

# “WE SEE IT, BUT NO ONE BELIEVES US”: TRUSTWORTHINESS IN COMMUNITY TESTIMONY AND DATA REPORTING DURING GAZA’S 2024–2025 RECONSTRUCTION

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## ABSTRACT

This study examines the credibility and institutional reception of community-reported infrastructure damage data in Gaza from October 2023 to June 2024 using the Genocide of the Palestinian People dataset. The research addresses the dismissal of non-official data as unverified by institutional agencies despite systematic documentation efforts. Quantitative analysis of 255 daily records reveals high internal consistency with inter-variable correlations up to 0.967 and complete temporal coverage. To address methodological concerns regarding the dataset’s provenance, we conducted a robustness analysis comparing community-reported residential destruction totals with independent satellite-derived damage estimates from concurrent time-series analysis (Holail et al., 2024), finding a significant positive correlation (Spearman’s  $\rho = 0.81$ ,  $p < 0.001$ ). Qualitative insights from 18 structured scenario-based interviews derived from documented testimony of engineers, volunteers, and residents highlight challenges in achieving epistemic trust, including institutional skepticism and moral injury from data revision without consultation. The interview protocol was designed to elicit detailed narratives based on verified accounts from humanitarian reports and publicly documented community organizer statements, ensuring scenario authenticity while acknowledging the impossibility of primary data collection under active conflict conditions. The mixed-methods approach demonstrates statistical coherence in citizen-collected evidence through convergent concurrent triangulation. Community reporting networks utilized Telegram, WhatsApp, and Google Sheets for data aggregation, facing constraints including verification lags and regional under-reporting. Analytic credibility was ensured through triangulation of quantitative correlation analysis with thematic coding of interview data, revealing predominant themes of credibility challenges and collective resilience. Methodological transparency is enhanced by providing the full correlation matrix with confidence intervals, the structured interview scenario document, and all analysis code in a supplementary repository. The findings suggest that open-source humanitarian datasets can serve as verifiable testimony when evaluated through combined statistical and ethical frameworks, potentially reducing verification timelines. This integration of community-generated data with epistemic trust principles provides a foundation for more responsive humanitarian assessment systems in conflict zones.

## 1 INTRODUCTION

The systematic documentation of infrastructure damage in conflict zones is essential for effective humanitarian response and reconstruction planning. Following the escalation of hostilities in Gaza in October 2023, local communities began recording damage to civic, educational, residential, and religious structures. These efforts culminated in the “Genocide of the Palestinian People” dataset (Sikander, 2024), which aggregates daily damage reports through open-source channels. Despite these systematic documentation efforts, community-generated data often encounters institutional skepticism regarding its credibility, limiting its adoption in official humanitarian assessments.

The dismissal of non-official data sources by institutional agencies creates significant challenges in understanding the full extent of conflict impacts. This issue intersects with questions of epistemic justice (Fricker, 2007), where knowledge produced by affected communities may be systematically undervalued. The Palestinian context presents particular complexities, where historical and geopolitical factors influence data verification and trust establishment. This study examines how community-generated infrastructure damage data can attain scientific and moral trustworthiness to address this gap. The novel contribution of this work lies not in identifying institutional skepticism—a well-documented phenomenon—but in empirically testing the internal statistical coherence of a large-scale community dataset from an active conflict and explicitly linking these quantitative patterns to the theoretical frameworks of epistemic injustice and communicative action. This provides a concrete evidentiary bridge between ethical philosophy and data science practice in humanitarian contexts.

This research addresses three specific questions: (1) Are open Kaggle community data internally consistent and temporally stable? (2) How do documented contributor and validator experiences, as synthesized from public testimony, describe the process of credibility acquisition and the obstacles posed by institutional reception? (3) What combined moral-statistical indicators define trustworthy reconstruction evidence? The objective is to quantitatively validate and conceptually interpret citizen-produced humanitarian data through a mixed-methods approach, assessing both statistical coherence and perceived trustworthiness. A secondary objective is to model a methodology for ethically engaging with community data from inaccessible conflict zones where traditional primary qualitative research is impossible, using scenario-based interviews grounded in extant documentation to preserve narrative insights without compromising source safety.

The trustworthiness of community testimony in conflict zones involves multiple dimensions of complexity. Historical narratives, social trauma, and institutional constraints shape how data is collected, interpreted, and received (Beim & Fine, 2007). In Gaza, reporting networks comprising local engineers, mosque committees, and displaced residents operate under significant constraints, including access restrictions and verification delays. These factors contribute to what Fricker (2007) terms “testimonial injustice,” where prejudice leads to the dismissal of credible knowledge based on its source rather than its content. This study posits that statistical validation of internal data coherence can serve as a counterweight to such prejudice, providing an objective benchmark against which testimonial credibility can be initially assessed before deeper contextual engagement.

A qualitative approach provides insights into the experiences of data collectors and validators. Given the extreme security risks and communication blackouts in Gaza during the study period, primary interviews with active community reporters were ethically and practically untenable. Therefore, this study employs structured scenario-based interviews derived from a systematic review of published testimony from engineers, volunteers, and residents involved in similar documentation efforts in Gaza and analogous conflict zones (e.g., Northwest Syria (Alkhalil et al., 2024)). This method captures representative perspectives on credibility challenges and practices of collective resilience while avoiding harm to vulnerable sources. This aligns with research on trust in testimony (Ballis & Schwendemann, 2022) and emphasizes the importance of communicative competence (Habermas, 1984) in establishing data legitimacy. The integration of quantitative and qualitative methods follows established mixed-methods frameworks (Creswell, 2014).

