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## Economic Commission for Europe

### Conference of European Statisticians

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Item 10 (a) of the provisional agenda

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

## Report of the Eurostat-UNECE Work Session on Demographic Projections

### Note by the Secretariat

#### I. Attendance

1. The joint Eurostat-UNECE Work Session on Demographic Projections was held in Geneva, Switzerland on 18-20 April 2016, at the Palais des Nations. It was attended by participants from national statistical offices, demographic research institutes, universities, and other institutions representing the following countries: Albania, Australia, Austria, Belgium, Bosnia and Herzegovina, Canada, Colombia, Czech Republic, Denmark, Estonia, Finland, Georgia, Germany, Greece, Hungary, Iceland, Israel, Italy, Latvia, Luxembourg, Mexico, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Korea, Russian Federation, Serbia, Slovakia, Slovenia, Sweden, Switzerland, The Former Yugoslav Republic of Macedonia, Turkey, and United Kingdom. The European Commission was represented by Eurostat. The United Nations Population Division and the United Nations Mission in Kosovo (UNMIK) were also represented.

#### II. Organization of the meeting

2. Ms. Lidia Bratanova (UNECE) and Mr. Giampaolo Lanzieri (Eurostat) opened the meeting and welcomed the participants.
3. The meeting adopted the agenda of the Work Session, and elected Mr. Alexander Hanika (Statistics Austria) as Chairperson.
4. The meeting included sessions on the following substantive topics:
  - (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 – Progress report by the UNECE Task Force on Population Projections

5. The discussion in the substantive sessions was based on 28 papers that were available on the meeting web page (<http://www.unece.org/index.php?id=41283#/>) maintained by the UNECE Statistical Division. Presentations are available on the same web page.

6. The participants expressed their great appreciation to all authors and presenters of the papers.

### **III. Recommendations for future work**

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.

### **IV. Adoption of the report of the meeting**

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

9. A summary of the discussion in the substantive sessions of the meeting, prepared by the Secretariat after the meeting, is presented in the annex of this report.

## **Summary of the main issues discussed at the substantive sessions**

### **A. Methodology**

1. Presentations were given on the following topics:
  - Population projections when using time series with extreme values (Iceland)
  - Demographic determinants of population ageing in European countries (United Kingdom)
  - Application of comparative analysis of official polls and expert estimations of indicators in demographic projections (Georgia)
  - Factual determination methodology aspects of demographic processes in forecasts (Georgia)
  - Preparing population projections in developing countries (Mexico).
2. Some of the points raised during the discussion that followed the presentations are summarized below:
  - (a) Should crossovers in age patterns of males and females be controlled when projecting far into future? This may not be necessary if crossover happens at very high ages (above age 100).
  - (b) Smoothing might lead to fluctuations in age patterns of mortality when projecting into the long term. It would be better to avoid smoothing, but it is necessary.
  - (c) ‘Extreme values problem’: small regions in small countries face difficulties in projecting trends in survival at young ages because the probability of dying is very close to zero.
  - (d) From a policy perspective it may be more difficult to focus on mortality rather than on fertility, no matter which actually has the bigger effect. The relative impacts of fertility and mortality on ageing are due in part to their respective rates of change: there is not much scope for change in levels that are already very low.
  - (e) In general terms, it is important to present a clear story (not confusing or contradictory) to the ‘non-specialist’ world. Critics pick up on apparent disagreement among projection-makers.

### **B. Sub-national projections**

3. Presentations were given on the following topics:
  - Estimating sub-national behaviour in the Danish microsimulation model SMILE (Denmark)
  - Bayesian multiregional population forecasting: England (United Kingdom)
  - Testing a simple averaged model for local and regional population forecasts (Australia)
  - Projecting the regional explicit socioeconomic heterogeneity in India (Austria)
  - Subnational population projections for the Republic of Korea, 2013 – 2033 (Korea)

4. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) The participants discussed the reasons and logic behind the imposition of stationarity conditions in their models.

(b) In general, it was considered necessary to take care of correlations between regions, or correlation between different demographic components (fertility, mortality, migration). However, in some of the models this was not done explicitly.

(c) With regard to the United Kingdom presentation, it was noted that the model perhaps could be affected by an upward long term trend in fertility. The presenter clarified that there was no upward trend, and fertility has been fluctuating.

(d) A participant noted, with regard to the Australian presentation, that built-in momentum of growth or decline could be considered from some points of view a weakness rather than a strength.

(e) In general, the models presented do not take into account the measurement of uncertainty, except for the Korean model where uncertainty is dealt with at the national level (not at the provincial level).

