RESPONSE TO THE ONS CENSUS CONSULTATION

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GENERAL COMMENTS

Q1: What are your views of the different census approaches described in this document?

We need to improve the whole system of population and social statistics

At a small consultation meeting at the British Academy, I made the observation that I thought ONS and users were being asked the wrong question. The question posed by Cabinet Office should have been "How can we develop a better system of population and social statistics fit for purpose in the 21st century?" with the rider "How can we ensure value for money from our investment in such a system?" I cited Len Cook's 2003 plan for an integrated population statistics system as an excellent point to start from (ONS 2003).

We need to proceed with both an online census from 2021 onwards ***and*** *an administrative statistical population database*

There is a strong argument for both continuing with a full census every ten years, designed to be completed online so that the cost increases of recent censuses can be stopped, and building a system that uses administrative records to establish a population base each year supplemented by a large household survey. The alternative system does need to be thoroughly checked before people can have confidence in it. At the same time decennial censuses fail to supply towards the end of inter-census intervals information useful for all sorts of monitoring and planning purposes. I believe the country can afford both options.

Frequency for larger areas is more important than infrequent detail for smaller areas

However, if HM Treasury say that we cannot have both options, despite the arguments that are made about the importance of having small area statistics, then I would opt for the Administrative Database plus Survey Option. This is the system that provides the frequent statistics that we need. I set out later the case for such statistics in National Health Service planning.

This is a minority view among academic and local authority users

This view is very much a minority view among my academic colleagues, who wish to retain the small area statistics that a decadal census delivers. I think it is time to move on to a new and more comprehensive system of continuous population statistics. ONS should seize the opportunity to fulfil the vision set out in 2003 of an integrated population statistics system by Len Cook, then Director of the Office for National Statistics.

My remaining lifetime expectancy for population and social statistics

I have a personal motivation in choosing this option. My remaining life expectancy is probably about 20 years (based on choosing a more favourable life table than the average reflecting my socio-economic position). I would guess I have about ten years of useful demographic work left to me. Within that time I would benefit from only one traditional census, in 2021, whereas I would make more use of option 2 outputs.

The integrated administrative database plus survey is only the start of a journey

I would see Option 2 as just the start of a continuing journey in which more and more administrative data sets contribute to the Statistical Population Database. As new data sets are added, the population spine will become more reliable and the set of attributes that come with them will expand. No one, in any of the consultation meetings, has pointed out that the Department of Communities and Local Government and its sister departments in the devolved administrations already produce extensive sets of administrative statistics that go into the construction of the Index of Multiple Deprivation. Of course, these are aggregate statistics rather than individual and the methodology is not yet consistent over home countries and time. But the IMD data meet a vital need in the planning of communities and housing to know the condition of neighbourhoods in the recent past. ONS itself includes these data, other series and census data in the very useful product Neighbourhood Statistics. So, what I am arguing is that we should be debating the future of a system of population, social and economic statistics not just the future of one product, the decennial census.

USE AND BENEFITS OF POPULATION AND HOUSING STATISTICS

Q2: Please specify any significant uses of population and housing statistics that we have not already identified.

Q3: Please specify any significant additional benefits of population and housing statistics that we have not already identified.

I discuss here recent uses of census and other official statistics.

How good are roll forward methods from a census?

Between 2007 and 2011, a Leeds team, Phil Rees (University of Leeds), Paul Norman (University of Leeds), Pia Wohland (Newcastle University) and Peter Boden (Edge Analytics), developed a population projection model for local ethnic populations in the UK. The projection data and a full list of publications and presentations are provided via www.ethpop.org. ONS colleagues in the Population Estimates for Ethnic Groups (PEEG) team regularly refer queries about local ethnicity beyond their current series (2010) and the 2011 Census to our web site. Both the PEEG and ETHPOP teams have recently carried out evaluations of the performance of the estimates and projections respectively against the 2011 census. The results are set out in Table 1.

