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Item 10 (a) of the provisional agenda

Programme of work of the Statistics subprogramme of the United Nations Economic Commission for Europe

Reports on the work of the Conference of European Statisticians, its Bureau and Teams of Specialists

Implementation of the United Nations Economic Commission for Europe Statistical Programme 2020

Addendum

Report of the Eurostat-UNECE work session on demographic projections

Note by the secretariat

Summary

The present report presents the key outcomes of the Eurostat-UNECE work session which took place on 25-27 November 2019 in Belgrade, Serbia.

The workshop was organized following a decision of the Conference of European Statisticians in June 2019 (ECE/CES/2019/13). The report is submitted to the Conference of European Statisticians for information.



I. Attendance

1. The joint Eurostat-UNECE Work Session on Demographic Projections was held in Belgrade (Serbia) on 25-27 November 2019 at the Palace of Serbia. The meeting was hosted by the Statistical Office of the Republic of Serbia, the Minister in charge of Demography and Population Policy, and the Centre for Demography of the Institute of Social Sciences. The meeting was attended by participants from national statistical offices, demographic research institutes, universities, and other institutions representing the following countries: Austria, Belgium, Bosnia and Herzegovina, Canada, Croatia, Czechia, Denmark, France, Germany, Hungary, Israel, Italy, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Republic of Korea, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America. The European Commission was represented by Eurostat.

II. Organization of the meeting

2. Mr. Paolo Valente (UNECE) and Mr. Giampaolo Lanzieri (Eurostat) opened the meeting and welcomed the participants. On behalf of the hosting institutions, welcoming remarks were made by Dr. Miladin Kovačević, (Director of the Statistical Office of the Republic of Serbia), Dr. Mirjana Rašević (Director of the Centre for Demography of the Institute of Social Sciences, Belgrade), and Dr. Slavica Djukić-Dejanović, Serbian Minister in charge of Demography and Population Policies.

3. The meeting adopted the agenda of the work session, and elected Mr. Patrice Dion (Statistics Canada) as Chairperson.

4. The meeting included sessions on the following substantive topics:

- a) Methodology;
- b) Assumptions on migration;
- c) Assumptions on fertility;
- d) Communicating projections;
- e) Population projections at national level;
- f) Assumptions on mortality;
- g) Population projections at sub-national level.

5. Moreover, within the programme of the work session, a special workshop on future mortality was organized by Dr. Fanny Janssen (University of Groningen, The Netherlands).

6. The discussion in the substantive sessions was based on 18 papers, that were available on the meeting web page (<http://www.unece.org/index.php?id=51942>) maintained by the UNECE Statistical Division. Presentations will be made available on the same web page shortly after the meeting. A summary of the discussion in the substantive sessions will be sent by email by the Secretariat to the participants within two weeks after the meeting.

III. Conclusions

7. The participants recommended that the next meeting take place in about three years' time. A list of possible topics for discussion is as follows:

- a) Methodology;
- b) Sub-national projections;
- c) Assumptions on fertility;
- d) Assumptions on mortality;
- e) Assumptions on migration;

- f) Beyond projections by age and sex;
- g) Communicating projections to users.

8. The participants expressed their great appreciation to all authors and presenters of the papers. The participants also thanked the Statistical Office of the Republic of Serbia, the Minister in charge of Demography and Population Policy, and the Centre for Demography of the Institute of Social Sciences, for hosting the meeting and for the excellent support provided.

IV. Adoption of the report of the meeting

- 9. The present report of the meeting was adopted during the closing session.

Annex

I. Summary of the main issues discussed at the substantive sessions

A. Methodology

1. Presentations were given on the following topics:
 - Using expert elicitation to build long-term projection assumptions (Mr. P. Dion, WP.1);
 - Relational spline-model for interpolating demographic data and population projections (Mr. Dalkhat M. Ediev, WP.2).
2. Some of the points raised during the discussion that followed the presentations are summarized below.
3. With reference to the presentation by Mr. P. Dion: The shape of the aggregate predictive density of the TFR in 2043 resembles a bimodal density. What is the intuition here? One possible explanation is that we are dealing with two groups of experts: pessimistic and optimistic ones. Mr. Dion confirmed that the Excel spreadsheet is available for others. It was also suggested to broaden the group of experts, to include economists, epidemiologists, and representatives of other disciplines.
4. With reference to the presentation by Mr. D. Ediev: During the discussion a point was raised about the sensitivity of the results for choice of reference. The example with births as a reference for population even at high ages was surprising: the model assumes that within each broader age group, the distribution of the single ages is similar to that of the births within the corresponding group. The author confirmed that model results are not integer valued, as one would prefer with population numbers. However, rounding can give the desired result.

