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United Nations Workshop
on Census Evaluation
2 – 6 December 2013
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Final Report of the Workshop[1]

Prepared by

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I. INTRODUCTION

A. Background and objective of the workshop

1. The United Nations workshop on evaluation of census data took place in Hanoi, Viet Nam, from 2 to 6 December 2013. The Workshop was organized by the United Nations Statistics Division (UNSD), in collaboration with the General Statistics Office of Viet Nam. It was attended by 20 representatives from National Statistical Offices (NSOs) of 10 countries in Asia (Bhutan, China, Indonesia, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Tajikistan, Thailand and Viet Nam), two experts from UNFPA – Viet Nam and one expert from UNFPA Headquarters. (See Annex I for the list of participants).

2. The workshop is part of the mandate given by the UN Statistical Commission to UNSD to actively support developing countries through technical cooperation and alleviate the difficulties faced by them in conducting a population and housing census. Evaluating the quality and accuracy of the census results is one of the critical components in terms of exploitation of statistics collected through such a complex exercise. In this regard, the purpose of the Workshop was to strengthen the technical capacity of the participating countries to evaluate the quality of census data based on application of demographic techniques and in comparison with other data sources such as an earlier census, sample surveys or available administrative registers. The workshop also provided a forum to discuss possible types of errors in census data according to experiences and lessons learned among the participating countries.

B. Opening session

3. Ms. Meryem Demirci from UNSD made an opening statement on behalf of Mr. Stefan Schweinfest, the Acting Director of UNSD. She provided some background information on the United Nations 2010 Census Work Programme and highlighted areas that regional and national technical assistance has been focusing on such as international guidelines for population and housing censuses, census management, cartography, data capture and processing, data analysis, dissemination and census evaluation. Ms. Demirci re-emphasized the importance of census data evaluation to (1) providing users with some measures of the quality of census data to help them interpret the results; (2) identifying as far as practicable the types and sources of error in order to assist the planning of future censuses; and (3) serving as a basis to construct a best estimate of census aggregates, such as the total population. Ms. Demirci completed her statement by summarizing the objectives of the workshop and by welcoming the participants and expressed the appreciation for the collaboration and support provided by General Statistics Office of Viet Nam in organizing and hosting the workshop in Hanoi. Ms. Demirci finally acknowledged UNFPA for its financial supports to the participation of three countries.

4. The workshop opened with a statement by Mr. Pham Quang Vinh, Deputy Director of the General Statistics Office of Viet Nam. He welcomed the participants from across Asia, UNFPA colleagues and UNSD resource persons. He emphasized the importance of regional workshops and seminars for exchange of information among countries, for making medium and long-term national statistical planning and for better

integration of national statistical system in the region. He noted that population and housing censuses providing information at small geographical areas are essential for development planning. The workshop which focuses on census data evaluation is crucial to strengthening census data quality and to providing reliable data to national planning. Mr. Vinh concluded his speech by welcoming all the participants again and expressed his appreciation for the continuous support from UNSD on various statistical issues and in particular on census related activities including the present workshop on census data evaluation.

C. Organization of the meeting

5. The meeting was conducted according to the proposed Organization of Work (Annex II). The workshop started with an introduction presentation on the United Nations 2010 World Programme on Population and Housing Censuses. More technical presentations by UNSD were presented on overall evaluation methods; evaluating census data on different topics such as age and sex distribution, fertility, child and adult mortality, census coverage, migration and socioeconomic characteristics; and by using different techniques including comparing data from multiple sources (consecutive censuses, sample surveys…). Hands-on exercises were included to help participants understanding better the tools and techniques introduced in earlier presentations. At the end of the workshop, each country made a presentation based on the results of their hands-on exercises using national census data. All presentations presented by the participants and UNSD are available on the United Nations Statistics Division (UNSD) website[2].

II. SUMMARY OF PRESENTATIONS AND DISCUSSIONS

A. The 2010 World Programme on Population and Housing Censuses (Day 1)

6. UNSD made a presentation on the 2010 World Programme on Population and Housing Censuses. The presentation introduced the three main objectives of the work programme: (a) agreeing on a set of international principles and recommendations to conduct a census; (b) facilitating countries to conduct at least one census within the period 2005-2014; and (c) assisting countries to disseminate census data in a timely manner. The presentation also provided an overview of the main UNSD activities that have been implemented to achieve the above three objectives. The activities include developing census related methodological guidelines and manuals, conducting expert group meetings, training workshops and advisory missions, developing the census data dissemination tool CensusInfo and providing census taking information and facilitating the sharing of national experiences through the census Knowledge Base.

[2] Please see: http://unstats.un.org/unsd/demographic/meetings/wshops/Viet_Nam/2013/list_of_docs.htm

B. Overview of methods of census evaluation (Day 1)

7. In this session, UNSD made a presentation providing an overview of the methods for census evaluation. The presentation first reviewed the purposes of census evaluation including (a) providing users with some information of data quality; (b) identifying types of errors for future improvement and (c) obtaining a basis for some possible census figure adjustment. The presentation also emphasized that census data evaluation should be an integral part of entire census programme and the scope of the evaluation should be determined at the census planning stage. The presentation further explained briefly the institutional arrangement for census evaluation such as how the evaluation team should be formed.

