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Operational aspects of censuses

Costs and benefits: Key results from the UNECE Survey on National Census Practices, and first proposals about the CES Recommendations for the 2020 census round

Note by the UNECE Task Force on Costs and Benefits

Summary

In early 2013, the UNECE conducted an online survey among its member countries on national practices in the 2010 round of population and housing censuses. This document presents an overview of the main results of the survey on census costs and benefits (part I), and some first proposals by the UNECE Task force on census costs and benefits about the preparation of new Conference of European Statisticians Recommendations for the 2020 Round of Population and Housing Censuses, with regard to census costs and benefits.

I. Key results on census costs and benefits from the online survey on national census practices

A. Introduction

1. In this section, the main results of the questions on census costs and benefits included in the UNECE survey are presented. The section is based mainly on census cost figures and other information reported by countries in the survey, which have not been confirmed. The figures and the comments presented in this document may contain some errors, and have to be considered as provisional and unofficial.

2. Additionally, it is important to be aware that the method of recording and reporting expenditure on census varies a great deal between countries – and this will affect all results reported in this document. One example might be where enumerators already employed in some other capacity by the state, are used in the census operation but not charged directly to the census. Similarly the low costs reported for register based censuses here reflect the marginal cost of production of census statistics – not the full cost of building and maintaining the registers (which might be shared between applications).

3. Accordingly, whilst broad comparisons can be made, detailed comparisons between particular countries should be made only with caution.

B. Q1 What is the estimated total cost of your 2010 round census? (in terms of Euros or US Dollars)

4. There were 43 responses to this question (84% of the total asked), 25 of which were from EEA countries. Table 1 presents the total census costs reported by countries expressed in 2011 US dollars, the per capita census cost, and the per capita costs converted into purchasing power parity (PPP) units. This last measure reflects the difference in purchasing power across countries, and therefore should provide a relatively more internationally comparable estimate of costs¹. It should be noted that the costs presented in table 1 are spread over differing lengths of time for different countries (see sections C and D).

5. Of all of the countries that responded to this question, the USA (which conducted a full field enumeration in 2010 with annual sample updates) had the highest cost, both in terms of total cost, and of PPP per capita cost. However, concerning the per capita cost unadjusted for PPP, was highest in Lichtenstein (which conducted a census based on registers combined with full field enumeration for selected variables). The lowest cost, by any of these measures was Slovenia, which used a register based census method.

6. Among the countries with a combined census, those which conducted a full enumeration (Liechtenstein, Estonia, Latvia and Lithuania) have generally higher per capita census costs compared to those that did not conduct a full enumeration. In this last group, Germany has a higher per capita cost compared to the other countries.

¹ Purchasing power parities (PPPs) are indicators of price level differences across countries. They are obtained by comparing price levels for a basket of comparable goods and services, and indicate how many currency units a particular quantity of goods and services costs in different countries. Census costs are expressed in US Dollars PPP per capita: Except where stated otherwise, total census costs are here calculated using, 2011 values for PPP, national exchange rates, and population, whereas the yearly cost profile is calculated based on yearly data for costs, PPP, exchange rate, and population.

Table 1
Different measures of countries' census cost, grouped by census method

COUNTRY	COST (in 2011 US dollars)		
	TOTAL COST	PER CAPITA	PER CAPITA (PPP)
Traditional census (including rolling census)			
Azerbaijan	9,428,371	1.03	1.45
Kyrgyzstan	6,100,000	1.12	2.40
Armenia	5,126,000	1.57	2.78
Tajikistan	10,084,000	1.31	3.09
Belarus	14,489,003	1.53	3.63
Republic of Moldova	7,655,902	2.15	3.69
Bulgaria	13,443,758	1.83	3.79
Russian Federation	544,800,000	3.81	4.79
France	405,066,815	6.22	5.16
Romania	62,716,391	2.93	5.28
Malta	2,053,167	4.93	6.33
Croatia	22,245,312	5.05	6.93
Portugal	65,732,758	6.23	7.06
Ukraine	164,700,000	3.62	7.31
Luxembourg	5,567,929	10.74	8.33
Greece	95,440,015	8.45	8.50
Serbia	34,131,389	4.70	8.85
Slovakia	40,747,494	7.55	10.21
Montenegro	3,458,416	5.57	10.51
Hungary	75,755,615	7.60	11.70
UK	807,349,666	12.87	11.82
Italy	840,842,149	13.85	12.49
Albania	19,487,751	6.10	13.42
Bosnia and Herzegovina	29,231,626	7.61	14.33
Canada	658,235,748	19.09	15.34
Ireland	83,357,494	18.21	15.64
USA	12,517,149,000	40.17	40.17
Combined census			
Turkey	14,555,612	0.20	0.32
Switzerland	21,297,327	2.69	1.65
Spain	118,318,486	2.56	2.56
Poland	136,533,906	3.54	5.59
Lithuania (full enumeration)	11,953,508	3.94	6.01
Latvia (full enumeration)	10,663,976	5.18	7.24
Germany	1,043,986,637	12.76	11.41
Estonia (full enumeration)	18,735,013	13.98	18.56
Liechtenstein* (full enumeration)	1,670,379	47.09	28.80
Register based census			
Slovenia	69,599	0.03	0.04
Denmark	375,835	0.07	0.05
Netherlands	1,948,775	0.12	0.10
Finland	1,280,624	0.24	0.18
Norway	2,465,200	0.50	0.31
Sweden	6,698,218	0.71	0.51
Austria	13,780,624	1.64	1.39

