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Research Article

Safewaves: A Portable Humanitarian Communication and Emergency Medical Relief for Conflict Zones-A Feasibility Study of Potential Application in Sudan

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Abstract
This study examines the plausibility of SafeWaves, an integrated emergency radio and psychosocial aid kit designed for conflict-affected contexts, with a focus on Sudan. Combining a self-powered, pre-tuned radio broadcasting verified humanitarian information with non-lyrical classical music for psychological stabilization, SafeWaves proposes a dual function: communication and care. Using a realist synthesis of academic literature, humanitarian reports, and precedent cases from South Sudan, Burkina Faso, and Nepal, the study traces the Context–Mechanism–Outcome configurations that underpin effective radio-based interventions. Findings indicate that radio's resilience and community embeddedness enable trust formation, rumor containment, and affect regulation even amid infrastructural collapse. However, the literature also cautions that the psychosocial use of music-while potentially soothing-can reproduce cultural exclusion if uncontextualized. The paper argues that SafeWaves effectiveness depends less on technology than on localization, participatory governance, and ethical transparency. It concludes that when culturally adapted and co-produced, sound can serve as a humanitarian infrastructure of both information and solace, advancing the emerging field of humanitarian acoustics.
Keywords: Humanitarian Communication, Radio, Music, Affect, Conflict, Sudan, Resilience, Psychosocial Support.

Introduction

Armed conflict continues to generate one of the gravest humanitarian challenges of the early twenty-first century: the forced displacement of civilians into settings where infrastructure is destroyed and access to reliable health information is severely limited. In such contexts, traditional aid delivery is disrupted, and vulnerable populations face dual threats: the immediate danger of violence and the indirect risks of disease, malnutrition, and psychological trauma. As the United Nations High Commissioner for Refugees (UNHCR) reports, over 110 million individuals were forcibly displaced worldwide in 2023, the majority of them in fragile and low-infrastructure environments (UNHCR, 2023). Addressing both physical survival and psychosocial resilience in these contexts requires innovative, low-tech, and community-sustained solutions.

This study examines the potential application of the SafeWaves project-a portable emergency kit combining basic first aid supplies with a solar-powered, pre-tuned radio transmitting evacuation warnings, public health directives, and culturally neutral comfort messaging-in the context of the current Sudan conflict. The SafeWaves initiative emerges from this intersection of communication and care. Conceived as an integrated emergency radio and psychosocial aid kit, it combines (1) a solar- and hand-powered, pre-tuned radio that broadcasts verified health and safety information with (2) preloaded audio content designed to provide emotional stabilization through non-lyrical classical music. The project thus bridges technical resilience and psychological relief, proposing a holistic form of humanitarian communication that attends simultaneously to informational and emotional survival.

Existing humanitarian communication initiatives provide useful precedents. For instance, Nile FM, a solar-powered community radio station established in South Sudan in 2013, demonstrated how rapid deployment of culturally sensitive broadcasting could deliver safety instructions, health information, and psychosocial

support to displaced populations (Internews, 2016). Similarly, BBC Media Action projects have shown that locally controlled communication tools can strengthen trust and adoption in crisis contexts (BBC Media Action, 2016). Yet, despite these examples, few scalable models exist for combining portable medical assistance, emergency communication, and psychosocial support in a single, deployable kit. While humanitarian agencies and scholars have long documented radio's utility in conflict and disaster settings (Internews, 2016; Heywood *et al.,* 2024), few studies have systematically examined its potential to deliver psychosocial support alongside critical information. Furthermore, although extensive research explores the sociopolitical roles of music in conflict, the literature remains divided between idealized claims of music's healing power and critical examinations of its use in propaganda and coercion (Bergh, 2010; Grant and Stone-Davis, 2013; Thompson, 2017; Mozara, 2020). Little attention has been paid to how non-lyrical, non-propagandistic sound might function as a form of neutral humanitarian accompaniment-supporting emotional regulation without reinforcing cultural hierarchies or political narratives.

