GUAM POPULATION PROFILE

A guide for planners and policy-makers

Statistics and Demography Programme
&
Guam Bureau of Statistics and Plans

Secretariat of the Pacific Community,
Noumea, New Caledonia, March 2007

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CONTENTS

List of tables

List of figures

List of maps

FOREWORD

Since 1967, the Secretariat of the Pacific Community (SPC) has assisted its 22 Pacific Island members in the areas of population data collection, demographic analysis and population development. This technical assistance has been made possible by generous support from bilateral and multilateral donors, most notably the Australian Agency for International Development (AusAID) and the United Nations Population Fund (UNFPA).

During the 1970s and 1980s, the activities of SPC's Demography Programme concentrated on population censuses and surveys, covering all aspects from design, data collection and processing to analysis and dissemination, with a strong emphasis on training and institutional capacity building. While maintaining these services, the programme's overall strategic objective was widened in 1990 to include data utilization, paying greater attention to the relationship between population and development. This change in emphasis was made in response to growing demands from the member countries.

Evidence-based decision-making and effective planning are essential for good governance. The overall objective guiding SPC's programme's activities over the last decade has been to strengthen national capacities in the collection, analysis and utilization of population data, and to foster a greater understanding of the interdependence between population dynamics and development. To achieve this objective, technical information is communicated so that it can be understood and applied by both technical and non-technical users, in order to familiarize planners and policy-makers with some of the key features of their country's socio-economic and demographic situation.

The core theme of this report is the analysis of recent population growth and dynamics on Guam. In particular, trends and patterns for fertility, mortality and migration are discussed. The report includes a brief discussion of the likely impacts of some of these dynamics on wider cross-cutting issues such as the environment, health, education and economic activity. A set of population projections are presented to assist planners and policy-makers with scenarios of future population size and structure. The report's aim is to assist decision-makers to plan effectively for the specific needs of different population groups at different points in time.

SPC emphasizes the importance of close collaboration with national counterparts to ensure transfer of knowledge for improving analytical methodologies and planning and organizing national reports. This emphasis will facilitate the long-term sustainability of demographic analysis in the region.

This report is based on the 2000 census of Guam's population and also draws on other administrative records. The profile was prepared by SPC's Statistics and Demography Programme in close collaboration with the Guam Bureau of Statistics and Plans.

Dr Jimmie Rodgers
Director-General
Secretariat of the Pacific Community

ACKNOWLEDGEMENT FROM GUAM GOVERNMENT

Hafa Adai! I am pleased to present to you the *Guam Population Profile*. The profile gives an overview of Guam's demographics, and social and economic characteristics with a comparison of census data and updated information, where available. Topics include population growth, structure and dynamics, such as levels and patterns of fertility, mortality and migration. Population projections for the period 2000 to 2025 are also presented. Other topics covered are the labor force, military, household composition, education characteristics, disability and poverty. The last *Guam Population Profile* was prepared by SPC in 1997.

With the increasing military presence on Guam and expected growth in construction and infrastructure development, the profile will serve as a useful resource tool for researchers, planners, government and policy-makers in developmental planning and decision-making. The information contained in this report will support the formulation of policies and implementation of efficient and effective measures to develop immediate and long-term strategies to address our island's needs.

I would like to take this opportunity to thank my staff for their hard work, dedication and commitment in completing this publication. Our sincere appreciation is extended to Mr Andreas Demmke, SPC Demography Specialist, for his technical assistance and guidance and to Ms Cynthia Naval of the Guam Department of Public Health & Social Services for providing vital statistics and critical information about Guam's population for inclusion in the report. We also thank the many other Government of Guam agencies, businesses, and countless others who contributed to this worthwhile effort. We are confident this profile will be invaluable in meeting your data, research and planning needs.

Dangkulo Na Si Yu'os Ma'ase',

Alberto 'Tony' A. Lamorena V
Acting Director
Bureau of Statistics and Plans

Summary of main indicators

	Total	Males	Females
Total enumerated population (April 2000)	154,805	79,181	75,624
Rate of growth (%) of total population, 1990–2000	1.5	1.1	2.0
Rate of natural increase (CBR – CDR)	2.5	2.4	2.6
Crude net migration rate	–1.0	–1.3	–0.6
Per cent urban (of population)	93%		
Labor market activity (March 2006)			
Civilian labor force (number)	65,940	35,160	30,780
Employed (number)	61,390	32,910	28,480
Unemployed (number)	4,530	2,230	2,300
Veterans	3,040		
Not in the labor force	38,890	15,380	23,510
Unemployment rate (%)	6.9	6.4	7.5
Labor force participation rate	62.9	69.6	56.7
Fertility			
Average annual number of births, 1990–2000	4,194	2,181	2,013
Crude birth rate (CBR), 1990–2000	29.1	29.1	29.2
Total fertility rate (TFR), 2003/2004			2.7
Teenage fertility rate 2002–2004			57
Mean age at childbearing (MAC), 2002–2004			27.8
Average age at first marriage (SMAM), 2000	28.0	29.0	27.1
Mortality			
Average annual number of deaths, 1990–2000	625	382	243
Crude death rate (CDR), 1990–2000	4.3	5.1	3.5
Life expectancy at birth, 1998–2002	73.6	71.1	76.1
Infant mortality rate (IMR), 2001–2004	9.8	11.1	8.4
Child mortality rate (1q5), 1998–2002	2.0	2.4	1.6
Under 5 mortality (q5), 1998–2002	10.4	11.4	9.3

	Total	Males	Females
Number of private households (2000)	38,769		
Average household size	3.9		
Median household income ($)	$39,317		
Number of households headed by male/female		27,906	10,863
Number of families (2000)	32,367		
Average family size	4.3		
Median family income ($)	$41,229		
Number of families headed by male/female		23,780	8,587
Number of non-family households	6,402		
Median non-family income	$22,712		
Military characteristics (2000)			
Number of people living in military group quarters	1,710	1,255	455
Number of people on active duty	4,376	3,395	981
Number of military dependants	11,840	4,550	7,290
Number of people in reserves or National Guard only	1,470	1,050	420
Veteran status	8,962		
Military characteristics (2006)			
Number of people on active duty	6,253		
Number of military family members	6,058		
Education[1]			
Primary & secondary enrollment (SY2005–2006)	39,783		
Catholic schools	3,839		
Dept of Defense & Education Activity (DODEA)	2,418		
Other private schools	2,748		
Guam public school system	30,778		
High school graduates	1,735		
Private schools	517		
Public schools	1,218		
University & college enrollment (2005–2006)			
University of Guam	3,034		
Guam Community College	10,268		
	Total	**Males**	**Females**

Primary & secondary (includes pre-primary)			
Total enrollment (1990)	31,182	15,983	15,199
High school graduates and higher (people 25 yrs & over)	48,860	26,891	21,969
Total Enrollment (2000)	39,549	20,310	19,239
High school graduates and higher (people 25 yrs & over)	63,576	32,834	30,742
College			
Total enrollment (1990)	5,949	3,082	2,867
Total enrollment (2000)	7,279	3,092	4,187
Housing units (2000)			
Occupied	38,769		
Owner-occupied	18,747		
Renter-occupied	20,022		
Vacant	8,908		

[1] For school year (SY) 2005–2006, several schools did not provide a complete gender breakdown.

EXECUTIVE SUMMARY

This report presents an analysis of the population of Guam and its socio-economic characteristics. It also provides population projections, and discusses implications for planning and policy formulation.

The 2000 Guam population census found that the total population was 154,805. This total compares with 133,152 in 1990, an increase of 16.3 per cent or 21,653. This increase in population represents an average annual rate of growth of 1.5 per cent.

The district of Dededo had the largest and fastest growing population between 1990 and 2000, followed by Yigo. The district of Santa Rita showed the largest decrease in population in the period between the two censuses. The districts of Agana Heights, Mongmong-Toto-Maite, Tamuning and Sinajana had more than 3,000 people per square mile, representing the highest population densities found in 2000. In contrast, the districts of Inarajan, Talofofo and Umatac had less than 200 people per square mile, the lowest population densities.

The number of households on Guam increased 24 per cent, from 31,373 in 1990 to 38,769 in 2000. There was a dramatic decline in the number of households in the district of Santa Rita, with 507 fewer households in 2000 compared with 1990.

Married couple families accounted for the majority of family households. However, these families have grown at a slower rate than families headed by females. In 1980 families headed by a female (with no husband present) made up 11.1 per cent of all family households, increasing to 14.1 per cent in 1990 and 19.4 per cent in 2000.

The 1990 Guam census reported Guam's median household income at $30,755 (income in 1989). Household median income grew to $39,317 as recorded in the 2000 Guam census (income in 1999).

Grandparent caregivers claimed long-term responsibility for their grandchildren after a period of 5 years or more. The 2000 Guam census results indicated that 43.4 per cent of grandparent caregivers were responsible for their grandchildren for 5 years or more.

During the intercensal period 1990–2000 a total of 41,936 births and 6,248 deaths were registered. Applying the *demographic balancing equation*[1] provides an estimate of about –14,000 net migrants during the period 1990–2000 or a loss of 1,400 people annually.

Almost 24,000 (17.4 per cent) of Guam's population in 2000 had been living overseas in 1995, half of them in the US.

Almost half (47.8 per cent) of Guam's total enumerated population in 2000 (154,805) was born overseas. This number includes 23 per cent of the native population of Guam.

Based on the registered number of births by age of mother, a total fertility rate (TFR) (average number of births per woman) of 3.1 was estimated for 2000. The TFR was estimated to have decreased to about 2.7 in 2003/2004.

[1] Population growth = Births – Deaths + Net Migration

Based on registered numbers of infant deaths, the infant mortality rate (IMR) was estimated at 9.8; 11.1 for males and 8.4 for females during the period 2001–2004. This represents a slight increase compared with the period 1996–2000 when the male and female IMR was only 8.6 and 7.7, respectively.

Based on the registered number of deaths by age and sex for the years 1998–2002, life expectancy at birth was estimated at 71.1 years for males and 76.1 for females.

The Chamorro or part Chamorro population comprised 42 per cent of the Guam population in 2000 and was the largest single ethnic group. Filipinos formed the second largest group at 26 per cent of the population, followed by Koreans, Chinese and Japanese. Another 8 per cent of the Guam population consisted of other Pacific Islanders, mainly Chuukese.

The proportion of the population with a disability increased continuously with age. The overall proportion of males with a disability was 18 per cent of males aged 5 years old and older, slightly higher than that of females in this category (17 per cent).

The employment prospects of people with a disability at ages 21–34 years were not affected by their disability. People aged 35 years and older with a disability had lower employment prospects than people without a disability.

Based on the set income threshold that defines people living below the poverty level, one in five families lived below the poverty level in 1999. Households headed by females with children (no husband present) were particularly vulnerable. The district with the highest proportion of families living below the defined poverty level was Umatac, which was followed by Mongmong-Toto-Maite and Chalan Pago-Ordot.

Between 1990 and 2000 the civilian labor force increased by 10,266, from 54,186 people in 1990 to 64,452 in 2000. During the same period, the employed population increased by 4,909, from 52,144 people in 1990 to 57,053 in 2000. The number of unemployed people increased by 5,357 from 2,042 in 1990 to 7,399 unemployed in 2000.

The number of people working for the armed forces declined by 7,511, from 11,952 in 1990 to 4,441 in 2000.

The unemployment rate in 2000 was equally high for males and females: 11.5 per cent.

The proportion of the population aged 16 years and older in the labor force (*labor force participation rate)* in 2000 was 73.1 per cent for males and 57.8 per cent for females (65.6 per cent for the total population).

Military personnel on active duty made up only 4.4 per cent or 4,376 people in 2000, as compared with 13.1 per cent or 11,888 in 1990. This number increased again to 6,253 personnel in 2006.

In 1990 nearly 15 per cent of Guam's total population consisted of military personnel on active duty and their dependants. By 1999, this group made up only 8 per cent of Guam's

total population. From 2000 to 2006 the number of active duty personnel and their families remained steady at 7 per cent of Guam's population.

In 1990 the school enrollment population was 27.9 per cent of Guam's total population. Between 1990 and 2000 there was an increase of 26.1 per cent in the total student population (people aged 3 years and older), from 37,131 in 1990 to 46,828 in 2000.

In 2000 renter-occupied housing units made up the majority of all occupied housing units. Of the 38,769 occupied housing units on Guam, 52 per cent, or 20,022, were rented. Dededo and Tamuning had the highest number of rented units, both holding 22 per cent of all renter-occupied units.

According to the population projections prepared for this report, the population of Guam in 2015 will be well over 200,000 people, mainly due to the expansion plans of the US Marines, which are designed to boost US reconnaissance, deployment and training capabilities in the region. This increased deployment will most probably be accompanied by an influx of migrant workers to assist with the construction of housing and infrastructure.

The population will be older overall, with a decreasing proportion of the young population aged 15 years and younger, and an increasing proportion of the older population aged 60 years and older.

The government and business community need to be aware of their country's population structure, population processes and socio-economic characteristics so that they can plan for an adequate standard of living, and for proper provision and distribution of goods and services.

The population data in this report provide an effective tool for planning and policy-making. Understanding and anticipating population changes enables development planners to formulate effective development programs and strategies to promote the well-being of the people of Guam.

1. INTRODUCTION

Guam is an island territory of the United States located 900 miles north of the equator in the Western Pacific, situated along 13 degrees north latitude, 144 degrees east longitude. It is the largest island in the Marianas Archipelago, located at the southern end of the Marianas chain in the Western Pacific, and is known as the 'gateway' to the region.

The island of Guam is approximately 209 square miles in area (549 sq. km) and is about 30 miles (48.3 km) in length with a width of 8.5 miles (13.71 km) at the northern tip and a maximum width in the south of 12 miles (19.3 km). It is approximately 6,000 miles from San Francisco; 3,800 miles west of Honolulu; 1,500 miles southwest of Japan; 1,596 miles from the Philippines; and 2,026 miles east of Hong Kong. Average flight times to key Asian cities are between 3.5 and 4.5 hours. Travel time to Hawaii is seven hours.

The island is surrounded by a coral reef with deep water channels. The coastlines include sandy beaches, rocky cliff lines, and mangrove areas. Guam was formed by the unification of two ancient volcanoes that fused together, shaping the island like a footprint with limestone plateaus in the northern and southern areas of the island.

Guam has a tropical climate. The average temperature during the day is 85°F while evening temperatures average 65°F to 75°F. The humidity averages between 72°F to 86°F. The coolest months are January and February, with an average temperature of 83.4°F, while June is the warmest month, with an average temperature of 86.9°F. The driest months are normally January to June, with an average of 5.2 inches of rainfall. The wettest months are July to October, averaging 13 inches in rainfall.

Guam is eight hours ahead of Pacific time and 10 hours ahead of the eastern seaboard time zone. The currency used is the US dollar.

Guam is an unincorporated territory of the United States. Its capital is Hagåtña, formerly known as Agana. The government has three branches set up by Congress through the Organic Act of 1950, and one non-voting Congressional delegate to the House of Representatives. The Governor, Lieutenant Governor, Congressional delegate, Attorney General and 15 members of the unicameral Guam Legislature are all elected by the people of Guam.

The indigenous people of Guam are Chamorros. The official languages are Chamorro and English. The official tree is ifit (*intsia bijuga*), the official flower is bougainvillea (*puti tai nobio*) and the official bird is the Guam rail (*ko'ko*).

Entry requirements for Guam are the same as for any US destination. US citizens must possess a US passport to enter Guam and US citizens from Guam must possess a passport to enter the US. Citizens of most other countries must have a valid passport with a US visa. The Visa Waiver Program permits nationals from designated countries to apply for admission to the US for 90 days or less as non-immigrant visitors for business or pleasure

without first obtaining a US non-immigrant visa, but they must have a machine-readable passport and arrive on a signatory carrier.

This report provides an analysis of the characteristics of the Guam population. It is mainly based on data from the 2000 census and recent vital registration and administrative data.

The report was produced by the Guam Bureau of Statistics and Plans, Office of the Governor, in collaboration with the Statistics & Demography Programme of the Secretariat of the Pacific Community (SPC). In particular, Guam's State Data Center Coordinator, Ms Monica J. Guerrero, and Planner, Ms Janet Quitugua, played a significant role in producing the report, and as part of this work, visited SPC in Noumea from 2 to 16 December 2006.

The report has two main purposes:

- to provide a general overview of the vast amount of detailed information available from the 2000 census and earlier census enumerations; and
- to highlight key implications and factors for developmental planning and policy-making.

Data users are encouraged to contact the Guam Bureau of Statistics and Plans or SPC's Statistics & Demography Programme for further information.

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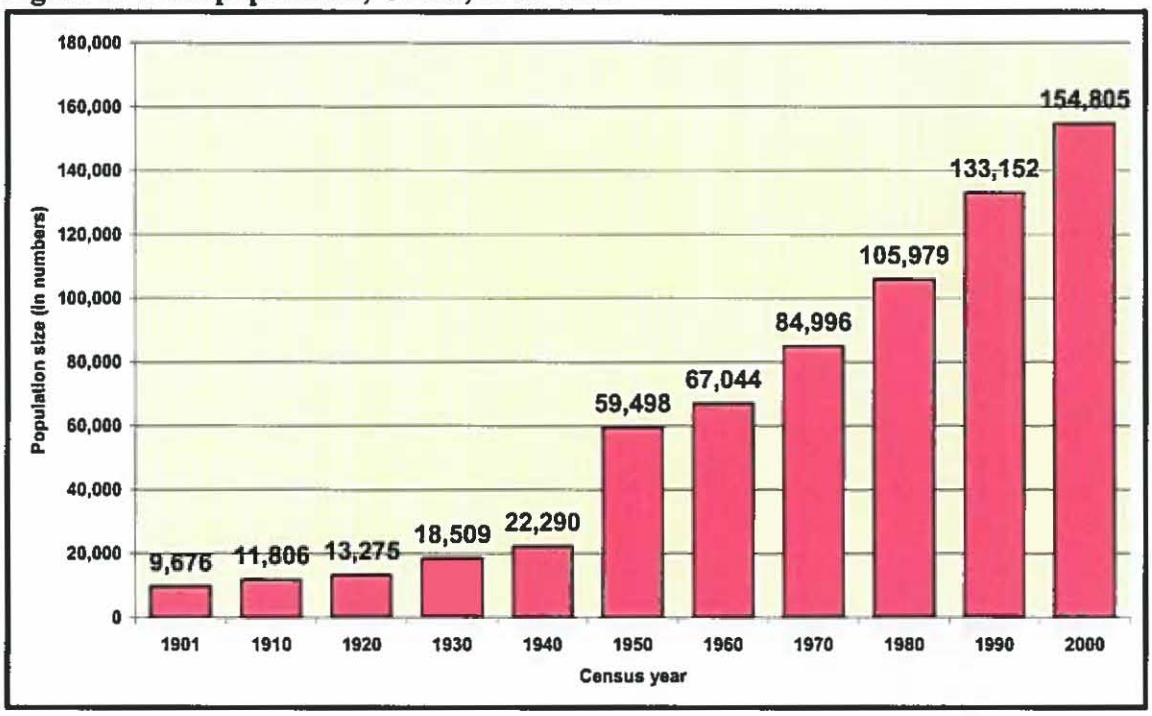
2. POPULATION TRENDS AND STRUCTURE

2.1 Population trends

The total population of Guam, as enumerated on 1 April 2000, was 154,805 people: 79,181 males and 75,624 females. This total represented an increase of 21,653 people in the 10 years since the 1990 census (133,152). The overall growth rate[2] of Guam's population between 1990 and 2000 was 1.5 per cent per annum, which compares with 2.3 per cent annually between 1980 and 1990.

Guam's population has steadily increased since the early 1900s (Figure 1). In 1901 the population was just under 10,000 people. It was almost 60,000 in 1950, more than 100,000 in 1980, and over 150,000 in the year 2000.

Figure 1: Total population, Guam, 1901–2000



The different districts of Guam showed large differences in population growth during the period 1990–2000 (Table 1 and Figure 2). Dededo, Yigo and Mangilao experienced significant increases in population size, while that of Santa Rita decreased. The districts of Barrigada, Piti, Hagatna and Umatac also experienced a slight decline in population size. The drop in the population size of Barrigada and Santa Rita can be attributed to the closure of military bases and military downsizing in those areas; while the total population of the two districts declined, the civilian population increased between 1990 and 2000.

[2] For explanation of growth rate formula, please refer to the 'Growth rate calculation' box under Table 2.

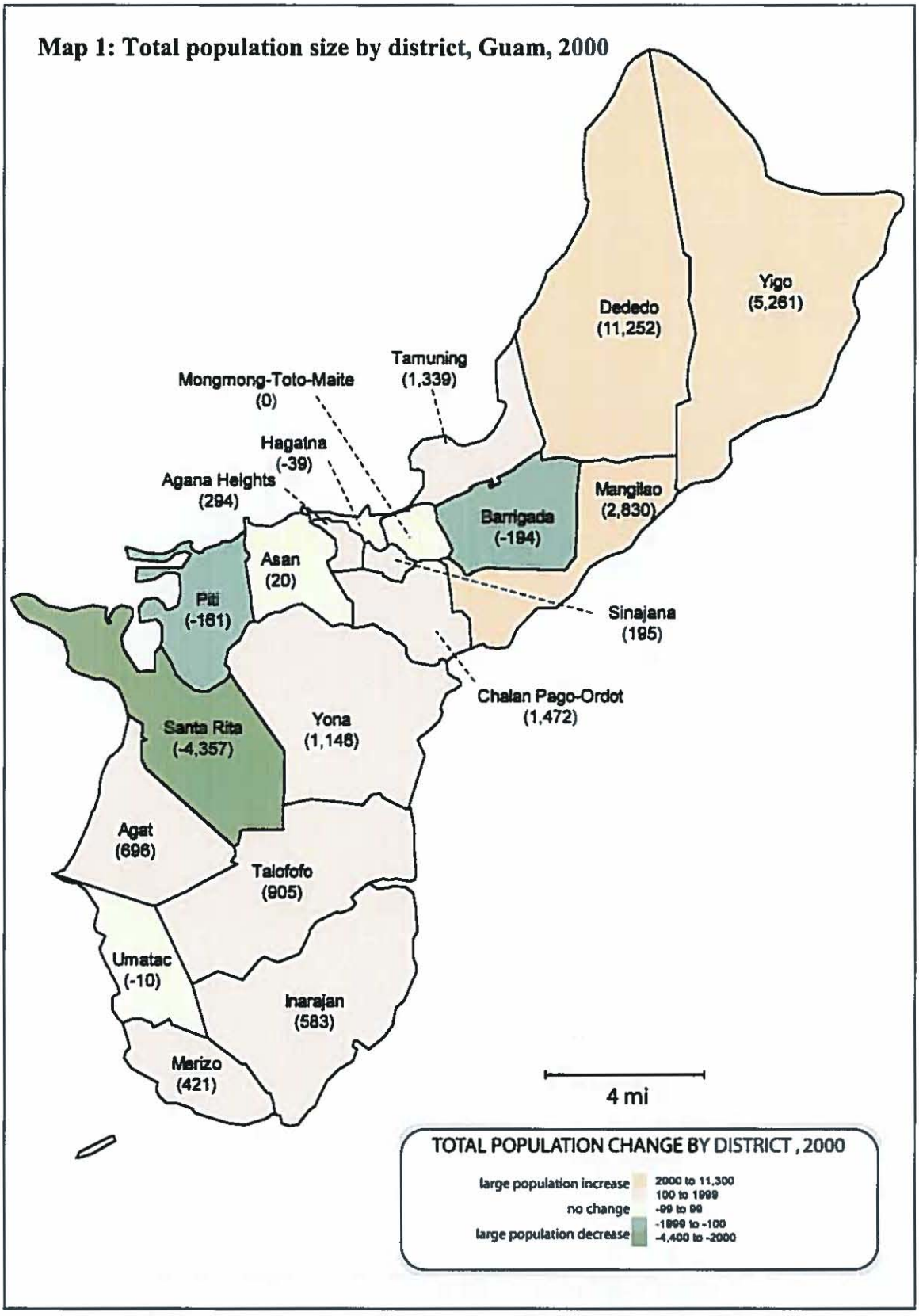
Figure 2 displays population changes by district between 1990 and 2000 in percentage terms. The total population of Guam increased by 16.3 per cent between 1990 and 2000 (see also Maps 1 and 2).

Districts that grew faster than the national average most likely gained people from other districts through internal migration. In districts that grew less than the national average, people moved to other districts or overseas.

Table 1: Population size by district, Guam, 1990 and 2000

	Population size		Population change 1990–2000	
District	**1990**	**2000**	**Total**	**%**
Agana Heights	3,646	3,940	294	8.1
Agat	4,960	5,656	696	14.0
Asan	2,070	2,090	20	1.0
Barrigada	8,846	8,652	–194	–2.2
Chalan Pago-Ordot	4,451	5,923	1,472	33.1
Dededo	31,728	42,980	11,252	35.5
Hagåtña/Agana	1,139	1,100	–39	–3.4
Inarajan	2,469	3,052	583	23.6
Mangilao	10,483	13,313	2,830	27.0
Merizo	1,742	2,163	421	24.2
Mongmong-Toto-Maite	5,845	5,845	0	0.0
Piti	1,827	1,666	–161	–8.8
Santa Rita	11,857	7,500	–4,357	–36.7
Sinajana	2,658	2,853	195	7.3
Talofofo	2,310	3,215	905	39.2
Tamuning	16,673	18,012	1,339	8.0
Umatac	897	887	–10	–1.1
Yigo	14,213	19,474	5,261	37.0
Yona	5,338	6,484	1,146	21.5
Guam	**133,152**	**154,805**	**21,653**	**16.3**

Map 1: Total population size by district, Guam, 2000



Map 2: Population change (%) by district, Guam, 2000

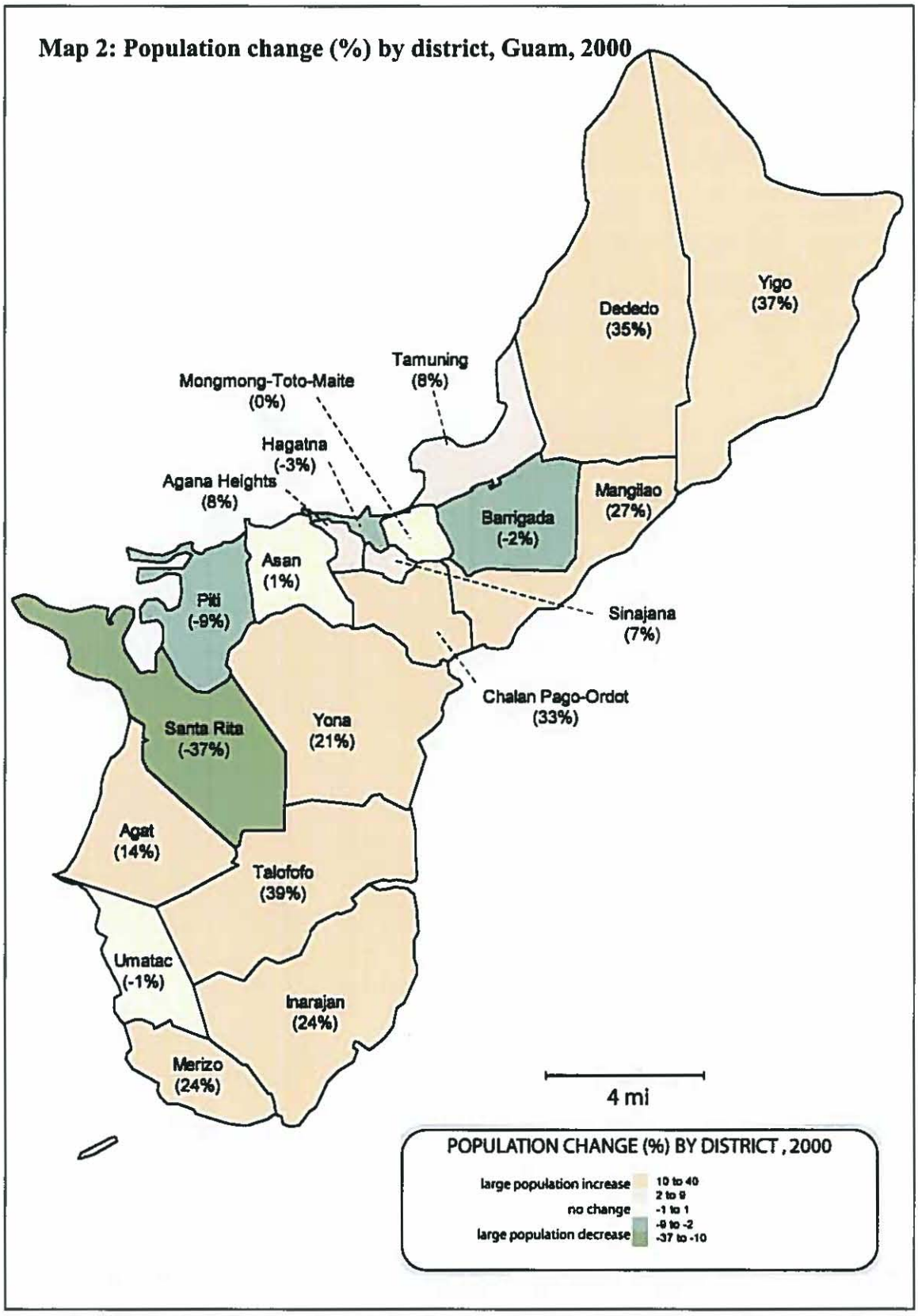
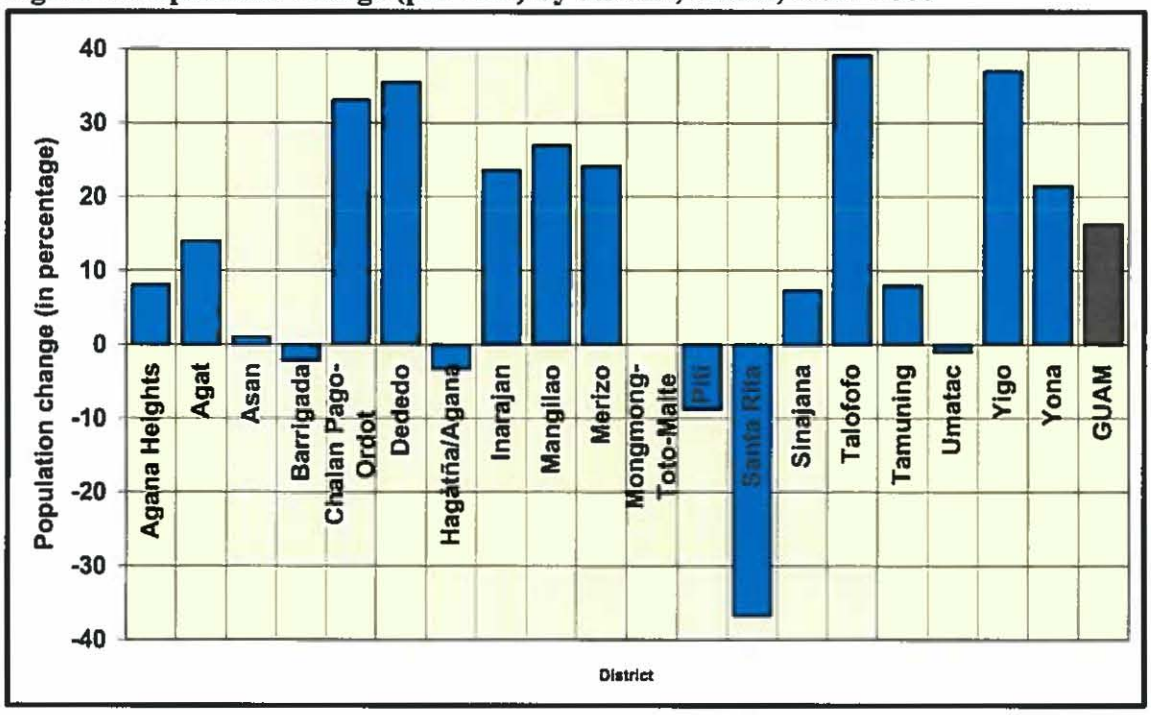


Figure 2: Population change (per cent) by district, Guam, 1990–2000



According to census data for 2000, the average population density of Guam was 738 people per square mile, an increase from 634 in 1990 (Table 2).

The population density varied widely by district. While there were more than 3,000 people per square mile in Agana Heights, Sinajana, Tamuning and Mongmong-Toto-Maite districts, there were less than 200 people per square mile in the districts of Inarajan, Talofofo and Umatac (Table 2 and Map 3).

Table 2: Population density (people per square mile), Guam, 1990 and 2000

District	Land area (sq. miles)	Population density	
		1990	2000
Agana Heights	1.03	3,540	3,825
Agat	10.50	472	539
Asan	5.54	374	377
Barrigada	8.48	1,043	1,020
Chalan Pago-Ordot	5.69	782	1,041
Dededo	30.56	1,038	1,406
Hagåtña/Agana	0.90	1,266	1,222
Inarajan	18.85	131	162
Mangilao	10.21	1,027	1,304
Merizo	6.33	275	342
Mongmong-Toto-Maite	1.85	3,159	3,159
Piti	7.44	246	224
Santa Rita	16.17	733	464
Sinajana	0.85	3,127	3,356
Talofofo	17.69	131	182
Tamuning	5.66	2,946	3,182
Umatac	6.42	140	138
Yigo	35.41	401	550
Yona	20.28	263	320
Guam	**209.86**	**634**	**738**

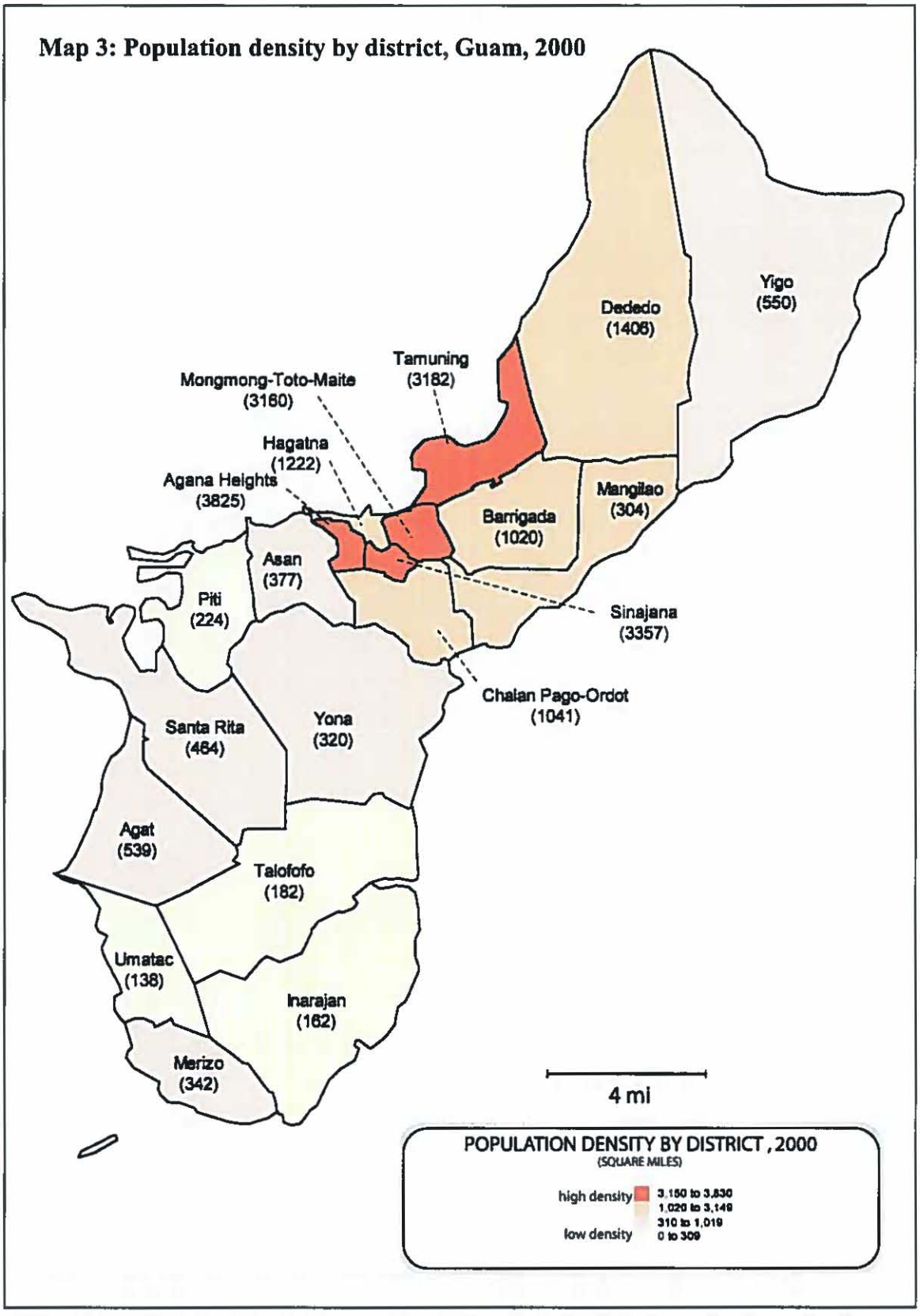
Growth rate calculation: **Growth rate (r) = $ln(P(2) / P(1)) / t$ x 100**

Where:

r = average rate of growth during the time interval between point 1 and 2
ln = logarithm
$P(1)$ = size of the population at point 1 or the initial (base) population
$P(2)$ = size of the same population at point 2 at a later date
t = interval (in years) between point 1 and 2

Growth rate (r) = ln((population in 2000) / (population in 1990)) / 10 x 100
= ln(154,805/133,152)/10 x 100
= (0.151)/10 x 100
= 0.0151 x 100
= **1.51**

Map 3: Population density by district, Guam, 2000



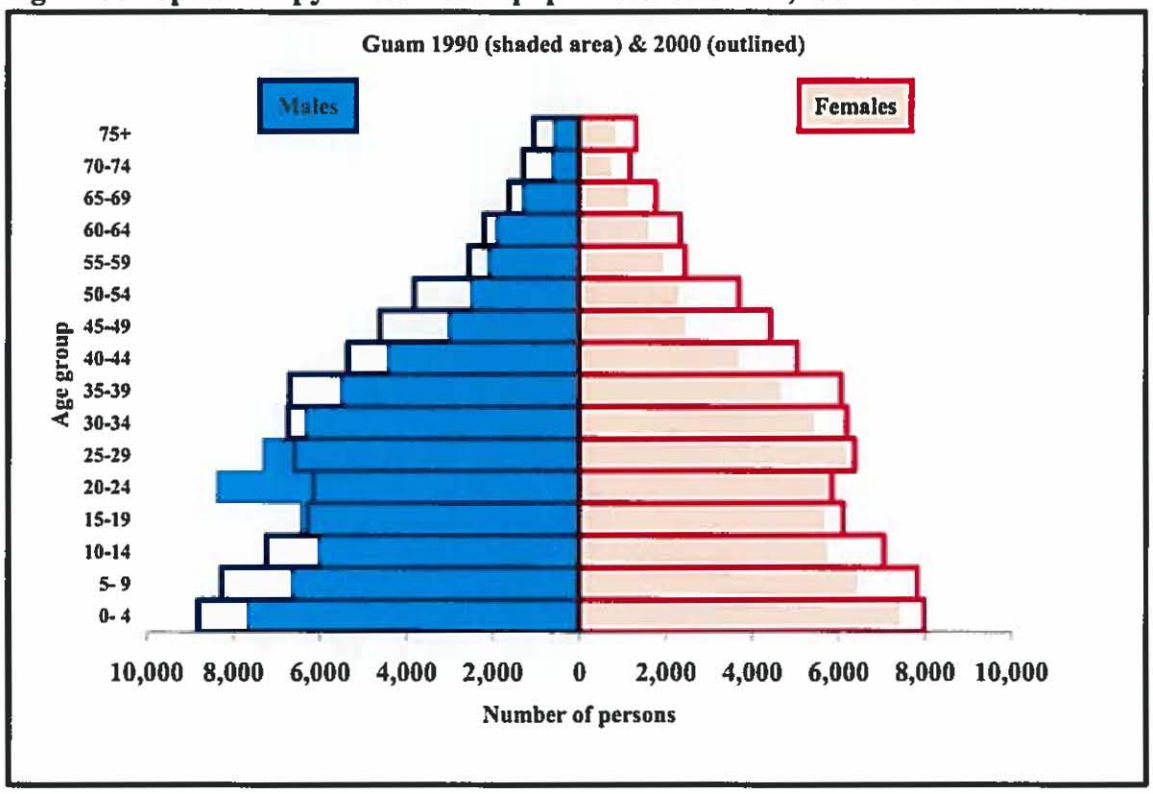
2.2 Population structure

The enumerated 2000 population consisted of 79,181 males and 75,624 females. These figures reflect a surplus of 3,557 males, resulting in a sex ratio of 105, which means that there were 105 males per 100 females. A *sex ratio* of more than 100 shows that there are more males than females, as in this case (whereas a sex ratio of 100 shows that there are equal numbers of males and females and a sex ratio of less than 100 shows that there are fewer males than females).

The population pyramid in Figure 3 shows the number of males and females in 5-year age groups, starting with the youngest age group at the bottom, and increasing with age through the higher parts of the pyramid. The number of males is depicted on the left of the pyramid and the number of females on the right.

The shaded area shows the population count of the 1990 census, while the thickly outlined area shows the population count of the 2000 census. Note that the people counted in the 1990 census were 10 years older in the 2000 census, if they were present on Guam and enumerated during both censuses.

Figure 3: Population pyramid – total population of Guam, 1990 and 2000



A distinct feature of the Guam population pyramid is the indent for the 15–24 year age groups, meaning that there are far fewer people in these age groups than in the younger and older age groups. This difference is most probably the result of out-migration for educational and employment reasons.

In general, almost all age groups in 2000 increased in population size compared with the 1990 population enumeration. A noticeable exception was the group of 20–29 year males, which showed a significant decrease in numbers between 1990 and 2000. This drop reflects a reduction in the military population during this period.

Just over 30 per cent of Guam's population was younger than 15 years. This proportion has only marginally changed since 1990. However, the proportion of the population aged 60 years and older has increased from 6.6 per cent to 8.2 per cent. As a result, the median age, which was 25 years in 1990, has increased to 27.3 years in 2000 (Table 3). In other words, half of Guam's population was younger than 27.3 years and the other half was older than 27.3 years.

Table 3: Distribution of Guam's population by age, dependency ratio, median age and sex ratio, 1990 and 2000

Indicator	1990	2000
Proportion of population by broad age group (in %)		
Age group 0–14 years	30.0	30.5
Age group 15–59 years	63.4	61.3
Age group 60+ years	6.6	8.2
Age dependency ratio (15–59 years)	58	63
Median age (years)	25.0	27.3
Sex ratio (males per 100 females)	114	105

A common way to describe a population's age structure is according to the *age dependency ratio*, which compares the proportion of the economically dependent component of a country's population with the proportion of its productive component. This ratio is conventionally expressed as the ratio of the young (0–14 years of age) plus the old (60 years and older), to the population in the working age group (15–59 years of age).

Guam's dependency ratio in 2000 was 63. This means that for every 100 people in the working age group, there were 63 people in dependent age groups (Table 3). The higher the dependency ratio, the higher the number of people that need to be cared for by the working age population. The dependency ratio has increased since the 1990 census, when it was 58.

3. DEMOGRAPHIC CHARACTERISTICS

3.1 Fertility

The fertility of a population depends on various factors:

- demographic composition (age structure) of the population, particularly number of women aged 15–49 years (childbearing years);
- age at marriage;
- availability and use of family planning methods (contraceptive prevalence rate);
- cultural context (family size preference/value or cost of children);
- level of economic development; and
- status of women (place in society, level of education, work status).

Fortunately, Guam can draw on a complete and timely vital registration system. The Department of Public Health and Social Services collects and publishes the annual number of births on Guam by the age of the mother and by date of birth.

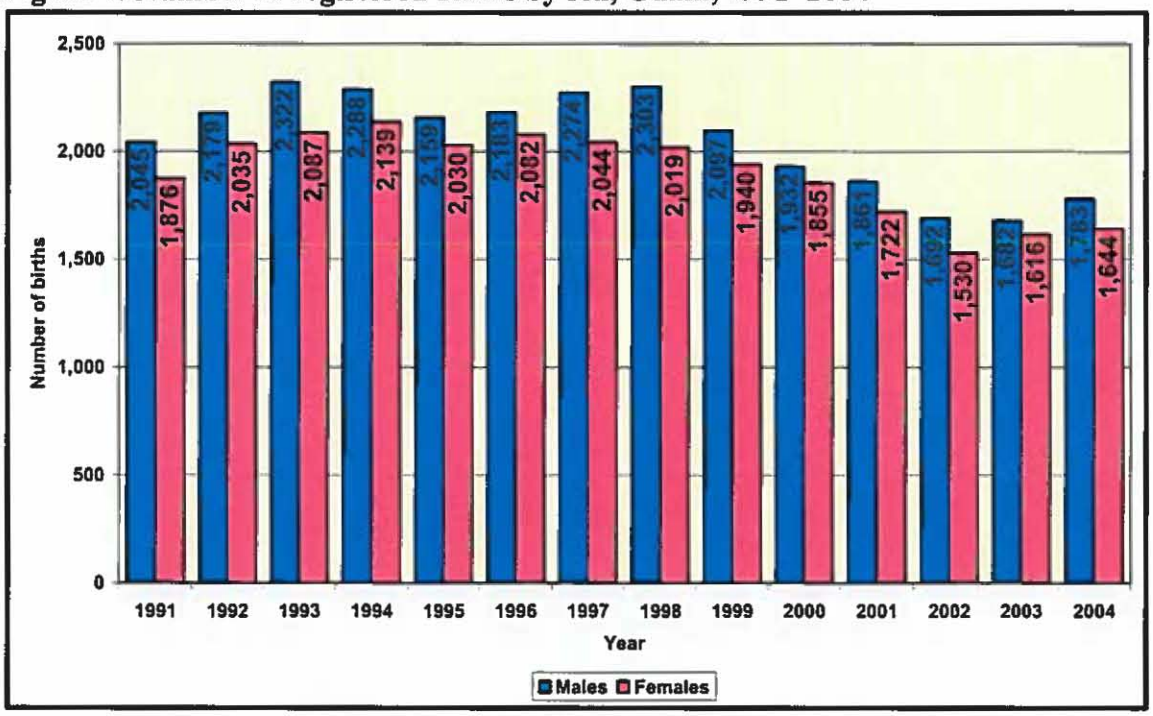
Detailed information on the number of births by sex (Figure 4, and Appendices 1 and 3) and by age of mother (Figure 5 and Appendix 1) is available up to the year 2004, from which fertility indicators can be directly calculated.

The total number of annual births decreased notably between 1998 and 2002. During the period 1992–1998, well above 4,000 births per year were registered, while the average number of births seems to have stabilized at only 3,200–3,400 per year over 2002–2004.

Annually, on average about 8 per cent more male than female births were registered. This translates to a sex ratio at birth of 108, which means that there were 108 male births per 100 female births.

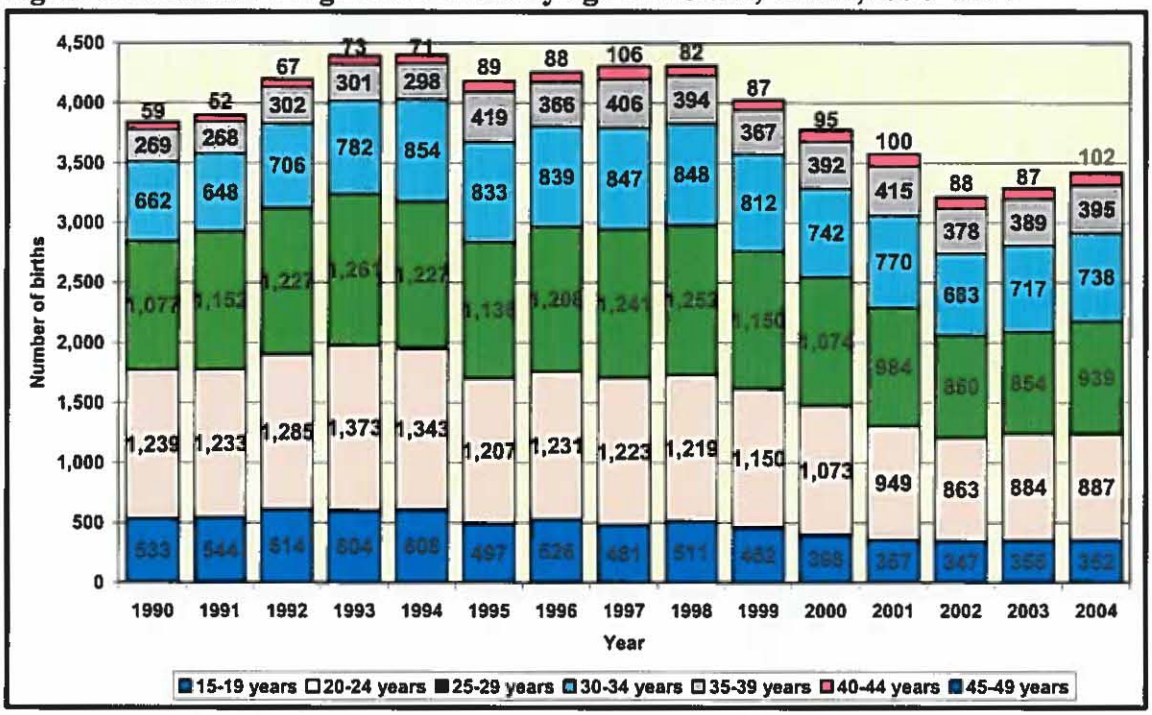
As mentioned above, the Department of Public Health and Social Services registers the number of births by the age of the mother. Most children were born to women aged 20–29 years of age, followed by children to women aged 30–34 years. Women aged 15–19 years and 35–39 years gave birth to about equal numbers of children. On average, fewer than 100 births per year were registered for women aged 40–44 years and no more than 2 children per year were born to women older than 45 years of age.

