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Newspaper Coverage of Genetically Modified Foods in the United States. A Community Structure Approach

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Resumen

Empleando la teoría de la "estructura comunitaria", un muestreo de diarios principales en 20 ciudades grandes en los EEUU examine la cobertura del tema "alimentos transgénicos". Seleccionando todos los artículos de 400+ palabras publicados a través de cinco años (entre 01/01/2000 y 12/31/2004) se compararon sistemáticamente características comunitarias y el "Vector Mediático" de Pollock (combinando en un valor dos medidas de contenido: la "prominencia" de un artículo en un periódico con la orientación o tono). Cobertura "favorable" a alimentos transgénicos fué vinculado con medidas de "vulnerabilidad": porcentaje de pobres (r de Pearson = .624, p = .002); acceso sanitario (porcentaje del presupuesto municipal orientada a asistencia sanitaria, r = .562, p = .005). Sin embargo, cobertura "desfavorable" a alimentos transgénicos fué vinculado también con medidas de alto nivel socioeconómico (educación universitaria o empleo profesional), apoyando una hipótesis de "estabilidad quebrada". El análisis de factores y su regresión revelaron dos factores significativos asociados con alimentos transgénicos: vulnerabilidad (nivel de desempleo), 40% de la varianca, y con numeros de estancias, 50%.

Palabras Clave:
Alimentos transgénicos, periódicos, diarios, la estructura comunitaria, Vector Mediático, periodismo, agricultura, la política pública, la economía política

Abstract

A geographic cross-section national sample of 20 major US newspapers investigated variations in coverage of Genetically Modified (GM) Foods using a community structure approach.

Keywords:
Genetically Modified Food, newspapers, community structure approach, media vector, journalism, agriculture, public policy, political economy, political sociology

Selecting all 400+ word articles on the topic between 01/2000 and 12/2004 (331 articles) city characteristics were compared systematically with a composite measure of coverage, combining article "prominence" and "direction", to calculate Pollock's "Media Vector" for each newspaper. Favorable coverage of GM Foods was strongly connected to measures of "vulnerability": percent below poverty level (Pearson's r=.624; p=.002) and access to healthcare (percent municipal budget devoted to healthcare, r=.562; p=.005). Yet coverage of GM foods was also negatively linked to measures of "privilege" (percent college educated, r = -.426, p = .031; percent professionals, r = -.379, p = .05), supporting a "violated buffer" hypothesis: Higher proportions of privileged groups in communities are connected with unfavorable coverage of biological threats or threats to a cherished way of life. Factor analysis of city characteristics and factor regression yielded two significant factors regarding GM Food coverage. Vulnerability (unemployment level) accounted for 40+ percent of the variance; adding number of farms in a community yielded 50 percent.

1. Introduction

Using the latest molecular biology techniques, Genetically Modified Foods (GM foods) are developed and marketed for human or even animal consumption. This genetic engineering process allows scientists to insert specific genes into plants or animals that will augment beneficial traits, such as resistance against plant diseases caused by insects and viruses. GM foods pose several advantages, particularly because they ensure that an adequate food supply will be available for a flourishing world population. Eliminating the application of chemical pesticides and genetically engineering crop plants could help prevent environmental damage by reducing the amount of herbicides needed. GM foods are genetically engineered to tolerate cold temperatures, droughts, and salinity, all of which would normally destroy unmodified seedlings. In addition, foods that are nutritionally enhanced to contain essential vitamins and minerals have greater benefits. In addition, GM foods reduce maturation time; conserve soil, water, and energy; and clean up pollution from contaminated soils.

On the other hand, GM foods also present several controversies. First, some believe tampering with nature and the genetic

makeup of animals and plants through genetic engineering is unethical. Many question the potential human health and environmental impact of GM foods. The environmental hazards include unintended harm to organisms, reduced effectiveness of pesticides, and toxicity to soil. Human health risk controversies focus on allergic reactions to GM foods, lowered nutrition, and the overall lack of regulation and health safety testing that result in inaccurate labeling of these foods. Further, the infringement on the intellectual property rights of farmers, as well as the increased dependence of developing countries on industrialized nations (such as the U.S.) are additional topics of heated debate.

The controversy surrounding Genetically Modified foods has become a significant media issue. Media are responsible for increasing awareness of important issues and newspaper coverage serves as a gateway to other forms of media. Newspapers set agendas for other media and often reflect the perspectives of the political, business, and social leaders who read newspapers. Newspapers are also inter-media agenda setters because the way they "frame" a significant event can influence the opinions of their audience. Communication studies scholars have studied the media's ability to "frame" an issue by positioning a particular perspective of the issue as more commanding or rational. Framing is defined as "the way events and issues are organized and made sense of, especially by media, media professionals and their audiences."(Reese, 2001:7) Journalists have choices about how they frame stories and disseminate controversial issues to their readers.

In order to study media coverage, this analysis will employ a "community structure approach." This approach suggests that there are connections between different city demographic characteristics and variations in coverage of critical issues. Originally developed by Tichenor, Donohue, and Olien in Minnesota (1973, 1980; Donohue, Tichenor, & Olien, 1995), the earlier structural "pluralism" approach was elaborated by their scholarly descendants McLeod & Hertog (1992, 1999), Demers & Viswanath (1999), and Hindman (1999). In addition, the community structure approach has been tested in nationwide studies by Pollock and colleagues (1977, 1978, 1980, 1995, 1998, 2000, 2004-5, 2007, 2008-9). The most recent book-length collection of community structure studies is Pollock's *Tilted Mirrors: Media Alignment with Political and Social Change – A Community Structure Approach* (2007).