To fill this gap, the present study investigates whether the SafeWaves model could plausibly strengthen both informational access and psychosocial resilience in conflict-affected contexts, focusing specifically on the ongoing Sudan crisis. The research employs a realist synthesis of academic literature, international organization reports, and case documentation to identify and evaluate the Context–Mechanism–Outcome (CMO) configurations under which SafeWaves-like interventions have proven effective elsewhere.

The study is guided by the hypothesis: Safewaves, by integrating self-powered, pre-tuned radios with neutral, non-lyrical classical music, can enhance both informational reliability and psychosocial well-being among populations affected by armed conflict.

The study contributes to ongoing debates in humanitarian communication, media ethnography, and sound studies by advancing a model of what might be termed humanitarian acoustics: the deliberate use of sound to sustain life, belonging, and affective stability in crisis. It proposes that communication technologies should not be judged solely by their informational accuracy but also by their capacity to nurture emotional resilience and social trust. Empirically, the study consolidates multi-sectoral evidence from humanitarian reports, psychological research, and ethnomusicology to construct a realist explanation of how and why the SafeWaves concept might work. Analytically, it situates the intervention within a Context–Mechanism–Outcome framework that foregrounds five interrelated mechanisms: infrastructure resilience, affect regulation, trust formation, rumor containment, and service continuity.

The remainder of the paper unfolds as follows. Section 2 provides background information on the context, Sudan. Section 3 outlines the research design and methodology. Section 4 presents findings from reviews of intersecting literatures on radio in conflict, humanitarian communication, and the psychosocial dimensions of music, organized through CMO configurations and integrating case evidence from South Sudan, Burkina Faso, and other relevant contexts. Section 5 discusses theoretical, ethical, and design implications for humanitarian sound practice, while Section 6 concludes with summary and directions for future research and implementation.

Background Context

Sudan has become the site of the world's fastest-growing displacement crisis. Since fighting erupted in April 2023 between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF), more than 8.8 million people have been displaced, both internally and across borders (UNHCR, 2024). The conflict has devastated health systems: over 70 percent of hospitals in conflict-affected regions are non-functional, and humanitarian organizations report severe shortages of medicines, clean water, and electricity (WHO, 2023).

Perhaps most critically for communication-based interventions, internet and mobile networks are regularly disrupted or deliberately shut down by warring parties, leaving civilians unable to receive evacuation instructions or health alerts (Human Rights Watch, 2024). In such conditions, reliance on portable, solar-powered radios-independent of telecommunications infrastructure-becomes essential. Radio has historically played a central role in Sudanese communities as a trusted medium, and humanitarian actors continue to identify it as one of the few accessible channels during blackouts.

The humanitarian crisis in Sudan presents one of the starkest examples of informational deprivation as a form of suffering. In the wake of escalating violence, large-scale displacement, and recurring telecommunications shutdowns, communities have lost not only access to basic services but also to credible, verified, and actionable information (WHO, 2023; UNHCR, 2024). As power grids collapse and mobile

networks fail, communication infrastructure becomes fragmented and unreliable, leaving populations vulnerable to rumor, misinformation, and collective panic.

Radio, however, continues to operate where other media cannot. Comparative humanitarian evidence shows that when digital networks fail, radio frequently remains the last, most-trusted channel for critical updates (ReliefWeb/WFP, 2013; Hirondelle Foundation, 2025). The affordability, resilience to infrastructural breakdown, and capacity for mass reach of the medium radio make it indispensable during emergencies. As Grant and Stone-Davis (2013) observed, since the early twentieth century radio has been central to wartime strategy precisely because of its ability to cross borders and reach the unreachable. Whether mobilized by governments, guerrilla groups, or humanitarian agencies, it remains the medium that endures when others falter.

Within this environment, the SafeWaves emergency kit-a lightweight, solar-powered radio package preloaded with verified broadcast frequencies and accompanied by medical and psychological first-aid resources-targets the intersection of physical survival and emotional endurance. It recognizes that humanitarian relief involves both material and affective dimensions. The inclusion of a music broadcasting component positions SafeWaves as a hybrid intervention, one that addresses infrastructure continuity, trust restoration, and psychological stabilization simultaneously.

