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Numbers that count: public accountability during crises

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Abstract

Purpose – The purpose of this paper is to show how, in the public sphere, counts and accounts create meaning and legitimate decision-making and action as well as providing the basis for public accountability. Public accountability is generally viewed as an administrative and stable relationship between the state and its citizens. However, during a crisis or disaster responsibility for what and/or who counts reveals the dynamic nature of public accountability.

Design/methodology/approach – To understand how counts and accounts are mobilised as a mechanism of public accountability during and after a crisis, they adopt an ethnostatistical approach. The authors' use the death counts associated with the COVID-19 crisis as an illustrative case study to trace how the initial practice of simple quantification can be transformed into a novel metric through a process of remediation and recounting numbers that already exist.

Findings – Crises and disasters provide a unique context to study public accountability since the normal "rules of the game" and standard practices are subsumed by exigent circumstances. The COVID-19 crisis demonstrates that holding the state accountable for a crisis through death counts is not as straightforward as numerical representation implies. The classification schema, anomalies and misdiagnoses, incomplete and inaccurate data and lack of transparency or national reporting infrastructure all impacted on the reliability and comparability of COVID-19 death counts across jurisdictions and over time. While statistical modelling overcame some of the limitations of simple counts of COVID-19 deaths in the initial stages of the COVID-19 crisis, the adoption of a proxy measure, "excess deaths" with its rhetorical appeal enabled a shift in the focus of public accountability. The sensemaking associated with the term excess deaths normalised COVID-19 and served to dehumanise its long-term effects.

Originality/value – The COVID-19 crisis provides a unique case study to assess and adjudicate public accountability in times of a crisis and its aftermath. State actors are held accountable for a myriad of decisions and actions and often lean on statistics as a mechanism to deliver public accountability. Adopting an ethnostatistical approach to analyse the process of creating bespoke COVID-19 counts, accounts and recounts provides valuable insights into the social, political and institutional dimensions of "doing" statistics. They contribute to the public accountability literature by highlighting the dynamic nature of public accountability during a crisis or disaster. They also show how different statistics deliver accountability as a tool of bureaucratic administration, provide a basis for reflection and signal an end to the disaster or crisis.

Keywords Death statistics, Ethnostatistics, Public accountability, Excess deaths, COVID-19

Paper type Research paper

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Introduction

Counting is a ubiquitous practice that, in turn, produces "numbers that count" in all spheres of life (Wernimont, 2018, p. 1). When a crisis or disaster occurs and humans struggle to deal with the aesthetic reality of the unimaginable, they turn to the comfort residing in the rationality of numbers and statistical information to understand, make sense and bring order to an unruly world (Kant, in Wernimont, 2018). However, crises and disasters manifest in different ways and counting their impact depends on the nature of the event and the type of decisions required in real-time during the event and in its aftermath. Since the impact of a crisis or disaster changes over time, the practice of counting evolves to meet the changing information needs of policymakers and the public. In cases of novel events, new or rehabilitated "metrics" may be required to enable standardisation, visibility and the means to enact bureaucratic control and adjust intervention strategies (Sargiacomo *et al.*, 2024). In this paper we trace the shift in public accountability in accounting for deaths attributed to the SARS COV-2 [1] (hereafter COVID- 19) crisis as it transitioned from a critical disruption to life to a state of normalisation and community acceptance:

> [D]ead bodies are completely normal – until suddenly they're not. Until a novel virus sweeps the globe and produces a dead body count with life altering repercussions (Troyer, 2020, n.p.).

Public accountability describes the relationship between the governing powers of the state and the needs and interests of its public. While public accountability is understood and delivered according to the dynamics of the socio-political environment and extant systems of cultural communication, it is generally a relationship with normalised expectations (Shenkin and Coulson, 2006). In western-style states public accountability is exercised administratively through the provision of information by governments, which allows the possibility to evaluate and subsequently debate or question decisions or actions in a relatively stable context (Stewart, 1984). In abnormal circumstances, however, a lack of predetermined standards for evaluating a crisis or disaster situation involves the provision of new forms or types of information to secure public accountability. In this dynamic setting, the established calculative practices and existing metrics that allow bureaucratic control at a distance are often reconfigured in the form of a novel or bespoke public account Ferry *et al.* (2025). During the COVID-19 crisis, the introduction of the daily communication of the number of COVID-19 infections and deaths became an act of democratic importance (Ferry *et al.*, 2024). In communicating the state's responsibility to citizens through these novel or rehabilitated metrics, governing bodies could respond to the changed information needs of the public, resulting in a more dynamic understanding of public accountability Columbano *et al.* (2025).

The illustrative case study, the COVID-19 crisis, has been characterised as a health crisis, a slow-moving novel disaster Sargiacomo *et al.* (2024), a creeping, slow-burning crisis Ferry *et al.*, (2025), a contributor to the global polycrisis Columbano *et al.*, (2025), a grand challenge (Lai *et al.*, 2025) and as creating an uncertain and precarious socio-political context (Yu, 2021). In this paper we consider COVID-19 to be an event that evolved from an initial global health crisis to a more governable epidemiological fact of life (and death). Since COVID-19 presented a serious disruption that profoundly challenged the normal functioning of society globally, the visibility afforded through death "counts" was a key aspect of mediating the dynamic relationship between the public and policymakers responsible for decision-making and delivering resources in a constrained environment to exercise bureaucratic control. While initially used to assert and communicate management and control of the crisis, death counts quickly became emblematic as the "count" for which the public could hold state decision-makers accountable.

While a proliferation of health-related information at organisational, local and national levels was used to measure the impact of COVID-19 at the crisis stage, in this paper we adopt ethnostatistics (Gephart, 2017) to understand the changing nature of the production of COVID-19 death counts. These counts and statistics were produced in real-time at the height of the pandemic and to provide retrospective accounts that were part of the performance of public accountability.

In 2019, just prior to the pandemic, approximately 57 million human deaths were recorded globally (Troyer, 2020). However, when COVID-19 became a stark reality, the public were confronted with information about inadequate health systems, lockdown mandates and vaccination programmes, reinforced by alarming images of mass graves and overcrowded intensive care units combined with scathing reports of government failures (see for example, Lee and Finnegan, 2020; Troyer, 2020). Official communication of quotidian and compelling real-time raw counts of COVID-19 deaths in the public domain differed from our lived experience and our expectations of accountable governments and their agencies (Trabsky, 2022a). As the crisis progressed, states and institutions remediated death counts to calculate "excess deaths" as a more meaningful account of the impact of COVID-19.

Excess deaths or excess mortality is a measure of the difference between all-cause reported deaths and an estimate of expected or normal deaths in a given period. To mitigate the under-reporting of COVID-19 deaths, excess deaths were promoted as a superior account of COVID-19 deaths, as it recognises the underlying characteristics of a given population; such as the quality of health care, geographical differences and the prevalence of certain diseases (CDC, 2020). This rehabilitated metric eventually became the standardised measure of COVID-19 deaths and provided the means to evaluate state policy decisions and biopolitical controls and became the mechanism for states to deliver public accountability. In adopting an ethnostatistical approach, we expose the assumptions and subjectivities involved in the process of remediating counts and accounts, which rely on a numerical basis, to produce a recount which results in a "word-based quantitative expression", such as excess deaths (Gephart, 2017, p. 35). In doing so, it demonstrates how numbers and statistical logic have both political and persuasive power in terms of the transparency that is necessary for state legitimacy in a crisis or disaster event and *ex-post* public assessments of bureaucratic performance.

The paper begins with a background to accounting for death in times of crises or disasters, followed by a brief history of the development of global death registration practices and processes. We then provide a discussion of public accountability, highlighting its situational nature and the public disclosure that is required to promote state legitimacy and bureaucratic trust before outlining the ethnostatistical approach we adopt to analyse our data. We contribute to the literature in several ways. Firstly, we highlight the ways in which counts and accounts of death create meaning to legitimate state decision-making and action in times of crisis. Secondly, we demonstrate how practices, in this case, classification schemes, produce numbers that "count" in the public domain. Next, we show how counts in one domain are rehabilitated using measurement protocols to become "accounts" as the focus of public accountability during a crisis. Finally, we trace how these accounts are remediated to communicate a different post-crisis "story" using sophisticated modelling techniques. We also contribute to the deathcare literature by foregrounding the role played by standardised practices, methods and protocols in producing differing "accounts" of death. Adopting an ethnostatistical approach also helps us understand the way in which this *ex-post* accounts contribute to the process of normalising a crisis event, such as COVID-19 deaths. Since these different statistical representations of COVID-19 deaths demonstrate a dynamic shift in what states were accountable for, this paper differs from other disaster or crisis studies by taking a

longitudinal approach which allows for an exploration of the "totality" of a crisis Sargiacomo *et al.*, (2024, p. 412). In doing so, we demonstrate how the stable relationships and bureaucratic administration of public accountability are disrupted in a crisis through the use of novel metrics.

