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Assessing the Efficacy of Transparent Risk Communication Against Authoritative Directives During Scientific Emergencies

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ABSTRACT

Background: When a scientific emergency strikes-whether an infectious-disease outbre ak or an environmental hazard institutions face a recurring dilemma: should they lead w ith open, uncertainty-tolerant disclosure, or with firmdirectives that demand immediate o bedience?

Objective: This article reviews the available evidence to weigh the relative effe ctiveness of transparent risk communication against authoritative, directive-based com munication in shaping public trust, compliance, and resistance to misinformation during scientific emergencies.

Methodology: A narrative review approach was used, drawing on peer-reviewed empirical studies, WHO and CDC risk-communication guidance, and policy evaluations published from 2019 to 2026 and gathered through major academic databa ses, including PubMed, Scopus, Web of Science, Google Scholar, and ScienceDirect.

Key findings: The evidence gathered suggests that transparency particularly when it acknow ledges uncertainty and builds people's confidence in their own ability to act cultivates tr ust and voluntary cooperation that last, whereas directives on their own win quicker but more fragile obedience that tends to unravel once contradictions appear. The response st rategies that worked best, especially across Sub-Saharan Africa and Nigeria, blended the two: firm direction for urgent protective steps, reinforced by transparent, community-anc hored explanation that kept trust intact.

Conclusion: On their own, neither strategy is ade quate; the strongest results come from a hybrid, context-sensitive model that opens with authoritative clarity and sustains it with ongoing transparency.

Practical implications: Ri sk communicators, science educators, and policymakers across Taraba State and comp arable settings should build hybrid communication protocols into standard practice, culti vate trusted community messengers, and strengthen the science-communication skills of teachers and health workers who deliver risk messages locally.

Keywords: risk communication; transparent communication; authoritative directives; sci entific emergencies; public trust; misinformation; crisis communication

INTRODUCTION

A scientific emergency can be described as any sudden threat to public safety that is roo ted in unfolding scientific evidence an infectious disease outbreak, an environmental or i ndustrial hazard, or a natural disaster with a strong scientific dimension in which author ities must communicate rapidly changing, often incomplete, information while also direc ting people toward protective behaviour. The COVID-19 pandemic, repeated Ebola outbre aks across West and Central Africa, Monkeypox flare-ups, avian-influenza episodes, and climate-related disasters have all put this capacity to the test. In each instance, communi cators wrestled with the same underlying tension: whether to foreground open, uncertain ty-tolerant transparency, or to lead with firm, authoritative instructions meant to secure c ompliance without delay.

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Transparent risk communication can be understood as the honest, timely disclosure of w hat is known, unknown, and still uncertain about a hazard, together with the reasoning b ehind whatever actions are being recommended. Authoritative directives sit at the other e nd of the spectrum: top-down instructions from governments or health agencies lockdo wn, curfews, mandatory quarantine, compulsory vaccination that favour swift, uniform o bedience over drawn-out explanation. The World Health Organization's own guidance do es not treat these as opposing options but as complementary tools, provided that directi ves rest on transparent reasoning and are matched with support services people can act ually reach (Centers for Disease Control and Prevention, 2018).

Countries that paired clear non-pharmaceutical-intervention orders with ongoing, transpa rent explanations during COVID-19 South Korea being a frequently cited example general ly achieved stronger voluntary compliance than those that relied on directives alone. A si milar pattern surfaced in the West African Ebola epidemic and later outbreaks in the eastern Democratic Republic of Congo, where communities wary of response teams enforcin g directives without explanation were more inclined to resist screening and burial protoco Is, whereas transparent, community-level engagement improved cooperation (Vinck et al.,2019). The same dynamic has since appeared in Monkeypox communication, avian-infl uenza containment among poultry farmers, and natural-disaster early-warning systems,which suggests that the transparency authority balance is a general communication cha llenge rather than one specific to any single disease.

