Evidence on the accuracy of the number of reported Covid-19 infections and deaths in Lower-Middle Income countries

Robin Richards
Independent Research Consultant
17 July 2020

Question

- What evidence is available on the accuracy of the number of reported Covid-19 cases and deaths in Lower-Middle Income countries?
    - Were reasons mentioned for data inaccuracies identified in reporting Covid-19 cases?
- Is there evidence of inaccurate data reporting in previous global health crises, relating to infectious diseases?

Contents

1. Summary

This rapid literature review focuses on the accuracy of the number of reported Covid-19 infections and deaths in official records released by governments in Lower-Middle Income Countries (LMICs). In addition, the review highlights some of the reasons for data inaccuracies and/or manipulation of Covid-19 statistics. The second part of the review assesses if there are any examples of earlier infectious disease pandemics where there were data inaccuracies and/or deliberate concealment of data to hide the true picture of the epidemic.

The evidence reviewed suggests that there are data inaccuracies in reporting of Covid-19 infections in LMICs. There is also evidence of deliberate inaccuracies and concealment in reporting of Covid-19 infections in these countries. Examples highlighted include: Tanzania and Nicaragua. However, the review shows that at the country-level, inaccuracies in reporting may be a combination of valid capacity limitations as well as the deliberate concealment of the true picture of Covid-19 cases. The accuracy of Covid 19 data reporting is not restricted to LMICs, it is a global phenomenon that also affects high income countries.

Findings show that inaccuracies in officially reported data are not unique to the Covid-19 pandemic, but there are similar instances in reporting problems in previous infectious disease outbreaks. Examples highlighted include: Ebola and HIV.

The literature used for this review was mostly from grey sources and published news articles. Some peer reviewed journal material was utilised but this was limited due to the scarcity of these sources.

 The following key points emerge from this review:

- There is evidence of data inaccuracies in reporting on Covid-19 infections. Data inaccuracies may be attributed to deliberate concealment of the true picture of infections or because of capacity and resourcing issues in LMICs (see for example: Lau et al., 2020 and Medical Brief, 2020)

- Underreporting of Covid-19 infection and mortality data is a problem that many countries around the world experience and this is not limited to LMICs (Lau et al.,2020 and Alijani, 2020);

- Underreporting and inaccurate reporting of Covid infection and mortality data in LMICs can be the result of poor surveillance data such as from hospital admissions as well as weaknesses in country Civil Registrations and Vital Statistics (CSVS) data collected (Alam et al., 2020);

- Underreporting of Covid-19 data in LMICs may also be a function of the pandemic itself because in these countries the capacity of National Statistical Offices to collect civil registration data may be reduced (UN Department of Economic and Social Affairs (2020);

- When deliberate misinformation of Covid-19 data occurs, the group that appears to be most influential in terms of civic engagement of content through social media, is politicians and celebrities. This is particularly the case when the population does not trust official news or data from government sources on the virus (Brennan et al., 2020);

- Media freedom within countries may be an indicator of the accuracy of reporting of Covid-19 cases. When there is less media freedom, fewer deaths from the virus are reported Besley and Dray, 2020);

- In countries headed by more authoritarian governments such as Tanzania and Nicaragua, underreporting of Covid infection rates has been observed (Medical Brief, 2020 and Confidencial, 2020); and
- Data-reporting problems and misrepresentations of the disease are also found in previous epidemics, such as Ebola in West Africa between 2014-2016 and HIV/AIDS in South Africa during the 1980s and 1990's (Dalziel et al., 2020; Owada et al., 2020; Mian and Khan, 2020).

2. Accuracy of reporting Covid-19 infection rates and deaths

Underreporting and inaccurate reporting of Covid-19 cases is not just a problem of LMICs, it is a global concern. Lau (et al., 2020) use the mortality rate as a proxy-measure to estimate the extent of underreporting of Covid-19 cases in eight global epicentre countries. The researchers compare the total reported case numbers in each country with the total Covid-related deaths. Using the estimated mortality numbers, the researchers conclude that the following countries: France; Italy; Spain; Iran and the United States, have extremely high numbers of underreported cases.