Figure 4: Number of registered births by sex, Guam, 1991–2004



Source: Department of Public Health and Social Services, Government of Guam

Figure 5: Number of registered births by age of mother, Guam, 1990–2004



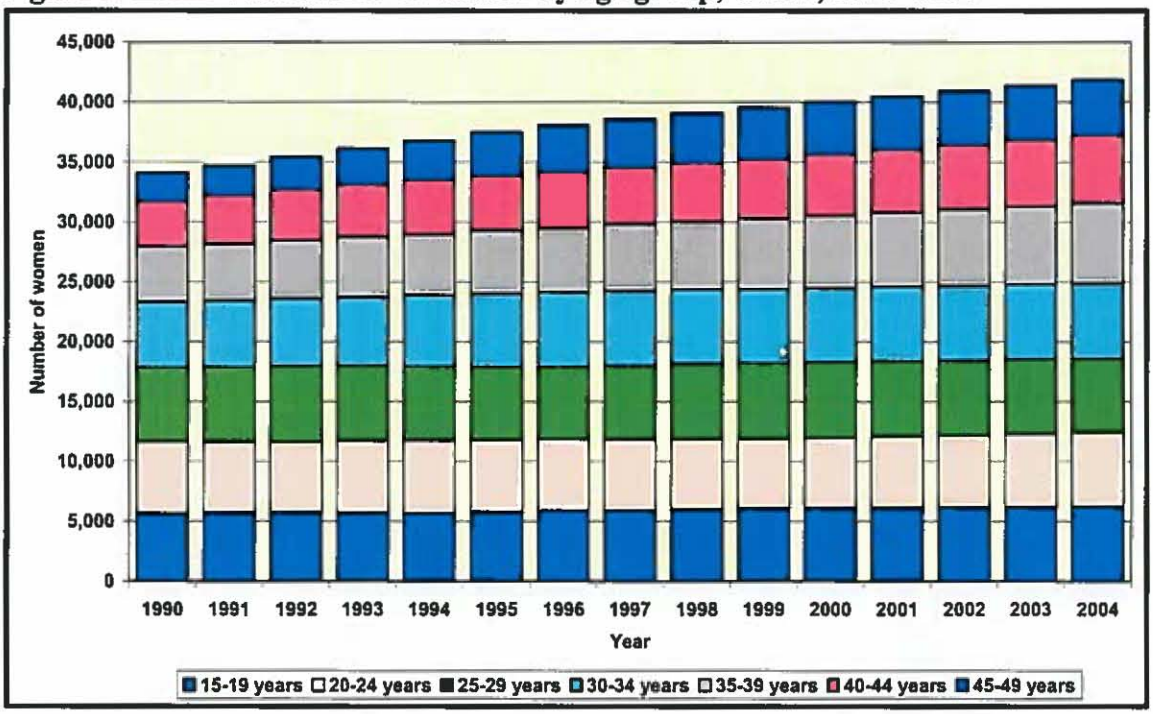
Source: Department of Public Health and Social Services, Government of Guam

The *age specific fertility rate* (ASFR) and *total fertility rate* (TFR) can be directly calculated by estimating the number of women by age group for the period 1990–2004

(Figure 6 and Appendix 1) by linearly interpolating birth cohorts of women as enumerated in the 1990 and 2000 censuses. It is assumed that women enumerated in the 1990 census were 10 years older in the 2000 census, and that women enumerated in 2000 are the survivors of those enumerated in 1990.

This procedure provides an estimate of the number of women by age group in each year of the intercensal period, 1990–2000. The number of women by age group for the years 2001–2004 was derived by extrapolating cohort growth rates as described above.

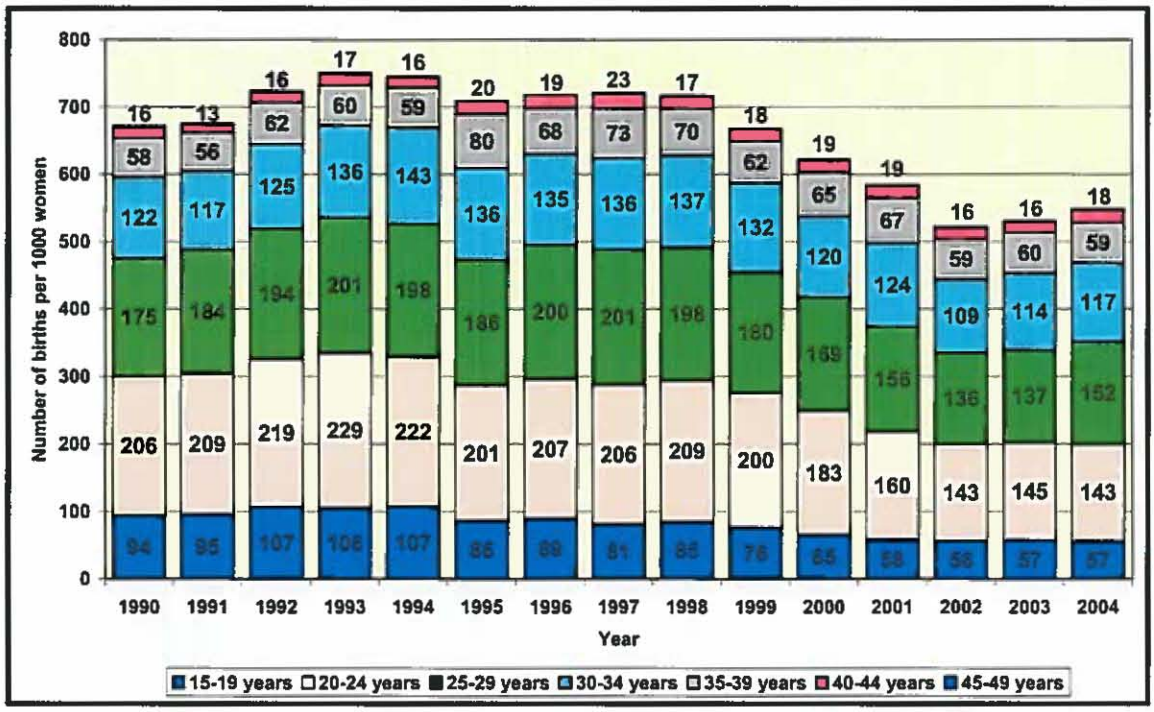
Figure 6: Estimated number of women by age group, Guam, 1990–2004



Based on the number of registered births by age of women, and the estimated number of women by age group, the ASFR for the years 1990–2004 can be calculated (Figure 7 and Appendix 1). The ASFR expresses the average number of children per woman by age group, and can be conveniently expressed as the number of births per 1,000 women in a given age group. Figure 6 shows that fertility rates have decreased for all age groups of women, and that the group with the most births per women has gradually shifted from the 20–24 year age group to the 25–29 year age group.

Based on the ASFR (number of births per woman), the *mean age at childbearing* (average age at which women gave birth) can be calculated. For the years 2002–2004 it was calculated at 27.8 years.

Figure 7: Estimated number of births by age of women (per 1,000 women), Guam, 1990–2004



3.1.1 Teenage pregnancy

Teenage pregnancy is defined as pregnancy in women under the age of 20 years.

Causes of teenage pregnancy

The problem of teenage pregnancy arises from individual, family, and various social factors. These factors include but are not limited to: culture; religion; moral values and beliefs; law; education; economic circumstances; support structures such as access to health care, contraception and other resources; and mental and emotional well-being.

More specifically, in some cases adolescents may lack knowledge of or access to conventional methods of preventing pregnancy (modern contraception), perhaps because they are too embarrassed to seek any assistance. In other cases, contraception is used but proves to be inadequate. Inexperienced adolescents may use condoms incorrectly, for example, or forget to take oral contraceptives. Contraceptive failure rates are higher among teenagers than among adult users.

Pregnancies of young women are often unwanted, and the result of unprotected sex. This experience is a serious health concern, as it exposes these young women to the risk of contracting sexually transmitted diseases (STDs) and HIV/AIDS.

Impact of adolescent pregnancy

The incidence of premature birth and low birth weight is higher among adolescent mothers than among older mothers. Often pregnant teens receive insufficient prenatal

care, and their children are more likely to suffer from ill health in childhood or be hospitalized than those born to older women.

Many pregnant teens are subject to nutritional deficiencies arising from poor eating habits that are common in adolescence, including skipping meals, snacking, and eating fast foods.

Demographic and Health Surveys (DHS) show that teen mothers are at high risk in terms of demographic and health issues, including death and contracting various diseases. The risk of medical complications is greater for girls of 14 years of age and younger, as an underdeveloped pelvis can lead to difficulties in childbirth. Further, medical services may not be readily available, which can lead to complications and sometimes the death of mother and child.

Being a young mother can affect a woman's education. Teen mothers are more likely than other young women to drop out of high school. Studies have found that most women who give birth during their teens do not complete their schooling. Young motherhood can therefore also affect employment and social class. The link between early childbearing and failure to complete school reduces career opportunities for many young women, who are then more likely to bear another child soon after the first.

Data supporting the view that teenage pregnancy is a social issue include lower educational levels, higher rates of poverty, and other poorer 'life outcomes' in children of teenage mothers. Teenage pregnancy usually occurs outside of marriage and, for this reason, it carries a social stigma in many communities and cultures.

The *teenage fertility rate* (the ASFR of women aged 15–19 years of age) decreased from about 100 births per 1,000 women during the period 1990–1994, to just below 60 births per 1,000 women for the years 2001–2004 (Figures 7 and 8).

Figure 8: Estimated teenage fertility rate, Guam, 1990–2004

3.1.2 Total fertility rate

The estimated ASFR allows direct calculation of the total fertility rate (Figure 9). The TFR indicates the average number of children that a woman gives birth to during her reproductive life (15–49 years of age).

The TFR for Guam in 2000 has been estimated at about 3.1. The 2000 figure, together with the 2002 estimate of 2.6, suggested that the TFR had been declining since 1998, when the TFR was 3.6. However, it appears that the 2002 estimate was the lowest level (for the time being) and that there has been a slightly increasing trend in the TFR since then (in 2003/2004 it was estimated at 2.7).

Figure 9: Estimated total fertility rate, Guam, 1990–2004

Estimates of the TFR have also been derived by Mr Michael Levin, US Census Bureau, using the *own-children method* (Figure 10). This method calculates the TFR to be at lower levels than the TFR calculated using registration data.

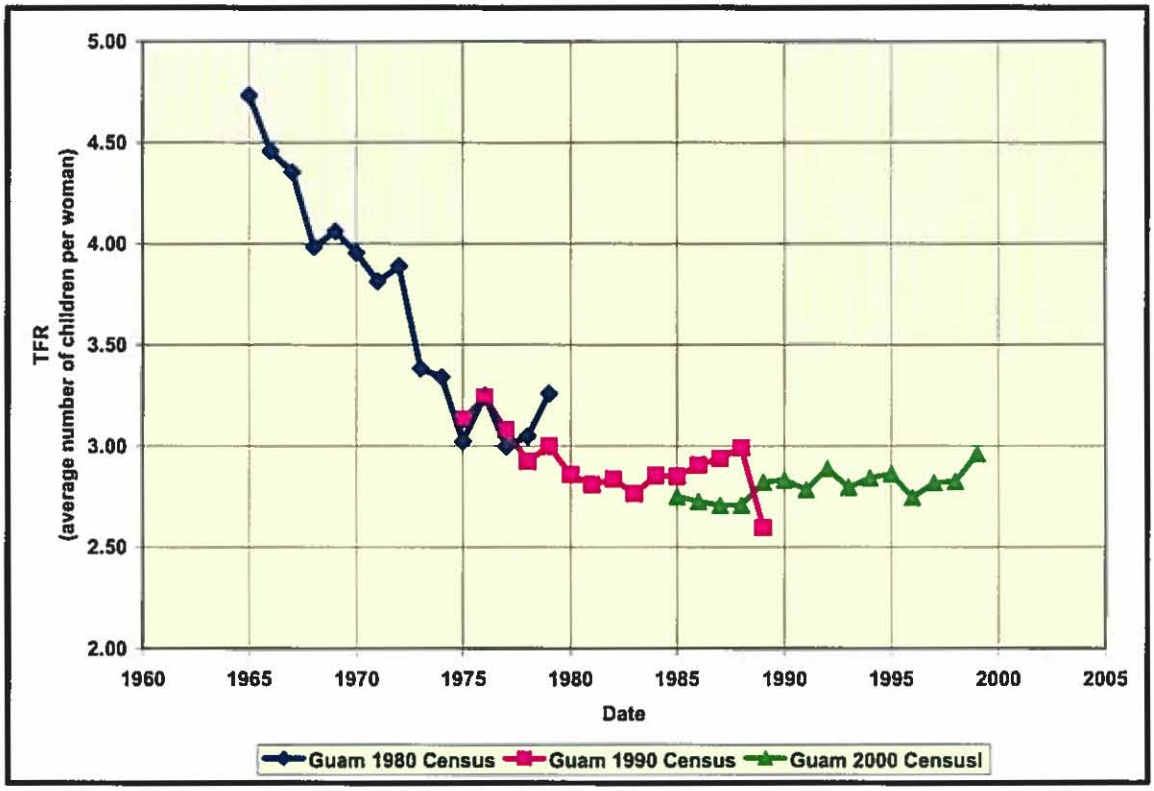
The own-children method is a procedure for deriving age specific fertility rates for a 10- or 15-year period from a special census tabulation of children classified by their age and the age of their mother, with both ages being given in years at the time of the census. Age of mother can be determined only for those children who are enumerated in the same household as their mother – that is, for children who are 'own children' of a woman present in an enumerated household (hence the name of the method).

Because of its distinct approach, it appears that the own-children method does not work well for Guam. The method cannot take account of children of mothers who were born on Guam but live overseas (at the time of the census). It is believed that many mothers, especially from the Federated States of Micronesia (FSM), give birth in Guam hospitals because of its higher quality health services compared with those in the FSM. After giving birth, many of these mothers send their child back to the care of their family in the FSM, while they remain on Guam for employment or to attain higher education.

However, even if the TFR based on the own-children method is a slight underestimate, it provides important insight into the fertility trends of Guam over the long term.

As Figure 10 shows, the TFR in Guam has continuously decreased since 1965 when it was estimated at just below 5 children per woman.

Figure 10: Estimates of total fertility rate using the 'own-children method', Guam, 1960–2000



Source: unpublished data, Mr Michael Levin, US Census Bureau

3.2 Mortality

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

- demographic composition of the population, i.e. the age and sex distribution;
- quality and utilization of health and medical services such as immunization programs, maternal and child health care, and primary health care;
- environmental conditions and availability of infrastructure such as housing, water supply, sanitation and waste disposal;
- lifestyle factors, such as abuse of alcohol and tobacco;
- work-related dangers;
- exposure to events outside individual control such as natural disasters and war; and
- socio-economic status, such as income and education.

Again, it is fortunate that Guam can draw on a complete and timely vital registration system. The Department of Public Health and Social Services collects and publishes the number of deaths on Guam by sex (Figures 11 and 12) and by age (Figure 12).

Detailed information on the number of deaths by age and sex is available until the year 2004, from which mortality indicators can be directly calculated.

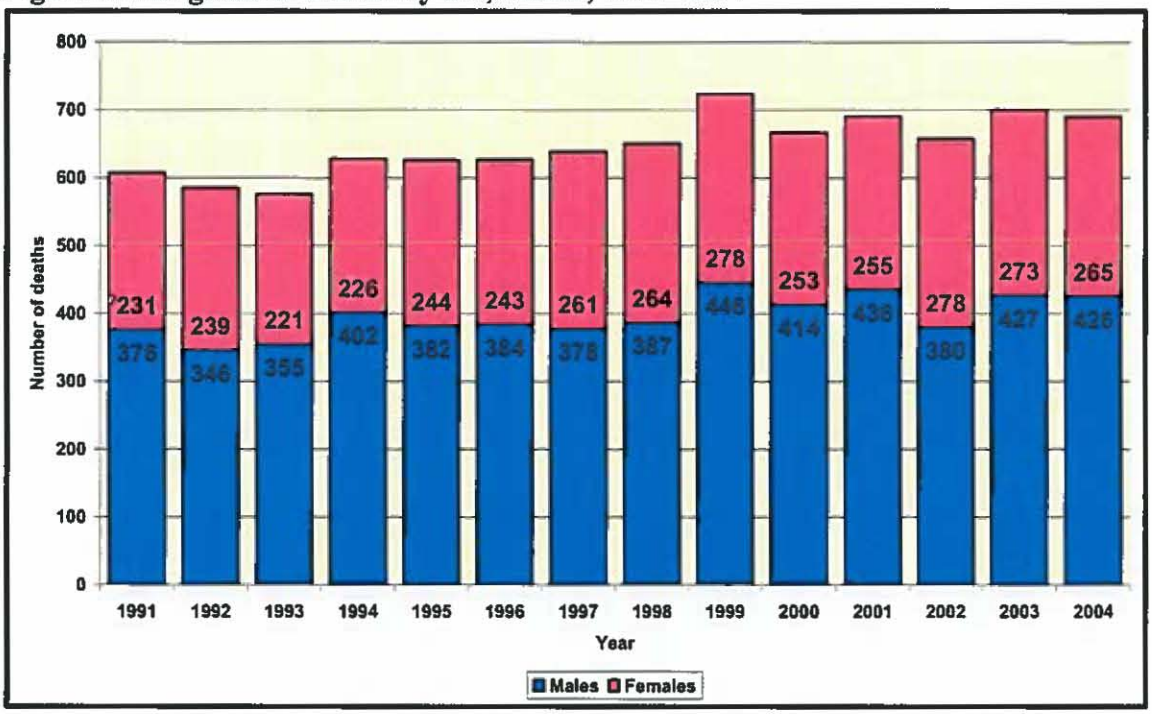
3.2.1 General mortality

Between 1991 and 2004 there was a noticeable increase in the total number of deaths in Guam, from about 600 deaths per year in the early 1990s to almost 700 deaths per year during 2003/2004. This rise in deaths has to be explained by an increasing and aging population.

Furthermore there were noticeably more male than female deaths – on average about 60 per cent more during the period 1991–2004.

As the following discussion will show, this phenomenon explains longer life expectancy among females compared with males – a trend found throughout the world.

Figure 11: Registered deaths by sex, Guam, 1991–2004



Source: Department of Public Health and Social Services, Government of Guam

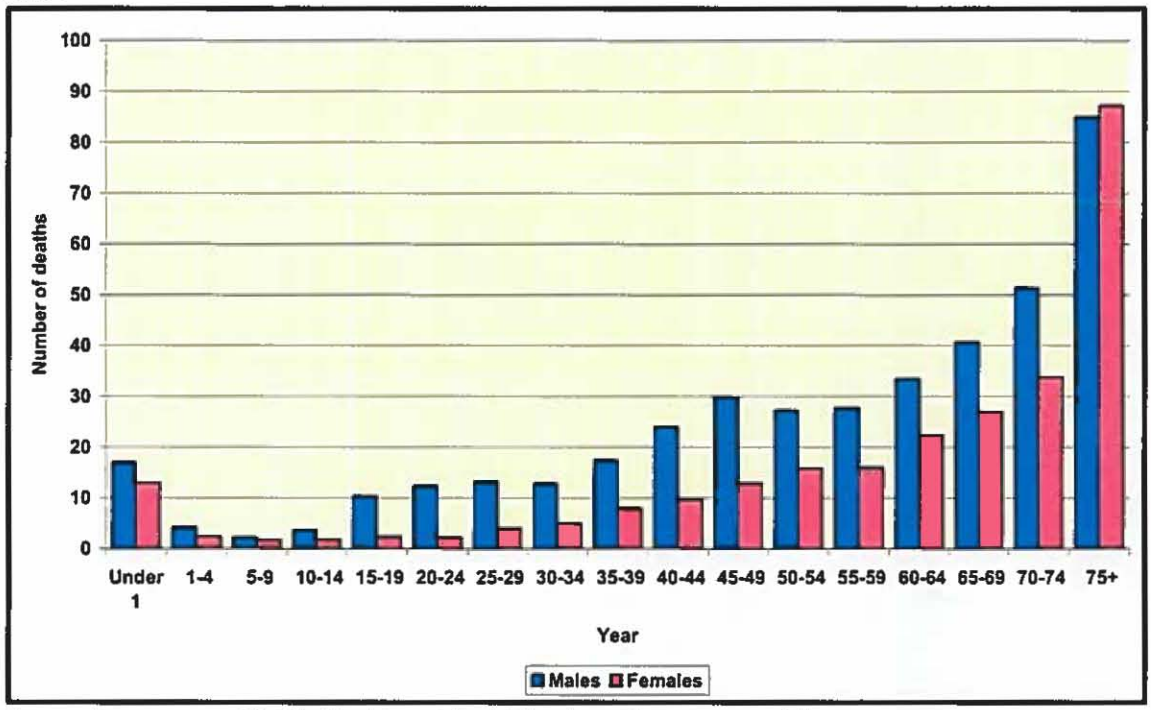
More male than female deaths are evident at almost every age group (Figure 12 and Appendix 2). The exception is the age group of 75 years and older, where female deaths outnumber male deaths simply because more females than males survive until that age.

The reason for the substantially higher number of male compared with female deaths is due to 'typical' risky behavior of male adolescents often resulting in fatal accidents. More male deaths at the age of 40 years and older are usually said to be caused by so-called lifestyle diseases such as poor diet, excessive consumption of alcohol and tobacco, and lack of physical exercise.

Figure 13 displays the *age specific death rate* (ASDR) – the average number of deaths per 1,000 people in the population – for males and females by age group. The ASDR is calculated by dividing the average annual number of deaths in the period 1998–2002 by the mid-period population in age and sex categories, in this case the enumerated 2000 Guam census population. From these calculations, Figure 13 displays the average number of deaths per 1,000 males and females by age group. It depicts the typical mortality pattern of a high infant mortality rate (mortality under 1 year of age), very low mortality rates among those aged 1–14 years, slightly increasing male mortality after the age of 15 years, and continuously increasing mortality rates after the age of 40 years.

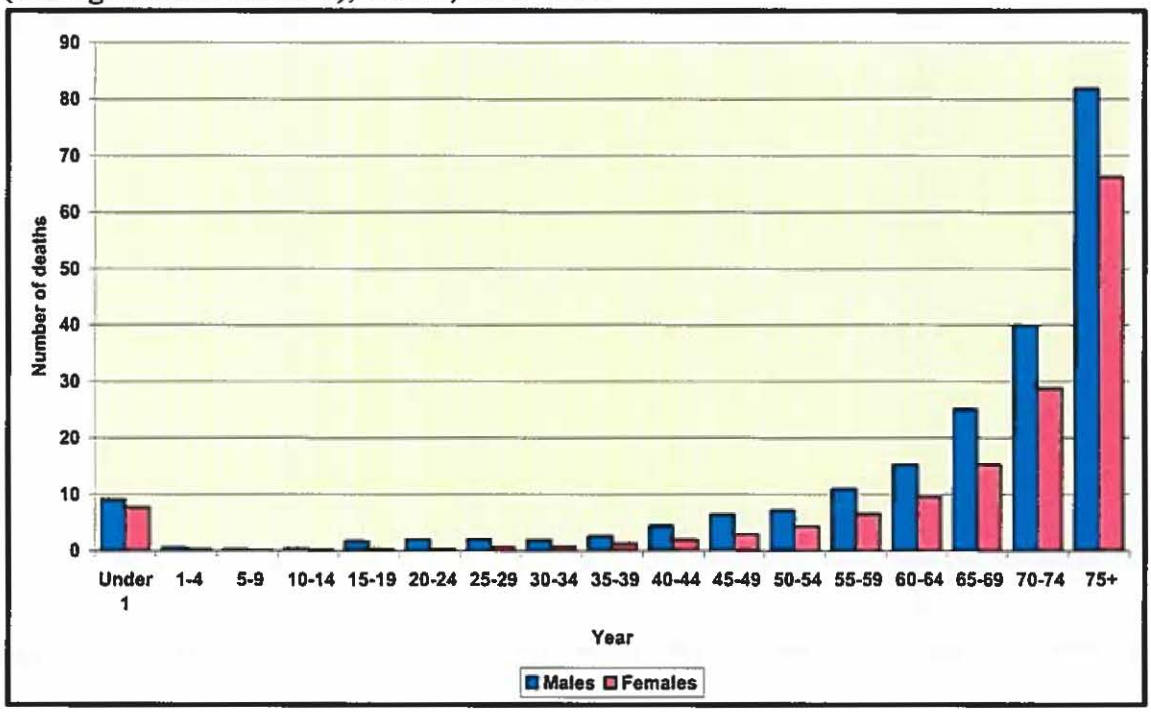
Based on the calculated ASDR, a complete life table can be produced (Table 4). For this purpose, the *LIFTB* procedure in the United Nations software package MORTPAK 4.1 was used.

Figure 12: Registered deaths (average annual number) by age and sex, Guam, 1998–2002



Source: Department of Public Health and Social Services, Government of Guam

Figure 13: Age specific death rates by sex – number of deaths per 1,000 population (average annual number), Guam, 1998–2002



Source: Department of Public Health and Social Services, Government of Guam

The life table for males and females is displayed in Table 4. The first value in column '$e(x)$' shows the average life expectancy at birth as 71.1 years for males and 76.1 years for females. (For more detail, see the 'Brief explanation of a life table' under Table 4.)

The estimated life expectancy at birth for males and females in 2000 represents an increase since 1990, when these indicators were estimated at 69.8 years for males and 74.4 years for females.

As a comparison, life expectancies at birth for the US population in 2003/2004 were 75.0 years for males and 80.3 years for females.

Table 4: Abridged life table for males and females based on 2000 census population and average number of deaths by age (years) and sex, Guam, 1998–2002

Males

Age	m(x,n)	q(x,n)	l(x)	d(x,n)	L(x,n)	S(x,n)	T(x)	e(x)	a(x,n)
0	0.0091	0.0090	100,000	902	99,159	0.9900	7,108,518	71.1	0.1
1	0.0006	0.0024	99,098	237	395,827	0.9979	7,009,358	70.7	1.6
5	0.0003	0.0015	98,860	148	493,930	0.9980	6,613,532	66.9	2.5
10	0.0005	0.0025	98,712	246	492,944	0.9950	6,119,601	62.0	2.5
15	0.0017	0.0085	98,466	834	490,481	0.9904	5,626,658	57.1	2.8
20	0.0020	0.0100	97,632	972	485,758	0.9900	5,136,177	52.6	2.5
25	0.0020	0.0099	96,660	962	480,882	0.9904	4,650,418	48.1	2.5
30	0.0019	0.0095	95,698	905	476,276	0.9892	4,169,536	43.6	2.6
35	0.0026	0.0129	94,793	1225	471,119	0.9828	3,693,261	39.0	2.7
40	0.0045	0.0223	93,569	2084	463,012	0.9726	3,222,142	34.4	2.7
45	0.0065	0.0320	91,485	2927	450,345	0.9667	2,759,130	30.2	2.6
50	0.0071	0.0349	88,558	3091	435,349	0.9569	2,308,784	26.1	2.6
55	0.0109	0.0531	85,467	4541	416,605	0.9374	1,873,436	21.9	2.6
60	0.0153	0.0738	80,926	5975	390,539	0.9061	1,456,831	18.0	2.6
65	0.0251	0.1185	74,951	8882	353,857	0.8539	1,066,292	14.2	2.6
70	0.0399	0.1825	66,069	12057	302,171	0.5759	712,435	10.8	2.7
75	0.1317	...	54,012	54012	410,264	...	410,264	7.6	7.6

Females

Age	m(x,n)	q(x,n)	l(x)	d(x,n)	L(x,n)	S(x,n)	T(x)	e(x)	a(x,n)
0	0.0078	0.0077	100,000	774	99,282	0.9916	7,613,890	76.1	0.1
1	0.0004	0.0016	99,226	159	396,508	0.9986	7,514,608	75.7	1.5
5	0.0002	0.0010	99,067	99	495,087	0.9988	7,118,100	71.9	2.5
10	0.0003	0.0015	98,968	148	494,469	0.9983	6,623,013	66.9	2.5
15	0.0004	0.0020	98,820	197	493,616	0.9980	6,128,544	62.0	2.6
20	0.0004	0.0020	98,622	197	492,635	0.9976	5,634,928	57.1	2.6
25	0.0006	0.0030	98,425	295	491,431	0.9965	5,142,293	52.2	2.6
30	0.0008	0.0040	98,130	392	489,734	0.9949	4,650,862	47.4	2.7
35	0.0013	0.0065	97,738	633	487,221	0.9921	4,161,128	42.6	2.7
40	0.0019	0.0095	97,105	918	483,379	0.9882	3,673,906	37.8	2.7
45	0.0029	0.0144	96,187	1385	477,697	0.9824	3,190,527	33.2	2.7
50	0.0043	0.0213	94,801	2018	469,283	0.9737	2,712,830	28.6	2.7
55	0.0065	0.0320	92,783	2970	456,949	0.9611	2,243,546	24.2	2.7
60	0.0096	0.0469	89,813	4216	439,188	0.9415	1,786,598	19.9	2.7
65	0.0152	0.0734	85,597	6285	413,511	0.9006	1,347,410	15.7	2.7
70	0.0288	0.1352	79,312	10725	372,390	0.6013	933,899	11.8	2.7
75	0.1221	...	68,587	68587	561,508	...	561,508	8.2	8.2

*Brief explanation of a **life table** (Table 4)*
A life table is used to simulate the lifetime mortality experience of a population. It does so by taking that population's age-specific death rates and applying them to a hypothetical population of 100,000 people born at the same time. For each year on the life table, death inevitably thins the hypothetical population's ranks until, in the bottom row of statistics, even the oldest people die.

Column '$m(x,n)$' shows the proportion of each age group dying in each age interval. These data are based on the observed mortality experience of a population. Column '$l(x)$' shows the number of people alive at the beginning of each age interval, starting with 100,000 at birth. Column '$d(x,n)$' shows the number who would die within each age interval. Column '$L(x,n)$' shows the total number of person-years that would be lived within each age interval. Column '$T(x)$' shows the total number of years of life to be shared by the population in the age interval and in all subsequent intervals. This measure takes into account the frequency of deaths that will occur in this and all subsequent intervals. As age increases and the population shrinks, the total person-years that the survivors have to live necessarily diminish.

Life expectancy is shown in Column '$e(x)$' – the average number of years remaining for a person at a given age interval.

The first value in column '$e(x)$' represents the life expectancy at birth.
The 1st value in column '$q(x)$' is an approximation of the infant mortality rate.
The 2nd value in column '$q(x)$' is an approximation of the child mortality rate.

$m(x,n)$ = age specific death rate
$q(x,n)$ = the probability of dying between two exact ages
$l(x)$ = the number of survivors at exact age x
$d(x,n)$ = the number of deaths between two exact ages, x and $x + n$
$L(x,n)$ = the number of person-years that would be lived within the indicated age interval (x and $x + n$) by the cohort of 100,000 births assumed
$S(x,n)$ = probability of surviving between two exact ages, x and $x + n$
$T(x)$ = total number of person-years that would be lived after the beginning of the indicated age interval by the cohort of 100,000 births assumed
$e(x)$ = expectation of life from age x
$a(x,n)$ = average person-years lived by those who die between ages x and $x + n$

3.2.2 Child mortality

An important indicator of a country's health status is the *infant mortality rate* (IMR). It is expressed as the number of infant deaths (deaths of children under 1 year of age) per 1,000 births per year (Figures 14 and 15, and Appendices 3 and 4).

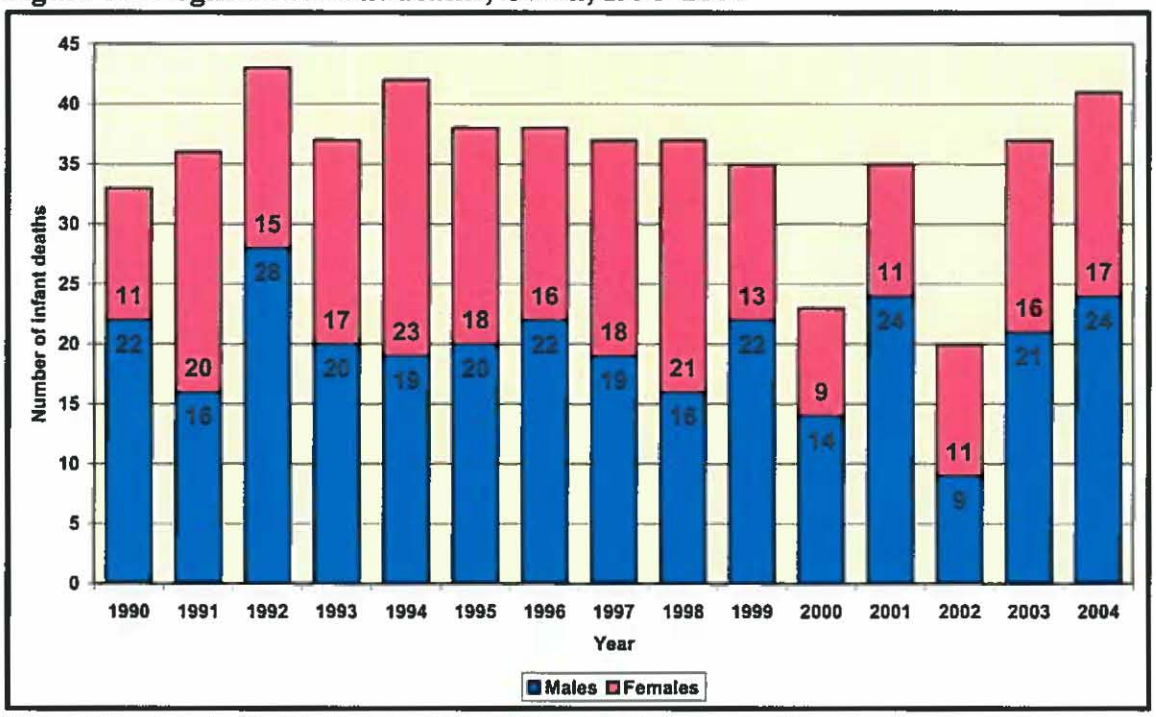
As Figures 14 and 15 show, the number of infant deaths and therefore the IMR varies widely from year to year. This variation is typical for small populations like Guam where only small numbers are involved in annual events, and small variations in the total number can produce large differences for annual indicators.

It is advisable to calculate multi-year averages to show more robust indicators and trends. In Appendix 4, average annual numbers are calculated for the periods 1991–1995, 1996–2000 and 2001–2004.

The average IMR for the entire period 1991–2004 was about 9.6 infant deaths per 1,000 births; 10.3 for males and 8.9 for females (Appendix 4).

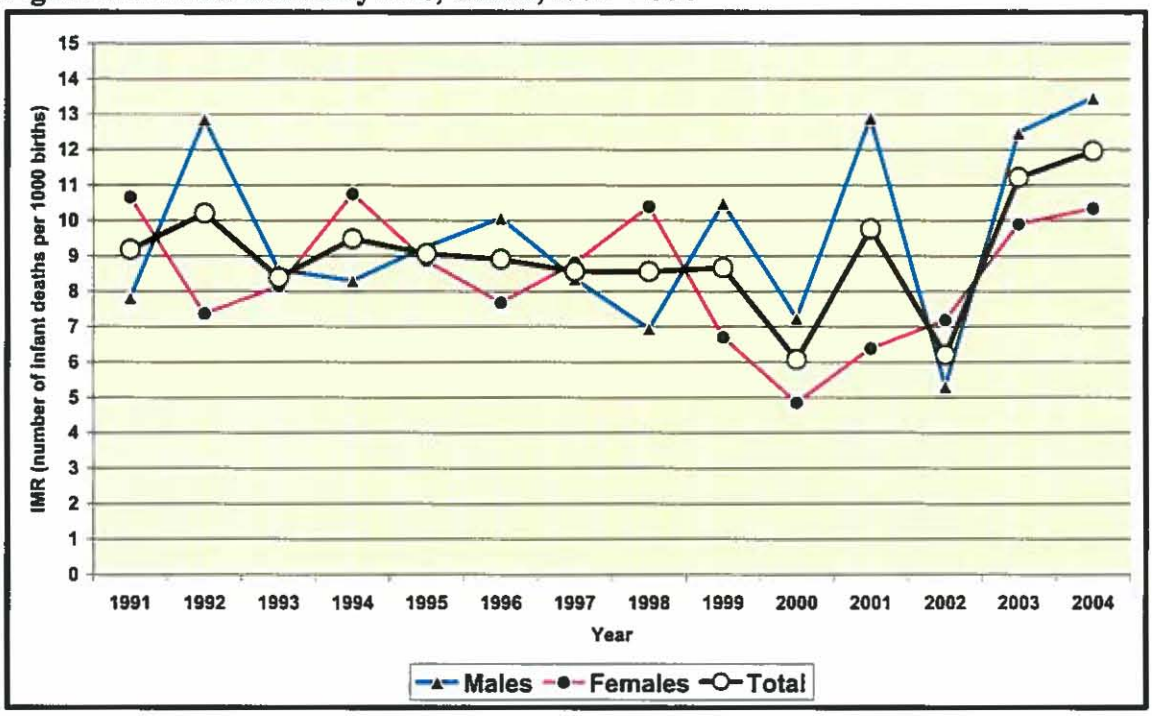
Unfortunately it seems that the IMR for the period 2001–2004 has increased compared with the period 1996–2000. Figure 14 shows that the total number of infant deaths of the years 2003 and 2004 was relatively high compared with most other years in the period 1990–2004.

Figure 14: Registered infant deaths, Guam, 1990–2004



Source: Department of Public Health and Social Services, Government of Guam

Figure 15: Infant mortality rate, Guam, 1991–2004



Child mortality is another important health indicator. It is a measure of the probability of dying between the ages of 1 and 5 years. Its estimated level is presented in the second column, '$q(x,n)$', of the life table (Table 4). Child mortality was estimated at 2.4 male deaths and 1.6 female deaths per 1,000 males and per 1,000 females, respectively, of the same age for the period 1998–2002.

Under 5 mortality is the probability of dying between birth and the age of 5 years. It can be estimated by adding the first and the second value in column '$q(x,n)$' – that is, by adding the mortality indicator of the population aged under 1 year of age, and that of the population aged 1–4 years (Table 4). For the period 1998–2002, under 5 mortality was estimated at 11.4 male deaths and 9.3 female deaths per 1,000 males and per 1,000 females respectively.

Conclusion

The general and child mortality indicators presented here clearly show more positive mortality indicators for females than for males. At birth, females are expected to live, on average, 5 years longer than males.

These findings are supported by the following data:

- More females than males survive to the age of 60 years and older (Figure 3).
- The proportion of widows among females aged 65 years and older (45 per cent) was considerably higher than that of male widowers in this age group (12 per cent), indicating that husbands tended to die earlier than wives (Figure 20 in Section 4).

3.3 International migration

The fluctuations in the level and pattern of international migration to and from Guam have a strong impact on the territory. They influence socio-economic policy and planning decisions because migration has been a major component of population growth in the past.

The net impact of migration flows (*net migration*) is measured by subtracting the total number of departures (emigration) from the total number of arrivals (immigration).

Unfortunately data on the number of departures from Guam is incomplete. As US citizens (Guamanians and US military alike) are not required to pass through immigration, and custom forms (which include some relevant questions on residential status) are not required upon departure from Guam, it is currently impossible for government officials to obtain accurate data on the magnitude of migration flows to and from Guam.

However, the 2000 census included two questions that provide an indication of the level of immigration:

- the respondent's residence in 1995; and
- information on nativity, citizenship status and year of entry.

Useful information also came from a third question, which covered reasons for moving to Guam (of those that were born overseas).

3.3.1 Residence in 1995

In response to the question of where they had lived 5 years before the census (i.e. in 1995), over 50 per cent said they had lived in the same house while 17.4 per cent answered that they had been living outside of Guam (overseas). Of those living overseas in 1995, half had been living in the United States (Table 5). Six per cent of Guam's population had been living in Asia (mainly in the Philippines) 5 years before the census.

Table 5: Residence of population 5 years and older in 1995

Residence in 1995	Population	%
Population 5 years and older	138,020	100.0
Same house	73,120	53.0
Different house in Guam	40,945	29.7
Same district	15,093	10.9
Different district	25,852	18.7
Outside Guam	23,955	17.4
Commonwealth of the Northern Mariana Islands	904	0.7
Federated States of Micronesia	1,817	1.3
Palau	267	0.2
Other Pacific Island	141	0.1
Asia (total)	*8,144*	*5.9*
China	1,205	0.9
Japan	1,199	0.9
Korea	647	0.5
Philippines	4,822	3.5
United States (total)	*11,782*	*8.5*
California	2,967	2.1
Elsewhere	900	0.7

Source: 2000 Guam census
Note: Percentages may not total 100% due to rounding.

3.3.2 Nativity, citizenship status and year of entry

Data on *lifetime migration* (number of people by place of birth) indicate almost half (74,068) of Guam's total enumerated population in 2000 was born overseas (Table 6). This total includes 23 per cent (105,186) of the native population of Guam. Nearly a third of Guam's total population in 2000 were foreign-born, of whom 14 per cent were naturalized citizens.

Table 6: Population by nativity, citizenship status and year of entry, Guam, 2000

Nativity, citizenship status and year of entry	Population	%
Total population	154,805	100.0
Native (total)	**105,186**	**67.9**
Born in Guam	80,737	52.2
Born in United States	19,096	12.3
Born in Puerto Rico or other US island area	2,377	1.5
Born abroad of US parent(s)	2,976	1.9
Foreign born (total)	**49,619**	**32.1**
Entered 1990–2000	28,989	18.7
Entered before 1990	20,630	13.3
Naturalized citizen	*21,675*	*14.0*
Entered 1990–2000	7,284	4.7
Entered before 1990	14,391	9.3
Not a citizen	*27,944*	*18.1*
Entered 1990–2000	21,705	14.0
Entered before 1990	6,239	4.0

Source: 2000 Guam census

3.3.3 Reasons for moving to Guam

Of the 74,068 people born overseas, half moved to Guam to accompany a spouse or parents, one in five people (20 per cent) came for employment, one in ten people born overseas (10 per cent) came to Guam as part of the military presence, and another 5 per cent came to Guam to attend school. About 15 per cent did not specify the reason they came to Guam.

3.3.4 Balancing equation

Unfortunately the census data give no indication of the level of emigration (departures). As mentioned above, the net flow of migration (net migration) is calculated by taking the total number of arrivals (immigration) and departures (emigration) into account.

The only way of estimating the level of net migration is by applying the *balancing equation* to the intercensal 1990–2000 population growth.

Balancing equation:

Population growth = **number of births** minus **number of deaths** plus **net migration**

Therefore **net migration** can be estimated:

Net migration = **population growth** minus **number of births** plus **number of deaths**

The population between 1990 and 2000 has increased by 21,653 people, from 133,152 in 1990 to 154,805 in 2000.

During this period, too, about 41,936 births and 6,248 deaths were registered.

According to the balancing equation, therefore, net migration can be calculated as follows (Table 7).

Population growth 1990–2000 = 21,653
Number of births 1990–2000 = 41,936
Number of deaths 1990–2000 = 6,248

21,653 – 41,936 + 6,248 = **–14,036**

Net migration of –14,036 means that 14,036 more people left the territory than entered it during the period 1990–2000. On average, 1,400 people left the territory annually.

Table 7: Number of registered births and deaths, estimated net migrants and overall population change, Guam, 1990–2000

	Total number	Average annual number	Rate*	
Births	41,936	4,194	29.1	Crude birth rate
Deaths	6,248	625	4.3	Crude death rate
Net migrants	–14,036	–1,404	–9.7	Migration rate
Overall change	**21,653**	**2,165**	**15.0***	**Average annual growth rate**

* Based on mid-period (intercensal) average population size of 143,979. The rates are displayed in ‰ (per 1,000 population). The average annual growth rate of 15.0 per 1,000 is the same as 1.5% (see Section 2.1).

Estimates of net migration in the intercensal period 1980–1990, using the balancing equation, revealed that it was negligible.

3.4 Military characteristics

Guam's history with the United States dates back to 1898, when Spain ceded the island to the United States through the Treaty of Paris after the Spanish–American War. From that time until World War II, the vast majority (95 per cent) of Guam's population was born on Guam; fewer than 1,000 people were born elsewhere. During World War II, the island was captured by Japanese forces in 1941 and then reclaimed by the United States in 1944. When tens of thousands of US military personnel seized Guam from the Japanese occupying forces, it altered Guam's population structure forever. The military presence grew to provide the skilled labor necessary to rebuild the island. After World War II, Guam became the site of major naval and air force facilities to guard US defense commitments in the Asia–Pacific region. Guam served as a valuable strategic location to support military operations and activities in the Pacific. By the 1980s, the emerging military presence on Guam, coupled with increased foreign investment and strong tourism, spurred substantial economic growth and development on the island.

Between the mid 1990s and 2006 the number of military and their dependants was reduced due to base closures and military downsizing initiated in 1995. The military-related population (active duty personnel and their dependants) dramatically decreased from 15,760 in 1995 to 12,311 in 2006. The base closures, unit transfers and scaled back activities resulted in job losses of federal civilian jobs and military positions. Compounding this economic impact, the Asian economic decline, natural disasters and the repercussions of the September 11, 2001 terrorist attacks have all contributed to business closures and loss of job opportunities. Only in recent years, through public and private partnership efforts, have there been gradual but significant improvements in the economy. A growth in private sector jobs, record-breaking visitor arrivals, and new construction projects are indicators that the Guam economy is recovering and stabilizing. It is also anticipated that the number of Marine personnel and their families will increase by 20,000 which, along with increases in the number of Air Force and Navy personnel, will further stimulate economic activity and military-related operations in the Pacific.

This section analyzes Guam's military population and its characteristics based on the 1990 and 2000 Guam censuses. It also presents annual data provided by COMNAV Marianas, Guam on the number of active duty personnel and their families living on Guam from 1987 to 2006. This valuable information about Guam's military composition is provided to assist government and business officials in addressing potential impacts (on infrastructure, housing, public safety, environment and society) in order to improve the quality of life for military and local residents alike.

3.4.1 Military quarters

All people not living in households are classified by the US Census Bureau as living in group quarters. Two general categories of people in group quarters are recognized as:

1. institutionalized people (prisons, federal detention centers, local jails, juvenile institutions, mental hospitals, hospitals or wards for specialized needs, nursing homes, etc.); and

2. non-institutionalized people (college dormitories, military quarters, emergency shelters for the homeless, shelters for the abused, etc.).

The 2000 census results showed that 3,877 people lived in group quarters, representing a 55 per cent drop from 1990 (Table 8).

Table 8: Total population by living quarters, Guam, 1990 and 2000

Description	1990	2000	% change
Total population	**133,152**	**154,805**	**16.26**
In households	124,596	150,928	21.13
In group quarters (total)	8,556	3,877	–54.69
Institutionalized population	187	976	421.93
Noninstitutionalized population (total)	8,369	2,901	–65.34
College dormitories	89	65	–26.97
Military quarters	6,086	1,710	–71.90
Other	2,194	1,126	–48.68

Source: Census Bureau, US Department of Commerce

Table 8 shows a 21 per cent rise in people living in households, from 124,596 people in 1990 to 150,928 people in 2000. Conversely, the most dramatic decline can be seen in the non-institutionalized population, specifically the military quarters. In 2000 there were 1,710 people reported living in military group quarters, occupied mostly by males at 73 per cent (1,255 males to 455 females). Table 8 reveals a staggering 72 per cent decline in military quarters occupancy between 1990 and 2000.

Table 9: Military status by age, Guam, 1990 and 2000

Military Status	Total	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 years and over
1990 Census									
Population 16 years and over	90,990	9,911	14,379	13,490	11,786	18,329	10,279	7,586	5,230
Now on Active Duty	11,888	872	4,023	2,889	2,028	1,904	165	7	0
On Active Duty in the Past But Not Now	7,974	26	396	966	1,065	2,261	1,463	1,218	579
In the Reserves or National Guard now	609	40	150	232	72	93	14	7	1
In Reserves or National Guard in the past but not now	283	6	37	51	34	81	36	22	16
Never Served	70,236	8,967	9,773	9,352	8,587	13,990	8,601	6,332	4,634
2000 Census									
Population 18 years and over	99,950	4,680	11,990	12,945	12,905	23,140	16,550	9,525	8,215
Now on Active Duty	4,375	320	1,250	855	725	1,050	165	10	0
On Active Duty in the Past But Not Now	8,970	25	380	555	885	2,465	2,390	1,180	1,090
In the Reserves or National Guard only	1,470	60	210	250	240	390	195	85	45
Never Served	85,135	4,280	10,145	11,285	11,060	19,240	13,795	8,255	7,080

Source: Census Bureau, US Department of Commerce
Note: Totals may not sum due to rounding.

The 2000 Guam census counted 4,376 people on active duty aged 18 years and older. This total represents a 63.2 per cent drop from the 1990 census. Note that the 2000 Guam census data reflect military service for people 18 years and older while the 1990 census gives data on military service for people aged 16 years and older (Table 9).

