

THE DEMOGRAPHIC EVOLUTION OF PUERTO RICO

Vazquez, Jose L

ProQuest Dissertations and Theses; 1964; ProQuest Dissertations & Theses Full Text

pg. n/a

T10675

THE UNIVERSITY OF CHICAGO

DATE May 28, 19 64

José L. Vázquez

Author

January 31st, 1929

Birth Date

The Demographic Evolution of Puerto Rico

Title of Dissertation

Sociology

Department or School

Ph.D.

Degree

June, 1964

Convocation

Permission is herewith granted to the University of Chicago to make copies of the above title, at its discretion, upon the request of individuals or institutions and at their expense.

Date filmed

Number of pages

Signature of writer

Extensive Quotation or Further Reproduction of This Material by Persons or Agencies Other than the University of Chicago May Not Be Made without the Express Permission of the Writer.

SHORT TITLE: \_\_\_\_\_

IRREGULAR NUMBERING

OVERSIZED SHEETS

PAID { By cash   
By thesis deposit

DATE BILLED \_\_\_\_\_



Foto obtenida del Departamento de Salud. (1992). Informe Anual de Estadísticas Vitales, 1990. Administración de facilidades y servicios de salud, Oficina de estadísticas de salud, San Juan, Puerto Rico

THE UNIVERSITY OF CHICAGO

THE DEMOGRAPHIC EVOLUTION OF PUERTO RICO

A DISSERTATION SUBMITTED TO  
THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES  
IN CANDIDACY FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY  
DEPARTMENT OF SOCIOLOGY

BY  
JOSÉ L. VÁZQUEZ

CHICAGO, ILLINOIS

JUNE, 1964

J. Vázquez Calzada  
BIBLIOGRAFÍA

**CIDE** CENTRO DE  
INVESTIGACIÓN  
Recinto de Ciencias Médicas  
Programa Graduado de  
Demografía **DEMOGRÁFICA**

**CIDE** Clásicos en  
Demografía  
Programa Graduado de Demografía  
Recinto de Ciencias Médicas • UPR

Programa Graduado de Demografía  
**UPR**  
Ciencias Médicas

TABLE OF CONTENTS

	Page
LIST OF TABLES. . . . .	iv
LIST OF ILLUSTRATIONS . . . . .	xiv
Chapter	
I. INTRODUCTION. . . . .	1
II. POPULATION GROWTH IN PUERTO RICO. . . . .	12
1493-1764: The Precensal Period	
1765-1895: The Spanish Censal Period	
1899-1960: The American Regime	
Population Growth in Urban Places	
City and Metropolitan Growth	
III. POPULATION CHARACTERISTICS. . . . .	41
The Age Structure of the Population	
The Sex Composition	
Nativity and Ethnicity	
Marital Status and Nuptiality	
Education	
The Working Population	
IV. EXTERNAL AND INTERNAL MIGRATION . . . . .	112
External Migration	
Internal Migration	
V. NATALITY AND FERTILITY. . . . .	156
The Crude Birth Rate	
Fertility Trends in Puerto Rico	
Fertility Differentials	
VI. MORTALITY TRENDS. . . . .	227
The Age and Sex Differential	
Infant Mortality	
Life Table Functions	
Causes of Death	
Factors Influencing These Changes	

TABLE OF CONTENTS--Continued

Chapter	Page
VII. PUERTO RICO'S DEMOGRAPHIC FUTURE. . . . .	257
Future Prospects in Mortality, Fertility and Migration Population Perspectives	
VIII. POLICY IMPLICATIONS . . . . .	294
SELECTED BIBLIOGRAPHY . . . . .	329
APPENDIXES	
I. METHODS OF POPULATION ESTIMATION FOR THE PRECENSAL PERIOD. . . . .	334
II. ESTIMATION OF THE CRUDE BIRTH RATE AND ESTIMATION OF UNDERREGISTRATION OF BIRTHS . . . . .	338
III. ABRIDGED LIFE TABLES FOR PUERTO RICO. . . . .	347

LIST OF TABLES

Table	Page
1. Estimates of Free and Total Population: 1510-1765. . . . .	16
2. Number of Settlements Existing at the End of Each Period: 1500-1800. . . . .	19
3. Population Counts: 1765-1897. . . . .	21
4. Population and Annual Rate of Increase During Each Intercensal Period: 1765-1887. . . . .	23
5. Proportion of Mulattos in the Colored Population: 1802-1897 . . . . .	27
6. Population and Annual Rate of Increase: 1899-1960. . . . .	28
7. Birth Rate, Death Rate, Natural Increase, and Emigration Rate During Each Intercensal Period: 1899-1960 . . . . .	29
8. Birth Rate, Death Rate, and Natural Increase: 1962	30
9. Population of Puerto Rico, Urban and Rural: 1899-1960. . . . .	34
10. Population Living in Cities: 1920-1960. . . . .	35
11. Population Growth in Standard Metropolitan Statistical Areas: 1899-1960. . . . .	38
12. Population Distribution by Residence (1960). . . . .	40
13. Broad Age Distribution of the Population: 1765-1960. . . . .	43
14. Arithmetic Mean of the Age Distribution of the Population: 1765-1960 . . . . .	47
15. Age and Sex Distribution of the Population: 1899-1960. . . . .	49
16. Percentage Distribution of the Population by Age and Sex: 1899-1960. . . . .	51

LIST OF TABLES--Continued

Table	Page
17. Median Age by Place of Residence and Sex (1960) . .	52
18. Sex Distribution of the Population: 1765-1960 . .	53
19. Sex Ratio at Birth: 1888-1898 to 1951-1960. . . .	54
20. Sex Ratios by Age: 1899-1960. . . . .	55
21. Sex Ratio by Age and Residence: 1950 and 1960 . .	57
22. Place of Birth of the Non-Native Population: 1899-1960. . . . .	59
23. Population by Color: 1899-1950. . . . .	61
24. Percentage Distribution of the Population 15 Years of Age and Over by Marital Status and Sex: 1899-1960. . . . .	65
25. Percentage of Actually Married Population in Each Age Group by Sex: 1899-1960. . . . .	68
26. Percentage of Ever Married Population 15 Years of Age and Over by Age and Sex: 1899-1960 . . .	69
27. Number of Marriages and Corresponding Rates: 1888-1898. . . . .	72
28. Number of Marriages and Corresponding Rates: 1900-1960. . . . .	73
29. Median Age at Marriage, by Sex: Selected Years (1932-1960). . . . .	75
30. Broad Age Distribution at Marriage, by Sex: 1913-1960. . . . .	76
31. Distribution of Marriages by Previous Marital Condition and Sex: 1913-1960. . . . .	77
32. Median Age at First Marriage: 1899-1960 . . . . .	77
33. Divorce: 1932-1960. . . . .	80
34. Population 10 Years of Age and Over Able to Read and Write, by Sex: 1860-1960 . . . . .	83
35. Ability to Read and Write for Persons 10 Years of Age and Over, by Age and Sex: 1899-1960. . .	83
36. Percentage of the Population 10 Years of Age and Over Able to Read and Write, by Residence: 1910-1960. . . . .	87

LIST OF TABLES--Continued

Table	Page
37. Median of School Years Completed, by Age and Sex, for the Population 25 Years Old and Over: 1950 and 1960. . . . .	87
38. Percentage Distribution of the Population 25 Years Old and Over by Years of School Completed and Sex: 1950 and 1960 . . . . .	89
39. Median of School Years Completed by Age, Sex, and Place of Residence (1960). . . . .	89
40. School Enrollment Rates by Age: 1910-1960 . . . . .	91
41. Proportion of the Population 14 Years of Age and Older Gainfully Employed or in the Labor Force, by Sex: 1899-1960. . . . .	95
42. Labor Force Participation Rates by Age and Sex: 1899-1960. . . . .	96
43. Total Civilian Employment by Sex: 1940, 1950, and 1960 (In Thousands). . . . .	100
44. Total Employment by Industrial Groups: 1950 and 1960 (In Thousands). . . . .	100
45. Annual Average Unemployment by Sex: 1950-1961 . . . . .	101
46. Percentage Distribution of Employed Workers by Industry: 1899-1960. . . . .	104
47. Percentage Distribution of Gainfully Employed Persons by Industry and Sex: 1899 and 1930. . . . .	104
48. Percentage Distribution of Employed Workers by Industry Group and Sex: Selected Years (1940 to 1959) . . . . .	105
49. Percentage Distribution of the Working Population by Broad Occupational Groups: 1899-1960 . . . . .	109
50. Percentage Distribution of the Working Population by Occupational Groups and Sex: 1899, 1940, 1950, and 1960 . . . . .	110
51. Percentage Distribution of the Usual 20 Per Cent Sample and a Complete Count in All Departing Flights Included in the Sample: July-September, 1961. . . . .	117
52. Net Emigration from Puerto Rico: 1910-1961. . . . .	118
53. Place of Birth and Ancestry of Net Migrants: Fiscal Years 1958-1959 to 1961-1962. . . . .	122



LIST OF TABLES--Continued

Table	Page
54. Net Migration by Age and Sex: Calendar Year 1946. . . . .	124
55. Estimates of Net Migration by Age and Sex: April 1, 1950 to April 1, 1960 (In Thousands) . . . . .	125
56. Enumerated and Expected Population in the Absence of Emigration Since 1940: 1950 and 1960 . . . . .	129
57. Expected Population in the Absence of Emigration Since 1940, by Age and Sex: 1950 and 1960 . . . . .	130
58. Broad Age Distribution of the Expected and Enumerated Population by Sex: 1950 and 1960 . . . . .	133
59. Sex Ratios by Age in the Enumerated and Expected Populations for 1960. . . . .	134
60. Actual and Expected Labor Force by Age and Sex: 1950 and 1960. . . . .	137
61. Actual and Expected Employment by Sex: 1950 and 1960 . . . . .	139
62. Dependency in Puerto Rico: 1899-1960. . . . .	142
63. Number of Persons Without Employment Per Person Employed: 1940, 1950, and 1960. . . . .	144
64. Internal Migration Estimates for Each Inter-censal Period: 1930-1940 to 1950-1960 . . . . .	147
65. Distribution of Municipalities by Rate of Migration: 1930-1940, 1940-1950, and 1950-1960. . . . .	152
66. Distribution of the Municipalities by Rate of Out-migration, Family Income, and Proportion of the Employed Male Labor Force Engaged in Agriculture . . . . .	155
67. Estimated Crude Birth Rate: 1755-1765, 1850-1855, and 1877-1882. . . . .	157
68. Registered Number of Births (Baptisms) by Sex for 1828 . . . . .	158
69. Number of Recorded Births and Corresponding Birth Rates: 1888-1960. . . . .	164
70. Number of Children Ever Born per 1,000 Females of Completed Fertility (45 Years of Age and Over): 1950 . . . . .	167

LIST OF TABLES--Continued

Table	Page
71. Estimates of Completeness of Birth Registration: 1889-1893 to 1930-1934 . . . . .	167
72. Number of Births and Corresponding Birth Rates: 1929-1939. . . . .	169
73. Estimated Average Completeness of Birth Registra- tion for Several Periods: 1888-1960 . . . . .	171
74. Recorded and Corrected Birth Rates for Several Periods: 1888-1960. . . . .	171
75. Specific Fertility Rates by Age of Mother: Total Fertility Rates and Gross Reproduction Rates (1932, 1940, 1950, and 1960) . . . . .	177
76. Age Specific Fertility Rates by Birth Order: 1940, 1950, and 1960 . . . . .	179
77. Total Fertility Rates per 1,000 Females by Birth Order: 1940, 1950, and 1960 . . . . .	180
78. Specific Fertility Rates by Age of Father: 1940, 1950, and 1960 . . . . .	184
79. Crude Birth Rate and Age Standardized Rates by Age of Mother and Father: 1940, 1950, and 1960. . . . .	187
80. Age Specific Fertility Rates per 1,000 "Actually Married Population": 1940, 1950, and 1960 . . . . .	190
81. Age and Marital Status Standardized Birth Rate for 1940, 1950, and 1960 (by Sex). . . . .	191
82. Percentage of Actually Married Women with Husband Present by Age: 1950 and 1960 . . . . .	192
83. Age Specific Birth Rates by Age of Mother per 1,000 "Actually Married Females with Husband Present": 1950 and 1960 . . . . .	192
84. Number of Children Ever Born per 1,000 Women Ever Married 15 to 44 Years Old by Age and Place of Residence: 1950 and 1960. . . . .	195
85. Crude and Age-Marital Status Adjusted Birth Rates for Census Years: 1910 to 1960. . . . .	195
86. Number of Children Under 5 Years of Age per 1,000 "Actually Married" Females 15-44 Years Old: 1899-1960. . . . .	198
87. Specific Birth Rates by Age of Mother: Puerto Rico and Selected Countries, Recent Years. . . . .	202