Methods

Research Design

This study adopts a realist qualitative approach assess the potential of the SafeWaves emergency radio kit in conflict-affected environments, with particular attention to the ongoing crisis in Sudan. As field experimentation in active conflict zones pose safety, ethical, and logistical issues, the analysis relies on the triangulation of peer-reviewed literature, humanitarian reports, and precedent cases of communication-based interventions to theoretically explore the feasibility and viability of the SafeWaves project.

Informed by a realist ontology (Pawson and Tilley, 1997), the study traces the Context–Mechanism–Outcome (CMO) configurations across diverse sources and assembling them into an emergent theory of change to explain "what works, for whom, and under what circumstances." The analysis foregrounds how SafeWaves may foster infrastructure resilience, affective regulation, trust formation, rumor containment, and continuity of humanitarian services. Sudan serves as the motivating case: its communication breakdown, protracted displacement, and fragmented humanitarian infrastructure offer a rigorous testing ground for assessing both plausibility and transferability of design principles derived from other conflict-affected settings.

Data Collection

Peer-reviewed scholarship on radio in conflict and disaster settings, sonic and affect theory, peace journalism, and humanitarian communication formed the core academic corpus. Practitioner documents included UN and NGO situation reports, community-radio toolkits, radio-distribution manuals, and policy or technical notes on broadcast reliability and security. Materials were eligible when they (i) addressed conflict or disaster contexts, (ii) used radio or audio for public information and/or psychosocial aims, and (iii) reported enough detail to infer mechanisms, implementation choices, or outcomes. English-language availability constituted a pragmatic boundary.

Searches were conducted in Google Scholar and Scopus using combinations of terms related to radio or community broadcasting, conflict or humanitarian crises, and music or audio interventions. Gray-literature searches focused on repositories maintained by key international organizations working in conflict-affected contexts, including the United Nations High Commissioner for Refugees (UNHCR), World Health Organization (WHO), International Committee of the Red Cross (ICRC), and Internews that provide data on displacement, health infrastructure, and communication access in Sudan (ICRC, 2018; WHO, 2023; UNHCR, 2024).

Data Analysis

Data were coded deductively and inductively. Deductive categories-context, inputs, mechanisms, outcomes, risks, and equity-provided an analytical scaffold, while inductive coding captured emergent patterns related to sonic practice and community-radio governance. Coded data were synthesized through joint displays that aligned CMO chains with the evolving theory of change, allowing triangulation between academic and practitioner evidence. The synthesis yielded two central propositions and several practice-oriented design principles emphasizing ethical safeguards, cultural adaptation, and sustainability.

Publications from international organizations including the United Nations High Commissioner for Refugees (UNHCR), International Committee of the Red Cross (ICRC), and Internews provided data on displacement, infrastructure, and communication access in Sudan. Comparative examples such as Nile FM initiative in South Sudan and BBC Media Action projects informed discussion of design feasibility and psychosocial outcomes. Peer-reviewed studies and humanitarian policy briefs contributed theoretical grounding in resilience-based design, participatory communication, and media-enabled psychosocial support.

Findings

Mechanism 1: Trusted Access to Information During Conflict

Radio systems work under disruption because (i) transmission can be maintained with low power from fixed or mobile units; (ii) receivers can be solar/crank powered and pre-tuned; (iii) content is localized and iteratively verified through community feedback; and (iv) rumor management is embedded via rapid Q&A and corrections (CDAC Network, 2020; Internews, 2021).

Conflict environments present risks of jamming, spoofing, disinformation, and reprisals. At the same time, polarized narratives can escalate tensions if editorial practices are opaque or sensational (ICRC, 2018). Radio occupies a unique position among media in conflict zones due to its technical resilience, accessibility, and credibility. Unlike television or digital media, radio operates without dependence on stable electricity grids or broadband networks. In environments where infrastructure is destroyed or mobility is restricted, it continues to reach remote populations (UNESCO, 2023).

