



REVIEW ARTICLE

COMMUNICATION STRATEGIES AND ANTI-GMO SENTIMENT IN NIGERIA: AN ASSESSMENT OF THE NATIONAL BIOSAFETY MANAGEMENT AGENCY'S OUTREACH

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ABSTRACT

This article assesses how the National Biosafety Management Agency (NBMA) influences anti-GMO (genetically modified organism) activities through its communication strategies. Guided by the Diffusion of Innovations Theory and the Risk Communication Model the study uses a mixed-methods design. A census survey of 347 NBMA staff and stakeholder representatives (93 % response rate) is supplemented with six key-informant interviews and three focus-group discussions. Quantitative data were analysed descriptively; qualitative data underwent thematic analysis. Findings show that although NBMA employs multiple channels such as social media, workshops, and public forums, only 27 % of respondents believe these efforts have reduced anti-GMO resistance, and 40 % feel myths remain largely unaddressed. Language barriers, limited rural penetration, and insufficient real-time engagement impede message effectiveness. The article concludes that NBMA's strategies are only partially successful and recommends culturally tailored, two-way, grassroots communication, capacity-building for communicators, and strengthened media partnerships.

KEYWORDS

Biosafety communication, Genetically Modified Organisms (GMOs), Communication strategies, Anti-GMO sentiment, Biotechnology regulation, Stakeholder engagement.

1. INTRODUCTION

Biotechnology, especially genetically modified organisms (GMOs) could help Nigeria tackle pest pressure, low yields and climate stress, bolstering food security and rural incomes as evidenced in some countries around the world such as United states of America, Brazil, Argentina, China and many more.

The National Biosafety Management Agency (NBMA), created by the 2015 Act, is mandated to assure the safe, transparent deployment of these technologies. Yet public resistance, fuelled by civil-society campaigns, religious scepticism and online misinformation, remains strong, particularly in rural areas where language and access barriers limit NBMA's reach. Understanding how well NBMA's current communication strategy builds trust and counters anti-GMO narratives is therefore essential for evidence-based policy and informed public debate.

1.1 Theoretical Framework

Diffusion of Innovations Theory: Originally developed, DoI explains the process through which an innovation, defined as "an idea, practice, or object perceived as new by an individual or unit of adoption," spreads within a social system over time by (Rogers, 1962; 2003). Adoption proceeds through five adopter categories, innovators, early adopters, early majority, late majority, and laggards, whose uptake is heavily influenced by communication channels (mass media vs. interpersonal networks) and change agents (extension officers, local chiefs, religious leaders).

Risk Communication Model: centres on how institutions convey

information about hazards and uncertainties (Covello and Sandman, 2001; WHO, 2020). In biosafety contexts, public outrage can escalate when stakeholders perceive a risk as involuntary, dreadful, or inequitably distributed. Anti-GMO activists frequently frame GM technology in those terms

1.2 Conceptual Review

Biosafety communication: is the purposeful exchange of information about biotechnology risks, benefits, and regulatory safeguards (WHO, 2020). In Nigeria, the NBMA Act (2015) assigns NBMA statutory responsibility for public awareness and education (Okpokwasili and Ogbonna, 2016). Effective biosafety communication transcends one-way information dissemination; it relies on risk-communication principles—timeliness, transparency, audience focus, and responsiveness—to build trust and encourage informed participation (Covello and Sandman, 2001).

Genetically Modified Organisms (GMOs): are organisms whose genomes have been deliberately altered to express desired traits (James, 2018). While GM crops can improve yield and resilience, they are frequently framed as "unnatural" or risky in popular discourse (Scheufele and Krause, 2019). In Nigeria, GMOs remain the focal point of biosafety regulation and the primary target of public skepticism (Adamu, et al., 2019).

Stakeholder engagement: involves identifying, informing, and involving groups that have an interest in—or are affected by—biotechnology (Cornelissen, 2020). Systems Theory emphasises that each stakeholder group forms a subsystem that must be interconnected through feedback loops for effective regulation (von Bertalanffy, 1968). Empirical studies show that meaningful engagement—particularly with farmers, media, and religious leaders—increases acceptance of biotechnology in sub-Saharan

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Africa (Ampadu-Ameyaw, et al., 2021).