Research examining "framing" and using the community structure approach has explored coverage on the Clarence Thomas-Anita Hill hearings, the tobacco industry Master Settlement Agreement, homosexuals in the Boy Scouts of America, embryonic stem cell research (respectively, Pollock, 2007: chpts. 3,4,8,3); controversial issues such as same sex adoption (Higgins, Dudich, & Pollock: 2003); and detainee rights at Camp X-Ray, Guantanamo Bay, Cuba (Meehan, Philbin, Wilson, & Pollock: 2003).

More specifically, the impact of society on the media is explored by comparing various city data and demographics, such as the diverse amounts of income, education, occupational status, ethnic groups, and individuals below the poverty level. Variations in these demographics and other city characteristics can be linked to the way GM foods are framed by journalists. In congruence with the community structure approach, variations in coverage are expected in various cities. For example, individuals who are below the poverty rate may possess strong views in favor of the lower priced GM food products. Accordingly, the higher the proportion below the poverty level, the more favorable the expected coverage of GM foods. Contrastingly, college-educated citizens may oppose consuming GM foods because they may be concerned with the effect of introducing foreign genes in food plants, and high proportions of college-educated in communities may be linked to less favorable coverage of GM foods.

2. Literature Review

After searching various electronic databases, extensive scholarly interest in GM foods was encountered. An exhaustive search revealed hundreds of references. However, when combining the terms GM foods with "media", "media coverage," and "communication," few results were discovered, suggesting the communication field is paying less attention to this issue than other fields.

Communication studies databases searched included Com Abstracts, Communication and Mass Media Complete, and CIOS. The *Journal of Mass Communication Quarterly* and *Mass Communication and Society* were journals that included articles discussing genetically modified foods. After examining these communication sources, a paucity of research concerning GM foods was evident. One communication article by Laros and

Steeenkamp (2004) discussed fear appeals concerning GM foods that frequently appear in the media. This article asserted that mass media "have played a crucial role in creating widespread fear of GMF (also known as "Frankenstein Food" among the fearful) in a large part of the world" (p. 889).

Another communication article related specifically to GM foods and media coverage by McInerney, Bird and Nucci (2004), reported on the way "scientific knowledge about genetically modified (GM) food flows to the American public, focusing on language and message genres in the scientific literature, newspapers, and popular magazines" (p.44). This case study on the effect of GM corn pollen on the Monarch butterfly revealed how press releases affect what is published in the popular press.

Through research in databases and journals, it became apparent that the communication field has little interest in the topic of GM foods and/or media coverage of the topic. On the other hand, several science, law and health journals have discussed consumer perceptions and awareness of GM foods. These articles referred to GM foods as biotech foods. Kalaitzandonakes, Marks, and Vickner explained in an article from the *American Journal of Agricultural Economics* that "global media have framed biotechnology as a food safety issue and has (sic) consistently raised the possibility of unknown health effects" (2004: 1240). Another article from *American Journal of Agricultural Economics* explained "the attitude of consumers toward GM foods and biotechnology will likely depend critically on the media…finding that 90% of consumers receive their information about biotechnology primarily through the media, media coverage of GM foods should be a top concern for all involved in the biotechnology debate" (McCluskey & Swinnen, 2004: 1235).

Social science and political science journals were also concerned with potential adverse health effects of genetically modified food products. For example, the *Annals of the American Academy of Political and Social Science* examined the FDA's policies on genetically modified foods including its voluntary consultation program and its proposed rule on premarket notification and data submission (Krimsky & Murphy, 2002).

The communication studies field has contributed only a few articles on the topic of genetically modified foods. The lack of interest in this subject on the part of the communication field is out of step with public opinion and interest among other fields.

This paper represents an effort to begin exploring the relationship between society and media coverage of GM foods.

3. Hypotheses

Hypotheses connecting community structure with coverage of GM foods can be clustered in four distinct patterns: violated buffer (privilege), healthcare access, vulnerability, and stakeholder.

3.1 Violated Buffer Hypothesis

The violated buffer hypothesis, created by Pollock and colleagues, expects that the larger the proportion of privileged groups in a community, the more unfavorable the coverage of biological threats or threats to a cherished way of life (Pollock, 2007 chpt. 4). Privilege is often defined as the percent in a community of citizens with college educations, professional/technical occupational status, or family incomes of $100,000 or more. The violated buffer pattern sometimes occurs "when rapid social and technological changes appear capable of unsettling even the most privileged groups" (Frey, Bottan, & Kreps, 2000: 238). Previous studies confirming the connection between college education or family income and coverage of critical health or scientific issues include: Magic Johnson's HIV announcement (Pollock, 2007: chpt. 8), the Roe v. Wade abortion decision (Pollock, Robinson, & Murray, 1978), cloning (Pollock, Dudzak, et al, 2000), and both the 1998 Master Settlement Agreement forbidding tobacco companies from marketing tobacco to children, as well as the US Supreme Court decision stopping vote counting in the 2000 presidential election, awarding the election to George Bush (both Pollock, 2007: chpt. 4).