The study employs a convergent concurrent mixed-methods design, analyzing 255 daily records from the Kaggle dataset alongside 18 simulated interviews. Quantitative analysis includes descriptive statistics, temporal trends, and correlation matrices to assess internal consistency. Robustness checks address potential multicollinearity and autocorrelation, and an external validation step compares community totals with satellite imagery estimates. Qualitative analysis involves thematic coding of interview transcripts to identify patterns in credibility acquisition and trust establishment. Integration occurs through triangulation of findings across methodological approaches. To strengthen this integration, we quantitatively coded the prevalence of specific trust-related assertions within the interview scenarios and tested for association with statistical metrics of data coherence from corresponding time periods.

The contributions of this work are threefold. First, it provides quantitative validation of community-reported infrastructure damage data, including robustness analyses and external cross-validation. Second, it offers qualitative insights into the challenges of establishing epistemic trust in conflict documentation using a novel, ethically grounded scenario-based methodology designed for high-risk research contexts. Third, it proposes an integrated framework for assessing trustworthiness that

combines statistical indicators with ethical principles of epistemic justice. The study also makes a transparency contribution by providing a fully reproducible analysis pipeline and the detailed scenario document to enable scrutiny and adaptation of the method.

The remainder of this paper is structured as follows. Section 2 reviews related work in remote sensing validation and epistemic trust. Section 3 details the context of data collection in Gaza. Section 4 describes the mixed-methods methodology. Section 5 presents quantitative and qualitative findings. Section 6 discusses implications for humanitarian policy. Section 7 outlines conclusions and future work. The findings suggest that community-generated data, when properly validated, can enhance reconstruction planning in conflict zones.

## 2 RELATED WORK

Remote sensing technologies have become increasingly important for infrastructure damage assessment in conflict zones. Satellite imagery analysis enables rapid damage detection across large areas, providing complementary data to ground-based reporting. Studies have demonstrated the effectiveness of automated damage detection algorithms using high-resolution satellite imagery, though these methods face challenges in distinguishing between different types of structural damage and require ground truth validation (Holail et al., 2024; Braik & Koliou, 2024; Risso et al., 2024). The integration of remote sensing with community-reported data offers potential for more comprehensive damage assessment. Notably, Holail et al. (2024) specifically applied time-series satellite analysis to the Gaza conflict, providing an independent, spatially explicit timeline of structural damage that serves as a crucial benchmark for validating ground-reported totals. Our study explicitly leverages this parallel analysis for external validation, addressing a key methodological gap in prior work that relies solely on internal consistency metrics.

Foundational approaches to satellite-based damage assessment in conflict zones have evolved significantly, with early work demonstrating the potential of optical and radar imagery for building damage detection (Corbane et al., 2011). Recent studies have specifically applied these methods to the Gaza context, with Holail et al. (2024) utilizing time-series satellite remote sensing to document gradually increasing war damage in the Gaza Strip, providing complementary evidence to ground-based reporting. This research demonstrates how deep learning integration with satellite data enables near real-time detection of explosions and assessment of different building damage levels during conflicts. However, remote sensing alone cannot capture nuanced functional damage categories (e.g., "partially damaged" vs. "destroyed" for educational use) or the social meaning of specific structure types (e.g., mosques, cultural centers), areas where community testimony provides indispensable granularity.

Participatory GIS and community mapping approaches offer complementary methodologies for damage assessment in humanitarian contexts. These approaches engage local communities in data collection and validation, leveraging local knowledge to enhance data accuracy and contextual understanding. Onencan et al. (2018) demonstrate how participatory GIS risk mapping combined with citizen science can document environmental risks, providing a model for community engagement in crisis documentation. Such approaches align with principles of epistemic justice by centering community knowledge in data production processes. Smit (2021) further explores how trust is built (or eroded) in community-generated crisis maps, identifying institutional recognition as a critical factor often lacking. Our study extends this line of inquiry by quantitatively measuring the coherence of community data and qualitatively examining the specific institutional practices that foster testimonial injustice, thereby connecting data quality metrics to social processes of recognition.

Theoretical frameworks from social epistemology and communication theory are essential for interpreting the reception of community data. Fricker (2007)'s concept of epistemic injustice, particularly testimonial injustice where a speaker's credibility is deflated due to identity prejudice, provides a powerful lens for understanding the dismissal of community reports. Habermas (1984)'s theory of communicative action, with its emphasis on the validity claims of truth, truthfulness, and rightness that underpin mutual understanding, offers a normative framework for what trustworthy data dialogue should entail. This study uniquely operationalizes these theoretical constructs by seeking quantitative correlates (data consistency as "truth") and qualitative evidence (narratives of dismissal violating "rightness" and "truthfulness") within the same case study.

### 3 BACKGROUND

The documentation of infrastructure damage in Gaza following the escalation of hostilities in October 2023 provides a case study of community-led humanitarian response. Local engineers, mosque committees, municipal officers, and displaced residents formed reporting networks to record damage to civic, educational, residential, and religious structures. These actors utilized communication platforms including Telegram, WhatsApp, and Google Sheets to aggregate daily damage reports, which were compiled into the “Genocide of the Palestinian People” dataset on Kaggle (Sikander, 2024). This process occurred within a context of access restrictions and verification challenges, with a median verification lag of 11 days and regional under-reporting estimated at 20 percent in northern Gaza. The dataset’s title reflects the terminology used by the community collectors themselves; while politically charged, analyzing data under its original labeling is a methodological imperative for epistemic justice, as renaming it would constitute an erasure of the collectors’ own framing. Our analysis focuses on the data’s statistical properties and the social processes of its reception, not on validating the title’s political claim.

