

COMPREHENSIVE HEALTH PLAN FOR THE TERRITORY OF GUAM



BUREAU OF PLANNING
GOV. PRINTING OFFICE
P.O. BOX 2500
AGANA, GUAM 96910

HEALTH PROBLEMS AND GOALS OF GUAM:
(First Component)

BUREAU OF PLANNING
GOVERNMENT OF GUAM
P.O. BOX 2930
AGANA, GUAM 96910

Health Problems and Goals of Guam:
(First Component)

Comprehensive Health Plan
For The
Territory of Guam

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(First Component)

Comprehensive Health Plan for the
Territory of Guam

February 1971

Prepared by the Office of Comprehensive Health Planning
Department of Public Health and Social Services
Agana, Guam



TERRITORY OF GUAM
OFFICE OF THE GOVERNOR
AGAÑA, GUAM 96910
U.S.A.

CARLOS G. CAMACHO
GOVERNOR

To The People of Guam:

This document is the first component of the Comprehensive Health Plan for the Territory of Guam. It is an attempt to gather the various health problems together as a sort of reference so as to lend some order to an otherwise unwieldy multitude of often overlapping problems.

This part of the Plan will serve as a health program milieu out of which priority health problems can be identified and targeted for a more in depth assessment and eventual assignment of recommendations for action by the Planning Council for the Coordination of Health and Social Services.

As new information becomes available and continuing studies are completed, these additions will be distributed so that holders of this document may add to or revise it as required.

When completed, the Plan will be a useful planning tool attuned to the requirements and realities of Guam's health needs and resources.

Sincerely yours,


CARLOS G. CAMACHO

To the People of Guam:

It is well known that there is a universal need for more accurate and relevant information concerning the measurement of health status and the relationship between health and known and/or suspected health influences. Guam is no exception in this respect. However, the search for more meaningful and accurate data is a never-ending process and planners can ill-afford to sit on their thumbs and wait for complete and irrefutable data on every aspect of health. Planning must go on.

Since decisions on health policy are being made everyday on the basis of existing knowledge, any degree of improvement in health information will better enable leaders to make wiser decisions. Nevertheless, it is most important for planners to recognize the limits of reliability of the various sources of health information being used.

The Office of Comprehensive Health Planning is especially cognizant of these realities and has taken considerable pains to assure the validity of its sources of information whenever possible and to carefully footnote these sources throughout this document. Where less specific or indirect indicators were used in the assessment of health problems, for a lack of more solid data, the limitations of this data and precautions about making unqualified inferences from this information are included in the narrative of this study.

This document was developed primarily for use by the Planning Council for the Coordination of Health and Social Services, but was written with the intent that any reader, with a general understanding of health terminology, can readily understand the concepts and recommendations presented herein.

It is hoped that this presentation of Guam's health problems will receive widespread circulation and be used by individual health and health related agencies and organizations of the Territory of Guam.

This document is presented, then, with the confidence that the material contained herein can be used as a reliable basis for the formulation of enlightened health policy and recommendations for action.


PEDRO L.G. ROBERTO
Chairman, Planning Council for
the Coordination of Health
and Social Services

Members of the Planning Council for the Coordination of Health
and Social Services as of February 1971.

Captain Bruce Barnhill
Commanding Officer, U.S.
Naval Hospital

Dr. O. Randall Braman
Head, Psychology Department,
University of Guam

Mrs. Mieko Crowell
Director, Head Start

Mr. Edward A. Cruz
Teacher, Merizo Martyr
Elementary School

Mr. Franklin S. Cruz
Director, Public Health
and Social Services

Dr. Olivia Cruz
Private Physician, Internal
Medicine

Honorable Oscar Delfin
Senator, Eleventh Guam
Legislature

Mrs. JoAnn Eldredge
Homemaker

Mrs. Remedios Gabriel
Manager, Guam Drugs

Mr. James Long
Engineer in Charge,
Transmitting Station, RCA

Mrs. Carmen Mesa
Homemaker

Dr. O.V. Natarajan
Administrator, Water
Pollution Control

Mr. Vicente Perez
Chief, Environmental
Health, Public Health
and Social Services

Mrs. Montie Protasio
News Reporter, Pacific Daily
News

Mr. Pedro L.G. Roberto
Commissioner of Santa Rita

Mr. Tom Sapp
Legislative Aide, Guam
Legislature

Sister Angela Marie
Administrator, Catholic
Medical Center

Mr. Ngirarois Skey
Manager, Bookkeeping and
Secretarial Services

Mrs. Clara Soliday
Teacher Specialist,
Department of Education

Mr. Carlos P. Taitano
Manager, Coca Cola Bottling
Company

Mrs. Josephine Toves
Homemaker

Ex-Officio Members:

Mr. Larry Iriarte
Medicaid Supervisor, Public
Health and Social Services

Mr. Frank A. Perez
Veteran's Affairs Counselor

Mrs. Teresita Salas
Chief, Vocational
Rehabilitation

Sister Jean Marie Menke
Administrator, Guam Memorial
Hospital

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BETTY S. GUERRERO
Administrator, Comprehensive
Health Planning

Members of the Comprehensive Health Planning Task Forces:

Accident Prevention Task Force

Mr. Felix Borja
Administrator, Workman's
Compensation

Mr. Richard Bothmer
School Program Consultant -
Physical Education

Lt. Edward Camacho
Traffic Division, Department
of Public Safety

Mr. Larry Chappelle
Safety Officer, Department of
Public Works

Mrs. Karen Cruz
Health Educator, Public
Health and Social Services

Mr. Bill Flores
Public Relations Officer,
Department of Labor

Mr. Larry Flores
Public Relations Officer,
Commercial Port

Mr. Bill Lujan
Safety Officer, Department of
Public Works

Mr. Joe Paulino
Physical Education Instructor,
University of
Guam

Mr. Vicente Perez
Chief, Environmental Health,
Public Health and Social
Services

Mr. Herman Sablan
Public Relations Officer,
Public Utility Agency
of Guam

Mr. Felix San Nicolas
Safety Officer, Commercial
Port

Captain John Wusstig
Commander, Fire Division,
Department of Public Safety

Alcoholism and Drug Addiction Task Force

Mrs. Marie P. Benito
Homemaker

Mrs. Orenia Concepcion
Pharmacist, Medical Arts Center

Mr. Antonio T. Cruz
Chief Pharmacist, Guam
Memorial Hospital

Mrs. Angeles Flojo
Pharmacist, Guam Memorial
Hospital

Mrs. Remedios Gabriel
Manager, Guam Drugs

Mrs. Mife Garcia
Pharmacist, Catholic
Medical Center

Mrs. Norma Patron
Homemaker

Mrs. Edrei Z. Perez
Pharmacist, Guam Memorial
Hospital

Sister Angela Marie
Administrator, Catholic
Medical Center

Mrs. Adeline San Nicolas
Pharmacist, Catholic Medical
Center

Mr. Bill Smith
Principal, Barrigada
Junior High School

Communicable Disease and Chronic Disease Task Force

Honorable Concepcion Barrett
Senator, Eleventh Guam
Legislature

Mrs. Annie Bordallo
Homemaker

Mr. Antonio Calvo
Commissioner of Yigo

Mr. Francisco Chargualaf
Commissioner of Merizo

Dr. Leon Concepcion
Staff Pediatrician, Public
Health and Social Services

Dr. Olivia Cruz
Private Physician, Internal
Medicine

Honorable Oscar Delfin
Senator, Eleventh Guam
Legislature

Dr. Eduardo Del Rosario
Assistant Public Health
Officer

Sister Felicia Plaza
Instructor, University
of Guam

Dr. Belle Neri
Internist, Public Health and
Social Services

Mr. Honofre Oliva
Acting Executive Director
Guam TB and RD Association

Mrs. Bernadita Terre
Assistant Principal, Adelup
Elementary School

Mrs. Teresita Umagat
Assistant Commissioner of Dededo

Dental Health Task Force

Mr. Gregorio Calvo
Commissioner of Tamuning

Mrs. Mieko Crowell
Director, Head Start

Mrs. Gloria S. Cruz
Community Development Aide

Mrs. Nelda Flynn
Homemaker

Dr. William McGriff
Chief, Dental Clinic, Public
Health and Social Services

Mrs. Alfonso Oiterong
Counselor, Trust Territory
Dormitory, University of Guam

Mrs. Helen Pangelinan
Teacher, Price Elementary
School

Mr. Moses Sam
OEO, CAP Supervisor

Mr. Jesus D.L.R. Santos
Commissioner of Mangilao

Mental Retardation and Mental Health Task Force

Mrs. Madeleine Bordallo
Homemaker

Dr. O. Randall Braman
Head, Psychology Department,
University of Guam

Dr. Jess Farris
Clinical Psychologist,
Mental Health Center

Mrs. Olivia Guerrero
Public Health Nurse

Mrs. Vicki Harper
Teacher Specialist in
Special Education

Mrs. Maria Leon Guerrero
Assistant Commissioner of
Tamuning

Mrs. Fidela Limtiaco
Assistant Principal,
Brodie Memorial School

Miss Julita Manibusan
School Program Consultant -
Multi-Media

Dr. Naomi Morris
Advisor in Public Health

Mrs. Gloria Peckens
Instructor, University of Guam

Mr. Roman Quinata
Commissioner of Talofofo

Dr. Roger Rickey
Dean, College of Arts and
Sciences, University of Guam

Mrs. Teresita Salas
Chief, Vocational
Rehabilitation

Mr. Lucas San Nicolas
Veteran's Affairs Counselor

Nutrition Task Force

Mrs. Lorraine Aguon
Student, University of
Guam

Mrs. Bartola Balajadia
Homemaker

Mrs. Maria Balajadia
Community Aide, OEO

Mrs. Dolores C. Cruz
Cafeteria Attendant, George
Washington Senior High School

Mrs. Dolores Q. Cruz
Production Guam, OEO

Mrs. Teresita Del Banco
Acting Public Health Nutritionist

Mrs. Rosa Francisco
Cafeteria Attendant, George
Washington Senior High
School

Miss Caroline Gerhold
Professor of Home Economics,
University of Guam

Mrs. Rosario Gumabon
Cafeteria Attendant, George
Washington Senior High
School

Mrs. Audrey Hansen
School Lunch Program Consultant

Mrs. Maria Megofna
Community Aide, OEO

Miss Rita Salas
Nutritionist, Food Commodity
Center, Public Health and
Social Services

Mrs. Teresita Sana
Homemaker

Mrs. Dolores Santos
Cafeteria Attendant, George
Washington Senior High School

Mrs. Josephine Toves
Homemaker

Mrs. Lorraine Yamashita
Assistant Professor, University
of Guam

Reproduction and Human Development Task Force

Mr. Tommy Aguon
Assistant Principal, Agat
Elementary School

Mrs. Frances Barczak
Teacher, Maria Ulloa
Elementary School

Dr. Joy Benson
Chief, Maternal and Child
Health, Public Health and
Social Services

Mr. Edward A. Cruz
Teacher, Merizo Martyr
Elementary School

Mr. Jeff Keuss
Principal, Agat Junior High
School

Mrs. Maria McDermott
Homemaker

Mrs. Rita San Nicolas
Student, University of
Guam

Dr. Salvacion Sirilan
Private Physician, Obstetrics
and Gynecology

Dr. Benjamin Sison
Chief Public Health Officer

Mrs. Sally Thomas
Teacher, Wettengel Elementary
School

Mrs. Louisa Toves
Homemaker

Swimming Pools and Bathing Areas Task Force

Mrs. Marilyn Carlson
Teacher, Department of
Education

Mr. Jack Cross
Assistant to the President,
University of Guam

Mrs. Emiliana Duenas
Homemaker

Mrs. Isabel Guzman
Homemaker

Mrs. Carmen Mesa
Homemaker

Dr. O.V. Natarajan
Administrator, Water Pollution
Control

Mr. Robert Penick
Recreational Director,
Andersen Air Force Base

Mrs. Clara Soliday
Teacher Specialist, Department
of Education

Mr. Tommy Tanaka, Jr.
Management Analyst, Bureau
of Budget and Management
Research

Sgt. Ray Topasna
Juvenile Branch, Department of
Public Safety

Total Environment Task Force

Mrs. Josephine Barcinas
Teacher, Price Elementary
School

Mr. Joaquin Diego
Commissioner of Inarajan

Mrs. Marjorie Driver
Associate Professor of
Spanish, University of Guam

Captain Leon Eisman
Preventive Medicine Section,
ComNavMar

Mrs. Felisa Guterrez
School Program Consultant,
Department of Education

Dr. Robert Haddock
Chief, Zoonosis Control, Public
Health and Social Services

Captain Baxter Harwood
Veterinarian, Andersen Air
Force Base

Captain James Henderson
Bio-Environmental Engineer,
Andersen Air Force Base

Mr. Jose Manibusan
Vice Principal, Dededo
Junior High School

Dr. O.V. Natarajan
Administrator, Water Pollution
Control

Mr. Vicente Perez
Chief, Environmental Health,
Public Health and Social
Services

Mrs. Montie Protasio
News Reporter, Pacific Daily
News

Mr. Frank San Nicolas
Director, Land Management

OUTLINE OF HEALTH PROBLEMS AND GOALS OF GUAM

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INTRODUCTION

INTRODUCTION

Aims of Comprehensive Health Planning

Public Law 89-749, commonly known as the "Partnership for Health Act" was enacted by Congress as a means of establishing some order to the multitude of federal, state and local health planning efforts. The intent is that the Comprehensive Health Planning Program of the Act will encourage and support orderly approaches to improving the health of individuals, and will permit the individual states and territories sufficient flexibility to select major health problems as targets for the total health resources.

The problem oriented approach to planning attempts to identify all efforts and resources, regardless of source, which have a bearing on the relief of a problem or the fulfillment of a need. This approach to planning is a reflection of the general mission of Comprehensive Health Planning, which is, to marshal all available knowledge and resources, private and public, in a concerted and cooperative effort to reduce the barriers to the attainment of the highest achievable level of health and well-being.

A requirement for participation in the Comprehensive Health Planning program is the designation of a single administering agency for each state and the formation of a consumer oriented

advisory council to advise this agency in matters of health policy and planning.

As a framework for implementing this act, states and territories are expected to develop a Comprehensive Health Plan.

All states are not expected to use identical planning methods or to schedule their activities in an identical manner. However, it is expected that Comprehensive Health Planning in each state and territory will include a variety of informational, consultative and promotional activities. Such activities would include recommendations for action by both public and private agencies and institutions, or individuals in meeting health services, health facility, health manpower, and environmental and social health problems. Each state will be gathering data, conducting special and ongoing studies and analysis of health problems and resources, identifying goals and objectives, and recommending policies and plans for action to attain those goals. These activities, of a continuing and interrelated nature, would constitute, as they are completed and periodically revised, the components of a Comprehensive Health Plan.

Explanation of the Plan

The first section of the Plan, the Background for Planning, is intended to give the reader knowledge of the physical, social and political setting in Guam in which health planning must take place; a brief statement of the general health status of the people and coexisting planning efforts of other disciplines.

The second section, Classification and Inventory of Health Problems and Hazards by Area of Concern, is meant to serve as a framework for the examination of health problems. The various health problems of Guam are outlined here under common areas of concern, which collectively cover every form that health problems may take. The categories are arbitrary and are not meant to narrow the planner's view of the inter-relationship of the various areas in determining the ultimate health of individuals, but are merely one means of giving some order to the multitude of problems. This can be thought of as a catalog of health problems from which those thought to be most serious are taken and assessed in more detail. In some cases the whole problem area may be viewed as the problem such as in the case of Nutrition.

The third section is an Assessment of Priority of Health Problems and Hazards and is a detailed explanation of the severity of each problem, the health, social and economic

significance for those affected, the various means by which the problems may be altered (often called intervention) and the resources available in terms of manpower, facilities and services.

The fourth section contains a Summary List of Goals adopted. Goals put forth in the Comprehensive Health Plan are those goals which the Council feels should become health goals for the entire territory of Guam.

The fifth section, Assessment of the Health System, is intended to give the reader an overview of the availability and use of the health resources of Guam which together comprise the building blocks of the health system and determine the manner in which health services are delivered. It is from this overview that health concerns (see glossary) are identified and examined in section five.

The sixth section, the Guide for Health Policy and Action is the actual working part of the Plan as far as the Planning Council is concerned and includes a restatement of each priority health problem and its significance; a subgoal reflecting that problem; one or more objectives whose attainment is thought to contribute to the achievement of that subgoal; a list of recommendations for the attainment of the objectives and how progress toward attainment of the objectives can be measured.

The seventh section is in effect a Summary of Council's Accomplishments, policies and recommendations and a record of positive action taken by the community as a result of Council recommendation. As such, this section, at any given time, serves as a running commentary on the success of the health planning process as a means of shaping the future health system of the territory and is the primary means of evaluating the Comprehensive Health Planning program in Guam.

GLOSSARY

GLOSSARY

(Terms as they are used in this document)

Health: The definition of health given by Rene' Dubos in his Man Adapting probably comes closest to a realistic description of what is attainable. His definition is:
"...health is a physical and mental state fairly free of discomfort and pain, which permits the person concerned to function as effectively and as long as possible in the environment where chance or choice has placed him."

Health System: The health system, for Comprehensive Health Planning purposes, encompasses all of those health or health related activities, and the organizations and resources behind those activities, which have as one of their objectives the improvement or preservation of the health of the people of Guam.

Health Problem: A health problem is a specific condition or practice which directly affects the health of people.

Health Concern: A health concern is a particular condition, situation or arrangement of the health system which impairs its ability to deal with health problems or deliver health services in accordance with the general health system policy statement adopted by the Comprehensive

Health Planning Council; also any condition or situation which constitutes a potential health hazard to the territory.

Goal: A goal is a description of a desired end that is agreed upon as an ideal to strive for. Goals are sometimes unquantifiable. It is for this reason that they must be broken down into more tangible elements, the objectives.

Objectives: Objectives are the quantifiable elements of goals. Achievement of an objective is assumed to be a partial achievement of the goal of which it is a sub-unit. There are two general types of objectives: (a) ends objectives are those objectives which indicate a desired end state, and (b) means objectives are those objectives whose achievement contributes to the achievement of an ends objective. (Example: an end objective might be to immunize a number of children. To do this, it may be necessary to hire a nurse; another objective, a means objective.)

Incidence: Incidence is the number of new cases occurring over a given period of time.

Prevalence: Prevalence is the number of cases existing at any time.

Fetal Deaths: Fetal deaths for purposes of this Plan are deaths prior to complete expulsion or extraction from the mother after 20 weeks gestation. The fetal death rate is the

number of fetal deaths per 1,000 live births and fetal deaths.

Infant Deaths: An infant death is a death occurring under one year of age. The infant death rate is the number of infant deaths per 1,000 live births.

Child Spacing: Child spacing is the conscious effort of parents to plan the time of pregnancy for the optimum health of the mother and child.

Human Ecologist: A human ecologist is a person who specializes in the relationship of man to his total environment.

SECTION I
BACKGROUND FOR PLANNING

BACKGROUND FOR PLANNING

Demography

The results of the recent 1970 U.S. Census, when officially available, will furnish up-to-date demographic and socio-economic data. Until this information is available, however, planning must proceed based on the most accurate estimates available.