B. Assumptions on migration

5. Presentations were given on the following topics:
 - Forecasting migration by age, sex and region with extensions of Lee Carter model (Mr. Arkadiusz Wiśniowski, WP.3);
 - Refugee immigration to Sweden, 2012–2018: a comparison of observed and forecasted numbers (Mr. Andreas Raneke, WP.4);
 - Using administrative and statistical data sources for estimation of international migration trends for Serbia (Ms. Dragana Paunović Radulović, Ms. Ljiljana Sekulić).
6. Some of the points raised during the discussion that followed the presentations are summarized below.
7. Forecasted numbers of refugee immigration to Sweden is needed for political decisions and planning. Therefore, good information is needed. Various factors are responsible for differences in projected and enumerated figures. In the discussion, time-lags in asylum seeking males and females as well as different age structures were addressed.
8. The well-known Lee-Carter model, developed for projecting mortality, was used in an extended version to forecast immigration. The discussion emphasised the problems of Lee-Carter, especially uncertainty in the slope parameter b . The variabilities of age parameters are very sensitive to time. Different age patterns of refugees and labour migrants have to be considered. Extended research in this field is needed.

C. Assumptions on fertility

9. Presentations were given on the following topics:
- Are surveys on fertility intentions useful in projections? (Mr. Johan Tollebrant, WP.6)
 - A study on the short-term fertility method using marriage rate (Ms. Eunjin An, WP.7)
 - Does one have to be healthy to opt to have children in Norway today? (Ms. Astri Syse, WP.8)
 - Ways to project fertility – how do European countries project fertility and what are their perceptions of current practices (Ms. Astri Syse, WP.9)
 - Comparing fertility forecasting methods: how do parametric mixture models perform? (Dr. Jason Hilton, WP.10)
 - Revision of the fertility model applied in the national population projection for Belgium – integration of structural and cyclical components in the projection of the total fertility rate and the evolution of the fertility schedule (Ms. Marie Vandresse).
10. In the current context, where fertility is decreasing to unprecedented levels in most of the countries (and in some of them very rapidly), the importance of having better fertility projections is crucial. For this reason, most of the countries are dedicating greater efforts to improve their fertility projection mechanism.
11. Some of the points raised during the discussion that followed the presentations are summarized below:
- Fertility models developed by countries are more and more advanced. In some cases, they also contain differences according to the demographic profile of the population (age, place of birth, citizenship, place of residence or even educational attainment, income or health situation);
 - An increasing number of countries include the detailed opinion of fertility experts to know the future evolution of certain parameters;
 - The number of scenarios where variations of a given phenomenon are reflected is increasing more and more;
 - The geographical data of the information published is more detailed and the periodicity of the dissemination products is also increasing;
 - Some countries have also developed stochastic projections in order to obtain prediction intervals of demographic variables, and thus measure projection uncertainty.
12. The main objective pursued with these advances is to have more and more accurate data on how the future will be in terms of fertility in a given region. With all this information, socio-economic policies adapted to the situation expected for the following years may be designed.

D. Communicating projections

13. Presentations were given on the following topics:
- Taking the CES Recommendations on Communicating Population Projections one step further: a joint exercise in the European Statistical System (Ms. Diana Ivan, WP.11)
 - Update on the UNECE Online Database on Population Projections Metadata (Mr.°Paolo Valente).
14. The session ‘Communicating projections’ was a direct follow-up of the recent UNECE work in the field, as presented in the 2018 publication ‘Recommendations on Communicating Population Projections’. Both presentations addressed the issue of improving communication coherence, the first from the perspective of the recommendation

2.3 ‘to clearly define the key terms used’; and the second from the perspective of using the UNECE database on population projections metadata to present in a standardised way general information about the most recent projections.

15. Participants agreed that addressing the issue of communication is important. By exploring the full range of assumptions made, producers set the ground for a clear communication and a transparent description of the production. This perspective facilitates the presentation of population projections as ‘what-if’ scenarios. It was also pointed out that sometimes the term ‘projections’ is over-used, while the technique applied, and especially for the short-term, is that of forecasting. For such cases, it becomes important to distinguish among the assumptions for the short, medium and long-term, and in this way help users better understand the results and their uncertainty.

E. Population projections at national level

16. Presentations were given on the following topics:

- Stochastic projections: the New Zealand experience (Mr. Kim Dunstan, WP.12)
- Population projections 2018–2068 in Spain (Mr. Jorge L. Vega Valle, WP.13).

17. Most of the questions and discussion revolved around the users understanding of and need for stochastic projections. The uncertainty intervals are difficult to interpret for a non-demographic user and many users just want one single figure. Other questions concerned the number of experts and their part in the different components.

