

Genocide Mortality: Data Integrity in Palestinian Records and Comparative Empirical Patterns from Past Genocides

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Abstract

Genocides constitute some of the most extreme forms of human-caused mortality, deliberately targeting specific populations and producing profound demographic, social, and intergenerational consequences. Accurate and reliable mortality data are essential for documenting these atrocities, yet systematic statistical evaluations remain limited. This study examines the daily mortality records released by the Palestinian Ministry of Health during the ongoing violence in Gaza, assessing their internal consistency through statistical distribution tests, regressions across demographic groups, correlations between age and identification numbers, and analyses of temporal patterns. Preliminary results indicate that the mortality records reflect patterns consistent with genuine conflict-related deaths, supporting their reliability. In addition, the extended abstract outlines plans for a comparative analysis with past genocides, including Bosnia and Rwanda, to identify demographic signatures of genocidal violence. By providing rigorous statistical methods for evaluating mortality data, this research contributes to the empirical understanding of ongoing mass atrocities and establishes a framework for the rigorous and timely monitoring of genocidal violence.

Keywords: mortality; genocide; Gaza; critical demography

JEL Codes: D78; J15; N45

Disclaimer: Data for this study are publicly available from the following sources: Palestinian MoH, and Tech for Palestine. The author had full access to all the data. There was no funding source for this study. I declare no competing interests.

Introduction

Genocides constitute one of the most severe forms of mortality shock, producing profound and enduring demographic, social, and psychological disruptions that extend across generations. Their destructive impact stems from their deliberate design to annihilate, in whole or in part, a national, ethnic, racial, or religious group (United Nations 1948). The deliberate and organized nature of such acts distinguishes genocides from other forms of mass violence, underscoring their objective of eliminating the biological and cultural foundations of targeted populations. Consequently, genocides constitute not merely episodes of extreme violence, but transformative demographic catastrophes whose effects persist through disrupted kinship lines, population displacement, and the intergenerational transmission of trauma.

Demographers and population studies scholars have extensively examined genocides to assess their long-term effects on fertility (Kraehnert et al. 2019), nuptiality (Jayaraman, Gebreselassie, and Chandrasekhar 2008; Staveteig 2011), selective mortality and related differentials (de Walque 2005), health outcomes such as HIV prevalence (Schmeer, Echave, and Nzitaira 2023), and patterns of forced and voluntary migration (Verwimp, Osti, and Østby 2020), among other demographic and social processes. Another strand of demographic research has focused on estimating genocidal death tolls and their demographic composition through the documentation, collection, reconstruction, and analysis of post-genocide census, survey, and vital registration data (Ball, Tabeau, and Verwimp 2007; de Walque and Verwimp 2010; Heuveline 2015). Although many of these studies include ancillary assessments of data quality to evaluate the completeness of reported deaths, there remains a lack of systematic research providing a coherent statistical framework for assessing the internal consistency and potential manipulation of genocide-related mortality data, as well as for enabling comparative analysis of demographic patterns across different genocides.

To address this gap, this study analyzes the mortality data released during the ongoing genocide in Gaza and compares it with mortality data from the Bosnian (Ball, Tabeau, and Verwimp 2007) and Rwandan genocides, which, although not contemporary, provide relatively complete and well-documented demographic records. The ongoing genocide in Gaza, however, presents a markedly different context of mortality reporting. Since the onset of the Israeli atrocities, the Palestinian Ministry of Health (MoH) has released mortality data on a daily basis, with an exceptional level of detail that includes individual names, surnames, age, sex, and identification numbers. In the cases of Bosnia and Rwanda, comparable demographic documentation was compiled only after the end of hostilities, through years of reconstruction and verification work involving multiple national and international institutions.

