

FROM FIELDS TO HEADLINES: MEDIA NARRATIVES OF FARMING, PESTICIDE EXPOSURE, AND RURAL HEALTH IN PAKISTAN

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Abstract

Purpose: Pesticide exposure has become a widespread public health concern in Pakistan's farming communities, yet media representation of this issue remains underexplored. This study investigates how Pakistani news media construct narratives surrounding pesticide use, farming practices, and rural health to understand the visibility, framing, and agenda-setting dynamics that shape public discourse.

Methods: Using qualitative content and framing analysis, 120 news articles published between 2019 and 2023 in four major national newspapers (Dawn, The News, Express Tribune, and Jang) were examined. Articles were coded deductively and inductively based on Entman's framing model. Frames related to problem definition, causal interpretation, moral evaluation, and treatment recommendations were analyzed, alongside source representation and episodic versus thematic framing styles. Intercoder reliability was established through Cohen's Kappa ($\kappa = .81$).

Results: Findings reveal that pesticide-related health issues receive limited and inconsistent media visibility and are predominantly framed through economic and productivity perspectives (42%), with public health frames comprising only 24% of coverage. Most articles relied on episodic rather than thematic framing (76%), emphasizing isolated poisoning incidents while overlooking structural causes and chronic health effects. Government and expert voices dominated news sourcing, whereas farmers, rural laborers, women, and children were significantly underrepresented. Policy accountability and environmental justice concerns appeared infrequently.

Conclusion: The study demonstrates a substantial gap between scientific evidence and media narratives, contributing to the social invisibility of pesticide-related health risks in Pakistan. The findings emphasize the need for stronger environmental journalism, enhanced thematic reporting, and the inclusion of marginalized rural perspectives to support equitable health and agricultural policy development.

Keywords: Pesticide exposure; Media framing; Rural health; Environmental justice; Agenda-setting; Farming communities; Pakistan; Risk communication; Agricultural policy; Environmental health narratives

Introduction

Agriculture remains the backbone of Pakistan's economy, employing a major proportion of the labor force and contributing substantially to national GDP (Government of Pakistan, 2021). Yet behind images of abundant harvests and national food security lies a less visible reality: the intensifying reliance on synthetic pesticides and the growing public health burden

borne by rural farming communities. Since the Green Revolution, Pakistan has experienced a steep rise in pesticide use, particularly in cotton-producing regions, where repeated chemical applications have become essential to controlling pests and sustaining crop yields (Din & Akhtar, 2018; Raza et al., 2019). Although pesticides support agricultural productivity, they simultaneously expose farmers, rural families, and surrounding ecosystems to toxic and often poorly regulated chemical hazards.

Numerous public health studies have documented widespread acute and chronic health effects associated with pesticide exposure in Pakistan, including neurological disorders, respiratory illness, cancers, reproductive complications, and dermatological conditions (Mostafalou & Abdollahi, 2017; Khan et al., 2020). Occupational safety research shows that Pakistani farmers frequently handle hazardous formulations with limited protective equipment, weak technical knowledge, and poor regulatory oversight, resulting in high rates of self-reported poisoning symptoms (Javaid et al., 2016; Yasin et al., 2012). Meanwhile, environmental research has found pesticide residues in drinking water, irrigation canals, soil, and food products, demonstrating that contamination transcends occupational boundaries and endangers entire rural populations (Ahmad et al., 2020; Saeed et al., 2017).

However, despite this growing public health concern, media coverage of pesticide exposure in Pakistan has been uneven, fragmented, and often overshadowed by narratives centered on agricultural success, productivity, and national development. Research in media and risk communication suggests that news framing plays a critical role in shaping public understanding of environmental hazards and determining which problems receive policy attention and which remain marginalized (Entman, 1993; Nisbet, 2009). Media representations influence how risks are perceived, who is portrayed as responsible, and whether structural factors—such as regulatory failure or corporate influence—are highlighted or obscured (Gamson & Modigliani, 1989; Allan, 2002). In many developing countries, environmental health issues affecting marginalized rural communities frequently struggle to gain sustained visibility in mainstream media discourse (Hansen, 2010; Boykoff & Boykoff, 2007).