18. Statistics New Zealand noted that the users are those who understand the results, for instance treasury who developed a stochastic model for the state budget. Statistics New Zealand published selected percentiles, that was enough for most of the users, but they are prepared to supply the users with all simulations.

19. The discussion also referred to the previous session about communicating projections and how to use the words forecast and projections: If we estimate uncertainty, can we speak about projections or is it a forecast?

F. Assumptions on mortality

20. Presentations were given on the following topics:

- Future mortality in selected European countries, taking into account the impact of lifestyle epidemics (Dr. Fanny Janssen, WP.15);
- European mortality forecasts: Are the targets still moving? (Mr. Nico Keilman, WP.16);
- Current Approaches to Mortality Projections (Ms. Lauren Medina, WP.17);
- Modelling frontier mortality using Bayesian generalised additive models (Dr. Jason Hilton, WP.18).

21. The first two presentations (WP.15 and WP.16) had slightly different starting points. Dr. Janssen presented the approach used to account for lifestyle factors when forecasting mortality, whereas Mr. Keilman held a presentation focusing on two problems with mortality forecasts, namely ‘assumption drag’ and ‘anchoring’.

22. The discussion raised questions as to whether the low levels of mortality in young ages (e.g. below age 40) perhaps would result in a future levelling off in the life expectancy increase. This was deemed unlikely by both presenters, as such trends have not been seen so far, and due to a continued increase in remaining life expectancy in older ages. On the other hand, questions were also raised as to whether a future linear trend resulting in life expectancies above 100 years is likely, and it was responded that that this might happen. It was emphasized that as of today, no ceiling effect appears to be imminent. Other comments were that the assumptions regarding linearity of future life expectancy should be checked and discussed. It was suggested that forecasters should ask about changes in life expectancy rather

than levels, and Mr. Keilman responded that this is what is currently considered in models such as Lee Carter.

23. The majority of the discussion centred around ‘anchoring’ and how we might reduce this bias. Mr. Keilman referred to an earlier paper that shows that forecasters generally do well in stable times, but that the results are less accurate in times when trends change. This was a response to a question on whether experienced teams of forecasters might help reduce the anchoring effect. Mr. Keilman suggested that one could repeat the evaluations done in the 70s and 80s. It was suggested that we are not courageous enough when setting future life expectancies, and that ‘anchoring’ thus is a bias we need to address. In terms of uncertainty, Mr. Keilman stated that for mortality, he would have liked to see random discrepancies, and not a systematic underestimation of the increase in life expectancy.

24. In terms of lifestyle factors, questions were asked regarding the extent to which future, currently unknown, epidemics (e.g. antibiotics resistance, opioid-related deaths) will affect life expectancy forecasts since the effect of known epidemics have been ‘removed’. Along the same lines, questions were raised concerning the rather sharp division between socioeconomic factors and lifestyle, which are interrelated in real life.

25. The last two presentations (WP. 17 and WP.18) had different topics. The US Census Bureau presented the approach and results from separating individuals by race, nativity and/or Hispanic origin in their mortality projections, as well as introducing DAPPS, a program that is freely available for all countries which connects to an international database covering a large proportion of countries worldwide. Dr. Hilton (Southampton) presented a new model for short-term (around 10 years) mortality forecasting, taking into account ‘frontier’ aspects as well as borrowing strength from multiple countries.

26. Concerns were raised as to the assumptions regarding a continued increase in US life expectancy, based on recent stagnation and/or declines. It was responded that ‘blips’ have been present also in the past, although the underlying trend is a general, almost linear, increase. However, the current US projections include the period up to 2015, and as such recent changes are not accounted for in the results shown here. Questions were raised as to over-coverage of for non-natives, or a general mismatch between numerator/denominator in the production, and this was acknowledged as a possible problem, in the US as in other countries. Questions were also asked as to whether more detailed or other grouping would yield different results and/or be more relevant. However, it was also pointed out that as the convergence between the groups is fairly pronounced in the long-term, the point of (any) such a separation might not yield better overall results for mortality forecasting.

27. With reference to the presentation of Dr. Hilton, concerns were voiced regarding the overall data quality of the HMD. Even though the data are considered the gold standard, it was noted that there are certain issues such as the way data are cleaned (especially for ages >80) that might affect the model results and estimates of uncertainty. It was also noted that there is a more ‘philosophical’ question about the trade-offs between very complex modelling and the relative gains that these models provide over more simple approaches. Dr. Hilton suggested that they are working to simplify certain parts of the model and accepted that in its current form there are marginal improvements over more simple approaches. It is hoped that the utility of the model will improve as they continue to develop and simplify it.

28. Overall, the discussion concluded that future trends in life expectancy are uncertain, as we do not know the technological or biotechnological developments to come. Likewise, concerns were raised as to a possible divergence in life expectancy and healthy life expectancy.