Yet, despite the systematic and detailed nature of these releases, the credibility of the Palestinian data has been repeatedly called into question. Notwithstanding the complete lack of any statistical or factual evidence attesting to data manipulation in the casualty figures provided by Palestinian authorities (Farge 2024), the debate on this data's integrity remains far from

settled. In fact, the prevailing narrative in the West continues to explicitly or implicitly align with the reductionist perspective promoted by Israeli authorities, often characterizing the information as mere "fake data from a terrorist organization" (AlShebli, Casara, and Maass 2025; Time 2023; BBC News 2024; Barron's 2023).

Recently, a substantial number of scholars, mostly from the medical and epidemiological fields, have published research aiming at estimating the true death toll in Gaza (Jamaluddine et al. 2025; Khatib, McKee, and Yusuf 2024; Jamaluddine, Checchi, and Campbell 2023). Most notably, Jamaluddine et al. (2025) reported that the true death toll in Gaza as of June 30, 2024, likely exceeded 70,000. Their study utilized capture–recapture analysis (cf. Ball and Price 2018) and relied on mortality data from official hospital records, a MoH survey, and social media obituaries. However, data manipulation could significantly distort such analyses. For instance, manipulation affecting only a single list reduces the proportion of overlaps, potentially inflating the estimated death toll. Conversely, consistent manipulation across multiple lists increases overlaps, leading to underreporting of actual fatalities.

Although no statistical or factual evidence currently substantiates claims of manipulation in the casualty data reported by Palestinian authorities, debates concerning their reliability persist. To date, however, no systematic statistical inquiry has been undertaken to evaluate the internal consistency of these records, nor have comparative demographic analyses been conducted across recognized genocides. The first part of this study, therefore, applies rigorous statistical techniques to assess the internal coherence of the mortality data released by the Palestinian MoH and to detect any regularities that might indicate deliberate alteration. The second part adopts a comparative demographic perspective, drawing upon mortality data from the Bosnian and Rwandan genocides, as well as from major non-genocidal conflicts (even if mass atrocities and war crimes were committed), to determine whether distinctive demographic configurations characterize genocidal violence as opposed to other forms of mass mortality (see the final section of this extended abstract for further details).

Data and Methods

My analysis on potential data tampering leverages the expanded sample size made available through the most recent data releases.¹ This publicly available data is a decoupled aggregate version of the lists employed by Jamaluddine et al. (2025). They have been produced by the Palestinian MoH and reorganized in tabular format (at both the daily and individual levels) by the Tech for Palestine group (Tech for Palestine 2024). The database of daily counts covers the period 7 Oct 2023 – 13 Nov 2024, and it includes information on 39,157 Palestinians killed by the Israeli army, for which daily detailed reports have been released (providing ID number, name, surname, age, and sex), out of a total of 43,712 cumulatively reported. Because the analyses on the demographic comparative study of genocidal violence vs. other forms of

¹ The preliminary results presented here cover fatalities reported up to 13 November 2024; the final version of the study will incorporate the most recent data available.

human-caused mass mortality are still undergoing, I detail the corresponding data and methods employed in the last section of this long abstract.

To assess potential manipulation in mortality records, I employ a range of statistical tools and methods designed to ensure transparency, reproducibility, and interpretability. These include tests of the statistical distribution of reported deaths; bivariate OLS regressions examining associations between male, female, and child casualties; correlations between age and identification number to assess consistency with the sequential numbering system used by Palestinian authorities; time-series analyses of birth dates as reported in ID records; and randomness tests of peak and zero-mortality days for women and children (runs test; Corder and Foreman 2014).

However, prior to engaging in statistical testing, it is essential to establish realistic expectations on what the Palestinian mortality data releases can and cannot reveal. Crucially, the inherent challenges of maintaining accurate mortality records in the context of contemporary Gaza must be acknowledged. The reported counts are inevitably incomplete and may contain inconsistencies; this is also true for past genocides, where a complete account of genocidal mortality has not been yet achieved. Frequent disruptions to communication infrastructure, coupled with sieges on entire cities or governorates, significantly hinder the production of timely, accurate, and comprehensive records. Furthermore, most mortality records are released only after verification of key demographic details, such as name, surname, national identification number, age, and sex, resulting in potential delays between the actual date of death and its formal registration. Conversely, highly consistent data releases could raise concerns about potential data manipulation. However, despite accurately estimating the actual death toll remaining challenging, meaningful statistical analyses can confidently reveal any attempt at data tampering.