Background

Several studies have identified how accounting is integral to how a localised crisis, such as an earthquake or other natural disaster, is governed by states and how the public adjudicate and assess state performance (Lai *et al.*, 2014; Sargiacomo *et al.*, 2014). Studies of how numbers were used to describe and communicate the COVID-19 global crisis differ in their approach. Some focus on the adjudicating role played by numbers to allow particular attributes of COVID-19 to be classified, enumerated and compared over time (daily reports) or spatially (geographical regions) (Rinaldi, 2023; Sidaway *et al.*, 2023). Other studies highlight how numbers were used during the crisis to render COVID-19 governable through state initiatives such as lockdowns or biosecurity controls (Antonelli *et al.*, 2022); or to assess the socio-economic effects of government policy interventions (Ahrens and Ferry, 2021; Nikidehaghani and Cortese, 2021) or to determine accountability, which has implications for the "value" ascribed to policy decisions or certain vulnerable populations, such as investment in health care systems for the elderly (Twyford, 2023; Vesty *et al.*, 2023). We differ by taking a longitudinal approach to study the dynamic practices surrounding the counting of deaths and the consequential shift in public accountability during a crisis event and its aftermath.

The tracking, enumeration and public dissemination of death counts has a history tracing back to the parish lists published in 17th-century Britain Wernimont (2018). These lists were initially collated by the Catholic Church for religious reasons, such as the devotion to the souls needing intercession following death (Wernimont, 2018). By the 18th-century, the Anglican church provided accounts of parish deaths to the government and the public in the form of "mortality bills". With the increased circulation of people and goods following industrial development, the recording and collecting of death information became a secular and bureaucratic practice (Trabsky, 2022a). This information was able to identify parishes affected by an outbreak of disease and subsequently used by the government to discourage travel to these affected areas (Wernimont, 2018).

Alongside the counting of deaths, in 1891 the Bertillon Classification and Causes of Death framework introduced a nomenclature to codify what was considered a lawful or normal death - "to die of anything except causes on the official list[…] [was] illegal, for example, to die of old age" (Hacking, 1991, p. 183):

> The exclusion of certain causes suggests that modern western societies have very specific vocabularies of causation as far as matters relating to death are concerned, and a distinct image of what can and cannot cause a death (Prior, 2003, p. 5).

The secularisation and standardisation of death registration allowed populations to be studied scientifically, resulting in the calculation of mortality rates and life expectancy, thus establishing a "normal" rate of death (Trabsky, 2022a). Therefore, counting the dead is a normalising exercise, one that defines the abnormal, such as dying a premature death; and places an intrinsic value on investing in initiatives such as screening programmes for asymptomatic disease, such as cancer screening (Trabsky, 2022b). Normalised population statistics, such as overpopulation or ageing combined with other data such as birth and death rates, provide the state with a powerful technology to determine policies consistent with the socio-political environment (Murphy, 2017). In this realm of biopolitical control,

classifications of normal or abnormal may take on a very different meaning in a state emergency or crisis Ferry *et al.* (2024).

Global standardisation was introduced with the adoption of the International Classification of Diseases (ICD) [2] by the World Health Organisation (WHO) in 1948. The ICD has developed from its initial simple list of causes of death to a worldwide digital database of health data (see: www.who.int/campaigns/75-years-of-improving-public-health/milestones#year-1948). However, due to the lack of appropriate civil registration systems in many countries, the WHO estimates that around 40% of deaths are not registered. Further, in low-income countries only about 8% of registered deaths document a cause of death (WHO, 2024, n.p.). As a result, the WHO has prioritised strengthening the civil registration of vital statistics (CRVS) systems at global, regional and country levels. Vital statistics are viewed as an essential public good, with 102 of the 232 indicators for monitoring the Sustainable Development Goals (SDGs) relying on their accuracy (Richards *et al.*, 2018, p. 2). Where accurate vital statistics are unavailable, other methods of estimating deaths such, as excess deaths or excess mortality, have emerged. Excess deaths has also been used to estimate historical death tolls, for example, the Great Plague of London in 1665 through to more recent disaster events, such as Hurricane Maria in Puerto Rico in 2016 (Karlinsky and Kobak, 2021).

Multiple bureaucratic agencies and experts are involved in the present-day identification and documentation of deaths worldwide. However, it was not until we were faced with COVID-19 that the vast machinery required to produce timely death counts and the importance of the transparency of that information to assess the adequacy of states to safeguard citizens in a time of crisis were exposed. The counts of COVID-19 deaths became a pervasive mechanism of public accountability.

Public accountability

Accounting and the idea that an account is a mechanism of accountability can be traced to the Norman conquest in England and the requirement for property holders "to count" their possessions and have them recorded in the Domesday Books to assess the size of William I's new realm (Bovens, 2010). Since then, the rendering of an account and expressions of accountability have evolved considerably. A plethora of adjectives and adverbs describe the primary purpose, the who, the what, the why and the how of giving an account, which gives rise to multiple understandings of accountability. However, as a relational phenomenon, accountability can be best understood in terms of the responsibility and expectations of the accountor and accountee in an existing, albeit informal or formal, relationship.

Where the state and its agencies produce accounts and are held accountable by citizens or other publics, accountability regimes legitimise democratic institutions, uphold notions of what is considered good governance and limit the ability of the state to abuse public power Stewart (1984). In return, we accept that these accounts transform "arbitrary actions" into the legitimate exercise of political power as a relatively stable and bureaucratic activity Stewart, (1984, p. 13). Two forms of accountability describe the relationship between the state and its agencies and those within the sphere of sovereign power (Funnell *et al.*, 2009). Public accountability relies on the provision of accounts that enable those within this realm the power to evaluate, debate and discuss the actions of the state. Civic accountability, on the other hand, requires a level of engagement and participation by citizens (Dryzek, 2005). In this paper we are interested in the accountability that occurs during and in the aftermath of a crisis. Therefore, we use COVID-19 as an example of where citizen engagement was limited to studying public accountability as a dynamic rather than stable phenomenon.

Public accountability has two aspects that must be considered in any framework of analysis (Stewart, 1984). Bovens (2007, 2010) identifies these as virtuous and mechanistic forms of accountability. Virtuous accountability describes the means by which the state communicates being accountable during a crisis, whereas mechanistic describes the means by which the public *ex-post* evaluates the state's response to a crisis. Both forms require public "accounts" in a language or vocabulary that can be understood and subsequently impacts the ways in which we make sense of the world (Potter *et al.*, 1991). Therefore, in a crisis this account may change as circumstances alter over time, especially when the "peculiarities" of a situation provide a substantial threat to the normal state of affairs (Garsten and Montoya, 2008; Stewart, 1984; Shenkin and Coulson, 2006). In extreme events, the timely communication of "hard" numbers often provides the legitimacy to promote public trust in the institutions of the state. The public, in a crisis or emergency, will often overlook or accept the dehumanising aspects of aggregate quantification in exchange for timely data to make sense of troubling times (Ferry *et al.*, 2024). In the aftermath, these numbers may take on a new role as a means for the public to assess or evaluate governance regimes (Ferry *et al.*, 2024).

Virtuous accountability responds to the demands for more transparency or bespoke visibilities in a crisis or disaster. It reflects the modern liberal idea that practices, based in rules and procedures, can provide a predetermined standard to enable evaluation at some level. Since the appropriateness of these standards is situational, the form of public disclosure and the information communicated are dependent on the realm in which they are considered important (Potter *et al.*, 1991). For example, during the COVID-19 crisis, the technology-enabled quotidian and real-time reporting of statistics, such as infection, vaccination and death rates, became the new practice to deliver public accountability (del Baldo *et al.*, 2024; Mazzola *et al.*, 2024).

Mechanistic accountability is demonstrated when the state and its agencies are held to account *ex post facto* through the "giving of an account" (Bovens, 2010). Therefore, mechanistic accountability is orientated towards the instrument or the account that enables public oversight and evaluation. Since these accounts are *ex-post*, they use remediated statistics often presented as word-based quantitative expressions, such as Gross Domestic Product. In the post-crisis phase of COVID-19, different statistics or measures were communicated in the public sphere. However, a shift in the purpose and form of account-giving can be cathartic for societies by signalling the end of a crisis and supplying the means to identify failures as a means of redress or reflection (Bovens, 2010). For example, the recent watershed decision to hold the state accountable for the deaths of 96 football fans at the Hillsborough Football Stadium in the UK after a long 30-year battle for justice (Cooper and Lapsley, 2021) resulted in the "Hillsborough Law" and major changes to crowd management and sports ground safety in the UK (Blundell and Elliot, 2024).

