



REPUBLIC OF THE PHILIPPINES

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## PHILIPPINE STATISTICS AUTHORITY

### PSA Board Resolution No. 06-B Series of 2015

#### **ADOPTING THE METHODOLOGY USED IN GENERATING THE 2010 CENSUS OF POPULATION AND HOUSING-BASED REGIONAL POPULATION PROJECTIONS**

**WHEREAS**, there is a need to prepare population projections to provide planners, policy-makers and program managers with population data between censal years;

**WHEREAS**, Executive Order No. 352: "Designation of Statistical Activities That Will Generate Critical Data for Decision-Making of the Government and the Private Sector", enables the identification and generation of the most critical and essential statistics required for social and economic planning/analysis;

**WHEREAS**, the generation of census-based population projections is one of the designated statistical activities;

**WHEREAS**, the availability of more recent population data based on the 2010 Census of Population and Housing (CPH) on 4 April 2012, allows the preparation of new sets of population projections;

**WHEREAS**, the Philippine Statistics Authority (PSA), through the Inter-Agency Working Group on Population Projections (IAWGPP) established on 11 March 2013, formulated the specific methodology proposed to be used in projecting the population at the regional level based on the cohort-component method and submitted the same for review by the Technical Committee on Population and Housing Statistics (TCPHS) on 19 March 2015;

**WHEREAS**, the 2010 Census-based regional population projections methodology, which is provided in Annex BR-06-B-20150408-01 assumed certain future trends in the demographic processes of fertility, mortality, and migration required by the cohort-component method of population projections;

**WHEREAS**, the TCPHS has endorsed the official methodology for the generation of the 2010 Census-based population projections at the regional level for approval by the Board;

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**NOW, THEREFORE, BE IT RESOLVED**, that the Board approves for adoption by all concerned the methodology for estimating the 2010 Census- based Regional Population Projections.

**BE IT RESOLVED FURTHER THAT:**

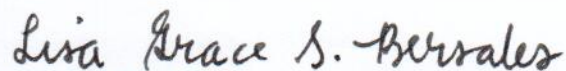
1. Regional estimates therefrom, to be released by the PSA on the second quarter of 2015, be hereby endorsed as the official figures to be utilized for planning and programming purposes.


Approved this 8<sup>th</sup> day of April 2015, in Pasig City.



**ARSENIO M. BALISACAN**  
PSA Board Chairperson and  
Socioeconomic Planning Secretary and  
Director General, NEDA

Attested by:



**LISA GRACE S. BERSALES**  
National Statistician and Civil Registrar General  
Chair, PSA Board Secretariat 



### Brief Description of the Methodology for the 2010 Census-Based Regional Population Projections

The 2010 Census-based regional population projections utilized the cohort-component method, which is the same method used for the national population projections. The cohort-component method takes into account the three demographic processes namely: fertility, mortality and migration, in projecting population. The methodology involves projecting separately the fertility rates by age of women, and the survival ratios and net migration rates by five-year age groups, for males and females.

The basic equation of the method states that the population at year  $t$  is equal to the population at year  $(t-n)$  plus births in the interval  $(t-n)$  to  $t$  minus deaths during the same time interval plus the net migrants during the interval. The net migrants is the difference between in-migrants and out-migrants. The components of population change are estimated or projected separately, and applied recursively to the equation given below to produce a series of populations by sex and by age group.

$$P_t = P_{t-n} + B_{t-n,t} - D_{t-n,t} + M_{t-n,t}$$

where

- $P_t$  = population at time  $t$
- $P_{t-n}$  = population at time  $t-n$
- $B_{t-n,t}$  = births, in the interval from time  $t-n$  to time  $t$
- $D_{t-n,t}$  = deaths, in the interval from time  $t-n$  to time  $t$
- $M_{t-n,t}$  = net migrants, in the interval from time  $t-n$  to time  $t$

#### Base Population

In order to compute the regional population projections, the method requires first, the baseline population by age and sex, that is, male and female population by 5-year age group and region as of July 1, 2010 based on the 2010 Census of Population and Housing.

#### Fertility

The fertility inputs used for the 2010 Census-based projections are the age-specific fertility rates (ASFR) and total fertility rate (TFR) of women 15-49 years old for the base year, which is 2010, and the projected ASFRs and TFR for the periods 2010-2015 to 2040-2045. The ASFRs and TFRs by region for the base year were taken from the 2003 National Demographic and Health Survey (NDHS), 2008 NDHS or 2011 Family Health Survey (FHS).

Fertility rates from the 2011 FHS were adopted for 15 out of 17 regions. The 2011 FHS TFR estimates for the two remaining regions (Region X and ARMM) do not conform to the expected decreasing trend in fertility, hence, were not used. Instead, the TFR estimate from the 2008 NDHS was adopted for Region X. The 2011 TFR



estimate for this region is higher than the 2008 TFR estimate. This increase in TFR does not conform to the decreasing fertility trend. For ARMM, the TFR estimate from the 2003 NDHS was used as this is lower than the 2008 NDHS and 2011 FHS estimates for the region. Of the regional estimates of TFR from the 2011 FHS, that for ARMM (2.9 children per woman) was the lowest among the regions, hence was not adopted.