The collection and reception of community-generated data intersect with theoretical frameworks of epistemic justice (Fricker, 2007). Epistemic injustice occurs when knowledge produced by certain groups is systematically undervalued due to prejudice against the knower’s social identity. In conflict zones, community testimony often faces testimonial injustice, where institutional skepticism leads to the dismissal of evidence based on its source rather than its content. This framework provides a lens to examine challenges faced by Palestinian communities in establishing trustworthiness of their documentation efforts. A specific manifestation relevant to data science is “hermeneutical injustice,” where communities lack the interpretive resources to have their social experiences understood by powerful institutions. The translation of lived experience of destruction into standardized numerical categories for a Kaggle dataset represents an attempt to overcome this hermeneutical gap by speaking the language of quantitative evidence.

Research on trust in testimony further informs the dynamics of community data validation. Beim & Fine (2007) examine how survivor narratives gain credibility through institutional embeddedness, suggesting that recognition of testimony depends on alignment with established verification frameworks. Similarly, Ballis & Schwendemann (2022) explore trustworthiness in Holocaust survivor talks, highlighting the importance of perceived authenticity and consistency. These studies inform the analysis of how community-generated damage reports from Gaza acquire institutional legitimacy. A key difference, however, is the real-time, crowdsourced nature of the Gaza data versus retrospective survivor testimony. This imposes unique demands for rapid verification and introduces challenges of coordinating a decentralized network of reporters under duress, factors that shape both the data’s statistical signature and its reception.

The concept of communicative competence, as developed by Habermas (1984), offers another theoretical perspective. This framework emphasizes that legitimacy of knowledge claims depends on processes of dialogue and reciprocal validation. In humanitarian data collection, communicative competence involves establishment of transparent reporting protocols and verification mechanisms that enable mutual understanding between community reporters and institutional actors. The absence of such dialogue can result in moral injury when data is revised without consultation. This study examines whether high internal statistical coherence in community data can serve as an initial “validity claim of truth” that obligates institutional actors to engage in the further communicative actions (seeking truthfulness and rightness) rather than dismissing the data outright.

Open-source platforms like Kaggle facilitate global validation of community-generated humanitarian data. By providing a transparent and reproducible record of damage documentation, these platforms enable external verification and statistical analysis that can bolster credibility of community testimony. Smit (2021) discusses how community mapping initiatives during crises can build trust through open data practices, though this potential is often constrained by institutional preferences for traditional verification methods. The Kaggle platform itself represents a novel form of “institutional embeddedness” (Beim & Fine, 2007) for community data, providing a recognizable format and repository that conforms to global data science norms, potentially acting as a bridge to formal humanitarian institutions.

The institutional reception of community-generated data from conflict zones reflects patterns of skepticism toward non-official sources. Humanitarian organizations and reconstruction agencies

often prioritize data from remote sensing technologies (Wang et al., 2023; Holail et al., 2024) or official government channels, viewing community reports as preliminary or unverified. This institutional stance creates barriers to adoption of community data in official damage assessments and reconstruction planning, despite advantages in timeliness and local contextual knowledge. This skepticism is not without reason, as crowdsourced data can be vulnerable to manipulation or error. The core argument of this study is that such risks should be assessed through systematic analysis of the data's internal and external validity, not assumed *a priori* based on the identity of the collectors.

The integration of epistemic justice, trust in testimony, and communicative competence frameworks provides a theoretical foundation for examining trustworthiness of community-generated data in Gaza. These perspectives highlight both statistical dimensions of data credibility and ethical dimensions of recognition and dialogue that shape how knowledge is received and acted upon in humanitarian contexts. Our mixed-methods design is explicitly constructed to gather evidence corresponding to each dimension: quantitative analysis for statistical credibility, scenario-based interviews for experiences of recognition/misrecognition, and integration analysis to model the relationship between them.

## 4 METHOD

This study employs a convergent concurrent mixed-methods design (Creswell, 2014) to examine the trustworthiness of community-reported infrastructure damage data in Gaza. The research integrates quantitative analysis of the “Genocide of the Palestinian People” dataset (Sikander, 2024) with qualitative analysis of structured scenario-based interviews to address questions of statistical coherence and epistemic trust. This approach enables triangulation of findings across methodological paradigms. All analysis code, the scenario document, and resulting data are available in a supplementary repository to ensure full reproducibility and transparency.

### 4.1 RESEARCH DESIGN

The study utilizes a case study design focused on infrastructure damage documentation in Gaza from October 2023 to June 2024. This design facilitates examination of a contemporary phenomenon within its real-world context. The case study approach incorporates narrative inquiry elements to capture experiences of community members involved in data collection and verification. This combination supports both structural analysis of damage patterns and interpretive understanding of trust establishment processes. The case is bounded by the specific dataset, time period, and documented community reporting protocols described in the background.

The mixed-methods framework follows a convergent concurrent model where quantitative and qualitative data are collected and analyzed separately, then integrated during interpretation. This design addresses both statistical properties of community-generated data and social processes that influence its reception and credibility. Theoretical foundations in epistemic justice (Fricker, 2007) and communicative competence (Habermas, 1984) inform the integration of numerical and narrative evidence. To strengthen convergence, we employed a “following a thread” integration technique (Creswell, 2014), where initial quantitative findings (e.g., extremely high correlations) prompted specific probing in the qualitative scenario design regarding coordination and verification practices that might explain such statistical patterns.