Within Pakistan, scholarship indicates that rural health concerns tend to receive episodic, event-driven news attention rather than consistent thematic coverage that situates problems within broader structural and policy contexts (Siraj, 2018; Iqbal, 2020). As a result, pesticide-related illnesses often remain invisible in national conversations on agricultural modernization, healthcare planning, and rural development. While media occasionally report dramatic poisoning incidents, stories about chronic exposure, regulatory failures, and the lived experiences of farmers and rural women receive comparatively limited space (Khan & Damalas, 2015; Abbas, 2021).

This paper examines how Pakistani news media frame pesticide use and its health implications for farming communities. By analyzing the presence, tone, sources, and dominant frames within national media coverage, this study investigates whether journalism amplifies rural health inequities or perpetuates their invisibility. Linking perspectives from environmental communication, public health, and journalism studies, the research explores how risk is constructed and represented, whose voices are included or excluded, and how media narratives align, or fail to align, with ground realities documented in scientific and agricultural research. The study aims to offer insights for strengthening public discourse, guiding policy attention, and promoting more ethical and socially responsible media engagement with rural environmental health.

Literature Review

1. Pesticide Use and Agricultural Dependency in Pakistan

The extensive use of pesticides in Pakistan is rooted in the Green Revolution of the 1960s and 1970s, when chemical-intensive agriculture was aggressively promoted to increase crop productivity and reduce dependence on food imports (Din & Akhtar, 2018; Riaz et al., 2019). Cotton, in particular, has driven pesticide consumption, accounting for nearly 70% of all chemicals used annually (Tariq et al., 2007). The adoption of synthetic insecticides, herbicides, and fungicides expanded rapidly as monoculture farming intensified and pest resistance increased (Rasheed et al., 2017). Despite periodic policy efforts to encourage integrated pest management (IPM), pesticide markets remain dominated by multinational agrochemical firms and profit-driven private distributors, with limited farmer regulation, product transparency, or training (Khan & Damalas, 2015).

Studies demonstrate that most farmers rely heavily on agrochemical dealers for technical advice, with 60–80% applying pesticides based on verbal recommendations rather than scientific instructions (Javaid et al., 2016; Khan et al., 2010). Poor product labeling, illiteracy, and pressure from pesticide retailers contribute to excessive and unsafe usage (Damalas & Khan, 2016). Consequently, Pakistan has become one of the highest pesticide-consuming countries in South Asia, surpassing regional neighbors in both volume and intensity of chemical application per hectare (Mahmood et al., 2015; Shahzad et al., 2021).

2. Health and Environmental Implications of Pesticide Exposure

A substantial body of research identifies pesticides as a critical public health threat. Acute poisoning remains pervasive in low- and middle-income countries where weak regulation and limited protective technologies prevail (Eddleston et al., 2008; Jørs et al., 2018). Chronic exposure has been linked to neurobehavioral impairments, respiratory diseases, reproductive dysfunction, cancers, and endocrine disruption (Mostafalou & Abdollahi, 2017; Alavanja et al., 2013). In Pakistan, studies consistently report high levels of exposure among farmers, farm laborers, rural women, and children who participate in cotton picking or wash contaminated clothing (Abdullah et al., 2004; Ilyas et al., 2018).

Environmental research shows widespread contamination of soil, water, and food products (Mahmood et al., 2015; Ahmad et al., 2020). Residues of organophosphate, carbamate, and pyrethroid pesticides have been detected in irrigation channels, drinking water, and agricultural commodities at concentrations above international safety limits (Saeed et al., 2017; Khan et al., 2020). Studies from Punjab, Sindh, and Khyber Pakhtunkhwa demonstrate that entire communities are exposed, not only workers directly applying chemicals (Khan et al., 2018). The intersection of occupational, household, and environmental pathways reveals systemic rural health vulnerabilities.

3. Public Health Governance and Policy Challenges

Although pesticide exposure represents a major public health risk, regulatory frameworks in Pakistan remain weak and inconsistently enforced. Studies highlight the absence of mandatory training programs for pesticide handlers, lack of structured monitoring systems, and limited government oversight of pesticide imports, manufacturing, and distribution (Tariq & Latif, 2020). Primary health facilities in rural areas rarely diagnose pesticide poisoning correctly, and poisoning cases are often misclassified due to insufficient laboratory capacity and clinical awareness (Raza et al., 2014).

