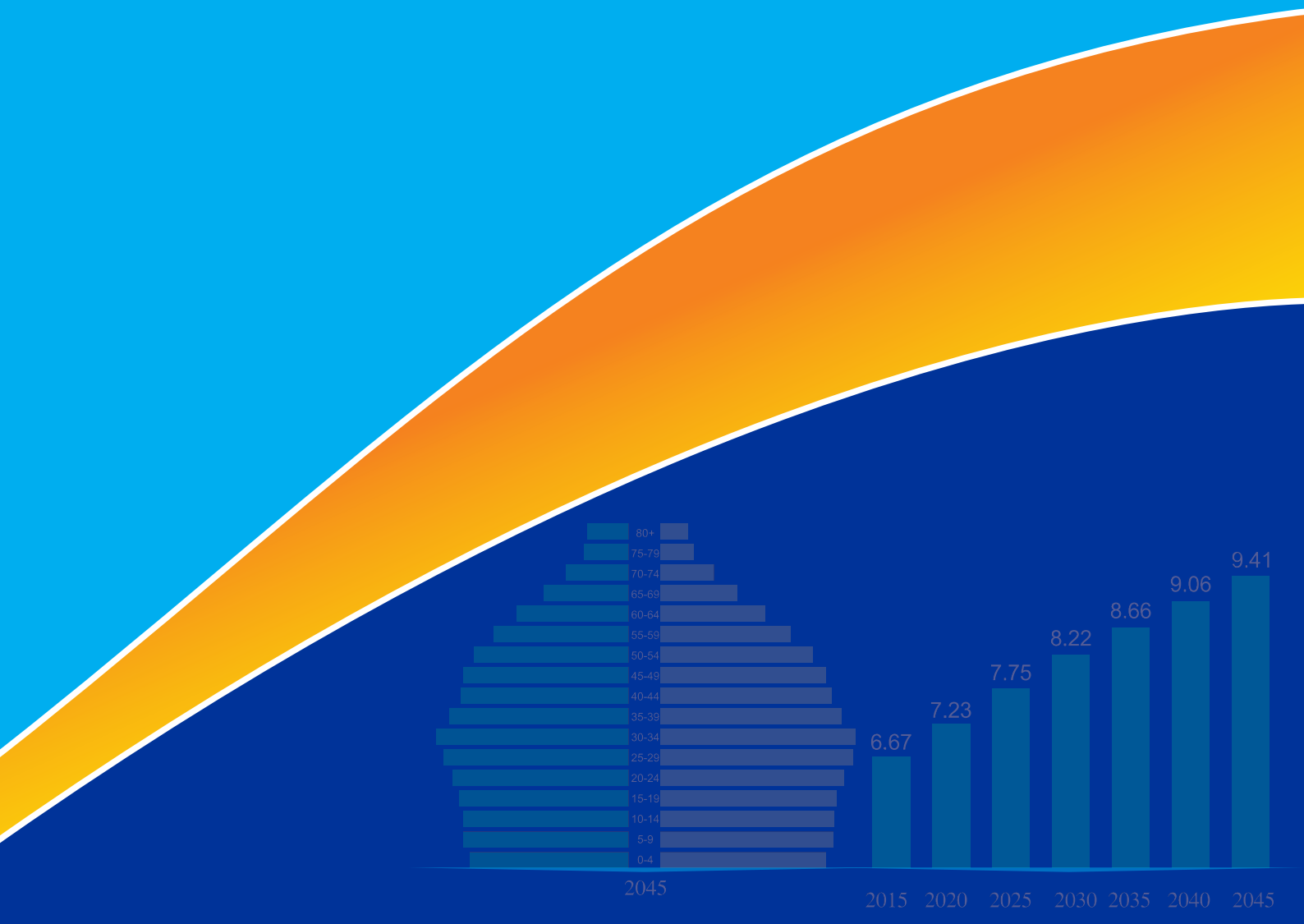
Ministry of Planning and investment

Lao Statistics Bureau

Lao Population Projections 2015-2045



Supported By: United Nations Population Fund

Vientiane Capital, June 2018

Foreword

Population projections are extremely important for effective management and administration of population growth and related demographic issues. If population projections are as accurate as possible, the government and policy makers will be able to inform and formulate policies and development plans with greater precision, in order to respond with necessary and effective population services such as social services and social welfare. Due to this importance and necessity the Lao Statistics Bureau, under the Ministry of Planning and Investment, has conducted this population projection by utilizing the baseline data from the fourth Population and Housing Census in 2015.

