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A Framing Analysis of Newspaper Coverage of Genetically Modified Crops in Kenya

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There was much public debate in Kenya about genetically modified (GM) crops when the national Biosafety Bill went through the parliamentary process toward enactment into law. This study analyzed how GM crops were framed in three mainstream Kenyan newspapers—the Daily Nation, The Standard, and Taifa Leo—during the period. The agriculture frame was predominant in the Daily Nation and The Standard, while the safety and regulation frames dominated coverage in Taifa Leo. Only 34.7% of articles were neutral in tone. Scientists and government officials, who generally spoke in favor of GM crops, were the most frequently quoted sources. Recommendations to improve the quality of coverage include training of journalists to ensure objective and balanced reporting.

KEYTERMS *content analysis, framing, genetically modified crops, Kenya, media, newspapers*

INTRODUCTION

Genetically modified (GM) crops are crops whose genetic make-up has been modified through the insertion of foreign (often bacterial) genes in order to impart certain desirable traits; for example, drought tolerance, pesticide and herbicide resistance, and improved nutritive quality (Panos Institute, 2005). The subject of GM crops, especially the transgenic products involving transfer

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of animal genes to plants and vice versa, has been shrouded in controversy and debate, much of which has taken place through mass media channels, in particular the print media. Proponents argue that GM crops hold the key to global food security, healthier crops, and improved nutrition. Those opposed to the technology often cite uncertainty of possible deleterious effects of the products of genetic modification on human health and crop biodiversity.

In the past, the Kenyan print media have been the center of confrontation between pro-GM lobbyists and the equally fervent opponents of GM crops (Wambugu, 2001). Previous studies in Kenya by Kimenju, De Groote, Karugia, Mbogoh, and Poland (2005) and Gathaara, Ngugi, Kilambya, and Gichuki (2008) to gauge consumer perceptions on biotechnology and GM crops have established low levels of consumer awareness ranging between 34 and 38.6%. These studies also found that most consumers who had heard or read about biotechnology and GM crops obtained the information primarily from the mass media, newspapers in particular, signifying the important role played by Kenyan newspapers in informing and educating the public about such subjects.

Research by the Panos Institute (2005) of the United Kingdom found a gap in the provision of analytical reporting on GM crops in five developing countries (Kenya included), with most news articles being simply based on press releases from governmental agencies. This may suggest that the Kenyan public is misinformed on GM crops through what they read in the newspapers. Accurate, unbiased media coverage of GM food is important because several studies have shown that media reporting directly influences consumers' attitudes and perceptions of risk associated with GM technology (Frewer, Miles, & Marsh, 2002; Marks, Kalaitzandonakes, Wilkins, & Zakharova, 2007; Vilella-Vila & Costa-Font, 2008).

Kenya's national biosafety legislation, the Biosafety Act, paves the way for the establishment of a National Biosafety Authority to govern the use of GM crops in the country and the scaling-out of GM crop research to national level trials to facilitate wider commercial production (Wafula, Persley, & Karembu, 2007). Beginning in June 2007, the Biosafety Bill went through the parliamentary process culminating in its enactment into law in February 2009. During this period, and the 6 months after, public debate on biosafety was catalyzed by the print media and was almost synonymous with that on genetic modification of staple food crops (Karembu, Otunge & Wafula, 2010). Because newspapers serve as key sources of information on GM crops for the Kenyan public (Gathaara et al., 2008; Kimenju et al., 2005), it is important to examine the quality of print media debate on GM crops and the way in which the topic is framed in newspaper articles, as this is likely to influence public attitudes toward and awareness of the topic.

"Framing" refers to the way in which events and issues are organized and made sense of by mass media and their audiences (Reese, 2003). According to Marks et al. (2007), media coverage of science and technology topics

can frame the issue so as to emphasize scientific facts, sociopolitical implications, environmental risks, and human health concerns. Similarly, potential environmental risks of a technology may be highlighted while ignoring the potential benefits, or vice versa, depending on the way the article has been framed.

Crawley (2007) remarks that in the case of controversial scientific topics like genetically modified organisms (GMOs), the news media can choose to frame the issue either from the perspective of risk or of a scientific opportunity. Frames often emerge as the presence or absence of keywords, phrases, images, and sources of information, among other elements (Crawley, 2007). The framing theory predicts that if the media frames a technology in such a way that its risks are emphasized relative to its benefits, there will be more negative sentiment toward that technology by the public (Marks et al., 2007; Vilella-Vila & Costa-Font, 2008).

So far, there is a paucity of published information on comprehensive content and frame analysis of Kenyan newspaper coverage of GM crops. In a case study of the regulation of GM crops and foods in Kenya, Kameri-Mbote (2005) reports carrying out a “generalized scan” through the content of selected daily newspapers published between 1997 and 2004 for their coverage of the subject of GM crops and found that there were “many pronouncements made by diverse actors at diverse fora” (p. 10). The main shortcoming of this analysis is that it did not seek to carry out a detailed content analysis of the newspapers but merely tabulated what was said about GM crops by various sources as reported in randomly selected newspaper articles.

