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Public Perception of Genetically Modified Food in Ghana

J.N. Buah

Department of Crop Science, School of Agriculture, University of Cape Coast, Cape Coast, Ghana

ABSTRACT

A seventy question questionnaire were administered to (1,200) respondents to find out the perceptions of the Ghanaian public on Genetically modified foods (GM Foods). The questionnaires which covered wide range of issues and structured such that a complete picture of the understanding and perceptions of the respondents would clearly come out, were administered between March 2009 to September 2009. The respondents cut across sectors of the country (Academics, Researchers, Government ministry workers and ordinary Ghanaians) to ensure a good representation of the public. Three hundred people were selected from each of the four categories. Even though more than 60% of respondents from all the categories had heard of GM food, the level of knowledge for most of the respondents was rated as low or average. This was because apart from 50 and 60%, respectively of academics and researchers who had heard of GM foods from workshops, most of the respondents had heard of GM foods from friends, who themselves may not have had a better understanding of GM foods. More than 80% of the respondents from government ministry workers and the ordinary Ghanaian category were unwilling to accept GM foods and their rejection was based on the fear of unknown side effects and on ethical considerations. It was evident that there is the need for a more comprehensive public education and debates to improve the perceptions of the public on GM foods.

Key words: Genetically modified foods, public perception, genes, molecular biology, Bt corn

INTRODUCTION

The term Genetically Modified Foods (GM Food) is most commonly used to refer to crop plants that are created for human or animal consumption using the latest molecular biology techniques. It usually involves the transfer of genes from one plant to another and in extreme cases, the transfer of animal genes into plants, for example the Bt. Corn (Saxena and Stotzky, 2001). This aspect of biotechnology has over the years generated debates and arguments and a good number of people including the better informed section of the public seem to be confused about the benefits and dangers of the use of GM foods.

This emerging technology is often viewed as the key to the next green revolution which has the potential to fundamentally alter the way the society organizes its production and distribution of food. It is widely recognized that biotechnology is one of the most innovative technologies developed in the 20th century with even more promising future in the 21st Century. Many GM products (rice with enhanced vitamin A, long lasting fruits and vegetables) have already entered the world's food distribution networks. These products have the potential to not only meet our basic needs, but also bring a wide range of economic, environmental and health benefits. Biotechnology advocates emphasize the potential benefits to society via reduction of hunger and malnutrition, prevention and cure of diseases and promotion of health and general well being (Isserman, 2001), UNDP,