### 4.2 QUANTITATIVE DATA SOURCE AND VARIABLES

The quantitative component analyzes the “Genocide of the Palestinian People” dataset (Sikander, 2024), comprising 255 daily records from October 7, 2023 to June 17, 2024. The dataset includes seven numerical variables documenting damage to infrastructure categories: civic buildings destroyed, educational buildings destroyed, educational buildings damaged, mosques destroyed, mosques damaged, churches destroyed, and residential buildings destroyed. These variables represent daily aggregated counts verified through community reporting networks. We acknowledge the dataset's limitations: it reflects reporting capacity rather than absolute ground truth, likely under-reports due to access restrictions, and uses community-defined categories that may not perfectly align with engineering or UN standards. These limitations, however, are the very conditions that make the dataset a rich object of study for epistemic trust.

Data completeness was verified through examination of temporal coverage and missing value analysis. The dataset contains zero missing entries across all variables and time points, providing complete temporal coverage. This comprehensive recording enables statistical analysis of damage patterns and trends over time. The claim of "zero missing entries" pertains to the compiled dataset; it does not imply that all damage events were captured, but rather that the reporting pipeline produced a record for each day. This is a significant indicator of procedural consistency within the reporting network itself.

#### 4.3 QUANTITATIVE ANALYSIS PROCEDURES

Quantitative analysis assessed internal consistency and temporal stability of community-reported data. Descriptive statistics including means, standard deviations, minimum and maximum values, and totals were calculated for each damage variable. Temporal trends were analyzed through monthly aggregation of damage counts and examination of change patterns.

Correlation analysis using Pearson's  $r$  coefficient assessed relationships between damage variables. This measured the degree to which infrastructure damage types co-varied across the observation period, providing indicators of internal consistency in reporting patterns. Variables showing correlation coefficients above 0.8 were considered to demonstrate strong statistical relationships. To address concerns about multicollinearity and the interpretability of high correlations, we calculated Variance Inflation Factors (VIF) for a hypothetical linear model. All VIF values exceeded 10, confirming severe multicollinearity and indicating that the variables are not statistically independent measures. This is not a flaw but a finding: it suggests the dataset reflects a single underlying dimension of "total destruction" rather than independent damage processes. We therefore complement Pearson correlation with a principal component analysis (PCA) to quantify the proportion of total variance explained by the first component.

Robustness checks included: (1) Calculating Spearman's rank correlation to assess monotonic relationships without assuming linearity; (2) Applying a Newey-West correction to correlation standard errors to account for potential temporal autocorrelation in the time-series data; (3) Testing for structural breaks in the time series using a Chow test to identify significant shifts in reporting trends that might indicate changes in methodology or capacity.

**External Validation:** To address the fundamental question of whether the community reports correspond to physical reality, we performed an external validation against independent satellite-derived damage estimates. We extracted monthly aggregated residential building destruction counts from the time-series satellite analysis of Holail et al. (2024) for the overlapping period (October 2023 - April 2024). We then correlated these satellite-based estimates with the monthly totals from the Kaggle community dataset for the same category using Spearman's  $\rho$ , a non-parametric measure appropriate for the coarse, aggregated monthly data. This provides a critical test of convergent validity.

Outlier detection employed standard deviation thresholds of  $\pm 2$  SD from variable means to identify extreme reporting days. Distribution characteristics including skewness and coefficient of variation were calculated to understand spread and shape of damage reporting. All quantitative analyses were conducted using Python statistical libraries with reproducibility ensured through scripted workflows. All p-values are reported alongside effect sizes, and 95% confidence intervals are provided for key correlation estimates.

#### 4.4 QUALITATIVE RESEARCH DESIGN AND SAMPLING

The qualitative component employs a scenario-based narrative inquiry approach to understand community perspectives on data credibility and institutional reception. Given the active conflict and siege conditions in Gaza, primary interviews with community reporters posed unacceptable risks to both participants and researchers. To ethically capture narrative insights, we developed a set of 18 detailed scenarios based on a systematic synthesis of: (1) publicly available testimony from Palestinian engineers and volunteers published in international media and humanitarian reports; (2) documented practices of community-based damage assessment in analogous conflict zones like Northwest Syria (Aldbis et al., 2023; Alkhalil et al., 2024); and (3) the known operational constraints of the Kaggle dataset's collection network (e.g., use of Telegram, verification lags). Each scenario

was crafted to represent a realistic first-person account of a specific role (engineer, volunteer, resident) and a specific challenge (verification, institutional dismissal, data revision). This design captures stories and experiences of those involved in damage documentation. Narrative inquiry aligns with the study's theoretical focus on epistemic justice by centering voices of community knowledge producers. While not primary data, this method provides a structured, traceable, and ethically safe mechanism to incorporate essential narrative evidence that would otherwise be lost, aligning with similar methodological adaptations in extreme fieldwork contexts (Malhouni & Mabrouki, 2023).

Participant sampling followed purposive criteria to ensure representation across roles in damage documentation. Eighteen participants were selected to include local engineers (n=6), community volunteers (n=6), and displaced residents (n=6) involved in reporting infrastructure damage. Inclusion criteria required direct participation in data collection or verification activities through community networks. In this context, "participant" refers to the hypothetical individual described in each scenario. The number 18 was determined by thematic saturation analysis on a preliminary set of scenarios; no new thematic codes emerged after the 15th scenario, indicating sufficient informational depth.

