

Federated States of Micronesia Population Profile

DEMOGRAPHY



A GUIDE FOR PLANNERS AND POLICY MAKERS



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**FEDERATED STATES OF MICRONESIA
POPULATION PROFILE**

A guide for planners and policy-makers

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CONTENTS

Foreword	v
Summary	vii
1. Introduction	1
2. Population structure	
2.1 Size and distribution	3
2.2 Age and sex	5
2.3 Household size and composition	9
2.4 Educational characteristics	12
2.5 Economic activity	15
3. Population dynamics	
3.1 Population growth	19
3.2 Fertility	23
3.3 Mortality	28
3.4 Migration	31
3.4.1 <i>Internal migration</i>	31
3.4.2 <i>International migration</i>	34
4. Likely future developments	
4.1 The importance of population projections	37
4.2 Projection assumptions	39
4.3 Projection results	43
4.3.1 <i>Summary of results</i>	43
5. Overall implications for planners and policy-makers	47
References	53
Appendix tables	55
Glossary	67

FOREWORD

For almost 15 years, the South Pacific Commission's Demography/Population Programme has assisted Pacific Island countries and territories in the population sector. With generous assistance from UNFPA, until the end of 1992, SPC was able to provide assistance over a broad range of demographic issues and activities to its 22 Pacific Island members. Most of its activities concentrated on population censuses and surveys, covering all aspects from design, data collection, processing to analysis, including training and institutional capacity building in these areas. The SPC Population/Demography programme established a tradition of providing quality advisory services throughout the region, in a technical discipline which most Pacific Island Governments still find difficult to address due to a lack of suitably-qualified national staff.

From 1993 onwards, the main SPC Demography/Population programme emphasis has shifted from data collection/processing/demographic analysis to data utilisation, paying greater attention to the interrelationship between population and development. This new and more applied emphasis is in response to demands from our member countries and territories, acknowledging that most planners have had no formal and/or first-hand experience with population matters; therefore they were neither in a position to incorporate population considerations into development planning processes, nor to appropriately digest highly technical demographic analyses.

To redress this situation is the main objective of the SPC Integration of Population Issues into Development Planning project, which is supported through a generous multi-year financial assistance arrangement with the Australian Agency for International Development (AusAID). The project has two key components:

- to provide training for national and sectoral development planners and project economists in techniques of incorporating population considerations into national planning processes; and
- to pay greater attention to the analytical component in 'demographic analysis', and undertake more policy- and planning-relevant demographic analyses to assist member countries and territories in the formulation of their national development plans and strategy frameworks.

This report addresses the second objective, and is a first attempt to provide a brief demographic profile that is useful for planners. Unlike more traditional demographic analyses, which are usually indigestible by non-demographers, we tried to write for a non-technical audience, paying less attention to discussing

mathematically complex demographic concepts at great length, and, instead, more attention to specific implications for planners. Some key points are summarised in 'boxes' at the end of each section, and it goes without saying that these references are by no means exhaustive, but examples of some key implications.

This profile is mainly based on the results of the 1994 FSM census. This census was the first of its kind to be organised and conducted at one point in time in all of the four States of the Federated States of Micronesia. Therefore it provides valuable and comprehensive information on the different States, easily comparable between States. Previous censuses of the FSM were conducted in 1985 (Pohnpei), 1986 (Kosrae), 1987 (Yap) and 1989 (Chuuk).

This volume was prepared under the leadership of Mr Andreas Demmke, and involved all members of the South Pacific Commission's Population/Demography programme.

We also would like to extend our gratitude to Caroline Nalo, Jipé Le-Bars and Patricia Martin, for their skills and contribution in editing, artwork and layout respectively.

Gerald Haberkorn
Demographer
South Pacific Commission

SUMMARY

1994 census population	105,506
Estimated population in the year 2000 (medium-variant projection)	118,858
Annual rate of growth (1989–1994)	1.9%
Median age (1994)	17.8 years
Crude birth rate (CBR), 1989–1994	33‰
Crude death rate (CDR), 1989–1994	7‰
Net migration rate, 1989–1994	– 7‰
Annual number of births, 1989–1994	3,313
Annual number of deaths, 1989–1994	708
Annual number of net migrants, 1989–1994	– 714
Total Fertility Rate (TFR), 1993–1994	4.9
Life expectancy at birth, males, 1990–1992	64.6 years
Life expectancy at birth, females, 1990–1992	66.8 years
Infant Mortality Rate (IMR), 1990–1992	45‰
Child Mortality Rate (U5M), 1990–1992	15‰

The aim of this report is to provide a brief overview of some of the demographic features of the population of the Federated States of Micronesia (FSM). The emphasis is on identifying the key implications of observed demographic levels and trends for planners and policy makers.

The Federated States of Micronesia consists of four states (Yap, Chuuk, Pohnpei and Kosrae) and 607 islands spread over approximately a million square miles (386,190 km²) in the western Pacific Ocean, with a combined land area of 271 square miles (105 km²). In May 1979, these four island groups, then under the 'Trust Territory of the Pacific Islands', united to form the Federated States of Micronesia, which became a sovereign independent nation in 1986 under the Compact of Free Association between the FSM and the United States. This Compact will end in the year 2001.

The 1994 Census counted the population of the country at 105,506 people, with an average population density of 389 people per square mile (150/km²).

More than half (53,319) of the total population of the FSM live in the State of Chuuk, with a population density of more than 1,000 people per square mile (386/km²). One third (33,692) live in Pohnpei and the others live in the smaller States of Yap (11,178) and Kosrae (7,317).

The population of the Outer Islands living on remote atolls far from the main islands, capitals, and urban centres of the 'High Islands' of Yap proper (Colonia), Pohnpei Island (Palikir/Kolonia) and Chuuk proper (Moen), comprise about 18,000 people, 17 per cent of FSM's total population.

FSM's population has a very young age structure: 43.5 per cent were under 15 years of age and the population's median age was 18 years. The current rate of population growth has been estimated at 1.9 per cent per year. At this rate, the population is expected to double in 36 years.

15,230 households were counted, with an average of 6.8 people per household.

Fertility has decreased from a Total Fertility Rate of about 8 children per woman in 1973 to about 5 in 1994. However, the level of fertility varies considerably among States. It is lowest in Yap (3.3) and highest in Chuuk State (6.0). Pohnpeian and Kosraean fertility was about 4 children per woman.

Life expectancy at birth for males and females is estimated at about 64.6 years and 66.8 years, respectively, for the early 1990s. The Infant Mortality Rate is estimated at 45 per thousand.

Mortality levels are highest in Chuuk and Kosrae, and lowest in Yap and Pohnpei States.

Surprisingly, the observed level of mortality seems to have not improved during the entire last decade. New efforts should be made to boost community and primary health care programmes, specifically in the maternal and child health area.

International migration is an important factor in determining the size of the population in future years. The estimated net migration rate is about -0.7 per cent per annum. The main destination areas are Guam and the Commonwealth of the Northern Mariana Islands, but Hawaii and the mainland US are also countries to which people move.

In view of the termination of the Compact of Free Association with the US in the year 2001, and the anticipated cuts in funds from the US, a higher rate of

emigration might very well be possible in the future. Consequently, fluctuations in the level and pattern of international migration have implications for FSM's population developments and should be closely monitored through improved arrival and departure registration.

The population projection scenarios presented in this paper point to a growing population for the Federated States of Micronesia during the next 20 years. The medium-variant scenario of the projections points to a continuous population growth rate of 1.9 for the next 20 years and a population size of 150,000 people around the year 2012. The needs of this larger population size should be considered in future development plans.

Changes in FSM's age structure as a result of possible declining fertility will have an impact on the proportion and size of its school-age and working-age population. The changes will be reflected in a smaller proportion of those under the age of 15, and a larger working-age population (15–64 years). As a result, the dependency ratio of FSM's population will decrease.

The working-age population is expected to increase considerably, both in proportion and in absolute numbers. This obviously demands the creation of more new employment opportunities. Given the relatively low economic growth rate and an already high unemployment rate of about 16 per cent, this undertaking certainly represents one of the great challenges for the National and State governments.

The registration system of births and deaths, as well as of migration (by age and sex), needs to be improved considerably, as it suffers from severe incompleteness. A well functioning registration system, able to supply accurate and timely statistics on population developments, is of fundamental importance to planners and policy makers.

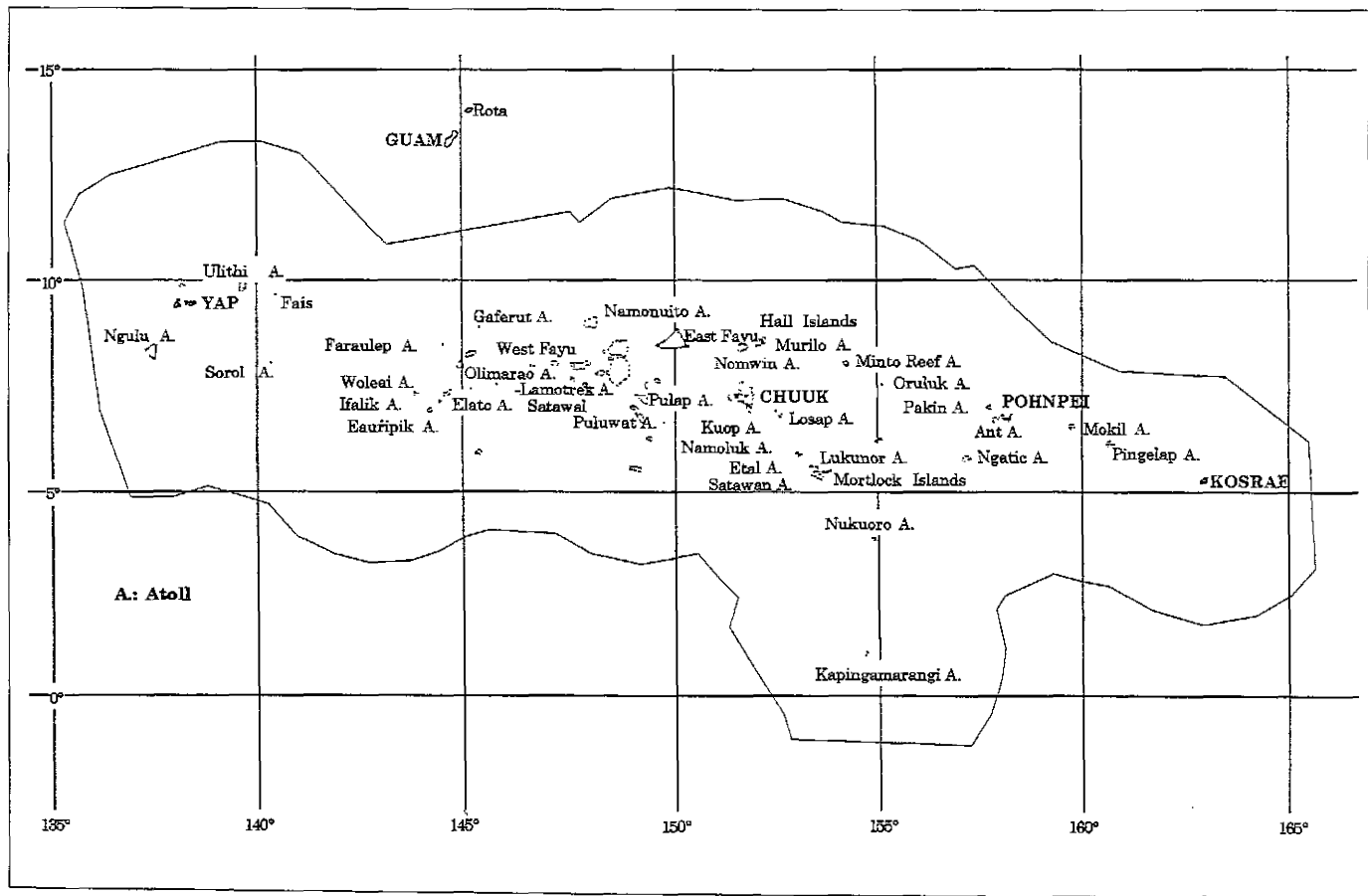
While availability of good data is one pre-condition for responsible development planning, data analysis and utilisation are of equal importance. These require adequately trained staff.

Population projections are an essential planning tool, and an improved knowledge of the interrelationship between population and development is essential to provide a firm basis for understanding and undertaking demographic projections and scenario-building.

The 1994 FSM census shows significant differences in demographic characteristics between the different States (Yap, Chuuk, Pohnpei and Kosrae). Population growth rates, levels of fertility and mortality, migration, educational and labour force characteristics vary significantly among the different States. Because of FSM's great socio-cultural, geographical and demographic diversity, social and economic development issues and priorities will be quite different from island to island: Chuuk's high population density will result in completely different policy options from those for Kosrae; and a Yapese family on the remote island of Eauripik Atoll might have completely different needs from a Pohnpeian family living in the urban centre of Kolonia. Therefore it is strongly recommended that planning and policy formulation in FSM be centralised; independent planning for each State is suggested.