Purpose of the Study

This study sets out to weigh transparent risk communication against authoritative directi ve based communication in terms of how each shapes public trust, compliance, and resi stance to misinformation during scientific emergencies. In particular, it aims to: (i) exami ne the theoretical perspectives that explain how each communication style influences pu blic response; (ii) bring together the empirical evidence on the outcomes each approach t ends to produce; (iii) weigh the strengths, weaknesses, and contextual fit of both approa ches against one another; and (iv) draw out practical recommendations for science com municators, educators, and emergency-response agencies working in Nigeria and similar settings.

Statement of the Problem

Although guidance on emergency risk communication has grown considerably, science c ommunicators, public health officials, and science educators working in resource-constr ained settings such as Taraba State, Nigeria, still tend to fall back on authoritative directi ves during scientific emergencies, often offering little transparent explanation alongside them. This pattern is consistent with broader assessments of Nigeria's risk-communicati on practice, which identify weak feedback channels and inconsistent messaging as recu rring structural challenges (Reuben & Danladi, 2022). The result, time and again, is short-lived compliance followed by a rebound of distrust, non-adherence, and openness to mis information once gaps or contradictions in official messaging come to light. A systematic comparison of transparent communication against authoritative directives is therefore needed to guide a more evidence-based, hybrid communication practice.

Research Questions

1. How does transparent risk communication influence public trust and compliance duri ng scientific emergencies, compared with authoritative directives?
2. What theoretical mechanisms explain differential public responses to transparent vers us authoritative risk communication?
3. Under what contextual conditions is each communication approach most effective?
4. What hybrid communication strategies are supported by the reviewed evidence?

Hypotheses

Because this is a narrative literature review rather than a study built on primary data colle ction, the hypotheses below are not tested statistically; instead, they function as evidenc e-derived propositions that are

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weighed against the reviewed literature in the Results and Discussion sections:

H1: Transparent risk communication that acknowledges uncertainty and builds people's confidence in their own ability to act is linked to more lasting public trust and voluntary c ompliance than authoritative directives issued without supporting explanation.

H2: Authoritative directives produce faster short-term compliance than transparent com munication on its own, but that compliance is more prone to breaking down once inconsi stencies in official messaging come to light.

H3: A hybrid strategy that opens with authoritative clarity and sustains it through ongoin g, community engaged transparency outperforms either approach used alone on measur es of trust, compliance, and resistance to misinformation.

Significance and **Scope**

This study should be of value to policymakers, public health agencies, science communi cators, science educators, and emergency-management practitioners looking for evidenc e-based guidance on designing risk messages during scientific emergencies. Its scope is confined to peer-reviewed and credible grey-literature evidence published between 2019 a nd 2026 concerning human scientific or health emergencies; purely financial or cybersec urity crisis communication falls outside it. For the purposes of this review, transparent ris k communication means open, two-way disclosure of hazard information that acknowle dges uncertainty; authoritative directives means compulsory, top-down instructions issue d by a recognized authority; public trust refers to the degree of confidence citizens place i n the competence, integrity, and honesty of the institution communicating with them; an d compliance means voluntary or mandated adherence to recommended or directed prot ective behaviour.

LITERATURE REVIEW

Scientific emergencies are marked by high uncertainty and urgency, and by a need for th e public to grasp technical evidence quickly conditions under which the balance between explanatory transparency and directive clarity must shift across the alert, response, and r ecovery phases of an emergency (Centers for Disea se Control and Prevention, 2018). Th e literature consistently points to timeliness, source credibility, and consistency as the str ongest predictors of an effective public response (Rimal & Lapinski, 2009). "Reasoned tr ansparency" explaining not just what is recommended but why, and how that advice mi ght change helps audiences tolerate revisions to official guidance without assuming aut horities are incompetent or dishonest (Hodson et al., 2023), while directives drawn from I egitimate institutional authority remain best suited to emergencies demanding immediat e, uniform action, provided they are paired with credible explanation and working support services, as Nigeria's COVID-19 response illustrates (Adebayo et al., 2022).