*For Liechtenstein, costs are calculated using its 2008 population, and PPP values for Switzerland, whose currency it uses.

7. In order to compare the cost for each type of census, table 2 presents the median values of the indicators presented in table 1 for each census type (median values are less influenced by extreme values than mean values).

8. As expected, for all indicators of census costs the median values concerning the register-based census method are by far lower than those for the traditional and combined census methods.

9. The median value of the total cost for countries with combined census (USD 18.7m) is much lower than the median value for countries with traditional census (USD 34.1m), while the difference is smaller (although still significant) for the per capita cost indicators.

Table 2

Median cost of 2010 census by census method (in US dollars)

Method	TOTAL COST (millions)	PER CAPITA	PER CAPITA (PPP)
TRADITIONAL	34.1	5.57	7.31
COMBINED	18.7	3.94	6.01
REGISTER BASED	1.9	0.24	0.18
ALL	18.7	3.94	6.01

C. Q2 Over what period of time do these costs relate?

10. There were 44 countries that provided responses to this question (86% of the total asked), 28 of which were from EEA countries (64% of respondents).

11. EEA countries report a slightly longer period of time over which census costs occur than do non-EEA countries (table 3).

Table 1

Period of time that the costs relate to by geography

	EEA COUNTRIES	NON-EEA COUNTRIES	ALL
Minimum (years)	0.5	1.0	0.5
Maximum (years)	14.0	13.0	14.0
Mean (years)	5.9	5.0	5.6
Median (years)	5.8	4.3	5.1

12. The results on period of time that the costs relate to by type of census method are included for completeness (table 4) but it is difficult to draw any useful conclusions from them. It seems likely that the small differences are more influenced by differences in reporting than by any real differences in approach. The graphs provided under the next question (Q3) provide a better insight.

Table 2

Period of time that the costs relate to by census method

	TRADITIONAL	REGISTER BASED	COMBINED	ALL
Minimum (years)	1.0	1.0	0.5	0.5
Maximum (years)	13.5	14.0	10.0	14.0
Mean (years)	5.8	5.6	5.0	5.6
Median (years)	5.0	4.6	5.5	5.1

