

Mission Report

**GDDS2 MODULE ON POPULATION PROJECTIONS
SEYCHELLES**

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GDDS2 MODULE ON POPULATION PROJECTIONS:

REPORT ON EXPERT VISIT TO SEYCHELLES

1. Summary and Main Findings

The GDDS2 (Population Projections) Expert first visit to Seychelles took place over two weeks, 25th August–5th September 2008. The overall purpose of this mission was to evaluate the quality and availability of demographic data and to train staff in the production of population projections of Seychelles' 25 districts for the first time. A list of mission participants, pre-mission preparations and meetings held are shown in Annexes 1, 2 and 3 of this report. The need for such projections has been occasioned by the decentralization of many government functions to local district offices and District Administrators. The Country Work Plan for this mission was drawn up by the Seychelles at the GDDS2 Launch Workshop in Mombasa, Kenya in June 2007 so that training in population projections was performed at their request. A summary of the main topic areas addressed in the mission is as follows:

Topic Areas	Issues discussed	Outcomes
Functions and status of the NSB	Position in relation to the Government of Seychelles	The National Statistics Bureau Act of 2005 established the National Statistics Bureau (NSB) as a semi-autonomous, parastatal, private company, funded by the government, whose purpose is to conduct national censuses and statistical surveys, publish vital statistics and semi-annual population estimates. The new status took effect in January 2006. A wide variety of topics are covered by the NSB including, housing, agriculture, labor force, income and migration and tourism. Its relative autonomy allows it to maintain sufficient authority to function more independently than prior to 2006 when it was the Management & Information Systems Division of the Ministry of Information Technology and Communication although it is still subject to the wishes of the National Assembly and any legislation passed by that body which may affect it. Still, the NSB's new position will certainly assure that future censuses, such as the one planned for 2010, will be conducted to a very high standard.
2002 and 2010 Census	Preparation	The 2002 Census was the first to incorporate GIS mapping as a part of a houselist procedure in which detailed maps are overlaid on aerial photographs. Each housing unit was identified and was visited as a type of pre-count operation. This procedure has been refined for the 2010 Census based on the 2002 experience.
	Census coverage	A post-enumeration check by use of spot checks by NSB staff estimated an undercount of 2.4%, well within standards in other countries.
	Data quality	The quality of census data is very high and census respondents have a very good knowledge of their age, an obvious and important contribution to the accuracy of age distributions. Age data are cross-checked with the National Population Database (NPD). All Seychellois by birth and/or descent, resident expatriates and naturalized foreigners must carry a national identity card.
	Comparison with previous censuses	Previous censuses, while generally of good quality suffered from a variety of organizational problems, primarily a last-minute rush to recruit and train enumerators. The 1997 Census, taken for the purpose of the delineation of voting districts for an upcoming election was taken in great haste, leading to inaccurate results and a high undercount of over 5 percent.
Vital	Completeness of	Since 100% of births occur in hospitals, the registration of

Statistics	coverage	births is believed to be complete, as is that of deaths. The relatively small size of the country (87,000 est. in 2008) is an asset in this regard. In the GDDS2 Launch Workshop report (Mombasa, June 2007), vital statistics are shown as "Approx. 90% complete." During the mission, this was been identified as an error and that registration is 100% complete. Vital statistics are collected and reported by the Civil Status Office.
	Data quality	Data quality is considered to be quite high although some anomalies do appear in district-level data, such as sex ratios at birth rather different from the usual 105 male births per 100 female births. This is likely due to the small number of births at the district level. Additionally, births and deaths are shown by year of reporting rather than by year of occurrence, the recommended practice. This leads to some annual fluctuation in the number of births, which is most notable in district-level data. For example, births for the Anse Boileau district were given as 92 in 2002 and 69 in 2003, an unlikely fluctuation.
	Data availability	Vital data become available very rapidly with data for 2007 on births, deaths and infant mortality published in August 2008. The speed of availability matches or exceeds that of many industrialized countries.
	Life tables	Life tables are produced annually for both sexes although the estimates show considerable annual variability due to the small annual number of deaths (about 650). Life tables are prepared by Mr. Joachim Didon of the Health Information and Statistics Section of the Ministry of Health and Social Development.
Projections	Past experience	Population projections have been prepared following each national census. The most recent series was based on the 1994 Census (the 1997 Census was deemed to be of insufficient quality to be used as a base).
	Geographic level	Populations projections have only been prepared at the national level by the NSB (when it was the Management & Information Systems Division).
	Quality	Based upon a reading of the 1994 Census-based projections publication, the projections were quite professionally performed.
Population Estimates (National)	Procedure	Post-censal population estimates are performed using the standard balancing equation method, applying annual data on births and deaths and estimating net immigration as the difference of arrival and departure information from immigration forms collected at the Mahe international airport and seaport ports of entry by the Immigration Division.
	Frequency	Estimates are produced bi-annually.
	Age-sex detail	Annual age-sex distributions are prepared by re-distributing the national total described above on the age distribution from the 2002 Census.
Population Estimates (District-level)	Procedure	Estimates for each district are derived by re-distributing the estimated national total on the district-wise distribution of the 2002 Census.
	Frequency	Prepared annually.
	Age-sex detail	Post-censal age-sex estimates are not prepared for districts.

2. Observations, Country and Working Conditions

a. The Country

With a total population of about 87,000 in 2008, Seychelles is one of the world's smallest countries in population and the smallest to issue its own currency. The country is divided into 25 administrative districts plus one parastatal district, Other Islands, which is administered semi-independently by the Islands Development Company. Mahe, the main island and by far the largest at 153 sq. km., is home to 87 percent of the national population (NSB 2008 est.). La Digue (2008 population 2,238 in one district) and Praslin (2008 population 7,555 in two districts) are the other two principal inhabited islands. Other Islands (2008 population 1,161) comprise over 17 additional inhabited islands which, among other activities, contain hotels, wildlife sanctuaries with their staff and a large prawn farm (Coetivy Island). (See Annex 4 for a list of districts with their 2008 estimated population and Annex 5 for district maps of the principal islands.)

Seychelles' capital, Victoria (population 24,994 in Greater Victoria in 2002), gives much architectural evidence of a British colonial past despite the distinctly French Creole nature of the society and culture. The large majority of the population, 91 percent, speak Creole as a first language although 28 percent speak English as a first or second language. English is the language of government and commerce. In 2007, 14.5 percent of the 39,572 employed persons were employed in hotels and restaurants, emphasizing tourism as one mainstay of the economy. A slightly higher percentage, 15.4, however, was in public administration. The next two largest groups, manufacturing and construction, accounted for 11.3 and 10.8, respectively. Manufacturing includes Indian Ocean Tuna, one of the world's largest tuna processors, while much construction activity is for new hotels. Agriculture, forestry and fishing account for 2.6 percent of employment and the number employed in those sectors is declining.

