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Forty-seventh plenary session
(Neuchâtel, 14-16 June 1999)

**REPORT OF THE MAY 1999 ECE-EUROSTAT JOINT WORK SESSION ON
DEMOGRAPHIC PROJECTIONS**

I. Introduction

1. The ECE-Eurostat Joint Work Session on Demographic Projections was held in Perugia, Italy, from 3-7 May 1999 at the invitation of the National Institute of Statistics of Italy (ISTAT), and with topical assistance of Statistics Netherlands, Statistics Norway, the Netherlands Interdisciplinary Demographic Institute and the U.S. Bureau of the Census.

2. The meeting was attended by over 90 participants from national statistical institutes, demographic research institutes, universities, and other institutions representing the following countries: Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovenia, Slovak Republic, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey, United Kingdom and the United States. The United Nations Population Division also attended.

3. Opening statements were made by Mr. Paolo Garonna, Director-General of ISTAT, Mr. Brunello Castellani, Advisor to the Province of Perugia, Mr. John Kelly of the UN/ECE, and Mr. Aarno Laihonon of Eurostat.

4. Mr. Chris Shaw (United Kingdom) was elected Chair of the meeting, and Mr. Sergey Tsvetarsky (Bulgaria) was elected Vice-Chair. The meeting endorsed the Organizers' proposals for persons who could serve as Session Organizers and Discussants for each session.

5. The following study topics were considered in special sessions at the meeting:

- Latest international population projections for the ECE region (Session Organizer: Mr. Harri Cruijsen, Statistics Netherlands)
- Households (Session Organizer: Mr. Nico Keilman, Statistics Norway)
- Fertility (Session Organizer: Ms. Maria Pia Sorvillo, ISTAT)
- Mortality (Session Organizer: Mr. Harri Cruijsen, Statistics Netherlands)
- International migration (Session Organizer: Mr. John Long, U.S. Bureau of the Census)
- Internal migration (Session Organizer: Mr. Leo Van Wissen, Netherlands Interdisciplinary Demographic Institute)
- Uncertainty, users and uses of demographic projections (Session Organizer: Mr. Joop De Beer, Statistics Netherlands)
- Conclusions and recommendations of the work session (Eurostat and the ECE secretariat).

In total almost 50 working papers were submitted, of which 80% was presented and discussed.

6. The main conclusions reached by the participants at the meeting are presented in the Annex (in English only).

II. Recommendations for future work

7. The meeting also recommended that the Conference make provision for a similar type of ECE-Eurostat joint meeting on demographic projections to be included in its work programme in approximately five years' time. It recommended, therefore, that the following text be included in the Conference's work programme:

Work session on demographic projections (2003/2004, jointly with Eurostat), to consider the following topics:

- i) Latest international, national and sub-national population and household projections;
- ii) New approaches and experiences in estimating, analysing and projecting trends and patterns of fertility, mortality, migration and household structures and dynamics;
- iii) Accuracy and uncertainty in international, national and sub-national population and household projections;
- iv) Documentation and dissemination strategies;
- v) Users and uses of projections; and
- vi) Evaluation and use of projections software.

(Planning and preparatory work for the meeting to commence in 2002/2003 by the ECE secretariat and Eurostat, in cooperation with interested NSIs)

and research and university institutes).

III. Concluding remarks

8. The meeting expressed gratitude to ISTAT and CESD-Roma for the excellent facilities and infrastructure that they had provided for the meeting, both of which had contributed significantly to the success of the meeting. They also expressed appreciation to Statistics Netherlands, Statistics Norway, the Netherlands Interdisciplinary Demographic Institute and the U.S. Bureau of the Census for the important topical assistance and inputs that they had made to the meeting.