LIST OF TABLES--Continued

Table	Page
88. General Fertility and Gross Reproduction Rates: Puerto Rico and Selected Countries, Recent Years. . . . .	204
89. Recorded Crude Birth Rate by Place of Mother's Residence for Several Periods Since 1930 . . . .	206
90. Children to Women Ratios by Urban-Rural Residence: 1899-1960. . . . .	207
91. Specific Fertility Rates by Age and Residence of Mother: 1940, 1950, and 1960. . . . .	208
92. Gross Reproduction Rates for Urban and Rural Zones: 1940-1960. . . . .	210
93. Number of Children Ever Born per Mother (of all Ages) by Income Group and Residence (1947) . . .	211
94. Number of Children Ever Born by Age and Ability to Read and Write per 1,000 Ever Married Women (1960) . . . . .	213
95. Number of Children Ever Born per 1,000 Women by Age, Years of School Completed, and Residence (1950) . . . . .	215
96. Number of Children Ever Born per 1,000 Ever Married Women by Age, Years of School Com- pleted and Residence (1960). . . . .	216
97. Total Children Ever Born per 1,000 Ever Married Women by Labor Force Status (1960) . . . . .	219
98. Children Ever Born per 1,000 Ever Married Women 35-44 Years Old by Labor Force and Employment Status (1960). . . . .	219
99. Partial Correlation Coefficients Between Eight Independent Variables and Index of Means- Competence and Index of Fertility Control, Holding Seven Variables Constant . . . . .	224
100. Crude Death Rate in Puerto Rico: 1888-1898 to 1960. . . . .	228
101. Crude Death Rate by Sex: 1909-1911 to 1959-1961 .	229
102. Infant Mortality for Selected Periods: 1902-1903 to 1959-1961 . . . . .	229
103. Neonatal, "Late," and Total Infant Mortality: 1932-1960. . . . .	231

LIST OF TABLES--Continued

Table	Page
104. Age Specific Mortality Rates and Indexes for Both Sexes: 1902-1903 to 1959-1961. . . . .	234
105. Age Specific Death Rates by Sex: Selected Periods	235
106. Ratios of Male to Female Age Specific Death Rates by Age: Selected Periods. . . . .	236
107. Probability of Dying During Each Age Interval (1,000 $q_x$ ) for Both Sexes: 1902-1903 to 1959-1961. . . . .	238
108. Probability of Dying During Each Age Interval (1,000 $q_x$ ) by Sex: 1930-1960. . . . .	239
109. Age at Which 25, 50 and 75 Per Cent of the Original Cohort Dies by Sex: 1902-1903 to 1959-1961. . . . .	241
110. Number of Survivors to Specified Age out of 1,000 Born Alive by Sex: 1902-1903 to 1959-1961 . . .	242
111. Expectation of Life at Birth, by Sex: 1902-1903 to 1960. . . . .	245
112. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1907) . . . . .	253
113. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1913) . . . . .	253
114. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1920) . . . . .	254
115. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1930) . . . . .	254
116. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1940) . . . . .	255
117. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1950) . . . . .	255
118. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1955) . . . . .	256
119. Deaths and Death Rates from Each of the Ten Leading Causes of Death (1960) . . . . .	256
120. Projected Survival Factors by Age and Sex: 1960-1965 to 1980-1985 . . . . .	261

LIST OF TABLES--Continued

Table	Page
121. Projected Annual Age-Specific Fertility Assuming that the Relative Decline Observed Between 1950 and 1960 in Each Age Group is to Continue in the Future. . . . .	263
122. Projected Annual Age-Specific Fertility Assuming a 50 per cent Reduction in Each Age Specific Birth Rate Between 1960 and 1985 . . . . .	263
123. Population Projection I: 1965-1985. . . . .	274
124. Population Projection II: 1965-1985 . . . . .	275
125. Population Projection III; 1965-1985. . . . .	276
126. Actual and Projected Total Population: 1960 to 1985. . . . .	276
127. Average Annual Rate of Population Growth (Per Cent): 1950-1960 and 1960-1985. . . . .	280
128. Implicit Crude Birth and Death Rates in Population Projections: 1960-1985. . . . .	280
129. Broad Age Distribution of the Projected Population: 1960-1985 . . . . .	286
130. Dependency Ratios: 1960-1985. . . . .	288
131. Labor Force Population (in Thousands): Projection I . . . . .	290
132. Labor Force Population (in Thousands): Projection II. . . . .	291
133. Labor Force Population (in Thousands): Projection III . . . . .	292
134. Deciles Computed from the Census Distribution of Income: 1950 and 1960. . . . .	297
135. Average Annual Additions to the Labor Force by Sex (in Thousands): 1960-1965 to 1980-1985. . .	309
136. Average Annual Additions to the Labor Force by Age (in Thousands): 1960-1965 to 1980-1985. . .	310
137. Additional Employment Needed to Maintain the 1960 Unemployment Rate Constant: 1960-1965 to 1980-1985 . . . . .	313
138. Projections of School Age Population by Age: 1960-1985. . . . .	315

LIST OF TABLES--Continued

Table	Page
139. Projections of School Enrollment by Age (in Thousands): 1960-1985 . . . . .	318
140. Needed and Existing Number of Hospital Beds: 1958 . . . . .	322
141. Projections of Medical and Nursing Personnel Needs. . . . .	325
142. Projection of Household Needs. . . . .	327
143. Enumerated Free Population by Age and Sex (1765) .	339
144. Abridged Life Tables for Both Sexes (1894) . . . .	342
145. Enumerated Population by Age and Sex as of December 25 and 26, 1860 . . . . .	343
146. Enumerated Population by Age and Sex as of December 31, 1887. . . . .	344
147. Survival Factors . . . . .	345
148. Quinquennial Estimates Obtained by Arithmetic Interpolations . . . . .	346
149. Survival Factors for Births Occurring During a Given 5-Year Time Interval to Age 5-9. . . . .	346
150. Abridged Life Table for Both Sexes (1902-1903) . .	348
151. Abridged Life Table for Males (1902-1903). . . . .	349
152. Abridged Life Table for Females (1902-1903). . . .	350
153. Abridged Life Table for Both Sexes (1909-1911) . .	351
154. Abridged Life Table for Males (1909-1911). . . . .	352
155. Abridged Life Table for Females (1909-1911). . . .	353
156. Abridged Life Table for Both Sexes (1919-1921) . .	354
157. Abridged Life Table for Males (1919-1921). . . . .	355
158. Abridged Life Table for Females (1919-1921). . . .	356
159. Abridged Life Table for Both Sexes (1929-1931) . .	357
160. Abridged Life Table for Males (1929-1931). . . . .	358
161. Abridged Life Table for Females (1929-1931). . . .	359
162. Abridged Life Table for Both Sexes (1939-1941) . .	360

LIST OF TABLES--Continued

Table	Page
163. Abridged Life Table for Males (1939-1941). . . . .	361
164. Abridged Life Table for Females (1939-1941). . . . .	362
165. Abridged Life Table for Both Sexes (1949-1951) . . . . .	363
166. Abridged Life Table for Males (1949-1951). . . . .	364
167. Abridged Life Table for Females (1949-1951). . . . .	365
168. Abridged Life Table for Both Sexes (1954-1956) . . . . .	366
169. Abridged Life Table for Males (1954-1956). . . . .	367
170. Abridged Life Table for Females (1954-1956). . . . .	368
171. Abridged Life Table for Both Sexes (1959-1961) . . . . .	369
172. Abridged Life Table for Males (1959-1961). . . . .	370
173. Abridged Life Table for Females (1959-1961). . . . .	371

## LIST OF ILLUSTRATIONS

Figure	Page
1. Population Estimates and Number of Established Settlements: 1500-1775. . . . .	18
2. Population Trends by Color: 1765-1887 . . . . .	24
3. Population Growth: 1765-1960 and by Residence: 1899-1960. . . . .	39
4. Distribution of the Population, by Broad Age Groups: 1765-1960 . . . . .	44
5. Broad Age Distribution of the Population by Sex: 1899-1960. . . . .	50
6. Sex Ratios by Age: 1940, 1950 and 1960. . . . .	58
7. Sex Ratios by Age and Residence: 1960 . . . . .	58
8. Marital Status of the Population 15 Years of Age and Over by Sex: 1899-1960. . . . .	66
9. Marital Status Distribution by Age and Sex: 1899 and 1960. . . . .	70
10. The Marriage Rate: 1900 to 1960 . . . . .	74
11. Percent Distributions of Marriages by Broad Age Groups and Sex: 1913-1960 . . . . .	77
12. Divorce in Puerto Rico: 1932-1960 . . . . .	81
13. Proportion of the Population 10 Years of Age and Over Able to Read and Write in Puerto Rico During the Present Century . . . . .	84
14. Proportion of the Population 25 Years of Age and Over who Have Completed a Specified Number of Years of School or More: 1950 and 1960. . . . .	88
15. Median Number of School Years Completed Among Persons 25 Years of Age and Over by Age and Sex: 1950 and 1960. . . . .	88
16. School Enrollment Rates by Age Groups: 1910-1960.	92



LIST OF ILLUSTRATIONS--Continued

Figure	Page
17. Labor Force Participation Rates by Age and Sex: 1940, 1950 and 1960. . . . .	97
18. Per Cent Distribution of Employed Workers by Industry Group: 1899-1960 and by Sex: 1940 to Fiscal Year 1958-1959 . . . . .	106
19. Distribution of the Working Population by Broad Occupational Groups and Sex: 1899-1960. . . . .	111
20. Net Migration: 1910-1961. . . . .	119
21. Net Migration by Age and Sex: 1946 and Decade of 1950-1960 . . . . .	126
22. Effects of Two Decades of Emigration (1940-1960) Upon the Sex-Age Structure of the Population . . . . .	131
23. Actual and Expected Labor Force Population by Age and Sex: 1950 and 1960. . . . .	138
24. Actual and Expected Employment by Sex: 1950 and 1960 . . . . .	140
25. Persons Under 20 Years of Age Plus Persons 65 Years of Age and Over per 100 Persons 20 to 24 Years: 1899-1960 . . . . .	143
26. Number of Persons Without an Employment per Persons Employed: 1940, 1950 and 1960 . . . . .	143
27. Migration Rates by Municipalities: 1930-1940. . . . .	149
28. Migration Rates by Municipalities: 1940-1950. . . . .	150
29. Migration Rates by Municipalities: 1950-1960. . . . .	151
30. The Crude Birth Rate: 1755-1765 to 1960 . . . . .	172
31. Specific Fertility Rates by Age of Mother: 1932, 1940, 1950 and 1960. . . . .	178
32. General Fertility Rate and Gross Reproduction Rate: 1932, 1940, 1950 and 1960 . . . . .	178
33. Age Specific Fertility Rates by Birth Order: 1940, 1950 and 1960. . . . .	181
34. Specific Fertility Rates by Age of Father: 1940, 1950 and 1960. . . . .	185
35. Total Fertility and Gross Reproduction Rates for Males: 1940, 1950 and 1960. . . . .	185

LIST OF ILLUSTRATIONS--Continued

Figure		Page
36.	Number of Births per 1,000 Actually Married Population by Age of Parent: 1940, 1950 and 1960. . . . .	191
37.	Number of Births per 1,000 Females Actually Married with Husband Present by Age: 1950 and 1960. . . . .	197
38.	Number of Children Ever Born per Woman Ever Married by Age Groups: 1950 and 1960 . . . . .	197
39.	Crude and Age-Marital Status Standardized Rates (1950 Rates as Standard): 1910-1960. . . . .	199
40.	Children Under 5 Years of Age per 1,000 Actually Married Females 15-44 Years: 1899-1960 . . . . .	199
41.	Specific Birth Rates by Age of Mother, Puerto Rico and Selected Countries, Recent Years . . . . .	203
42.	Age Specific Fertility Rates by Residence of Mother: 1940, 1950 and 1960. . . . .	209
43.	Children Ever Born per Ever Married Woman (a) by Age and Ability to Read and Write (b) 35-44 Years Old by Ability to Speak English: 1960. . . . .	214
44.	Children Ever Born per 1,000 Ever Married Women by Years of School Completed and Residence for Selected Age Groups: 1960. . . . .	217
45.	Children Ever Born per Ever Married Woman (a) by Age and Labor Force Status (b) 35-44 Years Old by Labor Force Status and Employment Status: 1960 . . . . .	220
46.	The Crude Death Rate: 1888-1898 to 1950-1959 . . . . .	230
47.	The Crude Death Rate by Sex: 1910-1960 . . . . .	230
48.	Infant Mortality in Puerto Rico, for Selected Periods: 1902-1903 to 1959-1961. . . . .	232
49.	Total Neonatal and Late Infant Mortality in Puerto Rico: 1932-1960 . . . . .	232
50.	Probability of Dying During Each Age Interval (1,000 n <sup>ax</sup> ): Selected Periods. . . . .	240

LIST OF ILLUSTRATIONS--Continued

Figure		Page
51.	Age at Which 25, 50 and 75 per cent of the Original Cohort Died by Sex: 1902-1903 to 1959-1961. . . . .	243
52.	Expectation of Life at Birth by Sex: 1902-1903 to 1959-1961. . . . .	246
53.	The Ten Leading Causes of Death: 1930, 1940, 1950 and 1960 . . . . .	249
54.	Unemployment in the United States and Net Emigration from Puerto Rico: 1948-1961 . . . .	267
55.	Population Pyramids for the 1960 Enumerated Population and the 1985 Projections . . . . .	277
56.	Population Growth; 1920-1960 Enumerated and 1960-1985 Projected . . . . .	278
57.	Projected Crude Birth and Death Rates: 1955-1960 to 1980-1985 . . . . .	281
58.	The Median Age in the Projected Population: 1960-1985 . . . . .	287
59.	Broad Age Distributions of the 1960 Census Population and 1985 Projected Population. . . .	287
60.	Dependency in the Projected Populations: 1960-1985 . . . . .	289
61.	Projections of Labor Force Population by Broad Age Groups: 1960-1985. . . . .	293
62.	Observed and Projected Labor Force Population and Total Employment. . . . .	311
63.	Projections of School Age Population (6 to 18 Years Old) by Age: 1960-1985 . . . . .	316
64.	Projections of Elementary School Age Population (6-12 Years): 1960-1985. . . . .	316
65.	Projections of Medical and Nursing Personnel Needs . . . . .	326
66.	Projections of Household Needs on the Assumption that the 1960 Population-Household Ratio will Remain Constant in the Future . . . . .	328
67.	Projections of Household Needs on the Assumption that the Population-Household Ratio will Decline from 4.7 in 1960 to 4.3 in 1970 and From There on it Will Remain Constant. . . . .	328

## CHAPTER I

### INTRODUCTION

About two decades ago Puerto Rico was considered among the most backward countries of the world. Not only was it a land of hunger, indolence, and misery, but in the minds of many, a hopeless land. The scarcity of natural resources combined with an enormous population density was thought to be an irremediable malady. The conviction that the island had already surpassed the optimum population size was one of the arguments used by those who viewed the population-resources problem as insoluble.