Population projections can be calculated using different methods. This population projection is based on estimations of population indicators such as fertility, mortality and migration rates. These indicators are some of the most utilised when looking at factors that change population dynamics in the future. However using such indicators for population projections cannot fully predict accurate population changes because there are numerous other, sometimes unpredictable, factors that may affect these changes.

Population projections demonstrate a calculation of the population's size and characteristics in the future. It is not possible to guarantee one hundred percent accurate estimations, even if the best available methodology was utilized in the estimation. Therefore, it is necessary for Lao Statistics Bureau to improve the population projection periodically in order to obtain a more accurate picture of the population in the future, which is estimated using data from several sampling surveys such as Lao Social Indicator Survey and other surveys.

Finally, we hope that the report will serve as a useful source of information and data for policy makers at all central and local levels, and that general use of this population projection will be to formulate plans and periodically monitor the social economic develop plan to improve the population's facilities and welfare of all population groups including ethnic groups in whole country. We would like to thank UNFPA for their technical and financial support in conducting and completing this population projection and hope for their continued collaboration in the future.

Head of Lao Statistics Bureau
Vice Minister of Planning and Investment

Contents

Chapter 1 Introduction

Population projections are estimates of the size of the future population and their characteristics based on assumptions about changes in the factors that affect population growth. If the assumptions hold, then the projected population will very closely approximate the actual size of the future population. In reality, nobody can assume with certainty what is going to happen in the future. It follows therefore that population projections can hardly be expected to be 100 percent accurate. They can be reasonably accurate within a short-term period, of say, less than 20 years but can be off tangent the farther into the future they go.

There are generally two methods of estimating future population size. One method uses a model to estimate the size of a future population based on an assumed growth pattern. The model is represented by a mathematical equation that relates the change in current population, say *n* years from now, if its growth rate is *r* per year. Population growth is generally regarded as exponential; therefore, the formula

(1) $P_n = P_0(1+r)^n$ or $P_n = P_0e^{rn}$

is usually used to estimate the change in population from P_0 (the initial total population size) to P_n (the projected total population after *n* years). A major limitation of this approach of estimating future population size is that it provides only aggregate values and ignores details such as age composition of the population. Use of the projected number is therefore extremely limited.

The second and most commonly used method of projection is the cohort-component method whereby demographic factors – fertility, mortality and migration – are considered in estimating future population. The method is actually a simulation of what would happen to the size and demographic structure of a current population if assumed levels of fertility, mortality and migration were to prevail in the future. It makes use of the population balancing equation, which is expressed as:

(2) $P_n = P_0 + \text{Births} - \text{Deaths} + \text{In-migrants} - \text{Out-migrants}$

where *n* is the length of the interval for which the projection is made and where the births, deaths and migration are the total number of events that occur during the interval. Equation 2 can also be written as

(3) $P_n = (P_0 - \text{Deaths}) + (\text{In-migrants} - \text{Out-migrants}) + \text{Births}$

where (P_0 -Deaths) refer to the survivors of the population alive at the initial period and (In-migrants – Out-migrants) refer to net-migrants.

In the cohort-component method of projection, the equation above can be applied to every age and sex cohorts except that the component of birth does not come into play. Hence, the equation that applies is:

(4) $P_n(x+n,s) = P_0(x,s) - Deaths(x,s) + Net\text{-}migrants(x,s)$

where *x* stands for age, and *s*, for sex. This means that the projected population of a given age and sex cohort is equal to the initial population of that cohort when they were *n* years younger, less the number of deaths among them and plus the net-migrants. Meanwhile, the survivors among the births that occur during the interval becomes the youngest age and sex cohort of the total population, P_n.

Cohort-component method of population projections is appealing for the reason that it provides demographic details of the composition of the projected population which are very useful for a wide-range of purposes. It usually provides more accurate estimates because it takes into account the demographic processes that directly affect population change compare to the use of mathematical models which simply take into consideration the general growth pattern of the entire population. Growth rate, which is the only parameter used in mathematical models, masks the impact of the components of growth and the interaction among them on over-all population change.