See: Figure 1: Estimating the extent of under testing and underreporting of Covid-19 cases in selected countries, source: (Lau et al., 2020, p. 5), https://www.sciencedirect.com/science/article/pii/S253104372030129X?via%3Dihub#fig0025

The 'Fold Change' represented on the y axis in the Figure above is the indicator for underreporting and underdetecting of Covid cases.

Christiaens (2020) confirms that underreporting and inaccuracies in the number of Covid-19 cases is a widespread phenomenon across the world and a solution is for countries to agree on standardised approaches for measuring Covid-19 mortality. There is also inconsistency in the way countries count Covid 19 deaths. For example, some countries only count deaths from Covid-19 if people had tested positively such as Iran (Alijani, 2020). Russia on the other hand reportedly classifies death in terms of the organ in the body that directly caused it (Nechepurenko, 2020). Whereas other countries count all deceased people with Covid-like symptoms (termed 'probable Covid cases') in their Covid mortality data. An example of this is the United States (Sung and Kaplan, 2020).

Alam, et al (2020) confirms that in countries around the world, monitoring mortality is a key indicator utilised to respond to Covid-19. Country surveillance systems are used for these purposes and include patients admitted to hospitals who tested positive for Covid-19. In addition, for some countries, deaths occurring outside hospitals are also included in Covid statistics, for example the United Kingdom (Roberts, 2020). People suspected of dying from Covid-19 are therefore part of the surveillance system. In high income countries, gaps in data on Covid-19 are eventually filled through records from Civil Registrations and Vital Statistics (CSVS) collected by government. However, for LMICs, these two key data sources (hospital surveillance and CSVR data) may not be complete and therefore mortality data is less reliable as an indicator of actual Covid-19 deaths. In such contexts, researchers use models to assess the effects Covid-19 may have on mortality (Alam, et al.,2020).

O'Neil (2020) identifies a number of key reasons to doubt Covid-19 country reported data:

- **The global availability of testing kits for Covid-19:** because of the shortage of testing kits in many countries, testing is targeted at those who display clear Covid symptoms. In South Africa and the United States, testing is limited to people who are sick enough to be admitted to hospitals. In the United States, about 10% of those with infection need to be hospitalised and therefore the actual number of those infected may be far higher. In South Africa, a small segment of the population with private medical insurance, are able to be tested immediately, if they present a letter from a medical practitioner and pay a fee for the test.[1]

- **Inaccuracy of tests:** Covid tests reportedly produce many more false-negative tests than false-negative results. It is estimated that false-negatives could be as high as 30%. This means that the real number of infections should be inflated.

- **The number of tests completed does not match the number of people tested (cause of test inaccuracy):** this means that some people are tested twice to ensure their results. Therefore, the share of the population tested compared to the number of people found to be infected provides a misleading picture of infection cases. The number of infections is likely to be higher.

- **The lag-effect from infection to death:** there is a time-lag of several weeks between diagnosis and death and therefore the infection statistics and death data are not in alignment.

- **The meaning of hospitalisation statistics is changing:** officials sometimes use hospital admissions as an indicator of Covid infections and lower hospital admissions can be utilised as a proxy for reduced infections and Covid illness. However, admission to hospital due to Covid is becoming more stringent. This is happening in hospitals in Tanzania and India for example. Hospitals are already full and ambulances services are scarce and people are avoiding hospitals with emergency rooms that are already overwhelmed and where there is a risk of infection. Fewer Covid-related hospital admissions can therefore not be used as a reliable measure of reduced Covid infections.

- **Reporting deaths are not immediate or consistent:** this may be due to administrative processes, including paper-filing and communicating with family members. Time-lags in these processes delay the releasing of accurate weekly statistics.

- **Attribution of death due to Covid is not consistently applied:** once a person is deceased, the motivation for testing for Covid is diminished especially in the context of a shortage of testing equipment.

- **Incentives to hide Corona virus statistics:** even countries that appear to have dealt with the epidemic successfully and/or which are upper-middle income countries such as China have been accused of hiding the true Covid infection data. Resourcing and capacity issues in LMICs.