Table 1: Evaluations of ONS and ETHPOP end of decade ethnic group population estimates and projections for England and Wales

Broad Ethnic Group	Census 2011	PEEG 2010	PEEG minus Census	% Difference
All Groups	56.08	55.23	0.85	1.52
White British	45.13	45.79	0.66	1.46
White Other	3.07	2.54	-0.53	-17.26
Mixed Ethnic Group	1.22	1.03	-0.19	-15.57
Asian/Asian British	4.21	3.81	-0.40	-9.50
Black/Black British	1.86	1.59	-0.27	-14.52
Other Ethnic Group	0.56	0.45	-0.11	-19.64
Broad Ethnic Group	Census 2011	ETHPOP 2011	ETHPOP minus Census	% Difference
All Groups	56.08	56.06	-0.02	-0.04
White British	45.13	46.57	1.44	3.19
White Other	3.07	3.04	-0.03	-0.98
Mixed	1.22	1.02	-0.20	-16.39
Asian	3.38	3.12	-0.26	-7.69
Black	1.58	1.40	-0.18	-11.39
Other	1.68	0.92	-0.76	-45.24

Sources: ONS (2013a), Rees et al. (2013)
Notes:
All populations are in millions.
Dates for populations:(1) Census = 27 March 2011, (2) PEEG = 30 June 2010, (3) ETHPOP – 30 June 2011
ETHPOP populations = average of the TREND and UPTAPER projections.
% Difference = 100 × (Difference/Census 2011).

Considerable errors accumulate over a decade

What does the table show? It shows that population estimates of the *total* population of England and Wales have been reasonably accurate over a decade using roll forward demographic models. However, once you disaggregate by ethnicity, for individual ethnic groups, there can be very high errors (e.g. a 45% under-projection in the ETHPOP projections from 2001 to 2011 for an Other grouping which puts together all ethnic groups with "Other" in their census titles). So the task of generating annual population statistics for small populations finds itself between a rock and a hard place. The attribute survey delivers reasonable accuracy only down to "large" small areas e.g. LSOAs, MSOAs. Rolling forward attributes from a decennial census, as in this ethnicity example, is rarely attempted and is challenging.

Possible solutions to these issues

(1) Parliament should pass a population registration bill which includes some additional attributes deemed vital to monitoring the social and economic health of the nation, such as ethnicity.
(2) Use attributes available from administrative registers that cover most of the population. To monitor ethnicity would mean extending the requirement to record ethnicity to most administrative forms, now common in the employment and health fields, in connection with Equality and Human Rights legislation.
(3) Experiment with extending the Statistical Population Database from its proposed minimalist content of date of birth (yielding age) and sex to all other attributes covered in a census. This

would be done by imputing attributes from the survey to the SPD. The imputation would use relationships between age, sex and location at the previous census to create conditional probability distributions to be sampled. However, we know that if we can use more attributes to base the conditionality on, the better will be the result. This is where the suggestions in point (2) would help.

IMPACT OF DIFFERENT CENSUS APPROACHES ON STATISTICAL USES

Q4: What would the impact be if the most detailed statistics for very small geographic areas and small population groups were no longer available? High, medium, low, or no impact?
Q4.1 If medium or high, please give further information.

It would no longer be possible to produce official small area geo-demographic classifications

Lack of output area (OA) data would have a HIGH impact on the census based classifications such as the widely used 2001 Census OA classification. In collaboration with ONS (the late John Charlton), Dan Vickers (now of the University of Sheffield), Mark Birkin (University of Leeds) and I designed and generated the 2001 Census Classification of Output Areas (Vickers et al. 2006). Using the same methods, ONS developed super-output, local authority and health area classifications.

These classifications have been widely used in both academic and commercial applications. They have the key advantage that the input data and methodology are both available in the public domain (and therefore replicable). Equivalent commercial geo-demographic classifications make extensive use of OA data with other data from commercial surveys and administrative registers. However, their methodology is not in the public domain, the claims made for them cannot be verified and they cost a lot. Without OA data from the Census, the country would lose these products (free at the point of use) and researchers and businesses would have to spend precious funds on non-transparent commercial products. The 2001 OA based classification has been linked to lots of household, panel and longitudinal surveys, to provide the socio-economic context for the individual being studied.