Anti-GMO sentiment: refers to negative attitudes and actions directed toward GMOs and their regulators, often fuelled by misinformation, cultural values, and distrust in government (Scheufele and Krause, 2019). In Nigeria, anti-GMO activism leverages social media to amplify fear narratives and legal challenges (Nwosu and Ezeanya-Esiobu, 2022). Understanding the drivers of anti-GMO sentiment is critical for tailoring NBMA's communication to the concerns of late adopters and laggards (Rogers, 2003).

Biotechnology regulation: comprises the legal and institutional frameworks designed to ensure safe research, deployment, and use of modern biotechnology (FAO and WHO, 2013). The NBMA provides Nigeria's primary oversight, aligning national practice with the Cartagena Protocol on Biosafety (Federal Republic of Nigeria, 2015). Regulatory legitimacy increases when processes are transparent and participatory (Pardo, 2012).

Communication strategies: are planned, audience-specific combinations of channels and messages aimed at achieving behavioural or informational objectives (Cornelissen, 2020). According to the Diffusion of Innovations Theory, the speed and breadth of innovation adoption depend on message attributes—relative advantage, compatibility, complexity, trialability, and observability—and on the credibility of the change agent (Rogers, 2003). Studies in Ghana and Kenya demonstrate that strategies grounded in local languages, storytelling, and trusted intermediaries outperform purely technical messaging in rural settings (Kamau, et al., 2019).

2. EMPIRICAL REVIEW

As examined COVID-19 risk-communication campaigns in Australia, combining a nationally representative survey (n = 2,010) with policy analysis (Hyland-Wood et al., 2020). Their mixed-methods findings show that timely updates, transparent data release, and the use of locally trusted messengers (e.g., general practitioners, community broadcasters) substantially reduced misinformation. Although the topic was public health rather than GMOs, the study underscores principles directly applicable to NBMA: identify credible community voices and communicate early and often.

Across Europe, conducted a content analysis of print and online reports in 12 EU member states during high-profile GMO authorisations (Durant and Legge, 2021). They found that headlines emphasising uncertainty ("Frankenfoods?") heightened public concern, whereas explanatory stories detailing the science and regulation behind approvals mitigated fear. The implication is that NBMA press releases should move beyond procedural announcements and instead translate risk-assessment steps into compelling narratives.

A longitudinal Eurobarometer analysis, covering public attitudes across 23 years—points to trust in national competent authorities as the single strongest predictor of GMO acceptance by (Gaskell et al., 2020). Where regulators were perceived as transparent and responsive, acceptance increased; where they were viewed as opaque, resistance persisted. This finding reiterates that NBMA's credibility is central to public buy-in.

Randomised controlled trials (RCTs) also demonstrate the value of visual risk messaging. As exposed U.S. university students (n = 280) to either infographics or plain-text explanations about GMO risks and benefits (Chin, et al., 2020). Infographics boosted comprehension by 34 percent, indicating that visual aids can simplify complex biotechnology information for low-literacy or time-poor audiences.

Using a discrete-choice experiment with 1,030 U.S. consumers, found that clear GMO labelling increased willingness to purchase by 20 percent (McFadden and Lusk, 2020). Transparent labelling signals regulatory oversight and builds confidence—an approach that might be piloted in Nigerian markets through QR codes or colour-coded labels.

A systematic review covering 77 West African studies concludes that GMO resistance is driven less by knowledge deficits and more by a combination of language barriers, religious values, and longstanding mistrust of political elites by (Adenle, et al., 2021). A similar pattern emerged in Kenya and South Africa: found that inclusive multi-stakeholder platforms convened early in policy formulation reduced litigation and increased GMO field-trial approvals (Kamau, et al., 2019). In Ghana, surveyed 1,200 respondents and reported significantly higher GMO acceptance among people who had interacted with extension officers and received information in local languages (Ampadu-Ameyaw, et al., 2021). Together, these studies highlight that NBMA must partner deliberately with county-level authorities, faith leaders, and local extension services—and deliver

messages in indigenous languages if it hopes to penetrate rural Nigeria.