X



1. INTRODUCTION

Throughout various stages of their lifetime, people have different demands on different services. Almost every aspect in life is somehow associated with age, and age 'creates' very specific demands, for example:

- young children need special health care (immunisation);
- children usually commence their formal education at around age six (schools, teachers, materials);
- young people leave their parental homes (housing);
- school-leavers search for work (employment opportunities);
- child-bearing is usually confined to women aged 15–49 (maternal and child health/family planning services);
- elderly people have special demands on health care, transport, housing, welfare, etc.

For governments to effectively cater for specific needs of different population groups, it is important that planners have a clear picture of the demographic make-up of the population. In other words: planners need to be aware of their country's population structure and population processes.

Population structure refers to population size; geographic distribution; age-sex structure; socio-economic characteristics (economic activity, educational attainment of population). *Population processes* refer to population growth; fertility; mortality; migration (including urbanisation).

Apart from playing an important role in shaping a country's economic and social development, population structure and processes can also be the direct result of development. This is quite evident in situations where policies are incorporated into development plans with the aim of altering specific population variables:

- greater budget allocation to a country's Ministry/Department of Health to expand its maternal and child health and family planning services can lead to fewer deaths of infants, children and women;
- promotion, provision and easy access of family planning services may lead through a reduced fertility rate to a lowering of the population's growth rate;

- the promotion of rural employment opportunities and accessibility of services may slow down rural–urban drift.

Accepting that population factors are important components of development, and accepting the premise that development is ultimately about people (specifically, about improving people's lives), it will be clear to everyone involved in planning and policy-making that incorporating population considerations into the planning process is at the very heart of planning and development.

The aim of this paper is twofold:

- 1) to familiarise planners and policy-makers with some of the key features of the demography of the Federated States of Micronesia; and
- 2) to discuss some of the key implications for development planning and policy.

The emphasis of the report is on providing a brief overview of some of the key implications for Federated States of Micronesia planners and policy-makers. More detailed analyses can be undertaken on any other specific sectoral issue or subject, of course, given the availability of data.

This analysis draws mainly on the following source material: 1994 FSM National Census Report and Census Tabulations; 1985 Pohnpei Census; 1986 Kosrae Census; 1987 Yap Census; and 1989 Chuuk Census.

2. POPULATION STRUCTURE

2.1 Size and distribution

A population has major implications for planning decisions as both consumers and producers of goods and services. Population factors such as size and growth play an important role in determining overall development objectives. Therefore, plans regarding production, consumption, investment, distribution, education, health, housing, the environment and so forth need to be closely connected with population factors.

The Federated States of Micronesia (FSM) consist of four States: Chuuk, Kosrae, Pohnpei and Yap. The population is distributed over a vast area of Pacific Ocean of approximately one million square miles, comparable to the size of the USA. The population of the FSM is not only geographical and very dispersed; it is also ethnically and culturally diverse: each FSM state has its own language and several dialects are spoken.

The 1994 Census enumerated a total resident population of 105,506 persons. The distribution of the population between the States is as follows: more than half of the population live in the State of Chuuk, about one third live in Pohnpei State, and the others live in the smaller States of Yap and Kosrae (Table 1).

Table 1: Population distribution by States, 1994 Census

State	1994 population	Per cent	Land area (square miles)	Population density per square mile
FSM	105,506	100.0	271	389
Chuuk	53,319	50.5	49	1,088
Pohnpei	33,692	31.9	132	255
Yap	11,178	10.6	46	243
Kosrae	7,317	6.9	43	170

Source: 1994 FSM Census.

Table 1 also shows the population density, the number of people per one square mile of land. The average population density of the FSM is 390 people per square mile (150/km²). In Chuuk it is more than four times that of the States

2.2 Age and sex

Development and planning objectives are often formulated with respect to population groups whose characteristics are usually associated with age—such as infants, children and adolescents, pregnant women, workers, students, elderly persons and so forth. Therefore, the age distribution of a country's population is a very important consideration in planning.

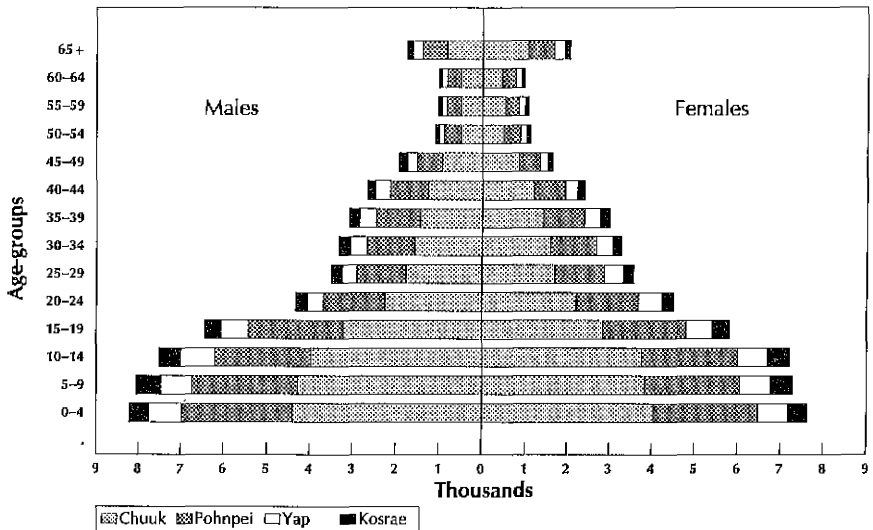


Figure 1: Age-sex structure of the population, 1994 census

As can be seen from Figure 1 and Appendix Table 1, FSM has a very young population, 43.5 per cent were under the age of 15 and 2 out of 3 were under 25 years of age in 1994, with a median age of 18 years. This is the result of persistent high fertility over the past years.

Birth cohorts (the number of births in a given period, for example during one year or five years), form the basis of a population pyramid. If there is a trend to emigration, as is the case in the FSM, the population pyramid shows a sharp indent at ages 15 and over, since these are usually the people who go overseas for educational or employment opportunities. This development is visualised with the help of the pyramid by comparing the relative 'shortness', or small size, of the age-groups 15-19 and 20-24 with the wide base of the age-groups 0-14.

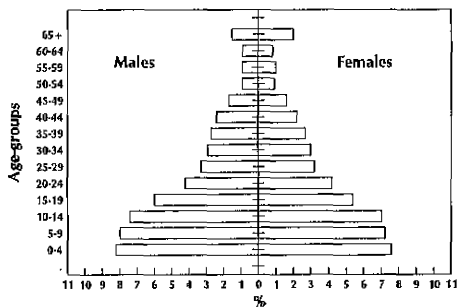


Figure 2: Age-sex structure of the Chuuk population, 1994

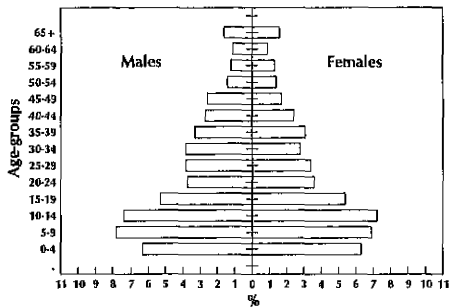


Figure 3: Age-sex structure of the Kosrae population, 1994

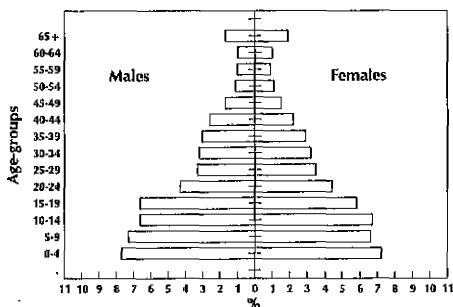


Figure 4: Age-sex structure of the Pohnpei population, 1994

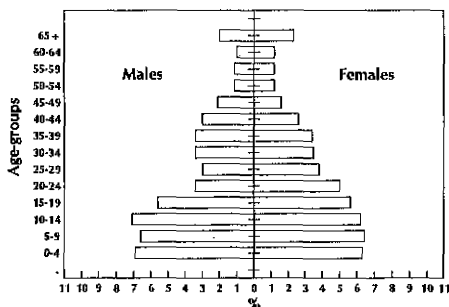


Figure 5: Age-sex structure of the Yap population, 1994

Figures 2–5 show the population pyramids of the four FSM States. It becomes immediately clear that the population structures of the different States vary significantly.

The wide base of the Chuukese population pyramid suggests a continuing high level of fertility, while the abrupt narrowing of the base of the Kosraean population pyramid points to a recent sharp fertility decline. The sudden indent of the Kosraean population aged 15 and above is certainly the result of increased net out-migration for educational and employment opportunities.

The longer bars of the Yapese female population aged 20–29 years of age, relative to their male counterparts, suggest sex-selective migration at these ages, either net male out-migration or net female in-migration. In Yap it might be the

result of predominantly female immigration for the garment factories. The relatively wide bar of the Pohnpeian 15–19 year age-group might be a reflection of the influx of young people for educational purposes (CCM).

A common way to describe a population's age structure is via the *dependency ratio*, which describes the proportion of a country's population that is economically dependent on the economically active population. The dependent ages are usually defined as 15 and younger and 64 and older. FSM's dependency ratio declined from 102 in 1973 to 89 in 1994, which means that for every 100 persons in the working ages, there were 89 in the dependent ages under 15 and over 64.

The higher the dependency ratio, the higher the number of people who need to be cared for by the working-age population (and from this group, only those who actually work and earn a living). In this regard it is a positive development that the dependency ratio in future years is expected to decline under all projection scenarios. The dependency ratio would be lowest if fertility declines fast. Fewer numbers of births lead to a proportional decrease of the population younger than 15 years compared to the working-age population.

The trends and composition of international migration have also affected the age structure of the Micronesian population. The effect of international migration can be seen on the smaller-than-expected size of the age-groups 20 to 29 in the 1994 Census (Figure 1 and Appendix Table 1). This is the result of young people going overseas for higher education, work or other purposes.

The distribution of males and females was fairly even in 1994; the national sex ratio of 105 means that there were 105 males for every 100 females. Sex ratio at birth is generally around 105, which in the FSM is fairly consistent with a sex ratio of the 0–4-year age-group of 107 and also with the registered numbers of birth by sex for the years 1993–94. In general, sex ratios tend to decline by age, reflecting higher mortality of males. Such a trend becomes clear for the population aged 60 years and over, when the sex ratios decline from 105 at ages 60–64 to 78 for the age-groups 75 and older. The relatively erratic sex ratios for the other age groups of FSM's population have to be explained by sex- and age-selective migration.

DEMOGRAPHIC TRENDS

A country's age structure has significant implications for all its developmental policies and programmes, as people have different demands and different services throughout their lives. For example:

- the number of young children and young adults affects the need for educational and health programmes;
- the age of the primary school-age population, and the 15-64 age group, determines the demand for primary education, health, employment, housing, transport;
- housing policies are dependent on the number of elderly people;
- transport policies depend on the size of the working age population;
- the number of the young age population is important for organization of leisure activities, sports and other activities.

2.3 Household size and composition

Knowledge about household and family characteristics is of fundamental importance for planning and policy purposes, because of its impact on demands for housing and on different types, quantities and qualities of dwellings and accommodation needed.

The different demands for housing are also closely linked to demands for land allocation, energy and water consumption, waste disposal and sewage connections, telephones and general infrastructure.

The size and composition of a household depend mainly on the socio-economic and cultural factors of a country and are shaped mainly by the structure of the families (whether nuclear or extended), but also by the age of young people leaving their parents' house in order to form their own household and whether they do this with or without family (single household, couples with/without children).

The housing market (availability and costs of suitable housing) and the availability of land to build upon also have a big impact on the composition of the household.

In 1994, the population of the Federated States of Micronesia consisted of 15,230 private households, with an average of 6.8 persons per household; this figure was 7.2 in 1973.

95 per cent of all households are family households. A family comprises at least two persons related to each other by birth, marriage or adoption. The average family size has decreased only slightly, from 7.3 persons per family in 1973 to 7.1 in 1994.

Almost two per cent of the total FSM population were not living in households. They were living in so called *group quarters* or *institutions* such as school dormitories and workers' quarters or were in hospitals or prisons at the time of the census enumeration.

As shown in Table 2, there are marked differences in household size in the different States. While Yap has on average only 5.5 persons living in a household, Chuuk households contain on the average 2 persons more (7.5). Kosrae also has more than 7 persons living in a household (7.2), while a Pohnpeian household consists of only 6.3 people. These differences are largely due to a difference in the number of children per household, with 60 per cent of Chuuk household membership comprising children, compared to just 45 per cent in the case of Yapese households.

Table 2: Household size and composition by State, FSM, 1994

	No. of households	Persons per household	Household head	Relationship (%)				Total percent
				Spouse	Children (own/adopted)	Other relatives	Non-relatives	
FSM	15,230	6.8	15	11	55 (89/11)	18	1	100
Yap	1,925	5.5	18	12	45 (85/15)	23	1	100
Chuuk	7,043	7.5	13	10	60 (90/10)	17	0	100
Pohnpei	5,298	6.3	16	12	52 (89/11)	19	1	100
Kosrae	964	7.2	14	12	57 (85/15)	17	1	100

Source: 1994 FSM Census.

16 per cent of all FSM households were headed by a female householder, and this was also the case in Pohnpei and Chuuk State. In Yap, however, almost a quarter (23%) of all households were headed by a woman, whereas in Kosrae there were only 12 per cent female-headed households.