(2001) have reported that many GM crop varieties have shown superiority over conventionally grown crops in terms of yield, pests and disease resistance, nutritional improvement and longer shelf life. With many nations in the developing world already struggling to meet their citizens' food and nutritional needs and with global populations slated to increase by 50% between 2006 and 2050, GM foods have attracted growing attention (Quaye *et al.*, 2009). Proponents of the GM technology hold the view that anti-GM food attitudes are uniformed, emotionally driven and fostered by both media hysteria and non governmental organizations that are opposed to biotechnology in general (Hoban, 1998; Marchant, 2001). They contended that if citizens had more accurate scientific information and were made more aware of the benefits of GM foods, support from the public would increase. Despite its promise to bring significant benefits to society, public acceptance of biotechnology has been with mixed feelings (Einsiedel, 1997; Kassadjian *et al.*, 2005). It has been argued that modern genetic technologies may allow developed countries to produce commodities that are currently imported from developing countries. Such developments, it is claimed, will have significant negative effects on poverty situation in the third world and lead to global instability (Galhardi, 1995). Critics of biotechnology/GM foods insist that these new technologies have potential threat to human life, to existing plant and animal species (biodiversity) and to the environment. Even though opponents of GM foods agree that GM crops produce better yield, they stress that cataclysmic risks to public health, safety and the environment are inherent in GM research, production and commercialization. The most prominent among them being the potential of GM foods to create new allergies or harmful toxins that may cause sickness and death among vulnerable populations (Pusztai, 2001; Paarlberg, 2006). They insist that such foods could pose risks to health and the environment. Another argument by the opponents of GM foods is that; Most testing is carried out by the very biotech companies that have the most to gain from results that say GM food is safe. Growing GM crops also threatens wildlife and the production of GM-free foods. Moreover, some GM crops that produces their own antibiotics against bacteria could have adverse effect on the human body's response to antibiotics in times of need. Opponents view its use as a needless interference with nature that may lead to unknown and potentially disastrous consequences (Rohrmann and Renn, 2000). Some resist the use of genetic technologies in agricultural production alleging (perceived) risks to humans and environment, while others oppose it citing moral, ethical and social concerns (Winterfeldt and Edwards, 1984). Biotechnology is often criticized on the ground that man is trying to play God and that its use in plants and animals, especially gene transfer across species, take us to realms of God and against Law of nature. Some argue that since genes are naturally occurring entities that can be discovered (not invented), granting patent ownership to genetic findings and processes is morally and ethically untenable (Hallman *et al.*, 2001). Africa as a developing continent and viewed as the continent where hunger prevails, is emerging as one of the frontlines in the battle for acceptance of agricultural biotechnology and GM food. For Africa, the debate is occurring at a crucial time when incidence of food insecurity, poverty and malnutrition are particularly devastating (FAO, 2003). The local policy makers, who will ultimately decide on the future of biotechnology, including genetically modified foods, are being pushed and pulled in both directions. Only a few countries, namely Burkina Faso, Egypt, Kenya, South Africa, Uganda and Zimbabwe are involved in some form of biotechnology research or (at least for South Africa) commercial use, especially in crop agriculture (African Agricultural technology foundation, www.aatf-africa.org). Given the significance of the subject, full understanding of public interests and concerns is needed to arrive at sound private and public decisions pertaining to food biotechnology. A lot of research has been done on public perception of

agricultural biotechnology in industrialized countries (Yawson *et al.*, 2008; Juma, 2002; Shanahan *et al.*, 2001; Gaskell *et al.*, 2000; Kalaitzandonakes, 2000; Sagar *et al.*, 2000; Watanabe, 1985). However, the same cannot be said about developing countries. In Ghana for instance, there has been workshops and conferences on GM food by scientists, sponsored largely by developed countries where these GM foods are created. There has however not been a serious public education or debate on the issue to find out how the public feels and views the use of GM food. Such views are important since it has a bearing on GM policy formulations. For example, a survey of consumer acceptance of GM foods in Japan, Norway, Taiwan and the United States showed wide differences in consumer acceptance across countries (Chern and Rickersten, 2002). This study therefore looks at the perception of the Ghanaian public on GM food research and use with the following objectives:

- To investigate the level of willingness of the public in the use biotechnology/GM foods and the social implications
- To examine the extent of usefulness of biotechnology in solving food problems in Africa as perceived by the public.
- To determine the level of awareness of the Ghanaian public on Biotechnology and GM Foods

MATERIALS AND METHODS

A total of one thousand two hundred people were interviewed from the Ghanaian adult population. The different segments covered included the academia (Universities), research scientists from the countries research institutes, government ministries and ordinary Ghanaians who are literates. Three hundred people were selected from each section mentioned above. The sampling of the ordinary Ghanaian cut across people from areas of work which does not belong to the groups mentioned above but who were literates to understand the issues in the questionnaire. The four categories of respondents for this work were chosen to ensure that almost every segment of the Ghanaian population was covered.

The approach used allows conducting a survey on public risk perception in a country with low awareness of agricultural biotechnology (Quaye *et al.*, 2009). Structured questionnaire was designed for data collection on the set objectives which include level of willingness to use GM products, perceptions of the usefulness of biotechnology, level of interest in biotechnology research and how to improve the level of acceptance among the Ghanaian public.

Each questionnaire comprised of a total of seventy questions and the questions covered wide range of issues and were structured such that a complete picture of the understanding and perception of the respondents would come out clearly. Each questionnaire had four main sections which covered, Demographic data, Knowledge and source of knowledge on GM foods, perceived risks and willingness to buy and use GM foods and support for Gm research and trust for government agencies to handle issues of GM foods. Samples of the questions for the various categories are provided in Table 1.

