

PERTILITY AND MORTALITY IN PUERTO RICO
II

By

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TABLE OF CONTENTS

PART	PAGE
I. INTRODUCTION - - - - -	1
Statement of Problem - - - - -	1
Purpose of this Research - - - - -	1
Assumptions and Definitions- - - - -	2
Review of Related Literature - - - - -	4
Description of Puerto Rico - the Area Studied- - - - -	5
II. ANALYSIS OF FERTILITY IN PUERTO RICO - - - - -	14
Some Factors Related to Puerto Rico's High Fertility -	15
Age at Marriage- - - - -	15
Length of Child-bearing Period - - - - -	16
Percentage of Young Persons- - - - -	17
Sex Distribution - - - - -	18
Percentage of Illiteracy - - - - -	19
Occupational Composition - - - - -	20
Percentage of Illegitimate Births- - - - -	21
III. ANALYSIS OF MORTALITY IN PUERTO RICO - - - - -	38
Infant Death Rates - - - - -	38
Maternal Death Rates - - - - -	40
Life Expectancy- - - - -	40
Causes of Death- - - - -	41
Tuberculosis - - - - -	43
Diarrhea and Enteritis - - - - -	44
Diseases of the Heart- - - - -	45
Pneumonia- - - - -	46
Cancer - - - - -	46
Malaria- - - - -	47
IV. SUMMARY AND CONCLUSIONS- - - - -	75
BIBLIOGRAPHY - - - - -	79
VITA - - - - -	82

INDEX OF TABLES

TABLE		PAGE
1	Population of Puerto Rico by Census Years, 1765-1950, Showing Changes in Number, Percent and Density - - - - -	10
2	Some Facts for Census Regions of Puerto Rico, 1940 - - - - -	13
3	Crude Birth Rates for Puerto Rico Compared with the United States for Selected Years, 1915-1949 - -	23
4	Crude Birth Rates for Various Countries, 1949 - - -	24
5	Fertility Ratios for Puerto Rico by Regions, Compared with Ratios for the United States, 1940- -	25
6	Fertility Ratios for Puerto Rico by Regions Related to Selected Population Characteristics, 1940-1949 -	26
7	Distribution of Married Persons in Puerto Rico, 1940 by Age at Marriage (including only first marriages)	27
8	Marital Status of the People of Puerto Rico, 14 Years Old and Over Compared with the United States, 1950 - - - - -	28
9	Specific Birth Rates by Age of Mother for Puerto Rico, 1944, and for the United States, 1946 - - - -	28
10	Percentage Age Distribution of the Population of Puerto Rico, 1899-1950 - - - - -	29
11	Percentage Age on Sex Distribution of Puerto Rico's Population by Rural and Urban Residents, 1950 - - -	30
12	Percentage Population Age and Sex Distribution for Puerto Rico and the United States in Relation to Sex 1950 - - - - -	31
13	Fertility Ratios for Puerto Rico, by Regions, Related to Percentage of Persons in the Reproductive Ages, and Percentage of the Population Under 45 Years of Age, 1940 - - - - -	32
14	Percentage of Age and Sex Distribution of Puerto Rico's Population, 1940 and 1950 - - - - -	33

TABLE		PAGE
15	Percentage of Population Illiterate in Puerto Rico, 1940, and the United States, 1930, by Age and Sex	34
16	Average Number of Children Born to 968 Puerto Rican Mothers by Education of Mother and Place of Residence, 1949 - - - - -	34
17	Percentage of Persons Employed in Puerto Rico and the United States by Occupations, 1940 - - - - -	35
18	Percentage of Puerto Ricans in Different Occupations, by Age and Sex, 1940 - - - - -	36
19	Percentage of Puerto Ricans in Different Occupations, by Regions, 1940 - - - - -	37
20	Crude Death Rates for Puerto Rico and the United States for Selected Years, 1900-1949 - - - - -	48
21	Crude Death Rates for Puerto Rico by Age and Sex, 1949 - - - - -	49
22	Infant Death Rates for Puerto Rico and the United States by Years, 1932-1948 - - - - -	50
23	Neo-Natal Infant Mortality Rate for Puerto Rico and the United States by Sex, 1945 - - - - -	51
24	Life Expectancy in Puerto Rico for Various Age Groups by Sex, 1947 - - - - -	52
25	Life Expectancy at Birth in Puerto Rico and Selected Countries by Sex and Year - - - - -	53
26	Death Rates for Puerto Rico per 100,000 population from Important Causes, 1932 and 1949 - - - - -	54
27	Comparative Changes in Puerto Rico and the United States Death Rates per 100,000 People from Important Causes, 1932 - 1948 - - - - -	55
28	Death Rates for Puerto Rico and the United States from Selected Causes by Race and Sex, 1948 - - - - -	56
29	Age-Specific Death Rates from Tuberculosis in Puerto Rico for Selected Years, 1933 to 1949 - - - - -	57
30	Computation for Fitting a Straight Line for Puerto Rican Death Rates from Tuberculosis, per 100,000 Population, 1933-1949 - - - - -	58

TABLE	PAGE
31 Age-Specific Death Rates from Diarrhea and Enteritis in Puerto Rico for Selected Years, 1933 to 1949 - - - - -	60
32 Computation for Fitting a Straight Line for Puerto Rican Death Rates from Diarrhea Enteritis, per 100,000 Population, 1933-1949 - - - - -	61
33 Age Specific Death Rates from Diseases of the Heart in Puerto Rico for Selected Years, 1933 to 1949 - - - - -	63
34 Computation for Fitting a Straight Line for Puerto Rican Death Rates from Diseases of the Heart per 100,000 Population, 1933-1949 - - - - -	64
35 Age-Specific Death Rates from Pneumonia in Puerto Rico for Selected Years, 1933 to 1949 - - - - -	66
36 Computation for Fitting a Straight Line for Puerto Rican Death Rates from Pneumonia per 100,000 Population, 1933-1949 - - - - -	67
37 Age-Specific Death Rates from Cancer in Puerto Rico for Selected Years, 1933 to 1949 - - - - -	69
38 Computation for Fitting A Straight Line for Puerto Rican Death Rates from Cancer, per 100,000 Population, 1933-1949 - - - - -	70
39 Death Rates for Puerto Rico per 100,000 Population from Malaria by Age and Sex, 1949 - - - - -	72
40 Computation for Fitting a Straight Line for Puerto Rican Death Rates from Malaria, per 100,000 Population, 1933-1949 - - - - -	73

INDEX OF FIGURES

FIGURE		PAGE
1	Location of Puerto Rico - - - - -	9
2	Trends in Birth Rates, Death Rates and Natural Increase in Puerto Rico, 1900-1949 - - - - -	11
3	Census Regions of Puerto Rico - - - - -	12
4	Trend in the Death Rate from Tuberculosis in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares - - - - -	59
5	Trend in the Death Rate from Diarrhea Enteritis in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares	62
6	Trend in the Death Rate from Diseases of the Heart in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares	65
7	Trend in the Death Rate from Pneumonia in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares - - - - -	68
8	Trend in the Death Rate from Cancer in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares - - - - -	71
9	Trend in the Death Rate from Malaria in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by the Method of Least Squares - - - - -	74

INTRODUCTION

The island of Puerto Rico, a territory of the United States about a thousand miles southeast of Miami, Florida, is one of the most densely populated areas of the world. With a land area of less than 3,500 square miles and a population of over 2,000,000 inhabitants, Puerto Rico has 643 persons per square mile, a ratio which is nearly fifteen times that of the United States, and eight times that of Virginia.

Hence, of all the problems of Puerto Rico, none is more important than its population problem. It is the basis of all other problems with which the island is confronted. The relationship between fertility and mortality indicates that the future of the Puerto Rican population will continue to be an example of extreme population pressure as long as present factors prevail.

Puerto Rico is of especial interest since its population growth represents in miniature the prospective growth which may take place in other areas in which birth rates are high and death rates are becoming lower; and which, like Puerto Rico, will experience with industrialization, urbanization, and the introduction of modern health practices a rapid decline in death rates before a concomitant decline in birth rates occurs.¹

Purpose of this Research

The purpose of this research is to study the fertility and

¹ Thompson, Warren S., Population Problems, McGraw-Hill Book Company, Inc., New York, 1942, pp. 72-82.

mortality of the people of Puerto Rico as related to selected cultural and demographic factors. Some of these factors are age at marriage, length of the child-bearing period, percentage of young persons, percentage of illiteracy, percentage of laborers, and percentage of illegitimate births.

Assumptions and Definitions

Since few people migrate to Puerto Rico, and medical science is aiding in a reduction of the death rate, it is apparent that excessive fertility is the major cause of the island's rapidly increasing population. Fertility is associated with cultural factors because such things as early marriage, illiteracy, and illegitimate births have back of them generations of traditions or handed-down beliefs that are acceptable modes of behavior or conditions of life. Cultural factors include all the ideas, practices, and man-made or modified things which make up a way of life. Demographic factors include those that pertain to the nature and characteristics of the population, such as age at marriage, age distribution, and sex distribution.

The term, fertility, means the number of children produced, or the actual reproduction of the population. Generally it is measured by crude birth rates, fertility ratios, and age-specific birth rates. Crude birth rates are a measure of the number of births within a year per 1,000 total population, while fertility ratios are measures of the number of children under five years of age to the number of women of child-bearing age. Age-specific birth rates are a refinement of the total birth rate and relate to the number of births to the number of

women in the various age groups of the child-bearing period.^{/2}

The term, fertility, is distinguished from the term, fecundity, in the following way: Fecundity is a term which defines the biological capacity to reproduce, and is assumed to be an almost unchanging constant for groups of human beings. Fertility is the actual reproduction, and is a variable, influenced by cultural environment. Hence, fertility never equals fecundity for any population universe.^{/3}

The formulas for calculating crude birth rates, fertility ratios, and age-specific birth rates as referred to in this study are as follows:

1. Crude birth rate = $\frac{\text{Number of births during the year}}{\text{Total population}} \times 1,000$
2. Fertility ratio = $\frac{\text{Number of children 0-5 years of age}}{\text{Number of women 15-44 years of age}} \times 1,000$
3. Age-specific birth rate = $\frac{\text{Number of births}}{\text{Number of women in given age group}} \times 1,000$

In this study the term, mortality, means the rate at which people die. The relationship between fertility and mortality is one of the principal determinants of whether the size of the population is on the increase or the decrease. The principal measures of mortality are the crude death rate and life expectancy. Crude death rates are a measure of the number of deaths within a year per 1,000 total population. Expectation of life is the average number of years that persons of any

^{/2} Smith, T. Lynn, Population Analysis, McGraw-Hill, New York, 1948, pp. 193-230.

^{/3} Landis, Paul, Population Problems, American Book Company, New York, 1948, pp. 50-53.

given age from birth on up may expect to live.^{/4}

The infant death rate relates the number of deaths of infants less than one year of age to the number of live births in a given year. This rate may be further refined to analyze deaths of infants less than one month, one week or one day old. The latter rates are called neonatal death rates.^{/5}

The maternal death rate is the number of deaths due directly to pregnancy, childbirth and puerperal causes per 1000 live births.^{/6}

Review of Related Literature

The literature reviewed was of two kinds: one, dealing with studies relating to the subject, and the other, literature dealing with general facts on population.

Combs and Davies made a study on the fertility of Puerto Rican women and concluded that they have more children than the women of the United States, and also have a longer child-bearing period.^{/7}

Rodriguez-Bou concluded that illiteracy in the island is still

^{/4} Smith, T. Lynn, op. cit., p. 193.

^{/5} Yerushalmy, Jacob, The Annals of the American Academy of Political and Social Science. "Infant and Maternal Mortality in the Modern World", January 1945, pp. 138-140.

^{/6} Ibid.

^{/7} Combs, J. W. and Davies, Kingsley, "The Pattern of Puerto Rican Fertility", Population Studies: A Journal of Demography, Vol. IV. No. 4, March 1951.

a fact and a problem.^{/8}

The increased life expectancy of the Puerto Rican population has been discussed by Janer.^{/9}

Smith says fertility, mortality, and migration are the dynamic factors in population growth. The rate of natural increase remains low when fertility and mortality are both high. But the rate of natural increase will rise sharply when the fertility is high and the mortality is declining,^{/10} as in the case of Puerto Rico.

Thompson says that death rates are affected by such factors as sex ratio, age composition, and occupational status of the population. Likewise, birth rates are affected by age composition, marital composition, income, religion, and education.^{/11}

Dublin and others say that the declining mortality rates tend to increase life expectancy of individuals.^{/12}

Description of Puerto Rico, The Area Studied

Puerto Rico is a rectangular island, 113 miles from east to west and 41 miles from north to south. Its land area is less than one

^{/8} Rodriguez-Bou, I., El Analfabetismo en Puerto Rico, University of Puerto Rico, 1949.

^{/9} Janer, Jose, La Esperanza de Vida Actual de Los Puertorriquenos, Asociacion de Estudios Poblacionales de Puerto Rico, 1949.

^{/10} Smith, T. Lyn, op. cit., p. 193.

^{/11} Thompson, Warren S., op. cit., pp. 96-126.

^{/12} Dublin, Louis J., Lotka, Alfred and Spiegelman, M., Length of Life The Ronald Press Company, New York, 1936, p. 167.

tenth the size of Virginia.

The Island is divided into a northern and southern part by a chain of mountains that run from east to west. Less than one half of the land area is arable. The soils are similar to those of the southern United States, but low in productivity. The land has been rapidly deteriorating due to the primitive type of agriculture practiced in the past. Production per acre is very low. The uniformly tropical climate makes possible the cultivation of the land throughout the year. The economy of Puerto Rico is based on the selling price of sugar, its principal cash crop. Tobacco, coffee, tropical fruits, and vegetables are produced and consumed mainly on the island.

Discovered by Columbus in 1493 Puerto Rico remained a Spanish possession until 1898 at which time it was ceded to the United States. The present inhabitants are mainly descendants of Spaniards, some Negroes, and a mixture of both. The 1950 Census reports that the colored population is decreasing and now is only 20 percent of the total. Nearly 60 percent of the people live in rural areas. Most of the people are Catholics, whose church officially opposes birth control and encourages large families.

The people have relatively low incomes. In 1949 the median per capita income was \$636, and in rural areas only \$270. Although low income is due to a number of factors, apparently it is influenced greatly by the large number of people in relation to natural resources. Low levels of living come as a consequence of low income. Many families live in houses of low health standards. Diets of most families are deficient in good quality protein, calcium, and vitamin A.