Table 2 indicates the importance of the extended family structure in the Federated States of Micronesia. On average about 18 per cent of the household members are 'other relatives', people other than husband, wife and their children who are not part of the so-called nuclear family; on Yap, 23 per cent of all household members belong to this category. This proportion has decreased from 27 per cent in 1973, which suggests that household composition has shifted to a more Westernised and nuclear family structure.

Single-adult households and households embodying only strictly nuclear families reflect such developments. About 22 per cent of all households are without a spouse (single-person households or households headed by a never-married, divorced, separated or widowed person).

Adoption is very common in the FSM. About 11 per cent of all children in FSM households are adopted. On the outer islands of Yap, up to 25 per cent of all children in households are adopted. This emphasises the importance of the practise of adoption in Micronesian society.

Water and energy resources

Planners and policy-makers also need to take account of the growth in household size and composition, and their impact on different demands for heating and cooling. In order to be able to supply the appropriate quality and quantity of housing units, the planning process concerning an estate takes account of the land, drainage, sewage and water consumption, reuse of water, energy conservation and general infrastructure.

It is not merely the growth of the population which contributes to an increased demand for water and energy usage. An increase in the number of households will also increase demand. Presently, the Council is faced with an any significant growth of the population, although a decrease in the average household size has led to a trend towards a more nuclear family structure.

Households and families who are not economically capable of securing appropriate health facilities might need the assistance of the government, these facilities being arrangements which are linked to the long run strategy. In housing arrangements, the conditions should be of such a nature as to allow water supply and drainage systems to be installed, and to have a sufficient capacity to handle a safe sewage treatment which is capable of withstanding regular variations in the amount of average energy.

2.4 Educational characteristics

Educational attainment has clearly improved since 1980. In 1994 a much higher percentage of the population aged 25 and over had had an education higher than elementary school than in 1980 (Appendix Table 2). Only 25 per cent had had an education higher than elementary schooling in 1980; this has now increased to 47 per cent. While this positive trend can be observed for both sexes, the percentage of males who had had post-elementary education was still significantly greater than that of females. Despite this positive development, a very high percentage (23 per cent) of the FSM population older than 25 years has still had no formal education. However, these people are probably the same as those recorded in 1980: elderly people who never attended school at all during their childhood.

19 per cent of males and 27 per cent of females over 25 years and of age have had no formal education. While the majority of males (57 per cent) had an education higher than elementary schooling, this was only the case for 37 per cent of females. The percentage of people having had at least some college education was 25 and 11 per cent for males and females, respectively.

Educational attainment shows some marked differences for the different States (Appendix Table 3). The proportion with no formal education was lowest in Kosrae (10%) and Yap (17%) and highest in Chuuk (25%) and Pohnpei (24%). Kosrae and Yap also have the highest percentage of its population with at least high school education, 61 and 57 per cent respectively of their population aged 25 years and older. This proportion was considerable lower in Pohnpei (41%) and Chuuk (46%).

Data on educational attainment mainly show developments of the past and it is therefore of more importance to take a look at data on school enrolment, which show the most recent developments concerning educational characteristics.

The 1994 FSM Census data on school enrolment (Table 3 and Appendix table 4) show, that about 16 per cent of children aged 6–9 are not enrolled in schools. At primary and secondary level, enrolment rates for females are generally equal to or higher than those for males, yet at tertiary level, females lag behind males.

As can be seen from data on age-specific enrolment rates by State, the pattern of a rather low enrolment rate for the 6–9-year-olds and declining enrolment rates at secondary and tertiary levels are quite similar in all the States of the FSM, although enrolment rates are lowest in Chuuk and highest in Yap.

Due to the lack of access to high school and university education, the enrolment rate decreases drastically after the age of 15 years of age, with the only college in the FSM, the Community College of Micronesia (CCM), located in Pohnpei.

Table 3: School enrolment rates by age-group and State and sex/gender, 1994
(As percentage of total number of people per age-group)

Age-group	Grade	FSM			Yap	Chuuk	Pohnpei	Kosrae
		Males	Females	Total				
6-9	1-4	84	85	84	92	81	85	94
10-13	5-8	88	89	89	95	84	94	94
14-17	9-12	67	68	68	78	64	69	73
18-21	Tertiary	28	25	27	27	26	28	18

Source: 1994 FSM census results.

Note: As enrolment rates are given by age, it is possible that some pupils of certain ages are actually enrolled one or even two grades lower than the grades they are expected to be in. For example, some of the 18- and 19-year-old students are still enrolled in high school, rather than university.

Health care cost forecast

Changes in spending by different age groups of the population are being followed in a study by David C. Hurd, a senior health economist at the U.S. Social Security Administration, in the use of health care. Hurd says that in 1994 a young age group, the so-called population 18 to 24, is expected to fall 2.5% to 2.6% over 2014. According to the Social Security Administration, the number of people aged 65 and older is expected to rise 10.5% over the same period, and the number of people aged 75 and older is expected to rise 13.5% over the same period.

The largest 14-year cohort is expected to be age 65 to 74, with a projected population of about 10.4 million in 2014. Hurd says that the number of people aged 65 and older is expected to rise 10.5% over the same period, and the number of people aged 75 and older is expected to rise 13.5% over the same period.

Other projections of future spending on health care are also being followed in a study by Hurd. Hurd says that the number of people aged 65 and older is expected to rise 10.5% over the same period, and the number of people aged 75 and older is expected to rise 13.5% over the same period.

2.5 Economic activity

The term 'economically active' refers to people who were either employed at the time of the census, or actively looking for employment. In other words, it refers to a country's labour force. 44 per cent of FSM's total population aged 15 years and over were economically active in 1994 (Table 4). This means that the remaining 56 per cent of the working-age population were not in the labour force. This category consists of people involved in housework, those who were not engaged in subsistence activities, students, the sick and disabled and those persons who did not actively seek employment but could have taken a job if one had been offered to them (10 per cent of the population older than 15 years of age fell into the last category!).

Although the working-age population is usually defined as people between the ages of 15 and 64, it must be noted that in the FSM, 15 per cent of the population aged 65 and older were still economically active in 1994, and 11 per cent of persons aged 75 years and older were still working. Because of this the entire population older than 15 years of age is defined in this report as being of working age, in line with the definition used in the National Census Report tabulations.

Of the economically active population, about 61 per cent were employed in the cash economy at the time of the census, 23 per cent were engaged in subsistence activities (fishing or agriculture) and 16 per cent were unemployed at the time of the census.

These figures indicate an employment–population ratio of 37 per cent, defined as the number of employed persons aged 15 years and over to the total population of the same age.

In Yap exactly half the working-age population was employed, while this was the case for only just over 30 per cent of the Chuukese working-age population. The employment–population ratios were around 40 per cent in Pohnpei and Kosrae. The same trend can be observed if the labour force participation rates, which include unemployed persons, are compared. Labour force participation rates were highest in Yap (55%) and lowest in Chuuk (38%). This corresponds to the unemployment rates, which were lowest in Yap (10%) and highest in Chuuk (20%).

Kosrae, with 80 per cent, had the highest percentage of its work force employed in the formal sector (the cash economy). This percentage was lowest in Chuuk, with only 52 per cent involved in the cash economy. In Yap 57 per cent and in Pohnpei 70 per cent were in the cash economy.

Table 4: Labour force characteristics by State, 1994

	FSM		Total	Yap	Chuuk	Pohnpei	Kosrae
	Males	Females					
Persons aged 15 years and older	30,127	29,446	59,573	6,754	29,068	19,500	4,251
Labour force participation rate (%)	57	30	44	55	38	46	49
Percentage of labour force in cash economy	66	52	61	57	52	70	80
Percentage of labour force in subsistence	23	21	23	33	28	16	5
Percentage of labour force unemployed	11	27	16	10	20	15	15
Total labour force	100	100	100	100	100	100	100
Employment-population ratio	51	22	37	50	31	40	42

Source: 1994 FSM Census.

A comparison of the proportions of the labour forces of the four States involved in subsistence activities, shows that Yap had the highest percentage (33%), while in Kosrae only 5 per cent of the labour force were involved in subsistence work. The percentages were 28 and 16 for Chuuk and Pohnpei, respectively.

Significant differences exist between male and female participation in the labour force. 66 per cent of all persons in the labour force were men, compared to 34 per cent women. Looking at the employment-population ratio, 51 per cent of all men aged 15 years and older were employed, compared to only 22 per cent of women, which corresponds to 57 and 30 per cent labour force participation rates for males and females, respectively. 11 per cent of men in the labour force were unemployed compared to 27 per cent female unemployment. Women therefore not only have a much lower labour force participation rate, but of the relatively few in the labour force, more than a quarter are unable to find a job.

At this point it should be mentioned that the definition of 'economic activity' does not include household work, which is mainly done by women. 75 per cent of all women not in the labour force do exactly this. Therefore the numbers given above should be used with care. Economic activity does, however, include subsistence activities, which employ 21 per cent of FSM women.

IMPACTS OF THE 1988 CONSTITUTION

- As stated in the 1988 National Council Report, 'The established differences between the States with regard to the employment situation, labour force participation rates, unemployment rates, gross fixed capital formation, etc. are by and large the result of independent planning for each State.
- With female labour force rates between 40 and 50 per cent, female labour force participation rates are probably much lower than would be expected to achieve the gender equality goal, as well as hindering the specific development needs of women.
- Projections made presented in Section 4 indicate that the working age population will increase constantly during the next 20 years. While present estimates indicate population growth rates, the labour force could increase from 26,000 people in 1988 to over 57,000 people in the year 2008. The inclusion of new employment opportunities for these additional people will create a major challenge for all national and local labour agencies and the government.
- As the labour force characteristics of the states are quite different, each state has developed future objectives in the working age population which will affect the labour force and the unemployment situation of each state will also be different. As a result, future projections of the working age labour force in development of the past 10 years, that in 1988 and 1990 were 24,000 people and 27,000 people respectively, will also be different. Such a projection is a result of independent planning by each specific economic organization.

3. POPULATION DYNAMICS

3.1 Population growth

There are two ways for demographers to describe population growth. We speak of *natural increase*, when describing population increase as the result of births and deaths only. Growth occurs when the number of births in a given time period (such as a calendar year) exceeds the number of deaths. Negative growth, or population decline, occurs when the number of deaths exceeds the number of births. In other words:

$$\text{Natural increase} = \text{births} - \text{deaths}$$

Throughout the world and throughout time, population growth is and has been shaped by a further component: migration. In most countries, and particularly in many island countries of the Pacific, migration is a major contributing factor to a country's population dynamic. In such circumstances we cannot only look at natural increase. Overall population growth defines the change in a country's population as the result of births, deaths and migration. Migrants are those people who come into the country in order to settle or seek residency (whether or not permanent), the immigrants, and those who leave the country to seek residency (permanent or not) in a foreign country, the emigrants.

The term 'net migration' refers to the sum of the immigrants minus the emigrants.

This relationship is readily summarised in what is commonly referred to as the 'balancing equation':

$$\text{Population growth} = \text{natural increase} + \text{net migration (immigration} - \text{emigration)}$$

The most basic demographic measures referring to births and deaths are the Crude Birth Rate (CBR) and Crude Death Rate (CDR). They refer to the number of births and deaths in a given year for each 1,000 people. A average CBR of 33 for the Federated States of Micronesia during the period 1989–1994 means that during those years, there were on average about 33 births for every 1,000 people. A average CDR of 7 for the same period means that there were on average about 7 deaths per 1000 people.

By subtracting the CDR from the CBR, we obtain the *rate of natural increase or natural growth rate*, as stated above:

$$\text{CBR}(33) - \text{CDR}(7) = 26 \text{ (per thousand),}$$

expressed in a more frequently used percentage term: 2.6 per cent.

Compared to this high rate of natural increase, the average annual population growth rate for the Federated States of Micronesia between 1989 and 1994 was calculated at around 1.9 per cent. The difference between the average annual growth rate (1.9 %) and the natural increase (2.6%) indicates the magnitude of net migration:

$$\text{Overall growth rate (1.9) - natural growth rate (2.6) = -0.7}$$

A net migration rate of -0.7 per cent per annum for the Federated States of Micronesia means that 7 out of 1000 people are leaving the country annually, which is about 700 people a year. This indirect estimation of the volume of the net international migration, though very crude, signifies the relative importance of overseas migration to the demography of FSM. In the absence of international migration, the population would grow by its rate of natural increase (2.6%), and the population would double in 27 years. Should the annual growth rate of 1.9 per cent persist into the future (including a rate of -0.7% net migration), the Federated States of Micronesia's population would double in about 36 years time.

Considerable differences in growth rate prevail between the different FSM States. Population growth was fastest in Chuuk, with 2.2 per cent annual growth. Pohnpei State had a growth rate of 1.8 per cent and Kosrae and Yap about 1.3 per cent per year.

The estimated average annual growth rate of 1.9 per cent during 1989-1994, implied from the 1994 FSM Census, is twice as high as the estimated average annual rate of 0.96 per cent incorporated in the Federated States of Micronesia's Second National Development Plan for the years 1992-1996. It appears that the magnitude of emigration from FSM (-2 per cent per year) was over-estimated in the Second Development Plan.