D. Q3 What was the profile of spend for this total cost over the entire census period?

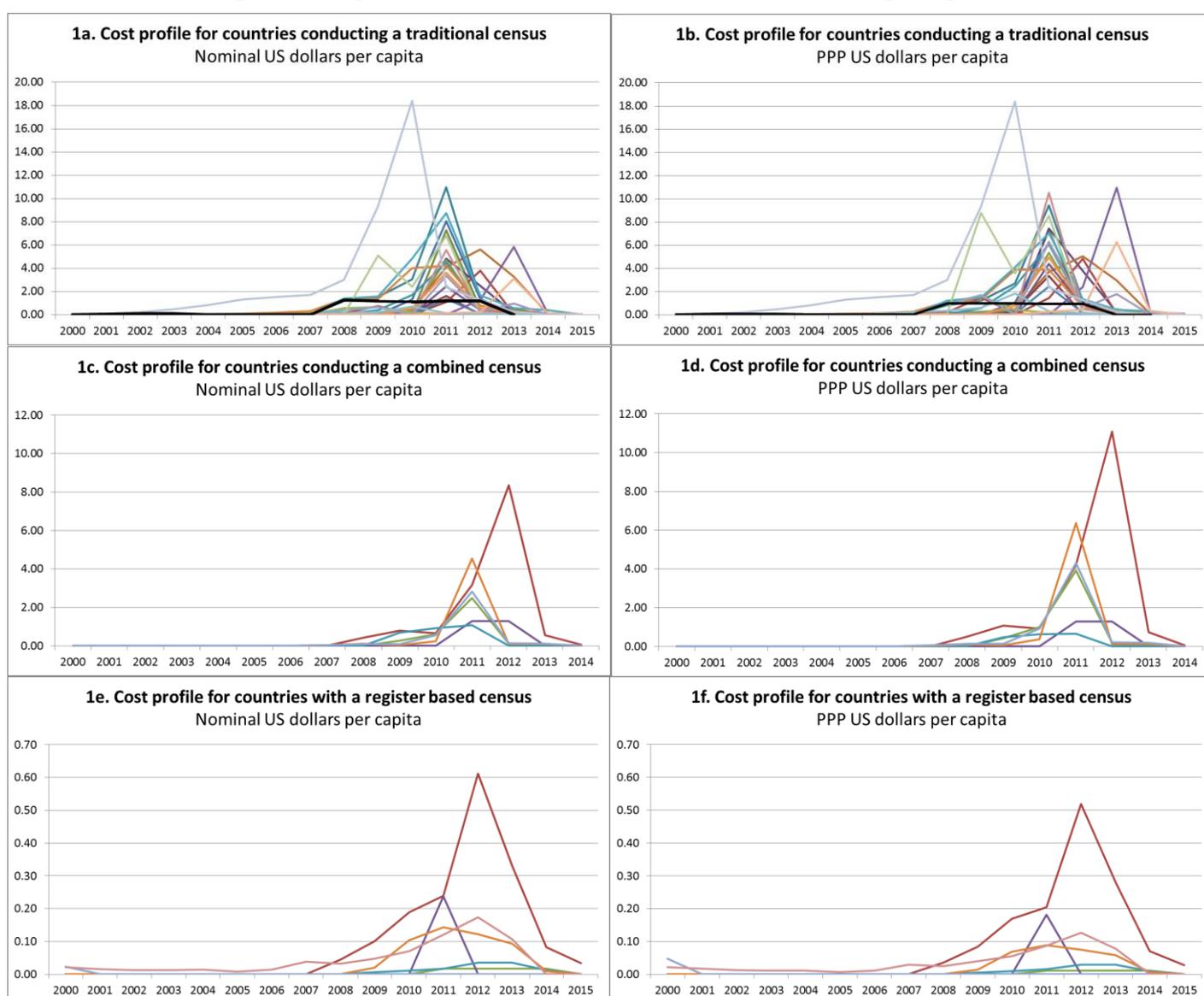
13. The graphs in figure 1 provide the profiles reported for every country who responded – classified by census type.

14. These costs are expressed in US dollars per capita, with charts on the right hand side being adjusted for purchasing power parity (PPP). (For the years 2012 onward, costs are normalised using figures frozen at 2011 values for population PPP and exchange rates.)

15. Although the levels of cost are broadly comparable between cost for countries using traditional and combined census (especially after adjustment for PPP), the scale of cost for countries using a register based census (figure 1e and 1f) is radically lower.

Figure 1

Cost profile by type of census, in nominal and PPP-adjusted US dollars per capita



16. PPP adjustment makes relatively little difference to the results for countries using combined and register based census, due to these countries having more similar cost of living than for those using the traditional census.

17. For countries with traditional census (figures 1a and 1b), the USA is notable, as having a far higher cost per capita than any other country, even once PPP is taken into account. The cost profile for France (black line) is remarkably flat due to the fact that the costs of the rolling census are evenly distributed over time.

18. The patterns obviously vary by country but are broadly similar across census types. Although there are exceptions (notably the French rolling census, mentioned above), costs in many countries rise slowly to a peak around 2011 or 2012 – and then drop off more sharply. Even the register based census shows a similar profile in many cases. Again this may reflect the fact that what was requested here was the extra cost associated with producing the census statistics – not the ongoing cost of maintaining the whole register system.

E. Q4 What was this spent on? (estimate the percentage of total spend on each category)

19. There were 39 countries that provided responses to this question (76% of the total asked), 25 of which were from EEA countries (64% of respondents).