ONS has equivalent plans for updating the classification to 2011 (ONS 2013b):

"An external partner, University College London is currently working on producing an updated 2011 Census Output Area Classification for the UK using 2011 Census data. It is currently planned that the 2011 Output Area Classification will be published in late 2013. When the methodology used for producing the 2011 Output Area Classification has been finalised, ONS will then look to update the current 2001 Census based UK area classifications for Super Output Areas/Data zones, local authorities, and health areas using 2011 Census data. These updates are planned to be published in 2014. Consideration will also be given to updating the previous ward area classification. As part of the methodology review for a new Output Area Classification, thought will be given to periodically updating the 2011 Census based area classifications in the future using non-census data sources."

The last sentence recognizes the need for more frequent updates than every decade and anticipates using administrative and survey sources. Such classifications must continue to be available in the public domain and transparent.

Q5: What would the additional benefit be if more frequent (i.e. annual) statistics about population characteristics were available for areas like Local Authorities and Electoral Wards? High, medium, low, or no impact?
Q5.1 If medium or high, please give further information.

The benefit from having more frequent statistics about local authorities or equivalent areas is HIGH. The following example is taken from the work of NHS England to allocate funds to local agencies in the NHS.

Distributing NHS funds to Clinic Commissioning Groups (CCGs) in England

Small area statistics really matter for improving the health of the nation's population as it ages. In the past reliable small area statistics have only been available at ten year intervals based on the census of population and households. The alternatives proposed to the traditional census have the potential to deliver reliable small area statistics at more frequent intervals. A caveat is needed: the demographic and financial figures presented here are indicative, not definitive.

The Department of Health (DH) is charged with delivering the best possible health care to the nation's population, improving health outcomes and reducing health inequalities. To achieve these aims, DH distributes circa £80 billion of public funds to local NHS providers and agencies such as Primary Care Trusts (to 31 March 2013), CCGs (from 1 April 2013) and Local Authorities (which receive public health funds). These bodies further distribute funding to General Practices, Clinics, Out-of-Hours services and so on, and ultimately to the potential patient. Between 85 and 95%, depending on year and policy, of this budget is allocated on the basis of patient demographics (age, sex) and recent revealed demand for treatment. The other 5 to 15% of the budget is allocated in response to unmet need, in order to reduce health inequality.

