

GM Foods: A Nanjing Case Study of Chinese Consumers' Awareness and Potential Attitudes

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This article provides insights on Chinese consumers' awareness of and potential attitudes toward genetically modified (GM) foods and identifies major factors influencing these attitudes as assessed by telephone interviews in the city of Nanjing. Additionally, a preliminary analysis of Chinese media reports on GM foods was conducted for the 1995-2001 time period in Beijing and Shanghai. These media reports serve as an important source of information that may influence consumers' attitudes. Results indicate that the majority of Chinese consumers surveyed had little knowledge of GM foods, that almost all surveyed consumers thought that GM foods should be labeled, and that media attention on GM foods has increased since the late 1990s in both frequency and the number of negative articles.

Key words: China, genetically modified foods, GMOs, biotechnology.

Introduction

It is widely recognized that biotechnology is one of the most innovative technologies developed in the 20th century with an even more promising future in the 21st century. Biotechnology is currently a hot topic in both academic and political circles for its implications on food security, economic growth and income distribution, human health, the environment, and agricultural trade. Genetic modification techniques are at the center of this focus and have spurred worldwide debate on biosafety issues. Many regard these new techniques as a potential threat to human life, to existing plant and animal species, and to the environment. These concerns have resulted in government regulations in some countries that have tightened monitoring, supervision, and control of research and commercialization of genetically modified (GM) varieties, especially GM foods.

Alternatively, many GM crop varieties have shown superiority over conventionally grown crops in terms of higher yield, pest and/or disease resistance, nutritional improvement, and a longer shelf life. Globally, GM crop planted areas expanded from 1.7 million hectares in 1996 to 44.2 million hectares in 2000 and is expected to continue to expand (James, 2002). Similar trends have occurred in China (Huang, Rozelle, Pray, & Wang, 2002).

In 2002, the Chinese government established a set of regulations requiring labeling of GM foods. Although implementation has been postponed, the implication of such regulations is important to all parties involved—consumers, producers, processors, and international traders of GM foods, as well as research institutes and enterprises who produce GM seeds and associated

inputs. In many cases, the public sector has also been impacted due to its significant investment in this new technology. Some argue that these regulations may impose additional costs on manufacturing, marketing, and transportation of GM foods, reducing the competitiveness of GM foods over conventional foods, and hence slowing technological developments.

Others argue that consumers should be fully informed of the benefits and risks associated with biotechnology and ensured the right to make their own decisions in the marketplace. In this case, no matter how the production, marketing, and labeling of GM foods are regulated, as long as they are labeled in some way, consumers' awareness and acceptance might be the long-run decisive factor of their success in the marketplace—partly due to consumers' purchasing behavior of GM foods and partly due to the potential influence of public opinion on government regulations.

This article seeks to assess Chinese consumers' awareness of and potential attitudes toward GM foods and to identify major factors influencing these attitudes as assessed by telephone interviews in the city of Nanjing. Additionally, a preliminary analysis of media reports on GM foods was conducted for the 1995-2001 time period. These media reports serve as an important source of information that may influence consumers' attitudes. The remainder of this article is organized as follows: the next section reviews recently conducted surveys of consumer attitudes toward GM foods in various countries. The third section discusses basic assumptions and the approach adopted in this research. Next, we describe our survey design and sampling procedure used in telephone interviews. This is followed by a dis-

cussion of findings and implications from these interviews. We then discuss the results of our review of media coverage on GM foods. We present our conclusions in the final section.

Literature Review

The GM food safety debate seems to have been initiated by the commercialization of GM crops and has since become more heated. This debate has important implications for the development of this new technology, which is viewed as a major approach in the fight against global hunger. Also, it is widely recognized that consumer acceptance will ultimately determine whether GM foods can survive and expand in the marketplace, and will conclude this debate to some extent, at least with regard to policymaking.

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 & Rickertsen, 2002). For example, although Norwegian consumers seemed better informed about GM issues, and a higher percentage of them viewed GM foods as “very safe,” Norwegian consumers tended to accept GM foods much less than US consumers. In Japan and Taiwan there was also a large difference in consumers’ willingness to pay for GM foods. Although Japanese consumers were the most skeptical in this survey, Taiwanese consumers seemed to have similar attitudes as those in the United States. These survey results may imply that consumer attitudes are strongly influenced by cultural and institutional factors.