On most socio-economic measures, Seychelles appears more like a developed country than a developing one and it is difficult to think of Seychelles as "developing¹." School enrolment through the secondary school ages is 100 percent, 100 percent of births are in hospital, life expectancy at birth is 76 years for women and 69 for men (the latter somewhat disproportionately low), and registered infant mortality is very low at about 11 infant deaths per 1,000 live births. These favorable statistics are not surprising when one tours the country observing the excellent roads, the number of new vehicles, the environment free from litter and the overall condition of buildings and housing, which is generally excellent. Education is free from creche through to post secondary level. Higher-ranking graduates of the educational system receive scholarship to study abroad, as Seychelles' small size precludes the establishment of degree-granting institutions. There are a number of polytechnic schools, however. Health care in the very good public hospitals is also without charge and health centres are located in regional districts. Visitors are immediately impressed by what is seen as a very well run country.

However, Seychelles high standards must also be seen in the context of a high cost of living, much of that resulting from the need to import nearly all goods. The average monthly house hold income is Seychelles rupees (SR) 3,817 (\$US 515) but prices of consumer goods are high. Recently, the price of a liter of petrol rose from SR 7 to SR 17, a percentage increase quite a bit larger than most other countries during the recent oil price rise. Currently, rising prices for nearly all goods are placing increasing strain on household budgets. There are no income taxes in Seychelles, other than a payment into the social security system, the Seychelles Pension Fund. The government earns much of its income from import taxes, general sales taxes and luxury taxes on hotels and restaurants. Import taxes act to increase the price of consumer goods.

¹ The most commonly used classification of "more developed" and "less developed" is that of the United Nations Statistics Division (UNSD). The UNSD does not actually classify individual countries as more or less developed. It classifies entire regions in that manner. As a result, even Singapore in Asia, a less developed region, is classified as less developed as is Seychelles since it is placed in Africa. The UNSD makes only three exceptions to the rule. Australia, Japan and New Zealand are classified as more developed countries despite being located in less developed regions, Asia and Oceania. Many writers shorten the two categories to "developed" and "developing," as is the practice in this report.

An innovative aspect of the economy, as Seychelles seeks to diversify the economy is the construction of double-hull tanker ships by Seychelles Petroleum. These ships, constructed in Germany, are then leased to users.

b. Working conditions.

Excellent working facilities were provided by the NSB, including a large desk, power strip, etc. which were set up and waiting so that work could commence immediately. NSB also provided a car and driver, Philip, for daily transportation to and from the hotel, relieving the consultant of the necessity of finding and hiring taxis each day. This made my working in two locations, the NSB office and hotel, much more efficient. Philip also took me on a driving tour of Mahe on Saturday, 30 August, visiting all 22 of Mahe's districts which provided a very useful background for producing projections with some understanding of the pattern of habitation and the nature of the districts themselves. It became clearer which districts were likely to see future population growth and which were likely to remain stable. For example, Takamaka district's population in extreme southern Mahe is predominately agricultural and land ownership is high so that little in or out-migration is expected. On the other hand, other districts, such as Au Cap, are likely to see considerable population growth as new housing "estates" are built and population transferred to the new housing. This type of observation was quite valuable as such changes, or the lack of them, have quite a considerable effect on the distribution of population in such a small country and had the effect of making districts real places rather than just names in a statistical table. Internet access was interrupted in the office during the first four working days but was available for the rest of the mission. I was provided with access each day at NSB.

2. MAIN REPORT

Country Work Plan:

The following numbered items are taken directly from the Country Work Plan and are discussed in the relevant detail. Some reference is made to pre-mission preparations as needed for clarity. A separate, itemized list of such preparations is included in Annex 2 below.

1. Problem to be addressed:

No post-2002 Census projections at the district or national level. Need to evaluate the impact of HIV/AIDS on population. District level projection are necessary due to decentralization and the fact that planning is now done at district government level. Seychelles has a total of 25 districts.

Action taken. The possibility that district level projections could be produced for Seychelles was investigated both as a part of trip preparation and upon arrival at the NSB. Prior to leaving for Seychelles, Mrs. Therese Gopal, GDDS Coordinator and GIS Manager, provided me with tables giving the 2002 Census population by single years of age. This was the first step in evaluating census data for use as the base population in the projections.

The first thing one looks for is anomalies in the age distribution such as misreporting of age so that the advisability of age "smoothing" could be considered. No clear pattern of age misreporting could be identified so the preliminary evaluation was made that the data were likely of good quality. In addition, the age of those counted in the census had been checked against the National Population Database during census processing and all ages were verified. This is quite an impressive procedure to say the least. Two common types of age misreporting are age "heaping" on round digits, such as 0 or 5 when age in completed years is asked on the census. A second type is heaping on birth years in a similar manner when birth date is asked on the census, as is done in Seychelles. In that case, a census taken in 2002 would result in heaping on ages ending in 2 or 7. No such evidence could be found in the single year data. I was also later told that people in Seychelles know their birth dates quite well. Such accuracy in age data is rare in a developing country. At all times, fluctuation in numbers attributed to the very small size of district populations (an average of 3,345) had

to be taken into account. In larger countries, such fluctuations might be considered a serious problem, but in very small populations, they are also quite likely to be real.

Prior to leaving for Seychelles, population age-sex “pyramids” were prepared for each district in order to provide a visual view of the age-sex structure to NSB staff upon arrival. Mrs. Gopal also forwarded data on the incidence and prevalence of cases of HIV and AIDS. This suggested that, as of July 2008, there were 232 persons living with HIV and 102 living with AIDS. The consultant conferred with staff at the U.S. Census Bureau’s International Programs Center on this issue. We discussed whether it would be possible to create life tables to reflect AIDS mortality but this was deemed statistically impractical with such small numbers and especially when divided among 25 districts. It was also pointed out that, with the antiretroviral care in Seychelles, much mortality would occur beyond the 15 year window of the projections from the 2002 Census. Since AIDS mortality could not be factored directly into the projections, the inclusion of a section in the projections report on HIV/AIDS prevalence statistics (and by district if such information proved to be available) was recommended.

2. Strategic objective:

Post-census projections from 2002 census result and application to future censuses.

Action taken. Mission plans to implement the GDDS2 Work Plan were agreed to with Seychelles National Statistics Bureau (NSB) first by e-mail with Mrs. Therese Gopal, GDDS module coordinator and GIS Manager. An agenda was planned with an initial meeting with Mr. Jude Padayachy, CEO of the NSB in which we reviewed the primary goal of the mission, i.e., to produce population projections for Seychelles’ 25 districts for a 15 year period and to ensure that key staff would be trained in the use of the projection software as an added capability. The 2002 Census-based projections were deemed sufficient for the many requests received from District Administrators until the results of the planned 2010 Census became available.