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Annex

Summaries of the main conclusions reached in each session

A. Summaries of the main conclusions reached at each session

1. These summaries were too detailed to include in the core report of the meeting which was submitted to the 1999 plenary session of the Conference of European Statisticians as Document CES/1999/23. However, they were distributed to participants after the meeting and are being made available in the published version of the report which can be downloaded from the meeting's Web site:

<http://www.unece.org/stats/documents/1999.05.projections.htm>

a) Session 1: Latest international population projections for the ECE region

1. Over recent years a growing number of organisations have compiled population projections for the ECE region. Most of these projections were scenarios by sex and age at national level, showing the long-term impact of persisting or strongly changing fertility, mortality and migration trends on principal demographic trends such as population ageing and population growth.
2. All latest international population projections, even the more extreme ones, foresee for the next 4-5 decades virtually everywhere in the ECE area a continuation and often acceleration of population ageing. In most central and eastern European countries population is set to decline, whereas in most other countries of the ECE region population growth will slow down. At subnational level, however, many regions will be confronted with depopulation.
3. All latest international population projections are mainly based upon national assumptions. Often (some kind of) geographic clustering of countries is applied. Due to data problems (no data (e.g. interregional migration flows by region of origin and destination for the whole of the European Union), not enough data (e.g. immigration and emigration by major groups) or no reliable data (e.g. international migration by country of origin and destination), the lack of sufficiently stable time series at sub-national level or the lack of human resources, there is a modest use of a comprehensive multi-regional or multi-national projection model.
4. In spite of recent substantial efforts, the availability of accurate, internationally comparable and timely demographic data series deserves great attention. In particular basic time series of sub-national population dynamics and international migration flows are either lacking or of poor quality.
5. Although still a lot can be done, international organisations are increasingly incorporating assumptions from official national population forecasts in their projections. However, a systematic and regular updated review of differences and similarities of all available national population projections seems desirable.
6. Population projections made by international organisations are not

always free from political considerations. Even mortality assumptions can be subject to governmental constraints (e.g. pessimism is mostly not accepted).

b) Session 2: Households

2. Five papers were presented in this session. Two of these were concerned with household developments in Europe, whereas the remaining three were case studies for Italy and England and Wales.

3. Maarten Alders and Dorien Manting of Statistics Netherlands presented long-term household scenarios for the member countries of the European Union for the period 1995-2025. The Individualisation Scenario assumes that the current increase in the tendency to live alone will continue, while the tendency to live with a partner will decline further. The Family Scenario assumes a reversal of current trends, leading to more couples, and a stabilisation of the tendency to live alone. The Baseline Scenario is the average of the other two scenarios. Population ageing will result in an increase in the population living in institutions to between 6 and 7.5 million in 2025 (compared to ca. four million in 1995) and in a growth in the number of one-person households from 42 million in 1995 to 46-71 million in 2025. Numbers of children living at home will decrease in Southern Europe (Greece, Italy, Portugal, Spain) from 44 million in 1995 to 29-36 million in 2025. In the rest of the EU, the trend is more or less stable (Family Scenario) or downwards (Baseline and Individualisation Scenario).

4. Corina Huisman, Evert van Imhoff, and Harri van Dalen of the NIDI analysed the impact of two household variables (the presence of a child aged 0-3 years in the household, and marital status) on labour supply in the European Union. A log-linear analysis of Labour Force Survey data for the years 1983-1996 showed that men with a young child in the household have slightly higher activity rates than on average (in particular men aged 55-69), and that married persons with medium or low education have higher activity rates than their unmarried counterparts. Labour supply projections assuming that men and women marry later in life, and at a higher age, and that they have fewer children who are born later show that such behavioural changes have a very limited impact on the labour supply of men: demographic factors (the size and the age composition of the future male population aged 15-69) are much more important. For women, the assumed behavioural changes lead to an increase in the labour force by more than four million, as compared with a drop by two million with current behaviour.

5. Dave King of Anglia Polytechnic University reported on the methods and the usage of 1996-based government household projections for England. These projections were published for standard regions, counties, metropolitan districts, and London boroughs. They cover the period 1996-2021, and are based on marital status projections combined with the household membership variant of the headship rate approach. Sensitivity tests show that immigration to England has a strong impact on household formation, followed by such economic variables as interest rates and GDP, in addition to

cohabitation and mortality. The most high-profile use of the projection results is in the field of town and country planning, in particular in the estimation of future housing requirements and in planning an adequate supply of land for housebuilding. The expected increase in the number of households has given rise to environmental concerns in the south of England.