Although efforts are being made to increase school facilities, the number of children out of school is unusually large. Adult education is being emphasized.

Regions

The Bureau of the Census divides Puerto Rico into seven regions as shown in Figure 3 and listed with some of their characteristics in Table 2. These regions are important with respect to variations in fertility, and are used in this study as a basis for comparing and contrasting fertility ratios and related factors.

The seven census regions are:

1. Northwestern coast region. The principal crop in this region is sugar cane. Cotton, tobacco, and vegetables also are grown.
2. North-central coast. This region has the largest percentage of urban people. The most important crop grown is sugar cane. Farms are larger than in other areas. Dairying is important also. This is the region that offers most opportunity for work. Most of the industrial development is taking place here, and urbanization is increasing. The capital, San Juan, is located along the coast and opportunities for education are better here since San Juan contains the University of Puerto Rico, and several private colleges. In this region live most of the colored people.
3. Eastern coast. Sugar cane is the most important crop grown here, and this area, too, has a large percentage of colored people.
4. Southern coast. This region includes the second largest city of the Island, Ponce. Although sugar cane is grown, and some coffee,

dairying is the most important enterprise.

5. Western coast. Mayaguez, the third largest city in Puerto Rico, is located here. Fifteen years ago the hand-embroidery industry was the most important source of income, but today the most important source of income is sugar cane. New industries are being developed and urbanization is taking place. Opportunities for college education are available as the College of Agriculture and Mechanic Arts and the San German Polytechnic Institute are located in this region.

6. Western interior. This is known as the coffee region. Because of the low price of coffee this region is losing many people through migration to other parts of the Island. It is the most rural portion of the Island.

7. Eastern interior. In this region the principal crop is tobacco. However, there are sugar cane fields; coffee, and minor crops. As in the western interior region, most of the people are rural.

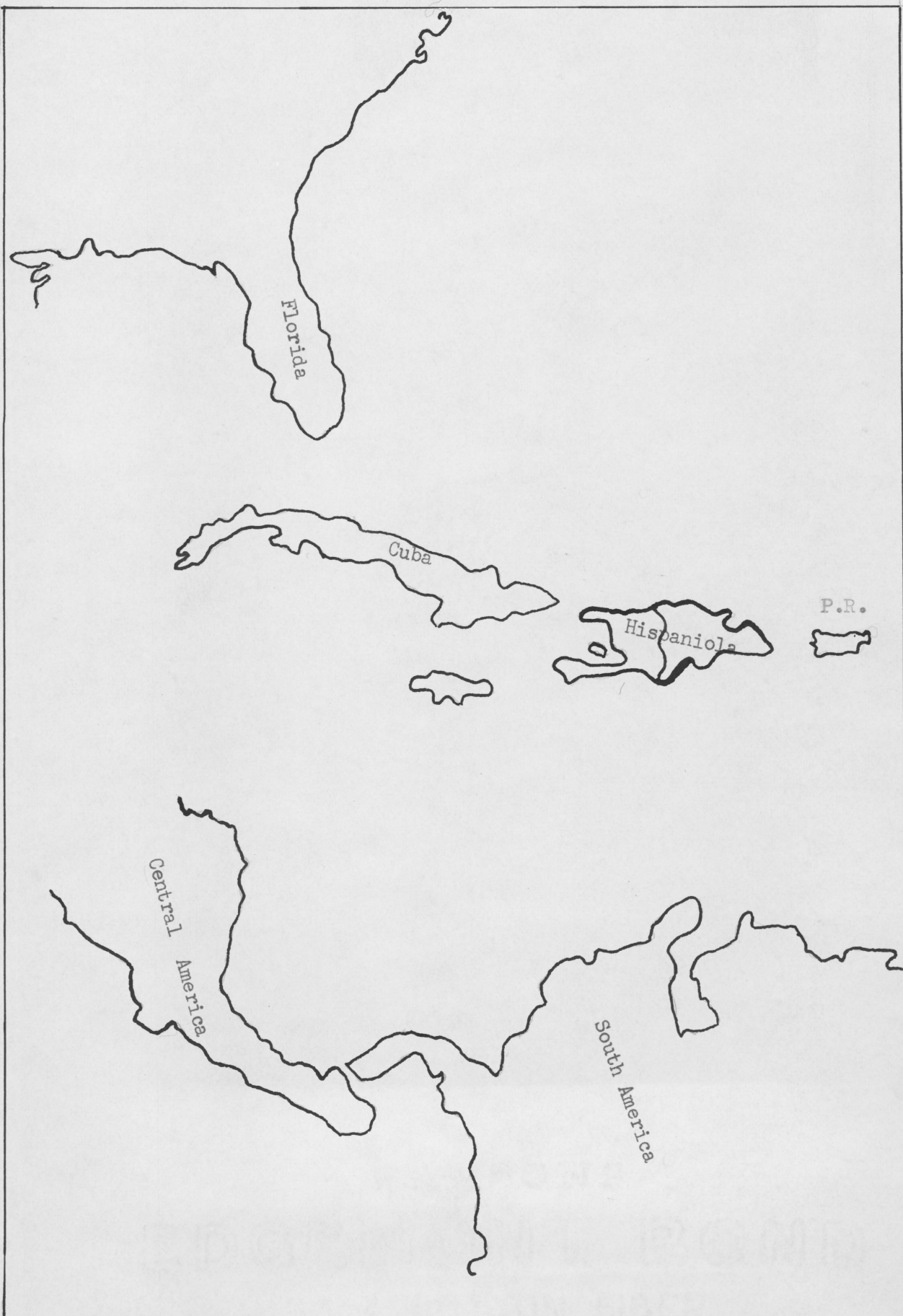


Figure 1 - Location of Puerto Rico

Table 1. - Population of Puerto Rico, by Census Years, 1765-1950
Showing Changes in Number, Percent and Density

Year	Population	Increase over previous census		Density	
		Number	Percent	Per square mile	Per square kilometer
1950	2,211,000	341,745	18	643.0	248.0
1940	1,869,255	325,342	21	544.2	210.1
1930	1,543,913	244,104	18.8	449.5	173.5
1920	1,299,809	181,797	16.3	378.4	146.1
1910	1,118,012	164,769	17.3	325.4	126.1
1899	953,243	154,678	19.4	277.5	107.1
1887	798,565	66,917	9.1	232.5	90.1
1877	731,648	148,340	25.4	213.1	82.2
1960	583,308	135,394	30.2	170.0	65.5
1846	447,914	117,863	35.7	130.3	50.3
1832	330,051	109,159	49.4	96.1	37.1
1915	220,892	65,466	42.1	64.3	25.0
1800	155,426	85,176	121.2	45.2	17.4
1775	70,250	25,367	56.5	20.4	8.1
1765	44,883	-	-	13.1	5.0

Source: United States Census reports for Puerto Rico, 1910-1950.

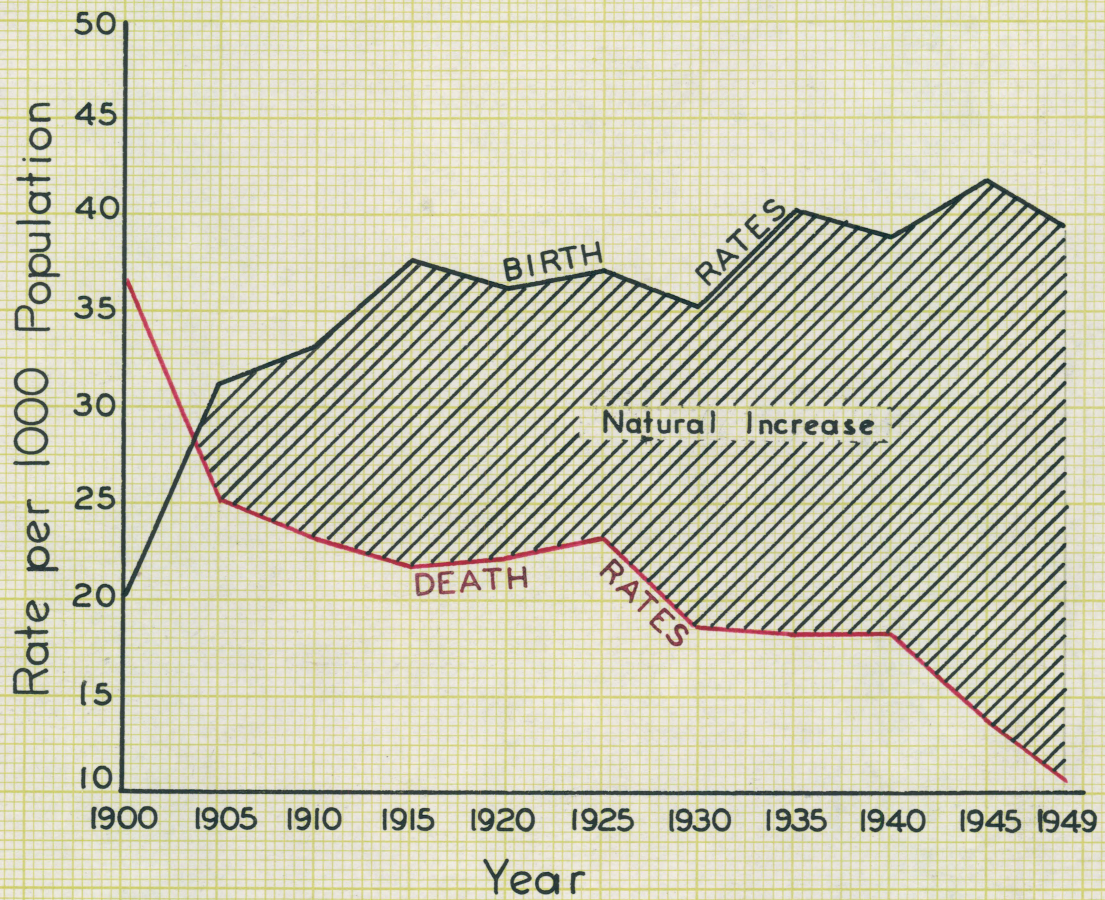
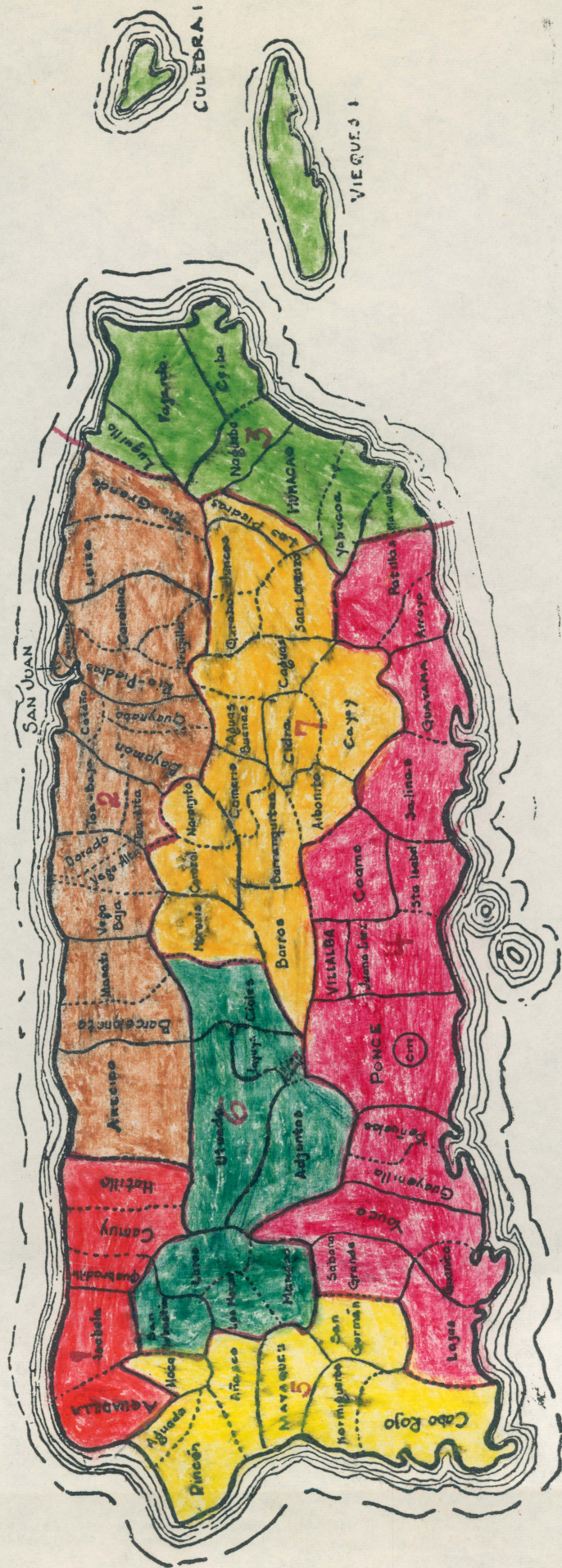


Figure 2. - Trends in Birth Rates, Death Rates and Natural Increase in Puerto Rico, 1900-1949



- 1. Northwestern Coast
- 2. North Central Coast
- 3. Eastern Coast
- 4. Southern Coast
- 5. Western Coast
- 6. Western Interior
- 7. Eastern Interior

Figure 3. - Census Regions of Puerto Rico

Table 2. - Some Facts for the Census Regions of Puerto Rico, 1940.

Region	Size in		Population			
	square miles	Total	Per sq. mi.	White	Colored	Percent Rural Urban
Northeastern Coast	195	109,536	972	88.2	11.8	84.6 15.4
North Central Coast	650	565,597	515	69.4	30.6	55.0 45.0
Eastern Coast	329	134,742	955	65.6	34.4	80.6 19.4
Southern Coast	795	356,065	988	72.7	27.3	64.3 35.7
Western Coast	333	200,240	944	80.8	19.2	65.8 34.2
Western Interior	516	180,112	705	93.5	6.5	90.7 9.3
Eastern Interior	605	322,963	182	81.7	18.3	82.6 17.4
All Puerto Rico	3,435	1,869,255	718	76.5	23.5	69.7 30.3

Source: United States Census Report for Puerto Rico, 1940.

