

Age-Based Policy in the Context of the Covid-19 Pandemic: How Common are Multi-Generational Households?

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Abstract

Are general lockdowns an appropriate response to the threat of Covid-19? Recent cost-benefit studies do not favour the case for them. Instead, since the virus practises a form of age discrimination (approximately 90% of coronavirus deaths are older than 65), some analysts have suggested an alternative. It is that younger citizens -- the generation worst affected by lockdowns and the one that will predominantly pay the eventual tax bill for furlough -- should be allowed to return to work to sustain the economy. Lockdown advocates argue that this would be dangerous, because older people would get infected by young workers living in the same home. We explore that claim. We find that 96% of UK workers under age 40 do not live with anyone over 65. In fact, 92% of *all* UK workers live in a household without anyone over 65 years old – and that holds true for white and BAME workers. Releasing young workers would thus expose only a small fraction of older citizens to intra-household transmission, although we recognize that the absolute number of people infected might eventually become considerable, and some vulnerable citizens could potentially be at risk if they live in large households. In general this paper's results illustrate the potential value of fine-tuning the lifting of restrictions. Our findings buttress the cost-benefit case for age-based policies.

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Key words: coronavirus; labor market; recession; COVID-19.

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“Covid-19: Experts divide into two camps of action—shielding versus blanket policies.” BMJ September 2020. [bmj.m3702](https://www.bmj.com/content/370/bmj.m3702)

“The most pertinent epidemiological feature of COVID-19 [is] ...89% of ... mortalities over age 65. This ... suggests that the harm caused by uniform strategies...will outweigh the benefits...Our strategy should therefore target interventions to protect those most at risk” Gupta et al. 2020.

“To cut a cohort of ‘vulnerable’ people off from ‘non-vulnerable’ or ‘less vulnerable’ is likely to prove practically impossible, especially for disadvantaged groups (e.g. those living in cramped housing and multi-generational households). Greenhalgh et al. 2020

“The idea that you could completely separate the fifth of the population who are aged over 65 [for example] is ... implausible...and ... it would be age-based apartheid” Simon Stephens in the BMJ, September 2020.
<https://www.bmj.com/content/370/bmj.m3788>

INTRODUCTION

There is disagreement about the optimal way to design a Covid-19 policy. Understandably, the pandemic has provoked a great deal of emotion -- and, in some cases, even vitriolic exchanges among scientists about the best course of action. These difficult issues are likely to continue to matter well into 2021 and indeed beyond that if there are new pandemics.

During 2020 most governments implemented a full or partial lockdown approach. However, some scientists and business leaders have argued instead for targeted restrictions that bear in mind the large numbers of citizens (especially the young) who face comparatively little risk from coronavirus.

Is there a case for ‘age-based’ Covid-19 policy? This study provides evidence on the possible perils of age segmentation that have been put forward by epidemiologists and public health experts. The key claim is that young workers cannot be safely ‘released’ because they often live in multigenerational households. But is that true? This paper provides some of the first estimates of the extent of multi-generational living in the UK. Using data on approximately 2.5 million people from 10 pooled years of the Labour Force Survey, it concludes that the vast majority of workers do not live with anyone older than, for example,

age 65. This finding sheds doubt on some of the arguments put forward by the large group¹ who have believed, and who continue to believe, the UK should use general lockdowns.

BACKGROUND

The aim of lockdown restrictions is to reduce transmission by attempting to keep people away from one another. That kind of policy has a natural logic and in practice has probably been helpful towards achieving its stated intention. Nevertheless, the policy has necessarily produced a large loss of social contact and huge economic losses. Speeches by UK government ministers typically do not mention or quantify those kinds of social and economic losses (as, for example, in Prime Minister Boris Johnson's evening presentation when announcing the so-called second lockdown in November 2020, in which only health data were shown to the television audience). At the time of writing, the Financial Times has estimated that the public borrowing deficit this year will be 350 billion pounds or more. That equates to a lump sum of more than 10,000 pounds per worker in the UK. The debt continues to rise and will eventually have to be repaid. Various authors have started to ask whether the cure is worse than the disease (see Dorling 2020, for example).

To our knowledge, no formal Covid-19 cost-benefit analysis of pandemic policy has been done by SAGE (the scientific advisory group for emergencies) or the UK government. However, a number of economists (Miles et al. 2020, Reddy 2020, Rowthorn and Maciejowski 2020) have published systematic studies. All three papers point out that standard kinds of cost-benefit calculations do not suggest that lockdowns are desirable (De Neve et al. 2020 is also

¹ It may be fair to characterize the pro-lockdown group as largely epidemiologists and public health professionals. The current paper, by contrast, looks at what might be described as social science evidence on the nature of societal living arrangements, about which epidemiologists and public health professionals presumably would not claim special knowledge. The ideal would be for different scientific communities to work together in a cooperative spirit, as has been advocated in various fora by Gus O'Donnell. It may not be widely realized, for example, that SAGE (the government's scientific advisory group for emergencies) had from the start, and apparently still has, no economists on it.

doubtful). The main intuitive reason for this -- though it can sound harsh -- is that those people likely to die from Covid-19 are elderly, so that lockdowns, which are extremely expensive in terms of national resources, are primarily saving relatively few quality-adjusted life years (QALYs). To put that in a different way, it is not fair-minded to deny our children, grandchildren and many unborn citizens the resources that could otherwise have been spent on their future hospitals, schools, defence, medicines, and much else.

Even on health grounds, some scientists doubt the efficacy of lockdowns. For example, two opposing open-letters appeared in the UK press in mid-September 2020. The first, objecting to government policy, was by Gupta et al (2020)². The second, objecting to the objectors, was by Greenhalgh et al (2020). Slightly after that, the Great Barrington Declaration was publicized, and then a further group published a critique of that. The Greenhalgh letter included the sentence “It is more important than ever to consider multiple perspectives on the issues and encourage interdisciplinary debate ...”. Despite the avowed sentiment³, its 24 signatories were almost all from the same disciplinary background. No economist, for example, signed the letter, and as far as we know no economist was asked to do so.

It is necessary to accept that any policy will have disadvantages. All decisions will be painful. The optimal strategy is presumably one that weighs up different ‘harms’ to society⁴.

KEY QUESTIONS AND POLICY

² For transparency, it should perhaps be recorded that one of the two authors of the current paper signed the first open letter, and that neither of the two authors signed the Great Barrington Declaration.