20. The biggest proportion of census costs for all countries that undertook a traditional census in the 2010 round was field enumeration (table 5). The biggest proportion of census costs for all but two countries that undertook a register based census was data processing, checking and coding. Data processing, checking and coding was the only topic for which all countries said they incurred some costs – all other categories had at least one country stating that there were no costs for that topic.

Table 3

Percentage spent on different topics

TOPIC	MINIMUM (%)	NON-ZERO MINIMUM (%)	MAXIMUM (%)	MEDIAN (%)
Rehearsal / pilot	0	1	18	1
Development of online questionnaires	0	1	12	1
Printing	0	1	19	3
Mapping and other geographical support services	0	1	21	2
Publicity and promotion	0	1	7	2
Field enumeration	0	20	85	52
Data processing, checking and coding	2	2	100	13
Dissemination, publication and documentation	0	1	46	2
Project management and / or administrative support services	0	1	30	5
All other costs	0	1	50	5.5

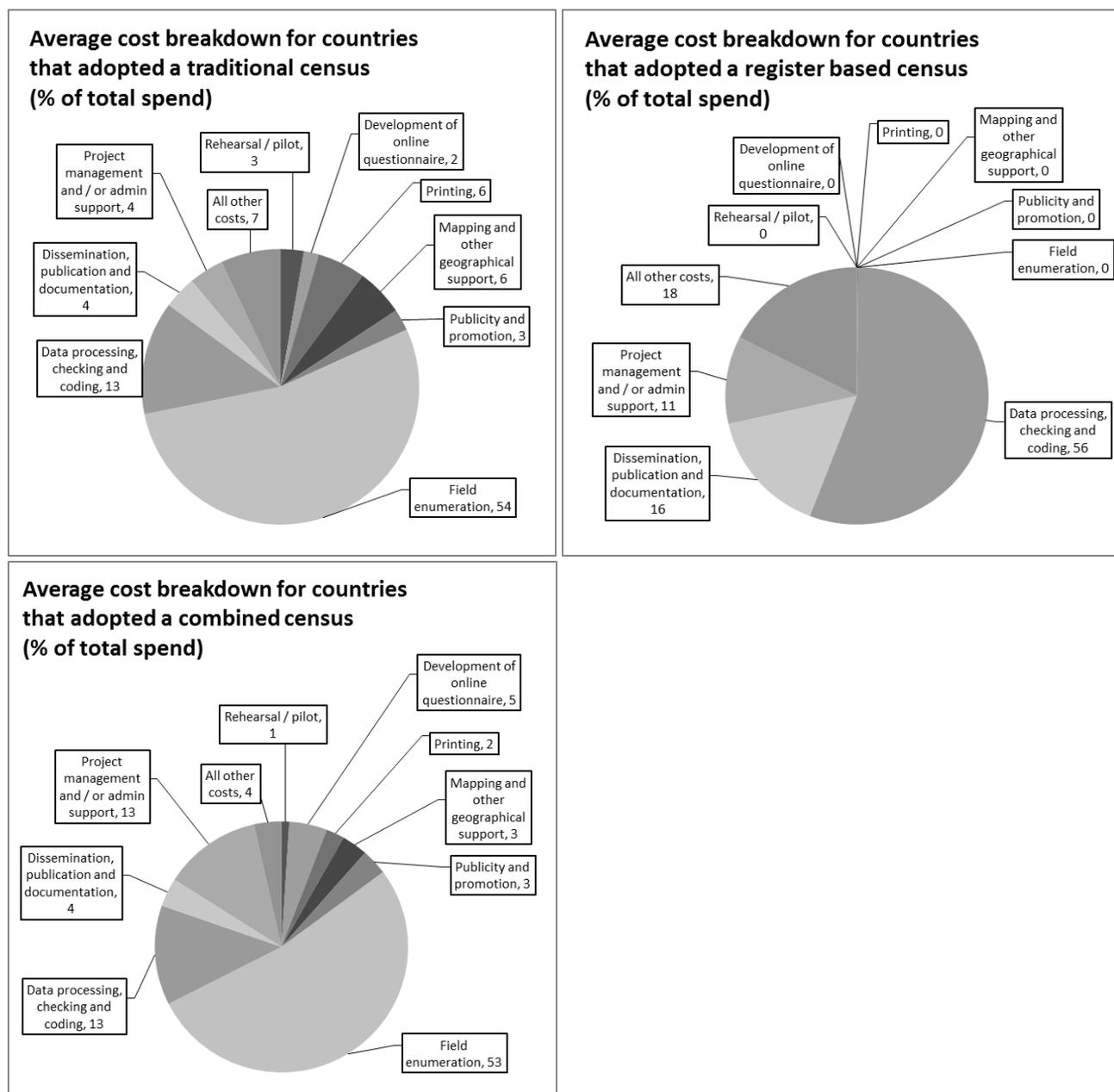
21. The following graphs (figure 2) provide more detail on this by summarising the breakdown of expenditure for each of the three approaches.