Ensuring Reliability, Security, and Ethical Communication

Pipeline fragility and volatile access routinely interrupt humanitarian operations (ICRC, 2018). Device and distribution choices strongly shape equity and durability of access. Distribution models that go beyond one-off handouts-pairing radio delivery with INAs, priority sampling (by mobility, gender, age, language), listener groups, and continuous monitoring-are recommended across guides (CDAC Network, 2020; Internews, 2021; UNESCO, 2023).

Programs using these principles e.g., distribution of >40,000 solar/crank radios in South Sudan with organized listener groups-report greater continuity of access, broader reach to women and other low-access groups, higher trust, and more durable adoption due to local repair/training networks (BBC Media Action, 2016; Internews, 2016, 2021). Participatory models are associated with reduced rumor spread and accumulation of social capital that supports collective resilience (Blum *et al.,* 2025).

Technical Safeguards

Technical safeguards include redundant power and mobile transmitters, anti-jamming approaches, secure authentication, and staff cyber-hygiene training; modern standards such as DRM can improve robustness (ICRC, 2018). Verification workflows use multi-source triangulation, on-air corrections, and visible editorial chains (CDAC Network, 2020; Internews, 2021). As for devices, Internews and USAID guidelines on humanitarian radio provision (2021) suggests solar-and hand-cranked multi-band radios reduce dependency on batteries and grids, while SD-card capability enables playback of pre-packaged health/safety content during transmission outages.

Ethically, peace journalism prioritizes accuracy, inclusion, and context, avoids inflammatory framing, and amplifies marginalized perspectives to reduce polarization (Galtung, 1998; Lynch and McGoldrick, 2005; Center for Global Peace Journalism, 2022). Studies find that stations employing these safeguards demonstrate higher credibility, fewer harmful rumors, and more constructive audience engagement, even under acute insecurity (ICRC, 2018; Internews, 2021; Heywood *et al.,* 2024).

Existing guidelines or toolkits on humanitarian radio provision converge on the same design principles: conduct an Information Needs Assessment (INA) first; co-produce scripts with local reporters; use clear multilingual formats; and build a visible verification workflow on-air (ReliefWeb/WFP, 2013; ICRC, 2018; Internews, 2021; Foundation Hirondelle, 2025). For SafeWaves, by pre-tuning radios to verified humanitarian frequencies and coupling them with health guidance, the kit enables individuals to reestablish a sense of control-what psychologists call cognitive anchoring-in the midst of a conflict. The mere act of hearing a consistent, trusted voice or sound pattern reaffirms that communication channels remain open. In conflict psychology, such perceptions of ongoing contact are critical for reducing anxiety and perceived isolation. From a realist perspective, the mechanism at play is not merely information transmission but trust formation through sound. The human voice-and by extension, music-functions as a social cue that evokes

safety, presence, and belonging, while this dimension is often overlooked in purely logistical models of humanitarian communication.

Mechanism 2: Fostering Community and Sense of Belonging

Radio's most immediate value lies in its ability to restore a sense of continuity and cognitive reassurance in chaotic conflict-affected environments. In numerous post-conflict and displacement contexts, localized radio stations have reconnected communities to reliable information and mitigated rumor-based panic. For example, Nile FM in South Sudan successfully provided actionable updates on safety, medical services, and humanitarian aid while fostering community dialogue and inclusion. Specifically, Nile FM programs paired broadcast bulletins with listening groups, call-ins, and field correspondents to relay evacuation notices, epidemic prevention guidance, and service availability in real time (Internews, 2016). Such two-way communication models enabling listeners to communicate through SMS, WhatsApp, or voice notes transform radio into a dialogic platform where residents co-produce information and request clarifications. Case studies from West Africa shows that blending radio with social media increased credibility and transparency and let listener feedback directly shape editorial choices (Heywood *et al.,* 2024).

