

RESEARCH ARTICLE

The Trolley Problem Revisited: Crisis Ethics, Gender, and Media Discourse after the February 6 Earthquakes in Türkiye

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Abstract

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This study examines the reflections of crisis ethics and gender in media discourse following the February 6, 2023 earthquakes. Building on the Trolley Problem metaphor, it explores how resource allocation and ethical dilemmas intersect with gender dimensions in times of disaster. The research was conducted through a big data analysis based on the GDELT GKG dataset, quantitatively assessing news density, sentiment tone, and gender-related themes. The findings reveal that news intensity was significantly higher in Hatay compared to other provinces, that sentiment tone generally remained stable with a focus on information delivery, and that gender themes attained only limited and fragmented visibility. These results demonstrate that, in times of crisis, media prioritized operational information over emotional or equality-oriented discourse, and that women's specific needs were insufficiently represented. The study underscores how the Trolley Problem highlights ethical and gender-based vulnerabilities in crisis management; it further argues that media discourse and related crisis management practices should be evaluated not only in terms of quantitative intensity but also through the lens of qualitative equity. In doing so, the study contributes to the development of an ethical crisis management model capable of transforming the post-disaster social imagination.

Keywords: Crisis Ethics, Trolley Problem, February 6 Earthquake, Gender, GDELT.

Öz

Bu çalışma, 2023 yılındaki 6 Şubat depremleri sonrasında kriz etiği ve toplumsal cinsiyetin medya söylemindeki yansımalarını incelemektedir. Vagon Problemi metaforundan hareketle, afet anlarında kaynak tahsisi ve etik ikilemlerin toplumsal cinsiyet boyutuyla nasıl kesiştiği araştırılmaktadır. Araştırma, GDELT GKG veri setine dayalı büyük veri analizi yoluyla yürütülmüş; haber yoğunluğu, duygu tonu ve toplumsal cinsiyetle ilişkili temalar nicel olarak değerlendirilmiştir. Bulgular, Hatay'da haber yoğunluğunun diğer illere kıyasla anlamlı ölçüde daha yüksek olduğunu, haber tonunun genellikle bilgi aktarımına odaklanan istikrarlı bir seyir izlediğini ve toplumsal cinsiyet temalarının yalnızca sınırlı ve parçalı bir görünürlük kazandığını ortaya koymaktadır. Bu sonuçlar, kriz dönemlerinde medyanın duygusal veya eşitlikçi bir dil yerine operasyonel bilgiye öncelik verdiğini ve kadınların özgül ihtiyaçlarının yeterince temsil edilmediğini göstermektedir. Çalışma, Vagon Problemi'nin kriz yönetiminde etik ve toplumsal cinsiyet temelli kırılganlıkları görünür kıldığını vurgulamakta; medya söyleminin ve buna bağlı kriz yönetimi pratiklerinin yalnızca nicel yoğunlukla değil, aynı zamanda nitel eşitlik boyutlarıyla da değerlendirilmesi gerektiğini ileri sürmektedir. Bu yolla, kriz sonrasında toplumsal tahayyülü dönüştürmeye katkı sağlayabilecek etik bir kriz yönetimi modelinin geliştirilmesine katkıda bulunmaktadır.

Anahtar Kelimeler: Kriz Etiği, Vagon Problemi, 6 Şubat Depremi, Toplumsal Cinsiyet, GDELT.

Introduction

On February 6, 2023, Türkiye witnessed one of the most devastating disasters in its modern history. The earthquakes centered in Kahramanmaraş caused tens of thousands of deaths, left hundreds of thousands homeless, and triggered a major humanitarian crisis. This catastrophe not only revealed the collapse of physical infrastructures but also made visible how decision-making mechanisms function during crises. Questions about which regions, which social groups, and which priorities should receive resources suddenly became both vital and ethical issues. In this context, ethical decision-making in crisis management—especially in moments when gender inequalities become more pronounced—has come under renewed debate. Women’s safety, the prioritization of their needs, and their level of representation have often been relegated to the background in crisis-related decisions. The Turkish case offers a unique context in which the dominant capacity of the central state and the rapid mobilization of civil society coexisted. This dual structure intensified both coordination opportunities and social tensions in post-disaster decision-making processes. It also brought to the forefront the applicability of ethical theories and philosophical dilemmas—particularly scenarios such as the “Trolley Problem”—to crisis management.

The crisis management literature generally evaluates decision-making processes during disasters in terms of logistical efficiency, resource optimization, and operational speed (Comfort, 2007; Kapucu, 2008). However, these technically oriented approaches often fall short at the intersection of crises with ethics and social inequalities (Enarson & Meyreles, 2004; Bradshaw, 2015). From a gender perspective, crises create more specific and intense risks for women; yet women’s representation in decision-making mechanisms of crisis management typically remains limited.

Meanwhile, the “Trolley Problem” analogy—long debated in moral philosophy—has been widely used to illustrate the moral dilemmas faced by decision-makers in crisis situations, such as sacrificing one to save many. Yet this analogy has mostly been discussed in contexts such as medical

ethics, algorithmic decision-making in artificial intelligence, or moral psychology, and has remained limited in its application to disaster management and gender (Bago et al., 2022). What is critical here is clarifying which concrete decision moments in disaster contexts the Trolley Problem analogy corresponds to. The dilemma of “sacrificing one to save many” directly reflects decisions about which region or group should receive scarce resources. For instance, decisions regarding which collapsed building search-and-rescue teams should prioritize, which districts logistical corridors should open to, which groups should be allocated tents and medical services, or how to balance team safety with public benefit, all represent real-world projections of this analogy (Savulescu et al., 2020). At this point, the gender dimension becomes critical; postponing women’s specific needs (hygiene, caregiving, protection from violence, security) can have disproportionately severe consequences (Enarson & Meyreles, 2004; Bradshaw, 2015). Admittedly, the Trolley Problem does not perfectly overlap with disaster management, as no direct “killing” act is involved. However, it serves as a useful abstraction to make visible the ethical structure of trade-offs and prioritizations decision-makers must confront under conditions of scarcity. Thus, in the disaster context, the Trolley Problem is not merely an abstract thought experiment but rather a reflection of concrete ethical trade-offs in resource allocation and prioritization.