While different in their operationalisation, virtuous and mechanistic accountability overlap because the normative standards of responsibility that are used to assess performance are embedded in public accounts as predetermined standards (McKernan, 2012). Therefore, to analyse public accountability during and post-COVID-19, we take a longitudinal approach to study the shift from virtuous to mechanistic forms of accountability, from a crisis to a post-crisis state of affairs. While numerous accounts of the many accounting and accountability aspects of COVID-19 have proliferated (see, for example, the summaries provided by Leoni *et al.*, 2021, 2022), we adopt an ethnostatistical approach to understand how novel public accounts of COVID-19 deaths were rehabilitated post the initial crisis stage of COVID-19 into the word-based quantitative expression of excess deaths to demonstrate this shift in accountability (Gephart, 2006, 2017; Smith *et al.*, 2004).

An ethnostatistical approach

Any numerical summary of rule-based calculations, such as the scoring regime used in a game of football, can be understood as statistics (Gephart, 1988). This process involves the classification of similar "things" into ordered categories (Carlon *et al.*, 2006, p. 477). Statistics create artefacts in the form of numerical measures according to a "scheme of rationality" often in the form of "word-based quantitative expressions" (Gephart, 2017, p. 35) producing non-numerical quantities e.g. small, half and decimate, that inform our understandings of the world and ourselves (Potter *et al.*, 1991). Statistics while appearing straight-forward, "act as black boxes once they have been constructed and conceal the processes that have constructed them" (Gephart, 2017, p. 36). Therefore, the "'mathematicization' of phenomena" is persuasive and has rhetorical power that is found in the social ordering of value or importance (Potter *et al.*, 1991, p. 334). In addition, numbers or statistics are often used in arguments that are non-mathematical because they are perceived as ethically neutral, leaving the resolution of moral and political issues to questions of numerical accuracy (Power and Brennan, 2022).

Ethnostatistics bridges the quantitative/qualitative divide by identifying; the rationale for counting (or not), the impact of a particular situation or context on the count, the effects of quantitative information and the social processes or institutional norms that influence data collection and statistical analyses (Smith *et al.*, 2004). Ethnostatistics has developed from enumerology or the study of language and classification to express phenomena numerically (Bogdan and Ksander, 1980). Initially used within the realm of scholarly research, ethnostatistics has expanded to a range of organisational sites to understand the "quantitative sensemaking" of "doing statistics" as a situated and social, rather than a purely technical, practice (Gephart, 2006, p. 418).

In enumeration, the rate or count does not exist independently from the method of counting. For example, deaths must be counted to determine mortality rates (Bogdan and Ksander, 1980). Further, certain counts take on a privileged status, such as numerical representations that embed higher-order statistical procedures (Kilduff and Oh, 2006). Additionally, counts can direct our attention from something innocuous or taken-for-granted to something deserving of our attention (Bogdan and Ksander, 1980). While enumeration is used for everyday and professional purposes, ethnostatistics extends our understanding of the way in which numbers produced for one purpose take on a new meaning in a different context (Gephart, 2006):

> The fundamental concern of ethnostatistics is in describing, analyzing, explaining, and understanding how statistics are actually accomplished […] Ethnostatistics thus examines the qualitative aspects of doing statistical analyses, and treats statistical analyses as sources of insight into social processes that underlay scientific knowledge (Gephart, 1988, p. 11).

There is little doubt that presenting numerical information is important and conveys a sense of competency and legitimacy in a wide range of settings (Gephart, 1997):

> Numbers including statistics symbolize science, which is essentially the religion of desecularized modern society. Numbers, counting and statistics also evidence rational action. And quantification perpetuates the myth of rational organizational practices (Gephart, 2006, p. 426).

Ethnostatistical studies identify three empirical levels, orders or domains [3]; constructing numbers (count), interpreting the quantitative use of numbers (account); and interpreting the rhetorical meaning of the display of numbers (recount) (Boje *et al.*, 2006; Kamuf, 2007). Figure 1 below outlines these three domains.

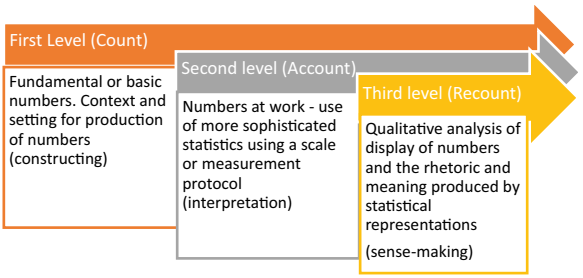


Figure 1. Three levels of ethnostatistics

First level: to count

First-level studies examine the most fundamental statistical or numerical representations to determine the cultural realm of the producer by describing the setting, the reasons why the numbers are produced and the technical, albeit bespoke or situated, rules used. At this level we are interested in how categories and classification systems determine meaning-in-context (Landrum and Boje, 2008). The simplicity of "what looks like or passes as counting" often serves to hide the complexity of phenomena (Wernimont, 2018, p. 24). For example, a study by Smith and Bradshaw (2006) found discrepancies in counting the number of hospital deaths of patients from a particular geographical location when the family name was used as the indicator of ethnicity.

First-level studies also identify and critique the genesis and existence of "official" definitions, especially those that have been determined by powerful institutions or organisations (Bogdan and Ksander, 1980, p. 303). For example, during the COVID-19 pandemic, determining the eligibility for a struggling business to access government support rested on the simple statistic of actual versus budgeted turnover (Nikidehaghani and Cortese, 2021):

> Social scientists, policy researchers, and government officials arbitrarily choose one dimension of meaning or develop one set of conventions to arrive at a method of constructing a real rate, but whatever is arrived at is the product of the assumptions used and the concepts used, and the process as it evolves. To claim to have the true measures is to claim the supremacy of one definition and one method over others and should not be confused with *true* in any strict sense (Bogdan and Ksander, 1980. p. 303, emphasis in original).

To further illustrate, Huber *et al.* (2022) identify the number of COVID-19 beds as a one-dimensional measure or convention adopted at the outbreak of COVID-19 in Germany. Important operational decisions were made at hospitals using that number to manage the emerging challenges. As time went on, it became obvious that a COVID-19 bed had multi-dimensional characteristics that were ignored (e.g. intensive care beds with high or lower-level ventilators).

Second level: to account

Second-level analyses involve understanding the "numbers at work". This is the accounting aspect of statistics and includes the assumptions underpinning statistical manipulation according to a measurement device or scale (Gephart, 2006, p. 420). Level two analyses incorporate the impact of a particular context on the producer of the statistics. For example, Landrum and Boje (2008) reanalysed the 1997 Tuck Study that claimed that conditions at

Nike's operations in Vietnam did not impede the ability of workers to maintain a reasonable standard of living within their local community. At the time, Nike was under extreme public scrutiny and pressure to improve sweat-shop conditions. By altering the techniques used and assumptions made, Landrum and Boje (2008) found different and contradictory results.

In more recent examples, Broadbent (2020) challenged the UK government's reporting of COVID-19 deaths by comparing disclosed UK rates with other countries. These disclosures were aimed at building public trust and confidence in the UK government. However, only COVID-19 deaths occurring in hospitals were disclosed, omitting the significant number of deaths that occurred in aged care facilities and similar institutions. Thus, the UK account of COVID-19 deaths was skewed to reinforce the success of government policy, rather than any failure. Similarly, Ahmad *et al.* (2021) explored the COVID-19 testing regime that supported the UK government's accounts of the rates of infection. To understand the rationale behind the chosen method of testing, Ahmad *et al.* (2021) concluded that these accounts were chosen to communicate the government's "good" performance in the initial phase of the pandemic.

Third-level: to recount

> Read the numbers, the numbers tell the story', […] numbers, we believe, do not narrate, interpret, invent or make up the figures (Kamuf, 2007, p. 252).

Third-level studies involve identifying the statistical manipulation of existing Level 1 and 2 counts and accounts. This process provides more comparable information by resolving issues of scale and accommodating any temporal and jurisdictional idiosyncrasies e.g. the sophisticated statistical modelling used to compare the death counts from the COVID-19 pandemic with the 1918 Spanish Flu. These recounts appeal to "commonsense" understandings, justifying claims and assisting in comparability across time (historical events) and space (geography) (Higgins and Walker, 2012; Holt and Macpherson, 2010).