The entire 1,200 questionnaire were administered and retrieved. Statistical Package for Social Sciences (SPSS) version 17 and Microsoft excel were used to analyze the data collected.

RESULTS

All the respondents from the various categories were able to participate in the interview Table 2.

Table 1: Sample questions of the questionnaires administered

Category	Sample question	Options for evaluation
Knowledge and Interest about GM food	Have you heard about GM food	Yes, No
	what is your source of information about GM food?	TV, Radio, Friends Print media, workshop
	How interested are you in GM issues?	Very interested, not interested, somehow interested
Perceived risk and Willingness to buy GM foods	Would you accept GM foods if they were cheaper?	will accept, will not accept Not sure
	What is your view of GM foods in terms of consumption?	harmful, not harmful Not sure
Support for GM research and trust for government in handling GM issues	What would you say about government funding of GM research?	must be banned, Not sure Should be funded more
	Do you trust the capacity of government agencies to handle GM issues safely?	High trust, low trust Do not trust, not sure

Table 2: Percentage participation of the categories of participants in the interview

Category	Gender proportion	Percentage participation
Academia		
M	150	100
F	150	100
Research institutes		
M	200	100
F	100	100
Government ministries		
M	150	100
F	150	100
Ordinary Ghanaian		
M	150	100
F	150	100

M: Male respondents, F: Female respondents

People from four different categories (Academia, Research Institutions, Government Ministries and the ordinary Ghanaian) constituted the respondents. Respondents were asked whether they had heard about Biotechnology and Genetically Modified Foods (GM foods). All the respondents (100%) from the academia and research institutes had heard about Biotechnology and GM foods. Eighty-nine and sixty-eight percent of respondents from Government ministries and the ordinary Ghanaians, respectively also indicated that they had heard about Biotechnology and GM foods (Fig. 1).

Majority of respondents from Government ministries and the ordinary Ghanaians; 46 and 90% respectively, had heard of GM foods from friends as indicated in Fig. 2.

Workshops and friends were the main sources of information on biotechnology and GM foods for respondents from research institutes and academia. Almost 60% of respondents from the research institutes had heard about GM foods from workshops they attended and media (print) accounted for only 15%. For those in the academia, 55 and 5% heard of GM foods from workshops and through the media, whilst 40% heard about GM foods from friends. The electronic media (radio and television) had not been a source of information for any of the respondents.

