



# Adult mortality patterns in Yemen before and during armed conflict and the COVID-19 pandemic: Evidence from a web survey of the global diaspora

## Briefing note for non-technical readers

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### What was this study about?

The ongoing war in Yemen has created a protracted crisis that has left nearly three-quarters of the population in need of urgent humanitarian assistance. Despite eight years of conflict there exist few robust estimates of how the crisis and COVID-19 pandemic have affected mortality in Yemen. The security situation has limited access to affected populations and thus limited options for collecting data on the ground. We attempted to generate mortality estimates using **data collected from members of the global Yemeni diaspora**, specifically Yemenis who live abroad but still have family in Yemen.

### How were the data collected?

We developed an **online survey** application that enabled participants to provide completely anonymised, confidential information about their families, and to invite others in their network to also take the survey. This approach is known as

web-based respondent-driven sampling (webRDS).

We sent **survey invitations** to a pool of individuals that we identified through our networks in the Yemeni diaspora community. Invitations were sent via the webRDS software we developed as part of this project. These initial respondents were asked to send the survey to five **other potential participants within their social networks**. These participants were in turn also asked to invite five of their peers, and so forth. The webRDS software sent survey invitations anonymously, without interference from the study team.

The survey asked members of the Yemeni diaspora to provide information about the status of their **close family members (including parents, siblings, nieces, and nephews) and those of their spouse** (if applicable). We stopped the survey once we received approximately 100 responses.

## 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 implemented by 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. The study received authorisation from the London School of Hygiene and Tropical Medicine.

## What were the findings?

Collectively our survey respondents provided data on 1704 individuals; of these 85 (5%) had died, with 65 (3.8%) dying in Yemen (see **Table**).

### Deaths among adult siblings

**Sibling mortality** amongst those aged 15-49 years old was 0.7 per 1000 people per year during the pre-war period compared to 1.1 during the war/pandemic period amongst males, and 0.8 versus 0.0 amongst females. Note that these estimates are quite imprecise due to small numbers.

## Deaths in older age groups

We analysed how the **survival of parents after their 50<sup>th</sup> birthday** changed as a function of time in Yemen, after accounting for differences due to gender and when people were actually born. During the war period, our best estimate was that our sample experienced a **2.5 times higher** risk of dying compared to the pre-war period; this risk rose **to 3.6 times** during the pandemic period (see **Figure**). We're 95% confident that risk was approximately between 1 and 6 times higher during the war period, and between 1 and 12 times higher during the pandemic period.

Analysis of the subset **of individuals who died in Yemen** also suggested an increased risk of dying during the war/pandemic period; however, these results were not statistically significant and therefore inconclusive.

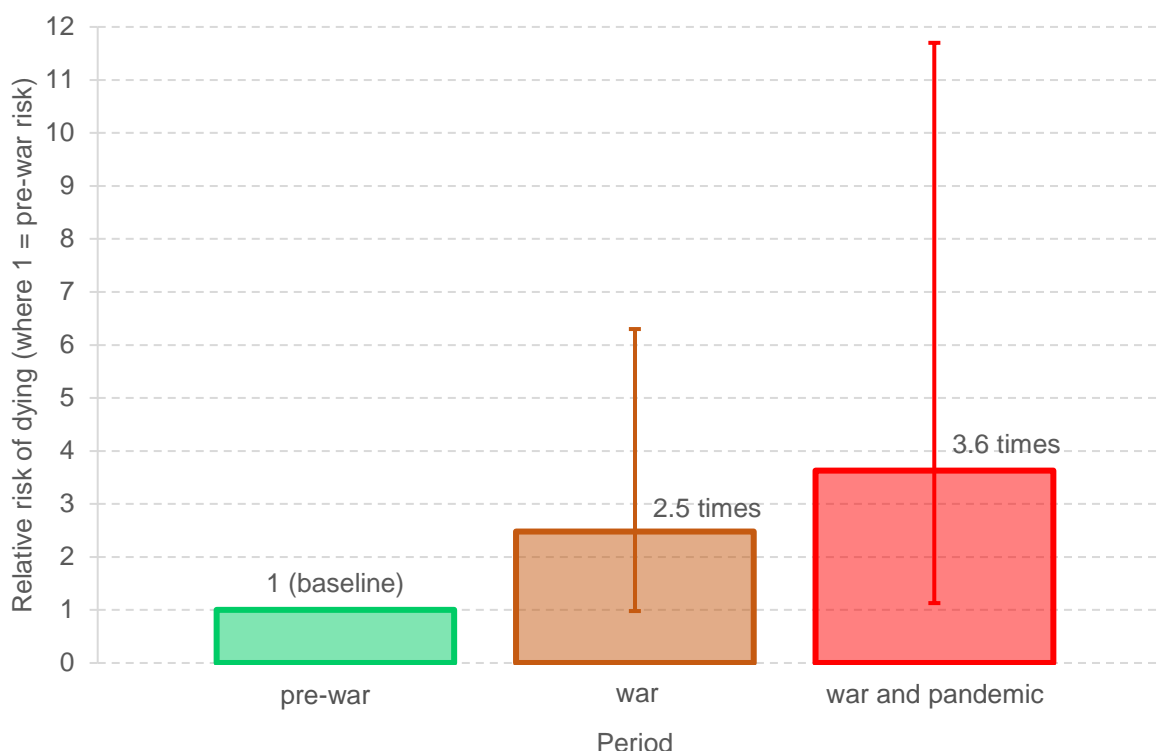
### What about children?