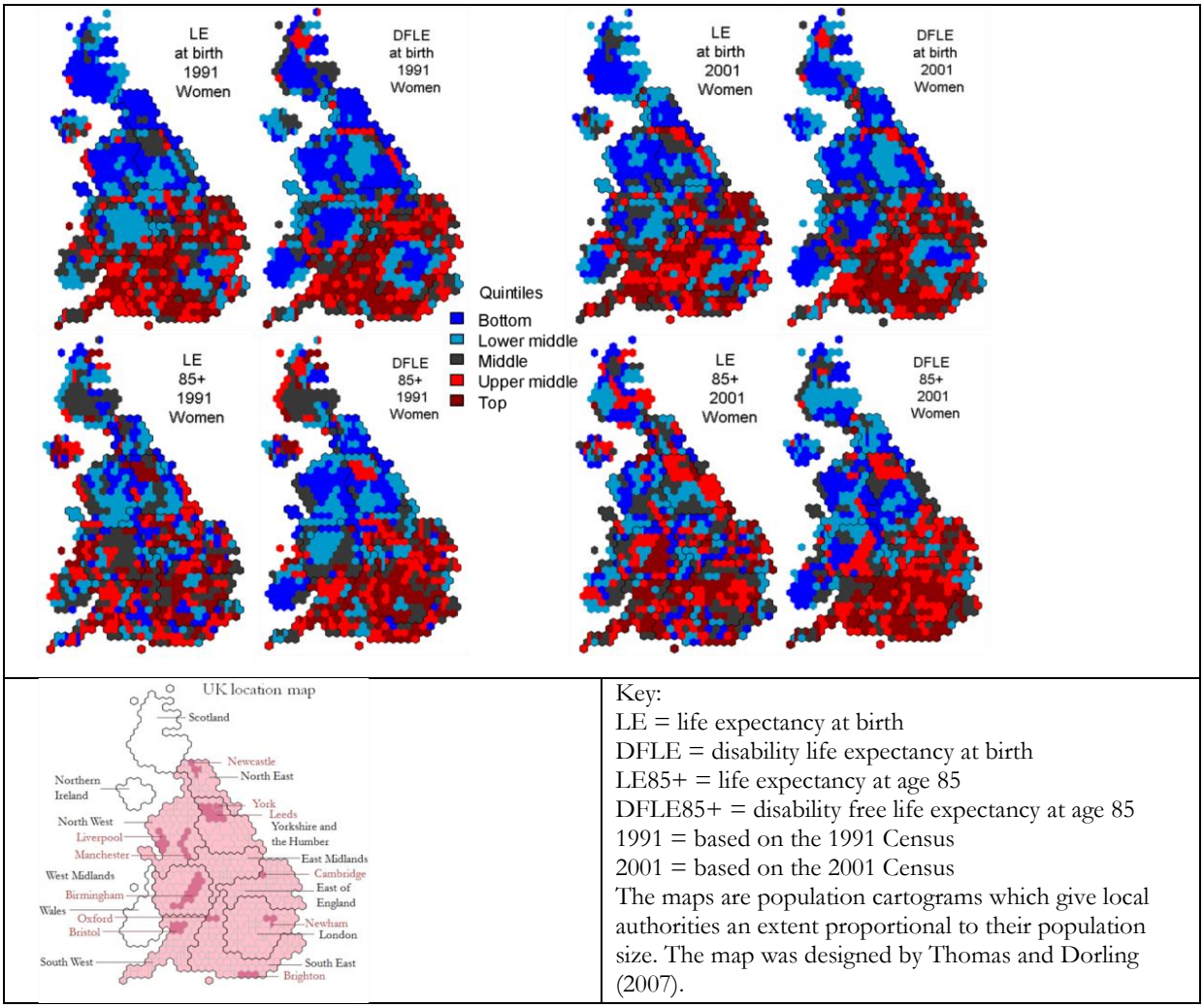
Why we need health statistics for health areas

We need good health statistics in order to monitor health inequalities, which we aim to reduce because we believe in social justice. Health inequality also reduces everybody's health (Wilkinson and Picket 2009). Health statistics for health areas are needed in order to generate suitable measures for the NHS allocation formulae to provide funds to NHS Clinical Commissioning Groups (CCGs) or Local Authorities (LAs) designed to reduce the inequalities. Each CCG and each LA also needs good health statistics for small areas to further distribute NHS funding in a fair way that helps reduce inequalities. Because NHS planning is organised in three year periods, we need health statistics more frequently than decennial censuses. NHS patient data measure revealed demand through treatments and associated costs. They fail to monitor unmet need hidden by late presentation and premature mortality.

The Department of Health through its Advisory Committee on Resource Allocation (ACRA) has commissioned work on health inequalities/unmet need by the brightest and best academic health social scientists but none of the work has so far convinced the Committee. In previous rounds of allocation for Primary Care Trusts, the Department of Health had used Disability Free Life Expectancy which combines census based information on disability (limiting long-term illness or LLTI) with deaths and population data. For the current funding period of 2013-15, data on LLTI from the 2011 Census were needed by the end of 2012. Mortality information was available for 2010 and 2011, though not 2012 but the latest DFLE estimates for sub-national areas in England were for 2007-09 (ONS 2012). ACRA therefore recommended use of the latest available Standardised Mortality Ratios (SMRs) for persons aged under 75, produced by ONS, to NHS England for use in its interim allocations to CCGs for 2013-2014 as the inequality compensation indicator. The consequences of using SMRs<75 instead of DFLEs for CCGs and LAs were considerable.

