ANNEX I: NEXT STEPS FOR SOCIAL DISTANCING MEASURES: SEGMENTATION

Introduction

1. The objective in deciding on next steps for social distancing measures will be to strike the balance between keeping transmission rates low and allowing a degree of normal economic and social activity to resume.
2. Adopting a segmentation approach to social distancing would enable us to segment the population to apply different non-pharmaceutical interventions (NPIs) to different groups, dictated by each groups characteristics. In essence, this approach would enable us to tailor the extent and effect of social distancing applied by different groups to maximise the overall benefits to both health and the economy.
3. In practice this would mean providing stronger protection to the vulnerable while allowing lower risk segments of the population greater freedom. Although there would be benefits to this approach, there is the risk that the approach would be perceived as unfair. To minimise this risk, it is important that the NPIs are based on robust evidence, are reasonable and, where possible, highlight and draw on the reciprocal responsibilities between the different segments.
4. Therefore, this paper:
    - Introduces the concept of segmentation;
    - Sets out how it could be applied in the social distancing context, summarising the work that is currently being undertaken in these areas; and,
    - Sets out how scientific and medical analysis could inform next steps in social distancing, particularly in the context of the next review.

The Segmentation Approach

5. The approach requires the identification of groups within the population which would be at the lowest and highest risk were social distancing measures to be relaxed or lifted based on scientific and medical analysis. It is distinct from differential effects as it consists of the deliberate segmentation of the population to enable government to meet its objectives rather than of the unintended and unforeseen discriminatory effects of policy implementation which are not necessarily beneficial and do not contribute towards meeting the policy's objectives.
6. Theoretically, segmentation would enable the UK population to partially emerge from lockdown whilst keeping the risk of exponential rise in transmission rates (thus the number of excess deaths and hospitalisations) as low as possible, mitigating the impact of social distancing on both non-Covid19 health issues and the economy.
7. However, the approach carries with it risks related to defining where the lines are drawn between groups:
    - *Discrimination.* Individuals who are deemed as 'high risk' may claim discrimination on the basis that their civil liberties continue to be curtailed whilst those of others are not; and,

- *Failure to protect*. Individuals who do not fall into a high-risk group and therefore are no longer able to, for example, legitimately claim furlough, may claim that the government is failing to protect them.
- *Methodological limitations.* The principle of segmentation is to identify homogenous groups. However, there are risks that applying the same policy to everyone in the group without the consideration of tailoring to individual people produces risk at the level of the individual, which would need balancing against overall advantages at the level of population groups.

8. Adoption of this approach would not be entirely new; the measures implemented in March mean we are currently segmenting by:
    - *Symptoms* as symptomatic individuals are being asked to self-isolate;
    - *Age* as social distancing recommendations for those over 75 are more stringent;
    - *Underlying health conditions/ clinical vulnerability* evidenced by the implementation of shielding
    - *Work type* by closing down certain sectors of the economy and deeming others essential; and,
    - *Geography* as a consequence of devolved decision-making.
9. Nevertheless, extending the policy would make segmentations more visible and nuanced, and therefore more likely to be challenged. Segmentations inherent to existing policies which are more general than those we are proposing moving forward, have proved problematic. For example, we introduced a segmentation of the population based on 6 medical conditions, and applied one policy intervention. However, with such a range of medical conditions, we have seen that operationally not everyone on the shielded list requires the civil contingencies support (false positive from a policy perspective) while others not on the list have different vulnerabilities and do require the support (false negative). Ethnicity is also another segmentation that illustrates this – we regularly talk about Black and Minority Ethnic Groups (BAME) – but each of the ethnic groups within this has very unique health genetics and conditions, as well as being influenced and affected by different cultural and socio-demographic characteristics.

Extending Segmentation

10. The approach can be further extended on the basis of sector, geography and health risk to varying degrees and effect.
11. **Sector.** HMT and BEIS are undertaking an exercise to prioritise the sectors in which revived economic activity would benefit the economy the most. Based on this prioritisation and scientific analysis, we expect to compile a list of low-risk sectors in which low-risk employees could return to work whilst keeping the risk of increasing transmission rates low. This will be carried out along with engagement with sectors to support the adaptation of workplaces, educational settings and transport, public places to minimise coronavirus transmission.
12. In addition, work is currently ongoing to understand how workplaces can be made safer based on scientific evidence, enabling employees to maintain social distancing whilst at work in so far as is practical.