22. As might be expected under a traditional census approach field costs absolutely dominate – making up an average of 54% of the costs in this case. Data processing costs are next, making up a further 13% of the cost.

23. Under the register based census data processing, checking and coding dominate to a similar extent (making up, on average, 56% of the costs). Other costs such as rehearsal, printing, mapping and development of the online questionnaire which contribute to the cost under the census options are, of course, wholly missing.

24. The combined approach is remarkably similar in breakdown to the traditional one - once a field data collection is carried out the extra costs associated with field enumeration clearly dominate the costs and so the reported percentage shares.

Figure 2
Average cost breakdown by census method



F. Q5 How have innovations that you have made since the last round affected the cost (in real terms) or benefit of the census?

25. Most countries had made innovations in approach (see doc. ECE/CES/GE.41/2013/5) and in most cases these resulted in a reduction in overall cost (table 6). The greatest number of reports of cost savings came from data integration from registers and statistical methodological improvements. Outsourcing either reduced cost or made little difference.

26. The ‘use of other technology’ and ‘other main innovations’ were the only categories which, on balance, increased costs.

Table 4

Count of countries by innovation and impact on cost²

INNOVATION	INCREASED TOTAL COST	LIMITED IMPACT	DECREASED TOTAL COST	N/A (NO INNOVATION)	TOTAL
Use of internet collection	5 (19%)	2 (8%)	8 (31%)	11 (42%)	26 (100%)
Use of scanning	1 (4%)	5 (19%)	5 (19%)	16 (59%)	27 (100%)
Use of other technology	8 (32%)	2 (8%)	3 (12%)	12 (48%)	25 (100%)
Outsourcing services (e.g. recruitment, scanning)	1 (4%)	7 (27%)	8 (31%)	10 (39%)	26 (100%)
Statistical methodological improvements (e.g. estimation)	1 (4%)	5 (19%)	10 (37%)	11 (41%)	27 (100%)
Data integration from registers	1 (4%)	7 (25%)	12 (43%)	8 (29%)	28 (100%)
Other main innovation	7 (32%)	2 (9%)	2 (9%)	11 (50%)	22 (100%)

27. All of those countries that made use of internet collection reported an increase in total benefit (table 7). 50% of those countries that made use of this innovation also found that it decreased their total costs.

28. Innovations in statistical methodological and data integration from registers are the next most positive in terms of benefit – and also led to lower costs.

² The percentages are the percentage of the total number of countries that utilised that innovation. For example, 42% of countries said that they had made no innovation in the use of internet technology. No account is made of the scale of the investment or the size of the costs or savings.

Table 5
Count of countries by innovation and impact on benefit
(percentage is of those that utilised each innovation)

INNOVATION	INCREASED TOTAL BENEFIT	LIMITED IMPACT	DECREASED TOTAL BENEFIT	N/A (NO INNOVATION)	TOTAL
Use of internet collection	15 (58%)	0 (0%)	0 (0%)	11 (42%)	26 (100%)
Use of scanning	6 (22%)	3 (11%)	2 (7%)	16 (59%)	27 (100%)
Use of other technology	11 (44%)	2 (8%)	0 (0%)	12 (48%)	25 (100%)
Outsourcing services (e.g. recruitment, scanning)	11 (42%)	5 (19%)	0 (0%)	10 (39%)	26 (100%)
Statistical methodological improvements (e.g. estimation)	14 (52%)	2 (7%)	0 (0%)	11 (41%)	27 (100%)
Data integration from registers	14 (50%)	4 (14%)	1 (4%)	9 (32%)	28 (100%)
Other main innovation	10 (46%)	1 (5%)	0 (0%)	11 (50%)	22 (100%)

29. As noted above the two innovations that increased costs were use of other technology and other main innovations. In both cases, the vast majority of countries making these innovations saw an increase in total benefit – clearly decisions have been made to invest in technology to gain benefits elsewhere – perhaps in terms of quality. Please note that “other” uses will differ between respondents.