It is unlikely that there will be a decrease of the overall population growth rate in the near future even if the level of fertility decreases, and the population of the FSM is likely to pass the 150,000 mark by about the year 2012. The reason

for this continuing stable growth rate, despite decreasing fertility rates, has to be explained by the so-called 'Population Momentum':

Population growth has a built-in tendency to continue even after birth rates have declined. Due to high fertility in the past, the population has a young age structure (see Section 2.1), with a high proportion of children and adolescents. These young people, who are already born, outnumber their parents, and when they reach adulthood during the next 15 years or so, the number of potential parents will be much higher than at present. Even if these new parents have fewer children on average than parents today, the fact that the total number of couples will be higher than in the past will result in continued population growth, and it will take many more years before it levels off.

The University of Chicago is a private, non-profit institution of higher learning, organized under the laws of the State of Illinois. It is a corporation with a board of trustees, and its assets are held in trust for the benefit of the students and faculty. The University is committed to the highest standards of academic excellence and to the advancement of knowledge in all fields of inquiry. It is a place where the pursuit of truth is the paramount concern, and where the intellectual and personal growth of each individual is the primary goal. The University is open to all who are capable of the highest scholarship, and it is proud to be a part of the great tradition of American higher education.

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3.2 Fertility

Fertility refers to the reproductive behaviour of a population, relating to the number of live births a woman has had. The fertility of a population depends on various factors:

- demographic composition of the population (this refers particularly to number and age of women; populations without many women, particularly women in child-bearing ages, will have fewer births than a population with a large number of women in child-bearing ages);
- fecundity (biological/physiological ability to reproduce);
- age at cohabitation/marriage (as child-bearing, in most countries, is usually closely linked to marriage or cohabitation, the age when men and women begin to live together has an obvious bearing on fertility);
- availability and use of family planning (populations that have access to, and regularly use, family planning methods have lower fertility rates than those where access is limited or denied, thus interfering with regular/efficient use);
- psycho-social and cultural context (this includes practices such as post-partum abstinence and breastfeeding, as well as value/belief systems concerning concepts of ideal family size, and the perceived 'value' of children);
- economic development;
- status of women (place in society, level of education, work status; based on world-wide empirical evidence, we know that higher levels of female education, and access to economic opportunities outside the household, are related to lower fertility and smaller families).

Fertility is, besides migration, the demographic component which has the biggest impact on a country's age–sex composition, as the composition and size of different age-groups depend largely on birth rates. Populations become older with falling birth rates, since these reduce the proportion of children.

The demographic indicator most commonly used to describe a country's fertility situation is called the *Total Fertility Rate* (TFR). This measure basically tells us how many children a woman gives birth to, on average, during her reproductive life (15–49 years of age). It is calculated from the number of live births by age of women in a given year, the *Age-Specific Fertility Rates* (ASFRs). Data needed are the total number of births by age of women in a given time interval (usually a calendar year) and the total number of women in each age-group. Data usually

come from vital and civil registration systems. Where such information is not available or considered incomplete or untimely, we rely on censuses and/or specific surveys.

The number of live births from 1986 to 1995 registered by the Department of Health were examined. If these data are compared with data collected during the 1994 Census on the number of children ever born to women aged 15 to 49, the number of births during the year prior to the census, and the number of children counted aged under one year, it becomes evident that birth registration data suffer from under-registration of at least 20 per cent.

The number of registered births by women aged 15–30 exceeds the numbers of children born in the year prior to the 1994 census (Appendix Table 5). This points to an under-count of births in the census and at the same time to an under-count of children aged less than one year in the census. On the other hand, a comparison of the numbers of children born to women older than 30 years of age shows that the number of enumerated children born during the year before the census is considerably larger than the number registered. This pattern holds also true when the census data are adjusted by half a year to make them comparable to the registration time-period.

Because of this, indirect techniques need to be used to measure the level and pattern of fertility in the FSM, as it seems that both the reported number of births in the census and the registered number of births are incomplete.

Based on the estimated ASFRs, the Total Fertility Rate (TFR) for the Federated States of Micronesia was estimated to be 4.9 (Table 5). This estimated level is somewhat higher than the estimate used in the National Census Report, which calculated a TFR of 4.6. The difference is the result of the different use of data and method. While the 1994 census analysis (FSM, 1996) used only the 1994 census data for the whole of the FSM, this report is based on data on children ever born and children born during the twelve months before the censuses for two points in time for each State (1985 Pohnpei census, 1986 Kosrae census, 1987 Yap census, 1989 Chuuk census and 1994 FSM Census). Furthermore, the 1994 census analysis used the Trussell variant of Brass's P/F ratio method, while this profile used Arriaga's approach to Brass's P/F Ratio method because it accounts for a possible fertility change during time.

The results are summarised in Table 5 and Appendix Tables 6a and b.

TFR has declined by about 3 children during the last 20 years, from around 8 in 1973 (1973 TTPI Census) to around 4.9 in 1994. According to the estimated Age-Specific Fertility Rates from the 1994 Census data, the average Micronesian woman gives birth to almost 5 children during her entire reproductive life.

Table 5: Adjusted Age-Specific Fertility Rates, Total Fertility Rates and mean age at childbearing (MAC) by States, 1994

Age-group	FSM	Yap	Chuuk	Pohnpei	Kosrae
15-19	0.062	0.074	0.044	0.087	0.055
20-24	0.191	0.139	0.190	0.211	0.189
25-29	0.230	0.152	0.276	0.197	0.201
30-34	0.214	0.161	0.279	0.149	0.157
35-39	0.159	0.108	0.219	0.105	0.095
40-44	0.095	0.018	0.154	0.039	0.064
45-49	0.029	0.018	0.044	0.009	0.025
TFR	4.90	3.35	6.02	3.97	3.93
MAC	30.7	29.1	32.0	28.3	29.7

Source: 1994 FSM Census.

The mean age at childbearing (the average age at which a woman bears a child) was 30.7 years.

Fertility varies widely between the different States. The TFR was lowest in Yap (3.34) and highest in Chuuk (6.0). In Pohnpei and Kosrae it was estimated at about 4 children per woman. As can be seen from the ASFRs and the mean age at childbearing (Table 5), the fertility patterns (the age of childbearing) also vary by State. Childbearing in the FSM affects younger women in Pohnpei (28.3 years) than in all other States; the oldest mean age at childbearing, 32 years, is found in Chuuk.

The childbearing schedule can best be studied by comparing the ASFRs of the different States. The most fertile age-groups are the 20-24-year-old women in Pohnpei, the 25-29-year-old women in Kosrae and the 30-34-year-old women in Yap and Chuuk. In Pohnpei, women bear children at younger ages than in all other States. Women aged 15-19 years of age bear twice as many children as Chuukese women of the same age. Childbearing in Chuuk takes place at a considerably older age than in all other States. Women continue to bear children at ages 35 and older.

According to data provided by the Department of Health in 1993, about 28 in 100 currently married women used contraceptives. The figure for 1989 was 23.2 per cent. Although the contraceptive prevalence rate seems to be on the rise, it is still very low.

For 1994, age at first marriage has been calculated at 27 years for males and 24 years for females, an increase of about 3 years for both sexes since 1973. Although age at first marriage is frequently used as a determinant of fertility by demographers world-wide, some caution is advised when using this concept uncritically in a country like the FSM where childbirth is not as directly linked to marriage as in countries where the method was first developed. This may be illustrated by the fact that the mean age at marriage, as stated in the National Census report, was highest in Chuuk, where the level of fertility is by far the highest in the FSM. Normally, demographers associate an older age at marriage with low or decreasing fertility rates.

The decline in fertility during the last 20 years could be explained by a combination of several factors: educational improvements, especially for women; higher participation rates of women in the work force; possibly changing attitudes in favour of smaller families; a slight increase in the contraceptive prevalence rate; and possibly also an increase in the mean age at marriage.

3.3 Mortality

The *mortality* of a population depends on various factors, including:

- demographic composition of the population (age and sex distribution);
- health and medical services (immunisation programmes, maternal and child health care, primary health care);
- environmental conditions and availability of infrastructure such as housing, water supply, sanitation, waste disposal;
- exposure to risk factors, such as substance abuse (alcohol, tobacco);
- occupational hazards (work-related stress and danger);
- exposure to events outside individual control (natural disasters, war);
- social class.

Death registration data from the Department of Health were examined in order to produce direct estimates of mortality. Unfortunately, the data—compared with the 1994 Census results—appear to suffer from severe under-registration and are less than 65 per cent complete. The registered Infant Mortality Rate (IMR) for the years 1989 to 1994 was 19 per 1000 live births, compared to the estimated 45 from the census data.

Therefore, we have to rely on indirect estimation methods to provide mortality indicators from the 1994 Census returns. A life table was computed using the census data on children ever born and children surviving, classified by age of mother. These data are used to determine probabilities of surviving at specific ages, which are fitted to a model life table using the UN's software package Mortpak Lite. The results are presented in Table 6 and the complete life tables for males and females are presented in Appendix Tables 7a and b.

Table 6: Life Expectancy at birth (E(0)), Infant Mortality Rate (IMR) and Child Mortality Rate (1Q5)*

	FSM		Kosrae		Pohnpei		Chuuk		Yap	
	M	F	M	F	M	F	M	F	M	F
IMR (‰)	49	41	40	50	50	29	53	52	39	32
1Q5 (‰)	17	13	12	18	18	7	18	18	11	8
E (0)	64.6	66.8	66.9	64.5	64.2	69.9	63.9	64.2	67.3	69.0

* Based on 1994 census data on children ever born/children surviving and an implied West Pattern of the Coale & Demeny Model Life Tables, FSM, 1994. The reference period for given values is 1990–1992.

The procedure used gives an average Infant Mortality Rate (IMR) in the FSM of 45 deaths per 1000 births, an average child mortality rate (1Q5) of 15 deaths per 1000 children aged 1–4 years, and an average life expectancy at birth (E(0)) of about 65.7 years. Table 6 also clearly shows, however, that there are marked differences between the different States and between males and females.

Yap enjoys the highest life expectancy at birth, followed by Pohnpei, while Chuukese people have on average the lowest expectation of life at birth. Kosrae represents exactly the national average. Mortality levels are generally lower for females than for males, except in Kosrae.

Generally the level and pattern of mortality for the Federated States of Micronesia, implied from the 1994 Census, point to a moderate mortality regime. However, the estimated infant mortality level of 45 per 1000 live births is still high. Furthermore, considering the fact that life expectancy has only improved by 5 years during the last 20 years, and mortality has hardly decreased during the last 12–14 years, no real improvement in mortality levels has been achieved in recent years (1994 National Census Report).

According to the Government's Report on the Implementation of Strategies for Health For All by the year 2000, only about 22 per cent of the population had access to safe water and only 39 per cent had adequate sanitary facilities (data are for the period 1991–93). These rather poor environmental and hygienic factors must have a negative influence on the general health condition of the population, especially infants and young children, and might explain the rather high rate of infant deaths.

For the FSM population as a whole, the major causes of death were diseases of the circulatory system (cardiovascular and heart diseases) followed by diseases of the respiratory system and malignant neoplasm (cancer).

Factors Affecting Mortality Rates:

- The basic cause of improvement of improved mortality is healthier people in healthier lives.
- Current mortality levels seem to have the largest margin during the last decade, improved effort through the medical care, infant, child and maternal health by improving primary health care programmes, and, in particular, expanding programmes of immunisation, improving nutrition and providing a more hygienic living environment (safe drinking water, sludge and sewage and waste disposal systems, etc.).
- Higher life expectancies will have a direct impact on the age and structure of the population. To meet health care needs for labour force planning and financial provision for social welfare or more dependent benefits, health care facilities, it is useful to have good mortality statistics by age and sex, and preferably also by cause of death. More detailed data on regional and national health care activity. Better co-ordination between all human resources health services delivery would be helpful.

3.4 Migration

Migration is the movement of people across a certain boundary. When this boundary is a national border, we speak of international migration; otherwise it is internal migration. The people involved are referred to as migrants. We speak of immigration if they are moving into a country and emigrants if they are moving out of a country. When we refer to internal migration (movement within a country, between districts and municipalities, for example), we speak of in-migrants and out-migrants.

Apart from this spatial consideration, time plays a major role. Someone coming for a short visit can hardly be termed a migrant—he or she is a visitor. Apart from time, intent is also of crucial importance, as a visitor can turn into a migrant if confronted with sudden job opportunities. Along the same lines, a person intending to migrate may turn into a visitor if the expected job opportunities do not materialise.

This highlights one of the key problems concerning migration. Whether a particular person qualifies as a migrant or not can only be established *post facto* (after the fact). Planners need to base their decisions on past and projected movements of people.

3.4.1 Internal migration

The 1994 census data on persons by place of birth and place of residence show that 82 per cent of FSM's population have lived in the same municipality since birth; they have never moved anywhere. Thirteen per cent have previously lived in a different municipality in the same State. Five per cent previously lived outside their present State or in another country. Only 334 people had lived in another FSM State during the year before the census, which is a mere 0.3 per cent of the population.