³ Unfortunately, this kind of behavior-conflicting-with-what-writers-claim-to-want-in-others is not uncommon. On November 22 2020, a journalist called Sonia Sodha wrote an article in the Observer castigating the authors of the Great Barrington Declaration. Her article stated that “it is essential for the status quo to be challenged, but [those who do so] need to draw on evidence”. She went on to say that her objection to Great Barrington was that “it would be pretty much impossible ... for 30%-40% of the population to lock themselves away for ... well over a year.” Despite what she said she expected of others, Ms Sodha presented no evidence for her claim. Relevant facts are that (i) the over 65s constitute only 18% of the population, for example, and (ii) the UK managed to lock away approximately the whole of its population for some months in late Spring and the majority of its population for large parts of 2020.

⁴ We have been influenced here by John Broome’s 2017 book *Weighing Goods* and by Oswald (2015).

Some of the contentious ethical questions include the following:

- Is it morally justifiable to leave decades of debt to the younger generation, including the unborn, in order to extend somewhat the lives of those who are already old? ⁵
- Is it more justifiable to lock down regions than age groups?
- Is it the responsibility of young people to stay away from other young people? Or is it the responsibility of the old to stay away from the virus?

Some of the contentious practical and scientific questions include the following:

- Exactly how effective and costly are lockdowns?
- Is it feasible, and reasonably safe, to rely on a natural build-up of so-called herd immunity?
- Would an age-based lockdown, or set of restrictions, be feasible and safe?
- If it takes a long time for a vaccine to be distributed to the public, or the effects of a vaccine quickly wear off, are there strategies other than general lockdowns that could control the virus?

This paper is especially concerned with the possible case for a ‘release’ of younger workers. ⁶ It will not focus primarily on ethics, although we do view the moral issues as something that should be seriously debated in a democratic nation.

ONS data show that at the time of writing approximately 300 people under the age of 40 have died in the UK, while above age 40 the number of deaths exceeds 50,000. The asymmetry is thus striking. Pro-lockdown advocates believe that it would be a mistake to release the young. They argue that younger people should not be allowed to resume normal

⁵ This has been termed the ‘fair innings’ issue by researchers such as Paul Dolan of LSE; see for example Tsuchiya et al. (2003).

⁶ The literature is now fairly large and we will not attempt to survey it. Early writings included Acemoglu et al. (2020), Eastwood (2020), Ichino et al. (2020), and papers by Oswald and Powdthavee.

life because they would quickly infect the old. That sentiment has a ring of common sense on its side. Its persuasiveness does depend, however, on the empirical question: are multi-generational households common or rare?

DATA

The current study examines data from the recent Labour Force Survey. The LFS allows us to provide estimates of the extent of multi-generational living in the modern UK. The overall sample size used for the estimates is approximately 2.4 million citizens. Subsamples, including for white and BAME individuals, are also examined later in the paper.

We concentrate on adults who live in private households. The target population of the LFS is based on the general resident population in the United Kingdom. Specifically, the LFS aims to include all people who live in private households, or are resident in National Health Service accommodation, or are young people living away from the parental home in a student hall of residence or similar institution during term time. (This latter group is included in the LFS sample specifically to improve the coverage of young people.)

The 2001 and 2011 Population Census definitions state that communal establishments (CEs) provide managed residential accommodation. Examples of CEs include residential care homes and university halls of residence. LFS outputs relate almost exclusively to the population living in private households, and exclude most of the population living in CEs. The later analysis does not cover people in care homes or other institutionalized settings like prisons.

RESULTS

For presentational clarity, we reply mainly upon pie charts. The analysis initially considers the possibility of a release of workers who are relatively young. Then we consider

the sample of workers of all ages. Throughout the analysis we define workers as those in employment, self-employment, in training, or looking for a job.

Figure 1 reveals how rare it is for young UK workers to live in a household with adults who are over the age of 65. Here we take an initial cut-off of age 40 as the upper end of 'young'. The diagram shows that approximately *96% of workers under the age of 40 have no-one in their home who is older than 65*. As a guide to reading the pie chart, the red area in Figure 1 depicts the proportion of younger workers in the population who have at least one person in their household who is over the age of 65.

The next set of diagrams move to consider the UK workforce as a whole. Here we deliberately present a variety of different age cut-offs.

Figure 2 shows that in fact the vast majority of (all) workers do not live with anyone who is age 65 or above. The exact proportion, as demonstrated in the pie chart, is 91.8% of the working population. The remainder, 8.2%, have one or more than one person older than 65 as part of their household. Within the diagram, the large green area depicts workers in the population who have nobody in their household who is over the age of 65. The smaller red area depicts workers in the population who have at least one person in their household who is over the age of 65.

Figures 3 and 4 are variants on the same diagram. They use two different age cut-offs. Figure 3 reveals that 83.3% of workers have nobody over age 60 in their household. Figure 4 is the equivalent calculation for a cut-off defined on age 55. The figure is then 70.7%.

BAME HOUSEHOLDS

Might some ethnic groups be different? It has sometimes been said in public debate that BAME (black, Asian, minority, ethnic) households tend to have a different age structure and family makeup than white households. Health experts have, reasonably enough, expressed

concern about this possibility. They have argued that older BAME men and women would be more vulnerable to a release of younger workers.

Figures 5 and 6 shed some doubt on that. In both cases, for white workers and BAME workers, the proportion of workers who live in a house that has no person over age 65 is approximately the same, at 92%.

Nevertheless, there is an important complication here. Consider the current empirical question posed in a somewhat different way (in essence, the other way around, one might say). The earlier diagrams have revealed how many workers are in a household with one or more older persons. Now consider instead how many households with an older person contain one or more workers. Figures A1 and A2 inquire into that empirical question, and do so separately for white and BAME individuals. Figure A1 shows that approximately 14% of white citizens over the age of 65 have at least one younger worker in the house. Figure A2 demonstrates that that number is far larger for BAME men and women – it is approximately 41%. This means that those in BAME households, when viewed as families rather than individual workers, are at greater risk, in numerical terms, than those in white households. Although the diagrams of Figures 5 and 6 hold good for both main ethnic groupings, it is the case that if a BAME worker became infected there would a somewhat larger potential spread from him or her.

CONCLUSIONS

“Lockdowns and restrictions cause immense economic, social and non-Covid health damage, and we’ve got to start talking about those so that we know the restrictions we’re being asked to live under are not causing more harm than good to our citizens.” Steve Baker, MP for Wycombe. Quoted in the FT, 19 November 2020.