The mission goal under this objective was to ensure that NSB would have the capability and trained staff to produce 2010 Census-based projections independently. Early on, it was realized that one individual should be designated as the in-house expert on use of the software although all nine members of the list designated to receive training would do so. Mrs. Gopal is the obvious person for this role since she is the one who deals with Seychelles population statistics on a daily basis and is the one who produces the country’s semi-annual population estimates and responds to user requests from both within and out of the NSB. Other staff are absorbed in other tasks not directly related to demographic statistics from day to day. Therefore, Mrs. Gopal received additional training on a “trainer of trainers” basis. Mrs. Gopal had also participated in the preparation of Seychelles most recent national population projections following the 1994 Census, published in 1996.

3. Activities required:

Review of past methods, training/work-study in use of recommended software and preparation of projections

Action taken.

The last projections, produced in 1996 were for the period 1996 – 2019. A reading of the publication in which these projections were released indicates that they were quite professionally performed. The projections utilized the software package PEOPLE. Beyond the selection of a base population as a starting point, projections require that assumptions be made on the three components of population change, fertility, mortality and migration.

The projections were performed at a time when the fertility rate (the total fertility rate, or TFR²) was higher than the present time, 2.6 children per woman in 1994 as opposed to about 2.1 at present. Thus, the

² The total fertility rate is the average number of children a woman would have if the rate of childbearing of a particular year were to remain constant throughout her lifetime.

projections had to make assumptions regarding fertility decline. According to the report, it was assumed that the TFR would decline from 2.6 in 1994 to 2.0 by 2014-2019. For mortality, it was assumed that life expectancy at birth would rise from 65.6 years for males in 1994-1999 to 70.6 in 2014-2019 and, for females, from 74.7 to 78.7 over the same period.

Assumptions on migration are always especially difficult, not in the least since determining what a country's true level of net immigration or emigration actually is can be fraught with data and definitional problems. Seychelles is no exception to the rule. In the 1994 projections report, it was noted that Seychelles was believed to be a country of net emigration prior to the 1994 census but "may have become a country of net immigration" around the time of the 1994 Census. A major part of the uncertainty regarding migration results from the fact that people who remain in the country beyond 90 days receive resident permits but, when they leave, are treated as departing residents. It was estimated that, at the time of the 1994 Census, a net of – 48 persons emigrated from the country annually. As a result, the decision was made at the time to assume that migration in the post-1994 Census projections would be zero. These projections, in hindsight, projected a population somewhat larger than proved to be the case, but not excessively so.

The projections to be performed during the present mission had the goal of projecting each of the country's 26 districts (with Other Islands the 26th district) for 15 years and then summing to a national total. This task is considerably more complex than might at first appear. The software recommended for the mission project is the shareware package FIVFIV, software that projects a population by five-year age groups and sex for five year periods and has the ability to aggregate subnational units, such as districts, into a national total very accurately.

4. Input required from international sources:

Technical assistance, software (free), training

Action taken.

As part of mission preparation, the FIVFIV software was downloaded by Therese Gopal of NSB, installed and tested for proper operation on NSB's computers. The FIVFIV software was developed by the Population Council in the 1970s, has been enhanced with many features since that time and is a favorite among demographers. It is currently used by many countries and many state and local planning organizations. The current version runs under DOS, setting up a text file for input that is quite easy to edit. It is ideal for projects such as the current mission in that it aggregates subnational units into a national total including all demographic rates, age distributions, etc. The resulting populations by age and sex can be easily pasted into Excel for rapid production of reports and graphics such as population pyramids. The program uses the standard cohort-component method, projecting each five year age-sex group using life table survival rates, age-specific fertility rates and migrants by age and sex as specified by the user. While many initial users are surprised to see a program running under DOS, they quickly appreciate the ease with which all input data are entered into a single .txt file and how input data can be cut and pasted from one subnational unit into another. The output file is similarly contained in a single text file with results preceded by the input that the user provided. Thus, reviewing results and checking for input errors can be performed very rapidly. The software is currently maintained by HPN Technologies of Vancouver, Washington, U.S.A.

An introduction to the purpose of the mission and the software to be used was conducted on Monday, 25 August, upon arrival with the nine participants selected for training (Annex 1). Training in the use of the software was conducted continuously with Mrs. Gopal during the mission and was further demonstrated to Ms. Helena De Letourdis, Principal Statistician (Census & Surveys) on Thursday, 28 August on a one-to-one basis. It was decided that Ms. Gopal will be the person primarily responsible for the projections as the task is part of her normal duties and other participants have full schedules in their own area of responsibility.

5. Own preparation required:

Action taken:

District-level data by age and sex from the 2002 Census were e-mailed to the consultant prior to the mission, allowing some preliminary work to begin. In addition, GIS maps showing the location of

districts were sent. Population pyramids were made from the age-sex distributions for review by the consultant and NBS staff upon arrival. It was noted that the country's 87,000 population was divided into 26 districts but the districts were of reasonable size for a projection, varying from about 2,200 population to about 4,700. This early receipt of data enabled the real work on the project to begin upon arrival.

NSB identified staff to be involved in the project and training and established an initial series of two meetings to discuss mission plans and the mission purpose with staff. Arrangements were made for the needed hardware for training, such as a computer and projector, etc.

6. Output planned:

Population projections to 2015, compilations and disseminations of results

This task, i.e. the actual production of district-level population projections, occupied the majority of the mission. The task involved discussions of the selection of a base population and assumptions on fertility, mortality and migration that would actually be used to perform the projections. The third consideration, migration, and with it, consideration of the definition of the country's resident population, occupied much of the discussion.

Selection of a base population. The 2002 Census was the choice for the base population. Census populations are, of course, a customary choice when available. The projection process used in the mission projects the districts individually and then sums those units to a national total. The age-sex distributions of each district were reviewed both in tabular and population pyramid form. Since age reporting is a key concern in demography, the age distributions were inspected for evidence of such anomalies as preference for round digits such as '0' or '5' when individuals are not certain of their age ("Age heaping"). No evidence of systematic heaping could be found. This finding was not surprising as knowledge of age is excellent in Seychelles. There were some anomalies in the sex distributions and sex ratios in some districts, most of which could be attributed to small numbers while others appeared to be potential errors in census data processing. E.g., the sex ratio of males to females in Baie Lazare district in the age groups 0-4 and 5-9 were only 72 males per 100 females instead of the more normal 105 males per 100 females. Errors of this type are unusual in Seychelles census data, however. Finally, spot checks of households after the census suggested that the population undercount was approximately 2,000, or 2.4%, well within undercount levels observed in many countries. The base population was not adjusted for undercount as no information was available on undercounts by age and sex nor by individual district.

It was also decided to extend the projections from the initially planned 15 year period from the 2002 Census to 2022 since population estimates for the current year have already been published.

Fertility. Assumptions on future fertility levels are often of major importance in projecting the population of developing countries. In the case of Seychelles, however, fertility has declined to quite a low level, with a total fertility rate (TFR) of about 2.1 children per woman. The TFR, which was 2.6 at the time of the 1994 Census, declined to 2.1 in 1997 and has fluctuated between 2.0 and 2.2 since that time, up to 2007. This is a clear sign of stability as the TFR appears to have declined to a floor value and, in discussions held at NSB, it was agreed that there is no reason to expect it to decline further in the foreseeable future as has happened in many European and other industrialized countries. For that reason, a constant TFR of 2.12, the average TFR in the most recent five year period, was used for the projections.