Between January and June 2004, the Panos Institute (2005) analyzed print media reporting of the GM debate in five developing countries—Brazil, India, Kenya, Thailand, and Zambia—by studying newspaper and magazine coverage of GM crops in each country. The Kenya case study identified 27 newspaper articles on GM crops from the *Daily Nation*, *The Standard*, *Taiifa Leo*, and *Science in Africa* that were published during the period. Of these, only one was an editorial (in the *Daily Nation*). Scientists and government officials, who tended to speak in favor of GM crops, were quoted more often than other stakeholders, while the voices of farmers’ groups were completely absent from the newspaper coverage. The study also found limited print media coverage of GM crops in languages other than English (Panos Institute, 2005).

STUDY OBJECTIVE AND RESEARCH QUESTIONS

This study was undertaken to examine the principal frames used in the coverage of GM crops by three daily newspapers in Kenya—the *Daily Nation*, *The Standard*, and *Taiifa Leo*—between June 2007 and August 2009, at the

height of increased public debate around the development of the biosafety law. The period under study represented the period between the publishing of the Biosafety Bill and the 6-month period following the Bill's enactment into law. The analysis included an evaluation of tone of coverage and the sources of information. The following research questions were posed to guide the study:

1. What media frames were used in the *Daily Nation*, *The Standard*, and *Taifa Leo* newspapers in their coverage of GM crops during the period between the publishing of the Biosafety Bill and the 6-month period following the Bill's enactment into law?
2. What was the tone of coverage related to GM crops in newspaper articles published in the *Daily Nation*, *The Standard*, and *Taifa Leo* during the period under study?
3. What sources of information were used in newspaper articles on GM crops in the *Daily Nation*, *The Standard*, and *Taifa Leo* during the period under study?

METHODS

This study employed quantitative content analysis to answer the research questions. For the purpose of this study, the sampling frame was defined as all articles on GM crops published by the Kenyan print media. The sample was defined as all articles on GM crops published in the *Daily Nation*, *The Standard*, and *Taifa Leo* between June 2007 and August 2009. The time frame included the 6 months following the enactment of the Biosafety Law in February 2009, in order to capture any possible changes in coverage after the law was passed. The units of analysis were the individual newspaper articles.

Purposive sampling was used to select the *Daily Nation*, *The Standard*, and *Taifa Leo* from among the diversity of the Kenyan print media. Currently, Kenya has six daily newspapers: *Daily Nation*, *The Standard*, *Kenya Times*, *People Daily*, *The Star*, and *Taifa Leo*. The *Daily Nation* and *The Standard* were selected because they are the leading English language newspapers in the country (Nation Media Group, 2010; Obonyo, 2007), while *Taifa Leo* was selected because it is Kenya's only Kiswahili language newspaper and has a wide readership among the country's rural farming population.

All the articles on GM crops published in the *Daily Nation*, *The Standard*, and *Taifa Leo* between June 2007 and August 2009 were exhaustively sampled for the study. For the *Daily Nation* and *The Standard*, an initial search of the online databases of the respective newspapers was carried out using general and Boolean search terms (for example, "GMOs," "GM," "GM

crops,” “genetically modified*”) to select articles for inclusion in the sample. The database search was complemented by a physical search of the library archives of the *Daily Nation* and *The Standard* to verify that all articles on GM crops during the study period were included.

Since *Taifa Leo* articles were not indexed in an electronic database, electronic versions of clippings of the relevant articles on GM food/crops published during the period under study were obtained directly from the newspaper’s library archives. The search terms used to select articles from *Taifa Leo* for inclusion in the sample were various Kiswahili translations of the terms “genetically modified food” (*vyakula vilivyokuzwa kisayansi; vyakula ambavyo vimefanyiwa mabadiliko ya kijenetiki; vyakula vya GMO; chakula kilichostawishwa kisayansi; chakula kilichozaishwa kisayansi maarufu kama GMO*), “genetically modified organisms” (*viini tete*), and living modified organisms (*viini hai*), as well as the English acronyms “GM” and “GMO.”

Only articles that directly related to GM food/crops were included in the analysis; these were articles in which at least one of the search terms was mentioned in the headline and/or lead paragraph, or in which one or more search terms appeared more than once in the entire article. Thus, the results of the database search were screened in order to eliminate duplicate articles, non-relevant articles (for example, articles citing General Motors abbreviated as GM), and articles in which GMOs were mentioned only once and were not the direct focus of the article.