This critical socio-economic situation, aggravated by the economic depression of the thirties, led in 1937 to the radical measure of adopting birth control as a government policy over a strong Catholic opposition. To this end, laws were approved by Puerto Rico's legislature authorizing the Department of Health to disseminate knowledge about birth control practices and distribute contraceptive material to those persons requesting it. Although several birth control methods were made available (including the rhythm method), sterilization became the preferred method, due perhaps to the fact that the low educational level of the average Puerto Rican made other procedures inefficient.

No effect, however, was noticed in the crude birth rate which in 1950 was still 40, or a little below earlier levels. At least three factors were responsible for the apparent failure of

the birth control campaign initiated in the late thirties. First, sterilization was used too late--when there were four or more children in the family. It was, and still is, used primarily as an emergency action. In the second place, when legalized, sterilization and other birth control methods become a substitute for abortion which, although not legal, was a common practice in the island.

And third, but by no means least important, was the change in policy towards birth control taken by the Puerto Rican Government in 1940, when the Popular Democratic Party came to power and immediately established a new policy in relation to birth control, which has since oscillated between indifference and outright opposition to it. However, one must recognize that such opposition has always been relatively mild and never threatened the 1937 birth control laws which the previous government had the foresight and courage to approve. But all official activities overtly aimed at the promotion of responsible parenthood through family planning were suspended and the Health Department's policy has been one of "hands off" with respect to family planning in Puerto Rico.

Fortunately, civic minded and liberal thinking people in and out of government could not remain indifferent to such an important aspect of individual and family welfare and organized to assume, at least in part, the role that clearly belonged to the Health Department. First they organized an Association for the Study of Population in Puerto Rico (Asociación de Estudios Poblacionales) whose main objective at the moment was to keep alive an interest in Puerto Rico's demographic situation. Eventually this association decided to change its policy and objectives, and re-organized itself into an action group for guidance and orientation,

especially of the poor, with respect to family planning and responsible parenthood. With substantial financial help from philanthropic institutions outside the island it embarked on an island-wide program for the dissemination of knowledge about birth control methods and the distribution of contraceptive materials. Progress made in harnessing the uncontrolled fertility which has continually threatened Puerto Rico's social and economic development must be credited almost exclusively to the legislative body and to the then Acting-Governor of Puerto Rico, Dr. Rafael Menendez-Ramos, who in 1937 passed and approved the birth control laws which made this program possible; and to the Association for the Study of Population, now the Family Planning Association of Puerto Rico.

Several fortunate events, however, removed the island from socio-economic stagnation in spite of the still prevailing population problem. Among the most important factors are the following:

(1) The New Deal Era which accompanied the rise of the Democratic Party under Franklin Roosevelt's leadership. The consequences of victory for the liberal forces in the United States were felt almost immediately in Puerto Rico in a most favorable way from both the socio-economic and political points of view.

(2) Changes in the political realm in Puerto Rico deriving from the above which resulted in an honest and able public administration and loosened the grip of absolute colonialism.

(3) World War II, which ironically, produced an economic boom in the Island.

(4) Mass emigration of Puerto Ricans to the Continent.

Thus, from hopeless and miserable conditions, a new Puerto Rico has emerged. The socio-economic progress has been amazing, not only for the achievements per se, but for the short period of time in which they have taken place. During the last 20 years, income per capita and gross national product have increased more than 400 per cent.<sup>1</sup> Wages and salaries increased from 125 million dollars in 1940, to 867 million dollars in 1960. At the same time, industrialization has received considerable impetus during the last two decades. Employment in manufacturing, for example, increased from 26 thousand persons in 1940, to 93 thousand in 1960. Income derived from this source increased almost 1,000 per cent during the same period. On the other hand, investment in Puerto Rico increased from 29 million dollars in 1939-40, to 392 millions in 1959-60 (a 1,252 per cent increase).

Education has received unusual attention. The number of employed teachers rose from 6,000 to 1940, to 14,000 in 1958. School enrollment increased from 304,000 pupils to 679,000 during this period. The relative increment has been even greater at college level. Enrollment at the University of Puerto Rico, for example, increased 236 per cent during the 20-year period.

As a result, illiteracy declined from 32 per cent in 1940, to 17 per cent in 1960, and the average school attainment increased from 2.7 years in 1940, to 4.6 years in 1960.

In the realms of public health we find that the utilization of modern health practices, of D.D.T. and the antibiotics, and economic improvement, among other things, have placed the Island

---

<sup>1</sup>All money figures are in current dollars.

among lower mortality countries of the world. Malaria was completely eradicated by 1955, and tuberculosis, although still high as compared with the United States, has been reduced by 90 per cent since 1940. Similar declines have been observed in other infectious diseases--pneumonia, diarrhea, and enteritis, for example. Infant and maternal mortality have been reduced by more than 60 per cent during the last decades. Mortality among children 1-4 years of age<sup>1</sup> was, in 1960, only one-tenth of the figure recorded in 1940. Life expectancy at birth, which increased from 30 to 46 years during the first forty years of the present century, was almost 70 years in 1960.

Meanwhile the crude birth rate declined from 40 in 1950 to 32 in 1960, which represents a radical deviation from the slowly declining trend observed during the first half of this century. The rate of population growth recorded during the decade of 1950-60 was only 0.6 per cent per year, as compared with almost 2 per cent observed during the two preceding decades. The 6 per cent population increase observed during the last decade represents a record low for all the censal history of Puerto Rico (1765-1960), and was one of the lowest among all the countries of the world.

In the minds of many, these achievements logically imply that Puerto Rico's population-resources problem has been solved, or at least significantly minimized. Many political leaders and social scientists are now looking to this country, unknown 20 years ago, for a model to be applied in other areas where explosive

---

<sup>1</sup>Many authors, especially English ones, prefer mortality among children 1-4 years of age over infant mortality as an indicator of socio-economic conditions.



population growth is the real obstacle to socio-economic progress. Some of them assume that accomplishments in Puerto Rico can be repeated elsewhere, while others believe that Puerto Rican methods have to be but slightly modified in order to apply in other countries. A few, however, have suggested that the Puerto Rican experience is a product of a variety of very special circumstances and is thus inapplicable in other under-developed areas.

In support of these points of view the economic side of the population-resources equation has received considerable attention. The present work, however, will be an attempt to produce a systematic analysis of the demographic evolution of the Island. The past, present, and future prospects of the Puerto Rican demographic situation will be analyzed and is, in our opinion, the logical background needed for understanding the socio-economic, as well as demographic, changes which have recently taken place in Puerto Rico.

#### Some Previous Works

One of the first attempts at describing the demographic changes occurring in Puerto Rico was made by Janer.<sup>1</sup> For the purpose he analyzed the rate of population growth during the period of 1765 to 1940. In the mathematical description of the pattern of population growth, following Pearl, he used the logistic curve as a descriptive device.

Janer found that the trend of growth of the Island's population could be properly described by two logistics: one fitted to

---

<sup>1</sup>José L. Janer, "Population Growth in Puerto Rico and its Relation to Time Changes in Vital Statistics," Human Biology, Vol. XVII, No. 4 (December, 1945).

the period of 1765 to 1887 and another to the period of 1899 to 1940. During the first cycle, covering the period of 1765 to 1887 or so, the rate of population growth exhibited a dampened trend, as the logistic theory presupposes. A reactivation of the rate of growth can be observed after 1887, and a second logistic cycle was assumed.

Janer also tried to explain the reasons for the reactivation of the rate of growth after 1887 and, for such purposes, entered into an analysis of the vital process. A series of abridged life tables was computed and a rough test for birth registration incompleteness undertaken. Probably the two main contributions of his work were: the construction of a set of abridged life tables for Puerto Rico and his ability to demonstrate that the crude birth rate was not increasing as the recorded figures indicated, and as many scientists were assuming. He concluded:

. . . As the sole factor responsible for the new growth wave which has created so many problems of maladjustment of population to resources, has been found to be a steadily decreasing death rate and an almost stationary high birth rate, we must conclude that the development of these factors affecting the fertility of our people, such as education, and standard of living, has not kept pace with the progress made by public health activities directed at a reduction in death rates.<sup>1</sup>

In his M.A. thesis about mortality, the present author has also attempted to describe the most important demographic changes occurring in the Island during the Spanish and American Regimes.<sup>2</sup> One of the most relevant points raised about the dynamics of

---

<sup>1</sup>Ibid., p. 288.

<sup>2</sup>José L. Vázquez, "Mortality Changes in a Society in Rapid Transition: Puerto Rico, A Case Study" (unpublished Master's thesis, University of Chicago, December, 1961).

population growth was the probability of being able to explain most of the recent sharp decline in the crude birth rate by several variables other than changes in the reproductive performance of the population. One of these important variables is emigration. An intensive analysis of mortality patterns and trends was also undertaken; a series of abridged life tables by sex computed for periods covering from 1902-1903 to the present, and in one of the last chapters, the factors which contributed to the radical changes observed in mortality were discussed.

In a recent article Janer, Vázquez, and Morales<sup>1</sup> have analyzed more fully the effects of migration upon fertility, as well as the recent demographic changes which have taken place in Puerto Rico. According to their analysis the decline in the crude birth rate in the Island can be attributed to a great extent to changes in the age, sex, and marital status distribution of the population. All these changes, apparently, are a result of heavy emigration of Puerto Ricans to the United States.

After an analysis of relevant changes occurring in the Island, they concluded that Puerto Rico's transformation is deceptive in terms of the transfer possibilities of its methods. In their opinion, the Puerto Rican experience is to a great extent a function of variables which cannot be found in other areas where "explosive" population growth is the great obstacle to economic development.

---

<sup>1</sup> José L. Janer, José L. Vázquez and Nidia R. Morales, "Puerto Rico's Demographic Situation" (revision of a paper read in the annual meeting of the Southern Branch of the American Sociological Society, April, 1962).

Numerous studies have been made of Puerto Rico's fertility. Some of the most outstanding are: Hatt's,<sup>1</sup> and Hill, Stycos and Back's<sup>2</sup> socio-psychological approaches, Combs' doctoral dissertation,<sup>3</sup> and Combs and Davis' papers.<sup>4</sup> It would be impossible to enter into a discussion of each of these studies in this introduction. Throughout the work, however, reference to these studies will be made and the most relevant findings discussed.

Although here and there, in many works, reference is made to some relevant aspects of Puerto Rico's emigration, there is not a single comprehensive study about this important factor in the island's demography.

The labor force population and changes in the industrial and occupational compositions of the population have been intensively analyzed by Jaffe.<sup>5</sup>

---

<sup>1</sup>Paul K. Hatt, Backgrounds in Human Fertility in Puerto Rico (Princeton, 1952).

<sup>2</sup>Reuben Hill, Mayone Stycos, and Kurt W. Back, The Family and Population Control (Chapel Hill, North Carolina, 1959).

<sup>3</sup>Jerry W. Combs, "Human Fertility in Puerto Rico" (Unpublished Ph. D. dissertation, Columbia University, 1954).

<sup>4</sup>Jerry W. Combs and Kingsley Davis, "The Pattern of Puerto Rican Fertility," Population Studies, Vol. IV, No. 4 (December, 1950); and Jerry W. Combs and Kingsley Davis, "Differential Fertility in Puerto Rico," Population Studies, Vol. V, No. 2.

<sup>5</sup>A. J. Jaffe, People, Jobs and Economic Development (Glencoe, Illinois, 1959).

### Main Objectives

This work has three main objectives: The first is to analyze the demographic evolution of the island of Puerto Rico since its discovery. This analysis will cover such areas as patterns and trends of growth, population structure and structural changes, patterns and trends of migration, mortality, and fertility. In this sense, the work will be similar to Roberts' analysis of the population of Jamaica.<sup>1</sup> We expect this study to serve as a source of information for other demographers and social scientists interested in the Island. The most complete series of population figures will be included, covering the whole period between its discovery and the present. Similar series will be included in relation to vital statistics.

The second important objective is to analyze intensively those demographic changes which have, in one way or another, contributed to the radical transformation of Puerto Rico's society and economy. We will attempt, in addition, to isolate the most important variables or factors which have precipitated such demographic changes.

