

## **JEWS AND CORONAVIRUS IN ENGLAND AND WALES:**

### **What the ONS study of COVID-19 mortality comparing different religious groups in England and Wales tells us about British Jewish mortality**

**Dr Daniel Staetsky**

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#### **Introduction**

In June 2020, the Office for National Statistics (ONS) published the results of an investigation into mortality from COVID-19 by religious group.<sup>1</sup> The investigation showed that Jews had elevated mortality from coronavirus. It revealed that with age, sex, place of residence, population density, socio-economic status and health status controlled for, the mortality of British Jews from COVID-19 was higher than the mortality of British Christians. Specifically, between 2 March and 15 May 2020, the risk of death from COVID-19 for Jewish men was almost twice as high as among Christian men, all other things being equal. For Jewish women too, elevated mortality was also observed, with their risk of death being 1.2 times higher than among their Christians counterparts, all other things being equal.

Within the Jewish community, the ONS report seemed to confirm people's worst fears, and provide empirical evidence that Jews were significantly more susceptible to COVID-19 than others, as had been rumoured and reported since the early days of the pandemic.<sup>2</sup> For professional demographers, however, the ONS report raised as many questions as it solved. At the very least, the elevated Jewish mortality result makes an unusual finding in Jewish demography. The Jewish communities of the Diaspora and Israel consistently feature in demographic studies as examples of groups with relatively low mortality.<sup>3</sup>

Further analysis is required to fully clarify the reasons behind the situation, and, following the publication of the results, JPR issued a recommendation to the ONS concerning the type of analysis required. In particular, JPR asked the ONS to evaluate the situation of Jewish mortality *outside* of the coronavirus pandemic period – something that had become possible owing to the existence of the innovative data product that the ONS created: the 2011 Census file linked to mortality records. By

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<sup>1</sup> ONS. 2020. *Coronavirus (COVID-19) related deaths by religious group, England and Wales, 2 March - 15 May 2020*.

<sup>2</sup> For just two examples see: Frot, M. 2020, March 25. '22 UK Jews have died after contracting coronavirus, figures show,' Jewish News, <https://jewishnews.timesofisrael.com/at-least-20-uk-jews-have-died-after-contracting-coronavirus-figures-show/>. Heilman, U. 2020, May 5. 'How the coronavirus hitting the Jewish communities worldwide, a country-by-country breakdown,' Jewish Telegraphic Agency, <https://www.jta.org/2020/05/05/global/how-the-coronavirus-is-hitting-jewish-communities-worldwide>

<sup>3</sup> For a detailed presentation see: (1) Staetsky, L.D. and Hinde, A. 2015. 'Jewish mortality reconsidered,' *Journal of Biosocial Science* 47 (3), pp. 376-401; (2) Staetsky, L.D., Hinde, A. 2009. 'Unusually small sex differentials in mortality of Israeli Jews: what does the structure of causes of deaths tells us?' *Demographic Research* 20 (11): 209-252; (3) Staetsky, L. 2011. 'The role of smoking in the explanation of the Israeli Jewish pattern of sex differentials in mortality,' *Population Studies* 65 (2): 231-244; (4) Staetsky, L. 2011. 'Mortality of British Jews at the turn of the 20<sup>th</sup> century in a comparative perspective,' *European Journal of Population* 27(3): 361-385. References therein can be consulted for further information and they cover about 100 years of research on this topic.

linking the 2011 Census file containing information on religion, and Jewishness in particular, to mortality records in subsequent years in order to estimate the differences in COVID-19 mortality between different religious groups, the ONS revolutionised the study of Jewish mortality in Britain. UK mortality records do not include information about the religion of the deceased, so this new approach opened up the possibility of examining the pattern of Jewish mortality in detail, not simply during the pandemic, but under normal conditions as well. This had been unthinkable until very recently. That analytical route, we maintain, should be pursued in the future – for Jews and others – for the sake of better understanding of the quality of life of different religious groups. The story of the quality of life of groups is eloquently told by their death statistics.