The United Nations Department of Economic and Social Affairs (2020) released the results of a global survey on the impacts of the Covid-19 pandemic on the operations of National Statistical Offices in LMICs. The survey highlighted the negative effects that Covid-19 had on NSO's ability to collect data over this period as well as their capacity to meet international reporting

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[1] Dr Zaid Kimmie, Epidemiologist. Consultant to National Institute for Communicable Diseases

requirements. The pandemic itself therefore may have impacted on the ability of NSOs to collect surveillance data including civil registration data (such as recorded deaths). The report for example notes that 65% of main offices of NSOs are partly or fully closed and that 90% of staff in these offices have been instructed to work from home and a further 96% have fully or partially stopped face-to-face data collection (UN, 2020, p.3). In low and lower middle- income countries, 9 out of 10 surveyed offices said that the pandemic had affected their ability to meet international reporting requirements. A further eight out of ten offices indicated that they were operating with reduced capacity because of funding constraints due to Covid-19 (UN, 2020, p.3).

3. Incentives for hiding Covid-19 data and other explanations for poor reporting

This section highlights some of the main reasons for poor data reporting and/ or manipulating Covid-19 data. Key sources of information inaccuracies in countries and the impact of data reporting inaccuracies are also highlighted. Examples of LMICs are used in this section to illustrate reasons for data manipulation and poor reporting.

Reasons for data inaccuracies and manipulation of Covid data with special reference to LMICs

Using regression analysis, and controlling for factors such as population age, per capita income and country-region, Besley and Dray (2020) conclude that countries with media freedom report more deaths than predicted during infectious disease outbreaks. This is in comparison to countries with censored media which were reporting fewer deaths than forecasted (Clustered Standard Error 0.0578, significant at 1% level). Related to the previous finding, some LMICs have more authoritarian governments where media freedom is restricted.

Examples from a selection LMICs in different regions across the world illustrate at a granular-level government reasons for not reporting, hiding or manipulating data on Covid infections. These reasons very often boil down to restricted media freedom either in place before Covid-19, or restrictions that were put in place because of Covid. Examples of countries selected are from Africa, South America and Asia.

- **Tanzania and other African states:** In Tanzania, opposition activists have accused the government of hiding Covid-19 statistics and believe that the mortality rate is far higher than government claims (Medical Brief, 2020). President John Magufuli reported that infections had been "massively" reduced but provided no proof to this claim. Government had released no Covid statistics since April 29 and, furthermore, no testing had been undertaken since 4 May when 21,000 samples were taken from people in Dar es Salaam. Evidently, the processing of these tests was halted due to complaints from the President that the national medical laboratory was publishing false results. Laboratory officials had been suspended after President Magufuli reportedly performed secret tests on Covid testing and allegedly found that a papaya and a goat tested positive (News24, 2020). There are also reports that government is claiming hospitals are empty, but an activist noted that government had deliberately "decongested" public hospitals to counter a claim made by the US Embassy that hospitals were being overwhelmed by Covid-19 cases. Furthermore, activists claimed that government was sending many patients home

which was worsening the Covid health problem. It is also alleged that government is not treating Covid as a national public health crisis, but as national security issue (Fabricius, 2020). For example, government was clamping down on media for any negative reporting on the government's handling of the pandemic.

Journalists reporting negative stories have been fired and as a result of such intimidation they are practising self-censorship. Tanzania is holding national elections in October and activists believe that no election observer missions would be allowed this year (Fabricius, 2020). News24 (2020) reported that Tanzania had summoned the top official at the US Embassy to object to an Advisory that warned of "exponential growth" of Covid-19 cases in the country. The Advisory also warned that many hospitals in Dar es Salaam had been overwhelmed. The Tanzanian Ministry of Foreign Affairs claimed that this was inaccurate information and could cause panic among Tanzanians and visitors (News24, 2020).