The Census Bureau defines 'active duty' as people on active service in the Armed Forces of the United States in the Army, Navy, Air Force, Marine Corps or Coast Guard; the definition does not cover active duty in the military Reserves or National Guard for the 4–6 months of initial training or yearly summer camps. People on active duty decreased from 11,888 in 1990 to 4,376 in 2000. People on active duty made up only 4.4 per cent of all people aged 18 years and older in 2000, as compared with 13.1 per cent of active duty personnel reported in 1990.

About three out of five people on active duty were Whites in 1990, or 7,406 of the 11,888 active duty personnel. Chamorros made up only 3 per cent or 378 of all active duty personnel in 1990. In 2000 just over half the people on active duty, 56.9 per cent, were Whites, or 2,490 of the 4,375 people on active duty service. The proportion of Chamorros on active duty in 2000 remained the same as 1990 at 3 per cent, translating to a raw figure of 140 people. In 1990 the median age for people on active duty was 26.8 years. In 2000 the median age rose to 28.6 years. The median income for active duty personnel increased from $14,567 in 1990 to $23,107 in 2000.

Though the number of active duty personnel dropped between the two censuses, the number of Reserves or National Guard personnel jumped significantly from 609 in 1990 to 1,470 in 2000. The 1990 census reported that the age group with the strongest representation in the Reserves or National Guard was 25–29 years, at 232 people or 38.1 per cent of the total. In 2000, however, an older population was serving in the Reserves or National Guard, with the highest proportion being between 35 and 44 years of age. The 2000 census results also revealed that the Chamorros (720 people) and Filipinos (330 people) made up the largest pool of people who served in the National Guard or Reserves during the time of enumeration. The median age of people who served in the National Guard or Reserves rose from 27.5 years in 1990 to 34.5 years in 2000.

The median income for people serving in the National Guard during the time of enumeration nearly doubled from $13,606 in 1990 to $25,746 in 2000.

3.4.2 Active duty personnel, veterans and military dependants

The 2000 census showed a significant drop in the number of people on active duty compared with the 1990 census figures (Table 10). In 1990 there were 11,888 active duty personnel, making up 13 per cent of all people aged 16 years and older. By 2000 there were only 4,441 people on active duty, or 4 per cent of all people 18 years and older. Military installations in the districts of Yigo and Santa Rita reported the largest showing of people on active duty in both 1990 and 2000.

Table 10: Active duty personnel, veterans and military dependants, Guam, 1990 and 2000

	1990					2000				
	Population			Military Dependent		Population			Military Dependent	
District	16 years & over	Active Duty	Veteran Status	Of Active Duty Member	Other Dependent	18 years & over	Active Duty	Veteran Status	Of Active Duty Member	Other Dependent
Total Persons	90,990	11,888	7,974	12,149	3,049	99,951	4,441	8,962	6,968	4,872
Agana Heights	2,587	221	319	176	103	2,638	101	332	111	169
Agat	3,220	91	315	143	127	3,445	26	387	81	270
Asan	1,429	177	160	279	87	1,338	26	153	65	93
Barrigada	6,170	1,148	512	679	170	5,600	27	551	93	360
Chalan Pago	2,930	20	293	64	154	3,818	51	363	69	191
Dededo	21,001	1,698	1,375	2,328	658	27,345	674	1,680	1,299	1,028
Hagatna	842	17	99	14	31	861	2	78	4	30
Inarajan	1,499	6	176	32	94	1,803	11	191	46	129
Mangilao	7,111	384	705	688	246	8,745	84	733	190	458
Merizo	1,129	2	171	31	75	1,239	9	169	31	94
Mongmong/Toto/Maite	3,924	233	359	297	110	3,648	36	315	74	174
Piti	1,307	212	185	33	105	1,161	49	190	35	110
Santa Rita	8,567	4,473	523	3,379	208	5,160	1,311	922	1,685	249
Sinajana	1,770	19	192	50	90	1,875	29	250	42	114
Talofofo	1,467	17	180	38	83	1,930	14	254	48	143
Tamuning	12,718	422	1,220	300	177	12,941	280	784	224	304
Umatac	525	5	71	26	45	508	2	52	22	29
Yigo	9,518	2,696	722	3,455	284	12,044	1,675	1,069	2,743	594
Yona	3,276	47	397	137	202	3,852	34	489	106	333

Source: Census Bureau, US Department of Commerce

The Census Bureau characterizes military dependency as a person who is a dependant of either (a) an active duty member of the armed forces, or (b) a retired member of the armed forces or of an active duty or retired member of the full-time National Guard or Armed Forces Reserve. Table 10 reveals that military dependants of active duty personnel dropped 42.6 per cent, from 12,149 military dependants in 1990 to 6,968 military dependants in 2000. The number of other dependants rose slightly from 3,049 dependants in 1990 to 4,872 dependants in 2000.

There was no major change in the number of veterans between 1990 and 2000. The Census Bureau defines a 'civilian veteran' as a person aged 18 years or over (or, in 1990, 16 years or over) who, at the time of enumeration, had served on active duty in the US Army, Navy, Air Force, Marine Corps or the Coast Guard in the past (even for a short time) but was not currently on active duty, or who had served in the Merchant Marine during World War II. Veterans made up 8.8 per cent (7,974) of the population aged 16 years and older in 1990, while 9 per cent (8,962) of the total population aged 18 years and older were classified as veterans in 2000. In 1990 most veterans lived in Dededo (17.2 per cent) and Tamuning (15.3 per cent). This distribution shifted slightly in 2000 as the highest proportion of veterans lived in the district of Dededo (18.7 per cent), followed by Yigo (11.9 per cent) and Santa Rita (10.3 per cent).

Table 11: Active duty personnel and military dependants by sex, Guam, 1990 and 2000

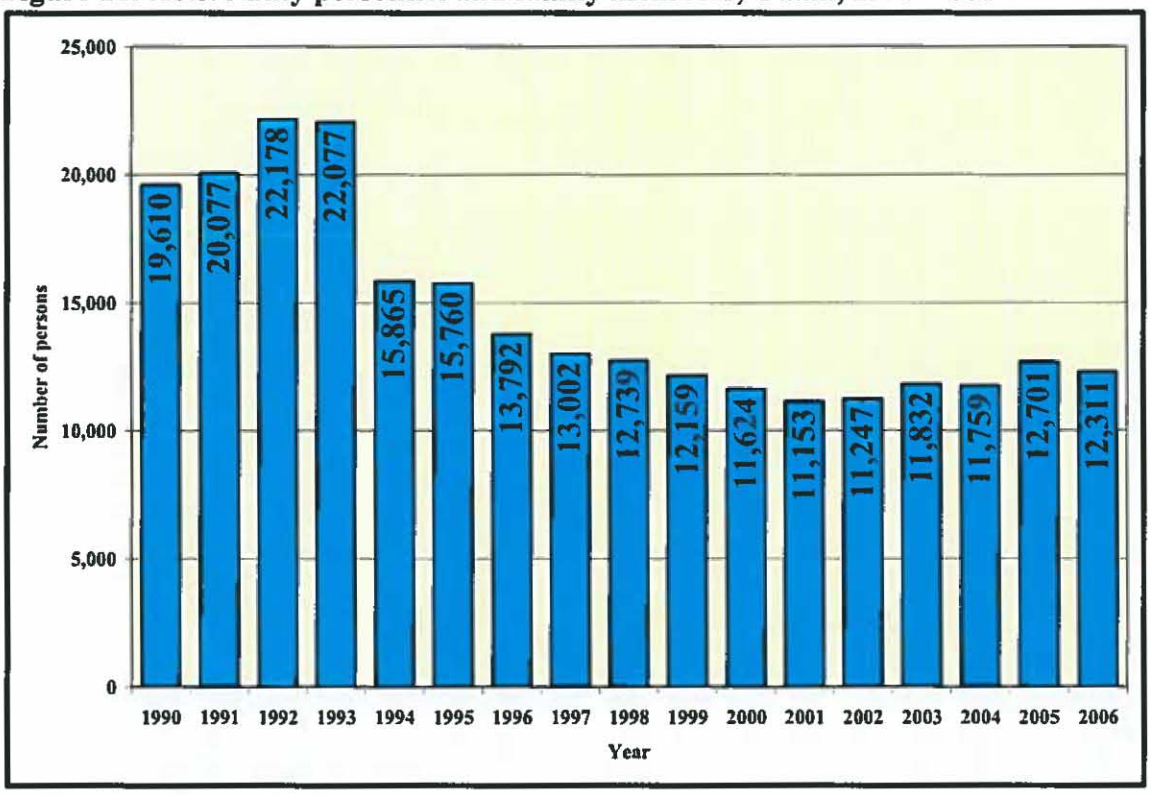
Status	1990	2000
Total population of Guam	**133,152**	**154,805**
Active duty	11,888	4,441
Military dependant	15,198	11,840
Of active duty member	12,149	6,968
Other dependant	3,049	4,872
Not a military dependant	106,066	138,524
Males (total)	**70,945**	**79,181**
Active duty	10,286	3,436
Military dependant	5,255	4,550
Of active duty member	4,163	2,650
Other dependant	1,092	1,900
Not a military dependant	55,404	71,195
Females (total)	**62,207**	**75,624**
Active duty	1,602	1,005
Military dependant	9,943	7,290
Of active duty member	7,986	4,318
Other dependant	1,957	2,972
Not a military dependant	50,662	67,329

Source: Census Bureau, US Department of Commerce

Table 11 shows the number of active duty personnel and military dependants by sex. In the 1990 Guam census, 20 per cent of Guam's total population comprised active duty military personnel and their dependants (or 27,086 people). Guam's strong military presence dropped dramatically by 2000. In 2000 there were 16,216 active duty personnel and military dependants on Guam, making up 10 per cent of Guam's total population. As part of this total, the number of military dependants on Guam dropped by 22 per cent between 1990 and 2000, from 15,198 to 11,840.

Males clearly dominated active duty service in 1990, comprising well over 85 per cent of active duty personnel. Likewise in 2000, males made up 77.6 per cent of active duty service, as compared with the females at 22.4 per cent.

Figure 16: Active duty personnel and family members, Guam, 1990–2006



Source: COMNAVMAR, Guam

Figure 16 illustrates the size of the presence of active duty military personnel and their dependants on Guam for the period 1990–2006, as released by COMNAV Marianas (COMNAVMAR), Guam (see also Appendix 5). The data include counts of active duty members of the US Air Force, US Army, US Coast Guard, US Marine Corps, US Navy, and their families. It should be noted that the 1990 and 2000 Guam census data may differ from the COMNAVMAR results. The US Census Bureau conducts the census for Guam every 10 years, using April 1 as the reference date. Data for 1998–2006 from COMNAVMAR are as of September 30 for each year.

In 1990 COMNAVMAR reported that Guam had 19,610 active duty personnel and military dependants, of whom 50 per cent (or 9,830 people) served on active duty. Based on these data, in 1990 nearly 15 per cent of Guam's total population were active duty military personnel and their dependants. By 1999 only 8 per cent of Guam's total population were active duty personnel and their family members. From 2000 to 2006 the number of active duty personnel and their family members remained steady at 7 per cent of Guam's population. Figure 16 shows that the military-related population on Guam peaked at 22,178 people in 1992 and reached its lowest point in 2001, with 11,153 active duty military personnel and dependants. Since 2001 the number of active duty personnel and their family members has risen steadily. As reported by COMNAVMAR, the number of active duty military personnel and dependants grew from 11,153 in 2001 to 12,311 in 2006, representing a 10.4 per cent increase.

COMNAVMAR annual reports indicated that the US Navy made up the largest proportion of active duty personnel, followed by the US Air Force. The number of US Army personnel on active duty increased dramatically from 56 in 1990 to over 600 by 2006.

From 1990 to 1992 the US Marine Corps reported an average of about 350 active duty members. In 1993, this number decreased dramatically to only 55 US Marine Corps personnel. The trend then continued: the number of US Marine Corps on active duty dropped from over 300 in 1992 to no reported Marines on active duty by 1997 and, through to 2006, the average was fewer than 5 people per year. However, with the anticipated military build-up and entry of about 20,000 active duty military personnel and their families, Guam could see the military population escalate beyond 40,000 by 2014.

3.4.3 Education of school-age children of military personnel

School-age children of active duty members and federal employees hired from the United States with return rights may choose to be enrolled in the Department of Defense Education Activity (DODEA) Schools, Guam public schools, private schools, or home school. The Department of Defense domestic dependant elementary and secondary schools began operations on Guam in 1997, allowing eligible Department of Defense family members to enroll their children in Guam's educational institutions. The DODEA schools on Guam include Andersen Elementary School, Andersen Middle School, McCool Elementary/Middle School and Guam High School.

Table 12: School enrollment of military school-age children, Guam, 1999–2006

		Number of school-age children			
School year	Total	DODEA [1]	Public [2]	Private [2]	Home school [2]
1999–2000	2,749	2,504	136	78	31
2000–2001	2,702	2,429	133	94	46
2001–2002	2,768	2,561	88	92	27
2002–2003	2,679	2,333	114	146	86
2003–2004	2,654	2,388	126	82	58
2004–2005	2,956	2,538	222	131	65
2005–2006	3,009	2,418	438	103	50
2006–2007	2,463	1,871	415	140	37

Source: DODEA, Guam; COMNAVMAR, Guam

Notes

[1] DODEA fall enrollment figures

[2] COMNAVMAR Manning reports, as of September 30

In the school year (SY) 2006–2007, school-age children of military families and federal hire (or employee(s) contracted by the federal government) made up over 6 per cent of Guam's 39,000 plus student population. In SY 2004–2005 and 2005–2006, student enrollment from military families had been at its highest, at close to 3,000 students. However, in SY 2006–2007, student enrollment dropped by 18 per cent from the previous school year, representing a decrease of 546 students.

Table 12 shows that the majority of the school-age children of military families were enrolled in the DODEA school system as compared with public, private and home

schooling. In SY 2006-2007 about three out of every four school-age children of military families attended DODEA schools. In the same school year, nearly 17 per cent attended public schools while only 6 per cent attended private schools and fewer than 5 per cent received home schooling. School figures indicate that children of military families and federal hire personnel represent a very young age group. Annual DODEA school figures show that a majority of the students were enrolled in Kindergarten to 5th grade, comprising over 1,000 students per school year (Appendix 6).

4.1 Marital status

During the 2000 census, 54 per cent of males (29,820) and 52 per cent of females (27,670) aged 15 years and older were married. Thirty-eight per cent of males (20,580) and 32 per cent of females (17,140) were never married (single). In the widowed category were 1 per cent of males (803) and 7 per cent of females (3,449) (Figure 17).

The higher number of married males than females may be explained by the presence of males whose wives reside overseas, or males whose wives are temporarily absent during the time of the census.

Figure 17: Marital status of population aged 15 years and older, Guam, 2000

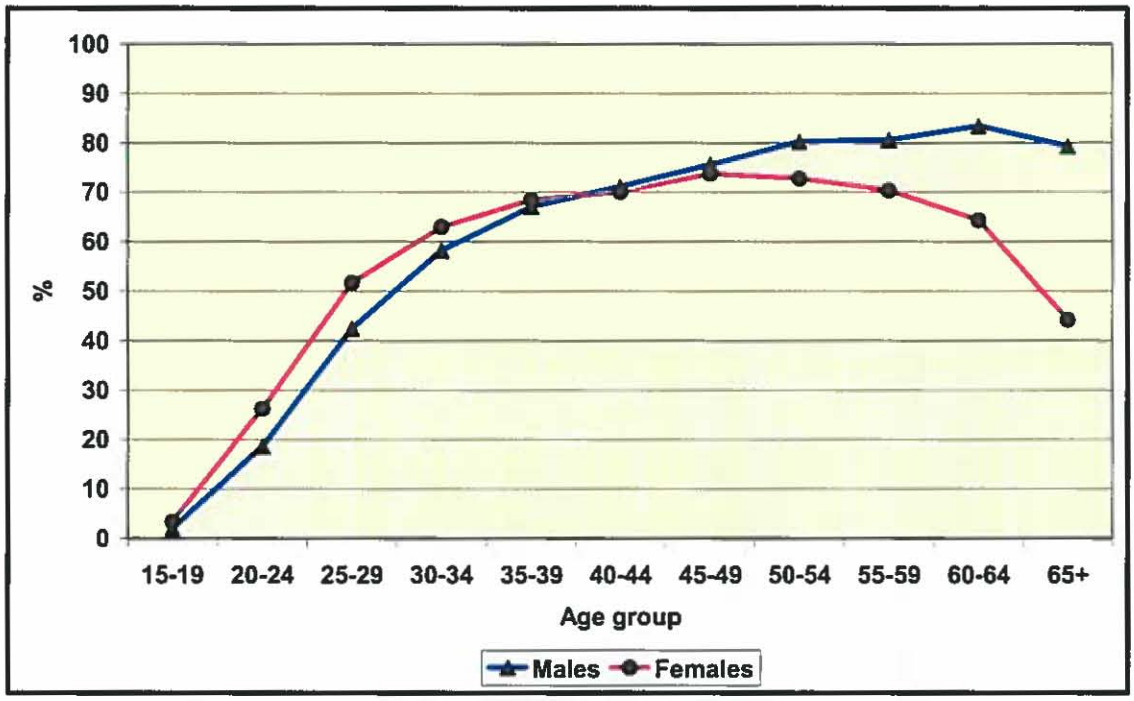
Source: Census Bureau, US Department of Commerce

Women marry at younger ages than men. The average age at marriage was 29.0 years for males and 27.1 years for females (based on the proportion never married by age, this calculation represents the *singulate age at marriage* (SMAM)). The higher proportion of young married women compared with men of the same age is a further indication that women generally marry at younger ages than men (Figure 18).

While 19 per cent of males were married in the age group of 20–24 years, 26 per cent of females married in this age group. In the 25–29 year age group, 42 per cent of males were married compared with 52 per cent of females.

The same pattern can be seen with the population never married (single) (Figure 19). A higher proportion of the male population was never married at almost all age groups, and especially at ages 20–34 years.

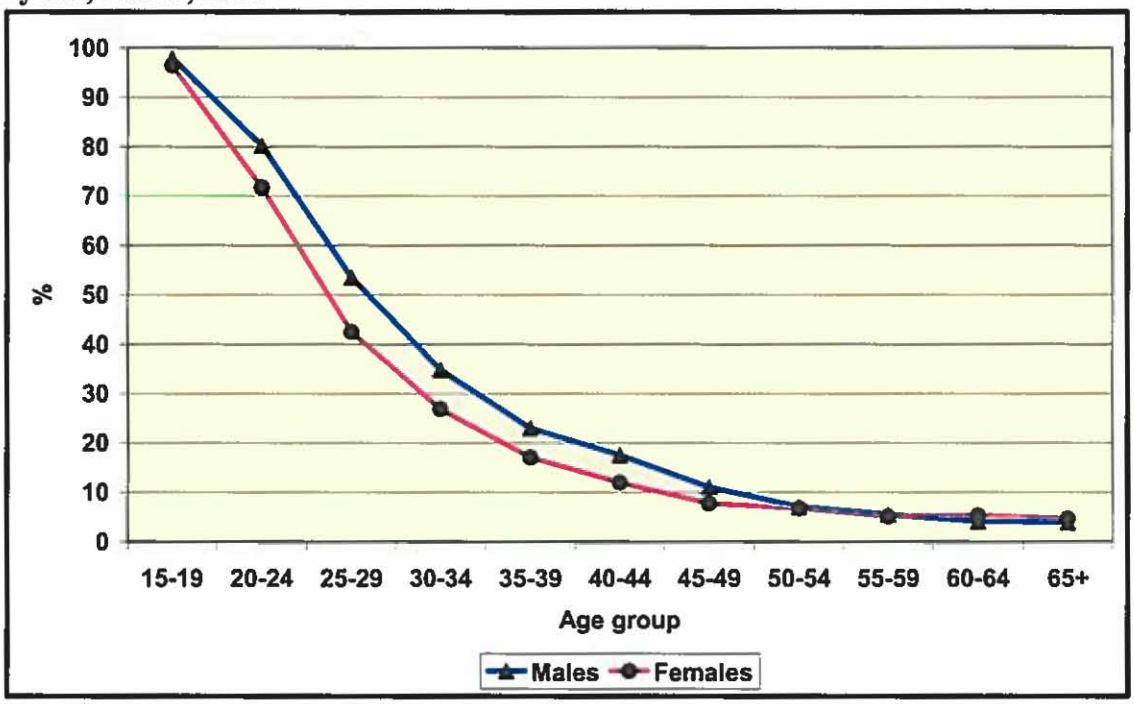
Figure 18: Proportion of population aged 15 years and older married by sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

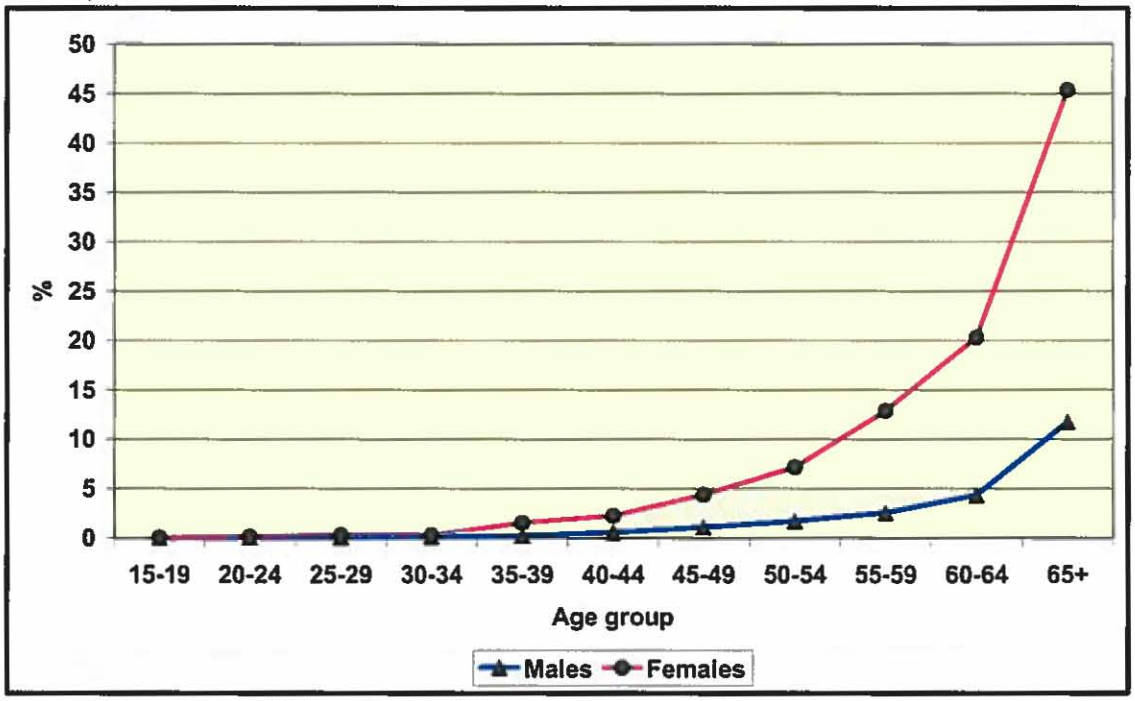
At the age of 35 years and older, the discrepancy between the proportion of widowed males and females increased continuously (Figure 20). At the age of 55–59 years, only 3 per cent of males were widowed, compared with 13 per cent of females. At the age of 65 years and older, only 12 per cent of males were widowed, compared with 45 per cent of females. The higher proportion of widowed females is explained by the lower mortality rates, and therefore longer life expectancies, for females.

Figure 19: Proportion of population aged 15 years and older never married (single) by sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

Figure 20: Proportion of population aged 15 years and older widowed by sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

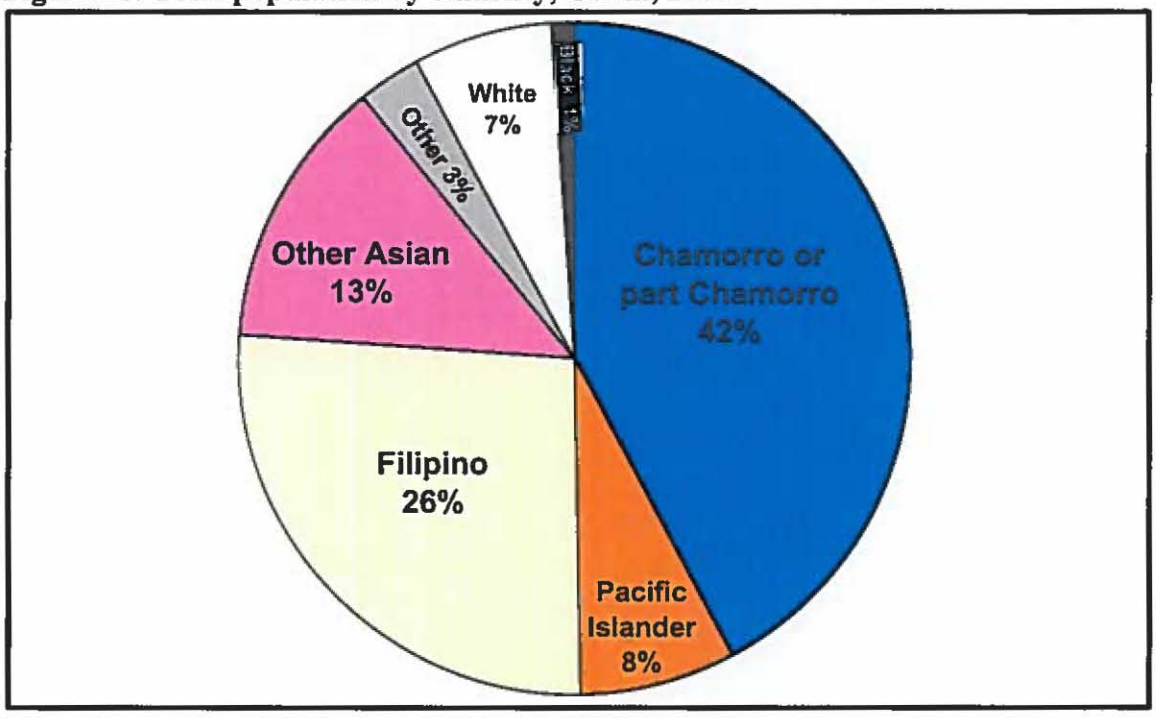
4.2 Ethnicity

The data on ethnic origin were based on self-identification and were open-ended (respondents were required to produce their own answer). *Ethnic origin* refers to an individual's origin or descent, 'roots', heritage, or place where the individual or his/her parents or ancestors were born. Respondents reported their ethnic group regardless of how many generations removed they were from their place or origin. Responses to the ethnic origin or race question reflected the groups with which respondents identified and not necessarily the degree of attachment or association the individual had with the particular group(s).

Ethnic origin or race is different from other population characteristics that are sometimes regarded as indicators of ethnicity – namely, country of birth and language spoken at home. A large number of people reported their ethnic origin or race by specifying a single ethnic group, but some reported two, three or more ethnic groups.

According to the data collected in the 2000 census, 42 per cent (65,243) of the Guam population identified themselves as Chamorro or part Chamorro (Figure 21). The second largest group were Filipino, with 26 per cent (40,729) of the population, followed by Other Asians, who were mainly Korean, Chinese and Japanese (13 per cent). Another 8 per cent of the Guam population were Pacific Islanders, mainly Chuukese, and some 7 per cent were White, most likely members of the armed forces.

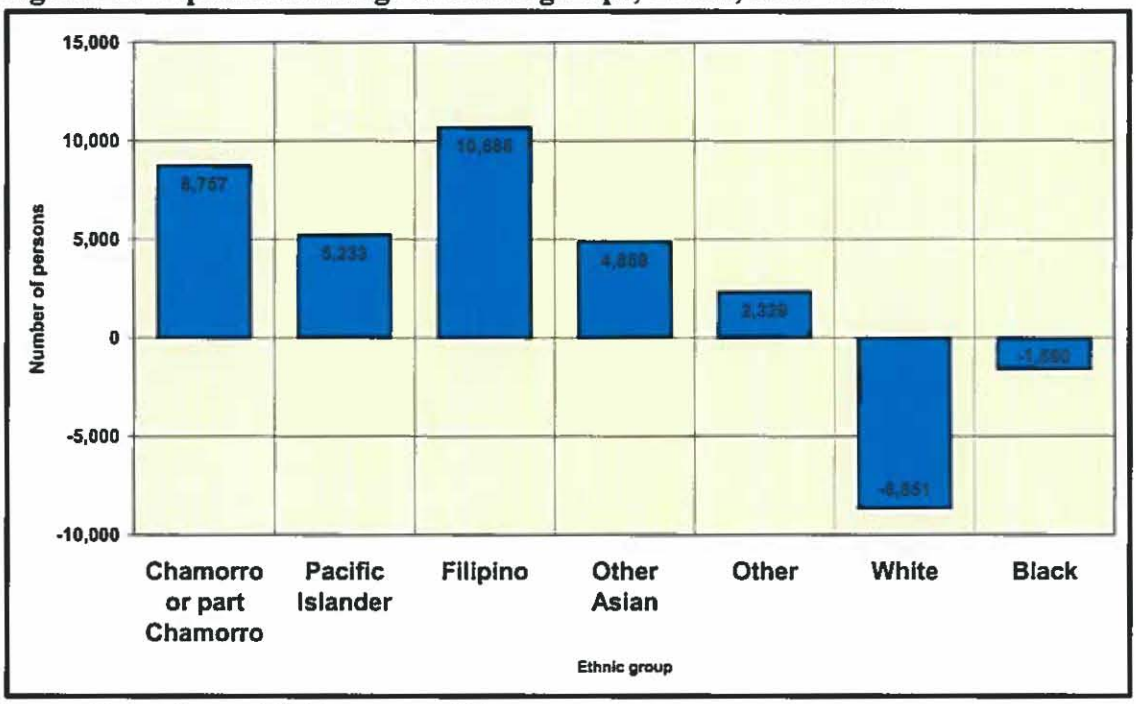
Figure 21: Total population by ethnicity, Guam, 2000



Source: Census Bureau, US Department of Commerce

The Filipino population was the fastest-growing ethnic group on Guam between 1990 and 2000, increasing by more than 10,000 people (Figure 22). The Chamorro and part Chamorro population increased by almost 9,000 people, while Whites decreased by 8,651 people, most likely due to the reduction in the size of the military forces in the mid 1990s. This downsizing also appears to have affected the Black population, which decreased by 1,590 people. The populations of Pacific Islanders and Other Asians each increased by about 5,000 people.

Figure 22: Population change of ethnic groups, Guam, 1990–2000

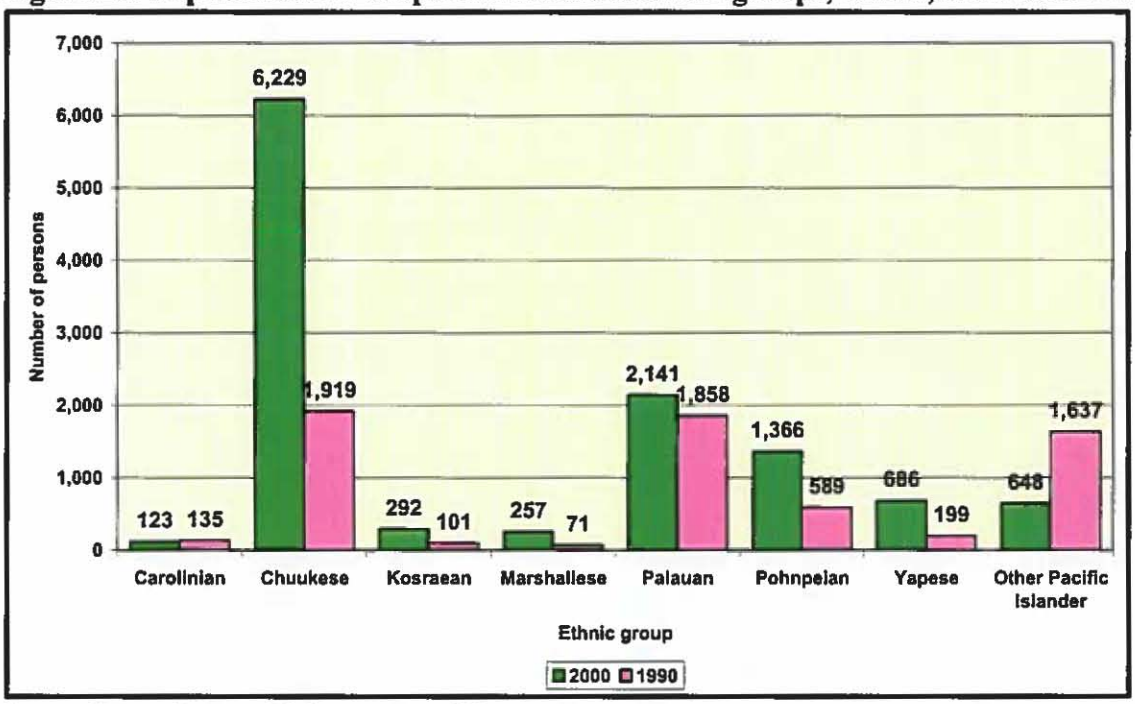


Source: Census Bureau, US Department of Commerce

Examining the Pacific Islander population, it can be seen that the Chuukese were the fastest-growing group between 1990 and 2000, followed by Pohnpeian and Yapese (Figure 23). However, Palauan remained the second largest Pacific Islander group in 2000. Carolinians and Other Pacific Islanders decreased in population size between 1990 and 2000.

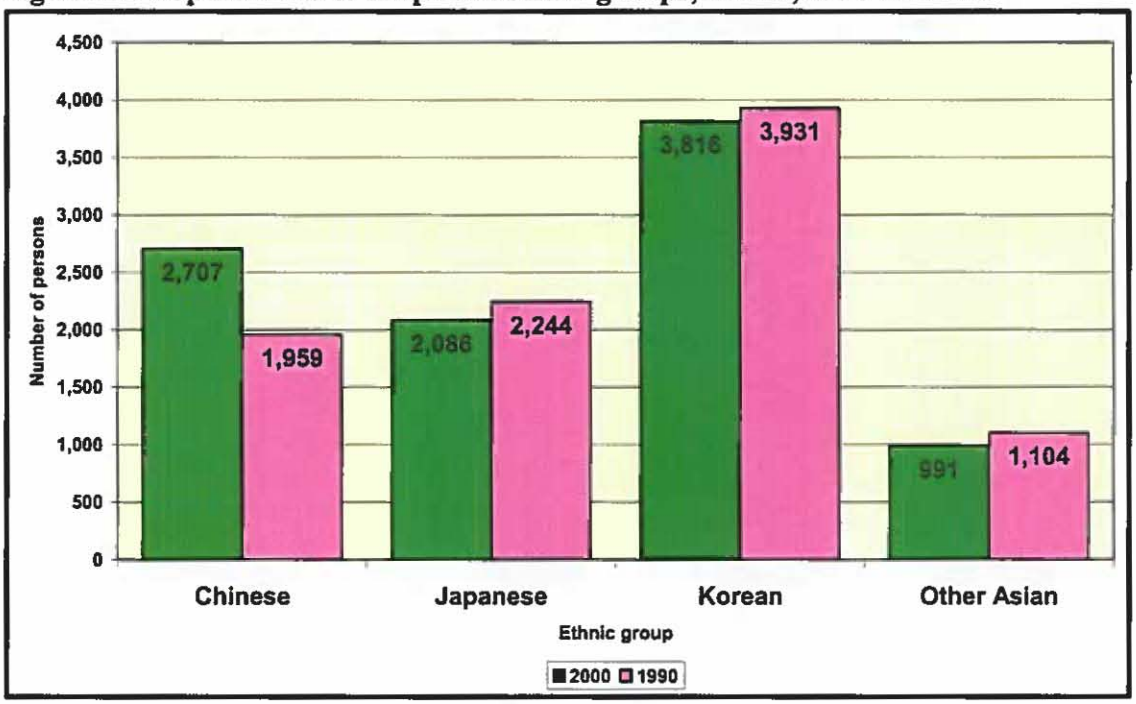
With regard to the Asian population other than Filipinos, only the Chinese increased in population size between 1990 and 2000. Populations with Japanese, Korean and Other Asian ethnic origins all decreased in size during the last intercensal interval (Figure 24).

Figure 23: Population size of specific Pacific Islander groups, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

Figure 24: Population size of specific Asian groups, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

4.3 Disability

The data on disability status was based on two questions. The first was a two-part question in the 2000 census that asked if the respondent had any of the following long-lasting conditions:

(a) blindness, deafness, or a severe vision or hearing impairment (sensory disability); and
(b) a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, reaching, lifting or carrying (physical disability).

This question was asked of respondents aged 5 years and older.

The second question, comprising four parts, asked if the respondent had a physical, mental or emotional condition lasting 6 months or more that made it difficult to perform certain activities. The four activity categories were:

(a) learning, remembering or concentrating (mental disability);
(b) dressing, bathing, or getting around inside the home (self-care disability);
(c) going outside the home alone to shop or visit a doctor's office (going outside the home disability); and
(d) working at a job or business (employment disability).

Categories (a) and (b) were asked of respondents aged 5 years and older; (c) and (d) were asked of respondents aged 16 years and older.

The 2000 Guam census questionnaire allows respondents aged 5 years and older to report more than one type of disability. Thus, the total number of disabilities tallied for people 5 years and older is the sum of the number of all disabilities reported for the population (Table 13).

Table 13: Characteristics of the civilian non-institutionalized population by age, disability status and type of disability, Guam, 2000

Characteristic	Total Disabilities Tallied [1/]	Total [2/]		Male [2/]		Female [2/]	
		Number	Percent	Number	Percent	Number	Percent
Population 5 years and over		132,611	100.0	66,124	100.0	66,487	100.0
With any disability	39,962	23,440	17.7	12,091	18.3	11,349	17.1
Population 5 to 15 years old		32,981	100.0	16,824	100.0	16,157	100.0
With any disability	1,061	819	2.5	517	3.1	302	1.9
Sensory disability	269						
Physical disability	191						
Mental disability	429						
Self-care disability	172						
No disability		32,162	97.5	16,307	96.9	15,855	98.1
Population 16 to 64 years old		91,474	100.0	45,368	100.0	46,106	100.0
With any disability	31,593	18,956	20.7	9,856	21.7	9,100	19.7
Sensory disability	1,838						
Physical disability	3,875						
Mental disability	1,450						
Self-care disability	1,060						
Go-outside home disability	10,768						
Employment disability	12,602						
No disability		72,518	79.3	35,512	78.3	37,006	80.3
Population 65 years and over		8,156	100.0	3,932	100.0	4,224	100.0
With any disability	7,308	3,665	44.9	1,718	43.7	1,947	46.1
Sensory disability	1,154						
Physical disability	2,289						
Mental disability	924						
Self-care disability	751						
Go-outside home disability	2,190						
No disability		4,491	55.1	2,214	56.3	2,277	53.9

Source: Census Bureau, US Department of Commerce

1/ People in age group may report one or more disabilities.

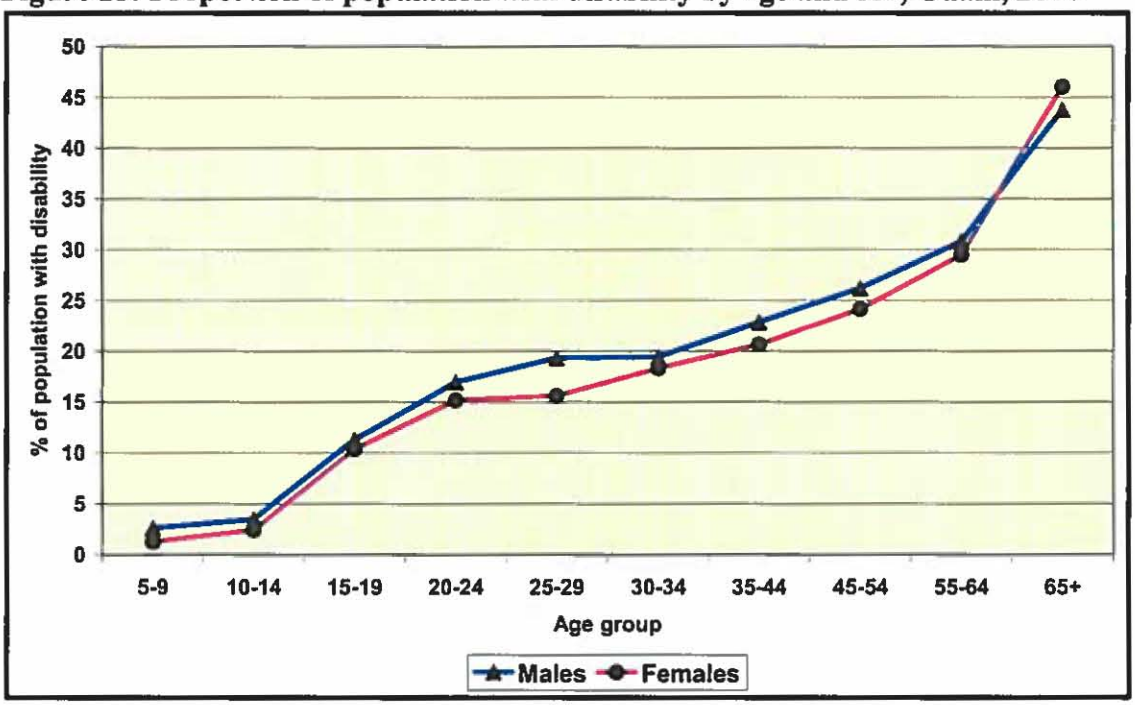
2/ Data reflect number of people in age group by sex.

The 2000 Guam census counted 23,440 people with some type of disability. The proportion of the population with a disability increased continuously with age. Overall, among males aged 5 years and older, 18 per cent had a disability, a slightly higher proportion than among females aged 5 years and older, of whom 17 per cent had a disability (Figure 25).

Under the age of 15 years, less than 5 per cent of the population had a disability. This proportion increased to between 15 and 20 per cent in the age group of 20–34 years, while it increased further to about 45 per cent of the population aged 65 years and older.

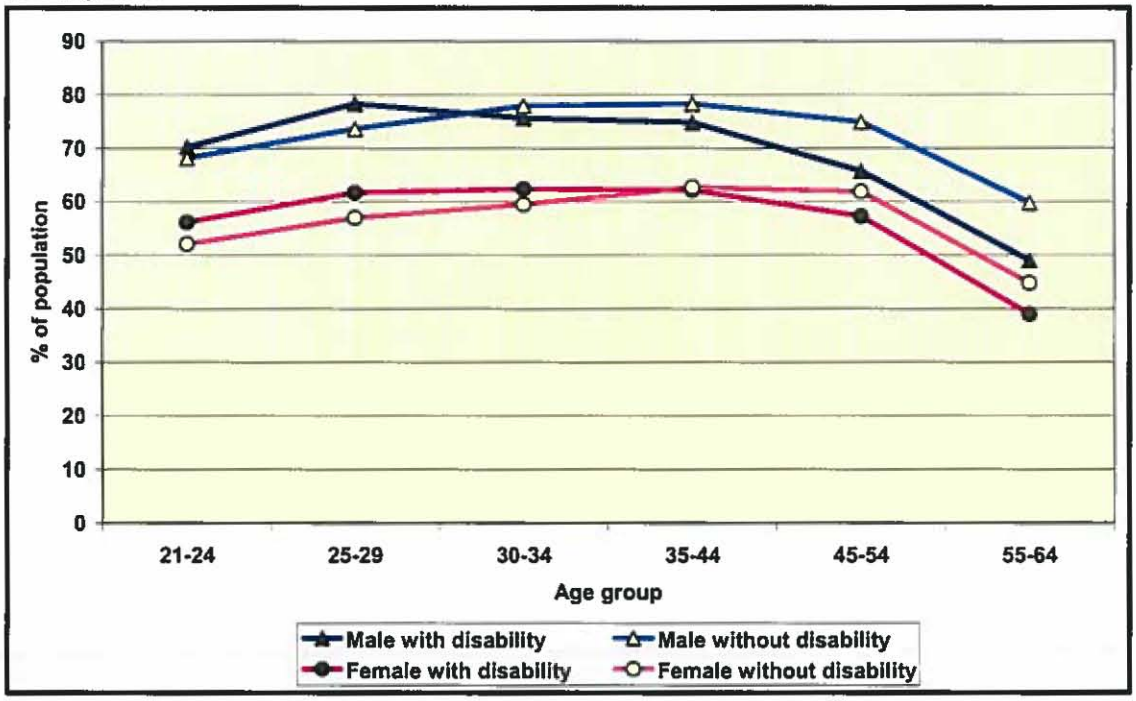
From data on employment status of the population with and without a disability, it can be seen that employment prospects of people with a disability at ages 21-34 are not affected by their disability (Figure 26). Only for people 35 years and older, employment prospects diminish for people with a disability compared with those people without a disability. This is most probably due to the fact that with increasing age increases the severity of the disabilities, and its impact on disabled person's abilities to find suitable employment.

Figure 25: Proportion of population with disability by age and sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

Figure 26: Proportion of population employed by disability status, age and sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

4.4 Poverty status

What is poverty – which people are poor?

There is no single, universally accepted definition of *poverty*. Modern definitions have moved away from conceptions based on a lack of physical necessities towards a more social and relative understanding. For example, the European Union's working definition of poverty is:

> *Persons, families and groups of persons whose resources (material, cultural and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State to which they belong.*

In the Pacific context, the term *hardship* is more commonly used to describe poverty. Hardship arises through poor access to basic services and economic opportunities. Forms of hardship include the experience of poor quality, limited reach and high cost of basic services, particularly power, water, education, transport and telecommunications.

The following groups are considered to be suffering more hardship than the rest of the community:

- people without a regular source of income;
- those without access to land (settlers);
- people with large families (supporting many children and relatives);
- abandoned elders (whose children have moved to the capital or overseas);
- mentally challenged and physically handicapped people;
- orphans;
- widows and single mothers without regular income;
- elderly childless couples; and
- families living in squatter areas.

However, Guam's data on poverty status are based on the poverty definition that is used by the Census Bureau (Table 14). In this definition, a set of *money income thresholds* that vary by family size and composition determine who is in poverty. If a family's total income is less than the family's money income threshold, then that family and every individual in it are considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using the Consumer Price Index (CPI-U). They are based on money income before taxes and does not include capital gains or non-cash benefits (such as public housing, Medicaid and food stamps).

The poverty data were derived from answers to questions about income. The Census Bureau uses the federal government's official poverty definition. The Social Security Administration (SSA) developed the original poverty definition in 1964, which federal interagency committees subsequently revised in 1969 and 1980.

4.4.1 Derivation of the current poverty measure

When the SSA created the poverty definition in 1964, it focused on family food consumption. The US Department of Agriculture (USDA) used its data about the

nutritional needs of children and adults to construct food plans for families. Within each food plan, dollar amounts varied according to the total number of people in the family and the family's composition, such as the number of children it contained. The cheapest of these plans, the Economy Food Plan, was designed to address the dietary needs of families on an austere budget.

The USDA's 1955 Food Consumption Survey showed that a family of three or more people across all income levels spent roughly one-third of their income on food. On this basis, the SSA multiplied the cost of the Economy Food Plan by three to obtain dollar figures for the poverty thresholds. As the Economy Food Plan budgets varied by family size and composition, so too did the poverty thresholds. For two-person families, the thresholds were adjusted by slightly higher factors because those households had higher fixed costs. Thresholds for unrelated individuals were calculated as a fixed proportion of the corresponding thresholds for two-person families.

The poverty thresholds are revised annually to allow for changes in the cost of living as reflected in the CPI-U. The poverty thresholds are the same for all parts of the United States – they are not adjusted for regional, state or local variations in the cost of living.

How poverty status is determined
The poverty status of families and unrelated individuals in 1999 was determined using 48 thresholds (income cut-offs) arranged in a two dimensional matrix. The matrix consists of family size (from one person to nine or more people) cross-classified by the presence and number of family members under 18 years old (from no children present to 8 or more children present). Unrelated individuals and two-person families were further differentiated by the age of the reference person (under 65 years old, and 65 years old and older).

Determining a person's poverty status involves comparing the person's total family income with the poverty threshold appropriate for that person's family size and composition. If the total income of that person's family is less than the threshold appropriate for that family, then the person is considered poor, together with every member of his or her family. If a person is not living with anyone related by birth, marriage or adoption, then the person's own income is compared with his or her poverty threshold.

Individuals for whom poverty status is determined
Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. These groups also were excluded from the numerator and denominator when calculating poverty rates. They were considered neither 'poor' nor 'non-poor'.

Specified poverty levels
For various reasons, the official poverty definition does not satisfy all the needs of data users. Therefore, some of the data reflect the number of people below different percentages of the poverty level. These specified poverty levels are obtained by

multiplying the official thresholds by the appropriate factor. For example, the average income cut-off at 125 per cent of the poverty level was $21,286 ($17,029 x 1.25) in 1999 for a family of four people (Table 14).

Table 14: Poverty threshold in 1999, by size of family and number of related children under 18 years old (dollars)

Size of family unit	Weighted average threshold	Related children under 18 years old								
		None	One	Two	Three	Four	Five	Six	Seven	Eight +
One person (unrelated individual)	8,501									
Under 65 years old	8,667	8,667								
65 years old and older	7,990	7,990								
Two people	10,869									
Householder under 65 years old	11,214	11,156	11,483							
Householder 65 years old and older	10,075	10,070	11,440							
3 people	13,290	13,032	13,410	13,423						
4 people	17,029	17,184	17,465	16,895	16,954					
5 people	20,127	20,723	21,024	20,380	19,882	19,578				
6 people	22,727	23,835	23,930	23,436	22,964	22,261	21,845			
7 people	25,912	27,425	27,596	27,006	26,595	25,828	24,934	23,953		
8 people	28,967	30,673	30,944	30,387	29,899	29,206	28,327	27,412	27,180	
9 people or more	34,417	36,897	37,076	36,583	36,169	35,489	34,554	33,708	33,499	32,208

Source: Census Bureau, US Department of Commerce

4.4.2 Poverty data

Based on the above definition, the Guam 2000 census showed that one in five families lived below the poverty level in 1999 (Table 15).