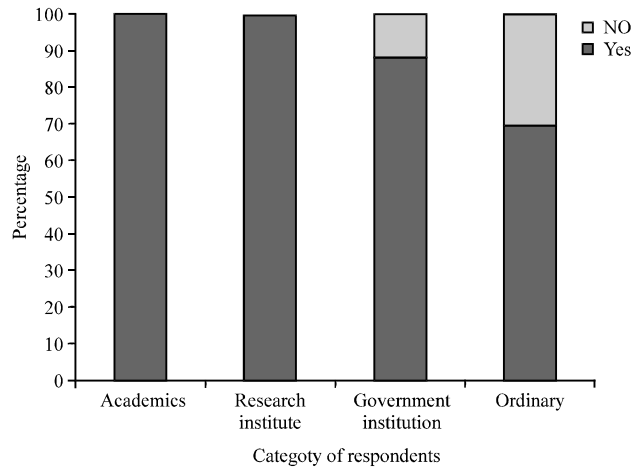


Fig. 1: Percentage of respondents who had heard about Biotechnology and GM foods

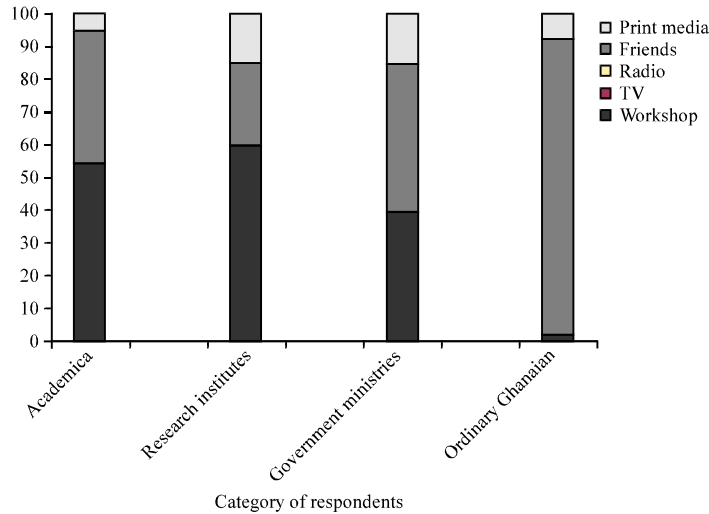


Fig. 2: Sources of information on Biotechnology and GM Foods

There was a clear distinction between the knowledge level of respondents from academia and research institutes on one side and those from government ministries and ordinary Ghanaians on the other. Whilst most of the respondents from academia and the research institutes rated their level of knowledge between excellent and average, those in the government ministries and Ordinary Ghanaians rated theirs between average and low. Out of the four categories of respondents, 55% from the government ministries rated their level of knowledge as Low, compared to 35, 10 and 25% from the Ordinary Ghanaian, respondents from research institutes and the academia, respectively (Fig. 3).

When respondents were asked about their interest in issues concerning Biotechnology and GM foods, 50% or more from all the categories indicated that they were interested (Fig. 4). The level of interest was high among the academia 82% and those from research institutes 68%.

It was observed that very small percentage between 3-13% from all the groups indicated that they were not interested in the issues of Biotechnology and GM foods. This trend was similar to the

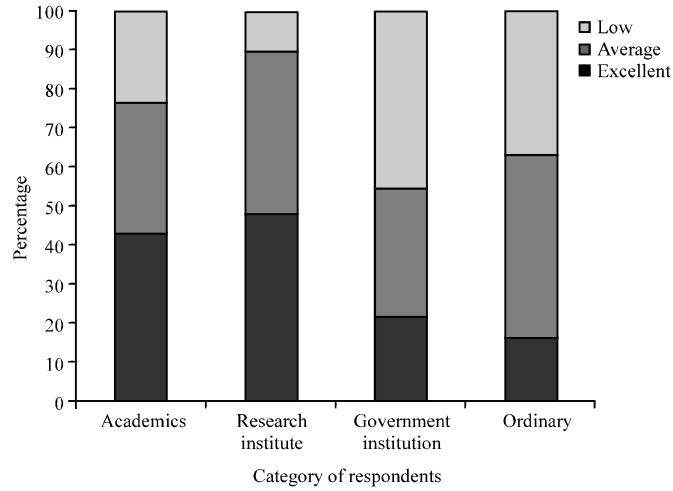


Fig. 3: Respondents' rating of their level of knowledge in Biotechnology and GM Foods

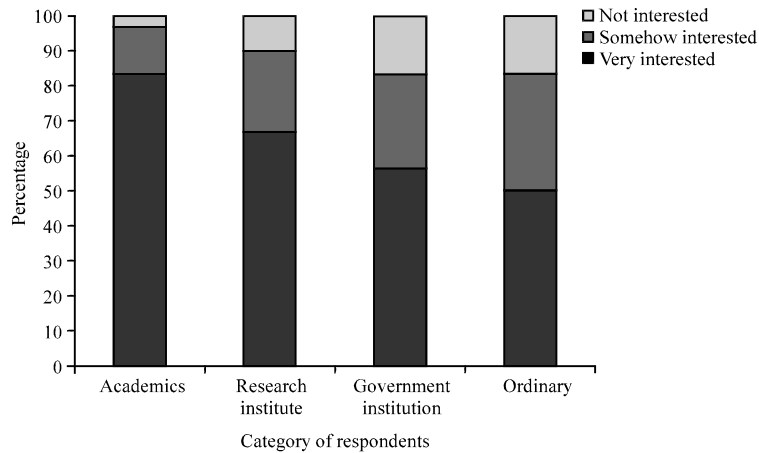


Fig. 4: Level of interest of respondents in issues concerning Biotechnology and GM Foods

responses given by the respondents about how concerned they were, with regards to GM Foods in our supermarkets (Fig. 5).