In many countries around the world, preparing population projections, or updating previous ones, has become a regular routine especially when new data about the population becomes available either through censuses or surveys. The need for current projections, especially in resource-scarce countries, has become ever more demanding as development planning requires more precise and targeted social and economic programs. Estimates of the size and composition of the population are at the core of fiscal planning and decision making. They are essential inputs for planners and policy makers engaged in the various sectors of the economy. The private sector, businesses, non-governmental organizations, research organizations and the academe, likewise, need these data to better plan and implement their activities. Below are some examples of the uses of population projections:

- Estimating requirements for education, such as additional classrooms, teachers, textbooks, etc, based on the size of school-going population, and the investments required
- Estimating investments in the provision of basic health care services
- Estimating incidence of certain types of illnesses and costs requirements to deal with such incidence
- Estimating number of jobs needed to cater to the demand of the future labor force
- Formulation of policies in such areas as social security for the aging population, retirement age for the employed, etc.
- Formulation of advocacy programs with respect to, for example, housing, age at marriage, etc.
- Re-allocation of national resources to sub-national administrative bodies
- Estimating number of persons requiring specific types of services such as child-feeding programs,
- In business, estimating the number of prospective customers of certain consumer products

Lao PDR conducted its last census of population in 2015. In addition, a number of household surveys, such as the Lao Social Indicator Survey (LSIS) and Demographic Health Survey, have been conducted in recent years – providing current information about the levels of mortality and fertility

in the country. The availability of these new sets of demographic data provides a fitting occasion for updating its last set of population projections which was based on the 2015 census.

This report describes the application of the cohort-component method to project the population of Lao PDR for the period 2015 to 2045. Three variants of national projections are prepared corresponding to three (3) different assumptions on the path of fertility change. The low variant assumes that fertility will decline at an accelerated rate in the immediate future whereas the high variant assumes a slow decline in birth rates. The medium variant, which is considered to be the most plausible assumption with respect to fertility change, assumes that fertility decline in the country will proceed at the rate experienced by other countries with a similar past level of fertility and pursuing similar intensity of family planning program. It may be mentioned, that in demographic context of Lao PDR, fertility is the major factor that determines population growth. At current mortality situation, the impact of death rates on the size of the population, is inconsequential to a certain degree. The same may be said with respect to the migration component. The need to have alternative assumptions on the other two components of population change – mortality and migration – is, therefore, considered not as important.

Unlike in the previous exercise of this kind, the current projections are prepared not only at the national level but also at provincial level. Provincial governments are responsible for the implementation of national programs as well as in the provision of services in their respective areas. For such purposes, availability of data on the number and characteristics of the population at the provincial level is necessary. Furthermore, since planning is also done at the provincial level, making population forecasts for the provinces is more than justified.

In this exercise, the approach used to prepare two-level projections is a 'top-down' approach; that is, national level is done first before the provincial level. Once the national projections are finalized, the results are used to control the provincial figures.

To implement the calculations called for in the application of the cohort-component method, the computer software DemProj is used. It is a module of the Spectrum System of Policy Models[1] which is a tool that supports analysis, planning and advocacy for health programs by projecting future needs and examining effects of policy options in the health sector. Other software, such as PAS and Mortpak are also used for other intermediate calculations.

[1] Spectrum Manual, *Spectrum System of Policy Models*, Avenir Health, Connecticut, USA

Chapter 2 Methodology and Data Requirements for Population Projections

There are four (4) basic types of data that are required when making population projections using DemProj. [2] These are:

1. Base population, that is, the total population as of the initial period of the projection disaggregated by 5-year age group and by sex;
2. Current levels of fertility in terms of total fertility rate (TFR) and age pattern of child-bearing among women in reproductive ages; sex ratio at birth of 105 males per 100 females is assumed;
3. Current levels of mortality in terms of life expectancy at birth by age and sex (the software actually uses the survival rates implied in an assumed model life table[3] corresponding to the given life expectancy);
4. Number of in-migrants and out-migrants.