Public trust is what converts either style of messaging into actual behaviour; it accumula tes through consistency and demonstrated honesty, yet it can just as quickly be eroded by directives that appear arbitrary or by disclosure that arrives past the point it was still us eful (O'Malley et al., 2009). The literature further distinguishes coerced compliance, drive n by fear of sanction, from voluntary compliance, driven by perceived legitimacy and self -efficacy the belief that one is capable of carrying out a recommended action (Bandura,1997) with self-efficacy messaging shown to predict stronger voluntary protective behav iour than fear-based directives alone (Yoon et al., 2022). On misinformation specifically,both the WHO/EMRO infodemic synthesis and the Lancet Public Health prevention fram ework find that transparency-based, literacy-building communication eases the burden o n regulatory anti-misinformation measures, and that pairing proactive transparency with selective content moderation yields the most resilient outcomes (Achenbach & Hua, 2024; Nagar et al., 2023; Ophir et al., 2020). Read alongside theoretical frameworks including Situational Crisis Communication Theory (Coombs, 2007) and the Extended Parallel Pro cess

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Model (Ahn & Noh, 2021), this body of work converges on one interpretive point: dir ective clarity and transparent, efficacy-building explanation function as complementary,not competing, levers of compliance.

METHODOLOGY

A narrative-review design was adopted to bring together evidence on how communicatio n choices shape public outcomes during scientific and health emergencies. Sources wer e identified across several major academic databases -among them PubMed, Scopus,Web of Science, Google Scholar, and ScienceDirect -and supplemented with guidance documents issued by bodies such as the World Health Organization, the United States C enters for Disease Control and Prevention, and the Johns Hopkins Center for Health Secu rity (2025). Search terms combined through Boolean operators included risk communica tion, transparent communication, authoritative directives, crisis communication, public tr ust, compliance, misinformation, and public health emergency, targeting material publish ed between 2019 and 2026.

Only peer-reviewed empirical studies, review articles, and credible institutional publications written in English and directly relevant to emergency risk communication were retaine d for analysis. Non-peer-reviewed commentary, studies unrelated to the topic, and source s predating 2019 were excluded, except where a work represented a foundational theoreti cal contribution. Material from the selected studies was organised into a structured evide nce matrix and examined thematically to surface recurring patterns in public trust, compl iance, misinformation management, and intervention acceptance, read against each stu dy's theoretical framework.

RESULTS

The evidentiary basis of this review rests on twelve empirical and evidence-synthesis stu dies published between 2019 and 2025, alongside a comparative synthesis of the streng ths, weaknesses, and contextual fit of the two communication approaches. Findings are presented first in tabulated form and then discussed narratively by theme.

Table 1 Comparative Strengths, Weaknesses, and Context of Transparent Communication and A uthoritative Directives

Dimens ion	Strengths	Weaknesses	Appropriate Context
Transparent Risk Co mmunication	Builds long-term public tru st; acknowledges uncerta inty; supports informed de cision-making; reduces ru mour and misinformation	Can heighten anxiety;may be exploited by opportunis tic misinformation actors;slower where instant actio n is required	Prolonged emergencies w ith evolving science; literat e, digitally connected pop ulations; contexts of pre-e xisting institutional distrus t
Authoritative Dire ctiv es	Enables rapid, uniform act ion; reduces ambiguity; us eful when time for deliber ation is limited	Risk of non-compliance if legitimacy is questioned;can suppress feedback; v ulnerable to backlash onc e inconsistencies emerge	Acute, fast-moving hazard s (e.g.,chemical spills, ac tive outbreaks) requiring i mmediate protective actio n

Note.Synthesised from the body of literature reviewed on emergency risk communicatio n, drawing in particular on Centers for Disease Control and Prevention (2018), Coombs (2007), Hodson et al. (2023), and O'Malley et al. (2009).