PART II

ANALYSIS OF FERTILITY IN PUERTO RICO

Puerto Rico's crude birth rate has been high for a long time. In 1915 it was nearly 38 per thousand population, 12 points higher than the rate for the United States. Thirty years later, in 1945, the rate was nearly 42 per thousand population, 22 points higher than the rate for the United States. The figures available for 1949 show a slight decrease but are still 15 points higher than the rate for the United States. See Table 3.

Birth rates are usually higher in areas of the world in which social and economic conditions are poor.¹³ The majority of babies are born to families who are poorly nourished and under conditions in which their chances of becoming healthy adults are very slim. Puerto Rico is among those countries with high birth rates. See Table 4. Some of these countries, such as Costa Rica, are predominantly Catholic and were settled by western Europeans as was Puerto Rico. Also, as in the case of Puerto Rico, in these countries the population is mostly rural with agriculture as the main source of income, and low income is characteristic.

Puerto Rico's overall fertility ratio is nearly double that of the United States, and is still higher in four of the seven census regions. The western region has the highest ratio, with 765 children under five years of age per 1,000 women 15-44 years of age, while the

¹³ Landis, Paul H., op. cit., p. 107.

north central coast region has the lowest ratio with 568. The three regions with the highest fertility ratios are the western and eastern interior and the eastern coast. These three regions have more than 700 children per 1,000 women. See Table 5.

According to the range of fertility ratios three distinct divisions may be made of the seven regions: (1) three regions with ratios from 737 to 765; (2) three regions with ratios from 633 to 670; and (3) one region with a ratio of 568. These and related items are shown in Table 6.

The first division, with the highest fertility ratios, has the highest percentage of rural people, the highest percentage of males, the lowest percentage of women in the child-bearing age, 15-44, and the lowest density of population per square mile.

One division, the north central coast, which has the lowest fertility ratio, also has the highest percentage of females and the highest percentage of females in the child-bearing age, 15-44. Apparently, the excess of females is due to the greater job opportunities for women in this region.

SOME FACTORS RELATED TO PUERTO RICO'S HIGH FERTILITY

Age at Marriage

Beebe and Belaval in their study of 1,962 married women of Puerto Rico, in 1939, found that the average age at marriage was 18.6 years.¹⁴

¹⁴ Beebe, G. W. and Belaval, Jose S., Fertility and Contraception in Puerto Rico, 1942.

Dublin, in his recent book, The Facts of Life From Birth to Death, states that the median age at marriage for married women in the United States was 20.3 years in 1950.^{/15} When both studies are compared there exists a slight difference in the average age at which women marry in the two countries. This difference in age at marriage gives Puerto Rican women the opportunity to have one or two children in that period of time.

The facts in Table 7 show that more than 60 percent of Puerto Rican women are married before 23 years of age; and nearly 60 percent of them by the age of 25.

Marital Status

At the beginning of this study the author assumed that there was a high percentage of married persons in the Island and that this was one of the factors associated with high fertility. Available data show the opposite of this hypothesis. See Table 8. Puerto Rico has a lower percentage of married persons than the United States. Perhaps the explanation for this lies in the age distribution of the Island's population. Thirty-one percent of the people are under ten years of age and 43 percent are under 15. Whereas, in the United States, 19.6 percent are under ten years of age and 27.1 percent are under 15.

Length of Child-bearing Period

The child-bearing period is long among Puerto Rican women and

^{/15} Dublin, Louis I., The Facts of Life From Birth to Death, The MacMillan Company, New York, 1951, p. 42.

is characterized by high age-specific birth rates for all mothers from the age of 15 to 50. When compared with the United States, Puerto Rico shows an excess of age-specific birth rates in all age groups except one. The biggest difference is found in the age group, 30-34. In this group, Puerto Rico shows an excess of 136.4 over the United States. See Table 9.

Combs and Davies explain in their paper, Patterns of Puerto Rican Fertility, that judging by the fertility in 1945 the average woman in the Island, by the age of 25 has borne more children than the average woman in the United States has by the age of 30. They also say that Puerto Rican women differ from those of the United States, in that they continue to bear children to an advanced age, with only a gradual decline in fertility as age increases.¹⁶

According to the 1950 United States Census an average of six children had been borne by "ever-married woman" of Puerto Rico 45 years old and over. More than one-fifth of these women had borne ten or more children.

Percentage of Young Persons

Different censuses show that Puerto Rico's population is composed mostly of young people. In 1899 the Island had about 78 percent of its population in the age groups under 35 years of age. In 1930, about 76 percent belonged to those ages, and in 1950, the same age groups

¹⁶ Combs, J. W., and Davies, Kingsley, op. cit.

constituted about 75 percent of the population. This high percentage of young persons reflects the high fertility of the past and makes possible a high fertility for the future. See Table 10.

The age group, 15-44 years of age, now comprises about 41 percent of all persons. This group constitutes most of the child-bearing group for females and is the economically active group of the total population.

Urban places have higher proportion of population in the age groups economically active. Most of the people from 20 to 44 years of age live in urban places. Urban areas contain 45.7 percent of those between the ages 15 and 44, while rural areas have only 38.5 percent. See Table 11.

Puerto Rico has a higher percentage of her people between the ages 15 and 24 years than the United States. In 1950, the Island had 18.2 percent of its population between the ages of 15 and 24 years and the United States had 14.6 percent. See Table 12.

In the three regions of Puerto Rico with the highest fertility ratios in 1940, 86.7 percent of the people were in the ages under 45 years. In contrast, the north-central coast region, with the lowest fertility ration, and the lowest percentage of people under 45 years of age, had the highest percentage of people in the productive age groups, 15-44 years of age. See Table 13. Urbanization and employment of women in industry are some factors which may influence this.

Sex Distribution

The sex distribution of the population has changed in the

last decade. In 1940, the majority of persons were males, while in 1950 the majority were females. Females now exceed males in all five-year age groups except in the groups under five years of age, 10-14, 30-34, 35-44 and 55 to 64. See Table 14. It is interesting to note that females are in excess in the reproductive ages, 15-29, which they have high age-specific birth rates. Since the excess of females is in the age groups in which high age-specific birth rates are shown, there is a possibility for the fertility ratios to remain high for a long time.

Percentage of Illiteracy

According to the 1940 Census, 31.5 percent of all Puerto Ricans over ten years of age were unable to read or write and therefore were classified as illiterates. By comparison this rate was over seven times the rate for the United States in 1930. These and other wide contrasts are shown in Table 15, in which it will be noted that the Puerto Rican illiteracy rate is quite high for persons in their teens and twenties, and extremely high among persons over thirty. It is also higher for women than for men.

Table 16 shows the number of children born to 968 Puerto Rican mothers, by educational status, and reveals that women without schooling have nearly twice as many children as those with sixth grade training or more. It is apparent that both the lack of schooling and the amount of schooling are factors associated with fertility.

The trend in the Island is toward an increase in the number of years of schooling. If this trend continues fertility may be lowered

since higher education and low birth rates are associated factors.

Occupational Composition

One of the factors associated with fertility is the occupational composition of the population. Traditionally, professional and clerical workers have lower birth rates than members of the working classes. Occupational composition accounts for such level of living factors as amount of income, education, housing and others. Differential fertility not only occurs among the various working strata but also by rural and urban residence. Professional workers have higher birth rates in rural areas than they do in urban areas and the working classes also tend to have higher birth rates in rural areas.¹⁷

In Puerto Rico, a very high percentage of employed persons are laborers. In 1940, nearly 40 percent of all persons employed were laborers. In the same year less than 14 percent of employed persons in the United States were in this occupational group. Not only did laborers represent a high proportion of the working population of Puerto Rico, but most of them were employed in agriculture where rural residence was also associated with fertility. Nearly 42 percent of the laborers were engaged in farm work. See Table 17.

When the occupational groups are broken down by sex some interesting variations occur. Of the total number of males employed in Puerto Rico, 52.3 percent were working as laborers whereas in the United

¹⁷ Thompson, Warren S., op. cit., pp. 167-176.

States only 16.9 percent of the male labor force was in this group. The percentage of females employed as laborers was higher in the United States than in Puerto Rico. In the professional group of Puerto Rico there is a higher percentage of females represented than males. Of all females employed, 5.4 percent are professional workers, whereas, only 1.7 percent of all males employed are in this class.

When occupational status is related to age, we find that 69.8 of the persons 15-19 years of age are laborers. In the 20-24 year old group, 65.3 percent are laborers. The increase in age brings a reduction in the percentage of employed persons as laborers. See Table 18.

By regional divisions, occupational composition shows a direct relationship to fertility ratios. The three regions with the highest fertility ratios have the highest percentage of laborers. The north-central coast region has the lowest fertility ratios and the lowest percentage of laborers. See Table 19.

In 1950, 53,000 persons were added to the labor force, whereas only 26,000 additional jobs were registered. This meant that over half of those who entered the labor force could find no employment. Thirty thousand persons in the addition to the labor force were women.¹⁸ This ratio of new members in the labor force to jobs available, reflects the trend toward continued population increase which is outstripping the economic basis for sustaining such an increase.

Percentage of Illegitimate Births

Nearly 33 percent of all births in Puerto Rico for the year

¹⁸ Commissioner of Labor of Puerto Rico, Annual Report, 1949-50.

1949 were illegitimate^{/19}, a percentage over eight times the proportion for the United States. Perhaps the stronger disapproval of illegitimacy and the use of contraceptives in the United States, rather than any difference in behavior, account for the difference in illegitimacy rates between the two countries.^{/20} Corese says in his book, Realidad Poblacional de Puerto Rico, that to have concubines has always been a tradition in Puerto Rico. Vital statistics for 1949 show that 14.0 percent of the women 14 years old and over were consensually married.

In Puerto Rico, according to a recent law, illegitimate children have the same status as children born in wedlock. They have the right to inherit property, and birth certificates make no distinction between legitimate and illegitimate children.

^{/19} Commissioner of Health of Puerto Rico, Annual Report, 1949-50.

^{/20} Gillin, Lewis J., Social Pathology, Appleton-Century-Crofts, Inc., New York, 1946, p. 300.

Table 3.- Crude Birth Rates for Puerto Rico, Compared with the United States for Selected Years, 1915-1949

Year	Puerto Rican <u>1/</u> birth rate	United States <u>2/</u> birth rate	Puerto Rican excess
1915	37.6	25.1	12.5
1920	36.4	23.7	12.7
1925	37.1	21.3	15.8
1930	35.2	18.9	16.3
1935	40.4	16.9	23.5
1940	38.7	17.9	20.8
1945	41.9	19.6	22.3
1949	39.3	24.0	15.3

Sources: 1/ Commissioner of Health of Puerto Rico, Annual Reports.
2/ United States Bureau of Census, Vital Statistics of the United States, 1937, part 1, p. 16.

Table 4.- Crude Birth Rates for Various Countries, 1949

Country	Birth rate
Venezuela	43.3
British Guiana	42.0
Costa Rica	41.0
Honduras	40.3
Ceylon	39.9
Salvador	39.5
PUERTO RICO	39.3
Dominican Republic	38.7
Windward Island	36.8
Nicaragua	35.4
Bahama Island	34.2
Panama	33.0
Cyprus	27.8
St. Pierre and Miquelon	27.1
Canada	26.9
Union of South Africa	26.7
Peru	25.9
Finland	25.8
Portugal	25.0
New Zealand	24.9
UNITED STATES	24.0
Australia	22.9
Spain	21.4
France	21.0

Source: United Nations Demographic Yearbook, 1949-1950.

Table 5.- Fertility Ratios for Puerto Rico by Regions, Compared with Ratios for the United States, 1940

Regions	Puerto Rican ratios	United States ratios	Puerto Rican excess
TOTAL	652	331	321
Northwestern Coast	670	-	-
North Central Coast	568	-	-
Eastern Coast	737	-	-
Southern Coast	633	-	-
Western Coast	652	-	-
Western Interior	765	-	-
Eastern Interior	739	-	-
All Rural Areas	773	348	425
All Urban Areas	441	259	182

Source: United States Bureau of the Census for Puerto Rico and United States, 1940.

Table 6.-- Fertility Ratios for Puerto Rico, by Regions Related to Selected Population Characteristics, 1940 and 1949

Division	Region	No. on map	Fertility ratios		Percent		Percent females 15 - 44 years of age	Persons per square mile 1949		
			Rural	Urban	Male	Female				
1	Western Interior	6	765	90.1	9.9	50.7	49.3	42.9	549	39.2
	Eastern Interior	7	739	82.6	17.4	50.8	49.2	44.0	534	37.8
	Eastern Coast	3	737	80.6	19.4	51.5	48.6	44.5	410	42.7
Average			747	84.4	15.6	51.0	49.0	43.8	431	39.9
2	Northwestern Coast	1	670	84.6	15.4	50.1	50.0	45.7	562	40.0
	Western Coast	5	652	65.8	34.2	49.6	50.3	46.5	601	36.0
	Southern Coast	4	633	64.2	35.8	50.0	50.0	46.7	448	41.2
Average			650	71.5	28.5	49.9	50.1	46.3	537	39.1
3	North Central Coast	2	568	55.0	45.0	49.6	50.4	48.4	870	37.7
	Average		568	55.0	45.0	49.6	50.4	48.4	870	37.7

Source: United States Bureau of the Census for Puerto Rico, 1940.
 Commissioner of Health of Puerto Rico, Annual Report, 1949-1950.

Table 7.- Distribution of Married Persons in Puerto Rico, 1940
by Age at Marriage (including only first marriages)

Age at marriage	Males		Females	
	Number	Percent	Number	Percent
Years of age:				
14	2	0.01	35	0.2
15	1	0.01	106	0.6
16	13	0.1	771	4.2
17	30	0.2	1,158	6.3
18	223	1.3	1,595	8.7
19	251	1.5	1,096	5.9
20	290	1.7	744	4.1
21	2,189	13.1	3,874	21.2
22	2,118	12.6	1,854	10.1
23	1,707	10.2	1,221	6.7
24	1,498	8.9	952	5.2
25	1,215	7.3	947	5.2
26	1,137	6.8	653	3.6
27	537	2.0	458	2.5
28	843	5.0	515	2.8
29	585	3.5	298	1.6
30	666	3.9	491	2.7
31	358	2.1	124	.7
32	505	3.0	209	1.2
33	419	2.5	151	.8
34	352	2.1	130	.7
35 - 44	153	0.9	702	3.8
45 and over	473	2.8	217	1.2
Total	16,744	100.0	18,301	100.0

Source: Commissioner of Health of Puerto Rico, Annual Report, 1940.