Guam's population totalling approximately 100,000 is mainly a composite of those born in Guam, Filipino and stateside immigrants. Approximately 33,000 are military and military dependents.

For planning purposes, the total population is best divided into two groups according to relative resident stability. The stable group is substantially composed of local Guamanians, and statesiders and aliens who have decided to make Guam their home. The transient or unstable portion of the population includes military personnel and their dependents, short time contract aliens and temporary stateside workers.

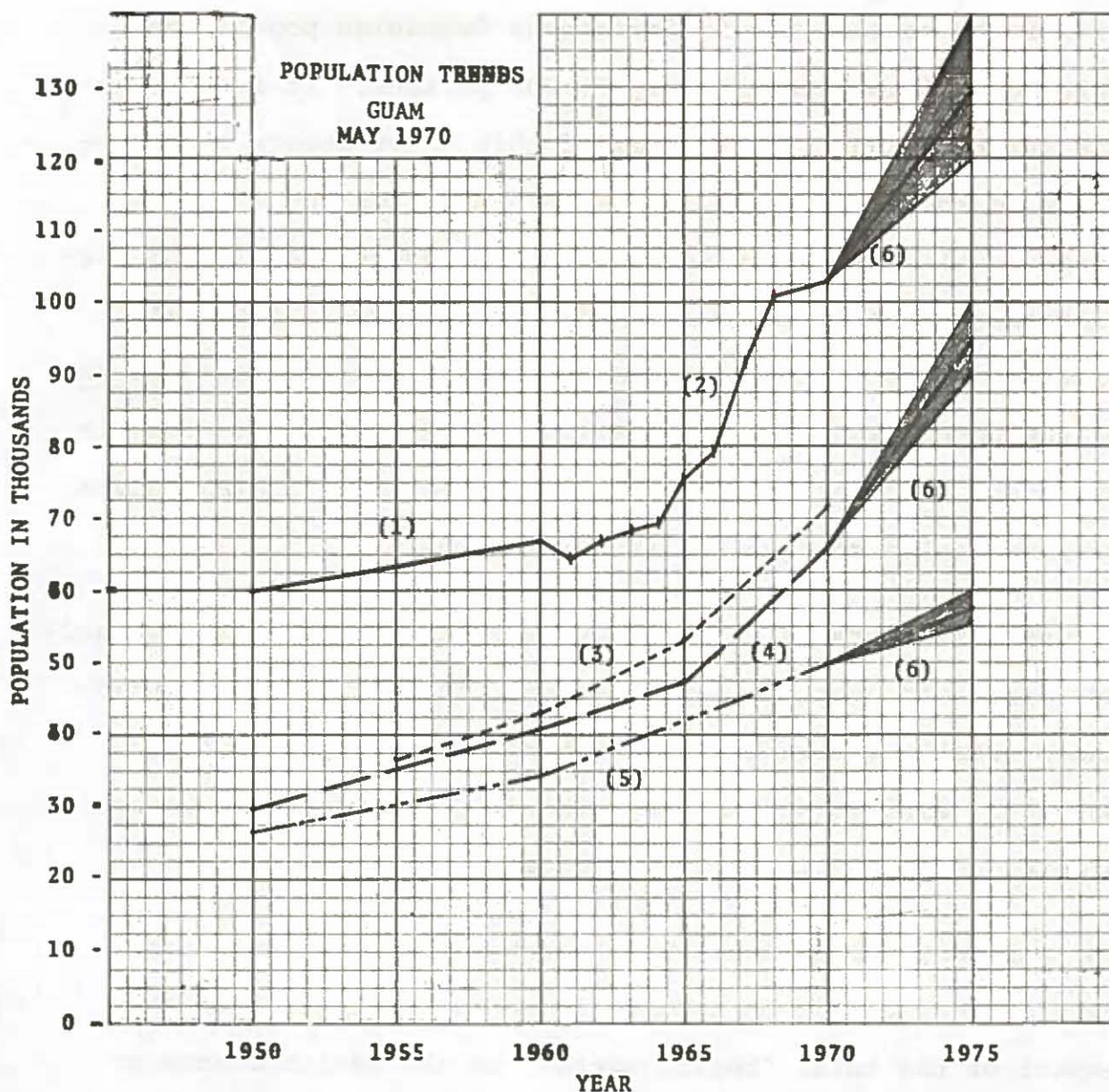
The size and very existence of the unstable population is dependent upon federal and territorial government policies, not on the natural demographic forces which influence the growth of stable demographic groups.

The stable population in the end will ultimately be controlled by the economic system which develops to support a viable economy. In and out migration will be the most important cause of population change in this group much more so than any change due to natural increase (births minus deaths).

On the assumption of continued economic growth, the ultimate size of the population will be largely controlled by the availability of land area and resources to sustain growth. From world population trends it is fair to assume that Guam will continue to grow and that the density of the population will be substantially higher than at present. This planning report assumes continued growth and the future population estimates presented are based on this assumption.

For the above reasons, it seems futile to attempt to extrapolate the total probable population to any great distance in the future.

Figure 1 shows population curves for various components of the total population and the source of the supporting data. These future estimates can be assumed to be fairly accurate for the first five-year period (up to 1975), but experience has shown that, in countries undergoing rapid changes in growth such as Guam is presently experiencing, it is unrealistic to rely on long range (over ten years) population estimates for concrete planning purposes.



- (1) Total Population from U.S. Census
- (2) Total Population estimates from U.S. Bureau of the Census
- (3) Commissioners' Reports adjusted for underreporting and approximately 5500 Transient Alien Workers.
- (4) Commissioners' Reports - Total Resident Population including U.S. Employees. (Excluding Transient Aliens and Military Dependents),
- (5) Chamorro Population from U.S. Census and Commissioners' Reports corrected for underreporting (See narrative).
- (6) Population Estimate Corridors 1970 - 1975. (Central Projection from Official Estimates of Department of Commerce),

FIGURE 1

Of primary concern is the indigenous Guamanian population which comprises approximately 50,000 persons. It is very important that the accurate size of this major demographic subgroup be known, since it serves as a base for the establishment of valid rates and measures in the assessment of the significance of health problems and progress toward their alleviation. Also of immediate importance is the relative growth of the population of various villages and districts. This is necessary in order to plan effectively for anticipated future village health service and facility needs.

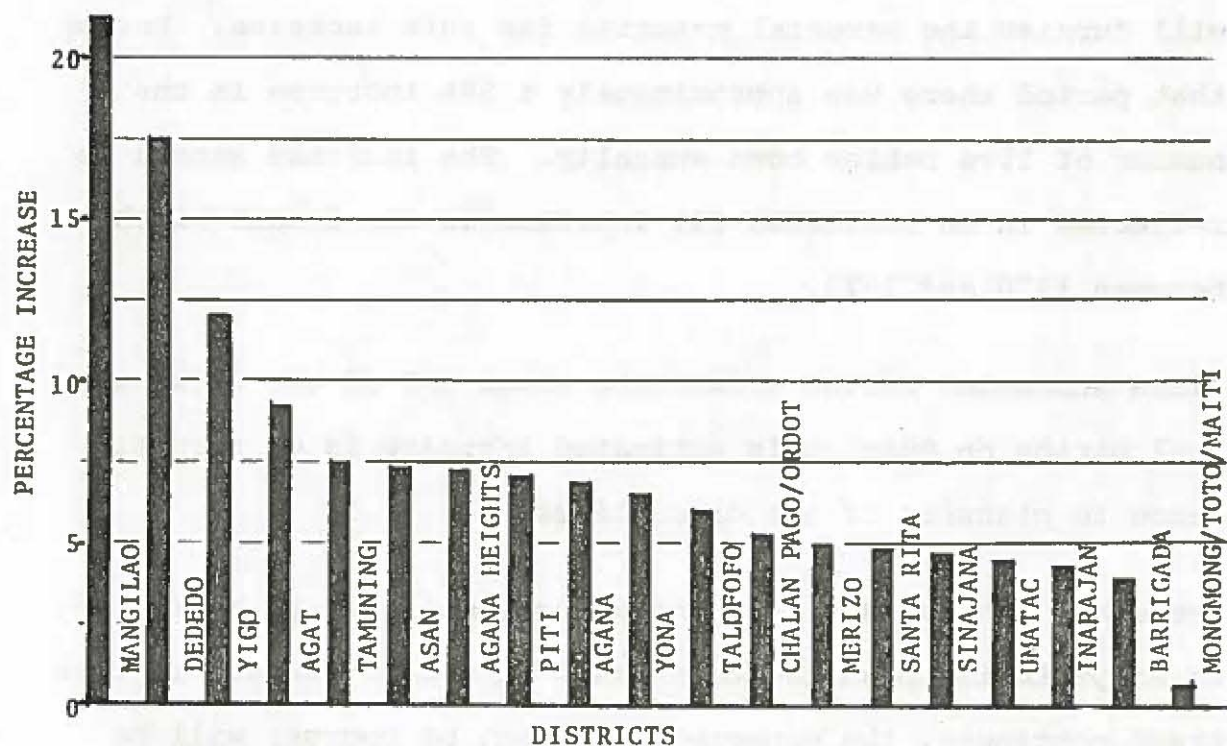
Figure 2 illustrates the relative increase in size of the various districts over the past 5 years. These trends are influenced greatly by available land and land use, proximity to services, employment and many other factors that must be considered in estimating future changes.

The military population, even though it has its own medical care system, cannot be ignored in any consideration of the impact of the total "health system" on the health status of the territory since many components, such as the water system, the waste system, animal control, public health education, and school health extend into and encompass varying portions of the military community.

It is of special importance that the appropriate population subgroups be used in determining rates and in gauging the relative severity of health problems in the community, so as to

PERCENTAGE INCREASE OF POPULATION
BY DISTRICT BETWEEN 1964 & 1969

GUAM *



* Data supplied by the Environmental Health Section, Department of Public Health and Social Services, Government of Guam, 1970, and presented graphically in, "A Plan for an Integrated Wastewater System, Guam, M.I.", January 1970, of that department.

FIGURE 2

reflect accurately the real extent of the problem in that segment.

The number of Guamanian babies being born every year can be expected to increase from approximately 1600 to around 2000 by 1975 assuming that the 1967 age specific fertility rates remain unchanged. Guam's post war baby boom of 1944-1948 will furnish the parental material for this increase. During that period there was approximately a 50% increase in the number of live babies born annually. The increase should be reflected in an estimated 20% increase in the annual births between 1970 and 1975.

Since Guamanian births constitute about 2/3 of the total annual births on Guam, this estimated increase is of significance to planners of all disciplines.

There are indications that the younger mothers are beginning (1) to adopt family planning techniques in recent years. If this trend continues, the expected increase, of course, will be mitigated somewhat.

Figure 3 shows graphically the ethnic, age and sex composition of the total population for 1960. As of 1967, approximately (2) 63% of the Guamanian population was less than 20 years of age.

(1) R.J. Wolff, B.Z. Bell and R. Desanna, "KAP Study Guam," a study by the School of Public Health, University of Hawaii, January 1970, in cooperation with the Office of Comprehensive Health Planning.

(2) 1967 Commissioners' Reports corrected for underreporting of preschool children by the Office of Comprehensive Health Planning from birth certificate data.

*utilized
you could really
not use this for
planning*

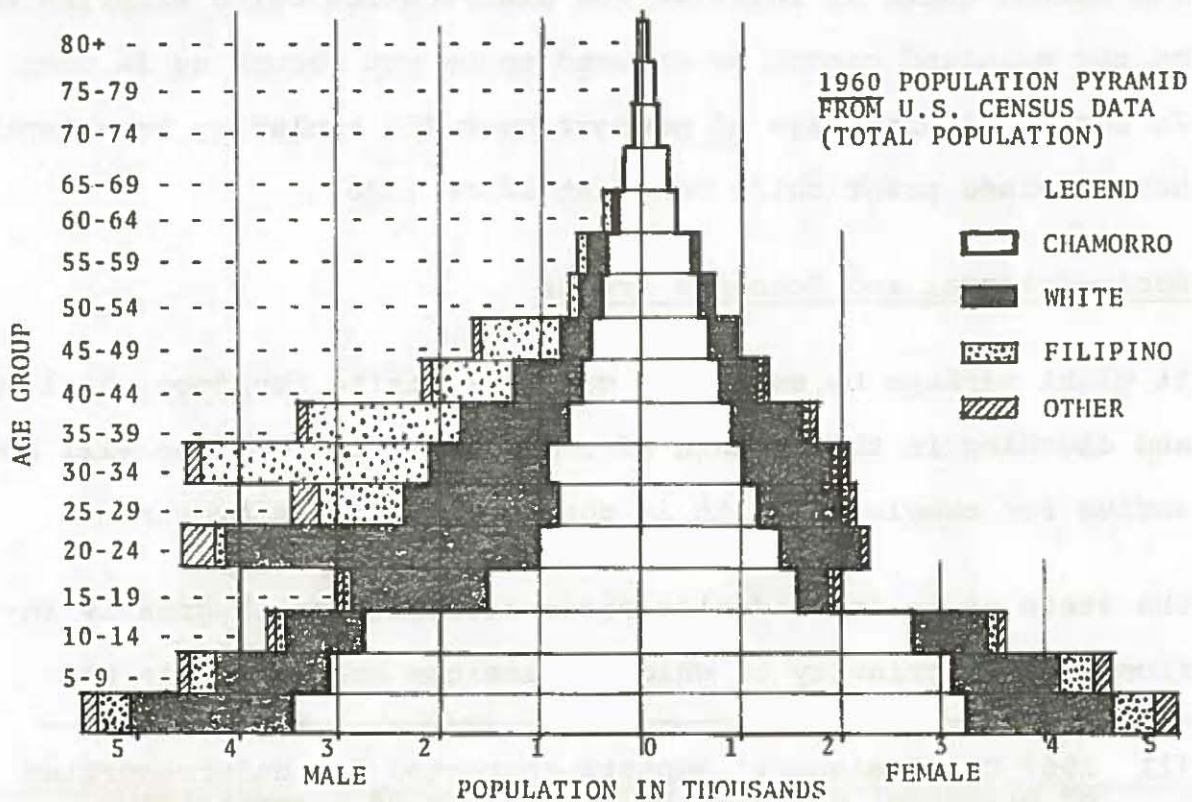
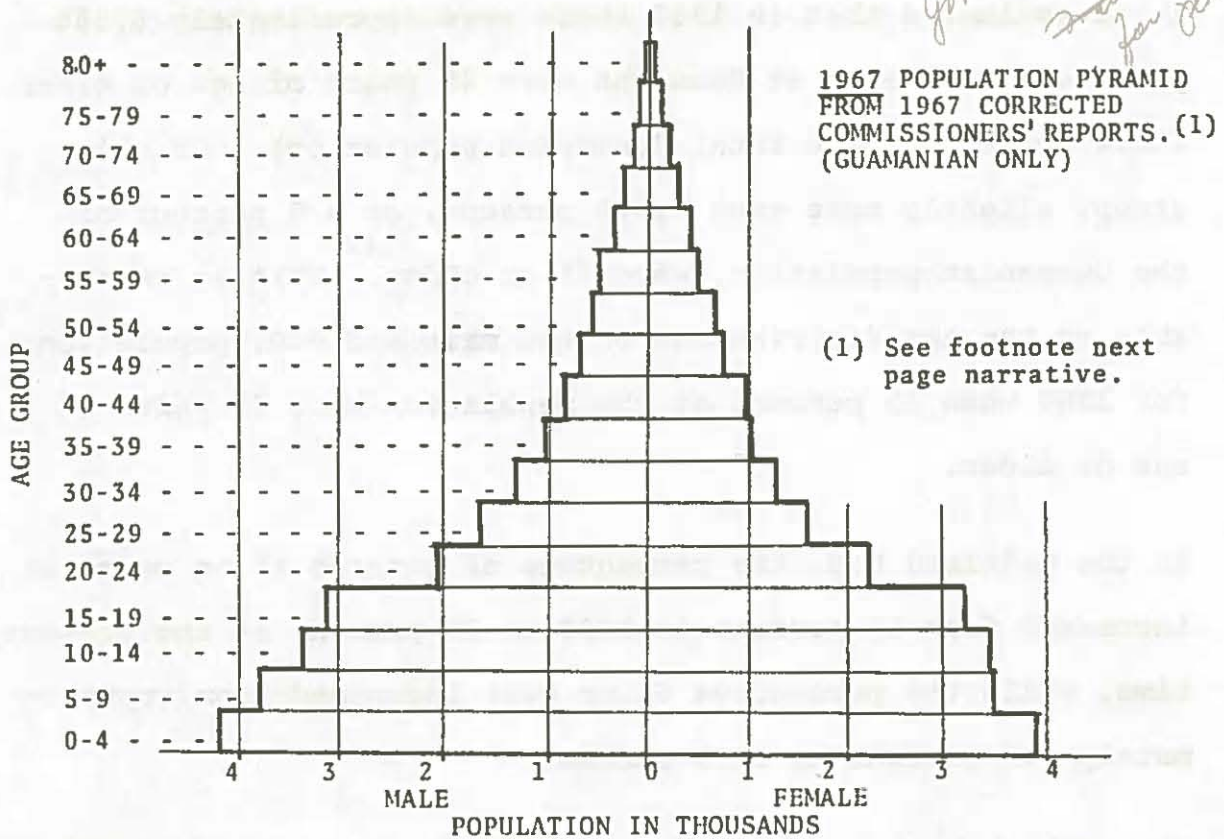


FIGURE 3

It is estimated that in 1967 there were approximately 6,500 permanent residents of Guam who were 45 years of age or older (13.4 percent of the total Guamanian population). Of this group, slightly more than 1,500 persons, or 3.2 percent of the Guamanian population, were 65 or older.⁽¹⁾ This is comparable to the age distribution of the mainland U.S. population for 1860 when 13 percent of the population were 45 years of age or older.

In the mainland U.S. the percentage of persons 45 or over has increased from 18 percent in 1900 to 30 percent at the present time, while the percentage 65 or over increased from approximately 6.8 percent to 12.0 percent.

The marked shift in relative age distribution being experienced on the mainland cannot be assumed to be yet occurring in Guam. In fact the percentage of persons over 45, excluding transients, has remained practically constant since 1920.

Socio-Cultural and Economic Trends

It might perhaps be said that man will strive for food, shelter and clothing in the absence of complete health, but he will not strive for complete health in the absence of the others.

The state of an individual's socio-economic status greatly influences the priority to which he assigns health within the

(1) 1967 Commissioners' Reports corrected for underreporting of preschool children by the Office of Comprehensive Health Planning from birth certificate data.

spectrum of his total needs.

Education and employment - Occupational incentives and level of educational accomplishment and/or degree of skilled training are intimately entwined in the determination of the place of the indigenous Guamanian in Guam's economic future.

Three general sources of employment present themselves to the labor force in the territory. These are, by decreasing basic wage scale; the Naval Civil Services, the Government of Guam and the private enterprise market. The last is further divisible into the alien contract rate and the local rate.

The civilian working force, as of June 30, 1969, was 24,500. The Government of Guam employed 26.7 percent of the total while the Federal Government employed 35.4
(1)
percent.