Focusing on Asia, consumer surveys conducted in China, Indonesia, and the Philippines suggest that most Asian consumers have a positive attitude toward GM foods (Asian Food Information Center, 2002, 2003). Results indicated that about two thirds of consumers not only accepted GM foods but also believed that they would personally benefit from consuming GM foods. This finding is consistent with previous observations in Taiwan. However, this survey does not reveal Asian consumers’ knowledge of GM foods.

An additional survey conducted by Xuan and Zhou (2002) in China sought to identify consumers’ awareness of GM foods. Results from questionnaires showed that only about 5% of Chinese consumers think that they know the issues concerning GM foods well, while 63% know “a little” and the rest (32%) know nothing. Additionally, survey results indicated that about half of consumers did not know whether GM foods are safe for humans or the environment; 37% and 29% respectively

believed they are harmful to human health and the environment in the long run. These findings are very negative. The authors suggested that the results be considered with caution, because the survey was conducted through the mail among individuals known to the investigators.

It is of interest to determine how much information Chinese consumers really know about GM foods and whether they will accept or reject GM foods. Of course, this is a very difficult task, as China is a large country with vast regional differences in economic, cultural, social, and ethnic characteristics. This article seeks to determine consumers’ awareness and acceptance towards GM foods in Nanjing, a coastal city in eastern China. A more comprehensive picture depends on future research on a much larger scale.

Basic Assumptions and Approach Adopted in this Research

Many Chinese consumers have unknowingly consumed GM foods (e.g., edible oils) in their daily diet for quite a long time. However, our preliminary survey shows that a majority of consumers do not have even a basic knowledge of GM techniques and their implications, and are not aware of heated disputes surrounding GM foods.¹ Therefore, this research views our survey as an experiment: relevant information is supplied to those interviewed, and their reply to each question was recorded for this analysis. Our basic assumption is that when the dispute over GM foods becomes a hot topic in the Chinese media and attracts consumers’ attention, and when Chinese consumers are able to distinguish GM foods from conventional foods, their attitudes may be influenced by information acquired at that time. So if Chinese consumers are now provided with certain information, their reaction might be considered as a potential “true” action in the future. This approach is not a typical survey of existing phenomena or attitudes; rather, it is an experiment, or simulation. Of course consumers’ future actions may not be exactly the same as their current reply. Nevertheless, our survey may provide insights into future actions under specific circumstances.

This research consisted of two parts. The first part was a telephone survey, which sought to identify consumers’ awareness of GM foods, their major concerns in

1. Four students enrolled in an agricultural university were interviewed on the phone about their awareness and attitudes at the design stage of our survey; three of them hesitantly replied that they knew virtually nothing about GM foods.

selecting various foods, their possible reactions after receiving specific information regarding GM foods, and their attitudes toward various types of media reports on GM foods. Demographic information, such as income, occupation, gender, education and age, was also obtained. The primary purpose of our survey was to determine if consumers' potential attitudes toward GM foods was influenced by their existing knowledge and potential information from various types of media as well as by demographic characteristics.

The second part of this research included a survey of media coverage of GM foods. Two types of newspapers—official government newspapers and popular evening newspapers—were chosen from Beijing and Shanghai. We recorded the number of articles about GM food between 1995 and 2001, and the attitude towards GM foods in each article was identified. The primary purpose of this analysis was to determine whether there is any difference in the attitudes of media reports on GM foods among types of newspapers and among regions, as well as what factors might influence media attitudes.

It is reasonable to assume that there might be a connection between media coverage and consumers' awareness and attitudes—i.e., consumers' opinions are likely to be influenced by the media. However, as our interviews sought first to determine consumers' attitudes, it is too early to establish a linkage between media coverage and consumers' attitudes in any quantitative way. If such interviews are conducted regularly in the future, such relationships might be identified and better understood. Such information is certainly significantly important to researchers, developers, producers, processors, and international traders of GM foods, as well as to government policymakers and the public sector.