Digital misinformation is another common theme. In an Iranian netnography of anti-GMO Telegram groups, observed that emotive videos and conspiracy narratives were shared far more virally than science-based posts (Pousti and Ekbia, 2022). Similarly, a comparative study of crisis preparedness found that Uganda's National Biosafety Authority reduced GMO rumours by 50 percent within six months after deploying a social-media monitoring dashboard—whereas NBMA lacked such tools at the time of the study by (Nwosu and Ezeanya-Esiobu, 2022). The lesson is clear: social-listening analytics and rapid-response teams are becoming indispensable.

Internal documentation and staff interviews analysed reveal that roughly 80 percent of NBMA's outreach budget in 2018–2019 was spent on Abuja-based events, leaving state and rural audiences under-served by (Isah, et al., 2020). Farmers' perspectives reinforce that imbalance. Surveying 200 cotton growers found that while Bt-cotton adopters reported yield gains, almost two-thirds felt the government had not "explained GMOs well" in (Kaduna and Katsina, et al., 2019). Many attributed lingering scepticism in their communities to unmet information needs and the absence of local testimonials.

Media-based edutainment shows promise. ran a quasi-experimental campaign in six northern local-government areas: a weekly Hausa-language radio drama embedded with GMO facts raised correct knowledge scores by 41 percent (Bello, et al., 2023). Such results suggest NBMA could scale edutainment formats in Igbo, Yoruba, and Nigerian Pidgin.

While the 2015 Act clarified authority, grassroots communication remained weak. Building on that critique, benchmarked NBMA's crisis-response protocols against those of Uganda and Kenya (Nwosu and Ezeanya-Esiobu, 2022). They concluded that NBMA needed structured media-monitoring tools and pre-approved communication templates to counter spontaneous anti-GMO claims.

Investments in digital engagement can produce rapid gains. India's Department of Biotechnology developed a mobile "Biotech" app delivering push notifications about research breakthroughs and biosafety guidelines. Analysed usage data (~ five million users) and reported a 48 percent increase in policy-update readership when push notifications were enabled (Kumar and Prasad, 2022). NBMA could replicate this model through SMS or WhatsApp in local languages.

2.1 Identified Gaps in Reviewed Literature

Despite this rich literature, several gaps persist such as longitudinal Nigerian evidence measuring how attitudes shift post-NBMA interventions is scarce quantitative evaluation of two-way platforms (e.g., stakeholder forums) remains limited, faith-based communication metrics are under-researched, despite frequent calls for clergy engagement and cost-effectiveness studies comparing digital versus traditional media in rural Nigeria are lacking.

Addressing these gaps will require NBMA and academic partners to integrate robust monitoring and evaluation into future outreach initiatives.

3. METHODOLOGY

This study employed an explanatory sequential mixed-methods design to generate a comprehensive understanding of how NBMA's communication strategies influence anti-GMO sentiment in Nigeria (Creswell and Plano Clark, 2018). Quantitative findings provided a broad picture of awareness, trust, and attitudes; qualitative data then elaborated the contextual factors behind the numbers. Fieldwork was conducted between October and December 2024 in Abuja (NBMA headquarters) and among stakeholders who work directly with the Agency. These stakeholders were selected purposively based on their activities, dealings with the public and the environment which they operate in.

3.1 Sample Size

The study targeted all staff of NBMA (n = 375) and representatives of 11 collaborating organisations e.g., NAFDAC, National Orientation Agency (NOA), National Agricultural Seed Council, bringing the frame population to N = 386 (NBMA nominal roll, February 2024). Because the population was finite and manageable, a total-population (census) approach was justified, consistent with recommendation for small frames. A questionnaire was sent to every frame member by hand (Cochran's, 1977).

3.2 Data Presentation and Analysis

Table 1: The agency's communication efforts have reduced tensions around modern biotechnology in Nigeria.