2.1 Base Population

2.1.1 Enumeration errors in the base population

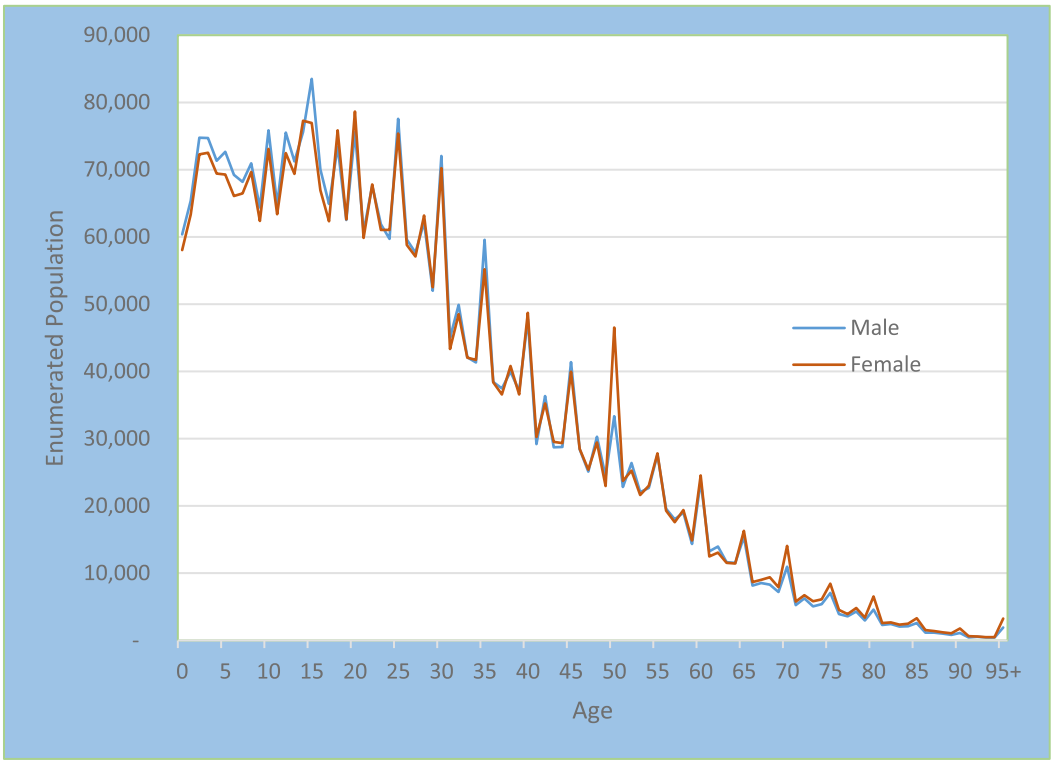
The base population for this set of projections refers to the age-sex structure of the population as of the census enumeration in 2015. It is commonly acknowledged that census enumeration is not perfect and that the enumerated population contains errors. The 2015 census of Lao PDR is not an exception and therefore, some kind of corrections to the data on the enumerated population are deemed essential prior to using them in the projections.

Digit preference is a common error in reporting a person′s age during censuses and surveys. This means that rather than reporting their true age, some people report a preferred number that is close to the true value. In most cases, the preferred numbers are those that end in digits ′0′ and ′5′. This leads to heaping of the enumerated population in those preferred digits. Figure 1 illustrates digit preference in the reported ages of the total population enumerated in the 2015 census. The data on both male and female population exhibit heaping in ages ending in ′0′ and ′5′ and to a lesser extent, those ending in ′2′ and ′8′. At age 50 for the female population, heaping is extremely high. A special reason for this could be the deliberate upward misreporting of ages of women who are nearing age 50 to this particular age in order to avoid being interviewed about their fertility during the census. It will be recalled that fertility questions in the census are asked only of women between age 15 and 49.

[2] DemProj Manual

[33] West Model of the Preston-Coale family of model life tables has been assumed.

Figure 1 Enumerated Total Population by Age and Sex, 2015 Census of Population



Under-enumeration of population is also a common occurrence in many censuses although at varying degrees. Furthermore, within the same population, there are specific age groups that appear to be more under-enumerated than others. Comparison of the reported number of persons reported during the 2005 and 2015 population censuses reveal some of the irregularities in census age reporting (Table 1).

Young children are typically more under-enumerated, possibly due to cultural reasons. For example, in the census of 2005, there were considerably fewer children aged 0-4 that were reported than there were children aged 10-14 reported in 2015 (351,559 vs 363,026). The calculated survival ratio for age group 0-4 is therefore above 1.0 which is not acceptable. This can happen only if the age-group 10-14 were over-enumerated in 2015 or if there had been significant in-migrants in this age group. But neither seems to be the case and therefore one can only conclude that children aged 0-4 were under counted in 2005. That this may have also happened during the