Third-level studies also identify the way in which quantitative information, when combined with "words", leverages the rhetoric of objectivity in numbers to validate or legitimise claims through "creative authoring" (Ahmad *et al.*, 2021, p. 1362). Statistics have power because they tap into the taken-for-granted belief "that '[n]umbers don't lie'" (Kamuf, 2007, p. 252) and that truth and/or reality can be assembled, interpreted and communicated through numbers. Therefore, using statistics in recounting stories and other narratives has persuasive appeal. For example, Mills *et al.* (2006) explored how Canadian business schools retrospectively used historical university rankings to construct a new positive organisational identity:

> We cannot completely separate statistics and stories: both are used in processes of knowledge production and to produce convincing accounts of social problems that become the basis for public deliberation, decision-making and action (Ainsworth and Hardy, 2012, p. 1697).

Studies at Level 3 demonstrate how rhetoric can create new meanings or reinforce meanings within a particular situation or in some cases even affect the format the statistical information takes to maximise rhetorical appeal. For example, the mortality bills used to communicate death counts in Victorian England used a ledger format similar to double-entry bookkeeping to guarantee arithmetic accuracy and reinforce the veracity of the information (Wernimont, 2018). Similarly, Antonelli *et al.* (2018) demonstrated how the use of tables in Fascist Italy obscured the personal identity of Jewish subjects during the Holocaust. The spatial logic of a table format provided a "deceptively simple" mechanism of transparency and visibility yet was also a persuasive and socio-politically powerful vehicle of meaning (Wernimont, 2018).

At this level of analysis, studies often incorporate a theoretical framing to understand the different rhetorical practices at work. For example, Boje *et al.* (2006, p. 457) applied a theatre metaphor to understand Enron's incorporation of numbers in a "Hollywood-style" setting to misdirect audiences. In relation to COVID-19, the study by Antonelli *et al.* (2022) used Agamban's state of exception to demonstrate how the Italian government spread fear and uncertainty to ensure public compliance with its strict rules. The Italian government introduced biopolitical measures by combining statistical information with the "belligerent rhetoric" of a war with an invisible enemy (Antonelli *et al.*, 2022, p. 127). Similarly, in Australia, wartime metaphors of fear and slogans of responsibility were used to mediate the social issues encountered from COVID-19 restrictions (Twyford and Abbas, 2022). Further, de Villiers and Molinari (2022) adopted legitimacy theory to explain how open access to statistical data in New Zealand ensured public buy-in and conformity to their harsh COVID-19 restrictions. In particular, the New Zealand Prime Minister repeatedly referred to the use of expert scientific data to legitimise government policy.

Method

Stories recounted in a crisis or disaster are often used to make sense of troubling information (Brown, 2000). Individuals and organisations "turn to calculations, numbers and statistics to make sense of a situation and the associated risks" (Ahmad *et al.*, 2021, p. 1362). Since numerical representations are a result of statistical processes and schemes of rationality, we use the three levels of ethnostatistics to examine the counting, accounting and recounting of COVID-19 deaths. To understand the counting aspect, we describe the classification of causes of death according to the ICD schema. As the official guide to classification, it is used by government agencies and experts who are involved in the production of an official death certificate. The death certificate is a source document (not dissimilar to an invoice used to calculate sales) that provides the input data for the "raw" count of COVID-19 deaths. To understand the scheme of rationality or logic, we reviewed the professional technical guidance issued by the WHO, including the role of the CRVS in the provision of accurate and timely data. To illustrate the ambiguities, challenges and strategic opportunities in practice, we provide examples of the complexity of coding and expertise required to classify COVID-19 deaths.

For the second-level analysis, we demonstrate the accounting aspect of death counts and how the information provided on the death certificates is assembled, aggregated and disclosed as an account of COVID-19 deaths in the public domain. This "account" is one mechanism by which state actors demonstrate a degree of responsiveness in a crisis Bovens (2007). Since the COVID-19 pandemic was a global phenomenon, we examined how this counting was conducted at a global, national and regional level by COVID-19 "trackers". We identified Worldometer [4], Johns Hopkins University and Medicine Coronavirus Resource Centre (hereafter Johns Hopkins) [5] and the WHO COVID-19 trackers as characteristic examples of trackers that presented their "live" accounts of COVID-19 deaths in near real-time using interactive formats. All three trackers collated data from official sources. To understand the calculative practices required to present their accounts of COVID-19 deaths, we accessed the website information to determine the input data collection process and the assumptions used to assemble, collate and present this data, as well as articulated limitations.

For the level three analysis, we focused on the measurement and subsequent valuation aspects of the accounting practices of COVID-19 deaths through recounting, resulting in excess deaths. This novel metric claimed to overcome the limitations of other measures by imputing the number of COVID-19 deaths by modelling all deaths compared to expected deaths in jurisdictions. In doing so, it allowed the telling of a different global story of

COVID-19. However, calculating a metric that compares all recorded deaths with those that were expected is a complex research challenge that requires innovative modelling to limit the uncertainties arising from inconsistencies in recording deaths and other problematic assumptions (Adam, 2022). To limit the effect of these uncertainties, different methods such as satellite imaging of cemeteries and machine learning were adopted by modelling agencies. We chose to analyse the model developed by two health economists, Karlinsky and Kobak, because it was considered the most comprehensive estimate of excess deaths at the country level at the time (Adam, 2022). Additionally, we examined the model developed by The Economist (2020, 2022), as it was a high-profile media attempt and considered to be one of the most comprehensive and rigorous models to understand the changes in mortality rates at a global level (Our World in Data, 2022). We accessed the websites of these two groups to understand their methods of statistical modelling, such as the logic behind the algorithms used and the data sets accessed, as well as reviewed the limitations of the models developed.

Who counts?

Level 1: to count

The counting of COVID-19 deaths begins with the determination of the cause of death according to the recognised classification schema. The categorisation of a COVID-19 death is consequential since it reveals "like things" that can be individually counted as well as creating order by drawing attention to these "things" collectively (Carlon *et al.*, 2006). Several institutional practices underpin the official documentation of cause of death, including the adoption of the ICD procedures as the rules "of the game" and the logic of keeping systematic records. For example, the Vital Statistics Reporting Guidance in the US stated that "an accurate count of the number of deaths due to COVID–19 infection […] depends in part on proper death certification [and] is critical to ongoing public health surveillance and response" (National Center for Health Statistics, 2020, p. 2).

On 20 April 2020, the WHO issued emergency-use ICD codes following the declaration of "a public health emergency of international concern" (WHO, 2020a, n.p), rendering COVID-19 visible as a legally recognised cause of death:

> A COVID-19 death is defined for surveillance purposes as a death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID disease (e.g. trauma). There should be no period of complete recovery between the illness and death (WHO, 2020b, p. 3).

In the first instance, a COVID-19 death is classified clinically and then coded using one of the two codes below:

(1) U07.1: COVID-19, virus identified (laboratory confirmed); and

(2) U07.2: COVID-19 virus not identified (laboratory unconfirmed) to be used for:

- Clinically-epidemiologically diagnosed COVID-19;
- Probable COVID-19; and
- Suspected COVID-19. (adapted from Gamage, 2020, p. 3).

While the guidance from the WHO is prescriptive and appears relatively straightforward, its application across and within jurisdictions varied. Karanikolos and McKee (2020) found that of the 27 countries they studied, slightly more than half (15) based their reporting purely on diagnosis (U07.2), while 12 reported a COVID-19 death only if it had been confirmed with a laboratory test (U07.1). However, the efficacy of laboratory-based classification was

constrained by the policies and criteria for testing and the capacity and availability of testing resources.

To further complicate matters, the taxonomic approach to coding can obscure a COVID-19 death. In cases where co-morbidities exist, the decision to determine the Underlying Cause of Death (UCOD) requires medical expertise. Thus, to complete a death certificate, a significant level of judgement is needed, especially in complex cases. To demonstrate, Figure 2 below identifies COVID-19 as the UCOD. Figure 3, on the other hand, indicates that while COVID-19 is present and clinically determined at the time of death, the death is not classified as a COVID-19 death. Therefore, the death certified in Figure 2 contributed to the COVID-19 death count, but not that in Figure 3. In both cases COVID-19 was not only laboratory-confirmed but clinically assessed.

Figure 4 below identifies a death that contributes to the COVID-19 count even in the presence of significant complications. This determination relied on clinical judgement to determine, first, that COVID-19 was present in the absence of laboratory confirmation and second, that pneumonia and subsequent respiratory failure followed. Since COVID-19 is recorded at 1c (the highest in ordering protocol for the cause of death), it is determined to be the UCOD. Hypertension, diabetes and asthma were recorded as contributing factors.

Therefore, inaccurate coding occurred, especially in the early stages of the pandemic when testing rates were low. For example, in one US state, post-mortem testing was not undertaken and, in the absence of ante-mortem evidence, the COVID-19 coding may have been compromised (Bakst, 2020). In many high-income countries, deaths in aged care facilities were unlikely to be attributed to COVID-19 (Islam, 2022). Counterintuitively, it was reported that some US hospitals exploited the subjectivities in coding to inflate the number of COVID-19 deaths to obtain increased government funding (Miltimore, 2020).