Income sufficiency and medical benefits - The median per capita income on Guam in 1968 was \$3,987 as compared with
(2)
\$5,948 for the U.S.

Unionism is beginning to grow in Guam and has affected an increase in wages and fringe benefits in many instances.

(1) W.D. Johnson and E.L. Carey, "Guam 1969," Guam Technical Services, January 1970.

(2) "A Five-Year Plan for the Socio-Economic Development of Guam," Staff Planning Council, Government of Guam, December 6, 1968.

Starting salaries in the local community have risen in recent years. The new minimum wage law has been a significant factor. More employers are now paying for vacations, medical appointments, group medical, life and pension plans.

The low income level of some families are forcing many wives into the role of co-providers. This often poses problems of child care, but concurrently improves family income sufficiency and induces incentives for rational child spacing and family planning.

Family size - The average Guamanian family is composed of eight individuals. This same family typically would contain 5-6 children.

Family planning services are available in the Public Health clinics and the Seventh Day Adventist Clinic and indications are that they are quietly enjoying considerable success. A recent survey conducted by the University of Hawaii, School of Public Health, indicates increasing acceptance and practice of family planning techniques in Guam.⁽¹⁾

It appears as though the traditional importance which Guamanians once placed on the production of large families

(1) R.J. Wolff, B.Z. Bell, and R. Desanna, "KAP Study Guam," A study by the School of Public Health, University of Hawaii, January 1970, in cooperation with the Office of Comprehensive Health Planning.

is slowly giving way among the younger generation. A recent study by the Office of Comprehensive Health Planning shows a substantial decrease in high order births among Guamanian mothers in the five years following 1963.⁽¹⁾ In 1963, about 48 percent of the liveborn babies were the 4th child or over, whereas in 1968, only 36 percent of the livebirths were the 4th child or over.

Tourism - Predictions of the rate of growth of tourism, if accurate, are astounding. "A Five-Year Plan for the Socio-Economic Development of Guam" predicts an annual tourist flow of 36,000 persons in 1970 increasing to 150,000 by 1975. The biggest percentage of Guam's tourists originate in the Orient.⁽²⁾

for changed

Cultural change - The Chamorros have been undergoing cultural change since the Spaniards first established themselves in the island in the sixteenth century. More recently, the widespread adoption of a wage earning style of life, which quite rapidly replaced subsistence farming and fishing as the major means of livelihood has produced problems of a different nature. One result of this re-orientation has been a change in the dietary practice of the people.

(1) "Infant and Fetal Mortality of the Indigenous Population of Guam, 1965-1967," Office of Comprehensive Health Planning, March 1969.

(2) "Quarterly Review of Business Conditions in Guam," Department of Commerce, Volume 7, No. 3 Third Quarter Fiscal Year 1970.

Political climate - Politics play a very active role in every Guamanian's life. Knowledge of political issues is widespread and has a great influence on actions and decisions at every level of involvement. The political climate is a significant determining factor in any planning effort in the territory.

General Health Status

Probably the most critical aspect of planning is the need for adequate assessment techniques to determine what is happening, the trends that have led to the present and point to what the future might hold unless there are interventions. Assessment provides a score card and a warning signal system.

Assessment of specific health problem areas is carried out in Sections II and III of the Plan.

A general view of the health status of the territory as a whole can be gained from the examination of a few selected rates and indices which are universally valuable in the assessment of the health status of any country.

Infant mortality rate - One indicator that has more utility than any other with which we are familiar is the infant death rate, because it is so heavily correlated with every kind of social inadequacy.

Data for three-year periods were combined and averaged in computing the infant mortality rates for comparison

here to reduce variability due to small numbers.

The average infant mortality rate for the three-year period ending 1967, 1968 and 1969 are given in Table 1.

TABLE 1

INFANT MORTALITY RATES, THREE-YEAR RUNNING AVERAGE
GUAM, 1965-1969

DEMOGRAPHIC GROUP	3-Year Period		
	1965-1967	1966-1968	1967-1969
Indigenous Population	25.2	23.5	25.4
Total Population	19.8	21.1	21.6

TABLE 2

INFANT MORTALITY RATES, HAWAII AND U.S.
1966-1968

AREA	1966	1967	1968
Hawaii	18.9	16.9	18.9
U.S.	23.4	22.1	22.7

It will be recognized by referring to Table 2 that Hawaii rates are substantially below United States rates. Guam mortality rates are compared with Hawaii rates because this is a Pacific island area, closer to Guam than any other state in geography and ethnic composition. Guam is now in a stage of social and economic development which was reached in Hawaii many years earlier. While the rates for Guamanians are surprisingly low considering the level of average family income, it can be seen from the Hawaii

experience that lower rates are achievable. The Hawaii rates may be accepted as a desirable and realistic norm for future efforts.

Relative Mortality Index - The Relative Mortality Index is a standardized death rate which reduces or eliminates the effect of age distribution in comparing mortality of different population groups. The Relative Mortality Index is the preferred method for comparing mortality rates when population census data by age is not available.

The crude death rate of Guam is less than half that of the United States (3.7 deaths per 1,000 population in Guam compared with 9.6 per 1,000 for the United States in 1968). Health officials need to know whether this low rate is the result of unusually good health conditions or whether it merely reflects an unusually low age distribution where low mortality is normal.

As will be seen from the table on the next page, the Relative Mortality Index for Guam for the years 1966-1968 inclusive was 1.06 which means that the adjusted mortality for the civilian population of Guam was about 6 percent higher than that of the United States taking into account the differences in age distribution.

Further analysis of mortality by ethnic group shows that the Relative Mortality Index for Guamanians is 1.31 or 31 percent higher than the United States average. This

indicates that general health conditions of the indigenous population are substantially below mainland standards.

<u>GUAM</u>	<u>RELATIVE MORTALITY</u> <u>INDEX</u>
Total Civilian Population.....	1.06
(1) Guamanians.....	1.31
All Other Ethnic Groups.....	.73

<u>UNITED STATES</u>	
All Ethnic Groups.....	1.00

The category entitled "All Other Ethnic Groups" includes a high transient population (dependent of the military, imported labor, other contract employees, etc.) with high selectivity of persons in good health. This probably accounts for the Relative Mortality Index of .73 which is (2)
27 percent below the United States average.

The two general indicators discussed above should not be thought of as health indices by which we can make a final statement as to the level of health of the people of Guam. They are, however, useful when compared with like rates of other populations. These two rates also serve as useful "milestones" against which to measure the health progress of the territory.

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- (1) Guamanians are those persons whose mother was a resident of Guam and of Guamanian ethnic origin; or a resident of Guam and born in Guam.
 - (2) "Monthly Vital Statistics Report," October 1969, Office of Comprehensive Health Planning, 1969.

SECTION II

CLASSIFICATION AND INVENTORY
OF HEALTH PROBLEMS AND HAZARDS
BY AREA OF CONCERN

CLASSIFICATION OF HEALTH PROBLEMS AND HAZARDS

This section attempts to group health problems of similar types under broad "areas of concern" which reflect the common elements of these problems.

The classification of problems in this manner is not meant to imply in any way that the problems listed under any one "area of concern" are independent and unrelated in their total effects on people, but is merely an attempt to establish some order among a multitude of various dissimilar problems.

It is recognized that health problems rarely, if ever, arise from a single condition or set of circumstances. For example, the degree to which an individual is ultimately affected by a disease entity depends on his genetic background, his internal and external environment, his ability and willingness to act concerning his condition, and the availability of health services.

Other problems do not involve disease entities at all but arise from the insults of an adverse physical or social environment, the adoption of unhealthy habits or practices, a lack of knowledge concerning health altering factors or any number of other or combinations of the above factors which prevent people from enjoying that level of physical and mental wellness which, under a different set of conditions would be possible.

The Total Environment

In discussing "environmental health" in the following pages, the Office of Comprehensive Health Planning has adopted the definition of environmental health proposed by the Ad Hoc Committee on Training in Environmental Health in its 1960 report to the Association of Schools of Public Health; its definition states that: "environmental health deals with the impact of the physical, biological and social environment of man and with the adjustments and control of external factors to promote health and well-being."

Background of need:

The need to consider the whole environment rather than its parts as one endeavors to understand and to deal with current and future problems of community health, is all important in view of the changing patterns of disease and the new concept of the relation between the environment and health problems.

This perspective of the man-environment relationship has only recently begun to receive the widespread recognition of health planners and top level national and state decision makers.

As Doctor John J. Hanlon pointed out in a recent Presidential Address on current environmental problems: "In many quarters, outdated or fundamentally irrational concepts have caused us to perpetuate many actions, as though the existing and potential external hazards to man's health were fixed and isolated phenomena related to one or another specific environmental element such as air, water, or waste. Admittedly, this approach produced dramatic results in the past when confronted with prevalent communicable diseases which superficially appeared to exhibit single specific cause-and-effect relationships. Unfortunately, it is dangerously unsuited to deal with illness and disorders which have multiple causes that arise out of an increasingly complex revolution in the environment. Such concepts ignore the convergent complexity of the relationship of total man to his total environment."⁽¹⁾

(1) J.J. Hanlon, "An Ecologic View of Public Health," American Journal of Public Health, Volume 59, No. 1, January 1969.

Thus, we should view man as simultaneously reacting to and with his environment. In considering this environment, three major areas of health concern present themselves:

- 1) The biological component, including the living things of the plant and animal kingdom--ranging from the food upon which life depends to those microorganisms responsible for disease.
- 2) The physical component, encompassing the non-living things and physical forces affecting man--such as water, air, food, chemicals, heat, light, and other radiations.
- 3) The social component including a complex interplay of factors and conditions--cultural values, customs, attitudes, and mores; economic status, social and political organizations; and ability to support facilities and services.⁽¹⁾

In simple terms, much disease and dysfunction (impaired or abnormal function) may be viewed as the clinical evidence of man's unsuccessful attempts to adapt to his changing total environment. Each individual's ability to adapt to the same conditions is, of course, modified by his genetic makeup and qualities of resistance.

The more rapid and widespread the changes in environment are, the less likely will be people's adaptive mechanism to cope

(1) L.E. Burney, "Testimony presented to the Subcommittee of the Committee on Appropriations," House of Representatives, U.S. Congress on environmental health, March 8, 1960.

with the changes, and the more probable it is that clinical symptoms will become evident in that particular community, be it neighborhood, state, nation, or worldwide in scope.

When viewed in this context, then, it becomes evident that the greatest benefits from a program of preventive health and/or health promotion may not necessarily come from the implementation of specific symptom-oriented services, but rather from an overall program of rational social change and wise environmental management.

The recent rapid and anticipated future changes in Guam's social structure, basic values, population makeup, and physical environment may be considered as characteristic of the kind of environmental transformation which one would expect to produce multiple symptoms of adaptive dysfunction.

Specific Problems:

The Bio-physical Environment:

Air: In the past, the major air pollution problems on Guam have been that of the nuisance type consisting of construction and road dust, open burning from dumps and private residences, and visible emissions from motor vehicles, ships, aircraft, and stationary sources. It was not expected that an air pollution episode would ever occur on the island; however, industrial development and tourism have introduced problems requiring (1) that appropriate rules and regulations be adopted.

Water: Ground pollution is a very serious problem on Guam. The bacterial counts of water samples taken during the rainy season are high, indicating that the runoff to (2) the water bodies carries polluting materials. An observation of conditions on the ground--lack of proper toilet facilities, failure of leaching fields--confirms this indication.

The northern half of Guam is composed mainly of highly permeable limestone. Any surface water sinks rapidly into the limestone carrying with it contaminants which have been deposited on or in the soil. The public water

(1) Wayne A. Blackard, "Report to the Director, Regional Air Pollution Control," June 18, 1969.

(2) "What 50¢ can do in Guam, U.S.A.," Guam Water Pollution Control Commission, August 1969.

system is in the process of being chlorinated with the installation of chlorinators at various sites.

Several of Guam's otherwise fine beaches are unfit for public use as a result of discharge of raw sewage directly into the ocean. The "Standards of Water Quality for Waters of the Territory of Guam" forbids direct discharge of sewage or other wastes, treated or untreated, into fresh surface water, near-shore coastal water, or fresh ground water of the territory.

Waste: Solid waste collection and disposal is a growing problem in the territory of Guam, as elsewhere.

It has been estimated that there are approximately 2,000 abandoned vehicles on the island.

Residential and commercial solid waste is generally stored in uncovered 55-gallon drums at the roadside, and is collected approximately twice a week. However, an accumulation of debris around the storage area is readily accessible to animals and permits fly breeding. Bad habits lead to burning waste in the cans that produces obnoxious odors and particulate air pollution.

The Government of Guam has closed its outlying open and burning dumps and is now dumping at the centrally located dump (1) (Ordot) which is a modified landfill operation. The

(1) H.R. Little, "A Solid Waste Management Study of the Territory of Guam," United States Department of Health, Education, and Welfare, Public Health Service, 1969.

Navy disposes of its waste in a sanitary landfill. The Air Force utilizes a moving open trench type operation.

Roadside dumping and littering are prohibited by law, but the law is not being vigorously enforced.

Noise: Noise levels vary greatly depending on location.

In the southern end of the island, which is composed of smaller villages and a more rural life style, noise is negligible as a health factor.

Along the well traveled arterials, one of the sources of sustained noise is primarily motor traffic which is persistently heavy until late at night.

In the central and northern regions, temporary high levels of noise are frequent in certain localized areas adjacent to the various air strips especially along the approach-take off flight patterns of military and civilian aircraft. Certain areas experience extremely high, short duration, noise levels from this source. As air traffic increases in and out of Guam, the annoyance caused by aircraft noise can be expected to become more severe since there is no simple solution immediately evident.

Temporary and localized noise from construction operations is also expected to increase as the frequency of new construction rises.

Consumer Products: Food and beverage service establishments, markets, bakeries, bottling plants, milk plants, ice plants, etc. are routinely inspected by the Environmental Health Section of the Department of Public Health and Social Services.

Federal Food and Drug laws apply to Guam, but there is no local program of inspection. In general, the burden of proof that materials and products meet safety standards lies with the manufacturers who market them. Since Guam imports foods and other products from a host of diverse countries, there is no assurance that these standards are being met.

Housing: The high cost of construction in Guam coupled with the relatively low median family income are disincentives for the construction of adequate homes for the great majority of the indigenous population.

The average Guamanian family is comprised of eight individuals. This same family typically would contain five-six children.

The necessarily crowded conditions and multiple sleeping arrangements arising from living space limitations undoubtedly have adverse health implications. The Kent Pediatric Society in their study of school children had discovered the importance in child health of having one's

own bed to himself. Crowded conditions are also conducive for the transmission of communicable diseases and induced stress as the result of lack of privacy.

Pesticides: Guam recently (April 1970) adopted new legislation⁽¹⁾ limiting the use of pesticides. Pesticides, especially DDT, were used extensively on Guam following World War II. No known studies have been conducted in the territory to determine any detrimental effects of this usage. The nearest pesticide testing laboratory available for this kind of surveillance is located in Hawaii.

Radiation Hazard: There is the possibility that many dental and medical x-ray machines fail to meet standards of safety with the result that persons engaged in diagnostic and therapeutic practice may be dangerously exposed to radiation.

Occupational Hazard: As more and more industries become established on Guam, the importance of determining the extent of health hazards associated with employment is being recognized.

The magnitude of work related accidents in Guam is described in the subsection on accidents. In addition to accidents, the nature and extent of ill-health resulting from occupational exposure to dusts, chemicals, noise, heat, etc. should be determined and steps taken to prevent such conditions.

(1) Public Law 10-142.

Climate: Intimately influencing the extent of favorable development of man on the one hand, which act to his detriment on the other hand, and other biological forms (i.e. bacteria, viruses, protozoa, helminths, insects, etc.) is the climate to which all are subjected.

(1)

Medical research has demonstrated that the greatest incidence of disease is found in the warmer areas; this would include the territory of Guam.

The climate, of course, cannot be controlled but the importance of its effect on the introduction, incidence, progression and types of disease cannot be discounted in the epidemiology of disease.

Population: The size of the population, and more specifically, the population density, determine the degree to which other environmental problems exist. Most changes in the natural environment are brought about by people to meet their demands for food, shelter, mobility, and material goods. People produce pollution, and in simple terms, the more people there are, the greater is the problem of pollution in their particular location.

Related to the actual size or density of the population, and of great significance in environmental planning, is

(1) J.J. Hanlon, "Principles of Public Health Administration," The C.V. Mosby Company, Saint Louis, Fourth edition, 1964, page 73.

the degree of affluence presently experienced by that population and the present state of technological advancement and industrialization.

Any realistic examination of the question of maintaining or improving the quality of Guam's environment must include within its scope of inquiry the very important consideration of population expansion.

The Socio-cultural Environment: While Guam is not confronted with the multiplicity of problems arising from the social environment of large urban slums and ghettos and their poverty stricken and socially deprived inhabitants, it is subject to its own unique and changing social conditions of potential mental and physical health hazards.

Some of these trends have already been discussed under other headings but should be reiterated here to place them in the proper context of environmental health.

Economic Sufficiency: Insufficient relative income levels are associated with substandard housing, higher than normal morbidity levels, less than average utilization of health services, and a high rate of premature births. When these conditions are carried to the extreme for long periods, they may foster family disorganization, juvenile delinquency, drug abuse, alcoholism and other conditions of social dysfunction. Coupled with actual income, is the

the need for wise money management and the evaluation of individual values underlying the allocation of family resources to satisfy needs. It is well known that Guam's median per capita income is much lower than that of the United States, while the cost-of-living is disproportionately higher.

Education: The importance of education in the education-employment-income-health cycle has long been recognized. Education also greatly influences the way in which people see the value of good health, the causes of ill health, and the value of health care services, and consequently how much they are willing to spend to maintain good health.

Personal Safety: The value of this component of the social environment is self evident but nevertheless should not be left out in any comprehensive view of environmental health. Protection against violent physical harm and also the assurance itself that one is reasonably protected against violent acts are important to the well-being of individuals and communities. The incidence of attempted or successful violent acts is used as one indicator of the degree of disharmony in the social environment.

Land Use and Recreation: These two factors which are at the same time of a physical nature but also involve social activities and social decisions could be considered as

separate categories. However, on an island such as Guam where useable land is so limited it seems advisable to consider both as a unit.

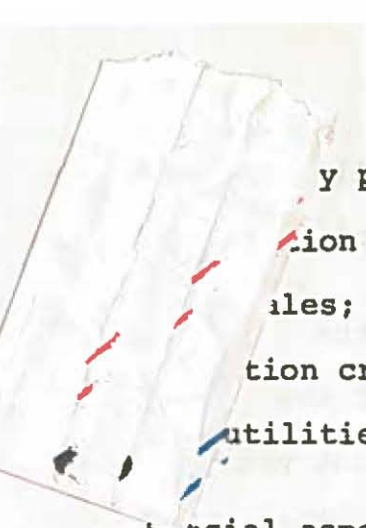
The population of Guam is expected to double in the next 20 years. A great portion of the best land is limited to military usage. (Some of the best recreational sites are unavailable to the civilian population because of military restrictions.)

Very careful long range management plans should be formulated as to policy for the physical development of the island, giving due importance to recreation needs and the protection of material resources including the intertidal reef areas.