Similarly, "community radio" strengthens participation and solidarity through listener-in programs, call-ins, and locally gathered stories. Encouraging listener participation correlate with greater trust, topic relevance, and faster rumor correction, while broadening inclusion of marginalized voices and geographically isolated communities (Internews, 2016, 2021; Heywood *et al.,* 2024; Foundation Hirondelle, 2025). In Burkina Faso, stations maintained accessible, verified flows of information by blending analog broadcasting with WhatsApp groups for sourcing, feedback, and distribution where reporters could not move freely (Heywood *et al.,* 2024). Citizen journalists extend reach and relevance when professional media are constrained; in Gaza and other high-risk settings, grassroots documentation provides real-time local perspectives otherwise absent from mainstream coverage (Sidhu *et al.,* 2022). Across conflict and disaster settings, radios are associated with higher reach to information-poor households, improved timeliness of alerts, rumor containment, and increased audience trust in guidance from humanitarian actors (ReliefWeb/WFP, 2013; Internews, 2016; Foundation Hirondelle, 2025). In analogous contexts (e.g., South Sudan, Nepal, Haiti), pairing distributed radios with community liaison networks yielded better message uptake and safer movement decisions when mobile/internet was unavailable (CDAC Network, 2020; Internews, 2021; UNESCO, 2023).

Mechanism 3: Psychosocial Support Through Music

Role of Radio and Music in Armed Conflict

Since the early twentieth century, radio has become a central medium in wartime communication due to its affordability, portability, and ability to transmit across vast distances (Grant and Stone-Davis, 2013). Governments, militaries, and insurgent groups have all used radio strategically in times of conflict. Yet, while the significance of music within radio broadcasting is undeniable, its specific role in conflict contexts has received comparatively little academic scrutiny. Historical and cross-regional studies reveal that music transmitted by radio during war has served multiple purposes: as a vehicle for both reliable information and deliberate misinformation, as a means of maintaining connections among communities separated by violence, and as a resource for managing the intense emotions that accompany conflict. In their account, music on radio is not simply an incidental backdrop to war but can influence the trajectory of conflict itself (Grant and Stone-Davis, 2013).

The broader literature emphasizes two cross-cutting mechanisms: identity and emotion. Bergh (2010) observes that in violent conflicts, music has often intensified emotions and crystallized group identities in oppositional terms. During the Yugoslav wars, music both reinforced ethnic boundaries and mobilized collective affect (Mozara, 2020). As Kemp and Fry (2004) argue, emotions must be subdued or amplified for violence to occur; Frith and Street (1992) stress music's boundary-marking function; and Becker (2001) shows how music-affiliated identities allow listeners to occupy temporary roles with distinct emotional resonances. At the same time, Bergh (2010) critiques speculative and romantic claims about music's transformative power, warning against "black boxes" that leap from peak anecdotes to sweeping generalizations-though he also notes that individuals commonly report profound, hard-to-verbalize experiences (Crafts *et al.,* 1993; DeNora, 2000; Gabrielsson, 2001).

Music as Therapy and Reconciliation

Ethnomusicological work documents music as a vehicle for trauma processing, testimony, and social repair. Examples include songs among Korean "comfort women" confronting wartime trauma and stigma (Pilzer,

2014); music schooling for former girl soldiers in Sri Lanka (Sykes, 2013); and post-tsunami Aceh initiatives using traditional arts to restore children's psychological strength (Kartomi, 2010).

Cross-culturally, applied ethnomusicology shows shared music-making can reduce prejudice and build empathy (Skyllstad, 2008; Hemetek, 2010; Sweers, 2010). In South Sudan, Dinka testimonial singing has supported restorative justice (Impey, 2013). In Peru, local song practices complemented truth-commission processes and sustained communal remembrance (Ritter, 2012, 2014), while in Colombia, escopetarra embodied transformation from violence to creativity, though mixed effects remind us interventions can heal and inflame (Pinto Garcia, 2016).