The TFRs for year 2045 were computed by maintaining the ratio of the regional TFRs for the base year to the national base year estimate (3.125 children per woman). The end-period TFR at the national level is 1.791 under the medium series. The ratio method ensures that the projected regional TFRs are consistent with the projected national TFRs. In short, the degree of relationship between a regional TFR and the national TFR as of the base year which is 2010 was maintained up to the end-year of the projection period under the medium series, that is, year 2045.

$$\frac{TFR_{region, endyear}}{TFR_{national, endyear}} = \frac{TFR_{region, baseyear}}{TFR_{national, baseyear}}$$

$$TFR_{region, endyear} = \frac{TFR_{region, baseyear}}{TFR_{national, baseyear}} \times TFR_{national, endyear}$$

The projected regional TFR estimates for each five-year period were calculated using the exponential growth curve equation, with the TFR estimates for the base year and for the end year as input.

## Mortality

The regional population projections require the age-sex specific death rates, by region based on the registered deaths from the Vital Registration System for years 2008-2010, and the life table estimates of age-sex specific survival ratios during the base year and the projection period, also by region. Life tables were constructed to derive the baseline age-specific survival ratios for males and females. The data on registered deaths for males and females by age adjusted for incompleteness of registration were used to compute these life tables.

The age-specific death rates or ASDRs for males based on registered male deaths resemble the age pattern of mortality of the UN General Pattern Model life tables, while the ASDRs for females based on registered female deaths resemble the age pattern of the UN life tables under Latin American pattern. End-period life expectancy at birth for males and females were targeted using fast gains in life expectancy at birth based on the UN Working Model for the quinquennial gains in life expectancy. End-period life tables for males and females were derived based on UN Life Table estimates of ASDRs derived for the life expectancy at birth equal to the end-period targets, but with adjustment in the death rates at ages below 5. ASDRs from the base year (2010) and the end-period (2040-2045) were interpolated for projection periods. Life tables for 2010-2015 to 2040-2045 were constructed using



the interpolated ASDRs; and the survivorship ratios by age group and sex from these life tables were used as input for the regional population projections.

## Migration

The migration component is the last requirement of the cohort component method in computing the regional population projections. Two types of migration inputs were applied to generate the regional population projections – inter-regional migration and international migration. The baseline and projected age-sex specific inter-regional migration rates were based on the census data on residence 5 years ago. For international migration, the baseline and projected age-sex specific net number of international migrants were computed based also on the data on residence 5 years ago from the 2010 Census, and the data on registered emigrants from the Commission on Filipinos Overseas.

For the base year, the data on residence 5 years ago collected for population 5 years old and over based on the 2000 and 2010 Censuses were used to compute for the inter-regional net migration rates. The provincial net migration rates were also computed since the provinces were used as data points for the regression model in order to have more reliable migration estimates as compared to only the regional data which has only 17 cases. Then, the provinces and regions were grouped based on the trend of the net migration rates or NMRs observed between the 1995-2000, and 2005-2010.

Six different trends were exhibited by the provinces during the periods 1995-2000 and 2005-2010. Only types 2, 3, 4 and 6 were reflected in the trends of the regions. Regions III, IV-A and VII exhibited decreasing positive trend, that is, the net migration rates for the 2 periods were both positive, with the 2005-2010 NMR lower than that of 1995-2000. Four regions (I, II, IV-B and X) showed increasing negative trend, while 7 out of the 17 regions have NMRs which were negative but decreasing. CAR, Region XI and Caraga had negative NMRs during 1995-2000, and positive NMRs in 2005-2010.

Trends in net migration rates from 1995-2000 to 2005-2010

Type	Trend	Regions exhibiting the trend
1	Increasing positive	
2	Decreasing positive	Regions III, IV-A, VII
3	Increasing negative	Regions I, II, IV-B and X
4	Decreasing negative	Regions V, VI, VIII, IX, XII, NCR and ARMM
5	Positive to negative	
6	Negative to positive	CAR, Region XI and Caraga

*Note: The regions exhibited types 2, 3, 4 and 6 only*

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Regression models were used to project inter-regional net migration rates of the regions, with the NMR as dependent variable.

Unlike in the 2000 Census-based population projections where it was assumed that international migration has little effect on the Philippine population, international migration was considered for the first time in the 2010 Census-based projections. This is in recognition of the already large concentration of Filipinos in other countries. The net number of international migrants was computed using data on the number of emigrants based on registered Filipino emigrants from CFO and the number of migrants based on Filipino and non-Filipino nationals residing in a foreign country 5 years prior to the 2010 CPH but who were enumerated in the 2010 CPH as proxy indicators for number of immigrants.

At the national level, the projected net number of international migrants was assumed to increase linearly based on the 1990 and the 2010 CPH data on residence 5 years ago and 1996-2000 & 2006-2010 CFO data on registered emigrants. The regional distribution of the net number of international migrants for the base year was used to estimate the regional breakdown of the national estimates for the projection periods. The base year age-sex distribution of the net number of international migrants of the region was used to compute the age-sex specific net number of international migrants of the region.

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