Scholars argue that pesticide governance in Pakistan is shaped by economic priorities rather than public health considerations, reflecting a development paradigm that equates modernization with chemical intensification (Khan & Damalas, 2015; Din & Akhtar, 2018). Limited investment in rural healthcare, fragmented institutional responsibilities, and agricultural-industrial interests contribute to policy inertia. As a result, pesticide-related

illness remains largely invisible within national health agendas and agricultural extension programs (Siraj, 2018; Abbas, 2021).

4. Media, Health Communication, and Environmental Risk Representation

Mass media play a critical role in shaping public understanding of environmental health issues. News framing influences what risks are perceived as urgent, who is represented as responsible, and how solutions are imagined (Entman, 1993; Gamson & Modigliani, 1989). Media framing studies reveal that environmental coverage often prioritizes elite, political, or economic perspectives while marginalizing those most affected by health and ecological crises (Hansen, 2010; Allan, 2002). In developing countries, environmental hazards affecting poor and rural populations receive limited sustained visibility unless linked to disaster events or political controversy (Boykoff & Boykoff, 2007; Cox, 2013).

Research on health and risk communication shows that news reporting frequently relies on episodic framing, focusing on individual incidents rather than structural causes or systemic inequities (Iyengar, 1991; Nisbet, 2009). Such patterns lead to narrow public understanding and reduced policy attention. Studies also highlight how the selection of scientific and governmental sources shapes the legitimacy of risk narratives while excluding experiential voices such as farmers, women, or local health workers (Hansen, 2018; Allan et al., 2000).

5. Media Coverage of Agricultural and Rural Issues in Pakistan

Empirical research on Pakistani media indicates that rural and agricultural issues are routinely marginalized relative to national politics, security, and urban economic narratives (Siraj, 2018; Iqbal, 2020). When agriculture is covered, reporting tends to emphasize crop yields, market demands, and national development agendas rather than social and environmental concerns (Abbas, 2021). Public health challenges affecting rural populations, such as pesticide exposure, unsafe drinking water, and malnutrition- receive limited and episodic attention (Khan & Damalas, 2015). Stories about illness outbreaks or poisoning incidents may appear, but long-term chronic conditions, regulatory failures, or environmental justice dimensions rarely advance into sustained news discourse (Sadaf, 2020).

Scholars argue that the absence of thematic framing weakens public engagement (Adnan et al., 2019; Aslam et al., 2020, 2024; Aslam & Ahmad, 2019; Faizullah et al., 2021; Riaz et al., 2021a, 2021b) and policy mobilization, preventing pesticide-related health harms from being recognized as systemic problems (Iqbal, 2020; Siraj, 2018). This marginalization is further reinforced by limited rural journalism resources, low environmental reporting expertise, and the urban bias of mainstream media audiences (Hassan, 2017).

6. Research Gaps

The literature reveals several unresolved gaps:

1. Limited integration of environmental science and media research: Studies on pesticide exposure and those on media representation rarely intersect, leaving unexplored how journalism shapes or silences rural health realities.
2. Scarcity of systematic media framing research on pesticide-related health risks in Pakistan: Most research addresses agricultural production rather than health implications.
3. Lack of comparative analysis between scientific findings and media narratives: Little is known about whether media align with or diverge from ground realities reported in public health studies.
4. Underrepresentation of rural voices: Farmers, especially women and informal workers, rarely appear as authoritative sources.
5. Absence of research exploring how media coverage influences policy attention, public awareness, or risk perception.

Research Questions & Hypotheses

RQ1: *How do Pakistani news media frame issues of pesticide use and rural health in their coverage of agricultural practices and farming communities?*

RQ2: *What dominant narrative themes and frames (e.g., economic, public health, environmental, regulatory, or human-interest) characterize media reporting on pesticide exposure in Pakistan?*

RQ3: *Whose voices and perspectives are most frequently represented in media stories about pesticide-related health risks (e.g., farmers, agricultural experts, government officials, corporations, medical professionals)?*

RQ4: *To what extent do news reports highlight structural factors such as regulatory failures, environmental contamination, and systemic rural health vulnerabilities?*

RQ5: *How does media coverage align or diverge from scientific and public health research evidence related to pesticide exposure and rural health risks?*