Telephone Interview Design and Sampling

The telephone interview consisted of questions covering the following five parts: (a) interviewees' existing knowledge of GM foods; (b) interviewees' attitude after providing them with basic, general knowledge of GM foods; (c) interviewees' attitude after providing them with some specific information regarding GM foods; (d) interviewees' potential sources of information and attitude towards various types of media; and (e) interviewees' basic demographic information.

The first part of the survey sought to determine consumers' current awareness of and attitude towards GM foods. It consisted of six questions to identify where the interviewee bought food for his or her family; what factors he or she was concerned with when buying food; if,

and how well, he or she was aware of GM foods; where such information was obtained; and if aware, whether he or she thought that GM foods are safe. Data collected in this first part of our survey was also used to determine whether interviewees changed their opinions after receiving certain information.

The second part of our survey consisted of basic GM knowledge (such as the role and function of genes in plant and animal evolution, various approaches humans have used in changing, combining and modifying plant and animal genes in order to fit human needs, and the current transgenic methods and associated benefits and risks) followed by one question: Was the interviewee willing or not willing to buy and consume GM foods, or wait for more information?

Our survey's third part consisted of several specific kinds of information regarding GM foods, such as the positive opinion of an expert and well-known bioscientist; a report on health problems after consuming transgenic corn not designed for human use; and the potential benefits and risks associated with pest resistance, improved nutritional value, and functional (medical merits) varieties.² Interviewees were asked if they were willing to buy GM foods immediately after they were given each type of information.

In order to determine whether interviewees were influenced by positive or negative information, the entire sample was divided into two groups. In addition to the above information and questions, one group was supplied with relatively positive information that scientists found no additional risks associated with feeding mice with transgenic fish that grew much faster than conventional ones. The other group was told that the health of mice was seriously damaged after feeding them transgenic potatoes, and that many Europeans are worried about the potential risks associated with GM foods and strongly oppose producing and marketing such foods. Interviewees' opinions were asked after they were given such information.

There were five questions in the fourth part of our survey, asking where the interviewee might obtain information regarding GM foods, whether his or her attitudes might be influenced by media reports, what kind of media he or she trusts more, and whether he or she thought that labeling is needed. The survey's final part

2. In this survey, respondents were told that "improved nutritional value" meant that the GM foods contained the Vitamin A and the mineral iron, whereas "medical function" meant that GM potatoes contained a hepatitis-B antigen to prevent hepatitis-B, without injection of this antigen.

obtained interviewees' demographic information, such as age, occupation, gender, education, family size, and income.

More than 500 households in the Nanjing urban area were interviewed. Interviews were conducted in July and August 2002, from 7:30 to 9:30 p.m. every evening, and each interview lasted for approximately 15 minutes. We believe that most family members were at home during that time, and that the interviewee was more likely to be the head of the family.

In regards to sampling, the Nanjing municipal telephone system does not have a residence number list, so the following method was used to ensure an unbiased survey. First, all sub-area codes (the first two digits of the phone number) were identified for the Nanjing urban area. Second, to provide equal representation among sub-areas, about 20 numbers were selected based on equal distance in each sub-area. If a selected telephone number was invalid, or was a nonresidence user, the closest alternative was substituted.

Interview Findings and Their Implications

Current Awareness and Attitudes

Of the 540 households called, there were 480 valid interviews, and their answers are used in this analysis. As stated above, the first stage of our research seeks to identify consumers' knowledge and awareness of GM foods, and their attitude towards GM foods, if awareness exists. The number of interviewees who knew nothing about GM foods totaled 272, accounting for 56.67% of the total 480; while the other 208 interviewees, or 43.33% of the total, had heard of GM foods (Table 1).

Even among those who had heard of GM foods, about 74% only "have heard the words" but "have no idea" of the benefits and risks associated with GM foods. Thus, of the consumers who had heard of GM foods, only 26% of those thought that they knew something about GM foods. A relatively larger percentage of men in our survey had heard about GM foods (53.4%) compared to women (32.3%). The percentage of respondents who claimed of "knowing something" was about equal between genders for those who had heard of GM foods. However, the overall consumer awareness of GM foods in the Nanjing urban area was very low when the survey was conducted: only 34 men and 20 women, or 11% of the total, thought that they knew something about GM foods.