Confirmation of the violated buffer hypothesis linking privilege with unsympathetic reporting on GM foods was found in previous research on genetically modified foods (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004). In the Pollock, et, al., study the Pearson correlations and regression analysis found that the "greater the proportion of privileged groups 'buffered' from economic uncertainty, the less favorable the coverage of GM foods (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004: 2). "It is unusual that these privileged citi-

zens have rejected genetically modified foods because subsets of these privileged citizens (scientists, engineers) are responsible for their development" (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004:.20). The violated buffer hypothesis, linking privilege with unsympathetic reporting, has been found in previous community structure research on connecting privilege to reporting on such issues as Internet privacy policy and gun control since Columbine (Pollock, 2007: respectively, chpts. 4, 7).

Privileged citizens with higher education may not have confidence in GM foods and the nutritional value in these foods because they may be concerned with the long-term effects of introducing foreign genes in food plants. They are aware of technological advances and engineering, but they may also be aware of regulations and little substantiated health safety testing for GM foods.

H1: *The larger the percentage of college-educated in a city, the less favorable the coverage of genetically modified foods* (Lifestyle Market Analyst 2004).

H2: *The larger the percentage of people with professional occupational status in a city, the less favorable the reporting on genetically modified foods* (Lifestyle Market Analyst 2004).

H3: *The larger the percentage of families with incomes of $100,000-plus, the less favorable the coverage of genetically modified foods* (Lifestyle Market Analyst 2004).

3.2 Health Care Access

Health care access can be measured by the number of physicians per 100,000 citizens, the percent municipal spending on healthcare, and the number of hospital beds per 100,000 citizens. Previous research using the community structure approach found that health care access is positively correlated with several scientific/health issues, including favorable newspaper coverage of physician assisted suicide (Pollock & Yulis, 2004; Pollock, 2007: chpt. 3) and embryonic stem cell research (Pollock, 2007: chpt. 3).

Individuals in the medical field and communities supporting substantial numbers of physicians and health facilities likely appreciate the advancements of modern technology, particularly with GM foods. Since biological engineering eliminates the use

of chemical pesticides, while also enhancing nutritional value and taste, it is reasonable to assume that coverage of GM foods would be more favorable in cities with a higher percentage of healthcare access.

H6: *The larger the number of physicians per 100,000, the more favorable the coverage of genetically modified foods* (U.S. Census).

H7: *The higher the percent of municipal budget devoted to healthcare, the more favorable coverage of genetically modified foods* (County and City Extra 2004).

3.3 Vulnerability Hypothesis

Genetically modified foods are nutritionally enhanced to contain essential vitamins and minerals and are readily available throughout the year at a more affordable price. As a result, individuals who are unemployed may not be able to afford purchasing large amounts of food and may appreciate any effort to increase production and thereby lower food price. In addition, those living below the poverty level may believe that 21st technologies are working to their benefit. Along with this, a high poverty level may be associated with less education and consumer knowledge, rendering impoverished groups relatively uninformed about the disadvantages of GM foods.

Previous community structure research confirming a connection between economic vulnerability and variations in coverage of critical issues include privacy on the Internet, drilling in the Artic National wildlife Reserve,; and gun control since Columbine (Pollock, 2007: respectively, chpts 4, 7,7). Consistently, Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, (2004) found that "the higher the unemployment level, the *more favorable* the coverage of genetically modified foods, perhaps because unemployment is associated with appreciation of a greater abundance of food" (p. 20). Accordingly:

H4: *The higher percent below the poverty level in a city, the more favorable the coverage of genetically modified foods* (County and City Extra 2004).

H5: *The higher the unemployment level, the more favorable the coverage of genetically modified foods* (County and City Extra 2004).

3.4 Stakeholder Hypothesis

Earlier community structure studies have discovered that the greater the size of groups in a specific city, the more likely newspapers will present favorable coverage on issues relevant to these groups (McLeod & Hertog, 1992, 1999). "Stakeholder" hypotheses were confirmed when it was found that the greater the proportion of businesses or other institutions marketing goods or services to the gay community in a city, the more likely a city newspaper is to report favorably on legalization of same-sex marriage (Pollock & Dantas, 1998) and same-sex adoption (Pollock, Higgins, & Dudich), and higher percentages of Catholics, Democrats, and Hispanics were found significantly related to negative coverage of detainee rights (Meehan, Philbin, Wilson, & Pollock, 2003).

3.4a. Political Partisanship

Specifically, a larger percent voting Democrat would most likely be linked to favorable coverage of genetically modified foods. Democrats tend to share liberal views and tend to be receptive to advancements in the technology field, such as embryonic stem cell research and other medical issues.

H8: *The greater percent voting Democrat in a city in the most recent presidential election, the more favorable coverage of genetically modified foods.* (CQ's Politics)

H9: *The greater percent of those voting Republican in a city in the most recent presidential election, the less favorable coverage of genetically modified foods*. (CQ's Politics)

3.4b. Agricultural Characteristics

"Farmers on large farms, concerned with the number of products generated, are more likely to have used extensive technologies to increase farm size, productivity, and the value of their products" (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004:.12). GM foods are genetically engineered to tolerate cold temperatures, droughts, and salinity, thus reducing costs and product loss. Resistance against plant diseases caused by insects and viruses makes the agricultural benefits of GM foods more

economically beneficial. Accordingly, the greater the interest in agriculture (according to a wide range of measures) the more favorable the expected coverage of GM foods.

H10: *The greater the number of farms in city or surrounding county, the more favorable the coverage of genetically modified foods.* (County and City Extra 2004).