The households headed by a female (no husband present) with children were particularly vulnerable.

About 39 per cent of households headed by a female lived below the poverty level. If the families included children under 18 years, this proportion rose to 44 per cent of all households headed by a female and, if the families included children under 5 years of age, it rose again to more than half (52.4 per cent) of all households in this category.

With regard to individuals, 23 per cent of the population lived below the poverty level. Young children were particularly vulnerable: about 27 per cent of them lived in families that were below the poverty level in 1999.

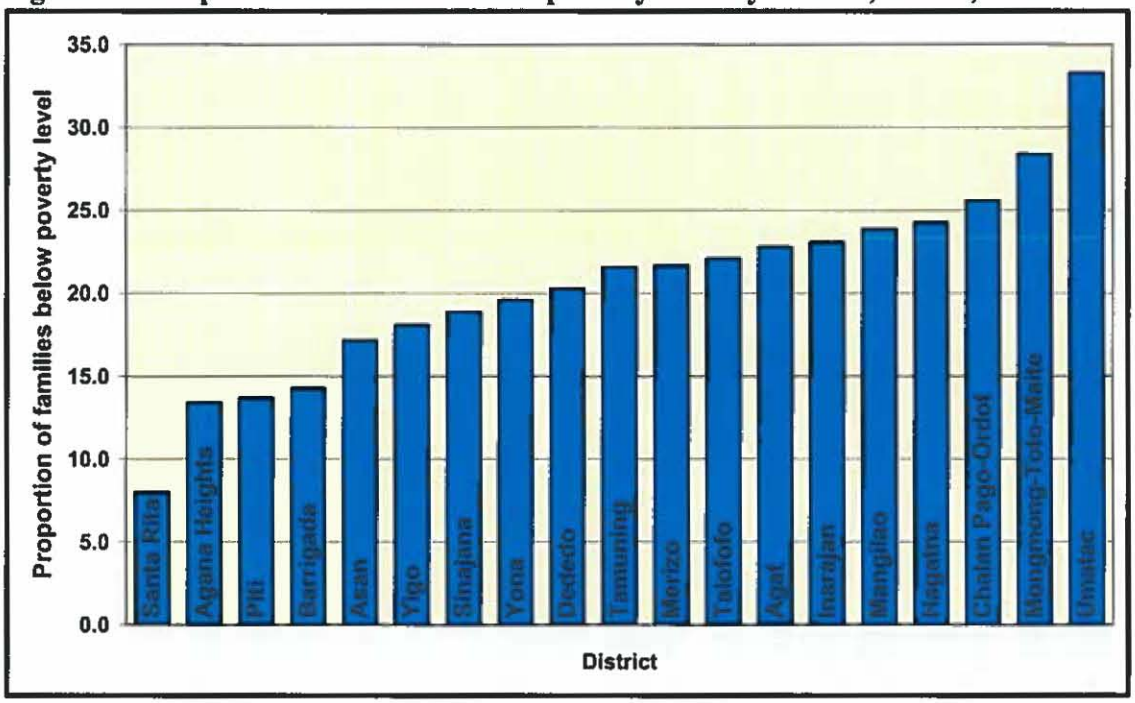
However, 46.6 per cent of individuals who lived in non-family arrangements (unrelated individuals) lived below the poverty level.

Table 15: Families and individuals by poverty status, Guam, 1999

Poverty status in 1999	Families below poverty level	
	Number	%
Families	6,466	20.0
With related children under 18 years	5,420	23.4
With related children under 5 years	3,180	27.7
Families with female householder, no husband present	2,434	38.7
With related children under 18 years	2,189	44.2
With related children under 5 years	1,287	52.4
Individuals	34,792	23.0
18 years and older	19,143	19.7
65 years and older	1,302	16.0
Related children under 18 years	15,509	28.6
Related children 5 to 17 years	10,247	27.3
Unrelated individuals 15 years and older	3,203	46.6

Source: Census Bureau, US Department of Commerce

Figure 27: Proportion of families below poverty level by district, Guam, 1999



Source: Census Bureau, US Department of Commerce

Examining poverty status of families by district reveals that a particularly high proportion of poor families lived in the districts of Chalan Pago-Ordot, Mongmong-Toto-Maite and Umatac (Figure 27).

In contrast, the districts of Piti, Agana Heights and especially Santa Rita had significantly lower poverty levels than those in all other districts.

5. EDUCATION CHARACTERISTICS

Education is a key component in the economy, which shapes the lives of people and how they live. Government officials, policy-makers and community leaders rely on education information to institute programs and services to address the needs and improve the welfare of the community. A quality education for every child is much valued in society today. The old adage 'knowledge is power' is strongly evident in this complex and competitive world, where investment in and access to higher learning contributes to the economic and social well-being of any individual.

Experience, skills and training all characterize white and blue collar personnel in hospitals, clinics, private or government offices, construction sites and shipyards. All of these workers acquired their knowledge, skills and expertise through education and the desire to excel through training. The data on school enrollment and educational attainment in this section offer a glimpse of Guam's student population, the level of education and the impact of this education on household and personal income.

5.1 School enrollment

Guam's education system contains a diverse selection of schools. The Guam Public School System (GPSS) provides education across the entire island. The private schools, which are also part of Guam's education system, include the Catholic Schools System, independent private institutions and the Department of Defense schools. The enrollment for Department of Defense schools is limited to eligible children of military members and civilian employees of the federal government.

The elementary and middle schools are recognized as the primary education level and high schools are at the secondary education level. The Guam Public School System oversees 27 elementary–middle schools (kindergarten to 8th grade) and 4 high schools (9th to 12th grade). As for the private schools, the Catholic School System has 14 elementary–middle schools and 3 high schools, while the independent private institutions include 15 elementary–middle schools and 5 high schools, in addition to 8 schools that include both primary and secondary education levels (elementary–middle and high), and the Department of Defense has 3 elementary–middle schools and 1 high school. In total the private schools offer 32 elementary–middle schools, 9 high schools and 8 schools that go from elementary to high school grade levels.

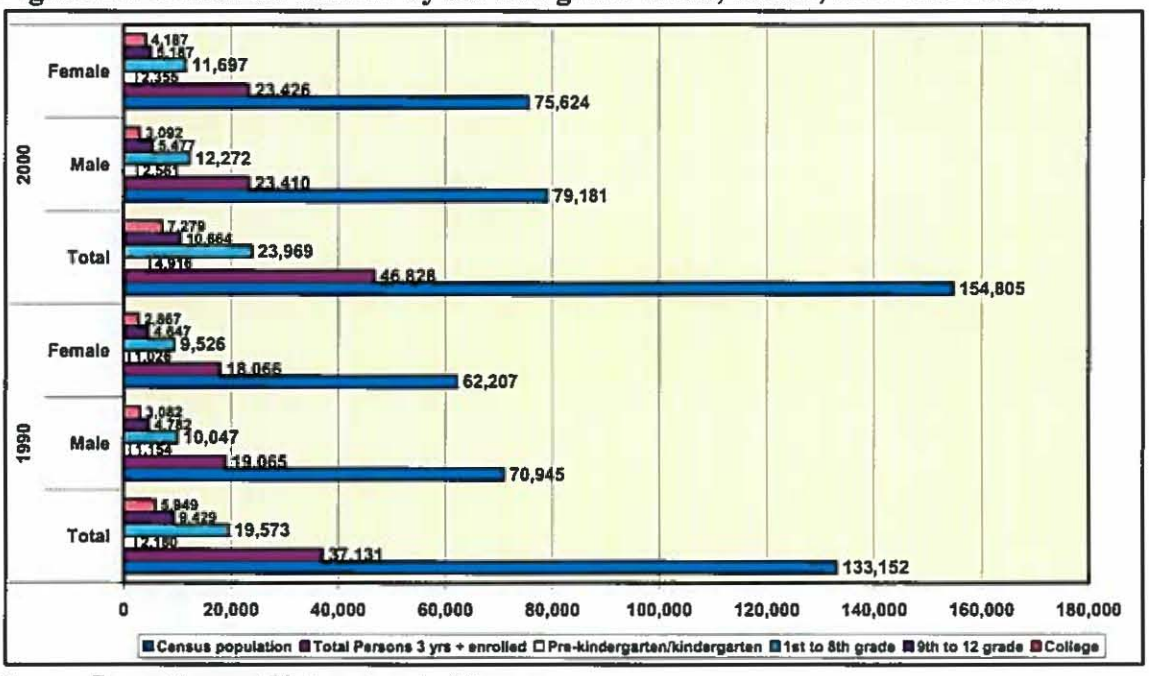
Although the educational system on Guam contains an assorted selection of schools, the organizational structure of all schools is consistent, with the standard levels of elementary (kindergarten to 5th grade), middle (6th to 8th grade) and high (9th to 12th grade). Headstart classes are also available for preschool children of income-eligible families. It is mandatory for children to attend school from 5 to 16 years of age. Guam's schools, the Guam Community College and the University of Guam are all accredited by the Western Association of Schools and Colleges, which also accredits California, Hawaii and other western states.

Every 10 years, the census presents a candid view of Guam's school enrollment and educational attainment. To assess education in the population, the census collects data on two types of characteristics – namely, the level of enrollment and the level of educational attainment of adults no longer in school.

Information about school enrollment originates from answers to questions 7a and 7b in the 2000 census. A respondent was classified as being 'enrolled in school' if he or she attended a 'regular' public or private school or college at any time between February 1, 2000 and the time of enumeration. The question includes instructions that regular school or college includes 'pre-kindergarten, kindergarten, elementary school, and schooling which leads to a high school diploma or a college degree'. Respondents who did not answer the enrollment question were assigned the enrollment status and type of school of a person with the same age, sex and ethnic origin and whose residence was in the same or nearby area.

In 2000, 30.3 per cent or 46,828 of the total population aged 3 years and older were enrolled in Guam's schools (Figure 28 and Table 16). Of the 46,828 enrolled, 23,402 were male students and 23,426 were females. Figure 28 shows that 4,916 people enrolled in pre-kindergarten/kindergarten, 23,969 in elementary–middle school, 10,664 in high school and 7,279 in college in 2000.

Figure 28: School enrollment by sex and grade levels, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

In 1990 student enrollment was 28 per cent or 37,131 of Guam's total population aged 3 years and older. Between 1990 and 2000 enrollment increased by 26 per cent to 46,828. The male student population increased by 23 per cent from 19,062 in 1990 to 23,410 in 2000. Female student enrollment showed a greater increase of nearly 30 per cent, from 18,066 in 1990 to 23,420 in 2000 (Table 16).

In 2000 about 84 per cent or 39,102 of the student population aged 3 years and older were enrolled in public schools, and 17 per cent or 7,726 attended private schools. Of the male student population, 83 per cent or 19,528 were enrolled in public schools and 17 per cent or 3,874 were registered in private schools. Of the female student population, 84 per cent or 19,574 were enrolled in public schools and 16 per cent or 3,852 were enrolled in private schools.

Table 16: School enrollment by sex and grade level, Guam, 1990 and 2000

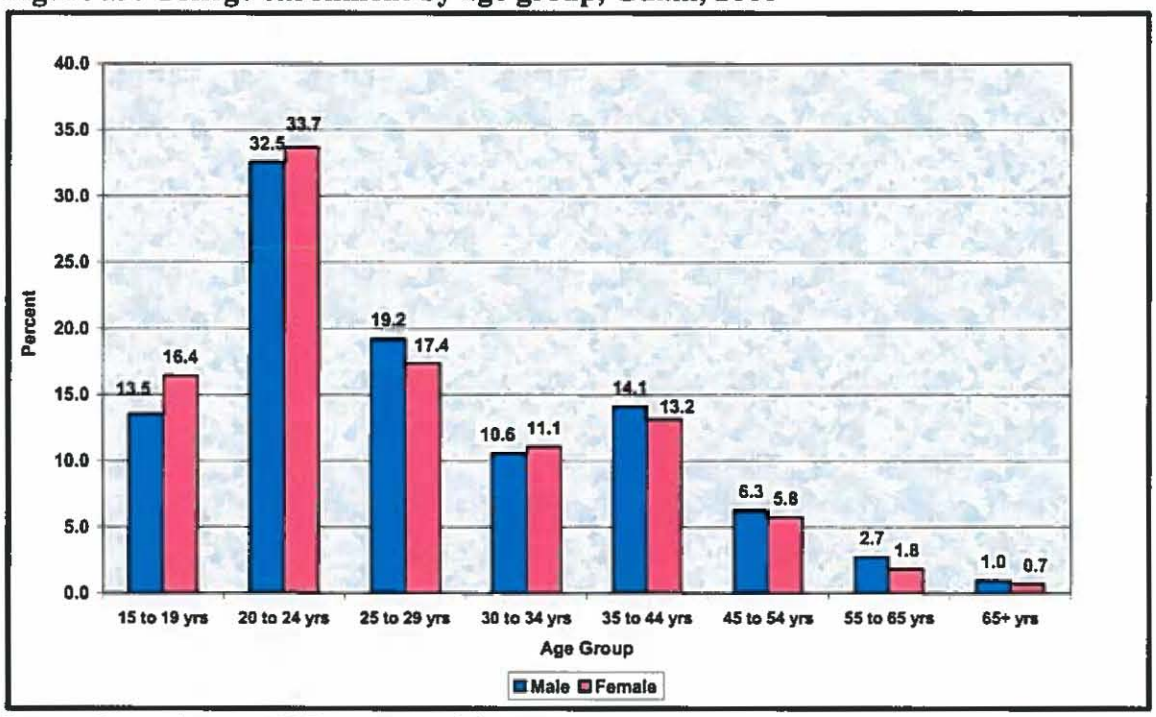
School Enrollment	1990			2000			1990/2000 (%) Change		
& Grade Level	Total	Male	Female	Total	Male	Female	Total	Male	Female
Census population	133,152	70,945	62,207	154,805	79,181	75,624	16.3	11.6	21.6
Total Persons 3 years and over enrolled in school	37,131	19,065	18,066	46,828	23,402	23,426	26.1	22.7	29.7
Pre-kindergarten/kindergarten	2,180	1,154	1,026	4,916	2,561	2,355	125.5	121.9	129.5
1st to 8th grade	19,573	10,047	9,526	23,969	12,272	11,697	22.5	22.1	22.8
9th to 12 grade	9,429	4,782	4,647	10,664	5,477	5,187	13.1	14.5	11.6
College	5,949	3,082	2,867	7,279	3,092	4,187	22.4	0.3	46.0
Public School	30,647	15,907	14,740	39,102	19,528	19,574	27.6	22.8	32.8
Pre-kindergarten/kindergarten	1,402	750	652	3,535	1,839	1,696	152.1	145.2	160.1
1st to 8th grade	16,060	8,275	7,785	20,471	10,479	9,992	27.5	26.6	28.3
9th to 12 grade	8,058	4,212	3,846	8,982	4,662	4,320	11.5	10.7	12.3
College	5,127	2,670	2,457	6,114	2,548	3,566	19.3	-4.6	45.1

Source: Census Bureau, US Department of Commerce

There were more males than females at all school levels from pre-kindergarten/kindergarten to 12th grade in both 1990 and 2000. Likewise, males were the larger group in college enrollment in 1990. However, in 2000 the female student population attending college increased substantially by 1,320 or 46 per cent, whereas the male students increased by 10 people or 3 per cent, compared with 1990 levels. The overall population of students attending college increased by 1,330 or 22 per cent between 1990 and 2000.

The number of college students attending public universities increased by 19 per cent between 1990 and 2000. There was a 5 per cent decline in the number of male college students attending public universities over this period. The number of female college students in this category, on the other hand, increased by 45 per cent.

Figure 29: College enrollment by age group, Guam, 2000



Source: Census Bureau, US Department of Commerce

In 2000, 6,116 of college enrollees were aged 15–19 years, representing 14 per cent of all male college students and 16 per cent of all female college students (Figure 29). The age group that contained the highest proportion of college enrollees was 20–24 years, representing 33 per cent and 34 per cent of all male and female college students respectively. There was also a strong showing of college enrollees aged 25–29 years, representing 19 per cent and 17 per cent of the total male and female college enrollments respectively. Less than 1 per cent of college enrollees were aged 65 years or over.

In SY 2005–2006 Guam's total school fall enrollment was 39,783, a decrease of 18 per cent from the 2000 census enrollment of 46,828. One factor that helps to explain to the apparent drop is that the census figures include children in nurseries aged 3 years and older, whereas Guam's education system only begins to count children from the kindergarten level of 5 years. However, a substantive factor contributing to the enrollment decline was the downsizing of private businesses, which may have prompted families to relocate overseas to look for better economic opportunities.

Table 17: Students enrolled in and graduated from primary and secondary schools, fall enrollment, Guam, SY 2001–2002 to SY 2005–2006

School/Grade	School Year				
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Total School Fall Enrollment	39,918	39,584	38,849	39,370	39,783
Catholic Schools Total	3,184	3,206	3,535	3,726	3,839
Kindergarten to 5th Grade	1,385	1,321	1,447	1,611	1,674
6th - 8th Grade	777	808	879	917	877
9th - 12th Grade	1,022	1,077	1,209	1,198	1,288
High School Graduates	246	208	214	241	254
DoDEA Total	2,561	2,333	2,388	2,538	2,418
Kindergarten to 5th Grade	1,558	1,334	1,388	1,545	1,386
6th - 8th Grade	549	569	555	553	554
9th - 12th Grade	454	430	445	440	478
High School Graduates	63	60	68	61	66
Other Private Schools Total	2,654	2,705	2,751	2,567	2,748
Kindergarten to 5th Grade	1,336	1,270	1,276	1,164	1,227
6th - 8th Grade	616	573	596	608	610
9th - 12th Grade	702	862	879	795	911
High School Graduates	167	176	178	198	197
Guam Public School System Total	31,519	31,340	30,175	30,539	30,778
Kindergarten to 5th Grade	15,143	14,705	14,110	14,659	14,555
6th - 8th Grade	7,517	7,554	7,146	6,840	6,852
9th - 12th Grade	8,859	9,081	8,919	9,040	9,371
High School Graduates	1,446	1,502	1,456	1,317	1,218
Public School Drop-outs	950	756	825	725	769
Public School Drop-outs Rate	8.3	6.5	7.1	7.9	6.4
Cost Per Pupil	$4,508	$4,370	$4,064	$4,405	$5,122
Pupil/Teacher Ratio	25.6	14.1	14.1	16.1	16.4
District Cohort Graduation Rate (%)	56.9	59.0	61.9	55.2	64.2
Total High School Graduates	1,922	1,946	1,916	1,817	1,735
Private School Graduates	476	444	460	500	517
Public School Graduates	1,446	1,502	1,456	1,317	1,218

Source: Catholic Education Office, DODEA; GPSS; other private schools: Asmuyao Community School, Evangelical Christian School, Southern Christian Academy, Guam Adventist Academy, St John's School, Tamuning Christian Academy, Temple Christian Academy and Trinity Christian School

As Table 17 shows, school enrollment in Guam's primary and secondary schools consisted of a majority of school children in the Guam Public School System: 30,778 people, or 77 per cent of the total school enrollment of 39,783 in Guam schools in SY 2005–2006. School children in Catholic schools accounted for only 3,839 or 10 per cent of all students in Guam schools.

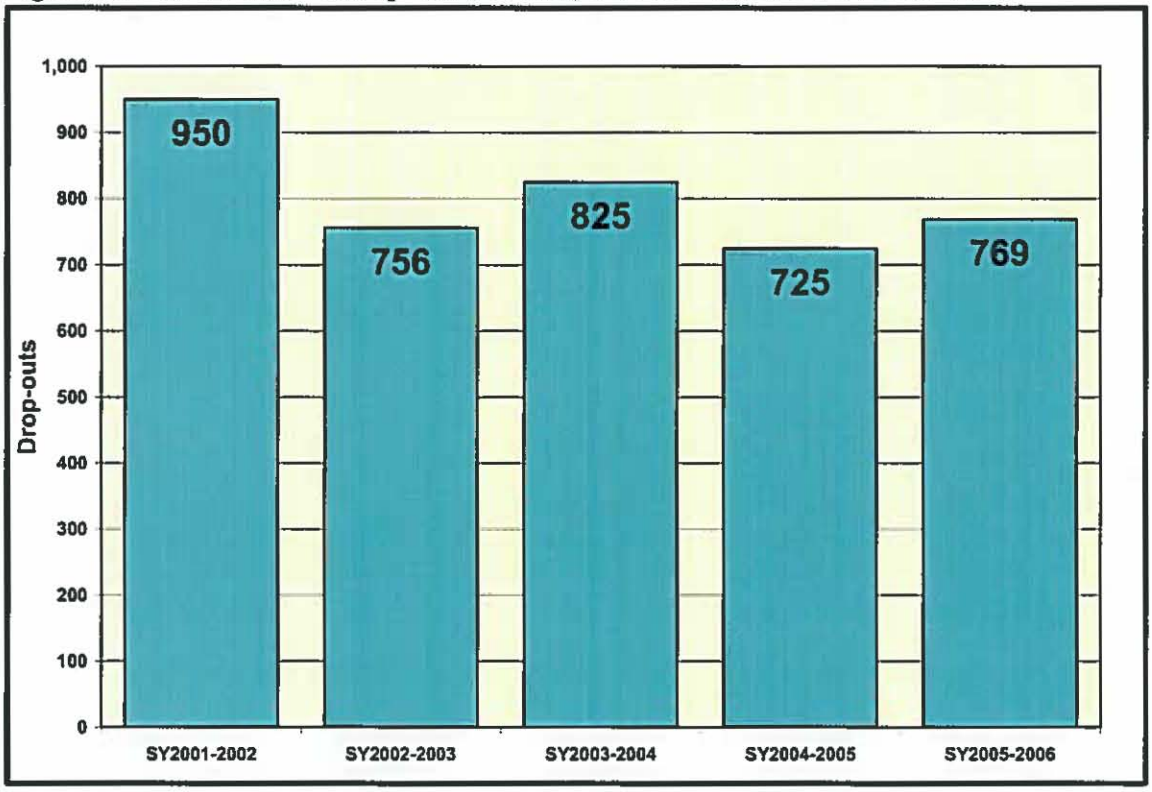
The total number of high school graduates for SY 2005–2006 was 1,735. About 70 per cent of all graduates were from public schools and 30 per cent were from private schools, including Catholic schools.

The success of the education system is also monitored by the proportion of students who drop out of school every year. The drop-out rate includes public school students in 9th to 12th grades. A '*drop-out*', as defined by Board Policy 375, is a student who was enrolled in a GPSS high school during a given school year and, after enrollment, stopped attending school without:

- being transferred to another school or to a high school equivalency educational program recognized by GPSS;

- being incapacitated to the extent that enrollment in school or participation in an alternative high school program was impossible;
- graduating from high school, or completing an alternative high school program recognized by GPSS, within 6 years of the first day of enrollment in 9th grade;
- being expelled; or
- being removed by law enforcement authorities and confined, thereby prohibiting the continuation of schooling.

Figure 30: Public school drop-outs, Guam, SY 2001–2002 to SY 2005–2006



Source: Guam Public School System, Government of Guam

As Table 17 and Figure 30 show, the number of drop-outs in the public schools decreased from 950 people in SY 2001–2002 to 769 in SY 2005–2006, a 19 per cent decline over 5 years.

The *cost per pupil* in public schools is calculated by dividing the total amount of public school expenditure per year by the average daily attendance. The expenditures do not include the cost for transportation by the Guam Department of Public Works.

In SY 2001–2002 the cost per pupil in public schools was $4,508. The cost per pupil then decreased during the following school years until SY 2005–2006, when the cost per pupil rose to $5,122, a 14 per cent increase from SY 2001–2002 (Table 17).

The *cohort graduation rate* is calculated after tracking the high school experience of each member of the 9th grade cohort. After four years of high school, each member of the 9th grade cohort is identified as one of the following:

- a graduate;
- still in school;
- a transfer;
- a drop-out; or
- a withdraw due to illness or death.

A 4-year cohort graduation rate may then be calculated by dividing the number of cohort graduates after 4 years of high school by the total 9th grade cohort, less the number of transfers and the number of new students that withdrew during the 4 years due to illness or death.

The district cohort graduation rate was 57 per cent for SY 2001–2002 and increased to 64 per cent in SY 2005–2006.

5.2 Educational attainment

Completing post-secondary education is an achievement that is greatly valued by society, and is one of the main determinants of class and status. For this reason, it also is an indicator of the level of educational achievement among Guam's population, and can then link to indicators of the highest income and wealth, as well as of the lowest earnings and poverty in the community.

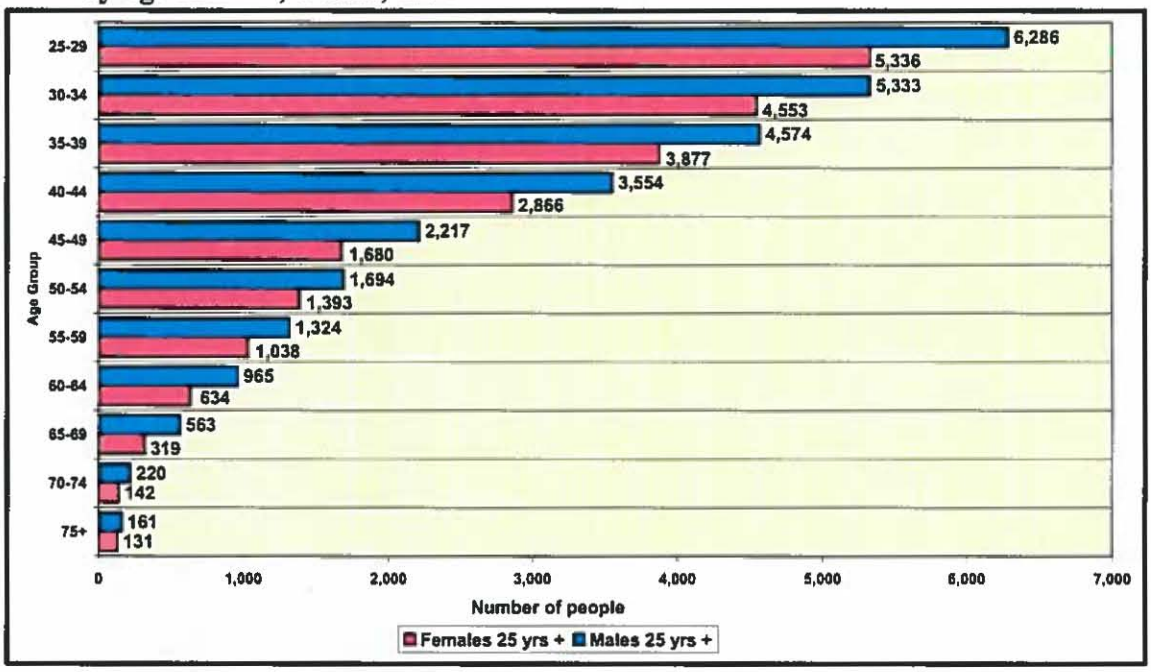
Table 18 presents data on educational attainment for people aged 25 years and older as of February 1, 1990 and 2000. In 1990 close to 2 per cent of people aged 25 years and older did not complete any schooling. More males (58 per cent) than females (42 per cent) reported they did not complete any schooling. In 2000, the number of people who did not complete any schooling had dropped by 70, or 7 per cent since 1990. In 2000, too, fewer males reported that they had not completed any schooling. However, there was a significant (32 percent) increase in the number of females who did not complete any schooling, compared with 1990 figures.

In 1990 the highest educational attainment for 12 per cent or 8,263 of the population aged 25 years and older was completing an elementary level from 1st to 8th grade. There were more females, who made up 55 per cent of this category, than males. Another 13 per cent reported that their highest educational attainment was completing a high school level from 9th to 12th grade. There were more males in this category, at 53 per cent, than females.

In 1990, 75 per cent or 26,891 out of 35,744 males aged 25 years and older were high school graduates (including those with college background), compared with 77 per cent or 32,834 out of 42,459 males in this age group in 2000. Among the female population aged 25 years and older in 1990, 71 per cent or 21,969 out of 30,956 were high school graduates (including those with college background), while in 2000 75 per cent or 30,742 out of 40,822 were in this category. Overall, the 1990 census results showed that 73 per

cent of males and females aged 25 years or over were high school graduates or had a higher level of educational attainment. This proportion increased slightly in 2000, to 76 per cent.

Figure 31: Number of high school graduates and higher among people 25 years and older by age and sex, Guam, 1990



Source: Census Bureau, US Department of Commerce

In 1990 the age groups with the most males aged 25 years and older who were high school graduates or higher were 25–29 years at 6,286, 30–34 years at 5,333 and 35–39 years at 4,574 (Figure 31). Likewise for females, the age groups with the most high school graduates or higher were 25–29 years at 5,336, 30–34 years at 4,553 and 35–39 years at 3,877.

Table 18: Educational attainment of the population aged 25 years and older by sex, Guam, 1990 and 2000

Educational Attainment	1990			2000			1990/2000 (%) Change		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total persons 25 years and over	66,700	35,744	30,956	83,281	42,459	40,822	24.9	18.8	31.9
No schooling completed	975	568	407	905	368	537	-7.2	-35.2	31.9
Elementary	8,263	3,700	4,563	6,938	3,062	3,876	-16.0	-17.2	-15.1
1st to 4th grade 1/	2,362	916	1,446	1,366	524	842	-42.2	-42.8	-41.8
5th to 6th grade	3,300	1,470	1,830	2,864	1,247	1,617	-13.2	-15.2	-11.6
7th to 8th grade	2,601	1,314	1,287	2,708	1,291	1,417	4.1	-1.8	10.1
High School	8,602	4,585	4,017	11,862	6,195	5,667	37.9	35.1	41.1
9th grade	1,849	970	879	2,020	1,016	1,004	9.2	4.7	14.2
10th grade	2,424	1,279	1,145	2,951	1,527	1,424	21.7	19.4	24.4
11th grade	2,265	1,129	1,136	3,259	1,688	1,571	43.9	49.5	38.3
12th grade, no diploma	2,064	1,207	857	3,632	1,964	1,668	76.0	62.7	94.6
High school graduate, including equivalency	22,220	11,948	10,272	26,544	13,922	12,622	19.5	16.5	22.9
Some college, no degree	11,318	6,578	4,740	16,611	8,793	7,818	46.8	33.7	64.9
Associate degree in college	3,666	2,135	1,531	3,787	2,066	1,721	3.3	-3.2	12.4
Bachelor's degree	8,792	4,518	4,274	12,774	5,964	6,810	45.3	32.0	59.3
Master's degree	...	...	...	2,489	1,220	1,269	...		
Graduate or professional degree	2,864	1,712	1,152	946	591	355	-67.0	-65.5	-69.2
Doctorate degree	...	...	...	425	278	147	...	...	...
Percent high school graduate or higher	73.3	75.2	71.0	76.3	77.3	75.3	...	...	...
Percent bachelor's degree or higher	17.5	17.4	17.5	20.0	19.0	21.0	...	...	...

Source: Census Bureau, US Department of Commerce

Notes:

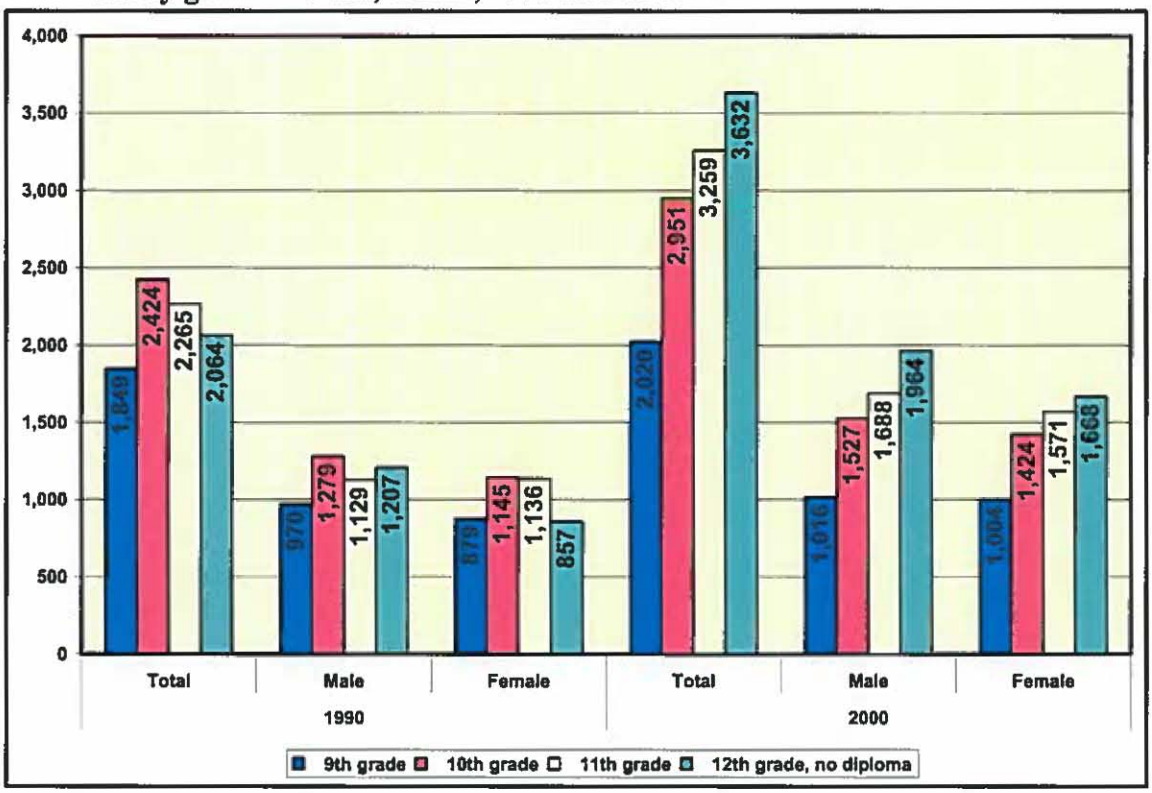
1/ In the 2000 census, nursery, pre-kindergarten and kindergarten figures were included in elementary level, 1st to 4th grades.

... indicates not applicable.

In 2000 about 14.2 per cent of people aged 25 years and older on Guam had attained high school education with no diploma (9th to 12th grade). Slightly more males (52 per cent) had attained this level than females (48 per cent).

As Table 18 shows, between 1990 and 2000 the number of people aged 25 years and older who had attained a high school education increased by 38 per cent. Over this same period, the number who had attained 12th grade but no diploma increased by 63 per cent for males and by nearly double for females.

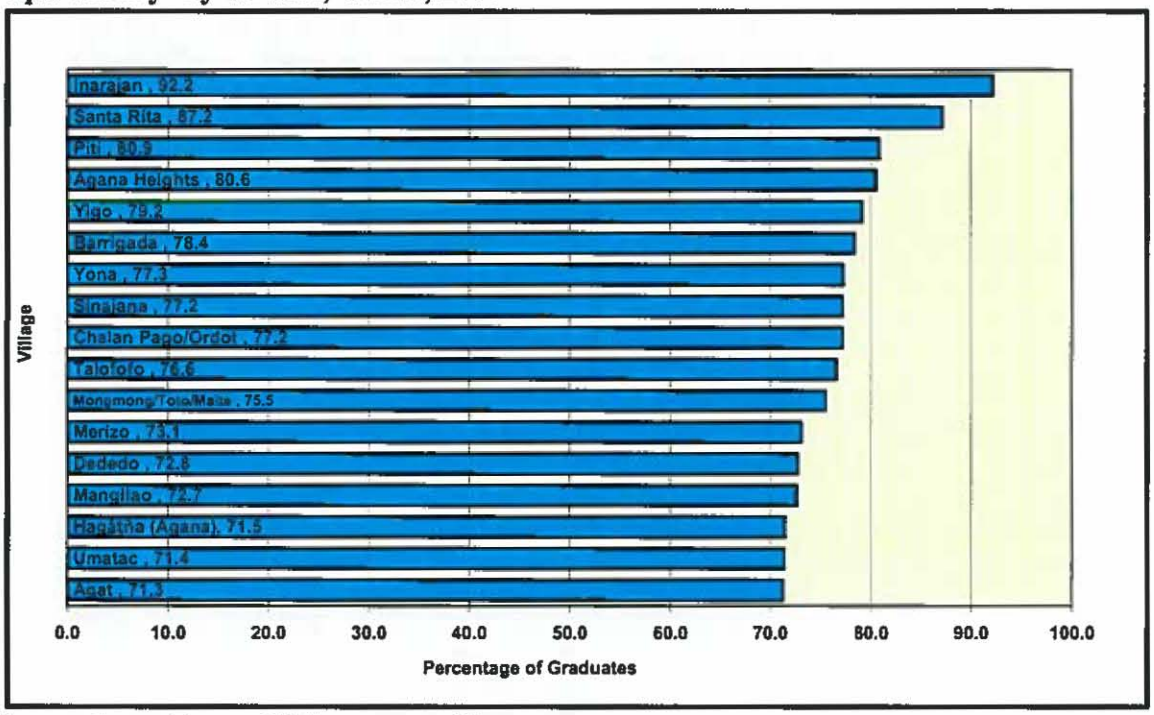
Figure 32: Number of people aged 25 years and older who had attained high school education by grade and sex, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

Figure 32 shows how males and females aged 25 years and older who had attained a high school education were distributed across 9th to 12th grades in 1990 and 2000. In 1990 there were more people (2,424 in total) who had attained a 10th grade education than any other grade level. In contrast, in 2000 there were more people (3,632 in total) who had attained a 12th grade education (but no diploma) than any other grade level.

Figure 33: Educational attainment level of 'high school graduates including equivalency' by district, Guam, 2000



Source: Census Bureau, US Department of Commerce

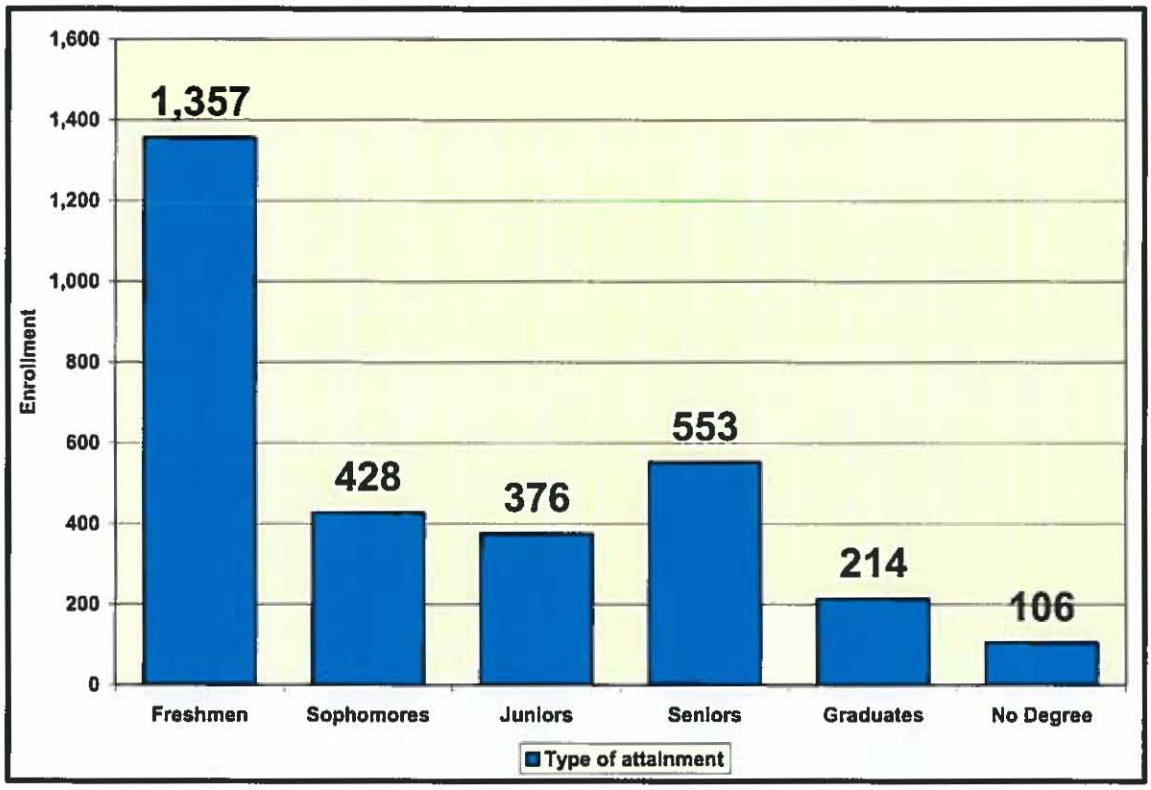
Figure 33 shows the proportion of people aged 25 years and older in each district in 2000 who were 'high school graduates, including equivalency'. The district of Inarajan reported the greatest proportion of high school graduates, at 92 per cent, followed by Santa Rita at 87 per cent and Piti at 81 per cent. Agat, at 71 per cent, had the lowest proportion of high school graduates.

Guam's major post-secondary academic land-grant institution is the University of Guam, accredited by the Western Association of Schools and Colleges. The University of Guam offers Bachelor's degrees in 35 subject areas and Master's degrees in 12 subject areas.

Guam Community College, also accredited by the Western Association of Schools and Colleges, provides vocational educational technical programs and associate degree programs. It operates secondary and post-secondary vocational programs, which include adult and continuing education, community education and short-term, specialized training.

In 2000, 12,774 people aged 25 years and older reported they had a Bachelor's degree, an increase of 45.3 per cent from the 1990 total of 8,792 (Table 18). In 1990 there was no entry for a Master's or doctoral degree; however in 2000, 2,489 or 3 per cent reported that they had a Master's degree and 425 or 1 per cent reported having a doctoral degree. In 1990, 2,864 or 4.3 per cent of people aged 25 years and older had a graduate or professional degree; however in 2000, the number declined by 67 per cent to 946.

Figure 34: University of Guam fall enrollment by attainment, Guam, academic year 2005–2006

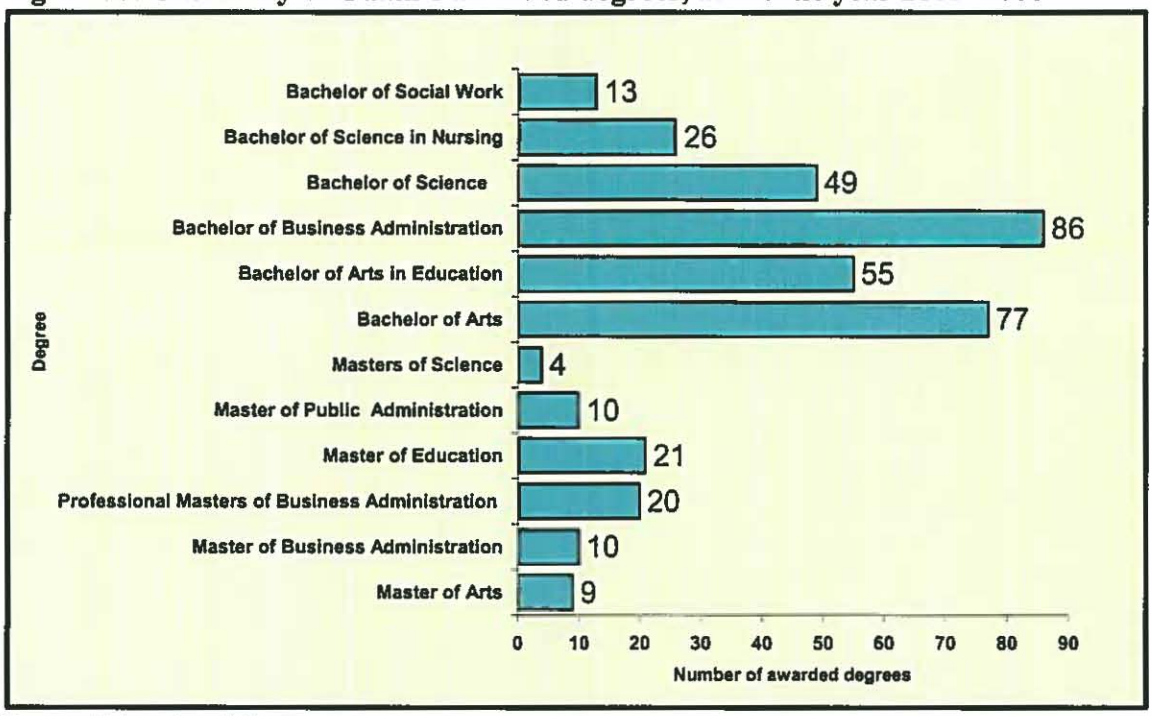


Source: University of Guam

The University of Guam reported an enrollment of 3,034 students in academic year 2005–2006, of whom 69 per cent were full-time students and 31 per cent attended part time. Freshmen were the biggest group enrolled at the university, making up 45 per cent of the student population. Nearly one in every five students was a senior while only 7 per cent were graduate students (Figure 34).

The University of Guam awarded 380 college degrees during academic year 2005–2006 (Figure 35). From this total, 3 per cent of the students were awarded a Master of Public Administration, 20 per cent a Bachelor of Arts, 14 per cent a Bachelor of Arts in Education, 3 per cent a Master of Business Administration, 7 per cent a Bachelor of Science in Nursing, 6 per cent a Master of Education, 5 per cent a Professional Master of Business Administration, 3 per cent a Bachelor of Social Work, 3 per cent a Master of Public Administration, 2 per cent a Master of Arts, and 1 per cent a Master of Science.

Figure 35: University of Guam's awarded degrees, academic year 2005–2006



Source: University of Guam

Vocational training is a school program designed to prepare a person for work in a specific occupation. People were included in this category if they completed the requirements for a training program at a trade school, business school or some other kind of school for occupational training, or at a hospital or another place of work. Training at place of work includes programs designed to teach new skills. However, on-the-job training was not considered to be vocational training as its purpose is to provide instruction for specific job duties. Vocational training could be in such fields as carpentry, electronics, nursing and accounting, if the training did not lead to a Bachelor's degree. Vocational training in high school was included if it was in an organized program of study and was intended to provide a marketable skill upon graduation.

Table 19 reports that 23,151 or 23.9 per cent of people aged 16–64 years completed the requirements for vocational training in 2000, up 4 per cent from 1990. Of the 23,151 people that completed vocational training in 2000, 13,189 or 57 per cent completed the training on Guam, while the remaining or 43 per cent completed their training elsewhere. In 1990 the proportions were the reverse: 43 per cent completed their training on Guam while the remaining 57 per cent completed their training elsewhere.

Table 19: Vocational training of the population aged 16 years and older by sex, Guam, 1990 and 2000

Vocational Training	1990			2000		
	Total	Male	Female	Total	Male	Female
Total Persons 16 years and over	...	...	...	105,014	53,536	51,478
Completed requirements for a program	...	...	...	24,457	14,223	10,234
In Guam	...	...	...	13,721	7,486	6,235
Not in Guam	...	...	...	10,736	6,737	3,999
Did not complete requirements for a program	...	...	...	80,557	39,313	41,244
Persons 16 to 64 years	85,760	46,910	38,850	96,799	49,583	47,216
Completed requirements for a program	22,300	14,372	7,928	23,151	13,384	9,767
In Guam	9,585	5,525	4,060	13,189	7,145	6,044
Not in Guam	12,715	8,847	3,868	9,962	6,239	3,723
Did not complete requirements for a program	63,460	32,538	30,922	73,648	36,199	37,449
Persons 65 years and over	...	...	...	8,215	3,953	4,262
Completed requirements for a program	...	...	...	1,306	839	467
In Guam	...	...	...	532	341	191
Not in Guam	...	...	...	774	498	276
Did not complete requirements for a program	...	...	...	6,909	3,114	3,795

Source: Census Bureau, US Department of Commerce
Note: ... indicates not applicable.

In 2000 (but not in 1990), data were also collected on vocational training for people aged 65 years and older. These data showed that 16 per cent or 1,306 of people aged 65 years and older completed vocational training. Of this total, 532 or 41 per cent completed their training on Guam, while 774 or 59 per cent completed their training elsewhere.

Table 20: Guam Community College fall enrollment statistics, 2000–2005

Guam Community College	Fall Enrollment					
	2000	2001	2002	2003	2004	2005
Total	4,703	5,640	9,489	6,173	6,822	10,268
Postsecondary	1,569	1,697	1,799	1,526	1,532	1,495
Associates of Arts Degree	45	33	50	87	113	155
Associates of Science Degree	574	725	847	821	849	798
Certificate	160	230	238	239	191	192
Undeclared	790	709	664	379	379	350
Special Projects (Postsecondary)	256	197	163	236	103	795
Continuing Education	1,064	1,842	5,198	2,158	2,604	5,556
PROTEC Institute/CJACD/CJAS	80	1	47	19	29	16
Industry Certification	0	0	0	8	6	2
Journeyworker's Certificate	59	62	52	33	16	122
Apprenticeship	159	153	117	132	188	171
Adult Education	173	266	307	325	393	364
General Educ Development/Adult Basic Education	9	135	133	125	121	171
Adult High School	164	131	174	200	272	193
Secondary Education (GPSS)	1,343	1,422	1,806	1,736	1,951	1,747
George Washington High School	369	406	572	621	614	492
John F. Kennedy High School	343	458	416	470	544	363
Simon Sanchez High School	357	293	482	326	449	592
Southern High School	274	265	336	319	344	300

Source: Guam Community College
Notes:
Enrichment changed to Undeclared in 2004.
CJACD = Criminal Justice Academy; CJAS = Criminal Justice Academy Supplemental

In 2005 the Guam Community College's fall enrollment was 10,268 students. By far the greatest share of the enrollments was in continuing education, which accounted for 54.1 per cent. The next highest categories were secondary education, at 17 per cent, and the Associates of Arts degree at 7.8 per cent.