RQ6: *What patterns of episodic versus thematic framing are present in the media's portrayal of pesticide exposure and rural health?*

H1: *Media narratives on pesticide exposure are predominantly framed in episodic, event-driven terms rather than thematic, structural contexts.*

H2: *Government officials, agricultural industry representatives, and scientific experts appear more frequently as sources in news coverage than farmers, rural women, and farm laborers.*

H3: *Coverage emphasizes economic and productivity frames more often than public health, environmental justice, or regulatory accountability frames.*

H4: *Media reporting underrepresents chronic and long-term health effects associated with pesticide exposure compared to acute poisoning incidents.*

H5: *Media coverage insufficiently addresses policy and governance failures related to pesticide regulation, training, and monitoring.*

H6: *Media narratives diverge significantly from scientific evidence regarding the scale, severity, and systemic nature of pesticide-related health risks.*

Theoretical Framework

This study is grounded in three interrelated theoretical perspectives: Framing Theory, Agenda-Setting Theory, and Environmental Justice Theory, which collectively explain how media narratives shape public understanding of pesticide exposure and rural health, whose voices are prioritized or marginalized, and how coverage influences policy attention.

Framing Theory

Framing Theory provides a foundational lens for analyzing how news media construct social problems by selecting and highlighting certain aspects of reality while downplaying others. Entman (1993) defines framing as a process of selecting elements of perceived reality to promote particular problem definitions, causal explanations, moral evaluations, and recommended remedies. Frames influence how audiences interpret events and identify responsibility (Hallahan, 1999). In the context of environmental and health reporting, framing determines whether risks are understood as technical, economic, political, or moral issues (Gamson & Modigliani, 1989; Nisbet, 2009).

Media framing research shows that news often privileges episodic frames that focus on isolated incidents rather than thematic frames that contextualize structural causes (Iyengar, 1991). When environmental hazards are reported episodically, responsibility tends to be individualized rather than attributed to systemic failures in governance, regulation, or industry accountability (Hansen, 2010). This is particularly important for pesticide exposure, as chronic health impacts and environmental contamination typically unfold over long periods and are less visually dramatic than acute poisoning events. Therefore, framing theory helps assess whether Pakistani media portray pesticide risk as isolated episodes or as part of broader structural and environmental health crises.

Agenda-Setting Theory

Agenda-Setting Theory posits that the media do not tell people what to think, but rather what to think about, determining the salience of issues in public discourse and shaping policy priorities (McCombs & Shaw, 1972). The prominence and frequency of coverage influence which topics are perceived as socially important and deserving institutional response (McCombs, 2004). Second-level agenda-setting further explains that the attributes associated with an issue—such as causes, solutions, or moral judgments—affect public attitudes and understanding (McCombs et al., 2014).

Environmental and health communication research demonstrates that problems affecting marginalized communities often receive less media attention, and therefore lower policy priority, unless tied to dramatic events, elite political conflict, or economic agendas (Boykoff & Boykoff, 2007; Cox, 2013). In Pakistan, where rural voices are underrepresented and journalism is dominated by urban, political, and commercial interests, agenda-setting mechanisms may contribute to the invisibility of pesticide-related health risks (Siraj, 2018; Iqbal, 2020). Agenda-setting theory thus helps evaluate whether pesticide exposure appears as a significant issue in national news and what competing narratives shape its visibility.

Environmental Justice Theory

Environmental Justice Theory provides a critical lens for understanding unequal exposure to environmental hazards and unequal representation in public discourse. The framework argues that marginalized communities—particularly rural, low-income, and minority groups—bear disproportionate environmental burdens while possessing limited power to influence decision-making (Bullard, 1990; Pellow, 2000). Environmental injustice is both material and discursive: it manifests in physical exposure to toxic substances and in the symbolic exclusion of affected groups from policy and media narratives (Capek, 1993).

Within pesticide-intensive agriculture, environmental justice concerns emerge through inequitable risk distribution, inadequate protection for farm workers, and structural neglect in healthcare and regulatory systems (Cole & Foster, 2001). Women and children in farming communities face additional vulnerabilities due to unpaid labor roles and low social recognition (Abdullah et al., 2004). Applying an environmental justice perspective highlights how public narrative power, media representation, and regulatory decision-making intersect to reproduce social inequities.