When mortality and morbidity measures are combined this reveals greater inequality

Wohland et al. (2013) investigate the temporal and spatial trends in life expectancy and disability free life expectancy in UK local authorities in 1991 and 2001. The maps of these indicators for ages 0 and 85 are displayed in Figure 1. The maps show the familiar south-east (high LE or DFLE) to north-west (low LE or DFLE) gradients interrupted by some urban sinks in the south-east and some rural domes in the north-west. The gradient is clearer and steeper for LE or DFLE at birth than at age 85. For LE at birth there is little change in the spatial pattern between 1991 and 2001 though the level of LE at birth rises by about 2 years. The gradients are more distinct for the DFLE measures than for LE measures, suggesting that inequalities are greater when morbidity is combined with mortality. This is confirmed by the distributional statistics assembled in Table 2. The Inter-quartile range is much larger in DFLE at birth than in LE at birth. It is also greater for men than women. Between 1991 and 2001 the IQRs increase significantly, indicating growing inequality. At age 85, the IQRs for DFLE are lower than for LE, suggesting that inequalities have shrunk at older ages in absolute terms, though not in relative. Assuming LE and SMR<75 are highly correlated (inversely), the analysis suggests that inequalities in DFLE are considerably larger than those measured by the SMR<75. Both SMR<75 and DFLE are highly correlated with deprivation so using either of these in a resource allocation formula will redistribute funds from less to more deprived areas. What might be the consequences of using a lesser gradient (SMR<75) compared with a steeper gradient (DFLE)?



Key:
LE = life expectancy at birth
DFLE = disability life expectancy at birth
LE85+ = life expectancy at age 85
DFLE85+ = disability free life expectancy at age 85
1991 = based on the 1991 Census
2001 = based on the 2001 Census
The maps are population cartograms which give local authorities an extent proportional to their population size. The map was designed by Thomas and Dorling (2007).

Figure 1: Life expectancy and disability free life expectancy at birth and age 85 for women in UK local authorities (Source: Wohland et al. 2013)

Table 2: Percentiles and the inter-quartile ranges for life expectancies and disability free life expectancies for local authorities in the UK, 1991 and 2001

	Life Expectancy				Disability Free Life Expectancy			
Percentile	1991		2001		1991		2001	
	Birth	85+	Birth	85+	Birth	85+	Birth	85+
Women								
75%	80.05	6.61	81.85	6.79	65.81	1.59	66.87	1.63
50%	79.14	6.16	80.86	6.39	64.3	1.42	64.81	1.40
25%	78.14	5.81	79.79	6.00	62.02	1.25	62.24	1.19
IQR	1.91	0.80	2.06	0.79	3.79	0.34	4.63	0.44
Men								
75%	74.92	5.29	77.47	5.72	63.21	1.76	64.8	1.79
50%	73.86	4.87	76.46	5.35	61.24	1.56	62.23	1.58
25%	72.46	4.49	74.83	4.96	58.77	1.38	59.45	1.41
IQR	2.46	0.80	2.64	0.76	4.44	0.38	5.35	0.38

Source: Wohland et al. 2013, computed from 1990-92 and 2000-02 mortality, and population data and 1991 and 2001 Census data on limiting long-term illness from ONS

A hypothetical example of the consequences of not using up to date information

It is useful setting out an imaginary example using some plausible assumptions, to show what the consequences of not using up to date information on the better inequality index might have on mortality and gains/losses in life years and the benefits/costs associated. The computations are set out in Table 3. The assumption underpinning the example is that spending in areas of poorer health will realise greater gains in terms of deaths avoided and life years gained than in areas of better health. In effect, we are assuming that there are diminishing returns to health care investment as health improves. This seems to be the case internationally, where richer countries are making slower gains in life expectancy (~2 years per decade) than emerging economies (~4 years per decade, figures based on Salomon et al. 2012).