The initial keyword search of articles yielded a total of 121 articles (54 from the *Daily Nation*, 50 from *The Standard*, and 17 from *Taifa Leo*). Upon screening these articles, 26 non-relevant articles were eliminated from the analysis (5 from the *Daily Nation*, 9 from *The Standard*, and 12 from *Taifa Leo*). The excluded articles from the *Daily Nation* and *The Standard* were not directly related to GMO food/crops, while the articles excluded from *Taifa Leo* were duplicates. Thus, a total of 95 articles were used for the content analysis: 49 from the *Daily Nation*, 41 from *The Standard*, and 5 from *Taifa Leo*.

The procedure of Tankard (2001) for carrying out a framing content analysis was used, which involved first creating an explicit range of possible frames and descriptors based on a random sample of 10% of the sampled articles. The various possible frames were then listed and keywords, symbols, metaphors, and phrases identified to help detect each frame. Using the frames in the list as categories, the entire sample was then analysed to code the articles into the categories, based on whether the frames were present or not present. In addition to coding for frames, articles were coded for the following categorical variables: newspaper name, type of article (editorial, news, letter to the editor, or opinion piece), tone (positive, negative or neutral), sources, word count, and author type. The headlines were coded for tone (positive, negative, or neutral) and frame (similar to those used for content analysis of articles).

Variable data were entered directly into a computer spreadsheet in Microsoft Excel. Inclusion of frames was coded as “present” or “not present,” while the remaining variables were coded based on the designated categories. Frequencies were calculated for the above-mentioned variables of interest, which were then analyzed by way of quantitative descriptive statistics (counts and percentages).

RESULTS AND DISCUSSION

Frequency of Coverage of GM Crops

Of the 95 articles analyzed in total, 49 (51.6%) were from the *Daily Nation*, 41 (43.2%) from *The Standard*, and only 5 (5.2%) from *Taiifa Leo*. Most (80%) of the articles published in *Taiifa Leo* were published in 2009, the year when the Biosafety Bill was passed into law, while the paper had no coverage of GMOs in 2007 at the start of the legislative process when the Biosafety Bill was first published. Figure 1 shows the combined monthly coverage of GM crops by the *Daily Nation*, *The Standard*, and *Taiifa Leo* between July 2007 and August 2009. The plot shows a near linear, albeit slight, increase in the number of articles published during the period under study.

The months of October 2007, September 2008, and May 2009 witnessed sharp increases in newspaper coverage of GM crops. The events at the center of this sudden increase in coverage were, respectively, the initiation of parliamentary debate on the Biosafety Bill and its quick passage through to the stage of Second Reading; the issuance of several public announcements in favor of GMOs by the Minister for Agriculture; and the release of a report

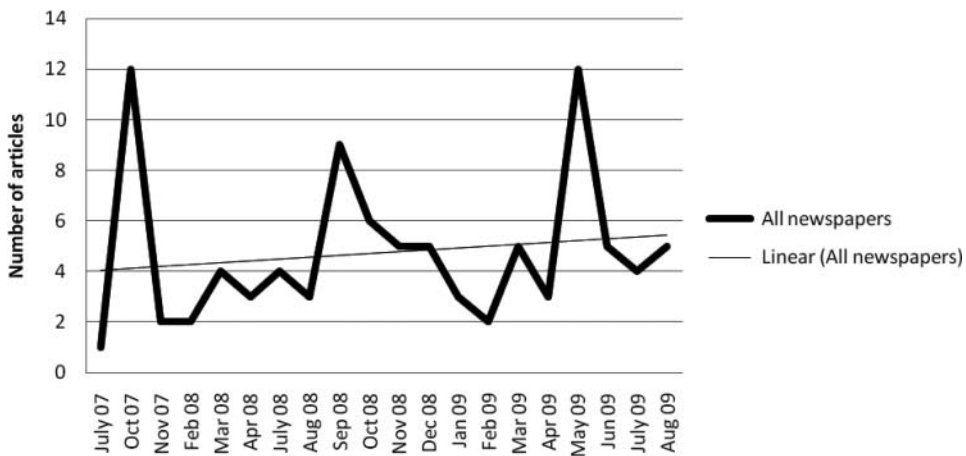


FIGURE 1 Monthly Combined Coverage of GM Crops From July 2007 to August 2009 by the Three Newspapers.

by the Parliamentary Committee on Agriculture claiming that Kenyan consumers were unwittingly consuming GM maize, despite the absence of supporting legal frameworks in the country. In each case, the initial media coverage of the events as news stories was followed by a flurry of media debate in the form of feature articles and letters to the editor, both for and against GMOs (Karembu et al., 2010).