Regrettably, our sample was too small to allow estimation of mortality amongst children.

Table: Period and location of reported deaths, by familial relationship.

|                       | Pre-analysis period<br>(pre-January 2008) |          |                |              | Pre-war period<br>(January 2008 - May 2014) |          |                |              | War period<br>(June 2014- March 2020) |          |                |              | War and pandemic period<br>(April 2020- August 2022) |          |                |              |
|-----------------------|---|----------|----------------|--------------|---|----------|----------------|--------------|---------------------------------------|----------|----------------|--------------|--|----------|----------------|--------------|
|                       |   |          |                |              |   |          |                |              |                                       |          |                |              |  |          |                |              |
|                       | 2008                                      |          |                |              | 2014  |          |                |              | 2014                                  |          |                |              | 2020   |          |                |              |
|                       |   |          |                |              |   |          |                |              |                                       |          |                |              |  |          |                |              |
| Died outside of Yemen | 1   | 1        | 0              | 2            | 4   | 1        | 0              | 5            | 5                                     | 1        | 2              | 8            | 5  | 0        | 0              | 5            |
| Died in Yemen         | 23  | 4        | 2              | 29           | 8   | 2        | 1              | 11           | 14                                    | 2        | 3              | 19           | 4  | 1        | 1              | 6            |
| <b>TOTAL</b>          | 24  | 5        | 2              | 31           | 12  | 3        | 1              | 16           | 19                                    | 3        | 5              | 27           | 9  | 1        | 1              | 11           |
|                       | Parents                                   | Siblings | Nieces/nephews | <b>TOTAL</b> | Parents                                     | Siblings | Nieces/nephews | <b>TOTAL</b> | Parents                               | Siblings | Nieces/nephews | <b>TOTAL</b> | Parents  | Siblings | Nieces/nephews | <b>TOTAL</b> |

Figure. Risk of dying as a function of period in Yemen's recent history, relative to before the war.



### What are the implications?

Our findings suggest **decreased survival** amongst older Yemeni adults during the war and pandemic periods, when compared to the pre-war period.

To our knowledge this is the first instance of health data within a country being measured through a survey of its diaspora. Our study contributes to a better understanding of the impact of the crisis on Yemenis' health.

### What are the main limitations of the study?

Our **sample size** was too small to produce precise estimates. Our sample may also be over-representative of those with smaller families (as those with large families may have chosen not to complete the survey) and those who had not experienced conflict-related bereavement (as those who found the survey topic distressing may not have completed it or sent it to others who were similarly bereaved).

Based on questions we asked about household characteristics, it is also **likely that our sample differs from the general population in Yemen** in terms of being wealthier and more representative of urban settings; as higher household wealth likely improves survival, this is an important limitation that should be borne in mind when interpreting our results.

### Where is this study published?

We have submitted this work to a peer-reviewed journal. It is currently under consideration. However, you can access the non-peer reviewed pre-print here: [Adult mortality patterns in Yemen before and during armed conflict and the COVID-19 pandemic: Evidence from a web survey of the global diaspora | Research Square](#).

### Questions and feedback

If you have any questions or feedback please contact [Catherine.McGowan@lshtm.ac.uk](mailto:Catherine.McGowan@lshtm.ac.uk) or [Francesco.Checchi@lshtm.ac.uk](mailto:Francesco.Checchi@lshtm.ac.uk).