Integrating Theoretical Perspectives

Together, these theories guide the study's examination of how pesticide exposure and rural health are represented in Pakistani news coverage:

- **Framing Theory** explains how narratives define pesticide risks and assign responsibility.
- **Agenda-Setting Theory** reveals whether pesticide-related health issues gain visibility in public discourse.
- **Environmental Justice Theory** interrogates whose voices and experiences are prioritized or marginalized and how narrative power structures reinforce inequities.

By integrating these perspectives, the study analyzes media content not merely as information but as a form of power that shapes public understanding, influences health perception, and potentially contributes to policy silence. This combined framework supports a critical investigation into whether Pakistani media amplify or obscure the lived realities of farming communities confronting toxic agricultural environments.

Methodology

This study employs a qualitative content analysis and framing analysis approach to examine how Pakistani news media construct narratives about pesticide use, farming practices, and rural health. Qualitative content analysis enables systematic examination of meaning patterns,

narrative structures, and sources used in media reporting, while framing analysis allows identification of dominant interpretive frameworks and representations (Hsieh & Shannon, 2005; Entman, 1993). This design is appropriate for understanding not only what topics are covered but also how they are portrayed, whose voices are prioritized, and which aspects remain marginalized.

Sampling and Data Sources

The study focuses on mainstream national newspapers and digital news platforms in Pakistan with a wide readership and influence on public discourse. Four leading national outlets were selected through purposive sampling, representing English- and Urdu-language press, government and privately owned institutions, and diverse editorial orientations:

- Dawn
- The News International
- Express Tribune
- Jang

Articles were collected from five years (2019–2023) to capture contemporary coverage trends during a period of increasing pesticide-related health concerns and agricultural policy debates. The timeframe aligns with major pesticide contamination cases, extreme weather-triggered pest outbreaks, and rural health coverage growth identified in previous studies.

Search terms included:

“pesticide poisoning,” “pesticide exposure,” “farmers’ health,” “agricultural chemicals,” “cotton pesticides,” “rural health,” “toxic crops,” “pesticide regulation,” “farmers protest pesticides,” “pesticide deaths Pakistan.”

A total of 240 news articles were initially retrieved. After removing duplicates and irrelevant content (e.g., articles about food price markets without health references), 120 articles were selected for final analysis using relevance criteria: explicit mention of pesticide exposure, farming health risks, agricultural chemical use, regulatory policy, or rural community experiences.

Unit of Analysis

The unit of analysis was the individual news article. Headlines, leads, body content, sources cited, imagery (if present), and concluding frames were examined. Each article was coded for themes, frames, and narrative elements.

Coding Process and Analytic Framework

A deductive–inductive coding approach was adopted. Initial coding categories were derived from Framing Theory and previous studies of environmental and rural health reporting (Entman, 1993; Iyengar, 1991; Hansen, 2010). Additional codes emerged inductively during reading. Coding was conducted manually using NVivo 12 software to manage textual data and categorize emerging themes.

The final coding scheme included:

1. Problem Definition

- Economic framing
- Public health framing
- Environmental contamination framing
- Technological/modernization framing
- Disaster or emergency framing

2. Causal Attribution

- Farmer behavior
- Government failure/regulatory oversight
- Climate and environmental causes
- Market and corporate influence

3. Moral Evaluation

- Responsibility narratives (individual vs. structural)
- Victimhood portrayal
- Accountability positioning

4. Treatment Recommendations

- Policy reform
- Technical or educational solutions
- Medical and public health response
- Corporate responsibility
- Silence (absence of solution)

5. Source Analysis

- Government officials
- Agricultural experts/scientists
- Farmers and farm workers
- Medical professionals
- NGOs/activists
- Corporations or pesticide companies

6. Framing Style

- Episodic vs. thematic framing (Iyengar, 1991)

7. Tone

- Neutral/Informational
- Alarming/Advocacy-oriented
- Minimizing/defensive

Intercoder Reliability

To ensure reliability and reduce subjective bias, two trained coders independently coded 20% of the sample articles ($n = 24$). Cohen's Kappa coefficient was applied to assess intercoder reliability, producing a value of 0.81, indicating strong agreement. Discrepancies were resolved through iterative discussion until consensus was reached, followed by final coding of the full dataset.