When the Covid-19 pandemic began, politicians around the globe had to decide how to react. There were, and are, no costless options. Emotions have run high. Policymakers have had to weigh ‘harms’, it might be said, and to attempt to choose the fairest and least painful strategy. In 2020 nearly all countries opted to use blanket kinds of lockdown restrictions of a kind unprecedented in post-war peacetime.

It is now known, admittedly with the help of hindsight, that young people's mental health consequences and unemployment experiences were far more severe during lockdown than among older groups (Banks and Xu, 2020; Xiong et al. 2020; IFS 2020). Even before that was discovered, however, there were at least two reasons to believe that blanket restrictions risked inter-generational unfairness:

- (i) The young were known from the early Chinese data to be at much milder risk from the virus, so the young had less to gain from lockdowns;
- (ii) The large debts inevitably built up by furlough and other support schemes would have to be repaid principally by the younger generation (including, very probably, some of the unborn).

Hence, although the moral issues were not widely discussed in the world's media in Spring 2020, it might be argued that even from the start the young were not treated in a way that was self-evidently ethically justifiable.⁷

A number of analysts suggested at the start of the crisis, and have since, that an efficient strategy for COVID-19 could be designed around the known epidemiological fact that younger citizens are mostly invulnerable, or nearly invulnerable, to the virus, while older citizens are very disproportionately the ones at risk. Those analysts argued that in principle the economy could be run by younger people while the older at-risk adults stayed out of the way until a vaccine was discovered.⁸ Large numbers of epidemiologists and public health researchers

⁷ The two authors of the current paper wish to record that they do not have a completely firm view on the morality of locking down a society. Reasonable people can differ on ethical questions. We do, however, believe that the ethics of intergenerational effects of coronavirus policy is a complicated area that should have been debated more openly, and that it was not immediately obvious that the old had a right to expect the young to lock themselves away.

⁸ Sanjay Reddy has pointed out to us that a sensible policy stance might seek to provide 'focused protection' to the elderly not merely through moral injunctions but providing financial and practical supports, and to enable those who live with them to avoid risks (e.g. by staying home from work, by temporarily moving elsewhere, by undergoing frequent testing etc.). The idea of 'conditional cash transfers', much vaunted in some developing

vehemently opposed this.⁹ One reason was, they argued, that the existence of multigenerational households -- in the sense of workers living with the old who are particularly vulnerable -- makes age segmentation infeasible. Those epidemiologists and public health researchers presented no evidence (as far as we know) for that view.

The results in this paper, which appear to be the first of their kind, demonstrate that in fact ¹⁰ only a tiny percentage of young UK workers live in a household with anyone over, say, age 65. A critic could reasonably object that, even so, a release of the young might not prevent all forms of contact between younger (therefore safer) adults and older (therefore intrinsically more vulnerable) adults¹¹. Nevertheless, the extent of multi-generational living is an important element in any calculation of this general sort, and it is now known that much of coronavirus transmission goes on within households and that older individuals are the most susceptible to household transmission¹².

A number of caveats should be pointed out.¹³ First, we do not yet know, and cannot yet know, the effect of so-called ‘long Covid’ on the young, but that possibility needs to be borne in mind in case new evidence does emerge in the future. Second, this paper does not look at interactions outside the household. Perhaps the most significant of these might be where grandparents provide day-care for their grandchildren, whether either in the child’s home, or in their grandparents’ home for some days a week (of course this presents difficult issues for

country contexts, may be applicable here, but practical supports, such as grocery deliveries, could also be offered. Such measures would have a small cost in comparison to some of those being now undergone by the whole society.

⁹ An unfortunate aspect of this is that emotive language was sometimes used, and ethical judgments made, by the scientific advisers who were on advisory panels for their medical knowledge and not for their ability to make better moral judgments than any other member of society. An extreme example, in our view, was the statement by Simon Stephens, the head of the National Health Service, that age segmentation would be a form of age ‘apartheid’. Mr Stephens, who did PPE at Oxford and is not a doctor, is entitled to his view; but his ethical opinion is not one that is rooted in medical science or biology or any other scientific discipline.

¹⁰ Of course it is not rare for parents to live with young children, but that is not what has been meant by multigenerational living in the context of the coronavirus debate.

¹¹ This is true of any kind of policy, however.

¹² [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(20\)30471-0/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30471-0/fulltext)

¹³ We thank Danny Dorling for a number of these.

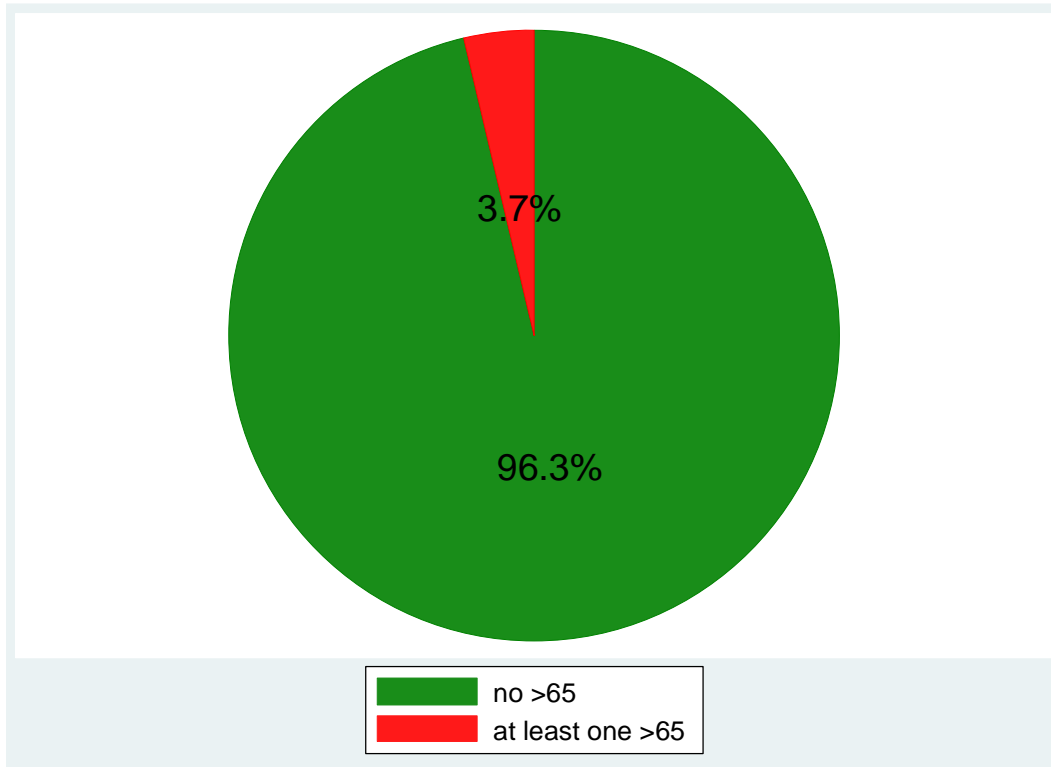
all policies). Third, at the time of writing there is hope of three potential vaccines, so the elderly may not have to isolate for too long¹⁴.