The Agency's Communication Efforts Have Reduced Tensions Around Modern Biotechnology in Nigeria	Frequency	Percentage
Strongly Disagree	59	17.06%
Disagree	55	15.87%
Neutral	80	23.05%
Agree	125	36.06%
Strongly Agree	28	8.07%
Total	347	100%

Source: Field Survey 2024

The study evaluated whether the communication efforts of the National Biosafety Management Agency (NBMA) have helped reduce tensions around modern biotechnology in Nigeria. The results revealed that 44% of respondents agreed, strongly agreed, suggesting that many believed the agency's efforts contributed to reducing tensions. However, 55% disagreed, strongly disagreed or remained neutral. These findings imply that while the agency's communication strategies have had a positive

effect in alleviating concerns, there remains a larger portion of the population who either felt tensions were not reduced or were uncertain about the impact. Further efforts may be needed to ensure broader acceptance and understanding of biotechnology. NBMA may need to focus on expanding their outreach and addressing the concerns of these groups to achieve broader impact.

Table 2: The information provided by NBMA has reduced Anti-GMO kickbacks.

The Information Provided by NBMA Has Reduced Anti-GMO Kickbacks	Frequency	Percentage
Strongly Disagree	57	16.42%
Disagree	110	31.74%
Neutral	85	24.49%
Agree	60	17.28%
Strongly Agree	35	10.09%
Total	347	100%

Source: Field Survey 2024

On whether the information provided by the National Biosafety Management Agency (NBMA) has contributed to reducing anti-GMO (Genetically Modified Organisms) sentiments. The results indicated that 27% of respondents agreed or strongly agreed, suggesting that a small portion of stakeholders felt the information was effective in countering anti-GMO sentiments. However, a very large 72% disagreed, strongly disagreed or remained neutral. These findings imply that while NBMA's

communication efforts have had some success in mitigating anti-GMO opposition, there is still very large resistance or uncertainty among certain groups, indicating the need for enhanced and more targeted communication strategies. This indicates that there is need for more targeted and persuasive approaches in addressing persistent resistance. For instance, collaborating with influential community leaders could enhance credibility and acceptance.

Table 3: There is increased awareness about the benefits and potential risks of modern biotechnology due to these communication strategies.

Increased Awareness About the Benefits and Potential Risks of Modern Biotechnology	Frequency	Percentage
Strongly Disagree	20	5.76%
Disagree	70	20.18%
Neutral	120	34.56%
Agree	92	26.51%
Strongly Agree	45	12.98%
Total	347	100%

Source: Field Survey 2024

The study assessed whether the communication strategies of the National Biosafety Management Agency (NBMA) have led to increased awareness about the benefits and potential risks of modern biotechnology. The results indicated that 31% of respondents agreed or strongly agreed, suggesting that some respondents recognized the agency's efforts in raising awareness. However, 25% disagreed or strongly disagreed, while

a significant portion (34.56%) remained neutral. These findings imply that while there has been some success in increasing awareness, a large number of respondents either remain uncertain or feel that the communication strategies have not fully addressed the issue, pointing to the need for more targeted and effective awareness campaigns.

Table 4: The agency's communications have helped dispel myths and misconceptions about biotechnology.

The Agency's Communications Have Helped Dispel Myths and Misconceptions About Biotechnology	Frequency	Percentage
Strongly Disagree	25	7.21%
Disagree	70	20.18%
Neutral	110	31.74%
Agree	92	26.51%
Strongly Agree	50	14.41%
Total	347	100%

Source: Field Survey 2024

The study examined whether the communication efforts of the National Biosafety Management Agency (NBMA) have helped dispel myths and misconceptions about biotechnology. The results indicated that 40% of respondents agreed or strongly agreed, suggesting that some stakeholders felt the agency's communications were effective in clarifying misconceptions. However, a significant 59% disagreed, strongly disagreed

or remained neutral. These findings imply that while there have been some positive outcomes in addressing myths, a considerable portion of respondents still hold misconceptions or feel that the communications have not sufficiently dispelled them. This highlights the need for continued and more targeted efforts such as localized campaigns in regions where myths are prevalent to correct misinformation and engage with skeptics.

Table 5: Nigerians trust the information provided by NBMA regarding biotechnology.