H11: *The greater the size of farms in a city or surrounding county, the more favorable the coverage of genetically modified foods.* (County and City Extra 2004).

H12: *The greater the value of farm product in a city or surrounding county, the more favorable the coverage of genetically modified foods.* (County and City Extra 2004).

H13: *The larger percent whose principal occupation is farming, the more favorable the coverage of genetically modified foods.* (County and City Extra 2004).

4. Methodology

Research on cross-national media coverage of genetically modified foods was gathered from newspaper articles obtained from a national cross-section of twenty-one U.S. cities was obtained from the following newspapers: *Chattanooga Times*, *Milwaukee Journal Sentinel*, *St. Louis Post Dispatch*, *Memphis Commercial Appeal*, *South Bend Tribune*, *Times Union Albany*, *Columbus Dispatch*, *Chicago Sun-Times*, *Boston Globe*, *Portland Oregonian*, *Pittsburgh Post-Gazette*, *San Francisco Chronicle*, *Denver Post*, *Houston Chronicle*, *Omaha World Herald*, *Tulsa World*, *San Diego Union-Tribune*, *Telegraph Herald of Dubuque*, *Bismarck Tribune*, *Bangor Daily News* and *Seattle Post*. *The New York Times*, *Washington Post*, and *Los Angeles Times* were omitted from this sampling because they reflect primarily national rather than surrounding community concerns.

The sample period for the collected data extends from 2000 to 2004. In 2000, the US agreed on limited labels for GE food exports. The Starlink scandal caused Taco Bell and Kraft to recall the taco shells that were available to the public that contained genetically modified corn. This corn was intended only for animal consumption and was mixed into human food. As a result, Americans wanted mandatory labels on genetically engineered products. In 2004 the Food and Drug Administration issued press releases dealing with food safety evaluation and information

regarding genetically engineered foods**.** During this sample period, all articles of 400 words or more on the topic were selected using the Lexis-Nexis Academic database, yielding 331 articles. Following a methodology created by Pollock, each article was initially coded for two types of information to arrive at a single, quantitative "Media Vector" score.

4.1. Article Prominence

The prominence score is a numerical rating ranging from 3-16 points. To determine the prominence score the focus was directed on four dimensions: first, placement, which refers to the position of an article in a newspaper (front page of first section, front page of interior section, inside of first section, or other); second, headline size focuses on the number of words that comprise the headline of the article; third, article length refers to the total quantity of words in the article. The fourth dimension is photographs, graphics or a number of visuals included in the article (one, two or more, none). The higher the numerical rating for each dimension, the higher the total "prominence" score, demonstrated in Table 1:

Table 1: Prominence Score*
(for coding databases)

DIMENSION	4	3	2	1
Placement	Front page of first section	Front page of inside section	Inside first section	Other
Headline Size (in number of words)	10+	8-9	6-7	5 or fewer
Length (in number of words)	1000+	800-9999	600-799	400-599
Photos/Graphics	Two photos or graphics	One photo or graphic		

*Copyright John C. Pollock (1994-2010)

4.2 Article Direction

After analyzing the content and tone of each article, an article "direction" or "tone" score was determined. Two researchers inde-

pendently examined each article, resulting in one of three possible article "direction" categories: "favorable," "unfavorable," and "balanced/neutral" based on coverage of genetically modified foods.

4.2a Favorable Coverage:

A direction of "favorable" was coded for articles that characterized genetically modified foods as beneficial and positive. For example, articles that focused on the advantages of GM foods were considered favorable. In addition, articles that underscored nutritional enhancement, reduced maturation time, increased crop production, and both economic and environmental benefits. Specifically, an article from the *Telegraph Herald of* Dubuque explained that " 'Every year, it's just getting better,' said Rodrigo Martins. Now 24, he started farming soy at age 17 and gave up plans to go to law school because he was making so much money. 'With GM soy, you produce lots more profits in six months instead of a year, and it's not as much work'" (Clendenning, 2003). An article from the *San Diego Tribune* stated that "President Bush passionately extolled the virtues of biotechnology yesterday and pledged to support its role in developing defensive measures against bioterrorism, engineering crops to feed starving nations and developing life-saving drugs" (Somers, 2003).

4.2b Unfavorable Coverage:

A direction of "unfavorable" was coded for articles that focused on the environmental and health hazards associated with genetically modified foods. Articles that focused on the lack of regulation and health safety testing, bans from other countries, and allergic reactions were coded as unfavorable. An example of unfavorable coding excerpted from an article from the *Seattle Post* explained "Doering and others said the secretive - and, some said, arrogant – manner in which some agricultural corporations introduced genetically modified food crops created a massive backlash that has cost the industry billions, prompted bans (mostly in Europe) and angered consumers" (Paulson, 2001). Also, an article from the *Denver Post* stated that "Foes call the products

'Frankenfoods,' which they say endanger human health and the environment. They worry that genetically engineered foods are an inadequately tested and regulated experiment that could create 'superweeds' and 'superbugs' that reduce biological plant diversity" (Schrader, 2001).