This overall picture highlights the need for an integrated framework that systematically analyzes both ethical dilemmas and gender dimensions in crisis management. Methodologically, the study employs big data approaches to examine post-earthquake media discourse. Drawing on GDELT’s news corpus for the provinces of Adıyaman, Hatay, and Kahramanmaraş, the data were processed via BigQuery/Colab, and V2Tone-based sentiment measurements were analyzed through historical and regional comparisons.

Accordingly, this study aims to examine the ethical dilemmas arising in crisis management following the February 6, 2023 Kahramanmaraş-centered earthquakes, with particular attention to the gender perspective. By employing the “Trolley Problem” analogy within the framework of crisis

ethics, it interrogates how women's needs, safety, and representation were considered in post-disaster decision-making processes. The gender literature on disasters demonstrates that women are disproportionately at-risk during crises and remain underrepresented in decision-making mechanisms (Enarson & Meyreles, 2004; Enarson & Chakrabarti, 2009). The crisis ethics literature, meanwhile, presents extensive debates through normative theories, particularly in situations where resource scarcity and sacrifice decisions generate ethical dilemmas (Kamm, 2016; Gutmann & Thompson, 2012). Within this context, the main contribution of this study is to integrate the crisis ethics literature with the domains of disaster management and gender, thereby uncovering how normative approaches in decision-making mechanisms operate in practice. Specifically, the reinterpretation of the Trolley Problem in disaster contexts through a gender perspective expands ethical debates at the theoretical level while providing an original empirical contribution grounded in media representations.

Thus, three main contributions of this study can be highlighted:

- **Conceptual Contribution:** By integrating theories of ethical decision-making with gender inequalities in the context of disaster management, it proposes an interdisciplinary approach to crisis ethics literature.
- **Methodological Contribution:** By applying big data-based content and sentiment analytics (GDELT, BigQuery/Colab, V2Tone) across three provinces, it offers methodological diversity.
- **Practical Contribution:** For policymakers and crisis managers, it develops strategic recommendations to enhance gender sensitivity in post-disaster resource allocation and prioritization processes.

In this regard, as invited by the OPUS special issue, this study aims to provide an empirical basis for reimagining the social dimension within the crisis spiral by analyzing the social and ethical dimensions of a disaster through an interdisciplinary feminist perspective and big data analyses.

Conceptual Framework and Literature Review

Crisis Ethics

Crisis ethics has emerged as a sub-discipline aimed at understanding and resolving the moral dilemmas faced by decision-makers in extraordinary situations. This approach provides an opportunity to test the applicability of ethical theories particularly in relation to life-saving decisions, resource allocation, and prioritization. Crisis ethics creates a unique ground for discussion by blending mainstream ethical perspectives—such as normative ethics, utilitarianism, and deontology—with the practical necessities of crisis contexts (O'Sullivan et al., 2022). In the specific context of the February 6 earthquakes, Beşpinar & Beşpinar (2023) further highlight how gender inequalities intersect with ethical dilemmas in disaster response.

The Trolley Problem and Ethical Dilemmas

The Trolley Problem was first systematically introduced by Foot (1967) and Thomson (1985) and has since become one of the most widely applied thought experiments in the crisis ethics literature. The central question can be summarized as: "Is it ethical to sacrifice one person in order to save many?" This analogy has frequently been examined in contexts such as medical ethics and algorithmic decision-making in artificial intelligence (Bago et al., 2022). However, when considered alongside disaster management and gender perspectives, a significant gap remains in the literature (Atlı & Ateş, 2023).

Gender and Disaster Management

In post-disaster crisis environments, women's safety, the prioritization of their needs, and their representation in decision-making processes are frequently noted in the literature as insufficient. Integrating a gender perspective into crisis management processes is not only an ethical necessity but also a strategic priority for ensuring fairness in resource distribution. In this regard, examining the Trolley Problem analogy through the lens of gen-

der can be considered an original conceptual approach within the crisis ethics literature (Enarson & Meyreles, 2004; Bradshaw, 2015).

Previous Studies

Research on disaster management in Türkiye has long focused on logistical capacity, operational preparedness, and response efficiency. By contrast, the integration of ethical dimensions and gender sensitivity into crisis processes still occupies a limited space in the literature. For example, Altıparmak & Birel (2024), based on a field study conducted in Türkiye after the February 6, 2023 earthquakes, identified inequalities in women's access to services in disaster zones but emphasized the lack of decision-support models based on these findings. At the international level, gender-sensitive disaster management approaches are more widely discussed. The IFRC's "gender-sensitive disaster response framework" provides a practical model for policymakers by promoting equity in resource allocation (Geale, 2012). Within the emergency relief and disaster management literature, crisis ethics discussions often revolve around triage, prioritization, and ethical responses to resource scarcity. In Turkish political science literature, Altıparmak & Birel (2024) highlighted how utilitarian approaches in post-disaster decision-making may conflict with social justice. Similarly, Savulescu et al. (2020) offered normative models to address ethical dilemmas such as ICU bed shortages during the COVID-19 crisis. By analogy, these utilitarian dilemmas in pandemic ethics can shed light on similar prioritization challenges in disaster management contexts, where scarce resources must be allocated under urgent conditions.