13. **Geography.** Although whether an individual is low or high risk is not affected by geography, population density does have a bearing on transmission rates. Consequently, different parts of the UK are at different stages of the epidemic, with the shape of the curve being impacted by density and number/nature of contacts in each region.
14. Deaths (and healthcare use etc) by region and by country are possible but care is needed when using a snap shot. [DN. Uncleared by analysts.] For example, data on geographic distribution of deaths from Covid-19 covering the four nations of the UK and the English regions shows that London and the Midlands have experienced a higher proportion of cases and deaths up until now. However, advice is needed on the epidemiology of the disease to ensure that geographies are compared at consistent points in the disease.
15. **Health risks.** Factors such as age and underlying health conditions (as well as ethnicity) can form the basis for determining the risk levels of population groups as it has done in, for example, shielding. Relative risk of death and healthcare use of individuals or groups can be affected by multiple factors. Further work is required, but initial analysis suggests the following:

    - **Age:** There is a strong age gradient in Covid-19 related fatalities. For example, as at 19 April, NHS Hospital deaths in England were 7,447 for those aged 80+, compared with 5,713 for 60-79, and fewer than 1,250 for all people under the age of 60.
    - **Gender:** As suggested by the above, males appear to be more susceptible to the virus than females. For example, analysis of critical care admissions shows that over 20% of all critical care admissions are men aged 60-69, whilst the figure is only c 8% for women in the same age bracket.
    - **Pre-existing health conditions:** Individuals with underlying health conditions are more susceptible to the virus. Data for deaths in hospital in England shows that 83% of all individuals had a pre-existing medical condition. This can be further stratified by particular conditions. Data from deaths in England and Wales in March 2020 shows that around 50% of all deaths involved individuals with the top 4 co-morbidities (heart disease, dementia, lower respiratory disease, and influenza or pneumonia). For all groups aged 80+ the most common comorbidity was dementia and Alzheimer's disease while for those aged 50-79 the most common comorbidity was either chronic lower respiratory diseases or Ischaemic heart diseases. 18% of all deaths up to 15 April were shielded individuals,[1] with the proportion of deaths

[1] The shielded list includes the following individuals[2]:

•Organ transplant recipients who are on long term immune suppression therapy

•Specific cancers

•Severe respiratory conditions

•Rare diseases and inborn errors of metabolism

•Immunosuppression therapies

•Pregnant individuals with congenital heart disease.

amongst shielded individuals higher in every age group than the proportion of the population that they comprise.

- **Ethnicity:** Initial analysis also appears to show that some ethnic groups are more likely to be hospitalised or to die from the virus. Data on deaths shows a particularly high incidence of deaths amongst Black/Caribbean and Indian ethnic groups (421 and 289 deaths per million respectively) when compared to White or Chinese ethnic groups (178 and 115 deaths per million respectively). Analysis on critical care admissions shows similar trends. However, further work is required to understand whether these trends derive from underlying health risk or social factors.

16. The health and care system, academic and think tanks already has a range of experts in population segmentation, and risk stratification methods that we can galvanise and bring together. To date most methods are based on local geographies and so there will be challenges to overcome in developing a national approach, based on the underlying need for fully linked national data sources.
17. [Further work (likely timescale: 1 week) would analyse comorbidity-prevalence in different age groups to see the extent to which co-morbidities predict deaths beyond age. Further work (likely timescale: 3 days) would also try to establish which groups are more/less likely to be more susceptible to be infected and transmit the infection. Work is on-going to improve earlier analysis on the proportion of deaths that are 'excess deaths' i.e. would not have happened within a year otherwise.]

Implementing Segmentation

18. In applying this this approach to social distancing policy, we will need to manage the risks outlined in paragraph 6, and consider the practical implementation challenges (I.e. the feasibility), including enforcement. Although the data and analysis will provide an understanding of high and low risk individuals and contexts, identifying viable options for implementing these findings as policy is likely to be challenging due to the nature of segmentations as multi-layered and tailored to individual circumstances. Our approach will be to consider the segmentation approach for the different NPIs.
19. One option currently being explored is '**test, track and trace',** particularly issues around determining immunity and deliverability. If supported by scientific and medical analysis and applied thoroughly, this approach would likely prove highly effective, it requires significant human and financial resource and relies on high levels of compliance among the populations to, for example, download an app which would enable the tracking and tracing of contacts.