There does not seem to be any contact or movement between some parts of the FSM States. Hardly anybody has ever moved from the outer islands of Yap to the outer islands of Chuuk, Pohnpei or Kosrae, and Chuukese, Pohnpeians and Kosraeans seem not to move to Yap. There also is very little contact between Chuuk and Kosrae. The remoteness of the States from each other, the absence of strong migration 'pulling factors', and the different cultural and linguistic backgrounds all contribute to the lack of long-term population movements between the States.

Data on lifetime migration (number of persons by place of birth and place of residence) show that the direction of internal migration flows was mainly towards Pohnpei where FSM's capital, Palikir, and FSM's only college, the Community

College of Micronesia (CCM), are located (Table 7). This attracts government workers and students from all the other FSM States. Pohnpei was the only net receiving State, gaining migrants from all the other States. With the exception of Yap, it seems that there are as many male as female migrants from each state.

Table 7: Interstate lifetime migration by State and sex, 1994

State	Non-movers	In-migrants	Out-migrants	Net migrants
All persons				
Yap	10,326	95	213	-118
Chuuk	52,347	224	665	-441
Pohnpei	31,233	1,073	362	+711
Kosrae	6,633	185	337	-152
Males				
Yap	5,184	51	135	-84
Chuuk	26,562	134	329	-195
Pohnpei	15,833	545	194	+351
Kosrae	3,318	92	164	-72
Females				
Yap	5,142	44	78	-34
Chuuk	25,785	90	336	-246
Pohnpei	15,400	528	168	+360
Kosrae	3,315	93	173	-80

Source: 1994 FSM Census, Table 6.4, 1994 FSM census report.

Furthermore, in Yap, Chuuk and Pohnpei people have migrated from the outer islands towards the main island (high island) of its respective State. Overall, 18 per cent of the people born on the outer islands have moved to their respective main island (Table 8). This was especially marked in Pohnpei State; almost 40 per cent of all people born on the outer islands of Pohnpei have moved to the main island.

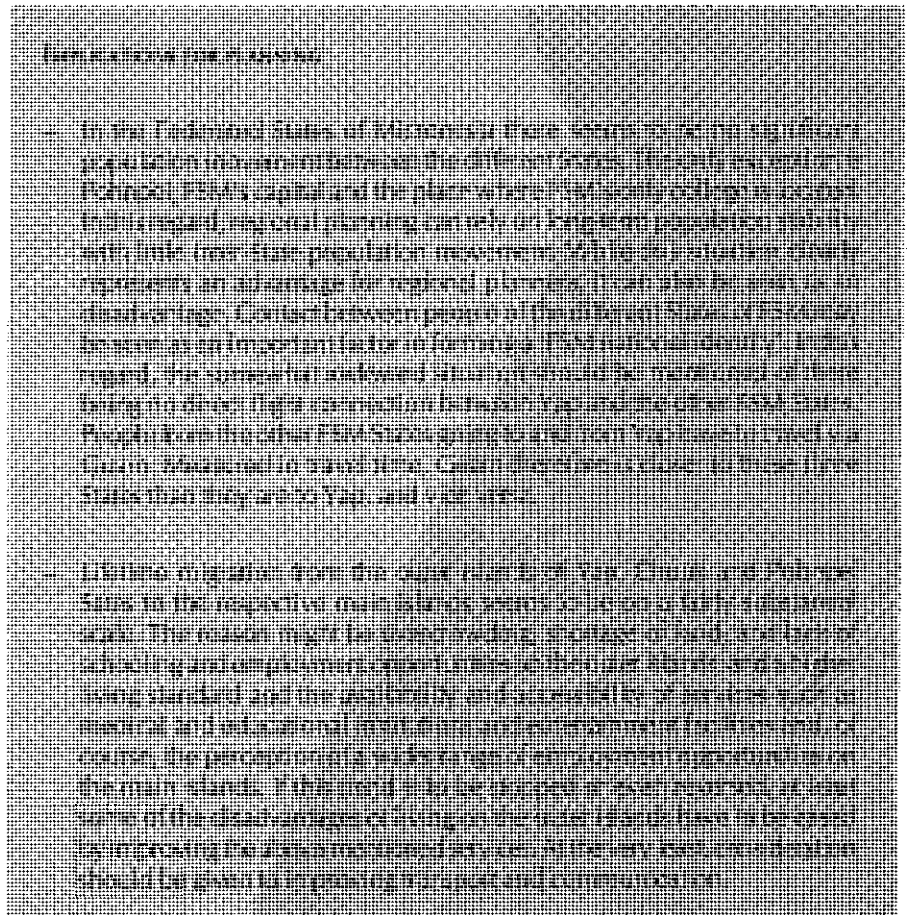
Table 8: FSM-born population by place of birth and place of residence, 1994

	Place of birth	Place of residence	
		Main islands	Outer islands
Main islands	80,891	80,296	595
Outer islands	21,225	3,805	17,420
All islands	102,116	84,101	18,015

Source: 1994 FSM Census, Table 17, Place of birth by usual residence.

(1) The FSM main islands are defined as: Yap proper, Northern and Southern Namoneas and Faichuk (Chuuk), and the islands of Pohnpei and Kosrae.

(2) The FSM outer islands are defined as: Yap and Pohnpei outer islands and the Mortlocks and Okorotod of Chuuk.



3.4.2 *International migration*

The Compact of Free Association between the United States and the Federated States of Micronesia grants FSM citizens free access to the US and its territories, mainly Guam and the Commonwealth of the Northern Mariana Islands (CNMI).

Estimates based on the 1992 census of Micronesians on Guam and the 1993 survey of Micronesian migrants to the CNMI, state that about one per cent of the FSM-born population emigrates to these two countries per year. However, the nature of these data means that they cannot account for multiple entries and especially for return migration.

For statistically developed countries, the prime source of data on international migration is records of passengers arriving and departing at the country's border, sea-ports and airports, classified by purpose of visit, duration of visit, and age and sex of the migrants and visitors. Unfortunately, for the Federated States of Micronesia, statistics relating to migration and emigration suffer from serious inadequacies.

In Sub-section 3.1 regarding population growth, the magnitude and importance of international migration for FSM were briefly discussed. It was mentioned that if we apply the estimated average annual growth rate of 1.9 per cent to the balancing equation, together with the known natural increase of 2.6 per cent per year, we obtain a net migration rate of -0.7 per cent per annum. While this procedure is only an indirect and crude estimation of the volume of net migration, it does provide a migration rate which is consistent with the estimated levels of mortality and fertility. The estimated migration rate, therefore, depends on the accuracy of estimates related to fertility and mortality.

The analysis of international migration in this profile mainly draws on estimates based on a comparison between the latest FSM censuses. Appendix Table 8 displays the *residuals* of a forward projection of the enumerated FSM State populations of the 1980s to match the 1994 FSM census population, given the previously estimated fertility and mortality levels described in Section 3.2 and 3.3. The residuals are the difference between the enumerated 1994 census population and the projected population.

At this point it must be emphasised that these numbers are net migration numbers. The higher number of female emigrants does not mean that more women than men emigrate, because these numbers also include immigrants who are mainly men, e.g. the Asian construction workers who counterbalance the number of male emigrants.

The 1994 Census showed 1074 people who had their previous residence outside FSM and had arrived during the year before the census. That would represent an immigration rate of about 1 per cent per annum. Of these immigrants, 30 per cent settled in Yap, 16 per cent in Chuuk, 29 per cent in Pohnpei and 25 per cent in Kosrae.

Of the foreign-born population, 54 per cent were Asians, 21 per cent from other Micronesian countries (Guam, CNMI, Palau and Marshall Islands) and 18 per cent from the US.

The 1990 Guam census shows that about 1,100 FSM-born persons migrate to Guam each year. This finding is consistent with the results of the 1992 census of Micronesians in Guam. The 1995 CNMI census shows 550 FSM citizens entered CNMI during the years 1994 and 1995. As the census was conducted in September, it accounts for about 330 FSM migrants per year. As FSM citizens also migrate to other countries and especially to the US, these data are low estimates of total numbers of emigrants.

The 1992 survey of Micronesians on Guam and the 1993 survey of Micronesians in the CNMI (note that there are some differences between the Guam and CNMI migrants), show that:

- slightly more males than females migrate, especially to Guam;
- the bulk of migrants to Guam and Saipan (60%) are from the State of Chuuk;
- more than 60 per cent were between 15 and 40 years of age;
- a larger percentage of adult migrants were never married than the FSM average;
- female migrants had fewer children than average FSM females;
- the average education of an FSM male migrant to Guam and the CNMI was substantially poorer than that of the average FSM male population and hardly any of the migrants had a college degree. Female migrants, however, had a higher education than the average female FSM resident population;
- most male migrants worked as operators, fabricators and labourers while most female migrants worked in the service industry;
- the average household size and number of persons per room were considerably higher for migrant households than for resident households;
- considerable back-migration occurs.

Environmental Impact

While substantial environmental impacts are expected to occur, the proposed project is a major project and the environmental impacts are expected to be significant. The project is expected to have a significant impact on the environment and the project is expected to have a significant impact on the environment.

In the long term, Federal and State government action, as well as environmental protection measures to take the pressure off the State of California, are also required to take the pressure off the State of California.

On the other hand, people who are not taking action to protect the environment might not be concerned with the project. However, the project is expected to have a significant impact on the environment and the project is expected to have a significant impact on the environment.

A major impact of the project is the impact on the environment. The project is expected to have a significant impact on the environment and the project is expected to have a significant impact on the environment. The project is expected to have a significant impact on the environment and the project is expected to have a significant impact on the environment.

4. LIKELY FUTURE DEVELOPMENTS

4.1 The importance of population projections

It is becoming increasingly recognised in formulating socio-economic development plans, that population variables have to be considered in conjunction with economic and social conditions. For Governments to cater effectively for specific needs of different population groups at different points in time, it is important that planners be in a position to provide policy-makers with 'a look into the future'. The appropriate method to do this is to provide a series of future population scenarios, pictures of what FSM's population may look like in future years under various conditions.

Scenario-building is based on population projections. The starting point for any projections is a reliable age-sex distribution of a population (for example the Federated States of Micronesia 1994 Census age and sex distribution) and information on fertility, mortality and migration.

There are various mathematical methods available for computing future population scenarios. Most of these methods are based on the cohort-component method. Some Statistics Officers and Planners who attended the SPC population workshop in Pohnpei in July 1996 are familiar with this methodology.

The key to making meaningful projections lies in the choice of assumptions regarding our views of future population developments. These assumptions concern in the first place possible future birth, death and migration rates. The main objective of providing future population scenarios is not to predict the future (*what will happen*), but to describe *what-would-happen-if* a specific scenario materialised.

Given the ability to specify future demographic developments, we are in a position to evaluate likely outcomes of specific policy interventions without actually having to implement the policy first. An example will illustrate this:

The Government of the FSM wants to evaluate the impact of international migration on the growth of the population. In other words: what would FSM's population look like if net migration was zero for a period of, for example, ten years? In this case the growth of the FSM population would be determined by its natural growth only (births – deaths). Population projections allow us to examine this situation without having to close all air- and seaports of all FSM states and islands for ten years (see Section 4.3).

Hence, scenario-building based on population projections should be treated as an essential planning tool, equivalent in importance to other, more traditional social, economic and financial analyses undertaken by planners world-wide.

4.2 Projection assumptions

In order to have a clearer understanding of FSM's population situation in the future, several projections have been prepared, using the age and sex distribution of the 1994 Census.

The fertility pattern (ASFRs) reported in the 1994 census is used, together with the estimated fertility level (TFR) of 4.9, as outlined in Section 3.2.

The Coale & Demeny model life table, West Pattern, with an estimated life expectancy of 64.6 for males and 66.8 for females (for the year 1994), as described in Section 3.3, is used.

Nine different projection scenarios have been prepared covering the period from 1995 onwards. Three are described in detail. These projection scenarios cover 20 years in five-yearly projection periods from 1994 to the year 2014 (see bold figures, Table 9, and Appendix Table 9).

All scenarios assume the same rising trend of life expectancy, based on the medium variant of the UN working model for mortality improvement as described in World Population Prospects (United Nations, 1995, p.144).

The reason for this is that assumed differences in mortality usually produce only slight and insignificant differences in total population growth rates and, on the other hand, require the production of too many different scenarios which result in an increasingly confusing presentation of outcomes. Furthermore, it is thought that under normal circumstances (meaning the absence of catastrophes such as wars, famines or epidemics) mortality levels will continuously improve, as has been the situation historically in countries world-wide.

From the estimated level of fertility of 4.9 (TFR) in 1994, three different fertility assumptions are made:

Assumption 1: Constant fertility—fertility remains at its 1994 level throughout the projection period until 2014;

Assumption 2: Slow decline—fertility decreases by one child, to 3.9 in the year 2014;

Assumption 3: Fast decline—fertility decreases by two children, to 2.9 in 2014.

Making assumptions about migration provides the greatest difficulty. One reason is the lack of reliable current data and another is the potential fluctuations in the level and pattern of international migration. Hence it is imperative to

specify several different migration scenarios in order to visualise the impact of migration on the population dynamic of the FSM. In order to do this, we decided to combine each fertility scenario (see above) with three different migration assumptions:

Assumption 1: Zero net migration. Comparing the results of this assumption with those of the others illustrates the important impact of migration on development of the FSM population.