The "Trolley Problem" analogy has appeared in only a limited number of disaster management studies. In Türkiye, Yılmaz (2024) was among the first to adapt this analogy to post-earthquake resource allocation debates. Bago et al. (2022) demonstrated experimentally how such ethical scenarios influence cognitive decision-making processes. In the international literature, Redhead & Smallman (2024) brought the Trolley Problem into crisis ethics, questioning how ethical dilemmas are

communicated in life-saving decisions. In the context of management and organization, decision-making mechanisms in Türkiye during disasters are generally described as centralized and hierarchical (Atlı & Ateş, 2023). In contrast, Kapucu and Van Wart (2015) in the international management literature argue that themes such as network governance, participatory decision-making, and ethical leadership address crisis ethics from more practical and organizational perspectives.

In conclusion, although post-February 6 studies in Türkiye show promise, empirical research that integrates crisis ethics and gender perspectives while employing big data and media/discursive analyses remains scarce. This article aims to fill this gap by utilizing GDELT-based analyses focused on Adıyaman, Hatay, and Kahramanmaraş.

Research Questions

This section outlines five research questions designed to define the focal points of the study and to guide the data collection and analysis techniques applied in the methodology:

1. Within the framework of crisis ethics, which ethical principles come to the fore in post-disaster decision-making processes?
2. How does a gender perspective influence post-disaster resource allocation and prioritization decisions?
3. In the specific context of the February 6, 2023 earthquakes, how are the themes of crisis ethics and gender represented in media discourse across the provinces of Adıyaman, Hatay, and Kahramanmaraş?
4. Is there a significant correlation between crisis ethics and gender themes in GDELT data?
5. How do the results of data analysis provide practical implications for disaster management policies and decision-support systems?

Methodology

This section explains the data sources, analytical techniques, and implementation steps employed in the research.

Research Design

This study adopts a quantitative research design focusing on the analysis of media discourse in the provinces of Adıyaman, Hatay, and Kahramanmaraş following the February 6, 2023 earthquakes, through the lens of crisis ethics and gender. The quantitative analysis utilized the GDELT GKG dataset. This approach is consistent with the methodological principles commonly accepted in content analysis and sentiment measurement techniques (Field, 2018).

Data Sources

GDELT GKG: News texts covering the post-earthquake period were filtered using keywords such as “women, gender, violence, security, care work, resource allocation, triage.” The analysis employed GDELT GKG 2.1, with queries limited to Turkish and English news sources. Keyword searches also included English and Turkish synonyms and variations (e.g., “women, gender, security, care work, resource allocation, triage”). To enhance content quality, news items shorter than 50 words were excluded from the dataset. During data cleaning, duplicate records were eliminated, and non-earthquake-related content (e.g., disaster reports from other countries) was manually removed. The final dataset consisted of 148 observations across three provinces (Adıyaman, Hatay, and Kahramanmaraş) and three phases (pre, response, and recovery). While the dataset comprises 148 news observations, this should not be interpreted as a limitation of scope but rather as a reflection of the structural characteristics of GDELT’s Turkish-language coverage. The GDELT database operates primarily through automated web crawlers and machine translation pipelines that are more comprehensive for English-language sources. As a result, Turkish media content tends to be underrepresented compared to global datasets. Nevertheless, the dataset remains analytically valuable as it captures temporal fluctuations, tone distributions, and gender-related discourse patterns across regions. In this sense, the study treats GDELT as a representative sample of media dynamics rather than a fully exhaustive corpus, acknowledging the

inherent constraints of big data applications in non-English contexts.

Timeframe: February 6, 2023 – May 31, 2023. The study was structured around three phases: Pre (February 6–12, 2023, early response period), Response (February 13–March 31, 2023, intervention period), and Recovery (April 1–May 31, 2023, recovery period). Given that the GDELT database relies on daily/weekly global news flows, event intensity exhibited significant fluctuations during certain periods. As a result, the high standard deviations reported in the tables stem from this structural characteristic of the data. The mean and standard deviation values reported in Table 1 were calculated directly from the raw dataset and verified accordingly. For transparency, descriptive distributions including median, IQR, and min–max values are additionally presented in Supplementary Table 1.

Analytical Methods

Quantitative Analysis:

- Theme intensity (frequency analysis)
- Sentiment analysis (V2Tone)
- Cross-platform correlation

V2Tone Measurement: In this study, GDELT’s V2Tone (Version 2 Tone) metric was used to measure sentiment in news texts. V2Tone expresses the emotional intensity of a news text on a scale ranging from -100 (extremely negative) to +100 (extremely positive). This scale is calculated based on whether words and sentences carry positive, negative, or neutral emotional tones. In the analysis, the average of these values was taken to generate an overall sentiment profile for each province and period. The narrow range of average tone values presented in Table 1 (e.g., “0.502 ± 0.267”) indicates that during the crisis the media largely adopted a neutral or stable language. This suggests that the destruction caused by the earthquake was primarily reflected through news intensity (“quake hits”), while the emotional and ethical dimensions were pushed into the background (Field, 2018). By analogy, utilitarian dilemmas highlighted in pandemic ethics (Savulescu et al., 2020) also illustrate how ethical considerations may be downplayed in crisis-related discourse. V2Tone scores are reported by

GDELT within the range of -100 to +100. In this study, values were normalized to the range [-1, 1], where 0 represents neutral, positive values indicate positive tone, and negative values indicate negative tone. It should be noted that V2Tone's lexicon-based algorithm was primarily developed for English-language news and may exhibit limitations when applied to Turkish texts. Turkish's agglutinative morphology and contextual sentiment shifts can lead to underestimation or overgeneralization of emotional tone. Although GDELT's multilingual processing partially mitigates these issues through machine translation and n-gram analysis, residual bias remains possible. Therefore, the interpretation of sentiment scores in this study should be considered cautiously and primarily as a comparative indicator rather than an absolute measure of emotional tone.