These kinds of decisions should be made with the advice of knowledgeable social scientists, human ecologists and marine and animal ecologists, agriculturists and other land management specialists.

These decisions all have long range implications for the health of Guam's future population and should be very carefully considered, and not only from an economic standpoint.

Effects of a Transitory Population: The presence of a large transient population (military, tourist, and labor force) undoubtedly influences the overall health and well-being of the population. Common problems associated with this



y population are: the introduction of disease;
tion resulting from the increased ratio of males
ales; drug trafficking; air, noise, and water
tion created by aircraft, motor vehicles, ships,
utilities demands; and traffic conjection.

Special aspects associated with the military presence
are: restricted use of land under military control; the
strategic location as America's westernmost territory;
significant dependence on the military; potential hazards
associated with the storage and handling of military
weapons; contributions to disease control, surveillance
and health planning; opportunity for the youth to travel
abroad; additional medical facilities and technical ex-
pertise for consultation and training; and special emer-
gency services and resources. Continued close liaison
between Government of Guam agencies and the Armed Forces
organizations and personnel must be encouraged.

Attitudes, Customs, Habits: The whole gamut of factors in
this category that are unique to the people of Guam in-
fluence and modify the effects of all the other compo-
nents of the environment and, along with inherited char-
acteristics and general resistance and adaptability,
figure strongly in the final determination of the total
effect of man's total environment on his health and well-
being. These factors should be carefully weighed in the

development of a health plan since they can spell the ultimate success or failure of an otherwise sound plan.

In addition, these factors in conjunction with the physical environment, determine the frequency of the occurrence of accidents. This relationship is not yet entirely clear but is of great importance since accidents are the leading causes of death in ages 1-24 years.

Resources:

In accord with the concept of environmental health planning as understood by the Office of Comprehensive Health Planning, there has been recently established the Territorial Planning Commission⁽¹⁾ which has responsibility (if it will accept it) at a sufficiently high level of authority to assure that the preservation of the total environment receive an equal status with the concern for the economic development of the island.

The Department of Public Health and Social Services performs, through its various sections, the function of sanitation inspection and testing, zoonosis control, air pollution control and water pollution control.

The Department of Public Works has responsibility for solid waste collection and disposal.

The Department of Education has responsibility for administration of the public school system and policies applied thereto, including the school environment.

The Department of Land Management has responsibility for administration, use and disposition of all government land within the territory.

The Guam Recreation Commission plans and organizes for the recreational needs of the people of Guam; while the

(1) Executive Order 70-21, June 29, 1970.

Governor's Committee on Children and Youth plans, coordinates, supervises, and evaluates the recreation program for the youth of Guam.

The Department of Public Safety provides public safety services, traffic regulations and fire prevention and suppression.

The Department of Agriculture aims to protect and promote the development and utilization of the territory's agricultural resources.

In addition, the following councils and planning bodies have policy formulating responsibilities related to the total environment.

- 1) Air Pollution Control Commission
- 2) Water Pollution Control Commission
- 3) Advisory Council for the Coordination of Health and Social Services
- 4) Guam Economic Development Authority
- 5) Guam Housing and Urban Renewal Authority

There are other official, voluntary, and community groups concerned with various aspects of the environment not mentioned.

The point illustrated here is the fact that, although there is a multitude of different groups and agencies concerned with some component of the total environment, it is important that there continue to be a single authority with the responsibility to plan or establish and interpret an overall policy framework within which these agencies and groups must cooperate toward

the common goal of insuring the future total environmental
quality of the territory of Guam.

Accidents

The scope of interest embraced by all accidental injuries is multifaceted. The treatment of accidents as a health problem involves consideration of environmental factors, human behavior, and the object of the accident. The importance of accidents as a problem lies in the tragedy of more than 112,000 deaths and 10,000,000 injuries which result from this cause annually in the nation as a whole. ⁽¹⁾ While degenerative diseases like heart disease, cancer, and stroke take their toll among the older age groups, accidental injuries are especially prevalent during the most productive years.

(1) "Accident Facts," 1969 Edition, National Safety Council.

1 52
25
20

Background of Need:

The estimated population of Guam for 1969 is a little below 100,000. There is 253 miles of paved roads with a vehicle density average of 138 cars in 1969. Medical care for accidental injuries too often is not sought unless serious enough to warrant hospitalization or professional medical care. These and the increasing cost of living indicate the need for a concentrated effort by the community in the area of accident injury prevention.

Year	Population	Vehicle Density
1969	98,000	138
1968	97,000	135
1967	96,000	132

Specific Problems:

High Accident Rate: Accidents rank second among the ten leading causes of death for all ages in Guam and account for 12-14% of all deaths annually. ⁽¹⁾ Table 3 shows a comparison of the number of deaths and the mortality rates for all kinds of accidents for Guam and the U.S. for 1968.

TABLE 3
ACCIDENTAL DEATHS OF ALL KINDS, NUMBER AND RATE
⁽¹⁾
U.S. AND GUAM

LOCATION	DEATHS	RATE*
U.S.	115,000 ⁽²⁾	57.5
Guam	49 ⁽³⁾	48.3

*Per 100,000 population

- (1) The number of deaths and rate for Guam is an average of the years 1967-1969 to reduce variability due to small numbers.
- (2) "Accident Facts," 1969 edition, National Safety Council.
- (3) "Death Certificates," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam, 1967-1969.

On the World Health Organization's list of Accidental Death Rates by Nation for 1967, the U.S. ranked 9th with an all accidents mortality rate of 56.6 and Guam ranked 37th with a rate of 36.4/100,000 population. Other nations of comparable development had rates as follows:
Japan, 41.4; Sweden, 43.2; New Zealand, 52.7; Australia,

-
- (1) "Annual Reports," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam.

56.2; Philippines, 22.5; and Guatemala, 34.6.

A breakdown of all accidental deaths by external cause for Guam in 1968 is shown in Table 4.

TABLE 4
(1)
TOTAL DEATHS FROM ACCIDENTS BY TYPE OF ACCIDENT AND SEX
GUAM 1968

TYPE OF ACCIDENT	Number	Percent	Male	Female
All Accidents - Total	49	100	44	5
Motor Vehicle Accidents.....	31	63.3	27	4
Non-Motor Vehicle				
Other Road Vehicle.....	2	4.0	2	-
Water Transportation.....	-	-	-	-
Aircraft.....	-	-	-	-
Poisoning.....	-	-	-	-
Falls.....	3	6.1	2	1
Blow From Falling Object..	-	-	-	-
Vehicle.....	-	-	-	-
Machinery.....	-	-	-	-
Electricity.....	1	2.0	1	-
Burns From Fire.....	1	2.0	1	-
Firearms.....	-	-	-	-
Suffocation.....	-	-	-	-
Drowning.....	11	22.6	11	-
Late Effects of Accidental				
Injuries.....	-	-	-	-
All Other Causes.....	-	-	-	-
Total Non-Motor Vehicle.....	18	36.7	17	1

(1) "Death Certificates," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam, 1968.

As can be seen from the above table, motor vehicle accidents and drownings were the two major causes of accidental deaths for that year. Also it is significant that over 8 times as many accidental deaths were suffered by males than by females.

Motor Vehicle Accidents: Table 5 below shows a comparison of the U.S. and Guam mortality figure from motor vehicle accidents alone for 1968.

TABLE 5
MOTOR VEHICLE ACCIDENT MORTALITY, NUMBER AND RATE
(1)
U.S. AND GUAM, 1968

LOCATION	DEATHS	RATE*
U.S.	55,200 (2)	27.6
Guam	29 (3)	28.8

* Per 100,000 population

- (1) The number of deaths and rate for Guam is an average of the years 1967-1969 to reduce variability due to small numbers.
- (2) "Accident Facts," 1969 edition, National Safety Council.
- (3) "Death Certificates," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam, 1967-1969.

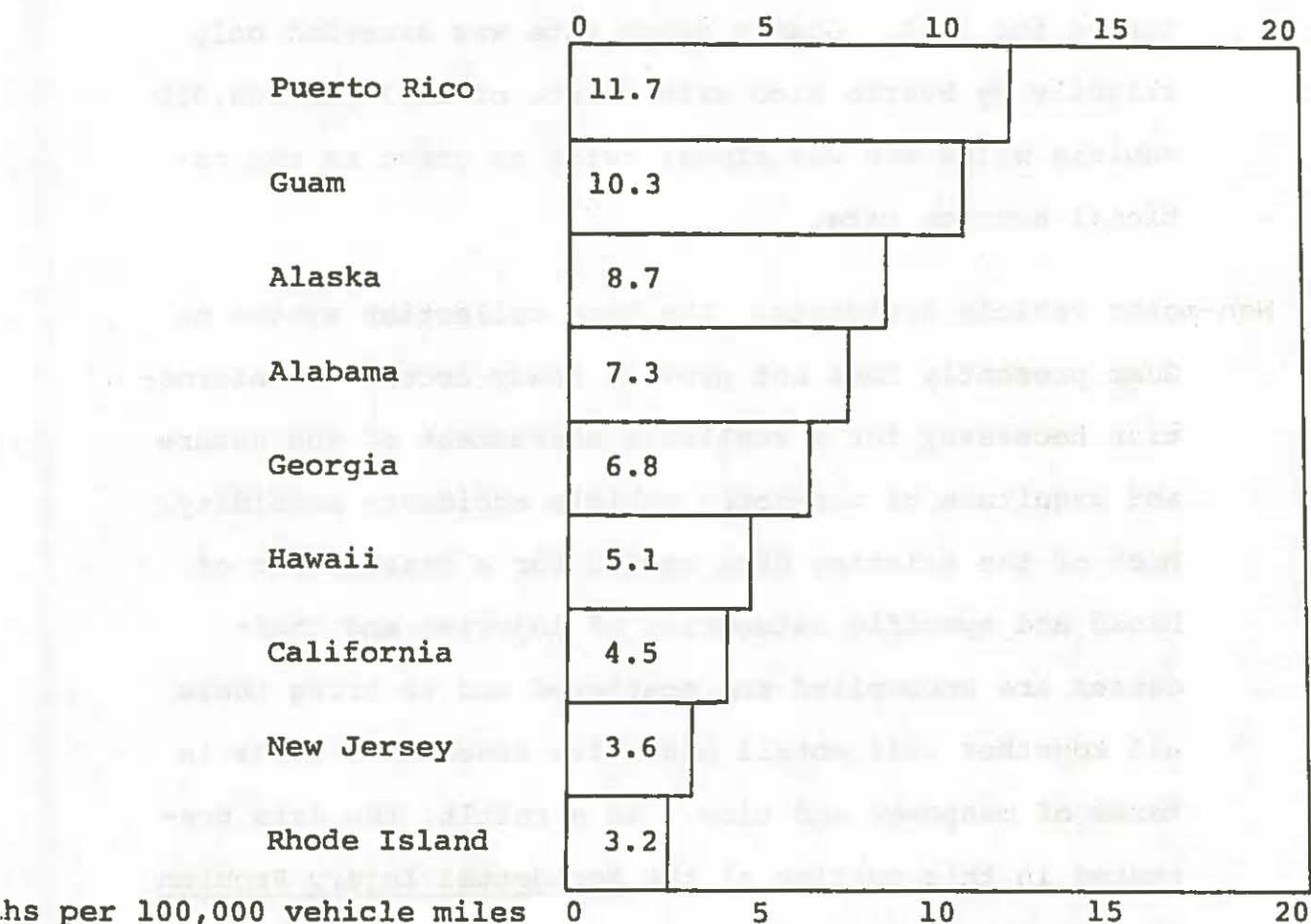
There were 55,200 deaths and 2,050,000 injuries in the U.S. in 1968 as a result of motor vehicle accidents producing a cost to the public of over eleven billion dollars. (1) The annual average number of persons injured in motor vehicle accidents over the 4 years ending 1968 (2) exceeds 630 persons a year for Guam.

Motor Vehicle accidents alone resulted in 31 deaths and 660 injuries in Guam in 1968; representing a loss to the

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- (1) "Accident Facts," 1969 edition, National Safety Council.
 - (2) "Traffic Analysis Report," 1968, Department of Public Safety, Government of Guam.

public of over three and one half million dollars.

(1)
MOTOR VEHICLE MILEAGE DEATH RATE - 1968
By Selected States and Territories



(1) "Accident Facts," 1969 edition, National Safety Council.

FIGURE 4

Mileage Death Rate: Since the incidence of motor vehicle accidents is related to the number of vehicles on the roadways and the number of miles traveled, comparison between different areas by motor vehicle deaths per 100,000 vehicle miles is much more meaningful than crude rates in attempting to assess the relative importance of vehicle accident deaths.

As Figure 4 indicates, Guam's vehicle mileage death rate of 10.3 deaths per 100,000 vehicle miles ranked second highest in the nation on a list of all states and territories for 1968. Guam's death rate was exceeded only slightly by Puerto Rico with a rate of 11.7 per 100,000 vehicle miles and was almost twice as great as the national average rate.

Non-motor Vehicle Accidents: The data collection system on Guam presently does not provide ready access to information necessary for a realistic assessment of the nature and magnitude of non-motor vehicle accidents morbidity. Much of the existing data needed for a measurement of broad and specific categories of injuries and their causes are uncompiled and scattered and to bring these all together will entail extensive research efforts in terms of manpower and time. As a result, the data presented in this portion of the Accidental Injury Problem Assessment are limited and do not present a complete picture of the total incidence of non-motor vehicle accidents in the community. Mortality data on the other hand is quite accurate and can be very useful for estimating the relative importance of non-motor vehicle accidents in the overall accident assessment.

Table 6 on the next page is a review of non-motor vehicle mortality in Guam and the U.S.

TABLE 6

NON-MOTOR VEHICLE ACCIDENT MORTALITY
BY NUMBER AND PERCENT OF ALL ACCIDENT DEATHS
(1)
U.S. AND GUAM, 1968

LOCATION	DEATHS	PERCENT
U.S.	59,800 (2)	52.0
Guam	20 (3)	40.9

- (1) The number of deaths for Guam is an average of the deaths for years 1967-1969 to reduce variability due to small numbers.
- (2) "Accident Facts," 1969 edition, National Safety Council.
- (3) "Death Certificates," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam, 1967-1969. (Average of 19.7 deaths rounded off to 20)

Drownings: Drownings are the second most frequent cause of accidental death in Guam. During the four-year period, 1966-1969, there were 27 drownings in Guam's waters. This accounts for 14 percent of all accident deaths and over 2 percent of all deaths over 1 year of age.

Work Injuries: The records of Workman's Compensation Office, which covers Government of Guam and private employees, show that a substantial number of employees incurred injuries resulting in a loss of time.

During the three-year period, 1967-1969, there was an average of 188 persons annually who suffered an injury

requiring them to be off work more than 7 days. Deaths reported as a result of work accidents totalled 4 for the same period.

The American Foreign Insurance Association (AFIA) provides medical insurance for 3,441 Government of Guam employees. A total of 463 employees and their dependents filed individual injury claims with AFIA in 1968.

School Injuries: A survey conducted by the Office of Comprehensive Health Planning in 1970 to determine the frequency of school accidental injuries disclosed the following information.

TABLE 7
PUBLIC SCHOOL ACCIDENT INJURIES
BY NUMBER AND PERCENT, GUAM 1967-1970

SCHOOL YEAR	NUMBER OF INJURIES	SCHOOLS (1) REPORTING	PERCENT
1967-1968	400	17	4.8
1968-1969	827	24	6.2 (2)
1969-April 1970	1072	27	6.1

- (1) Two senior high schools and one junior high school were excluded from the compilation because of incompleteness of requested data, failure to report data, etc.
- (2) Table reads: 827 students, or 6.2% of the school population reporting for school year 1968-1969 incurred some type of injury at schools.

High Risk Groups: It is helpful in determining priorities and planning health programs to identify certain groups

of persons whose common characteristics place them at greater risk of a particular disease or condition than their fellow citizens. They fall in the following categories.

1) Accidents are the leading cause of death in persons
(1)
1-34 years of age.

2) Fatalities and injuries resulting from accidents are especially high in the broad age category 15-34.

3) An analysis of motor vehicle accidents on Guam by age of driver for the years 1965-1968 singles out the age 15-24 as the age group with the highest occurrence of vehicle accident injuries. The percentage of all motor vehicle accidents from this age
(2)
group annually is about 41.1 percent.

4) Children 1-4 are the most likely to be involved in accidental poisonings.

5) The highest percentage of recreational activities accidents takes place at school.

6) The very young and the very old are at greatest risk from injuries as a result of falls.

(1) "Accident Facts," 1968-1969 edition, National Safety Council.

(2) "Traffic Analysis Reports," 1965-1968, Department of Public Safety, Government of Guam.

- 7) Data available both nationally and locally indicates the age group 15-24 as the group most involved in drowning incidents. Out of a total of 27 drownings reported in Guam during 1966-1969, 15 were in the age specific group 15-24, or a total of 56% of this age group.⁽¹⁾

Family and Personal Consequences: It would be difficult to state explicitly the type of personal and family consequences one encounters as a result of injuries. The high prevalence of accidents among young adults means that many families just beginning will suffer the loss or disability of a breadwinner or mother at a time when they are most needed by the family. The duration and severity of impairment as a result of an injury can vary considerably from short term temporary impairment to a lifetime of permanent and total disability. The hardship incurred by the family will depend on the nature and extent of the injury, and family resources.

Economic and Social Costs: The cost of all accidents to the nation in 1967 was over 21 billion dollars as shown in Table 8 on the next page.⁽²⁾

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- (1) "Death Certificates," Vital Statistics Section, Department of Public Health and Social Services, Government of Guam, 1966-1969.
- (2) "Accident Facts," 1968 edition National Safety Council.

TABLE 8

COSTS OF ALL ACCIDENTS, UNITED STATES, 1967

CATEGORY	COST
Wage losses, value of future earnings of incapacitated or killed.....	\$ 6,000,000,000
Medical fees, hospital expenses.....	2,200,000,000
Insurance administrative and settlement cost.....	4,800,000,000
Property damage in motor vehicle accidents	3,400,000,000
Property destroyed by fire.....	1,706,000,000
Money value of other indirect or direct costs of time lost by workers without disabling injuries.....	3,200,000,000
Total	\$21,306,000,000

U.S. Motor vehicle accidents in 1967 cost the nation over 10 billion dollars, 1/2 the total cost of all accidental injuries in the U.S.

(Guam) The figure \$2,934,940 was quoted as the estimated monetary loss from motor vehicle accidents on Guam in (1) 1967, a sum equal to 11% of the total Government of Guam General Fund Expenditure of \$26,705,632 for that fiscal year.

The average compensation paid an employee for 1966 was \$249.59. The average payment for death benefits per person was \$10,457.06. While these figures of themselves

(1) "Traffic Analysis Report," 1967, Department of Public Safety, Government of Guam.

relate little in the final analysis, compensation for disability as a result of accidents is a burden borne by every citizen through taxation and the increasing cost of premiums for disability, life, and accident insurance.