In the meantime, JPR undertook further analyses concerning the ONS findings, relying on (1) the rich documentation of the COVID-19 mortality investigation deposited by the ONS in the public domain; and (2) JPR's own resources in the field of Jewish mortality. These analyses have led to the following conclusions:

- 1) Elevated mortality of British Jews from COVID-19 is a 'blip,' a temporary and irregular development, in an otherwise positive picture of Jewish health in Britain. Jews in Britain have been described as a group with especially low mortality, and this fundamental condition is still observed among them. Heightened Jewish mortality from COVID-19 is not an expression of long-standing underlying vulnerability and ill health. In that, the Jewish situation is dramatically different from the situation of the Black, Asian and minority ethnic (BAME) population. Thus even though Jews have experienced high mortality along with other BAME groups, the underlying reasons are fundamentally different.
- 2) Strictly Orthodox Jews play a very small, if any, role in elevating coronavirus mortality levels among British Jews. The finding of elevated mortality is almost wholly reflective of the realities of mainstream (i.e. non-strictly Orthodox) Jews. Further insight is required into issues like the prevalence and the speed of the spread of the COVID-19 infection among Jews, as well as the lifestyles of mainstream Jews, in order to better understand the presence of the COVID-19 infection specifically in this population.

The following sections go through the research process underpinning these conclusions, and share the available evidence in support of them.

### **How to understand the ONS finding of relatively high Jewish mortality from COVID-19 in England and Wales, and how not to understand it**

The ONS report on COVID-19 mortality highlighted heightened levels of Jewish mortality. Seen in the perspective of existing research on Jewish mortality in Israel and the Diaspora, that finding was very unexpected, almost incredible. Jews are 'long-lifers,' one of the social groups with the lowest mortality possible in contemporary society. So the finding demands that we ask what happened to normally low Jewish mortality? Is it still here? If so, how can we explain the ONS finding of heightened mortality in the COVID-19 pandemic? Or, might it indicate that the tables turned in the early twenty-first century and Jews became – all of a sudden – a group with high mortality, perhaps due to the accumulation of more elderly and frail individuals as a result of very low mortality prevailing in the past, as some commentators have suggested? Alternatively, could it be that the explicit diagnosis of COVID-19 is present on a greater proportion of Jewish death certificates compared to others simply because Jews

tend to seek medical attention and investigations more readily than others – another hypothesis that has been suggested?<sup>4</sup>

These questions are not strictly of analytical interest. However, the answers matter for policy in the context of the COVID-19 pandemic. If Jewish mortality today is *generally* high, then heightened COVID-19 mortality is simply an expression, or an aspect, of this general state of affairs. What then needs to be explained and tackled by policy, if possible, is the issue of high mortality *in general* rather than in the specific case of COVID-19 mortality. This is precisely how the finding of elevated COVID-19 mortality in the Black, Asian and minority ethnic (BAME) population is interpreted and for sound reasons. In that case, the finding of high mortality is not unexpected, because previous research on health and mortality inequalities has long pointed out the compromised state of health among these subgroups within the British population. If, on the other hand, Jewish mortality is still generally low, as a rule, and COVID-19 mortality is unusual, what needs to be understood in the particular case of the COVID-19 pandemic is *what gave rise to that particular, and uncharacteristic, outcome?* Might it be something to do with the behavioural characteristics of Jews, i.e. the nature of their social and religious lives or perhaps non-compliance with government directives? Thus, the policy responses to these two situations are dramatically different, and the stakes are high. So, in short, is Jewish mortality still low in general, but abnormally high during the COVID-19 pandemic, or is it now high in general, and therefore ‘appropriately’ high also at the time of pandemic?

#### *An insight from Jewish communal statistics of deaths*

For many years, the Board of Deputies of British Jews and, more recently, the Institute for Jewish Policy Research, has collected data on the number of deaths in the UK Jewish population. The existence of these data makes it possible to reconstruct the ‘normal’ level of Jewish mortality and to understand whether or not the elevated mortality observed during the pandemic is an expression of long-standing Jewish vulnerability and ill-health, or due to some irregular, transient factors.

Drawing on Jewish communal statistics, in 2011-2016 (years of normal mortality), the average number of deaths in the UK Jewish community was in the range of 2,400-2,540.<sup>5</sup> Is this level high or low? A number of deaths as such is not a window into the level of mortality. It is shaped, over and above the force of mortality itself, by other factors, such as the size of a population and its age composition. A large population would have a larger number of deaths than a small population, even if its mortality (i.e. the underlying risk of death) is lower. This point is obvious, almost intuitive. And a very aged population (i.e. a population containing a large proportion of the elderly) would have a higher number