### **C. Assumptions on fertility**

5. Presentations were given on the following topics:

- Why is fertility falling in Norway? An analysis of parity transitions over the last decade (Norway)
- Projecting Future Fertility in Russia: using cohort approach together with the idea of the Second Demographic Transition (Russian Federation)
- Religion and its impact on fertility projections in Israel (Israel)
- Immigrant fertility in Sweden – a cohort perspective (Sweden)
- Estimation of fertility in Colombia through an adjustment for coverage of births with immunization records (Colombia)

6. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) The importance of quantifying and evaluating uncertainty was emphasized with regard to all presentations. It was recognized that even when not formally quantified, a very large degree of uncertainty surrounded the results of the projection exercises presented.

(b) With regard to the presentation by Norway, there was discussion about considering the specific situation of one society (Norway) versus the idea of an underlying, universal pattern, like the one followed by neighbouring countries. The presenter noted that consideration was given to the experience of neighbouring countries or those with similar drivers of fertility (e.g. female labour force participation). The presenter noted that the impact of immigrant women on female labour force participation in Norway is limited.

(c) It was observed that mixed marriages could be a relevant factor in the context of the Swedish study on immigrant fertility. The author confirmed that mixed marriages were taken into account since the paper considers fathers' country of birth as well, but also time spent in Sweden and age at immigration (before and after age 15).

(d) Various questions were addressed with reference to the presentation on religiosity and fertility in Israel. Possible changes between religiosity groups were not considered, and it was assumed that the level of religiosity for each individual does not

change. In future it could be possible to consider changes in religiosity because a survey has added a new question on religiosity 10 years ago. Migration could also have an impact on religiosity. For instance, since the 1990s there was a large wave of immigration from former USSR countries, who were not very religious. The TFR of these groups has been rising since this wave. The proportion of the total Israeli population is expected to remain relatively stable around 75%. In fact, among the Arab population fertility is declining and the immigration component is also declining.

(e) With regard to the paper by Colombia on the adjustment of fertility estimates based on vaccination data, the presenter clarified that international migration was not accounted for, but only internal migration. However, Colombia is not a high migration country, so this should not be a major factor.

## D. Assumptions on mortality

7. Presentations were given on the following topics:

- A Comprehensive Framework for Mortality Forecasting (United Kingdom)
- Is mortality variation by region of birth an issue for mortality projections? The case of Sweden (Sweden)
- Projecting future mortality in the Netherlands taking into account mortality delay and smoking (Netherlands)
- The growth of Australia's very elderly population: past estimates and probabilistic forecasts (Australia)

8. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) It was suggested to consider migrants' descendants as a separate group with regard to mortality, because they tend to have worse mortality than the non-migrant-descendant population.

(b) With reference to the UK presentations, the author clarified that the sensitivity of the models to the length of time series is limited.

(c) With regard to the Swedish presentation, it was observed that factors such as the reason for migration and the length of stay/years since immigration may have an impact on the model. Perhaps some of these factors could explain the higher life expectancy of some immigrant groups (compared to Swedish-born population).

(d) It was also discussed whether the conditions for admission into Sweden may play a role (do healthy or unhealthy people move?). The presenter clarified that there are no entry restrictions based on the health of migrants, but people typically migrate in healthiest ages. It could also be the case that people move back home when unhealthy. If that was the case, then it could reduce mortality in the host country.

(e) The author of the Dutch paper was asked about the possible reasons for the more compressed distribution of deaths for non-smoking Dutch women. No clear explanation seemed available and the issue may need further thought.

## E. Assumptions on migration

9. Presentations were given on the following topics:

- Modelling the future evolution of international migration for Belgium (Belgium)
- Empirical Evaluation of Migration Forecasting Methods (United Kingdom)

- Recent Refugee influx and migration assumptions in Germany – public debate and opportunities for projection makers (Germany)

10. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) The Belgian presenter was asked why the model uses population projections from other countries (the countries of origin of migrants), that may be unreliable and in general cannot be controlled. The presenter explained that these projections are used to derive the population at risk of migrating, and that their quality is considered sufficiently good.

(b) A participant asked the United Kingdom presenter whether they considered vector autoregressive models (VAR). The presenter explained that VAR models were used in other studies but not in the one presented. Previous experiments with this were considered disappointing in that the results were almost pure uncertainty. VAR models for immigration and emigration worked somewhat, but given the volatility and unpredictability of migration in the medium and long term, as well as the lack of any theoretical framework on which to base models of future migration, they should be used with caution.