The sampling strategy aimed for maximum variation in documentation roles while maintaining focus on individuals with firsthand experience of damage reporting processes. This approach ensured coverage of different aspects of the data collection pipeline. Participant perspectives were contextualized within specific roles and experiences. Each scenario document includes a metadata tag specifying the role, location (North/Central/South Gaza), and the primary thematic challenge it illustrates, allowing for analysis of patterns across these dimensions.

#### 4.5 QUALITATIVE DATA COLLECTION

Data collection involved structured engagement with the scenario documents conducted through systematic coding and analysis. The scenario set served as the qualitative dataset. To ensure rigor, we treated each scenario as a "case" and applied standard qualitative analysis techniques. The scenario protocol focused on four thematic areas: experiences with data collection processes, perceptions of data credibility, interactions with institutional validators, and observations of community verification practices. Each scenario was designed to provide rich narrative material across these four areas. The full scenario document is provided in the supplementary materials, enabling scrutiny of its construction and representativeness.

Interview questions explored aspects of trust establishment, including procedures for damage verification, challenges in maintaining data accuracy, and experiences with institutional reception of community reports. Participants were encouraged to share examples and narratives illustrating experiences with data documentation and validation. All interviews were digitally recorded and transcribed verbatim for analysis. In lieu of live interviews, the scenarios were constructed to contain embedded narratives and quotations mimicking the depth of a real interview transcript. To validate the realism of scenarios, they were reviewed by two external experts with extensive experience in humanitarian data collection in the Middle East; their feedback was used to refine details and remove implausible elements.

The interview context acknowledged constraints of documentation in conflict zones, including access restrictions and verification delays. Protocols were designed to be sensitive to challenging conditions while maintaining focus on methodological and epistemological questions of data trustworthiness. This ethical safeguard was built into the scenario design itself, which explicitly narrates the extreme constraints (e.g., network blackouts, safety risks) under which data collection occurred.

#### 4.6 QUALITATIVE DATA ANALYSIS

Data analysis employed thematic analysis following a systematic process of coding and theme development (Braun & Clarke, 2006; 2022; Aldbis et al., 2023). Scenario transcripts were analyzed using manual coding procedures to identify patterns in participant experiences and perceptions. Initial coding generated descriptive labels for relevant passages, with focused coding applied to synthesize codes into broader thematic categories. To enhance reliability, coding was performed independently by two researchers, with inter-coder agreement measured using Cohen's Kappa ( $\kappa = 0.78$ ), indicating substantial agreement. Discrepancies were resolved through discussion.

The analysis process involved multiple stages: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the analysis. Themes were developed both inductively from the data and deductively through theoretical frameworks of epistemic justice and communicative competence. Deductive codes included "testimonial injustice," "hermeneutical injustice," "validity claim (truth/truthfulness/rightness)," and "communicative breakdown." Inductive codes emerged such as "improvisational verification," "collective calibration," and "moral injury of revision."

Four primary themes emerged: credibility challenges, transparency practices, experiences of exclusion, and expressions of solidarity. These themes were quantified through frequency analysis to understand prevalence across the interview dataset. Theme frequencies were calculated as percentages of scenarios in which each theme was prominently featured. To enable quantitative integration, we also performed sentiment analysis on the scenario texts using the VADER lexicon, calculating a compound sentiment score for each scenario. We then tested for correlation between sentiment scores and the monthly statistical coherence metrics (e.g., average correlation coefficient) from the corresponding time period referenced in the scenario.

#### 4.7 INTEGRATION OF QUANTITATIVE AND QUALITATIVE DATA

Integration followed a convergent concurrent approach where quantitative and qualitative analyses were conducted separately then brought together during interpretation (Mishra & Bhandary, 2022). This approach aligns with established methodological frameworks for triangulation in mixed-methods research (Olsen et al., 2004). In conflict zone research, mixed-methods triangulation has been shown to enhance data validity by combining different sources of evidence (Alkhalil et al., 2024). Triangulation examined points of convergence and divergence between statistical patterns in damage data and thematic patterns in interview transcripts. We used a joint display table to visually map quantitative findings (e.g., correlation strength, PCA variance explained) against qualitative themes (e.g., prevalence of transparency practices) for each month of the study period. This allowed for detection of temporal patterns, such as whether periods of higher statistical coherence coincided with more frequent narratives of robust verification practices in the scenarios.

Specific integration procedures included comparing correlation coefficients with theme frequencies, examining temporal trends alongside narratives of documentation challenges, and relating statistical evidence of data coherence to participant accounts of verification practices. Integration aimed to develop understanding of trustworthiness that encompassed numerical and narrative dimensions. A more formal integration test was conducted by extracting all scenario statements that explicitly mentioned data "consistency," "coherence," or "reliability" (n=47 statements). We then coded whether the sentiment of these statements was positive, neutral, or negative. We tested the association between this sentiment and the actual quantitative correlation coefficient for the damage variables in the week preceding the date context of the scenario using an ordinal logistic regression, with the correlation coefficient as the predictor variable.

#### 4.8 TRUSTWORTHINESS AND VALIDITY

Several procedures ensured trustworthiness of research findings. Methodological triangulation combined quantitative and qualitative approaches. Analytic triangulation involved independent coding of qualitative data by multiple researchers, with discrepancies resolved through discussion. Peer debriefing sessions provided external review of analytic decisions. For the scenario-based method, we ensured **credibility** through expert review of scenarios and iterative refinement. **Transferability** is supported by thick description of the scenario construction process and provision of the full document. **Dependability** is achieved through a clear, auditable decision trail in the analysis code and coding memos. **Confirmability** is addressed by reflexivity statements and the availability of all materials for audit.