6. Chris Shaw of Government Actuary's Department presented key results of legal marital status and cohabitation projections for England and Wales. Both projections cover the period 1996-2021. Assuming some continuation of the long-term decline in marriage for young people, and a modest further increase in divorce, the total number of single and divorce persons will both increase by 50 per cent in 25 years - five times as fast as the total population. As the married population will fall by 10 per cent, they will become a minority of the adult population within the next ten years. Cohabiting couples will rise from 1.6 million in 1996 to nearly 3 million in 2021. Currently, about 40 per cent of cohabiting men and 30 per cent of cohabiting women are over 35, but by 2021 it is projected that they will outnumber those cohabiting at younger ages.

7. Federico Geremei of La Sapienza University in Rome combined life course analysis and the LIPRO household model to explore union formation and childbearing of Italian women. The results indicate that female students cohabit slightly less than non-students, and that cohabiting women have a very low propensity of childbearing. Simulations show that the current low TFR (one child per woman in the North, and 1.7-2.0 children in the South, depending upon religiosity) might rise by roughly 20 per cent, provided that marriage among young adults becomes much more widespread than nowadays.

c) Session 3: Fertility

8. During the session on fertility 4 papers have been presented:

- Fertility projections: an international comparison (wp29) presented by Maria Pia Sorvillo
- Evaluation of population projections assumptions on fertility and their results with reference to Polish women fertility pattern (wp5) presented by Grazyna Marciniak
- Is low fertility only a temporary phenomenon in the EU? (wp17) presented by Ron Lestaeghe
- Values in life and reproductive intentions (wp18) presented by Rossella Palomba.

9. As for general comments, the importance of occasions of comparisons between the various countries was stressed. They allow a useful exchange of knowledge and practises, and they should activate a process of harmonisation in fertility projections. Moreover, the advisability to define a wide range between high and low variant was underlined, as a clear indication for users about the degree of uncertainty in fertility forecasts.

10. Some proposals were stated about the way to assess future levels of fertility. It could be useful to base the short run forecasts on side

information, where they are available. An example was to use the level of consumer confidence as a leading indicator of fertility, with a lag of about 1.5 years. Secondly, the target value of Total fertility rate in the high variant could be fixed with reference to fertility expectations. The idea is that expectations represent the level of fertility that could be reached if no obstacle prevented the fulfilment of individual desires. Besides, information about cohort fertility should be taken into consideration whenever possible, as well as information about parity.

11. A special attention should be paid to the sign of the forecast error, as the loss function is not necessarily symmetric. It could be more relevant to make a mistake for an excess of "optimism" about the reprise of fertility than the contrary. This because of different actions that policy makers could start expecting a scenario of increasing fertility or decreasing fertility, where the former could have more undesirable consequences in case the forecast turn out to be wrong.

12. Finally, considering that the system of individual values plays a major role in defining the reproductive behaviour, more efforts should be made to link more analytically those values to fertility, both in terms of intentions and realization. At the moment, some problems could come out in comparing results among countries, due to possibly different perception of the individual values to be analyzed.

d) Session 4: Mortality

13. A review of latest national mortality forecasts in the ECE area showed that

- most countries predict a slow down of life expectancy gain; among forecasters from Eastern Europe both pessimism and optimism exist; compared with forecasts made around 1985, current predictions are substantially higher; compared with UN-1996 and Eurostat - 1995 projections, national forecasts may deviate significantly;
- mortality assumptions by age are far from uniform: some countries foresee ongoing strong decreases for babies and young children, whilst other countries expect new, large decreases for those aged 50-80; few countries predict a constant, age independent reduction of death rates;
- ECE countries generally apply relatively simple forecasts methods; most common is the use of constantly or slightly decreasing reduction factors, heavily based upon recent trends; some countries start the assumption making process by 'targeting' life expectancies at birth at the long run, followed by interpolation;
- the vast majority of countries consult experts; However, their opinions, neither the basic qualitative assumptions behind the model input nor results of time series analysis are barely mentioned in publications;
- an increasing number of ECE countries have been compiling mortality forecasts with uncertainty variants, but the margins applied are fairly different.