A similar case of a sudden spike in media coverage of GMOs was observed in the United Kingdom during the so-called “Great GM Food Debate” of February 1999, when 310 articles on GM food and crops were published in just one week, from February 13–20, 1999 (Parliamentary Office of Science and Technology [POST], 2000). The coverage was triggered by a controversial unpublished study by Dr. Arpad Pusztai of the Rowett Research Institute in Aberdeen, Scotland on the health effects of GM potatoes on experimental rats. The initial coverage about the possible health effects of GM food on humans expanded to include public debate on the possible environmental impacts of GMOs, issues of labeling of GM consumer products, and the role of large multi-national biotechnology corporations in the global agriculture economy. For one month, the GM debate made front-page news and enjoyed extensive coverage in the main broadsheet newspapers in the United Kingdom—namely, the *Mirror*, the *Guardian*, the *Daily Telegraph*, and the *Independent* (POST, 2000).

It is well documented that the agenda-setting function of the news media is powerful in focusing public attention on a few key issues and in directing the public on how much importance to attach to a topic based on how much emphasis is placed on it in the news (McCombs, n.d.). According to the agenda-setting concept, the media may not necessarily direct the public on what to think, but they direct the public on what to think about (Marks et al., 2007). In one of the early investigations of the agenda-setting function of the mass media, McCombs and Shaw (1972) noted that, in choosing what news to report and determining the degree of salience given to news stories, newspaper editors and reporters can set the agenda of public debate and concern about an issue by directing the attention of the public on what to think about. Marks et al. (2007) have posited that, the greater the volume and prominence of media coverage, the more important the public will evaluate the issue to be. Thus, in the instances cited above, the sudden surges in newspaper coverage of GMOs are an indication of the agenda-setting function of the media, whereby the newspapers focused public attention and stimulated debate around newsworthy events related to the subject of GMOs.

Media Framing

A total of eight frames were identified—namely, agriculture, controversy, environment, ethics, public awareness, regulation, research, and safety. All

TABLE 1 Frequency of Articles by Frame and Newspaper

Frame	<i>Daily Nation</i> (<i>n</i> = 49)	<i>The Standard</i> (<i>n</i> = 41)	<i>Taiifa Leo</i> (<i>n</i> = 5)	Total (<i>n</i> = 95)
Agriculture	34 (69.4%)*	23 (56.1%)	1 (20.0%)	58 (61.1%)
Safety	27 (55.1%)	19 (46.3%)	4 (80.0%)	50 (52.6%)
Regulation	26 (53.1%)	19 (46.3%)	4 (80.0%)	49 (51.6%)
Research	24 (49.0%)	16 (39.0%)	0	40 (42.1%)
Environment	12 (24.5%)	11 (26.8%)	0	23 (24.2%)
Public awareness	11 (22.4%)	11 (26.8%)	0	22 (23.2%)
Ethics	10 (20.4%)	8 (19.5%)	0	18 (18.9%)
Controversy	11 (22.4%)	5 (12.2%)	0	16 (16.8%)

Note. *Percentages in each column do not add up to 100 because some articles contained more than one frame.

eight frames were identified in coverage by the *Daily Nation* and *The Standard*, while only three (agriculture, safety, and regulation) were identified in coverage by *Taiifa Leo*.

Table 1 shows the number and percentage of articles containing the specified frame (some articles contained more than one frame). Overall, the agriculture frame, which appeared in 58 articles (61.1%), and the safety frame, which appeared in 50 articles (52.6%), were the most predominant. The least predominant was the controversy frame, which appeared in 16 articles (16.8%). In both the *Daily Nation* and *The Standard*, the agriculture frame dominated the coverage of GMOs, while in *Taiifa Leo* it was the safety and regulation frames that appeared most often. A striking observation was the absence of the research, environment, controversy, public awareness, and ethics frames in *Taiifa Leo*, where framing of GMOs was largely focused on aspects of biosafety legislation and the safety of GMOs to human health.

The agriculture frame was largely positive in tone toward GMOs and focused on the potential benefits of GM crops—including drought tolerance, pest resistance, and high yields leading to increased agricultural productivity and reduced food insecurity. The *Daily Nation* and *The Standard* used recurring words to highlight these aspects such as “spurring,” “boosting,” and “maximizing” food production. In *Taiifa Leo*, the agriculture frame was used in conjunction with phrases such as *kilimo cha mimea* (crop agriculture), *uhaba wa chakula* (food shortage), and *uzalishaji wa chakula* (food production).

Most of the sources quoted under the agriculture frame were government officials, as well as agricultural biotechnology researchers who spoke largely in favor of adoption of GMOs, presenting GMOs as the solution to the problems of hunger and food insecurity in the country. The metaphorical representation of a war was commonly used, with GMOs being presented positively as a “weapon” to be employed to “fight” and “eliminate” hunger

and poverty. For example, the Minister for Agriculture is quoted as saying: “As a country, we have the option of adopting it [GM technology] to fight hunger or rejecting it and perishing” (Cheboi, 2008, para. 4). In a similar vein, an editorial in the *Daily Nation* featuring research by the Kenya Agricultural Research Institute on a drought-tolerant maize variety stated: “The transgenic approach effort will add to the arsenal being assembled to fight drought, that include drought tolerance, which are currently being used by researchers” (Muthaka, 2009, p. 2).