As the current pandemic continues, and more generally in planning for future pandemics, we believe that epidemiologists and public health researchers' claims about the nature of society need to be scrutinized more carefully. Those researchers are well qualified to make medical and biological judgments. They are not so well qualified to make social science judgments.

¹⁴ Given the likely arrival of a vaccine in 2021, it might even be wondered whether there could be a case for the unusual idea of the government temporarily subsidizing unused hotel rooms, say, for young workers who happen to be living with someone over the age of 65 — so that they could go to work and come back to an accommodation where the risk of passing on anything they catch to people in their household was minimized.

Figure 1. A Tiny Proportion of Young UK Workers Live with Older People

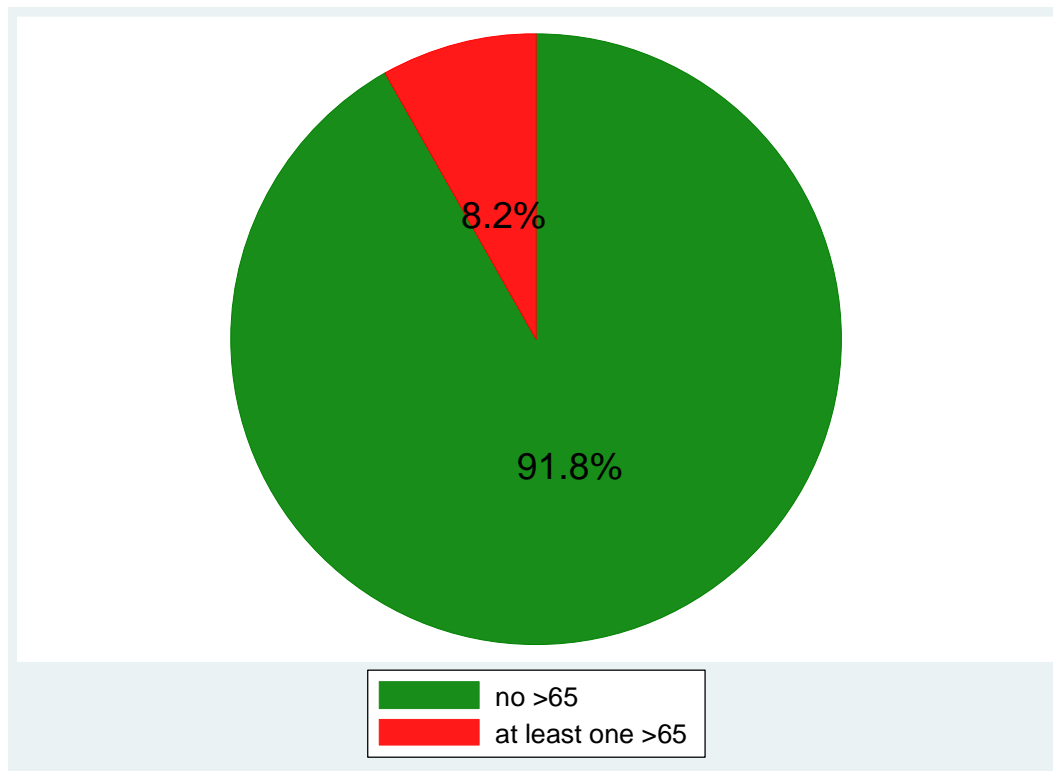
[where younger is defined as under age 40, and the cut-off definition for older is over age 65]



Note: In this diagram ‘younger’ is being under age 40. The definition of ‘older’ is being over age 65. As a guide to reading this diagram, the green area depicts younger workers in the population who have nobody in their household who is over the age of 65. The red area depicts younger workers in the population who have at least one person in their household who is over the age of 65. It can be seen that approximately 96% per cent of younger UK workers do not, on this definition, live with an older person.

no > 65 denotes nobody over age 65.

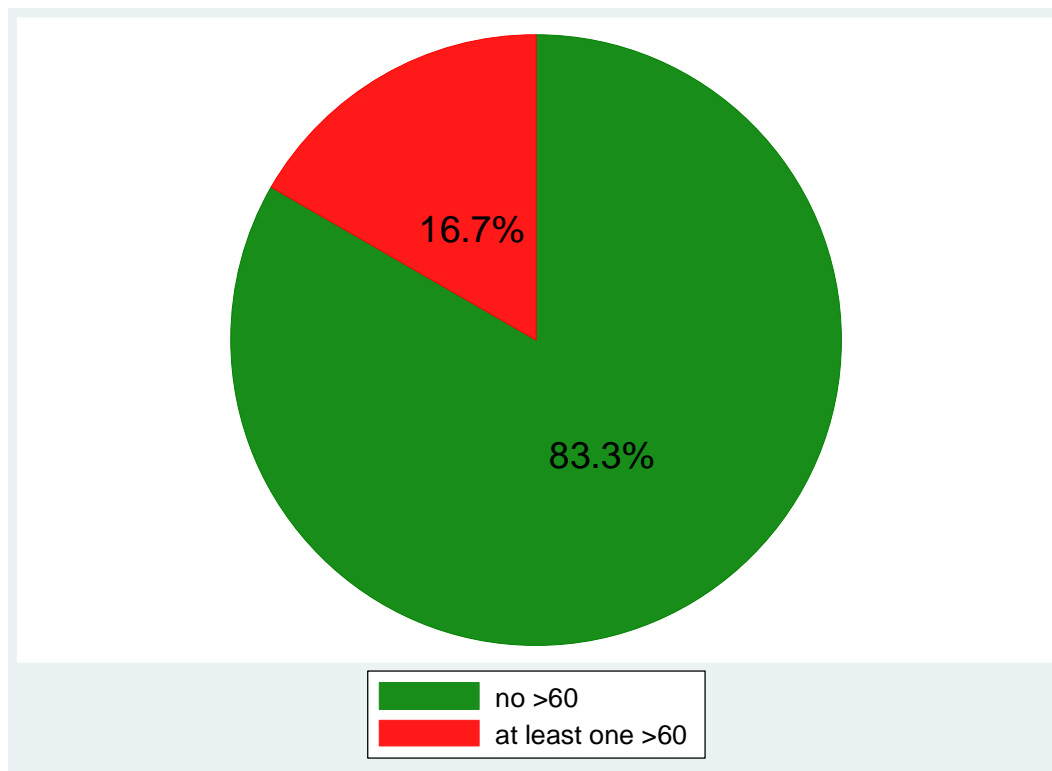
Figure 2. A Small Proportion of All UK Workers Live with Older People [where the cut-off definition for older is over age 65]