The TFR of 2.1 is an important demographic development in Seychelles since the country has reached "replacement level fertility" so that the current TFR, if maintained, will lead to a zero population growth rate (not accounting for the effect of migration) with the annual number of births and deaths equalizing over the long term.

In addition to the overall TFR, the age pattern of fertility in the country also appears to have stabilized, although age-specific fertility rates (ASFRs) are naturally somewhat variable from year to year. Fertility below age 20 is rather high, considering that the TFR is a low 2.1, at about 65 births per 1,000 women ages 15-19. This can be compared to the United States, which has one of the highest under 20 fertility rates of the industrialized countries, 41 births per 1,000 women ages 15-19, with the same TFR as Seychelles, 2.1. Fertility peaks in the 20s and then drops off rather quickly in the 30s.

Mortality. Seychelles has achieved high, and slowly rising, life expectancy as well as a low rate of infant mortality. Life expectancy at birth in 2007 is estimated at 68.9 years for males and 77.6 for females. The Seychelles value for males is somewhat low and the male-female gap rather large, however. Life expectancy can be compared to values of 77 for males and 82 for females in Western Europe and 75 for males and 80 for females in the United States. Corresponding values for Africa as a whole are 53 for males and 55 for females. Infant mortality has achieved a very low level at about 11 infant deaths per 1,000 live births. This can be compared to a value of 3.9 in Western Europe and 6.5 in the United States. The corresponding current figure for Africa is 82.

For the projections, life expectancy at birth for males and females were projected using the logistic curve, a standard demographic method. This method assumes that, as a variable approaches an eventual high, or ceiling value, annual increases diminish. Such a pattern has been universally observed worldwide. The ceiling, or target values, were 85 for males and 90 for females. The logistic curve is produced by drawing a curve through past observations to the target values. Past estimates of life expectancy used as input were smoothed into five year moving averages to remove the considerable annual fluctuation observed. Thus, the base data used for projecting the curve began with official five year moving average life expectancies centered on 1973 and ending with 2005 and the resultant projected values were input into the projection program.

Annex 6 contains summary data on vital events in Seychelles from 1971 to 2007.

Migration. As expected, the migration assumptions required for the projections created the most difficulties. It should be pointed out at the outset that these difficulties are commonplace in most of the world's countries.

Difficulties at the national level:

1. About 20,000 – 30,000 Seychellois, many with national I.D. cards, reside abroad but often return for long or short visits.
2. When Seychellois in the diaspora visit on holiday or for other purposes, they often use the passport of their country of residence when they enter but may use their Seychelles passport when they leave. As a consequence, they are then treated statistically as departing residents, skewing data on net migration.
3. Expatriates who stay over 90 days receive I.D. cards and are counted as departing residents when they leave.
4. Misreporting of length of stay by travellers.
5. Large numbers of temporary workers enter the country for specific periods for large construction projects of hotels and resorts or projects such as the large Perseverance and Eden Island residential project on reclaimed land in Victoria. These temporary workers usually have residential villages provided for them, are supplied with their needs and utilize the services of private doctors, arranged by their employers.
6. Imported labor is also used at such facilities as Indian Ocean Tuna in Victoria harbor, the world's second largest tuna processing plant. The workers, approximately 250, are predominately females from India, Thailand and Madagascar. These workers are prohibited from becoming pregnant and are sent home in that event. As a result, they make no contribution to the national fertility level but are likely counted in the denominator of rates.
7. For the above reasons, there are significant doubts about the degree to which the National Population Database reflects the resident population of the country and the degree to which immigration data, derived from embarkation and disembarkations forms filled at the airport and at ports of entry, can adequately be used to measure net migration. In preparation for the 2010 Census, NSB plans to inquire into the precise nature of data in the National Population Database as well as figures supplied by the Immigration Division. This will be a very valuable exercise with the goal of properly identifying the actual migration of the resident population. In our discussions regarding migration, the fundamental question was first posed: is Seychelles a country of net immigration or emigration? This question was not immediately answerable for reasons given above.

8. As a consequence of the uncertain nature of national data on net migration, NSB has little choice but to use data on total arrivals and departures in producing annual estimates of migration. (see Annex 7.) The difficulty here is that rather large numbers (219,949 arrivals of long and short-term migrants, short-absence residents and 217,966 departures in 2007) must be used to produce a relatively small net balance. As a result, national net migration estimates vary over a broad range from -1,029 in 2003 to +471 in 2007. Once again, this is a situation faced by many countries, including developed countries. It was recognized that the arrival-departure method would not be satisfactory insofar as providing a basis for migration assumptions in the projection exercise. Nonetheless, an assumption on migration must be made in the projections. After continued discussion, it was agreed that Seychelles is now likely to be a country of net immigration. Two factors resulted in this conclusion. First, the expanding economy is likely to induce Seychellois living abroad to return as many are known to wish to and the economy is also likely to attract more non-Seychellois. Secondly, an increased number of foreign workers are likely to arrive for the construction of new resorts by such companies as Emirates and Qatar airlines. New islands are developed by reclaiming land from the sea and then offered for sale to resort developers, particularly from the Middle East.

Difficulties at the district level:

Given the inexact nature of data on net migration at the national level, the situation is only magnified at the district level.

1. With average population size of 3,345, ranging from 2,238 on the single-district island, La Digue to 4,674 in Anse Etoile district on the northeast coast of Mahe, any assumptions regarding migration can have a large effect on a district's population³.
2. It is not believed that there is a great deal of intra-district migration, in part a result of the small size of Mahe and a relatively high rate of home and property ownership. In the case of Seychelles, considerable importance can be attached to the experience and opinions of NSB staff since the small size of country results in unusually detailed knowledge of the districts and their residents. There is, however, some intra-district migration and the districts which do have migration effects are well known.
3. A further issue complicating district-level migration is the construction of new housing "estates," developments of modern attached housing to which residents are offered the opportunity to move. This can have quite an effect on the population of a district. For example, Les Mamelles lost population in 2002 when a new housing estate opened in Roche Caiman district. New returning university graduates often prefer to settle in the eastern district of Au Cap, Belombre and Anse Etoile because that is where the government allocates them housing.

For the migration assumption, it was agreed that it would be assumed that Seychelles is a country of net immigration. The amount of that migration was the next issue. The only rationale that could be applied was to look at the approximate rate of population growth in recent years (itself a partial result of the application of arrival-departure data as a component of growth) and compare that to the rate of natural increase (crude birth rate minus the crude death rate) which is accurately measured. It was agreed that the national growth is about 1.2 percent per year. With a rate of natural increase of 1.0 percent, the implied rate of net immigration is a positive 0.2 percent, yielding approximately 200 annual net immigration. This is the figure used in the projections at the national level.