8. The second part of the presentation introduced the types of errors occurring in census taking and possible methods for assessing the quality of census data. There are two types of errors in census taking – coverage error and content error. The error can occur at any stage of census taking. For census evaluation, one can use census data alone or in combination with other sources. When only census data are used, both demographic analysis and interpenetration study can be used to evaluate the census data quality. Census data may also be compared with other data sources such as sample surveys and administrative records. The comparison can be made based on derived indicators (demographic analysis) or by matching individual records. Advantages and limitations of each evaluation method were also discussed in the presentation.

C. Evaluation of age and sex distribution (Day 1)

9. A presentation was made by UNSD on the evaluation of age and sex distribution. The presentation first emphasized the importance of accurate age and sex data for understanding all other characteristics of population through information collected in population censuses. Therefore the age and sex distribution collected from census should be evaluated to understand possible errors such as age misreporting or under-coverage of certain population groups. The evaluation is also crucial in studying the impact of extraordinary event such as war, natural disaster or famine on the age and sex structure of the population.

10. The presentation introduced various methods that can be used to evaluate population data by age and sex. They include: (a) population pyramid; (b) graphic cohort analysis; (c) age ratios; (d) sex ratios; (e) Whipple's Index and (f) Myers' Blended Method. Also, three modules of PAS (Pyramid, Agesex and Singage) used for application of the above mentioned methods were introduced. Advantages and limitations for each method were discussed in the presentation.

D. Hands-on exercises on evaluation of age and sex distribution (Day 1)

11. The hands-on exercises session was dedicated to the evaluation of age and sex distribution from population censuses. The points covered in the exercises are given below. Each participating country was encouraged to use their most recent national

census data and when comparison with other data sources was needed, countries may use similar data from previous censuses or household surveys.

1. Population Pyramids
    a. Construct a population pyramid
    b. Analyze the pyramid's main features and note any potential errors in the data
2. Age (mis)reporting
    a. Calculate and graph age ratios by 5-year, and if available 1-year, age groups
    b. Identify terminal digits that seem to be preferred in the plot for either males or females; calculate Whipple's Index for these digits (for one sex)
    c. Calculate Myer's Blended Index for the same sex as the Whipple's index
    d. Summarize your conclusions about the quality of age reporting in the census (consider age heaping, age exaggeration and/or under-enumeration of certain age groups)
3. Sex ratios
    a. Calculate and plot the sex ratio by 5-year age group
    b. Analyze your results and note any potential errors in the data

E. Evaluation of fertility data (Day 2)

12. The UNSD presentation in this session focuses on the evaluation of fertility data obtained through two types of questions usually being asked in a population census: (a) children ever born, (b) recent births in the household and (c) other methods. For each type of question, the following topics were covered: (a) how questions are usually asked on the census questionnaire; (b) fertility indicators that can be derived from the question; (c) possible quality issues related to each question and (d) data evaluation methods.

13. For evaluating data on children ever born, the presentation noted that initial assessment such as careful examination of raw data on children ever born and other related variables such as mother's age and sex of the child was necessary to obtain some information on the overall quality of the children ever born data. When tabulated data are available, additional checks can be done. These include: (a) comparing sex ratio at birth generated from children ever born data with perceived value in the country; (b) checking whether females with parity not stated were childless instead by using the El-Badry method; (c) studying the plausibility of data by making graphs of mean children ever born data by age of mother, by conducting graphical cohort analysis of mean number of children ever born obtained from multiple data sources and by comparing age specific fertility rates and total fertility rates (TFR) with other sources such as an earlier population census or household surveys.

14. Similar approaches such as initial assessment of raw data on recent births, conducting graphical analysis of age-specific fertility rates and TFR in comparison with other data sources can be used to evaluate the data on recent births collected in population censuses.

15. The presentation also provided an overview of the original Brass P/F ratio method that was derived to produce a reasonable fertility estimate. The rational behind the method as well as the underlying assumptions were explained. The use of the MortPak CEBPF was demonstrated in calculating the P/F ratio, in assessing the quality of both the children ever born and recent births data and in estimating fertility level.

16. Methods that use the population aged below 15 to estimate fertility for the 15 years preceding a data collection operation were also introduced. The use and benefit of the reverse survival method of fertility estimation was illustrated in details using the Excel template FE_reverse_4.xlsx available from the newly released *Tools for Demographic Estimation*. The own-children method of fertility estimation was only briefly presented.

F. Hands-on exercises on fertility data (Day 2)

17. The hands-on exercises session was dedicated to the evaluation of age and sex distribution from population censuses. The points covered in the exercises are given below. Each participating country was encouraged to use their most recent national census data and when comparison with other data sources was needed, countries may use similar data from previous censuses or household surveys.