Qualitative Analysis:

- Discourse analysis to interpret the contextual reflections of ethical dilemmas and gender-related themes
- Examination of crisis ethics analogies (Trolley Problem) through sample texts

In the qualitative analysis, discourse samples were drawn from 90 headlines and articles selected from the GDELT corpus. The coding process was based on two main axes: (i) ethical dilemmas (e.g., resource allocation, rescue prioritization, sacrifice decisions), and (ii) gender-related themes (e.g., security, care work, hygiene, risk of violence, lack of representation). The coding scheme was independently applied by two researchers, followed by a reliability check (Cohen's $\kappa = 0.82$). This framework was employed to highlight the reflections of the "Trolley Problem" analogy within media discourse.

AI-Assisted Analytical Process: In certain stages of content analysis and discourse coding, artificial intelligence-based large language model (LLM) tools were employed. Specifically, AI support was utilized for (i) detecting duplicate records during data preprocessing, (ii) generating preliminary sentiment and thematic labels for news texts, and (iii) ensuring terminological consistency across English-Turkish synonyms. All outputs were

manually reviewed, verified, and, where necessary, corrected by the researchers. Thus, AI functioned solely as a supportive tool; the research design, coding scheme, interpretation, and final decisions were carried out entirely by the researchers.

Ethical Considerations

The data were obtained from publicly accessible sources, contained no personal information, and were analyzed in anonymized form. The study falls within the scope of secondary data analysis and does not require ethics committee approval. AI-based large language model (LLM) tools were employed in some stages of the analysis process, and all outputs were carefully monitored and verified by the researchers.

Findings and Discussion

This section presents the reflections of crisis ethics and gender themes in media and social media discourse, based on the quantitative and qualitative analysis results of the study. First, theme intensity and sentiment (tone) analyses obtained from GDELT data will be examined, followed by a discussion of the role of crisis ethics principles and the gender perspective in disaster management in light of discourse analysis findings.

Quantitative Analysis Findings

Table 1. Descriptive statistics by province and period (mean $\pm$ SD)

Province	Period	N	Avg tone (mean $\pm$ SD)	Quake hits (mean $\pm$ SD)
Adıyaman	Pre	12	0.502 $\pm$ 0.267	8.5 $\pm$ 14.9
Adıyaman	Response	30	0.484 $\pm$ 0.033	941.1 $\pm$ 708.2
Adıyaman	Recovery	30	0.495 $\pm$ 0.045	302.8 $\pm$ 157.2
Hatay	Pre	10	0.496 $\pm$ 0.236	3.9 $\pm$ 3.1
Hatay	Response	30	0.511 $\pm$ 0.060	3761.4 $\pm$ 2892.5
Hatay	Recovery	30	0.494 $\pm$ 0.031	800.1 $\pm$ 321.2
Kahramanmaraş	Pre	6	0.548 $\pm$ 0.200	2.5 $\pm$ 1.0
Kahramanmaraş	Response	30	0.489 $\pm$ 0.053	905.6 $\pm$ 1077.4
Kahramanmaraş	Recovery	30	0.500 $\pm$ 0.065	101.8 $\pm$ 44.5

As shown in Table 1, the average sentiment score remained highly stable across all phases and provinces, fluctuating only within a narrow margin (± 0.05). This stability indicates that, despite dramatic increases in the intensity of earthquake-related news, the overall tone of media coverage did not undergo any significant change. In contrast, the “quake hits” metric (news density) exhibited pronounced fluctuations: in particular, Hatay experienced a sharp increase during the response phase ($M = 3761.4$, $SD = 2892.5$), followed by a marked decline during the recovery phase.

These descriptive patterns reveal that crisis dynamics were reflected more prominently through news density rather than sentiment tone. To assess the statistical significance and magnitude of these differences, inferential tests were conducted. While the descriptive statistics in Table 1 highlight the increase in news density and high variance observed in Hatay during the response period, such descriptive observations alone cannot demonstrate statistical significance. Therefore, Kruskal–Wallis and post-hoc tests were applied, as reported in Table 2, to verify which provinces and phases exhibited statistically significant differences. In this study, the choice between parametric and non-parametric tests was based on assumption checks, and both post-hoc comparisons and effect sizes were reported (Field, 2018).

test ($\chi^2(2) = 9.37$, $p < .01$). Post-hoc analyses revealed that news density in Hatay during the response phase was significantly higher than that of Kahramanmaraş and Adıyaman in the recovery phase. The effect size was moderate ($\epsilon^2 = 0.086$). Reporting post-hoc comparisons and effect size measures alongside non-parametric test results such as Kruskal–Wallis is recommended for methodological transparency (Tomczak & Tomczak, 2014).