Table 8.- Marital Status of the People of Puerto Rico, 14 Years Old and Over Compared with the United States, 1950

Marital status	Puerto Rico		United States	
	Males	Females	Males	Females
Single	39.2	29.6	26.2	20.4
Married	44.7	42.2	67.8	65.5
Consensually married	12.9	14.0	-	-
Widowed or divorced	<u>3.3</u>	<u>14.3</u>	<u>6.0</u>	<u>14.1</u>
Total	100.0	100.0	100.0	100.0

Source: United States Bureau of the Census, Preliminary Report, 1950.

Table 9.- Specific Birth Rates by Age of Mother for Puerto Rico, 1944 and for the United States, 1946

Age of mother	Puerto Rico	United States	Puerto Rican excess
Years of age:			
Under 15	0.3	0.7	-
15 - 19	79.0	57.1	21.9
20 - 24	250.6	172.2	78.4
25 - 29	259.4	157.7	101.7
30 - 34	240.3	103.9	136.4
35 - 39	154.5	56.9	97.6
40 - 44	41.1	15.7	25.4
45 and over	9.7	1.3	8.4

Source: United Nations Demographic Yearbook, 1948.
 Commissioner of Health of Puerto Rico, Annual Report, 1946-1947.

Table 10.- Percentage Age Distribution of the Population
of Puerto Rico, 1899-1950

Age	Years					
	1899	1910	1920	1930	1940	1950
Years of age:						
Under 5	15.8	16.6	15.4	14.7	15.0	16.4
5 - 9	15.1	13.5	15.0	14.5	13.5	14.6
10 - 14	13.0	12.9	12.9	12.9	12.1	12.2
15 - 19	9.8	10.2	9.7	12.1	11.0	9.5
20 - 24	9.3	9.7	9.9	9.7	11.0	8.7
25 - 29	8.8	8.4	7.4	6.5	7.9	7.3
30 - 34	6.7	6.3	6.0	6.1	5.5	5.9
35 - 44	9.6	10.4	10.7	10.7	10.0	10.0
45 - 54	6.2	6.3	7.1	6.7	6.7	7.2
55 - 64	3.5	3.4	3.5	3.7	3.7	4.4*
65 - 74	1.4	1.5	1.5	1.7	2.2	3.8
75 and over	0.7	0.8	0.8	0.9	1.1	-
Not reported	-	-	-	-	0.1	-
Total	100.0	100.0	100.0	100.0	100.0	100.0

* Includes 75 years and over.

Source: United States Bureau of Census, 1940 and 1950.

**Table 11.-- Percentage Age and Sex Distribution of Puerto Rico's
Population by Rural and Urban Residence, 1950**

Age group	Residence					
	Residence		Rural		Urban	
	Rural	Urban	Male	Female	Male	Female
Years of age:						
15 - 19	9.7	9.2	8.6	9.7	9.8	9.6
20 - 24	7.8	9.9	9.3	10.8	7.1	8.4
25 - 29	6.4	8.6	7.9	9.1	6.3	6.5
30 - 34	5.5	6.6	7.4	5.8	5.5	5.4
35 - 44	<u>9.1</u>	<u>11.4</u>	<u>11.8</u>	<u>10.8</u>	<u>10.1</u>	<u>8.2</u>
Total	38.5	45.7	45.0	46.2	38.8	38.1

Source: United States Bureau of the Census, 1950.

Table 12.- Percentage Population Age and Sex Distribution for Puerto Rico and the United States, in Relation to Sex, 1950

Age group	Total population				Males				Females			
	Puerto Rico	United States	Difference		Puerto Rico	United States	Difference		Puerto Rico	United States	Difference	
			Puerto Rico	United States			Puerto Rico	United States			Puerto Rico	United States
Years of age:												
15 - 19	9.5	7.1	2.4	-	9.3	7.1	2.2	-	9.7	7.1	2.6	-
20 - 24	8.7	7.5	1.2	-	8.0	7.3	0.7	-	9.4	7.7	1.7	-
25 - 29	7.3	8.0	-	0.7	6.9	7.9	-	1.0	7.7	8.1	-	0.4
30 - 34	5.9	7.7	-	1.8	6.3	7.7	-	1.4	5.6	7.7	-	2.1
35 - 44	<u>10.0</u>	<u>13.5</u>	-	<u>3.5</u>	<u>10.8</u>	<u>3.2</u>	<u>7.6</u>	-	<u>9.4</u>	<u>6.8</u>	-	<u>2.6</u>
Total	41.4	43.8	-	2.4	41.3	32.2	9.1	-	41.8	37.4	4.4	-

Source: United States Bureau of the Census, 1950.

Table 13- Fertility Ratios for Puerto Rico, by Regions, Related to Percentage of Persons in the Reproductive Ages, and Percentage of the Population Under 45 Years of Age, 1940

Regions	Both sexes		Males		Females		Excess Males Females	Percent of population under 45 years
	ages 15-44		ages 15-44		ages 15-44			
	Fertility ratios	ages 15-44	Fertility ratios	ages 15-44	Fertility ratios	ages 15-44		
Western Interior	765	42.3	41.5	42.9	-	1.4	86.6	
Eastern Interior	739	43.0	42.1	44.0	-	1.9	87.2	
Eastern Coast	737	44.6	44.9	44.5	0.4	-	86.5	
Average	747	43.3	42.6	44.1	-	1.5	86.7	
Northwestern Coast	670	45.0	44.0	45.7	-	1.7	86.2	
Western Coast	652	46.5	44.4	46.5	-	2.1	85.7	
Southern Coast	633	46.3	46.0	46.7	-	0.7	85.1	
Average	650	45.9	44.8	46.3	-	1.5	85.6	
North Central Coast	568	47.6	46.9	48.4	-	1.5	85.9	
Average	568	47.6	46.9	48.4	-	1.5	85.9	

Source: United States Bureau of Census, 1940.

Table 14.- Percentage Age and Sex Distribution of Puerto Rico's Population, 1940 and 1950

Age group	1940				1950				
	Males		Females		Males		Females		
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	
Years of age:									
Under 5	142,289	7.61	138,151	7.39	185,000	8.36	177,000	8.00	
5 - 9	127,791	6.83	123,861	6.62	159,000	7.19	164,000	7.41	
10 - 14	114,496	6.12	112,601	6.02	134,000	6.06	134,000	6.06	
15 - 19	99,460	5.52	106,689	5.70	103,000	4.65	107,000	4.83	
20 - 24	102,464	5.48	103,862	5.55	88,000	3.98	104,000	4.70	
25 - 29	72,263	3.86	75,745	4.05	76,000	3.43	85,000	3.84	
30 - 34	52,012	2.78	50,584	2.70	69,000	3.12	62,000	2.80	
35 - 44	94,268	5.04	92,842	4.96	119,000	5.38	104,000	4.70	
45 - 54	66,825	3.57	59,168	3.16	77,000	3.48	85,000	3.75	
55 - 64	36,808	1.96	33,023	1.76	53,000	2.39	45,000	2.03	
65 and over	29,245	1.56	33,861	1.81	39,000	1.76	44,000	1.99	
Not reported	359	-	588	-	-	-	-	-	
Total	938,280	50.1	930,975	49.7	1,103,000	49.8	1,108,000	50.1	

Source: United States Bureau of the Census.

Table 15.- Percentage of Population Illiterate in Puerto Rico, 1940, and the United States, 1930, by Age and Sex

Age grouping	Percent of total illiteracy		Percent of male illiteracy		Percent of female illiteracy	
	Puerto Rico	United States	Puerto Rico	United States	Puerto Rico	United States
	Over 10 years	31.5	4.5	27.7	4.4	35.3
10-14 years	17.9	1.2	17.8	1.4	17.9	1.0
15 - 19 years	14.6	1.9	13.8	2.4	15.4	1.4
20 - 29 years	19.6	2.9	15.6	3.3	23.6	2.5
30 - 39 years	38.2	4.1	30.4	4.0	46.2	4.2
40 - 49 years	58.7	6.0	51.6	5.8	66.6	6.2
50 - 59 years	68.0	6.8	63.0	6.7	73.5	7.0
60 years & over	76.3	9.0	72.5	8.3	79.7	9.7
Ages unknown	56.1	7.0	53.8	6.3	57.5	7.8

Source: Demographic Yearbook of the United Nations, 1948, pp. 206-207.

Table 16.- Average Number of Children Born to 968 Puerto Rican Mothers by Education of Mother and Place of Residence, 1949

	Average number of children born		
	Total	Rural	Urban
All mothers	4.9	5.5	4.1
No schooling	6.1	6.3	5.5
First and second grades only	5.0	5.1	4.5
Third, fourth, and sixth grades	4.6	5.0	4.0
Sixth grade or more	3.1	3.3	2.8

Source: Roberts, L. and Stefani, R. S., Patterns of Living of Puerto Rican Families.

Table 17.- Percentage of Persons Employed in Puerto Rico,
and the United States, by Occupations, 1940

Occupations	Both sexes		Males		Females	
	Puerto Rico	United States	Puerto Rico	United States	Puerto Rico	United States
Professional and semi-professional worker	3.0	7.4	2.0	5.5	6.0	13.2
Farm and farm managers	9.3	11.4	11.6	14.7	2.4	1.4
Proprietories, managers and officials except farms	4.7	8.3	5.8	9.8	1.6	3.8
Clerical, sales and kindred workers	8.1	16.6	8.7	12.8	6.2	28.3
Craftsmen, foremen and kindred workers	5.4	11.1	7.1	14.5	.2	1.0
Operative and kindred workers	17.9	18.5	7.3	18.2	49.4	18.4
Domestic service workers	7.7	4.7	1.1	0.4	27.5	17.7
Protective service workers	1.4	1.5	1.9	2.0	0.4	-
Service workers except domestic and protective	2.2	6.1	1.8	4.5	3.4	11.3
Farm laborers and foremen	34.8	6.8	46.0	8.2	2.3	2.9
Laborers except farm	5.1	6.8	6.3	8.7	0.2	0.9
Occupation not reported	0.3	0.8	0.4	0.7	0.3	1.2

Source: United States Census for the United States and Puerto Rico, 1940.

Table 18.- Percentage of Puerto Ricans in Different Occupations, by Age and Sex, 1940

Occupations	15 - 19		20 - 24		25 - 34	
	Males	Females	Males	Females	Males	Females
Professional and semi-professional worker	0.3	0.8	1.1	4.7	2.6	10.0
Farm and farm managers	1.0	-	3.4	0.1	9.9	1.4
Proprietors, managers and officials except farms	0.8	0.1	2.4	0.6	7.2	2.4
Clerical, sales and kindred workers	11.6	3.4	10.1	9.4	8.9	7.5
Craftsmen, foremen and kindred workers	3.1	0.1	5.6	0.2	8.4	0.2
Operative and kindred workers	6.8	63.6	8.4	58.2	8.7	46.3
Domestic service workers	5.0	28.2	1.2	22.6	0.5	25.6
Protective service workers	0.9	-	2.1	-	2.0	0.1
Service workers except protective and domestic	2.4	1.1	2.0	2.1	1.9	3.7
Farm laborers and foremen	61.3	2.2	55.5	1.6	42.6	2.2
Laborers except farm	6.1	0.2	7.9	0.3	7.1	0.3
Occupation not reported	0.8	0.3	0.3	0.2	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: United States Bureau of the Census, 1940.

Table 19.-- Percentage of Puerto Ricans in Different Occupations, by Regions, 1940

Occupations	1		2		3		4		5		6		7			
	Fe-	Ma-	Fe-	Ma-	Fe-	Ma-	Fe-	Ma-	Fe-	Ma-	Fe-	Ma-	Fe-	Ma-		
	males	males	males	males	males	males	males	males	males	males	males	males	males	males		
Professional and semi-professional worker	1.4	3.2	3.1	9.1	1.4	1.4	9.9	1.8	1.8	5.5	1.8	3.1	1.2	3.8	1.1	6.5
Farm and farm managers	15.6	2.9	5.9	0.1	8.7	5.3	7.7	1.5	10.9	2.0	20.3	4.3	22.6	5.4		
Proprietors, managers and officials except farms	5.9	1.1	7.3	0.2	4.1	3.1	5.8	1.6	6.0	1.2	4.1	1.0	4.8	1.9		
Clerical, sales and kindred workers	5.6	1.9	12.5	12.4	5.4	5.2	9.3	5.0	9.6	4.1	4.2	1.9	5.7	3.6		
Operative and kindred workers	6.1	68.6	9.5	26.5	5.1	24.5	7.9	54.4	8.7	73.1	3.7	63.3	5.0	46.2		
Domestic service workers	.9	15.2	1.0	41.4	.6	40.3	1.2	26.5	1.5	13.9	1.1	19.9	.8	26.4		
Protective service workers	4.6	-	3.4	-	0.9	-	1.1	-	1.0	-	0.5	-	.8	-		
Service workers except domestic and protective	1.2	1.3	2.8	5.2	1.2	5.8	1.7	3.5	1.7	1.5	.9	1.9	1.3	3.3		
Farm laborers and foremen	50.1	5.0	33.4	0.1	59.5	3.9	48.6	1.3	46.3	.6	56.8	3.3	49.4	5.9		
Laborers except farms	3.5	-	10.2	-	7.3	1.3	6.4	0.1	5.6	-	3.7	-	4.3	.7		
Craftsmen, foremen and kindred workers	5.1	-	10.5	-	5.2	-	8.1	0.3	6.6	.2	3.2	-	4.0	-		
Not reported	-	.4	.4	-	.6	.7	.2	.1	.3	.3	.3	.4	.2	.1		
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: United States Bureau of the Census, 1940.

PART III

ANALYSIS OF MORTALITY IN PUERTO RICO

The downward trend of the death rate in Puerto Rico has been dramatic. The crude death rate declined from 36.7 for 1900 to 10.7 for 1949, whereas in the United States the decline was from 17.2 for 1900 to 9.7 for 1949. See Table 20. Hence the death rate for Puerto Rico is now comparable with rates in various countries where medical science and sanitary measures have helped to control endemic diseases and preventable deaths. A change of one or two points is considered a significant drop in most progressive countries today for a 10-year period.

Age composition is a factor that affects death rates.^{/21} Each age has its own specific death rate which is high in infancy, declines in early childhood, rises slowly in middle age and rapidly in later years. See Table 21. It also will be noted in Table 21 that males have higher mortality rates than females. The largest differences occur in the age groups under one year of age and 65 years and over.