There remained the issue of migration at the district level, a much more complex consideration. In group discussions, the rather extensive NSB staff local knowledge of population

³ The 26th district, Other Islands, with a 2002 population of 1,092, are separately administered by the **Other Islands Company**. While not a direct concern of the national government, they are included in the national population total. Examples of such islands are Aldabra, with an outpost of scientists and naturalists attending to the world's largest number of giant tortoises, Alphonse, Bird, Denis, Desroches, Farquhar, Fregate, North, Silhouette with luxury resort hotels, Coetivy with a prawn farm, and Remire, a private island with the residence of the former President, F.A. Rene.

growth, new housing construction and migration led us to designate certain districts as “in-migration” districts, others as out-migration districts and the remainder as districts with no significant net migration anticipated. It should be noted that the amount of net migration in any district is a result not only of intra-district movements but also of international migration. The following districts, all on Mahe, were identified as in-migration districts:

1. Anse Etoile
2. Au Cap
3. Belombre
4. Cascade
5. English River
6. Glacis
7. Mont Fleuri
8. Point Larue

All of these districts are located to the north of the island, relatively close to the capital, Victoria, with the exception of Cascade and Point Larue, which are themselves on the east coast with direct commuting possibilities to the capital.

The following districts, all on Mahe, were identified as out-migration districts:

1. Anse aux Pins
2. Anse Boileau
3. Anse Royale
4. Mont Buxton
5. St. Louis
6. Takamaka

Of these districts, Mont Buxton and St. Louis are physically a part of Victoria but lack unbuilt land for expansion while the others are located some distance from Victoria to the west or south and generally accessible on mountain roads. Takamaka district, in the extreme south, is largely agricultural with a high degree of owned land although some out-migration of younger residents is expected.

All other districts were designated as those of zero net migration where the movement of in-migrants and out-migrants would balance out. The eight in-migration districts were assigned a total of 50 net in-migration per year, equally divided between the sexes, while the six out-migration districts were assigned negative migration to bring the national balance to the annual assumed net value of 200.

Dissemination of Results:

Results of the projections, and the methods used to produce them, will be issued as a NSB publication, planned for November 2008. Drafts of the report will be reviewed by the consultant.

Results.

The population of Seychelles is projected to rise from about 85,000 in 2007 to about 102,000 in 2022. In the first five year period, 2002-2007, the annual rate of population growth that resulted from the projection was 1.27 percent. By 2017-2022, the rate of growth declines to 1.05 percent, a result of a slowly declining rate of natural increase. The population growth rate during the period is augmented, however, by the assumption of a small amount of net immigration and rising life expectancy at birth. Although it was expected that the results of the projections would necessarily not be the same as the annual population estimates already disseminated by the NSB, the figure for 2007 (projected from the 2002 Census) was only 1,200 higher than the official 2007 figure of 85,033, a very close result. It was subsequently necessary to adjust the projection result downward to avoid confusion among users who had already seen the official 2007 figure. A proportional adjustment was then applied to subsequent projection years. The effect was minor and the adjustment of multiple subnational unit populations to a national total is common practice.

7. Changes anticipated:

Ability to produce and publish projections at the district level

The NSB now has the ability and understanding to produce district-level population projections as needed. It was decided that the projections produced during the present mission would fill the NSB's requirements for the interim given the proximity of the 2010 Census when a re-assessment of national and district-level population size and growth may be made. The projections will be issued as a NSB publication in November 2008. The 2010 Census will be especially valuable as it is expected to be of high quality and comparable to the 2002 Census, shedding considerable light on district population growth or decline. The system of preparing for the census with detailed GIS maps should assure a very complete count.

During the mission, a session was also conducted for mission participants on demographic measures such as crude birth and death rates, calculation of population growth rates, measures of reproduction, functions of the life table, cohort-component procedures, etc. This instruction was particularly valuable since as is true in the majority of countries, statistical office staff do not have specific demographic training *per se*. NSB's need for a full-time staff demographer was expressed many times. In many countries, statistical agencies are staffed by statisticians who collect and publish statistics on a variety of subjects but do not have a staff demographer for analysis and consultation. That function is typically performed at a university population research and analysis center but, lacking such an institution, Seychelles does not have that option. An on-site staff demographer, working daily with NSB staff, is quite badly needed.

Consideration of the migration assumptions, however, raised issues that went well beyond the projections themselves. As a result of the mission, planning for the 2010 Census will now include a detailed review of the definition of the usually resident population, the population of the greatest concern to the national and district governments. Discussions, of particular interest to Mr. Padayachy, NSB CEO, were held to consider who would be considered a resident for census purposes. This will involve further study of the National Population Database and a more in-depth analysis of immigration data which are not now fully understood. Consideration will be given to defining two populations: (1) a total population that would include such groups as temporary foreign workers and (2) a usually resident population, those who make Seychelles their primary residence whether Seychellois or non-Seychellois. Such a revision would result in a *de facto* and *de jure* population figure in the 2010 Census. The *de facto* population might apply to all those with residence in Seychelles of, say, more than 90 days (after which a resident visa must be issued) or some other period, such as one year. Or, a *de facto* population might include all those living in Seychelles such as very recently arrived foreign workers but excluding tourists. The *de jure* population would include true long-term residents and, most importantly, would be the population upon which demographic measures, such as birth rates, would be based for consistency of measures and trends. The consultant pointed out that this is a common practice in other countries. Singapore, for example, defines a *resident* population of 3.6 million upon which demographic measures are based, while the total population of the country is given as 4.8 million. While the difference in Seychelles is not as dramatic, given the country's small size, groups such as temporary workers still have a large impact. One anomaly in 2002 Census data occurred in Bel Air district, which includes the port facilities of Victoria. In Bel Air, 137 males age 33 were listed in the census, an extremely large number in a district of 2,900 where 27 males age 32 and 25 males age 34 were counted. This was caused by the long-term presence of several Indonesian ships in the harbor. It appears that the captain, presumably in charge of filling the census form, simply listed many sailors as being of the same age.

8. LINKAGES WITH OTHER ACTIVITIES:

National and district projections will facilitate policy makers to make better and more informed policies. For the first time, a future population perspective has been provided for the districts of Seychelles, taking into account the effects of age-sex structure, the level of childbearing, mortality, and migration. This will enable the government, NGOs and private sectors to better integrate population issues in all their programmes, plans

and policies. The future population projections will also assist local government and MNAs at district level to better target groups of the population and assess the impact of population growth in their jurisdictions.

8. Other donors supporting topic:

None.