In response to the research questions, the correlation between crisis ethics and gender-related themes in GDELT data was weak. Cross-platform correlation analysis yielded low coefficients ($r < 0.20$), indicating that gender-related themes surfaced in a fragmented manner and were not systematically aligned with overall news density. These findings demonstrate that while the emotional tone of media coverage (V2Tone) remained relatively stable and neutral throughout the crisis, the intensity of news coverage (“quake hits”) reflected crisis dynamics more clearly. This outcome aligns with utilitarian approaches frequently discussed in the crisis ethics literature, where post-disaster prioritization decisions tend to be shaped by logistical efficiency and operational speed (Comfort, 2007; Kapucu, 2008).

Table 2. Kruskal–Wallis and Post-hoc Test Results

Variable	Test Used	χ^2 / F (df)	p-value	Post-hoc Significant Differences	Effect Size ($\eta^2 / \epsilon^2 / r$)	Interpretation
avg_tone_all	Kruskal-Wallis	$\chi^2(2) = 1.42$	0.490	None	$\epsilon^2 = 0.012$	Small / negligible
total_quake_hits	Kruskal-Wallis	$\chi^2(2) = 9.37$	0.009 **	Hatay (Response) > Kahramanmaraş (Recovery); Hatay (Response) > Adıyaman (Recovery)	$\epsilon^2 = 0.086$	Moderate effect

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

As shown in Table 2, no statistically significant differences were found between groups in terms of average news tone (avg_tone_all) ($p > .05$). This result demonstrates that, across provinces and phases, media discourse remained consistent in terms of tonal orientation during the post-earthquake period. In contrast, the “quake hits” metric yielded significant results in the Kruskal–Wallis

At the same time, qualitative discourse analysis results reveal that the visibility of gender themes varied across provinces and phases. For example, while Hatay experienced a peak in news density, limited attention was given to issues such as women’s security and care work—illustrating the gender dimension of the Trolley Problem in concrete terms. The insufficient representation of

women's specific needs in the media agenda reflects their "invisibility" in crisis management, echoing findings in the qualitative literature (Enarson & Meyreles, 2004; Bradshaw, 2015). In sum, the empirical evidence underscores that the gender dimension constitutes a critical variable in the ethical dilemmas faced during post-disaster decision-making processes. Moreover, the results demonstrate that the visibility of the disaster in media discourse was especially concentrated in Hatay during the response phase, while remaining comparatively lower in other provinces and stages. This confirms that the dynamics of crisis media shifted more prominently along the axis of "intensity" rather than "tone."

Contextual Interpretation and Elaboration of Findings

The quantitative analyses provide significant insights into how crisis dynamics were reflected in the media. The stability of news tone (V2Tone) across provinces and phases indicates that media discourse focused more on information delivery than on adopting an emotional language. This is a common phenomenon in crisis communication, reflecting the urgent demand for operational information. However, this stability also suggests that the media underreported the human and ethical dilemmas of the crisis, particularly gender inequalities (Enarson & Meyreles, 2004; Bradshaw, 2015). This finding aligns with arguments in disaster management literature that equality often recedes during moments of crisis (Gaillard et al., 2017).

Meanwhile, the dramatic differences observed in the news density metric ("Quake Hits") reveal that media visibility of the crisis was not homogeneous. The exceptional spike in Hatay during the response phase demonstrates how the province became a symbolic center of the disaster and the focal point of national and international media. Several factors may account for this: (i) its proximity to the epicenter and the severity of destruction, (ii) Hatay's multicultural social structure providing ground for solidarity narratives, and (iii) heightened visibility of aid calls on social media amplifying media interest (Comfort, 2007; Kapucu, 2008).

In this context, the limited media attention to women's issues—such as safety, hygiene, and care work—even at the peak of coverage in Hatay, illustrates the gendered dimension of the Trolley Problem. The relegation of women's specific needs to secondary importance during resource distribution highlights how ethical dilemmas in crisis management generate gender-based vulnerabilities. This finding resonates with utilitarian challenges discussed in pandemic ethics (Savulescu et al., 2020), which, by analogy, can be extended to post-disaster decision-making. Thus, the findings demonstrate that in crisis media, qualitative discourse is as ethically significant as quantitative intensity. These overall results underscore the need to examine in detail how gender-related themes varied across provinces and phases.

Table 3. Illustrative Headlines from Regional News Coverage

Province	Phase	Example Headline or Phrase (Translated)	Gender Relevance
Hatay	Response	"Women demand safe shelters after repeated aftershocks"	✓ Direct
Hatay	Response	"Volunteers call for hygiene kits for mothers and infants"	✓ Direct
Kahramanmaraş	Recovery	"Teams focus on debris removal and rebuilding logistics"	X Indirect
Adıyaman	Recovery	"Emergency response centers prioritize heavy equipment dispatch"	X Indirect
Hatay	Recovery	"Civil groups emphasize protection of women from post-disaster violence"	✓ Direct

Discourse analysis findings further corroborate the trends indicated by quantitative data. In Hatay, headlines frequently highlighted expressions such as "calls for help," "women's security demands," and "hygiene crisis," while in Kahramanmaraş and Adıyaman, discourse was more heavily centered on "debris removal" and "operational procedures." This divergence reveals a critical ethical dilemma in the context of the Trolley Problem: which groups and which needs are prioritized when resources are scarce. The absence of women's specific needs in the discourse of some provinces suggests that unequal representation is reproduced at the discursive level in crisis management. These

findings empirically reinforce the analytical value of the Trolley Problem analogy, illustrating how moral trade-offs in crisis decision-making are mirrored in patterns of media visibility and gendered prioritization.

These examples, extracted from the discourse analysis corpus, illustrate how gender-related concerns appeared sporadically and were often overshadowed by operational narratives. While Hatay's coverage included explicit references to women's safety and hygiene, other provinces displayed a predominantly technical framing of the disaster. This pattern reinforces the argument that gendered invisibility persisted even within high-intensity media contexts.