G. Q6 Have you identified any financially quantifiable benefits to your NSI or other users?

30. There were 41 countries that provided responses to this question (80%). 27 EEA countries provided a response (66% of respondents).

31. Only 27% of countries (of the 80% who responded) identified financially quantifiable benefits – only around half of these were reported on (table 8). EEA countries seem to be more likely to identify, and to report on, benefits.

Table 6
Count of countries by geography

	EEA COUNTRIES	NON-EEA COUNTRIES	ALL
Yes – identified benefits and reported on	5 (19%)	1 (7%)	6 (15%)
Yes – identified benefits, but did not report	3 (11%)	2 (14%)	5 (12%)
No	19 (70%)	11 (79%)	30 (73%)
Total	27 (100%)	14 (100%)	41 (100%)

32. The results by census method (table 9) seem to suggest that countries conducting a combined census are more likely to identify financially quantifiable benefits (82 %, compared to 19 % for traditional census and 13 % for register based census).

Table 7
Count of countries by census method

	TRADITIONAL	REGISTER BASED	COMBINED	ALL
Yes – identified benefits and reported on	3 (12%)	1 (13%)	2 (29%)	6 (15%)
Yes – identified benefits, but did not report	2 (8%)	0 (0%)	3 (43%)	5 (12%)
No	21 (81%)	7 (88%)	2 (29%)	30 (73%)
Total	26 (100%)	8 (100%)	7 (100%)	41 (100%)

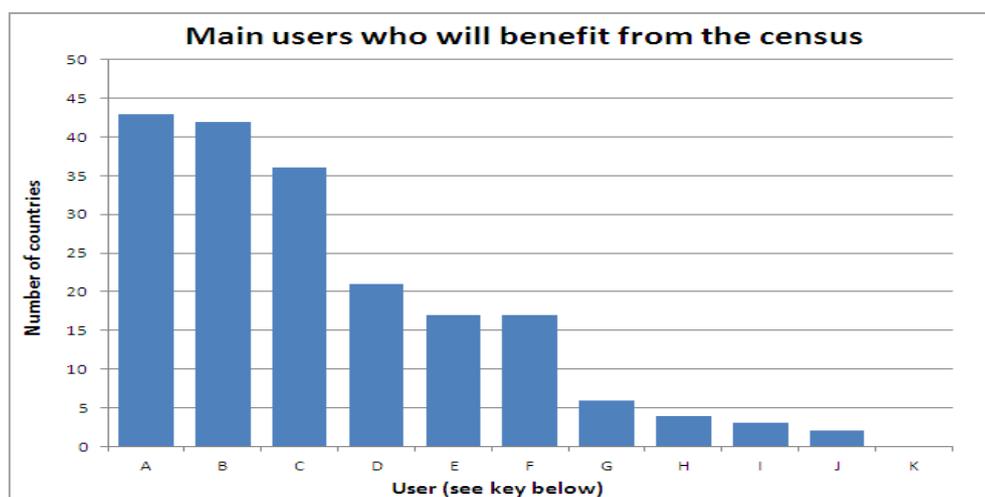
33. It is clear that assessment of benefits is complex and variable. While national situations will vary it seems likely that there would be value for many countries in doing more here. The recommendations presented in part II pick up on and discuss this point further.

H. Q7 Who are the main users who will benefit from the census? Please indicate only the FOUR most important users in your opinion.

34. There were 49 countries that provided responses to this question (96%), 30 of which were from EEA countries (61% of respondents).

35. The patterns are fairly obvious here – uses by central and local government and for internal use within the NSI (perhaps as feeds to other statistics) dominate (figure 3). Use by academics, the general public and international organisations form the next most important groups. There is no implication that other uses are not important – their low scores are partially the result of the fact that respondents were asked to select only their 4 most important users. Actually, the fact that as many as 12% mentioned the press and 8% mentioned business and commercial uses shows how what a large and complex range of users are covered by censuses.