Ninety-three percent and eighty-one percent of academics and researchers, respectively, responded that they were very concerned or somehow concerned. Seventy-one percent and 69% of respondents from government ministries and ordinary Ghanaians also indicated that they were very concerned about GM foods.

The four categories of respondents were again divided with respect to their acceptance of GM foods (Fig. 6). Ninety-five percent of Respondents from government ministries and 90% of respondents from the ordinary Ghanaian category indicated strong unwillingness to accept Biotechnology and GM foods.

On the other hand, 60 and 45% respectively of respondents from research institutes and academia indicated their acceptance for GM Foods. Fifty-five percent (55%) of academia and almost 40% of those from research institutes indicated that they will not accept GM Foods or were not sure about accepting or not accepting.

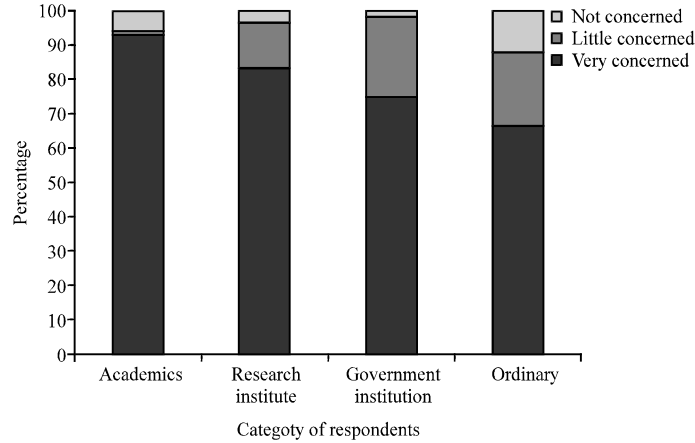


Fig. 5: Respondents level of concern about issues of Biotechnology and Gm foods

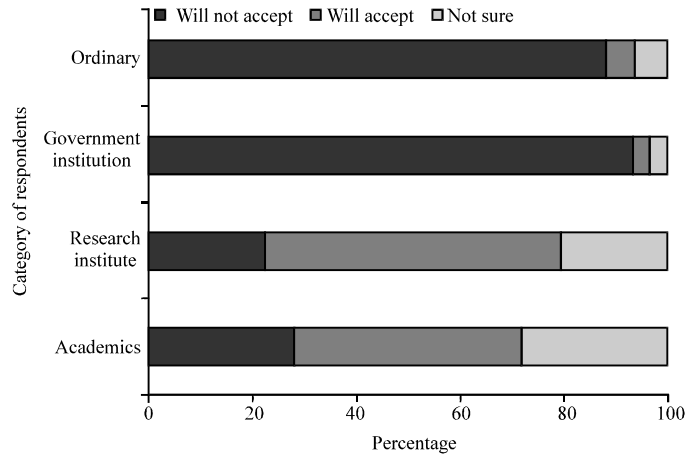


Fig. 6: Respondents willingness to accept GM Foods

Majority of the respondents from all the four categories based their rejection of GM Foods on the fear of side effects. Eighty-six percent of academics gave the fear of side effects as their reason for not accepting GM Foods, compared to 73% each from the three other categories (Fig. 7).

Religious considerations were very minimal among the academics (2%) compared to 20% each from respondents of the research institutes and ordinary Ghanaians. Very small percentages could not assign reasons for their objection to GM Foods.

Less than 10% each from government ministries and ordinary Ghanaian respondents agreed that GM research should be supported financially. Over 90% of respondents from the two categories supported the banning of GM research in Ghana as shown in Fig. 8.