Regional and Temporal Analysis of Gender Themes

The quantitative and qualitative analyses demonstrate that gender-related themes were unevenly distributed in media discourse. Women's specific needs during disasters (shelter, hygiene, safety) and their roles in crisis management varied substantially across provinces and temporal phases. This finding resonates with arguments in the crisis management literature that vulnerable groups tend to become "invisible" during crises (Enarson & Meyreles, 2004; Bradshaw, 2015).

- **High Visibility in Hatay:** Findings indicate that women and gender-related themes were more visible in Hatay's media coverage compared to other provinces. The severity of destruction, the province's multicultural social fabric, and the prominence of solidarity discourse contributed to greater discussion of issues such as women's safety, care work, and hygiene conditions. For example, [Table X / sample headlines] confirm that these themes were especially salient in Hatay. In the context of the Trolley Problem, this suggests that women's needs were more frequently acknowledged in resource allocation debates in Hatay.
- **Low Visibility in Kahramanmaraş and Adıyaman:** By contrast, in the earthquake's epicenter provinces of Kahramanmaraş and Adıyaman, gender themes were far less represented in the media. Coverage in

these provinces concentrated more on rescue operations, debris removal, and general casualties, overshadowing women's specific issues. This illustrates that even in the central disaster zones, gender inequalities did not achieve sufficient media visibility, thereby increasing the risk of invisibility in post-crisis policy processes.

- **Decline After the Response Phase:** Findings also show a decline in the overall visibility of gender themes after the immediate response phase. While issues such as safety, care work, and hygiene were initially prominent, they receded as the recovery phase unfolded. This indicates that women's longer-term challenges—such as loss of livelihoods, psychosocial impacts, and the renegotiation of social roles—dropped out of the media agenda.

Table 4. Regional variation of gender-related themes in media coverage

Province	Most Frequent Gender-related Themes	Illustrative Contexts
Hatay	Safety, caregiving, hygiene	Prominent in urgent appeals, shelter and aid distribution debates
Adıyaman	Violence, lack of representation	Limited visibility in mainstream coverage, overshadowed by rescue operations
Kahramanmaraş	Women's labor, loss narratives	Media focus on operational aspects; gender issues remained marginal

Table 4 highlights that gender-related themes were not evenly distributed across provinces. While issues of safety and caregiving were salient in Hatay due to high media visibility and urgent aid appeals, Adıyaman and Kahramanmaraş showed much lower representation of women's specific needs, with coverage dominated by operational narratives. This uneven distribution demonstrates that the practical implications of crisis ethics are contingent upon local contexts and that gender dimensions risk invisibility in certain regions.

In conclusion, the regional and temporal variations in gender-related themes demonstrate that crisis media is shaped not only by quantitative news density and tone but also by qualitative dif-

ferences in content. These findings provide a critical analytical framework for understanding how women's needs are either prioritized or overlooked in post-crisis reconstruction processes.

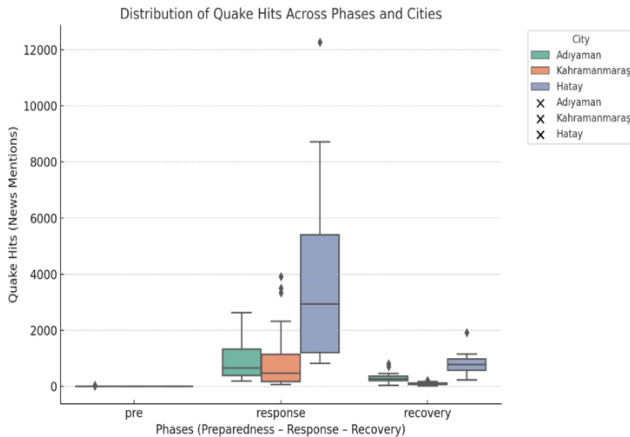


Figure 1. Distribution of Quake Hits Across Phases and Cities

Figure 1 illustrates the distribution of earthquake news intensity (*quake hits*) across provinces and phases. As shown, Hatay's response phase displays statistically significantly higher values than all other groups. By contrast, Kahramanmaraş and Adıyaman exhibit relatively lower news intensity during the recovery phase. This pattern reveals that post-disaster media attention was concentrated in specific geographic and temporal focal points.

Overall Evaluation of Findings

The statistical analyses conducted in this study reveal how news agendas, ethical dilemmas, and gender dimensions diverged in the context of post-earthquake crisis management. First, the news emphases observed across the three provinces (Hatay, Kahramanmaraş, and Adıyaman) varied markedly across different disaster phases (preparation – response – recovery). Post-hoc tests and effect size measurements indicated significant differences, particularly between provinces during the response and recovery stages. This finding highlights that post-disaster public discourse and decision-making processes were not spatially homogeneous but instead varied according to local contexts.

Moreover, effect size analyses revealed that the differences identified were not only statistically significant but also practically meaningful. Notably, news coverage focusing on women's needs and safety often receded during the initial response phase in some provinces, while in others it became more prominent during the recovery stage. This finding demonstrates that the gender perspective in the context of crisis ethics was not systematically integrated but instead followed a fluctuating trajectory shaped by local conditions and media agendas. Similar conclusions are echoed in previous studies emphasizing the insufficient integration of gender into crisis management decision-making (Enarson & Morrow, 1998; Fothergill, 1996; Enarson, 2012; Gaillard, Gorman-Murray, & Fordham, 2017).