Consultant Recommendations:

1. In addition to annual demographic measures, rates such as the crude birth and death rate, the total fertility rate, age-specific fertility rates and life expectancy at birth should be produced in multi-year moving averages, at least three year moving averages at the national level and five year rates at the district level in order to examine trends in a more meaningful way. This is commonly done in many countries, including, e.g., India, where numbers are necessarily quite larger. For birth and death rates, such a practice is particularly desirable since vital events are shown for the year of registration rather than the year of occurrence. The product of this exercise would yield, say, a national crude birth rate for 2005-2007 with the denominator the midpoint population, 1 July, 2006, then 2006-2008, and so on. After some experimentation, an even longer period might be desirable.
2. After investigation, a new definition of the resident population should be determined for the 2010 Census that could then also be used as a basis for consistent annual population estimates thereafter.
3. If at all possible and practical, consideration should be given to including a question in the census on the number of household members who have left the country for a long period and those who have returned after a long period. This would enable the evaluation of emigration and immigration of residents apart from the system of overall arrivals and departures.
4. NSB should look into the possibility of adding a staff demographer as soon as possible during 2010 Census planning.

Annex 1.

List of Participants in GDDS2 Popn Projections Mission for Discussions or FIVFIV Training

Participants	Designation	Place of Work
Mr Jude Padayachy	CEO	National Statistics Bureau
Mrs Therese Gopal	GDDS Coordinator/GIS Manager	National Statistics Bureau
Ms Jane Victor	Senior Research Officer/GDDS Committee Member	Ministry of Health and Social Development/Social Development Division
Ms Linda Gerry	Statistical Officer/GDDS Committee Member	National Statistics Bureau
Ms Helena De Letourdis	Principal Statistician (Census& Surveys)	National Statistics Bureau
Mr Michel Mellie	Principal Statistician (Trade & Tourism)	National Statistics Bureau
Ms Josiane Marie	Statistical Officer (Tourism)	National Statistics Bureau
Mr Joachim Didon	Director of Health Information and Statistics	Ministry of Health and Social Development

Annex 2.

Pre-Mission Preparations

1. Dates of the mission were agreed to as commencing on 25 August for a two week period.
2. Ms. Gopal e-mailed district-level single year age-sex distributions to the consultant for analysis. Population pyramids were constructed for each district for visual analysis by the consultant and in Seychelles by NSB staff after arrival.
3. Ms. Gopal downloaded the FIVFIV projection package and tested it on the NSB computer system. There were no problems.
4. Ms. Gopal e-mailed the latest HIV/AIDS statistics to the consultant and also recommended that the GIS maps of the districts be downloaded by the consultant for familiarization, which was done.
5. Consultant printed out relevant demographic data from the NSB website.
6. An initial agenda was agreed upon with a meeting on the first morning with Mr. Padayachy, CEO, and with the project participants later that day. Other meetings would be held as appropriate.

Annex 3.

Meetings held

Monday, 25 August. Preliminary meeting with Mr. Jude Padayachy, NSB CEO and Mrs. Therese Gopal, GDDS2 Module Coordinator on the purpose and plans for the mission. 30 minutes.

Monday, 25 August. Meeting with project participants listed in Annex 1. The purpose of the project was described and the cohort-component method of population projections, along with the software to be used, was introduced. Population pyramids for each district were shown and discussion were held on particular age-sex features of the districts. Mr. Didon also described his annual task of preparing annual life tables.

Thursday, 28 August. An in-depth training session in the FIVFIV program and cohort-component projection assumptions was held with Ms. De Letourdis and Mrs. Gopal.

Thursday, 28 August. A meeting with was held with Mr. Mellie and Ms. Marie, with Mrs. Gopal also in attendance, to look into the nature of migration data. The difficulties of defining Seychelles as a country of net immigration or emigration was discussed in detail. After discussion, we agreed to meet again the following week after Mr. Mellie and Ms. Marie had had an opportunity to consider some of the issues.

Tuesday, 2 September. A second meeting was held with Mr. Mellie and Ms. Marie, with Mrs. Gopal in attendance, to resolve the question of migration. It was decided that existing migration data do not provide a clear basis for estimating or projecting migration. It was then agreed that using the annual population growth and rate of natural increase to produce a residual estimate of net migration would have to suffice until the results of the 2010 Census were available.

Wednesday, 3 September. A second training session on projections was held for the participants listed in Annex 1, save for Mr. Didon who was ill that day.

Thursday, 4 September. Mr. Glenn McKinlay, National Accounts Consultant and Laura Ahtime, Principal Statistician, National Accounts, asked for a meeting to inquire if there would be major changes to population estimates that would have a serious impact on national per capita measures. Mrs. Gopal and the consultant met with them and assured them that future projections were a planning exercise and there was no effect on current estimates. Only after the 2010 Census would there be an anticipated re-basing of the population, which is standard practice.

Thursday, 4 September. At Mr. Padayachy request, a class on demographic measures was held for the participants so that all would be equally familiar with measures of population change, fertility, mortality and migration. Copies of the Population Reference Bureau's *Population Handbook*, a concise textbook-type guide to population statistics and measures were distributed to all participants.

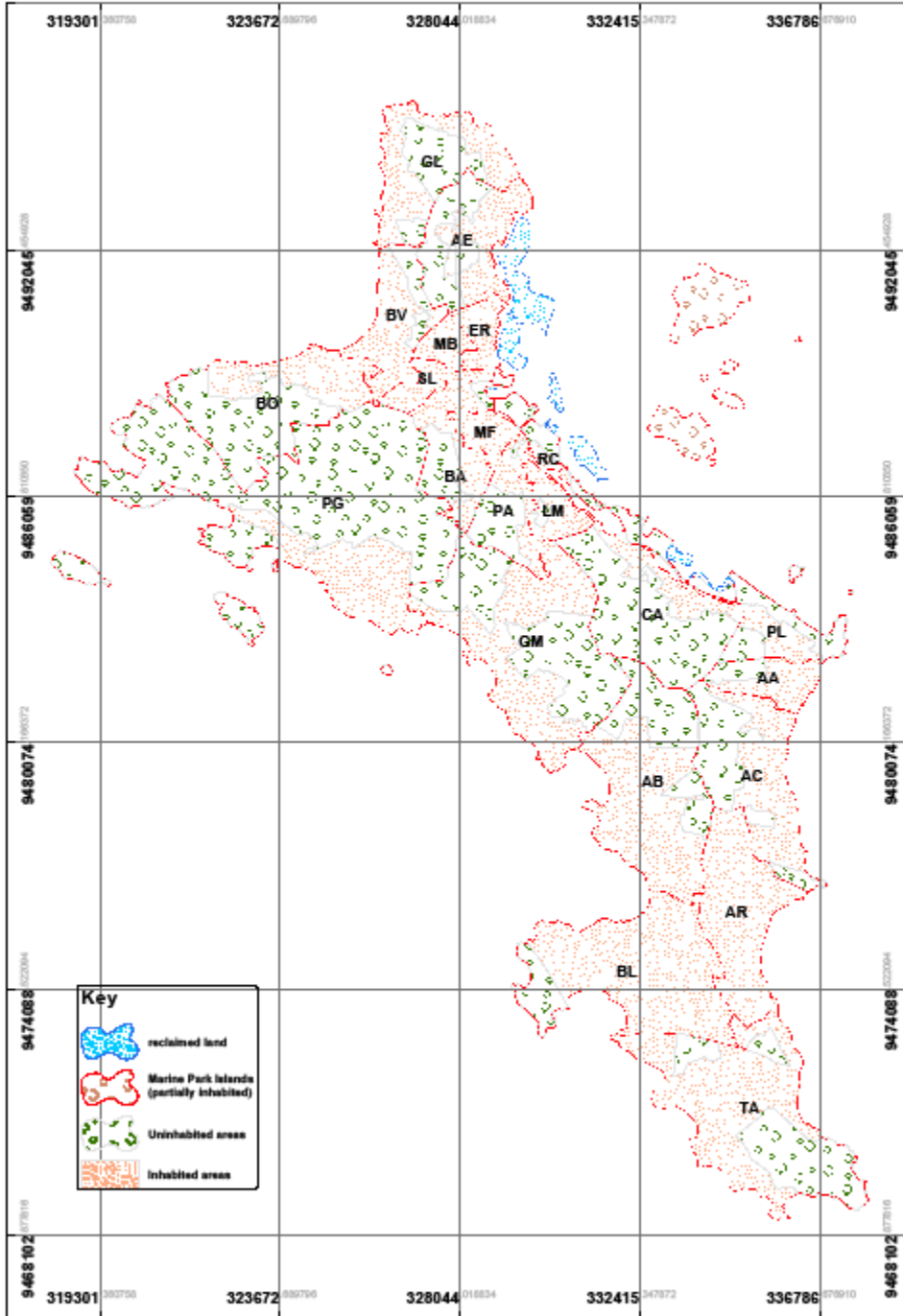
Friday, 5 September. A final meeting was held with Mr. Padayachy and Mrs. Gopal to asses the mission. Mr. Padayachy felt that the projection project had gone very well and that it filled a genuine need. He was also very keen to consider the definition of population that would be used in the upcoming census and that the timing of the mission had been most fortunate for that reason.