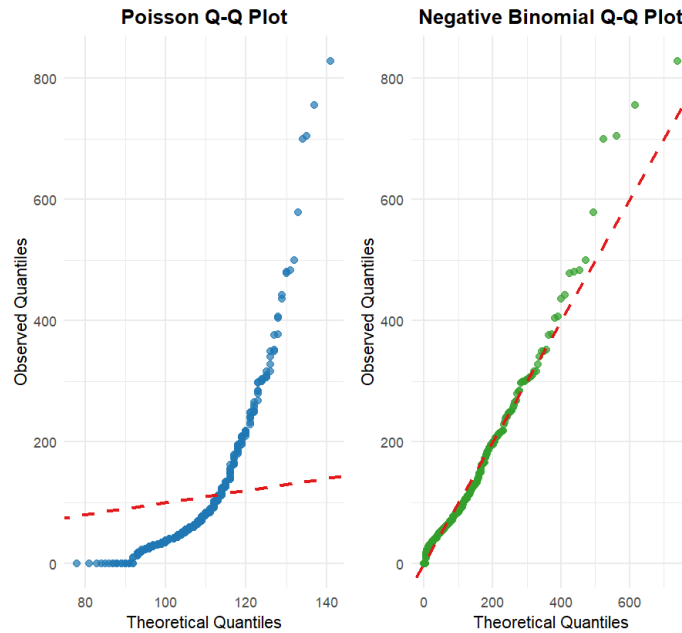
Preliminary Results

The statistical processes underlying the distribution of mortality events during wars or pandemics fundamentally differ from those associated with natural mortality. While the latter often follow a Poisson distribution, the former frequently demonstrate significant overdispersion (where variance exceeds the mean), which better fits a negative binomial distribution. This overdispersion arises due to the temporal and spatial clustering of killings, typically driven by massacres and other catastrophic events. Testing the Gaza mortality data against these two theoretical distributions serves as a meaningful exercise to verify its reliability. In fact, because the MoH releases its reports daily, consistently controlling the two key parameters of the statistical distribution (mean and dispersion) with the aim of manipulating the data is highly challenging.

As illustrated by the Q-Q plots reported in Figure 1, the data characteristics align more closely with the underlying statistical process of war mortality, modeled by a negative binomial

distribution. The data also exhibits natural deviations from the theoretical distribution, consistent with patterns expected in real-world datasets. A likelihood ratio test ($p=0.000$; H_0 : Poisson provides a better fit) and an AIC comparison further confirm the superior fit of the negative binomial model. In fact, the latter model yields an AIC value approximately ten times lower than its Poisson counterpart (4,600 vs. 40,380).

Figure 1 - Distributional fit of fatality counts

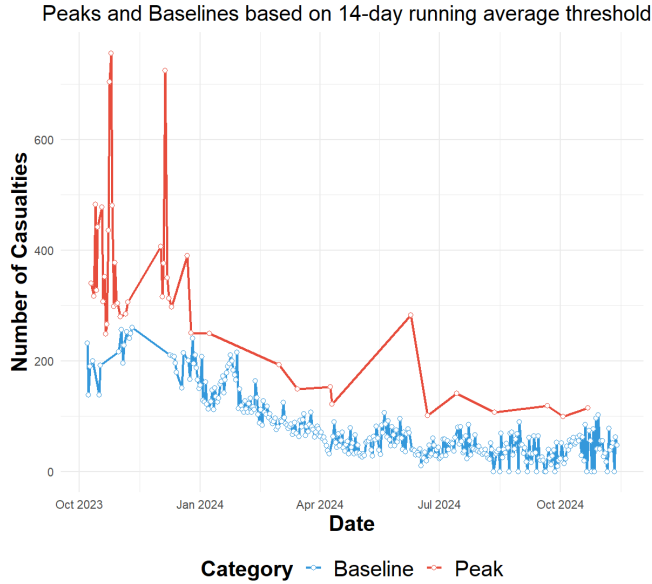


Notes: Author’s computations using Palestinian MoH daily mortality data releases.