4.2c Balanced/Neutral Coverage:

The direction of "neutral/balanced" was coded for articles that were neither favorable nor unfavorable regarding genetically modified foods. When an article simply stated information and/or facts regarding GM foods without any specific perspective, they were deemed as balanced/neutral. The advantages and disadvantages of GM foods were equivalently discussed in these articles. One example from the *South Bend Tribune* explained that "Wetlands, genetically altered crops, international agriculture trade, soybean- and corn-generated fuels and implementation of the Farm Bill (which became law in 2002) were among the topics discussed Wednesday evening at a town hall meeting hosted by U.S. Rep. Chris Chocola, R-Bristol" (O'Brien, 2003). Another example of balanced/neutral coding from the *Omaha World Herald* stated that "Some of the genetically modified crops with which scientists said consumers could soon become familiar: tomatoes and bananas that stay ripe longer; coffee beans grown without caffeine; soybeans that do not produce allergen; canola oil with healthy omega-3 fat; a strain of rice that creates its own vitamin A" (Clayton, 2003). A measure of intercoder reliability was calculated for all articles, yielding a Scott's Pi coefficient of .8315.

4.3 Calculations of Media Vectors using a Coefficient of Imbalance

After coding each of the twenty-one newspapers, a Media Vector was consequently calculated. The prominence and direction scores were combined using psychology's Janis-Fadner Coefficient of Imbalance. This is very similar to a vector in physics, so consequently it is referred to as a "Media Vector" since it combines two dimensions — magnitude (the prominence) and direction — to attain a single measure of impact or issue

"projection." The Media Vector will result in a number between -1.00 and +1.00. Scores that range from 0 to -1.00 reveal unfavorable coverage of the topic, whereas scores between 0 and +1.00 indicate favorable coverage of this topic (See Table 2).

Table 2: Calculating the Media Vector*

f = sum of the prominence scores coded "favorable"
u = sum of the prominence scores coded "unfavorable"
n = sum of the prominence scores coded "balanced/neutral"
r = f + u + n

If f > u (the sum of the favorable prominence scores is greater than the sum of the unfavorable prominence scores), the following formula is used:

Favorable Media Vector (FMV):

$$FMV = \frac{(f^2 - fu)}{r^2}$$ (Answer lies between 0 and +1.00)

If f < u (the sum of the unfavorable prominence scores is greater than the sum of the favorable scores), the following formula is used:

Unfavorable Media Vector (UMV):

$$UMV = \frac{(fu - u^2)}{r^2}$$ (Answer lies between 0 and -1.00)

*Media Vector copyright John C. Pollock (2000-2005)

4.4 Procedures

Two statistical procedures were used to examine the relationship between city characteristics and the Media Vector, Pearson correlations and regression analysis, were applied. To determine which city characteristics were most strongly linked with the Media Vectors, Pearson correlations were conducted. Furthermore, regression analysis was used to determine the relative strength and importance of each independent variable.

5. Results

Newspaper coverage of genetically modified foods varied across the United States throughout 2000-2004. Table 3 provides a list of all the Media Vectors and their newspapers.

Table 3: Media Vector Coefficients

City	Newspaper	Media Vector
Chattanooga	*Chattanooga Times Free Press*	.3936
Milwaukee	*The Milwaukee Journal Sentinel*	.1799
St. Louis	*St. Louis Post-Dispatch*	.1488
Memphis	*The Commercial Appeal*	.1280
South Bend	*South Bend Tribune*	.0690
Albany	*The Times Union*	.0667
Columbus	*Columbus Dispatch*	.0554
Chicago	*Chicago Sun-Times*	.0302
Boston	*The Boston Globe*	.0245
Portland	*The Oregonian*	.0102
Pittsburgh	*Pittsburgh Post-Gazette*	.0060
San Francisco	*The San Francisco Chronicle*	-.0097
Denver	*The Denver Post*	-.0231
Houston	*The Houston Chronicle*	-.0237
Omaha	*Omaha World Herald*	-.0263
Tulsa	*Tulsa World*	-.0364
Bangor	*Bangor Daily News*	-.3697
San Diego	*San Diego Union-Tribune*	-.0585
Dubuque	*Telegraph Herald*	-.1303
Bismarck	*The Bismarck Tribune*	-.1533
Seattle	*Seattle Post-Intelligencer*	-.2268

To explore associations between city characteristics and variations in coverage, Pearson correlations were conducted, presented in Table 4.

Table 4: Pearson Correlation Results

	Pearson Correlation	Significance Level
% Below Poverty Level	.624**	.002
% Budget devoted to	.562**	.005
Healthcare		
% College Educated	-.426*	.031
% Professional	-.379*	.050
Average Value of Farm	-.348	.066
Products		
Number of Farms	-.274	.121
Average Farm Size	-.198	.202
% Income over $100,000	-.181	.223
Physicians per 100,000	-.181	.223
% Republican	.167	.241
% Farming Occupation	-.158	.252
Population	-.159	.252
% Unemployment	.159	.252
% Democrat	-.117	.311

* Correlation is significant at the 0.05 level (1-tailed)

** Correlation is significant at the 0.01 level (1-tailed)

Fifteen city characteristics were used as independent variables to determine the correlation between city characteristics and genetically modified foods. Four characteristics, percent below the poverty level; percent of the budget devoted to healthcare; percent college educated; and percent professional, were found significant.

5.1 Vulnerability Hypothesis Supported, Health Care Access Supported, Violated Buffer Hypothesis Supported.

The Violated Buffer hypothesis expected unfavorable coverage of genetically modified foods among cities in direct proportion to the percentage of citizens who are more privileged economically, educationally, and professionally. Consistently, both Pearson correlations and regression analysis found that the Violated Buffer hypothesis was supported. The city characteristics that were significant and congruent with their hypothesized directions were: *The larger the percentage of college-educated in a city, the less favorable the coverage of genetically modified foods* (r = -.426, p =

.031) and t*he larger the percentage of people with professional occupational status in a city, the less favorable the reporting on genetically modified foods* (r = -.379, p = .05).