Annex 4.

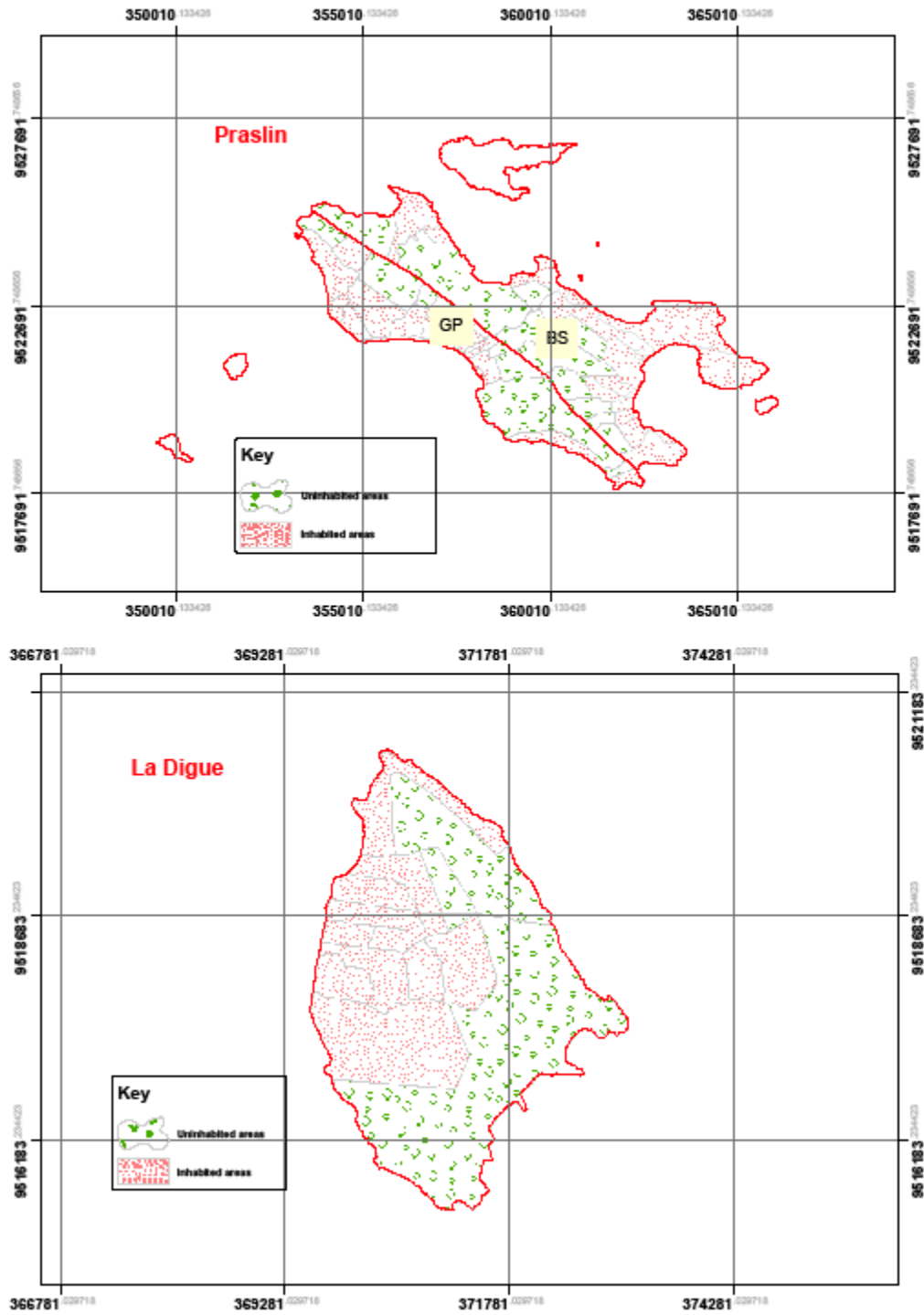
District	Code	Region	2008 Population
English River	ER	Central Mahe	3,842
Mont Buxton	MB		3,308
St Louis	SL		3,485
Bel Air	BA		3,105
Mont Fleuri	MF		3,827
Plaisance	PA		3,631
Roche Caiman	RC		2,843
Les Mamelles	LM		2,543
Cascade	CA	East Mahe	3,667
Pte Larue	PA		2,890
Anse Aux Pins	AA		3,791
Anse Royale	AR		3,922
Au Cap	AC		3,420
Takamaka	TA		2,775
Baie Lazare	BL	West Mahe	3,174
Anse Boileau	AB		4,293
Grand Anse Mahe	GM		2,759
Port Glaud	PG		2,323
Belombre	BO	North Mahe	3,852
Beau Vallon	BV		4,059
Glacis	GL		3,821
Anse Etoile	AE		4,674
Grand Anse Praslin	GP	Praslin	3,581
Baie Ste Anne	BS	Praslin	3,974
La Digue	LD	La Digue	2,238
Other islands	OS	Other islands	1,161
SEYCHELLES			86,956

Note: District populations distributed on 2008 national estimate assuming same distribution as 2002 Census

1. Inhabited and Uninhabited areas by district, Mahe



2. Inhabited and Uninhabited areas by district, Praslin and La Digue



Annex 6.