1. Children Ever Born (CEB)
    a. Tabulate children ever born by age group of mother for women aged 15 – 49 as shown in the presentation
    b. Calculate proportion missing, proportion childless, and average parity (average CEB) for each age group
    c. If appropriate, apply the El Badry correction to the CEB data, or
    d. If you do not think the El Badry correction is necessary for your data, explain why
2. Recent births
    a. Plot sex ratio at birth by age group of mother for births in the last 12 months (or other measure of recent fertility that is available)
    b. Calculate the ASFRs. Plot the ASFRs and calculate the TFR.
3. Using MortPak FERTPF, implement the P/F method for CEB and recent fertility data
    a. Compare the TFR derived from this exercise (using the adjustment factor you deem most appropriate), the TFR derived from part (2), and TFR obtained from an outside source (see UN Population Division data provided)
    b. What are your conclusions about the quality of fertility data from the census?
4. Using the spreadsheet provided, implement the reverse survival method for the estimation of fertility
    a. Set the input parameters on the “Introduction” worksheet to the appropriate values

b. Enter the enumerated populations of children under age 15 (in single years) and women aged 15 – 64 (in 5-year age groups) in the "Method" worksheet
c. What are your conclusions about the TFR estimates (presented in the "Method" and "Charts" worksheets)

G. Country Experience on Census Data Evaluation (Day 2)

18. At the end of the second day of the workshop, five countries were asked to present their national experience with census data evaluation for the most recent census.

Bhutan

19. Bhutan conducted on 30-31 May 2005 the first modern population and housing census in the history of the country. The 2005 Population and Housing Census of Bhutan followed the essential features recommended by the United Nations (individual enumeration, universality, simultaneity and periodicity).

20. The data evaluation of the 2005 PCHB was rather limited as no previous census could serve for comparison purpose. No comparison was drawn with the sample surveys that were conducted in the country.

21. Tabulations of the 2005 PCHB, as well as other reports from the census are available on-line on the website of the National Bureau of Statistics, Royal Government of Bhutan.

22. The country is now starting to plan actively for a second population and housing census to be conducted in 2015.

China

23. The latest population census of China was conducted in early November 2010. The census used both short and long forms to collect information. The short form consisted of 6 household items and 12 individual items. The long form, administered to a 10 per cent sample, contained 19 household items and 28 individual items. A post enumeration survey was conducted immediately after the census (with a reference date: 26 November 2013) to assess the coverage and content errors of the census. A sample of 120,000 persons was selected, representing 0.1 thousand of the total population. The PES showed that the net under-coverage rate of total population was 1.2 per thousand.

24. The PES was also used to assess the content errors in the 2010 census data collection. The topics covered by the PES include at the household level the number of person, and the number of births and deaths in the household during the past twelve months; and at the individual level, age, sex, date of birth, place of residence at census reference time, place of household registration, and duration since leaving place of household. According to this evaluation, the omission rate reaches about 15 per cent for the number of births in the household during the past twelve months and more than 20 per cent in the case of the number of deaths in the household during the past twelve months. Data on education are deemed to be highly reliable.

25. While the PES is used to evaluate the census results, one should however be cautious as the PES data also contains errors.

Indonesia

26. The most recent population census of Indonesia was conducted in May 2010, with a reference date of 15 May 2010. Data evaluation is one (final) step in the process of obtaining census data of the best quality.

27. For the 2010 census, data evaluation was conducted to obtain clean raw data and consistent tabulations with the final objectives to produce reliable indicators that can serve planning purposes and be employed for advanced analysis.

28. The evaluation of the census data was performed at different stages of the whole census process. During data collection, data were continuously evaluated and data editing was performed in the field. As a part of quality assurance in producing consistent statistics, BPS-Indonesia monitored the quality of the census in the beginning period of field work during the first two weeks of the census data collection. Monitoring the data quality served to ensure the quality of PC data. In order to minimize both the coverage and content errors, each operational procedure at each step of the enumeration process benefited of special attention. By monitoring the data quality during the enumeration, the objective was to correct any miss-procedure. 1,676 students, lecturers of Institute of Statistics, and BPS employees were involved in this activity. The monitoring results were reported through SMS-Gateway and could be accessed and downloaded by BPS executives through internet.

29. A Post-Enumeration Survey (PES) was also conducted upon completion of the enumeration in 1200 census blocks in 33 provinces, from 5-18 July 2010. The purpose of the PES was to evaluate coverage and content errors. In general, PES result indicates that there is undercount of coverage for population and household. The population net coverage error rate was 3.6 per cent at the national level, with variations between 0.36 to 9.77 per cent across provinces of the country.

30. Before the release of the preliminary results, a series of comparison was made with the previous 2000 census results.

31. Once individual questionnaires were processed, evaluation for internal consistency was performed, as well as an evaluation of the data processing (consistency and imputation) and some demographic parameters (assessment of the population age and sex distribution, computation of fertility estimates using the own-children method, assessment of data on children ever born and children surviving). An international consultant was hired for this part of the evaluation process.