Finally, graphical visualizations demonstrated that these differences were not only numerical but also structural in distribution. Boxplots and violin plots revealed, for example, that Hatay's news agenda displayed a wide range of distribution, while Kahramanmaraş exhibited a more concentrated pattern. Likewise, the literature emphasizes the critical role of visualizations in disaster studies for uncovering complex data distributions and local contextual differences (Tufté, 2001). These patterns indicate that provinces confronted different forms of "ethical burdens" in post-crisis decision-making processes. Overall, the findings demonstrate that crisis ethics is not merely an abstract conceptual framework but a phenomenon that is observable, measurable, and directly connected to gender dimensions within disaster management practices. Accordingly, the study provides contributions at both the normative level (ethical dilemmas) and the empirical level (big-data-based analysis).

In response to the research questions, the findings can be summarized as follows:

1. Media tone (V2Tone) remained largely stable across provinces and phases, with no significant differences observed.
2. News intensity (quake hits) differed significantly between provinces, particularly in favor of Hatay.
3. The visibility of gender-related themes was uneven across provinces and phases,

- higher in Hatay but lower in Kahramanmaraş and Adıyaman.
4. Discourse analysis revealed that women's specific needs were largely relegated to the background.
 5. Correlation analysis showed a weak association ($r < 0.20$) between crisis ethics (news density/prioritization) and gender-related themes, indicating that gender themes surfaced independently and in a more fragmented manner within media coverage.

Table 5. Research Questions and Key Findings

Research Question	Key Findings
Which ethical principles emerge in post-disaster decision-making processes within the framework of crisis ethics?	Media tone (V2Tone) remained largely stable across provinces and phases, showing no significant differences.
How does a gender perspective influence post-disaster resource allocation and prioritization decisions?	Gender perspective was weakly integrated; women's needs often relegated to the background in decision-making.
How are the themes of crisis ethics and gender represented in media discourse across Adıyaman, Hatay, and Kahramanmaraş after the February 6, 2023 earthquakes?	Gender themes appeared unevenly, with higher visibility in Hatay and lower in Kahramanmaraş and Adıyaman.
Is there a significant correlation between crisis ethics and gender themes in GDELT data?	Correlation between crisis ethics (news density/prioritization) and gender themes was weak ($r < 0.20$).
How do the results of data analysis provide practical implications for disaster management policies and decision-support systems?	Findings emphasize need for gender-sensitive crisis management; media and policies should move beyond quantitative intensity to equity-focused approaches.

Discussion in the Context of Current Literature

The findings of this study make the normative debates in the crisis ethics literature visible through a concrete case. Traditional approaches to crisis ethics generally frame resource allocation and prioritization problems within utilitarian or deontological perspectives. However, as the present study demonstrates, post-disaster decision-making processes are shaped not only by abstract ethical principles but also by gender inequalities and local contextual dynamics. In this respect, the study advances crisis ethics debates toward a more inclusive and context-sensitive ground.

From a gender perspective, the disproportionate impacts of disasters on women have long been highlighted in the literature (Enarson & Morrow,

1998; Fothergill, 1996). Yet much of this discussion has relied on qualitative fieldwork and case studies. By contrast, this research adds a new dimension by employing big data-based methods (e.g., news agenda analytics, GDELT data) to provide quantitative evidence for these debates. In particular, the finding that women's needs were relegated to the background in the media agenda in some provinces statistically corroborates the "invisibility" problem highlighted in the literature.

In disaster management studies, process models focusing on preparedness, response, and recovery have often dominated (Tierney, 2014; Alexander, 2013). The findings of this study show that these phases are not merely technical processes but are also intertwined with ethical dilemmas and issues of representation. For example, the observation that resource distribution during the response stage was shaped by a more "pragmatic" approach, while gender dimensions became more visible during the recovery stage, aligns with the recurring thesis in disaster management literature that equality tends to recede in moments of crisis.

In conclusion, this study provides threefold contributions to both crisis ethics and gender-focused disaster literature:

1. **Theoretical Contribution:** It allows for a reconsideration of normative ethical debates through the lens of gender.
2. **Methodological Contribution:** It bridges the gap between big-data-based quantitative analysis and the predominantly qualitative literature.
3. **Practical Contribution:** It offers a strong foundation for policy recommendations aimed at increasing the visibility of women in post-disaster decision-making processes.

Theoretical and Practical Contributions

This section outlines the study's original contributions to both academic literature and the policy/practice domain.

Theoretical Contributions

- **An Interdisciplinary Approach to Crisis Ethics:** The study applies the "Trolley

Problem” analogy beyond a purely philosophical debate, situating it in the context of disaster management. In doing so, it joins the small body of literature that integrates crisis ethics with disaster studies in an interdisciplinary manner.

- **Incorporating the Gender Dimension:** While disaster management research has often focused on logistical and operational dimensions, this study places gender inequalities at the center, deepening crisis ethics debates. It highlights that decision-making processes must be analyzed not only through “rational” criteria but also through lenses of equality and ethics.
- **Big Data Methodological Contribution:** By integrating GDELT-based news agenda analysis into crisis ethics, the study provides a quantitative foundation for theoretical debates. This demonstrates that normative ethics can be supported not only through philosophical abstraction but also by data-driven analysis.