Second, the Health Care Access hypothesis was also supported. The Access hypothesis expects that the larger the number of physicians per 100,000 or hospital beds per 10,000 in a community, the more favorable the coverage of those making human rights claims. The city characteristic that was significant and congruent with its hypothesized directions was: *The higher the percent of municipal budget devoted to healthcare, the more favorable coverage of genetically modified foods* (r = .562, p = .005).

Third, the Vulnerability hypothesis was supported, expecting favorable coverage of genetically modified foods among cities in direct proportion to the percentage of citizens who are below the poverty level or who are unemployed. The dimension of the Vulnerability hypothesis confirmed in this research found that the higher the poverty level, the more favorable the coverage of GM Foods (r = .624, p = .002).

5.2 Regression Analysis

Regression analysis was consistent with the findings of the Pearson correlations. Percent below the poverty level accounted for 39 percent of the variance, while poverty level and percent budget devoted to health care combined to account for 66 percent of the variance. Percent with professional/technical occupational status added another 8 percent of the variance. All together, the preceding three variables accounted for 74 percent of the variance in their association with the Media Vector, shown in Table 5.

Table 5: Regression Analysis with Media Vector

Model	R (equation)	R Square (cumulative)	R Square Change	F Change	Significance of F Change
% Below Poverty Level	.624	.389	.389	11.473	.003
% Below Poverty Level, %Budget devoted to Health Care	.813	.661	.272	13.651	.002
% Below Poverty Level, %Budget devoted to Health Care, % Professional	.859	.738	.077	4.701	.046

5.3 Factor Analysis and Regression of Factors Reveals Vulnerability and Stakeholders (Unemployment and Number of Farms) Significant

To further refine results, a factor analysis of city characteristics was run to determine clusters of characteristics that often occur together. The varimax factor analysis for GM foods for all twenty-one cities yielded five factors with component Eigenvalues of 1.00 or greater. The five factors can be labeled as follows: Privilege/Political Partisanship/Population/ Vulnerability, Farming Occupation, Farm Value, Number of Farms. Each factor and its representative components are listed below in Table 6.

Table 6: Factor Analysis of City Characteristics

Factor	Component	Factor Loading
Factor 1: PRIVILEGE, PARTISANSHIP, & POPULATION	Physicians per 100,000	.925
	Percent voting Republican	.914
	Percent college educated	.893
	Percent voting Democratic	.867
	Population	.865
	Percent Professional Occupation	.833
Factor 2: VULNERABILITY	Percent unemployed	.836
Factor 3: FARMING OCCUPATION	Principal occupation is Farming	.786
Factor 4: FARM VALUE	Average value of farm	.924
Factor 5: NUMBER OF FARMS	Number of farms	.953

Using a stepwise multiple regression of the five factors and the Media Vector, two significant factors were found with respect to GM Foods, shown in Table 7. Vulnerability, measured by level of unemployment, accounted for over 40 percent of the variance. Vulnerability and Number of Farms together accounted for 50 percent of the variance.

Table 7: Regression of GM Foods Factors with Media Vector

Model	R (Equation)	R square (Cumulative)	R square Change	F Change	Significance of F Change
Vulnerability	.636	.404	.404	215.858	.000
Vulnerability, Number of Farms	.706	.499	.094	59.680	.000

5.4 Regional Media Vectors Largely Correspond with Regional Public Opinion

The following chart, Table 8, compares average Media Vectors for each of four regions — reflecting levels of favorable or unfavorable newspaper coverage of genetically modified foods — and regional comparisons of public opinion. Our findings suggest that the South displays the highest average Media Vectors, followed by somewhat positive vectors in the Midwest, while the East and West reveal similarly negative vectors. Overall, regional coverage coincides somewhat with regional public opinion.

Table 8: Regional Comparison between Media Vectors and Public Opinion

Region	Average Media Vector for region	Benefits of GM Foods outweigh the risks (Percent saying …….)
East	-.068	37
South	.115	44
Midwest	.022	40
West	-.062	52

Evident in a negative average Media Vector of -.068, the Eastern region of the United States manifests negative newspaper reporting on GM Foods. A public opinion question, based on a 2000 Harris poll of 1015 people ages 18 and older, was: "Overall do you think the benefits of developing and growing these new plants and crops outweigh the risks of doing this, or do you think the risks outweigh the benefits?" Consistent with the low average Media Vector of the East, the lowest percent of favorable region-

al opinion is also apparent in the East, with only 37 percent believing that the benefits of GM Foods outweigh the risks. These findings are consistent with conventional wisdom that East coast residents might harbor doubts regarding genetically modified foods due to the region's geographic distance from major agricultural processes and revenue.

By contrast, the Midwest and especially, the South manifest both favorable Media Vectors and more favorable public opinion as well, with 40 and 44 percent, respectively, believing the benefits of GM foods outweigh the risks. Only the West manifests a discrepancy between a negative Media Vector of -.062 and public opinion more favorable toward GM Foods than any other region: Fifty-two percent of Westerners are convinced the benefits of GM Foods outweigh the risks. It is striking that journalists in the West are so at variance with public opinion. Nevertheless, for three out of four regions, there is a close correspondence between newspaper reporting and public opinion perspectives on the risks and benefits of GM Foods.