Third, we will try to determine whether Puerto Rico's population problem has been solved. For such purposes we will study the factors contributing to the recent slowdown in the rate of population growth, and the radical decline in the crude birth rate observed during the last decade. In this way we shall be able to demonstrate the degree of permanency of such demographic changes and the

---

<sup>1</sup>George W. Roberts, The Population of Jamaica (Cambridge, England, 1957).

prospects for the future. And if Puerto Rico's population resources problem appears to be solved, we will comment on the kind of solution and the applicability of the Puerto Rican experience to other under-developed countries.

In addition, we hope that this work will help Puerto Rican leaders in the evaluation of past and present development activities and in planning for the future.

## CHAPTER II

### POPULATION GROWTH IN PUERTO RICO

#### 1493-1764: The Precensal Period

The number of native inhabitants of the island of Puerto Rico at the time of its discovery is still a controversial matter. According to some historians Columbus estimated the population of the island at around 600,000 Indians. He did not stay in the island long enough, however, to make more than a rough estimate; besides, those familiar with the relationship between population density and type of economy would reject this "estimate" for the native economy was one of the "hunting and fishing" type with incipient agriculture. According to Wiechel's typology,<sup>1</sup> a "hunting and fishing" economy is capable of supporting a population density ranging from one to eight persons per square mile, while "beginnings of agriculture" ranges from 26 to 64. According to this classification, one may conclude that the population density of the Island during the last years of the Indian culture ranged from between 8 and 26 persons per square mile (in terms of total population this would represent between 30,000 and 90,000 inhabitants).<sup>2</sup> On this basis it seems safe to say that the native population never exceeded the 100,000 mark.

---

<sup>1</sup>Cited by Amos H. Hawley, Human Ecology (New York, 1950), p. 151.

<sup>2</sup>Puerto Rico has a land area of 3,423 square miles.

The Spanish invasion brought a rapid decline in the native population. In the first "trust" (distribution of Indians among Spaniards) of 1511, some 5,500 were enslaved; in 1514, about 5,100 Indian slaves were counted.<sup>1</sup> Fifteen years later (1530) only 1,148 of them remained enslaved.<sup>2</sup> This rapid decrease has been attributed to an epidemic of smallpox in 1518 which killed more than two-thirds of the Indian population. In 1543, only 70 were counted, and 15 remained in 1582.<sup>3</sup>

Some of the reasons for this sharp decline in the Indian population were:

- (1) Hard work and bad treatment in the gold mines.
- (2) War losses.
- (3) Illness introduced by the Spaniards, especially smallpox.
- (4) Emigration to other islands.
- (5) Miscegenation.

The importance of miscegenation is evidenced by the 1530 population count. In that year, out of 71 legally married women there were 14 Indian females married to Spaniards, without taking into account consensual marriages and concubinage.<sup>4</sup>

Indians did not disappear as rapidly as many historians have believed. With the abolition of Indian slavery, a number of

---

<sup>1</sup>Salvador Brau, La Colonización de Puerto Rico (San Juan, Puerto Rico, 1930), p. 243.

<sup>2</sup>Ibid., p. 364.

<sup>3</sup>Brau, Historia de Puerto Rico (New York, 1904), p. 80.

<sup>4</sup>Ibid., p. 70.



them found refuge in the open country, far from villages and the white man. According to Salvador Brau, by the end of the Eighteenth Century some Indians were living at "La Indiara" (Indian Place) near San Germán. He reported the following census counts.<sup>1</sup>

<u>Year</u>	<u>Indians</u>
1777 . . . . .	1,756
1787 . . . . .	2,302
1797 . . . . .	2,312

How this group of natives disappeared or how they were incorporated into the white-man society is an unanswered question. Nevertheless, we do know that early in the Twentieth Century the Indian group was included among the ethnic classification in vital statistics.<sup>2</sup> The accuracy of these figures is really unknown.

As Indians disappeared, Negro slaves became of paramount importance to the primitive economy of the epoch. In 1513, royal authorization was granted for large-scale trade of Negro slaves in the Spanish colonies. In 1530, trade began in Puerto Rico with the introduction of 200 slaves. From 1530 to 1553 some 1,500 Negroes were legally introduced in the Island.<sup>3</sup> These official figures were very far from the true numbers for in 1530, and as a result of a population count, more than 1,500 Negro slaves were reported.<sup>4</sup> From 1553 to 1765 little is known about the magnitude of the slave

---

<sup>1</sup>Brau, La Colonización de Puerto Rico, p. 437.

<sup>2</sup>See, for example, the 1920 Report of the Commissioner of Health of Puerto Rico, p. 151.

<sup>3</sup>U. S. War Department, Report on the Census of Puerto Rico, 1899 (Washington, 1900), p. 30.

<sup>4</sup>Brau, La Colonización de Puerto Rico, p. 117.

trade in the Island. We only know that from 1613 to 1621, eleven shiploads of slaves entered San Juan Harbor, and that in 1713 Philip V offered England the exclusive privilege of introducing 140,000 Negroes into the Spanish American colonies.<sup>1</sup> In spite of this continuous slave trade the Negro population never attained as considerable proportions as in other Spanish colonies. This is clearly evidenced by the census count of 1765, in which only 5,037 slaves were reported.

The following estimates and counts show the growth of the slave population from 1530 to 1765:

<u>Year</u>	<u>Number</u>
1530 (population count) . . .	1,523
1553 (estimate) . . . . .	3,000 <sup>2</sup>
1673 (estimate) . . . . .	4,500 <sup>2</sup>
1765 (census count) . . . . .	5,037

More information exists about the free sector of the population than for any other group although it, too, is scanty. The real difficulty is that, for most of the estimates presented, we will be unable to separate the white from the free-colored group. We do know that during the Sixteenth Century the free-colored population was insignificant, but we have no real notion of its magnitude up until 1673.

---

<sup>1</sup>R. A. Van Middeldyk, The History of Puerto Rico (New York, 1903), p. 209.

<sup>2</sup>For the method of estimation, see Appendix I.

The figures presented below are based in most instances upon estimates of the number of "vecinos"<sup>1</sup> living in the Island as reported by historians.<sup>2</sup>

TABLE 1

ESTIMATES OF FREE AND TOTAL POPULATION: 1510-1765

Year	Free Population	Total Non-Native Population
1510	300	300
1515	350	350
1530	600	2,100
1548	750	3,200
1580	1,250	4,200
1646	4,500	8,000
1673	6,000	10,500
1765	40,000	45,000

It must be kept in mind that these figures are only rough estimates (except for the 1765 census figures), and that errors of a magnitude of 20 per cent are highly possible. Nevertheless, they serve the purpose of tracing the general trend of population growth during this period.

It seems evident that the growth of the non-native population during the first two centuries of the Spanish regime was, in absolute terms, relatively small, despite the continuous inflow of colonists and Negro slaves. It is perhaps for these reasons that many historians have characterized this period as one of stagnant

---

<sup>1</sup>There is no exact translation for the Spanish word "vecino" as used during this period. It was a citizen with title of vecinity; that is, a citizen with a permit to establish residence in a given place.

<sup>2</sup>For method of estimation, see Appendix I.

population. At the end of the Eighteenth Century the population began to increase at a faster rate (see Fig. 1).

In relative terms the population growth was more or less uniform throughout the period. There is an apparent acceleration of the rate of population growth beginning with the Eighteenth Century or so, but we can not depend too much upon these estimates to support our statement.

The trend of growth in the number of settlements is additional evidence which tends to confirm the pattern of population increase depicted above. The economy of the Island during this period was of the primitive agrarian type, and accordingly not capable of supporting large aggregates of people in a single settlement. As arable land was not a limiting factor, substantial increases in population numbers would result in similar increases in the number of settlements. Table 2 shows the number of settlements existing at the end of each period.

As Fig. 1 shows, there is a close parallel between population growth and the increase in the number of settlements.

The more or less unchanging character of the rate of population growth from 1500 to 1700 or so does not mean that the rate of natural increase (birth rate minus the death rate) was constant throughout. Immigration played a significant role during the first century, and especially during the first few decades. It is our opinion that mortality and natality were nearly in balance during the first decades of the colonization, and the increase in population numbers only a product of the slave trade and immigration.

Figure 1

POPULATION ESTIMATES AND NUMBER  
OF ESTABLISHED SETTLEMENTS  
PUERTO RICO: 1500-1775

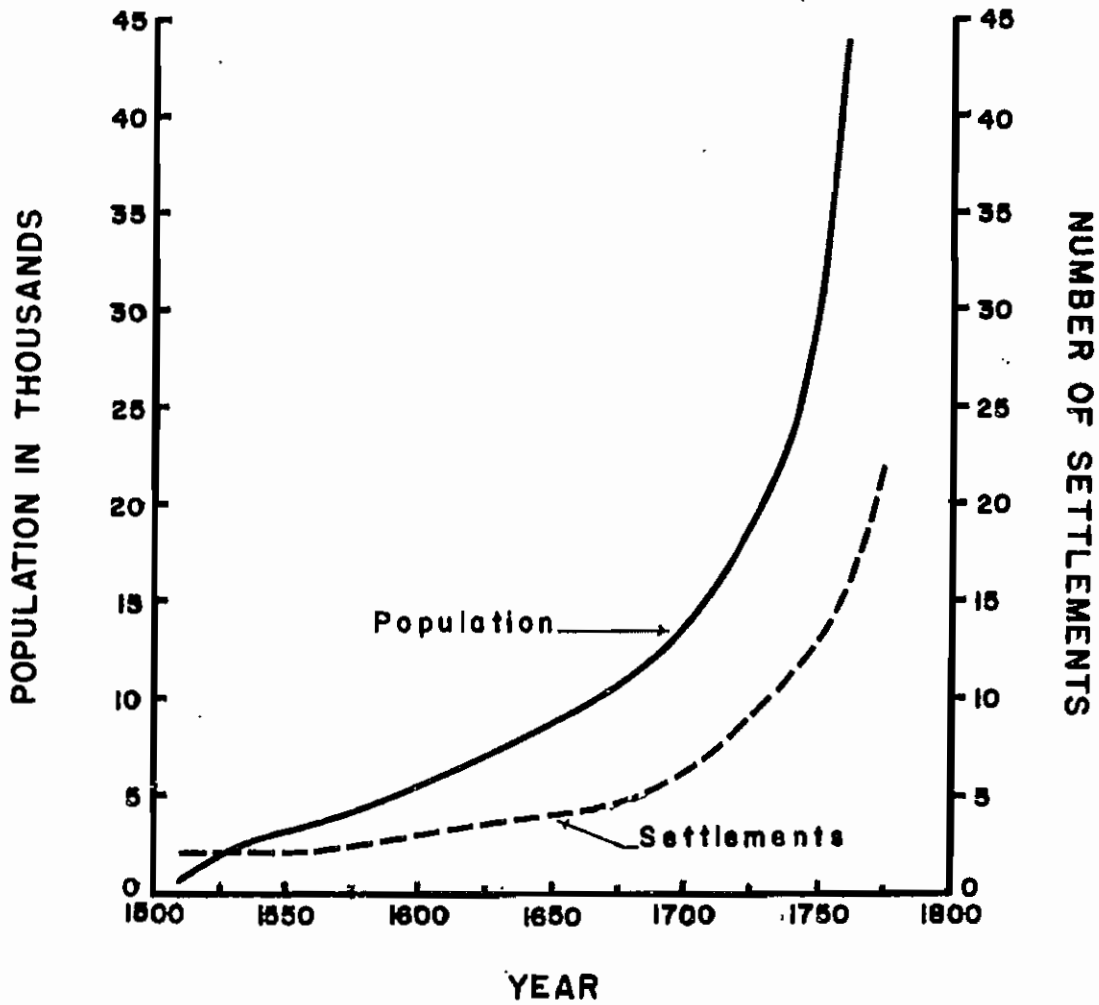


TABLE 2

NUMBER OF SETTLEMENTS EXISTING AT THE END OF  
EACH PERIOD: 1500-1800<sup>a</sup>

Period	Number of Settlements
1500 - 1550 . . . . .	2
1550 - 1600 . . . . .	3
1600 - 1650 . . . . .	4
1650 - 1675 . . . . .	4
1675 - 1700 . . . . .	6
1700 - 1725 . . . . .	9
1725 - 1750 . . . . .	13
1750 - 1775 . . . . .	22
1775 - 1800 . . . . .	34

<sup>a</sup>Source: Cayetano Coll y Toste, Reseña del Estado Social, Económico e Industrial de la Isla de Puerto Rico (Puerto Rico, 1899).

The acceleration in the rate of growth observed since 1700 can be easily explained by the following facts:

(1) The extermination of the native population put an end to their constant attacks upon white colonists. The native attacks caused significant losses among the non-native population during the Sixteenth Century.

(2) The completion of San Juan fortress in 1625 made the Island less vulnerable to the attacks of pirates and adventurers.

(3) The relative security achieved as a result of the completion of San Juan fortress, the end of the "gold rush" in the continental colonies, and the fact that the Island was used as an intermediate stop in the long trip from the mainland to the colonies, encouraged immigration.

(4) The construction of better and special structures made hurricanes less deadly.

(5) As will be shown later, immigration not only contributed directly but also indirectly to population growth by increasing natality. This is so because migrants are concentrated among the reproductive ages.

Thus the evidence is that two distinct demographic periods existed from 1500 to 1765: a period of slow population growth which lasted for two centuries, and a period of rapid population growth beginning with the Eighteenth Century.