In addition to the subjectivity of coding, timing is also an important factor in the coding of COVID-19 as a cause of death. In the UK, for example, the certification protocols "limited" the attribution of COVID-19 as a cause of death to within 28 days from a positive test (Pym,

Here, on the International Form of Medical Certificate of Cause of Death, is an example of how to certify this chain of events for deaths due to **COVID-19** in Part 1:

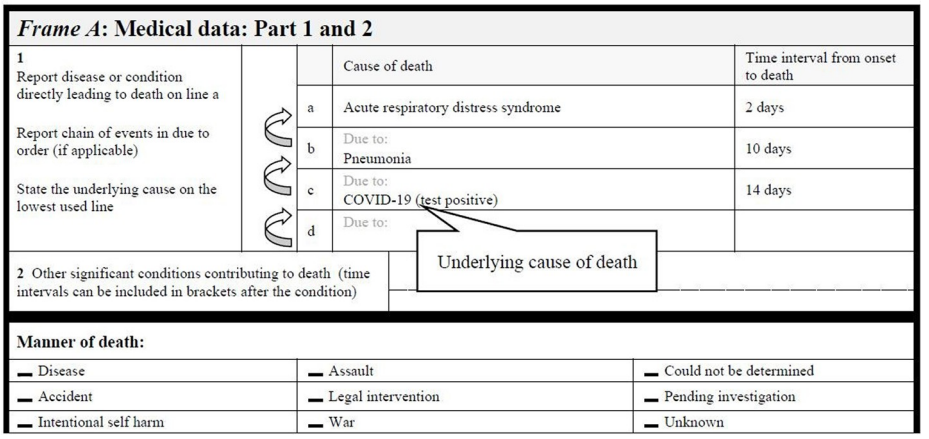
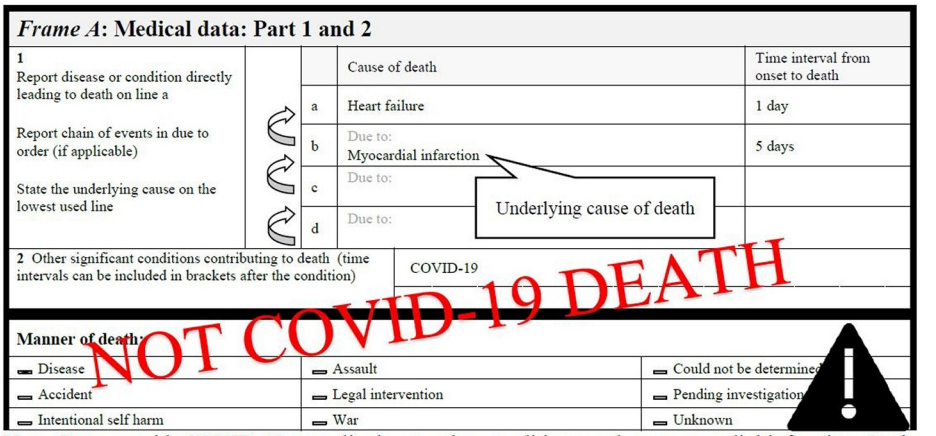


Figure 2. Completed international form of medical certificate cause of death – COVID-19 death

Source: WHO, 2020b, p. 4

Note: Persons with COVID-19 may die of other diseases or accidents, such cases are not deaths due to COVID-19 and should not be certified as such. In case you think that COVID-19 aggravated the consequences of the accident, you may report COVID-19 in Part 2. Please remember to indicate the manner of death and record in part 1 the exact kind of an incident or other external cause.



Note: Persons with COVID-19 may die due to other conditions such as myocardial infarction. Such cases are not deaths due to COVID-19 and should not be certified as such.

Figure 3. Completed international form of medical certificate cause of death – Not COVID-19 death

Source: WHO, 2020b, p. 7

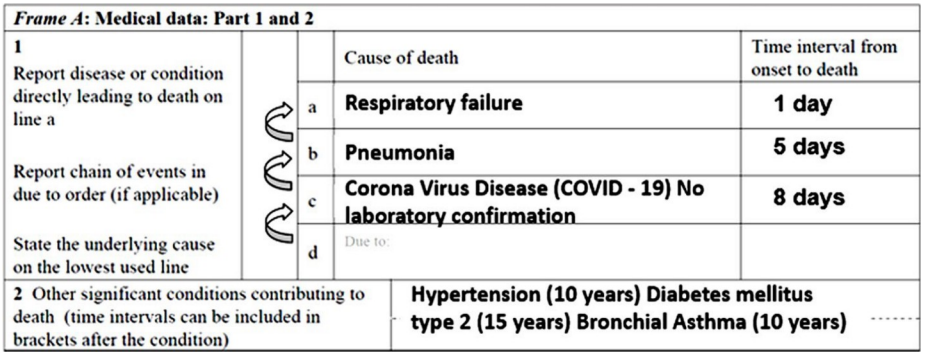


Figure 4. Completed international form of medical certificate cause of death – suspected COVID-19 death

Source: Gamage, 2020, p. 17

2020). Additionally, even with accurate coding, the lag between death and reporting resulted in errors in daily reporting. Using the UK as an example again, initially it took "at least five days for most deaths to be certified by a doctor, registered and the data processed, meaning the figures are always slightly out of date" (Roberts, 2020, n.p.). While in the US it took "several weeks for death records to be submitted to the National Centre for Health Statistics (NCHS), processed, coded and tabulated" (CDC, 2020, n.p.). The ambiguities created by

timing issues were exacerbated in jurisdictions without sophisticated reporting infrastructure:

> Multiple factors contribute to inaccuracies in documenting causes of death. Firstly, not everyone who dies from covid-19 is tested, especially in resource poor settings. Secondly, diagnostic tests for SARS-CoV-2 may fail to detect the virus (false negative) resulting in misclassification. Third, the definition of covid-19 deaths has changed over time. When Public Health England changed its definition of covid-19 deaths in July 2020, for example, the number of officially reported deaths fell by 73% (Islam, 2022, p. 1).

While deaths rose during the COVID-19 pandemic, many may have been inaccurately documented due to misdiagnosis or miscounting. Other indirect impacts of COVID-19 on populations, such as not counting those who die as a result of an untreated health condition in a resource-constrained environment or not attributing the decrease in road toll deaths that occurred during periods of lockdown, also affected the appropriate measurement of the impact of the COVID-19 crisis on deaths (Aron and Muellbauer, 2020). Indirect consequences arising from government actions to constrain the spread of COVID-19 also did not contribute to the death count. For example, lockdown and restriction on movement, restricting health procedures to only those of a critical nature and work-from-home orders all contributed to the deterioration of a healthy or safe environment and even the "deaths of despair" caused by psychological stress did not appear as a COVID-19 death (Kiang *et al.*, 2020, p. 1005). Additionally, in large parts of Africa and Asia, death certificates are only issued for a small number of deaths, fuelling "nonsense theories" that people in Africa had a genetic resistance to COVID-19 and justifying the lack of Western support for vaccination programmes (Solstad cited in Adam, 2022, p. 314):

> Most people in Africa and Asia are born and die without leaving a trace in any legal record or official statistic. Absence of reliable data for births, deaths, and causes of death are at the root of this scandal of invisibility, which renders most of the world's poor as unseen, uncountable, and hence uncounted (Setel *et al.* 2007, p. 1569).

The death certification process identifies the biological aspects of an individual's life and death that are subsequently collated and averaged and used in the aggregate to make decisions (Ferry *et al.*, 2024). This is an important aspect of governing since it establishes the official rules of the game and the formal visibility that is integral to public accountability regimes that rely on rule-based procedures (Shenkin and Coulson, 2006). This focus on rules and procedure to provide a predetermined standard enables evaluation, reflecting a virtuous accountability. While inaccurate, these official COVID-19 death counts were provided as a trustworthy source of data to legitimate the aggregation of "like things", such as the daily counts communicated in the public domain during the COVID-19 pandemic.

Level 2 accounting

> As covid-19 has spread around the world, people have become grimly familiar with the death tolls that their governments publish each day (The Economist, 2022, n.p.).