Assumption 2: A constant net decrease of -714 people per annum, based on the estimated number of migrants between 1989 and 1994 (Section 3.4.2). This estimate is based on the difference between the expected and actual population in 1994, calculated by projecting the estimated 1989 FSM population according to the outlined fertility and mortality rates. Appendix Table 8 displays the number of migrants by age and sex.

Assumption 3: More people will emigrate in the future. This is done by doubling the 1989–1994 emigration rates (negative values) by age and sex. Immigration rates (positive values) are assumed to decrease by half.

The combination of these three different fertility and migration assumptions enables us to look at the impact of different levels of fertility on the one hand and the impact of migration on the other. The combination of these three different fertility and migration assumptions results in nine scenarios (Table 9), of which only three are described in detail in this paper (the High, the Medium and the Low variants).

Table 9: Population Projections

Population in the year 2014			
Total Fertility Rate	Migration		
	None (zero net migration from 1994 to 2014)	Moderate (-714 people p. a. from 1994 to 2014)	High (-1621 people p.a. from 1994 to 2014)
Constant (4.9 from 1994 to 2014)	189,917 (High variant)	166,211	154,627
Slow decline (from 4.9 in 1994 to 3.9 in 2014)	178,666	156,360 (Medium variant)	145,209
Fast decline (from 4.9 in 1994 to 2.9 in 2014)	166,441	145,632	134,936 (Low variant)

Note: The high, medium and low variants are described in more detail in the text.

Scenario 1 (High variant)

Fertility: The estimated total fertility rate (TFR) of 4.9 in 1994 will remain on that level until the year 2014.

Mortality: the level of life expectancy gradually increases from 64.6 and 66.8 in 1994 for males and females respectively to 70.5 and 73.8 in the year 2014.

Migration: zero net migration is assumed for the entire projection period.

Scenario 2 (Medium variant)

Fertility: The estimated total fertility rate (TFR) of 4.9 in 1994 will decrease by one child to 3.9 in the year 2014.

Mortality: the level of life expectancy gradually increases from 64.6 and 66.8 in 1994 for males and females respectively to 70.5 and 73.8 in the year 2014.

Migration: the estimated level of -3571 net migrants during the 1989-1994 period is kept constant for the entire projection period (-714 persons per annum).

Scenario 3 (Low variant)

Fertility: TFR is assumed to decline by two children from the estimated level of 4.9 in 1994 to 2.9 in the year 2014.

Mortality: the level of life expectancy gradually increases from 64.6 and 66.8 in 1994 for males and females respectively to 70.5 and 73.8 in the year 2014.

Migration: the estimated level of the 1989-1994 age- and sex-specific migration rates is assumed to double during the period 1994-2014.

4.3 Projection Results

In Table 10, a comparison is made between the base year of the projections, 1994 and the end year for the three projection scenarios, 2014. The results are given in more detail in Appendix Table 9.

Table 10: Comparison of 1994 and 2014 population projections

Scenarios	Total pop.	Under 15 years (%)	15–64 years (%)	65+ years (%)	Median age (years)	Annual growth rate (%)
Base year 1994	105,506	43.5	52.9	3.6	17.8	1.9
Projection outcomes, 2014						
Scenario 1	189,917	41.1	55.7	3.2	19.7	2.9
Scenario 2	156,360	37.4	59.1	3.5	21.8	2.0
Scenario 3	134,936	33.6	62.9	3.5	24.4	1.2
Changes compared to base year 1994						
Scenario 1	+84,411	-2.4	+2.8	-0.4	+1.9	+1.1
Scenario 2	+50,854	-6.1	+6.2	-0.1	+4.0	0.0
Scenario 3	+29,430	-9.9	+10.0	-0.1	+6.6	-1.3

These projection scenarios highlight the impact of the different levels of fertility and increasing longevity on the age-structure of the population, and the impact of international migration on the size and growth of the population.

4.3.1 Summary of results

Scenario 1 (High variant)

As can be seen from Table 10 and Appendix Table 9, under the assumptions of constant fertility at the current estimated level (TFR = 4.9) and zero net migration for the entire projection period, the FSM population would grow by 2.9 per cent

between 1994 and 2014 and the total population would be 189,917. This scenario reflects population growth as a result of natural growth only. The population would double in 24 years time.

The school-age population (6–16 years) would increase considerably, from 32,150 in 1994 to 50,110 in 2014 and the working-age population (15–64 years) would almost double from 55,777 in 1994 to 105,800 in the year 2014. The dependency ratio would decrease from 89.2 to 79.5 during the same period because of the relative increase in the working-age population and the relative decrease of the population younger than 15 years.

Scenario 2 (Medium variant)

Based on the assumptions that fertility will slowly decrease by one child to a level of 3.9 in the year 2014 and migration will stay at its current estimated net emigration level of –714 people, in 2014 the population will have grown by 2.0 per cent to a total of 156,360 people.

The school-age population (6–16) would grow to almost 40,000. The working-age population would increase from its current level by 36,669 people to 92,446 people in the year 2014 and the dependency ratio would decrease to 69.1.

Scenario 3 (Low variant)

If fertility decreases by two children, from 4.9 in 1994 to 2.9 in the year 2014 and the age- and sex-specific migration rates double by the year 2014, the population will grow by only 1.2 per cent per annum to a total of 134,936 people in the year 2014.

The school-age population would not increase, but the working-age population would be 84,851 people which represents an increase of about 29,000 over 1994. The dependency ratio would decrease considerably, from 89.1 in 1994 to 59.0 in 2014. This is the result of a relative increase in the working-age population, to 62.9 per cent and a decrease in the population younger than 15 from 43.5 to 33.6 per cent.

Population changes close to those shown in Scenario 2 (Medium variant), appear to be the most likely outcome because:

- FSM's relatively high level of fertility is expected to decline slowly, as it has in the recent past, and based also on historical world-wide observations of countries with a similar high level of fertility;

- From the latest data available (early 1990s) it seems unlikely that the trend of emigration will stop, let alone reverse. Nevertheless, it remains to be seen whether this level is sustainable, which will mainly depend on the socio-economic developments triggered by the end of the Compact in 2001. It also depends on the willingness of the main destination countries (Guam and CNMI) to accept considerably more migrants from the FSM in the future. But most of all, it relies on FSM citizens: will they foresee a better future for themselves and their families by migrating away from their home island, overseas ?

Figure 2 illustrates likely future population trends under the three assumptions discussed.

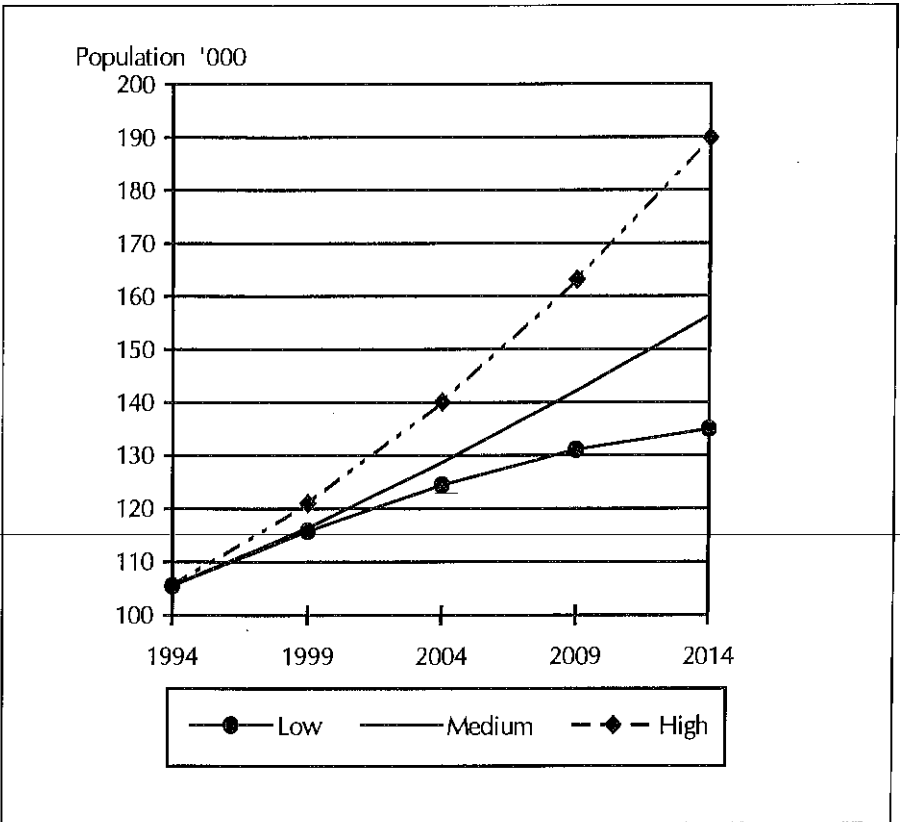


Figure 2: Projection scenarios, 1994–2014

All three scenarios have the following in common:

- 1) the population will increase further until the year 2014 by between 1 and 3 per cent (Appendix Table 9), and grow by 30,000 to 84,000 people;
- 2) the population aged 15 years and younger (which includes the school-age population) will be proportionally lower in the year 2014 than in 1994;
- 3) the proportion of people in the working ages in the year 2014 will be higher than in 1994;
- 4) the dependency ratio in the year 2014 will be lower;
- 5) the median age will have increased;
- 6) the proportion of the elderly (65 +) will not change significantly, although the total numbers will increase;
- 7) the rate of natural growth will be between 2 and 3 per cent, depending on the level of fertility (see Table 9; the three different population outcomes when zero net migration is assumed reflect rates of natural increase of 2.9%, 2.6% and 2.3% respectively).

Table 9 shows that the difference in the total population in the year 2014 between the constant-fertility assumption and the fast-declining assumption (reduction of TFR by 2) is between 19,700 and 23,500 people, depending on changes in migration. The difference in the total population in 2014 between the high- and zero-migration assumptions is between 31,500 and 35,300, depending on changes in fertility. This illustrates the relative importance of migration, which has a greater impact on the population than fertility.

5. OVERALL IMPLICATIONS FOR PLANNERS AND POLICY-MAKERS

1. The population projection scenarios presented in this paper point to a growing population for the Federated States of Micronesia during the next 20 years. The total size will be between 135,000 and 190,000 people, depending on the levels of fertility and migration. Under all projection assumptions, the Federated States of Micronesia's population in future years will be higher than in 1994. The needs of this larger population should be considered in future development plans. This is critical, given FSM's experience of no real growth in Gross Domestic Product (GDP) in the years prior to the 1992–1996 Second Five-year Development Plan.

Considering Scenario 2 as the most likely outcome, the total population is expected to reach about 156,000 people in the year 2014. This will be the case if net migration continues to remain at its present level and if fertility decreases slowly by one child from its current level of a TFR of 4.9 to 3.9 in the year 2014. The population will keep on growing by about 2 per cent per annum.

2. The relatively high population growth of 1.9 per cent per annum is the result of a natural growth rate of 2.6 per cent and a net migration rate of -0.7 per cent. This high rate of natural increase is the result of a high birth rate. It is estimated that a woman in FSM, on average, bears 5 children during her reproductive life. Consideration must be given to lowering these high fertility levels, if a reduction in the population growth rate is to be achieved. Therefore policies and programmes directed towards expansion of family planning services, including widespread information and counselling services, need to be strengthened and the availability and accessibility of these services improved, especially for adolescents and for young men and women of childbearing age.

3. Pregnancies of very young women are often unwanted and the result of unprotected sex. This is not only a tragedy in itself, but a major health concern, considering the risk and emergence of HIV/AIDS and other STDs.

4. From studies on the level of mortality presented in this profile and in the National Census Report, it seems that life expectancy at birth and infant mortality rates have not improved during the last decade. This unfortunate situation demands a renewed effort to improve infant, child and maternal health care programmes

including in particular, expanding immunisation programmes, improving nutrition and providing a hygienic living environment. Generally, a healthier life style needs to be promoted for the whole population.

5. The scenarios presented in this paper demonstrate that, in future, the age structure of the FSM population will undergo changes, especially if fertility continues to decline. Compared to 1994, there will be, proportionately and in absolute numbers, more people in the adult ages of 15–64. As a result, the dependency ratio in the year 2014 will be much smaller: around 69 (Scenario 2) compared to 89 in 1994. This anticipated decline in the dependency ratio may be viewed as a positive development, as it eases the strain on the working-age population. The lower the dependency ratio, the fewer the dependent people for whom the working-age population has to care. However, the whole concept of the dependency ratio only holds true if the working-age population is in fact employed and earns a living which enables it to support the young (0–15) and elderly (65+) people. If not enough employment opportunities are created for the expected growing working-age population, a larger part will be unemployed and will then have to be regarded as dependants themselves.

6. The median age of the population will increase by about 5 years, according to Scenario 2, from 17.8 in 1994 to 22.8 in 2014—the so-called ‘ageing of the population’. This is the result of a proportional decrease of the population 15 years and younger compared to the adult population aged 15–64 years and also can be seen in the expected increase of elderly people (65 years and older) until the year 2014.