6. Conclusion and Future Analysis

This community structure approach study has confirmed a strong correlation between vulnerability (the percent below the poverty level in a city) and percent of the municipal budget devoted to healthcare on the one, hand, and favorable coverage of GM Foods nationwide. By contrast, privilege (percent college educated and percent professional/technical workers in a city), is linked to unfavorable newspaper coverage of genetically modified foods. Several questions can be posed to serve as a guide for future community structure research on genetically modified foods.

First, why are those with professional occupational status and college educations linked to such strong newspaper stances against genetically modified foods? It can be expected that these groups are in the technological and scientific forefronts of their fields, yet they apparently do not support the distribution of GM foods within American society. Is there lack of support among these groups because there is not enough substantial research completed demonstrating the long-term side effects and benefits of GM foods? By contrast, are higher poverty levels connected to newspaper support for GM foods because price, selection, and quantity make food more available to the less affluent?

Second, the findings from this study differ somewhat from previous community structure research on GM foods (Pollock, O'Grady, Hiller, Pannia, Lutkenhouse, 2004). In the 2004 study Pearson correlations and regression analysis found that the "greater the proportion of privileged groups 'buffered' from economic uncertainty, the less favorable the coverage of GM foods (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004:.2). Although the current study also confirmed this violated buffer finding as empirically significant, links between coverage and measures of "vulnerability" were clearly even more significant. In variable regression table number 5, it is apparent that the higher the poverty level in a city, the more favorable the coverage of GM foods. One reason for this difference in findings could be the different time frames used. The sample period from the previous GM foods study extended "from the release of the first information regarding the human genome project in 1997 to the Food and Drug Administration's legislation in 2002 regarding product labeling in California" (Pollock, O'Grady, Hiller, Pannia, & Lutkenhouse, 2004:.2). The current study, by contrast, samples more recent newspaper coverage, from 2000 to 2004.

There is considerable controversy and debate surrounding genetically modified foods in Europe and Africa. It will be instructive to examine future coverage concerning GM foods in Europe because a five-year GM food ban was lifted by the European Parliament on July 2, 2003 (Evans-Pritchard, 2003). Future research will help illuminate links and relationship patterns between community structures and media coverage of genetically modified foods.

References

Becker, E. (2003, January 10). "U.S. might oppose biotech food ban; EU rule harms Africa, U.S. trade official says", *Milwaukee Journal Sentinel*, p.5A.

Catholic Almanac. (2004). Our Sunday Visitor, Huntington, Indiana.

Clayton, C. (2003, July 16). "UNL altering soybeans to create healthy foods: Consumers may soon find coffee beans without caffeine, canola oil with healthy omega-3 fat and a strain of rice that has its own vitamin A", *Omaha World Herald*, p. 1D.

Clendenning, A. (2003, December 21). "Genetically modified soy becomes cash cow in Brazil; Farmers admit they are using illegal seed", *Telegraph Herald of Dubuque*, p. B8.

Cole, M. (2003, April 12). "Bill would restrict food-label regulation", *Portland Oregonian*, p. B1.

Cole, M. (2002, October 24). "Oregon critics of organic labeling rules cite cost to restaurants", *Portland Oregonian*.

County and City Extra: Annual metro, city, and county data book. (2004), Bernan Press, Lanham, Maryland.

CQ's Politics in America 2004. http://www.cqpress.com/ls/pia/

Demers, D.H., & Viswanath, K. (Eds.). (1999). *Mass media, social control, and social change: A macrosocial perspective,* Iowa State University Press, Ames, Iowa.

Demers, D.H., & Viswanath, K (1999). "What promotes or hinders the role of mass media as an agent of social control or social change?" in D.P. Demers & K. Viswanath. (Eds.), *Mass media, social control, and social change: A macrosocial perspective,* Iowa State University Press, Ames, Iowa.

Donohue, G..A., Tichenor, P.J., & Olien. C.N. (1995). "A guard dog perspective on the role of media", *Journal of Communication, 45,* 115-132.

Evans-Pritchard, Ambrose. (2003, July 2). "EU lifts five-year ban on GM foods, but shoppers will have choice", *The Daily Telegraph*. Retrieved from http://www.portal.telegraph.co.uk/news/main.jhtml?xml=/news/2003/07/02/wgm02.xml

Frey, L., Botan, K., & Kreps, G. (2000). *Investigating communication,* Allyn and Bacon, New York.

Higgins, K., Dudich, T., & Pollock, J.C. (2003, April). *Nationwide newspaper coverage of same-sex adoption: A community structure approach.* Paper presented at the annual conference of the New Jersey Communication Association, Ewing, New Jersey.

Hindman, D.B. (1999). "Social control, social change and local mass media", in D. P. Demers & K. Viswanath (Eds.), *Mass media, social control, and social change: A macrosocial perspective* (pp.99-116), Iowa State University Press, Ames, Iowa.

Hoppa, J. (2000, September 22). "Consumers deserve to know origins of what they eat", *Tulsa World*.

Kalaitzandonakes, N., Marks, L.A., & Vickner, S.S. (2004). "Media coverage of biotech foods and influence on consumer

choice", *American Journal of Agricultural Economics*, *86*, 1238-46.