From 2001 to 2005, the two years with the highest overall enrollments at the Guam Community College were 2002 with 9,489 students and in 2005 at 10,268 students.

5.3 Income by educational level

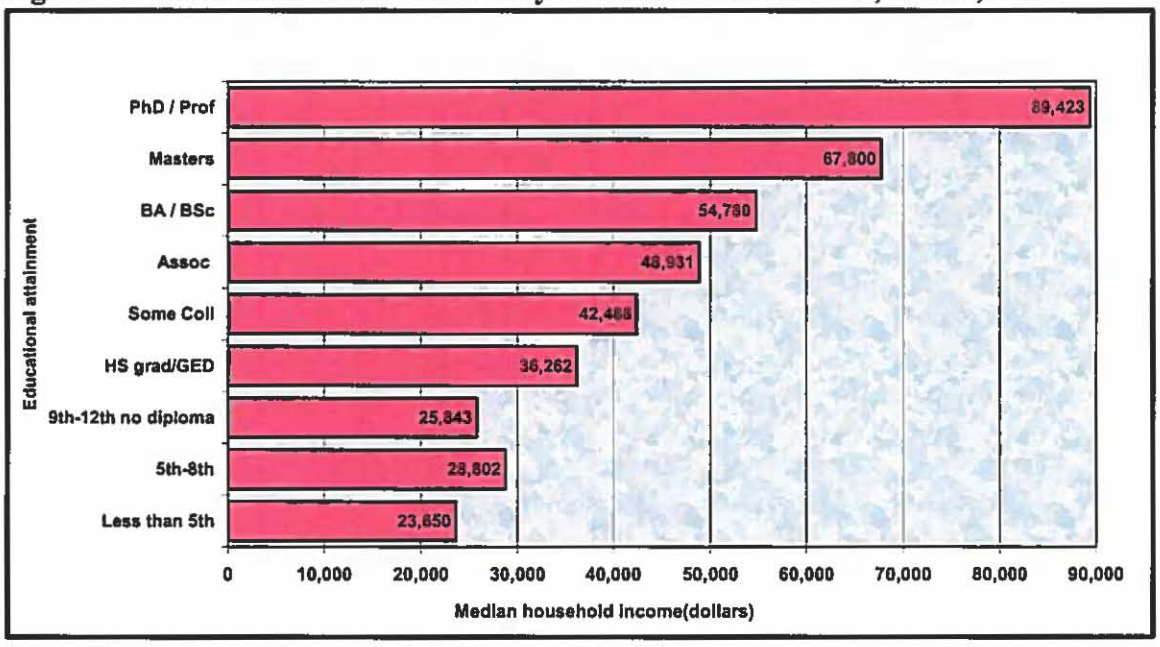
5.3.1 Household income by educational level

Linking data on educational attainment with data on earned income provides a true illustration of how those with the highest educational attainment are in the group with the top income and wealth, as well as how those with the lowest educational attainment are in the midst of poverty.

The *median income* divides the income distribution into two equal parts: half of the incomes lie above the median and half lie below it. The median income is based on the distribution of the total number of units or individuals from whom data are collected, including those with no income. The median income values are calculated using linear interpolation, on the basis of more detailed income intervals than are shown in these tabulations.

Of the 36,950 households (with earnings) enumerated in 2000, 899 households or 2.4 per cent included someone with a PhD or professional degree and the median household income among these households was $89,423 (Table 21 and Figure 36). Among the 4 per cent (or 1,379) of households in which someone had a Master's degree, the median household income was $67,800. In another 16 per cent (or 5,775) of households, someone had a Bachelor's degree and the median household income for this group was $54,780. In other words, the data show that the higher the level of education attained, the higher the household income is likely to be.

Figure 36: Median household income by educational attainment, Guam, 1999



Source: Census Bureau, US Department of Commerce

Table 21: Income of households, families and individuals by educational attainment of reference person aged 25 years or older, Guam, 1999

Educational Attainment by income in 1999	Total	Less than 5th grade	5th to 8th grade	9-12th grade No diploma	High sch grad or GED	Some college no degree	Associate degree
Households	36,950	830	2,185	4,675	11,075	7,970	1,945
Less than $2,500	2,880	85	185	590	990	525	100
$2,500 to $4,999	615	55	75	190	175	65	20
$5,000 to $9,999	1,580	75	175	415	500	245	40
$10,000 to $14,999	1,900	85	205	460	660	295	50
$15,000 to $24,999	4,310	130	335	725	1,505	930	185
$25,000 to $34,999	4,560	95	275	630	1,495	1,075	245
$35,000 to $49,999	6,150	105	325	660	1,910	1,500	360
$50,000 to $74,999	7,075	120	325	610	2,025	1,660	435
$75,000 or more	7,880	80	285	595	1,815	1,675	510
Median (dollars)	**40,736**	**23,650**	**28,802**	**25,843**	**36,262**	**42,488**	**48,931**
Mean (dollar)	**50,928**	**32,845**	**38,508**	**36,071**	**44,915**	**51,393**	**57,068**
Families	31,030	650	1,860	4,255	9,445	6,755	1,675
Less than $2,500	1,815	45	115	420	640	315	60
$2,500 to $4,999	435	20	45	160	135	50	10
$5,000 to $9,999	1,300	55	120	380	425	205	30
$10,000 to $14,999	1,560	60	160	390	560	245	45
$15,000 to $24,999	3,620	110	290	665	1,270	770	145
$25,000 to $34,999	3,865	80	255	560	1,295	905	220
$35,000 to $49,999	5,250	100	305	580	1,670	1,315	305
$50,000 to $74,999	6,215	110	310	560	1,825	1,465	395
$75,000 or more	6,970	70	260	540	1,625	1,485	465
Median (dollars)	**42,480**	**30,054**	**32,688**	**26,788**	**37,837**	**44,743**	**51,034**
Mean (dollar)	**52,930**	**37,076**	**41,514**	**37,300**	**46,698**	**53,156**	**58,688**
Median earnings for Persons 25 years and over							
Male full-time, year-round	**29,189**	**18,529**	**18,402**	**20,381**	**25,425**	**30,036**	**32,455**
Female full-time, year-round	**24,944**	**13,000**	**12,258**	**16,560**	**21,874**	**24,705**	**26,674**

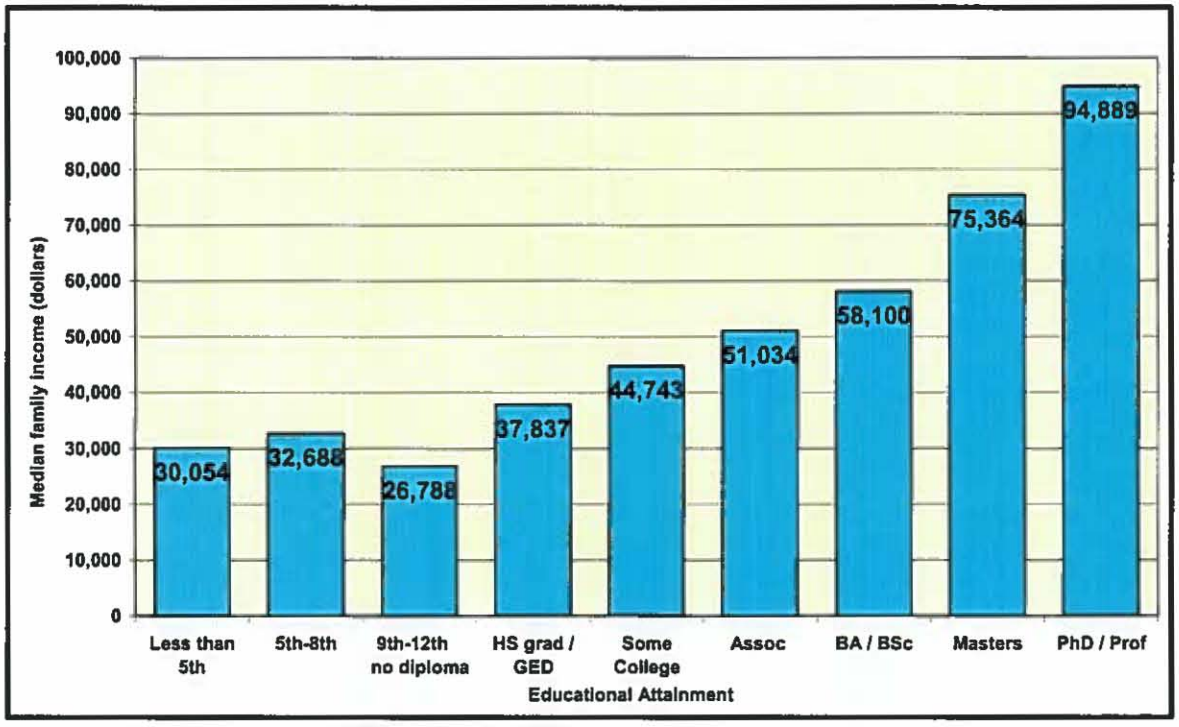
	Total	Bachelor's degree	Master's degree	Professional/ PhD degree	High school graduate (%)	Bachelor's degree (%)
Households	36,950	5,775	1,379	899	78.6	21.8
Less than $2,500	2,880	305	65	30	70.0	13.9
$2,500 to $4,999	615	25	4	4	48.0	5.7
$5,000 to $9,999	1,580	95	20	10	57.6	7.9
$10,000 to $14,999	1,900	115	15	15	60.5	7.4
$15,000 to $24,999	4,310	415	50	35	72.4	11.6
$25,000 to $34,999	4,560	620	80	50	78.1	16.3
$35,000 to $49,999	6,150	1,005	210	70	82.2	21.0
$50,000 to $74,999	7,075	1,405	335	155	85.0	26.9
$75,000 or more	7,880	1,790	600	530	87.8	37.1
Median (dollars)	**40,736**	**54,780**	**67,800**	**89,423**	**...**	**...**
Mean (dollar)	**50,928**	**64,222**	**79,283**	**107,012**	**...**	**...**
Families	31,030	4,685	1,033	673	78.2	20.6
Less than $2,500	1,815	170	30	20	68.3	12.1
$2,500 to $4,999	435	15	4	4	48.3	4.6
$5,000 to $9,999	1,300	65	10	4	57.3	6.2
$10,000 to $14,999	1,560	85	4	10	60.9	6.4
$15,000 to $24,999	3,620	315	30	25	70.6	10.2
$25,000 to $34,999	3,865	465	45	35	76.8	14.1
$35,000 to $49,999	5,250	795	140	45	81.2	18.7
$50,000 to $74,999	6,215	1,200	255	100	84.2	24.9
$75,000 or more	6,970	1,575	515	430	87.5	36.2
Median (dollars)	**42,480**	**58,100**	**75,364**	**94,889**	**...**	**...**
Mean (dollar)	**52,930**	**67,862**	**86,773**	**114,361**	**...**	**...**
Median earnings for Persons 25 years and over						
Male full-time, year-round	**29,189**	**36,942**	**51,385**	**70,795**	**...**	**...**
Female full-time, year-round	**24,944**	**31,006**	**42,393**	**45,278**	**...**	**...**

Source: Census Bureau, US Department of Commerce

5.3.2 Family income by educational attainment

Of the 31,030 families (with earnings) enumerated in 2000, 673 or 2.2 per cent included a member with a PhD or professional degree and, for this group, the median family income was $94,889 (Figure 37). In another 3 per cent or 1,033 families there was a member with a Master's degree and, for this group, the median family income was $75,364. Fifteen per cent or 4,585 families included a member with a Bachelor's degree and their median family income was $58,100. Among the 5 per cent or 1,675 families that included a member with an Associate degree, the median family income was $51,034.

Figure 37: Median family income by educational attainment, Guam, 1999



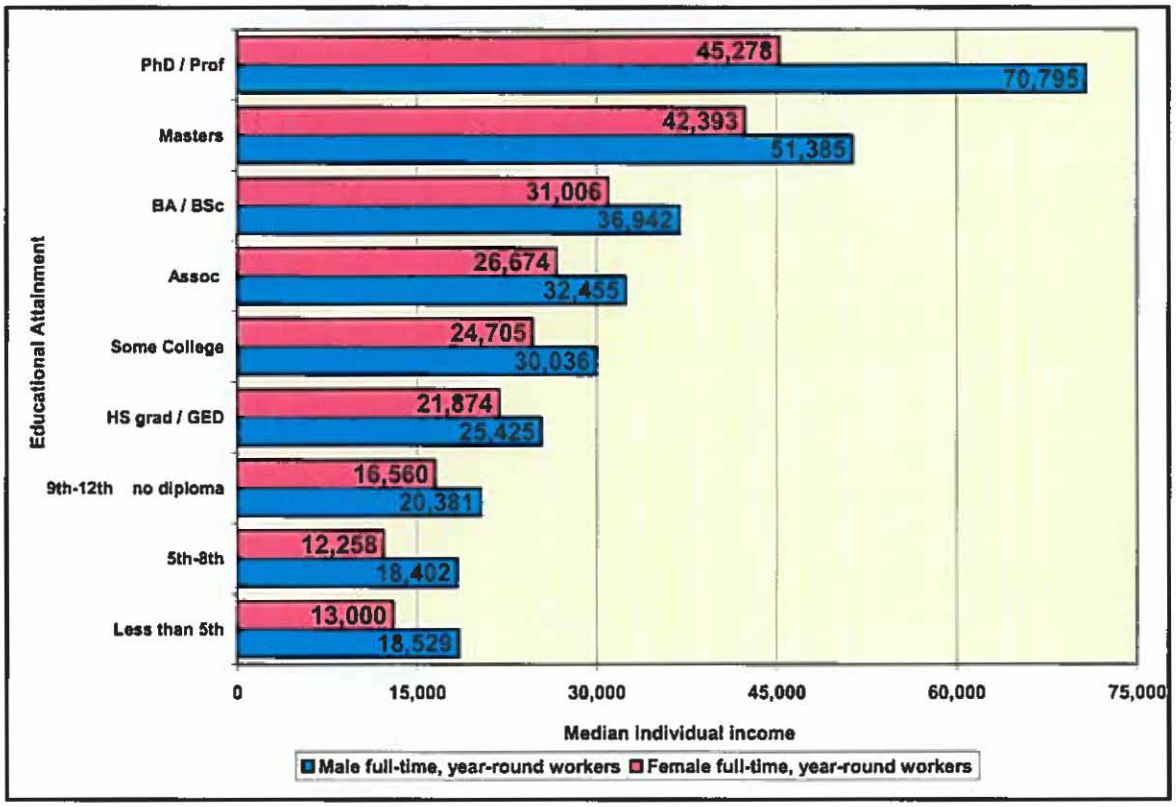
Source: Census Bureau, US Department of Commerce

In 2000, the following data on median income for individuals was collected for people aged 25 years and older and working full-time year-round, with reference to their educational attainment. Males who had a PhD reported a median income of $70,795, while females in this category had a median income of $45,278 (Table 21 and Figure 38). Males who were a high school or General Education Development (GED) graduate had a median income of $25,425, while females in this category reported a median income of $21,874.

Males who had a Master's degree reported a median income of $51,385, while the females in this category had a median income of $42,393. Males who had attained a level of education that was less than 5th grade reported a median income of $18,529, while females in this category had a median income of $13,000. As Figure 38 illustrates,

therefore, those who attain a higher level of education are likely to earn higher wages, while those whose educational attainment is low tend to have low-income occupations.

Figure 38: Median individual income by sex and educational attainment, Guam, 1999



Source: Census Bureau, US Department of Commerce

6. LABOR FORCE CHARACTERISTICS

Government and business officials rely on information about the labor force and labor market to determine patterns and changes in employment and unemployment and their effect on the state of the economy. Dramatic changes to the unemployment rate can trigger significant impacts on economic growth and development. Labor force information helps policy-makers and private business address labor shortage/supply conditions by implementing training programs, investment incentives and policies that will benefit business, attract investors and improve the economic well-being of the local community.

6.1 Labor force status

The US Census Bureau collects and publishes labor force information on people aged 16 years and older who are working or are actively looking for work. It defines people '*in the labor force*' as those aged 16 years and older who are classified as in the civilian labor force (that is, 'employed' and 'unemployed') plus members of the US armed forces (people on active duty in the US Army, Air Force, Navy, Marine Corps and Coast Guard).

The Census Bureau defines people '*not in the labor force*' as those aged 16 years and older who are not classified as members of the labor force. This category includes students, individuals taking care of home or family, retired workers, seasonal workers enumerated in an off-season who are not looking for work, institutionalized people, and people who were doing only incidental unpaid family work.

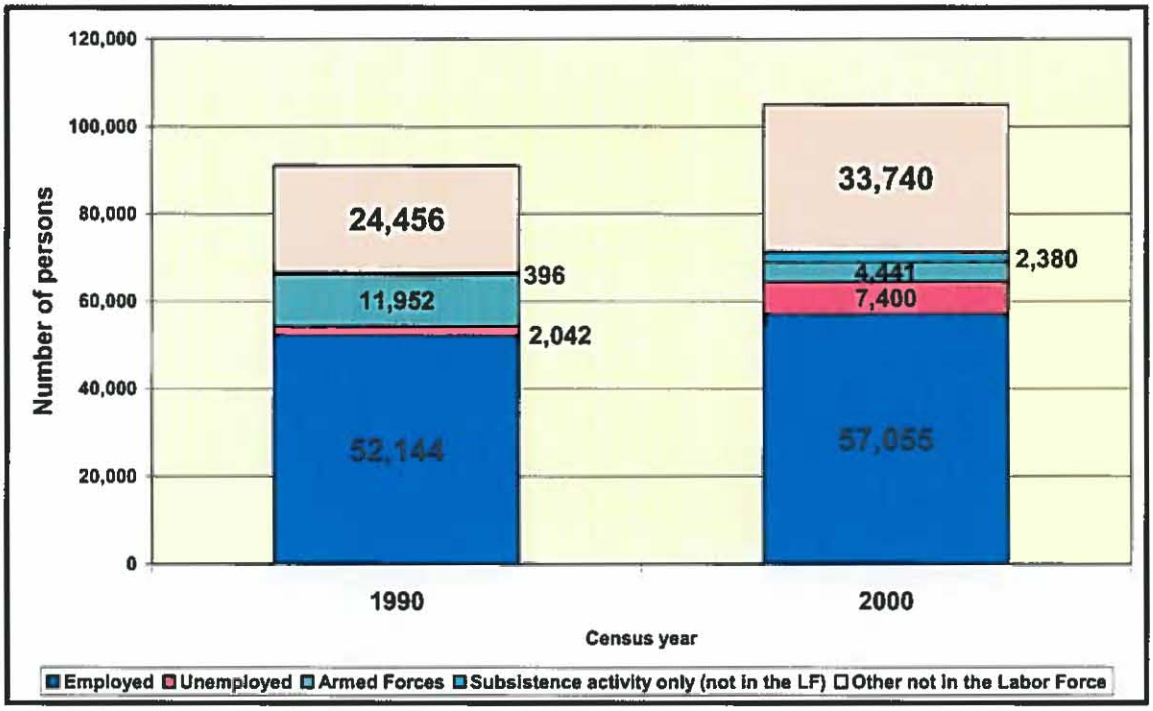
Out of 105,015 people aged 16 years of age and older on Guam in 2000, 68,895 were in the labor force (Table 22). Of those in the civilian labor force, 57,055 were employed and 7,400 were unemployed. The armed forces employed 4,441 people (Figure 39). The remainder of the population aged 16 years and older, 36,120 people or 34 per cent, were not in the labor force. There were 2,380 people who were not in the labor force and who did subsistence activity only. The proportion of people who were in the labor force (either employed or unemployed – the *participation rate*) was 65.6 per cent. Guam's unemployment rate in 2000 was reported as at 11.5 per cent, up nearly 8 per cent from 1990.

Table 22: Employment status of the population aged 16 years and older, Guam, 1990 to 2000

Employment status	1990		2000		1990/2000
	Number	%	Number	%	% change
Population 16 years and older	90,990	100.0	105,015	100.0	15.4
In labor force (total)	66,138	72.7	68,895	65.6	4.2
Civilian labor force	54,186	59.6	64,450	61.4	18.9
Employed	52,144	57.3	57,055	54.3	9.4
Also did subsistence activity	1,517	1.7	4,480	4.3	195.3
Unemployed	2,042	2.2	7,400	7.0	262.4
Percentage of civilian labor force	3.8	...	11.5	...	...
Armed forces	11,952	13.1	4,441	4.2	-62.8
Not in the labor force (total)	24,852	27.3	36,120	34.4	45.3
Subsistence activity only	396	0.4	2,380	2.3	501.0
Males 16 years and older	49,440	100.0	53,535	100.0	8.3
In labor force (total)	41,416	83.8	39,145	73.1	-5.5
Civilian labor force	31,080	62.9	35,705	66.7	14.9
Employed	30,140	61.0	31,610	59.0	4.9
Also did subsistence activity	990	2.0	2,880	5.4	190.9
Not in the labor force (total)	8,024	16.2	14,395	26.9	79.4
Subsistence activity only	216	0.4	1,255	2.3	481.0
Females 16 years and older	41,550	100.0	51,480	100.0	23.9
In labor force (total)	24,722	59.5	29,750	57.8	20.3
Civilian labor force	23,106	55.6	28,745	55.8	24.4
Employed	22,004	53.0	25,445	49.4	15.6
Also did subsistence activity	527	1.3	1,600	3.1	203.6
Not in the labor force (total)	16,828	40.5	21,725	42.2	29.1
Subsistence activity only	180	0.4	1,125	2.2	525.0
Own children under 6 years	10,679	100.0	17,360	100.0	62.6
All parents in labor force	6,338	59.4	9,750	56.2	53.8
Own children 6 to 17 years	8,395	100.0	31,145	100.0	271.0
All parents in labor force	5,860	69.8	19,350	62.1	230.2

Source: Census Bureau, US Department of Commerce
Note: ... indicates not applicable.

Figure 39: Labor force status of the population aged 16 years and older, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

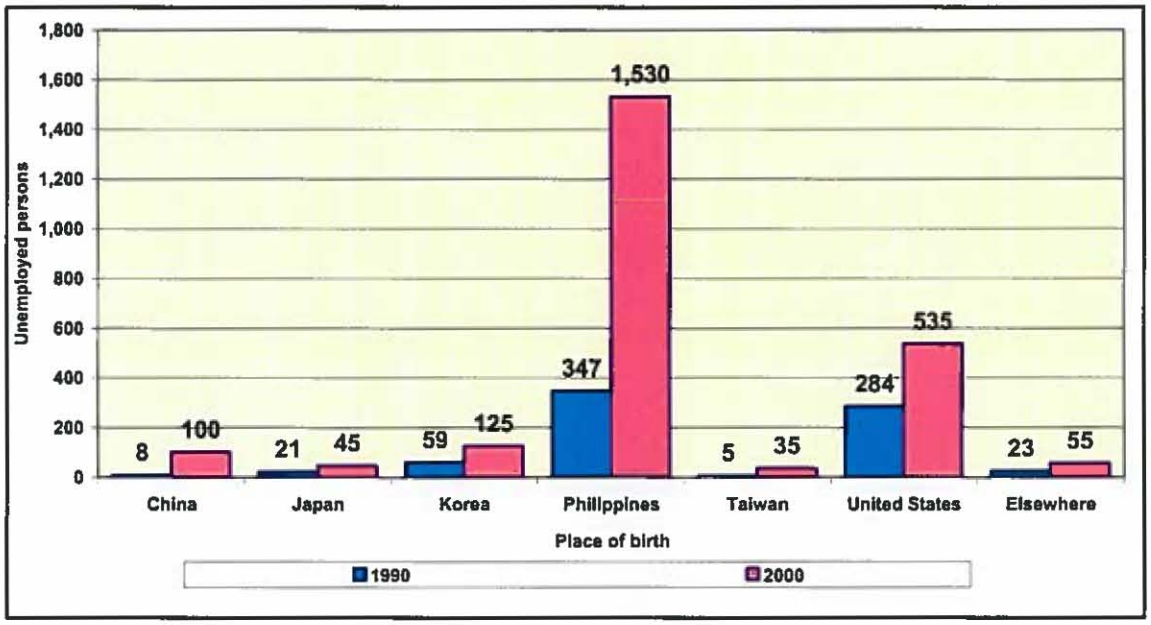
Between 1990 and 2000, the following increases occurred in the Guam labor force: the civilian labor force increased by 10,264 people (+18.9 per cent), the employed population as part of the civilian labor force increased by 4,911 people (+9.4 per cent) and the unemployed population increased by 5,358 people, representing an increase of 262 per cent.

During this same period, the number of people in the armed forces decreased by 7,511 (62.8 per cent). It might be assumed that the large decrease in the size of the armed forces contributed to the large increase in the ranks of the unemployed. However, there are no data to indicate the number of people who left the armed forces actually remained on Guam to become part of the civilian labor force and the unemployed in 2000.

It may be that many of the 10,264 people who entered the labor force between 1990 and 2000 tended to be unemployed rather than employed.

An analysis of the labor force characteristics by place of birth indicates that 440 unemployed people in 1990 had been born in Asia, compared with 1,835 in 2000. The data are even more revealing for Asians specifically born in the Philippines, for whom the number of unemployed rose by 1,183, from 347 in 1990 to 1,530 in 2000 (Figure 40).

Figure 40: Unemployed people born outside Guam by place of birth, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

6.2 Employed

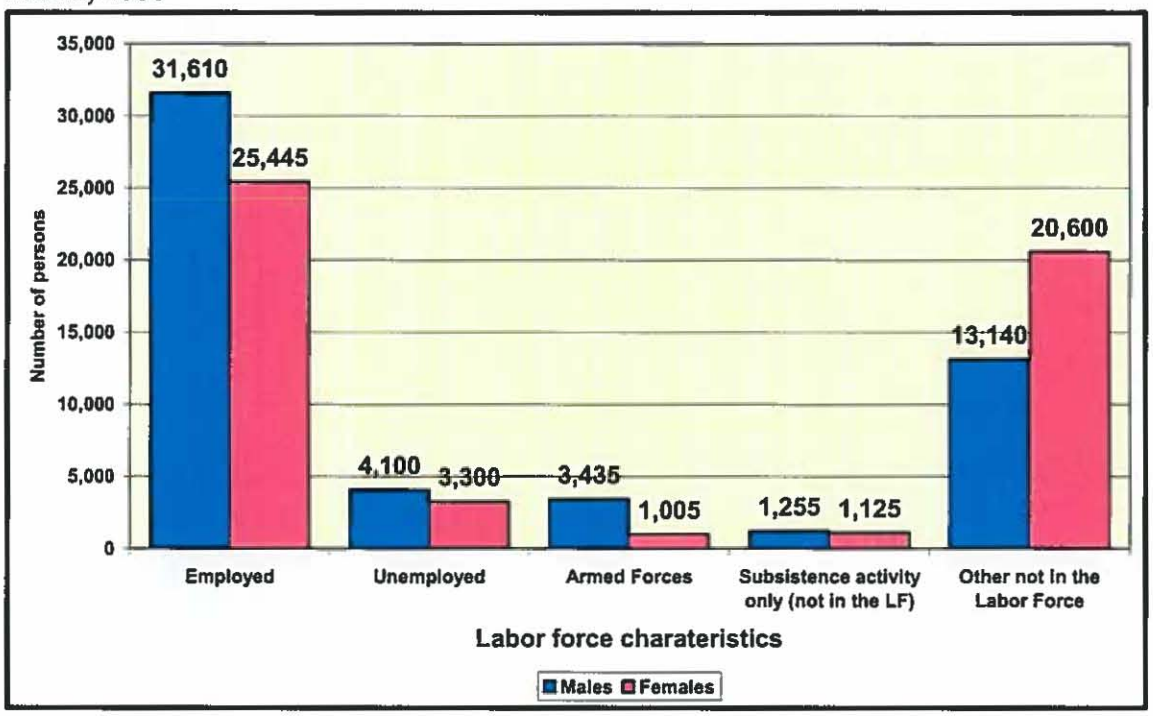
Employment statistics are an intricate component of measuring the labor market and industry. The quality and quantity of diverse employment in the different sectors (private, federal and local government) provide strength to the economy by addressing the needs of the people through career opportunities, job skills and occupational training and development. Thus as the number and activities of business companies increase, a variety of services is created and becomes more accessible, building the state of economy to a stable and solid foundation.

Through periodically collecting and reporting data, it is possible to describe the impacts and development trends of the labor market and individual industries over time. By this means, performance measurement and monitoring of progression for each sector can be made sustainable.

The Guam census defines *employed persons* as being all civilians 16 years of age and older who were either:

1. 'at work' – those who did any work at all during the reference week as paid employees, worked in their own business or profession, worked on their own farm, or worked 15 hours or more as unpaid workers on a family farm or in a family business; or
2. were 'with a job but not at work' – those who did not work during the reference week, but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, industrial dispute, vacation or other personal reasons.

Figure 41: Labor force status of the population aged 16 years and older by sex, Guam, 2000



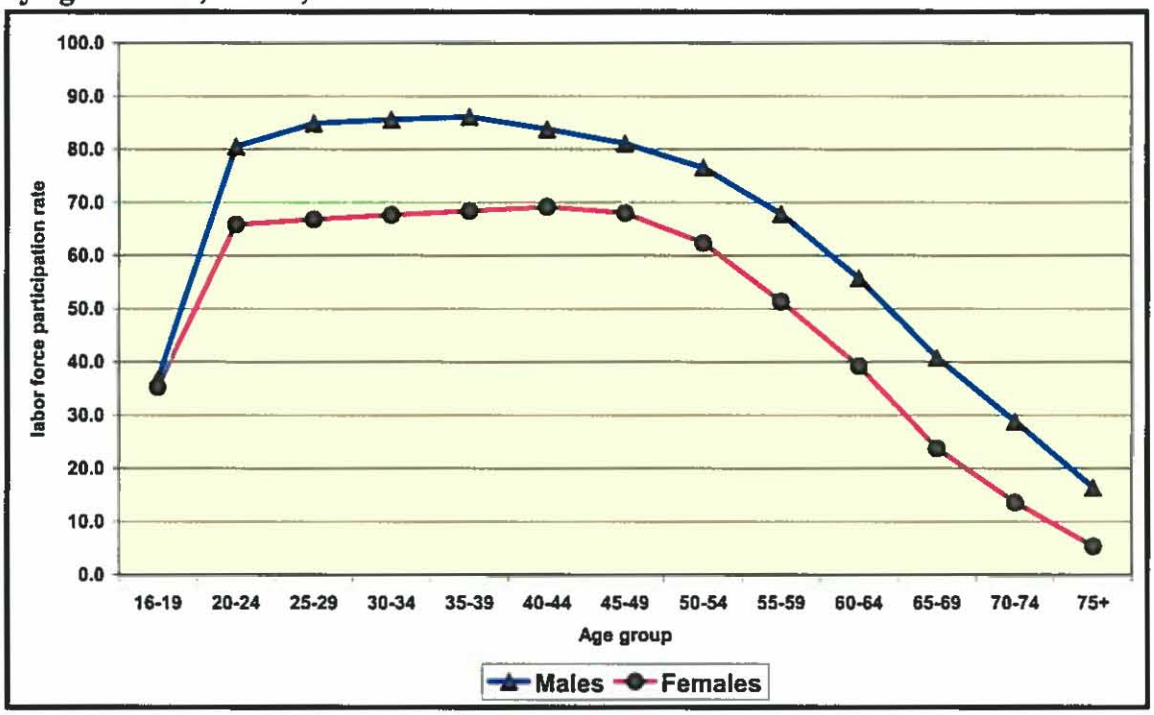
Source: Census Bureau, US Department of Commerce

Excluded from the employed category are people whose only activity consists of work around their own house (painting, repairing, or own home housework) or unpaid volunteer work for religious, charitable and similar organizations. Also excluded are all institutionalized people and people on active duty in the US armed forces.

During the week prior to the reference week of April 1, 2000, there were 57,055 employed people on Guam, of whom 31,610 (55 per cent) were male and 25,445 (45 per cent) were female (Figure 41). There were 4,100 unemployed males and 3,300 females. The armed forces accounted for 4,440 people, with 3,435 males and 1,005 females. Of the 36,120 people aged 16 years and older who were not in the labor force, 14,395 or 39.9 per cent were males and 21,725 or 60.1 per cent were females. Within this group of the people who were not in the labor force, 1,255 males and 1,125 females did subsistence activity only.

Analyzing the employed population by major age group, 8,305 (14.6 per cent) were 16–24 years of age, 42,300 (74.1 per cent) were 25–54 years of age and 6,445 (11.3 per cent) were 55 years and older. Labor force participation rates (LFPR) are depicted in Figure 42, which shows that the LFPR is higher for males than for females at all ages. While more than 80 per cent of males aged 20–49 years were part of the labor force, less than 70 per cent of females in the same age bracket had this status.

Figure 42: Labor force participation rate of the population aged 16 years and older by age and sex, Guam, 2000

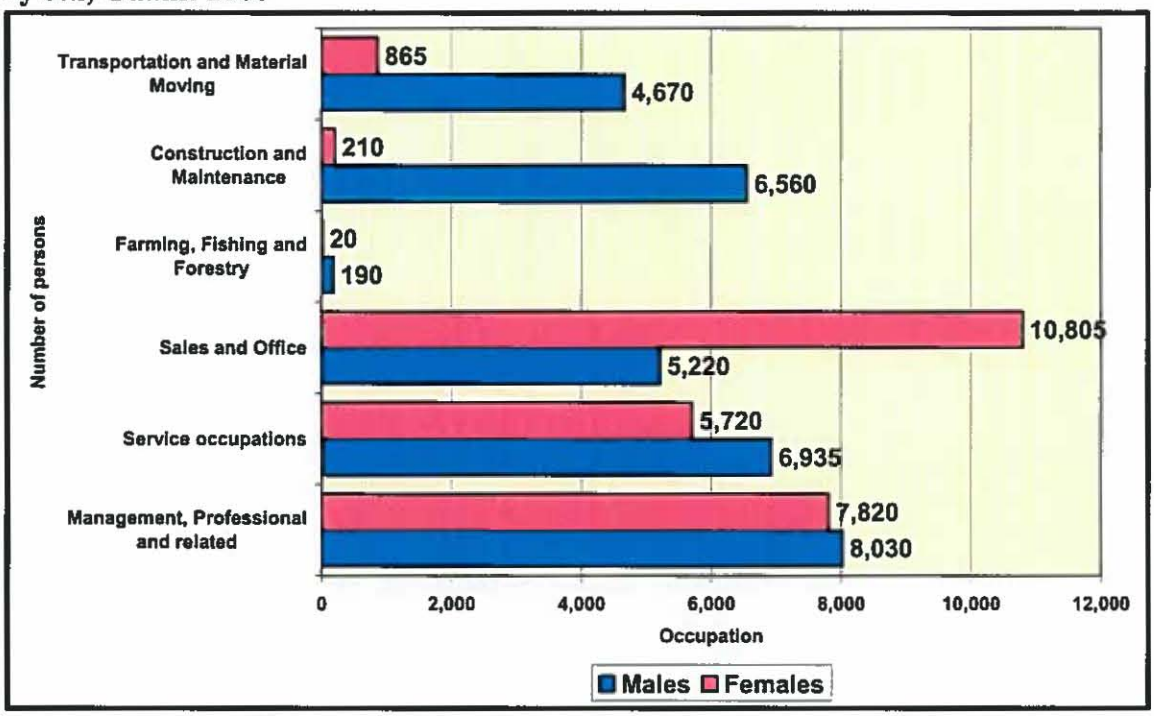


Source: Census Bureau, US Department of Commerce

6.2.1 Occupation

By occupation, the majority of people employed were in the occupational groups of sales and office (16,025 or 28.1 per cent); management, professional and related (15,850 or 27.8 per cent); and service occupations (12,655 or 22.2 per cent) (Figure 43). The occupational group employing the fewest people was farming, fishing and forestry (210 or 0.4 per cent).

Figure 43: Occupational groups of the employed population aged 16 years and older by sex, Guam: 2000



Source: Census Bureau, US Department of Commerce

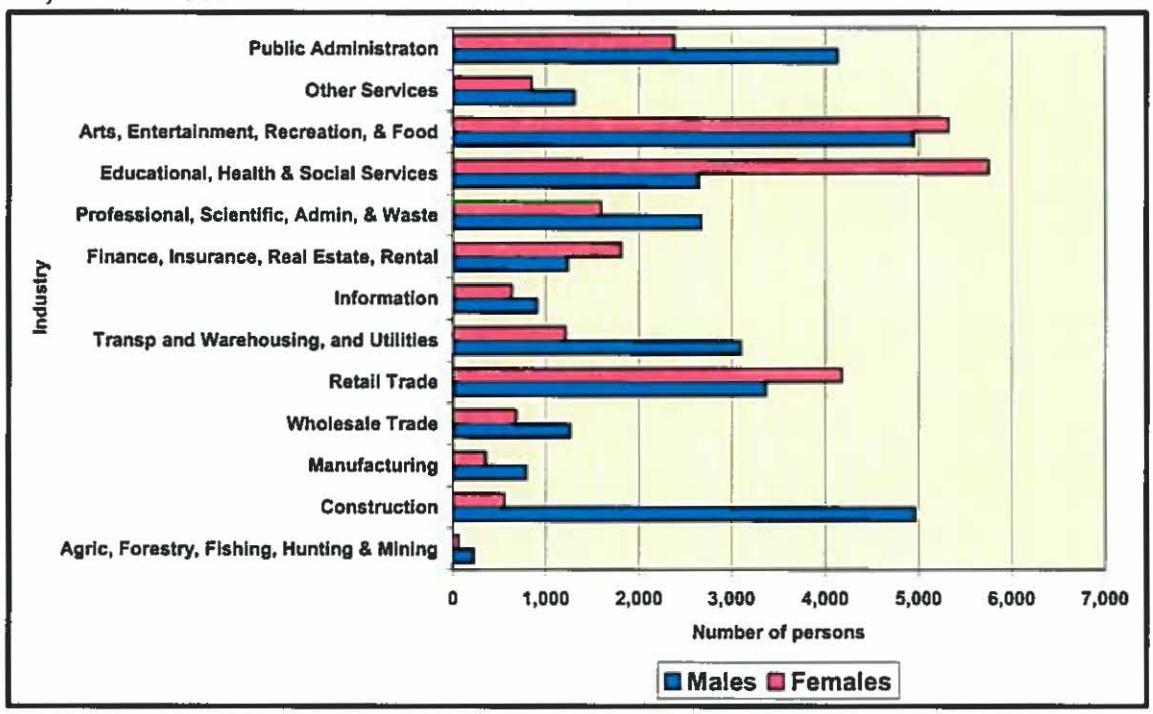
The only occupational group in which females outnumbered males was sales and office. All other occupational groups were dominated by male employees.

6.2.2 Industry

By industry, the largest number of people (10,280 or 18.0 per cent) were employed in arts, entertainment, recreation, accommodation and food service (Figure 44). This industry division was followed by educational, health and social services (8,410 people or 14.7 per cent), public administration (6,525 or 11.4 per cent), construction (5,530 or 9.4 per cent), transportation and warehousing, and utilities (4,320 or 7.6 per cent) and professional, scientific, management, administrative, and waste management services (4,275 or 7.5 per cent).

There were more female than male employees in the industry divisions of arts, entertainment, recreation, accommodation and food service; educational, health and social services; finance, insurance, real estate, and rental; and retail trade. All other divisions, especially construction, were dominated by male employees.

Figure 44: Industry divisions of the employed population aged 16 years and older by sex, Guam: 2000

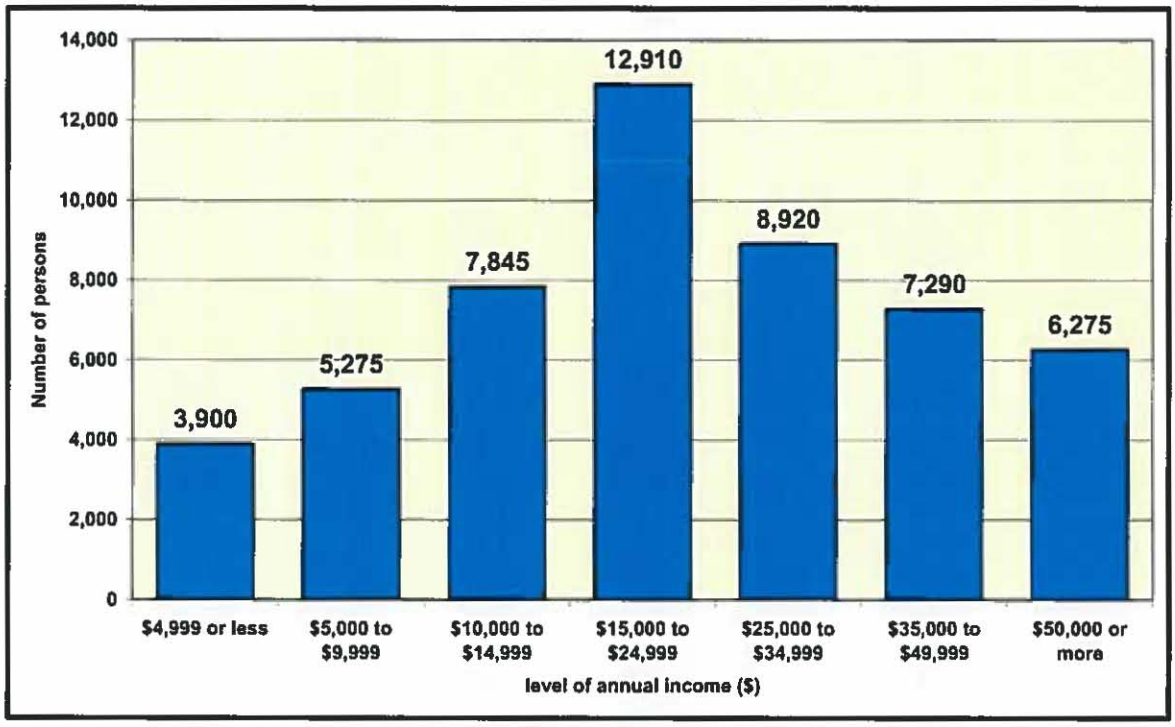


Source: Census Bureau, US Department of Commerce

6.2.3 Income level

The highest number of employed people (12,910, or 22.6 per cent) stated that their income level was in the range of $15,000–$24,999 per year (Figure 45). Those earning in the range of $25,000–34,999 followed with 8,920 (15.6 per cent), then came 7,845 (13.7 per cent) in the $10,000–$14,999 range and 7,290 (11.0 per cent) in the $35,000–$49,999 range. The $50,000 or more income group consisted of 6,275 (11.0 per cent) employed people. The average income level across all people employed was $28,213. A further 4,635 people who were counted as employed indicated that they had no income.

Figure 45: Income level of the employed population aged 16 years and older, Guam, 2000



Source: Census Bureau, US Department of Commerce

6.3 Unemployed and unemployment rates

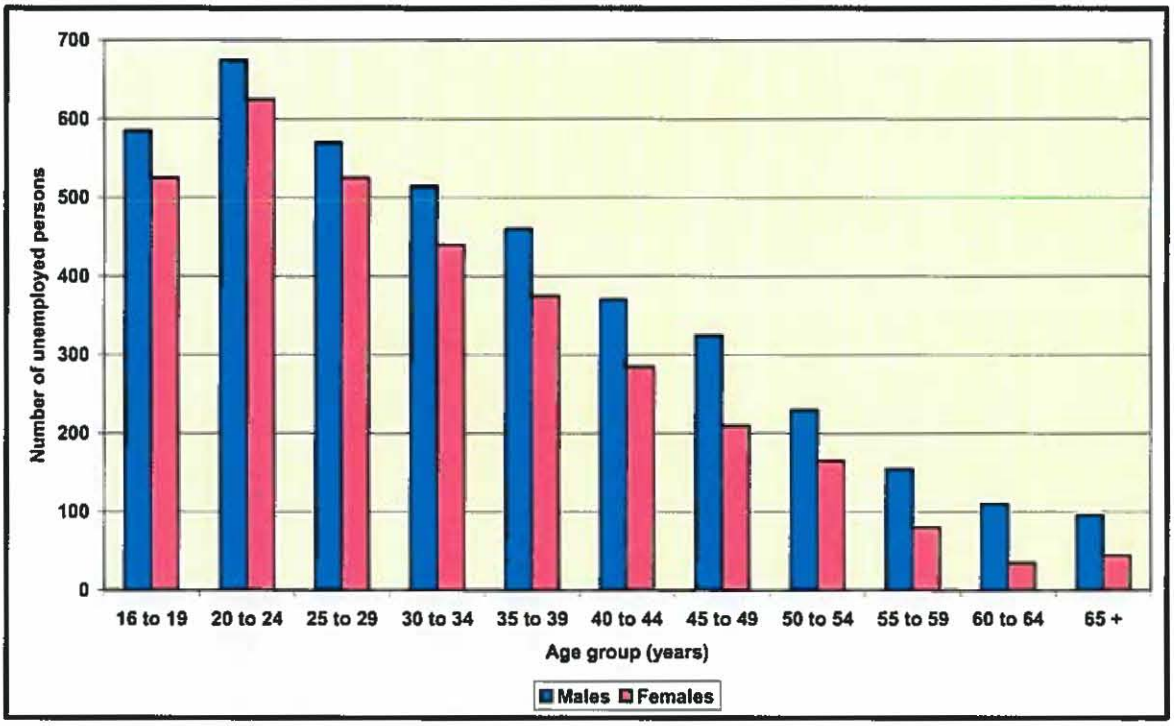
Unemployment trends give a significant amount of information about the labor market. The strength of the economy is measured from the unemployment rate and its trend from the previous years. Unemployment statistics furthermore identify the level of unutilized labor supply, and indicates a proportion of the labor force that does not have a job, but is available and actively looking for a job.

The total number of people unemployed in the civilian labor force was 7,400, of whom 4,100 were males and 3,300 were females. The unemployment rate for each group was the same at 11.5 per cent of the male or female labor force.

By age group, the unemployment level among those aged 16–24 years was 2,410 or 22.5 per cent of all people in this age group. There were 4,470 (9.6 per cent) unemployed aged 25–54 years and 520 (7.5 per cent) aged 55 years and older (Figures 46 and 47).

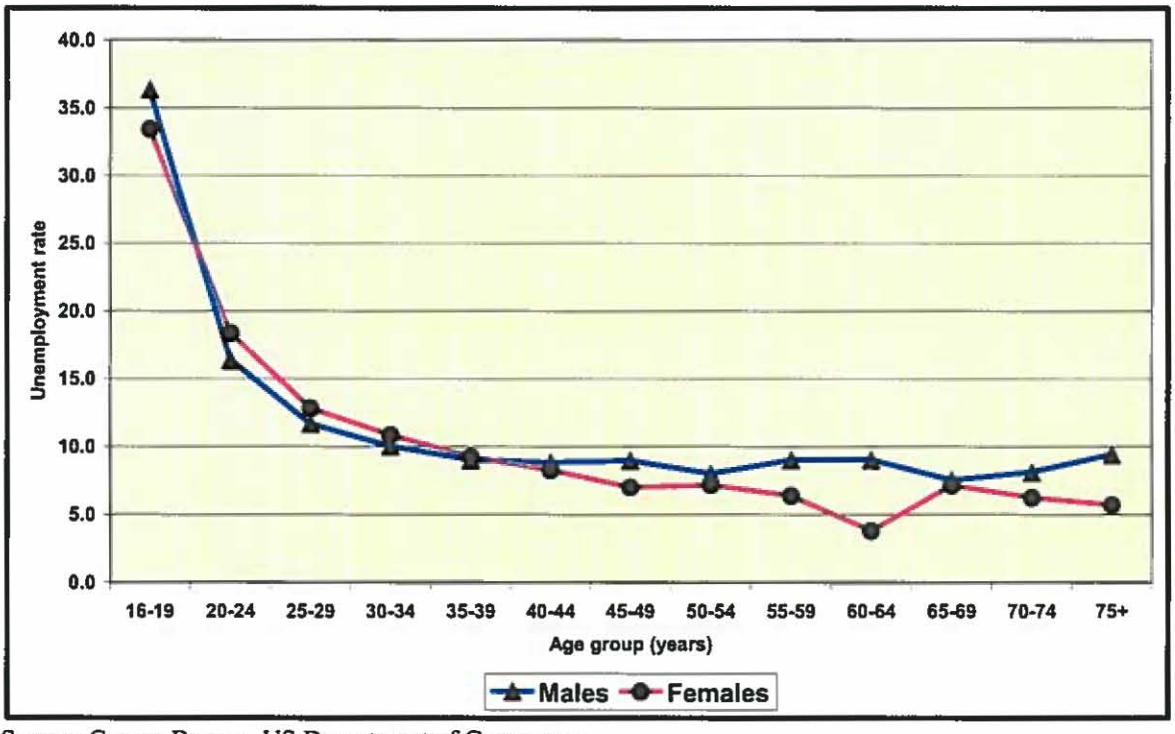
The increase of 5,358 in the number of unemployed between 1990 and 2000 was composed of 3,155 males and 2,198 females. However, in 1990 males represented 46 per cent of the total unemployed whereas in 2000 they represented 55 per cent. Therefore, it would appear that the increase in unemployment over the 10-year period is, in part, due to an increase in labor force participation among males.