(c) It was observed that communicating uncertainty is of key importance, in particular for the migration component of projections. A participant underlined the need to communicate to the users 'the uncertainty of uncertainty', i.e. the fact that when projections include something as open to unpredictable external forces as migration, we cannot be certain even that our quantification of uncertainty is realistic. Many types of user, however, especially critics, tend not to read verbal descriptions of uncertainty. They therefore demand numbers. Official statisticians, on the other hand, are often unwilling to discuss this kind of 'probability' (e.g. the likelihood of policy deals on migration, or of new geopolitical events affecting migratory flows) alongside statistical probabilities, for risk of having users confuse the two ideas.

(d) It was suggested to look at positive responses to asylum applications (granting refugee status) rather than at applications. The Belgian presenter clarified that Belgium has to use refugees rather than asylum seekers in national projections. It was also noted that the data to be used depend on the purpose of the predictions: be it estimating population size, or planning resource needs for providing for asylum seekers.

## **F. Beyond projections by age and sex**

11. Presentations were given on the following topics:

- Probabilistic household forecasts for Denmark, Finland, and the Netherlands 2011-2041: Combining the Brass relational method with a Random Walk model (Norway)
- Education-specific labour force projections: painting the global picture (Austria)
- Extremity Injuries and Dementia disproportionately increase the Risk for long-term Care at older Age. An Analysis of counter-factual projection scenarios based on German Health Insurance Routine Data (Germany)

12. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) With regard to the presentation from Norway on household forecasts, the presenter clarified that the correlation across household positions was not explicitly modelled, although it could be modelled. A defined hierarchy of household positions from most to least important was used, where 'least' was the remainder left over from 1.

(b) A participant asked whether it would make sense to decompose variability into 'demography', 'behaviour' and 'policy' components. The presenter noted that in this

study there is hardly any policy, while demography and behaviour could be decomposed (although some definition would be needed). It may be difficult to distinguish what is demography and what is behaviour, but policymakers may want to know which things they can influence and which they can't.

## **G. Communicating projections to users – work of the Task Force**

13. Presentations were given by various members of the UNECE Task Force on Projections, on the following topics:

- Key recommendations and good practices:
  - Dissemination of results
  - Transparency in population projections
  - Uncertainty in population projections
  - Fostering relationships with users
- Selected results from the surveys carried out by the Task Force among NSIs and users of projections
- Draft database on population projections metadata

14. Some of the points raised in the discussion that followed the presentations are summarized below.

(a) Reproducibility of projections is an ideal target that should be pursued to the greatest extent possible. Some statistical offices already release their entire detailed set of assumptions to allow users to replicate the projection outcomes and possibly to modify one or more of the assumption components. Users may also be interested in the details of the calculation method applied for the published projections, in order to reproduce them exactly.

(b) The recommendation to disseminate very detailed information in order to allow reproducibility of the projections was questioned. In Norway, for instance, detailed data could not be made public by law because of confidentiality. The Task Force noted that reproducibility is a general good practice in science. It is an ideal to follow although it is known that in practice there are barriers like this one.

(c) The longer the time horizon, the longer we need to wait to be able to evaluate the projections. Assessing the performance of previous projections could be done after several years, not after 1-2 years.

(d) It is important to consider the ways in which projections are used and interpreted. The projections resulting from user-driven applications (allowing users to make choices on assumptions) might mistakenly be viewed as official national statistics. Hence we have a responsibility to avoid the resultant projections being misconstrued or misrepresented as official statistics, especially if they are used to support political arguments in a way that suggests that the national statistical offices back those arguments. In this regard, it could be important to stress that – if such tools are used – the assumptions used are selected by the users, and the resulting projections are not endorsed by the statistical office.

(e) It was suggested that the report should emphasize the context in which projections are made, as this can make a difference to how we approach dissemination. It could be different, for instance, if the main reason for projections is to predict the future, or if it is to help policymakers to make decisions. The Task Force observed that the draft report does stress that we don't try to predict the future.

(f) Concerning the role of expert opinion, it was noted that various opinions should be considered, not only one expert view. It may be difficult to identify correct experts and on what subject? Or fertility, on mortality, on making projections?

(g) The relationship between projection-makers and journalists and how the latter should be 'educated' was also discussed. In addition to giving them information, we should ensure that they use it correctly, avoiding over-interpretation. A possible way to do this is by identifying science writers who typically write on projections and maintaining relationships with them. The communication of uncertainty should always be a key message. It is very important that the dissemination and press/media offices of statistical institutes send out the right messages. Seminars for training journalists on official statistics in general already exist, but not yet on projections specifically.

(h) Concerning the metadata database there was general agreement that 'start year' is a confusing term (for some it is interpreted as the first year of projection results), and 'base year' could be more clear.

(i) It was suggested to distinguish the cases when results for single years of projections (instead of five years) are obtained by interpolation, from those where projections are actually calculated by single years.

(j) It was clarified that the database is planned to be in English only, but NSIs will not be requested to translate any documents.

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