Table 1. Current consumer awareness of GM foods.

		Have heard of GM foods	Have not heard of GM foods
Men	just heard	100 (53.39%)	117 (46.61%)
	know something	34	
Women	just heard	54 (32.31%)	155 (77.69%)
	know something	20	
Total		208 (43.33%)	272 (56.67%)

Table 2. Current consumer attitudes toward GM foods.

	Safe	Unsafe	Do not know
Just heard	45 (29.22%)	26 (16.88%)	83 (53.90%)
Know something	24 (44.44%)	14 (25.93%)	16 (29.63%)
Total	69 (33.17%)	40 (19.23%)	99 (47.60%)

The 208 interviewees who had heard of GM foods were asked whether they thought GM foods were safe. Their answers are summarized in Table 2. Taking the 208 interviewees as a whole, 99 interviewees (47.6%) were uncertain about the safety of GM foods, while 109 persons (52.4%) had made their judgment on the issue—69 persons thought GM foods were safe and the other 40, unsafe. This implies that consumers are not adequately informed about GM foods: about 50% of the interviewees had not heard of GM foods, and about 50% of the persons who had heard of GM foods did not know if they were safe.

However, there was a significant difference between those who "just heard" and those who "know something" about GM foods: the second group consisted of more people who had made judgments on GM safety issues. Only 29.63 % of interviewees in the "know something" second group said that they "do not know" if GM foods were safe, compared to 53.9% of interviewees in the "just heard" first group. Thus, the "just heard" interviewees had nearly double the response selecting the "do not know" response regarding the safety of GM foods as that of the "know something" interviewees.

However, the percentage of people who said GM foods were "safe" or "unsafe," respectively, was about two-thirds higher by the "know something" second group for both responses, compared to responses by the "just heard" first group. It seems that current knowledge and awareness only makes consumers form more certain

Table 3. Consumer acceptance based on general information.

	Will buy	Will not buy	Follow majority	Do not know
Have heard	89 (42.70%)	40 (19.23%)	20 (9.62%)	59 (28.37%)
Have not heard	106 (38.97%)	42 (15.44%)	20 (7.35%)	104 (38.24%)
Total	195 (40.63%)	82 (17.08%)	40 (8.33%)	163 (33.96%)

Table 4. Consumer acceptance of specific GM food characteristics.

	Pest resistance	Improved nutrition	Medical function
Will buy	158 (32.92%)	228 (47.50%)	229 (47.71%)
Will not buy	183 (38.13%)	128 (26.67%)	149 (31.04%)
Follow majority	40 (8.33%)	34 (7.08%)	24 (5.00%)
Do not know	99 (20.63%)	90 (18.75%)	78 (16.25%)
Total	480 (100%)	480 (100%)	480 (100%)

opinions regarding the safety of GM foods, and those opinions are both positive and negative in regards to the safety of GM foods.

Consumer Acceptance After Being Given General Information on GM Foods

The second stage of our analysis sought to determine consumers’ attitudes after they acquired some basic, general knowledge of GM foods. The purpose was to provide interviewees with some general information on GM foods and to measure their reactions. No specific GM information was provided at this time. Interviewee responses are summarized in Table 3.

With regard to the basic GM information given to the interviewees, they were told: (a) the function of genes in evolution, (b) the various approaches humans have used to change plant and animal species, including their genes, to fit human needs, (c) the methods used in modern transgenic techniques, (d) the normal procedures in approving commercialization of GM foods, and (e) the risks and uncertainties of these new techniques. Interviewees were asked if they would like to buy GM foods after being given the above information.

It is interesting to compare data in Table 3 with those in Table 2. Although responses from all 480 interviewees are recorded in Table 3, after being given some

basic GM information, responses listed in Table 2 came from a subgroup of all 480 interviewees. Recall that responses in Table 2 were from interviewees who had “just heard” or “know something” about GM foods. These same interviewees are listed as “have heard” in Table 3. Comparing the total “safe” responses in Table 2 to the “will buy” responses by interviewees who “have heard” of GM foods in Table 3, we see that the number of positive responses increases from 69 to 89. Similarly, comparing the “unsafe” responses in Table 2 to the “will not buy” responses in Table 3, we see that the number of negative answers, 40, remains the same.