Figure 46: Unemployed people by age group and sex, Guam, 2000



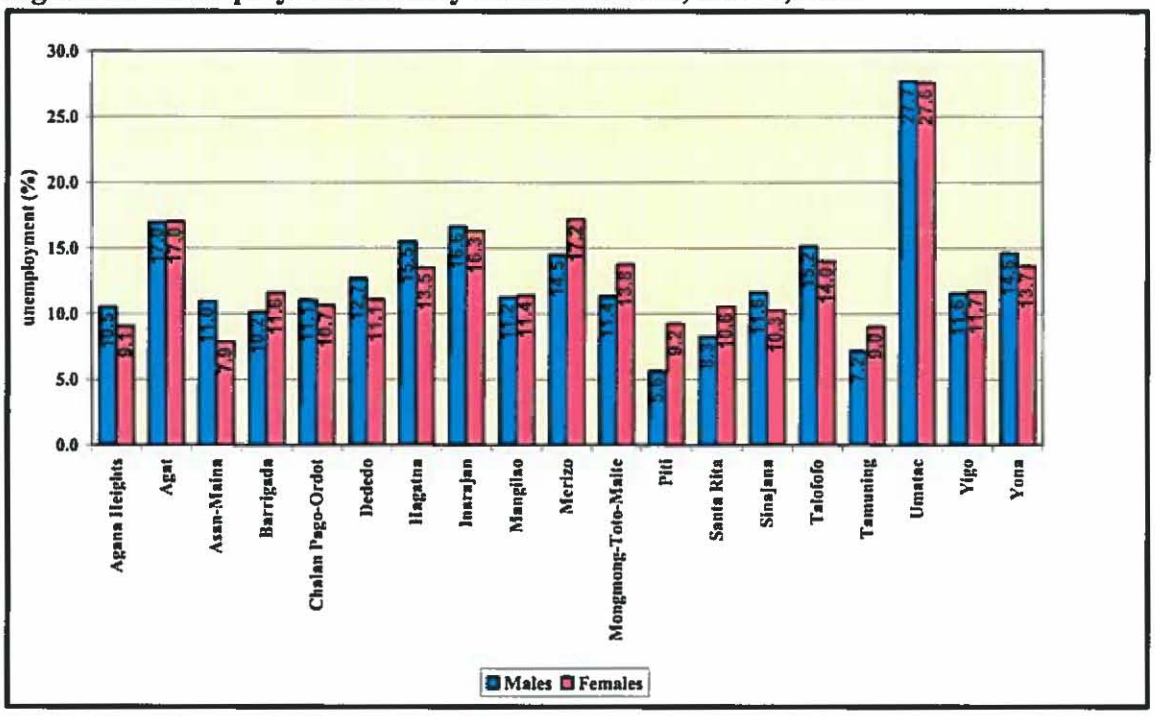
Source: Census Bureau, US Department of Commerce

Figure 47: Unemployment rate in the population aged 16 years and older by age and sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

Figure 48: Unemployment rate by district and sex, Guam, 2000



Source: Census Bureau, US Department of Commerce

In terms of unemployment by district, the greatest raw numbers of people unemployed tended to be in the larger districts of Dededo (2,216), Yigo (815) and Tamuning (738). However, a different picture emerges when the data are analyzed in percentage terms: the highest unemployment rates were in the smaller districts of Umatac (27.7 per cent), Agat (17 per cent), Inarajan (16.5 per cent), Hagatna (15.8 per cent), Merizo (15.7 per cent) and Talofofo (14.6 per cent) (Figure 48).

6.4 Subsistence activities

In the 2000 Guam census, the labor activity questions identified separately people who:
(a)worked for pay or profit, but did no subsistence activity;
(b)worked for pay or profit and did subsistence activity;
(c)did not work for pay or profit and did subsistence activity; and
(d)did not work for pay or profit and did no subsistence activity.

Responses were classified as follows:

- Those in categories (a) and (b) were classified as employed.
- Those in categories (c) and (d) were classified as unemployed if they had also looked for work in the past 4 weeks and were available to start a job if one was offered.
- Those in categories (c) and (d) who had not looked for or were not available to start a job were classified as not in the labor force.

Some labor market analysts argue that people in category (c) – that is, those who did not work for pay or profit, did subsistence work and did not look for work – should be classified as unemployed rather than as not in the labor force. It is suggested that these

people would prefer to have paid work rather be engaged in subsistence activities but, from their knowledge of their immediate and local labor market, they have concluded that looking for work would be useless because there are not jobs available. In this case, these people could be classified as unemployed.

In 2000 there were 2,380 people who fitted in the category of *not in the labor force, subsistence activity only*. If they are included in the count of the unemployed, the unemployment level increases from 7,400 to 9,780 and the unemployment rate increases from 11.5 per cent to 15.2 per cent.

6.5 Labor market trends based on sample surveys since 2000

The Bureau of Labor Statistics, Guam Department of Labor conducts periodic sample surveys of selected households (which represent the civilian non-institutional population) to collect data on the labor force, employment and unemployment to report the overall trends and changes in Guam's workforce over time. Each member of the selected household aged 16 years and older is interviewed for information on employment status. The enumeration also includes citizens of the Republic of the Marshall Islands and the Federated States of Micronesia, who are authorized by the Compact of the Free Association to accept employment in the United States, and also citizens of the Republic of Palau, who are authorized to accept employment through the Covenant with the United States in October 1994.

Table 23 reflects employment data for Guam by selected categories for September 2001 to March 2006. It should be noted that 2003 data are not included in the table because there was no survey conducted during that year.

Table 23: Highlights of the employment situation, Guam, 2001–2006

Selected categories	Sept 2001	March 2002	March 2004	Dec 2005	March 2006
Total civilian population					
16 years of age and older	100,470	99,500	99,780	104,980	104,830
Civilian labor force	64,800	62,050	61,520	64,130	65,940
Employed (total)	56,040	54,980	56,810	59,630	61,390
Adult women	24,410	24,910	23,450	26,030	27,110
Adult men	29,670	28,610	31,120	30,880	31,640
Teenagers	1,950	1,460	2,250	2,720	2,640
Household heads	23,670	24,070	23,970	24,250	24,310
Full-time workers	50,560	47,790	50,150	50,150	53,540
Part-time workers	5,490	7,190	6,660	8,860	7,570
US citizens	45,720	45,360	43,530	46,370	46,550
Immigrant aliens	10,320	9,620	13,280	13,260	14,850
Veterans	3,360	3,760	4,040	3,780	3,040
Unemployed (total)	8,760	7,070	4,710	4,500	4,530
Not in the labor force	35,670	37,450	38,260	40,850	38,890
Unemployment rates					
All workers	13.5	11.4	7.7	7.0	6.9
Adult women	12.6	8.9	7.1	7.6	7.1
Adult men	12.6	11.9	7.1	5.7	6.3
Teenagers	33.9	34.8	18.9	15.3	11.4
Household heads	11.5	8.8	7.1	10.4	6.0
Full-time workers	13.2	11.8	8.0	6.2	6.7
Part-time workers	15.8	8.6	5.3	11.9	8.4
US citizens	13.2	11.1	7.5	6.5	5.7
Immigrant aliens	14.7	12.9	8.3	8.6	10.4
Veterans	7.5	7.9	1.8	4.5	7.0

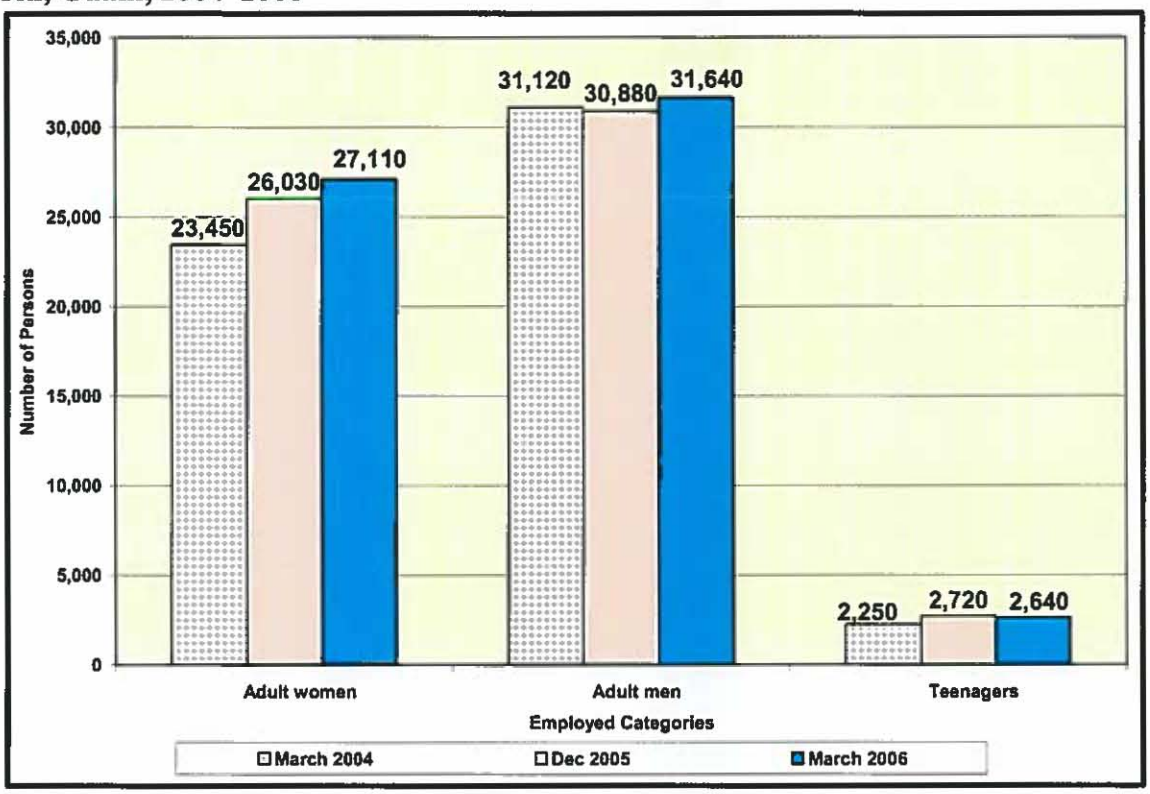
Source: Bureau of Labor Statistics, Guam Department of Labor, Government of Guam
Note: No survey conducted in 2003.

Table 23 shows that a 2.8 per cent more people were in the civilian labor force in March 2006 than in December 2005.

In March 2006, 93.1 per cent of the civilian labor force population were employed. Total employment increased by 3 per cent or 1,760 employees, from 59,630 in December 2005 to 61,390 in March 2006.

Guam's unemployment rate remained relatively stable at 7 per cent from March 2004 to March 2006. Of significance, teenage unemployment dropped dramatically from 33.9 per cent in September 2001 to 11.4 per cent in March 2006. In contrast, the rate of unemployment in the veteran population increased from 1.8 per cent in March 2004 to 7 per cent in March 2006.

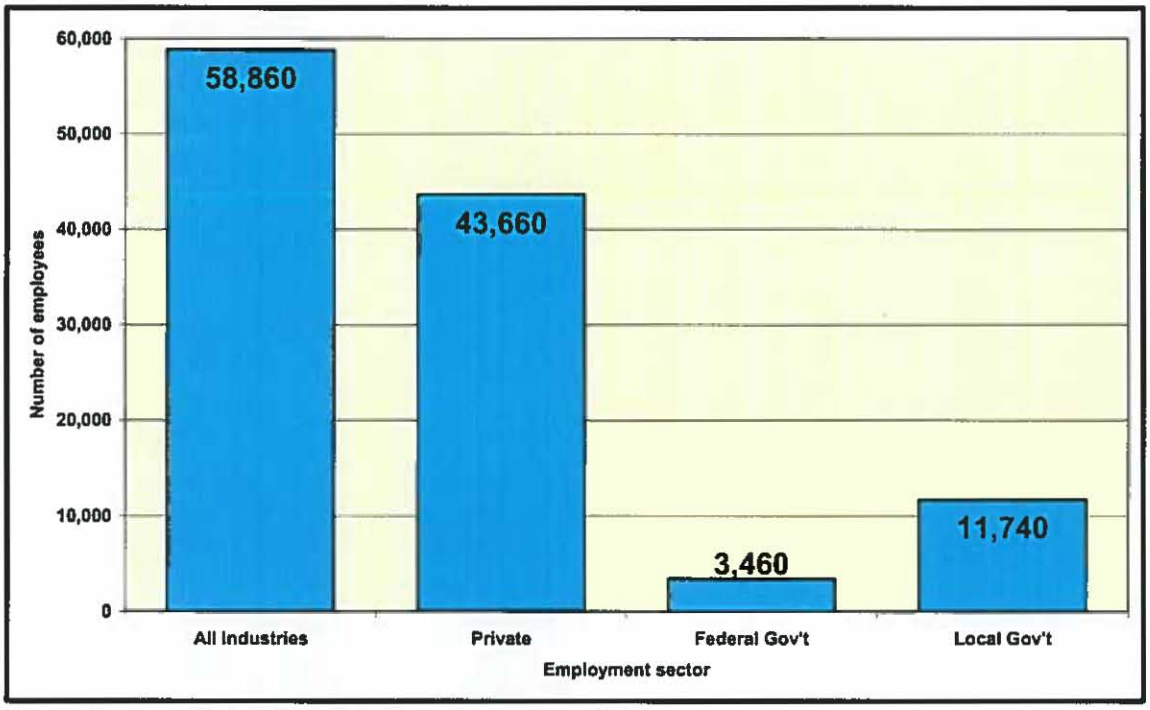
Figure 49: Employed people in the population aged 16 years and older by age and sex, Guam, 2004–2006



Source: Bureau of Labor Statistics, Guam Department of Labor

Figure 49 shows employment figures for adult women, adult men and teenagers at three periods from March 2004 to March 2006. The number of adult women employed in the civilian labor force increased 15.6 per cent from 23,450 in March 2004 to 27,110 in March 2006. Over the same period, the number of employed adult men increased slightly by 520 people or 1.7 per cent. The number of employed in the teenage population fluctuated: first increasing by 21 per cent from 2,250 in March 2004 to 2,720 in December 2005, then decreasing by 2.9 per cent to 2,640 in March 2006.

Figure 50: Number of employees on payroll by employment sector, Guam, December 2006



Source: Bureau of Labor Statistics, Guam Department of Labor

In December 2006, in total 58,860 employees were on the payroll across all industries on Guam (Figure 50 and Table 24). Of this total, 74.2 per cent or 43,660 were employed in the private sector and 25.8 per cent or 15,200 were employed in the government sector. The Government of Guam employees made up the majority of all people on the government payroll. Of the 15,200 employees on the government payroll, the Government of Guam employed 11,740 or 77.2 per cent, as compared with 3,460 (22.8 per cent) federal employees.

Table 24: Employees by industry base payroll, Guam, 2005–2006

Industry division	December 2005	December 2006	Annual (%) change
All industries	58,000	58,860	1.5
Private sector	43,230	43,660	1.0
Agriculture	170	290	70.6
Construction	4,460	4,380	–1.8
Manufacturing	1,660	1,640	–1.2
Transportation	4,970	5,000	0.6
Trade	14,240	14,080	–1.1
Finance, insurance and real estate	2,540	2,450	–3.5
Services	15,190	15,820	4.1
Public sector	14,770	15,200	2.9
Federal government	3,230	3,460	7.1
Government of Guam	11,540	11,740	1.7

Source: Bureau of Labor Statistics, Guam Department of Labor, Government of Guam
Note: Data include full-time and part-time employees who worked during or received pay for any part of the pay period, which included the 12th day of the survey months. The Current Employment Survey counts any person who is employed by two or more establishments at each place of employment. Proprietors, self-employed unpaid family workers, domestic servants and military personnel are excluded.

Table 24 further shows the industry division with the highest number of employees, as determined by base payroll, was services, which comprised 15,190 or 26.2 per cent of employees in 2005 and increased by 4.1 per cent to 15,820 in 2006. Trade followed with 14,240 or 24.6 per cent of employees in 2005 and remained second highest with 14,080 employees in 2006. For both survey periods, the Government of Guam had the third largest number of employees on its base payroll, with 11,540 people in 2005 and increasing slightly by 1.7 per cent to 11,740 people in 2006.

Table 25: Employment status of the civilian non-institutionalized population aged 16 years and older by age and sex, Guam, March 2006

	Civilian Labor Force								
	Total Civilian	Total		Employed		Unemployed		Not in the Labor Force	
Age and Sex	Population	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Both Sexes	104,830	65,940	62.9	61,390	93.1	4,550	6.9	38,890	37.1
16-17 years	6,320	870	13.8	690	79.3	180	20.7	5,450	86.2
18-19 years	3,900	2,120	54.4	1,940	91.5	180	8.5	1,780	45.6
20-24 years	9,800	7,390	75.4	6,420	86.9	970	13.1	2,410	24.6
25-34 years	20,120	16,050	79.8	15,080	94.0	970	6.0	4,070	20.2
35-44 years	20,810	16,510	79.3	15,130	91.6	1,380	8.4	4,300	20.7
45-59 years	24,430	17,660	72.3	16,910	95.8	750	4.2	6,770	27.7
60 years and above	19,450	5,340	27.5	5,220	97.8	120	2.2	14,110	72.5
Females	54,290	30,780	56.7	28,480	92.5	2,300	7.5	23,510	43.3
16-17 years	2,930	520	17.7	400	76.9	120	23.1	2,410	82.3
18-19 years	1,950	1,090	55.9	970	89.0	120	11.0	860	44.1
20-24 years	4,520	3,030	67.0	2,690	88.8	340	11.2	1,490	33.0
25-34 years	11,290	8,080	71.6	7,510	92.9	570	7.1	3,210	28.4
35-44 years	10,950	7,510	68.6	6,880	91.6	630	8.4	3,440	31.4
45-59 years	12,210	7,910	64.8	7,450	94.2	460	5.8	4,300	35.2
60 years and above	10,440	2,640	25.3	2,580	97.7	60	2.3	7,800	74.7
Males	50,540	35,160	69.6	32,910	93.6	2,250	6.4	15,380	30.4
16-17 years	3,390	350	10.3	290	82.9	60	17.1	3,040	89.7
18-19 years	1,950	1,030	52.8	970	94.2	60	5.8	920	47.2
20-24 years	5,280	4,360	82.6	3,730	85.6	630	14.4	920	17.4
25-34 years	8,830	7,970	90.3	7,570	95.0	400	5.0	860	9.7
35-44 years	9,860	9,000	91.3	8,250	91.7	750	8.3	860	8.7
45-59 years	12,220	9,750	79.8	9,460	97.0	290	3.0	2,470	20.2
60 years and above	9,010	2,700	30.0	2,640	97.8	60	2.2	6,310	70.0

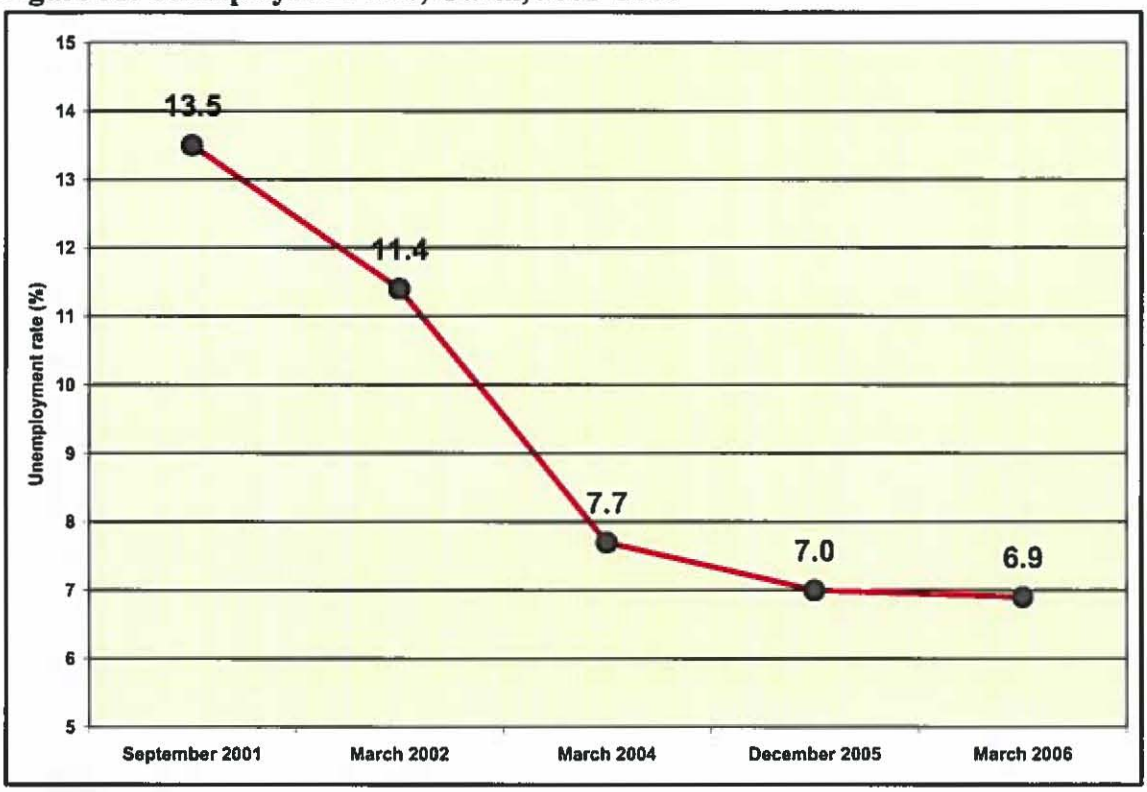
Source: Bureau of Labor Statistics, Guam Department of Labor

As Table 25 shows, in March 2006 the age group with the highest number of Guam's employed civilian labor force was 45–59 years, at 16,910 people. Of this group, 9,460 or 55.9 per cent were males and 7,450 or 44.1 per cent were females.

Conversely, in regard to unemployment, the biggest group, with 1,380 people or 8.4 per cent of the civilian labor force, was the age group of 35–44 years. Of this group, 750 were males and 630 were females.

Table 25 also shows that 38,890 or 37.1 per cent of people were not in the labor force. Of this total, 14,110 were aged 60 years and older and, in this age group, 6,310 or 44.8 per cent were males and 7,800 or 55.3 per cent were females.

Figure 51: Unemployment rate, Guam, 2001–2006



Source: Bureau of Labor Statistics, Guam Department of Labor, Government of Guam

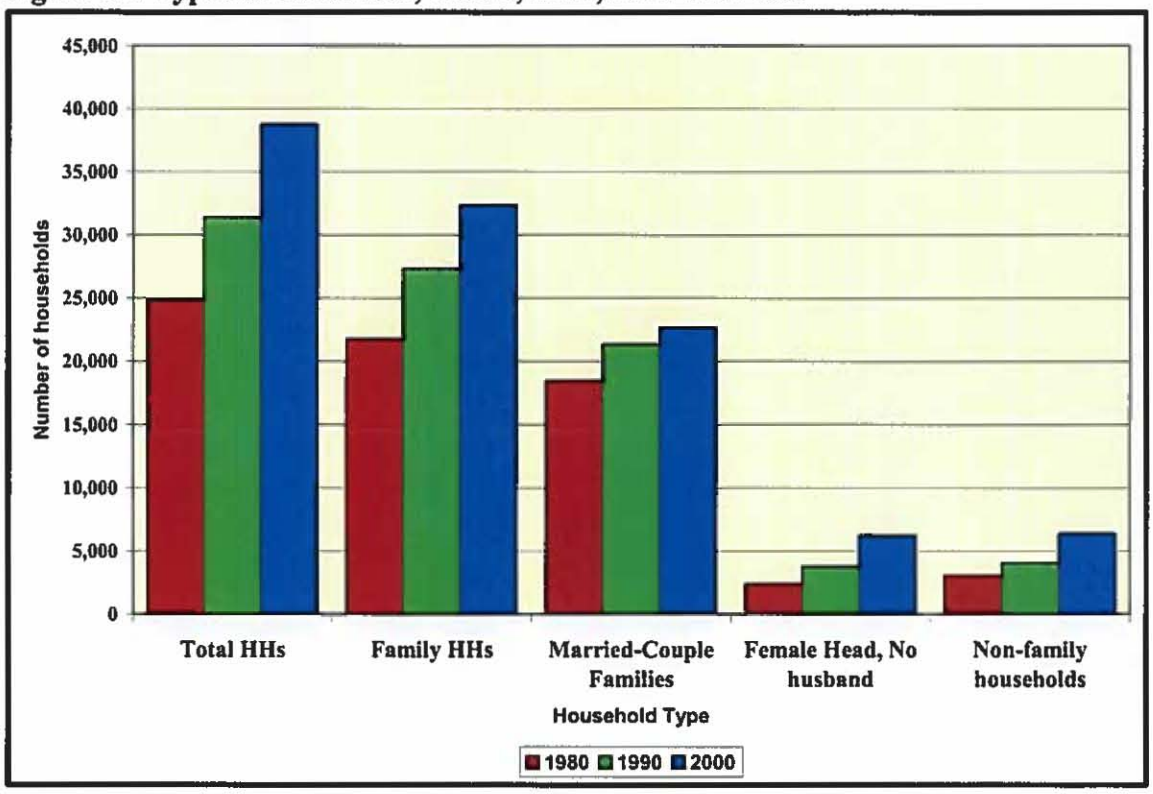
The unemployment rate was recorded at 13.5 per cent in September 2001 and progressively declined in the following years (Table 23 and Figure 51). In 2002 the unemployment rate dropped by 2.1 per cent to 11.4 per cent of the civilian labor force. Because no survey was conducted in 2003, no comparison is possible for this particular year. However, in March 2004 the unemployment rate had declined again by 3.7 per cent, with the unemployment rate at 7.7 per cent. In December 2005 the unemployment rate further declined to 7.0 per cent, a decrease of 0.7 per cent from March 2004. In March 2006, the unemployment rate was reported at 6.9 per cent, a decrease of 0.1 per cent from December 2005 report of 7 per cent.

The decrease in the unemployment rate may be attributed to improved employment opportunities and available training programs. It may also be due to an increase in the number of people categorized as not in the labor force.

7.1 Household size and composition

Information about households and family characteristics plays a fundamental role in assisting policy-makers and planners to identify housing impacts and develop program measures to respond to the needs of the community. A wide range of issues – from water consumption, energy demands and solid waste impacts to economic concerns and housing availability – are affected by household size and composition. Government and business leaders use household information and other demographic data to effectively respond to housing market needs, promote infrastructure development and strengthen socio-economic programs to improve the quality of life for the people of Guam.

Figure 52: Types of household, Guam, 1980, 1990 and 2000



Source: Census Bureau, US Department of Commerce

Table 26: Type, size and composition of households, Guam 1980, 1990 and 2000

Size and composition	1980	1990	2000
Total number of households	24,834	31,373	38,769
Number of family households	21,780	27,313	32,367
Married-couple families	18,473	21,342	22,693
Families headed by a female (no husband present)	2,415	3,824	6,284
Non-family households	3,054	4,060	6,402
Number of persons per household	4.1	4.0	3.9
Number of persons per family	4.4	4.3	4.3
Percentage of household members			
Household head	25.0	25.2	25.7
Spouse	18.0	17.1	15.0
Child	47.0	42.1	39.1
Other relative	8.0	12.3	16.1
Non-relative	2.0	3.3	4.1

Source: Census Bureau, US Department of Commerce

The US Census Bureau defines a *family household* as a family that includes a householder and one or more other people living in the same household who are related to the householder by birth, marriage or adoption. A family household may contain people not related to the householder, but those people are not included as part of the householder's family in census tabulations. The Census Bureau defines a *non-family household* as a household consisting of a householder living alone or with non-relatives only.

As Figure 52 and Table 26 show, overall the number of households on Guam increased by 24 per cent, from 31,373 households in 1990 to 38,769 households in 2000. Family households increased by 18 per cent, from 27,313 in 1990 to 32,367 in 2000, while non-family households rose considerably at 58 per cent, from 4,060 in 1990 to 6,402 in 2000.

Table 26 also shows that the household structure has changed slightly since 1980. The proportion of children in the household dropped from 47 per cent of the household in 1980 to 39 per cent in 2000. Though the proportion of children in the household has declined, the proportion of other relatives and non-relatives has doubled since 1980. More extended families, roomers and unmarried partners help to explain the differences in household make-up.

The proportion of family households remained relatively stable from 1980, at about 80 per cent or higher of the total number of households on Guam. Married-couple families continued to account for the majority of family households. However, it is interesting to note that the number of married couple families grew at a slower rate than that for families headed by females. In 1980 families headed by a female (with no husband present) made up 11 per cent of all family households. In 1990, this proportion grew to 14 per cent. The trend continued in 2000, when nearly 1 in every 5 families was headed by a female.

Average family size showed no major change from 1980, at over 4 people per family. In 2000, the average family size on Guam was 4.3 people per family (Table 26), higher than the average of 3.1 people per family reported in the United States.

Table 27: Household size and number of people per household, Guam, 1990 and 2000

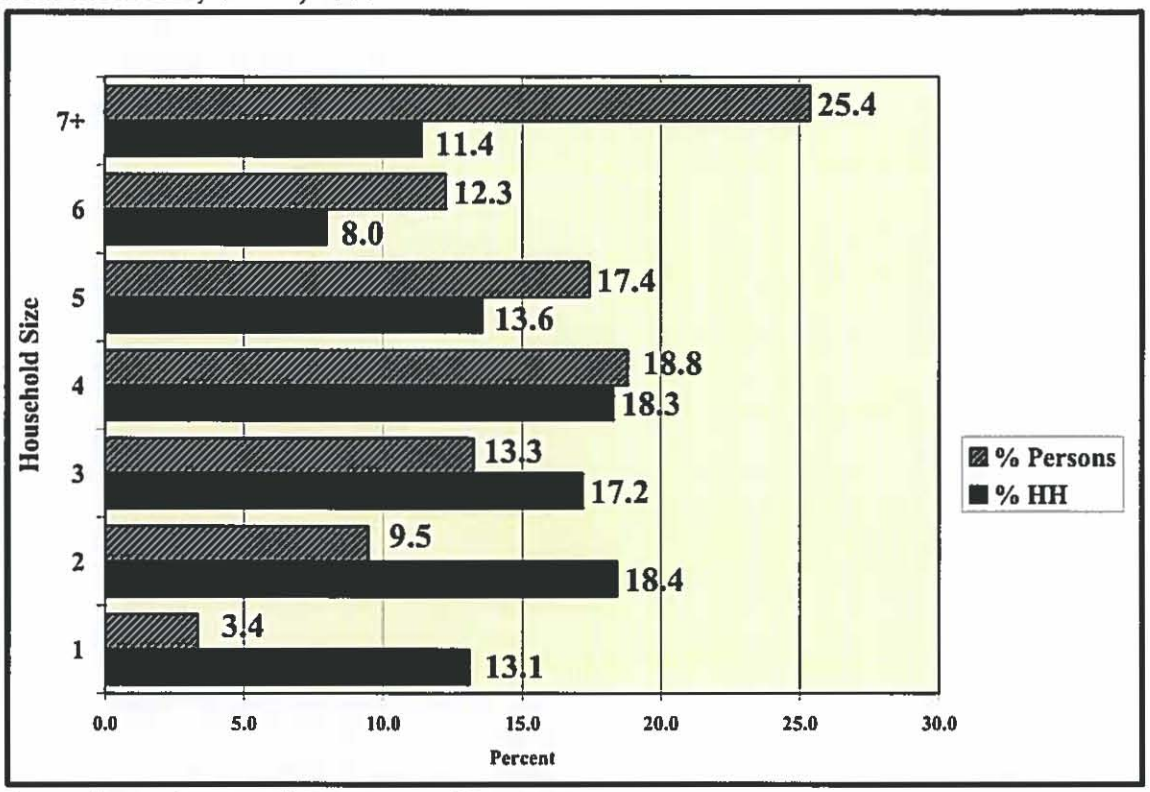
Household Size	1990				2000			
	Number of Households		Persons Per HH Size		Number of Households		Persons Per HH Size	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	3,080	9.8	3,080	2.5	5,082	13.1	5,082	3.4
2	5,859	18.7	11,718	9.4	7,145	18.4	14,290	9.5
3	5,566	17.7	16,698	13.4	6,668	17.2	20,004	13.3
4	6,291	20.1	25,164	20.2	7,101	18.3	28,404	18.8
5	4,258	13.6	21,290	17.1	5,264	13.6	26,320	17.4
6	2,679	8.5	16,074	12.9	3,089	8.0	18,534	12.3
7+	3,640	11.6	30,572	24.5	4,420	11.4	38,294	25.4
Total	**31,373**	**100.0**	**124,596**	**100.0**	**38,769**	**100.0**	**150,928**	**100.0**

Source: Census Bureau, US Department of Commerce

Overall, households with 2 or more people made up 87 per cent of all households on Guam in 2000 (Table 27). This proportion represented a 3 per cent drop from the 1990 census figures, which identified 90 per cent of all households as having 2 or more people. More people lived alone on Guam in 2000, as the proportion of one-person households increased from 2.5 per cent in 1990 to 3.4 per cent in 2000.

The 2000 census results showed that the northern districts of Tamuning and Dededo reported the highest number of one-person households, at 1,518 people and 906 people respectively. Conversely, the southern districts of Talofofo, Inarajan, Merizo and Umatac reported the lowest number of one-person households, each accounting for 1 per cent or less of all one-person household population on Guam.

Figure 53: Distribution of households and population living in households by household size, Guam, 2000



Source: Census Bureau, US Department of Commerce

The most common household sizes in 1990 and 2000 were 2 and 4 people per household, with just over 18 per cent in each category (Figure 53). In terms of population distribution, in both 1990 and 2000 about a quarter of all people lived in a household containing 7 or more people. The next biggest household size in terms of population distribution was 4 people (18.8 per cent of the population in 2000).

Table 28: Relationship of head of household to other household members, Guam, 1980, 1990 and 2000

	1980		1990		2000	
Relationship	Number	Percent	Number	Percent	Number	Percent
Total Persons in Households	101,000	100.0	124,596	100.0	150,928	100.0
Head	24,834	24.6	31,373	25.2	38,769	25.7
Family Households	21,780	21.6	27,313	21.9	32,367	21.4
Male Householder	---	---	22,252	17.9	23,780	15.8
Female Householder	---	---	5,061	4.1	8,587	5.7
Non-family Households	3,054	3.0	4,060	3.3	6,402	4.2
Male Householder	2,017	2.0	2,700	2.2	4,126	2.7
Female Householder	1,037	1.0	1,360	1.1	2,276	1.5
Spouse	18,473	18.3	21,342	17.1	22,693	15.0
Child	47,134	46.7	52,497	42.1	58,982	39.1
Grandchild	2,648	2.6	5,418	4.3	9,781	6.5
Parent	1,014	1.0	1,346	1.1	1,727	1.1

Other relatives	4,781	4.7	8,552	6.9	12,750	8.4
Nonrelatives	2,116	2.1	4,068	3.3	6,226	4.1

Source: Census Bureau, US Department of Commerce

Household composition refers to the general make-up of the household, meaning essentially the kind of relationship the head of the household with all other household members, including family members and non-relatives. Male householders continue to dominate as heads of families, with 22,252 male heads of household in 1990 and 23,780 in 2000. Female householders only accounted for a fraction of heads of household in 1990 and 2000 (Table 28).

In 1990 slightly over 80 per cent of all households were comprised of the husband, wife and their children (known as the *nuclear family*). In 2000, the proportion of nuclear families dropped to 76 per cent. At the same time, grandchildren and other relatives became more prevalent in the household structure. As Table 28 shows, in 1980 grandchildren comprised close to 3 per cent of all household members. From 1990 to 2000 the proportion of grandchildren living in households grew from 4.3 per cent to 6.5 per cent. Parents and other relatives made up 10 per cent of all households in 2000.

Map 4: Average household size by district, Guam, 2000

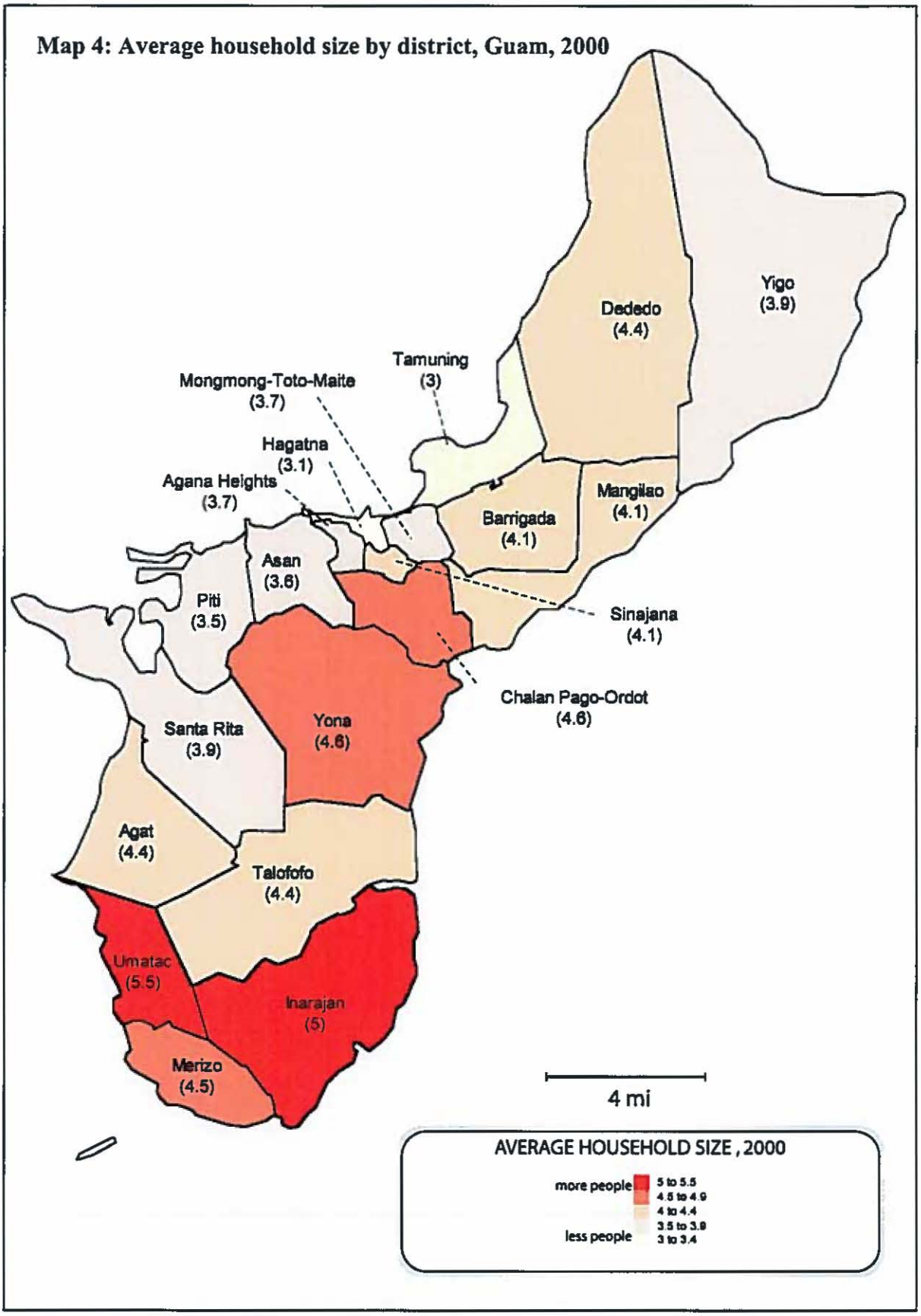


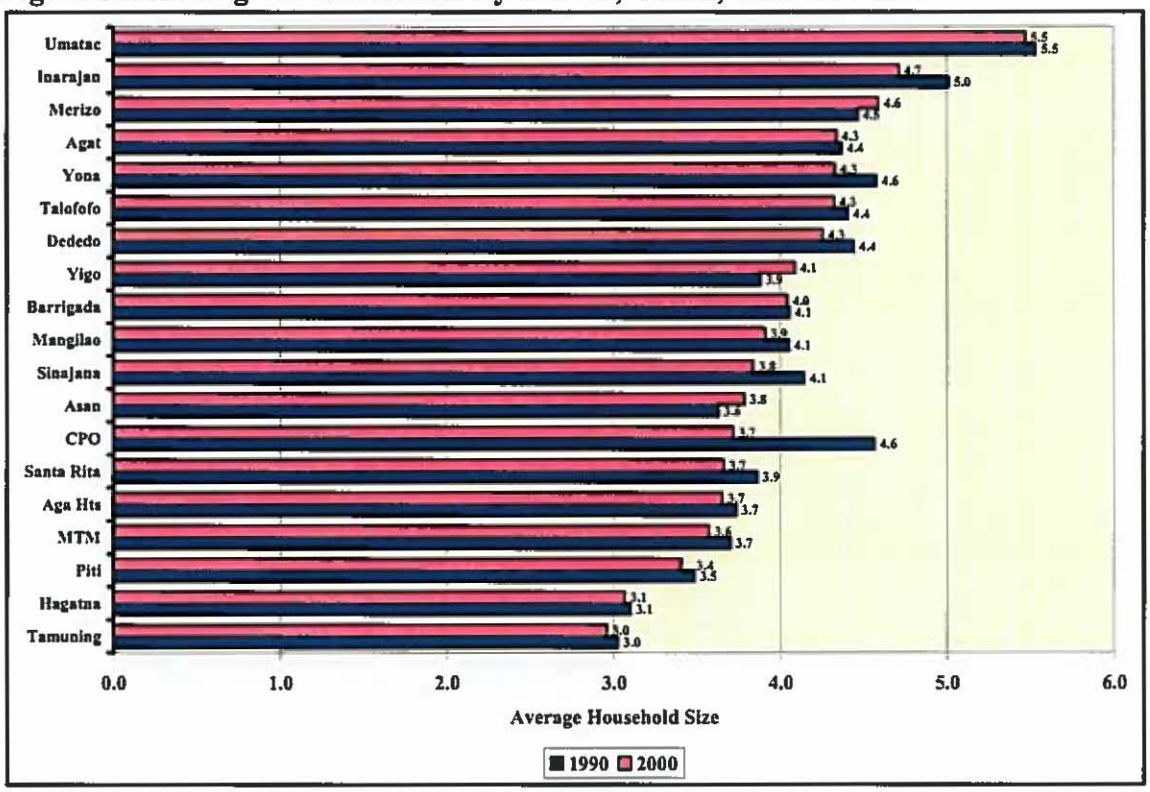
Table 29: Number of people in households, average household size, and median household income by district, Guam, 1990 and 2000

District	Number of Households		Number of Persons in Households		Average HH size (Persons per Household)		Median Household Income ($)	
	1990	2000	1990	2000	1990	2000	1990	2000
Agana Heights	939	1,058	3,506	3,862	3.7	3.7	36,250	47,396
Agat	1,135	1,298	4,960	5,633	4.4	4.3	28,423	37,398
Asan	565	552	2,049	2,089	3.6	3.8	34,688	48,611
Barrigada	1,975	2,097	8,013	8,481	4.1	4.0	32,285	49,974
Chalan Pago-Ordot	953	1,573	4,352	5,846	4.6	3.7	33,523	36,506
Dededo	6,963	10,016	30,933	42,635	4.4	4.3	30,828	37,654
Hagatna	367	268	1,138	822	3.1	3.1	26,691	31,136
Inarajan	488	644	2,446	3,036	5.0	4.7	30,577	42,361
Mangilao	2,427	3,190	9,839	12,474	4.1	3.9	31,858	39,754
Merizo	390	471	1,742	2,163	4.5	4.6	31,806	39,940
Mongmong-Toto-Maite	1,573	1,633	5,818	5,833	3.7	3.6	28,538	31,134
Piti	480	474	1,672	1,613	3.5	3.4	42,182	54,167
Santa Rita	2,287	1,780	8,832	6,512	3.9	3.7	27,679	41,928
Sinajana	641	742	2,658	2,850	4.1	3.8	33,317	48,750
Talofofo	521	738	2,296	3,192	4.4	4.3	35,859	47,885
Tamuning	4,982	5,953	15,076	17,619	3.0	3.0	30,596	35,347
Umatac	162	162	897	887	5.5	5.5	33,214	34,286
Yigo	3,370	4,634	13,081	18,947	3.9	4.1	27,069	37,415
Yona	1,155	1,486	5,288	6,434	4.6	4.3	39,805	52,955
Total	**31,373**	**38,769**	**124,596**	**150,928**	**4.0**	**3.9**	**$30,755**	**$39,317**

Source: Census Bureau, US Department of Commerce

Between 1990 and 2000, a substantial increase in the number of households was evident in the districts of Dededo, Yigo and Tamuning (Table 29). In the greatest rise, the district of Dededo increased by 3,053 households, from 6,963 in 1990 to 10,016 in 2000. Conversely, in the district of Santa Rita the number of households declined dramatically by 507 households between 1990 and 2000. The district of Hagatna had 99 fewer households in 2000 than in 1990. Umatac reported the same number of households in 1990 as in 2000, at 162.

Figure 54: Average household size by district, Guam, 1990 and 2000



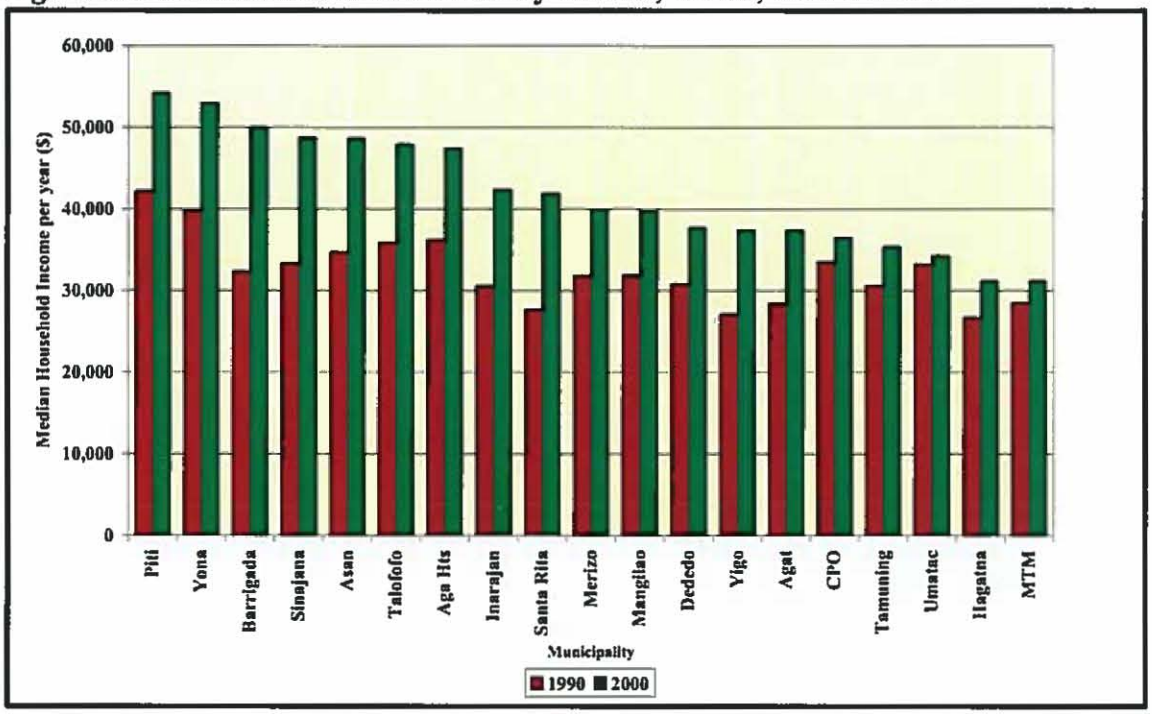
Source: Census Bureau, US Department of Commerce

The average household size on Guam decreased slightly between 1990 and 2000. In 1990 the average household size was 4.0 people, decreasing to 3.9 people in 2000. In most areas, there was no significant change in the average household size; however, there was a noticeable drop in the district of Chalan Pago, from 4.6 people per household in 1990 to 3.7 people in 2000. The districts in southern Guam showed the largest average household size, with Umatac reporting 5.5 people per household, followed by Inarajan at 4.7 people and Merizo at 4.6 people in 2000. The 1990 and 2000 census results showed that Tamuning and Hagatna had the lowest average household size, with 3.0 and 3.1 people per household respectively (Map 4 and Figure 54).

7.2 Household income

According to the data from the 1990 census, Guam's median household income was $30,755 per year. In the 2000 census, this figure had grown to $39,317. Analyzing the data by district, it is evident that the districts of Piti and Yona had the highest median household incomes in 2000. The median household income in Piti grew 28.4 by per cent, from $42,182 in 1990 to $54,167 in 2000. The median household income in Yona rose by $13,150, or 33 per cent, from $39,805 in 1990 to $52,955 in 2000. Hagatna and Mongmong-Toto-Maite had the lowest median household incomes, at $31,136 and $31,134 respectively (Figure 55 and Map 5).