Even if the statistical parameters of the mortality distribution were manipulated, doing so necessitates the inclusion of non-randomly occurring fabricated daily counts (e.g., exceptionally high or low counts). In this regard, I test the randomness of high death toll occurrences by classifying the 397 days between Oct 7, 2023, and Nov 13, 2024, for which daily reports were released (in seven days the MoH did not submit any report), as either baseline or peak days. Peak days are defined using a dynamic threshold calculated as the two-week rolling average death toll plus half of its standard deviation. A runs test (Corder and Foreman 2014) was then conducted on the mortality time series, which comprised 355 baseline days and 42 peak days (see Figure 2). The result of the test confirms that peak days occur randomly ($p=0.111$; H_0 : the sequence of events is random). The same analysis was performed for the number of days in which no children or women were reported killed.

For the days with zero counts of children or women killed, the runs tests similarly provided no evidence of data manipulation ($p=0.226$ and $p=0.854$, respectively). These results are particularly significant, as mortality statistics on these groups are often heavily disputed, given their role as the most reliable proxy for estimating the civilian death toll in the ongoing International Court of Justice (ICJ) genocide case against Israel.

Figure 2 - Time series of reported fatalities



Notes: Author’s computations using Palestinian MoH daily mortality data releases.

Table 1 - Bivariate OLS estimates of fatalities across demographic groups

	<i>Dependent variable:</i>		
	Children killed	Women killed	
	(1)	(2)	(3)
Women killed	1.109*** (0.041)		
Men killed		0.080 (0.070)	0.122 (0.087)
N	376	309	309
R ²	0.658	0.004	0.0006
F (p-value)	0.000	0.255	0.166

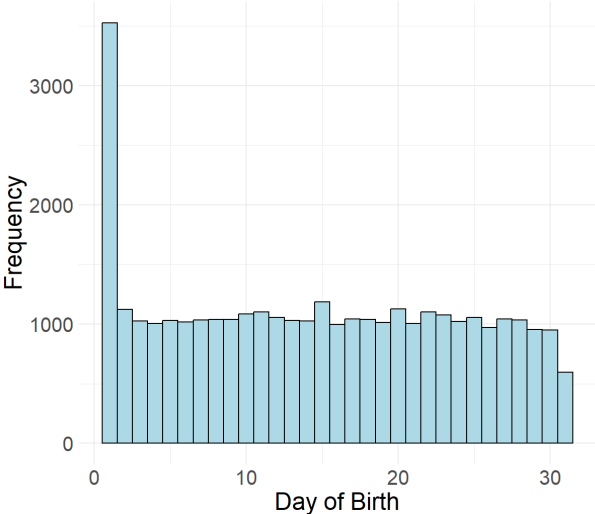
Notes: Standard errors in parentheses. Number of males killed computed as total killed minus children and females killed. Each sample excludes days for which statistics by demographic group were missing or with overall inconsistent counts. *** p<0.01, ** p<0.05, * p<0.10.

The daily-level data also yield meaningful insights into the relationship between the killings of different demographic groups. For instance, as shown in Table 1, each additional woman killed on a given day is associated with 1.1 child victims (column 1). However, no statistically significant association is observed between the number of men killed and the number of children or women killed (columns 2 and 3). These patterns align with the hypothesis of

Israeli attacks targeting specific demographic groups, a matter currently under deliberation at the ICJ.