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<sup>4</sup> In the course of the investigation underlying this short report it was found that out of all *excess* Jewish deaths occurring in the period of 2 March-15 May 2020, about 78% had COVID-19 diagnoses explicitly mentioned on death certificates. The ONS analysis identified 453 Jewish deaths from COVID-19 (503, allowing for 10% of unlinked deaths). Our preliminary assessment, based on the communications with Jewish burial societies across England, is that 642 *excess* Jewish deaths took place in England and Wales in that period. Thus, 78% of all *excess* Jewish deaths had a ‘COVID-19’ diagnosis stated explicitly on death certificates (as  $503/642 \times 100$ ). In the general population, the respective figure was similar. In total, 166,577 deaths were registered in England and Wales in 2 March-15 May 2020, which were 52,709 deaths higher than the average figure for this period in 2016-2019 (excess deaths). In this period, 41,105 COVID-19 deaths were registered across England and Wales, thus the proportion of COVID-19 deaths out of all excess deaths is calculated as  $41,105/52,709 \times 100 = 78\%$ . The source of information on registered deaths in England and Wales in 2 March-15 May 2020 is: ONS, ‘Weekly provisional figures on deaths registered where coronavirus (COVID-19) was mentioned on the death certificate in England and Wales’, deaths up to week ending 19 June 2020.

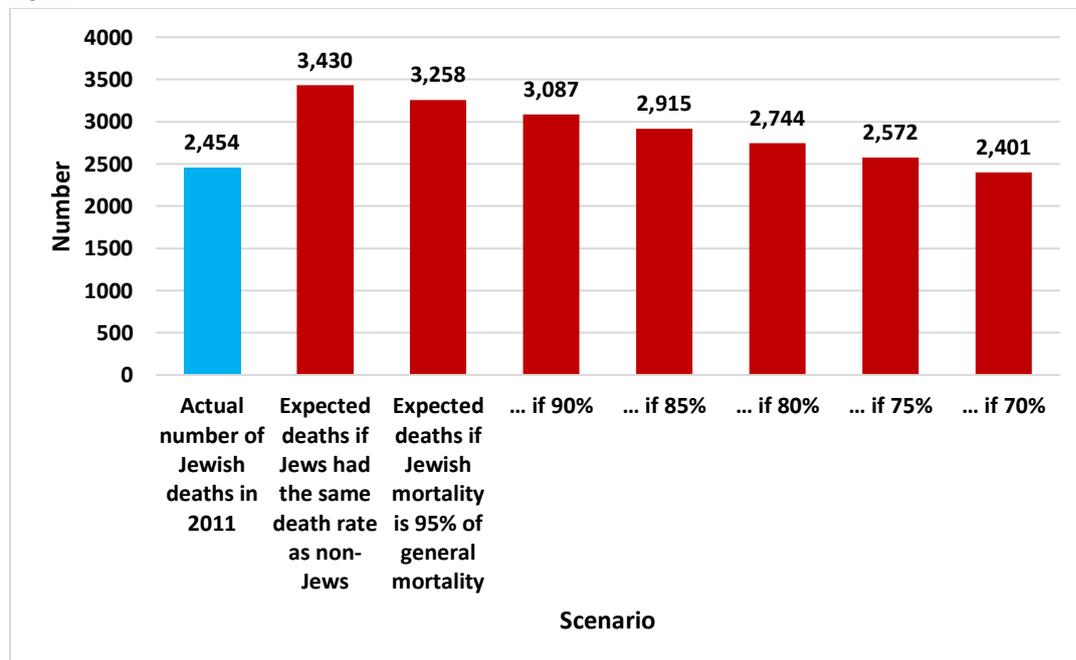
<sup>5</sup> See Casale Mashiah, D. 2018. *Vital statistics of the UK Jewish population: births and deaths*. London: Institute for Jewish Policy Research. The compatibility of Jewish communal statistics on deaths with the census and national registration of deaths in Jewish population has been demonstrated by previous research.

of deaths compared to a relatively young population of an equal size and with the same level of mortality. Thus, to have a clear view of Jewish mortality, one ought to control for Jewish population size and age structure. The exercise reported below controls both factors.

To clarify the level of Jewish mortality (i.e. the mortality rate, the measure of vulnerability), we can apply *mortality rates for the general population of England and Wales* to the age and sex distributions of the British Jewish population found in the 2011 Census and compare the number of deaths that such an exercise renders to the actual number of deaths (2,450 in 2011). If Jewish mortality (namely, the mortality rate) is the same or very close to the rate of the general population, the projected number of deaths would indeed be in the region of 2,450. If, on the other hand, Jewish mortality in reality is lower than the mortality of the general population, then the application of the general rate to the Jewish age and sex structure would produce a higher number than 2,450.