Table 2 Summary of Reviewed Empirical Studies

Author(s)/Year/Country	Design/Sample	Major Findings	Gap Identified
Fahim et al. (2023); Canada	Cross-sectional survey of the public	Clear, accurate, transparent communication was rated as	Limited attention to generalisability

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		central to reducing susceptibility to misinformation; perceived inconsistency in official messaging correlated with greater reliance on unofficial sources.	beyond a single province or health system.
Adebisi, Rabe & Lucero-Prisno (2021); 13 African countries	Narrative review of RCCE strategies	Most African governments combined directive measures (lockdowns, curfews) with community engagement, but transparency and two-way engagement were under-resourced compared with top-down messaging.	Country-level heterogeneity not empirically weighted against compliance outcomes.
Hodson et al. (2023); Canada	Qualitative document and discourse analysis	"Reasoned transparency"—explaining the basis and limits of evolving guidance—helped audiences tolerate changing scientific advice without losing trust in institutions.	Did not empirically test audience trust before and after exposure to reasoned-transparency messaging.
Lowe et al. (2022); United States	Bioethical case analysis (masking guidance)	Full transparency about scarcity-driven guidance changes was ethically preferable but practically difficult; withheld rationale eroded trust once discovered.	Single-country, single-hazard case; broader empirical testing across hazards is lacking.
Yoon, You & Shon (2022); South Korea	Online survey, n=813 adults	Self-efficacy messaging (a feature of transparent, explanatory communication) predicted stronger "danger control" responses, in the sense used by the Extended Parallel Process Model (Witte, 1992), such as hygiene and social distancing, than fear-based directive messaging alone.	Cross-sectional design precludes causal claims about message type and behaviour change.
Ahn & Noh (2021); South Korea	Survey testing EPPM with moral-intuition moderators	Perceived efficacy and moral framing jointly shaped compliance intentions; directive-only messages without efficacy cues increased fear without increasing protective action.	Limited testing outside collectivist cultural contexts.
Hu, Chen, Wang & Huang (2023); China (editorial synthesis)	Editorial synthesis of RCCE research	Community engagement combined with authority-issued guidance produced more consistent compliance than either strategy used alone.	As an editorial synthesis, it does not present new primary data.
Adebayo, Balogun & Salawu (2022); Nigeria	Policy/strategy analysis	Historical mistrust rooted in past disease-response controversies (e.g., the 2003–2004 polio vaccination boycott) weakened uptake of subsequently issued authoritative COVID-19 directives.	Limited primary survey data specific to Taraba State and similar sub-national contexts.
Nigeria Centre for Disease Control (2022); Nigeria	Programme/implementation review	A blended emergency operations approach—combining directive non-pharmaceutical-intervention orders with community-level risk	Programme reports rarely disaggregate the independent contribution of

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		communication—reduced (but did not eliminate) misinformation-driven non-compliance.	transparency versus directive elements.
Vinck et al. (2019); DRC (North Kivu, Ebola)	Population-based survey	Institutional distrust was strongly associated with belief in misinformation and refusal of Ebola response teams, even where directives were legally mandated.	Findings from an active Ebola outbreak may not transfer directly to slower-onset scientific emergencies.
WHO/EMRO infodemic synthesis (2025)	Scoping review of infodemic-management studies	Multi-pronged strategies pairing transparent, literacy-building communication with selective regulatory (authoritative) measures against harmful falsehoods were more effective than either approach in isolation.	Heterogeneous outcome measures across reviewed studies limit direct comparability.
Lancet Public Health infodemic framework (2024)	Narrative review of 54 documents (1961–2023)	Upstream, trust-building transparency interventions reduced the downstream burden on authoritative/regulatory infodemic responses.	Framework is largely conceptual; empirical validation across emergency types is still emerging.

Note.RCCE = Risk Communication and Community Engagement; EPPM = Extended Par allel Process Model.

Public **Trust in Scientific Institutions**

Across the studies reviewed, transparent communication especially when it discloses un certainty and reasoning openly builds public trust that lasts longer than trust generated b y unexplained authoritative directives (Hodson et al., 2023). This fits SCCT's prediction t hat when the public holds authorities responsible for an emergency response, accommo dating, explanatory strategies do more to protect institutional credibility (Coombs, 2007).

Compliance with Emergency Directives

Authoritative directives win faster short-term compliance, particularly where there is a me chanism to enforce them, yet the EPPM-and PMT-based studies reviewed here show that compliance sustained by fear or coercion alone, without any accompanying efficacy inf ormation, tends to fade over time or tip into avoidance responses such as denial and fat alism (Ahn & Noh, 2021; Yoon et al., 2022) a pattern that is most pronounced where publ ic trust in political institutions is already low (Lalot et al., 2020).