Vital statistics for 1950 show that Puerto Rican females have a higher death rate than females of the United States, and that males of both countries have almost the same rates.

Infant Death Rate

The infant death rate is highly susceptible to conditions of

^{/21} Thompson, Warren S., op. cit., p. 227.

the environment. It is one of the most sensitive indexes of the socio-economic conditions of the environment.^{/22} The saving of infant lives has brought a decline in the death rates during the last decade.^{/23}

Whereas the total infant death rates may be considered as an index to social and economic conditions, the neo-natal infant mortality rates represent those deaths which cannot be prevented for the most part. Total infant mortality rates vary from country to country, but neo-natal rates vary very little.^{/24}

Although still high, a reduction in infant death rates has occurred in Puerto Rico. In 1932 the infant death rate was 132.3, ten years later it was 103.3, and in 1949 it was 67.6. Viewed in another way, Puerto Rico's infant death rate was more than twice as high as the United States rate in 1932, and almost twice as high in 1949. See Table 22.

Because of the fact that a large proportion of the infant deaths in the United States occur in the neo-natal period, neo-natal rates are actually higher than those of Puerto Rico in the under one-day group. It is in the one-month to one-year age group where Puerto Rican rates show a great increase over those of the United States. See Table 23.

^{/22} Woodbury, Robert M., "Infant Mortality in the United States", The Annals of the American Academy of Political and Social Science, 188: 94-106, 1936.

^{/23} Thompson, Warren S., op. cit., p. 220.

^{/24} Yerushalmy, Jacob, "Infant and Maternal Mortality in the Modern World", The Annals of the American Academy of Political and Social Science, 237:134-141, 1945.

The five major causes of infant deaths in Puerto Rico for 1949 were diarrhea-enteritis; diseases peculiar to the first year of life; broncho-pneumonia and capillary bronchitis; immaturity; and congenital malformations. Premature births and congenital malformations account for most of the non-preventable deaths. Further reductions in the infant death rate may occur due to the extension of measures which will decrease the preventable infant deaths, as has happened in the United States.

Maternal Death Rates

Puerto Rico has a maternal death rate comparable to that of most progressive countries. Vital statistics show the rate for 1949 as 23.3 deaths per 10,000 total births, compared with a United States rate of 20.7 for 1945 and 11.7 for 1948.

Life Expectancy

Nowadays there is a tendency for people of many countries to have longer life expectancy than formerly. Puerto Rico has had a gradual evolution in this respect. In 1910 the life expectancy of Puerto Ricans at birth was 28 years. This increased by 1940 to 46 years and by 1947 to 57 years.^[25] Table 24 shows the life expectancy at birth for the people of several countries, all of whom have an average future lifetime greater than Puerto Ricans.

[25] Janer, Jose L., La Esperanza de Vida Actual de los Puertorriquenos, Asociacion de Estudios Poblacionales de Puerto Rico, 1948.

Puerto Rico's people have a much shorter life expectancy at birth than those of the United States. In 1946, the figures were approximately 57 years and 67 years, respectively, a difference of ten years. In 1950, the average life expectancy in Puerto Rico was 61 years, while in the United States it was 68 years, a difference of seven years.²⁶

In 1947, life expectancy for Puerto Ricans 10 to 14 years of age was approximately 56 years. Those in the 25 to 29 year-old group had a life expectancy of 43 years. Persons between the ages of 55 and 64 years of age had a life expectancy of 21 years, while those 75 years of age and over had a life expectancy of approximately 9 years.

Females in Puerto Rico, regardless of age, can expect to live about three years longer than males of the same age. See Table 25. In the age group 1-4 years, females have a life expectancy of 61.9 years and males 59.1, a difference of 2.8 years. In the age group 25-29 years, females have a life expectancy of 44.7 years and males 41.2, a difference of 3.5 years. In the age group 45-54 years, females have a life expectancy of 30.4 years and males 26.5, a difference of 3.9 years, which is the largest difference shown by recorded age groupings.

Causes of Death

A study of mortality would not be complete if the principal causes of death were not considered. When data are available for a number of years, the results of man's fight against various maladies can

²⁶ Dublin, Louis J., *op. cit.*, p. 387.

be easily observed. In many areas man has conquered nature; in others, the fight is just beginning.

Table 26 shows Puerto Rican death rates from 24 important causes in 1932 and 1949. In 1932 there were six leading causes of death, with death rates above 100 per 100,000 population. At that time diarrhea-enteritis had the first place with a death rate of 404.2. Tuberculosis, pneumonia, malaria, nephritis, diseases of the heart followed in order of importance. Cancer was ranked as the ninth in importance. By 1949 only tuberculosis and diarrhea-enteritis had death rates above 100. Diseases of the heart occupied the third position followed by pneumonia, and cancer was occupying the fifth place.

Table 27 shows comparative changes in death rates for Puerto Rico and the United States from 16 important causes between the years 1932 and 1948. Of the five leading causes of death, diarrhea-enteritis, pneumonia and tuberculosis showed a decrease, while cancer and diseases of the heart showed an increase. Diseases of the heart and cancer were the two leading causes of death in the United States in 1932 and 1948.

Table 28 shows the death rates from six leading causes in Puerto Rico, by race and sex, and similar rates for the United States. Any future references to comparisons of death rates for the Island and the mainland will be made on the basis of causes listed in this table.

Figures 4 to 9 illustrate the trend in the death rates from major causes. The actual rate and the straight line are plotted. The straight line was obtained by using the method of least squares.¹²⁷

¹²⁷ Hagood, Margaret S., Statistics for Sociologists, Reynal and Hitchcock, Inc., New York, 1941, pp. 267-271.

Tuberculosis

Tuberculosis has been one of the leading causes of death in Puerto Rico for a long time. Much has been done to conquer the "white plague". The government and private associations have spent large quantities of money in an effort to conquer this disease. Education, free X-ray examinations, pneumothorax, construction of hospitals and the vaccination of school children with the vaccine B. C. G. as a preventive, are part of the insular government program to reduce the spread of this disease.

In 1933 the death rate from tuberculosis was 337.2 per 100,000 population. The rate has been reduced some in recent years, but still in 1949 tuberculosis was the leading cause of death, the death rate for that year being 146.9.

When Puerto Rico and the United States are compared with relation to the death rates from tuberculosis, we find that in 1948 the Island had a rate of 196.9 deaths per 100,000 population while the mainland had a death rate of 30. See Table 28.

In 1933 and in 1945 colored people had higher death rates than white people, but in 1949 white people had higher rates. Colored females have the highest death rates from 20 to 34 years of age, while colored males have highest rates from 55 years of age and over. White children under five years of age have higher death rates than colored children of the same age. White persons as a whole have the highest death rates from 20 to 34 years of age.

Females have higher death rates from tuberculosis than

males. The death rates for females in the child-bearing age, 15 to 44, are high as compared to those of males of the same age, but males have the highest death rates in older ages. The lowest death rates for both sexes are found in ages up to 14 years. The rise of death rates from 15 years of age on is very rapid. See Table 29.

Diarrhea and Enteritis

In 1933 the death rate from diarrhea and enteritis was 463.0 per 100,000 population and ranked first among the principal causes of deaths. In 1949 the death rate was 139.7, and ranked second among the principal causes of death.

When the death rate from diarrhea and enteritis in the Island is compared with that of the United States, the latter is very low. In 1948 it was 6.0 per 100,000 population compared with the Puerto Rican rate of 176.5. See Table 28.

In general, white people of Puerto Rico have higher death rates from diarrhea and enteritis than colored people.

Males have higher death rates than females from diarrhea and enteritis. The highest death rate for both sexes are found among children under one year of age, though the rates continue to be high up to nine years of age when a decline is observed in the succeeding age groups. The highest death rates for adults is among persons 75 years of age and over. See Table 31.

Diseases of the Heart

Heart disease is one of the leading causes of death in Puerto Rico. In 1933 the death rate from this cause was 116.2 per 100,000 population and in 1949 it was 99.3.

In the United States, in 1948, the death rate from this disease was higher than in Puerto Rico. For that year the death rate in the United States was 322.7 per 100,000 population, whereas in the Island it was 106.7. See Table 28.

In 1933 and 1940 and 1945 the colored population showed the highest death rate from diseases of the heart. In 1949 white people had higher death rates than colored in most of the age groups.

In Puerto Rico, males tend to have higher death rates from diseases of the heart than females, with rare exceptions. In 1933 the lowest death rates were among persons up to 35 years of age, and in 1945, they were among the smaller group up to 25 years of age. In 1945 females in the age group 10-19 had a higher rate than males, but in 1949 males in the same age group had a higher rate than females. See Table 33.

Pneumonia

Death rates from pneumonia in Puerto Rico have remained among the first four principal causes of death for the last 17 years. In 1933 the death rate for this disease was 187.8 per 100,000 population and ranked third in importance. In 1949 the rate was 94.1 and ranked fourth in importance.

Statistics in regard to pneumonia in Puerto Rico are considered alone, but in the United States they include influenza. Influenza in Puerto Rico is considered a separate condition.

In 1933 and 1940 colored people had higher death rates from pneumonia than white people, whereas in 1945 and 1949 the higher rates were among white people. Colored people had higher death rates from this disease at age of 75, except in 1949.

Males have higher death rates from pneumonia than females. For both sexes the lowest death rate is among persons 10 to 24 years of age. Children under nine years of age have high death rates, though the under one-year age group has the highest rate. For both sexes, the death rates rise rapidly after 20 years of age. See Table 35.

Cancer

The trend of cancer mortality is upward, as it is in most countries where infant mortality and preventable deaths are declining. In 1933 the death rate from this cause in Puerto Rico was 45.9 per 100,000 population, while in 1949 it was 61.8. It had an increase of 24 percent from 1933 to 1949. In 1933 it ranked ninth as a cause of death and in 1949 it was fifth.

When death rates for cancer in Puerto Rico are compared with those of the United States for 1948, the Island had lower rates. At that time the death rate from cancer in the United States was 134.9 per 100,000 population, whereas in Puerto Rico it was 56.9. See Table 28.

In 1933 and 1940 the death rate from cancer in Puerto Rico was higher among colored people. In 1945 and 1949 white people had the higher rates.

Females have higher death rates from cancer than males, but the difference is diminishing. In both sexes, the death rate is higher among middle-aged and old persons. See Table 37.

Malaria

The trend of mortality from malaria shows what medical science and new sanitary techniques are doing to reduce the number of deaths caused by a disease. In 1933 the death rate from malaria was 197.9 per 100,000 population and in 1949 it was 4.1 compared with a rate of 0.1 for the United States, 1948. Statistics for 1950 for Puerto Rico give the death rate as 2.5.

White people in Puerto Rico have a higher death rate from malaria than colored ones. Whites had a death rate of 4.3 in 1949, while colored people had a death rate of 3.5.

In Puerto Rico, in 1949, males had higher death rates than females from malaria. The death rate for males was 4.5 while for females it was 3.5.

Unfortunately, the writer does not have data about malaria with relation to age, sex and race, and the only data available to the writer were for 1949. See Table 39.

Table 20.- Crude Death Rates for Puerto Rico and the United States
for Selected Years, 1900-1949

Year	Puerto Rico	United States	Puerto Rican excess
1900	36.7	17.2	19.5
1910	23.4	14.7	8.7
1920	22.3	13.0	9.3
1930	18.6	9.2	9.4
1940	18.4	10.7	7.7
1945	13.9	10.6	3.3
1949	10.7	9.7	1.0

Source: 1. Statistical Abstract of the United States 1951.
2. Puerto Rico y Su Problema de Poblacion.
3. Insular Department of Health, Annual Reports.

Table 21.- Crude Death Rates for Puerto Rico by Age and Sex, 1949

Age groups	Death rate	
	Male	Female
All ages	11.2	10.2
Years of age:		
Under 1 year	73.7	61.1
1 - 4	12.8	14.3
5 - 9	2.7	2.4
10 - 14	1.2	1.2
15 - 19	2.0	2.2
20 - 24	3.6	3.6
25 - 29	5.2	4.8
30 - 34	6.3	6.3
35 - 44	7.7	6.9
45 - 54	10.8	9.7
55 - 64	24.3	18.7
65 - 74	50.3	35.7
75 and over	139.1	115.6

Source: Commissioner of Health, Annual Report, 1949.

Table 22.- Infant Death Rates for Puerto Rico and United States
by Years, 1932-1948

Year	Puerto Rico	United States	Puerto Rican excess
1932	132.5	57.6	74.7
1933	139.6	58.1	81.5
1934	113.7	60.1	53.6
1935	114.8	55.7	59.1
1936	128.2	57.1	71.1
1937	137.8	54.4	83.4
1938	121.0	51.0	70.0
1939	112.6	48.0	64.6
1940	113.6	47.0	66.6
1941	116.2	45.3	70.9
1942	103.3	40.4	62.9
1943	96.4	40.4	56.0
1944	99.3	39.8	59.5
1945	93.0	38.3	54.7
1946	83.7	33.8	49.9
1947	71.5	32.2	39.3
1948	78.3	32.0	46.3
1949	67.6	31.1	36.5

Source: Demographic Yearbook of the United Nations, 1949-1950.

Table 23.- Neo-natal Infant Mortality Rate for Puerto Rico and the United States by Sex, 1945

Age	Puerto Rico		United States	
	Males	Females	Males	Females
Under 1 day	9.5	7.5	12.6	9.7
1 day under 1 week	13.5	10.5	9.9	7.1
1 week under 1 month	<u>11.2</u>	<u>9.8</u>	<u>5.1</u>	<u>4.1</u>
Under 1 month	34.0	27.6	27.6	20.9
1 month under 6 months	42.5	36.7	10.5	8.6
6 months under 1 year	<u>26.3</u>	<u>25.5</u>	<u>4.6</u>	<u>4.1</u>
Under 1 year	102.8	89.8	42.7	33.6

Source: United Nations, Demographic Yearbook, 1948.

Table 24.- Life Expectancy in Puerto Rico for Various Age Groups
by Sex, 1947

Age	Both sexes	Males	Females	Difference in favor of females
Years of age:				
Under 1	56.52	54.88	58.33	3.45
1 - 4	60.41	59.10	61.87	2.77
5 - 9	59.69	58.25	61.28	3.03
10 - 14	55.51	54.05	57.13	3.08
15 - 19	50.94	49.46	52.57	3.11
20 - 24	46.62	45.07	48.33	3.26
25 - 29	42.90	41.06	44.71	3.55
30 - 34	38.93	37.27	40.78	3.51
35 - 44	35.37	33.62	37.32	3.70
45 - 54	28.34	26.51	30.36	3.85
55 - 64	21.15	19.28	23.19	3.71
65 - 74	14.95	13.29	16.58	3.29
75 and over	8.92	7.53	10.12	2.59

Source: Abridge Life Tables for Puerto Rico, 1947, Insular Department of Health.