Let us assume we have 500,000 deaths in England in a year[1], 250,000 of which occur in more deprived areas and 250,000 in less deprived areas. Using SMR<75 the more deprived areas might have 240,000 deaths and the less deprived areas 230,000 deaths by 2015, that is, inequality increases. If we allocated funds using DFLE, we might be able to reduce those deaths to 220,000 in more deprived areas while deaths reduced "naturally" to 235,000 in less deprived areas, that is, inequality decreases If we did not use an Inequality Factor to compensate for deprivation, then we might see increased deaths in the 50% most deprived areas and with decreases continuing in the less deprived, so that inequality increases. In Table 3 we have spread the decreases/increases in deaths over the three years of the current funding allocation (2013-2015). We can interpret decreases or increases in deaths as life years gained or lost. This is done by changing the sign of the deaths in panel 2 to give the extra life years in panel 3. The next step is to allocate a value to the extra life years gained or lost, which is done in the next panel of the table. Here we assume the value of a life year is equal to the per capita income. We have assumed this to be £20K in more deprived areas and £30k in less deprived areas. The benefits are considerable over just three years: £1.55 billion when using SMR<75, £2.10 billion when using DFLE against a baseline of £0.41 billion with No Inequality Factor. In the next panel of Table 3 the costs of care for the people, whose lives have been prolonged, are estimated. Here we have assumed the cost of care is higher in less deprived areas and lower in more deprived areas because of differences in labour costs. The final panel of the table computed the net benefits under each funding allocation. If we had been able to use DFLE for health areas in 2011 rather than SMR<75, England would have gained £197 million net benefit. Using No Inequality Factor compared with SMR<75 would mean £400 million less net benefit; compared with using DFLE some £597 million net benefit would have been lost.

[1] In 2012 there were 499,331 deaths in England and Wales, the lowest number since the early 1950s.

Table 3: Hypothetical example of the benefits and costs of using different inequality indicators in NHS funding allocation in England

VARIABLE	Observed	Basis for allocation									Totals		
		SMR<75	SMR<75	SMR<75	DFLE	DFLE	DFLE	NIF	NIF	NIF	SMR<75	DFLE	NIF
Area(s) of Interest	2012	2013	2014	2015	2013	2014	2015	2013	2014	2015	2013-2015	2013-2015	2013-2015
DEATHS	Numbers												
Deaths in England	500000	491,000	481,000	470,000	485,000	470,000	455,000	500,000	500,000	500,000	1,442,000	1,410,000	1,500,000
Deaths in 50% most deprived areas	250000	247,000	244,000	240,000	240,000	230,000	220,000	257,000	264,000	270,000	731,000	690,000	791,000
Deaths in 50% least deprived areas	250000	244,000	237,000	230,000	245,000	240,000	235,000	243,000	236,000	230,000	711,000	720,000	709,000
GAINS OR LOSSES (2015 less 2012)	Numbers												
Deaths in England		- 9,000	- 19,000	- 30,000	- 15,000	- 30,000	- 45,000	-	-	-	- 58,000	- 90,000	-
Deaths in 50% most deprived areas		- 3,000	- 6,000	- 10,000	- 10,000	- 20,000	- 30,000	7,000	14,000	20,000	- 19,000	- 60,000	41,000
Deaths in 50% least deprived areas		- 6,000	- 13,000	- 20,000	- 5,000	- 10,000	- 15,000	- 7,000	- 14,000	- 20,000	- 39,000	- 30,000	- 41,000
EXTRA LIFE YEARS	Numbers												
Extra life years in England		9,000	19,000	30,000	15,000	30,000	45,000	-	-	-	58,000	90,000	-
Extra life years in 50% most deprived areas		3,000	6,000	10,000	10,000	20,000	30,000	- 7,000	- 14,000	- 20,000	19,000	60,000	- 41,000
Extra life years in 50% least deprived areas		6,000	13,000	20,000	5,000	10,000	15,000	7,000	14,000	20,000	39,000	30,000	41,000
TOTAL BENEFITS	£1000s												
Value of an extra life year in England		240,000	510,000	800,000	350,000	700,000	1,050,000	70,000	140,000	200,000	1,550,000	2,100,000	410,000
Value of an extra life year in 50% most deprived areas	20	60,000	120,000	200,000	200,000	400,000	600,000	- 140,000	- 280,000	- 400,000	380000	1200000	-820000
Value of an extra life year in 50% least deprived areas	30	180,000	390,000	600,000	150,000	300,000	450,000	210,000	420,000	600,000	1170000	900000	1230000
TOTAL CARE COSTS	£1000s												
Care cost for extra life year in England		159,000	338,000	530,000	230,000	460,000	690,000	49,000	98,000	140,000	1,027,000	1,380,000	287,000
Care cost for extra life year in 50% most deprived areas	13	39,000	78,000	130,000	130,000	260,000	390,000	- 91,000	- 182,000	- 260,000	247000	780000	-533000
Care cost for extra life year in 50% least deprived areas	20	120,000	260,000	400,000	100,000	200,000	300,000	140,000	280,000	400,000	780000	600000	820000
NET BENEFIT	£1000s												
England		81,000	172,000	270,000	120,000	240,000	360,000	21,000	42,000	60,000	523,000	720,000	123,000
50% most deprived areas	7	21,000	42,000	70,000	70,000	140,000	210,000	- 49,000	- 98,000	- 140,000	133,000	420,000	- 287,000
50% least deprived areas	10	60,000	130,000	200,000	50,000	100,000	150,000	70,000	140,000	200,000	390,000	300,000	410,000