Note: The definition of ‘older’ here is being over age 65. As a guide to reading this diagram, the green area depicts all workers in the population who have nobody in their household who is over the age of 65. The red area depicts workers in the population who have at least one person in their household who is over the age of 65. It can be seen that approximately 92 per cent of UK workers do not, on this definition, live with an older person.

no>65 denotes nobody over age 65.

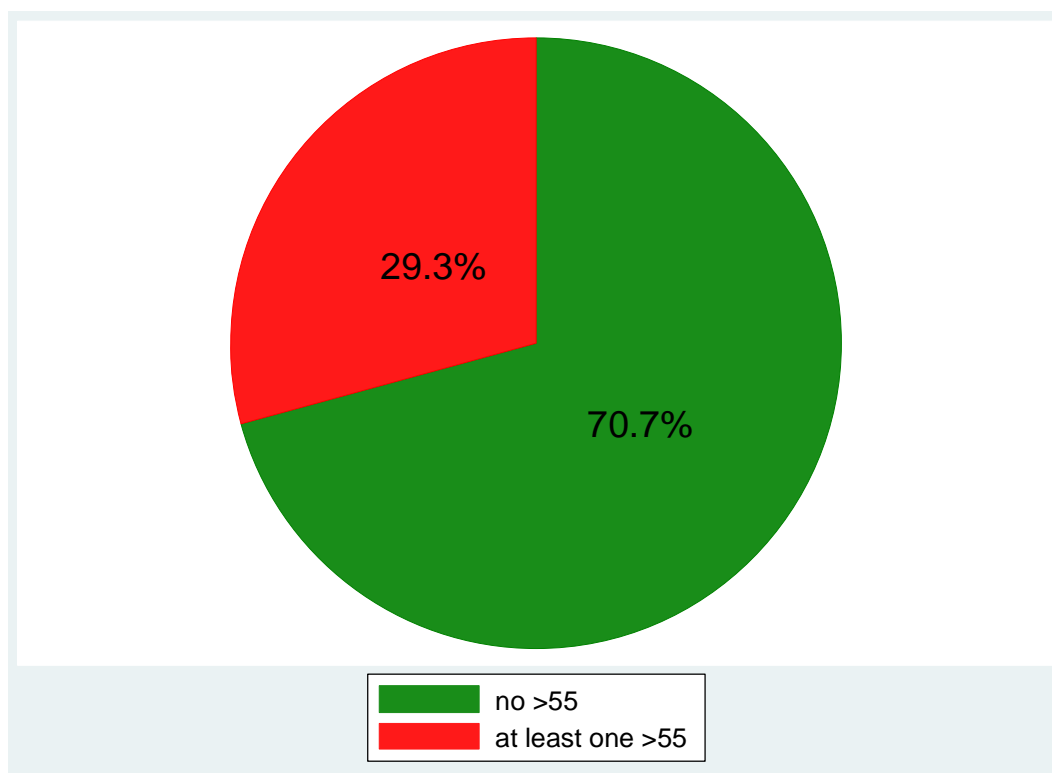
Figure 3. Proportions Calculated Using Instead an Age Cut-Off of 60 [this diagram, which is for all workers, is a variant on Figure 2]



Note: The definition of ‘older’ here is being over age 60. As a guide to reading this diagram, the green area depicts workers in the population who have nobody in their household who is over the age of 60. The red area depicts workers in the population who have at least one person in their household who is over the age of 60. It can be seen that approximately 83 per cent of UK workers do not, on this definition, live with an older person.

no>60 denotes nobody over age 60.

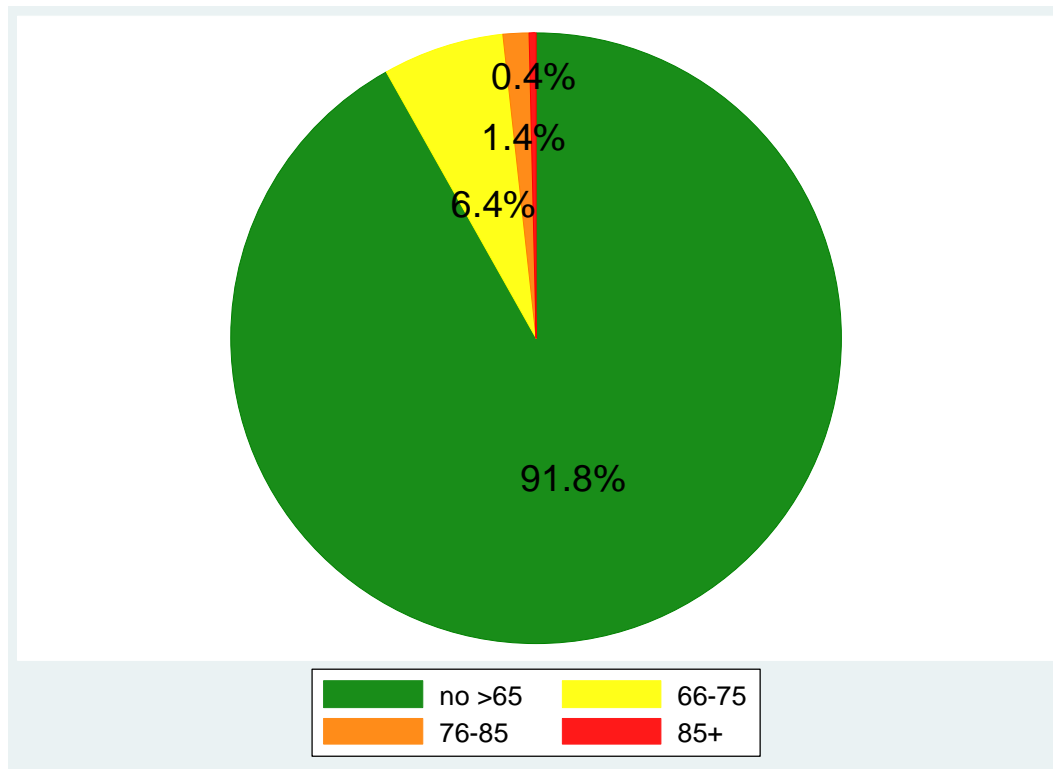
Figure 4. Proportions Calculated Using Instead an Age Cut-Off of 55 [this diagram, which is for all workers, is a variant on Figure 2]