The results of this exercise are set out in Figure 1. The number of Jewish deaths we would expect to see in a given year assuming that general mortality and Jewish mortality are equal, is 3,430, which is about 40% higher than 2,450. Thus we can conclude that, under normal circumstances, Jewish mortality is indeed lower than general mortality. It follows then, that *the ONS finding of elevated COVID-19 mortality among Jews is an aberration, an exception to the rule.*

**Figure 1. Actual and expected Jewish deaths in Britain under different assumed levels of mortality, 2011**



Source: author's calculations based on (1) Casale Mashiah, D. 2018. *Vital statistics of the UK Jewish population: births and deaths*. JPR Report, June 2018; (2) Office for National Statistics. *Deaths: age, sex and marital status, 2010, 2011, 2012*; (3) Office for National Statistics. 2011 Census Table DC2107, available at *NOMIS, official labour market statistics*, <https://www.nomisweb.co.uk/>, and (4) Scotland's Census. 2011 Census Table SC2107, available at <https://www.scotlandscensus.gov.uk/ods-web/home.html>.

Further, Figure 1 also shows an attempt to figure out, by the method of sensitivity analysis, the approximate level of British Jewish mortality. In this exercise, we gradually reduced the level of general mortality (by 5%, 10%, 15%, 20%, 25% and 30%) and recalculated the number of deaths we would expect to see in the British Jewish population under the new schedule. The number of deaths approximating the actual level can only be achieved at a level of mortality that is 70-75% of (or 25-

30% lower than) general mortality. Experimentally, using the same method, we established that British Jewish mortality is lower than mortality of Jews in Israel.<sup>6</sup> This is not a definitive statement of how low British Jewish mortality actually is, but a rather unambiguous indication that – outside of COVID-19 times – it is *substantially lower* than general mortality. Had this not been the case, we would have seen, under normal circumstances, a much higher number of deaths among Jews.

### *A closer look at the ONS findings*

Closer examination of the ONS findings, based on the detailed documentation of their new data product, provides further support to the claim that high COVID-19 mortality among Jews is an aberration. The ONS documentation tells us that, among those aged 65 years and over, there were 430 certified COVID-19 deaths in the Jewish population during the period 2 March-15 May 2020.<sup>7</sup> The total number of Jewish deaths in this age group in that period was 980. We can remove the COVID-19 deaths from the total number of Jewish deaths to re-estimate mortality rates in March-May 2020.<sup>8</sup> The result of this exercise for Jews and an identical exercise for Christians is illustrated in Figure 2.

Panels A and B show the results of the simple re-estimation of mortality rate, while Panels C and D present a re-estimation that also takes into account a certain degree of under-registration of COVID-19 deaths in the national statistics.<sup>9</sup> The under-registration is a global phenomenon and has to do with the novelty of COVID-19 diagnosis as well as with the complex nature in which coronavirus interacts with pre-existing medical conditions.

In terms of mortality, the change in the position of Jews relative to Christians<sup>10</sup> as a result of the exclusion of COVID-19 deaths is *radical*. Without COVID-19, the Jewish death rate in March-May 2020 is either about the same as the Christian rate (Panel A) or lower than among Christians (Panel C). On the other hand, the *specifically* COVID-19 death rate is much higher. For reasons having to do with data availability, the death rates for Christians are almost certainly underestimated and the Jewish advantage in non-COVID-19 mortality does not appear to be as decisive as it is in reality.<sup>11</sup>

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<sup>6</sup> Death rates of Jews in Israel around 2011 were applied to the British Jewish age and sex structure; this exercise produced 3,135 deaths.

<sup>7</sup> The ONS counts of Jewish deaths mentioned in this section relate to the population of Jews appearing in the 2011 Census file.