On the other hand, 70 and 68% of respondents from academia and research institutes supported the funding of GM research. More than 20% of respondents from research institutes were not sure of their position on the funding of GM research in Ghana.

More females had an overall negative perception towards GM foods than their male counterparts (Table 3). Sixty percent of the female respondents were negative on issues of GM

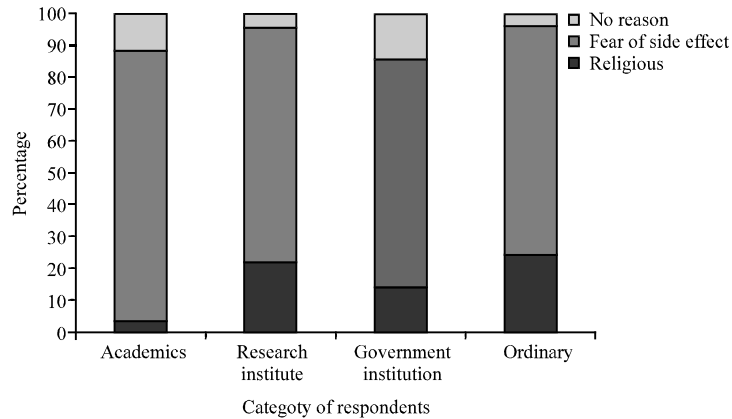


Fig. 7: Reasons for rejection of GM Foods

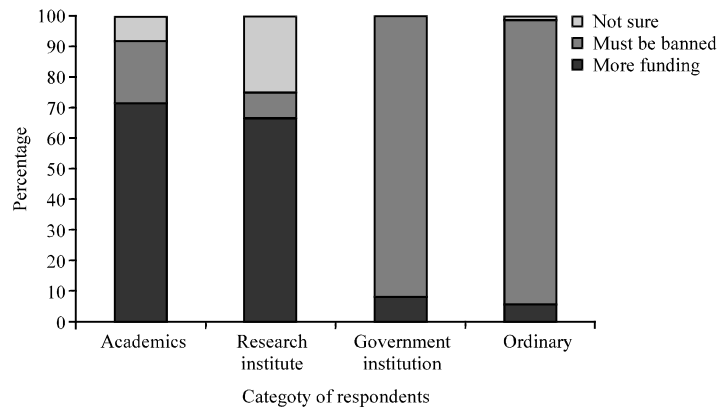


Fig. 8: Respondents' support for the funding of GM research in Ghana

Table 3: Gender perception towards GM foods

Perception	Gender percentage (%)	
	Male	Female
Negative	30	60
Positive	55	35
Neutral	15	5

compared to 30% for the males. On the other hand, more of the male respondents showed positive attitudes towards GM foods.

DISCUSSION

Issues of GM foods and technology are a very important one worldwide and since its inception, people of different countries and sexes have been concerned and shown interest. This will explain why in this work, all the respondents showed interest in participating in the interview.

Most of the respondents interviewed from all the categories had heard about Biotechnology and GM food. The fact that they had heard about Biotechnology and GM food did not seem to reflect in their knowledge level because a good number of those interviewed from the four categories rated

their knowledge level between average and low. The underlying reasons for this could well be their sources of information. Friends were one of the major sources of information on GM foods and biotechnology for all the categories of respondents. It is possible that the friends, who were the sources of information themselves, had very little knowledge and understanding beyond the mentioning of the technologies therefore, little or no education went on. On the contrary, those who had their information from workshops rated their knowledge level as excellent or average. The media (print or electronic) contributed very little to the knowledge levels of the respondents. In this study, friends and workshops had been the main sources of information for the respondents. In the work of Frewer *et al.* (2002) however, the use of television, radio, newspapers and public lectures were the main sources of information for Chinese respondents. According to Curtis *et al.* (2003), the use of these avenues by the Chinese government has been very successful in educating the public because only 9.3% of the respondents in China had a somewhat negative opinion concerning GM food, compared to the over 50% of respondents in Ghana. Again, in the work of McCluskey and Swinnen (2004), television was the main source of information for their respondents. The use of television and radio will be effective tools in Ghana because every household in Ghana either has a Television or radio. Therefore if issues of Biotechnology and GM food are explained in English and the local dialects on radio and television, it will offer better sources of information to the public and also enhance their level of understanding about issues of GM foods.

