes toward genetically modified organisms in Poland: to GMO or not to GMO? *Food Security 8*(3):689-697.

Salmon, C. T. & Murray-Johnson, L. (2014). Communication campaign effectiveness: Critical distinctions. In: Rice RE, Atkin CK, editors. Public Communications Campaigns. 3rd ed. Thousand Oaks. Sage Publications.

Taylor, K. R., Joy, N. R., Keegan, D. G. and Mary, T. R. (2016). The Importance of Source: A Mixed Methods Analysis of Undergraduate Students Attitudes toward Genetically Modified Food. *Journal of Agricultural Education, 57*(3), 145-161.

Thorogood, M. & Coombes, Y. (Eds). (2010). *Evaluating health promotion: practice and methods*. 3rd ed. Oxford University Press.

Varrela, S. (2020). Statistics and facts on agriculture in Nigeria. *Statista*. Retrieved from www.statista.com/topics/6729/agriculture-in-nigeria/#topicHeader_wrapper.

Waite, A. A. (2017). Consumer Knowledge, Perception and Attitudes of Unlabeled Genetically Modified Foods of an Educated Population in the State of Kentucky. A Study Presented to the Department of Architectural and Manufacturing Sciences Western Kentucky University Bowling Green, Kentucky in Partial Fulfillment of the Requirements for the Degree Master of Science.

Wunderlich, S. & Gatto, K.A. (2015). Consumer perception of genetically modified organisms and sources of information. *American Society for Nutrition: Adv Nutr* (6). 842-850.

Yeo, S.K., Xenos, M.A., Brossard, D. & Scheufele, D.A. (2015). Selecting our own science: How communication contexts and individual traits shape information seeking. *The Annals of the American Academy of Political and Social Science 658*(1). 172-191.

Zhang, C., Wohlhueter, R. and Zhang, H. (2016). Genetically modified foods: A critical review of their promise and problems. *Food Science and Human Wellness*, *5*. 116-123. Retrieved from https://doi.org/10.1016/j.fshw.2016.04.002.