MID-YEAR POPULATION ESTIMATES, BIRTHS AND DEATHS, 1971-2007

Year	Mid-year Population	No. of Registered Births	Birth ⁽¹⁾ Rate	No. of Registered Deaths	Death ⁽¹⁾ Rate	Registered Infant Deaths	Infant ⁽²⁾ Mortality
1971	54695	1837	33.6	463	8.5	61	33.2
1972	56029	1723	30.8	529	9.4	62	36.0
1973	56892	1639	28.8	474	8.3	51	31.1
1974	57937	1860	32.1	496	8.6	73	39.2
1975	59292	1806	30.5	433	7.3	64	35.4
1976	60504	1642	27.1	466	7.7	53	32.3
1977	61786	1599	25.9	477	7.7	69	43.2
1978	62150	1796	28.9	466	7.5	47	26.2
1979	62686	1730	27.6	436	7.0	44	25.4
1980	63261	1830	28.9	444	7.0	32	17.5
1981	64035	1802	28.1	442	6.9	31	17.2
1982	64413	1552	24.1	482	7.5	30	19.3
1983	64335	1662	25.8	452	7.0	24	14.4
1984	64717	1739	26.9	487	7.5	24	13.8
1985	65244	1729	26.5	468	7.2	31	17.9
1986	65652	1722	26.2	498	7.6	31	18.0
1987 ⁽³⁾	68499	1684	24.5	505	7.4	31	18.4
1988	68755	1643	23.8	504	7.3	28	17.0
1989	69167	1600	23.0	566	8.1	29	18.1
1990	69507	1617	23.1	543	7.7	21	13.0
1991 ⁽⁴⁾	70439	1706	24.2	542	7.7	22	12.9
1992 ⁽⁵⁾	70763	1601	22.6	522	7.4	19	11.9
1993	72253	1689	23.4	597	8.3	22	13.0
1994 ⁽⁶⁾	74205	1700	22.9	562	7.6	15	8.8
1995	75304	1582	21.0	525	7.0	29	18.3
1996	76417	1611	21.1	566	7.4	15	9.3
1997	77319	1475	19.1	603	7.8	12	8.1

1998 ⁽⁷⁾	78846	1412	17.9	570	7.2	12	8.5
1999	80410	1460	18.2	560	7.0	15	10.3
2000 ⁽⁷⁾	81131	1512	18.6	553	6.8	15	9.9
2001	81202	1440	17.7	554	6.8	19	13.2
2002 ⁽⁸⁾	83723	1481	17.7	647	7.7	26	17.6
2003 ⁽⁸⁾	82781	1498	18.1	668	8.1	25	16.7
2004 ⁽⁹⁾	82475	1435	17.4	611	7.2	17	11.8
2005	82852	1536	18.5	673	8.1	16	10.4
2006	84600	1467	17.3	664	7.8	14	9.5
2007	85033	1499	17.6	630	7.4	16	10.7

Source: National Statistics Bureau/Civil Status Office

- Notes:**
- (1) Measured per thousand of mid-year population
 - (2) Deaths of infants under one year of age per 1000 live births
 - (3) The mid year population estimates for 1987-1993 have been rebased using the 1987 census data
 - (4) 2 persons aged 36 & 37 who were registered in 1991 are not included in births in this table
 - (5) 2 persons aged 27 & 50 who were registered in 1992 are not included in births in this table
 - (6) The population has been rebased using the 1994 Census results
 - (7) The population has been adjusted due to misreporting of births from Civil Status
 - (8) The original census figure has been adjusted by 2.4% to take into account undercounts
 - (9) The population has been rebased using the 2002 census results.

Annex 7.

COMPONENTS OF POPULATION CHANGE, 1992 – 2007¹

Period	Population at beginning of period	Births	Deaths	Migration	Population at end of period
Jan - June 1992	70445	741	-250	-173	70763
Jul-Dec 1992 ⁽²⁾	70763	860	-272	-25	71326
Jan - June 1993	71326	820	-331	438	72253
Jul - Dec 1993	72253	869	-266	-158	72698
Jan - June 1994	72698	883	-277	546	73850
Jul - Dec 1994 ⁽³⁾	74205	817	-285	-142	74595
Jan - June 1995	74595	782	-255	182	75304
Jul - Dec 1995	75304	800	-264	-121	75719
Jan - June 1996	75719	810	-271	159	76417
Jul- Dec 1996	76417	801	-289	-642	76287
Jan - June 1997	76287	805	-319	546	77319
Jul-Dec 1997	77319	670	-269	-137	77583
Jan - June 1998 ⁽⁴⁾	77583	748	-309	824	78846
Jul-Dec 1998	78846	664	-252	36	79294
Jan - June 1999	79294	726	-280	670	80410
Jul-Dec 1999	80410	734	-271	398	81271
Jan-June 2000 ⁽⁴⁾	81271	758	-268	-630	81131
Jul-Dec 2000	81131	754	-270	-448	81167
Jan-June 2001 ⁽⁴⁾	81167	736	-272	-429	81202
Jul-Dec 2001	81202	704	-267	-912	80727
Jan-June 2002 ⁽⁴⁾	80727	757	-348	-315	80821
Jul-Dec 2002 ⁽⁵⁾	83723	724	-287	-1984	82176
Jan-June 2003 ⁽⁶⁾	82176	771	-323	157	82781
Jul-Dec 2003	82781	727	-331	-1186	81991
Jan-June 2004	81991	748	-276	12	82475
Jul-Dec 2004	82475	687	-319	-396	82447
Jan-June 2005	82447	808	-297	-106	82852
Jul-Dec 2005	82852	728	-358	-505	82717
Jan-June 2006	82717	732	-363	1514	84600
Jul-Dec 2006	84600	735	-289	-1104	83942
Jan-June 2007	83942	767	-315	639	85033
Jul-Dec 2007	85033	732	-290	-168	85307

Source: National Statistics Bureau from information provided by Civil Status Office and Immigration Division

⁽¹⁾ From 1987-1993 the population estimates have been rebased using the 1987 census results.

⁽²⁾ 2 persons aged 27 & 50 who were registered in 1992 are not included in the births in this table

⁽³⁾ The population has been rebased using the 1994 census results

⁽⁴⁾ The population has been adjusted due to misreporting of births from Civil Status Office

⁽⁵⁾ The difference in the population at the beginning of period is due to an adjustment of the census figure by 2.4% to take into account undercounts

⁽⁶⁾ The population has been rebased using the 2002 census results

⁽⁷⁾ As from 1996 the number of deaths excludes deaths of persons not on the NPD