Note: The definition of ‘older’ here is being over age 55. As a guide to reading this diagram, the green area depicts workers in the population who have nobody in their household who is over the age of 55. The red area depicts workers in the population who have at least one person in their household who is over the age of 55. It can be seen that approximately 71 per cent of UK workers do not, on this definition, live with an older person.

no>55 denotes nobody over age 55.

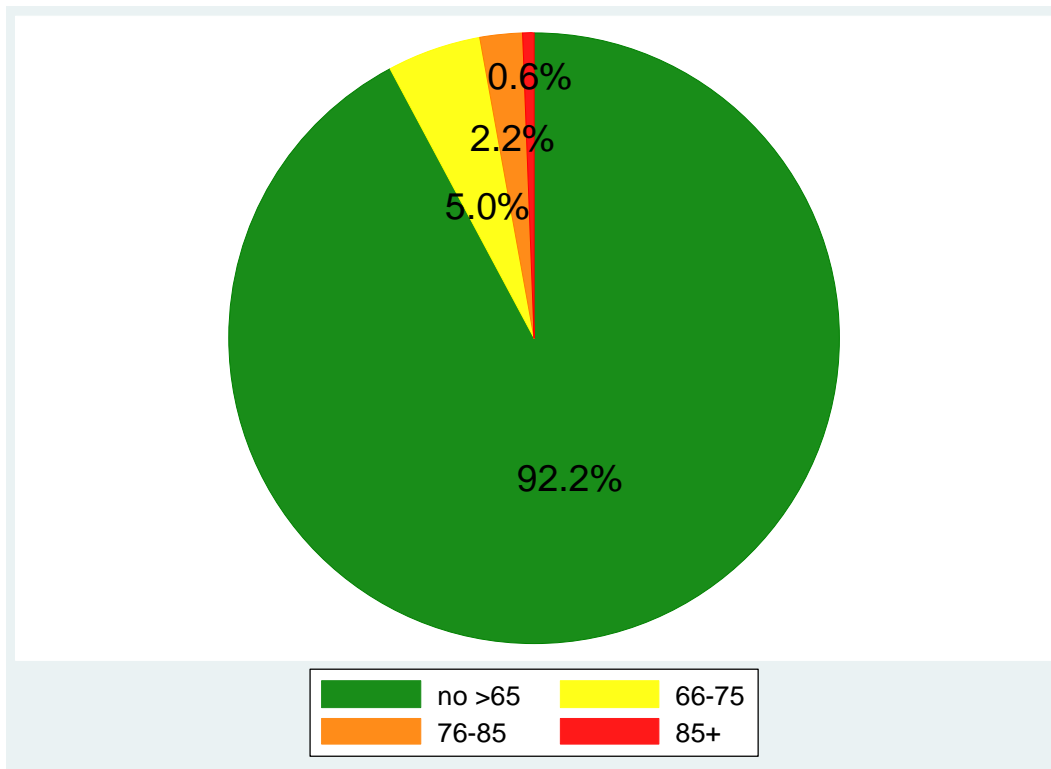
Figure 5. The Proportions of White Workers Living with at Least One Older Person [a further variant of Figure 2, with a set of older age cut-offs shown] White Subsample



Note. Here the different colours signify the proportion of workers who live with people of different ages. Hence the yellow colour depicts the proportion of UK workers who live with an older adult between the age of 66 and the age of 75 (there are 6.4% workers in that kind of household).

no>65 denotes nobody over age 65, and so on for the other categories.

Figure 6. The Proportions of BAME Workers Living with at Least One Older Person [a further variant of Figure 2, with a set of older age cut-offs shown] BAME Subsample



Note. Here the different colours signify the proportion of workers who live with people of different ages. Hence the yellow colour depicts the proportion of UK workers who live with an older adult between the age of 66 and the age of 75 (there are 5.0% workers in that kind of household).

BAME is the acronym for black, Asian, minority, ethnic.

See also the footnote to Figure 4.

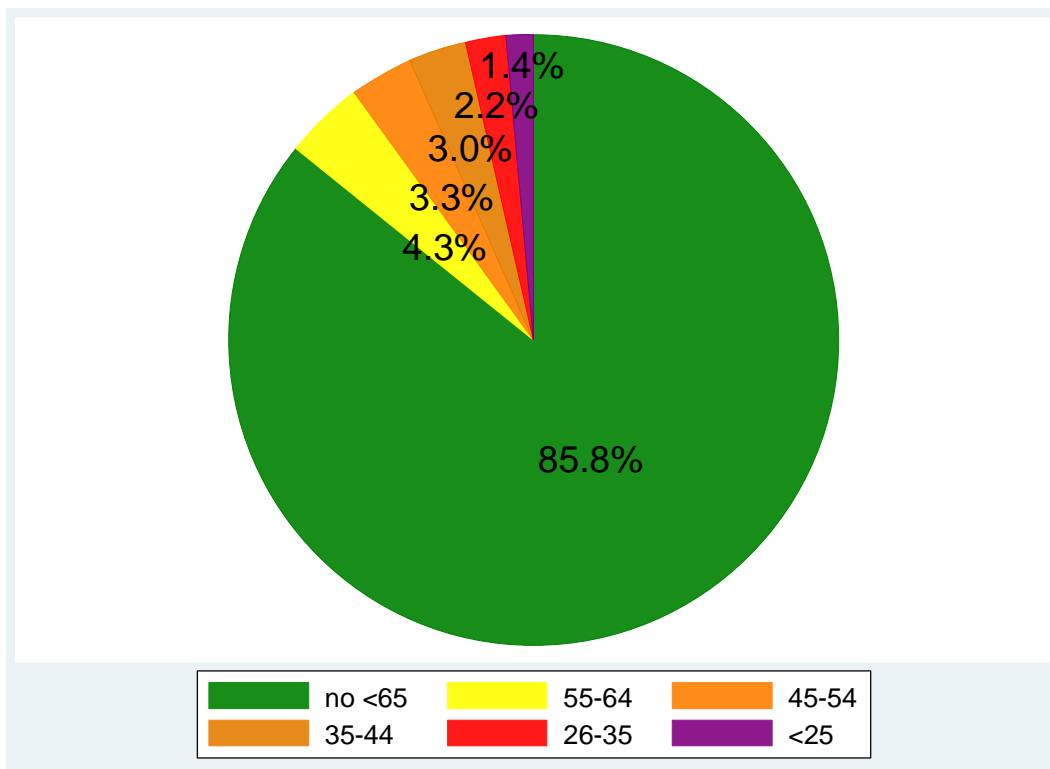
no>65 denotes nobody over age 65, and so on for the other categories.