TABLE 9

A REVIEW OF GUAM'S WORKMAN'S COMPENSATION RECORDS, 1966

SEVERITY OF INJURY	TOTAL PAYMENT
Permanent Total Disability.....	\$ 20,000.00
Temporary Total Disability.....	48,421.36
Permanent Partial Disability.....	26,726.65
Head or Facial Disfigurements.....	525.00
Death Benefits.....	<u>31,371.18</u>
Total	\$127,044.19

Prevention and Control: Accidents as a general problem contain such a variety of diverse causes and variables that the general programs of prevention and control cannot be applied across the board. Each specific type of accident must be analysed individually and specific actions recommended. There are however, certain common elements which apply to the study of all accidents. Whether or not an accident occurs; if it occurs, whether it results in an injury; and, how severe the injury, depends on three general variables, the environment, human behavior, and the object of the accident.

As an example, an analysis of some of the factors which predispose to or cause auto accidents and which determine the occurrence and severity of casualties would include investigations into the relationships between the auto, the roadways on which autos operate, the driver, and the medical and emergency care aspects of the treatment of auto accidents. Planning for the resolution of other types of accident problems can be approached in the same comprehensive manner.

Treatment - Emergency care of major injuries is limited to the Guam Memorial Hospital and the Naval Hospital. In a true emergency, where time is crucial, either hospital will accept a patient from the other sector.

There is no poison information center. Callers at the Guam Memorial Hospital out-patient department are advised to proceed immediately to the hospital.

A physician and supporting personnel are on call 24 hours a day at the Guam Memorial Hospital Emergency Unit.

The Guam Memorial Hospital has maintained a limited blood bank. A list of potential donors is kept. There is a verbal agreement between the Red Cross and the Guam Memorial Hospital to secure additional blood from Hawaii or from a voluntary donor committee in the event of a massive need for blood.

Emergency Transportation - Civilian Ambulance Service -- Three civilian ambulances are maintained for the central population centers of the island. The dispatching office is located at the Tamuning Fire Station. There are between 1400-1500 ambulance dispatchs annually, most from the central area. The average time interval between arrival at the accident site and arrival of the injured at the hospital is 9 minutes for the central area.

Two other ambulances are stationed in Agat and Inarajan respectively, with a passenger limit of one, plus driver and attendant.

Military Ambulance Service -- In mass emergency situations the 10 military ambulances are made available for civilian patients.

In special emergency situations helicopter transportation services may be requested from the military. There is no landing pad at the Guam Memorial Hospital. Helicopters are also available as a part of the military Air-Sea Rescue group which serves the entire population of Guam.

Resources:

Within the Government of Guam structure, there are available 5 individuals with some responsibility akin to safety officers. These officials are located within the Department of Administration (all employees' safety), Department of Labor (industrial safety), Department of Public Works (inspection of workers and shop facilities), Commercial Port (all port employees), and Department of Public Safety (Traffic Safety Officer).

The Civil Defense Office and the Emergency Resources Management Office are also additional resources. In the private and civic sector, the Red Cross is probably the major community organization whose objectives pinpoint safety as a concern. The military resources have not been explored to any degree and as a result will not be stated in this section.

In addition:

- a) The Department of Public Safety publishes annually a Traffic Analysis Report which provides some useful motor vehicle accident injuries data.
- b) The Accident Prevention Program within the Department of Public Health and Social Services provides information on preventive aspects of accidents.
- c) There are lifeguards but no life saving equipment posted at one of Guam's popular public beaches.

Communicable Diseases

In the usual sense of the term a "preventable disease" is understood to be a disease whose initial occurrence can be prevented. It is this group of diseases which are considered in this subsection. These diseases are alternatively referred to as the communicable or infectious diseases.

General Background of Need:

Guam, because of its unique location in the western Pacific; its increasing attraction for tourism; its large transient military population; and its expanding economic importance, plays host to large numbers of individuals arriving from various Asian and southeast Asian countries, many of which are endemic areas of diseases such as plague, malaria, encephalitis, dengue, and filariasis.

Presently, there are 15 species of mosquitos reported on Guam. ⁽¹⁾
Five of these have been introduced subsequent to 1944. Several of these species are well known for their ability to transmit disease.

The overall sanitary conditions on Guam are generally substandard.

Aside from the common drinking water, water pollution is a ⁽²⁾
serious problem.

The nutritional status of the population has not recently been reassessed but is thought to remain inadequate for optimum ⁽³⁾
maintenance of resistance to infection and diseases.

(1) G. Roy Hayes, Jr. and Brian T. Whitworth, "Survey of Vector Problems, Guam, U.S.A.," United States Department of Health, Education, and Welfare, Public Health Service, 1969.

(2) "What 50¢ can do in Guam, U.S.A.," Guam Water Pollution Control Commission, August 1969.

(3) S.H. Malcolm, "The Diet of Mothers and Children of the Island of Guam," South Pacific Commission, Noumea, New Caledonia, January 1958.

The conditions which lead to a high prevalence of parasitic
infestation are present in Guam as in other Pacific areas. (1)

Public knowledge and understanding of all of the foregoing conditions and their implications for health and the prevention of disease are limited to a relatively small segment of the total populace.

(1) "FY 1970 State Plan for Public Health Services," Department of Public Health and Social Services, Government of Guam, October 1969.

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Specific Problems:

General Communicable Diseases - Immunizations Available: An accurate picture of the true incidence of most communicable diseases on Guam is, at present, unobtainable because of the generally incomplete and sporadic reporting of these diseases.

In 1968, nine patients were admitted to Guam Memorial Hospital with a diagnosis of poliomyelitis, five under (1) 14 years of age, and four between 14 and 24 years.

In early 1970, there was one death from diphtheria. There was an epidemic of Rubella in 1964, which eventually resulted in the birth defects of over thirty infants.

Immunity levels against diphtheria, tetanus, polio, measles, and rubella among elementary school age children were approximately 80 percent as of April 1, 1970.

Approximately 40-50 percent of preschool children had (2) been seen in well-child conferences at this time. However, this does not necessarily imply that this percentage of preschool children has actually received its full compliment of shots for these diseases.

Gastrointestinal Disease: The preparation of large quantities of food to be served to guests at fiestas and other occasions provides the opportunity for large incidences of

(1) "Inpatient Discharge Records," Guam Memorial Hospital.

(2) Health Services Special Project, "Communicable Disease Prevention and Control on Guam," 1970.

enteric diseases. Such outbreaks have been commonplace in past years.

The General Sanitation Section of the Department of Public Health and Social Services has the responsibility for routine inspection of all restaurants, cafeterias, markets, bakeries, etc. It is known that the sanitary condition of the establishments is below the national average. (1)

An occasional case of typhoid fever is seen but no epidemics have occurred in recent years.

The large number of fly species present on the island are efficient agents for the transmission of such diseases as amoebic and bacillary dysenteries, typhoid fever, and cholera.

Diseases Spread by Insects: There have been epidemics of dengue (1944), and Japanese B Encephalitis (1947) on Guam in the past. Several cases of malaria have occurred, one of which is suspected of having been transmitted on the island (October 1969). (2)

There is, as of April 1970, no specific coordinated program for insect control. The Department of Public Health

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- (1) "1970 State Plan for Public Health Service," Department of Public Health and Social Services, Government of Guam, October 1969.
- (2) G. Roy Hayes, Jr. and Brian T. Whitworth, "Survey of Vector Problems, Guam, U.S.A.," United States Department of Health, Education, and Welfare, Public Health Service, 1969.

and Social Services has no staff entomologist but is presently recruiting for this position.

Among the 15 species of mosquitos on Guam, there is a suspected vector of malaria, two known vectors of Japanese B encephalitis, a known vector of dengue, a primary vector of Bancroft's filariasis and St. Louis encephalitis and a known vector of Malayan filariasis. One particular species (Culex quinquefasciatus) is capable of transmitting three of the above diseases and (1) is primarily a man feeder.

Diseases Harbored by Animals: Guam recently (1967) experienced an epizootic (animal epidemic) of rabies. Fortunately, no human cases of the disease were recorded and (as of November 19, 1970) no new cases of animal rabies have been reported since October 22, 1967. If no additional rabies cases are detected, the Director of Public Health and Social Services is expected to declare Guam a rabies free territory in the near future. Four hundred sixty-eight biting animals were impounded during 1969 for the required 10-day observation period. This shows that there was still ample opportunity for rabies to be transmitted had it been present.

There have been no confirmed instances of other diseases transmitted by animals such as brucellosis

(1) G. Roy Hayes, Jr. and Brian T. Whitworth, "Survey of Vector Problems, Guam, U.S.A.," United States Department of Health, Education, and Welfare, 1969.

(undulant fever), leptospirosis (hemorrhagic jaundice), cat scratch fever, psittacosis (parrot fever), or tularemia (rabbit fever).

Diseases of Direct Contact: Tuberculosis - The incidence of new active cases of tuberculosis in Guam was 96/100,000 population in 1968. This rate is approximately four times that of the continental United States. It is felt that 5/100,000 new active cases per year is the maximum rate that should be tolerated. Considering the number of transient military dependents with a much lower rate who are included in the base population used in determining the overall rate for Guam, a true picture of the importance of this disease among the high risk indigenous population is not readily apparent.

Venereal Disease - During 1968, in Guam, 17 cases of syphilis and 98 cases of gonorrhea were reported to the Department of Public Health and Social Services. In 1969, the number of gonorrhea cases reported had increased to 252. Of these, approximately 200 were reported by military medical units. It is felt that this figure is considerably less than the actual reservoir of this disease.⁽¹⁾

Internationally Quarantinable Diseases: Because of the general sanitary conditions, presence of capable vectors and

(1) "1969 Annual Report," Department of Public Health and Social Services.

potential animal reservoirs, and the fragmented quarantine responsibilities on Guam, sporadic or epidemic occurrences of these diseases are entirely within the realm of possibility at any time. Planning should proceed as if these diseases were expected to occur.

The oriental rat flea, an efficient vector of bubonic plague, is present on Guam, as is its preferred host the recently introduced (1956) Norway rat, which is now spread island-wide and has historically served as the animal reservoir of bubonic plague during epidemics and pandemics of that disease throughout the world.⁽¹⁾

Other Infective and Parasitic Diseases: Parasitic infestation is widespread and common. Ascaris, trichuris, and enterobius are the most prevalent forms with an estimated 50 percent of school age children affected. The incidence of hookworm infestation in most areas of Guam does not approximate the importance of this disease in many of the other Pacific islands.

Helminthic (worm) infestations represent one of the greatest drains on human energy and health. In combination with an inadequate diet these diseases can produce a significant effect on the development of those children so infected.

(1) G. Roy Hayes, Jr. and Brian T. Whitworth, "Survey of Vector Problems, Guam, U.S.A.," United States Department of Health, Education, and Welfare, 1969.

Resources:

Public Health and Social Services: The Communicable Disease

Section of the Department of Public Health and Social Services has the responsibility for the following five
(1)
programs.

- 1) Immunization
- 2) Tuberculosis
- 3) Venereal disease
- 4) Epidemiology
- 5) Foreign Quarantine

Immunization Program - During the 1969-1970 school year a school immunization program was carried out among the first through sixth grades. In three phases, diphtheria, tetanus, polio, measles and rubella antitoxin were given to all children for whom parental consent forms were signed. Future immunizations will be accomplished in well-child conferences and directed toward first graders and transfer students.

Tuberculosis Control - The Tuberculosis Control Program provides medical and epidemiologic services through its chest clinic facility and field follow-up visits. The activities of this program are coordinated through a central register to provide patients, contacts and suspects with recommended appropriate services. The recommendations

(1) "Communicable Disease Prevention and Control on Guam," Health Services Special Project, 1970.

for medical and epidemiologic services are contained in a medical policy statement and are consistent with basic tuberculosis management techniques.

Venereal Disease Control - A weekly clinic session for comprehensive medical and epidemiologic venereal disease services is conducted under this program. Present emphasis is placed on determining the extent of venereal disease in Guam.

Epidemiology Program - A new disease reporting system is being developed under this program that will hopefully improve the adequacy of disease surveillance on the island. This program acts in support of the other three programs.

Foreign Quarantine - Foreign quarantine was primarily the responsibility of the U.S. Navy with some authority assumed by the U.S. Air Force. As of November 1, 1970, the responsibility to provide quarantine inspection on commercial vessels has been reallocated to the Department of Public Health and Social Services of the Government of Guam.

The General Sanitation Section of the Department of Public Health and Social Services essentially performs two functions:

- 1) Inspection of eating, food handling, etc. establishments.
- 2) Village sanitation.

Inspection of Establishments - This program is well established and demands almost the entire attention of the

sanitation section.

Village Sanitation - The objectives of this program include community cleanup, surveillance on solid waste, insect and rodents control efforts, housing hygiene and complaints. This program, as it is now operating, consists primarily of handling complaints.

The Zoonosis Control Section of the Department of Public Health and Social Services is directed primarily against rabies. This program includes animal surveillance, bite investigation, impoundment, animal reduction and pickup, licensing enforcement, animal vaccination and related activities in support of other public health programs.

Health education concerning communicable disease is coordinated through the Health Education Section of the Department of Public Health and Social Services.

The role of nutrition in the resistance of individuals to disease is well established. There is at present no formal program for the improvement of nutrition in the territory of Guam.

Chronic Diseases

General Background of Need:

Chronic diseases, though not confined to the older age groups, are more prevalent as age increases.

In the continental U.S., the increasing relative importance of the chronic diseases is greatly the result of three long-term developments.

First is the diminution of the prevalence of the infections and parasitic diseases.

Second is the changing age structure of the population which has resulted in a greater proportion of the population in the older age groups.

Third, the increased rate of overall population growth has placed a greater number of people at risk of chronic disease, because at any age, a larger number of persons are at risk.

It is apparent from a comparison of the age composition of the U.S. and Guam populations, shown in Table 10 that aging of the population has not taken place in Guam as it has in the mainland U.S. Rather, the percentage of persons in the stable population at ages 45 and over actually decreased by 1.1 percent between the years 1930 and 1960, while the proportion under 20 years of age showed an increase of 6.6 percent.

In contrast the U.S. population during these same years demonstrated an increase of 6.2 percent for the age group 45 and over and the proportion under 20 remained practically constant.

Aside from the relative changes that are taking place in the two populations it is of interest to note the absolute differences in age compositions existing in 1960. Over sixty percent of Guam's stable population were under 20 years of age while only 13.1 percent were 45 or older. At the same time, in the U.S., only 38.5 percent of the population were under 20 and almost 30 percent were 45 or older.

TABLE 10
PERCENTAGE AGE COMPOSITION OF U.S. AND GUAM*
POPULATIONS - U.S. BUREAU OF THE CENSUS

AGE GROUP	U.S.			GUAM	
	1960	1930	1860	1960	1930
Under 20	38.5	38.6	51.2	60.6	54.0
20-44	32.3	38.4	35.6	26.4	31.9
45-64	20.0	17.6	10.4	10.2	11.4
65+	<u>9.2</u>	<u>5.4</u>	<u>2.8</u>	<u>2.8</u>	<u>2.7</u>
Total	100.0	100.0	100.0	100.0	100.0

*Indigenous population only.

A popular tendency has been to attribute the increased importance of chronic disease to the aging of populations or to equate the "aging problem" with the "chronic disease problem."

Recent studies on the mainland indicate that, despite the high age-specific prevalence of all chronic diseases among the population 65 years and over, no more than 15 percent of the total persons in the U.S. with one or more chronic conditions were in this age group. There has been a tendency to assume that persons with chronic illness and disease are more heavily concentrated in this segment of the population than is actually the case.

There is, of course, no reliable means of determining what the volume of chronic diseases actually will be in the future, but the possibility of a much greater volume as a result of population increase alone appears most probable even though the prevalence of chronic disease were to remain the same. The greatest increase in volume will also probably occur in the younger age groups.

These data suggest that relatively more of our efforts and resources for prevention will need to be directed to the younger segments of the population in the future. This same conclusion is even more valid in Guam, where the stable population is so youthful and growing more so.

A comparison of the ten leading causes of death for the continental U.S. and Guam can be seen from the data presented in Tables 11 and 12.

TABLE 11
TEN LEADING CAUSES OF DEATH - GUAM
(1)
FOUR-YEAR PERIOD 1965-1968

RANK	CAUSE (2)	PERCENT
--	All causes.....	100.0
1.	Diseases of the heart and blood vessels.....	22.6
2.	Accidents, all types.....	11.7
3.	Malignant neoplasms (cancer).....	10.0
4.	Ill-defined diseases peculiar to early infancy and immaturity.....	7.7
5.	Pneumonia, all types.....	7.1
6.	Other diseases of the central nervous system (ALS and PD).....	5.6
7.	Vascular diseases affecting central nervous system (stroke).....	4.2
8.	Cirrhosis of the liver.....	2.7
9.	Other diseases of digestive system except diarrhea of the newborn...	2.6
10.	Diabetes mellitus.....	2.4
--	All other causes.....	23.4

- (1) The ten leading causes of death were determined from the mortality data over a four-year period to minimize the yearly variability of rank due to small numbers.
- (2) Seventh Revision, International Classification of Diseases. Source: "Annual Report, 1968," Office of Vital Statistics, Department of Public Health and Social Services, Government of Guam.

TABLE 12

TEN LEADING CAUSES OF DEATH - U.S. 1968

RANK	CAUSE ⁽¹⁾	PERCENT
--	All Causes.....	100.0
1.	Diseases of heart.....	38.8
2.	Malignant neoplasms (cancer).....	16.6
3.	Cerebrovascular disease (stroke).....	10.9
4.	Accidents, all.....	5.8
5.	Influenza and pneumonia.....	3.6
6.	Certain causes of mortality in early infancy.....	2.2
7.	Diabetes mellitus.....	2.0
8.	Arteriosclerosis.....	1.7
9.	Bronchitis, emphysema and asthma.....	1.7
10.	Cirrhosis of the liver.....	1.5
--	All other causes.....	15.2

(1) Eighth Revision, International Classification of Diseases,
Source: "Vital Statistics Reports," National Center for
Health Statistics, Vol. 17, No. 13, August 15, 1969.

Specific Problems:

Heart Disease: Cardiovascular disease is a general name for any condition which impairs the functioning of the circulatory system - the heart and/or blood vessels.

"Heart disease" in this analysis means all cardiovascular diseases other than stroke.

Heart diseases in Guam is the leading cause of death. For the 4-year period ending 1968, heart disease accounted for 22.6 percent of the total deaths in Guam.

Mortality from heart disease, in general, increases with age. Since Guam's population contains such a small proportion of people in the older age groups, it is relatively less affected by these diseases than older populations such as the continental U.S.

Arteriosclerotic and Other Diseases of the Heart - This category represents the majority of cardiovascular deaths. Coronary heart disease is the best known and most feared of these diseases. In order to function effectively as a pump, the muscular wall of the heart depends upon an adequate supply of blood flowing through the coronary arteries. When disease interferes with coronary flow, the resulting condition is called "coronary heart disease."

The prevalence of coronary heart disease rises with age. The incidence of coronary heart disease is associated

with such risk factors as elevated serum cholesterol, high blood pressure, abnormal electrocardiogram and excessive cigarette smoking.