In their study of media representations of the GM debate in the United Kingdom, Augoustinos, Crabb, and Shepherd (2010) also noted similar positive representations in opinion pieces on GM foods and crops in which they were described as being necessary to combat famine, poverty, and hunger in the developing world. Contrary to the widely positive representation of the agriculture frame in the two English-language dailies, the sole article in *Taifa Leo* that contained the agriculture frame had a negative tone and highlighted the potential risks of GM crops to the agricultural sector. Titled, “*Mbegu za mabindi zichunguzwe*” [Maize Seed Should be Investigated], the article claimed that, if GM maize seed were to be incorporated into the national food supply system, Kenya’s agricultural sector would be negatively affected: “*Kilimo kitavurugika na tutalazimika kutegemea kampuni kubwa za ng’ambo kutosheleza mahitaji yetu ya mbegu*” [Agriculture will be destabilized and we will be forced to depend on multinational companies to meet our requirements for seed], (Ngare, 2008, p. 10).

The second-most predominant frame was the safety frame, which appeared in 52.6% of all articles. This frame gave a negative presentation of GM food and crops, focusing on the likelihood of risk and framing GM food and crops as potentially harmful to human health. The main sources quoted under this frame were individual anti-GM lobbyists and the Kenya Biodiversity Coalition, an association of largely anti-GM civil society organizations and farmer groups. In the *Daily Nation* and *The Standard*, the articles that framed GMOs from the point of view of safety used lexical representations that indicated *possible* rather than *actual* risks of GMOs, for example:

Consuming GM crops over a long time could cause allergies. (Mbaria, 2007, p. 2)

Are there legal rights guaranteed to Kenyan citizens in the event that the GMOs cause health and other risks? (Thatiah, 2009, p. 18)

On the other hand, presentation of the safety frame in the *Taifa Leo* articles was more explicit, declaring GM food and crops as harmful to human health but without detailing evidence of specific health risks, as in the two examples below:

... *mabindi [ya GMO] ambayo ni batari kwa afya ya binadamu yatia hofu* ([GM] maize that is harmful to human health is cause for worry). (Ngare, 2008, p. 10)

Bw Spika, vyakula vyote vilivyokuzwa kwa njia ya 'GMO' ni batari sana kwa wananchi ... [Mr. Speaker, all genetically modified foods are very harmful to the public ...]. (Olali, 2009a, p. 4)

These findings are similar to those of Kakunta (2002), whose analysis of Zambian newspaper coverage of GMOs found that the media presentation of GMOs from a safety frame tended to speculate and make unsubstantiated statements on the potential health risks associated with GM crops. For example, many articles claimed that GMOs were a danger to human health but did not explain how.

As with the safety frame, the environment frame, which featured in 24.2% of all articles (and only in the English-language papers), mostly cited *potential* rather than *actual* environmental risks of GM crops. The main sources quoted under this frame were anti-GM lobby groups, newspaper editors, and writers of opinion pieces. In a few cases, sources cited studies in support of their claims of the environmental hazard posed by GMOs, using phrases such as “danger to the environment,” “loss of biodiversity,” “environmental hazards,” and “contamination of non-GM foods.”

In the United Kingdom, Augoustinos et al. (2010) also found that most articles framing GMOs from a safety perspective spoke of potential rather than actual risks to the environment, as a result of cultivating GM crops. Marks et al. (2007) note that the framing of GMOs and agricultural biotechnology from the perspective of potential health and environmental risks carries with it an affective component that may influence public perception.

The regulation frame (in 51.6% of all articles) focused on explaining the scope of the biosafety legislation as stated in the preliminary section of the Biosafety Bill, as well as calling for adequate institutional policies to be established to allow for the implementation of the law. This frame featured mainly in general news, parliamentary news, and editorial articles. The keywords and phrases used in the *Daily Nation* and *The Standard* under this frame were “Biosafety Bill,” “Biosafety Act,” “law,” “legislation,” “regulatory framework,” “National Biosafety Authority,” and “policy.” In *Taiifa Leo*, the regulation frame used repetition of these keywords and phrases: “*sberia*” [law], “*mbinu*” [policy], and “*sberia ya usalama wa viini hai*” [biosafety law].

The research frame, found in 42.1% of all articles, presented the scientific research on GM technology using a variety of adjectives and descriptive phrases, depending on whether the articles were positive or negative in tone toward GMOs. Articles with a positive tone used adjectives and phrases such as “modern farming technology,” “progressive,” “beneficial,” and “global reality” to frame research on GM crops and food as “the way forward” and the solution to Kenya’s problems of food insecurity and low crop yields;

while those with a negative tone described research on GM crops and transgenic products using emotive words and phrases such as “risky,” “mysterious seeds,” “unnatural,” “new and uncertain technology,” and “playing God” to frame GM technology as being out of the norm and thus something to be cautious about.