In other African states, key weaknesses in data collection, sharing of information and surveillance of Covid-19 statistics are highlighted by Houreld and Lewis (2020). For example, Equatorial Guinea has not shared its Covid figures with the World Health Organisation (WHO) since late May when its government accused the WHO of inflating caseload numbers and demanded that it recall its representative. The authors also note that whilst some countries will not share their Covid statistics others cannot because of security issues. For example, Islamists and ethnic militias in some regions make it impossible for states such as Burkino Faso; Niger and Mali to monitor the spread of the virus throughout the country. There are also Covid test kit shortages in Burkino Faso which restricts its testing to contacts of confirmed cases and foreign travellers. Therefore, data on local spread of Covid is poor. The Democratic Republic of Congo was already battling with an Ebola outbreak and it took three months before its government was able to process Covid tests outside Kinshasa. The use of Civil Registrations to fill in data gaps in Covid reporting is an option when other surveillance data is not available. However, this data is also incomplete in many African states and only eight countries, viz: Algeria, Cape Verde, Djibouti, Egypt, Mauritius, Namibia, Seychelles and South Africa record more than 75% of their deaths. In contrast, Ethiopia records less than 2% (Houreld and Lewis, 2020).

- **Nicaragua:**
  In Nicaragua the signs are everywhere that Covid -19 is ravaging the country (Flores Bermudez and Robles, 2020). However, the government insists that the virus is under control. This was reportedly one of the last countries in the world to resist adopting strict measures to stop the spread of the disease. It never closed schools and allowed businesses to remain open. The government not only permitted mass public gatherings but organised them (Bermudez and Robles, 2020). It is reported that health authorities are struggling to get accurate case numbers and testing is limited and controlled by the government. Government has also suspended an Epidemiological Bulletin that reports infectious diseases in the country. The Government claims that such public information could be used as a weapon against it (Confidencial, 2020).

  An independent body, the Citizen Observatory has started collecting infection numbers and by early May it had reported 1,500 Covid cases and approximately 360 deaths

(Semana, 2020). Hospitals are said to be near collapse and photos of morgues filled with bodies and clandestine burials indicate the real situation. It has also been reported that the authorities collect bodies from hospitals either late at night or early in the morning as a means of concealment of the true picture. The decision to hide Covid case numbers in Nicaragua is allegedly motivated by a number of factors, these include political, family and economic interests. For example it is postulated that political leaders are using the pandemic to lift sanctions on the families of the President and government officials, and that it is hoped that in the wake of the crisis, international funds will enter the country to support its rehabilitation (Wallace, 2020). A further reason cited is that by downplaying the gravity of the spread of the virus, people will be encouraged to attend political celebrations in July to remember the 41st anniversary of the Revolution (Wallace, 2020).

- **Ecuador:**

  In Ecuador the death toll from Covid-19 is said to be 15 times higher than the official number reported by government. This was according to an analysis of mortality data by New York Times (José María León Cabrera and Anatoly Kurmanaev, 2020). Between March 1 to April 15 approximately 7,600 more people died according to this analysis. Whereas, the number of deaths that the government officially attributed to the virus was 503 people (José María León Cabrera and Anatoly Kurmanaev, 2020). However, in contrast to other countries, the Ecuador government acknowledged that its mortality figures fell far short of reality. Its President alluded to the lack of testing capacity and the shortage of medical services as the reason for reporting inaccuracies: *"We know that both the number of infections and the number of deaths are falling short,…The reality always overtakes the number of tests and the speed of attention of medical services"* Ecuador's president, Lenín Moreno, public address on April 2. It is reported that Ecuador is already dealing with its worst economic crisis in decades, even before the arrival of Covid-19 (José María León Cabrera and Anatoly Kurmanaev, 2020).

- **Afghanistan:**

  In Afghanistan it is reported that the number Covid cases is surprisingly low and this has cast doubt over the accuracy of reporting on the virus and government 's possible role in hiding statistics on the virus. The low number of reported cases is especially surprising considering Afghanistan shares a border with one of the globe's coronavirus hotspots (Iran) and thousands of Afghan refugees began returning to the country with symptoms of Covid (Shadi Khan Saif, 2020). In addition, its eastern border (with Pakistan) has also been experiencing a spike in Covid-19 infections and people residing in this country have also crossed the border back into Afghanistan (Shadi Khan Saif, 2020). There is speculation as to whether Afghanistan's low Covid case count is due to deliberate underreporting or because of a country's fragile health system. A previous director in Afghanistan's public health sector believes that the real figure could be much higher than the reported official figure. He attributes this to two factors: firstly, the resources needed for nationwide testing are insufficient and the expertise to deal with a crisis of this magnitude is not available. Secondly, the population still doubts the seriousness of the disease and they are not following the recommended measures to avoid infection (Shadi Khan Saif, 2020).