APPENDIX: MEASURING THE DATA THE OTHER WAY AROUND

There is an alternative way to view the data. It is to begin not with the worker as the focus but instead with the older individual as the focus. It is then possible to ask a different, but closely related, question to the one pursued in the earlier text of the paper: for any given older person, how likely is it that that individual lives with a younger person who works?

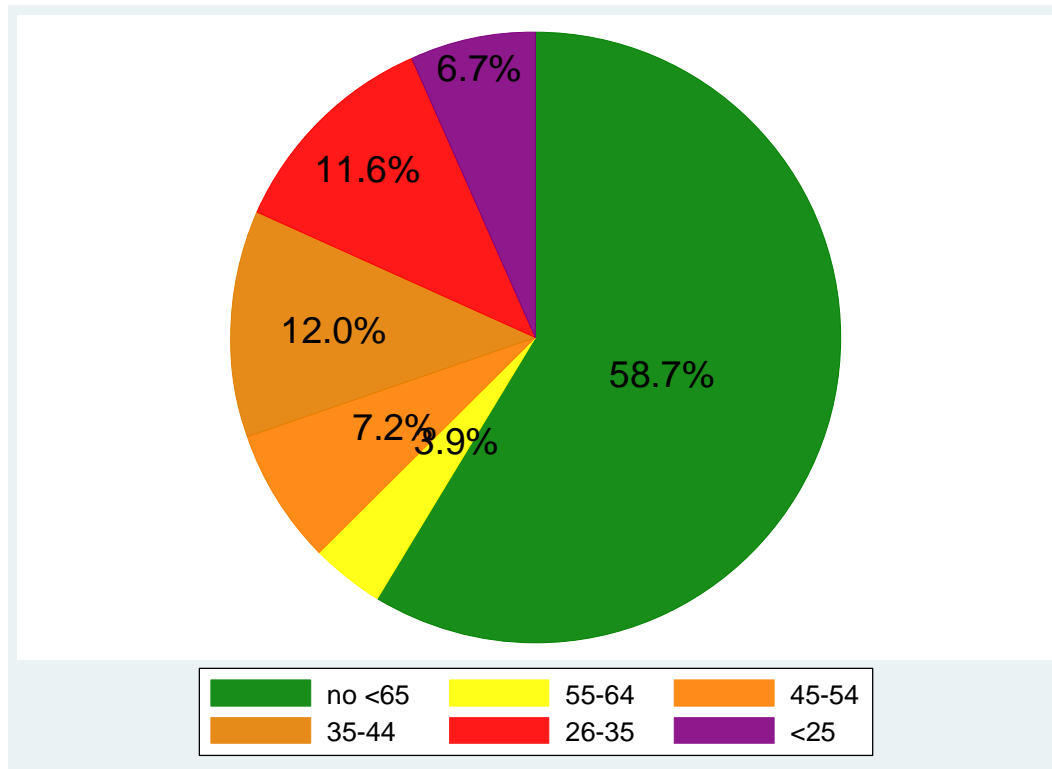
This appendix reports evidence in that form. It initially contains two figures, Figure A1 and Figure A2, that each take as its primary unit of observation the older citizen (**not the worker**).

Figure A1. How Many Older Citizens [65 plus] Live with at Least One Worker? White Sub-sample



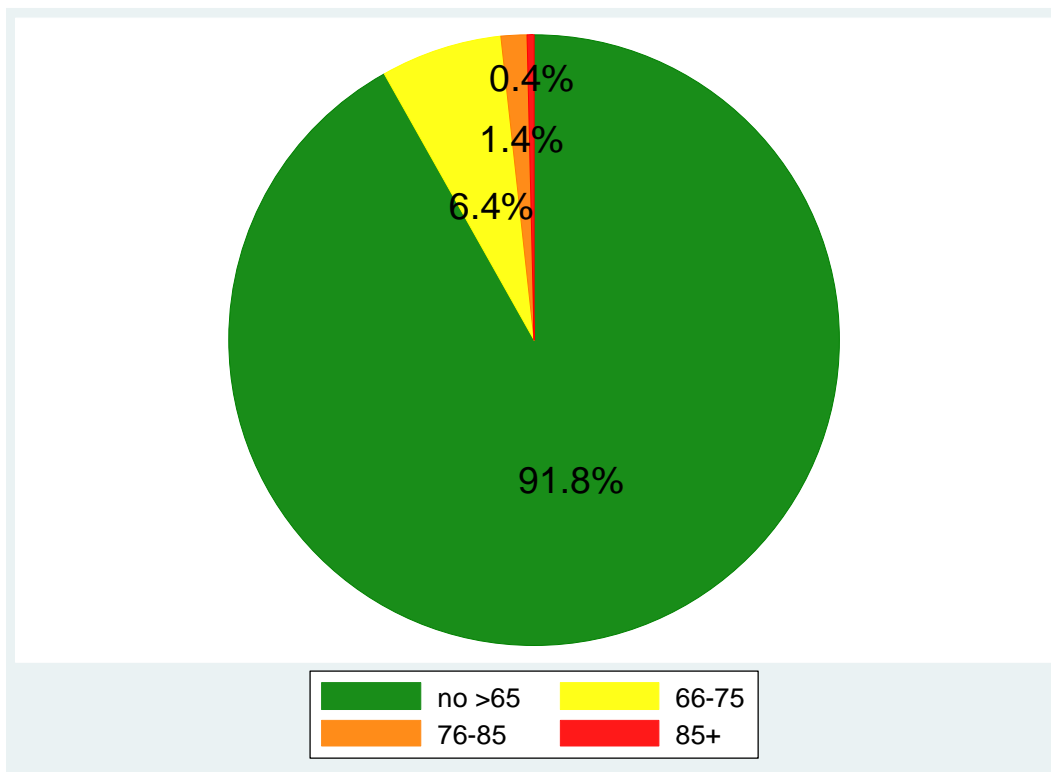
Note. In this diagram the total area of the pie represents older citizens, defined here as being over age 65. The green area depicts older citizens who have nobody in their household who is in the labour force under the age of 65. The different coloured slices represent the proportions of older citizens who live with workers in different age groups. Hence, the yellow colour, for example, depicts the proportion who live with a worker between 55 to 64 years old; there are 4.3% of older citizens in that kind of household. Almost 86 percent of older citizens do not live in the same household as a worker.