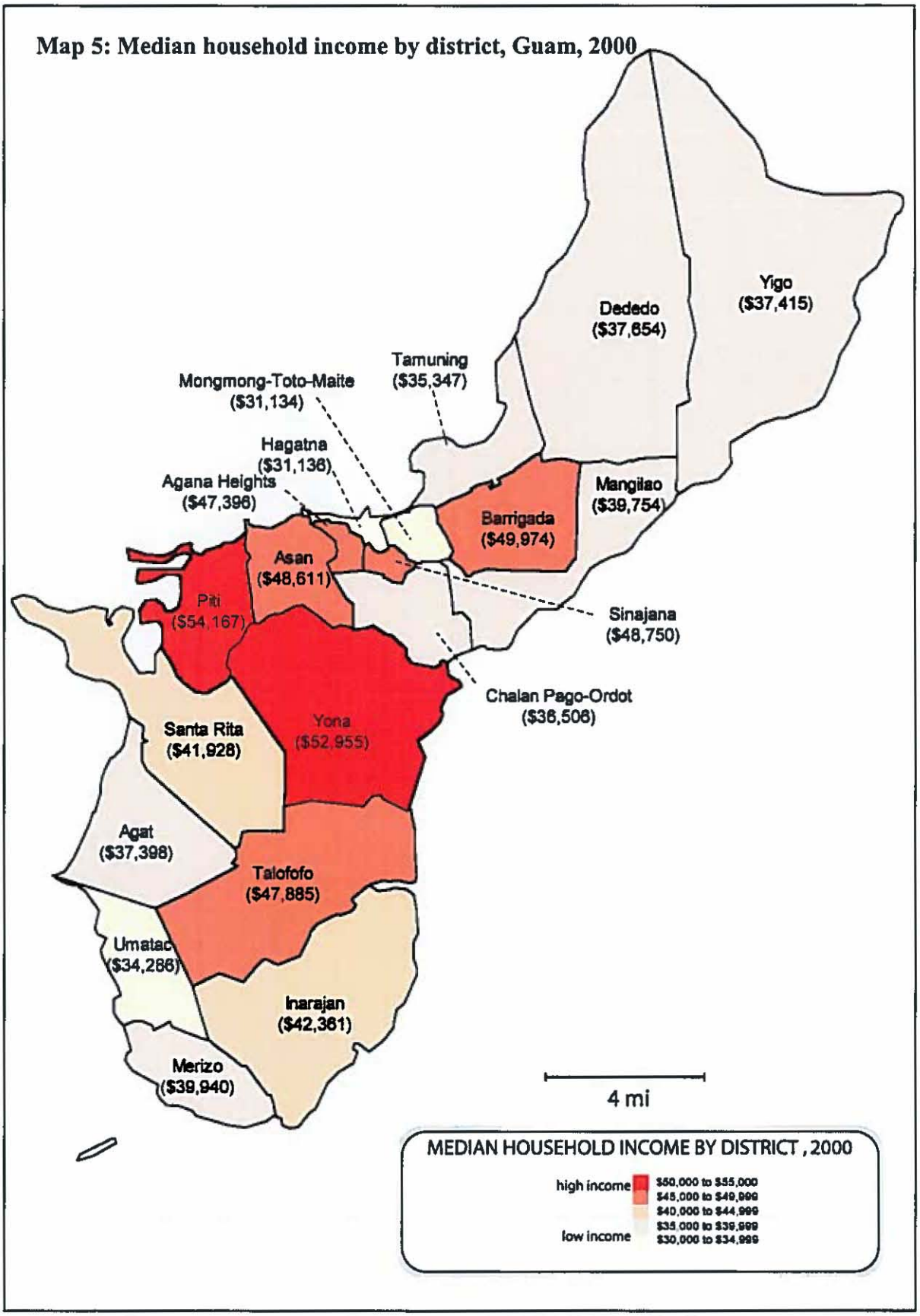
Figure 55: Median household income by district, Guam, 1990 and 2000



Source: Census Bureau, US Department of Commerce

Median household income rose in all districts. The largest increase in median household income was evident for Barrigada, where the median increased by 54.8 per cent, from $32,285 in 1990 to $49,974 per year in 2000. The second-largest increase occurred in the district of Santa Rita, where median household income rose by 52 per cent, from $21,679 in 1990 to $41,928 in 2000. At the other end of the scale, Umatac had the lowest increase at 3.2 per cent, from $33,214 in 1990 to $34,286 in 2000.

Map 5: Median household income by district, Guam, 2000



7.3 Grandparents as caregivers

Over the years, government officials have recognized the growing role of grandparents in raising and caring for their grandchildren. This trend is evident in the rising number of grandchildren living in the same household as their grandparents, who support the parent(s) and may act as caregivers in their absence. It is not a surprising development, as extended families are growing in the United States as well as on Guam. In 2000 the US Census Bureau began collecting information on grandparents who serve as primary caregivers for their grandchildren under the age of 18 years and who live in the same house or apartment.

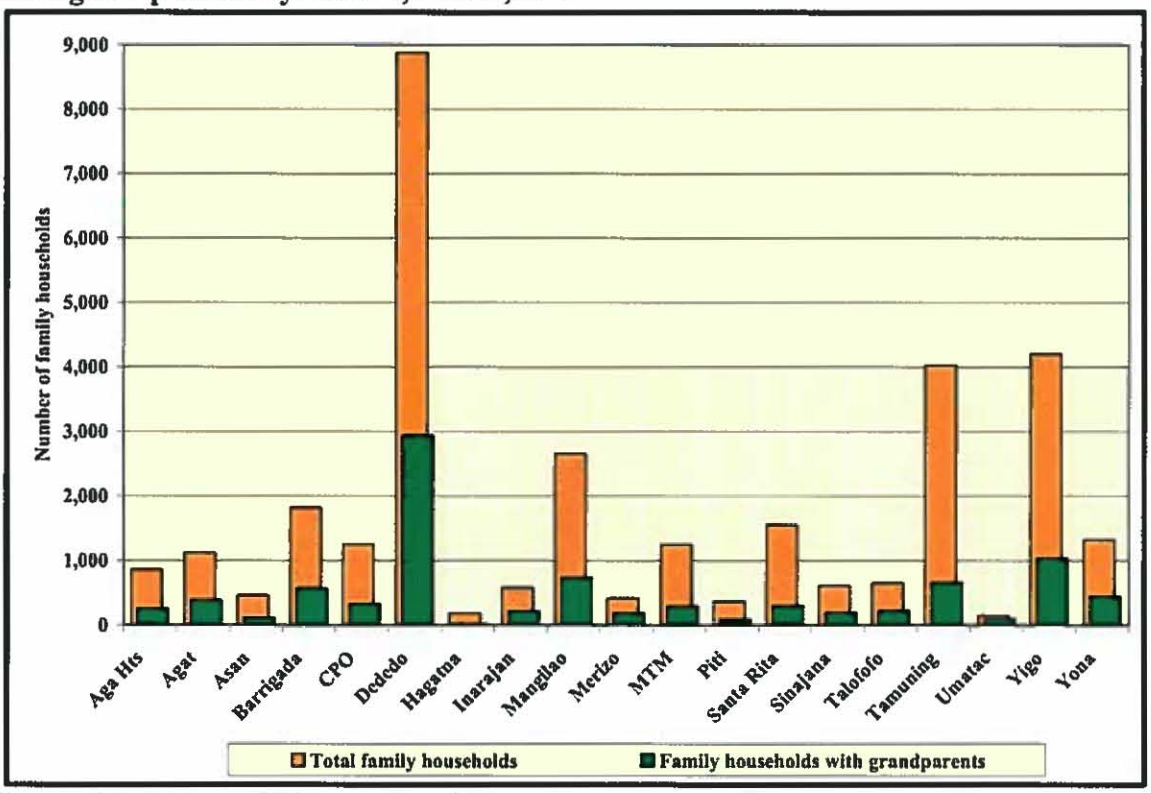
The Census Bureau derived data on grandparents as caregivers from three questions:

- The first question asked if the person has any grandchildren under the age of 18 years living in the same house or apartment.
- If the answer was yes, the grandparent was asked if he/she was responsible for most of the basic needs of any of the grandchildren.
- If the answer was yes, the grandparent was additionally asked how long he/she had been responsible for the grandchild(ren).

The US Census Bureau tabulated the data only for people aged 30 years and older because people younger than 30 years are unlikely to have grandchildren.

The 2000 census results showed that, in Guam's household structure, there were 9,781 grandchildren living in the same household as their grandparents, an 81 per cent increase from the 5,418 grandchildren reported in 1990. Though census results showed that grandchildren represent a small segment of the household population, the proportion of grandchildren has been increasing since 1980, when 2.6 per cent of all households included grandchildren; in 1990 the proportion was 4.3 per cent and in 2000 it was 6.5 per cent.

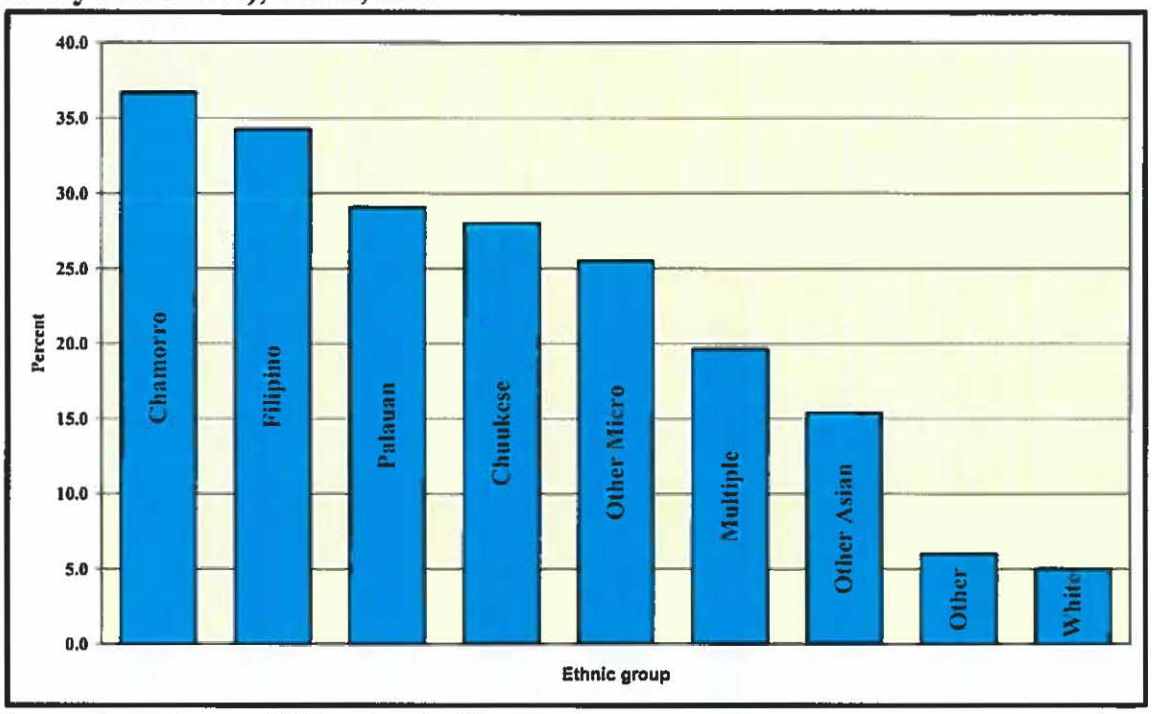
Figure 56: Total number of family households, and number of family households with grandparents by district, Guam, 2000



Source: Census Bureau, US Department of Commerce

In 2000 there were 9,125 grandparents living in a household with one or more grandchildren under 18 years of age. About 28 per cent of all family households had a grandparent as a household member. At the district level, Figure 56 shows that Umatac had the highest proportion of grandparents residing in family households, at 105 grandparents of the 150 households in Umatac, or 70 per cent. Next highest was the southern district of Merizo, where about grandparents lived in 44 per cent of family households. Tamuning reported the lowest proportion of grandparents living in family households, at 16.5 per cent, or 665 grandparents in the 4,031 family households.

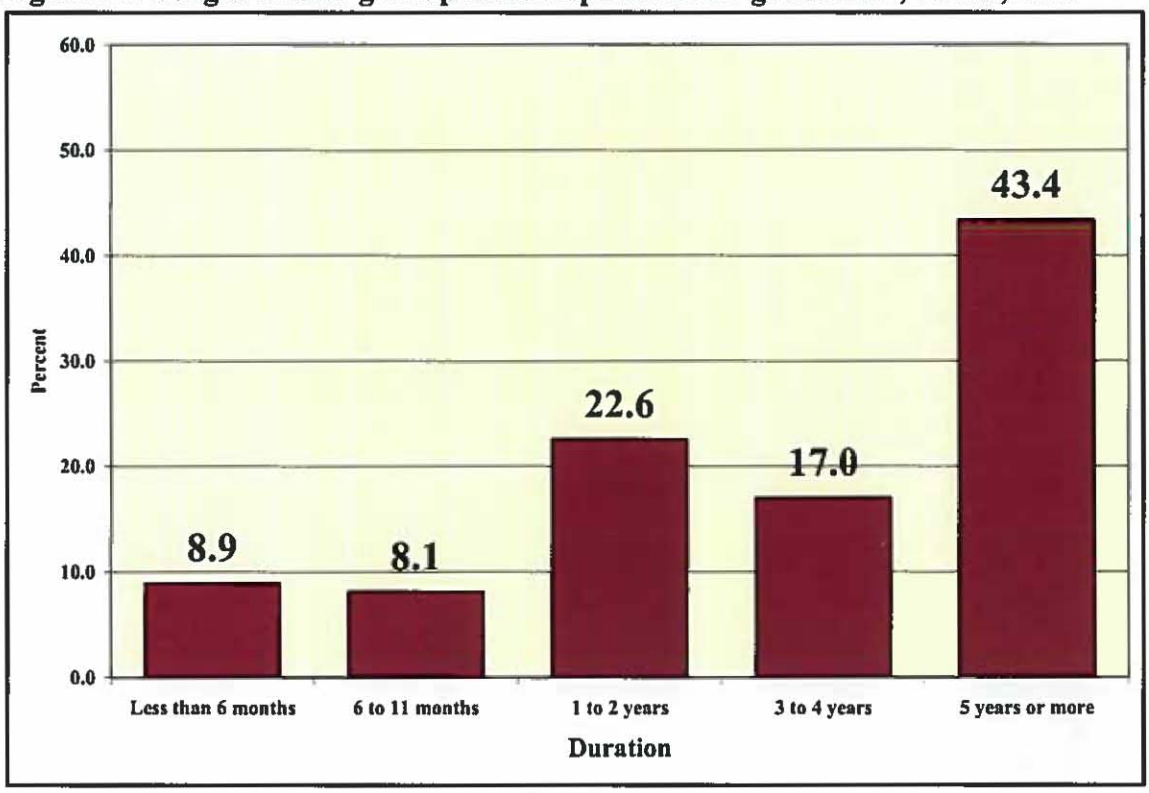
Figure 57: Grandparents living in family households by ethnicity (as a percentage of family households), Guam, 2000



Source: Census Bureau, US Department of Commerce

In 2000 the highest proportion of family households with grandparents as caregivers were of Chamorro descent, at about 36.7 per cent, or 4,280 grandparents in the 11,660 Chamorro family households (Figure 57). Grandparents of Filipino descent were the next highest proportion, living in a third of Filipino family households. Whites, at 5 per cent, had the fewest grandparents living in family households of the same race.

Figure 58: Length of time grandparent responsible for grandchild, Guam, 2000



Source: Census Bureau, US Department of Commerce

In 2000 about 41 per cent, or 3,700 grandparents of the 9,125 grandparents living in family households identified themselves as primary caregivers for their grandchildren. Of this total, 43.4 per cent, or 1,605 grandparent caregivers had been responsible for their grandchildren for 5 years or more. About 17 per cent reported having this responsibility for less than a year, and under 9 per cent for less than 6 months (Figure 58). The majority of the grandparent caregivers, 2,802 or 76 per cent, reported that they had been living in the same house 5 years earlier. Only 5 per cent, mostly Filipinos, US or Commonwealth of the Northern Mariana Islands citizens, reported residing outside of Guam in 1995.

7.4 Tenure

All occupied housing units are asked about *housing tenure*, which is defined as whether an occupant owns or rents a home. The decision on whether to own or rent a housing unit is generally dependent on a number of factors such as: income, access to loan and assistance programs, cost, availability of housing, and preference for a particular location. Information on the different forms of tenure assists data users and policy-makers to develop strategies and programs to meet Guam's housing demand and market needs. The data also help Guam's leaders to assess the social, environmental and economic impacts associated with Guam's housing situation and to promote quality housing standards and requirements to benefit the people of Guam.

The 2000 census counted 47,677 housing units, of which 38,769 were occupied and 8,908 were vacant. Table 30 shows that the number of occupied housing units increased by 24 per cent and that the vacancy rate more than doubled between 1990 and 2000.

In an analysis by district, Chalan Pago showed the largest increase in occupied housing units at 65 per cent, from 953 occupied units in 1990 to 1,573 occupied units in 2000. This was followed by Dededo at 44 per cent, and Talofofo at 42 per cent. The district of Umatac showed no change, with 162 occupied housing units in both 1990 and 2000. Conversely, the number of occupied housing units in the district of Hagatna dropped by 27 per cent, with its vacancy rate nearly tripling since 1990. Santa Rita also reported a 22 per cent decline in occupancy, with a significant rise in vacant units from 56 in 1990 to 737 in 2000. Because Santa Rita is recognized as a major military installation, the high vacancy rate may be attributed to the departure of a significant proportion of the armed service personnel and their dependants since 1990.

Table 30: Housing tenure by district, Guam, 1990 and 2000

	1990			2000		
Municipality	Total Housing Units	Occupied Housing Units	Vacancy Housing Units	Total Housing Units	Occupied Housing Units	Vacancy Housing Units
Total Housing Units	35,223	31,373	3,850	47,677	38,769	8,908
Agana Heights	1,008	939	69	1,193	1,058	135
Agat	1,300	1,135	165	1,499	1,298	201
Asan	620	565	55	660	552	108
Barrigada	2,140	1,975	165	2,307	2,097	210
Chalan Pago	1,047	953	94	1,920	1,573	347
Dededo	7,541	6,963	578	12,119	10,016	2,103
Hagatna	416	367	49	395	268	127
Inarajan	553	488	65	701	644	57
Mangilao	2,699	2,427	272	3,926	3,190	736
Merizo	469	390	79	535	471	64
Mongmong/Toto/Maite	1,742	1,573	169	2,102	1,633	469
Piti	554	480	74	576	474	102
Santa Rita	2,343	2,287	56	2,517	1,780	737
Sinajana	712	641	71	857	742	115
Talofofo	548	521	27	849	738	111
Tamuning	6,296	4,982	1,314	8,108	5,953	2,155
Umatac	188	162	26	179	162	17
Yigo	3,686	3,370	316	5,489	4,634	855
Yona	1,361	1,155	206	1,745	1,486	259

Source: Census Bureau, US Department of Commerce

Renter-occupied housing units made up the majority of all occupied housing units, at 52 per cent, or 20,022 rented units of the 38,769 occupied housing units on Guam. Owner-occupied units accounted for the remaining 48 per cent, or 18,747 owner-occupied units. Dededo and Tamuning were the districts with the highest number of renter-occupied units, each with 22 per cent of all renter-occupied units on Guam. Umatac was the district with the lowest number of renter-occupied units, with less than 1 per cent of all rented housing units on Guam.

With reference to the type of structure of occupied housing units, in 2000 over 50 per cent of all housing units were single-family houses, not attached to any other structure. About 18 per cent were single-family houses attached to one or more structures. Of the owner-occupied units, close to 80 per cent were single-family, detached homes while only 11 per cent were attached to one or more structures. Most renter-occupied units were

single-family houses (including detached and attached units), at 57 per cent of the 20,022 rented units. Duplexes accounted for 6 per cent while apartments with 20 or more units made up close to 15 per cent of all rented units (Table 31).

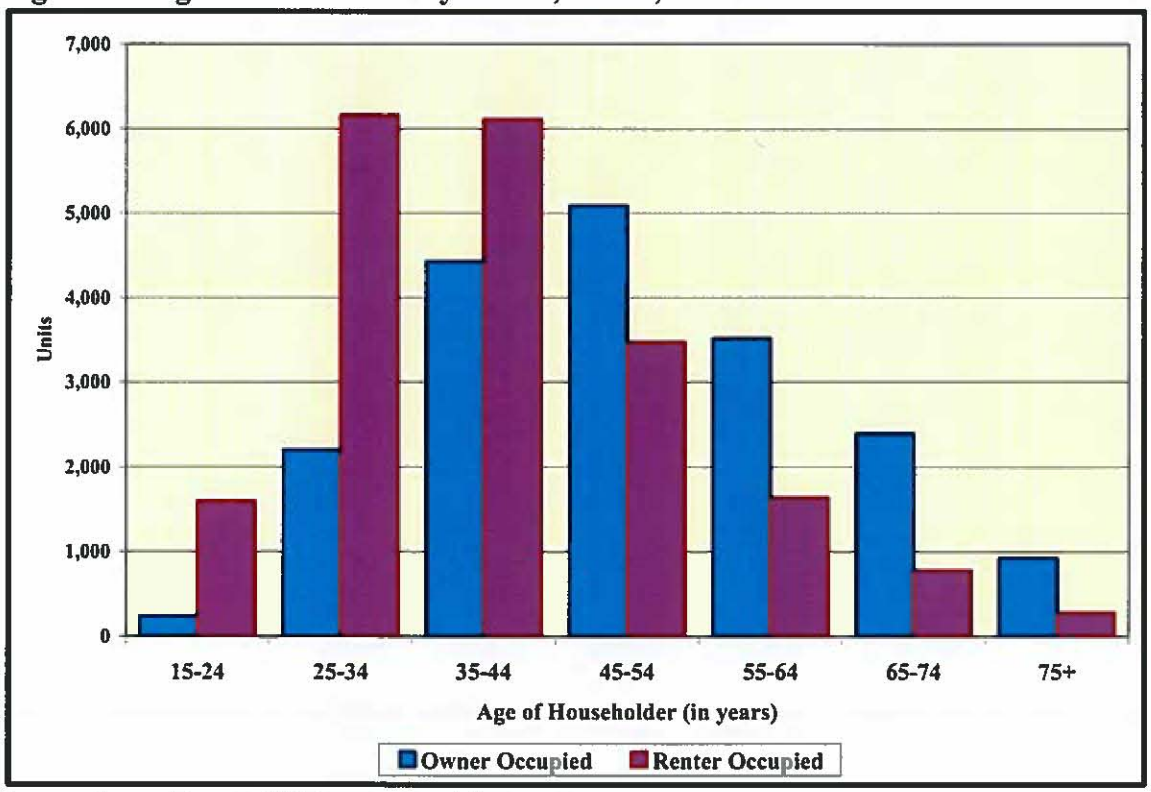
Table 31: Type of structure of occupied housing units, Guam, 2000

Type of Structure	All housing units		Owner-occupied		Renter-occupied	
	Number	Percent	Number	Percent	Number	Percent
Total	47,677	100.0	18,747	100.0	20,022	100.0
1, detached	24,470	51.3	14,947	79.7	6,473	32.3
1, attached	8,505	17.8	2,107	11.2	4,942	24.7
Building with 2 apartments	1,634	3.4	225	1.2	1,109	5.5
Bulding with 3 or 4 apartments	2,292	4.8	303	1.6	1,437	7.2
Building with 5 to 9 apartments	2,306	4.8	240	1.3	1,428	7.1
Building with 10 to 19 apartments	2,446	5.1	178	0.9	1,407	7.0
Building with 20 to 49 apartments	3,155	6.6	244	1.3	1,675	8.4
Building with 50 or more apartments	2,189	4.6	225	1.2	1,277	6.4
Mobile home, container, boat, van, etc	680	1.4	278	1.5	274	1.4

Source: Census Bureau, US Department of Commerce

In 2000 just over half (51 per cent) of household heads living in owner-occupied housing units were between the ages of 35 and 54 years (Figure 59). For renter-occupied units, over 61 per cent of household heads were between 25 and 44 years of age. While most renters were relatively young, 5 per cent of those aged 65 years and older were still renting units. On the other hand, people aged 65 years and older were more likely to own homes, making up 18 per cent of all owner-occupied units. The median age of owner-occupied and renter-occupied households was 50 years and 39 years respectively.

Figure 59: Age of householder by tenure, Guam, 2000



Source: Census Bureau, US Department of Commerce

8. POPULATION PROJECTIONS

Timely and accurate information about population trends is in high demand. Knowledge about the current size and structure of a country's population is needed to formulate and implement policies and programs in almost all areas of public life. Because policies are aimed at achieving goals in the future, knowledge about future population trends is required. Activities in areas as diverse as health, environment, poverty reduction, social progress and economic growth rely on comprehensive and consistent demographic information.

The appropriate method to gain demographic information of this quality in regard to future trends is to prepare estimates and projections of population size and structure by age and sex.

The starting point for any projections is a reliable age–sex distribution of a population; in this case it is the population by age and sex derived from the Guam 2000 census. Also needed is information on recent levels and patterns of fertility, mortality and migration .

The *cohort-component method* was used to calculate the population projections presented here. This procedure simulates population changes as a result of changes in the components of growth: fertility, mortality and migration. Based on past information, assumptions are made about future trends in these components of change. The assumed rates are applied to the age and sex structure of the population, in a simulation that takes into account that people die according to their sex and age, that women have children, and that some people change their residence. The cohort-component method of projecting a population follows each cohort of people of the same age and sex throughout their lifetime according to their exposure to fertility, mortality and migration.[3]

The key to making meaningful projections lies in the choice of assumptions about future population developments. These assumptions concern the birth, death and migration rates that are possible in the future.

8.1 Projection assumptions

As a general guideline, when preparing multiple assumptions about future levels of fertility, mortality and/or migration, it is advisable to arrive at outcomes that are symmetric. This means that the level of the low and the high, or the fast and the slow growth assumptions should be positioned above and below the medium level assumption at equal distances.

To gain a better understanding of Guam's future population, several projections have been prepared, covering a 25-year period, from 2000 to 2025.

The assumptions described below were developed and discussed during a Population Projections Workshop conducted by SPC on Guam in November 2006. Participants

[3] Eduardo Earring, Population Analysis with Microcomputers, Volume I: Presentation of Techniques, Bureau of the Census, Department of Commerce, USA, pp. 309–310.

included representatives from a wide variety of Guam government agencies such as the Bureau of Statistics and Plans, Department of Labor, Department of Public Health and Social Services, Department of Youth Affairs, Guam Housing and Urban Renewal Authority, Guam Mental Health and Substance Abuse, Guam Police Department, Guam Public School System, Office of Civil Defense, and representatives of the University of Guam.

The following demographic inputs were developed for the projections.

8.1.1 Base population

The base population is taken as the 2000 Guam census age and sex distribution of the total enumerated population, adjusted to mid year 2000 (Appendix 7).

8.1.2 Fertility

The estimated average total fertility rate (section 3.1) for 1999–2001 and associated age specific fertility rates (section 3.1 and Appendix 8) are used as a starting point, with three different assumptions made about future fertility developments (Figure 60).

The high and the low fertility assumptions are based on the set *medium assumption*. It is assumed that the level and trend of the future TFR of the *medium fertility assumption* is reaching the level of TFR of the present-day United States (Appendix 9). This level will be reached (by means of linear extrapolation) with a pace of fertility decline that is based on the fertility trend of Guam in the recent past (1990–2000). According to this pace, Guam would reach a TFR of 2 in the year 2025.

The reason for choosing the fertility level of the United States as the future level for Guam is twofold:

1. The United States has completed the *demographic transition* (see explanatory note in glossary). Appendix 9 shows that the TFR remained almost constant at a level of 2 over 15 years (1990–2005).
2. The United States is regarded as the metropolitan focal point of Guam.

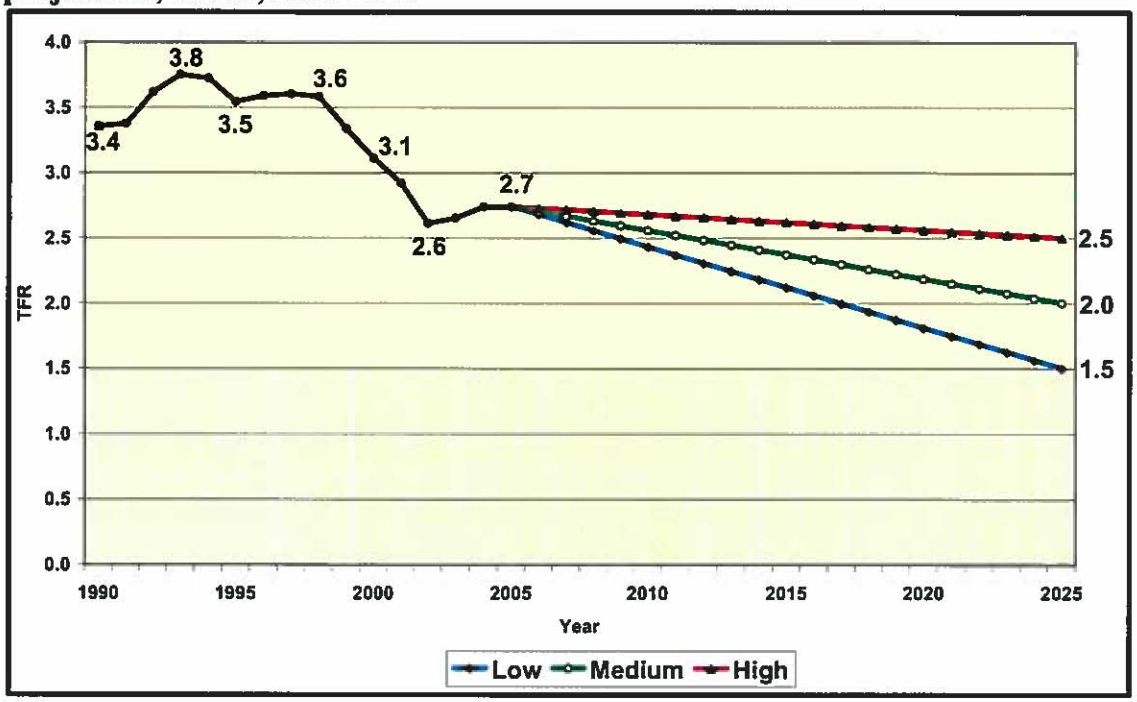
Therefore the *medium fertility assumption* is set as follows:

- **Assumption 1 – Medium fertility**: Fertility decreases to 2.0 in the year 2025, and resembles the level of fertility in the United States of the recent past (see above).

The high and the low fertility assumptions were built symmetrically around the medium fertility assumption:

- **Assumption 2 – High fertility**: Fertility slightly decreases from its current level to 2.5 in 2025. The high level is assumed to be 'half a child' (TFR of 0.5) higher than the medium fertility level.
- **Assumption 3 – Low fertility**: Fertility decreases to 1.5 in the year 2025. The low fertility level is assumed to be 'half a child' (TFR of 0.5) less than the medium fertility level.

Figure 60: Estimated past levels of fertility, and future fertility assumptions for projections, Guam, 1990–2025



8.1.3 Mortality

It is thought that under normal circumstances (meaning in the absence of catastrophes like wars, epidemics and major natural disasters) the health situation on Guam and mortality levels will continuously improve throughout the projection period.

Life expectancies at birth [E(0)] of 71.1 years for males and 76.1 years for females (Table 4) are used as the starting point for the projections in 2000. These estimates are based on the number of registered deaths by age and sex in the years 1998–2002, as outlined in Section 3.2.

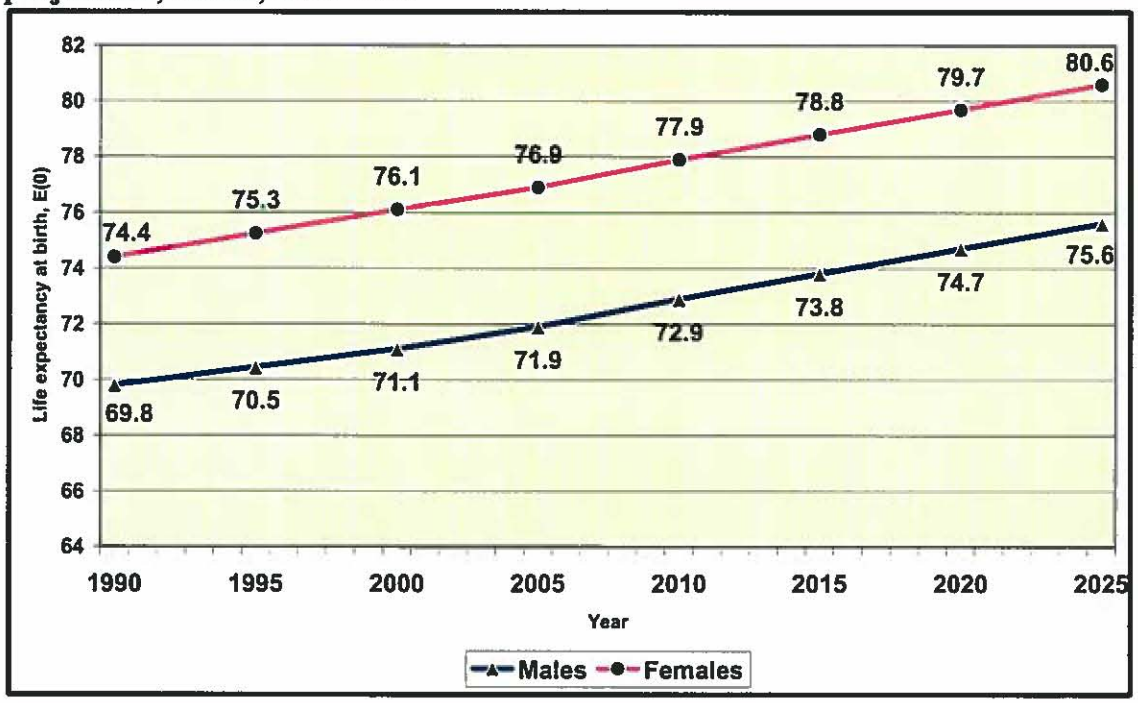
Assumption

The population projections presented here assume a rising trend in life expectancy for males and females according to the United Nations working model of a medium pace of mortality improvement, as described in World Population Prospects.[4] According to this model, current estimated life expectancies will gradually increase and reach 75.6 years for males and 80.6 years for females in 2025 (Figure 61).

Only one assumption regarding mortality is made. The reason for this is that variations in mortality levels (multiple assumptions) usually have only a minor impact on final projection results; they also would require the production of too many different scenarios that ultimately would only complicate the presentation of results.

[4] United Nations, 1995, World Population Prospects, New York, p. 144.

Figure 61: Estimated past levels of mortality, and future mortality assumptions for projections, Guam, 1990–2025



8.1.4 Migration

Making meaningful assumptions about future migration developments is the single greatest difficulty in undertaking population projections, as many of the social and economic parameters shaping migration patterns depend largely on a country's overall social, economic and political developments, which can fluctuate widely and are hard to predict. Guam's overall level of migration depends largely on decisions taken by the US military leadership in regard to the number of active duty personnel and their dependants to be stationed on Guam.

Although the size of the military decreased between the 1990 and 2000 censuses, it is anticipated that it will increase again from 2007 onwards. The US military's expansion plans are to boost US reconnaissance, deployment and training capabilities in the region. The first wave of 3,000 US military forces and their dependants will be relocated to Guam sometime after 2007.

The total number of migrants is expressed as *net migration*, which is the difference between the number of arrivals (immigrants) and departures (emigrants) during a certain period of time.

Net migration = **Arrivals (immigrants)** minus **Departures (emigrants)**

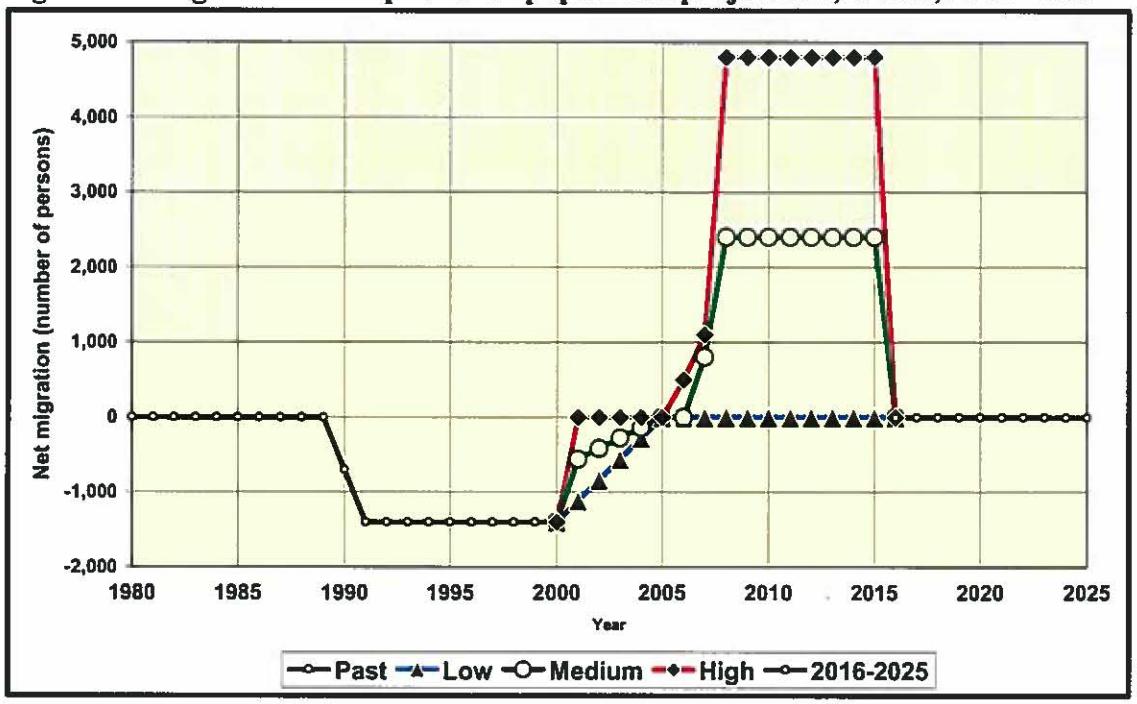
Therefore if net migration is *positive*, it means that the number of arrivals (immigrants) was higher than the number of departures (emigrants); if net migration is *negative*, the number of departures (emigrants) is higher than the number of arrivals.

In Section 3.3 the level of net migration was estimated as at –1,400 people annually for the intercensal period 1990–2000. This means that there were an estimated 1,400 more departures than arrivals each year. During the previous intercensal period, 1980–1990, *net migration* was insignificant (zero).

In total three different migration assumptions were made (Figure 62):

- **Assumption 1 – Zero migration:** Net migration is assumed to gradually increase from –1,400 per year for the period 1990–2000 to zero in the year 2005, and to remain at zero for the entire projection period.
- **Assumption 2 – Medium migration:** Net migration is assumed to gradually increase from –1,400 per year for the period 1990–2000 to zero in the year 2005. It is then assumed to remain at zero until 2007, when it is expected to increase to 1,600 male and 800 female net migrants per year during the period 2008–2015. In total, it is assumed that 20,000 net migrants will enter Guam during the period 2007–2015. From 2016 net migration is assumed to be zero.
- **Assumption 1 – High migration:** Net migration is assumed to gradually increase from –1,400 per year for the period 1990–2000 to zero in the year 2005. It is then assumed to remain at zero until 2006, when it is expected to increase to 3,200 male and 1,600 female net migrants per year during the period 2008–2015. In total, it is assumed that 40,000 net migrants will enter Guam during the period 2007–2015. From 2016 net migration is assumed to be zero.

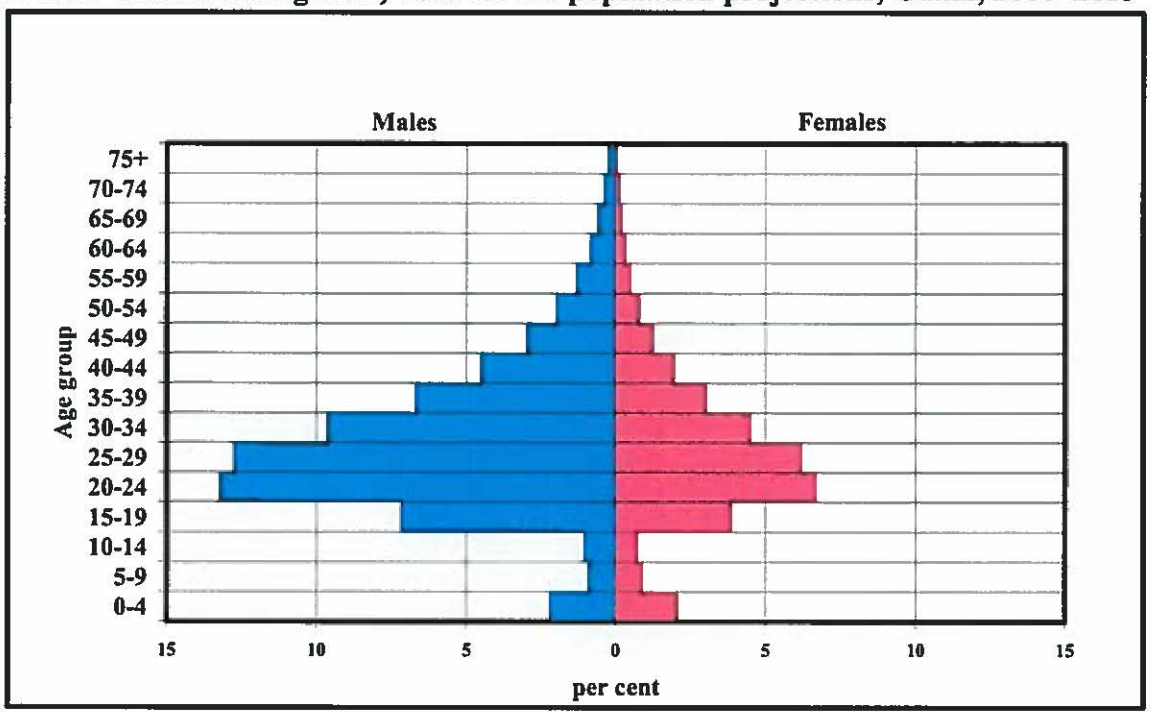
Figure 62: Migration assumptions for population projections, Guam, 2000–2025



With regard to the age and sex structure of migrants (Figure 63), it was found that twice as many males as females left Guam between 1990 and 2000. This difference was due to downsizing of the predominantly male military forces during that period.

It is, therefore, assumed that in future there will be twice as many males as females entering Guam because most migration will be based on the anticipated military build-up. Because there is currently a shortage of facilities (housing etc.) to accommodate the anticipated high number of military staff (including their dependants), significant construction work is expected to take place. Getting it done will also require a substantial number of construction workers from overseas.

Figure 63: Population pyramid – assumed age distribution of net migrants (per cent of total number of migrants) used for the population projections, Guam, 2000–2015

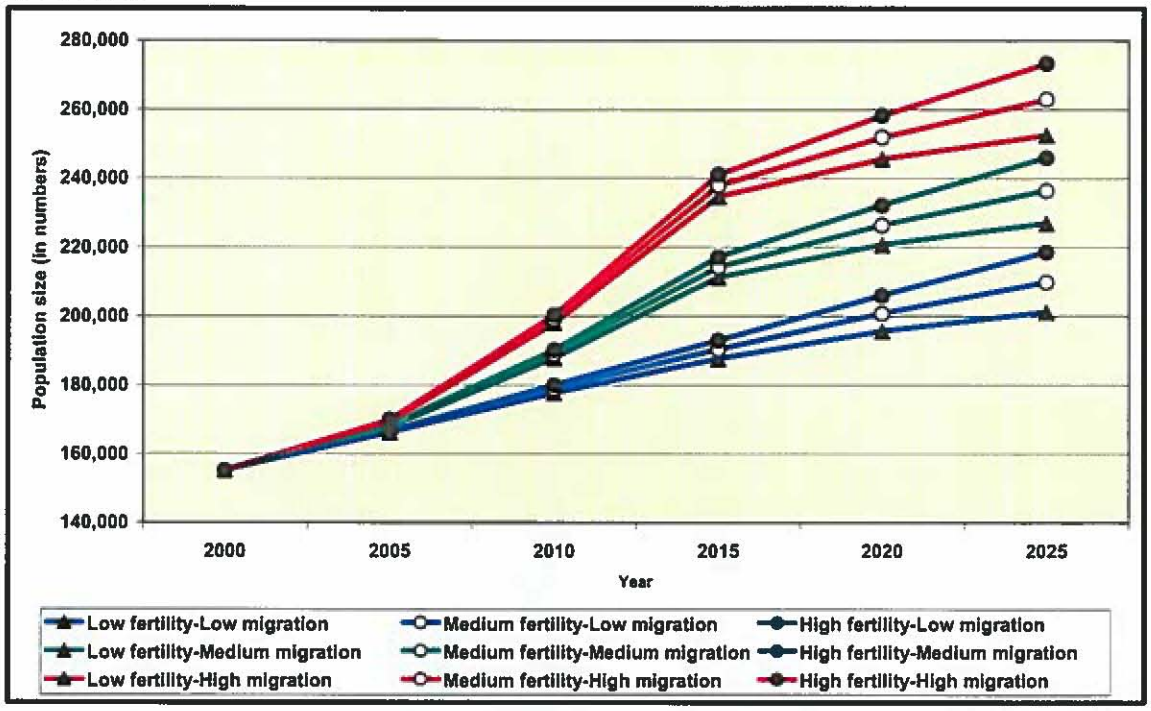


8.2 Projection results

Combining the above three fertility assumptions and three migration assumptions (with one prevailing mortality assumption) in all possible ways results in nine different projections (Figure 64). These projections highlight the impact of different levels of fertility on the one hand and the impact of migration on the other.

From Appendix 10 and Figure 64, it can be seen that the assumptions about different levels of fertility have a relatively small impact on the population size compared with the impact of the different migration assumptions. Described in detail below, therefore, are only the three population projections that show the impact of each different migration assumption on the population size and structure in combination with the medium fertility assumption (which is regarded as the most likely outcome in term of future fertility trends) (Figure 65).

Figure 64: Future population trend according to nine projection variants, Guam, 2000–2025



Figures 66–72 and Table 32 feature the comparative results of the various projections, highlighting the differential impact that declining fertility and different levels of migration have on population size, growth and structure.

The various migration assumptions (zero net migration, 20,000 or 40,000 net migrants during the period 2006–2015) have a profound impact on the future size and structure of Guam. The same is true of the three fertility assumptions, although to a lesser degree. Obviously the higher the implied number of migrants, the larger the expected future population. Likewise, the higher the fertility assumption, the larger the expected future population.

There is a huge difference in the population size projected for 2025 from the two extreme projection assumptions of:

- decreasing fertility to a TFR of 1.5 in 2025 and zero migration; and
- high fertility (TFR=2.5 in 2025) in combination with 40,000 net migrants until 2015.

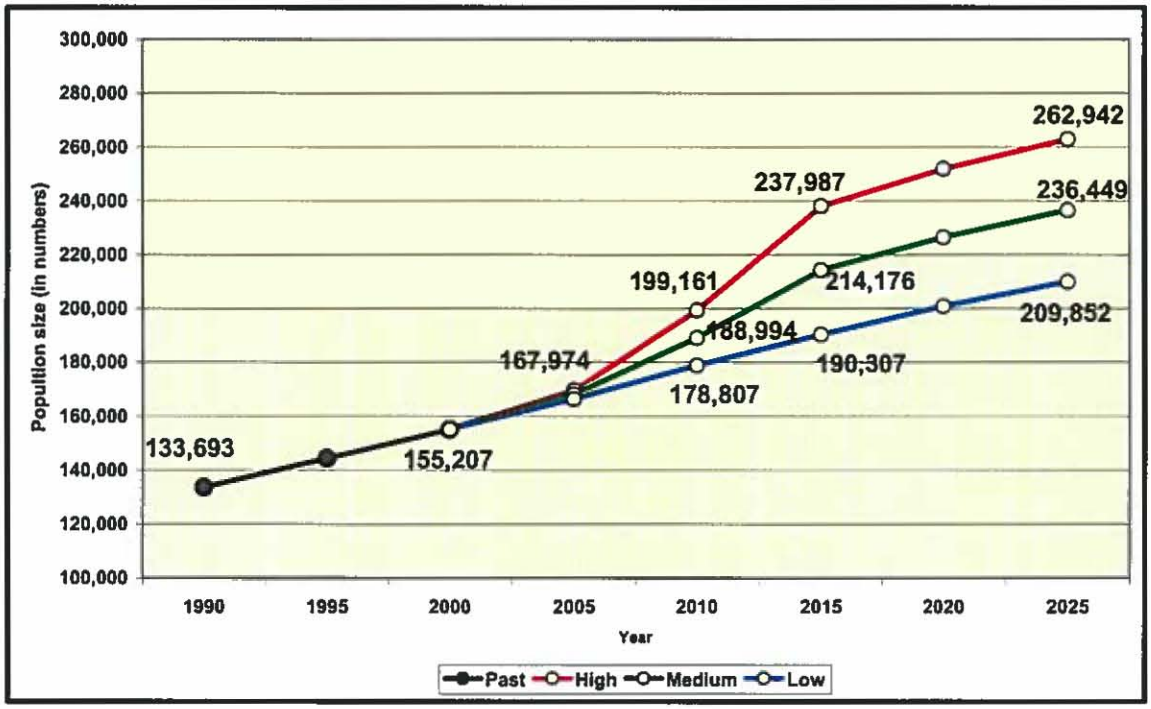
Specifically, the former results in a population size in 2025 of only 201,202; the latter produces a population of 273,358 people.

