Deaths among adults before and during the COVID-19 pandemic in nine communities of Yemen

Briefing note for non-technical readers

October 2022

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What was this study about?

Most of Yemen has experienced armed conflict and insecurity since 2014. In addition, the country has been affected by several waves of the COVID-19 pandemic since early 2020.

Our team of researchers was funded by the United Kingdom government to study how these events have affected health in Yemen: in particular, we wanted to see to what extent mortality (i.e. how many deaths occur in the population) has evolved since the days before the current armed conflict broke out.

At the time this study was initiated, there was to our knowledge **no recent, published information on mortality in Yemen**. Many other studies in other countries affected by similar challenges have shown that both armed conflict and COVID-19 have resulted in a substantial increase in mortality.

How were the data collected?

Our initial plan was to collect data from various locations across Yemen. However, we were limited by insecurity and lack of authorisations from different authorities. In the end, we were able to collect data from **nine communities (four in Aden governorate and five in Ta'iz governorate)**.

The nine sites were selected because of their different conditions (some have experienced conflict very directly, while others have been less affected but have received many displaced persons; some are rural and others urban).

The nine communities have a population size as small as 2700, and as large as 22,000. We have chosen to keep the names of these communities anonymous, and instead simply identify them as **A1 to A4 for Aden, and T1 to T5 for Ta'iz**.

Within each community, our team of researchers contacted a variety of individuals that we were told were likely to know about many of the deaths that had occurred in their neighbourhoods. These individuals included **male and female community leaders, imams, burial preparers, teachers and healthcare workers**. We only collected data if the individual gave their consent.

From each individual we obtained a **list of people who had died since the start of 2014**. We then combined the lists using a statistical technique which looks at the extent to which the different lists mention the same deceased persons, and **estimated the total number of deaths** occurring in that community. This method has previously been used in other settings of Africa and Asia where authorities don't have complete records of births and deaths.

## Who did the study, and how was this funded?

The United Kingdom government's Foreign, Commonwealth and Development Office funded the study as part of its humanitarian assistance activities. However, the UK government had no role in designing, implementing or analysing the study. The researchers acted independently.

The study was a **collaboration between the University of Aden, the University of Ta'iz and the London School of Hygiene and Tropical Medicine**, a public university in the United Kingdom that carries out research and teaches students around the world on diseases and the health of populations. Yemeni researchers from Aden and Tai'z led the data collection. The study received **authorisations** from University of Aden and the London School of Hygiene and Tropical Medicine and from the Ministry of Health.

What were the findings?