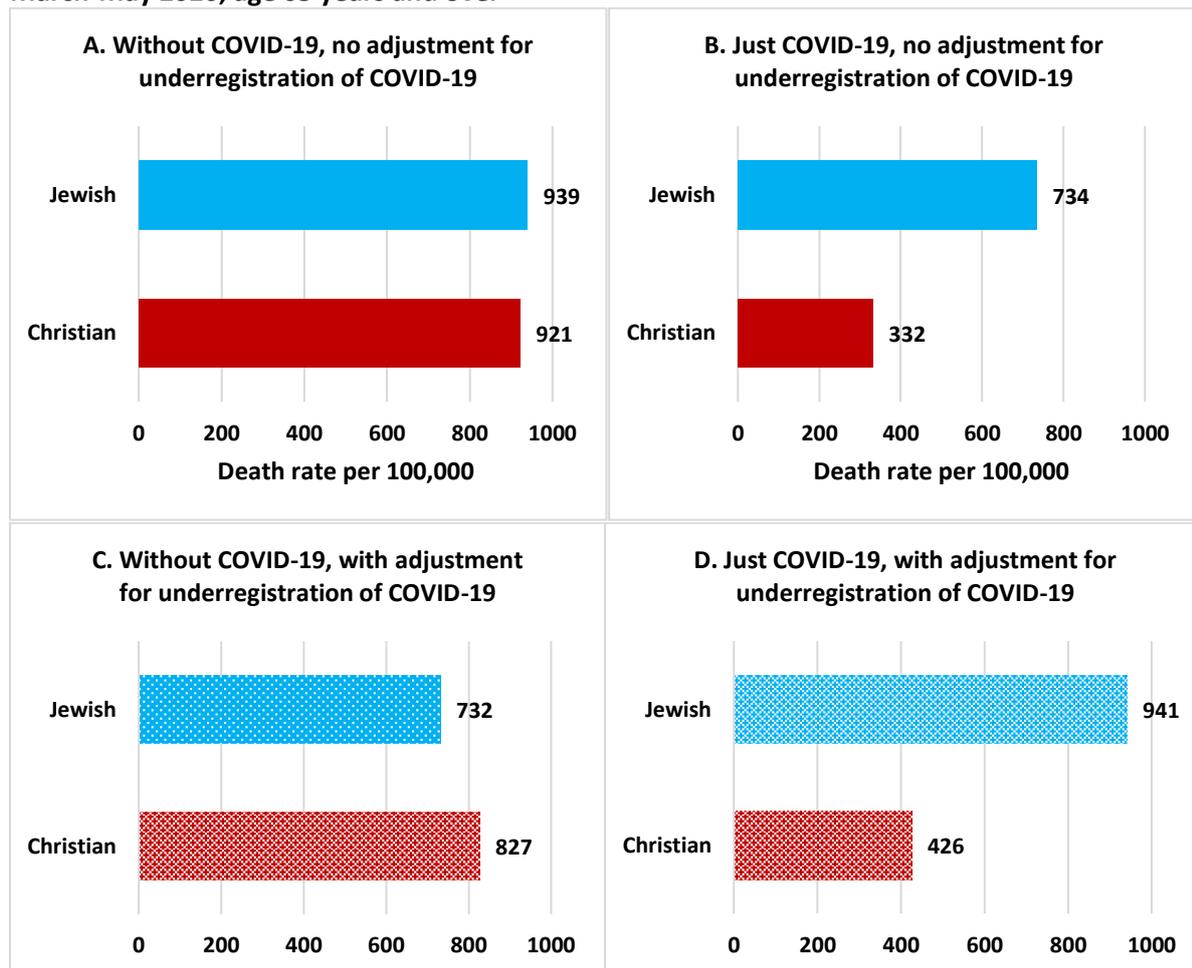
<sup>8</sup> In order to do so, we derived the denominators of the death rates around 2020 on the basis of the sizes of the religious groups in the 2011 Census (Census Table DC2107EW). Specifically, we applied Israeli Jewish death rates in 2017 to the 2011 Census counts of Jews in England and Wales. This made it possible to reconstruct the Jewish population in England and Wales around 2020. We also took into account Jewish migration from the United Kingdom to Israel between 2011 and 2020. We derived the denominators for Christians, applying death rates in England and Wales (2012-2018) to the Census counts of Christians in 2011. We could not account for migration among Christians. We do not expect this to affect the estimation dramatically, though it is worth remembering that Christians' death rates are likely to be somewhat underestimated as a result. Data on death rates of Israeli Jews and migration to Israel are from the Central Bureau of Statistics-Israel; data on death rates of Israeli Jews in England and Wales are from Human Mortality Database (<https://mortality.org/>).

<sup>9</sup> See footnote 4 for the logic and the method of accounting for under-registration of COVID-19.

<sup>10</sup> Christians were used as a comparator in the original ONS analysis.