Data Analysis Procedures

The analysis was conducted through three phases:

1. **Descriptive analysis** of article frequency over time, source distribution, and topical focus to map visibility trends.
2. **Thematic coding and frame identification** to develop categories of dominant narratives.
3. **Comparative interpretation** aligning media discourse with scientific literature and public health research on pesticide exposure in Pakistan.

This process enabled the detection of misalignments between empirical evidence and mediated representation, supporting the research aim of evaluating narrative equity and environmental justice dimensions.

Ethical Considerations

The study uses publicly available news content, requiring no human subject research approval. However, ethical responsibility was maintained by avoiding misinterpretation, protecting vulnerable communities from stigmatization, and ensuring analytic transparency.

Methodological Limitations

Several limitations must be acknowledged. First, the study focuses on mainstream print and digital outlets and does not analyze television, radio, or social media, which may produce different framing patterns. Second, the analysis does not measure audience reception or effects, restricting generalizability regarding public perception. Third, the study's purposive

sample may exclude smaller regional newspapers where community concerns may appear more prominently. Despite these limitations, the research provides an important foundation for understanding national media narratives around pesticide exposure and rural health in Pakistan.

Results

Overview of Coverage Frequency and Visibility

Analysis of 120 articles published between 2019 and 2023 revealed that media coverage of pesticide exposure and rural health was **limited and inconsistent**. Annual distribution showed noticeable peaks during years when major pesticide poisoning incidents occurred or when government agricultural policy debates entered public discourse. Coverage frequency increased modestly during 2020 and 2021, coinciding with locust outbreaks and heightened pesticide spraying across affected provinces. However, overall reporting remained sparse relative to broader agricultural or political news, confirming that pesticide-related health issues do not occupy a prominent position in media agendas.

Approximately 62% of all articles focused primarily on agricultural productivity, crop yields, pest outbreaks, and market fluctuations, while only 38% directly addressed health risks associated with pesticide use. These patterns indicate that pesticide exposure remains largely peripheral in national news priorities.

Dominant Frames in Media Coverage

Framing analysis identified five major narrative frames used across the sample, presented in descending order of frequency:

Frame Type	Percentage of articles
Economic/Productivity Frame	42%
Public Health Frame	24%
Environmental Contamination Frame	18%
Regulatory/Policy Accountability Frame	10%
Human-Interest/Social Justice Frame	6%

The economic/productivity frame dominated coverage, highlighting pesticide use primarily as a necessary tool for maintaining crop performance and protecting national agricultural output. Articles using this frame emphasized government assistance programs, export competitiveness, and pest-control efficiency (e.g., cotton bollworm and wheat rust outbreaks), while largely ignoring associated health impacts.

In contrast, the public health frame, which focused on poisoning cases, illness symptoms, hospitalizations, or deaths, appeared substantially less frequently and was typically triggered by episodic events, such as accidental poisonings or mass exposure incidents.

The environmental contamination frame discussed water or soil pollution, but rarely connected environmental exposure with household exposure pathways or chronic illness.

The regulatory accountability frame appeared mainly in editorials and investigative stories rather than routine news reporting. These articles highlighted ineffective monitoring, pesticide black markets, and weak enforcement.

The least represented frame was the human-interest or environmental justice frame, which spotlighted individual farmers or families experiencing long-term illness, disability, or financial distress linked to pesticide exposure.

Episodic vs. Thematic Framing

Evidence strongly supported H1, showing a predominance of episodic framing. A total of 76% of articles addressed pesticide exposure through isolated news events, typically acute poisoning cases, product bans, or outbreak-related spraying campaigns. Only 24% used thematic framing, situating pesticide hazards within structural issues such as regulatory weakness, profit-driven agrochemical markets, or rural healthcare limitations.

Episodic stories primarily attributed responsibility to individual farmers' practices, such as "careless spraying" or "failure to use protective equipment," while thematic stories emphasized broader systemic failures.

Sources and Voice Representation

Findings supported H2, revealing uneven representation of news sources. The majority of articles cited elite institutional voices:

Source Category	Frequency of Citation
Government officials	41%
Agricultural experts / scientists	28%
Medical professionals	11%
NGO / civil society representatives	8%
Farmers / rural laborers	9%
Pesticide industry representatives	3%

Government officials were the most frequently quoted, often presenting optimistic narratives about agricultural modernization. Farmers were quoted in less than **10%** of articles, usually in short statements expressing economic distress rather than health impacts. Women and children—identified in public health research as highly vulnerable—were almost entirely absent, appearing in only **3%** of articles, typically in poisoning incident reports.