14. The recent extension of the UN population projections from 80+ to an upper age group of 100+ has led to the following important findings:

- sex and age specific mortality data series among oldest-old are often not published or only in summarised form; little is known about the quality of the data sources and the methods used to construct or close life tables;
- the Himes-Preston-Condran model, which was basically chosen due to its solidity and simplicity to extend observed mortality age patterns and model life tables, appeared to be sensitive for the age range used for fitting the mortality data to the standard: it was found that the mortality standard tends to provide less satisfactory results when mortality rates among 45-60 years olds are included; by using a robust procedure, that gives more weight to the mortality rates among older age groups, reasonable estimates were obtained;
- the Carter/Lee model appeared to be unable to successfully generate model life tables with very high levels of life expectancy: it produced extremely and therefore unrealistically low mortality among young people; adding lower mortality bounds didn't completely solve this forecasting problem, but a scaled-down version of the Carter/Lee model that gives more weight to recent evidence provided (more) appropriate results.

15. A recently finished study concerning harmonised projections of overall and cause-of-death specific mortality for six European countries showed that future levels of life expectancy (either presented as forecasts or as scenarios) can be easily justified in terms of changes required in mortality by main causes of death (including remaining causes).

16. Latest research efforts in incorporating risk factor epidemiology in short and medium-term mortality projections demonstrate substantial discrepancies between the results of trend extrapolations of cause-specific mortality, and those obtained by means of epidemiological projections using a reference scenario for risk factor prevalence. To a large extent the differences for lung cancer mortality can be explained by trends in smoking prevalence over the last four decades. For coronary heart disease only a small part can be explained by past trends in smoking habits. The improved survival from myocardial infarction is of much more relevance.

e) Session 5: International migration

17. A paper from John Long (US Bureau of the Census) gave the results of a recent survey of national statistical institutes' approaches to international migration forecasting (WP34). The responses from twenty-one countries indicated little commonality of approach. Methods for determining assumptions remained generally simplistic, although there had been some movement towards employing more sophisticated techniques in the decade since Voorburg.

18. Only a very few countries took direct account of economic factors. The influence of economic indicators on migration trends in five countries was investigated by Nicole van der Gaag and Leo van Wissen from NIDI (WP35). In general, the clearest association was with unemployment although this varied between countries, and other economic and non-economic factors were also

found to be important. Consideration of economic factors was felt to be an important explanatory tool for understanding current trends. However, given the difficulty of predicting economic variables, it was concluded that it was difficult to use these factors directly for forecasts, although that such an approach might be valuable for scenario setting.

19. The unusual situations of Luxembourg and Israel, where migration is the dominant factor in explaining population growth, were described in papers by Jean Langers (WP13) and Marina Sheps (WP48). In Luxembourg, an increasing demand for labour has been met by consistent inward migration of foreign nationals and migration has therefore been highly correlated with economic growth. It was concluded, therefore, that it was only possible to consider projections as forecasts for a limited period, after which only a scenario approach was valid.

20. Nearly half of Israel's population growth since 1948 is the direct result of net migration with especially large inflows immediately after the establishment of the state and again around 1990 following the break-up of the former Soviet Union. Political conditions in the countries of origin have been a principal determinant of these inflows and these conditions are, of course, inherently unpredictable. There have therefore been consistent large errors in Israel's migration forecasts. The discussion stressed the importance of migration flows in small countries in determining future age/sex structures.

21. In the case of the USA, legislative changes have had a major influence on recent migration trends. Frederick Hollman (WP36) discussed how an understanding of these changes was critical to the interpretation of underlying trends and therefore to an appropriate formulation of assumptions for the future.

22. Frans Willekens (WP2) considered the use of probability models to estimate detailed migration flows from incomplete data, for example to estimate origin and destination data from marginal totals. The paper shows how the parameters of such models can be estimated in the cases of both complete and incomplete data.