<sup>11</sup> Firstly, the denominators of Christians' death rates may include people who moved abroad between the date of the 2011 Census and early 2020. Inflated denominators translate into suppressed death rates. Secondly, even though the death rates are calculated for ages 65 years and over, within this group British Christians are younger than British Jews. This too remains unaccounted for in the calculation of the rates presented here and give a further mortality advantage to British Christians.

**Figure 2. Simulated death rates for religious groups just for COVID-19 and without COVID-19 in March-May 2020, age 65 years and over\***

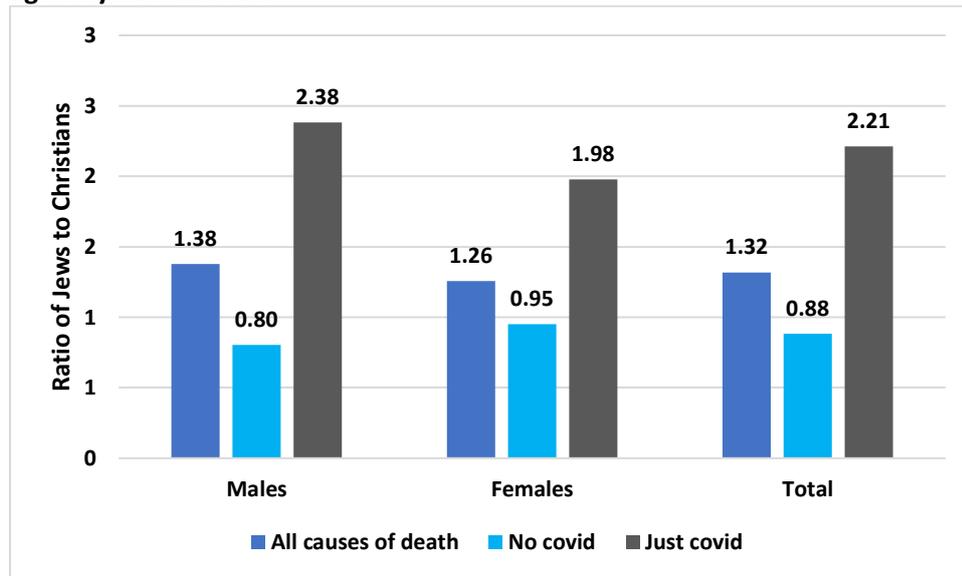


\*Note: the rates are for age groups 65 years and over, but are not standardised to reflect the internal age composition of this group. The proportion of British Jews aged 85 and over out of those aged 65 years and over is higher than the respective proportion among Christians.

Source: author's calculations based on: (1) supplements to the ONS report: ONS. 2020. *Coronavirus (COVID-19) related deaths by religious group, England and Wales, 2 March - 15 May 2020*; and (2) 2011 Census Table DC2107, available at NOMIS, official labour market statistics, <https://www.nomisweb.co.uk/>.

Finally, for a more concise exposition, Figure 3 shows the ratios of Jewish to Christian death rates in March-May 2020 – for all causes of death; for COVID-19 deaths only; and for non-COVID-19 deaths. The exhibit summarises the finding: *the Jewish mortality disadvantage in March-May 2020 is driven exclusively by COVID-19*. In essence, COVID-19 managed to affect the Jewish population in a way all other causes of death have not; it suppresses the underlying low mortality, making Jews appear to be as disadvantaged as Black, Asian and minority ethnic populations, even though they are not.

**Figure 3. Ratios of Jewish to Christian deaths rates in March-May 2020, with and without COVID-19, age 65 years and over\***



\*Note: See note for Figure 2.

Source: author's calculations based on (1) supplements to the ONS report: ONS. 2020. *Coronavirus (COVID-19) related deaths by religious group, England and Wales, 2 March -15 May 2020*, and (2) 2011 Census Table DC2107, available at NOMIS, official labour market statistics, <https://www.nomisweb.co.uk/>.