Next Steps

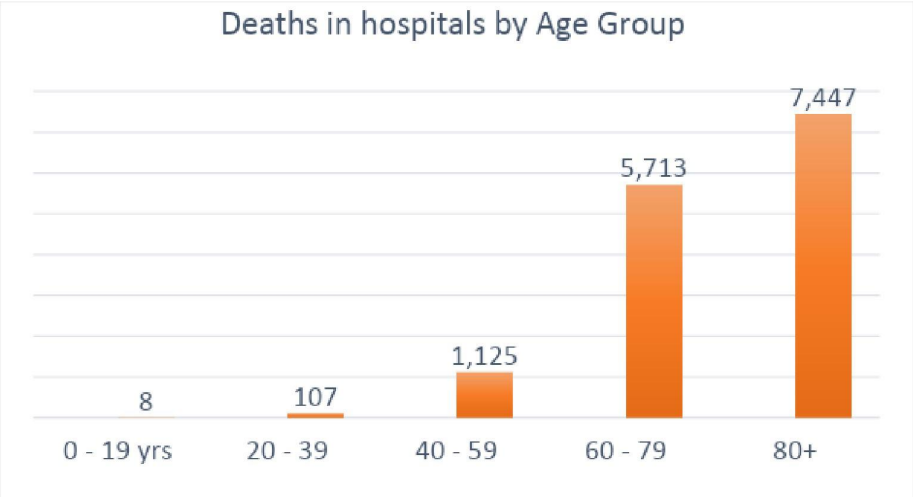
20. Further work is required to continue to develop our understanding of how Covid-19 risk can be segmented by I) sector, ii) geography and iii) health. SAGE should be asked to consider these questions and reach a collective and definitive scientific statement of the significance of each in time to influence the next review of social distancing measures.
21. In parallel, detailed work should be taken forward to explore the feasibility of options for implementing segmentation by each of these variables, working through the social distancing interventions to see which is best suited to segmentation approaches. This should

include looking for early opportunities to amend or relax measures for any groups that are deemed to be at low scientific risk, while remaining within our overall objective.

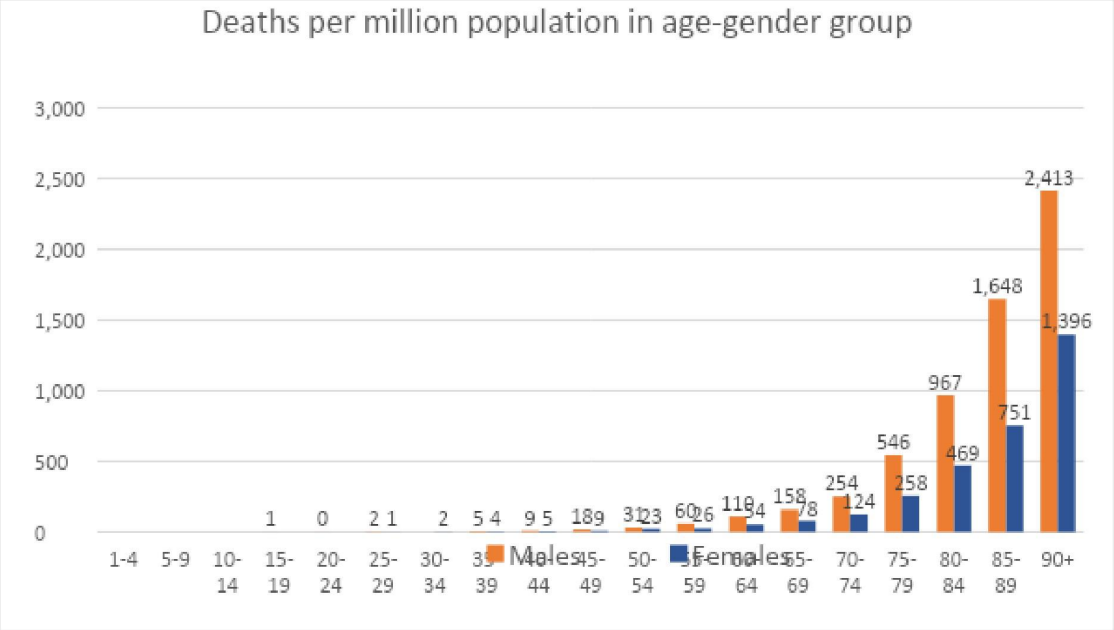
Annex

Age and gender break-down of deaths

Deaths in hospitals (NHS data up to 19 April[2])



Deaths per million population in all places (ONS data up to 10 April[3])