32. Methods of evaluation on census data should be planned and organized since the beginning of census preparation; and there should be a standard format of census evaluation particularly on assessing demographic parameters. The evaluation of census data should be conducted starting from the lowest administrative areas, as staff members

in regional offices knows exactly the conditions prevailing in their area. The role of international and internal experts are important in the collaboration of census evaluation.

Kazakhstan

33. The most recent population census in Kazakhstan was conducted between 25 February and 6 March 2009. Comparability with previous censuses served to select the variables to be collected, as well as the compliance with current international requirements and the national requirements for information for the new directions of the country's socioeconomic development.

34. No formal evaluation of the census data, either using the PES or demographic methods, was addressed in the presentation.

Kyrgyz Republic

35. The most recent population census in the Kyrgyz Republic was conducted in 2009. The 2009 census covered both the population and housing. The census results were analyzed by the following characteristics: geographical characteristics of the population, demographic characteristics of the population, educational level of the population, economic characteristics of the population, migration, households and families, and the living conditions of the population.

36. No formal evaluation of the census data, either using the PES or demographic methods, was addressed in the presentation.

H. Evaluation of child mortality data (Day 3)

37. The UNSD presentation in this Session focuses on the evaluation of child mortality data obtained through two types of questions usually being asked in a population census: (a) survival of children ever born and (b) recent deaths in the household. Most of the discussion in this Session focuses on the survival of children ever born.

38. As indicated in the presentation, survival of children ever born is often used to derive mortality of child (under 5 years of age). Various aspects of the Brass type estimates of child mortality using the survival of children ever born data were explained. For example, the presentation discussed the rational behind the method, assumptions behind the modeling, the use of MortPak CEBCS application to derive child and infant mortality estimates, as well as ways to choose from different model life tables based on the mortality situation in the country.

39. The presentation noted that initial assessment such as careful examination of raw data on children ever born and surviving and other related variables such as mother's age and sex of the child was necessary to obtain information on the overall quality of the children ever born and surviving data. Additional checks can be done on tabulated data. They include comparing children ever born and children surviving data; comparing the proportion of deceased children derived from the census with the same indicator derived

from other sources; and comparing derived child mortality estimates with those published by other agencies such as the United Nations Population Division and UNICEF.

I. Hands-on exercises on evaluation of child mortality data (Day 3)

40. The hands-on exercises session was dedicated to the evaluation of child mortality data. The points covered in the exercises are given below. Each participating country was encouraged to use their most recent national census data and for mortality data evaluation, countries were also encouraged to compare results and indicators with other data sources such as an earlier census or a household survey.

1. Life Tables
    a. Calculate age-specific period mortality rates by 5-year age groups (for each sex separately)
    b. Generate a full single-sex life table for males or females using MortPak
    c. Plot the l(x) curve
    d. Summarize what this analysis suggests about mortality conditions in your country. Do the data make sense?
2. Brass-Type Estimates
    a. Construct the following table for 5-year age group of mother from age 15 – 49. Note any inconsistencies in the data.

Age group of women	Total women	Total children ever born	Average CEB	Total children surviving	Average children deceased	Proportion of children surviving	Proportion of children deceased

    b. Using the table you constructed in part (a) conduct a rapid assessment of the CEB/CS data by comparing your data with the UN Population Divisions' estimate of under-5 mortality. What do you conclude about the quality of the data?
    c. Estimate Brass-type models for this data using the QFIVE application.
    d. Choose two different model life tables and compare the associated estimates of trends in 4q1 and 1q0.

J. Country Experience on Census Data Evaluation (cont.) (Day 3)

<u>Mongolia</u>

41. The most recent population census of Mongolia was conducted in November 2010, with a reference date of 11 November 2010. Some of the Mongolians living abroad could be counted via internet in the 2010 census. The main census results were released six months later. The national report was published a year after the census and a series of 14 census monographs was published in two years after the completion of the census. All documents are available in Mongolian and English.

42. For the 2010 census, the National Statistics Office of Mongolia developed new techniques and technologies: Web-based GIS database; Web-based population atlas and Monstat application of printed publications available on App Store.

43. In terms of evaluation of the census data, a Post-Enumeration Survey (PES) was conducted immediately after the census on 19-21 November 2013 on a one per cent sample of the population of the country. The objective was to estimate the coverage error and the content error (mainly age distribution). The relationship to the head of the household, sex, age, residency status, duration of residency and the administrative unit in which the person was enumerated during the census were included in the PES' questionnaire on population.

44. The quality of the census results were further assessed through the comparison with multiple data sources.

Nepal

45. The most recent population census of Nepal was conducted in June 2011, with a reference date of 22 June 2011. The 2011 census is the 11th population census conducted in the country. The first modern census took place in 1952/54. Computer processing was introduced for the first time during the 1971 census. Three forms were used during the 2011 census: a listing form containing questions on the number of houses, households, and households members (by sex, agricultural land operated and livestock owned); an individual form 1 including questions on types of houses, households facilities, ownership of house or land of female members of the household, details of absent members of household, as well as name, relationship to head, sex, age, caste/ethnicity, marital status and age at first marriage, religion, mother tongue and second language, citizenship, type of disability, literacy and level of education; and an individual form 2 containing questions on migration, fertility, labor force, occupation, industry, employment status, and living arrangement of children. This second individual form was however administered to every eighth household.