While both projections are regarded as realistic and possible outcomes for the Guam population in 2025, an intermediate assumption may be regarded as more probable.

As mentioned above, the different assumptions about the level of fertility have a relatively small impact on the future population size. Therefore only three projections are

described in more detail, which are the three projections that include the medium level fertility assumption in combination with all three migration assumptions. These three outcomes are highlighted in Appendix 10 and the projected population size for each one is displayed in Figure 65. (For details on the other projections, see Appendix 10.)

Figure 65: Future population trend according to three projection variants, Guam, 2000–2025



Note: Estimates refer to mid year (1 July)

The population size in 2015 can be expected to be between 190,000 and 238,000 people, depending on the migration assumption used (assuming the same medium projection for the different migration assumptions). However, if the anticipated military build-up takes place, the Guam population size is expected to be well above 200,000 in 2015.

Although the impact of increased migration is clearly visible during the period 2005–2010, it has an even more profound impact during the period 2010–2015.

According to the *medium migration assumption*, the population increases by 21,000 people between 2005 and 2010. It increases by more than 25,000 people during the period 2010–2015.

According to the *high migration assumption*, the population increases by 31,000 people between 2005 and 2010. It increases by almost 39,000 people during the period 2010–2015.

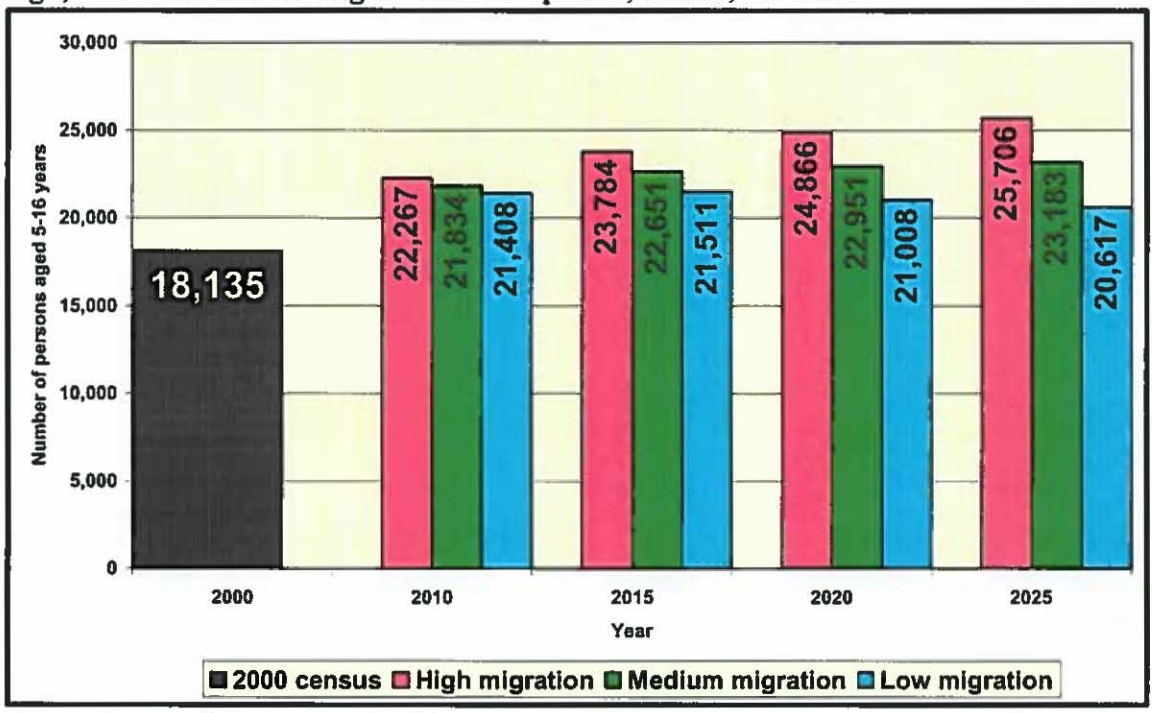
Because all three migration assumptions assume zero migration for the period 2016–2025, the growth of the population after 2015 slows compared with the period 2005–2015.

Now the impact of the three different migration assumptions on the population structure will be discussed in more detail.

The population aged 5–16 years – the mandatory school-age population – can be expected to increase in size from just over 18,000 in 2000 to well over 20,000 after 2010, regardless of which migration assumption is used. However, the higher the assumption, the larger the population aged 5–16 years is expected to be.

The size of the 5–16 year population is projected to be between 21,000 and 24,000 in 2015, with the specific size depending on the level of migration (Figure 66).

Figure 66: Projected population aged 5–16 years (mandatory school age) based on high, medium and low migration assumptions, Guam, 2000–2025



Note: Estimates refer to mid year (1 July)

The general impact on the future population structure by broad age groups can be seen in Table 32 and Figures 67–72. All age groups increase in size, regardless of the nature of the projection. Of course, the size varies substantially according to which migration assumption is used.

Working from the high migration assumption (40,000 net migrants enter Guam by 2015), the working age population would increase from 95,000 in 2000 to 153,000 in 2015, an increase of 61 per cent. Using the medium assumption (20,000 net migrants enter Guam

by 2015); the working age population would still increase by 41 per cent to 134,000 people, which is more than the total population count for Guam in 1980.

Another general outcome is that the population aged 60 years and older is projected to be larger than in 2000, regardless of the assumption used. According to the projection based on the high migration assumption, the population aged 60 years and older will more than double in size by 2015, when it is projected to comprise almost 27,000 people. Even using the low migration assumption (zero net migration), this population group is projected to almost double in size by 2015.

The population younger than 15 years (0–14 years) is also expected to increase in size by 2015. According to the projection based on the medium migration assumption, this population group will increase in size by 16 per cent, from 47,000 in 2000 to almost 55,000 in 2015.

At the same time, the young population aged 0–14 years is projected to decrease as a proportion of the total population from 30 per cent in 2000 to 25–26 per cent in 2015. Correspondingly, it is expected that the older population aged 60 years and older will increase from 8 per cent to 11–13 per cent of the total population. Therefore the population as a whole is expected to grow older regardless of which projection is used. This future trend is expressed in the median age, which is projected to increase by more than 2 years from 27.3 in 2000 to somewhere between 29.4 and 29.9 years in 2015 (Table 32).

The three different assumptions produce very different projections for population growth rates: the high migration assumption results in an annual population growth rate of 2.9 per cent, while the medium and the low migration assumptions produce annual growth rates of only 2.2 and 1.4 per cent respectively.

Table 32: Population structure and indicators according to three different projection variants, Guam, 2015

Indicator	2000 census	2015 High migration	2015 Medium migration	2015 Low migration
Population by broad age groups (%)				
0–14 years	30	26	25	26
15–59 years	61	64	61	63
60 years and older	8	11	13	12
	100	100	100	100
Dependency ratio	63	57	63	60
Median age	27.3	29.9	29.7	29.4
Average annual growth rate	1.5	2.9	2.2	1.4
Sex ratio	105	115	109	103

Figure 67: Population by broad age groups according to three projection variants, Guam, 2010

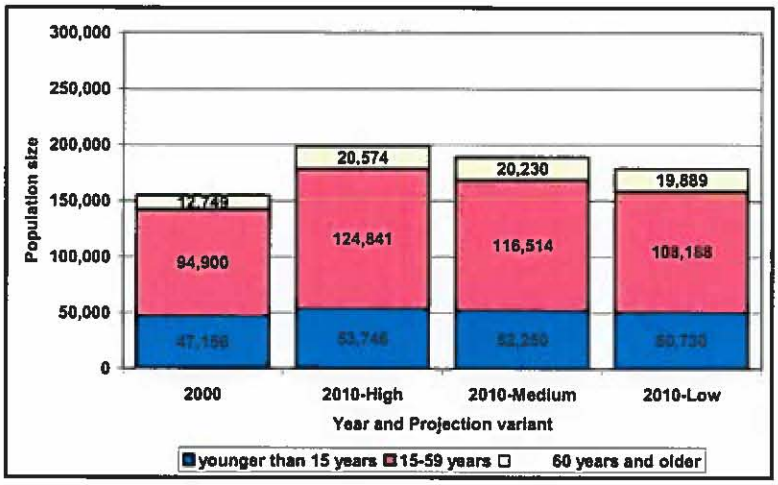


Figure 68: Population by broad age groups according to three projection variants, Guam, 2015

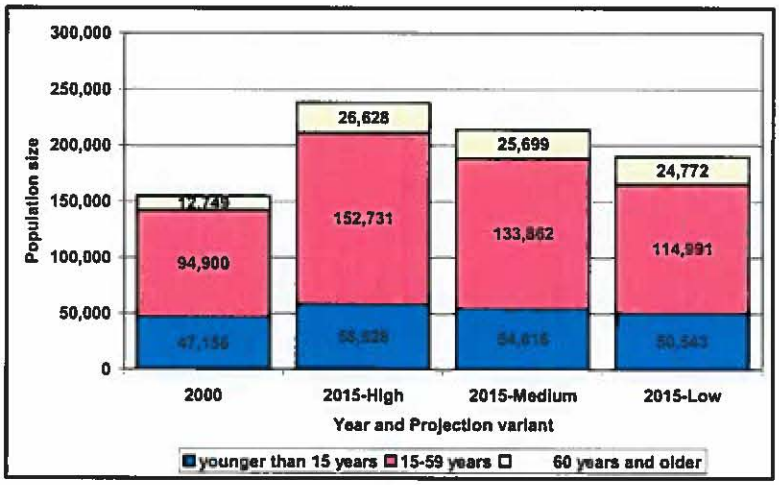


Figure 69: Population by broad age groups according to three projection variants, Guam, 2025

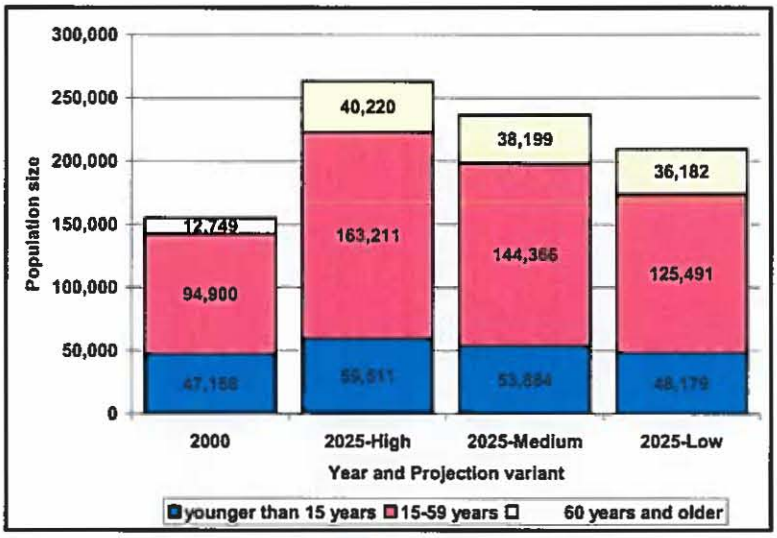


Figure 70: Population pyramid – projection using medium migration assumption, 2000 and 2010

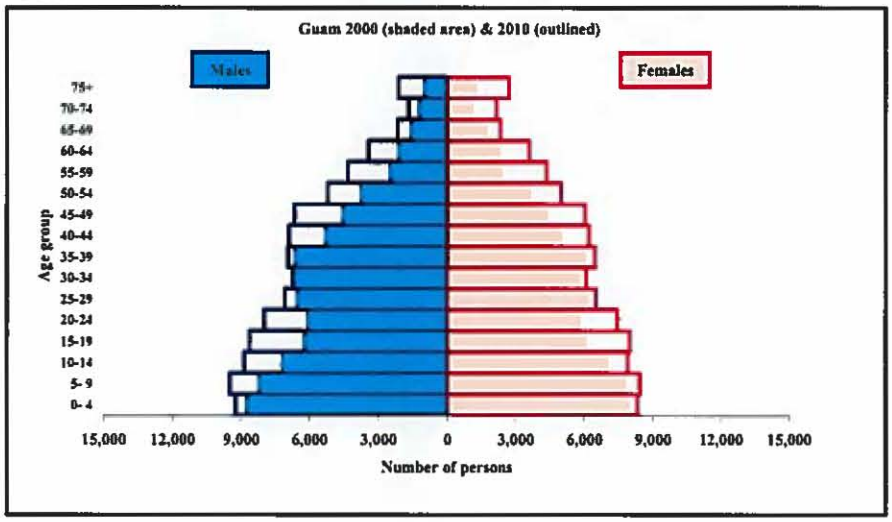


Figure 71: Population pyramid,- projection using medium migration assumption, 2000 and 2015

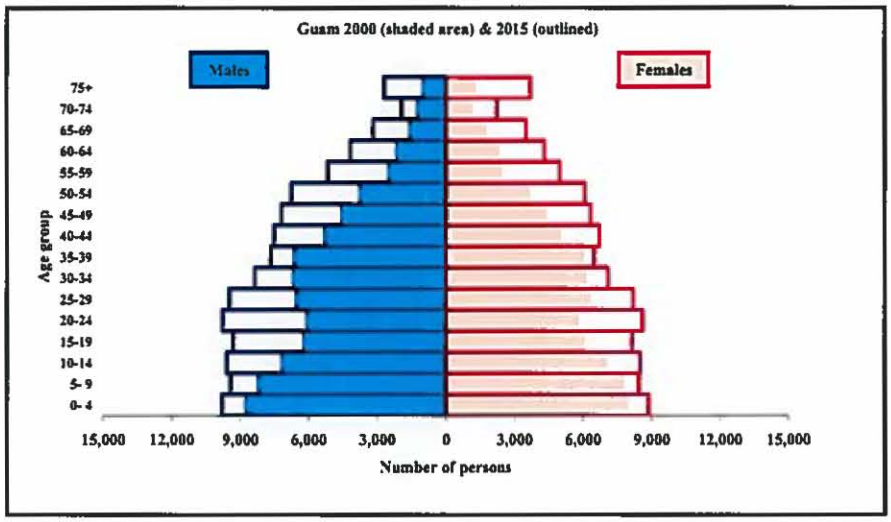
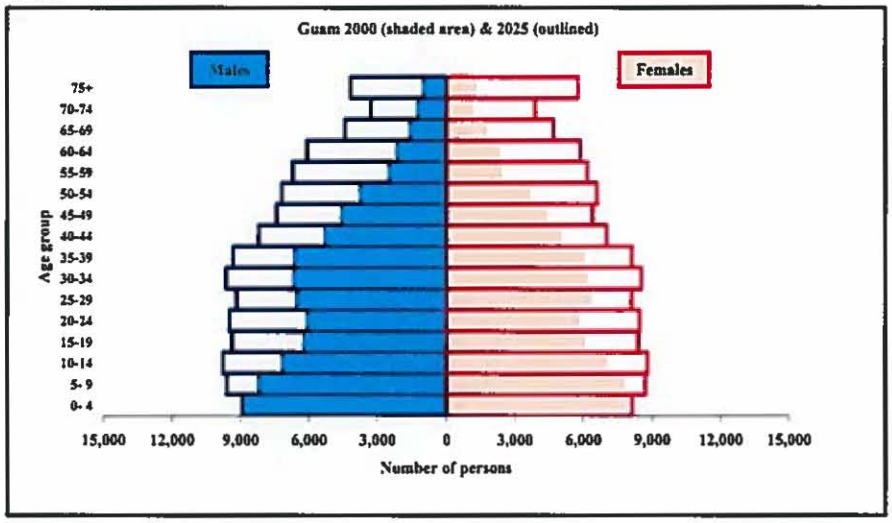


Figure 72: Population pyramid – projection using medium migration assumption, 2000 and 2025



Most likely outcome

Predicting the likelihood of a parti cular population size and structure in future is difficult for any country. Moreover, the further into the future the projection reaches, the more uncertain the outcome is. It is even more difficult for countries such as Guam where the population is highly mobile. Therefore several projections variants have been produced so that users can identify an outcome that seems most probable according to their own views and knowledge. However, as most data users like to be pointed to a *most likely outcome*, that is offered here also.

Population changes close to those presented in the *medium projection*, which uses the medium fertility assumption (TFR decreases from its 2000 level of 3.1 to 2.0 in 2025), and the medium migration assumption (a total of 20,000 net migrants by 2015), appear to

be the most likely outcome (see the green middle line in Figure 65 and the green shaded boxes in Appendix 10) based on the following reasoning:

- The relatively high level of fertility is expected to decline, on the grounds that it will follow the declining trend of Guam's recent past and that it will be consistent with historical worldwide observations of countries with a similar level of fertility (refer also to the explanatory note on *demographic transition* in the glossary). Therefore the high fertility assumption of a very slow fertility decline seems to be a more unlikely outcome.
- Although fertility levels have already declined to a TFR of below 2 in many parts of the world, such rapid fertility decline is not expected, based on Guam's relatively slow decline in fertility in the recent past. Hence, the low fertility assumption of a rapid fertility decline appears an equally unlikely outcome.
- Although it is nearly impossible to predict future migration patterns and levels, the medium migration assumption appears to be more realistic than the high migration assumption of a very fast population growth rate, which would put a major strain on Guam's administration and infrastructure.
- Equally, the low migration assumption of zero net migration also seems an unlikely outcome. There seems to be a high degree of certainty that the US military's expansion plans will be realized to boost US reconnaissance, deployment and training capabilities in the region. However, the low migration assumption has been applied because official population projections prepared by the US Census Bureau assume zero net migration for Guam.

9. IMPLICATIONS OF DEMOGRAPHIC TRENDS

The aim of this chapter is to address key implications and factors for developmental planning and policymaking purposes, based on demographic and socio-economic indicators and trends identified above.

9.1 Population dynamics

9.1.1 Fertility

Availability and accessibility of family planning services for women (and their partners) of all ages will empower them to make conscious decisions about the number and spacing of their children. Furthermore, pregnancies of young women are often unwanted and the result of unprotected sex. This is a major health concern, considering the risk of HIV/AIDS and STDs.

Data supporting the view that teenage pregnancy is a social issue of concern include lower educational levels, higher rates of poverty, and other poorer 'life outcomes' for children of teenage mothers. Teenage pregnancy usually occurs outside of marriage and, for this reason, it carries a social stigma in many communities and cultures.

Many stakeholders are involved in developing and implementing teenage reproductive health strategies, working at various levels to reduce teenage pregnancy and assist teenage mothers. Their activities include efforts to prevent teenage pregnancy through better sex education, improving contraceptive and advice services for young people, peer education, involving young people in service design, supporting the parents of teenagers to talk to them about sex and relationships, and targeting high-risk groups. Other activities are aimed at better support for teenage mothers, including help returning to education, advice and support, work with young fathers, better childcare and increasing the availability of supported housing.

9.1.2 Mortality

Improved mortality rates mean that healthier people live longer. In working towards this goal, the following efforts should be made:

- Improve infant, child and maternal health by improving primary health care programs.
- Expand programs of immunization.
- Prevent HIV/AIDS and STDs by:
  - increasing awareness and knowledge of safer sexual behavior and practices, using appropriate language;
  - targeting priority groups (young women and men, particularly aged 10–24 years);
  - enhancing education programs to encourage open discussions (between partners and their children) on issues of sexual behaviors;
  - promoting and disseminating information outlining the advantages and proper use of condoms by men and women, with an emphasis on targeting male organizations;

- reviewing, developing, implementing and evaluating the effectiveness of appropriate policies;
- delaying the initial sexual activity of young people;
- developing a well-planned media campaign throughout the year based on health promotion with regards to HIV/AIDS;
- ensuring protection of the rights of people living with HIV/AIDS;
- ensuring that people living with HIV/AIDS have free and unrestricted access to medical treatment, facilities and support services;
- ensuring that a reliable HIV/AIDS testing system is in place; and
- establishing a voluntary, confidential system of HIV/AIDS testing with informed consent that includes pre and post test counseling.

- Combat the prevalence of diabetes and heart disease.
- Provide a hygienic and safe living environment.
- Promote healthy eating habits and food nutrition programs.
- Advocate a healthy lifestyle overall, including regular physical exercise.
- Discourage smoking and excessive alcohol consumption.

9.1.3 International migration

Although Guam's vital registration system is functioning well, considerable improvements need to be made regarding migration statistics, especially in the area of departure information for all outgoing passengers. Information is needed on the total number, age, sex and nationality of all passengers, by year. Guam currently collects quality arrival data on total counts, sex, country of residence, purpose of stay and age group. Government officials are encouraged to establish program measures to obtain key demographic information on all people departing from Guam in addition to those who are arriving. By tracking all entries and exits, government leaders will gain an accurate and current picture of Guam's total counts and structure of the population. Such information will prove useful for policy planning and to develop meaningful population projections.

Guam's census data show that there was considerable out migration in the 1990s. The military base closures initiated in 1995 contributed to Guam's drop in military personnel and the termination of military-related operations. Active duty military personnel and their families were reassigned to off-island US military base installations and facilities.

The mass exodus of workers from the government workforce in the late 1990s (as a result of retirement and 'early out' voluntary resignation incentives) also contributed to the movement of residents to the United States and other areas. Island leaders introduced such incentives to employees in order to streamline the workforce and alleviate the government's financial crisis.

With no built-in migration component added to population size calculations, the level of net migration can only be crudely estimated by comparing intercensal population growth with rates of natural population increase for the same period. Although this method provides a reasonably robust indication of net migration, planners and policy-makers require more detailed information on the demographic make-up of opposing migration

streams to make and implement realistic policy decisions. Hence, the introduction of a system to collect and process information on age, sex and nationality of all arriving and departing passengers is of utmost urgency for Guam.

Should introducing such a system prove impossible, or politically undesirable, another option would be to undertake censuses at 5-year intervals. By applying the proper demographic methodologies, it would be possible, by comparing the two nearest censuses, to calculate the desired population data. The disadvantage of this option is that these data are only available after the analysis of the latest census is completed. This exercise can prove more timely (and costly) than an efficient registration system, which would provide regular (yearly) and timely migration information.

9.2 Crosscutting issues

There seems to be a high degree of certainty that the US military's expansion plans will be realized to boost US reconnaissance, deployment and training capabilities in the region. Such deployment will most probably be accompanied by an influx of migrant workers to assist with the construction of housing and infrastructure needed for the military personnel. If such a scenario becomes reality, Guam will experience a very fast population growth over the next several years. With the anticipated increase of military personnel and their families, appropriate health, education, safety and social welfare programs must be in place to fulfill the needs of the local and military communities alike.

9.2.1 The environment

The size and density of the population have a direct impact on water and energy consumption, sewage and waste production, the general infrastructure such as roads, the use of land, and the development of agriculture, forestry and marine resources.

Because Guam's economy is primarily fuelled by tourism, highest priorities should be the protection of its natural pristine environment and coastal resources and the prevention of pollution of any kind. These measures are needed to ensure the sustainability of the tourism industry, as well as the overall health of the community and the environment.

9.2.2 Health services

The health status of each individual and his/her family members is probably one of the most important concerns people have. Therefore the availability, utilization and affordability of quality health care and medical services are major issues for people in making decisions about where to live. The lack of available quality health care system and hospital services may prompt residents to relocate and seek better health care services off-island.

The rise of infant mortality in recent years should be a major concern for government and health officials. Addressing it will involve addressing challenges regarding the lack of affordable health services and/or the weakening health care system.

9.2.3 Education

The level of educational attainment of a population is a key indicator of a country's development and quality of life. Education plays an important role in development through its links with demographic, as well as economic and social factors. In general, there are close and complex relationships among education, fertility, morbidity, mortality and mobility: when couples are better educated, they tend to have fewer children, their children's health status tends to improve and their survival rate tends to increase. Higher levels of educational attainment are also linked to a better-qualified workforce, higher wages and better economic performance compared with the outcomes for a population with little or no formal education and training.

9.2.4 Economic activity

Economic activity and employment are shaped by the size of the working age population, the educational skill level of the labor force, and the economic resources available to a country.

As US passport holders, Guamanians are entitled to work in the United States. There is a regular two-way movement of Guamanians (including US citizens) between Guam and the metropolitan labor market of the United States. The extent of this movement strongly depends on economic opportunities on Guam and overseas; thus, the socio-economic developments on Guam are closely interwoven with developments overseas, especially in the United States.

In this regard, Guamanians compete with wage/salary offers, lower prices and the better quality of many goods and services offered in the United States; each of these factors contributes to residents' decisions to seek opportunities elsewhere. Government and business officials are encouraged to partner their efforts and ideas to develop innovative strategies that will boost investment opportunities, increase wages and promote economic diversification and growth on Guam.

9.2.5 Quality of life

People entering or leaving Guam are looking for better economic opportunities and/or to improve their quality of life. The high number of people who have left Guam in recent years points to dissatisfaction with local living conditions. People who emigrate or are planning to leave expect to better themselves, but the more specific reasons vary from person to person. A specially designed survey may shed more light on the specific motives and aspirations of migrants.

9.2.6 Good governance

Good governance and effective policy-making should provide the framework for sustainable development within which population, environment and all socio-economic aspects of a country can interrelate cohesively and bring prosperity.

In this regard, it is important that policy-makers, planners, political parties and community leaders are aware of the needs and aspirations of the people of their country so that they can effectively provide for the specific needs of their population and its

subgroups. A government needs to be aware of its country's population structure, population processes and socio-economic characteristics in order to plan for an adequate standard of living and for a proper provision and distribution of goods and services.

APPENDICES

Appendix 1: Number of registered births by age of women, and estimated number of women by age, number of births per 1,000 women, and total fertility rate, Guam, 1990–2004

Age group	Estimated number of women														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
15-19	5,673	5,713	5,746	5,708	5,667	5,796	5,888	5,903	6,000	6,078	6,106	6,134	6,161	6,189	6,216
20-24	6,007	5,897	5,881	6,003	6,061	6,017	5,960	5,932	5,841	5,763	5,849	5,935	6,021	6,107	6,193
25-29	6,168	6,276	6,335	6,260	6,211	6,093	6,048	6,170	6,335	6,404	6,360	6,316	6,271	6,227	6,183
30-34	5,442	5,535	5,630	5,729	5,955	6,114	6,225	6,249	6,186	6,148	6,179	6,210	6,242	6,273	6,305
35-39	4,665	4,758	4,859	5,024	5,053	5,244	5,377	5,534	5,666	5,910	6,059	6,208	6,357	6,506	6,655
40-44	3,694	4,003	4,189	4,313	4,502	4,550	4,615	4,707	4,847	4,895	5,046	5,197	5,349	5,500	5,651
45-49	2,444	2,532	2,785	3,090	3,307	3,694	3,967	4,092	4,217	4,379	4,434	4,489	4,545	4,600	4,656
Total	34,093	34,713	35,424	36,126	36,756	37,506	38,081	38,585	39,092	39,577	40,033	40,490	40,946	41,403	41,859

Age group	Number of registered births by age of mother														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
15-19	533	544	614	604	608	497	526	481	511	462	398	357	347	355	352
20-24	1,239	1,233	1,285	1,373	1,343	1,207	1,231	1,223	1,219	1,150	1,073	949	863	884	887
25-29	1,077	1,152	1,227	1,261	1,227	1,136	1,208	1,241	1,252	1,150	1,074	984	850	854	939
30-34	662	648	706	782	854	833	839	847	848	812	742	770	683	717	738
35-39	269	268	302	301	298	419	366	406	394	367	392	415	378	389	395
40-44	59	52	67	73	71	89	88	106	82	87	95	100	88	87	102
45-49	4	2	3	4	2	3	2	3	8	3	6	3	8	6	10
Total	3,843	3,899	4,204	4,398	4,403	4,184	4,260	4,307	4,314	4,031	3,780	3,578	3,217	3,292	3,423

Age group	Number of births per 1000 women														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
15-19	94	95	107	106	107	86	89	81	85	76	65	58	56	57	57
20-24	206	209	219	229	222	201	207	206	209	200	183	160	143	145	143
25-29	175	184	194	201	198	186	200	201	198	180	169	156	136	137	152
30-34	122	117	125	136	143	136	135	136	137	132	120	124	109	114	117
35-39	58	56	62	60	59	80	68	73	70	62	65	67	59	60	59
40-44	16	13	16	17	16	20	19	23	17	18	19	19	16	16	18
45-49	2	1	1	1	1	1	1	1	2	1	1	1	2	1	2
TFR	3359	3375	3619	3753	3726	3547	3590	3605	3585	3339	3112	2923	2611	2652	2742

Source: Department of Public Health and Social Services, Government of Guam

Appendix 2: Average annual number of deaths by age and sex, Guam, 1998–2002

Age group (years)	Males	Females	Total
Under 1	17	13	30
1–4	4	2	7
5–9	2	2	4
10–14	4	2	5
15–19	10	2	13
20–24	12	2	15
25–29	13	4	17
30–34	13	5	18
35–39	17	8	25
40–44	24	10	34
45–49	30	13	43
50–54	27	16	43
55–59	28	16	44
60–64	33	22	56
65–69	41	27	68
70–74	51	34	85
75+	85	87	172
Total	**413**	**266**	**678**

Source: Department of Public Health and Social Services, Government of Guam

Appendix 3: Number of registered infant deaths and births, calculated infant mortality rate, Guam, 1990–2004

	Infant deaths			Births			IMR		
Year	Male	Female	Total	Male	Female	Total	Male	Female	Total
1990	22	11	33						
1991	16	20	36	2,045	1,876	3,921	7.8	10.7	9.2
1992	28	15	43	2,179	2,035	4,214	12.8	7.4	10.2
1993	20	17	37	2,322	2,087	4,409	8.6	8.1	8.4
1994	19	23	42	2,288	2,139	4,427	8.3	10.8	9.5
1995	20	18	38	2,159	2,030	4,189	9.3	8.9	9.1
1996	22	16	38	2,183	2,082	4,265	10.1	7.7	8.9
1997	19	18	37	2,274	2,044	4,318	8.4	8.8	8.6
1998	16	21	37	2,303	2,019	4,322	6.9	10.4	8.6
1999	22	13	35	2,097	1,940	4,037	10.5	6.7	8.7
2000	14	9	23	1,932	1,855	3,787	**7.2**	**4.9**	6.1
2001	24	11	35	1,861	1,722	3,583	12.9	6.4	9.8
2002	9	11	20	1,692	1,530	3,222	5.3	7.2	6.2
2003	21	16	37	1,682	1,616	3,298	12.5	9.9	11.2
2004	24	17	41	1,783	1,644	3,427	13.5	10.3	12.0
Total	**296**	**236**	**532**	**28,800**	**26,619**	**55,419**	**10.3**	**8.9**	**9.6**

Source: Department of Public Health and Social Services, Government of Guam

Appendix 4: Average annual number of registered infant deaths and births, calculated infant mortality rate, Guam, 1991–2004

	Infant deaths			Births			IMR		
Period	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1991–1995	103	93	196	10,993	10,167	21,160	**9.4**	**9.1**	**9.3**
1996–2000	93	77	170	10,789	9,940	20,729	**8.6**	**7.7**	**8.2**
2001–2004	78	55	133	7,018	6,512	13,530	**11.1**	**8.4**	**9.8**
Total	**296**	**236**	**532**	**28,800**	**26,619**	**55,419**	**10.3**	**8.9**	**9.6**

Source: Department of Public Health and Social Services, Government of Guam

Appendix 5: Military active duty and family members, Guam, 1987–2006

Military and family members *	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Active duty	11,753	11,223	10,834	9,830	10,001	11,231	10,639	7,916	7,834	6,948
US Air Force	3,873	3,605	3,462	2,491	2,603	2,555	2,550	2,180	2,163	2,346
US Army	28	42	48	56	56	56	56	56	56	26
US Coast Guard	129	125	175	182	142	142	142	142	145	128
US Marine Corps	390	335	340	377	334	334	55	51	55	40
US Navy	7,333	7,116	6,809	6,724	6,866	8,144	7,836	5,487	5,415	4,408
Family members	12,037	11,992	10,818	9,780	10,076	10,947	11,438	7,949	7,926	6,844
US Air Force	5,054	5,931	4,553	3,897	3,426	4,147	4,131	3,138	2,828	2,351
US Army	26	43	100	115	169	169	169	176	171	40
US Coast Guard	160	153	300	145	117	117	117	115	122	87
US Marine Corps	206	155	104	154	121	121	20	45	23	49
US Navy	6,591	5,710	5,761	5,469	6,243	6,393	7,001	4,475	4,782	4,317
Total military and dependants	23,790	23,215	21,652	19,610	20,077	22,178	22,077	15,865	15,760	13,792
Resident population of Guam **	125724	127545	130947	133152	138159	142326	143825	143157	144090	145,324
% military and dependants	18.92%	18.20%	16.53%	14.73%	14.53%	15.58%	15.35%	11.08%	10.94%	9.49%

Military and family members *	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Active duty	6,265	6,379	6,155	5,806	5,974	5,820	5,944	6,220	6,514	6,253
US Air Force	1,926	2,119	1,964	1,752	1,981	1,670	1,828	1,950	1,844	1,596
US Army	186	178	158	172	183	200	217	211	422	606
US Coast Guard	124	134	130	136	180	136	136	134	160	180
US Marine Corps	0	2	1	5	4	4	3	3	3	4
US Navy	4,029	3,946	3,902	3,741	3,626	3,810	3,760	3,922	4,085	3,867
Family members	6,737	6,360	6,004	5,818	5,179	5,427	5,888	5,539	6,187	6,058
US Air Force	1,926	2,396	2,275	1,973	1,990	1,445	0	2,733	2,104	1,893
US Army	186	454	448	335	469	519	0	553	1,080	1,153
US Coast Guard	124	128	102	107	243	133	0	62	172	179
US Marine Corps	4	0	0	0	6	3	0	0	2	4
US Navy	4,497	3,382	3,179	3,403	2,471	3,327	0	2,191	2,829	2,829
Total military and dependants	13,002	12,739	12,159	11,624	11,153	11,247	11,832	11,759	12,701	12,311
Resident population of Guam **	146,799	149,724	152,590	154,805	158,330	161,057	163,593	166,090	168,564	171,019
% military and dependants	8.86%	8.51%	7.97%	7.51%	7.04%	6.98%	7.23%	7.08%	7.53%	7.20%

Source: COMNAVMAR, Guam

Appendix 6: Military school-age children enrollment by type of school by grade level, Guam, 1999–2006

Year	School year	Total	Enrollment by grade level		
			K–5th	6th–8th	9th–12th
DODEA [1]					
1999	1999–2000	2,504	1,498	582	424
2000	2000–2001	2,429	1,436	562	431
2001	2001–2002	2,561	1,558	549	454
2002	2002–2003	2,333	1,334	569	430
2003	2003–2004	2,388	1,388	555	445
2004	2004–2005	2,538	1,545	553	440
2005	2005–2006	2,418	1,386	554	478
2006	2006–2007	1,871	1,032	478	361
Public schools [2]					
1999	1999–2000	136	66	32	38
2000	2000–2001	133	77	30	26
2001	2001–2002	88	36	16	36
2002	2002–2003	114	49	25	40
2003	2003–2004	126	---	---	---
2004	2004–2005	222	107	52	63
2005	2005–2006	438	202	120	116
2006	2006–2007	415	224	102	89
Private schools [2]					
1999	1999–2000	78	50	20	8
2000	2000–2001	94	64	20	10
2001	2001–2002	92	57	19	16
2002	2002–2003	146	71	43	32
2003	2003–2004	82	---	---	---
2004	2004–2005	131	63	35	33
2005	2005–2006	103	51	17	35
2006	2006–2007	140	77	27	36
Home school [2]					
1999	1999–2000	31	20	8	3
2000	2000–2001	46	33	9	4
2001	2001–2002	27	18	1	8
2002	2002–2003	86	50	19	17
2003	2003–2004	58	---	---	---
2004	2004–2005	65	49	6	10
2005	2005–2006	50	34	8	8
2006	2006–2007	37	22	9	6

Source: [1] DODEA fall enrollment figures; [2] COMNAVMAR manning reports as of September 30.

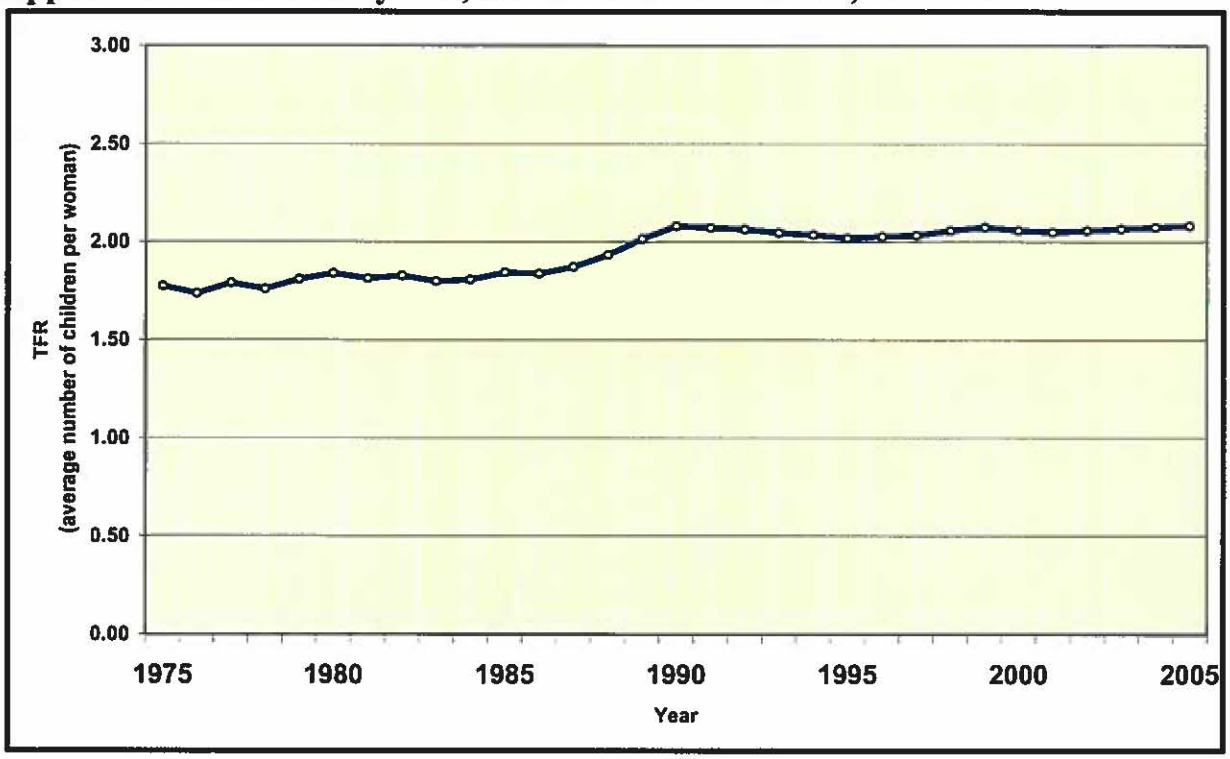
Appendix 7: Base population for population projections, Guam, mid year 2000

Age group (years)	Males	Females	Total
0–4	8,830	7,998	16,828
5–9	8,291	7,841	16,132
10–14	7,251	7,067	14,318
15–19	6,289	6,122	12,411
20–24	6,156	5,864	12,020
25–29	6,601	6,377	12,978
30–34	6,745	6,195	12,940
35–39	6,709	6,074	12,783
40–44	5,358	5,059	10,417
45–49	4,620	4,446	9,066
50–54	3,823	3,702	7,525
55–59	2,555	2,452	5,007
60–64	2,195	2,350	4,545
65–69	1,633	1,776	3,409
70–74	1,290	1,177	2,467
75–79	683	704	1,387
80+	358	616	974
Total	**79,387**	**75,820**	**155,207**

Appendix 8: Starting level of age specific fertility rate and total fertility rate for population projections, Guam, mid year 2000

Age group (years)	1999	2000	2001	1999–2001
15–19	0.076	0.065	0.058	**0.066**
20–24	0.200	0.183	0.160	**0.181**
25–29	0.180	0.169	0.156	**0.168**
30–34	0.132	0.120	0.124	**0.125**
35–39	0.062	0.065	0.067	**0.065**
40–44	0.018	0.019	0.019	**0.019**
45–49	0.001	0.001	0.001	**0.001**
TFR	3.3	3.1	2.9	**3.1**

Appendix 9: Total fertility rate, United States of America, 1975–2005



Appendix 10: Projected population size according to nine projection scenarios (combination of three fertility and three migration assumptions), Guam, 2010, 2015 and 2025

Year 2010			
Fertility assumption (TFR from 2000–2025)	**Migration assumption**		
	Low (zero)	**Medium (+20,000)**	**High (+40,000)**
Slow decline: (3.1 → **2.5**)	179,920	190,150	200,358
Medium decline (3.1 → **2.0**)	**178,807**	188,994	**199,161**
Fast decline (3.1 → **1.5**)	177,693	187,839	197,965
Year 2015			
Fertility assumption (TFR from 2000–2025)	**Migration assumption**		
	Low (zero)	**Medium (+20,000)**	**High (+40,000)**
Slow decline: (3.1 → **2.5**)	193,024	217,130	241,171
Medium decline (3.1 → **2.0**)	**190,307**	214,176	**237,987**
Fast decline (3.1 → **1.5**)	187,589	211,223	234,803
Year 2025			
Fertility assumption (TFR from 2000–2025)	**Migration assumption**		
	Low (zero)	**Medium (+20,000)**	**High (+40,000)**
Slow decline: (3.1 → **2.5**)	218,539	246,007	273,358
Medium decline (3.1 → **2.0**)	**209,852**	236,449	**262,942**
Fast decline (3.1 → **1.5**)	201,202	226,929	252,565

Note: shaded green box = most likely outcome

GLOSSARY OF TERMS AND ABBREVIATIONS

Indicator	Definition
Age dependency ratio	Number of people in the 'dependent' ages (population younger than 15 years plus population aged 60 years and older) per 100 in the 'economically productive ages' of 15–59 years
Age specific death rate (ASDR)	Average number of deaths per 1,000 people in the population
Age specific fertility rate (ASFR)	Average number of children per woman (can be conveniently expressed as the number of births per 1,000 women)
AusAID	Australian Agency for International Development
Average age at (first) marriage (SMAM)	Approximation of average age at marriage, based on proportion of population never married (single)
Balance equation	Population growth = Births – Deaths + Net migration
Child mortality rate (1*q*5)	Probability of children aged 1–4 years dying per 1,000 children
COMNAVMAR	COMNAV Marianas
CPI-U	Consumer Price Index
Crude birth rate (CBR)	Number of births per 1,000 population
Crude death rate (CDR)	Number of deaths per 1,000 population
Crude net migration rate	Rate of growth – Rate of natural increase
Decennial census	Census conducted every 10 years
Demographic transition	*See explanatory note that follows*
DODEA	Department of Defense & Education Activity
DHS	Demographic and Health Survey
FSM	Federated States of Micronesia
GED	General Education Development
GPSS	Guam Public School System
Infant mortality rate (IMR)	Number of deaths of infants (children younger than 1 year) per 1,000 births
Intercensal period	Time between two censuses
Labor force participation rate (LFPR)	Proportion of the population aged 16 years and older in the labor force
Life expectancy at birth	Number of years a newborn baby can expect to live, on average
Mean age at childbearing	Average age of women when giving birth
Median age	The age at which exactly half the population are older and half are younger
Net migration	Arrivals (immigration) – Departures (emigration)
Rate of growth (%)	Average annual growth rate e.g. rate of growth between 2000–2005 = *ln*(TotPop2005/TotPop2000)/5 * 100

Rate of natural increase	Crude birth rate (CBR) – Crude death rate (CDR)
Sex ratio	Number of males per 100 females
SMAM	*See: Average age at marriage*
SPC	Secretariat of the Pacific Community
SSA	Social Security Administration
STDs	Sexually transmitted diseases
SY	School year
Teenage fertility rate	Number of births by women aged 15–19 years per 1,000 women in this age group
Total fertility rate (TFR)	Average number of children per woman
Under 5 mortality (q5)	Probability of children aged 0–4 years dying per 1,000 in this age group
UNFPA	United Nations Population Fund
USDA	United States Department of Agriculture

Demographic transition

According to the *theory of demographic transition*, throughout history all countries change from high rates to low rates of birth and death. This transition process is usually closely associated with economic, social and scientific developments. It is thought to involve four distinct stages:

Stage 1: High birth rate, high death rate → little or no growth
Stage 2: High birth rate, falling death rate → high growth
Stage 3: Declining birth rate, relatively low death rate → slowed growth
Stage 4: Low birth rate, low death rate → very low population growth

In earlier times, high birth and death rates prevented most populations from growing rapidly through time. More than that, many populations completely died out when birth rates did not compensate for high death rates (*stage 1*). There are few populations/communities at stage 1 today.

Death rates eventually fell as living conditions, nutrition and public health improved. The decline in mortality usually precedes the decline in fertility, resulting in population growth during the transition period (*stage 2*). In Europe and other industrialized countries, death rates fell slowly. The countries that began the transition in the 20th century – mainly the so-called developing countries – had the added benefit of medical advances, inventions and innovations, so their death rates often fell more rapidly than in Europe.

In general, fertility rates fell neither as quickly nor as dramatically as death rates, and thus populations grew rapidly.

Stage 3 is characterized by falling birth rates. There are many reasons to explain this trend, which differ from country to country and population to population. Some of the reasons are: transition from non-monetary to monetary economy, urbanization, change in values from an emphasis on community to individualism, increasing emphasis on consumerism, improved education, availability of (modern) family planning methods (contraceptives), greater involvement of women in the workplace, a rising cost of living, rising cost of raising children, and changing preferences as to how to spend one's time.

The demographic transition is regarded as completed when both birth and death rates have reached a low and stable level (*stage 4*). As a result, population growth is very low.

Originally the theory of demographic transition included only the four stages described above. There is now another stage, the so-called *post-transition period* (although it is uncertain whether all countries will reach this stage):

Post-transition period: Very low birth rate, low death rate → negative growth

When fertility falls to very low levels and stays there for a protracted period, a slow rate of population growth can turn into a negative one, and the population decreases. Many countries in Europe and some in Asia now have TFRs well below 2 children per woman. The TFRs of the Republic of Korea, Ukraine, Czech Republic, Slovakia, Slovenia, Republic of Moldova, Bulgaria, and Belarus – all about 1.2 – are among the world's lowest, and those of several other countries are not far behind. The TFRs of Macao and Hong Kong were even less than 1 child per woman on average. Many of the factors that lowered fertility in the first place— greater involvement of women

in the workplace, a rising cost of living, and changing preferences as to how to spend one's time – appear to be keeping fertility rates very low.

Although the theory of demographic transition describes the population history of Western Europe quite well, for many reasons developing countries do not always exhibit the same patterns of change. In some cases, death rates increased after early contact with outside societies, which resulted in local epidemics as groups succumbed to diseases against which they had no natural immunity. When health conditions improved as a result of the application of new and efficient disease control technologies, death rates declined while birth rates sometimes increased. This combination of factors produced population growth rates in today's developing countries that are much higher than ever experienced in the pre-industrial West.

Stylized graph of the European demographic transition

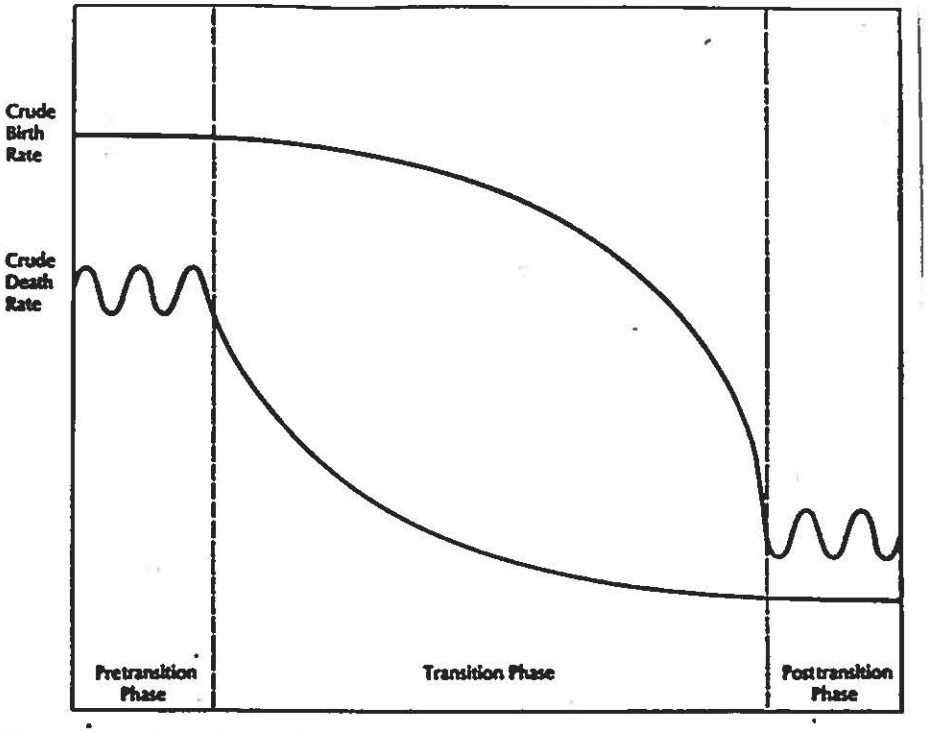


Figure 3–2 A SIMPLIFIED DIAGRAM OF THE EUROPEAN DEMOGRAPHIC TRANSITION
Source: Ansley J. Coale, 1974, p. 49.

Source: Population Handbook, Population Reference Bureau, Inc, Washington DC, 4th intern. edition; PNG National Population Policy 2000–2010, Department of Planning & Monitoring, Waigani, PNG