The individual-level data, last updated on September 15, 2024, and comprising information on 34,344 Palestinian victims, including demographic details and national identification numbers, provides further evidence supporting data integrity. This is demonstrated by the strong correlation between national identification numbers and age (Pearson correlation coefficient= 0.795, p=0.000), attributable to the sequential numbering system implemented by the Palestinian authorities.(Jamaluddine, Checchi, and Campbell 2023) Additionally, the distribution of killed Palestinians’ birth dates within a month exhibits a quasi-uniform pattern, with a notable peak on the first day of the month, likely reflecting genuine imputation instances where the precise date of birth is unknown. As expected, there is also a natural decline in frequency for the 31st of the month.

Figure 3 - Distribution of victims’ day of birth



Notes: Author’s computations using Palestinian MoH daily mortality data releases.

Preliminary Conclusions

Overall, this analysis supports the validity of Palestinian MoH mortality, incorporating up-to-date information and performing a set of easy-to-interpret statistical tests aimed at detecting potential data manipulation. However, despite the overwhelming lack of evidence of such manipulation (Farge 2024), a relevant share of Western media and political leadership question or even dismiss the catastrophic figures reported by the Palestinian MoH as inaccurate or fabricated (Time 2023; Barron’s 2023; AlShebli, Casara, and Maass 2025). This persistent

distrust reflects a deep-seated bias that privileges Western-produced knowledge while disregarding evidence that challenges entrenched narratives or geopolitical interests. As Frantz Fanon highlighted in his analyses, such biases are not merely epistemic but are intrinsically linked to structures of power and domination. They contribute to the perpetuation of inequalities in the acknowledgment and recognition of human suffering (Fanon 1963). Ultimately, failing to regard Palestinian suffering on par with that of any other human being reflects an unwillingness to stand against injustice.

Further Developments

The final version of this study will incorporate the most recent Palestinian mortality records to conduct a comprehensive assessment of potential data tampering. It will also examine the surname frequency distribution of the victims relative to the pre-genocide population, providing an additional lens for evaluating data completeness and representativeness. The second part of the study will focus on a comparative demographic analysis of genocidal versus non-genocidal mass violence. This analysis will draw upon mortality data from the Bosnian genocide (The Bosnian Book of the Dead; Research and Documentation Centre and Humanitarian Law Center of Serbia 2007), the Rwandan genocide (Genocide Archive of Rwanda: Victims' Database; Kigali Genocide Memorial and National Commission for the Fight against Genocide of Rwanda 2019), and other large-scale conflicts not classified as genocides, including Afghanistan (UNAMA Civilian Casualty Reports; United Nations Assistance Mission in Afghanistan 2024), and Iraq (Iraq Body Count Project 2024).

Although genocidal intent cannot be inferred solely from data analysis, demographic investigation of mortality in mass atrocities yields robust, falsifiable measurements of scale, timing, and demographic selectivity. These measurements do more than document loss: they supply key evidentiary foundations for criminal investigations and prosecutions, help expose networks of complicity, and strengthen prevention by informing timely interventions and international responses.

By their nature, genocidal campaigns target specific age and sex groups, so one should not expect uniform demographic patterns across genocides (Kugler 2016). The key analytic strategy is therefore not to identify common indicators across genocides, but to assess the extent to which demographic indicators in genocides deviate from the patterns observed in non-genocidal conflicts. Age distributions, sex ratios, and temporal concentrations of fatalities in genocides often diverge systematically from those observed in conflicts primarily driven by military objectives, reflecting patterns consistent with the intent to annihilate a population, even though mass atrocities and war crimes may also occur in the latter. The study will quantify these deviations by computing and statistically analyzing a series of demographic indicators, including population-adjusted and age-standardized mortality sex ratios, temporal distributions of peak mortality, and other relevant measures. By situating each conflict's demographic profile relative

to non-genocidal violence, this approach seeks to detect statistical signatures of genocidal intent, offering a robust framework for distinguishing genocidal violence from other forms of mass killing and advancing the empirical study of mass atrocities.

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