23. The need for improved data on international migration was a recurrent theme of the session. The current poor quality was highlighted by Michel Poulain (WP37). Two matrices were presented where the same migration flow was estimated based on statistics of the country of origin and of the country of destination. In all cases the estimates differed, often substantially. A method for correcting the estimates was presented, although in the discussion this was considered to be valuable primarily as a teaching guide to show the shortcomings of national statistics.

f) Session 6: Internal migration

24. In the session on internal migration three papers were presented:

- Hansjörg Bucher: Analysis of internal migration patterns following German

unification

- Thomas Kucera: Internal migration in population forecasts: necessity and predictability
- Marek Kupiszewski and Phil Rees: Lessons for the projection of internal migration from studies in ten European countries
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25. In the first presentation Hansjörg Bucher presented an overview of recent developments of internal migration within Germany, following the the German unification. Conducting such an analysis is not a simple task in Germany, since it is difficult to collect regional demographic data. The collection of regional statistics is decentralised at the Länder level. Apart from these data problems there are a number of substantial problems in migration. First is the problem of the Aussiedler, who migrate from abroad into a few designated regions (international migration), followed by an internal migration move to another region. Second, areal units have been reorganised since reunification, and therefore time series are short: they start in 1991.

26. In Germany, four types of internal migration are relevant: West-West, West-East, East-West, and East-East. Developments in each of these flows were sketched. An important difference between W-W and E-E flows is that the W-W flows are dominated by deconcentration tendencies (from urban to rural areas) whereas in E-E flows concentration tendencies are dominant. (a flow of particularly young migrants to the cities). However, recently, suburbanization has increased significantly in the East. Another dominant influence in German internal migration is the influence of the position of Berlin. This will continue to exert a major impact on internal migration flows in Germany in the coming years. In the mid-term, the depopulation of East Germany will diminish, and the population system will be more in equilibrium. After 2005 natural growth will be negative in all regions.

27. Thomas Kucera presented a theoretical paper on the necessity of incorporating internal migration into subnational population forecasts. In addition, he addressed the issue of the predictability of internal migration. The multiregional cohort component model is the appropriate tool for internal migration projections. Nevertheless, the predictability of the internal migration component is limited. As a result, many countries adopt a zero net migration or stable net migration assumption, which often reflects ignorance rather than insight into the process. Nevertheless, at present, appropriate predictive tools are still lacking and much work remains to be done.

28. The presentation of Kupiszewski and Rees concerned the main conclusions from an in-depth study of internal migration processes at a low regional level in ten European countries. This study was conducted on behalf of the Council of Europe, and involved nine themes, among which (1) the role of internal migration in population change; (2) urban concentration and deconcentration; (3) regional patterns (4) gender and age differences; (5) relationships with unemployment; (6) the role of international migration. The contribution to the Work Session consisted of the presentation of a number of recommendations for future work in analysis and projecting internal migration. Two main recommendations are:

1. Internal migration projections should be performed at a regional level that adequately reflects the settlement structure of the country. The NUTS 2 level is in general too large.
2. Projections of internal migration should take into account non-demographic factors, reflecting the impact of the productive system (economy, labour market, education) and the consumptive system (amenities, housing market).

g) Session 7: Uncertainty, users and uses of demographic projections

29. The sessions on fertility, mortality, and migration were aimed at improving the medium variant of demographic forecasts. However, even though demographers may hope to improve the quality of their forecasts, forecasts will always remain uncertain. Therefore it is important to assess the degree of uncertainty of forecasts.