Cook, Robbins, and Pieri (2006) observed a similar dichotomous framing of GM technology by pro-GM and anti-GM newspapers in the United Kingdom in which the pro-GM coverage tended to focus on the scientific aspects and potential benefits of GM crops, such as increased yield and pest resistance, and called for reasoned debate on the subject; while the anti-GM coverage emphasized the social context and the potential negative impacts of GM crops on health and the environment, rejecting scientists and biotechnology companies as unreliable.

Related to the framing of research on GM technology are the controversy (in 16.8% of articles) and ethics (18.9%) frames which are related to the perceived “unnatural” nature of the products of genetic modification. Articles carrying these frames mainly quoted the Kenya Biodiversity Coalition and individual anti-GM lobbyists. These frames focused on issues of morality, sovereignty, freedom of choice for farmers and consumers, and the perceived unjust profit-making objective of foreign multinational biotechnology companies at the expense of poor Kenyan farmers. By appealing to the audience’s sense of national pride, morality, and social justice, emotive constructions were used to frame GMOs and proponents of GM technology as unjust, unethical and a threat to personal freedoms, as seen in the following examples:

It would be a serious mockery of Kenya’s sovereignty for the [Biosafety] Bill to be enacted. (Kadida, 2007, p. 37)

The Government needs to protect our own companies that market seeds. We should avoid, at all costs, a situation where our farmers will end up being forced to source maize seeds solely from multinational companies. (“How Safe,” 2008, p. 10)

Finally, the public awareness frame, which featured in 23.2% of all articles (mostly in opinion pieces and letters to the editor), focused on the need for a national dialogue open to all stakeholders so that the public could engage in evidence-based debate on the potential risks and benefits of GMOs. This would raise their levels of awareness and enable them to make informed decisions about whether to accept or reject GMOs. Examples are quoted below:

Scientists and supporters of biotechnology need to ensure that all stakeholders participate in a dialogue about its potential. . . . We need to listen to the concerns being expressed about the use of genetic engineering

TABLE 2 Frequency of Articles by Tone and Newspaper

Article tone	<i>Daily Nation</i> (<i>n</i> = 49)	<i>The Standard</i> (<i>n</i> = 41)	<i>Taiifa Leo</i> (<i>n</i> = 5)	Total (<i>n</i> = 95)
Positive	19 (38.8%)	7 (17.1%)	0	26 (27.4%)
Negative	14 (28.6%)	18 (43.9%)	4 (80.0%)	36 (37.9%)
Neutral	16 (32.7%)	16 (39.0%)	1 (20.0%)	33 (34.7%)

for plant improvement. These concerns must be openly examined in an appropriate and credible forum. (“We Must Discuss, 2007, p. 14)

Kenyans have scant knowledge and awareness regarding GMOs. This is the Government’s first duty—to educate us on the issue. This must be done so that we can be consulted in the decision-making process. (Otum, 2008, p. 14)

Tone of Articles

Table 2 shows the frequency and percentage of articles in each newspaper disaggregated into positive, negative, and neutral tones toward GM crops. Of the total 95 articles analyzed, 36 (37.9%) had negative tone, compared to 26 (27.4%) with positive tone. The tone of the article is an indicator of the degree of bias for or against GMOs.

Considering the individual newspapers, *The Standard* and *Taiifa Leo* both had significantly more articles with negative tone compared to those with positive tone. The *Daily Nation*, on the other hand, had significantly more articles with positive tone (38.8%) than with negative (28.6%) or neutral tone (32.7%). Notably, none of the articles in *Taiifa Leo* were written in a positive tone, with four of the articles having a negative tone and the remaining one a neutral tone.

Articles with a positive tone characterized GM crops as beneficial in terms of increased crop production, enhanced food security, nutritional enhancement, drought tolerance and pest resistance, and reduced post-harvest losses. Articles with a negative tone focused on potential deleterious effects on the environment and human health or cited ethical issues related to the activities of multinational biotechnology companies and the loss of farmers’ sovereignty over their choice of planting material. Neutral or balanced articles presented an objective analysis of GM crops by simply stating both the pros and the cons, without lending support to either side.

In order for readers to make informed choices about whether or not to adopt GM crops, it is necessary for them to be presented with a balanced, objective analysis that is free of bias. The fact that only 33 articles (34.7%) of the total 95 gave a non-biased view of GM crops suggests that readers of these

articles were generally not presented with an unbiased, objective analysis of the pros and cons of GM crops. Consequently, many non-specialist readers are not likely to be well placed to make sound and informed decisions about GM food based on what they read in the newspapers, as the lack of balanced coverage is likely to be a source of uncertainty about the controversial aspects of GM technology. However, it is still possible for elite readers to read and critically analyze the two biases and make an informed decision for or against GM crops.