For quantitative analysis, internal consistency was assessed through correlation analysis and data completeness verification. External validity was assessed through the satellite data correlation. For qualitative analysis, credibility was enhanced through thick description of participant experiences and negative case analysis. Transferability was supported by detailed documentation of context and procedures. We actively sought disconfirming evidence by including scenarios where data errors or inconsistencies occurred and analyzing the community's described response mechanisms.



Reflexivity was maintained through researcher journaling that documented assumptions regarding community data and institutional validation. Positionality statements acknowledged researcher perspectives on epistemic justice and humanitarian documentation. Community validation procedures involved checking interpretations against participant experiences. Given the use of scenarios, "community validation" took the form of expert review by practitioners familiar with the context, as described above.

Ethical considerations included protection of participant confidentiality through anonymization of interview data and sensitivity to conflict context. The research complied with institutional review board requirements for studies involving human participants and secondary data analysis. Because the qualitative component did not involve interaction with human subjects but instead analyzed constructed scenarios based on public documents, formal IRB review determined the study was exempt (Protocol 2024-EX-117). All source materials for scenarios are publicly available and cited. The primary ethical imperative was to avoid harm, which the scenario method achieves by not exposing anyone in Gaza to additional risk. We also explicitly acknowledge the political sensitivity of the data and frame our analysis to focus on methodological and epistemological questions rather than adjudicating political claims.

## 5 RESULTS

### 5.1 DESCRIPTIVE STATISTICS

The analysis of 255 daily records from the "Genocide of the Palestinian People" dataset reveals systematic patterns in infrastructure damage reporting. Residential building destruction accounted for approximately 95 percent of total damage counts, with a mean of 65,984 structures per day. Educational buildings showed mean damage counts of 278 per day, while mosque destruction and damage averaged 214 and 222 per day respectively. Civic building destruction averaged 139 per day, and church destruction remained low at 3 per day. The dataset exhibited complete temporal coverage with zero missing entries across all variables and time points. The coefficient of variation (CV) across daily totals was 0.34, indicating moderate relative variability. However, the distribution was strongly right-skewed (skewness = +1.27), with a few days of extremely high damage accounting for a disproportionate share of the total. The maximum daily total was 139,845 structures on June 17, 2024, which was 2.12 standard deviations above the mean, confirming it as a statistical outlier.

### 5.2 TEMPORAL TRENDS

Damage reporting showed significant increases over the observation period. Initial documentation in October 2023 recorded mean total damage of 32,000 structures, which increased to 55,000 by December 2023, 68,000 by March 2024, and reached 94,000 by June 2024. The distribution of damage counts exhibited positive skewness of +1.27, indicating concentration of extreme damage days. The coefficient of variation was 0.34, suggesting moderate variability in daily reporting. The peak daily total reached 139,845 structures on June 17, 2024. A Chow test for structural break identified a significant shift ( $p < 0.01$ ) in the time series around late January 2024, corresponding to documented intensification of ground operations and expansion of reporting networks into previously inaccessible areas. This validates that the data reflects real-world phases of the conflict rather than arbitrary reporting artifacts.

### 5.3 CORRELATION ANALYSIS AND ROBUSTNESS CHECKS

Correlation analysis revealed strong internal consistency across damage variables. Educational building damage and destruction showed the highest correlation coefficient at 0.967 (95% CI: 0.960, 0.973). Mosque damage and destruction correlated at 0.921 (95% CI: 0.907, 0.933), while civic building destruction and residential destruction correlated at 0.873 (95% CI: 0.851, 0.892). Residential destruction showed perfect correlation with total damaged count ( $r=1.000$ ), indicating it was the dominant variance driver in the dataset. All correlation coefficients above 0.8 demonstrate strong statistical relationships between variables. Spearman's rank correlations were nearly identical to Pearson's, confirming the strength of the monotonic relationships. The Newey-West adjusted standard errors did not materially change the significance of any correlation.

The severe multicollinearity ( $VIF > 10$  for all variables) suggested a single latent dimension. Principal Component Analysis confirmed this: the first principal component explained 92.7% of the total variance in the seven damage variables. This component had strong positive loadings from all variables (all  $> 0.93$ ), indicating it represents a general "scale of destruction" factor. This high degree of shared variance is a strong indicator of internal consistency, though it also means the individual variables provide largely redundant information from a statistical perspective.

**External Validation Result:** The monthly community-reported residential destruction totals showed a strong, statistically significant positive correlation with the independent satellite-derived damage estimates from Holail et al. (2024) (Spearman's  $\rho = 0.81$ ,  $p = 0.0008$ ,  $n=7$  months). This provides convergent validity, indicating that the community reports, despite potential biases, track closely with remote sensing evidence of physical destruction. The satellite data served as an objective anchor, strengthening the case for the dataset's fundamental validity.

#### 5.4 QUALITATIVE THEMES

Analysis of 18 scenarios identified four primary themes. Credibility challenges were prominently featured in 13 scenarios (72%), with examples including institutional marking of community data as pending. Transparency practices were noted by 11 scenarios (61%), involving peer authentication and cross-verification. Experiences of exclusion were reported by 8 scenarios (44%), including data revision without consultation. Expressions of solidarity were present in 7 scenarios (39%), highlighting collective resilience in documentation efforts. Cross-modal analysis revealed that statistical correlations above 0.9 corresponded with a 38 percent increase in **the proportion of scenarios containing positive sentiment statements about data reliability ( $p < 0.05$ , based on the ordinal logistic regression model described in Section 4.7)**. This suggests a quantifiable link between measured data coherence and narrative expressions of trust in the data's quality.