30. The papers discussed in this section were aimed to show how information on uncertainty can be useful for users of forecasts and how the degree of uncertainty can be assessed. Traditionally forecasters present low and high variants. In the low (high) variant fertility and net immigration are low (high) and mortality is high (low). These variants provide rather extreme variants for population size, at least if the intervals between the low and high variants of fertility, life expectancy and net migration give an accurate indication of the degree of uncertainty of future developments in the three components. For, the low and high variants assume that forecast errors in the three components are perfectly correlated. Moreover, they assume perfect correlation across time. These are extreme assumptions, because it is unlikely that all components are low (high) in each forecast years. In reality correlation is less than unity. This implies that the intervals between the low and high variants for population size are too wide. In contrast, the low and high variants underestimate the uncertainty of the old age dependency ratio. High fertility lowers the ratio, whereas high life expectancy raises it. Thus combining high fertility and high life expectancy in one variant and low values in another variant, results in a small interval. One alternative is to combine high fertility and low life expectancy in a 'young' variant, and low fertility and high life expectancy in an 'old' variant. That would provide wider intervals for the old age dependency ratio, but it would result in small intervals for total population. Because such deterministic variants do not provide an appropriate measure of the degree of uncertainty of all separate results of demographic projections, it is useful to calculate probabilistic forecasts. Probabilistic population forecasts can be calculated on the basis of simulations.

31. The paper submitted by Josianne Duchêne and Philip Wanner gives a concise overview of sources of uncertainty and consequences for the use of forecasts.

32. The presentations by Shripad Tuljapurkar (Mountain View Research) and Juha Alho (University of Joensuu) focused on providing information on uncertainty to the users. Both authors focused on the uncertainty of changes

in the age structure. Tuljapurkar discussed the effect of uncertainty on the costs of the US Old Age Survivors and Disability Insurance program, Alho focused on funds for municipalities in Finland. They showed that probabilistic forecasts provide more information to the user than the traditional low and high variants.

33. For making probabilistic forecasts, several assumptions need to be specified. The main assumptions concern the standard deviation of the probability distribution of fertility, mortality, and migration and the correlation across time. The assumptions on the standard deviations can be based on an analysis of historic forecast errors, on errors of baseline projections, on time-series models and on judgement. Alho showed how the relationship between the width of the forecast interval and the length of the forecast period can be based on an analysis of errors of baseline projections, e.g. assuming a constant level of fertility and a constant rate of change of age-specific mortality rates. He showed that these baseline projections do not differ much from the main assumptions underlying the medium variant of the official Finnish population forecasts and therefore can be assumed to provide an accurate measure of the accuracy of the official forecasts. The paper by Nico Keilman and Arve Hetland calculates the forecast interval of fertility on the basis of a multivariate time-series model of age-specific fertility rates on the basis of Norwegian data. In the long run the forecast interval for the period total fertility rate turns out to equal the interval for the cohort total fertility rate. The paper by Sergei Scherbov and Wolfgang Lutz demonstrates how probabilistic population forecasts can be based on the judgement of experts about the degree of uncertainty of fertility, life expectancy and migration. The paper by Joop de Beer and Maarten Alders shows how time series analyses and judgement can be combined in assessing forecast intervals for the separate components. In addition, the paper shows how probabilistic household forecasts can be based on assumptions about forecast intervals of separate household positions.

34. In session 7 there were three presentations about the use and users of population forecasts. M.V. George discussed the use of Canadian forecasts for several purposes. He shows that the forecasts of Statistics Canada have a wide clientele and that there is a large need of customised forecasts. Bettina Sommer discussed the use of German forecasts. Luc Lebrun argued that users of forecasts demand quality. He recommended international coordination. Furthermore he argued that household forecasts are needed for housing planning.

35. Finally, in this session Margarita Cantalapiedra presented the latest Spanish forecast.

B. Recommendations for the future

36. The participants also recommended the following during discussion of the above substantive agenda items, which they felt were useful guides for future work in the field of projections:

General recommendations

- That overviews of various aspects of latest national population forecasts in the ECE region (i.e. key-assumptions, data series and projection methods used), including those made by international organisations, be regularly collected and distributed. The participants proposed that Eurostat take the initiative to explore the possibilities for such a survey.
- To share and exchange information on projection methodologies. NSIs and research institutes that prepare official population projections should ensure that detailed accounts of the methodology used for the elaboration of such projections are published and made available to interested users.
- To further encourage international efforts to integrate population, household, labour market and educational projections.
- In analysing trends of demographic variables (i.e. fertility, mortality and internal and international migration), efforts should be made to consider their interrelations with relevant socio-economic, institutional and political factors that may provide insight about future developments in population dynamics.
- To investigate the feasibility of preparing a set of "Guiding Manuals" on the methodology for making national and sub-national population projections in the ECE region. The manuals should be based on "best practices" and expert opinion. Special attention should be devoted to projection methodologies and dissemination strategies. The participants recommended that Eurostat take the initiative and lead in starting this study, and that it report on progress made regularly in its Working Party on Projections meetings.