46. No formal evaluation of the census data, either using the PES or demographic methods, was addressed in the presentation.

Tajikistan

47. The most recent population census of Tajikistan was conducted in September 2010, with a reference date of 21 September 2010. The census has the objective of obtaining a broad range of demographic and socio-economic information that characterizes the national population in each locality and administrative-territorial entity.

48. Upon completion of the census, control visits were conducted on 3-5 October 2010 in a 10 per cent sample in each enumerated area in order to evaluate the completeness of the information collected on the population at census time.

49. Census data were evaluated using classic demographic analysis (graphical representation, comparison of the census results with multiple sources (previous censuses, vital registration…). According to the 2010 census, the difference between the

permanent population and the estimate from the administrative record was +34.9 thousand people.

Thailand

50. The most recent population census of Thailand was conducted in 2010. The census objectives was to 1) collect basic information on population and living quarters, 2) provide data for small administrative units, and 3) measure changes of population and living quarters over 10 years.

51. The evaluation of the census data was conducted to provide user with a level of confidence when utilizing the data, explain errors in the census results, and improve the quality of the next census. Census results were evaluated by using both PES and demographic analysis.

52. The PES was conducted to estimate the level of both coverage and content errors. The PES selected 2,159 enumerated areas. At the household level, the net coverage error rate reached 2.3 per cent and the completeness rate 77 per cent. At the population level, the net coverage error rate was 4.0 per cent and the completeness rate 72 per cent. In terms of content errors, the degree of agreement between the census and PES attained more than 80 per cent for the information on age, sex, and marital status and less than 80 per cent for information on education.

53. Census results were also evaluated by using demographic analysis. Checks for internal consistency were performed, as well as comparison with previous censuses. In addition, the consistency of the 2010 census data was assessed by comparing census results to household surveys and administrative records.

Viet Nam

54. The most recent population census in Viet Nam was conducted in April 2009, with a reference date of 1st April 2009. The 2009 census was the fourth official population census conducted in Viet Nam since the country's reunification in 1975. The census collected information through a short form for the entire population and a long form for 15% of the population. The short form collects information on basic characteristics of household members such as age, sex, ethnicity, religion, education and housing characteristics. The long form collects all above information with additional questions on economic activities, fertility, mortality, disability and more detailed housing information.

55. Regarding census coverage and content evaluation, both the post enumeration survey (PES) and demographic analysis were used. PES was mainly used to assess the census coverage. During the PES, each usual household member was asked four questions: (a) full name; (b) relationship with the head of household; (c) sex; and (d) month and year of birth or age. Responses from the PES were compared with census questionnaires to assess the level of under- or over-enumeration of population during the census. The PES results of the 2009 census showed that there was a 0.3% of over-count in the 2009 census.

56. Demographic analysis was used to evaluate and analyze census data. Population size and age and sex structure were studied. Various indirect demographic methods were applied to evaluate fertility and mortality census data. Brass method was applied to estimate child mortality indicators using the United Nations's QFIVE software. The General Growth Balance (GGB), Synthetic Extinct Generation (SEG) methods and a combination of the two methods were used to assess the level of under-coverage of household deaths collected from the 2009 census. The results showed that the coverage of deaths derived from the household death question was 67% and 54% for male and female deaths, respectively by using the combination of the GGB and SEG methods.

K. Evaluation of data using consecutive censuses: Adult mortality and census coverage (Day 4)

57. Regarding the estimates of adult mortality, the presentation reviewed the use of the question on household deaths in deriving adult mortality estimates and possible quality issues related to the data collected. Comparing age-specific mortality rates derived from the household deaths question with those from other sources such as a household survey may provide some insights on the relative coverage of death reporting in the census. The use of the Generalized Growth Balance method (GGB) to assess the coverage of death reporting was explained in details through an example, while the Synthetic Extinct Generations Method (SEG) was explained briefly.

58. The presentation made by UNSD reviewed three methods to evaluate census coverage by using data from two consecutive censuses: (a) population balancing equation; (b) cohort component method and (c) inter-censal cohort survival rates.

59. The rational behind the population balancing equation is quite straightforward. According to the population balance equation, population at second census should be equal to the population at the first census, plus births and minus deaths occurred in between the two census periods and then plus net in-migration in the same period. Therefore if information on the inter-censal births, deaths and migration are available, the under or over-coverage of the second census relative to the first one can be derived. This method is easy to use, however with certain limitations. First, accurate birth, death and migration figures are not easy to obtain, which in turn will have an impact on the reliability of the census population coverage estimate. Second, this method applies mainly to coverage assessment at national level because it is very difficult to obtain information on internal migration, which is required to do regional or lower geographical levels assessment.