7. It is quite clear from the projections presented in this paper that international migration is an important and very unpredictable factor in determining the size of FSM’s future population, especially in view of the end of the Compact of Free Association with the United States in the year 2001. Consequently, fluctuations in international migration have far-reaching implications for FSM’s development. Table 9 shows that the different levels of migration assumed in the different scenarios result in quite different population numbers in the year 2014.

8. There is relatively little inter-state population movement in the FSM. Only Pohnpei attracts people from all other States because it is the location of FSM’s capital, attracting government workers and representatives, and FSM’s only college, which attracts students from Yap, Chuuk and Kosrae. However, people also move from the outer islands towards their respective main islands

on a fairly significant scale. This points to dissatisfaction with the present situation on the outer islands, including such things as overcrowding, shortage of land, lack of schooling and employment opportunities, and poor medical facilities. The only way to slow down this development would be to improve the general situation in the outer islands in regard to these inadequacies.

9. The average household size has been estimated as just under 7 persons per household and has not changed significantly during the last 20 years. Nevertheless, planners and policy-makers should be aware of changes in household size and composition and their impact on demands for housing and dwellings, in order to be able to supply the appropriate quality and quantity of housing units. Demands for housing are closely linked to demands for land allocation, energy and water consumption, waste disposal, sewage connections and general infrastructure.

10. Changes in FSM's demographic structure will affect the proportion and size of its school-age population. If the level of fertility does not decrease rapidly and if the number of out-migrants does not increase as outlined in Scenario 3, the school-age population will increase to 40,000 or more pupils (aged 6–16 years) in the year 2014. This will require considerably more financial commitment to support more teachers and classrooms.

11. Currently, only 84 per cent of children aged 6–9 years are enrolled in schools. This is a rather low percentage and should be of concern to educational planners in the FSM. More efforts need to be made to raise the school enrolment ratio for children at this age, to ensure that their need for education is met.

12. The working-age population, as mentioned earlier, will increase considerably. The population aged 15–64 years of age is estimated at between 85,000 and 106,000 in the year 2014, compared to less than 56,000 in 1994. Considering the fact that in 1994 at least 16 per cent of the economically active population was unemployed and that the working-age population, according to Scenario 2, will increase by about 2.5 per cent per annum during the years to come, a huge challenge lies ahead for the FSM and State governments, as well as the private sector; they will need to provide more (and suitable) employment opportunities for the rapidly increasing working-age population. Without major economic growth to stimulate such opportunities, emigration will most certainly increase.

13. Reliable population statistics (vital statistics, migration data) provide the very basis for sensible development planning. They are indispensable for keeping data on population size, growth and indicators up to date and form the basis for sensible population projections. The impact and success of any policies, programmes and projects designed to influence any of the population parameters (fertility, mortality, migration) could be readily evaluated with the help of a complete, reliable vital registration system which also included data on migration.

Improvements could be made in the collection of population data. The most important, much-needed change concerns the strengthening of the system to collect reliable and timely birth and death statistics. As has been shown, the collection of these data, especially the number of deaths by age and sex, is incomplete.

Improvements to migration statistics also need to be made, by collecting basic arrival and departure information on all incoming and outgoing passengers. Information is needed on the total number, age, sex and nationality of all passengers, on a yearly basis.

14. Should these improvements prove impossible, another option would be to undertake censuses at five-year intervals. By applying proper demographic method, it would be possible, by comparing the two nearest censuses, to calculate the desired population data. However, this option is more time-consuming and expensive than an effective registration system, and data can only be analysed after each census is completed.

15. It has been shown that the different FSM States have significant differences in population growth rates, levels of fertility and mortality, and migration, educational and labour force characteristics. Furthermore, because of FSM's great socio-cultural, geographic and demographic diversity, social and economic development issues and priorities will be quite different for the different FSM States and from island to island. Therefore it is strongly recommended that a decentralised approach be taken to development planning and policy formulation, within an overall national development framework.

16. While availability of good data is one pre-condition for responsible development planning, data analysis and utilisation are of equal importance. This requires adequately trained staff. Population projections are an essential planning tool, and an improved knowledge of the interrelationship between population and development is essential to provide a firm basis for undertaking

demographic projections and scenario-building. The SPC Population programme's in-country planner workshops (July 1996) are a first attempt at contributing to national capacity-building in this area. In addition, the preparation of specific and more detailed and sophisticated projections in such important sectors as education and manpower planning requires close co-operation between demographers, planners and policy-makers.

17. Incorporation of population variables in policy- and decision-making processes will certainly enhance the effectiveness of these processes. This is especially important at a time when the Government is about to embark on the formulation of the next five-year Development Plan (1997-2001).

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APPENDIX TABLES

Appendix Table 1: Population by age and sex, 1994 Census

5-year age-group	Population			Sex Ratio	Population distribution (%)		
	Total	Males	Females		Total	Males	Females
0-4	15,854	8,211	7,643	107	15.0	15.2	14.8
5-9	15,330	8,051	7,279	111	14.5	14.9	14.1
10-14	14,749	7,534	7,215	104	14.0	14.0	14.0
15-19	12,251	6,431	5,820	110	11.6	11.9	11.3
20-24	8,828	4,321	4,507	96	8.4	8.0	8.7
25-29	7,063	3,496	3,567	98	6.7	6.5	6.9
30-34	6,598	3,311	3,287	101	6.3	6.1	6.4
35-39	6,079	3,077	3,002	102	5.8	5.7	5.8
40-44	5,071	2,661	2,410	110	4.8	4.9	4.7
45-49	3,579	1,930	1,649	117	3.4	3.6	3.2
50-54	2,219	1,101	1,118	98	2.1	2.0	2.2
55-59	2,105	1,033	1,072	96	2.0	1.9	2.1
60-64	1,985	1,018	967	105	1.9	1.9	1.9
65-69	1,395	668	727	92	1.3	1.2	1.4
70-74	1,229	567	662	86	1.2	1.1	1.3
75+	1,171	513	658	78	1.1	1.0	1.3
Total	105,506	53,923	51,583	105	100	100	100
Broad age-group							
0-14	45,933	23,796	22,137	107	43.5	44.1	42.9
15-64	55,778	28,379	27,399	104	52.9	52.6	53.1
65+	3,795	1,748	2,047	85	3.6	3.2	4.0
Median age							
age	17.8	17.5	18.1				
Dependency ratio							
ratio	89.2						

Source: FSM 1994 National Census Report.

Appendix Table 2: Educational attainment of the population 25 years and over by gender, 1980 and 1994

	1980			1994		
	Total	Males	Females	Total	Males	Females
Total number of people 25 years and older	25,044 (100 %)	12,607 (100 %)	12,437 (100 %)	38,494 (100 %)	19,375 (100 %)	19,119 (100 %)
No formal education	25	20	30	23	19	27
Elementary	50	45	55	30	24	36
High School	17	22	12	29	32	26
College	8	12	3	18	25	11

Source: FSM 1994 census results and 1980 Trust Territory of the Pacific Islands (TTPI) census. 'No formal education' includes also people with only pre-school education (kindergarten).
 Elementary = Grades 1 to 8.
 High school = Grades 9 to 12
 College = Grade higher than 12 (tertiary).

Appendix Table 3: Educational attainment of the population 25 years and over by State, FSM, 1994

	FSM	Yap	Chuuk	Pohnpei	Kosrae
Total number of people 25 years and older	38,494 (100 %)	4,566 (100 %)	18,553 (100 %)	12,439 (100 %)	2,936 (100 %)
No formal education	23	17	25	24	10
Elementary	30	26	29	35	29
High school	29	34	30	23	34
College	18	23	16	18	27

Source: FSM 1994 census results and 1980 Trust Territory of the Pacific Islands (TTPI) census. 'No formal education' includes also people with only pre-school education (kindergarten).
 Elementary = Grades 1 to 8.
 High school = Grades 9 to 12
 College = Grade higher than 12 (tertiary).

Appendix Table 4: Age-specific enrolment rates by gender and State, 1994

Grade	Age	FSM			Yap	Total population		
		Males	Females	Total		Chuuk	Pohnpei	Kosrae
	3	5.2	4.7	5.0	23.2	4.3	1.3	2.4
	4	21.7	20.3	21.0	48.3	21.5	13.4	18.8
	5	55.2	53.5	54.4	75.4	57.3	42.5	58.0
1	6	75.1	78.1	76.5	88.9	75.0	72.2	90.5
2	7	83.0	84.5	83.7	91.3	80.7	84.1	93.6
3	8	85.8	87.9	86.8	91.7	83.1	89.4	95.9
4	9	90.4	89.7	90.1	95.0	86.1	94.5	94.4
5	10	88.8	90.3	89.5	93.9	85.2	94.8	96.4
6	11	88.8	89.9	89.3	95.5	84.9	93.8	93.9
7	12	88.1	89.3	88.7	94.1	83.8	94.1	93.5
8	13	86.6	86.8	86.7	95.1	81.1	91.3	92.7
9	14	81.8	83.2	82.5	86.7	76.7	88.7	90.7
10	15	74.7	75.1	74.9	83.6	70.5	77.8	82.1
11	16	61.8	64.8	63.2	78.9	59.0	63.3	71.4
12	17	50.0	44.7	47.6	61.6	47.5	44.7	41.1
	18	37.4	36.2	36.8	48.1	36.1	36.1	26.9
	19	31.5	25.8	28.6	28.2	28.3	29.8	24.1
	20	20.8	19.8	20.3	19.6	20.2	21.7	13.5
	21	18.7	16.3	17.4	9.5	18.2	20.6	6.9
	22	17.2	13.1	15.1	7.1	15.4	17.4	14.6
	23	11.9	11.6	11.7	7.9	13.4	11.5	5.9
	24	11.6	9.0	10.3	9.4	11.1	10.8	3.4

Source: 1994 FSM Census.

Appendix Table 5: Comparison of the number of reported births in the year prior to the 1994 census and the number of registered births from September 1993 to September 1994

Age-group	Number of children born during the year prior to the census ¹	Registered number of births in the year before the census ²	Estimated number of births
15-19	272	366	363
20-24	693	759	859
25-29	672	691	819
30-34	581	526	704
35-39	399	291	476
40-44	191	94	230
45-49	48	5	49
Total	2,856	2,732	3,500

Sources:

1. Census data.
2. Registration data.

Appendix Table 6a: Estimated Age Specific Fertility Rates and Total Fertility Rates by States, using the Arriaga fertility method (P/F Ratio) based on data on average number of children born for two dates (censuses) and the pattern of fertility (ASFRs) for those two dates, Chuuk and Pohnpei, 1985–1994

Reported average children ever born and Age-Specific Fertility Rates								
Age	CHUUK				POHNPEI			
	1989		1994		1985		1994	
	CEB	ASFR	CEB	ASFR	CEB	ASFR	CEB	ASFR
15–19	0.076	0.041	0.086	0.026	0.210	0.107	0.190	0.071
20–24	0.862	0.194	0.651	0.127	1.315	0.239	0.967	0.196
25–29	2.200	0.237	2.042	0.194	2.832	0.217	2.339	0.190
30–34	3.773	0.259	3.664	0.203	4.232	0.164	3.421	0.145
35–39	5.240	0.205	5.061	0.160	5.312	0.097	4.577	0.106
40–44	6.007	0.104	6.279	0.120	6.640	0.047	5.270	0.041
45–49	6.275	0.023	6.734	0.040	7.507	0.000	5.913	0.012
TFR		5.312		4.346		4.354		3.805

Adjusted Total Fertility Rates, estimated mean age at childbearing(MAC), and adjusting factors

	Total Fertility Rate		Total Fertility Rate	
20–29	5.48	5.87	4.49	3.97
25–29	5.57	6.01	4.59	3.98
25–34	5.67	6.02	4.55	3.91
30–34	5.76	6.03	4.52	3.85
MAC	30.76	31.97	27.34	28.30
	Adjustment factors		Adjustment factors	
15–19	1.2916	1.7425	1.0036	1.1273
20–24	1.0134	1.3185	1.0100	1.0390
25–29	1.0495	1.3829	1.0544	1.0467
30–34	1.0837	1.3886	1.0373	1.0109
35–39	1.0735	1.4039	1.0890	1.0550
40–44	1.0953	1.4304	1.1746	1.0827
45–49	1.1188	1.4528	1.2215	1.0976

Note: the average of the bold adjustment factors is used to adjust the reported fertility rates.