Prior to the COVID-19 pandemic, death counts were often important to gauge the extent of a crisis or disaster "somewhere else". In a very short space of time, the public were exposed to accounts of COVID-19 deaths on a daily basis. Governments were making rapid-fire decisions altering the "fabric of people's lives" by such things as imposing lockdowns or mandating vaccinations (Ferry *et al.*, 2024, p. 176). Since a critical aspect of public accountability is how states and agencies are evaluated according to their responsiveness in a crisis, these accounts became the way in which states could demonstrate "being accountable"

(Bovens, 2010). They established legitimacy by promoting public trust in the institutions of the state who were prepared to be transparent about the number of deaths. Therefore, for this second-level analysis we consider the assumptions used in creating these accounts and how they were disclosed in the public domain:

> What static numbers fail to provide is the perception of the frequency and timing of events, the *rhythm*, an essential part of nature and a tool for understanding the physical phenomena surrounding us. Only by using live counters are we able to convey these elements and truly grasp the magnitude of the quantitative change through time (worldometers.info/about, 2022, emphasis in original).

Numerous national governments and other institutions, such as the Centre for Disease Control in the US, collected COVID-19-related-data. At the height of the pandemic, this data was collated by various agencies that tracked the incidence of COVID-19 to produce comparative statistical "real time" accounts of the crisis at global and country levels. Here we focus on three well-known "trackers" – *worldometers* (www.worldometers.info), *Johns Hopkins University and Medicine Coronavirus Resource Centre* (https://coronavirus.jhu.edu/) and *the World Health Organisation* (https://covid19.who.int). All three trackers produced "live" data in a dashboard format similar to a league table, as well as more sophisticated visualisations, such as infographics.

Worldometers manually collected, validated and aggregated COVID-19 data in real time from over 5,000 sources, including official websites and the social media outlets of governments, institutions and authorities. They sourced local authority information to overcome the lag in reporting at the country level (www.worldometers.info/coronavirus/about/, 2022). Johns Hopkins collected and collated daily data internally through the Johns Hopkins Centre for Systems Science and Engineering. While global data was sourced from a variety of sources, there was a strong focus on US data (https://coronavirus.jhu.edu/map-faq, 2022). The WHO presented counts of COVID-19 cases and deaths sourced from official country communications, complemented by data from ministries of health and social media outlets (https://covid19.who.int/data).

Trackers provided an account to allow comparison across jurisdictions. However, jurisdictional challenges and differences rendered the death counts unreliable. As Broadbent (2020, p. 531) points out, the numbers are not necessarily comparable as "measurement is always potentially problematic". The issues of reliability identified in the classification of COVID-19 deaths are compounded at this level. Worldometers and WHO openly acknowledged several limitations in providing comparable accounts from data aggregated from different sources – the "like things" are not always alike. The WHO notes "[a]ll counts are subject to variation in case detection, definitions, laboratory testing, vaccination strategy and reporting strategies" (https://covid19.who.int/data). Worldometers also cautioned users that:

> [o]n a daily basis, we encounter an increasing number of reporting issues. Some of these include official governmental channels changing or retracting figures or publishing contradictory data on different official outlets. National or State figures with old or incomplete data compared to regional, local (counties, in the US) government's reports is the norm, so we try to compensate by collecting the missing data and maintaining an accurate and timely count (www.worldometers.info/coronavirus/about/#issues, Worldometer, 2022).

The spatial logic of public league tables, ranking performance and graphical representations, became both transparent "vehicles of meaning" and integral to forms of *ex post* public accountability (Wernimont, 2018, p. 24). Through their simplicity, States and their agencies could be held to account. Further, statistical manipulation to allow comparability across

jurisdictions, such as ratios (deaths per 1000), enabled performance evaluation over the short term. While these trackers provided information for the public in a time of global crisis, they were also criticised for providing flawed information either in their design, for political reasons or due to inaccuracies or misclassifications.

The accounts of COVID-19 death in the early stages of the pandemic reflected the urgency of the situation as governments sought to manage what was largely an unknown phenomenon with scarce resources. To ensure the government communication drove the desired behaviour during the pandemic, the real-time reporting of death counts needed to be understandable and relevant to the public, especially when states cast forgoing of civil liberties in the persona of an aged relative or vulnerable child. The fluctuating numbers of COVID-19 deaths provided the justification for often drastic measures, such as severe lockdowns and a demonstration of responsible governance (Ferry *et al.*, 2024). The "artful fiction" of using inaccurate death accounts from a subset of the population created death as news for an "informed" public and provided the power to modify our daily lives. Our "barometer of life" was silently set by the COVID-19 trackers (Wernimont, 2018, p. 31).

Even though the quotidian reporting of COVID-19 deaths abated with the revocation of pandemic status [6], death and other morbidity statistics are still collated, debated and politicised in sovereign and international domains. A novel metric, excess deaths, was added to the pandemic lexicon and emerged as a "more comprehensive measure" to determine the "total" impact and provided the ability to reflect on how countries responded over time (Ritchie *et al.*, 2020, n.p.).

Level 3 recounting

> The scramble to calculate a global death toll while the pandemic continues is an exercise that combines sophisticated statistical modelling with rapid-fire data gathering (Adam, 2022, p.312).

Not dissimilar to the way we impute or measure equity as the difference between assets and liabilities in accounting, excess deaths was a proxy measure for the number of COVID-19 deaths by estimating "the number of deaths from all causes during a crisis above and beyond what we would have expected to see under "normal" conditions" (Ritchie *et al.*, 2020, n.p.). This more-sophisticated statistic adjusted the baseline of expected or "normal" deaths by considering variables such as ageing population patterns or deaths associated with natural disasters, heatwaves or armed conflict (Adam, 2022):

> 'Normal' death rates reflect persistent factors such as the age composition of the population, the incidence of smoking and air pollution, the prevalence of obesity, poverty and inequality, and the normal quality of health service delivery (Aron and Muellbauer, 2020, n.p.).

While excess deaths is a simple statistic that represents the difference between all-cause reported deaths and an estimate of expected or normal deaths in a given period, its calculation is far from straightforward.

The count for both all-cause deaths and expected deaths is complicated by the inconsistencies and anomalies of estimation. Simple things like age-related factors can skew averages. For example, in Germany a surge in deaths of 80-year-olds (the generation too young for World War II) underestimated the number of expected deaths and resulted in the inflation of COVID-19 excess deaths by 4%. Therefore, to compare reported deaths from all causes with the estimates of expected deaths required sophisticated modelling and timely data gathering, as demonstrated in the two examples below (Adam, 2022).

The Karlinsky and Kobak Model

The modelling developed by Karlinsky and Kobak (2021) was the first to establish a comprehensive and regularly updated data set of deaths from all causes across 103 countries.

They used data from EuroStat [7], the [8]Short Term Mortality Fluctuations (STMF) and a further 59 countries to create the World Mortality Data set to determine an adjusted baseline mortality measure of expected deaths for the period 2015–2021. The World Mortality Data set only includes deaths that are recorded on a weekly, monthly or quarterly basis. Where countries only collect mortality data for certain types of deaths, for example, car accidents or do not meet other reporting period criteria, the all-cause mortality information is estimated by modelling existing country data (Karlinsky and Kobak, 2021).

The adjusted baseline mortality estimates of expected deaths factor in seasonal fluctuations, the impact of changing populations and structural and socio-economic conditions (Karlinsky and Kobak, 2021). The estimate is further adjusted to include known and significant death events such as political incidents and natural disasters. For example, Karlinsky and Kobak included the 4,000 lives lost in Armenia and Azerbaijan during the 2020 Nagorno-Karabakh war into expected deaths so that the COVID-19 excess deaths measure was not overstated (Adam, 2022).

Karlinsky and Kobak (2021) estimated excess deaths from COVID-19 at the height of the pandemic as the difference between all-cause deaths for 2020–2021 and their baseline modelling of expected deaths:

> In many cases, Karlinsky and Kobak's estimates of excess deaths diverge significantly from COVID-19 mortality statistics released by governments. Russia, for instance, reported more than 300,000 COVID-19 deaths by the end of 2021, but is likely to have exceeded 1 million excess deaths in that time (Adam, 2022, p. 313).

Karlinsky and Kobak identify several limitations in modelling a measure of COVID-19 deaths, such as different statistical techniques used in the mortality data sets and the use of timely but often "substantially incomplete" data, especially during 2020–2021 (Karlinsky and Kobak, 2021, p. 13). The discrepancy in the number of excess deaths using real-time data at the height of the pandemic was said to be in "the order of the population of Sweden" (Adam, 2022, p. 312). However,

[e]veryone involved knows any answer they provide will be provisional and imprecise. But they feel it is important to try. They want to acknowledge the true size and cost of the human tragedy of COVID-19 […] and they hope to counter misleading claims prompted by official figures, such as China's count of just under 5,000 COVID-19 deaths (Adam, 2022, p. 313).