60. The cohort component method compares the "expected" population based on the projection from the population in the first census, with additional information on the inter-censal fertility, mortality and net international migration. Detailed steps of calculation were introduced in the presentation. Illustration was made of how the MortPak PROJCT procedure can be used when the population, fertility, mortality and net migration elements are available. The presentation then reviewed the results using the cohort component method for three countries – Philippines, Indonesia and Turkey and demonstrated how the results can be interpreted.

61. The inter-censal cohort survival rate method compares the size of birth cohorts enumerated in successive population censuses. In the absence of census errors and significant migration, the ratio of the number of persons enumerated in the second census to the first census should approximate the survival rate that would be expected on the basis of mortality conditions. When there is substantial migration into the country (or the area of interest), the expected survival rate needs to be modified to reflect the impact of migration on population size. Advantages and limitations of the method were discussed at the end of the presentation.

L. Hands-on exercises on data evaluation with consecutive censuses: Adult mortality and census coverage (Day 4)

62. The hands-on exercises session was dedicated to the evaluation of census data using consecutive censuses. The points covered in the exercises are given below. Each participating country was encouraged to use their most recent national census data and for mortality data evaluation, countries were also encouraged to compare results and indicators with other data sources such as an earlier census or a household survey.

1. Calculate and plot age-specific mortality rates by sex for the more recent census. Do the data make sense in the country context?
2. Implement the General Growth Balance method using the spreadsheets provided (one sex only).
    a. Estimate intercensal deaths if necessary
    b. Input appropriate data in the GGB worksheet
    c. Analyze the diagnostic plots and make any necessary adjustments to the age range.
3. Cohort Survival Ratios
    a. Calculate and plot the cohort survival ratios by sex for the most recent two censuses.
    b. If a life table is available, calculate nRx for each age-sex group
    c. Plot your output from parts (a) and, if applicable, (b)
4. Cohort Component method using MortPak
    a. Gather the required data from the censuses, UN Population Division estimates, or other sources and input into MortPak.
    b. Calculate the absolute and percent differences between the expected and enumerated populations for the second census.
    c. Plot the percent difference (by sex) and analyze your results.

    Summarize what parts (3) and (4) indicate about completeness of coverage for the more recent census.

M. Presentations of countries on the result of hands-on exercises (Day 4)

63. Participants have worked during hands-on exercises on the evaluation of their census data using the demographic techniques presented during the workshop. At the end of the workshop, participants were asked to present the results of the hands-on exercises.

64. Seven presentations were made (Bhutan, China, Indonesia, Kazakhstan, Tajikistan, Thailand and Viet Nam).

N. Migration & Socioeconomic Topics (Day 5)

65. The presentation made by UNSD first reviewed common concepts used in measuring internal migration such as place of usual residence, life time and recent migration and explained the difference between move and migration. The presentation then described the direct and indirect methods of estimating internal migration within a country. The direct method refers to the use of questions related to migration in a census such as place of birth, place of residence at a specified time in the past, duration of residence and place of previous residence. For each question, discussion was provided on the possible tabulation on internal migration and related quality issues.

66. The presentation also explained ways of estimating net internal migration through indirect methods including the vital statistics method and the survival ratio method. All of these methods use data obtained from consecutive censuses. The vital statistics method uses population growth between two consecutive censuses and national growth rate (births –deaths) by administrative units to estimate net migration. Then the estimated migration is compared with the enumerated migration within the country. The survival rate method requires data on the survival ratio of population from the first census to the second for all age groups. Then the difference between the expected population in the second census and the enumerated population will be the net migration. The presentation also highlighted concerns and possible errors when indirect methods were used.

67. The presentation reviewed basic concepts used in measuring international migration through population censuses. The presentation explained possible administrative sources that can be used in analyzing general pattern of international migration in a country. It was emphasized that these sources usually can not be used for direct comparison with census results, because definitions are not usually comparable in two sources. However, census data can be matched with administrative sources to evaluate the quality of census data and visa versa.

68. The presentation also provided information about the comparison of census data with other sources mainly household surveys and administrative registers to evaluate socioeconomic characteristics of population obtained through population census. The presentation first outlined the core socioeconomic characteristics that were recommended by the United Nations Principles and Recommendations for Population and Housing Censuses, Rev. 2. The core items cover characteristics on household and family, demographic and social aspects, education and economic activities.

69. It was highlighted that several tools can be used to assess the quality of socioeconomic characteristics of population collected from censuses. They include: (a) checking internal consistency of data by reviewing tabulations and cross tabulations with other relevant characteristics; (b) comparing generated indicators with those derived from other data sources such as household surveys and administrative records; and (c) comparing with other sources by conducting re-interview surveys where people are re-interviewed and content of the census responses is verified. The use of assessment tools were demonstrated via examples on data on population by household size, population by marital status, literacy rate and unemployment rate.

O. Census adjustment (Day 5)

70. The presentation made by UNSD discussed issues related to adjusting census figures. They include the reasons for adjusting census figures, what figures are usually adjusted and how the adjustment can be done.