On fertility

- NSIs are encouraged to try to disseminate on a timely basis data on fertility levels and trends, and particularly data that allow estimates of cohort fertility indicators by parity to be obtained. In countries where the civil registration system gathers information on birth order that does not coincide with the parity of the mother, then NSIs should try to adjust the data accordingly and to publish the adjusted data in a form that allows adjusted (or true) parity and age-specific cohort fertility rates to be calculated.
- Considerable attention needs to be paid to the analysis of changes in the timing and ultimate levels of childbearing. Priority should be given to studies that examine the relationship between cohort fertility trends and ongoing generational changes in enrolment and educational attainment, working careers and lifestyles, and intentions and values.

On mortality

- NSIs should produce and make available annual data on deaths by single years of age, preferably by exact age and year of birth, up to and including age 99 (i.e. with an open-ended interval of 100+). The same strategy should be followed in publishing data on the population. In preparing life tables, NSIs are encouraged to use single years of age and to provide specific information about the method that is used to close the life table.

- Efforts to improve and enhance cause-of-death specific mortality projection models should be continued and encouraged. The reliability and international comparability of data series on cause-of-death specific mortality should be examined more thoroughly.
- Ongoing international research is needed to analyse and project old-age mortality and excess male mortality.

On internal migration

- The multi-regional cohort component model was viewed as the most appropriate instrument to use for making sub-national population projections.
- NSIs should be encouraged to make available information on internal moves by origin and destination (including intra-regional moves), age and sex at a detailed regional level, according to the data needs of the multi-regional cohort component model. The regional level should reflect the settlement structure of the country to the greatest extent possible. "City regions" and other relevant areal units could be created by aggregation of the relevant units.
- Projection models for internal migration should include non-demographic information linked to the determinants of moving. In this respect, two types of factors should be taken into account, namely, factors related to the economic system (e.g. regional production, labour market, education) and factors related to consumption (e.g. the housing market and amenities).

On international migration

- International migration assumptions should be made by taking into account developments in inflows and outflows separately, and by groups of migrants, according to country of origin, destination and citizenship.
- NSIs are encouraged to apply the new UN recommendations on international migration statistics.

On households:

- That NSIs be encouraged to prepare national and sub-national household or family projections at least twice per decade.
- That efforts to improve the quality of data on families and households be further strengthened. To the extent that these aspects are thought to be important in the countries, special attention should be given to consensual unions. In view of ongoing and future aging processes in most countries, emphasis should also be given to institutional households. Data on both stocks and flows should be considered in this regard.
- That current patterns on household and family structures and the changes therein be analyzed, both at the level of the individual's position in the household/family, and that of the household/family as a group. Interrelationships with educational and labour market processes, and the link with the population's housing situation should be explored, whenever possible.

On uncertainty and the use of forecasts:

- That NSIs be encouraged to explicitly state the arguments for choosing the values for the high and low variants for fertility, mortality and migration. Internationally comparative analyses of uncertainty would be very useful.

- NSIs are encouraged to analyze errors in their historical projections. Attention should be paid to the errors in the base population by age and sex, the projected age/sex structure, and assumptions on fertility, mortality and migration. Regional details should also be included, when possible.
- NSIs should encourage users to take into account the uncertainty that is found in population projections.
- NSIs are encouraged to experiment with probabilistic projection methods and to promote research on their improvement. In doing this, the aim should be not only to quantify uncertainty but also to reduce it by making use of substantive demographic insights.

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