#### 1765-1897: The Spanish Censal Period

In 1765, Alexander O'Reilly was commissioned by Spain to make a careful and intensive study of the defensive conditions and needs of the island of Puerto Rico. One of his first steps was to make a complete count of the population of the Island. Twenty-two established settlements were surveyed, many of them of recent creation and with few inhabitants. According to this enumeration the total population consisted of 44,833 persons, of which 5,037 were slaves. The population was classified primarily according to age, sex, marital status, civil condition (slave or free), color, and residence. Although we know that O'Reilly's study lasted three months (April through June of 1765), we do not know whether this was a "single day" census (population as of a given day) or if it covered a longer period of time.

The next census was taken about 1776.<sup>1</sup> The total population in that year was 70,210, of which some 7,600 were slaves. There is

---

<sup>1</sup>Many refer to this enumeration as the 1775 census or as the 1777 census. According to Abbad this census was taken by the end of 1776. See Fray Inigo Abbad y La Sierra, Historia Geográfica Civil y Natural de la Isla de Puerto Rico (Puerto Rico, 1866), p. 152.

TABLE 3  
POPULATION COUNTS: 1765-1897<sup>a</sup>

Date	Free Population			Slave Population	Total Population
	Total	Whites	Colored		
1765 <sup>b</sup>	39,769	(c)	(c)	5,037	44,833
1775 <sup>b</sup>	62,618	30,709	31,909	7,592	70,210
1787	95,459	46,756	48,703	11,260	103,051
1794	109,633	(c)	(c)	17,500	127,133
1800 <sup>b</sup>	(c)	(c)	(c)	(c)	155,426
1802	149,859	78,281	71,578	13,333	163,192
1812	165,468	85,662	79,806	17,536	183,014
1815	(c)	(c)	(c)	(c)	220,892
1820	208,892	102,432	106,460	21,730	230,622
1827 <sup>b</sup>	270,798	150,311	120,487	31,874	302,672
1830	289,598	162,311	127,287	34,240	323,838
1834 <sup>b</sup>	317,018	188,869	128,149	41,818	358,836
1846 <sup>b</sup>	391,874	216,083	175,791	51,265	443,139
Dic. 25-26, 1860 <sup>b</sup>	541,443	300,406	241,037	41,738	583,181
Dic. 31, 1877 <sup>b</sup>	731,648	411,712	319,936	(d)	731,648
Dic. 31, 1887 <sup>b</sup>	798,565	474,933	323,632	(d)	798,565
Dic. 31, 1897 <sup>b</sup>	885,819	570,187	315,632	(d)	894,302

<sup>a</sup>Sources: Fray Iñigo Abbad y La Sierra, Historia Geográfica, Civil y Natural de la Isla de Puerto Rico (Nueva Edición: Puerto Rico, 1866), pp. 296-306 (for the years 1765, 1775, 1794, 1800, 1815, 1834, 1846, and 1860); U. S. War Department, Report on the Census of Puerto Rico, 1899 (Washington, 1900), pp 34-36 (for the Censuses of 1877 and 1887); George D. Flinter, An Account of the Present State of the Island of Puerto Rico (London, 1834), pp. 206-208 (for the years 1802, 1812, 1820, 1827, and 1830); and Coll y Toste, (for the 1897 census).

<sup>b</sup>Corroborated Census counts.

<sup>c</sup>Data not available.

<sup>d</sup>Slavery abolished in 1873.



no clear evidence of the number of censuses taken from 1776 to 1834, or if the figures given are really census returns or merely population estimates. There is complete confidence, however, in the veracity of the 1834 census.

At least, population figures are offered for the years 1787, 1794, 1800, 1802, 1812, 1815, 1820, 1824, 1827, and 1832. The U. S. War Department in its report on the 1899 census accepted the 1800, 1815, and even an 1832 figure, as census returns. It is highly improbable that two censuses were taken within the time interval of two years (1832 and 1834), and as the 1834 enumeration is corroborated by almost all historical sources, we have serious doubts about the 1832 census count.

In 1845 a "Central Commission of Statistics" was created in Puerto Rico under the direction of Mr. Santiago Fortun.<sup>1</sup> The first census taken under the supervision of this organization was for the year of 1846. During the nights of December 25 and 26 a census was taken in 1860. Additional censuses, all as of December 31, were taken in 1877, 1887, and 1897. These censuses vary greatly in regard to the type of data available; the so-called 1800 and 1815 censuses present only total counts, those for 1776, 1834, 1846, and 1877 provide distributions by sex, color, and civil condition, and age distribution is presented only in the 1765, 1860 and 1887 censuses.

For these reasons, and because of the irregularity in the time interval between censuses, we have been unable to use "internal" evidence to test the accuracy of these enumerations.

---

<sup>1</sup>Ibid., p. 301.

TABLE 4

POPULATION AND ANNUAL RATE OF INCREASE DURING EACH INTERCENSAL PERIOD: 1765-1887<sup>a</sup>

Census Date	Total Population	Annual Rate of Increase (Per Cent)
1765	44,883	••••
1775	70,250	4.61
1800	155,246	3.20
1815	220,892	2.34
1827	302,672	2.66
1834	358,836	2.46
1846	447,914	1.84
1860	583,308	1.92
1877	731,648	1.32
1887	798,565	0.87
1899	953,243	1.50

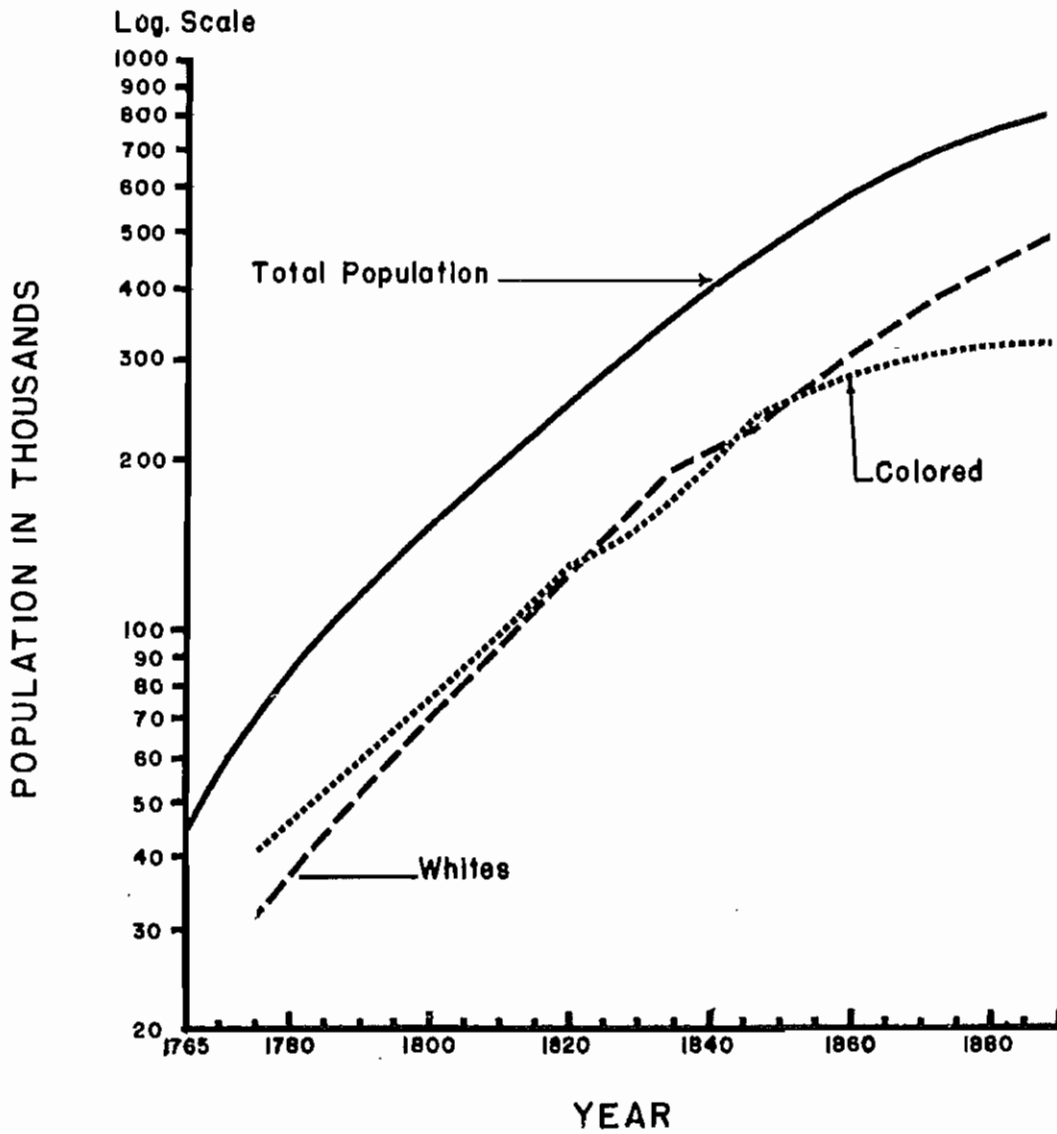
<sup>a</sup>Abbad y La Sierra, pp. 296-306 (source for years 1765, 1775, 1800, 1815, 1834, 1846, and 1860); Flinter, pp. 206 and 208 (for year 1827); and U. S. War Department Report, pp. 34-36 (for 1877 and 1887).

The smoothness in the population curve, suggesting the absence of gross errors in enumeration, is perhaps the only index we can use. Additional evidence of the relative accuracy of the Spanish censuses is obtained from a comparison of the 1887 and 1897 enumerations with the first American census of 1899. The close agreement between the age distributions of the 1899 and the 1887 censuses adds further support to this opinion. Thus, it seems that for the purpose of establishing the trends of population growth, the Spanish censuses are adequate.

As Fig. 2 shows, the pattern of growth of the total population during this period was one of dampened rate of increase (see Table 4). From an incredible rate of 4.6 per cent per year

Figure 2

POPULATION TRENDS BY COLOR  
PUERTO RICO: 1765-1887



recorded during the 1765-75 decade it decreased steadily, reaching a low of less than one per cent per year during the decade of 1877-87. It was for this reason that, in describing this period, Janer used the "logistic" curve as a mathematical model.<sup>1</sup> We agree with Janer in that the logistic, as a curve, makes an excellent fit, but we do not agree with the logistic as a theory to explain the dynamics of growth in human populations under most circumstances. Population growth is to a great extent a function of human behavior, and there is no simple mathematical model capable of satisfactorily explaining it.

The rate of population growth during this whole period is not entirely a reflection of the vital processes (natality and mortality). The tremendous increase in population numbers from 1765 to 1800 can be attributed in part to the first great wave of immigration, the "West Indies Rush," caused by the relative prosperity of the Spanish-American colonies.

The blockade of the Island by the English Navy (1795-1808) and the cessation of the "situados" (money relief coming to the Island from Mexico and Guatemala), as a result of the Spanish-American revolution, put an end to immigration. This situation constitutes a satisfactory explanation for the decline in the rate of population growth from 1800 to 1815.

Persecution of Spanish subjects in the areas of revolution and the royal decree of 1815, entitled "Regulations for Promoting the Population, Commerce, Industry, and Agriculture in Puerto Rico,"

---

<sup>1</sup>Janer, Human Biology, XVII, No. 4, 270-272.

opened the way for the second great wave of immigration.<sup>1</sup> The royal decree served as a "pull," while the revolution provided "push," for this current of immigrants and we see a reactivation in the rate of population growth from 1815 to 1834.

From Table 4, we notice that the rate of growth dropped sharply during the two intercensal periods following 1860, but increased in the next (1887-1897). From these observations Janer concluded that a new cycle of population growth began by the end of the Nineteenth Century, and that it might be properly described by a logistic.<sup>2</sup>

A close examination of the census figures shows that the colored population was affected, while the trend of the white sector continued more or less undisturbed (see Fig. 2). It seems that the abolition of slavery was an important cause in the decline of the colored population, in both the slave and the free colored groups. The free-colored group, as Table 5 shows, was essentially a blended group (mulatto), a product of white-Negro relationship. The increment in the free-colored group was influenced by white-slave marital relationships, because, in most of the cases, the children of such unions were born free. Thus, the abolition of the slave trade can account for part of the decline in the trend of growth of the colored population after 1860.

A second factor which probably contributed to the decline in the rate of growth of the colored sector was interracial marriages,

---

<sup>1</sup>For the content of such decree, see Van Middeldyk, pp. 155-157.

<sup>2</sup>Janer, Human Biology, XVII, No. 4, 270-72.

TABLE 5

PROPORTION OF MULATTOS IN THE COLORED POPULATION: 1802-1897<sup>a</sup>

Date	Total Colored <sup>b</sup>	Mulattos	Negroes	Per Cent Mulattos
1802	84,911	58,497	26,414	68.9
1812	97,342	68,367	28,975	70.2
1820	128,190	91,702	36,488	71.5
1827	152,361	103,398	48,963	67.9
1830	161,527	100,430	61,097	67.0
1846	227,056	167,340	59,716	73.7
1877	319,936	240,701	79,235	75.2
1887	323,632	246,647	76,985	76.2
1897	317,724	241,900	75,824	76.1

<sup>a</sup>Sources: Flinter, p. 206 (for years 1802 to 1812); Abbad y La Sierra, p. 300 (for 1846); and U. S. War Department Report, p. 58 (for 1877-1897).

<sup>b</sup>The slave population for the years 1802 to 1830 was broken down into mulattos and Negroes according to the 1846 proportions.

for in Puerto Rico there is a marked tendency to classify as white those who are not distinctly colored.