Nigerians Trust the Information Provided by NBMA Regarding Biotechnology	Frequency	Percentage
Never	18	5.18%
Rarely	45	12.98%
Occasionally	104	29.98%
A Moderate Amount	110	31.74%
A Great Deal	70	20.18%
Total	347	100%

Source: Field Survey 2024

The study evaluated the level of trust Nigerians have in the information provided by the National Biosafety Management Agency (NBMA) regarding biotechnology. The results reflected that 31% of respondents have moderate trust in the information provided by NBMA while 17% never or rarely trusted the information in the agency's communications. This result indicates a trust deficit among a substantial portion of the population, which could undermine the effectiveness of the communication strategies. To address this, NBMA could prioritize transparency, engage trusted figures in their campaigns and provide empirical evidence to back their claims.

The communication strategies of NBMA have not had good measurable impact on mitigating anti-GMO activities in Nigeria, the Agency has not been so successful in reducing tensions, dispelling myths and raising awareness about the regulation of biotechnology in other to build the trust of Nigerians despite its awareness campaigns and efforts. Hence challenges remain in fostering trust and ensuring the accessibility and persuasiveness of its communication efforts.

4. DISCUSSION OF FINDINGS

The survey, interview, and focus-group results converge on one central insight: NBMA's current communication mix, although visible to government-linked stakeholders, has not yet translated into broad-based shifts in anti-GMO sentiment.

Limited Impact on Tension Reduction. Only 44 % of respondents felt NBMA's outreach had softened public hostility toward modern biotechnology (Table 1), while a majority (55 %) were unconvinced. In qualitative sessions, participants attributed this to "Abuja-centric" events and a lack of real-time engagement when rumours flare.

Minimal Effect on Active Resistance. A mere 27 % agreed that NBMA information has dampened anti-GMO "kick-backs" (Table 2). Three-quarters of respondents either disagreed or were neutral, underscoring that entrenched activists still dominate the narrative in many communities.

Awareness Without Understanding. Roughly one-third of the sample acknowledged greater awareness of benefits and risks (Table 3), yet 35 % remained neutral and 26 % dissented. This suggests that awareness campaigns are not consistently converting into comprehension.

Myths remain widespread, as forty per cent believed NBMA messages were dispelling misconceptions (Table 4), but 59 % disagreed or were unsure. FGDs highlighted viral videos portraying GM crops as "toxic" outpacing NBMA's text-heavy responses.

Trust Deficit. Only one in five respondents expressed "a great deal" of trust in NBMA's information (Table 5). Almost half trusted it merely "occasionally" or less. Participants linked this to opaque approval procedures and delayed feedback on social-media queries.

Diffusion-of-Innovations perspective. NBMA is communicating primarily through mass channels (press briefings, social media) that reach innovators and early adopters in urban centres, but the early/late majority in rural settings rely on interpersonal networks that NBMA rarely engages. Moreover, the messages do little to lower perceived complexity or increase the observability of GMO benefits—two factors deems critical for adoption (Rogers, 2003).

Risk-Communication model states that effective risk outreach requires trust, transparency, and two-way responsiveness (Covello and Sandman,

2001). The survey's low-trust scores and interview testimonies of unanswered questions indicate these RCM prerequisites are not yet met. As a result, anti-GMO entrepreneurs easily fill the vacuum with emotive, fear-laden content.

5. CONCLUSION

The National Biosafety Management Agency's communication strategy is necessary but not yet sufficient for the agency's long-term regulatory legitimacy. To shift the public debate from suspicion to informed deliberation, NBMA must move from episodic, centre-outward messaging to a sustained, polycentric model that integrates grassroots voices, iterative feedback loops, and culturally grounded narratives of benefit.

RECOMMENDATIONS

- **Broaden Channel Mix:** Pair Abuja press events with community radio dramas, agricultural-show roadshows, and WhatsApp voice notes in Hausa, Igbo, Yoruba, and Pidgin.
- **Publish a Plain-Language "Biosafety Dashboard."** Post concise, infographic-style updates on every permit, field trial, and food-safety decision to demystify the regulatory process.
- **Showcase Observable Benefits:** Co-produce short videos in which Nigerian Bt-cotton and PBR-cowpea farmers discuss yield gains; distribute via community screenings and Facebook Live.
- **Mobilise Trusted Intermediaries:** Train extension agents, faith leaders, and health workers as "biosafety champions" who can respond to congregation-level questions and rumours.
- **Forge Deliberative Forums with Faith Leaders and Traditional Councils** to contextualise biosafety messages within stewardship and food-security values.

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