Table 25.- Life Expectancy at Birth in Puerto Rico and Selected Countries by Sex and Year

Country	Males	Females	Year
PUERTO RICO	45.12	46.92	1939-1941
PUERTO RICO	54.88	58.33	1947
New Zealand	65.46	68.45	1934-1948
United States	62.81	67.29	1939-1941
Holland	65.7	67.2	1931-1940
Denmark	63.5	65.8	1936-1940
England and Wales	60.18	64.4	1937

Source: Janer, Jose L., Esperanza Vida Actual de los Puertorriqueños.

Table 26.-Death Rates for Puerto Rico Per 100,000 Population, from Important Causes, 1932 and 1949

Cause of death	1932	1949
	Rate	Rate
Diarrhea and Enteritis	404.2	139.7
Tuberculosis (all forms)	297.3	146.9
Pneumonia	230.2	94.1
Malaria	173.2	4.1
Diseases of the heart	106.1	99.3
Nephritis	136.0	33.4
Cancer (all forms)	44.8	61.8
Accidents	50.8	30.9
Intracranial lessions of vascular origin	26.6	- 1/
Diseases of the coronary artery and angina pectoils	7.2	- 1/
Suicides	20.8	18.6
Syphilis	25.6	7.7
Bronchitis	58.9	7.9
Anemias	13.1	10.6
Uncinariasis	29.4	1.7
Homicides	13.2	10.7
Whooping cough	8.1	11.2
Influenza	27.8	14.5
Tetanus	27.7	6.1
Dysentery	8.5	2.7
Diphtheria	2.9	2.6
Typhoid fever	5.2	0.9
Measles	32.	1.1
Ildefined and not specified causes	72.4	- 1/
All causes	2204.6	1072.4

Source: Department of Health, Annual Reports, 1932-1949.

1/ Data not available.

Table 27.- Comparative Changes in Puerto Rico and United States
Death Rates Per 100,000 People from Important Causes, 1932-1948

Cause	Puerto Rico death rates			United States death rates		
	1932	1948	Percent change	1932	1948	Percent Change
Bronchitis	58.9	12.3	-79	3.6	19.0	428
Diarrhea	404.2	183.5	-55	16.4	6.0	-63
Diphtheria	2.9	4.1	41	4.5	.4	-91
Dysentery	8.5	3.6	-58	- 1/	.7	- 1/
Malaria	173.2	11.8	-93	2.1	.1	-95
Measles	3.2	10.2	219	1.6	.6	-62
Pneumonia	230.2	120.1	-48	107.8	38.7	-64
Tuberculosis	297.3	179.7	-39	56.4	30.0	-47
Typhoid	5.2	1.1	-79	3.7	.2	-95
Whooping cough	8.1	5.6	-31	4.5	.8	-82
Auto accidents	50.8	29.1	-43	- 1/	22.1	- 1/
Cancer	44.8	56.9	27	102.1	134.9	32
Heart disease	106.1	106.6	05	209.1	322.7	54
Nephritis	136.0	42.4	-688	87.2	53.0	-39
Suicide	20.8	21.6	-385	17.4	11.2	-36
Syphilis	25.6	8.2	-68	- 1/	8.0	- 1/

1/ Data not available.

Table 28.- Death Rates for Puerto Rico and the United States from Selected Causes by Race and Sex, 1948

Causes	Puerto Rico						United States					
	White			Colored			White			Colored		
	Total	Males	Females	Males	Females	Total	Males	Females	Males	Females	Males	Females
Diarrhea and Enteritis	183.5	204.9	189.4	130.5	137.1	6.0	6.0	5.1	5.1	12.2	8.6	
Tuberculosis	179.7	173.9	186.0	177.7	180.5	30.0	30.0	15.4	15.4	92.1	65.4	
Pneumonia	120.1	128.7	132.1	91.7	79.3	38.7	40.7	31.1	31.1	74.9	58.0	
Diseases of the heart	106.7	113.6	99.0	104.9	110.7	322.7	399.1	261.2	261.2	291.6	235.0	
Cancer	56.9	60.8	60.0	42.2	48.3	134.9	140.0	138.3	138.3	92.9	103.9	
Malaria	11.8	7.7	5.8	4.9	6.5	0.1	0.1	0.1	0.1	0.5	0.5	

Source: 1. Office of Vital Statistics, Death and Death Rates for Selected Causes by Age, Race and Sex, United States, 1948, Vol. 35, Number 18.

2. Insular Department of Health, Annual Report, 1948.

TABLE 29. - Age-Specific Death Rates from Tuberculosis in Puerto Rico for Selected Years, 1933 to 1949.

Age Group	1933				1940				1945				1949			
	Males		Females		Males		Females		Males		Females		Males		Females	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
All ages	291.8	371.4	352.1	396.4	225.9	307.2	257.5	348.5	196.0	203.2	203.6	220.1	147.4	134.1	150.0	148.2
Under 1 year	---	---	---	---	48.8	32.3	42.6	33.3	95.7	39.2	39.9	24.2	74.7	60.2	75.5	43.8
1-4 years	112.8	80.2	121.0	71.4	39.6	41.2	62.3	38.2	46.5	43.0	39.5	38.8	62.2	24.5	55.8	47.5
5-9 years	42.7	50.8	40.2	23.4	25.2	39.2	24.9	24.7	13.6	9.0	22.5	15.3	20.4	27.6	19.3	16.8
10-14 years	45.2	36.1	68.0	75.7	29.6	27.5	49.3	63.2	24.7	11.3	37.8	22.2	16.7	12.6	23.1	31.6
15-19 years	202.5	290.7	313.0	369.3	163.5	223.6	279.2	392.2	141.4	137.4	180.4	232.2	60.4	56.3	102.3	131.1
20-24 years	585.7	732.1	752.8	921.6	296.2	424.1	329.5	509.7	297.3	324.6	385.2	529.0	176.0	138.7	193.0	211.4
25-29 years	644.6	766.5	858.6	1036.6	492.1	653.7	562.1	816.3	285.2	335.8	383.1	402.3	221.2	233.9	278.7	235.6
30-34 years	481.8	615.9	544.3	718.0					355.0	400.1	414.4	500.5	222.3	281.6	312.5	377.6
35-44 years	429.4	718.5	551.7	677.0	402.5	595.6	408.4	647.6	382.3	415.0	328.7	385.2	285.6	292.5	293.9	319.9
45-54 years	459.6	702.0	463.0	541.7	398.0	584.9	392.6	441.2	323.9	354.5	354.0	361.9	277.9	238.2	219.8	189.4
55-64 years	508.2	787.7	471.2	407.2	397.5	519.6	411.6	437.5	413.3	539.6	228.7	288.9	362.0	345.3	230.3	221.0
65-74 years	590.4	609.7	391.3	517.3	476.6	925.9	439.8	639.9	369.7	497.7	184.0	198.0	386.5	541.9	248.9	270.3
75 and over	528.9	297.8	425.8	317.5	301.5	316.6	310.8	198.7	313.3	426.3	178.4	86.4	469.4	296.5	287.4	228.0

Source: Commissioner of Health of Puerto Rico, Annual Reports 1933, 1940, 1945, and 1949.

Table 30.- Computation for Fitting a Straight Line for Puerto Rican Death Rates from Tuberculosis, Per 100,000 Population, 1933-1949

Year	N	x	x ²	Death rate Y	xY	Yc
1933	0	-8	64	332.5	-2660.0	331.46
1934	1	-7	49	302.7	-2118.9	320.72
1935	2	-6	36	297.8	-2186.8	309.99
1936	3	-5	25	297.3	-1486.5	299.26
1937	4	-4	16	286.5	-1146.0	288.52
1938	5	-3	9	273.6	- 820.8	277.79
1939	6	-2	4	257.4	- 514.8	267.06
1940	7	-1	1	250.2	- 260.2	256.33
1941	8	0	0	242.8	-11194.0	245.60
1942	9	1	1	244.5	244.5	234.86
1943	10	2	4	231.0	462.0	224.13
1944	11	3	9	215.4	646.2	213.40
1945	12	4	16	202.4	809.6	202.67
1946	13	5	25	207.6	1038.0	191.94
1947	14	6	36	197.0	1182.0	181.20
1948	15	7	49	179.7	1257.9	170.47
1949	16	8	64	146.9	1175.2	159.74
	17	0	408	4175.3	<u>6815.4</u> -4378.6	

Formulas:

$$Y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum xY}{\sum x^2}$$

$$a = a^1 - b \frac{(N-1)}{2}$$

Evaluations:

$$a^1 = \frac{4175.3}{17} = 245.6$$

$$b = \frac{-4378.6}{408} = -10.732$$

$$a = 245.6 - (-10.73) 8 = 331.46$$

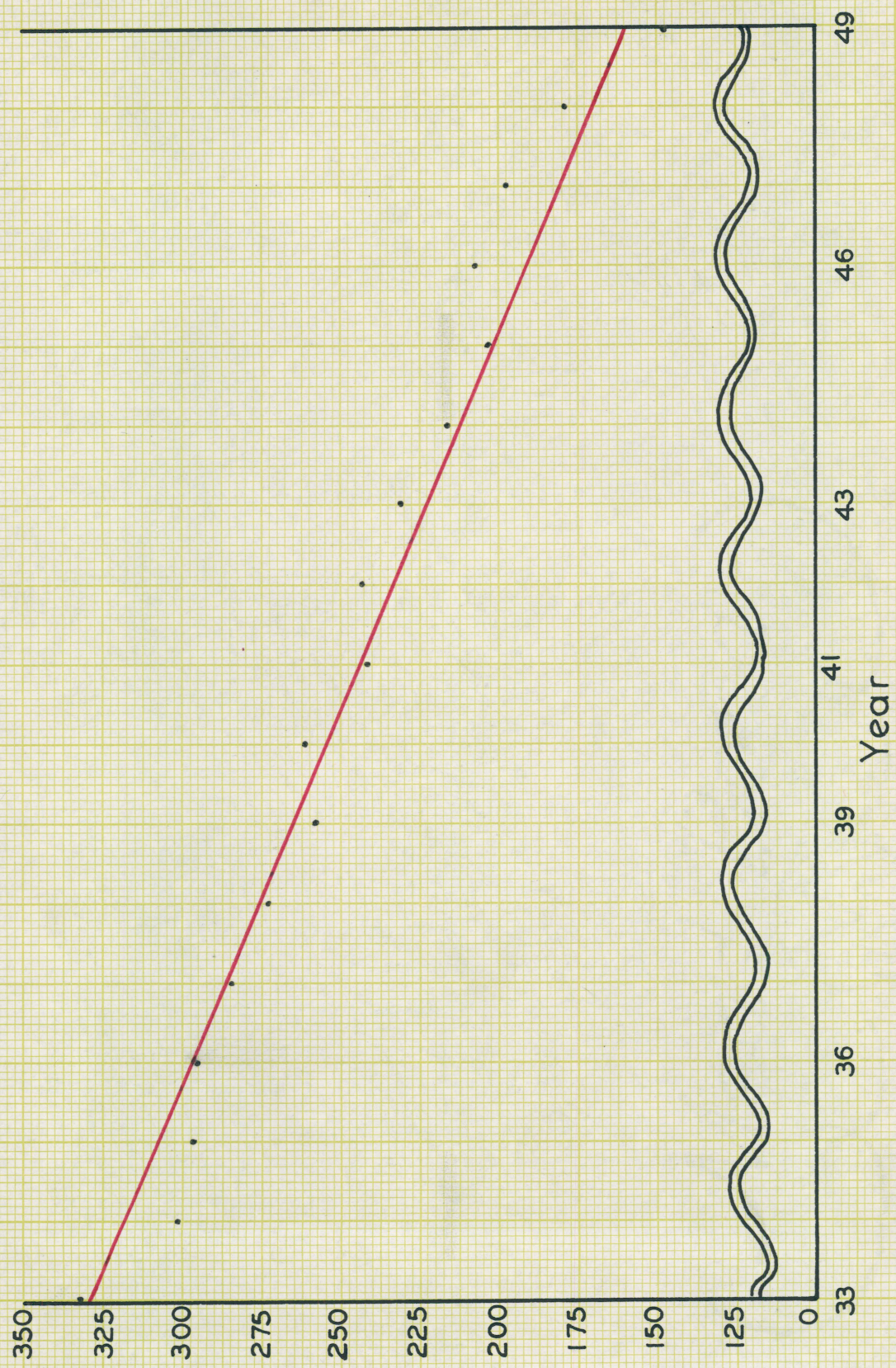


Figure 1.- Trend in the Death Rate from Tuberculosis in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by Method of Least Squares.

TABLE 31. - Age-Specific Death Rates from Diarrhea and Enteritis in Puerto Rico for Selected Years, 1933 to 1949.