While Karlinsky and Kobak (2021) were the first to provide country-level comparisons of excess deaths with a degree of accuracy, the World Mortality Data set does not include data from more than 100 countries, including China and India, where large numbers of COVID-19 deaths occurred. Therefore, modelling a global estimate of COVID-19 from this limited data set is less reliable. The Economist model attempted to overcome this limitation by identifying a range of national indicators that correlate with excess deaths rather than relying on incomplete data (Adam, 2022).

The Economist model

In 2015, The Economist established a public media site, GitHub, to provide its readers with information about data collection protocols and the evidence used to create infographics in its published articles (Scott, 2018). With the onset of the COVID-19 pandemic, The Economist supplemented GitHub with information from the Human Mortality Database [9] and the World Mortality Data set to provide a measure of excess deaths for "every country on every day since the pandemic" (The Economist, 2021b, n.p.). The Economist developed a machine-learning model to identify a suite of 100 national COVID-19 indicators extrapolated from a sample of 223 countries. These indicators were wide-ranging and

included the number of official deaths, the rate of testing and antibody surveys; geographic traits such as latitude; the length of time a country has been a democracy; and Internet censorship (Adam, 2022). In countries without a measure of COVID-19 deaths, an algorithm estimated excess deaths. The Economist predicted that excess deaths from COVID-19 were two to four times higher than the worldwide reported deaths at the height of the pandemic (The Economist, 2021b).

The Economist presented live statistical data in the form of interactive graphs along with an interpretive guide (see Figure 5 below).

The Economist model differs from Karlinsky and Kobak's approach. If we go back to the equity calculation example, Karlinsky and Kobak develop a more accurate model by strengthening the reliability of all-cause and expected deaths (similar to fair value approaches that are meant to represent a more appropriate measure of assets and liabilities). The Economist, on the other hand, strengthens the correlation between country characteristics and incidence of a COVID-19 death (recognition of the substance and form of equity accounts) but is also not without limitations or its critics (Ritchie *et al.*, 2020, n.p.).

Both Karlinsky and Kobak and The Economist provided information about the impact of COVID-19 on a global scale. While they both rely on available data from wealthy countries with high life expectancy to impute COVID-19 in poor countries with low life expectancy and despite the inherent limitations, the proxy measure of excess deaths provided some degree of visibility to invisible populations. In countries with poor or non-existent death registration data, innovative data collection methods, such as satellite imaging of cemeteries and door-to-door surveys, emerged to extrapolate more accurate global estimates of deaths (Adam, 2022). However, neither model actually used reported COVID-19 deaths in their approach.

To provide public accounts of comparable global COVID-19 excess deaths, states relied on information provided by experts that classify, categorise, arrange, measure, include and exclude information according to their system of writing, conventions, operational rules and conceptual schemes (Prior, 2003). In doing so, the data sets combined information from different sources to model excess deaths that have epistemic appeal as scientific and mathematical "hard" facts. At this third level of analysis, we can understand how excess death calculations were used to create "imprecise, yet meaningful "relative" quantities that reveal unmeasured differences among phenomena" allowing us to value or judge others (Gephart, 2017, p. 35). By measuring excess deaths, the power to assess the "effectiveness of a country's health policy interventions" was possible (Islam, 2022, p. 1). In the post-pandemic period, excess deaths was the novel metric that was instrumental in the

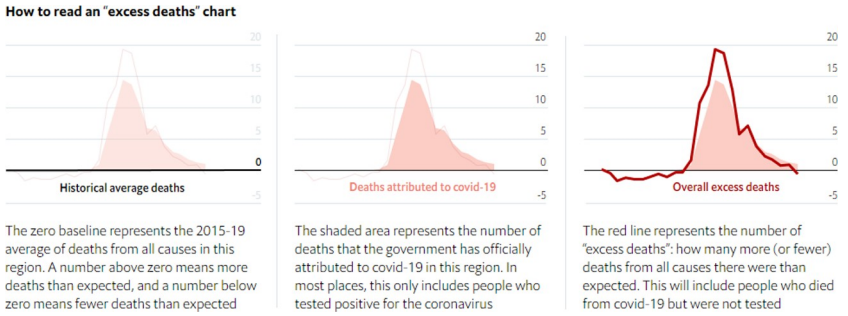


Figure 5. How to read excess deaths (The Economist, 2022, n.p.)

retrospective public evaluation of the effects of public policy decisions made throughout the pandemic. Therefore, as an *ex-post* mechanism, excess deaths provided public accountability at the country level and enabled comparisons at the transnational level. As a proxy, excess deaths purported to provide governments and their agencies with a "truer" measure to justify and legitimate political interventions as well as allowing the public to assess performance. This "better" measure affected the likelihood that the public would use this information to assess the adequacy of the state performance as well as fulfil their accountability obligations (Arnold, 2006, p. 245). For example, The Economist retrospectively measured a negative COVID-19 excess death rate in New Zealand and Australia, providing ex-post justification for their severe lockdown protocols (Adam, 2022).

Excess deaths as a word-based quantitative expression also allowed the creative authoring that is necessary in the telling of sense-making stories about the total impact of COVID-19 and signals a shift to mechanistic accountability which sought to justify the actions taken by the state during the crisis:

> Depending on how the world is imagined, how parts of that world are converted into data, and how those data are analyzed and folded into a sense-making rhetoric, a variety of truths can be assembled, all the while maintaining the apparent rationality of scientific and technological processes (Winiecki, 2008, p. 190).

The following example from The Economist (2022) recounted the impact of political decisions such as lockdowns and vaccinations in the eastern states of the USA by combining graphical representation (Figure 6) accompanied by explanatory text:

> In March 2020 America's east coast was hit hard by the pandemic. States elsewhere locked down quickly enough to prevent major outbreaks at that point, but a second wave in November and December surged through most of the country. Excess mortality [deaths] was low from March 2021 onwards, as a rapid vaccination campaign allowed the country to open up again (The Economist, 2022, n.p.).

The cathartic aspect of public accountability regimes is evident in the retrospective identification of success and failure and as a number, excess deaths also lends itself to more

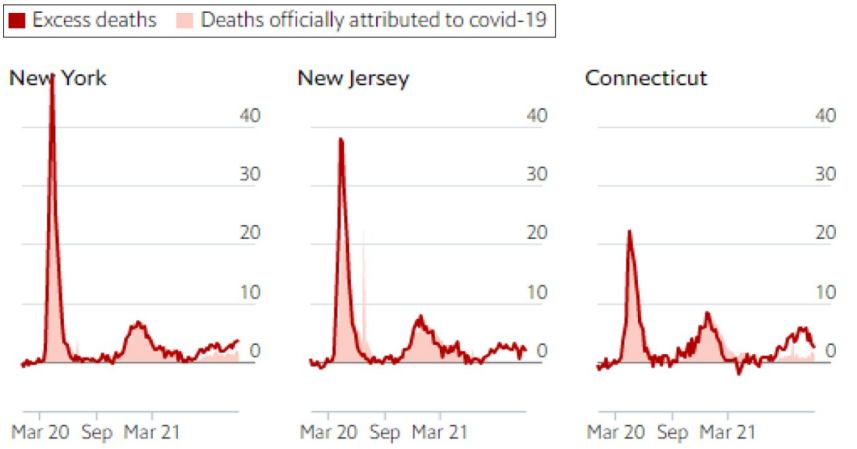


Figure 6. Weekly death rates, United States (The Economist, 2022)

nuanced information to reflect on national performance in relation to other countries. The estimates of COVID-19 excess deaths can accommodate scale, for example, by being expressed as deaths per 100,000 population. Additionally, Karlinsky and Kobak (2021) divided their excess deaths estimate by the actual recorded COVID-19 deaths to determine an under-or overcount ratio for different jurisdictions (a ratio greater than 1 demonstrated an undercount). By way of example, the undercount ratio for Peru was initially calculated as 2.7. The Peruvian government, by altering the definition of reported COVID-19 deaths to be more inclusive, was able to retrospectively revise the number and reduce the ratio to 1 (Karlinsky and Kobak, 2021).

Shifting public accountability

Mobilising ethnostatistics to study the communication of COVID-19 deaths allows us to demonstrate the dynamism of public accountability in the context of a crisis or disaster. Table 1 below summarises how it shifted as the information needs of policy-makers and the public changed over time. At first, adapting an existing system to record COVID-19 deaths was largely procedural with a reliance on rules and standards (Level 1). As the crisis evolved, the focus of accountability became a performative exercise of demonstrating responsiveness to a rapidly changing scenario (Level 2). Once the crisis was contained, a period of reflection meant that public information needed to be in a form that would give policy-makers the opportunity to justify or explain past decisions and actions (Level 3). The statistical presentation of COVID-19 deaths shifted from providing visibility and transparency to a more rigorous format required for evaluation, assessment, blame and legitimation following a crisis. The categorising and counting of individual deaths were manipulated to become the comparative metrics that allowed the type of collective judgement that governs national reputations and political legitimacy.