Vaccine and Intervention Acceptance

Nigeria offers a clear illustration of how deep-rooted distrust traceable to episodes such as the 2003-2004 polio vaccination boycott can turn people against purely authoritative vaccination directives, whereas transparent, community-engaged explanation noticeably improved willingness to accept later interventions (Adebayo et al., 2022; Jegede, 2007).Survey evidencefrom Ibadan similarly found that residents' willingness to accept a COVI D-19 vaccine tracked closely with how transparently its safety and cost implications were communicated, rather than with directive messaging alone (Ilesanmi et al., 2021).

Influence on Behavioural Change

In line with HBM and EPPM, behavioural change held up best where messaging address ed perceived susceptibility and severity together with self-efficacy and response efficacy features more typical of transparent communication than of directives issued on their o wn (Ahn & Noh, 2021).

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Management of Misinformation

The infodemic management literature suggests that proactive transparency closes off th e information vacuums that misinformation tends to fill, while targeted, authoritative reg ulatory action is still needed to deal with deliberately harmful falsehoods that transparen cy by itself cannot correct (Achenbach & Hua, 2024; Calleja et al., 2021). Work on the cog nitive roots of confusion adds that some resistance to correction stems less from bad fa ith than from a genuine difficulty separating uncertainty from ignorance, which transpar ent, literacy-building messaging is better placed to address than directive correction alon e (Ophir et al., 2020; Nagar et al., 2023).

Government Credibility

Government credibility held up best where directive measures came with transparent juust ification applied consistently; credibility losses clustered around cases of unexplained re versals or perceived favouritism in how directives were enforced (Lowe et al., 2022).

Community Engagement

Across the Nigerian, Congolese, and wider pan-African evidence reviewed, community en gagement served as the bridge that turned both transparency and authority into legitima cy largely through trusted local voices such as community leaders, religious figures, and science teachers embedded in local schools (Adebisi et al., 2021; Vinck et al., 2019). Earli er Nigerian evidence from the Ebola response in Rivers State points the same way: com munities that were engaged through locally trusted intermediaries, rather than addressedsolely through directive announcements, showed markedly better cooperation with conta inment measures (Adebimpe, 2015).

DISCUSSION

Taken as a whole, the studies agree that transparency builds trust and keeps voluntary c ompliance going over time, while equally agreeing that authoritative directives remain es sential for securing rapid protective action once an emergency turns acute. Where the lite rature splits is on sequencing and emphasis: high-trust, highly literate settings can lean more heavily on transparency alone, whereas low-trust or historically strained settings, in cluding parts of northern Nigeria, need directive clarity scaffolded by sustained, commun ity-rooted transparency before compliance takes hold (Adebayo et al., 2022; Jegede, 2007). This pattern supports H1 and H3 directly, and qualifies H2: directives do secure faster initial compliance, but that compliance proves fragile precisely where efficacy building tr ansparency is missing (Ahn & Noh, 2021; Yoon et al., 2022).

One clear point of tension in the literature concerns the ethics and practicality of full disc losure. Lowe et al. (2022) argue that complete transparency about scarcity-driven chang es in guidance is ethically the right call, yet the same study also shows that disclosure h andled prematurely or carelessly can heighten public anxiety and hand ammunition to b ad-faith actors a tension the WHO/EMRO (2025) synthesis does not fully resolve, instea d recommending that transparency be paired with selective regulatory authority over har mful falsehoods rather than left tostand alone. A second inconsistency concerns how fa r findings travel: evidence from the active Ebola outbreak in North Kivu (Vinck et al., 2019), where institutional distrust was already severe, may not carry over cleanly to slower-m oving scientific emergencies with a lower baseline of distrust, and several of the studies reviewed rest on single-country, cross-sectional designs that cannot pin down cause and effect between message type and behaviour change, among them the work of Fahimn et al. (2023) and Yoon et al. (2022). What these tensions suggest is that the transparency a uthority balance is not a fixed formula but a judgement call shaped by existing trust leveIs, how acute the hazard is, and how credible the messenger is seen to be.