These patterns reinforce concerns about lack of narrative agency for marginalized communities and substantiate environmental justice arguments about symbolic exclusion.

Representation of Health Effects

Supporting H4, analysis revealed that media focused predominantly on acute health effects such as poisoning, hospitalization, and death, which appeared in 74% of health-related stories. Chronic health effects, neurological disorders, reproductive harm, developmental delays, cancer, and endocrine disruption were mentioned in only 17% of articles, and typically without detail or scientific context. Very few stories discussed cumulative or long-term exposure pathways, such as contaminated drinking water or food residues.

Coverage seldom connected scientific findings to media narratives, supporting H6 concerning misalignment between empirical evidence and media representation.

Treatment Recommendations and Accountability

Supporting H5, 68% of articles did not include clear remediation or policy recommendations. Among the remaining articles, proposed solutions were largely technical or superficial—such as urging "awareness campaigns," "farmer training," or "improved spraying practices." Only 12% mentioned regulatory enforcement, and just 5% referenced corporate responsibility or agrochemical market dynamics.

Articles rarely connected pesticide exposure to systemic inequalities in healthcare or rural governance. Only **7%** identified government negligence or regulatory failure as a contributing cause of health risk.

Comparing Media Narratives with Scientific Research

Findings revealed a significant gap between media coverage and established public health research. While scientific literature emphasizes multiple chronic and environmental consequences of pesticide exposure, media representations remained narrow, episodic, and productivity-centered. This divergence supports the argument that journalistic discourse may contribute to the social invisibility of pesticide-related health risk, limiting its presence within national policy discussion.

Discussion

The findings of this study reveal significant disparities between documented scientific evidence on pesticide exposure and its representation in Pakistani news media. Although public health and environmental research consistently demonstrate the severe and chronic

health risks associated with pesticide use among farming communities, media coverage remains limited, episodic, and largely framed through economic and productivity narratives. This disconnect reinforces risk invisibility and restricts public awareness and policy responses.

The dominance of the economic/productivity frame, present in 42% of articles, reflects a broader national discourse that prioritizes agricultural expansion and export competitiveness over environmental health and rural wellbeing. This aligns with Kumar and Quarles' observations that agrarian economies often treat pesticides as symbols of modernization and national development, overshadowing their toxic implications for laboring bodies and ecosystems. The framing pattern also supports critical observations in environmental media scholarship that economic progress frames frequently suppress alternative narratives (Boykoff & Boykoff, 2007; Hansen, 2010).

Consistent with Framing Theory (Entman, 1993), the study shows that problem definition and causal attribution in media discourse predominantly emphasize farmers' behavior—such as inappropriate spraying practices or failure to use protective equipment—rather than structural complexities like weak regulation, poor access to training, unsafe supply chains, or corporate influence. This tendency to individualize responsibility, instead of addressing systemic failures, parallels findings by Iyengar (1991), who argued that episodic framing promotes personal blame while obscuring institutional accountability.

The strong reliance on episodic framing, 76% of articles, demonstrates how journalism in Pakistan treats pesticide exposure as isolated events rather than ongoing structural crises. Reporting spikes around dramatic incidents, such as poisoning deaths or crop infestations, but lacks thematic continuity that would situate pesticide-related illnesses within broader socio-environmental, policy, and health contexts. Such patterns restrict opportunities for public understanding of chronic exposure effects, cumulative toxicity, and environmental contamination. Similar patterns have been documented in global reporting on climate change, health disasters, and industrial pollution (Allan, 2002; Cox, 2013).

The underrepresentation of marginalized voices further reinforces environmental injustice. Farmers and rural laborers were quoted in fewer than 10% of articles, while women and children, who disproportionately experience exposure through cotton picking, food preparation, and washing pesticide-contaminated clothing, appeared in only 3% of coverage. Meanwhile, government officials and agricultural experts dominated as authoritative voices. This imbalance aligns with Environmental Justice Theory, which argues that affected communities often experience symbolic exclusion alongside material harm (Bullard, 1990; Capek, 1993). In the Pakistani context, such representational inequity reproduces existing rural–urban power hierarchies and reinforces the social invisibility of rural health.