It might be concluded that the information given to interviewees in this stage of our analysis did not contain any specific information regarding damage caused by or reported on GM foods, though general risks and uncertainties have been mentioned. Thus, responses provided at this stage of our analysis are likely to be considered more positive with regard to the potential influence on consumers. As a result, the number of interviewees who would buy GM foods increased, as some respondents had made their decisions on this issue. However, those who had formed negative attitudes seemed to be standing firm on their existing positions.

Consumer Acceptance After Being Given Specific GM Information

In the third stage of our analysis, interviewees were given some specific GM information, such as the merits of pest resistance, nutritional enhancements, and medical function that GM foods may have, and some reports on health problems found in both the laboratory and the real world. Then, interviewees were asked whether they would like to buy respective GM foods. Responses are summarized in Table 4. Results show that when comparing the pest resistance characteristic with the characteristics of improved nutrition and medical function, respondents were more accepting. The percentage of acceptance increased significantly from 33% for the pest resistance characteristic of GM foods to 48% for the medical function characteristic. This implies that consumers are more concerned with the benefits that they may obtain directly from GM foods and is consistent with the findings of Chern and Rickertsen (2002).

However, the difference between the two groups that were given additional either positive or negative information was not as expected, as the acceptance rate was higher in the negative group. A thorough review reveals that this might be due to the difference in the original attitudes between the two groups, as the interviewees in

Table 5. A further test of consumer acceptance to specific GM food characteristics.

	Pest resistance	Improved nutrition	Medical function
Will buy	122 (32.88%)	171 (46.09%)	170 (45.82%)
Will not buy	137 (36.93%)	98 (26.42%)	118 (31.81%)
Follow majority	30 (8.09%)	29 (7.82%)	17 (4.58%)
Do not know	82 (22.10%)	73 (19.68%)	66 (17.79%)
Total	371 (100%)	371 (100%)	371 (100%)

Table 6. Consumer reliance on various sources of media.

	Television	Newspapers and journals	Internet
Number	160	74	14
%	55.84	25.87	4.73

the negative group show more positive attitudes toward GM foods (10% higher). As the difference in information is not dramatic, interviewees tended to maintain their existing positions.

Further Tests of Consumer Acceptance After Being Given Specific GM Information

It is reasonable to assume that the above information given to interviewees may have had a relatively stronger influence on those who had no definite prior opinions on GM foods, and that individuals were more likely to be targeted for future information dissemination. Therefore, it is of great interest to determine how they formed their opinions after receiving the above information. Thus, we conducted additional tests on consumer acceptance for those 272 interviewees who had not heard of GM foods³ and those 99 interviewees who had heard of GM foods but had no idea of safety issues surrounding them.⁴ These respondents were regrouped for such a test; their responses to the above questions are summarized in Table 5.

Note that the data in Table 5 are quite similar to those in Table 4. This implies that there was no difference in attitudes toward GM foods between this subgroup and the entire sample. A variety of possible

3. There were 272 interviewees who had not heard of GM foods; see Table 1.

4. There were 99 interviewees who had heard of GM foods but were uncertain of their safety; see Table 2.

explanations exist—e.g., that the majority of interviewees responded to each question based on our information, so there is no difference between groups. An alternative explanation is that the original information given to interviewees was minimal, no matter what the interviewee believed. A third explanation is that either a positive or negative opinion trend may persist, even under somewhat different circumstances. A fourth possible explanation is that previously obtained information was similar to the information that we supplied.

Potential Influence of Various Media Sources

In the fourth stage of our survey, all interviewees were asked if their acceptance of GM foods would be influenced by media reports, and if so, what kind of media did they most trust. Among the 480 individuals interviewed, 287 (or nearly 60%) replied that their opinions would be influenced by media reports. The data in Table 6 summarizes their responses to the type of media they most trusted. It is interesting to note that less than 5% of interviewees trusted information from the internet, while more than 55% and 25% of interviewees trusted information from television and from newspapers and journals, respectively. The remainder of interviewees tended to obtain information from other sources.