Music as Weapon

Despite these positive effects of music in conflict settings, scholars stress the need to confront the "flip side" of music's power (Sandoval, 2016). The same affective qualities that foster peace can also incite violence, enforce domination, or deepen conflict. Historical cases show how music has been mobilized for violence. Sugarman (2010) demonstrates how Albanian songs were used to mobilize fighters in the Kosovo war, while McCoy (2009) documents the role of Simon Bikindi's songs during the Rwandan genocide. These examples illustrate how musical texts and performances can naturalize and legitimize aggression, especially when controlled by political elites or media.

Music has also been weaponized directly. Cusick (2006, 2013) details how U.S. forces used loud music in detention centers to disorient prisoners, cause "psychic pain," and undermine religious identity. Daughtry (2015) theorizes "thanatosonics," describing how wartime sounds themselves-explosions, drones, amplified music-inflict trauma and contribute to PTSD. In Sierra Leone, drumming was used to deceive civilians and sow fear during attacks (Nuxoll, 2015). In wartime broadcasting, these mechanisms have yielded ambivalent outcomes: music can stabilize emotions and sustain dignity, but it can also polarize and mobilize hostility depending on context, framing, and power dynamics (Bergh, 2010; Grant and Stone-Davis, 2013; Mozara, 2020).

Effects of Classical Music

Western European classical music has long been associated with cultural achievement and human refinement. Classical music, long celebrated for its associations with enlightenment and refinement, has increasingly been studied for its therapeutic and social effects, as suggested by the discourse around the "Mozart effect" (Thompson, 2017). Beyond the symbolic level, research in psychology and public health demonstrates that creative-expressive activities, including music, can function as important psychosocial interventions for people experiencing humanitarian crises. Such activities have been shown to reduce stress, promote resilience, enhance coping strategies, and help restore a sense of normalcy and hope in contexts of displacement and violence (Van der Steen *et al.,* 2025). In this sense, music acts as a universal language that can provide comfort and mental health benefits across cultural and linguistic divides.

Empirical studies also highlight the capacity of classical music to generate feelings of safety, belonging, and calm in public spaces. In the United Kingdom, for example, the Tyne and Wear Metro initiated a program in 1997 that broadcast works by Frederick Delius at stations to discourage antisocial behaviors, including swearing and smoking. This intervention was seen not only as reducing unwanted activities but also as making stations feel safer and more pleasant for other passengers. Transport for London later expanded on this approach, curating a 40-hour playlist of instrumental and operatic works by Handel, Beethoven, Schubert, Vivaldi, Tchaikovsky, Prokofiev, and Liszt. Over the course of an 18-month trial, reported robberies fell by 33%, assaults on staff by 25%, and incidents of vandalism by 37% (Duchen, 2008).

Similar interventions have been reported in Canada and the United States. In 1985, a 7-Eleven branch in British Columbia began broadcasting "classical" and "easy listening" music to deter teenagers from congregating outside the store (Hirsch, 2006). In London, Ontario, the Central Library used Vivaldi recordings in its foyer to discourage smoking and loitering (Joy, 2013). Transit systems in Portland, Oregon, have played instrumental and operatic music in light rail stations, which coincided with a decrease in calls for security assistance (Turner, 2010). In these cases, the calming, orderly associations of classical music were intentionally leveraged to influence behavior and generate a sense of public order.

In contrast, some studies document how classical music has also been used as a form of sonic exclusion. Thompson (2017) describes this phenomenon as the weaponization of classical music, where works by canonical composers are broadcast in public and semi-public spaces to deliberately deter groups deemed

undesirable. By generating feelings of discomfort, irritation, or alienation, classical music has been used as a subtle policing mechanism, resonating with the logic of the "revanchist city" (Smith, 1996, 1998). In these cases, music becomes an audio-affective technology of exclusion rather than inclusion. These cases highlight that music is not inherently benign but deeply contextual. As Sandoval (2016) notes, uncritical assumptions of music's neutrality risk overlooking its complicity in violence.