Sources and impact of misinformation in Covid-19

Brennen et al. (2020), analysed a sample of 225 pieces of information relating to Covid-19 that were published in English between January and the end of March 2020, drawn from a portfolio of fact checks compiled by the company *First Draft News.* The researchers found that rather than the information being completely fabricated it had been manipulated so that existing factually correct information is re modelled, 'spun' or recontextualised. The most common type of misinformation identified from the study concerned 'misleading content', comprising 29% of the identified categories. This type of information contained some true content but it had been reorganised and recontextualised in way that made such information false or misleading. The researchers also identified the sources of misinformation and although high level politicians, celebrities and other public figures produced or spread 20% of the misinformation in the sample, this information was the most influential in attracting high levels of social media engagements with it. Prominent public figures played a disproportionately large sized role in spreading misinformation. The researchers note that the most common types of claims concerned the actions and policies officials are taking to address Covid-19. The second most common type of misinformation concerned the spread of the virus through communities. Statements on this subject related to the geographic areas that had seen their first infections to content that accused specific ethnic groups of spreading the virus (Brennen et al, 2020, p. 6). Misinformation about Covid-19 often challenged information communicated by public authorities and the researchers suggest that this type of misinformation-spread may be a function of the failure of public officials in conveying clear, useful and trusted information to the public. In the absence of sufficient information about Covid, misinformation may fill these gaps. Sectors of the public which distrust their government or political parties may be more receptive to this kind of information and tend to be less willing to trust official communications on these subjects.

4. Evidence of underreporting and/or misinformation in previous infectious disease pandemics

Example1: Ebola

Between May 2014 and November 2015, Sierra Leone experienced a rapid spread of Ebola with 8,704 cases being reported and over 3,589 deaths recorded (Owada et al., 2016). Although initially, surveillance and data management of the outbreak was weak, during the latter part of the outbreak this improved substantially at all levels (Owada et al., 2016). The authors suggest that key problems with surveillance and data reporting of the disease was more to do with weaknesses in data collection and management processes, which were rectified as the disease response developed in the later stages. Typical problems identified as reasons for initial underreporting of cases included the following aspects:

- Data collection issues resulting from incomplete records and recording of information (such as gender, onset of the disease; age and locality of those infected. This was attributed to a lack of training of surveillance officers and supervision. There was also a lack of active tracing of those suspected of being infected.

- Data transmission: in the early stages of the outbreaks there was a lack of clear administrative processes for how deaths from confirmed cases were reported.

- Data cleaning: in the early stage data collected on infections and deaths was incomplete and of low quality. This accounted for the underestimation of deaths. A back log of

suspect or probable cases were not being updated and reported causing delay in reclassification of suspect and probable cases.

Despite these improvements in the administrative and research processes, other researchers note that there was still significant underreporting of Ebola cases during the 2014-2016 outbreak in West Africa and this was attributed to unreported non-hospitalised cases and community deaths (Dalziel et al., 2018).

Example 2: HIV

The HIV epidemic in South Africa emerged in the early 1980's. During this time, the country was dealing with unrest and the political consequences of apartheid which was in the process of being dismantled. Public attention on the emerging HIV infection crisis was therefore minimal and by the mid-1990's HIV infection rates had increased by 60% (Cichocki, 2020). By the mid 1990's then President Nelson Mandela acknowledged the severity of the disease as South Africa became the largest population with HIV in the world (Cichocki, 2020). By the 2000's, the South African Department of Health had outlined a five-year HIV/AIDS plan which received little support from President Thabo Mbeki at the time. Misinformation was widespread during the early years of the HIV epidemic. It was during that period that it was argued that HIV did not exist or cause AIDS. The Mbeki administration refused to accept the efficacy of HIV antiretroviral medication and the government instead promoted various herbal remedies such as garlic, beetroot and lemon juice for HIV treatment (Mian and Khan, 2020). This led to further rapid increases in HIV transmission and ultimately the loss of 300,000 lives (Mian and Kahn, 2020).

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Acknowledgements

Suggested citation

About this report