Deaths from arteriosclerotic heart disease in Guam generally follow the mortality pattern of the U.S. The risk of dying from this disease increases markedly with age for both sexes. The mortality rate from this group of diseases is over twice as great for males as it is for females in the stable population of Guam. (Table 13)

TABLE 13

NUMBER OF DEATHS FROM ARTERIOSCLEROTIC HEART DISEASE*
(1)
IN THE STABLE POPULATION BY AGE AND SEX
GUAM - TOTAL FOR 1962, 1963, 1964

Age Group	Male	Female	Total
0-34	2	0	2
35-44	6	0	6
45-54	8	1	9
55-64	12	5	17
65-74	11	5	16
75+	<u>10</u>	<u>11</u>	<u>21</u>
Total	49	22	71

*From Death Certificates 1962, 1963, 1964.

- (1) Indigeneous Guamanians and permanent residents, estimated at 50,000 as of 1963.

The relative magnitude of deaths from arteriosclerotic heart disease in Guam appears quite low when compared

with that of the U.S. for ages 45 and over. The Guam average death rate for arteriosclerotic heart disease in persons 45 or over for years 1962-1964 is 313/100,000 persons of the stable population,⁽¹⁾

Arteriosclerotic heart disease accounted for almost 70 percent of all deaths from heart disease in Guam.

Hypertensive Heart Disease - In hypertension (high blood pressure) pressure in the blood vessels is persistently (not just occasionally) high. High blood pressure results from arterioles clamping down all over the body, making it difficult for blood to pass through to the capillaries.

Sustained high blood pressure causes a gradual thickening of the muscle layers of the arterioles and arteries, followed by a breaking up of their elastic layers. As passages become narrower the heart must do extra work, and it becomes enlarged. The increased resistance may cause the heart to undergo functional deterioration prematurely, cause kidney failure, cerebral strokes, or heart failure.

The prevalence of hypertensive heart disease in Guam has not been determined, but the average number of deaths from hypertensive heart disease over the three-year period

(1) Computed by Office of Comprehensive Health Planning from death certificate data and using estimated stable population of 6,700 persons, 45 years and over in 1963.

1962-1964 indicate that the death rate from this cause in the proportion of Guam's stable population age 45 or over, is around 44/100,000.⁽¹⁾

Rheumatic Fever and Rheumatic Heart Disease - Rheumatic fever is primarily a disease of childhood and youth, striking most frequently between the ages of 5 and 15. It may affect any part of the body, including joints, skin, brain, or heart. Damage to the heart may be serious or fatal, while effects on other body parts are usually temporary.

Rheumatic heart disease is the result of inflammation and scarring of the heart's muscle and heart valves caused by rheumatic fever. Rheumatic heart disease is by far the most common type of infectious heart disease. It is felt to be a serious problem of relatively high incidence on Guam.⁽²⁾ During the period 1962-1969, there were 22 deaths in Guam attributed to rheumatic heart disease.

Sufficient data is not available to determine the incidence or prevalence of rheumatic fever or rheumatic heart disease on Guam.

There was, however, as of June 1970, 36 persons between the ages of 7 and 21 with positive Rheumatic Heart Disease

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- (1) Computed by the Office of Comprehensive Health Planning.
 - (2) "1969 State Plan for Crippled Children's Services," Department of Public Health and Social Services, Territory of Guam, June 17, 1968.

on the rolls of the Crippled Children's Services register in Guam. There were also 83 persons between the ages 7 and 21 on the Crippled Children's Services register with rheumatic fever at that time.

During the 18-month period including 1967, and the first 6 months of 1968, 35 persons were admitted to Guam Memorial Hospital with a diagnosis of rheumatic fever.

Congenital Malformations of Circulatory System - This defect exists at birth and results from failure of the infant's heart or a nearby blood vessel to mature normally during the prenatal growth period. It is estimated that more than 50 percent of all children with heart disease suffer from a congenital defect.⁽¹⁾

In Guam, the combined mortality from congenital heart defects for the (6) years 1963-1968, accounted for 6.2% of the total infant deaths for those years. The average death rate in Guam for infants from congenital heart disease for these 6 years was approximately 149/100,000 population under 1 year of age, whereas, the rate for the U.S. in 1960 was 187/100,000 for whites and 163/100,000 for non-whites.

It has been estimated that the incidence of congenital

(1) N.O. Borhani, "Magnitude of the Problem of Cardiovascular-Renal Diseases," in Chronic Diseases and Public Health, (ed) Abraham M. Lilienfeld and A.J. Gifford, Johns Hopkins Press, Baltimore, 1966.

heart disease in the U.S. is about 5 per 1000 births.⁽¹⁾

An analysis of Guam statistics shows the rate to be
around the same locally.⁽²⁾

Early mortality reduces the newborn incidence to about 2 per 1000 in school age children.

Guam's Crippled Children's Services' register lists 129 persons on their rolls with congenital heart disease as of June 1970. This register indicates a prevalence of congenital heart disease of about 3 per 1000 among school age children.⁽³⁾

During the 18-month period including the year 1967 and the first six months of 1968, 56 persons with a diagnosis of congenital malformation of the circulatory system were admitted to the Guam Memorial Hospital.

Cerebrovascular Disease (Stroke): A stroke occurs when the blood supply to a part of the brain tissue is cut off and prevents the cells in that part of the brain from functioning. As a result, the part of the body controlled by these cells cannot function, causing paralysis, difficulty in speaking, inability to walk, or loss of memory.

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- (1) N.O. Borhani, "Magnitude of the Problem of Cardiovascular-Renal Diseases," in Chronic Diseases and Public Health, (ed) Abraham M. Lilienfeld and A.J. Gifford, Johns Hopkins Press, Baltimore, 1966.
 - (2) Office of Comprehensive Health Planning, Guam, 1970.
 - (3) There were about 25,000 children on Guam, ages 2 to 14 in 1969, and 91 children on the Crippled Children's Service register of those ages.

Stroke, as a cause of death, has not assumed the relative rank among all causes of death in Guam that it shows in the continental U.S. Over the 4-year period 1965-1968, deaths from stroke averaged seventh among the ten leading causes of death in Guam, accounting for 4.2 percent of the total deaths for that period. For the same period of time, stroke ranked third as a cause of death in the mainland U.S. accounting for 10.9 percent of the total deaths for the year 1968.

As shown in Table 14, the age and sex distribution of deaths from stroke in Guam is fairly similar to that shown in the rest of the U.S. as a whole.

TABLE 14
(1) (2)
NUMBER OF DEATHS FROM STROKE IN THE STABLE POPULATION
GUAM, TOTAL FOR 1962, 1963, 1964

Age Group	Male	Female	Total
Under 45	0	1	1
45-54	4	5	9
55-64	12	3	15
65-74	4	6	10
75+	<u>7</u>	<u>9</u>	<u>16</u>
Total	27	24	51

(1) From "Death Certificates, 1962, 1963, 1964," Vital Statistics, Department of Public Health and Social Services, Government of Guam.

(2) Indigenous Guamanians and permanent residents, estimated at 50,000 as of 1963.

The Guam average death rate from stroke in ages 45 and over for years 1962-1964 was 254/100,000 persons 45 and over in stable population.⁽¹⁾

Mortality data at hand represent only a portion of the patients with cerebrovascular disease in Guam. Accurate surveys of the prevalence of stroke are not available, however, during the twelve-month period of 1967, eleven persons were admitted to Guam Memorial Hospital with this diagnosis.

Cancer: Cancer can be considered a family of related diseases.

Irrespective of the type of neoplasm or site, all cancers have certain common characteristics: uncontrolled growth, tendency to spread widely in the body, and fatal termination if not treated early and adequately.

The control of cancer, as of any other chronic illness, depends upon putting into practice existing scientific, technical and administrative knowledge for prevention, early diagnosis, definitive treatment, and rehabilitation. Before objectives and plans can be determined and priorities assigned, however, it is necessary to know something about the impact of cancer on the community.

(1) Computed by Office of Comprehensive Health Planning from death certificate data and using estimated stable population of 6,700 persons of 45 years of age and over in 1963.

TABLE 15

CANCER DEATHS - NUMBER AND PERCENTAGE BY AGE GROUPS AND SEX
GUAM, 1965-1968

Age Group	Number Cancer Deaths*			Number All Deaths			% Of All Deaths At These Ages		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
0-24	17	8	9	437	273	164	3.9	2.9	5.5
25-44	18	11	7	194	148	46	9.3	7.4	15.2
45-64	58	30	28	371	240	131	15.6	12.5	21.4
65+	<u>39</u>	<u>22</u>	<u>17</u>	<u>357</u>	<u>168</u>	<u>189</u>	<u>10.9</u>	<u>13.0</u>	<u>9.0</u>
Total	132	71	61	1359	829	530	9.7	8.6	11.5

*Includes military deaths.

Table 15 reveals that of all deaths occurring among females in Guam 45-64 years of age, 21.4 percent are attributed to cancer. This is the highest percentage among all age groups for either sex.

Table 16 shows the most frequent sites of cancer among males and females for the 4-year period ending 1968. Among males, the most frequent single site was lung (18.3 percent); among females, the most frequent site was breast (20 percent). Lung cancer is also high among females.

TABLE 16

**CANCER DEATHS* BY SEX AND 10 MAJOR SITES
GUAM, 1965-1968**

MALE			FEMALE		
Site	Number of Cancer Deaths	% of all Cancer Deaths	Site	Number of Cancer Deaths	% of all Cancer Deaths
All Sites	71	-	All Sites	61	-
Lung	13	18.3	Breast	12	20.0
Liver & biliary passages	11	15.5	Lung	11	18.0
Buccal cavity & pharynx	7	10.0	Leukemia	8	13.1
Leukemia	6	8.5	Uterus	7	11.4
Prostate	5	7.0	Buccal cavity & pharynx	4	6.6
Stomach	3	4.2	Stomach	3	5.0
Lymphomas	3	4.2	Liver & biliary passages	3	5.0
Colon	2	2.8	Ovary	1	1.6
Esophagus	2	2.8	Lymphomas	1	1.6
Larynx	<u>2</u>	<u>2.8</u>	Pancreas	<u>1</u>	<u>1.6</u>
TOTAL OF 10 MAJOR SITES	54	76.1	TOTAL OF 10 MAJOR SITES	51	83.9

*Includes military deaths.

Diabetes: Diabetes is a public health problem of significant magnitude in Guam, from the viewpoint of both mortality and morbidity. Its importance in producing disability is compounded by its predisposing influence in the development of atherosclerosis of the coronary, cerebral, and peripheral arteries, and blindness.

The crude death rate among the stable population of Guam in 1969 was 12.8/100,000.

Of the 17 deaths occurring among diabetic patients in 1969, there were 9 deaths listed with diabetes as a contributing factor but not as an underlying cause of death. These deaths were not included in the calculation of the crude death rate.

Of all the Guamanian death among diabetic persons in 1968 and 1969, 3% were at ages less than forty, 13% at ages 41-50, 22% at ages 51-60, and 62% at ages over 60. Of these same deaths, 38% were males, and 62% were females.

It is estimated that of every 1000 civilians in Guam's population in 1970, there would be found 13 persons with known diabetes, 9 persons with diabetes who were not aware of it, and another 36 persons who would, at some time during their lifetime become clinical diabetics.

There were over 230 diabetics hospitalized in 1967. The average hospital stay for those patients was 38.3 days per patient in that year.

Amyotrophic Lateral Sclerosis and Parkinson Dementia: Parkinson Dementia (PD) and Amyotrophic Lateral Sclerosis (ALS) involve different entities of the central nervous system and occur in somewhat different age groups, however, they are usually considered together since the clinical manifestations of the diseases overlap at times in such areas as muscle wasting, and the progressive deterioration of both physical and mental faculties.

The prevalence of known ALS in Guam as of 1969 was about 80/100,000 of the indigenous population.⁽¹⁾

It is estimated that the incidence of ALS on Guam is about 40/100,000 per year. This is over 25 times as great as the incidence of ALS for the continental U.S. of 1.5/100,000 per year.

Since 1950, 11 percent of adult male deaths on Guam and 6 percent of adult female deaths were caused by ALS.

Since 1960, 12 percent of all male deaths and 5 percent of all female deaths were caused by PD.

ALS caused about 1/3 of all deaths among people age 40-45, and approximately 1/3 of all deaths among males aged 50-59 were caused by PD.⁽²⁾

(1) National Institute for Neurological Disease reports 38 cases of ALS in 1969. Estimated indigenous population in 1969 was about 48,000.

(2) "Final Report, Statewide Planning for Vocational Rehabilitation Services," Part II, Chapter VII, 1969.

Kidney Diseases: Kidney diseases have assumed increasing importance in the overall chronic disease picture. The mortality figures shown in Table 17 give some idea of the importance of the kidney diseases as a cause of death in Guam.

TABLE 17

KIDNEY DISEASES CODED AS UNDERLYING AND CONTRIBUTORY CAUSES OF DEATH, GUAM - TOTAL 1966, 1967, 1968

Diagnostic Category	Direct or Underlying Cause of Death	Contributory Condition
Glomerulonephritis	5	0
Pyelonephritis	15	5
Nephrosclerosis	4	2
Other	<u>6</u>	<u>2</u>
TOTAL	30	9

It is recognized, however, that the deaths directly attributed to kidney disease represent only a part of the total number of deaths in which kidney disease was the primary cause. Many patients whose death certificate lists hypertension or its complications as the cause of death have underlying kidney disease. Others whose death certificate lists septicemia (blood poisoning) also have an underlying kidney lesion.

Although various diseases of the kidney may initially attack one specific area of the organ, progression of

the various diseases lead in time to a general impairment of function and a common end stage.

Some of the more common diseases affecting the kidney are glomerulonephritis, pyelonephritis and urinary tract stones.

Glomerulonephritis - Acute glomerulonephritis occurs most often in childhood, and the majority of patients recover completely. Complications that may occur include congestive heart failure, cardiac enlargement, and central nervous system effects due to hypertension.

Chronic glomerulonephritis is manifested by its complications - hypertension with effects on the heart and nervous system, and edema and anemia.

Pyelonephritis - Infection of the kidney with microorganism is called pyelonephritis. It is an infectious disease of great importance since inadequate treatment can lead to cessation of the warning symptoms while the destructive process continues.

Any factor tending to cause the obstruction in the urinary tract may be favorable to the development of infection.

Bacterial infections are especially common in young women because of pregnancies, and in older men, because of prostatic enlargement. (See Table 18 on next page)

Pyelonephritis untreated or inadequately treated may go

on to the chronic stage, which eventually progresses to renal failure and death.

TABLE 18

NUMBER OF PATIENTS DISCHARGED FROM GUAM MEMORIAL HOSPITAL
WITH PRIMARY OR ASSOCIATED DIAGNOSIS OF INFECTION OF KIDNEY
BY AGE AND SEX, GUAM, 1968*

SEX	AGE GROUP					
	14-24	25-34	35-44	45-54	55-64	65+
Male	1	1	2	0	1	5
Female	10	13	7	7	2	3

*Source: Guam Memorial Discharge Record, 1968.

Urinary Tract Stones - When crystals of chemical substances are present in urine, they may form stones at any level in the urinary tract, from the kidney through the bladder. Kidney infections are very common in individuals with stones and may lead to renal insufficiency as described under pyelonephritis.

TABLE 19

NUMBER OF PATIENTS DISCHARGED FROM GUAM MEMORIAL HOSPITAL
WITH PRIMARY OR ASSOCIATED DIAGNOSIS OF CALCULI OF KIDNEY
BY AGE AND SEX, GUAM, 1968*

SEX	AGE GROUP					
	14-24	25-34	35-44	45-54	55-64	65+
Male	2	10	9	2	1	2
Female	10	7	2	3	2	2

*Guam Memorial Hospital Discharge Record, 1968.

A comparison of Table 18 and Table 19 reveals that the two age groups 14-24 and 25-34 for females have the highest occurrence of urinary tract stones, as well as the highest occurrence of kidney infection.

Arthritis and Rheumatism: Arthritis and rheumatism probably account for more pain and disability in a large number of people than any other group of diseases. The term "arthritis" is applied to conditions of unknown or varied causes in which there is involvement of the skeletal joints. The term "rheumatism," as commonly used, includes not only arthritis but conditions of pain and limitation of motion.

A survey conducted by the Guam Division of Vocational Rehabilitation in 1968 indicated that 455 individuals were reported to be suffering from arthritis. This number represents .89% of the survey population of 51,092 persons.

Gout, a form of arthritis, was the primary or associated diagnosis of 24 persons admitted to the Guam Memorial in 1968. (88% over age 45 and 50% over age 65)

Glaucoma: Diseases of the eye are common causes of chronic disability in adult populations. Of the eye disorders, the glaucomas are reported responsible for approximately 14 percent of total blindness in the United States. The cause of the disease is unknown. Glaucoma is characterized by increased pressure within the eyeball and optic

nerve damage, leading to progressive changes in vision and frequently to blindness. It has been estimated that nearly half of the cases existing in the adult population are unrecognized.

A total of five patients were discharged in 1968 from the Guam Memorial Hospital who were recorded as having glaucoma as an associated diagnosis. This, however, cannot be taken as any indication of the prevalence of the disease since glaucoma is usually treated on an outpatient basis.

A private physician who is the only one doing routine glaucoma testing states his screening produces about 1 glaucoma case in every 1,500 examinations.

Resources:

Detection of Chronic Disease: As of June 1970, there is no functional program for the early detection of chronic disease in Guam.

New cases of chronic disease are usually discovered through the individual efforts of physicians or public health nurses or as patients present themselves at clinics or physicians' offices with symptoms or complaints.

Glaucoma testing for the civilian population is routinely conducted by only one physician located at the Catholic Medical Center.

Treatment of Chronic Disease: The Crippled Children's Services of Guam provides medical services to children under 21 with crippling or potentially crippling chronic conditions.

Among those illnesses which receive high priority are:

- a) Rheumatic Heart Disease and Rheumatic Fever
- b) Congenital Heart Disease (heart defect present at birth)
- c) Chronic Otitis Media (middle ear infection)
- d) Diabetis Mellitus
- e) Epilepsy

The Guam Memorial Hospital, Catholic Medical Center, Seventh Day Adventist Clinic and the private physicians

of Guam provide treatment services for the chronically ill. Much of the costly and sophisticated equipment and techniques used in the treatment of certain chronic diseases elsewhere is, however, for several reasons not available on Guam.

Such techniques as open heart surgery for heart defects, radiotherapy for cancer, renal dialysis and transplants for kidney disease and others cannot be supported by the relatively small number of potential users of these services and the shortage of specialized manpower. Patients requiring these services must be sent to Hawaii or elsewhere for treatment.

Guam's isolation also makes it difficult for local physicians to keep abreast of the rapid increase in medical knowledge and techniques for the diagnosis and treatment of chronic disease.

An intensive care unit for heart patients is planned for the Guam Memorial Hospital. Funds for this facility were approved by the Regional Medical Program.

Diabetics may receive free insulin injections at the Guam Memorial Hospital.

Rehabilitation and Follow-Up: The Home Health Services section of the Department of Public Health and Social Services provides home nursing services, physical therapy services and medical social services for homebound

patients suffering from various disabling chronic conditions.

The Division of Vocational Rehabilitation in Guam takes referrals from any source and conducts a workshop for the improvement of self sufficiency for those persons suffering from handicapping conditions.

The Guam Memorial Hospital provides physical therapy services and occupational therapy services for its chronically ill patients.