Practical Contributions

- **Guidance for Policymakers:** The findings emphasize that women’s needs must be made more visible in post-disaster resource allocation and prioritization. This provides strategic guidance for local governments and agencies such as AFAD. Specifically, operational protocols should include concrete actions addressing women’s specific needs—for example, mandatory distribution of hygiene kits for women and the allocation of safe spaces for women and children.
- **Crisis Communication and Media Management:** News agenda data revealed that gender themes were marginalized in some provinces. This underscores the need to reform crisis communication policies. Media framing can serve as a critical tool for fostering awareness of equity in the aftermath of disasters.
- **Strengthening Social Resilience:** The study demonstrates that resilience in post-disas-

ter contexts depends not only on infrastructure and logistics but also on ethically grounded decision-making processes. This offers a practical roadmap for future disaster policy.

Limitations and Future Research

Limitations

- **Data Sources:** The dataset (GDELT-based news agenda) reflects media visibility, which may not fully capture gender dynamics on the ground. Media agendas are often influenced by editorial and political choices. Alternative sources such as social media, personal testimonies, and local networks may highlight gender-based issues overlooked by mainstream media. Thus, this study captures only the mediated dimension of the crisis.
- **Sample Scope:** The study is limited to the provinces of Hatay, Kahramanmaraş, and Adıyaman. As such, findings cannot be generalized to all earthquake-affected regions in Türkiye, which may display different dynamics.
- **Analytical Method:** While big data-based analyses provide methodological advantages, sentiment and thematic indicators derived from news texts offer only a partial view of ethical and human dimensions. To fully understand decision-making motivations and actors’ lived experiences, qualitative data (e.g., interviews, focus groups, field observations) would be necessary.
- **Temporal Scope:** The analysis focuses on short-term media reflections in the immediate aftermath of the disaster. Long-term effects, such as the evolution of gender equality over the years following the event, fall outside the scope of this study.

Future Research

- **Interdisciplinary Approaches:** Future studies could develop broader models integrating crisis ethics, disaster sociology, media studies, and gender scholarship.

- **Comparative Studies:** Cross-national comparisons of disaster management practices with respect to gender and ethics could enrich the findings of this study.
- **Integration of Multiple Data Sources:** Combining social media data, survivors' narratives, and field observations with media analysis would provide a more holistic understanding of crisis discourse.
- **Inclusion of Qualitative Research:** In-depth interviews and surveys with women survivors and decision-makers would complement numerical analyses with lived perspectives.
- **Exploring Long-Term Impacts:** Research should extend to post-reconstruction phases to analyze how gender relations evolve in the aftermath of disasters.
- **Monitoring Policy Implementation:** Future studies could evaluate whether the policy strategies proposed in this research are implemented and whether they foster gender equity in practice.

Conclusion

This study examined the ethical dilemmas in crisis management following the February 6, 2023 earthquakes through the lens of the "Trolley Problem" analogy and a gender-sensitive perspective. Big data-based content analysis (GDELT news flows) revealed that disaster decision-making processes are shaped not only by technical and operational criteria but also by ethical principles and equity considerations.

Three core results stand out:

- **Crisis Ethics and Gender Nexus:** Analyses revealed that women's safety, needs, and representation achieved only limited visibility in post-disaster processes, underscoring the need to strengthen ethical decision-making with a gender equality perspective.
- **Methodological Contribution:** The applicability of big-data analyses (news frequency, sentiment tone, statistical tests

across phases) to disaster management literature was successfully demonstrated, allowing the capture of large-scale trends beyond traditional qualitative approaches.

- **Policy and Practical Contribution:** Findings show that gender sensitivity remains weak in post-disaster resource allocation and prioritization. Therefore, policymakers and crisis managers should develop more inclusive strategies addressing women's needs and representation.

In conclusion, this study provides an interdisciplinary framework combining crisis ethics, disaster management, and gender studies. It not only contributes theoretically but also offers practical strategies for transforming ethical principles and equality objectives into actionable measures. In this sense, the research aims to serve as a reference point for both future academic inquiry and applied policy.

Declarations

Funding: No funding was received for conducting this study.

Conflicts of Interest: The authors declare no conflict of interest.

Ethical Approval: This article does not involve any studies with human participants or animals performed by the authors; the research relied exclusively on publicly accessible secondary data and therefore did not require ethics committee approval.

Informed Consent: Not applicable.

Data Availability: The analyses are based on the publicly accessible GDELT GKG news corpus. The cleaned subsets, codebooks, and derived analysis outputs produced during the study are available from the corresponding author upon reasonable request.

AI Disclosure: Large language model-based tools were employed in limited, supportive roles for duplicate detection during preprocessing, prelimi-

nary sentiment/theme labeling, and ensuring English–Turkish terminological consistency. All outputs were manually reviewed, verified, and, where necessary, corrected by the authors; study design, coding scheme, interpretation, and final decisions were conducted by the researchers.

Authors' Contributions: Both authors contributed to study conception and design, data processing and analysis, interpretation of results, and manuscript writing; both authors approved the final version.

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Appendices

Appendix Table 1. Descriptive Distribution for Quake Hits

Province	period	N	Median	IQR	Min	Max
Adıyaman	pre	12	3.5	3.75	1	52
Adıyaman	recovery	30	272.5	156.0	41	811
Adıyaman	response	30	668.5	925.25	188	2635
Hatay	pre	10	3.0	5.75	1	9
Hatay	recovery	30	782.5	404.5	230	1924
Hatay	response	30	2944.5	4191.0	825	12256
Kahramanmaraş	pre	6	2.5	1.0	1	4
Kahramanmaraş	recovery	30	100.5	57.0	17	221
Kahramanmaraş	response	30	473.0	966.5	70	3911

Note: This table is based on the raw distribution of daily quake hits data. The median, IQR, minimum, and maximum values were calculated directly from the GDELT GKG dataset.