As Fig. 2 shows, the trends of growth in the white and free colored sectors of the population were very similar until 1860 or thereabout.

#### 1899-1960: The American Regime

One year after the American invasion of Puerto Rico a census was taken under the supervision of the United States War Department. Since 1910 the Island has been included in the United States census area, and population counts have been made every ten years. Much information is already available from the last count, taken on April 1, 1960.

TABLE 6

POPULATION AND ANNUAL RATE OF INCREASE: 1899-1960<sup>a</sup>

Year	Population	Annual Rate Increase (Per Cent)
1899	953,243	...
1910	1,118,012	1.5
1920	1,299,809	1.6
1930	1,543,013	1.7
1940	1,869,255	1.9
1950	2,210,703	1.7
1960	2,349,544	0.6

<sup>a</sup>Source: Bureau of the Census, U. S. Census of Population: 1960, Final Report P C (1)-53A, Table 1.

During this span of sixty years the population increased from 953,243 to 2,349,544, representing in relative terms a 2.5 fold increment and an average annual rate of increase of 1.5 per cent. Two divergent tendencies are observed in the rate of population growth throughout this time interval: an increasing trend covering the time period of 1899-1940, and a decreasing one since 1940. The annual rate of increase recorded during the intercensal period of 1899-1910 was 1.5 per cent. As Table 6 shows, it gradually increased, reaching a high of almost two per cent during the 1930-1940 decade, after which the rate of population growth began to decelerate. During the last decade (1950-1960) a record-low of 0.6 per cent was recorded.

The acceleration of the rate of population growth from 1899 to 1940 is explained by the increased gap between mortality and natality levels. In other words, the crude death rate decreased more rapidly than the crude birth rate during this period. As Table 7 shows, migration was insignificant.

TABLE 7

BIRTH RATE, DEATH RATE, NATURAL INCREASE, AND EMIGRATION RATE DURING EACH INTERCENSAL PERIOD: 1899-1960<sup>a</sup>

Period	Birth Rate <sup>b</sup>	Death Rate <sup>b</sup>	Natural Increase <sup>b</sup>	Emigration Rate <sup>b</sup>
1899-1910	40.5	25.3	15.2	?
1910-1920	40.4	24.0	16.4	0.8
1920-1930	39.3	22.1	17.2	2.6
1930-1940	39.6	19.6	20.0	0.5
1940-1950	40.7	14.5	26.2	8.8
1950-1960	35.0	8.0	27.0	19.9

<sup>a</sup>Sources: Janer, Human Biology, XVII, No. 4, 281; and Department of Health, Bureau of Demographic Registry and Vital Statistics, Annual Report on Vital Statistics, 1960, p. 2.

<sup>b</sup>Annual average rates per 1,000 population.

Emigration, which did not play a significant role during the first 40 years of the present century, began to rise rapidly after 1940 (see Table 7). During the 1950-1960 decade the rate of net emigration fluctuated around two per cent per year. Therefore, a record-low rate of population growth was observed during the period. It is true that the net rate of growth during the last decade was one of the lowest in the world (as many observers have tried to over-emphasize); but, in terms of biological growth, Puerto Rico must be included among the "explosive areas." With a rate of natural increase (crude birth rate minus crude death rate) of around 2.5 per cent per year, the Island compares with Latin America and other underdeveloped countries. As Table 7 shows, the rate of biological growth has been increasing with time; from a figure of 1.5 per cent per year recorded during the decade of 1899-1910 it rose gradually to 2.7 during the last decade, although a declining



tendency has been observed during the last few years (see Table 8).

TABLE 8  
BIRTH RATE, DEATH RATE, AND NATURAL  
INCREASE: 1959-1962<sup>a</sup>

Year	Birth Rate <sup>b</sup>	Death Rate	Natural <sup>b</sup> Increase
1950	38.7	9.9	28.8
1951	37.6	10.0	27.6
1952	36.0	9.2	26.8
1953	35.0	8.1	26.9
1954	35.0	7.6	27.4
1955	35.0	7.2	27.8
1956	34.5	7.3	27.2
1957	33.3	7.0	26.3
1958	32.9	6.9	26.0
1959	32.3	6.8	25.5
1960	32.2	6.7	25.5
1961	31.4	6.8	24.6
1962	31.3 <sup>c</sup>	6.6	24.7

<sup>a</sup>Source: Department of Health of Puerto Rico, Annual Report on Vital Statistics, 1962, p. 2.

<sup>b</sup>Not corrected for underregistration of births.

<sup>c</sup>Provisional.

From the demographic point of view, the open valve of emigration is the fact which clearly distinguishes Puerto Rico from other countries where "explosive" population growth represents a menace for future economic progress. Biologically, the Island's population is growing at a very high rate, but almost 80 per cent of the increase is being absolved by the United States through immigration. As will be shown in the discussion of migration, this kind of solution to the population problem seems to be more

advantageous for the United States than for the problem area, Puerto Rico. Emigration is, in fact, one means of getting rid of a substantial part of the increase in the labor force, for whom job opportunities in Puerto Rico are relatively scarce. On the other hand, it is an expensive solution for Puerto Rico must expend a significant amount of scarce resources to train its young people to become producers and join the labor force, only to see them go elsewhere to produce, once their training has been accomplished.

#### Population Growth in Urban Places

During the first three centuries of the Spanish regime, internal population movements were characterized by the centrifugal tendency of the process of colonization; that is, by a continuous emigration from already established settlements toward newly emerging places. Thus, population growth was accompanied by multiplication of settlements, a movement which really gained impetus during the Eighteenth Century (see Table 2). It was, perhaps, for this reason that during the first 300 years of Spanish domination great urban centers did not develop. Probably, apart from San Juan, the capital, no other town could be classified as urban according to the present definition (2,500 or more population).

During the Nineteenth Century urban sites began to emerge. According to Colonel Flinter, in 1827 about 13 per cent of the population lived in towns and villages.<sup>1</sup> He added that, with relatively few exceptions, most of these places were merely skeletons. In other words, perhaps much less than 13 per cent

---

<sup>1</sup>George D. Flinter, An Account of the Present State of the Island of Puerto Rico (London, 1834), p. 45.

of the people were living in truly urban places. Additional evidence of the rural nature of the Island during the Nineteenth Century is obtained from the 1899 census. In that year, only 17 out of the 69 existing towns were classified as urban, and the proportion of the total population living in those places approximated 15 per cent.

Many factors contributed to slow urban development, perhaps the most important being a subsistence farming economy, which is synonymous with ruralism. Trade oriented agriculture was practically unknown, and commerce relatively unimportant.

The development of commercial agriculture, increasing the importance of trade and commerce, and the appearance of small manufacturing industries, contributed to the rapid growth of the urban sector from 1899 to 1940.

In addition, the miserable living conditions of the landless "jíbaro" (the great majority of the rural population), resulting from a quasifeudal agrarian system, made the city appear to be a "promised land." The jíbaro moved out of the rural area to the urban slum, not so much for the sake of the urban way of life, but because he was pushed out by his intolerable socioeconomic situation. He emigrated to the city with no other assurance for his future than a hope, but with the certainty that his situation could not become worse.

In the chapter on emigration, we shall discuss the close parallelism between this movement and the present mass emigration current from Puerto Rico to the United States.

Thus, during the period of 1899 to 1940, when rural conditions were going from "bad" to "worse," the number of urban places

increased from 17 to 45, and the proportion of the total population living in these places from 15 to 30 per cent.

The deterioration of agriculture and the precarious conditions of small farm-enterprises, on the one hand, and urban industrialization on the other, have tended to accelerate the rural exodus during the last two decades. While the urban population increased 58 per cent from 1940 to 1950, the rural population remained more or less stationary. Population growth observed during the 1950-1960 decade tends to support the thesis that rural migration is the product of a push. During this period, for the first time in the Island's history, the rural sector was reduced in numbers. As Table 9 shows, the net loss was some 6,000 persons or 0.4 per cent. According to rough estimates the rural population should have been 1,645,000 persons in 1960 in the absence of migration,<sup>1</sup> which compared with the enumerated 1,310,000, represents a net emigration of about 335,000 persons (25.5 per cent of the 1950 population). The urban area gained nothing from this exodus. On the contrary, the urban area itself lost population, according to vital statistics, for it should have increased more than 20 per cent during this decade instead of the recorded 16.1.

#### City and Metropolitan Growth

The first city, in the statistical sense (urban place of 50,000 population or more), emerged after 1910. According to the 1910 census, San Juan numbered somewhat less than 49,000 inhabitants, but in 1920 had increased to 71,443. Ponce qualified as a city in

---

<sup>1</sup>Estimates based on the population formula: 1960 population equals 1950 population, plus births, minus deaths.

TABLE 9

POPULATION OF PUERTO RICO, URBAN AND RURAL: 1899-1960<sup>a</sup>

Date	Population			Percentage Increase Over Preceding Census			
	Total	Urban	Rural	Total	Urban	Rural	Per Cent Urban
1899	953,243	138,703	814,540	.....	.....	.....	14.6
1910	1,118,012	224,620	893,392	17.3	61.9	9.7	20.1
1920	1,299,809	283,934	1,015,875	16.3	26.4	13.7	21.8
1930	1,543,913	427,221	1,116,692	18.8	50.5	9.9	27.7
1940	1,869,255	566,357	1,302,898	21.1	32.6	16.7	30.3
1950	2,210,703	894,813	1,315,890	18.3	58.0	1.0	40.5
1960	2,349,544	1,039,301	1,310,243	6.3	16.1	0.4	44.2

<sup>a</sup>United States Census of Population, 1960, Final Report P(1)-53A, p. 9.

1930, Mayaguez in 1940, and Rio Piedras in 1950. No other urban place achieved sufficient growth during the 1950-1960 period to be classified as a city.

The proportion of the population living in cities increased from 5.5 per cent to 25.4 per cent during the last 40 years.

TABLE 10  
POPULATION LIVING IN CITIES: 1920-1960<sup>a</sup>

Year	Number of Cities	Population	Per Cent of Total Population
1920	1	71,443	5.5
1930	2	168,145	10.9
1940	3	284,805	15.2
1950	4	515,641	23.3
1960	4	596,810	25.4

<sup>a</sup>U. S. Census of Population, 1960, Final. Report P (1)-53A, Table 4, p. 11.

A relatively new tendency emerging along with urbanization is the process of sub-urbanization. People are migrating from the core of the city to the suburbs and from the central city to urban fringes outside the city limits. The people of San Juan, for example, are migrating to the suburbs of its "twin city," Rio Piedras, and to urbanized areas of the Metropolitan territory. The population of the city of San Juan, as a result, declined from 225,000 to 200,000 inhabitants during the last decade.<sup>1</sup>

---

<sup>1</sup>Although Rio Piedras Municipality was annexed to San Juan after 1950, in this work we are considering both of them separate municipalities.

Considering the fact that, according to vital figures, the population of San Juan in 1960 in the absence of out-migration should have been 270,000, a net out-migration of some 70,000 persons took place during the decade.

The city of Mayaguez also lost population during the last decade. Although part of this can be attributed to the centrifugal tendency toward urban fringes outside the city. In addition, a substantial amount of the net loss must be attributed to emigration to other places outside the Metropolitan territory. The migratory tendency in Ponce and Rio Piedras is from the center of the city to the less populated suburbs. Both cities increased in population during the last decade.

Supporting this trend is the fact that if the people living in urban fringes are not classified as urbanites, the proportion of urban population would have remained constant during the last decade.<sup>1</sup>

A standard metropolitan statistical area (SMSA) has been defined by the United States census as a municipality<sup>2</sup> or group of contiguous municipalities which contains at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to the municipality or municipalities containing such a city or cities, contiguous municipalities are included in an SMSA if, according to certain

---

<sup>1</sup>See U. S. Census of Population, 1960, Table 3.

<sup>2</sup>A municipality is one of the 76 political subdivisions of the Island. Each municipality is made up by a central town or city and other rural territory.

criteria, they are essentially metropolitan in character, and are socially and economically integrated with the central city.<sup>1</sup>

Following this definition, three SMSA's have been recognized in Puerto Rico: the San Juan Metropolitan Area (including the municipalities of San Juan, Bayamón, Catano, and Guaynabo), the Mayaguez Metropolitan Area (including the municipality of Mayaguez), and the Ponce Metropolitan Area (which includes the municipality of Ponce). Since 1940 all these areas can be properly considered SMSA's. We have, nevertheless, included in Table 11 the population of these areas in 1899.

According to these figures, one-sixth of the population in 1899 was living in the territory which today is classified as SMSA. This proportion has increased considerably and today more than one-third of the total population of the Island is resident in such places.

Urban and city growth in Puerto Rico (as in many other Latin American countries) is not necessarily a sign of socio-economic progress, as many people believe. It is usually a forced exodus, a distress flow, a symptom of miserable and deteriorating rural economic conditions (to a great extent, this is also true with respect to mass emigration of Puerto Ricans to the United States). It is true that the overall condition of the "jíbaro" has been improved since 1940, but at least in terms of

---

<sup>1</sup>Ibid., p. x.



TABLE 11

POPULATION GROWTH IN STANDARD METROPOLITAN  
STATISTICAL AREAS: 1899-1960<sup>a</sup>

Year	San Juan SMSA	Ponce SMSA	Mayaguez SMSA	All SMSA's	
				Population	Per Cent of Total Population
1899	65,748	55,477	35,700	156,925	16.5
1940	302,765	105,116	76,487	484,368	24.8
1950	465,741	126,810	87,307	679,858	30.7
1960	588,805	145,586	83,850	818,241	34.8

<sup>a</sup>Sources: U.S. War Department Report, p. 156; and U.S. Census of Population, 1960, Table 6.

wages and employment opportunities, the gap between urban and rural residents has become broader.<sup>1</sup> It must be kept in mind that misery is relative; one's position is evaluated in terms of another's position.