### *The haredi factor?*

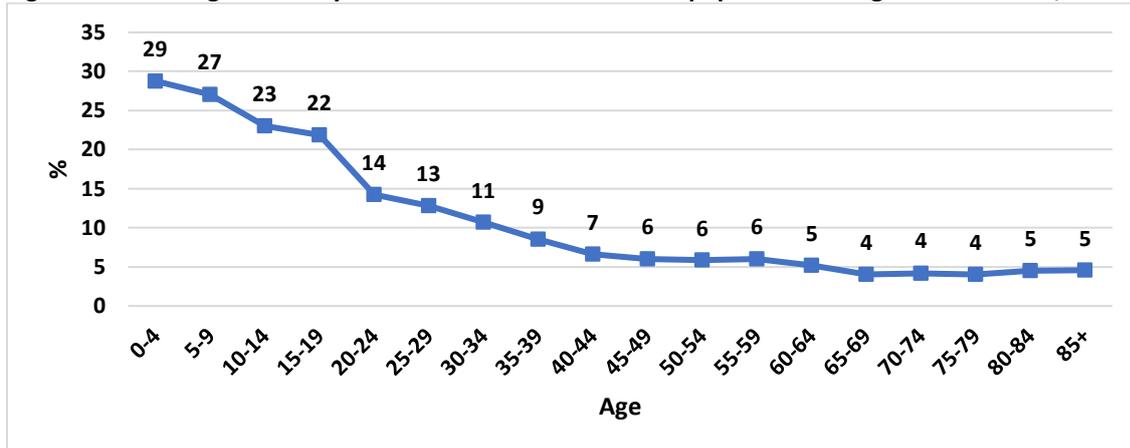
The *haredi* – or strictly Orthodox – Jewish population has a very small input into the overall picture of mortality of British Jews. This is true both in normal times and at the time of the pandemic. In Israel, the only context so far where direct estimation of strictly Orthodox Jewish mortality has been possible, *haredi* mortality was found to be no different from the mortality of other Jews in normal circumstances. In 2013-2017, in Israeli localities where *haredi* Jews are numerically dominant, life expectancy was in the range of 82.7 - 87.6 years, whereas for Israel as a whole it was 82.6 years.<sup>12</sup>

*Haredi* mortality from COVID-19 is not something that is possible to estimate at present, in England, Israel or elsewhere. However, it is clear that the numerical weight of the strictly Orthodox Jewish population in the age groups influencing mortality (and the ONS findings) is very low. Figure 5 plots the estimated proportions of *haredim* in the Jewish population of England and Wales, by age, in 2011. At ages 55 years and over (which are ages 65 years and over around 2020) only 5% of all Jews in England and Wales are *haredi*. Due to high fertility among the *haredi*, their proportion among children is much higher, signalling an unfolding compositional change in the British Jewish population.<sup>13</sup> However, in terms of mortality, the *haredi* simply cannot be influential and could not have impacted on the ONS conclusions regarding elevated Jewish mortality from COVID-19, for two key reasons. First, 95% of the Jews covered by the ONS analysis belong to the mainstream Jewish population, so they are *the group* most likely to be shaping and dominating the ONS findings. Second, to confirm this, data on Jewish burials collected by JPR directly from Jewish burial societies demonstrate that the phenomenon of elevated mortality from COVID-19 exists across the entire spectrum of Jewish religious observance in England, and is not limited to the more religiously observant pockets.

<sup>12</sup> Source: Central Bureau of Statistics, Israel. 2019. *Health and social profile of the localities in Israel 2011-2017*. *Haredi* localities are: Modiin Illit, Bnei Brak and Beitar Illit.

<sup>13</sup> Staetsky, L. Daniel and Boyd, J. 2015. *Strictly Orthodox rising: what the demography of British Jews tells us about the future of the community*. London: Institute for Jewish Policy Research.

**Figure 5. Percentage of strictly Orthodox Jews in total Jewish population in England and Wales, 2011 Census**



Note. The definition of ‘haredi’ includes all Jews enumerated in the London boroughs of Barnet (wards of Golders Green and Hendon only), Hackney (wards of Brownswood, Cazenove, Lordship, New River, and Springfield only), and Haringey (ward of Seven Sisters), as well as three local authorities outside of London: Bury (ward of Sedgely) and Salford (wards of Broughton and Kersal), both of which are in Greater Manchester, and Gateshead. In 2011, these locations combined included the vast majority of the British haredi population.

Source: author’s calculations on the basis of the 2011 Census data for England and Wales.

Importantly, at present we have no insight into haredi mortality from COVID-19. Our assertions above should not be construed as a suggestion that this community has not been impacted by COVID-19 or, alternatively, that it has been impacted in a manner similar to, or different from, the rest of the Jewish community. Rather, the very modest presence of haredi Jews in the age groups relevant to the analysis of mortality means that the overall profile of COVID-19 mortality of Jews in Britain is shaped by the non-haredi. Assessment of haredi mortality is something that future research needs to address.