The SafeWaves project, which proposes broadcasting classical instrumental music for soothing purposes in Sudan, must grapple with these complexities. On the one hand, instrumental classical music-without lyrics or propaganda-minimizes risks of misinterpretation. Studies consistently show that music can regulate mood, foster resilience, and offer relief in crisis (Bergh and Sloboda, 2010; Rice, 2014). Its use in public order initiatives further suggests potential to reduce anxiety and stress in humanitarian contexts. On the other hand, the reception of Western classical music in Sudan is not straightforward. Its cultural distance may limit resonance, as Sudanese traditions differ significantly from European tonal frameworks.

Discussion

The findings suggest that the SafeWaves concept-an integrated emergency radio and psychosocial aid kit-aligns closely with proven humanitarian communication models (see Table 1 for a summary). Evidence from South Sudan, Burkina Faso, and Nepal underscores the effectiveness of localized, low-infrastructure radio systems in sustaining trust, transmitting verified information, and fostering resilience during crises (Internews, 2016; Heywood *et al.,* 2024). In Sudan, where recurrent telecommunications blackouts, violence, and mass displacement compound vulnerability, a self-powered, pre-tuned radio equipped with public-health and psychosocial content could fill a critical information gap. However, the literature emphasizes that technological innovation alone does not ensure effectiveness. Success depends on mechanisms of localization, participation, and trust. Communication models that integrate community feedback, transparent verification, and cultural sensitivity consistently outperform top-down approaches. Accordingly, every component of SafeWaves-from broadcast governance to content curation-should be guided by humanitarian ethics of do no harm, inclusivity, and sustained community co-ownership (Tufte, 2017; CDAC Network, 2020).

Studies highlight the importance of designing contents for cultural relevance and community engagement. Partnering with Sudanese radio hosts, community leaders, and musicians can transform the project from a humanitarian intervention into a collaborative cultural process. This participatory model not only strengthens legitimacy but also enhances accuracy and reach, aligning with participatory communication theory's emphasis on communities as co-authors rather than passive recipients (Tufte, 2017). Participatory systems that allow listeners to send messages, verify rumors, or request information through call-ins and digital platforms improve both accuracy and trust (Internews, 2016; Heywood *et al.,* 2024). By institutionalizing these mechanisms, SafeWaves could transform radio from a one-way delivery tool into a platform of social reliability, reinforcing community agency even amid fragmentation.

In particular, broadcasting music or sound in humanitarian contexts demands explicit ethical protocols. Research on weaponized sound-from torture in detention centers to sonic exclusion in urban spaces-illustrates how audio can be co-opted for coercion (Cusick, 2006, 2013; Daughtry, 2015; Thompson, 2017). SafeWaves must therefore maintain transparency of intent, ensuring audiences understand the broadcasts as non-coercive, non-propagandistic, and purely supportive. Attention to gender, age, and accessibility further determines effectiveness. Studies by BBC Media Action (2016) and Internews (2016) note that women and older adults-often most excluded from digital channels-are critical nodes for rumor verification and decision-making. Ensuring inclusive distribution and multilingual audio is thus both an ethical duty and a functional necessity.

Ultimately, the power of humanitarian radio lies not only in transmitting facts but in cultivating trust. Evidence from South Sudan and Burkina Faso shows that two-way communication and listener groups sustain engagement even under extreme volatility (Internews, 2016; Heywood *et al.,* 2024). SafeWaves can embed itself in such a trust ecosystem, where local technicians, community reporters, and humanitarian agencies share responsibility for maintenance and verification. When communities perceive broadcasts as both technically reliable and emotionally attuned, information becomes more than survival-it becomes a form of reassurance. The continuity of listening itself, in this sense, constitutes a psychosocial intervention.

At the same time, limitations must be acknowledged. The absence of primary field data means these results are inferred rather than empirically demonstrated. Cultural reception of "neutral" music may vary, and

operational risks in conflict zones (e.g., targeting of aid technologies) require ethical consideration. Nevertheless, the plausibility of SafeWaves effectiveness is strengthened by triangulating evidence from multiple humanitarian precedents and applying them to the Sudanese context. Future research should test these hypotheses through pilot deployments in controlled humanitarian settings, coupled with mixed-methods evaluation (e.g., surveys of knowledge gain, validated resilience scales, and qualitative interviews). Such trials would enable empirical validation of the claims advanced here and support evidence-based scaling of SafeWaves in other crisis contexts.