Between 14 January and 31 March 2021, **138 interviews** were conducted, 35 with women and the remainder with men. The interviewees **listed a total of 2427 deaths**: while there was a peak in deaths mentioned to have occurred in the year 2020, even in previous years a fairly steady number of deaths was listed: this suggests that the people we interviewed were able to remember even deaths that occurred many years previously:
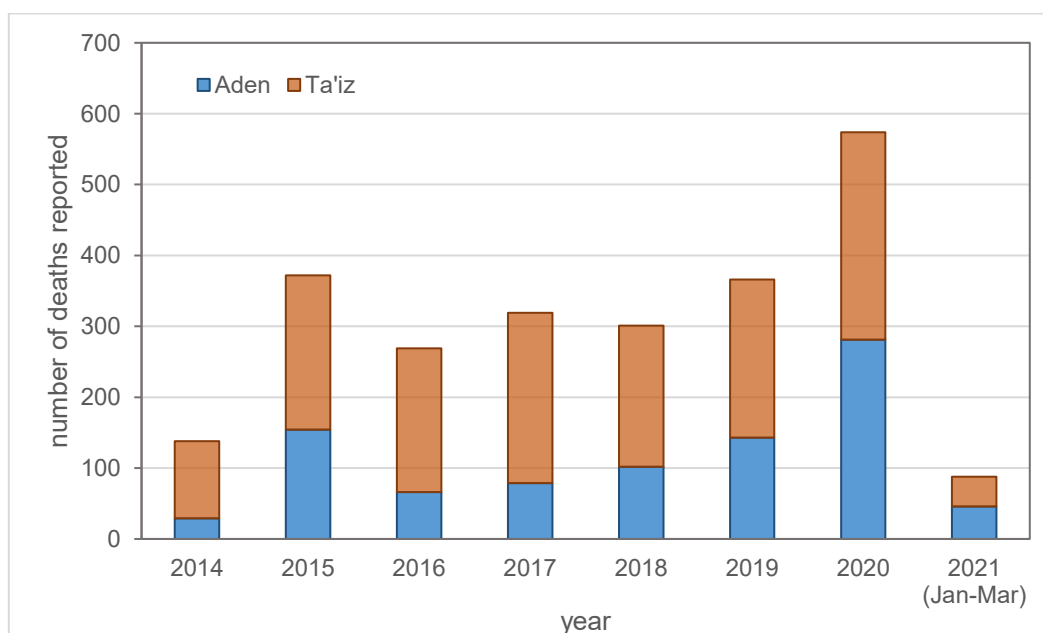
When looking at the **year 2020 specifically**, we noted that there was a spike in reported deaths during May, June and July, which may correspond with the first wave of the COVID-19 pandemic:
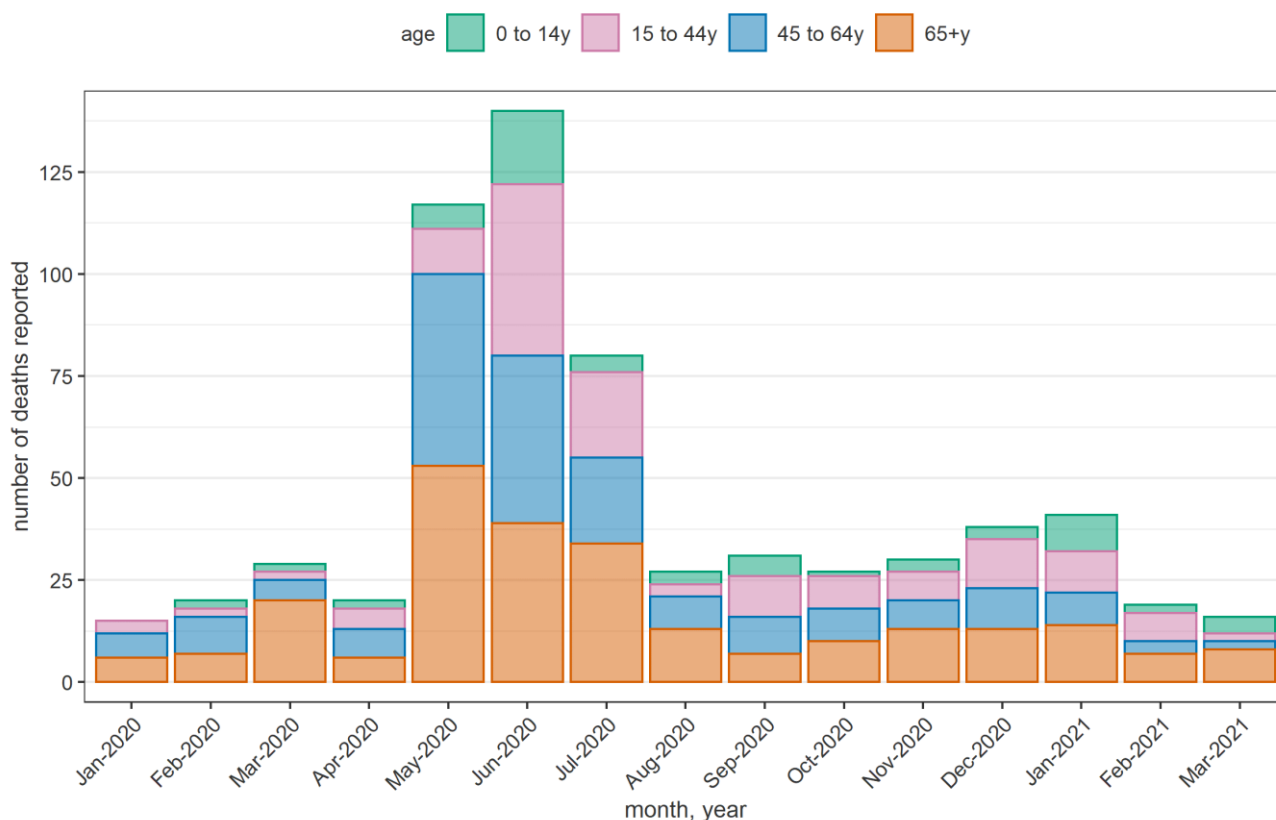
Not all deaths may have been listed by the individuals we interviewed, as it is difficult to remember or keep records of everyone who died: for example, only 25% (one out of four) of deaths listed were among women. That is why we used a **statistical technique that estimates *all* the deaths, including those that may have been omitted**.