Respondents were further asked whether they trusted major official government newspapers or popular evening newspapers with regard to reports on GM foods. The responses were that 43% of interviewees trusted government newspapers and 24% trusted evening newspapers. It seems that more people thought that official government newspapers were relatively more reliable in providing such information, though they may not actually read those newspapers.

Potential Impact of Personal Factors

Finally, demographic information (such as age, gender, education and income) was collected, as these variables are believed to have a strong impact on consumers' acceptance of GM foods (Table 7). Income data were not reliable, as many interviewees were reluctant to answer this question, and hence were omitted from the table.

Older respondents tended to accept GM foods more than younger respondents, and men tended to accept GM foods more than women. The comparison between more and less educated respondents suggests that the less educated also tended to accept GM foods more readily than those who received more education; although the percentages of responses to the question of

Table 7. Influence of demographic factors on willingness to buy foods with GM characteristics.

		Pest resistance		Improved nutrition		Medical function	
		Will buy	Will not buy	Will buy	Will not buy	Will buy	Will not buy
Age	18-29	26.73%	50.50%	47.52%	32.67%	45.54%	32.67%
	30-49	33.52%	34.09%	44.32%	25.57%	44.32%	27.84%
	50 and older	37.23%	28.72%	47.87%	21.28%	48.94%	27.66%
Gender	Men	36.36%	29.41%	51.34%	22.99%	45.99%	31.02%
	Women	29.51%	44.26%	40.98%	29.51%	45.90%	32.79%
Education	Junior high	40.20%	39.22%	53.92%	25.49%	53.92%	29.41%
	Senior high	32.43%	33.78%	41.22%	27.03%	45.95%	29.73%
	College	27.27%	38.84%	45.45%	26.45%	38.84%	36.36%

Table 8. Consumer attitudes toward labeling of GM foods.

	Should label	Should not label	Do not know	Total
Number	454	14	12	480
%	94.58	2.92	2.50	100.00

“not buy” are about the same, those responses to the question of “will buy” declined with education. A possible explanation is that respondents who are younger, female, and more educated tended to be more cautious with regard to the potential risks associated with GM foods and/or they have less trust in current institutions in ensuring food safety, compared to respondents who are older, male, and less educated.

Labeling Issues

When asked whether they thought GM foods should be labeled, nearly all of the 454 interviewees answered yes (95%), regardless of whether they were willing to buy GM foods or not. Such a strong response is a clear indication that consumers require the right to be informed of important and sensitive information regarding their welfare. This result may support the efforts made in some countries to set labeling regulations for GM foods, although uncertainty may exist over labeling implementation and monitoring processes.

Survey inference might conclude that labeling may not actually change consumers' attitudes toward GM foods, as virtually all respondents believed that labels should be required, while only some respondents were willing to buy GM foods. However, because the same or similar questions were not repeated after interviewees answered the labeling question and provided choices based on labeling, it is a bit early to draw such conclusions. It is also uncertain how consumers will treat labeling as a source of information with regard to their understanding of GM foods. If labeling is a major source of information, it might jointly determine con-

sumers' attitudes along with information from other sources. However, if labeling is merely a mechanism to distinguish GM foods from non-GM foods, it may not change consumers' attitudes but may alter buying patterns of those who have already made up their minds about consuming GM foods.

Media Coverage of GM Foods

It is assumed that reports on GM foods by various media sources play an important role in shaping consumers' awareness of, and in influencing their attitudes on, GM foods. A preliminary survey of selected newspapers was conducted. Our primary objective was to document the trend in newspaper coverage of GM foods in terms of frequency and attitude. We assumed that attitudes in reporting GM foods might be different between major government official newspapers and popular evening papers, and possibly among different regions of China. Although the official government attitude that may be fully reflected by official newspapers is likely to be more positive and/or neutral, the popular evening papers may report GM foods relatively more negatively. We also suspected that there might be some reporting differences between the coastal and inland areas of China, but this hypothesis was not tested due to data constraints.

In this portion of our analysis, four newspapers were surveyed: (a) *Beijing Daily*, the official newspaper of the Beijing Municipal Government; (b) *Beijing Evening*, the most popular evening paper in Beijing; (c) *Jiefang Daily*, the official newspaper of the Shanghai Municipal Government; and (d) *Xinmin Evening*, the most popular evening paper in Shanghai. The number of articles on GM foods and their attitudes, to the authors' best judgment, are summarized in Table 9 for the 1995-2001 time period.