Table 1. Summary of findings and implications for SafeWaves.

Mechanisms	**Key findings**	**Supporting evidence / case studies**	**Implications for SafeWaves**
#1 Access to trusted information	Radio can bridge communication gaps in conflict zones by delivering health and evacuation information where internet and mobile networks are unreliable.	Internews (2016); WHO (2023); UNHCR (2024)–Nile FM in South Sudan successfully delivered real-time public health information during crises.	SafeWaves' solar-powered radios can enhance access to verified, life-saving messages even under telecommunications blackouts.
#2 Sustainability and community adoption	Community-led repair and technician training improve device trust, continuity, and program sustainability.	BBC Media Action (2016); ICRC (2018)–Local capacity building ensured continuity of services in fragile contexts.	Training displaced or host-community technicians ensures long-term operability and local ownership of SafeWaves kits.
Psychosocial support	Music and comfort broadcasts reduce psychological distress and foster resilience in displacement settings.	BBC Media Action (2016); Mozara (2020)–Community broadcasting demonstrated measurable stress reduction through music-based interventions.	Integrating viola and neutral soundscapes could strengthen emotional coping and perceived safety among displaced populations.
#3 Music in conflict contexts	Music functions as both a unifying and divisive force, depending on cultural, political, and emotional contexts.	Bergh (2010); Grant and Stone-Davis (2013); Mozara (2020)–Studies from Yugoslavia show dual roles of music in propaganda and reconciliation.	SafeWaves must treat music as context-dependent; classical music should be positioned transparently as soothing and apolitical.
Classical music as a calming medium	Non-lyrical classical music has proven effective in reducing anxiety and discouraging antisocial behavior in public contexts.	Duchen (2008); Turner (2010); Joy (2013)–Broadcasts of classical works reduced vandalism, theft, and stress in public transit systems.	Classical playlists can provide neutral, non-provocative soundscapes to stabilize moods in humanitarian radio broadcasts.
Ethical and cultural considerations	Music's reception varies; even neutral genres can be perceived as foreign or elitist if not culturally contextualized.	Becker (2001); Sandoval (2016); Thompson (2017)-Classical music can both soothe and exclude depending on context.	Blending classical and local musical forms can maximize inclusivity and emotional resonance for diverse listeners.

Conclusion

This study examined the potential of SafeWaves-a humanitarian emergency radio and psychosocial support kit-as a scalable, ethically grounded model for communication in conflict-affected contexts. Drawing from literature on radio-based interventions, sound studies, and humanitarian design, the analysis demonstrates that low-infrastructure, community-centered radio remains one of the most resilient and trusted forms of crisis communication. SafeWaves builds on this tradition by integrating verified information dissemination

with affective care, using non-lyrical music and sound to mitigate fear, sustain connection, and promote psychological stability under extreme conflict-affected settings like Sudan.

Policy implications follow directly: future humanitarian communication strategies must integrate psychosocial design principles, localized governance, and affective evaluation into program planning. Donors and implementers should move from short-term "information delivery" models toward listening infrastructures that cultivate trust and participation. Cross-sector partnerships among humanitarian, cultural, and mental-health organizations are essential for embedding these standards in international practice.

While a pilot implementation or further feasibility analysis from field deployment would further inform the design, this study demonstrates the promising potential of SafeWaves as more than just a device, but a conceptual reframing of humanitarian communication as humanitarian listening. By combining infrastructural resilience with cultural reflexivity and emotional intelligence, it offers a template for crisis response that acknowledges both the fragility and the depth of human experience. If realized ethically and collaboratively, such approaches could redefine what it means to provide safety, not only through information access, but through the restoration of calm, connection, and belonging in the midst of conflict.

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