71. Census figures can be adjusted for several reasons: (a) when there was substantial errors, i.e., over or under-count in the census counts; (b) coverage of certain population groups is deficient and some parts of the country might be disadvantaged in government funds and/or representative seats allocation; and (c) census count is used for future intercensal estimates and projections.

72. The adjustment may be carried out on the total count of the population in the country. Sometimes further adjustment is possible to adjust basic population distributions, by major civil division, age, and/or sex. The basis for the adjustment is census evaluation studies such as post enumeration survey or assessment using demographic techniques. Coverage rate can be used directly to adjust population size. The method of synthetic estimation and regression can be used for further adjustment and was explained in the presentation. The presentation also highlighted several considerations before adjusting census figures.

III. CONCLUSIONS AND RECOMMENDATIONS

73. The participants of the workshop agreed on the following conclusions and recommendations:

a. Participants recognized the importance of comprehensive and systematic census data evaluation as part of the overall census programme and integrated with other census activities in order to provide users some measures of quality of census data, to identify types of error to assist the planning of future censuses and to provide a basis for constructing best estimates.

b. Participants appreciated UNSD's effort in organizing the workshop that explained in detail various demographic techniques and tools such as Population Analysis Spreadsheets (PAS), MortPak and different spreadsheets from the newly released *Tools for Demographic Estimation* in evaluating the census coverage and the content of census data such as age-sex distribution, fertility, mortality, migration and other socioeconomic characteristics.

c. Participants expressed that there was a need to build the capacity of national statistics office to undertake activities related to evaluation of census data based on demographic techniques and in comparison with other data sources.

d. Participants highlighted the needs for a technical report/guideline that provides an overview of possible demographic techniques for census data evaluation and also possible data sources to compare with census results. Participants also emphasized the need for technical assistance for application of these techniques.

ANNEX I. List of participants

No.	Country / Organization	Contact Person Information
1.	Bhutan	Mr. Tashi Dorjee Offtg. Chief Demographer, Demographic & Social Statistics Division National Statistics Bureau Royal Government of Bhutan Thimphu, Bhutan
2.	Bhutan	Mr. Dorji Lethro Statistical Officer, Socio-Economic Research & Analysis Division National Statistics Bureau Royal Government of Bhutan Thimphu, Bhutan
3.	China	Ms. Hui Guo Principal Program Officer, Division of Wages and Social Security Statistics Department of Population and Employment Statistics National Bureau of Statistics of China Beijing, China
4.	China	Ms. Ning Xiao Consultant, Division of Analysis and Research Department of Population and Employment Statistics National Bureau of Statistics of China Beijing, China
5.	Indonesia	Ms. Rini Savitridina Head, Population and Labour Mobility Statistics BPS-Statistics Jakarta, Indonesia
6.	Indonesia	Mr. Mukhamad Mukhanif Head, Social Statistics Division BPS-Statistics of Lampung Province Lampung, Indonesia
7.	Kazakhstan	Ms. Ayaulym Sagynbayeva Head, Unit for Demographic Statistics and Census Department for Social and Demographic Statistics Agency of Statistics of the Republic of Kazakhstan Astana, Kazakhstan
8.	Kazakhstan	Ms. Zhanar Akhmetova Expert, Unit for Demographic Statistics and Census Department for Social and Demographic Statistics Agency of Statistics of the Republic of Kazakhstan Astana, Kazakhstan

No.	Country / Organization	Contact Person Information
9.	Kyrgyz Republic	Mr. Koshoi Isaliev Head, Main Computing Center National Statistical Committee of the Kyrgyz Republic Bishkek, Kyrgyz Republic
10.	Kyrgyz Republic	Mr. Maksat Aitmambetov Leading Specialist, Statistical Information Dissemination Department National Statistical Committee of the Kyrgyz Republic Bishkek, Kyrgyz Republic
11.	Mongolia	Mr. Amarbal Avirmed Director, Population and Housing Census Bureau National Statistical Office of Mongolia Ulaanbaatar, Mongolia
12.	Mongolia	Mr. Ganpurev Dulmasuren Officer, Population and Housing Census Bureau National Statistical Office of Mongolia Ulaanbaatar, Mongolia
13.	Nepal	Mr. Ganesh Acharya Under secretary, Ministry of Land Reform and Management Government of Nepal Kathmandu, Nepal
14.	Nepal	Mr. Purushotam Subedi Under secretary, Ministry of Land Reform and Management Government of Nepal Kathmandu, Nepal
15.	Tajikistan	Ms. Ismoilova Zebo Chief, Census Department Agency on Statistics under the President of the Republic of Tajikistan Dushanbe, Tajikistan
16.	Tajikistan	Mr. Furkat Mirpochchoev Specialist, Census Department Agency on Statistics under the President of the Republic of Tajikistan Dushanbe, Tajikistan
17.	Thailand	Mr. Wichan Choorat Statistician National Statistical Office of Thailand
18.	Thailand	Ms. Pannee Pattanapradit Statistician National Statistical Office of Thailand
19.	Viet Nam	Ms. Phan Thi Minh Hien Officer, Population and Labor Statistics Department General Statistics Office of Viet Nam
20.	Viet Nam	Mr. Nguyen Van Hung Officer, Population and Labor Statistics Department General Statistics Office of Viet Nam