Notes: SMR<75 = Standardized Mortality Ratio for under 75s, DFLE = Disability Free Life Expectancy, NIF = No Inequality Factor

Of course, these numbers are invented. To do the analysis properly for CCGs would need: (1) measurement of the relationship between health spend and life expectancy outcomes at different deprivation levels, (2) Calibrating the relationships between the health inequality index and deprivation, (3) Estimating the value of a life year (at different levels of health/disability) and (4) Estimating the costs of a life year (at different levels of health/disability).

Can the Administrative Data plus Survey option deliver reasonably precise health statistics?
NHS Health Areas change with each successive government and sometimes when Secretaries of State for Health change. Note that neither CCGs nor GP practices are "crisp regions". Currently, NHS England allocates secondary care funds to CCGs based on a complex formula and primary care funds to GP practices based on a simpler formula reflecting work load (number and age of patients). There are ~150 CCGs and ~325 LAs to which funds are distributed. So, the Administrative Data plus Attribute Survey option should deliver frequent DFLE estimates with reasonable uncertainty intervals. "With one year's survey data, reliable statistics could be produced on the number of: People with a limiting long term illness in each LA" (ONS Consultation Workshop slides). Indirect methods would be needed. There are ~8000 GP practices in England with ~56.3 million patients, an average of ~7000 patients per practice, so they are roughly comparable in population size to MSOAs. "With three years' survey data, reliable statistics could be produced on the number of: People with a limiting long term illness in each MSOA" (ONS Consultation Workshop slides). Again indirect methods would be needed. So CCGs could plan more sophisticated allocations to GP practices with their groups

IMPACT OF DIFFERENT CENSUS APPROACHES ON HISTORICAL RESEARCH
ONS has worked with The National Archives and genealogists to understand how census information is used in historical research. These questions ask you to tell us about any uses or benefits of census information that we have not yet fully understood and to share your views on the potential impact of the different census approaches.
Q6: Please specify any significant uses of census information for historical research that we have not already identified.
Q7: What advantages or disadvantages for genealogical or historical research can you see from a move to a solution based on archiving administrative data sources?

This is not my field of interest but I believe that what historical researchers want is as complete a personal and household record that can be produced and released in one hundred years' time. The record will naturally improve as more administrative data sets are added to the Option (2) process. This would leave a lot of gaps in the individual record compared with an online census plus enumeration (Option 1). One partial fix would be to extend the use of the Attribute Survey as a means of imputing attributes to the whole population as suggested above.

MANAGING RISKS

As described in section 3, there are risks and opportunities with both census approaches. These questions give an opportunity to comment on these and to raise any other issues.

Q8: What are your views of the risks of each census method and how they might be managed?

Q9: Are there any other issues that you believe we should be taking into account?

Risks of each census method

For Option (1) there is the risk that too many people will decline to use the online method and this will increase the field collection costs back to the level of 2011. For Option (2) there is a need to demonstrate that the method really does deliver what it claims. With the 2001 Census and especially with the 2011 Census, a lot of effort was expended in comparing local population estimates with alternative sources in a quality assurance which worked well. The logical protection against these risks is to run both an online census in 2021 and to develop the Administrative Data plus Attribute Survey option so that it delivered comparable data. Could the Attribute Survey be organised in 2021 as a Coverage Survey to save on costs? Could the Attribute Survey be used as a check on the quality of census answers?

I hope some of these comments on future census options are useful to ONS, the UK Statistics Authority and HM Treasury.

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