---

<sup>1</sup>In October, 1952, the weekly median earnings of wage and salary workers employed in agriculture was 44 per cent lower than the corresponding figures for all industries and 52 per cent lower than the corresponding earning in manufacturing. In October, 1962, however, the corresponding percentages were 65 and 69 per cent, respectively (source: Department of Labor of Puerto Rico).

Figure 3

POPULATION GROWTH IN PUERTO RICO: 1765-1960  
BY RESIDENCE: 1899-1960

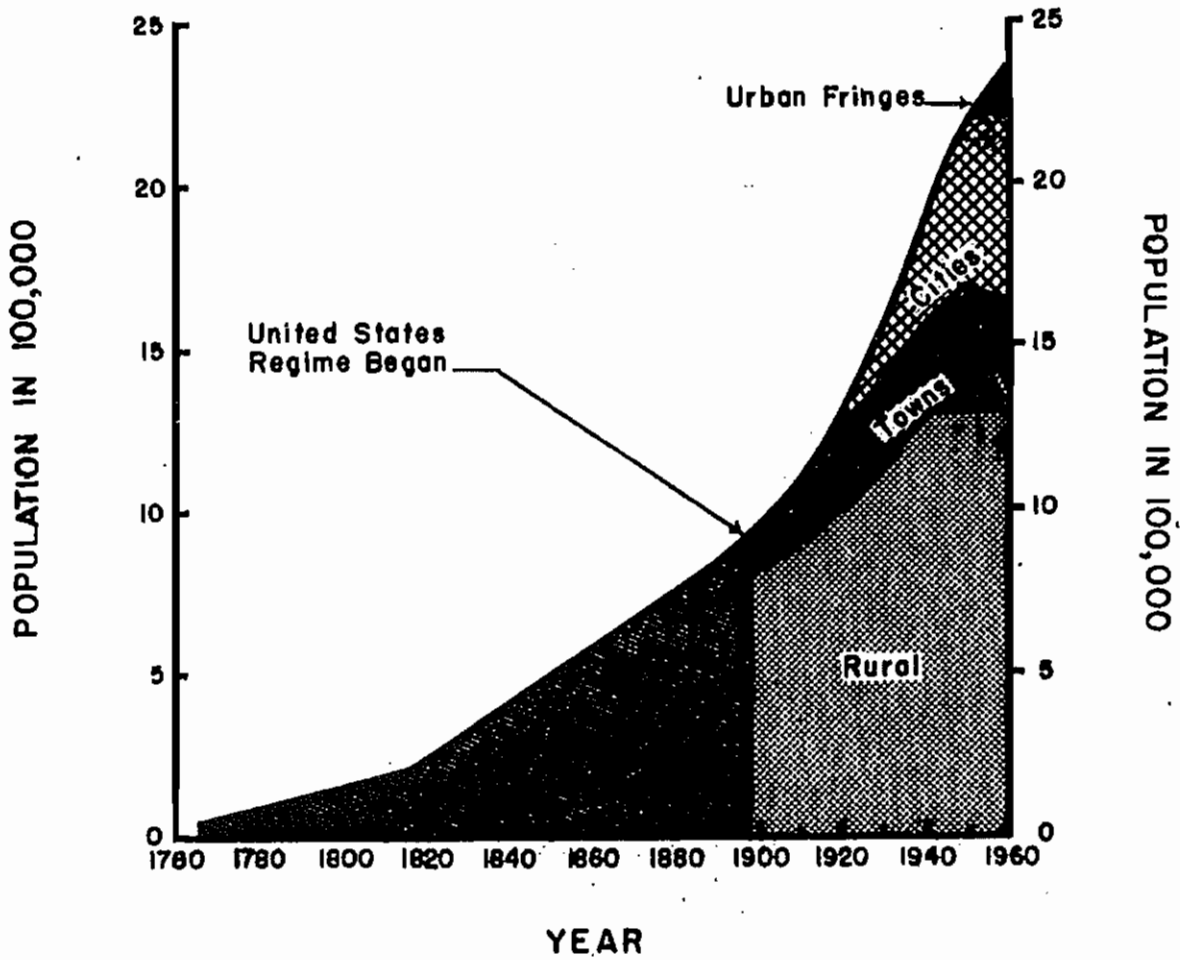


TABLE 12  
POPULATION DISTRIBUTION BY RESIDENCE (1960)<sup>a</sup>

Place of Residence	Population	Per Cent of Total Population
<u>Urban (Total)</u> . . . . .	1,039,301	44.2
Cities of 50,000 or more . . . . .	596,810	25.4
Towns of 10,000 to 50,000 . . . . .	140,262	6.0
Towns of 2,500 to 10,000 . . . . .	183,710	7.8
Urban Fringes . . . . .	118,519	5.0
<u>Rural (Total)</u> . . . . .	1,310,243	55.8
Villages of 1,000 to 2,500 . . . . .	45,134	2.0
Open Country . . . . .	1,265,109	53.8
<u>In Metropolitan Areas (Total)</u> . . . . .	818,241	34.8
In Central City or Cities . . . . .	596,810	25.4
In Other Urban Territory . . . . .	95,425	4.1
In Rural Territory . . . . .	126,006	5.3
<u>Not in Metropolitan Areas (Total)</u> . . . . .	1,531,303	65.2
In Urban Territory . . . . .	347,066	14.8
In Rural Territory . . . . .	1,184,237	50.4

<sup>a</sup>Source: U. S. Census of Population, 1960, pp. 9 and 19.

## CHAPTER III

### POPULATION CHARACTERISTICS

A population is an aggregate of people and, as such, it may differ or resemble others in terms of quantity and quality. Human resources in a community cannot be measured solely in terms of population size, age, and sex structure, but rather in terms of the quality levels attained by its members. It is this quality element which will tell us whether any particular individual or group of individuals represent an actual or potential asset to the community.

While the size and age-sex composition of a population are determined by past and present trends in fertility, mortality, and migration, its quality represents the cumulative experience of past and present trends in public health, education, and political and socio-economic development.

In this chapter we will deal with some major characteristics of the Puerto Rican population; most of them quantitative, a few qualitative in kind.

#### The Age Structure of the Population

Apart from calamities or disasters, such as wars, the age-sex structure of a population is almost exclusively determined by past and present trends in natality and migration. It has been mathematically proved that mortality, under normal conditions, can

only alter the size and rate of growth of a population.<sup>1</sup> Its effect upon the age and sex composition of the population is, for all practical purposes, negligible. This is true because any significant change in mortality conditions in a community tends to be shared by all age-sex groups. On the other hand, changes in the birth rate have an immediate effect upon the very young age groups, but no effect, whatsoever, upon the older groups, thus altering the shape of the age distribution.

Migration may have different effects depending upon the age-sex distribution of emigrants and that of the parent population. Overseas migrants, for example, are usually young single males, while in rural-urban migration females predominate. If the age-sex structure of the parent population differs significantly from the corresponding distribution of migrants, the former age-sex structure will obviously be affected. Thus, migration is the only factor, other than wars, which can considerably affect the sex composition of a population.

Puerto Rico's population is very young. According to the 1960 census its median age was only 18.5 years, as compared, for example, with a median age of 29 years for the United States. Forty-three per cent of the population was under 15 years of age, 42 per cent were 15-64 years, and only 5 per cent 65 years of age and over.

A close examination of the figures presented in Table 13 shows that significant changes occurred from 1765 to 1860.

---

<sup>1</sup>Ansley J. Coale, "The Effects of Changes in Mortality and Fertility on Age Composition," The Milbank Memorial Fund Quarterly, XXXIV, No. 1 (1950), 79-114.

During this period the median age increased four years (from 14 to 18), while the proportion of persons under 15 years of age declined from 54 to 43 per cent. At the same time, the proportion of persons 15-44 years increased from 36 to 46 per cent. No considerable change occurred in the age groups above 45 years. As will be shown later, these remarkable changes are explained by a significant decline in the birth rate.

TABLE 13

BROAD AGE DISTRIBUTIONS OF THE POPULATION: 1765-1960<sup>a</sup>

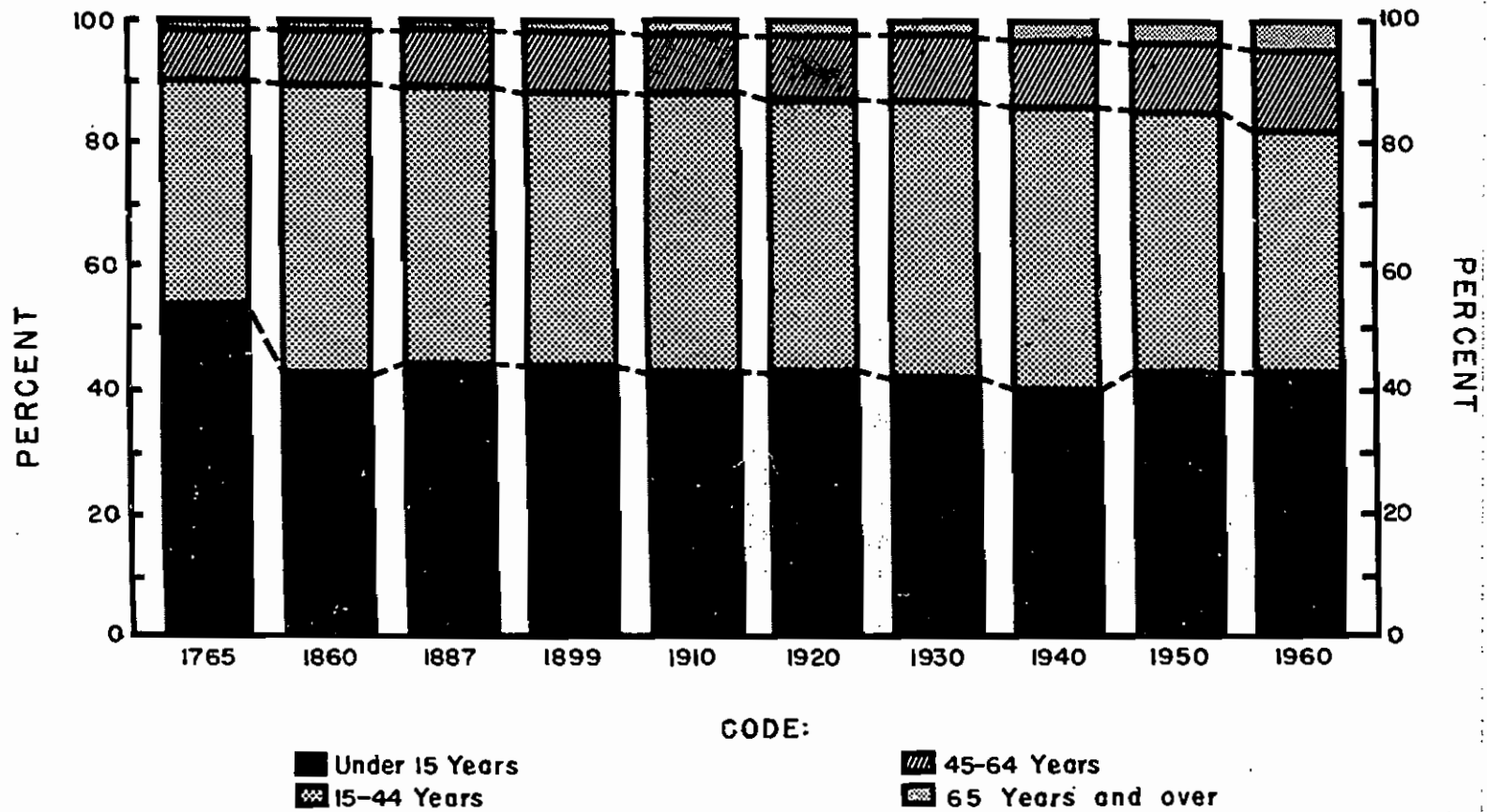
Year	Median Age	Per Cent of Total in Each Age Group			
		-15	15-44	45-64	65+
1765	13.9	54.0	36.5	8.1	1.4
1860	18.1	43.3	46.4	8.2	2.1
1887	17.6	44.5	44.8	9.1	1.6
1899	18.1	43.9	44.3	9.8	2.0
1910	18.5	43.0	45.1	9.7	2.4
1920	18.4	43.3	43.6	10.7	2.3
1930	18.3	42.1	45.1	10.4	2.6
1940	19.2	40.6	45.4	10.4	3.5
1950	18.4	43.2	41.9	10.9	3.9
1960	18.5	42.7	39.1	13.0	5.2

<sup>a</sup>Sources: Official censuses for Puerto Rico.

On the other hand, no extraordinary change occurred from 1860 to 1960. With relatively small fluctuations, the median age remained more or less constant during this 100 year period. The percentage of persons under 15 years, following closely the trend of the median age, declined slightly from 43.3 to 42.7. The share of the 15-44 year group remained constant up to 1940; since then a considerable decline is observed. The proportion of persons aged 45 years and over, however, has experienced a distinct increase.