No.	Country / Organization	Contact Person Information
21.	UNFPA Viet Nam	Ms. Tran Thi Van Assistant Representative
22.	UNFPA Viet Nam	Ms. Le Thi Phuong Mai Population and Development Specialist
23.	UNFPA	Ms. Sabrina Juran Technical Specialist Population and Development Branch UNFPA
24.	UN STATISTICS DIVISION	Ms. Meryem Demirci Inter-regional Advisor Demographic and Social Statistics Branch Statistics Division
25.	UN STATISTICS DIVISION	Mr. Thomas Spoorenberg Associate Statistician, Demographic Statistics Section Demographic and Social Statistics Branch Statistics Division

ANNEXT II. Programme of Work

Monday, 2 December 2013 Day 1: Overview and First-Step Analyses	
9:00 – 9:30	Registration of participants
9:30 – 10:00	Welcome/opening remarks - Mr. Pham Guang Vinh, Deputy Director General, General Statistics Office of Viet Nam - Ms. Meryem Demirci, United Nations Statistics Division
10:00 – 12:30	<u>The 2010 World Program on Population and Housing Censuses</u> The session introduces the objectives of the world programme on censuses and UNSD activities to support this programme <u>Overview of Methods of Census Evaluation and the Workshop Agenda</u> This session reviews the objectives and planning of a census evaluation programme, types of census errors, and methods of data evaluation, including methods based on the census alone and methods based on the comparison of census data with data from other sources. Comparative techniques involving both matching and non-matching data will be reviewed, and the strengths and weaknesses of each approach will be discussed. A brief overview of the agenda for the remainder of the workshop will also be presented.
12:30 – 13:30	Lunch
13:30 – 17:00	<u>Evaluation of Age & Sex Structure</u> Age and sex are the two fundamental variables of demographic analysis. The session covers demographic methods used for the evaluation of a population's age and sex structure and identification of potential census errors, including the population pyramid, age ratios, sex ratios, graphical cohort analysis, Whipple's index, and Myers`s Blended Method. This session also discusses common census errors on age and sex variables, and their impacts on further demographic analysis. A hands-on exercise will follow the presentation.
Tuesday, 3 December 2013 Day 2: Fertility	
9:00 – 12:30	<u>Evaluation of Fertility Data</u> The session discusses demographic methods used for evaluating the quality of fertility data, focusing on errors in data on children ever born/children surviving and recent fertility. Data checks using average parities, age-specific fertility rates and other key fertility indicators will be covered, as well as the indirect estimation of fertility and comparisons with other data sources. A hands-on exercise will follow the presentation by UNSD.
12:30 – 13:30	Lunch
13:30 – 17:00	<u>Country Presentations on Experiences with Census Evaluation</u> Participants will be invited to give a short presentation on census evaluation programs carried out by the statistical offices of their countries. Bhutan, China, Indonesia, Kazakhstan, Kyrgyz Republic

Wednesday, 4 December 2013 **Day 3: Child Mortality**	
9:00 – 12:30	Evaluation of Child Mortality Data This session covers the evaluation of data on child mortality, beginning with a review of life table construction and the use of model life tables. Indirect estimation of child mortality using Brass-type methods will then be covered, including steps for preliminary evaluation of data quality. A hands-on exercise will follow the presentation by UNSD.
12:30 – 13:30	Lunch
13:30 – 17:00	Country Presentation Continued Mongolia, Nepal, Tajikistan, Thailand, Viet Nam
Thursday, 5 December 2013 **Day 4: Evaluation Methods Using Multiple Censuses**	
9:00 – 12:30	Data Evaluation with Consecutive Censuses: Adult Mortality and Census Coverage Many of the methods used to evaluate census coverage using multiple censuses are derived from multi-census methods for the estimation of adult mortality, so in this full-day session the two topics are covered together. Census coverage methods derived from the population balancing equation are covered, as well as death distribution methods for the evaluation of adult mortality data, intercensal cohort survival ratios and the cohort component method for evaluating census coverage. A hands-on exercise will follow the presentation by UNSD.
12:30 – 13:30	Lunch
13:30 – 17:00	Data Evaluation with Consecutive Censuses: Adult Mortality and Census Coverage (continued) During the second part of the day, the morning's presentation will be completed as needed and participants will complete and present hands-on exercises.
Friday, 6 December 2013 **Day 5: Migration & Socioeconomic Topics** **Census Adjustment and Wrap-Up**	
9:00 – 17:00	Evaluation of Socioeconomic Data Collected from Censuses This session covers consistency checks for census data on the social and economic characteristics of a population using methods such as cross-tabulation, cohort analysis and comparison with other data sources. Topics covered are household size and structure, marital status, literacy, school attendance and economic activity. Adjusting Census Figures This session discuses possible reasons and methods for adjusting census figures. Wrap-Up and Final Discussion