Figure 3
Main Users



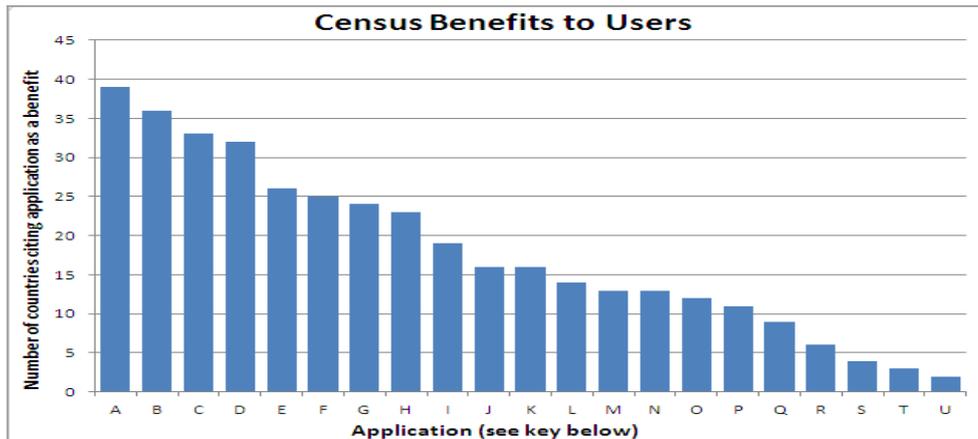
USER	DESCRIPTION	NUMBER OF COUNTRIES STATING USER AS HAVING BENEFITED		
		EEA COUNTRIES	NON-EEA COUNTRIES	TOTAL (% of resp. countries)
A	Other central government departments or organisations	24	19	43 (88%)
B	Local government authorities or organisations	26	16	42 (86%)
C	Your own NSI	22	14	36 (74%)
D	Academics and education service providers	12	9	21 (43%)
E	General public	8	9	17 (35%)
F	International organisations (such as UNECE, UNSD, European Commission)	12	5	17 (35%)
G	Press and the media	5	1	6 (12%)
H	Business, marketing, retailers and other commercial sectors	2	2	4 (8%)
I	Other	2	1	3 (6%)
J	Health service providers	2	0	2 (4%)
K	Community groups, religious organisations and charities	0	0	0 (0%)

I. Q8 How will the census benefit your users? Please choose the EIGHT applications that you consider to be the most important.

36. There were 49 countries that provided responses to this question (96% of the total asked). All 30 EEA countries responded (61% of respondents).

37. National resource allocation dominates with 80% noting it as a key benefit – but a whole range of other applications are apparent (figure 4). The importance of census data in academic research is highlighted – as is its role in developing, delivering and monitoring local policy. Census's importance in providing a benchmark for other statistics also scores well.

Figure 4
Census Benefits



APPLICATION	DESCRIPTION	NUMBER OF COUNTRIES STATING APPLICATION AS A BENEFIT		
		EEA COUNTRIES	NON-EEA COUNTRIES	TOTAL (% of resp. countries)
A	National allocation of resources to regional and local areas	22	17	39 (80%)
B	Academic and scientific research	20	16	36 (74%)
C	Local policy and services - Housing	21	12	33 (67%)
D	Benchmarking population estimates and projections, birth, death, and fertility rates	17	15	32 (65%)
E	Local policy and services - Education	17	9	26 (53%)
F	Local policy and services - Social services	18	7	25 (51%)
G	Benchmarking migration rates	12	12	24 (49%)
H	Local policy and services - Employment	18	5	23 (47%)
I	Benchmarking employment and unemployment rates	8	11	19 (39%)
J	Local policy and services – Health	10	6	16 (33%)
K	Local policy and services – Transport	13	3	16 (33%)
L	Informing the democratic process/electoral boundaries	8	6	14 (29%)
M	Local policy and services - Utilities (such as water, gas, electricity and waste disposal)	8	5	13 (27%)
N	International monitoring	7	6	13 (27%)
O	Local policy and services - Community services	10	2	12 (25%)
P	Retail and other market research	4	7	11 (22%)
Q	Equalities monitoring	5	4	9 (18%)
R	Local policy and services - Other public services	4	2	6 (12%)
S	Other	2	2	4 (8%)
T	Local policy and services - Industry	1	2	3 (6%)
U	Local policy and services - Police and fire services	1	1	2 (4%)

II. First proposals about the CES Recommendations for the 2020 census round

A. Planning and monitoring costs

38. Since financial practices vary greatly among countries it is not possible, or appropriate, to recommend a single approach to census budgeting and cost control. Nonetheless a few generally accepted principles should be noted.

39. First and foremost, effective planning and control of the various census operations are not possible without a careful financial estimate of the cost of the census operation, including all of its key components. It is recommended that a detailed list of census activities is drafted and, as far as possible, that the budget is designed to correspond to this list of activities. Because practice varies so widely it is not possible to specify a definitive list of such activities but in defining these activities account should be taken of what is appropriate to allow monitoring of costs, effective audit and planning of future operations.