Age Group	1933				1940				1945				1949			
	Males		Females		Males		Females		Males		Females		Males		Females	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
All ages	486.6	475.9	455.1	409.0	421.6	419.9	400.5	365.0	316.8	243.9	302.0	209.8	156.5	93.1	149.9	98.0
Under 1 year	---	---	---	---	5417.6	2903.1	4966.5	2467.3	4555.3	2393.1	4045.8	1897.6	2456.7	1135.9	2100.1	1032.7
1-4 years	1754.6	1752.8	1807.5	1464.0	1652.7	1683.8	1758.1	1534.5	868.0	651.4	960.6	627.0	409.6	241.8	487.1	288.3
5-9 years	281.8	222.2	249.8	222.0	160.7	146.2	184.5	137.8	89.5	48.0	96.0	67.3	39.8	35.9	54.2	42.0
10-14 years	59.1	33.6	41.8	34.0	26.4	20.6	26.8	31.6	19.1	7.6	17.2	14.8	8.8	6.3	10.0	6.3
15-19 years	22.4	15.9	16.1	7.2	7.4	19.4	22.2	19.1	7.0	---	5.4	---	---	---	4.2	6.7
20-24 years	34.6	24.4	31.1	20.4	18.1	28.8	11.0	17.4	9.9	25.0	7.4	4.6	1.1	---	2.1	---
25-29 years	46.6	8.2	27.7	31.2	23.0	35.7	21.7	31.0	5.9	10.8	8.7	---	6.1	---	1.5	15.4
30-34 years	29.1	25.3	36.5	75.1					4.1	7.5	13.0	8.1	2.1	7.4	10.9	---
35-44 years	39.2	70.9	40.5	37.1	49.0	52.8	31.3	13.9	28.5	27.7	10.8	9.5	11.7	8.1	8.4	4.0
45-54 years	84.0	61.7	103.2	53.4	62.2	61.2	52.3	73.5	33.3	57.0	18.0	35.5	18.1	11.6	11.3	31.6
55-64 years	151.6	152.0	179.1	218.2	133.7	123.0	76.7	155.2	67.8	89.9	81.9	50.2	11.9	---	30.0	23.3
65-74 years	371.4	353.0	409.9	213.0	275.2	272.3	244.3	246.1	136.2	139.4	139.1	132.0	111.2	20.8	81.3	54.1
75 and over	1078.9	536.0	1056.0	907.0	628.1	542.7	568.0	629.3	300.2	284.2	339.1	403.1	185.3	296.5	222.5	228.0

Source: Commissioner of Health of Puerto Rico, Annual Reports 1933, 1940, 1945, and 1949.

Table 32.- Computation for Fitting a Straight Line for Puerto Rican Death Rates from Diarrhea and Enteritis, Per 100,000 Population, 1933-1949

Year	N	x	x ²	Y	xY	Yc
1933	0	-8	64	456.5	-3652.0	483.14
1934	1	-7	49	356.3	-2494.1	464.74
1935	2	-6	36	360.6	-2163.6	446.34
1936	3	-5	25	475.4	-2377.0	427.94
1937	4	-4	16	483.5	-1934.0	409.54
1938	5	-3	9	417.8	-1253.4	391.14
1939	6	-2	4	398.1	- 796.2	372.74
1940	7	-1	1	405.2	- 405.2	354.34
1941	8	0	0	420.2	-15075.5	335.94
1942	9	1	1	331.3	331.3	317.54
1943	10	2	4	286.1	572.2	299.14
1944	11	3	9	304.0	912.0	280.74
1945	12	4	16	290.4	1161.6	262.34
1946	13	5	25	225.9	1129.5	243.94
1947	14	6	36	176.5	1059.0	225.54
1948	15	7	49	183.5	1284.5	207.14
1949	16	8	64	139.7	1117.6	188.74
	17	0	408	5711.0	<u>7567.7</u> -7507.8	

Formulas:

$$Y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum XY}{\sum x^2}$$

$$a = a^1 - b \left(\frac{N-1}{2} \right)$$

Evaluations:

$$a^1 = \frac{5711}{17} = 335.94$$

$$b = - \frac{7507.8}{408} = - 18.4$$

$$a = 335.94 - (-18.4) 8 = 483.14$$

DR/100,000

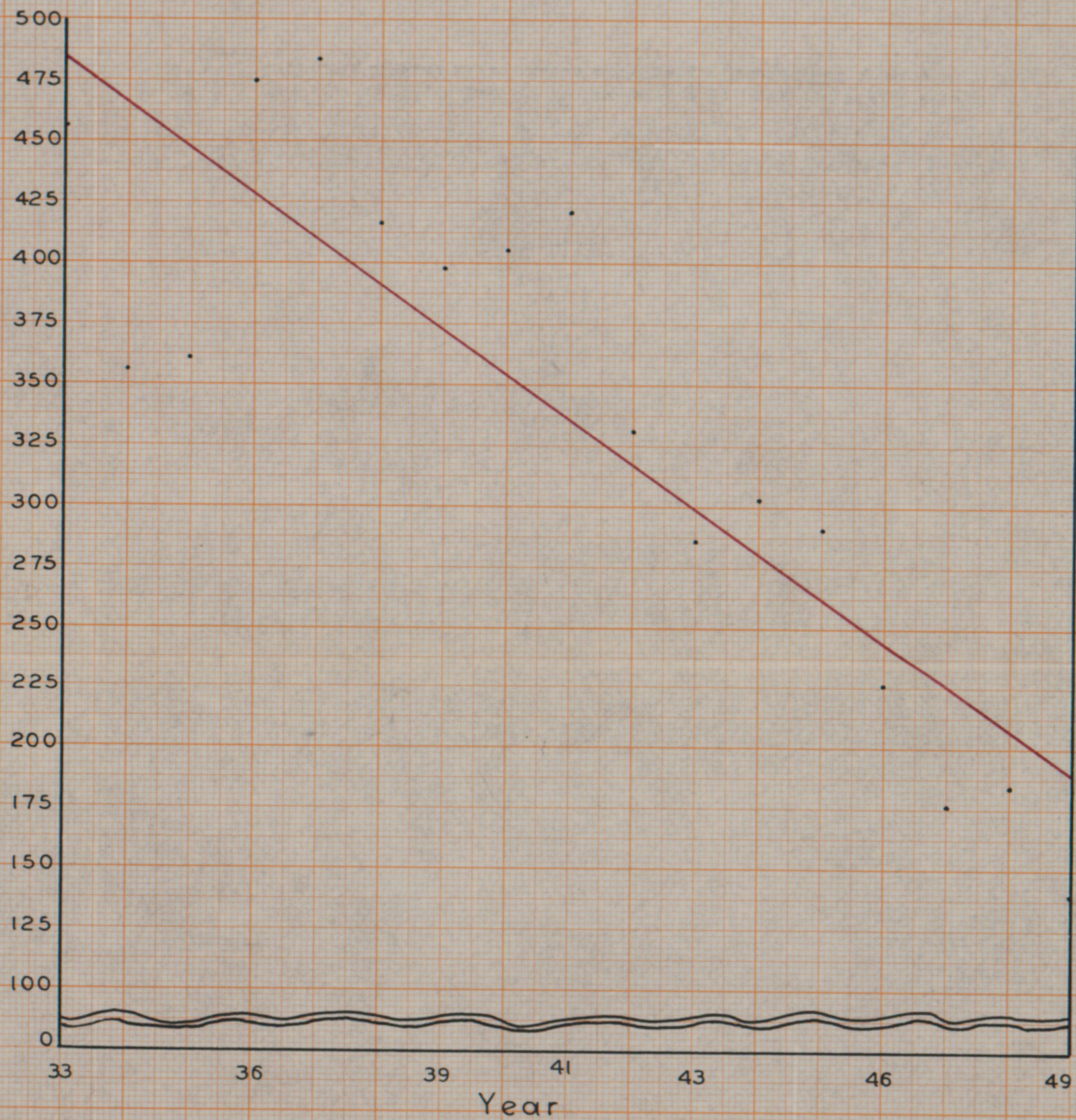


Figure 5. - Trend in the Death Rate from Diarrhea and Enteritis in Puerto Rico, 1933-1949 Showing Actual Rates and Straight Line Fitted by Method of Least Squares.

TABLE 33. - Age-Specific Death Rates from Diseases of the Heart in Puerto Rico for Selected Years, 1933 to 1949.

Age Group	1933				1940				1945				1949			
	Males		Females		Males		Females		Males		Females		Males		Females	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
All ages	119.7	145.0	101.0	123.0	130.3	157.6	111.9	127.1	94.2	99.9	96.6	100.2	107.6	85.3	100.2	82.7
Under 1 year									44.7	31.4	43.2	24.2	6.2	- - -	6.6	8.8
1-4 years									8.3	6.1	10.7	9.7	7.1	3.1	4.2	- - -
5-9 years					8.8	15.3	10.2	10.9	7.8	6.0	7.2	6.1	5.3	5.5	4.6	- - -
10-14 years	13.8	14.5	13.8	15.0					3.4	- - -	6.9	11.1	2.0	- - -	6.0	6.3
15-19 years									11.7	3.6	14.1	10.4	8.0	10.6	6.3	3.4
20-24 years									14.7	25.0	13.5	23.2	3.3	7.1	7.4	22.3
25-29 years									20.6	32.5	17.4	32.2	7.6	42.5	14.5	15.4
30-34 years					27.7	59.4	32.6	46.4	49.0	37.7	36.9	40.4	23.3	59.3	30.4	46.2
35-44 years	93.4	127.6	65.5	97.4	75.5	163.3	75.7	78.6	38.9	92.2	57.9	80.8	57.4	48.8	40.6	36.4
45-54 years	263.6	424.3	161.4	228.9	232.0	265.2	163.6	220.6	133.0	234.2	152.3	220.0	179.3	168.5	137.1	138.9
55-64 years	606.6	898.3	391.1	494.6	693.0	765.7	387.3	564.6	394.8	528.4	368.6	477.3	548.9	377.6	370.5	395.5
65-74 years	1304.5	1380.0	1267.0	1460.7	1658.0	2096.9	1305.5	1132.2	992.4	1055.1	700.1	660.1	1281.3	1042.1	960.0	847.0
75 and over	4294.5	5003.0	3798.3	4444.4	3203.5	4115.8	3386.6	3643.6	2819.7	2605.4	2498.4	2245.9	3384.4	2922.5	3449.2	2279.8

Source: Commissioner of Health of Puerto Rico, Annual Reports 1933, 1940, 1945, and 1949.

Table 34.- Computation for Fitting a Straight Line for Puerto Rican Death rates from Pneumonia, Per 100,000 Population, 1933-1949.

Year	N	x	x ²	Death rates		Yc
				Y	xY	
1933	0	-8	64	185.1	-1480.8	180.40
1934	1	-7	49	143.4	-1003.8	177.52
1935	2	-6	36	152.1	- 912.6	172.64
1936	3	-5	25	157.6	- 788.1	167.76
1937	4	-4	16	187.5	- 750.0	162.88
1938	5	-3	9	174.4	- 523.2	158.00
1939	6	-2	4	177.2	- 354.4	153.12
1940	7	-1	1	168.7	- 168.7	148.24
1941	8	0	0	160.0	-5981.1	143.36
1942	9	1	1	141.5	141.5	138.48
1943	10	2	4	122.0	244.0	133.60
1944	11	3	9	122.5	367.5	128.72
1945	12	4	16	112.4	449.6	123.84
1946	13	5	25	116.2	581.0	118.96
1947	14	6	36	102.0	612.0	114.08
1948	15	7	49	120.7	840.7	109.20
1949	16	8	64	94.1	752.8	104.32
	17	0	408	2436.8	3989.1	
					-1992.0	

Formulas:

$$Y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum xY}{x^2}$$

$$a = a^1 - b\left(\frac{N-1}{2}\right)$$

Evaluations:

$$a^1 = \frac{2436.8}{17} = 143.34$$

$$b = \frac{1992.0}{408} = -4.88$$

$$a = 143.34 - (-4.88)(8) = 182.4$$



Figure 6.- Trend in the Death Rate from Diseases of the Heart in Puerto Rico, 1933-1949 Showing Actual Rates and Straight Line Fitted by Method of Least Squares.

TABLE 35. - Age-Specific Death Rates from Pneumonia in Puerto Rico for Selected Years, 1933 to 1949.

Age Group	1933				1940				1945				1949			
	Males		Females		Males		Females		Males		Females		Males		Females	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
All ages	191.5	243.1	165.3	189.5	168.9	199.8	161.1	173.3	116.8	97.8	119.8	87.3	103.1	61.2	107.3	54.9
Under 1 year	---	---	---	---	1754.3	1059.3	1637.0	841.9	1269.6	564.9	1165.9	436.0	1117.8	431.7	1125.5	306.3
1-4 years	421.7	413.1	322.6	396.8	478.6	415.8	497.2	463.3	267.6	196.7	328.0	193.9	280.2	131.6	321.9	142.6
5-9 years	70.4	79.4	74.6	94.7	64.7	103.4	60.1	53.0	42.8	26.9	41.9	18.4	40.7	30.4	37.6	11.2
10-14 years	26.4	26.1	28.8	49.2	15.9	17.2	31.1	38.6	15.7	15.1	11.4	7.4	6.9	31.5	13.0	18.9
15-19 years	55.9	67.7	39.6	39.8	29.5	34.0	16.7	47.8	11.7	21.4	13.0	13.9	8.0	3.5	4.2	3.4
20-24 years	77.7	156.2	66.3	106.9	20.2	53.9	23.0	27.9	11.1	25.0	12.3	13.9	3.3	3.6	10.6	3.7
25-29 years	117.9	230.8	62.9	70.1	32.3	83.2	48.8	77.4	16.2	27.1	20.3	26.8	6.1	5.3	8.7	---
30-34 years	84.7	135.2	80.7	91.8												
35-44 years	91.9	160.7	84.2	102.0	56.9	120.1	48.3	97.1	32.4	41.5	35.0	57.1	28.1	8.1	16.7	16.2
45-54 years	156.3	300.9	121.7	129.7	69.8	129.2	76.3	161.8	50.8	50.6	43.5	92.2	23.0	40.7	35.7	50.5
55-64 years	274.6	414.6	212.1	189.1	200.5	273.4	157.3	197.6	70.9	179.9	109.2	138.2	62.3	64.7	83.5	116.3
65-74 years	571.3	738.1	465.8	426.0	349.1	571.9	307.2	221.5	189.7	318.5	161.6	165.0	195.9	229.3	127.0	144.2
75 and over	803.9	1012.5	1004.9	1179.1	1017.6	1266.4	900.2	927.4	691.9	710.6	562.1	604.7	741.1	593.0	714.0	456.0

Source: Commissioner of Health of Puerto Rico, Annual Reports 1933, 1940, 1945, and 1949.