Mental Health and Social Adaptation

The incidence of mental illness on Guam is not known, but professional opinion indicates that the incidence of mental illness on the island is very likely comparable, if not greater than, that experienced on the mainland. This would mean that approximately one in every ten persons is suffering from some form of mental or emotional illness, from mild to severe, that needs psychiatric treatment.

During the 12 months ending June 1969, the Guam Memorial Hospital admitted 87 patients with diagnosed and undiagnosed mental or emotional disorders. The distribution of these patients among the various classifications of mental disorders appears to be approximately the same as that found in Hawaii and the mainland United States. Psychotic disorders constitute about 35 percent of the total cases.

The line of demarcation where poor mental health becomes mental illness is only arbitrarily definable and even more nebulous than the delineation between poor physical health and physical illness.

This discussion is concerned with those aspects of maintaining

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- (1) "Guam Plan for Mental Health Services, Fiscal Year 1970," Department of Public Health and Social Services, Government of Guam, October 1969.
 - (2) "Facts About Mental Illness," National Association for Mental Health, 1965 Fact Sheet.

and improving mental health, the treatment of defined mental illness and the rehabilitation of mentally or emotionally disturbed persons.

Background of need:

Cross cultural conflict between traditional Guamanian family and community life and the Americanized environment of school or employment settings is an important stress producing situation. Also, the rapid changes in Guamanian cultural mores undoubtedly affect mental health through resultant changes in attitudes toward older family members, rising expectations of the father as a monetary provider, the frustration of having to compete in an unequitable economic environment with state-siders and alien contract workers, the striving for social acceptance through material wealth and other manifestations of success unfortunately adopted from American culture and moral conflict between strong church ties and the "new morality." All these situations, and others, combine to produce a total stress load which many individuals find intolerable.

Indicators of mental health such as juvenile delinquency, alcoholism, drug abuse, suicide, and school dropouts reinforce the belief that mental health is an important problem area on Guam; a problem whose manifestations are often insidious and misinterpreted, but whose implications for health and well-being are nevertheless as profound as those of the more obvious biophysiological diseases.

Specific Problems:

The following specific problems often involve the physical health of individuals and are in this respect problems in their own right. They are also symptoms of poor mental health or social maladjustment and as such are often used as indicators of the state of the mental health of a community. In addition, the existence of these problems in the family is a source of mental health problem for the other members of the family.

Alcoholism: The first six months of 1969, 19 persons were admitted to Guam Memorial Hospital with a primary or associated diagnosis of chronic alcoholism and an additional 21 persons were admitted with cirrhosis of the liver with alcoholism. Readmissions were excluded in these statistics.

Cirrhosis of the liver was one of the ten top causes of death for years 1965-1968 in Guam and became the seventh leading cause of death in 1968 for all ages. Statistics on death from cirrhosis of the liver are, of course, not a good measure of the health problems resulting from alcoholism.

Drug Abuse: In the study "Adolescent Psychiatry on Guam" (Womach, Machnir, and Freimund, 1968), Dr. Womach, the psychiatrist of this group stated that a year or two ago

when he helped write this study, he probably had an average referral rate of one case of narcotic use every four months; he further stated that by March 1969, it was more like four each month; (an increase of about 800 percent).

Table 20 below shows the extent of known narcotic usage in 1968.

TABLE 20
ESTIMATED USE OF DRUGS
BY TYPE, AGE AND SEX*

TYPE	AGE		SEX	
	0-14	15-23	MALE	FEMALE
Marijuana	27	23	45	5
Barbiturates	29	36	<u>65</u>	<u>0</u>
Total			110	5

*Source: Office of the Attorney General, Guam, 1968

During the summer of 1969 an informal survey of youth gang members was conducted, from which the following information has been extracted. Of the estimated 5-10 percent of the total island youth gang population surveyed (37 individuals, ages 12-23), 56 percent had used drugs at least once; 68 percent of those over 16 had used drugs at least once; 83 percent of those over 18 had used drugs at least once. Most drug usage was limited to marijuana, although

3-4 individuals reported instances of LSD. These estimates are considered to be very conservative.

In recent months the problem of drug abuse on Guam has increasingly been thrust into open discussion. The full magnitude of the local problem is just now becoming known to the general public. Conflicting reports from various sources of information make it difficult to state the number of uses of the various drugs in 1969. However, Mr. John Walls, Narcotics Officer for the Office of Naval Intelligence, has stated that drug abuse has increased 100 percent over 1968.

Suicide: The three-year average annual rate of civilian suicide deaths for Guam for years 1967-1969 was determined (1) to be 6.8/100,000 as compared to the suicide rate of 10.8/100,000 for the continental United States for 1967, and the suicide rate of 8.8/100,000 for Hawaii for 1967.

During the same period of time (1967-1969) 14 persons were admitted to the Guam Memorial Hospital with a diagnosis of attempted suicide and self inflicted injury. Over 60 percent of this group were under 25 years of age; an age when they had yet to realize their full productive potential. The significance of these attempted suicides for the planning of mental health services are pointed out in a study by Sherdman and Farberow in which they reported that 75 percent of the subjects in their study who

(1) "Monthly Vital Statistics Reports," Office of Comprehensive Health Planning, March 1970.

successfully committed suicide had a history of having previously threatened or attempted suicide.

Juvenile Delinquency: According to juvenile authorities, one of the primary causes of juvenile crime is the problem of acculturation, including change in the value system and intergenerational value conflict. "The extended family system appears to be breaking down. Island youth seek to emulate their concept of stateside behavior. Thus, conflicts arise which are reflected in delinquency of male and female island youth. Also given as primary causes, are the changing structure of the villages and the village rule as well as age-old village customs. Governmental control is becoming more and more patterned on the urban stateside model of law and order. Such social order is not only unfamiliar, but many times in opposition to Guamanian tradition. Military personnel were also mentioned by the juvenile authorities as creating sexual competition as well as representing a symbol⁽¹⁾ of success felt to be unattainable by the island youth."

There were 653 cases of juvenile offenders reported by the Department of Public Safety for 1968. These ranged from illegal possession of bats to assault with a deadly weapon. However, there is a notable increase in crimes

(1) "Final Report of the Comprehensive Statewide Planning for Vocational Rehabilitation Service," Territory of Guam, Vocational Rehabilitation, Part III, Section B, May 1969, p. 195.

of violence. There is an accumulated annual growth rate of 11.6 percent in juvenile delinquency, according to the Department of Public Safety. In 1968, approximately 50 percent of all drug users were 14 years of age. ⁽¹⁾

School Dropouts: The Department of Education reported in June 1967, that 880 students graduated from Guam's public high schools. Twelve years before, there had been 1,683 students in this class. Thus, 803 students dropped out during their school career (transfers were not included in this figure). Table 21 indicates that the school dropout problem is improving.

TABLE 21

JUNIOR HIGH AND SENIOR HIGH SCHOOL ENROLLMENT AND DROPOUTS
SCHOOL YEARS 1962-1963 to 1968-1969*

SCHOOL YEAR	ENROLLMENT	DROPOUTS	PERCENT OF ENROLLMENT
1962-1963	5971	488	8 %
1963-1964	6268	516	8 %
1964-1965	6771	502	7 %
1965-1966	7084	(184)	(2) % ⁽¹⁾
1966-1967	7433	498	7 %
1967-1968	7622	304	4 %
1968-1969	7958	339	4 %

* Department of Education

(1) Reason for low percentage of dropouts for this school year undetermined.

(1) Office of the Attorney General, Guam.

The school dropout problem has a twofold significance for mental health. Firstly, a large number of school dropouts are directly or indirectly the result of emotional problems and are in this respect an indication of the general mental health of their age group.

Secondly, the population of individuals who permanently drop out of school, for any reason, are a group at high risk of poor mental health in later years as they find it increasingly more difficult to compete for jobs in a changing social and economic environment which demands more and more sophisticated knowledge as a prerequisite for success.

Divorce: The divorce ratio for the continental United States for 1967 was approximately 2.5/1,000. The divorce ratio for Guam has remained fairly constant at an average of .55/1,000 population since 1967. This extremely low rate could mean that most Guamanian marriages are happy ones, or that unhappy marriages are resolved on other ways, for example, by voluntary separation.

Resources:

Guam's formal mental health program had its inception in fiscal year 1968. This program is administered by the Mental Health Section of the Department of Public Health and Social Services.

In September 1969, formal efforts were begun to establish a Community Mental Health Center on Guam, and in 1970, the new Comprehensive Community Mental Health Center was opened at the Guam Memorial Hospital. This center is expected to offer outpatient, consultative and educational services.

The need for outpatient mental health services on Guam is especially great in view of the lack of community resources available for people with emotional problems. For example, there is no child guidance clinic, no marriage counseling agency, as well as none of the other resources that would ordinarily complement the services of a Mental Health Clinic.

The Mental Health Administrator states in the fiscal year 1971 Budget Request for the Department of Public Health and Social Services that the "emphasis of the program will be placed on the prevention of mental illness," and "towards this goal, the program will be focused on the individual and/or his family in the community."

It is hoped that this plan to eventually take outpatient mental health services to the people in their own communities

will come to early fruition. This method of delivering mental health services is important in Guam since there is presently no public transportation system and the telephone system is either incomplete or malfunctioning in many areas.

Primary efforts in providing consultation and education should be directed not only toward the social service workers and public health nurses, but also to educators, the clergy, police officers and other persons in public service, since these are the people who often experience the first contact with emotionally disturbed individuals and should have some idea when further counseling or treatment is required and what services are available for referral.

Dental Health

(1)

General Background of Need:

The occurrence of dental disease in the children of the territory of Guam is comparable in the prevalence in most developing areas of the Pacific where dietary patterns have been disrupted due to social and economic change. Specifically, these changes are related to the diet, income sufficiency, motivations and the availability and accessibility of dental services.

In Guam, the economy has changed through the years from a subsistence rural economy to an economy based on employment by the military, local government, or private agencies. Agriculture and fishing make a very minor contribution to the island's economy. This has brought about the dietary change from locally produced fruits, vegetables, meats, and fish to a diet which contains more sugar, soft canned foods and sweetened drinks and less fresh fruits, vegetables, meat, and milk. Economic factors have exerted considerable effect upon the dental health of the residents. The Public Health Report for the territory of Guam for fiscal years 1966-1967, (2) stated that the average family consisted of 5.7 persons.

(1) The narrative of the problem under this heading has been taken almost entirely from: "A Proposal for the Training of Dental Personnel for the Territory of Guam," Department of Public Health and Social Services, Government of Guam, May 3, 1969.

(2) "Public Health State Plan for the Territory of Guam; Fiscal Years 1966-1967," Department of Public Health and Social Services, Government of Guam, July 13, 1965.

The median annual income per family in Guam is \$3,987.00. The highest income for the lowest 50 percent of the income bracket⁽¹⁾ is less than \$3,000.00 per family per year. These large families, together with the high cost of living and low income, give the buying of dental health services a low priority.

(1) "Five-Year Plan for the Socio-Economic Development of Guam," Staff Planning Council, Government of Guam, December 6, 1968.

Specific Problems:

The above factors, along with the lack of good oral hygiene habits and a lack of available dental care has produced a deplorable dental condition in the younger generation. The seriousness of the dental situation was emphasized by a dental survey in 1959 performed upon elementary school children and preschool children which indicated a 90-93 percent prevalence of dental caries with an average of 5.2 carious teeth per child.⁽¹⁾ A later survey of the same age level performed in 1964 showed a prevalence of 98-99 percent and an average of 8.3 carious teeth per child.⁽¹⁾ There is no evidence to suggest that the problem has not increased in intensity since the last survey. Considering that there are approximately 25,000 school children in Guam, the prevalence rate indicated would produce a projected total of over 200,000 teeth which should be restored or extracted in school children.⁽²⁾

No statistics are available on the extent of gingival inflammation. It is the professional opinion of the Division of Public Health dentists that approximately 60 percent of the school children have an indication of some form of gingival inflammation. This can further be projected into a much more

(1) "Public Health State Plan for the Territory of Guam; Fiscal Years 1966-1967," Department of Public Health and Social Services, Government of Guam, July 13, 1965.

(2) "State Plan for Public Health Services, Fiscal Year 1970," Department of Public Health and Social Services, Government of Guam, October 22, 1969.

serious periodontal problem for these patients as they become young adults.

The extent of orthodontal problems has not been determined in Guam.

Dental caries and their consequences constitute by far the major proportion of the total dental problem, therefore, the remainder of this report will deal almost exclusively with this aspect.

High Risk Groups: Dental caries is a disease of the calcified tissues of the teeth. It is caused by acids resulting from the action of microorganisms on carbohydrates. Very few people are immune to dental caries, therefore, practically everyone is at risk of the disease.

Innumerable factors have been related at one time or another to the development or lack of development of dental caries. Some of those particularly considered have been pregnancy, chronic debilitating diseases such as diabetes and tuberculosis, radiation, endocrine problems, psychic trauma, nutritional deficiencies, inadequate dental exercise, inadequate dental cleansing, enzymes, bacteria of various species, and inherited or acquired immunity or susceptibility.

It is generally considered that no relationship exists

between endocrine disturbances and the amount of caries. (1)

The general feeling is that inherited or acquired susceptibility or immunity to dental caries plays a minor role in the total caries picture.

It has been conclusively demonstrated that there exists a relationship between the formation of dental caries and the number of lactobacilli in the mouth. (1)

Prevention and Treatment: The use of the toothbrush, mouth-washes, lozenges, medicated chewing gum, and professional dental prophylaxis while useful from the standpoint of general oral hygiene, cosmetic effect and the stimulation of healthier gingival tissues, have no evidence to indicate that their use bears a relationship to the suppression of caries. (2)

By far the most dramatic and significant development in dental health during recent years has been the discovery of the relationship of fluorides to dental caries.

It has been clearly shown that proper fluoridation of water supplies will decrease dental caries prevalence up to 65 percent. In addition, a program of properly applied preventive measures may now be able to reduce the

(1) J.J. Hanlon, "Public Health Dentistry, in Principles of Public Health Administration," C.V. Mosby Co., St. Louis, 1964.

(2) K.A. Easlick, "Dental Caries, Mechanisms and Present Control Technics," The C.V. Mosby Co., St. Louis, 1948.

needs for caries correction to a point at which they may eventually be handled reasonably well along with the prosthetic, orthodontic, and dental surgical needs of the community.

To plan for the adequate provision of dental care for adults is somewhat more costly and complex than to do so for the children of the future. The oral ills of adults are more varied and often require more time consuming work than those of children. It is difficult to see how these problems can be handled by other than personalized treatment of individual dentists. The very nature of these adult ailments makes the cost of remedying them a very important factor.

Resources:

There are an estimated 65,000 persons in the stable population of Guam, as of 1970; approximately 25,000 are school age children and some 8,000 are of preschool age. The annual birth rate produces about 1,600 new potential dental patients every year.

- A. "The dental manpower in the Territory of Guam consists of three clinical dentists in the Public Health Dental Clinic, and nine dentists who perform services in private offices in other facilities. These dentists are attempting the impossible task for supplying the dental needs for approximately 65,000 Guamanians, plus dental service for numerous other persons who are living on Guam. The ratio of one dentist to over 5,000 people is unrealistic. A ratio of one dentist for each 2,200 population would be more comparable to the present dentist-patient ratio in the United States and this cannot be considered an adequate ratio.

The Dental Section of the Department of Public Health and Social Services is responsible for providing dental services to the following categories.

- a) All school children through sixteen years of age (P.L. 9-93).
- b) Crippled Children Services Program.
- c) Maternal and Child Health Program.
- d) Title XIX emergency dental service.
- e) Treatment for other eligible categories (Social Services, penitentiary inmates, detention home inmates, Head Start children, preschool examinations, and over-age school children.

This is a responsibility for performing various categories of dental services to approximately 30,000 patients.

The basic service given by the Dental Section is oral examination, prophylaxis, topical application of fluoride, emergency service, some restorative work and instruction in oral health to the school children; and some restorative work and emergency treatment of all other eligible categories.

The Public Health Dental Clinic is equipped with six operating units, seven chairs and a dental x-ray machine. Additional minor dental equipment is available to complement this major equipment in providing dental services." (1)

Although the necessary equipment is now on the island to

(1) "Proposal for the Training of Dental Personnel for the Territory of Guam," Department of Public Health and Social Services, Government of Guam, May 3, 1969.

fluoridate Guam's public water supply, it has not to date been completely installed.

Physical and Mental Impairment

General Background of Need:

Impairment is defined in this paper as a physical or mental handicapping condition which prevents one from performing on a par with one's contemporaries. As distinct from the more general term disability, the term impairment is confined here to those functional conditions which are the end result of disease, injury or defect.

Disability which is associated with continuing chronic disease is considered together with the disease condition under the "area of concern," Chronic Disease. The question of prevention and treatment of conditions giving rise to various types of impairment has generally been included in each respective "area of concern" and is not repeated here.

This paper, then, cuts across all areas of concern and contains a survey of those conditions which in effect are the final evidence of the inability or failure of society and medical science to successfully prevent or treat all of those diseases, accidents or events which terminate in conditions which we call impairments.

Impairment is treated as an "area of concern" separate from those conditions from which it derives because the problems which result from an impairment are often much different from

the problems associated with the prevention and/or treatment of the conditions which gave rise to it.

Specific Problems:

Physical Impairment: Vision - A survey of over 95% of Guam's (1) stable population in 1968 uncovered the fact that there was approximately 210 persons of all ages who were considered to be blind. The same survey also recorded 1052 persons with "eye problems" that were not corrected with glasses.

During the 12-month period ending June 1969, there were 59 persons who were patients at the Guam Memorial Hospital with a primary or secondary diagnosis of cataracts. Almost two-thirds of these were female and half were 65 years of age or older. However, there was still a significant percentage of that total (17%) who were 45 years of age or younger.

As of the end of the registration period for school year 1970-1971, there were 4 children of ages 5-12 who were enrolled in the New Piti School for the Visually Impaired.

Speech - The division of Vocational Rehabilitation survey (1) mentioned earlier recorded 377 persons, of the survey population of over 51,000 individuals, who had a "speech problem." There were also 52 persons with corrected or uncorrected cleft palate. The survey did not clarify what percentage of the 52 remain with uncorrected cleft palate,

(1) "Final Report, Statewide Planning for Vocational Rehabilitation Services," Vocational Rehabilitation, May 1, 1969.

nor how many of these individuals are included in the total of those with a speech problem.

The former speech therapist, Mr. John Miller, with the Department of Public Health and Social Services in an interview on January 9, 1970, stated that the most common speech problems encountered in his program were those of "faulty functional articulation" (inability to pronounce correctly certain sounds like th, etc.).

Hearing - The Division of Vocational Rehabilitation
(1)
survey revealed 157 persons of the survey population who were completely deaf in one or both ears and 53 persons who were deaf-mutes. (There were 1,010 persons with "ear problems" of an undetermined nature that could have included everything from blockage by wax to middle ear infection. No attempt is here made to interpret the significance of this group.)

The incidence of hearing loss in Guamanian school children is four times that of school children in the mainland U.S.
(2)

It has been estimated that 30-50 preschool children suffer from some degree of hearing loss as a result of the rubella epidemic in 1964 in Guam.