40. Consideration of the potential cost of each element, and where appropriate alternative approaches, will obviously play a role in deciding the approach to future census taking.

41. Second, (where appropriate) it is critical for this census plan and budget is presented by national statistical agencies to their respective Governments with adequate lead time, to ensure the availability of sufficient resources from national budgets. Practice on this will differ but the lead time for obtaining funds must be taken into account at the planning stage.

42. Information on expenditures from previous operations will provide an important basis for estimating the budget of the census and this is one key reason why careful monitoring and recording of costs is critical. Figures from the previous census will of course have to be modified in order to take into account of changes in costs (for example, related to changes in technological or wage rates) and anticipated changes in the population itself (for example, total size, percentage urban, and average household size), all of which may affect the cost structure of the census.

43. National statistical offices should set up appropriate robust financial management systems that will ensure speedy disbursement of wages and other funds, proper receipting of their expenditure and an efficient audit. As far as possible transparent and consistent accounting procedures should be applied at all stages and at all levels of the census operation and all significant costs should be recorded to an agreed classification as discussed above.

44. Effective recording of costs is critical not only to ensure control of spending but also to allow the examination of the trade-offs in terms of costs and benefits of alternative ways of carrying out census operations. Although cost experience from a previous census in a country may provide useful experience for planning the next census, considerably more caution should be exercised in using the cost parameters from other countries. Differences in census content, organisation and operations, as well as different approaches to cost accounting, can introduce serious incompatibilities into such country-to-country cost comparisons.

45. There may be value in involving staff at the administrative and supervisory levels in estimating and monitoring costs locally in order to help promote "cost-consciousness" throughout all levels of the census operation.

46. The complexity of carrying out a census means that the operation (and so the costs) will rarely align exactly with plans. A perfect correspondence between the estimates and

the final costs is not to be expected. Changes in the prices of major components of census costs should be monitored on a regular basis with either the census budget adjusted accordingly or the census plans modified. The development of the census budget is usually an incremental process in which rough initial estimates are replaced by more detailed and precise statements of resource requirements. As far as possible the approach should be discussed and agreed with funding agencies in advance and any risks associated with changes of costs fully assessed.

47. Costs associated with approaches to census that depend upon use of a population register or other administrative sources will require a rather different approach — although many of the same principles hold. Depending upon national practice and how these sources are funded it may be appropriate to record the whole or part of the cost of these sources — or just the costs of those elements of work required to prepare data to support the census or statistical purposes. In all cases the approach taken should be considered and transparent in reporting.

48. Again the principle is the same — budgeting and recording of costs should be at a level appropriate to support effective monitoring and audit of spend and to help inform future decisions on approach.

B. Assessing benefits

49. Practice and experience on assessing the benefit that arises from census data varies a great deal between countries. Accordingly, even more so than with costs, it is not possible to recommend a universal approach to assessing benefits.

50. Nonetheless countries are strongly encouraged to carry out and publish an assessment of the benefits that arise from their census outputs.

51. It is only by assessing the social and economic benefit that arises from census that it is possible to truly justify the significant expenditure involved. Equally, by understanding the benefit that arises from particular outputs it is possible to assess whether the (marginal) effort involved in their production is appropriate. In some cases individual outputs are mandated by law — but even in this case there is value in understanding how data is used — and where it adds benefit.

52. Assessing the benefits of statistics is often a difficult problem because social benefit is difficult to tie to measurable financial benefit. Equally the value of data often extends far beyond direct use — for example where data is used as the denominator in other statistics.

53. Nonetheless some general advice is possible. There may be value in:

- identifying where census is adding real value in resource allocation — by comparing outcomes with those that would arise using the best possible available data if census data were not available
- identifying where particular census outputs contribute to delivering or monitoring particular policy goals — particularly where there are funds directly associated with the policy
- considering how much users would spend on purchasing other data sources or on commissioning their own surveys if census data were not available.

54. In cases where there are clear social or economic benefits — but no easily quantifiable financial benefit it may be appropriate to record ‘case-studies’ which can be used to support any future case or decision making.

55. In assessing the overall benefit of the census it may also be appropriate to consider the economic and social value of employment and other spend associated with the operation.

56. As ever the approach to benefit assessment and any assumptions made in the process should be clearly documented.