[2] https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-daily-deaths/

[3] https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/weeklyprovisionalfiguresondeathsregisteredinenglandandwales

Main co-morbidities in fatalities (all ages ONS data on deaths in March 2020[4])

Conditions	Number of deaths involving C-19	% of deaths involving COVID-1	Prevalence among the English population 2018-19[2]	Prevalence amongst C-19 deaths compared to general population
Ischaemic heart diseases	540	14%	3.1%	4.5
Dementia and Alzheimer's disease	530	14%	0.8%	17.9
Chronic lower respiratory diseases	500	13%	8.0%	1.6
Influenza and pneumonia	420	11%	-	-

Place of deaths (ONS data on deaths up to 10th April[5])

Location	Deaths up until 10th April	Percentage of total COVID-19 deaths
Home	466	4.5%
Hospital (acute or community, not psychiatric)	8,673	83.9%
Hospice	87	0.8%
Care Home	1,043	10.1%
Other communal establishment	21	0.2%
Elsewhere	45	0.4%
Total	10,335	**100%**

Geographical distribution of hospital deaths (DHSC/NHS data up to 19th April[6])

[4] https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsinvolvingcovid19englandandwales/deathsoccurringinmarch2020

[5] https://www.ons.gov.uk/file?uri=%2fpeoplepopulationandcommunity%2fbirthsdeathsandmarriages%2fdeaths%2fdatasets%2fweeklyprovisionalfiguresondeathsregisteredinenglandandwales%2f2020/publishedweek152020.xlsx

[6] https://coronavirus.data.gov.uk/#regions; https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-daily-deaths

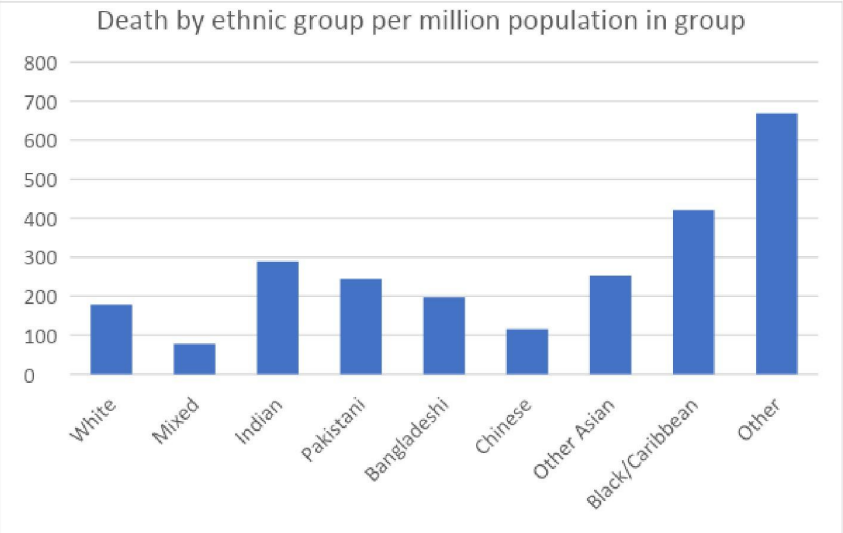
Country	Region	Cases	Deaths	Cases per million	Deaths per million	Deaths per cases
England		93,030	14,830	1,640	260	16%
	London	21,650	4,040	2,400	450	19%
	Midlands	15,040	3,130	1,380	290	21%
	North West	14,330	2,280	1,950	310	16%
	North East and Yorkshire	12,640	1,970	1,540	240	16%
	East of England	7,730	1,720	1,230	270	22%
	South East	12,880	1,750	1,390	190	14%
	South West	4,860	720	850	130	15%
Northern Ireland		2,730	190	1,430	100	7%
Scotland		8,450	900	1,550	170	11%
Wales		7,550	580	2,390	190	8%
Total		**111,750**	**16,510**	**1,660**	**250**	**15%**

Hospital deaths in different ethnic groups (NHS data[7])

All categories: Ethnic Group	Deaths	Deaths per million
White	9,783	178
Mixed	97	78
Indian	420	289
Pakistani	287	244
Bangladeshi	89	197
Chinese	50	115
Other Asian	217	252
Black/Caribbean	801	421
Other	388	669

[7] https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-daily-deaths

Hospital death rate per million population in ethnic groups (NHS data[8])



[8] https://www.england.nhs.uk/statistics/statistical-work-areas/covid-19-daily-deaths