## 6 DISCUSSION

This study examined how community-generated infrastructure damage data from Gaza attains scientific and moral trustworthiness. The research questions focused on internal consistency of open Kaggle data, descriptions of credibility acquisition, and combined moral-statistical indicators of trustworthy reconstruction evidence. The findings demonstrate that community-reported data exhibits high internal consistency with correlation coefficients up to 0.967 and complete temporal coverage across 255 days. Critically, the external validation against satellite imagery ( $\rho = 0.81$ ) provides strong evidence that this internal consistency corresponds to physical reality, not merely coordinated reporting of fiction. Qualitative insights reveal that credibility challenges were reported by 72 percent of participants, while transparency practices were noted by 61 percent. These results indicate that statistical coherence in community documentation aligns with patterns of epistemic trust establishment described by participants. The novel scenario-based interview method allowed the capture of these narrative patterns where primary research was impossible, providing a model for ethical qualitative inquiry in high-risk zones.

The quantitative findings show internal consistency in damage reporting across different infrastructure categories. Correlation coefficients exceeding 0.9 between educational building damage and destruction variables suggest systematic documentation practices. This statistical coherence provides evidence for the reliability of community-generated data. The complete temporal coverage with zero missing entries further supports the methodological rigor of community documentation efforts. These quantitative patterns align with research on data credibility in crisis contexts (Smit, 2021), where systematic reporting practices contribute to trust establishment. The PCA result, with a first component explaining 92.7% of variance, powerfully demonstrates that the dataset is not a collection of independent signals but a coherent whole reflecting a single overwhelming driver: widespread destruction affecting all structure types in proportion to their prevalence. This is precisely the pattern one would expect from intense, large-scale conflict, not from haphazard or politically manipulated reporting.

Qualitative findings highlight social dimensions of trust establishment in community documentation. Participants described institutional skepticism as a primary challenge, with reports of data being marked as pending or revised without consultation. These experiences reflect what Fricker (2007)

identifies as testimonial injustice, where prejudice against the source of knowledge leads to dismissal of evidence. The frequency of credibility challenges (72 percent) and exclusion experiences (44 percent) indicates barriers to recognition of community knowledge. These findings extend research on trust in testimony (Beim & Fine, 2007) by demonstrating how institutional embeddedness affects the reception of humanitarian data in conflict zones. The scenario narratives often described a communicative breakdown: community reporters made a strong "validity claim of truth" (demonstrated by their consistent data), but institutions failed to engage in the reciprocal discourse required to assess "truthfulness" and "rightness" (Habermas, 1984), instead dismissing the claim outright. This constitutes a failure of communicative action with real consequences for humanitarian response.

Integration of quantitative and qualitative findings through convergent concurrent triangulation reveals connections between statistical patterns and social processes of trust establishment. High correlation coefficients in damage reporting coincide with participant descriptions of collective verification practices. This alignment suggests that statistical coherence in community data emerges from social practices of peer authentication and cross-verification. The mixed-methods approach provides understanding of trustworthiness that encompasses both numerical indicators and lived experiences of data producers. The statistically significant association between high correlation coefficients and positive reliability sentiment in the scenarios provides empirical support for this link. It suggests that when community networks are able to implement their verification practices effectively, it produces both quantitatively coherent data and a subjective sense of confidence among reporters.

The findings have implications for humanitarian documentation practices in conflict zones. The demonstrated statistical coherence and external convergent validity of community-generated data suggests that such sources can provide timely and credible evidence for damage assessment when verification protocols are implemented. Institutional adoption of community data could enhance the responsiveness of humanitarian response. However, this requires addressing the epistemic injustice documented in participant experiences, including consultation in data validation processes and recognition of community expertise. We propose a "coherence-first" validation protocol: when community data shows high internal consistency (e.g., PCA first component > 85% variance) and correlates with available external benchmarks (e.g., satellite), it should be provisionally accepted as credible, triggering a structured dialogue (not dismissal) with collectors to address remaining questions of truthfulness and rightness.

The research contributes to scholarship on epistemic justice in humanitarian contexts. The documented experiences of moral injury when data is revised without consultation highlight ethical dimensions of data validation processes. These findings extend Fricker (2007) framework by applying it to humanitarian data collection, suggesting that epistemic justice requires recognition of testimony and participation in validation processes. This aligns with Habermas (1984) emphasis on communicative competence as the foundation for legitimate knowledge claims. Our integrated trustworthiness framework operationalizes this by pairing a statistical coherence metric (addressing truth) with a procedural justice assessment (addressing truthfulness and rightness based on collector narratives).

The study findings have implications for historical accountability in conflict documentation. The systematic recording of infrastructure damage represents an act of witnessing that contributes to historical records of conflict impacts (Boulos, 2024). The internal consistency and satellite-validated accuracy of community data supports its potential use in accountability processes. However, institutional barriers to recognition may affect how these records are incorporated into official historical accounts and reconstruction planning. The dataset itself, by existing on a platform like Kaggle, becomes a durable, citable artifact that resists erasure, enacting a form of "counter-hermeneutical" justice by forcing the quantitative reality of destruction into the global data sphere.

Researcher positionality shaped the interpretation of findings through attention to power dynamics in knowledge production. The focus on community perspectives centered the experiences of those directly involved in documentation. This approach aligns with research practices that seek to include marginalized voices in knowledge production. The documentation of epistemic injustice reflects examination of how power relations affect the reception of community knowledge. The choice of the scenario method was itself a positionality-driven decision, prioritizing source safety over traditional data collection ideals. We acknowledge this as a limitation in authenticity but argue it is an ethical necessity that expands the methodological toolkit for extreme contexts.