However, we found it particularly difficult to obtain information on deaths among children: only 186 of the deaths listed (less than one out of ten) were among children below the age of 15 years. Therefore, **we only present results for older ages** (15 years old or older), which we refer to for simplicity as 'adults'.

The speed at which people are dying in the population is called a **'death rate'**. The following table shows our estimates of the death rate among adults in each site, for the period from 2014 to right before the pandemic, and the pandemic period. Specifically, this is the average

number of **adult deaths that occur every year, out of 1000 people**.

Instead of presenting a single number, we have reported a **range:** we are confident that the true value lies within this range. Thus, for example, for site A3 we think that the adult death rate during the period before the pandemic was at least 25 and up to 82 deaths per 1000 people per year.

As can be seen, our results are very imprecise for some of the sites. To obtain more precision, we would probably have had to study larger populations. What is also striking is how elevated the death rate is in some sites (A3, T1 and T4 especially): in these sites, interviewees reported that a high percentage of the deaths were due to **injuries sustained as a result of the war** (see the corresponding column on the table). In other words, it may be that the population of these sites suffered very high casualties during periods of conflict.

Site	Death rate among adults (people aged 15 years or older), per 1000 people per year		Percentage of deaths due to war injuries, out of all deaths listed
	January 2014 to February 2020	March 2020 to March 2021 (COVID-19)	
A1	No estimate possible: we did not have data on the population size		37%
A2	5 to 23	8 to 25	16%
A3	25 to 82	20 to 84	20%
A4	8 to 124	19 to 89	16%
T1	95 to 218	35 to 226	40%
T2	6 to 13	3 to 7	16%
T3	No estimate possible: we did not have data on the population size		8%
T4	26 to 193	3 to 386	51%
T5	1 to 16	1 to 138	16%

What do the results mean?

How can we make sense of these estimates? How high are the death rates we estimated? Based on the last census done in Yemen, the United Nations expect that the adult death rate in Yemen should be around **4 per 1000 people per year, if there hadn't been armed conflict** and a pandemic. For most of the sites, we can see that even the lowest value of the death rate that we estimated is higher than this expected value of 4: for example, in site A4, we think that before the pandemic the death rate was about two to thirty times higher (8/4 to 124/4) than it would have been in the absence of the conflict.

This study shows for the first time how mortality has changed in parts of Yemen from the days before the armed conflict until recent times. Each of the nine sites we did the study in shows a different pattern, but the overall picture seems to be that **mortality occurred a lot more frequently during the armed conflict period** than before. It wasn't clear based on this study whether mortality increased even more during the COVID-19 pandemic.

Overall, this study suggests that the war in Yemen has had a very substantial impact on the population, at least in the sites we did the study within. The levels of mortality we have estimated are usually considered very alarming by people experienced in providing humanitarian assistance.

Our study, however, has some **important limitations**. We cannot say whether the parts of Yemen that we did not collect data from have

experienced the same pattern of mortality: it may be that the communities we worked in were particularly affected by the conflict, or vice versa that places that we could not access have in fact experienced even higher mortality. Another important limitation is that we were not able to collect good information on deaths among children: we therefore cannot say how much different mortality was among the youngest members of the population.

Questions and feedback

If you would like to share your feedback or ask further questions about the study, please contact Mervat.Alhaffar1@lshtm.ac.uk (Arabic, English) or Francesco.Checchi@lshtm.ac.uk (English). A **full report** containing more detail on the methods and results has been published here: https://conflictandhealth.biomedcentral.com/articles/10.1186/s13031-022-00497-3.