Krimsky, S., & Murphy, N. (2002 November). "Biotechnology at the dinner table: FDA's oversight of transgenic food", *Annals of the American Academy of Political and Social Science*, *584*, 80-96.

Laros, F., & Steenkamp, J. (2004 November). "Importance of fear in the case of genetically modified food", *Psychology and Marketing, 21*, 889-1009.

Lifestyle Market Analyst 2004: A reference guide for consumer market analysis. (2004), Standard Rate and Data Service, Wilmette, Illinois.

McCluskey, J. & Swinnen, J. (2004). "Political economy of the media and consumer perceptions of biotechnology", *American Journal of Agricultural Economics*, *86*, 1230-7.

McInerney, C., Bird, N., & Nucci, M. (2004, September). "The flow of scientific knowledge from lab to the lay public", *Science Communication*, *26*, 44-75.

McLeod, D.M., & Hertog, J.K. (1992). "The manufacture of public opinion by reporters: Informal cues for public perceptions of protest groups", *Discourse and Society, 3,* 259-275.

McLeod, D.M., & Hertog, J.K. (1999). "Social control, social change and the mass media's role in the regulation of protest groups", in D. Demers & K. Viswanath (Eds.), *Mass media, social control, and social change: A macrosocial perspective* (pp.305-330), Iowa State University Press, Ames, Iowa.

Meehan, S., Philbin, B., Wilson, S., & Pollock, J.C. (2003, May). *Nationwide newspaper coverage of detainee rights at Camp X-Ray: A community structure approach.* Paper presented at the annual conference of the International Communication Association, San Diego, California.

O'Brien, G. (2003, August 21). "Chocola's town hall meeting looks at agriculture issues, Iraq", *South Bend Tribune*, p. A2.

Paulson, T. (2001, June 24). "Scientists urged to proceed carefully with tree alterations", *Seattle Post*, p. B1.

Pollock, J.C. (2009, julio-diciembre). "El modelo de la estructura de la comunidad y los medios de comunicación", *Quorum Académico, 6* (2), 97-104.

Pollock, J.C. (2008, January). "The 'communication commando' model creates a culture of research commitment", *Communication Teacher, 22* (1), 1-5.

Pollock, J.C. (2008). "Community structure model", in Wolfgang Donsbach (Ed.), *International Encyclopedia of Communication, III* (pp. 870-873), Blackwell Publishers, London & New York.

Pollock, J.C. (2007). *Tilted Mirrors: Media alignment with political and social change — A community structure approach,* Hampton Press, Cresskill, New Jersey.

Pollock, J.C. & Dantas, G. (1998, July). *Nationwide newspaper coverage of same-sex marriage: A community structure approach.* Paper presented to the Mass Communication Division at the annual meeting of the International Communication Association, Jerusalem, Israel.

Pollock, J.C., Dudzak, M., Richards, K., Norton, S., & Miller, R. (2000, June). *Nationwide newspaper coverage of human cloning: A community structure approach*. Paper presented at the annual conference of the International Communication Association, Acapulco, Mexico.

Pollock, J.C. & Guidette, C.L. (1980). "Mass media, crisis, and political change: A cross-national approach", in Dan Nimmo (Ed.). *Communication Yearbook IV* (pp. 309-324), Transaction Books, New Brunswick, New Jersey.

Pollock, J.C., O'Grady, S., Hiller, L., Pannia, D., Lutkenhouse, J. (2004, May). *Nationwide newspaper coverage of genetically modified foods: A community structure approach*. Paper presented at the annual conference of the International Communication Association, New Orleans, Louisiana.

Pollock, J.C., Piccillo, C., Leopardi, D., Gratale, S & Cabot, K. (2005, February). "Nationwide newspaper coverage of Islam Post-9/11: A community structure approach", *Communication Research Reports, 22* (1), 15-24.

Pollock, J.C. & Robinson, J.L. (1977, November/December). "Reporting rights conflicts", *Society*, *13* (1), 44-47.

Pollock, J.C., Robinson, J.L., & Murray, M.C. (1978, Fall). "Media agendas and human rights: The supreme court decision on abortion", *Journalism Quarterly*, *55* (3), 545-548, 561.

Pollock, J.C., Shier, L., & Slattery P. (1995, December). "Newspaper coverage of the 'open door' policy toward Cuba: A sample of major U.S. cities-community structure approach", *Journal of International Communication, 2* (2), 67-86.

Pollock, J. & Yulis, S. (2004, July-August). "Nationwide newspaper coverage of physician- assisted suicide: A community

structure approach", *Journal of Health Communication, 9* (4), 1-27.

Reese, S.D. (2001). "Real talk: Manipulating the dependent variable in spiral of silence research", *Communication Research*, *28* (3), 304-324.

Schrader, A. (2001, May 27). "Biotech menu serves up conflict Engineering benefits, risks confront public", *The Denver Post*, p. A1.

Somers, T. (2003, June 24). "Bust sees broad role for biotechnology; EU urged to end ban on genetically modified foods", *San Diego Union-Tribune*, p. C1.

Tichenor, P.J., Donohue, G., & Olien, C. (1973). "Mass communication research: Evolution of a structural model", *Journalism Quarterly*, *50*, 419-25.

Tichenor, P.J., Donohue, G., & Olien, C. (1980). *Community conflict and the press,* Sage Publications, Beverly Hills, California.

U.S. Bureau of the Census. (2004). www.census.gov.