(1) "Final Report, Statewide Planning for Vocational Rehabilitation Services," Vocational Rehabilitation, May 1, 1969.

(2) R. Eldridge, J. Brody and N. Wetmore, "Hearing Loss and Otitis Media on Guam," Arch Otolaryng, Vol. 91, February 1970, pg. 130.

Orthopedic - The Guam Division of Vocational Rehabilitation survey⁽¹⁾ reported 32 persons with amputation of one or both upper limbs, 51 persons with amputation of one or both lower limbs and 198 persons suffering with some form of orthopedic birth deformity. (The survey further recorded 1,255 persons with "bone problems," the nature or extent of which was not determined.)

Other - The Guam Division of Vocational Rehabilitation survey⁽¹⁾ of 1968 further reported:

- a) 218 persons with epilepsy
- b) 44 persons with some degree of paralysis following accidents.
- c) 34 persons with some degree of paralysis following "stroke"
- d) 16 persons with impairment associated with cerebral palsy.

Mental Impairment: Mental Retardation - The Guam Division of Vocational Rehabilitation survey⁽¹⁾ of 1968 recorded 685 persons of the survey population as being "mentally slow." Of this total, 535 were between the ages of 5 and 19.

It is difficult to determine, on Guam, whether a person is really mentally deficient or not, since the overlay of cross-cultural difficulties undoubtedly obscure any

(1) "Final Report, Statewide Planning for Vocational Rehabilitation Services," Vocational Rehabilitation, May 1, 1969.

definitive identification of the true extent of mental retardation.

Other - The extent of mental impairment due to brain damage from stroke, head injuries, brain tumors, chemicals and drugs (including alcoholism), anoxia, etc. is unknown at the present time.

This report relies heavily on information contained in the Final Report of the Division of Vocational Rehabilitation which was obtained from household interviews conducted among 9,846 heads of household in Guam in 1968.

The limitations of this type of survey are well known. Nevertheless, in lieu of more specific information, the authors have decided to use this information with accompanying notes of caution to the reader. The survey contains no indication of the degree of disability due to the various types of impairment, therefore it is impossible to estimate the total impact of impairment on the territory of Guam and its people.

Resources:

The Guam Crippled Children's Services Program provides medical services to children to age 21, who have a crippling condition or potentially crippling condition. Theoretically this includes all of the impairments covered in this report.

The Speech and Hearing Clinic of the Department of Public Health and Social Services provides evaluation and therapy services for children referred from the military, Vocational Rehabilitation Program, Crippled Children's Services, Public Health clinics and physicians of Guam. The Clinic has a speech therapist and an audiologist.

The Division of Vocational Rehabilitation provides rehabilitation services to the physically and mentally handicapped persons of Guam on the basis of prognosis of the condition.

Brodie Memorial School provides vocational and scholastic training for approximately 150 mentally retarded children of Guam.

There is a specialized school for the visually handicapped and a school for the deaf located at the New Piti Elementary School campus.

There is a plastic surgeon available on-island for the surgical repair of cleft palate and harelip conditions.

The Lion's Club of Guam donates glasses and hearing aids to needy impaired persons requiring these items.

As of August 1970, there is no organized program for the care of preschool mentally retarded children nor custodial care of the mentally retarded who are ineligible for acceptance at the Brodie Memorial School.

Reproduction and Development

General Background of Need:

The general non-military stable population of Guam, which was estimated at approximately 62,000 as of 1969,⁽¹⁾ is characterized by comparatively large families, confronted with low income and high living costs. Dietary habits are often unsatisfactory because of the changing cultural patterns and the scarcity and/or high cost of fish and fresh produce. These factors plus the lack of understanding and appreciation, by many mothers, of their own health needs and those of their children, lead to too frequent pregnancies and a number of other conditions detrimental to good maternal and child health.

(1) Commissioners' reports, 1969.

Specific Problems:

The general conditions outlined in the preceding page contribute to the following specific problems. These are accompanied by an assessment of their severity and implications for general well-being.

Premature Birth Rate: Prematurity is highly associated with infant and neonatal mortality and is influenced by specific types of maternal morbidity.

A comparison of the premature birth rates of Guam, Hawaii, and the U.S. are given on the following for the year 1969.⁽¹⁾

Guamanian.....	102/1000 live births
Hawaiian.....	83/1000 live births
U.S. White.....	72/1000 live births

Birth Weight: Guamanian babies on the average weigh less at birth than white babies in the United States. The median birth weight of the liveborn Guamanian child was 3,180 (6 lbs. 15 oz.) grams compared with 3,310 (7 lbs. 4 oz.) grams for the United States whites in 1966. The median birth weight for the Guamanian baby, however, was about 60 (2 oz.) grams heavier than the median birth weight for United States non-white babies.⁽¹⁾

(1) "Infant and Fetal Mortality of the Indigenous Population of Guam, 1965-1967," Office of Comprehensive Health Planning, March 1969.

Neonatal Mortality Rate: Neonatal deaths, particularly early neonatal deaths reflect maternal and developmental factors associated with the fetus, as well as factors associated with the delivery. The incidence of neonatal deaths in Guam has been shown to be highly associated with lack of prenatal care.⁽¹⁾

A comparison of the neonatal mortality rates for Guam, Hawaii, and the U.S. are given below for 1966.⁽¹⁾ The average rate for the years 1965-1967 was used for Guamanians since the low number of annual neonatal deaths results in significant yearly variations.

Guamanian (average 1965-1967).....	18.5/1000 live births
Hawaiian (1966).....	15.7/1000 live births
U.S. White (1966).....	15.6/1000 live births

Infant Mortality Rate: The infant mortality rate is generally believed to provide an index of general health conditions, since it reflects environmental factors and those conditions which are usually preventable by Public Health measures.

A comparison of the infant mortality rates for Guam, Hawaii, and the U.S. are given below for 1966.⁽¹⁾ Again the three-year average (1965-1967) is used for Guamanians.

(1) "Infant and Fetal Mortality of the Indigenous Population of Guam, 1965-1967," Office of Comprehensive Health Planning, March 1969.

Guamanians (1965-1967).....	25.2/1000 live births
Hawaiians (1966).....	18.9/1000 live births
U.S. Whites (1966).....	20.6/1000 live births

Child Spacing and Family Planning: Studies on the mainland have indicated that child spacing is a significant factor in accounting for infant mortality. Where pregnancies are closely spaced, the infant and fetal mortality risk is increased. Even with high birth orders such as those prevalent in Guam, it is possible to have a spacing pattern which would reduce infant and fetal loss.

The new United States standard certificate of birth, adopted for use in Guam beginning January 1, 1969, contains information about spacing so that it will be possible in the future to analyze this variable as a factor in infant mortality.

A study by the School of Public Health, University of Hawaii, conducted in 1969 sampled the female population of Guam concerning contraceptive knowledge, attitude and practices. A summary of the study revealed the following:
(1)
"There seems to be no great objection to contraception; in fact, it can be said that there is a general desire to

(1) R.J. Wolff, B.Z. Bell, and R. Desanna, "KAP Study Guam," a study by the School of Public Health, University of Hawaii, January 1970, in cooperation with the Office of Comprehensive Health Planning.

know more about family planning."

"The majority of sample women express the desire to have not more than four children: two boys and two girls; and the ideal interval between pregnancies is two to three years. Many of the ever-pregnant women, however, have exceeded their desired number of children, and few have managed the ideal pregnancy interval."

"This sample shows two major groups of women who are most receptive to family planning services. There is a large group of older women, having over four children (exceeding the number they desire), who want contraceptive advice; this group needs family planning services immediately. There is another group of young women, for the most part as yet unmarried, and some of them as young as fifteen, who indicate that they want to learn about contraception in order to plan their families in the future; this group needs family planning education."

Unwed Mothers: One out of every ten births on Guam are known
(1)
to be illegitimate. Unwed mothers have been reluctant to seek prenatal and postnatal care, thus contributing to an elevated infant mortality rate.

The combined infant and fetal mortality rate is almost 50 percent higher for unmarried mothers as compared with

(1) "Annual Report," Office of Vital Statistics, Department of Public Health and Social Services, Government of Guam, 1969.

married mothers.

Maternal Morbidity and Mortality: Maternal morbidity is associated with premature births, hence, neonatal deaths. Maternal morbidity often causes the occurrence of various birth defects.

Because of insufficient reporting and the small population base of Guam, maternal morbidity and mortality rates are unusable in any analysis. However, low income populations living elsewhere in the U.S. are known to have relatively higher maternal morbidity and mortality rates than their more affluent counterparts.

Child Morbidity: Among the preschool age children there appears to be a high incidence of iron deficiency anemia, dental caries and intestinal parasitism. It is also suspected that undiagnosed and untreated chronic illnesses exist secondary to lack of treatment of acute disease. This is in part due to the fact that many parents do not recognize these problems and, therefore, do not seek medical treatment.

Middle ear infection often goes untreated in the preschool years because mothers fail to recognize this as a disease. Probably as a result of this there is a high incidence of hearing loss in school age children. As

shown in a recent study by the National Institute of Health,⁽¹⁾ the frequency of hearing loss in Guamanian school children is four times that of school children in the U.S.

It has been estimated that 30-50 preschool children suffer from hearing loss as a result of a rubella epidemic in 1964.

The existence of minor health problems such as pediculosis (head lice) and intestinal parasitism are signs of the living conditions and the need for more effective health education program and better environmental sanitation.

Genetic Factors: In any relatively isolated population of small size where intermarriage among a limited number of families over a long period of time occurs, there is always an increased chance for the generation of inherited factors which either give rise to certain defects or predispose the individuals so endowed to diseases or other health problems.

That genetic factors should be recognized as an important source of health problem in Guam is indicated by the extremely high incidence of Amyotrophic Lateral Sclerosis

(1) R. Eldridge, J. Brody and N. Wetmore, "Hearing Loss and Otitis Media on Guam," Arch Otolaryng, Volume 91, February 1970, page 130.

and Parkinson's Dementia, and the high rate of diabetes.

There are other atypical conditions that may be associated with genetic factors, such as the unusual excess of male births and the high rate of male fetal and infant mortality.⁽¹⁾

(1) "Infant and Fetal Mortality of the Indigenous Population of Guam, 1965-1967," Office of Comprehensive Health Planning, March 1969.

Resources:

Maternal and Child Health: Those services delivered by Public Health nurses and Government, private, and Navy physicians in the village and central clinics consist of:

- Child spacing and infertility counseling services.
- Prenatal and postnatal services.
- Maternal counseling services.
- Maternal and infant care project (special services to mothers at high risk of premature delivery).
- Well-child conferences.

As of December 1970, prenatal services in Guam are available as follows:

1. Two general medical clinics sponsored by religious groups are staffed with four doctors each who devote full-time to the clinics;
2. Nine doctors in private practice;
3. Six prenatal clinics of the Department of Public Health and Social Services presently staffed by two part-time obstetricians in private practice; and
4. The Outpatient Department of Guam Memorial Hospital serves a small number of prenatal patients.

There is only one obstetrician among the eight doctors staffing the medical clinics, and three obstetricians in private practice.

The School Health Program: This program is under the joint responsibility of the Department of Public Health and Social Services and the Department of Education.

A major stumbling block in public health administration, is often concerned with which agency should bear responsibility for the school health program. There are many advantages to operating the school health program as part of the community health program with the public health agency assuming the responsibility for its administration. The actual teaching of health subjects, however, should rightfully fall under the jurisdiction of the Department of Education with technical assistance from the Department of Public Health and Social Services. However, the subject matter to be taught should be determined in collaboration with the Health Department in order to ascertain priority areas.

Appropriate educational curricula dealing with reproduction, sex counseling, and family life education, utilizing skilled teachers and consultants are at present being given at only two of Guam's numerous elementary and high schools.

Twenty-five percent of the unwed mothers in Guam are teenagers. These girls are routinely dropped from their school classes and generally remain a group with a strong probability of poor mental health. This reflects a strong need for education in the classroom concerning those factors which lead to the occurrence of this situation.

Marriage Counseling: At present there are no marriage counseling services, as such, available on Guam.

Genetic Counseling: Whatever protection is afforded pregnant women from drugs with potential teratogenic effects is in the hands of their attending physicians.

There are no heredity clinics, and what help is given again must come from each individual's physician.

Abortion and Sterilization: Women desiring a legal abortion must go either to Japan or Hawaii for the operation. Voluntary sterilization of the male is available from private physicians and at the Seventh Day Adventist Clinic.

Nutrition

General Background of Need:

In Guam, the economy has changed through the years from a subsistence rural economy to an economy based on employment by the military, local government, or private enterprise. Agriculture and fishing presently play a very minor role in the island economy. This shift has brought about a dietary change from locally produced fruits, vegetables, meats and fish to a diet which contains more sugar, soft canned foods and sweetened drinks, and less fresh fruit, vegetables, meat and milk.

Superimposed on this dependence on manufactured and processed foods is the inequity of high living costs and low average family income. The high cost of living especially prohibits the purchase of high-priced items such as vegetables and fruits which are often in scant evidence and generally of a poor quality.

(1)

A food survey of elementary school children in 1961 revealed that food intakes were not balanced nutritionally. Their diets invariably lacked enough green and yellow vegetables, fruits and milk which would indicate probable minimal or sub-minimal intake of vitamins and minerals, especially vitamins A and C, riboflavin, calcium and iron.

(1) "Hidden Hunger on Guam," Nutrition, Department of Public Health and Social Services.

General implication for health: Diets which do not conform to the principles of satisfactory nutrition lead to impaired physical and mental development, ill health and untimely death.

Nutrition undoubtedly is of greater importance in the area of maternal and child health than in any other area of public health activity.

Mothers who are well nourished protect their health and the health of their babies; mothers who are not well nourished jeopardize their own physical well-being and give birth to infants not adequately equipped to withstand the early rigors of life. Furthermore, a greater proportion of miscarriages and stillbirths are attributed to poorly nourished mothers.

The postpartum mother has definite nutritional needs to enable her to effectively recover from the physiological strain of pregnancy and child birth and for the production of adequate breast milk.

The newborn child is more sensitive to the type of nutrients ingested than at any other time in life. The lack of teeth, limited digestive powers, enormous needs for growth and development, susceptibility to infection and the need to acquire a taste for foods of a variety of flavors and textures all influence the nutritional needs of infants. It has been established that normal

mental development is highly associated with proper nutrition during the early formative years.

The duration and severity of infectious diseases are dramatically lessened in well-nourished individuals as opposed to the ill-nourished.

The time of onset and severity of chronic diseases are thought to be tempered by the degree of success or failure in the totality of our life's encounters with disease and stress, and reaction of our environment and diet. It could well be that nutrition has the greatest part to play in determining whether we grow old enjoying our declining years in relative good health, or merely exist under the burden of multiple disabling chronic conditions and the imminent threat of premature death.

One of the greatest concerns with regard to an aging or aged population is nutrition. The older population in general, are more sedentary, their period of tissue and organ development is past and certain changes in food habits often occur as the result of dental problems, elimination difficulties and various physiologic changes. A common consequence of these conditions is obesity. Obesity has a well known effect on life expectancy and the prevalence of certain chronic diseases.

Conversely, the problem of excessive leanness is sometimes

seen among the aged. This may be due to calorie restrictions by reason of impaired dental function, allergic difficulties, lack of appetite because of living alone or anorexia nervosa.

Excessive leanness leads to lessened resistance to tuberculosis and various acute infections and possibly serious disability from ocular, vasomotor, endocrine, or skeletal changes. In addition, there is a risk of avitaminosis such as pellegra, beriberi, or scurvy.

In the field of oral hygiene and public health dentistry, good nutrition practices play a primary role. Not only the nutrient content but also the physical character of the diet play important roles in the determination of the condition of the gingivae and teeth. This is especially true among pregnant women and children.

As Jameson has pointed out, "Nutrition is the very essence
(1)
and basis of national health."

Through the diet, a new level of health can be attained, enabling mankind to develop inherited capacities to the fullest extent.

(1) W. Jameson, "The Place of Nutrition in Public Health Programs," American Journal of Public Health, 37:1371, November 1947.

Specific Problems:

Specific problems indicative of inadequate or inappropriate dietary intake are listed below. These may be the direct or indirect partial consequences of the general background conditions noted in the foregoing paragraphs.

High incidence of iron deficiency anemia: Iron deficiency anemia may be due to inadequate intake of iron in the diet.

During 1967 and 1968, 277 persons (68 children under the age of 14) were admitted to Guam Memorial Hospital with a primary or associated diagnosis of iron deficiency anemia. These statistics exclude those admitted with
(1)
anemia secondary to blood loss.

Very high incidence of dental disease among children: The high incidence of dental caries and gingivae inflammation are thought to be largely the result of inadequate diet. In 1969, approximately 98% of all school children had 1 or more carious teeth. It was estimated that about 60% of these children had some form of gingivae
(2)
inflammation.

High tuberculosis incidence rate: It is felt that inadequate nutrition may be a contributing factor in the high

(1) Medical Records Office, Guam Memorial Hospital, 1970.

(2) "State Plan for Public Health Services, Fiscal Year 1970," Department of Public Health and Social Services, Government of Guam, 1969.

incidence of active TB in the territory. In 1969, the incidence of new active cases of tuberculosis in Guam was 75/100,000 compared to 21/100,000 for the continental United States.⁽¹⁾

Large number of obese females in early and middle ages: In 1967-1968, approximately 112 females and 20 males were admitted to Guam Memorial Hospital with a primary or associated diagnosis of obesity.⁽²⁾ Data on the prevalence of obesity in Guam is given in more detail under a separate problem heading. From direct observation and professional opinion it appears that obesity is definitely a problem area.

Low average birth weights of Guamanian infants: The median birthweight of liveborn Guamanian infants for years 1965 through 1967 was 3,180 (6 lbs. 15 oz.) grams compared to 3,310 (7 lbs. 4 oz.) grams for the continental United States newborn infants.

(1) "State Plan for Public Health Services, Fiscal Year 1970," Department of Public Health and Social Services, Government of Guam, October 1969.

(2) Medical Records Office, Guam Memorial Hospital, 1970.

Resources:

There is little indication among the components of the health system, in terms of active continuing programs, that the improvement of general nutritional status commands a priority equal to its implications for health.

The nutrition program of the Department of Public Health and Social Services was severely curtailed from 1966-1968 for want of a staff nutritionist and again in 1969 for the same reason.

At present, there is not a separately budgeted, distinct nutrition program existing within that department.

Individual government programs continue to engage in those nutrition related activities which directly concern their own program. However, without the overall direction and long range planning strategy of a coordinated and continuing program in nutrition, these efforts are fragmented and the benefits are partial and transitory at best.

The Food Commodity Program provides food at no cost to those persons receiving financial assistance and is soon expected to be extended to low income families. This additional provision would make eligible about 8,700 additional individuals.

Food habits are slowly developed and once formed are even more slowly changed. To accomplish this change sometimes involves the breakdown of almost traditionally faulty diet habits and the introduction of a diet which is culturally acceptable yet

adequate in nutritional quality. In other words, a scientifically balanced diet and good nutrition habits must be made a part of the local folklore to be successfully adopted by a majority of the homemakers. This is a change that can only be brought about slowly over a number of years through an on-going coordinated program of nutrition education, demonstration and services.