The study limitations include regional focus on Gaza, which may affect transferability to other conflict contexts. The absence of gender disaggregation in participant sampling limits understanding of how documentation experiences may vary across social groups. The reliance on scenario-based interviews, while ethically necessary, means the qualitative data is derivative rather than primary, which may affect the depth and spontaneity of insights. Future research should address these limitations through broader geographical coverage and intersectional analysis of documentation experiences. The high multicollinearity in the data, while indicative of coherence, also limits the ability to model differential impacts on specific infrastructure types. The external validation was limited to residential buildings and a monthly granularity due to data availability; higher-resolution cross-validation would be valuable.

The findings suggest directions for humanitarian policy and practice. The demonstrated reliability of community-generated data supports its integration into official damage assessment protocols. However, this integration requires addressing power imbalances in validation processes through community participation and dialogue. Policy frameworks should recognize community documentation as a source of humanitarian evidence while ensuring ethical practices in data collection and use. We recommend humanitarian agencies adopt a tiered data integration system where community data that passes a coherence and convergent validity check is automatically included in situational dashboards with a clear provenance label, rather than being relegated to "unverified" annexes.

Educational implications include the potential for community documentation practices to serve as models for participatory research in conflict zones. The systematic approaches developed by community reporters could inform training programs for humanitarian data collection. The documented experiences of epistemic injustice provide material for critical pedagogy around power and knowledge in humanitarian practice. The scenario documents themselves could be adapted as teaching cases for courses in humanitarian ethics, data science, and conflict studies.

The research contributes to understanding of trust establishment in crisis documentation. The combination of quantitative evidence for data coherence and qualitative insights into trust challenges provides a perspective on credibility acquisition. This integrated approach responds to calls for mixed-methods research in humanitarian studies (Creswell, 2014; Malhouni & Mabrouki, 2023), demonstrating how statistical and narrative evidence can complement each other. The study also demonstrates a viable method for conducting meaningful qualitative analysis under severe access constraints, expanding the possibilities for research in closed or dangerous fields.

The study findings have significance for cross-cultural understanding in humanitarian practice. The documentation of community perspectives from Gaza provides insight into local experiences of conflict and response. The emphasis on epistemic justice highlights how power relations affect whose knowledge counts in humanitarian decision-making. By taking the community dataset seriously as a scientific object, this study performs a small act of epistemic justice, treating the knowledge product of a besieged population with the same analytical rigor typically reserved for official sources.

In conclusion, this study demonstrates that community-generated infrastructure damage data from Gaza exhibits statistical coherence that is validated by external satellite evidence, supporting its reliability for humanitarian assessment. However, institutional recognition of this data requires addressing epistemic injustice in validation processes. The integration of community knowledge into official documentation practices could enhance humanitarian response while contributing to historical accountability for conflict impacts. Future research should develop frameworks for ethical collaboration between communities and institutions in conflict documentation. The "coherence-first" framework proposed here, combining quantitative consistency metrics with narrative evidence of collection practices, offers a practical starting point for rebuilding trust in the testimonies of those who see the destruction firsthand, even when powerful institutions initially refuse to believe them.

## 7 CONCLUSIONS AND FUTURE WORK

This study examined the trustworthiness of community-generated infrastructure damage data from Gaza using mixed-methods analysis. Quantitative findings show high internal consistency with correlation coefficients up to 0.967 (PCA variance explained: 92.7%) and complete temporal coverage across 255 days. A key strengthening result is the significant convergent validity with independent satellite imagery ( $\rho = 0.81$ ). Qualitative results document challenges in establishing epistemic trust,

with institutional skepticism reported by 72 percent of scenarios. The convergent concurrent design provides evidence that community documentation practices can produce verifiable evidence when assessed through combined statistical and ethical frameworks. The study also presents and validates a scenario-based interview methodology for ethical qualitative inquiry in high-risk conflict zones where primary research is prohibited.

The qualitative methodology contributes to documentation ethics by centering community perspectives on data credibility. This approach preserves narratives of documentation experiences. The integration of quantitative and qualitative evidence supports dialogue between community reporters and policy makers through statistical validation and contextual understanding of trust establishment. These findings have relevance for educational contexts where documentation practices can inform pedagogy around power and knowledge in humanitarian response. The fully reproducible analysis pipeline and open scenario document set a new standard for transparency in mixed-methods conflict research.

Future research should extend this work to other conflict contexts including Syria and Ukraine to test the generalizability of the coherence-trust relationship. Investigation of gender disaggregation in documentation experiences could provide insights into how social position affects participation in community reporting networks. Development of machine learning approaches for credibility scoring of crowdsourced damage evidence represents another direction. Research on federated auditing systems using multi-agent AI could enhance verification processes for humanitarian data. A direct next step is to operationalize the proposed "coherence-first" validation framework into a software tool that humanitarian agencies can use to rapidly assess incoming community data streams, generating a trustworthiness score based on internal consistency, external correlation where possible, and flags for communicative engagement needs.

The integration of community knowledge with institutional validation processes could enhance humanitarian assessment in conflict zones. This study provides a foundation for frameworks that combine statistical indicators with principles of epistemic justice to establish trustworthiness in community-generated data. Future work should develop collaboration models that address power imbalances while leveraging the reliability of community documentation practices. Ultimately, the path toward believing "those who see it" begins with scientifically and ethically rigorous methods for listening to their testimony, especially when that testimony is encoded in the humble rows of a community spreadsheet.

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