A striking outcome of the analysis is the limited attention to chronic health effects, which appeared in only 17% of articles. Media reporting largely focuses on acute and dramatic poisoning events—hospitalizations, deaths, or mass intoxication—rather than long-term neurological, reproductive, or endocrine consequences documented in scientific research (Alavanja et al., 2013; Mostafalou & Abdollahi, 2017). This selective visibility narrows public perception of danger and downplays the substantial long-term burden on rural families and the healthcare system.

Similarly, reporting on policy accountability and regulation was rare. Only 10% of articles discussed pesticide governance, and just 12% offered any policy recommendations. The infrequent mention of regulatory failure or corporate responsibility suggests a reluctance to challenge powerful institutional actors, including agrochemical corporations and government agencies. This aligns with studies indicating that news media often avoid confrontation with influential economic and political interests (Hansen, 2018; Boykoff & Boykoff, 2007). In

Pakistan, where agricultural and chemical industries hold significant economic and political leverage, such silences may be particularly pronounced.

Additionally, comparison between media narratives and scientific research confirms significant divergence. While scientific literature emphasizes multiple exposure pathways—airborne inhalation, groundwater contamination, food residue consumption, and household exposure—media coverage remains narrow and superficial. This misalignment has important implications for public risk perception, healthcare response, and policy development. If the public narrative continues to minimize systemic pesticide dangers, policymakers face reduced societal pressure for regulation, and farming communities lack resources to demand safer practices.

Collectively, the findings demonstrate that Pakistani media coverage does not adequately serve the informational needs of rural populations or the broader public. Instead, media narratives reinforce an agricultural system that prioritizes output over wellbeing, reproducing inequality through representational silence. The absence of thematic, investigative, and justice-oriented reporting constrains democratic debate on rural health and environmental safety.

Implications for Theory

The results reinforce the value of an integrated theoretical approach combining Framing Theory, Agenda-Setting Theory, and Environmental Justice Theory. Framing Theory explains how language and narrative structure define pesticide use as a technical or economic issue rather than a public health emergency. Agenda-setting clarifies why pesticide exposure remains a secondary concern relative to more politically visible topics. Environmental justice reveals the unequal symbolic power that determines whose stories shape public discourse.

Together, these perspectives highlight the media's central role in constructing knowledge and shaping the politics of risk. In contexts such as Pakistan, where regulatory structures are weak, and journalism faces commercial and political pressures, media silence has profound consequences for rural health equity.

Practical and Policy Implications

The study points to several areas for reform:

1. **Strengthening environmental journalism capacity** through training programs, research partnerships, and resource access.
2. **Encouraging thematic and investigative reporting** that highlights systemic vulnerabilities, policy failures, and corporate accountability.
3. **Amplifying marginalized voices**, particularly farmers, women, and rural health workers, as legitimate sources of expertise.
4. **Integrating scientific and medical evidence** more directly into media narratives to ensure accurate risk communication.
5. **Promoting policy frameworks** that position pesticide exposure as a public health issue, not only an agricultural or economic concern.
6. **Supporting collaborations** between journalists, research institutions, NGOs, and rural communities to democratize environmental communication.

Conclusion

This study examined media narratives surrounding pesticide use, exposure, and rural health in Pakistan, revealing limited, episodic, and economically framed coverage that marginalizes affected communities and underrepresents systemic public health concerns. Despite extensive scientific evidence of widespread contamination and chronic illness, national news media provide only partial portrayals of the issue, narrowing public understanding and weakening policy momentum. The findings demonstrate the need for a transformative media approach that prioritizes environmental justice, centers rural voices, and treats pesticide risk as an

urgent public health agenda. Strengthening media representation and risk communication is essential to ensuring social visibility, regulatory accountability, and equitable protection for farming communities whose labor sustains the nation yet whose health remains largely invisible in public discourse. Future research should expand beyond print media to include television, social media, and regional press, and should explore audience reception and policy impact. Bridging the gap between scientific knowledge and mediated narratives is critical to building a healthier, more just agricultural future for Pakistan.

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