Previous studies of United Kingdom newspaper coverage of GMOs found similar predominantly negative coverage, with articles mostly focusing on the potential risks of GM food and crops to human health and the environment (Augoustinos et al., 2010; Lewison, 2007; Vilella-Vila & Costa-Font, 2008). This is in contrast to newspaper coverage of GM food in the United States which generally shows a strong bias toward positive presentation (Nucci & Kubey, 2007). The reason for this difference lies in the different approaches that the two regions have taken toward GM technology, with the United States widely embracing commercial production of GM crops and the United Kingdom adopting the precautionary approach which underpins the Cartagena Protocol that governs the use of GM technology and calls for withholding adoption of a new technology until there is conclusive evidence that it will do no harm. In Japan, newspaper coverage of biotechnology between 1985 and 2000 presented GMOs in a predominantly positive tone (Hibino & Nagata, 2006). Similarly, in the Philippines, 41.3% of news stories on GMOs published from 1999 to 2009 in the top three national newspapers were written in a positive tone, 38.2% had a neutral tone, and only 19.8% had a negative tone (Navarro, Panopio, Malayang, & Amano, 2011). The news media in Spain tended to present a balanced view of GMOs and GM food (Lewison, 2007).

Tone of Headlines

Table 3 presents the frequencies and percentages of headlines that were positive, negative, and neutral in tone toward GM crops. Overall, there were more headlines with a neutral tone (55.8%) toward GM crops than negative (32.6%) or positive (11.6%). This trend was maintained by the *Daily Nation* and *The Standard*, but not by *Taiifa Leo* in which three of the headlines (60%)

TABLE 3 Frequency of Headlines by Tone and Newspaper

Headline tone	<i>Daily Nation</i> (<i>n</i> = 49)	<i>The Standard</i> (<i>n</i> = 41)	<i>Taiifa Leo</i> (<i>n</i> = 5)	Total (<i>n</i> = 95)
Positive	6 (12.2%)	5 (12.2%)	0	11 (11.6%)
Negative	15 (30.6%)	13 (31.7%)	3 (60.0%)	31 (32.6%)
Neutral	28 (57.1%)	23 (56.1%)	2 (40.0%)	53 (55.8%)

were negatively biased and two (40%) were neutral. This was comparable to the tone of the articles in the same daily, in which none of them had a positive tone.

Several of the negative headlines framed genetically modified food as something to be cautious about, using words such as “danger,” “threat,” and “abomination” as shown in these examples:

- “GMOs ‘not solution to food crisis in Africa’” (Otieno, 2007, p. 7)
- “Danger lurks in genetic farming” (Kimole, 2008, p. 12)
- “Genetically modified food imports an abomination” (Wakio, 2009, p. 11)
- “GM foods a threat to farming” (Barnes, 2008, p. 16)
- “*Mbegu za mabindi zichunguzwe*” [Maize seed should be investigated], (Ngare, 2008, p. 10)
- “*‘Mizimwi’ ya mabindi yarejea*” [The maize ‘dragons’ return], (Olali, 2009b, p. 4)

On the other hand, the positive headlines focused on scientists’ approval of genetic modification of food crops and the potential of the technology to improve agriculture in the country. Below are a few examples of such headlines:

- “Genetic foods fears overblown, say scientists” (Ubwani, 2009, p. 30)
- “Genetic farming is the way to go” (Okatch, 2008, p. 12)
- “Scientists find genes to protect wheat from rust” (Kahn, 2009, p. 22)
- “Scientists back GMO science” (Ntale & Ogodo, 2009, p. 8)

Over 50% of headlines contained a reference to GMOs or GM technology and were framed without bias either for or against GMOs, pointing to attempts by the writers of the headlines (usually the sub-editors) to maintain balance and objectivity while drawing attention to the content of the article or framing the reader’s interpretation of the article.

Comparative analysis of the tone of the articles and that of their corresponding headlines revealed that there were 10 instances in which articles that were neutral in tone toward GM crops had corresponding headlines that were either positive (3 articles) or negative (7 articles) in tone. This finding suggests that, in the case of these 10 articles, there is a possibility that articles framed by the author in a neutral tone may end up being perceived by the reader as either positively or negatively biased toward GM crops on account of the headline. This is because of the “replacement effect” in which headlines stand in for the content of the article or the “framing effect” in which the headline frames the reader’s interpretation of the content of the article (Condit et al., 2001).