Table 36.- Computation for Fitting a Straight Line for Puerto Rican Death Rates from Cancer, Per 100,000 Population, 1933-1949

Year	N	x	x ²	Death rates		Yc
				Y	xY	
1933	0	-8	64	45.3	-362.4	51.25
1934	1	-7	49	46.2	-323.4	51.30
1935	2	-6	36	49.2	-295.2	51.35
1936	3	-5	25	50.7	-253.5	51.40
1937	4	-4	16	48.6	-194.4	51.45
1938	5	-3	9	51.7	-153.1	51.50
1939	6	-2	4	53.6	-107.2	51.55
1940	7	-1	1	51.7	- 51.7	51.60
1941	8	0	0	54.1	1742.9	51.65
1942	9	1	1	54.8	54.8	51.70
1943	10	2	4	50.8	101.6	51.75
1944	11	3	9	52.1	156.3	51.80
1945	12	4	16	48.5	194.0	51.85
1946	13	5	25	48.4	242.0	51.90
1947	14	6	36	54.8	328.8	51.95
1948	15	7	49	56.9	398.3	52.00
1949	16	8	64	61.8	494.4	52.05
	17	0	408	879.2	<u>1970.2</u> 227.3	

Formulas:

$$Y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum xY}{\sum x^2}$$

$$a = a^1 - b \left(\frac{N-1}{2} \right)$$

Evaluations:

$$a^1 = \frac{879.2}{17} = 51.7$$

$$b = \frac{227.3}{408} = .055$$

$$a = 51.7 - (.055)(8) = 51.25$$

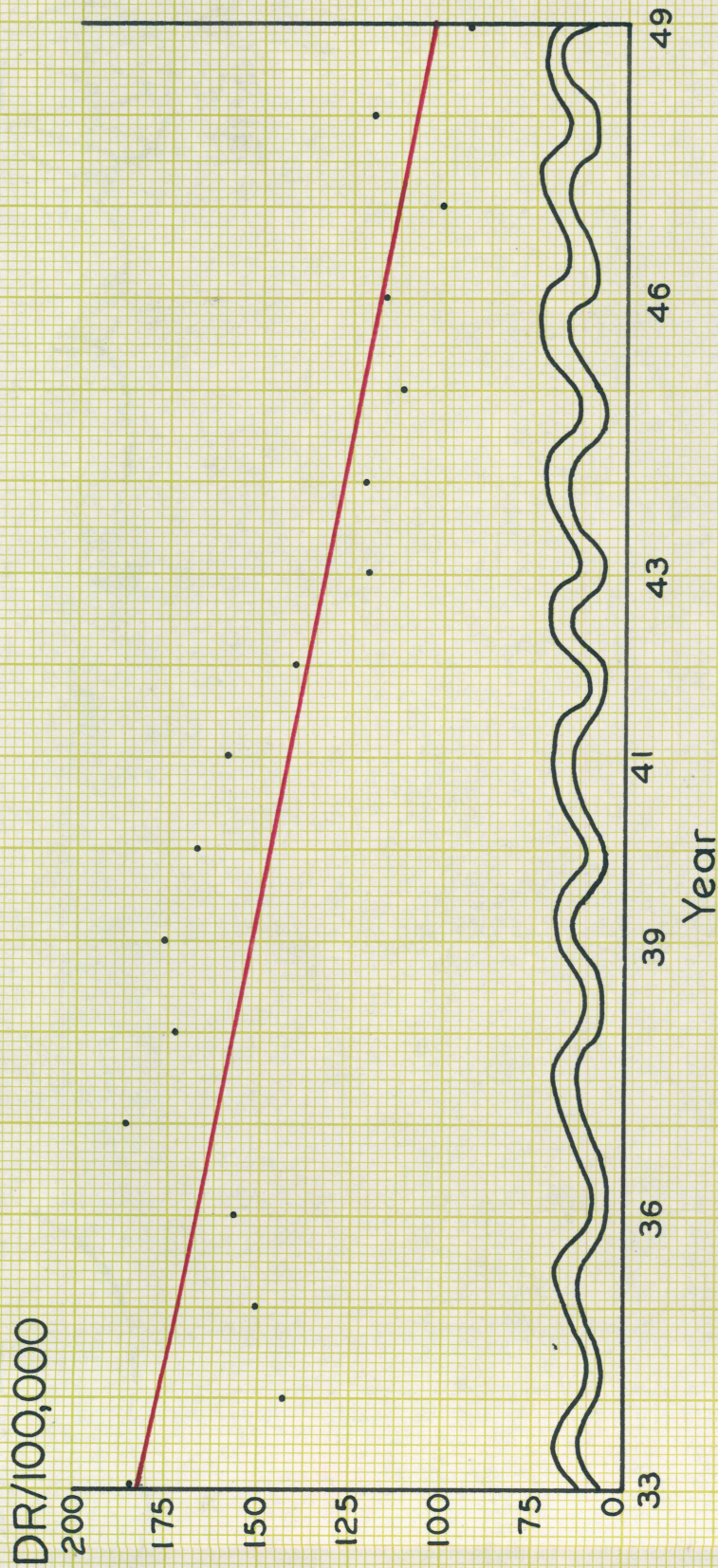


Figure 7.- Trend in the Death Rate from Pneumonia in Puerto Rico, 1933-1949
 Showing Actual Rates and Straight Line Fitted by Method of
 Least Squares.

TABLE 37. - Age-Specific Death Rates from Cancer in Puerto Rico for Selected Years, 1933 to 1949.

Age Group	1933				1940				1945				1949			
	Males		Females		Males		Females		Males		Females		Males		Females	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
All ages	38.3	41.5	53.5	51.1	46.1	51.1	57.1	54.6	46.4	38.6	53.2	47.1	64.4	48.3	66.5	51.4
Under 1 year																
1-4 years													3.1	8.6	9.8	
5-9 years									2.1	3.1	1.1	3.2	9.2	3.1	4.2	
10-14 years					1.8	0.7	3.3	0.7			3.1		4.4		2.8	
15-19 years	2.8	2.5	3.9	7.5									1.0		1.0	
20-24 years									2.3		3.2		5.7	10.6	5.3	
25-29 years									3.7	4.2	3.7	9.3	1.1		9.5	11.1
30-34 years					17.3	15.8	26.0	31.0	4.4		11.6	10.7	9.2	5.3	17.4	25.6
35-44 years	39.2	70.9	84.2	76.8	33.1	43.2	74.4	106.4	31.1	41.5	95.6	76.1	44.5	48.8	70.5	76.9
45-54 years	128.3	131.2	227.5	175.5	120.7	136.0	224.6	235.3	108.5	120.3	189.8	163.2	136.5	104.6	236.7	189.4
55-64 years	217.2	304.0	353.4	334.6	320.1	396.5	318.8	282.3	308.4	202.4	307.2	251.2	412.4	269.7	424.0	372.3
65-74 years	495.1	417.2	456.5	486.9	577.3	653.6	579.4	369.2	506.9	557.4	323.1	396.0	725.4	729.5	604.4	414.5
75 and over	698.1	833.8	698.3	600.3	565.3	949.8	557.3	563.1	861.6	710.6	580.1	604.7	1334.0	1101.2	649.0	513.0

Source: Commissioner of Health of Puerto Rico, Annual Reports, 1933, 1940, 1945, and 1949.

Table 38.- Computation for Fitting a Straight Line for Puerto Rican Death Rates from Diseases of the Heart, Per 100,000 Population, 1933-1949

Year	N	x	x ²	Death rates		Yc
				Y	xY	
1933	0	-8	64	114.6	-916.8	108.74
1934	1	-7	49	102.3	-716.1	108.67
1935	2	-6	36	95.3	-571.8	108.60
1936	3	-5	25	111.1	-555.5	108.53
1937	4	-4	16	116.4	-465.6	108.46
1938	5	-3	9	119.5	-358.5	108.39
1939	6	-2	4	115.8	-231.6	108.32
1940	7	-1	1	125.4	-125.4	108.25
1941	8	0	0	117.3	-394.3	108.18
1942	9	1	1	111.9	111.9	108.11
1943	10	2	4	103.2	206.4	108.04
1944	11	3	9	102.8	308.4	107.97
1945	12	4	16	96.4	385.6	107.90
1946	13	5	25	99.7	498.5	107.83
1947	14	6	36	101.7	610.2	107.76
1948	15	7	49	106.6	746.2	107.69
1949	16	8	64	99.3	794.4	107.62
	17	0	408	1839.3	3661.6 -279.7	

Formulas:

$$y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum xY}{\sum x^2}$$

$$a = a^1 - b \frac{(N-1)}{2}$$

Evaluations:

$$a^1 = \frac{1839.3}{17} = 108.19$$

$$b = \frac{-279.7}{408} = .068$$

$$a = 108.19 - (-.068) \times 8 = 108.74$$



Figure 8.- Trend in the Death Rate from Cancer in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by Method of Least Squares.

Table 39.- Death Rates for Puerto Rico Per 100,000 Population from Malaria by Age and Sex, 1949

Age group	Males	Females	Total
All ages	4.5	3.8	4.1
Under 1 year	25.2	9.5	17.5
1 - 4 years	9.9	13.4	11.7
5 - 9 years	1.3	0.7	1.1
10 - 14 years	-	1.5	0.8
15 - 19 years	1.7	1.6	1.7
20 - 24 years	-	1.6	0.8
25 - 29 years	1.2	-	0.6
30 - 34 years	1.6	5.1	3.3
35 - 44 years	3.6	1.8	2.7
45 - 54 years	6.4	4.3	5.4
55 - 64 years	9.3	-	4.9
65 - 74 years	16.9	11.9	14.3
75 years and over	19.1	14.0	16.2

Source: Commissioner of Health of Puerto Rico, Annual Report, 1949-1950.

Table 40.- Computations for Fitting a Straight Line for Puerto Rican Death Rates from Malaria, Per 100,000 Population, 1933-1949

Year (1)	N	x	x ²	Death rates		Yc
				Y	xY	
1933	0	-8	64	197.9	-1583.2	170.0
1934	1	-7	49	150.0	-1050.0	159.6
1935	2	-6	36	123.5	- 741.0	149.2
1936	3	-5	25	137.7	- 688.5	138.8
1937	4	-4	16	129.2	- 516.8	128.4
1938	5	-3	9	108.4	- 325.2	118.0
1939	6	-2	4	88.8	- 177.6	107.6
1940	7	-1	1	96.8	- 96.8	97.2
1941	8	0	0	124.6	-5179.1	86.8
1942	9	1	1	99.4	99.4	76.4
1943	10	2	4	58.9	117.8	66.0
1944	11	3	9	49.9	140.7	55.6
1945	12	4	16	43.1	172.4	45.2
1946	13	5	25	32.3	161.5	34.8
1947	14	6	36	20.0	120.0	24.4
1948	15	7	49	11.8	82.6	14.0
1949	16	8	64	4.1	32.8	3.6
	17	0	408	1476.4	<u>936.2</u> -4242.9	

Formulas:

$$y = a + bx$$

$$a^1 = \frac{\sum Y}{N}$$

$$b = \frac{\sum xY}{\sum x^2}$$

$$a = a^1 - b \left(\frac{N-1}{2} \right)$$

Evaluations:

$$a^1 = \frac{1476.4}{17} = 86.8$$

$$b = \frac{4242.9}{408} = 10.4$$

$$a = 86.8 - (-10.4)(8) = 170.0$$

23



Figure 9.- Trend in the Death Rate from Malaria in Puerto Rico, 1933-1949, Showing Actual Rates and Straight Line Fitted by Method of Least Squares.

SUMMARY AND CONCLUSIONS

The object of this project was to study the fertility and mortality of the people of Puerto Rico. It was found that fertility is very high and has been consistently high since 1900. It was found that mortality has declined very rapidly since 1900. Hence, the combination of these two trends is bringing about a very high rate of natural increase and making Puerto Rico one of the most densely populated areas in the world.

Fertility was studied in relation to certain cultural and demographic factors such as age at marriage, length of the childbearing period, age distribution of the population, percentage of illiteracy, and occupational status. From this it was found that:

1. Most Puerto Rican women marry at very early ages.
2. The child-bearing period is long and characterized by high-age-specific birth rates.
3. Puerto Rico's population is mostly composed of young people, with 74.6 percent under 35 years of age, reflecting a high fertility for the present and future.
4. There is a high percentage of illiterates and persons with little schooling, both of whom have higher fertility rates than highly educated persons.
5. Almost 40 percent of Puerto Rico's employed persons are laborers, who have higher fertility rates than other occupational groups.

Fertility also was studied in relation to selected regional characteristics. From this it was found that:

1. The highest fertility ratios are in the most rural regions.
2. The three regions with the highest fertility ratios have the highest percentage of young persons reflecting a high fertility for the present and the future.
3. The three regions with the highest fertility ratios have the highest percentage of laborers.
4. The region with the lowest fertility ratio has the highest percentage of females.

Mortality is being affected by advances in medical science, public health and improvement in the level of living. Life expectancy has increased from 38 years in 1900 to 61 years in 1950, mainly as a result of the decline in mortality.

The five leading causes of death are tuberculosis, diarrhea-enteritis, diseases of the heart, pneumonia, and cancer. Malaria was a leading cause of death in 1933 but is now almost eliminated. Diarrhea-enteritis, and pneumonia are responsible for high death rates among persons under five years of age. Tuberculosis, diseases of the heart, and cancer are responsible for high death rates among persons 25 years of age and over. Females have higher death rates from tuberculosis and cancer than males. Males have higher rates from diarrhea-enteritis, diseases of the heart, and pneumonia than females. White people have higher death rates from diarrhea-enteritis, pneumonia, and cancer than colored people. Colored people have higher death rates from tuberculosis

and diseases of the heart than white people. Death rates from Diarrhea-enteritis, tuberculosis and pneumonia have declined in recent years, while the death rate from cancer has increased, and the death rate from diseases of the heart has remained about the same.

The combined Spanish and United States culture systems are to a great extent responsible for the extreme case of population pressure that exists. The 405 years of Spanish domination of the Island have left traditions and beliefs that still direct the way of thinking of most of the people. Many of these cultural traits have been affecting the Island's basic problem, excessive population. Such things as unlimited reproduction, large families, and little emphasis on schooling are examples of the beliefs that tend toward the Island's high birth rate.

On the other hand, the 50 years of American influence has provided the Island with modern ideas of sanitation, and public health programs that have made possible the reduction in the death rates from the different diseases, and as a result a higher life expectancy. Emphasis has been given to more schooling, small families and limited reproduction, but the previous culture is still in the way.

Although an attempt has been made to control the number of births, the results are nil. Besides, different historical periods have had their influence. During the depression years when there was food and money available through the different relief programs, the birth rates increased. The same thing happened during the World War II period, when the birth rates were very high. On the contrary the death rates have shown a decline every year, and in this phase the government

has been successful.

In view of what happens in countries where death rates have fallen more rapidly than birth rates, the future trend of population growth in Puerto Rico apparently will continue to increase. This means that population pressure will worsen unless cultural changes such as increased emphasis on schooling, industrialization, urbanization and higher standards of living make the people more aware of the problem and cause them to change their present ideas and practices with respect to fertility.

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