A common trend that exists in all four newspapers is the dramatic increase in coverage of GM foods that started after 1998, especially in the two popular evening

Table 9. Number of articles reporting GM foods in selected newspapers.

Year	Attitude	Beijing Daily	Beijing Evening	Jiefang Daily	Xinmin Evening
1995	positive	5	1	2	1
	neutral	2	1	0	0
	negative	0	0	0	0
	total	7	2	2	1
1996	positive	2	1	0	3
	neutral	3	0	2	0
	negative	0	1	0	0
	total	5	2	2	3
1997	positive	3	2	3	3
	neutral	1	0	0	1
	negative	0	0	0	1
	total	4	2	3	5
1998	positive	5	3	3	2
	neutral	2	2	0	0
	negative	0	0	0	2
	total	7	5	3	4
1999	positive	9	7	5	10
	neutral	3	4	0	3
	negative	3	4	0	2
	total	15	15	5	15
2000	positive	10	7	6	7
	neutral	4	2	2	5
	negative	0	5	1	3
	total	14	14	9	15
2001	positive	5	4	8	2
	neutral	3	5	4	6
	negative	2	5	2	4
	total	10	14	14	12

newspapers. From 1995 to 1998, they reported very little on this issue. Another common trend is that more negative reports have been released after 1998, whereas positive reports had previously dominated. This is consistent with the development of transgenic technology and commercialization of some GM crops in China that have attracted more public attention. It is also consistent with some reports on real or false damage to human health, biosafety, and the environment in recent years.

The comparison of attitudes between government official newspapers and popular evening newspapers supports our assumption that popular papers are reporting more negatively on GM food safety issues than the official newspapers. However, it is interesting to note that both papers in Beijing, the capital of China, are holding relatively negative attitudes compared with

their counterparts in Shanghai, the largest business center of China, especially after 1998. One plausible explanation is that local governments are likely more sensitive in following policies formally stipulated by China's central government, as well as in following what are implied as the "attitudes" in policy formation, while those in the center of government are less cautious, or have more inside information.

Conclusions

From the above preliminary surveys, we draw the following general conclusions:

- The majority of Chinese consumers have little knowledge of GM foods. Even in a provincial capital city like Nanjing, more than 50% of urban residents had not heard of GM foods at all; of those who had heard of GM foods, only about 25% thought that they knew something about GM foods.
- About 40% of Chinese urban consumers may buy GM foods based on general and basic information on GM foods—without dramatic reports on disasters and/or serious damage caused by GM food consumption—regardless of their prior knowledge of GM foods.
- Nearly 20% of consumers thought that GM foods were unsafe and would not buy them. Their attitudes were quite firm and not likely to be easily changed. However, 30 to 50% of consumers had not made up their minds on GM foods and their purchasing decisions might be influenced by future information.
- The characteristics of GM foods with special benefits to consumers (such as nutritional enhancements and improved medical functions) were more acceptable to consumers than the pest resistant characteristic that primarily benefits producers.
- Almost all surveyed consumers thought that GM foods should be labeled. However, such labeling might not influence their attitude towards GM foods once they had made up their mind about consuming GM foods.
- Consumers who were younger, female, or had higher education tended to be more reluctant to accept GM foods, while older, male, and less-educated consumers were less suspicious of this new technology and its outcomes.
- Genetically modified foods have attracted media attention since the late 1990s, as both the frequency of reports and the number of negative articles has increased significantly since 1998. This is consistent with the development of transgenic technology

(especially the commercialization of some GM crops) and the increasingly hot debate on food safety issues throughout the world.

This research is only a preliminary survey on (or more precisely, a type of “experiment” of) consumers’ potential acceptance of GM foods in selected Chinese urban areas. As current consumers have little knowledge of GM foods and its related issues, their opinions might change over time when new information reaches them. A continuation of our survey may help in understanding how and why consumers’ opinions are formed and changed. If possible, coverage of various types of media should be reviewed, and its linkage with consumers’ attitudes should be analyzed.

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