Majority of the respondents from all the four categories expressed their interest in issues of GM foods and were willing to participate or attend public lectures on GM foods. In the same way, a good number also indicated that they were concerned about issues of GM foods. This observation is similar to the work of Wanskin and Kim (2001) and Aermi (2000) who reported that 80% of their respondents expressed interest to participate in public lectures or debate on GM food. This goes to confirm that Biotechnology and GM food are topics of global concern and public education is a necessity for a better understanding of the issues involved. Over 80% of the respondents from the ordinary Ghanaian category and 90% of those from the government ministries indicated their total rejection of GM foods. Even in the categories of academics and research institutes where most of them had rated their knowledge level as excellent or average, over 50 and 40%, respectively indicated they will not accept or were not sure whether they will accept or not. This was similar to work done by Quaye *et al.*, (2009) who reported that close to 50% of respondents in Ghana were not in favour of accepting GM foods. The acceptance or rejection of GM foods tended to reflect on the level of knowledge of the respondents because more of the respondents from the academia and research institutes indicated they will accept GM food compared to the over 80% from the government ministries and ordinary Ghanaian groups that rejected GM foods. Baker and Burnham (2001) have similarly reported that consumers' cognitive variables like educational level tended to influence their acceptance of GM foods. Sjoberg (2008) had also said that experts and scientist saw GM technology as good whilst the public saw it as the worst technology. Legge and Durant (2010) had also similarly reported that it is very common to find very large differences between experts and the public when it comes to acceptance of GM technology. Contrary to the findings of this study however, Rowe (2004) had reported that the level of knowledge was not influential in accepting or rejecting GM food and that the educated were more opposed to GM technology than those with little knowledge. This is not surprising because educated people are more analytical and so will have more questions on any technology than the less educated. This will be different when one is not just educated but an expert on a technology. Some of the academia as well as those in the research institutes also indicated their rejection for GM food. This shows that the issues of biotechnology and

GM food are very complex therefore the knowledge just of it, is not enough to give someone a good understanding. This is collaborated by Legge and Durant 2010. Therefore, for the public to understand the issues of GM food there must be intensive public debate and lectures spear headed by the government and research institutes. Since, 1998, six nations led by France, prompted and sustained a de facto EU moratorium on the approval of new GM crops until public confidence in the GM technology is restored. It was supported by the fact that, only with more trust in the information afforded to the public could government policy on GM hold. (Braun, 2002). Governments in France and the UK, therefore launched public participation and consultative exercises involving the citizens in 1998 and 2003, respectively (Kelly, 2003; Lieberman and Taylor, 2005).

The fear of unknown side effects and religious inclinations were the major reasons for the rejection of GM food by the respondents. More than 70% from all the four categories involved in the survey based their rejection on the fear of unknown side effects which were mainly in the area of health and environment. This observation is supported by Townsend and Campbell (2004), Poortinga and Pigeon (2005) all of who had reported in their work that one of the major reasons why respondents in their work would not accept GM food was on health risks. On the contrary, Hallman *et al.* (2001) and Frewer *et al.* (2002) reported that majority of respondents in America and China think that the GM Food and technology can bring immense health benefits to the public. This could be due to the fact that, public education in America and China has been extensive and comprehensive to allay the fears of the general public. In fact, Li *et al.* (2003) had reported that in China, consumers were willing to pay a 16% premium for GM soybean oil and a 38% premium for GM rice over the non-GM rice and attributed this to effective public education by the government. On the contrary however, Noussair *et al.* (2004) had reported that French consumers were willing to buy GM foods if it was cheaper than non-GM foods. Schuler and Orozo (2007) had also reported that respondents in Columbia were willing to try GM food because it was good for them.