Conclusion: who counts?

The counting and recounting of COVID-19 deaths created the necessary space for public accountability and the *ex-post* evaluation of State decision-making and action. However:

> [w]hether this counting of bodies serves the interest of elite control or, alternatively, of democracy and accountability is a matter of politics and power. Embodied in this question of counting is who counts, and how. Classifications and categories employed in any [count] necessarily are enmeshed in the social and political realities of the society in which the [count] is conducted (Krieger, 2000, p. 1687).

Adopting an ethnostatistical approach allowed us to analyse the process of constructing word-based quantitative expressions and identify the shift in public accountability provided by accounts of COVID-19 deaths. Initially, there was a reliance on the legitimacy of real-time counts which moved as the crisis unfolded transitioning to more sophisticated modelling resulting in excess deaths being acknowledged as the best measure demonstrating a shift from raw to rehabilitated metrics. Concomitantly there was a shift in styles of accountability, from virtuous to mechanistic.

Accounting is the practice of classifying, counting, measuring and valuing to enable the provision of an account. This account provides the mechanism for accountability. Accounts of death, like other accounts, are contingent on context and a range of practices, methods and protocols. The importance of this classification aspect is demonstrated in the coding schema of COVID-19 deaths that produces an official record. These universal coding protocols for death registration rely on a conceptual framework and medical expertise to categorise like things that can be aggregated. As a source document or input, it enabled the counting of

Table 1. COVID-19 deaths and public accountability

Level of ethnostatistics	Form of accountability	Accountability mechanism	Accountability claim	Findings
Level 1: To Count	Rule-based / virtuous accountability	Standardised classification rules (ICD codes), death certification procedures, medical judgement	States are accountable if they *follow recognised rules and procedures* to record deaths objectively and consistently	COVID-19 deaths became accountable objects through formal rules that enabled counting, aggregation and auditability. However, discretionary clinical judgement, inconsistent testing regimes, timing constraints and weak civil registration systems produced systematic invisibility and miscounting – particularly among vulnerable and low-income populations. Official counts retained legitimacy due to procedural compliance
Level 2: Accounting	Transparency-based / performative accountability	Public reporting, dashboards, league tables, ratios and visualisations	States demonstrate accountability by *making numbers visible*, comparable and intelligible to the public	Aggregated death counts transformed mortality into public-facing accounts that enabled comparison, ranking and performance evaluation. Despite acknowledged data flaws and non-comparability, real-time reporting fostered trust, justified emergency interventions and functioned as a performative signal of responsible governance. Visibility, not accuracy, became the primary accountability currency
Level 3: Recounting	Ex post / mechanistic accountability	Statistical modelling, expert judgement, proxy measures (excess deaths)	Governments are accountable for *narratives of outcomes* when evaluated retrospectively against counterfactual benchmarks	Excess deaths reconstituted accountability by retrospectively reassessing the true human cost of policy decisions. These proxy measures challenged official narratives, revealed undercounts, enabled transnational comparison and reassigned responsibility for success or failure. Although imprecise, excess deaths carried epistemic authority and legitimised retrospective judgement of state performance

COVID-19 deaths at the height of the pandemic. Essentially, constructing the numbers that counted. "Trackers" collated disaggregated information, transforming it by defining boundaries and communicating it as real-time accounts of COVID-19 deaths, enabling a description of the impact of the pandemic. Numbers and counts have persuasive power in terms of the bureaucratic transparency that is necessary for state legitimacy in a crisis or disaster event, supporting biopolitical forms of control and softening resistance to unpopular policy decisions. In those early days of the pandemic, states were not responsible for COVID-19 deaths *per se* but for their responsiveness to the pandemic through policy decisions such as lockdowns, the number of hospital beds available, types of ventilators and the roll-out of vaccination programmes. Death counts were deserving of our attention as one way to assess state performance and policy decisions. These statistics, however flawed, allowed the public to interpret and make sense of the crisis. Real-time accounts of COVID-19 deaths demonstrated the "democratic importance" of data (Ferry *et al.*, 2024, p. 192) and the mobilisation of public accountability during a crisis. In this paper, we highlight that during a crisis, public accountability is dynamic, demonstrating that the relationship between the state and its citizens is not always stable. Just as new information on the Hillsborough disaster provided accountability several decades after the event triggering new state responsibilities, public account-giving can be cathartic for societies by identifying failures as a means of redress or reflection (Bovens, 2010).

Our research has shown not all jurisdictions have adequate systems of death registration, nor do they have the necessary capability or political will to provide even a moderate level of information transparency. As the COVID-19 crisis progressed, to overcome the limitations of using compromised accounts, modelling COVID-19 deaths in the terminology of excess deaths created a new measure of *ex-post* pandemic performance, with quite startling results. This measurement aspect of accounting is evident in "the rules of the game" or schemes of rationality that facilitate comparability by applying a scale or other statistical conventions. Subsequently, these remediated accounts of COVID-19 deaths allowed sense-making and the assessment of state performance as the outcomes of policy decisions and actions became apparent. Excess deaths were considered a superior indicator of pandemic preparedness and national healthcare resilience since it arguably prevented politically motivated under-reporting of COVID-19 deaths, allowing ex post geographic and temporal comparisons (Islam, 2022). Comparability, however, has the power to normalise excess deaths and this dehumanising transactional logic is a "poor vector for emotional and social impact" (Wernimont, 2018, p. 22). The quest for bureaucratic visibility to make sense of COVID-19 tempered the social and ethical aspects of evaluating state performance with questions of mere numerical accuracy:

> Models like [excess deaths] have the effect of putting a thin veneer of objectivity and science-thinking over what's basically an op-ed […] [u] sing any model to make an estimate […]is just bad practice (Shotwell in Adam, 2022, p. 314).

Notwithstanding the limitations of this paper, including confining discussion to only two of the models used to measure excess deaths and methodological limitation of researcher bias, adopting an ethnostatistical approach reminds us that remediating already problematic and incomplete data obscures the subjectivities of the "complex social and interpretive processes and practices of measurement and enumeration" (Gephart, 2017, p. 36). Given accounting relies on categorisation and aggregation of things that are not always alike, as well as the ubiquitous use of word-based quantitative expressions that are the result of remediation, for example, return on assets, an ethnostatistical approach could be applied in many contexts.

Reflecting on the accounting aspect of the assignation of value, it must be acknowledged that the development of the statistic, COVID-19 excess deaths, is a normalising exercise. Not only does it alter the way in which we think about the allocation of resources but also how we value life, particularly the young, the elderly and the vulnerable. Excess deaths, like the financial accounting concept of equity, is a residual derived from other estimates. Our *locus* of concern during COVID-19 and subsequent public accountability needs shifted from the micro measures that contributed to the death count, like hospital beds or lockdowns, to overall measures that allowed us to make sense of the previously unimaginable. This modelling of excess deaths did not reflect the human suffering that is/was represented by each COVID-19 death. And while "the rich world suffered relatively badly […] most of the dying [was] elsewhere" (The Economist, 2021a, n.p.). Perhaps the most important feature of modelling excess deaths as a mechanism of public accountability was it enabled the necessary feedback and a period of reflection to mark the resolution of a crisis that took so many lives. However, along with this resolution, deaths attributable to COVID-19 have now become normalised to a point where they are no longer anomalous or represented by excess deaths.

Notes

[1.] SARS-COV-2 is the name of the virus which causes the disease known as COVID-19.

[2.] The ICD has its genesis in 1893 with the production of the International Statistical Institute's International List of Causes of Death (WHO, 2020a).

[3.] These terms are used interchangeably and for consistency we have used the term 'level' consistent with Gephart (1988).

[4.] As of April 13, 2024, the Worldometer Coronavirus Tracker was no longer being updated because the majority of countries providing evidence stopped reporting statistically valid totals.

[5.] John Hopkins also ceased data collection efforts because of the slowing down in the reporting cycle of COVID-19 deaths.

[6.] The WHO revoked COVID-19s status as a public health emergency of international concern on 5 May 2023. However, COVID-19 is still widely referred to as a pandemic.

[7.] Eurostat produces European statistics in partnership with National Statistical Institutes and other national authorities in European countries. EuroStat generates an array of country statistics such as economic, population social and health related including information related to COVID-19.

[8.] The STMF is a resource collated within the Human Mortality Databasae (HMD). This resource was established as a consequence of the COVID 19 pandemic. At the time of writing STMF included weekly death counts from 38 countries (www.mortality.org/).

[9.] A collaboration between UC Berkeley and the Max Planck Institute in Germany

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