The most recent evidence reinforces this hybrid position rather than overturning it. Both t he WHO/EMRO (2025) infodemic management synthesis and the Lancet Public Health i nfodemic framework (Achenbach &

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Hua, 2024), drawing on literature running into 2024 a nd 2025, confirm that upstream transparency eases the downstream burden on authorit ative regulatory responses which suggests the transparency authority relationship docu mented during COVID-19 and Ebola still holds in current infodemic-management practic e, rather than being a one-off feature of a single pandemic cycle.

These findings carry implications for several audiences. Policymakers and public health agencies have reason to build hybrid protocols into standard practice rather than defaulti ng to directive-only messaging. Science communicators and media organizations gain a reminder of the reputational value in consistent, uncertainty-tolerant messaging. Science educators including chemistry and biology teachers in secondary schools such as Omas Royal College occupy an underused role: equipping students and communities with the scientific literacy to weigh both transparent explanations and authoritative directives criti cally rather than react to them on impulse. And emergency management agencies are re minded that a directive's legitimacy rests on the transparent reasoning and reliable servic es that come with it.

CONCLUSION

This review set out to weigh transparent risk communication against authoritative directi ves during scientific emergencies. The evidence gathered shows that transparent comm unication, when it acknowledges uncertainty and builds people's confidence in their own ability to act, produces more lasting public trust and voluntary compliance, while authorit ative directives remain necessary for securing rapid, uniformn protective action once an e mergency turns acute. Neither approach stands on its own: the strongest results come fr om a hybrid model in which authoritative clarity is consistently scaffolded by transparen t, community-engaged explanation. These findings answer the study research questionsand support the hypotheses proposed, confirming that how well each approach works d epends on existing institutional trust, how urgent the hazard is, and how credible the mes senger is seen to be.

RECOMMENDATIONS

Drawing on these findings, the following recommendations are proposed:

1. Governments should build hybrid emergency risk communication protocols into stand ard practice, pairing directive orders with transparent, plain-language reasoning delivered through multiple trusted channels.
2. Public health agencies should invest in trust-building before crises hit, through consist ent, uncertainty-tolerant routine communication, so that emergency directives land again st a backdrop of established credibility
3. Scientists and researchers should prioritise timely, accessible sharing of evolving evid ence, limitations included, to close off the information vacuum that misinformation expl oits.
4. Media organizations should adopt editorial standards that separate verified official dir ectives from unverified claims, while holding authorities to account for justifying directiv es transparently.
5. Science educators should build risk-communication literacy into chemistry, biology, an d integrated science curricula, equipping learners in schools such as Omas Royal College to critically weigh both transparent explanations and authoritative directives.
6. Emergency response agencies, including Nigeria's NCDC and state-level emergency op erations structures, should formally bring community-trusted messengers teachers, religi ous and traditional leaders among them into directive dissemination to strengthen legiti macy in historically distrustfuI settings.

LIMITATIONS OF THE STUDY

This review draws on secondary, previously published data rather than original primary d ata collection, which leaves it open to publication bias favouring studies with significant or notable findings. Geographic coverage skews toward North American, East Asian, and selected African contexts, with limited sub-national evidence from north-eastern Nigeria specifically. The review was also confined to English-language sources,

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which may have left out relevant evidence published in French, Portuguese, or local Nigerian languages,p articularly around community-level risk communication in Francophone West Africa and the Democratic Republic of the Congo.

Suggestions for Future Research

Future research should test hybrid transparency-authority communication protocols em pirically within Nigerian sub-national contexts, including Taraba State, using pre and pos t-intervention designs. Comparative studies spanning diverse cultural and socio-economi c settings are needed to pin down the specific thresholds of institutional trust at which a uthoritative directives require transparent scaffolding to stay effective. Further work is al so warranted on the role science teachers and school-based science communication can play in strengthening community level risk literacy ahead of future scientific emergen cie S.

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