### Summary and conclusion

From a scholarly perspective, the ONS findings initially looked incomprehensible in light of existing research on Jewish mortality globally and in the UK. Evidence has long demonstrated that Jews are ‘long-lifers’; compared to many other populations, they have low mortality. Hence, the initial doubts and scrutiny of the results. However, it now looks as if the results are correct and do not contradict the whole historical body of literature. They show, simultaneously, that Jewish mortality due to COVID-19 is high, but it remains low outside of this pandemic period and event. Thus, in brief, the ONS finding of the *Jewish mortality disadvantage during the pandemic* is real, but it is also unique, and emphatically *not* an expression of long-standing vulnerability and ill health of British Jews, which is the case with other population groups highlighted by the ONS analysis for their elevated mortality (e.g. BAME).

The academic conversation should now be specifically about why COVID-19 affected Jews particularly badly notwithstanding their generally low mortality. The leading hypotheses now are that the sheer presence (prevalence) of COVID-19 was either: (1) higher initially in Jews for some reason that requires exploration; or (2) was the same/smaller in Jews than others, but spread more quickly because, for example, Jews are more sociable (e.g. they attend communal events or celebrations more frequently than others – for example, bar/bat mitzvah parties, or festival activities such as those that occurred during the holiday of Purim in mid-March), they pray regularly in groups (a ‘minyan’ – a quorum of ten adults – is required for key parts of Jewish prayer), and/or they have above average size family units (especially among the strictly Orthodox). The arithmetical necessity of a greater prevalence of infection is more sick people, and the result of more sick people is more deaths – all other things

(social class, etc) being equal. Jews do not need to be more vulnerable, in any biological sense, to the effects of the virus, for elevated mortality to occur; indeed, they can be less vulnerable in purely physical terms. It is just that – either due to the high initial exposure or to close contact with other Jews in a variety of settings post-exposure – the Jewish population may have become ‘overwhelmed’ by the virus.

Further, the scholarly conversation should focus, as a priority, on the non-strictly Orthodox Jewish community and its elderly population. This is for the simple reason that the presence of the haredi component in the ONS data is very low. We estimate that haredim constitute about 5% of Jews in the age groups relevant for mortality analysis. The haredi community, and others interested in understanding the impact of haredi lifestyle on COVID-19, may find the lessons taught both by the ONS analysis and further analyses that JPR has and will offer, of use to themselves. These analyses *may* be relevant to the ways in which the haredi community manages the COVID-19 pandemic in the future. At present, however, it should be stated in the strongest terms that the findings obtained by the ONS so far are not the result of any particular developments within the haredi population. To state otherwise is to derail the much needed investigation and discussion of the reasons for elevated COVID-19 mortality among Jews in Britain. At the same time, it should be emphasised that at present we have no empirical understanding of COVID-19 mortality in the haredi community. Nothing in the existing data discussed here can provide an indication of the impact of COVID-19 among the haredi and the way it compares to its impact among the non-haredi, or the general population. This should be addressed in the future to build a fuller picture of Jewish mortality from COVID-19.

The academic work on Jewish mortality from COVID-19 will continue in earnest. The Jewish communal conversation should acknowledge what has been proven so far, and avoid further speculation until the scholarly insights have become more conclusive. In summary, what can be said with a high degree of certainty at this stage is:

- 1) even though Jewish mortality from COVID-19 is high as it is for other Black, Asian and minority ethnic groups, Jews are a completely different case and should be analysed and understood as such;
- 2) the high mortality levels found among Jews is not caused in any significant way by any particular developments occurring in the strictly Orthodox (haredi) population;
- 3) elevated mortality among Jews *may* in part be due to the interconnected and contact-rich social and religious lives that Jews have, but further analysis is required to confirm this.

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**Dr Daniel Staetsky**, the author of this paper, is a Senior Research Fellow at JPR and Director of our European Jewish Demography Unit. His expertise spans the disciplines of demography, applied statistics and economics, and he is a former researcher and analyst at the Central Bureau of Statistics in Israel and at RAND Europe. He holds an MA in demography from the Hebrew University of Jerusalem and a PhD in social statistics from the University of Southampton. He specialises in Jewish, European, Israeli and Middle Eastern demography. His work in demography has been widely published, and he focuses particularly on the major puzzles of contemporary demography, such as relatively high Jewish longevity, divergence of longevity paths between different Western countries and stagnating fertility in the context of the developing world. He has authored and co-authored thirty-five manuscripts covering the topics of demography, survey methodology, social statistics and the quantitative study of antisemitism.

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