TABLE 4 Frequency of Articles by Source Quoted and Newspaper

Source	<i>Daily Nation</i> (n = 49)	<i>The Standard</i> (n = 41)	<i>Taiifa Leo</i> (n = 5)	Total (n = 95)
Government official	17 (34.7%)*	7 (17.1%)	1 (20.0%)	25 (26.3%)
Research scientist	14 (28.6%)	13 (31.7%)	0	27 (28.4%)
Kenya Biodiversity Coalition	7 (14.3%)	0	1 (20.0%)	8 (8.4%)
Member of Parliament	6 (12.2%)	5 (12.2%)	2 (40.0%)	13 (13.7%)
Anti-GM lobbyist	6 (12.2%)	5 (12.2%)	0	11 (11.6%)
Agri-biotechnology industry	5 (10.2%)	2 (4.9%)	0	7 (7.4%)
Parastatal official	3 (6.1%)	6 (14.6%)	0	9 (9.5%)
Farmer	3 (6.1%)	2 (4.9%)	0	5 (5.3%)
University lecturer	2 (4.1%)	0	0	2 (2.1%)
Pro-GM lobbyist	1 (2.0%)	2 (4.9%)	0	3 (3.2%)
Consumer group	0	3 (7.3%)	2 (40.0%)	5 (5.3%)

Note. *Percentages in each column do not add up to 100 because some articles contained more than one source.

Sources of Information

Table 4 shows the frequencies and percentages of articles that quoted specific sources of information on GM crops (some articles quoted more than one source). Overall, research scientists were quoted most frequently as sources (28.4% of all articles), followed by government officials (26.3%) and Members of Parliament (13.7%). Researchers and government officials tended to speak more in favor of GM crops, while Members of Parliament were of split views, with some supporting and others opposing GM crops.

The three newspapers varied in their degree of coverage of different sources of information, with government officials from the Ministry of Agriculture and the Kenya Plant Health Inspectorate Service being the most frequently quoted sources by the *Daily Nation* (34.7%), while research scientists were quoted most frequently by *The Standard* (31.7%). Sources quoted in *Taiifa Leo* were limited to just four categories of stakeholders, with the most frequently quoted sources being consumer groups (40%) and Members of Parliament (40%), followed by government officials (20%) and the Kenya Biodiversity Coalition (20%). Overall, farmers, university lecturers, pro-GM lobby groups, and consumer groups were quoted less frequently. Considering that farmers and consumers are likely to be directly affected by the commercialization of GM crops, their comparatively low frequency as sources in newspaper coverage of GM crops suggests that their voices are not being effectively heard in the media debate on the subject.

In the United States, where farmers have been growing GM crops since the 1990s, a quantitative content analysis of agricultural biotechnology

coverage between 1992 and 2004 found that governmental agencies were the dominant sources of information, followed by the private biotechnology industry and research organizations (Crawley, 2007). The predominance of researchers and government officials as sources in media coverage of GMOs and minimal reporting of the voices of farmers was also observed in a media survey by the Panos Institute (2005) in India, Kenya, and Zambia where researchers and government ministers were cited more often than the civil society, non-governmental organizations, biotechnology industry, and farmer groups. The implication of this lack of balanced coverage is that the perceptions of the Kenyan public toward GMOs, based on what they read in the newspapers, are likely to be shaped by the statements and opinions of a small sub-set of stakeholders, while ignoring the views of others, particularly farmers who are directly affected by GM crops.

CONCLUSION

Results indicate that there was generally low coverage of GMOs in the Kenyan print media. Most articles were published in the two leading English-language newspapers, with the majority in the *Daily Nation*, more than in *The Standard*. Coverage of GMOs in the non-English newspaper, *Taifa Leo*, was comparatively lower.

Among the frames used to represent GMOs, the agriculture frame was most dominant and emphasized the potential benefits of GMOs in improving agricultural productivity or potential threat of GMOs to the agricultural sector. Other less dominant frames focused on human and environmental safety, research, policy and legislation, public awareness, ethics, and economics.

Overall, coverage of GMOs was not balanced, with most articles being biased either positively or negatively and more articles having negative bias than positive bias. Researchers and government officials had the greatest “voice” in Kenyan media coverage of GMOs, followed by anti-GM lobbyists and parliamentarians. Farmers and consumers received minimal coverage and were rarely quoted as sources of information.

RECOMMENDATIONS

In order to improve the quality of coverage by the Kenyan print media of GMOs, as well as of issues on research, science, technology, and innovation in general, there is a need to train and enhance the capacity of journalists to critically analyze scientific and technical issues related to these topics so as to be able to write well-researched, objective, and in-depth articles that adequately and accurately convey information to the general public. Newspaper coverage of GMOs also needs to be broadened to ensure that the views

of farmers and consumers are adequately represented in the GM debate as these groups stand to be the ones directly affected by the introduction of GM crops. In order to do this, a glossary of scientific words and terminology should be created to facilitate an increase in articles in the Kiswahili daily, because this is the widest read by farmers and the low-educated public, who constitute the majority of beneficiaries and who cannot understand English articles.

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