There are other reasons apart from health risks that had been given elsewhere as well as in Ghana for the rejection of the GM technology. Moon and Balasubramanian (2003) and Quaye *et al.* (2009). had reported that the public was concerned that GM will only benefit the big multinational companies coupled with the lack of public trust for their government (Durant and Legge, 2005). Other factors had been that farmers will lose focus on the traditional ways of cultivating crops, research institutes are not well equipped to deal with issues of GM in Africa and Ghana and also that the technologies are not tailored towards the African environmental needs Quaye *et al.* (2009) Ruivenkamp, 2005; Feenberg 1999, 2002 and 2005. About 20% each from the research institutes and the ordinary Ghanaian groups and 10% of respondents from the government ministries rejected the GM foods based on religious and ethical reasons. The rejection of GM technology based on religious reasons seems to be a global trend. Wanskin and Kim (2001) reported that respondents in their work rejected GM foods based on religious reasons. Moon and Balasubramanian (2003), Subrahmanyam and Chen (2000) had reported the same in the Philippines and Singapore respectively, that consumer acceptance of GM food was significantly related not only to their perceptions of risks and benefits but also to their moral, ethical and religious views.

Whilst the majority of respondents from the academic and research institutes supported the funding of GM research, there was an overwhelming rejection of Government's funding of GM research by respondents from the government ministries and the ordinary Ghanaian categories. This observation related very well to their willingness to accept or reject GM food. This observation

is contrary to the work of Quaye *et al.* (2009) whose respondents did not call for a ban on GM research but rather called for a strengthening of government regulatory bodies. This is not surprising because her respondents were all from a class of people that had something to do with GM food whilst this work involved people from all sectors of the country.

Women gave an overall negative perception of GM foods than men and this finding is supported by other researchers. Von Roten and Alvarez (2008) and Anunda *et al.* (2010) have all reported that women show negative attitudes and rejection of GM foods than men and that the arguments in favour of GM foods seem to be less appealing to women than to men. These differences are not explained by a lack of knowledge about genetics but they may partially be explained by trust and values variations. Thus the myth of the nurturing woman still remains deep-rooted in our social spirit and in the posture of the privileged managers of the domestic universe, which makes GM foods of principal concern to woman (Von Roten and Alvarez, 2008). Moreover, women are mostly those who shop for the food needs of most households and have been shown to be very concerned and selective when it comes to foods (Anunda *et al.*, 2010).

It is obvious from the results of this study that, there is the need for an extensive and more comprehensive public education and debate on the issues of GM technology. This public education should be able to bring a better understanding to most women to change their present perception since most of them had a negative perception towards GM food. It is possible that the rejection by some of the respondents of the GM technology and the call for government not to support GM research has been due to the lack of proper understanding of the whole GM technology. This has been shown by Ruivenkamp (2005) and Zhong *et al.* (2002) where the level of acceptance of Gm food by respondents increased from 60 to 84.9% and from 69 to 89%, respectively.

The debate on food security and potential risk of biotechnology demand starting wide and comprehensive education programmes to promote an open dialogue among scientists, opinion leaders, mass media that would act as the basis to support the technological shift. Consumer acceptance of GM foods is complex and diverse across cultures as reported by Braun (2002) and Blaine *et al.* (2002). Government must therefore formulate public educational strategies with due consideration to the public fears and perception and these could have a positive impact on the perceptions and fears of the public concerning GM foods.

CONCLUSION

It has been evident that public education on GM foods and technology has been very scanty in Ghana. The media (electronic and print) which many of the Ghanaian population use have not been used effectively as sources of information on GM foods for the public. Friends have rather been a major source of information for most people. This has resulted in the respondents showing their unwillingness to accept GM food. Workshops are organized for a specialized group of people and does not constitute a major public education avenue. For the public to understand the issues of GM food, there must be active public education schemes since this will change public perception, increase acceptance and promote the success of government policies on the use GM food and technology in Ghana.

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