Appendix Table 6b: Estimated Age Specific Fertility Rates and Total Fertility Rates by States, using the Arriaga fertility method (P/F Ratio) based on data on average number of children born for two dates (censuses) and the pattern of fertility (ASFRs) for those two dates, Yap and Kosrae, 1986–1994

Reported average children ever born and Age-Specific Fertility Rates								
Age	YAP				KOSRAE			
	1987		1994		1986		1994	
	CEB	ASFR	CEB	ASFR	CEB	ASFR	CEB	ASFR
15–19	0.191	0.079	0.151	0.066	0.077	0.0284	0.099	0.0457
20–24	1.110	0.170	0.688	0.137	0.748	0.1387	0.820	0.1801
25–29	2.251	0.195	1.739	0.153	2.494	0.2915	1.831	0.2016
30–34	3.668	0.172	3.082	0.166	3.787	0.2277	3.025	0.1618
35–39	4.530	0.121	3.966	0.121	5.271	0.1695	4.251	0.0969
40–44	5.767	0.062	4.545	0.017	7.442	0.1239	5.365	0.0674
45–49	6.446	0.014	4.871	0.023	7.129	0.0538	6.740	0.0315
TFR	4.054		3.4145		5.1675		3.925	

Adjusted Total Fertility Rates, Estimated Mean Age at Childbearing(MAC), and Adjusting Factors

	Total Fertility Rate		Total Fertility Rate	
20–29	4.03	3.06	7.35	4.03
25–29	4.06	3.36	6.00	3.69
25–34	4.04	3.35	5.56	3.71
30–34	4.02	3.33	5.12	3.74
MAC	29.06	29.12	31.65	29.66
	Adjustment factors		Adjustment factors	
15–19	1.2244	0.9762	1.5060	1.3368
20–24	0.9855	0.8091	1.6820	1.1149
25–29	1.0009	0.9849	1.1615	0.9391
30–34	0.9907	0.9764	0.9911	0.9520
35–39	0.9488	0.8951	1.0986	0.9709
40–44	1.0068	0.9058	1.1944	0.9325
45–49	1.0361	0.8921	1.2193	0.9171

Note: the average of the **bold** adjustment factors is used to adjust the reported fertility rates.

Appendix Table 7a: Male life as implied by Coale & Demeny model life table for the West pattern, 1990–1992

Age	M(X,N)	Q(X,N)	I(X)	D(X,N)	L(X,N)	S(X,N)	T(X)	E(X)	A(X,N)
0	0.05042	0.04842	100,000	4,842	96,038	0.94733 /A/	6,460,000	64.600	0.182
1	0.00319	0.01267	95,158	1,206	377,625	0.98890 /B/	6,363,962	66.878	1.507
5	0.00116	0.00578	93,952	543	468,403	0.99485	5,986,337	63.717	2.500
10	0.00091	0.00452	93,409	423	465,989	0.99408	5,517,934	59.073	2.500
15	0.00159	0.00792	92,987	736	463,228	0.99035	5,051,944	54.330	2.685
20	0.00224	0.01114	92,250	1,028	458,756	0.98859	4,588,716	49.742	2.573
25	0.00231	0.01147	91,222	1,046	453,523	0.98792	4,129,960	45.274	2.526
30	0.00260	0.01292	90,176	1,165	448,046	0.98559	3,676,437	40.770	2.568
35	0.00328	0.01628	89,011	1,449	441,591	0.98086	3,228,391	36.270	2.611
40	0.00457	0.02263	87,562	1,982	433,140	0.97227	2,786,799	31.827	2.644
45	0.00687	0.03378	85,580	2,891	421,130	0.95824	2,353,659	27.502	2.658
50	0.01048	0.05113	82,689	4,228	403,541	0.93636	1,932,529	23.371	2.658
55	0.01625	0.07827	78,461	6,142	377,860	0.90327	1,528,988	19.487	2.648
60	0.02507	0.11830	72,320	8,555	341,309	0.85487	1,151,128	15.917	2.628
65	0.03869	0.17702	63,764	11,288	291,774	0.78334	809,820	12.700	2.604
70	0.06071	0.26444	52,477	13,877	228,559	0.68066	518,046	9.872	2.562
75	0.09583	0.38622	38,600	14,908	155,571	0.46260 /C/	289,487	7.500	2.489
80	0.17692	.....	23,692	23,692	133,916	.....	133,916	5.652	5.652

/A/ Value given is for survivorship of 5 cohorts of birth to age group 0–4 = $L(0,5)/500000$.

/B/ Value given is for $S(0,5) = L(5,5)/L(0,5)$

/C/ Value given is $S(75+5) = T(80)/T(75)$

Appendix Table 7b: Female life as implied by Coale & Demeny model life table for the West pattern, 1990–1992

Age	M(X,N)	Q(X,N)	I(X)	D(X,N)	L(X,N)	S(X,N)	T(X)	E(X)	A(X,N)
0	0.04527	0.04365	100,000	4,365	96,425	0.95070 /A/	6,680,000	66.800	0.181
1	0.00375	0.01485	95,635	1,420	378,923	0.98821 /B/	6,583,575	68.840	1.453
5	0.00113	0.00564	94,215	532	469,745	0.99497	6,204,652	65.856	2.500
10	0.00088	0.00441	93,683	413	467,383	0.99455	5,734,907	61.216	2.500
15	0.00139	0.00693	93,270	646	464,836	0.99176	5,267,524	56.476	2.657
20	0.00191	0.00949	92,624	879	461,006	0.98960	4,802,688	51.852	2.597
25	0.00226	0.01123	91,744	1,030	456,212	0.98784	4,341,682	47.324	2.564
30	0.00265	0.01318	90,714	1,195	450,664	0.98548	3,885,470	42.832	2.570
35	0.00324	0.01607	89,519	1,439	444,119	0.98192	3,434,806	38.370	2.586
40	0.00413	0.02046	88,080	1,802	436,088	0.97614	2,990,687	33.954	2.607
45	0.00566	0.02790	86,278	2,408	425,683	0.96651	2,554,599	29.609	2.630
50	0.00816	0.04000	83,870	3,355	411,428	0.95180	2,128,915	25.383	2.638
55	0.01191	0.05795	80,515	4,666	391,597	0.92797	1,717,487	21.331	2.647
60	0.01859	0.08908	75,850	6,757	363,390	0.88804	1,325,890	17.481	2.653
65	0.02992	0.13975	69,093	9,655	322,704	0.82291	962,500	13.931	2.643
70	0.04978	0.22240	59,437	13,219	265,557	0.72360	639,795	10.764	2.607
75	0.08235	0.34236	46,219	15,823	192,158	0.48654 /C/	374,238	8.097	2.539
80	0.16693	.....	30,395	30,395	182,080	.....	182,080	5.990	5.990

/A/ Value given is for survivorship of 5 cohorts of birth to age group 0–4 = $L(0,5)/500000$.

/B/ Value given is for $S(0,5) = L(5,5)/L(0,5)$

/C/ Value given is $S(75+5) = T(80)/T(75)$

Appendix Table 8: Estimated number of net migrants by age and sex, 1989–1994

Age-group	Males	Females	Both
0–4	125	25	150
5–9	-121	-242	-363
10–14	-382	-179	-561
15–19	-490	-492	-982
20–24	-834	-520	-1,354
25–29	-59	-172	-231
30–34	208	-78	130
35–39	58	-71	-13
40–44	53	-100	-47
45–49	41	-76	-35
50–54	14	-11	3
55–59	-6	-71	-77
60–64	56	-14	42
65–69	-114	-114	-228
70–74	29	58	87
75+	-80	-12	-92
Total	-1,502	-2,069	-3,571

Note: the positive migration numbers of the age group 0–4 are most probably due to an under-enumeration of the 0–4 year population in the 1994 census, as indicated in Section 3.2 and/or to a slight under-estimation of the assumed level of fertility between 1989 and 1994.

Appendix Table 9: Population projections by age-groups, 1994 and 2014, under three varying scenarios*

Indices	1994	2014		
	(base year)	Scenario 1	Scenario 2	Scenario 3
Population size	105,506	189,917	156,360	134,936
of which are				
< 15	45,933	78,086	58,509	45,300
65+	3,796	6,031	5,405	4,786
School ages (6-16)	32,150	50,110	39,970	32,861
Working ages (15-64)	55,777	105,800	92,446	84,851
Population structure				
% < 15	43.5	41.1	37.4	33.6
% 65+	3.6	3.2	3.5	3.5
% School ages (6-16)	30.5	26.4	25.6	24.4
% Working ages (15-64)	52.9	55.7	59.1	62.9
Median age (years)	17.8	19.7	22.8	24.4
Dependency ratio (15-64)	89.2	79.5	69.1	59.0
Annual growth rate (%)	1.9	2.9	2.0	1.2
Sex ratio	104.5	104.4	107.7	107.9

* Assumptions discussed in the text.

GLOSSARY

Term	Definition/description
Age and sex composition	Distribution of population by age and sex
Age-specific fertility rate (ASFR)	Relates the number of births to women of a particular age-group, in a specific calendar year, to the mid-year population of women in that same age-group
Average household size	Total population living in private households divided by total number of private households
Population growth	Population growth = Births – deaths + net migration
Birth cohort	A group of people born in the same reference period
Child mortality	Mortality of children under five years
Child mortality rate	Total number of deaths of children aged 1–5 during a year x , divided by the mid-year population estimates of children aged 1–5
Child life expectancy (for women)	Ages 15–49 (the reproductive age-span of women)
Children	Population under 15 years
Crude Birth Rate (CBR)	The total number of live births in a year per 1,000 mid-year population
Crude Death Rate (CDR)	The total number of deaths in a year per 1,000 mid-year population
Dependency ratio	The ratio of the economically-dependent component of a country's population to its productive component. This is conventionally expressed as the ratio of the young (0–14) plus the old (65+), to the population in the working ages (15–64)

Term**Definition/description**

Destination of migrants

Destination of migrants

Economic active population

Persons aged 15–64 (or 59) who were employed or looking for work; also referred to as the 'labour force'

Educational attainment

Proportion of the population 25 years and over by age-groups and level of education

Elderly persons

Persons aged 65 years and over

Emigrants

Persons who move out of a country for the purpose of establishing a new permanent residence

Extended family household

Household consisting of couples living with their children and others related by blood or through marriage

Family

A group of two or more persons related by birth, marriage or adoption and living together

Fertility

The biological/physiological ability to reproduce

Fertility

Actual reproductive performance of a population; the number of live births occurring in a population

Household

A single person living alone or a group voluntarily living together, having common house-keeping arrangements for supplying basic living needs, such as principal meals; the group may consist of related or unrelated persons

Immigrants

Persons who move into a country for the purpose of establishing a new permanent residence

Infant mortality

Mortality of children under one year

Infant mortality rate (IMR)

Total number of deaths of children under one year, per 1,000 live births in a year

Term	Definition/description
Immigrants	Persons who move into a different area of a country for the purpose of establishing a new permanent residence
Internal migration	The movement of people within a country for the purpose of establishing a new permanent residence
International migration	The movement of people between countries for the purpose of establishing a new permanent residence
Labour force	Persons employed and unemployed; excludes those not seeking employment, housewives and students
Labour force participation rate	The number of persons in the labour force at a given age, sex and/or level of education, divided by the corresponding total number of persons of the same characteristics
Life expectancy at birth	The average number of additional years a newborn child would live if current mortality trends were to continue
Marital status	Married status of a person: includes not married (single), currently married, divorced/separated, <i>de facto</i> , widowed
Median age	The age that divides a population into two numerically equal groups; that is, half the people are younger than this age, and half are older
Migrant	A person who moves for the purpose of establishing a new permanent residence
Migration	Movement of people across a specified boundary for the purpose of establishing a new permanent residence

Term	Definition/description
Availability	Deaths as a component of population change
Natural increase	Population increase that is the result of births and deaths; growth occurs when the number of births in a given time period (e.g. a calendar year) exceeds the number of deaths; a negative growth, or population decline, occurs when the number of deaths exceeds the number of births
Net migration	The net effect of immigration and emigration on a country's population, expressed as increase/decrease per 1,000 population in a given year
Nuclear family	A couple and their unmarried children residing together
Out-migrants	Persons who move out of an area within a country for the purpose of establishing a new permanent residence in a different area of the country
Percentage Age-Specific Fertility Rate	Fertility pattern: shows the relative contribution to fertility of one age-group compared to the overall fertility
Population census	The total count of a population. Usually taken at 5- or 10-year intervals
Population density	Number of persons per square mile or square kilometre of land area
Population mobility	Movement of population through time
Population momentum	Continued population growth even after birth rates have fallen; due to an increasing number of adult couples because of past high fertility
Population policies	Measures devised by governments to influence population size, growth or distribution

Terms

Population dynamics

Definition/description

Vital events or migratory movements: refer to fertility, mortality and migration (including urbanisation)

Population projections

Scenarios of what future populations may look like under given assumptions

Population structure

Refers to population size; geographic distribution; and age-sex structure

Rate of natural increase

Rate of which population grows (increase/decrease) during a given year, as the result of a surplus/deficit of births over deaths; expressed as a percentage of the base population

Rate of population growth

Rate at which population grows (increase/decrease) during a given year, as the result of natural increase plus net migration; expressed as a percentage of the base population

Retard age population

Depends on the education systems of various countries, but usually ages 6–19

School enrolment

Proportion of population, by age-groups or single years of age, currently enrolled in school

Sex ratio

Number of men per 100 women. Sex ratios over 100 indicate that there are more males than females, and sex ratios under 100 indicate more females than males

Socio-economic indicators

Economic activity, educational attainment of population, and marital status

Total fertility rate (TFR)

The average number of children a woman would give birth to, during her lifetime, if she were to pass through her childbearing years conforming to the Age-Specific Fertility Rates of a given year

Term	Definition/description
Vital events	Births, deaths, marriages and divorces
Vital statistics	Information on vital events
Volume of migration	Number of migrants
Working-age population	Normally defined as population aged 15–64, or 15–59

Definition/description

Births, deaths, marriages and divorces

Information on vital events

Number of migrants

Normally defined as population aged 15–64, or 15–59