Figure A2. How Many Older Citizens [65 plus] Live with at Least One Worker? BAME Sub-sample



Note. In this diagram the total area of the pie represents older citizens, defined here as being over age 65. The green area depicts older citizens who have nobody in their household who is in the labour force under the age of 65. The different coloured slices represent the proportions of older citizens who live with workers in different age groups. Hence, the yellow colour depicts the proportion who live with a worker between 55 to 64 years old; there are 3.9% of older citizens in that kind of household. Almost 59 percent of older citizens do not live in the same household as a worker.

Figure A3. Workers Living with Older Person [Greater detail on cutoffs compared to Figure 1]



Note. This is a more detailed version of Figure 1. It gives the breakdown of different age groups within the over-65 category.

no>65 denotes nobody over age 65, and so on for the other categories.

References and Background Literature

- Acemoglu D, Chernozhukov V, Werning I, Whinston MD. (2020). Optimal targeted lockdowns in a multi-group SIR model. NBER working paper 27102.
- Anderberg D, Rainer H, Wadsworth J, Wilson T. (2016). Unemployment and domestic violence: Theory and evidence. Economic Journal, 126, 1947-1979.
- Banks J, Xu X. (2020). The mental health effects of the first two months of lockdown and social distancing during the Covid-19 pandemic in the UK. IFS Working Paper W20/16.
- Bonell C. et al. (2015). Aggressive behaviours among young people: a public health priority. Health Technology Assessment, 19, Issue 53, July.
- Broome J. (2017). Weighing Goods: Equality, Uncertainty and Time. John Wiley. London.
- De Neve J, Clark AE, Krekel C, Layard R, O'Donnell G. (2020). Taking a wellbeing years approach to policy choice. BMJ, 2020;371:m3853.
- A Tsuchiya, P Dolan, R Shaw. (2003). Measuring people's preferences regarding ageism in health: some methodological issues and some fresh evidence. Social Science & Medicine 57 (4), 687-696.
- Dorling D. (2020). Is the cure worse than the disease? The most divisive question of 2020. www.dannydorling.org
- Eastwood B. (2020). <https://mitsloan.mit.edu/ideas-made-to-matter/age-based-reopening-could-soften-economic-blow-while-saving-lives>.
- Economist (2020). <https://www.economist.com/science-and-technology/2020/10/21/should-covid-be-left-to-spread-among-the-young-and-healthy>.
- Ferguson NM. et al. (2020). Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand. Imperial College London.
- Greenhalgh T. et al. (2020). <https://www.theguardian.com/science/2020/sep/22/scientists-disagree-over-targeted-versus-nationwide-measures-to-tackle-covid>.
- Great Barrington Declaration (2020). www.gbdeclaration.org
- Gupta S. et al. (2020). <https://www.theguardian.com/science/2020/sep/22/scientists-disagree-over-targeted-versus-nationwide-measures-to-tackle-covid>
- Iacobucci G. (2020). Covid-19: Isolating older people would be age-based apartheid says NHS boss, BMJ 2020;370:m3788.
- Ichino A, Calzolari G, Mattozzi A, Rustichini A, Zanella G, Anelli M. (2020). Transition steps to stop

- COVID-19 without killing the world economy. VOX EU website, 25 March 2020.
- Institute for Fiscal Studies. (2020). A bad time to graduate. 17 April 2020.
- Long SJ, Fone D, Gartner A, Bellis MA. (2016). Demographic and socioeconomic inequalities in the risk of emergency hospital admission for violence: cross-sectional analysis of a national database in Wales. BMJ Open, 6, article number e011169.
- Lourenco J. et al. (2020). Fundamental principles of epidemic spread highlight the immediate need for large-scale serological surveys to assess the stage of the SARS-CoV-2 epidemic. Oxford University.
- Miles D, Stedman M, Heald A. (2020). Living with Covid-19: Balancing costs against benefits in the face of the virus. National Institute Economic Review, 253, August 2020. R60-R76.
- Oswald AJ, Powdthavee N (2020a). The case for releasing the young from lockdown: A briefing paper for policymakers. University of Warwick.
- Oswald AJ, Powdthavee N (2020b). Driving licences make it possible to check a young person's age. April 14, Financial Times.
- Oswald M. (2015). In a democracy, what should a healthcare system do? A dilemma for public policymakers. Politics, Philosophy and Economics, 14, 23-52.
- Office for National Statistics website
(<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2018>).
- Reddy SG. (2020). Population health, economics and ethics in the age of COVID-19. BMJ Global Health 2020;5:e003259. doi:10.1136/bmjgh-2020-003259.
- Rowthorn R, Maciejowski J. (2020). A cost-benefit analysis of the COVID-19 disease. Oxford Review of Economic Policy, 36, S1, S38–S55.
- Verity R. et al. (2020). April 15. Estimates of the severity of coronavirus disease 2019: a model-based analysis. Lancet Infectious Diseases (2020). [https://doi.org/10.1016/S1473-3099\(20\)30243-7](https://doi.org/10.1016/S1473-3099(20)30243-7).
- Wise J. (2020). Covid-19: Experts divide into two camps of action—shielding versus blanket policies. BMJ 2020; 370 doi: <https://doi.org/10.1136/bmj.m3702> (Published 21 September 2020).
- Xiong JQ et al. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. Journal of Affective Disorders, 277, 55-64.