Figure 4

DISTRIBUTION OF THE POPULATION OF PUERTO RICO  
BY BROAD AGE GROUPS: 1765-1960



From these structural changes, it is easy to infer that no significant change occurred in the birth rate from 1860 to 1930 (the median age remained more or less constant), although a slight declining trend is consistent with the steady increase in the proportion of persons 45 years of age and over.

From 1930 to 1940 the proportion of persons under 15 years declined from 42.1 to 40.6 per cent, while the median age increased almost one year. These changes were the result of the economic depression of the 30's, which not only halted emigration, but during the period of 1930-35 many Puerto Ricans returned home from the United States. As emigration in Puerto Rico has the effect of lowering the median age (migrants are concentrated above age 20), we suspect that immigration should have had an opposite effect. In addition, economic disturbances tend to decrease the birth rate, if nothing else, due to a decline in the marriage rate. In countries like Puerto Rico, where marriage is more or less a free choice, nuptiality is an excellent indicator of economic pressures.

The economic progress achieved in the Island, partly as a result of World War II, and the demobilization of the armed forces after the war, resulted, as in many other countries, in the "baby boom" with the birth rate rising considerably during the years 1944 to 1948. This, added to the depletion of age groups 15 to 44 years, as a result of the reactivation of emigration (during this period the annual rate of emigration was 0.9 per cent) are the reasons for the decline in the median age observed from 1940 to 1950.

From many points of view, the 1950-1960 decade is a distinct demographic epoch. It was during this period that the birth rate declined significantly, although the reasons for this decline are



not yet clear. From 39 births per 1,000 inhabitants in 1950 the rate declined to 32 in 1960 (see Table 8). Nevertheless, the median age did not rise as expected as a result of heavy emigration to the United States. According to official figures, slightly less than half a million Puerto Ricans were lost through emigration. From these official resources, we know in addition that migrants were heavily concentrated around a median age of 25 years. As migrants, in general, were older than the population, the effect of the decline in the birth rate on the median age was cancelled out.

For testing this hypothesis we have computed the 1960 population that would have resulted in the absence of migration. In general, the procedure was hypothetically to expose the 1950 enumerated population throughout the 1950-1960 decade to the prevailing age specific mortality and fertility rates without allowing for any migration. According to this expected population, the median age should have been 20.1 years instead of the recorded 18.5.

As the median is not affected to a significant extent by extreme values, it is sometimes a poor index for detecting changes occurring in the age structure of a population. From Table 13 it is evident that Puerto Rico's population is becoming older. The proportions of persons 45-64 and 65 years of age and over have increased consistently since 1860, but the median age has remained more or less unaffected.

For this reason, the arithmetic mean is perhaps the best single index to portray the process of aging in a population. According to census figures, the mean age in 1860 was 21.5 years.

By 1910 it had increased to 22.4 years, and in 1960 it was 23.5 years. The consistent, although small, increase in the mean age tells us that the population of the Island is aging, undoubtedly as a result of a declining birth rate (see Table 14). This is one of the arguments we can use against those who hold that the birth rate in the Island remained stationary up to 1950.

TABLE 14

ARITHMETIC MEAN OF THE AGE DISTRIBUTION OF  
THE POPULATION: 1765-1960<sup>a</sup>

Year	Mean Age	Year	Mean Age
1765 <sup>b</sup>	16-17	1920	22.7
1860	21.5	1930	22.8
1887	21.4	1940	23.3
1899	22.2	1950	23.4
1910	22.4	1960	23.5

<sup>a</sup>Sources: Official censuses for Puerto Rico.

<sup>b</sup>The broad age groups used in the 1765 tabulations do not permit the exact computation of the mean age.

The Sex Differential

Females, as a group, tend to be older than males. Two interesting biological facts explain this universal phenomenon: first, there are about 105 male births per each 100 female births; and, second, female mortality is in general lower than male's. These apparently natural mechanisms tend to maintain a balance between the sexes in the population as a whole.

Figures presented in Table 15 are in complete agreement with these facts. Female's median age is higher than the

corresponding figure for males, as a result of a lower proportion of females at ages below 15 years and a higher one at ages above 65 years. In the so-called "highly productive ages" (15-44 years of age), proportionally there are more females than males.

Table 15 also shows that the post-war "baby boom" had a similar effect upon the male and female groups, for both the decline in the median age, as well as the increase in the proportion of persons under 15 years, were almost identical for males and females. Nevertheless, during the last intercensal period the median age increased for females but decreased in the male group, a product of the combination of a decline in the crude birth rate and sex selectivity among emigrants. In other words, the greater proportion of male emigrants cancelled the opposite effect of the declining birth rate. In the female group, however, the effect of the declining birth rate was greater than the corresponding effect of emigration, so that the median age increased, and a depletion of population occurred among age-groups 20-39, as Table 16 shows.

#### The Urban-Rural Differential

In Puerto Rico, as in most of the countries of the world, rural communities are younger than urban ones. This is a result of a higher birth rate and continuous emigration. According to the 1960 census, the median age for the rural population was 16.6 years as compared with 21.3 years for urban. Table 17 shows that the population of central cities, the upper-end of the rural-urban continuum, have the highest median age. On the other hand, the population of urban fringe suburbs have the lowest median with the exception of the open country. Suburbs tend to be populated by

TABLE 15

AGE AND SEX DISTRIBUTION OF THE POPULATION: 1899-1960<sup>a</sup>

Sex and Year	Median Age	Per Cent of the Population in Each Age Group				
		-15	15-44	45-64	65 +	All Ages
<u>Males:</u>						
1899	17.5	45.5	42.7	9.8	2.0	100.0
1910	18.1	43.9	44.3	9.8	2.0	100.0
1920	18.2	44.2	42.2	11.5	2.1	100.0
1930	18.2	42.6	44.1	10.9	2.4	100.0
1940	19.2	41.0	44.8	11.1	3.1	100.0
1950	18.2	43.7	41.2	11.4	3.7	100.0
1960	18.0	43.7	37.7	13.5	5.1	100.0
<u>Females:</u>						
1899	18.7	42.3	45.8	9.8	2.1	100.0
1910	18.7	41.9	45.9	9.6	2.6	100.0
1920	18.7	42.5	45.1	9.9	2.5	100.0
1930	18.3	41.6	46.0	9.7	2.7	100.0
1940	19.2	40.3	46.1	9.9	3.7	100.0
1950	18.6	42.8	42.7	10.5	4.0	100.0
1960	18.9	41.7	40.5	12.5	5.3	100.0

<sup>a</sup>Source: U. S. Census of Population, 1960, Report PC (1)-53B, Table 14.

couples with small children, perhaps because the city is not the best place for rearing them. It is evident, also, that rural towns (places of 1,000 to 2,500 population) do not differ in this respect from small urban towns (places of 2,500 to 10,000 population). This residential pattern is almost the same for both males and females, although the female group is older in all places.

The Sex Composition

We have few details about the sex composition of the population during the precensal period (1493-1764), although the 1530 population count tells us that during the colonization period males predominated. According to that count, there were 3.7 males for

Figure 5

BROAD AGE DISTRIBUTION OF THE POPULATION  
BY SEX  
PUERTO RICO: 1899-1960

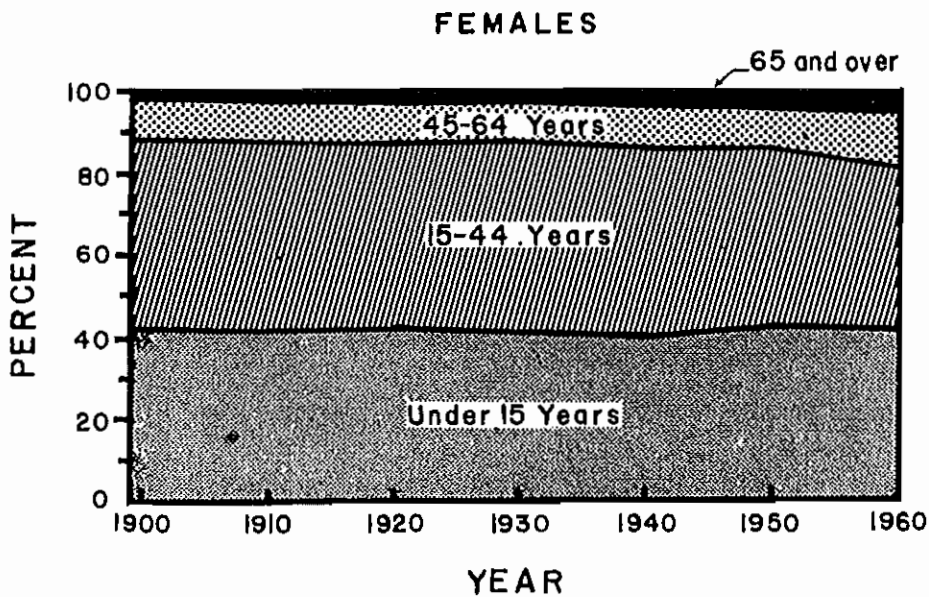
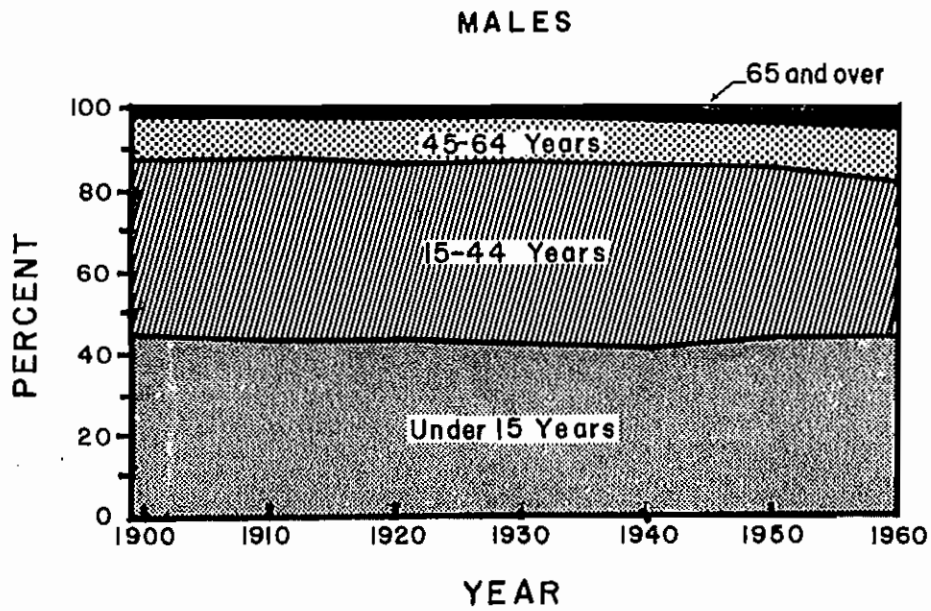


TABLE 16  
 PER CENT DISTRIBUTION OF THE POPULATION BY AGE  
 AND SEX: 1899-1960<sup>a</sup>

Sex and Age	1899	1910	1920	1930	1940	1950	1960
<u>Males (Total)</u>	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0- 4	16.3	16.9	15.6	14.8	15.2	16.7	15.4
5- 9	15.4	13.7	15.3	14.7	13.6	14.5	14.3
10-14	13.8	13.3	13.2	13.1	12.2	12.5	14.0
15-19	9.1	9.6	9.3	11.4	10.6	9.8	10.5
20-24	8.8	9.6	9.6	9.6	10.9	8.2	6.9
25-29	8.4	8.2	6.8	6.2	7.7	6.9	5.3
30-34	6.6	6.3	5.8	6.1	5.5	6.0	5.1
35-39	5.1	5.8	5.9	5.9	5.4	6.0	5.3
40-44	4.7	4.8	4.8	4.9	4.7	4.3	4.6
45-49	2.8	3.4	4.4	3.9	3.9	3.6	4.6
50-54	3.4	3.0	3.4	3.2	3.3	3.3	3.4
55-59	1.8	1.7	1.8	1.8	2.0	2.2	3.0
60-64	1.8	1.6	1.9	2.0	1.9	2.3	2.5
65-69	0.8	0.8	0.8	0.9	1.3	1.5	2.1
70-74	0.6	0.6	0.6	0.7	0.8	1.0	1.4
75 and over	0.6	0.6	0.7	0.8	1.0	1.2	1.7
<u>Females (Total)</u>	100.0	100.0	100.0	100.0	100.0	100.0	100.0
0- 4	15.3	16.2	15.2	14.6	14.8	16.5	14.7
5- 9	14.7	13.3	14.7	14.3	13.3	14.3	13.6
10-14	12.3	12.4	12.6	12.7	12.1	12.0	13.4
15-19	10.4	10.8	10.1	12.7	11.5	10.1	10.5
20-24	9.7	9.8	10.2	9.7	11.2	9.3	7.7
25-29	9.3	8.6	8.0	6.8	8.1	7.4	6.3
30-34	6.8	6.3	6.2	6.2	5.4	5.9	5.7
35-39	4.8	5.7	5.9	6.1	5.4	6.0	5.8
40-44	4.6	4.6	4.6	4.5	4.5	4.0	4.6
45-49	2.7	3.2	3.4	3.4	3.5	3.3	4.4
50-54	3.5	2.9	3.0	2.9	2.8	3.2	3.0
55-59	1.5	1.7	1.5	1.5	1.7	2.0	2.7
60-64	2.1	1.8	1.8	1.9	1.9	2.1	2.4
65-69	0.6	0.9	0.9	0.9	1.4	1.5	2.0
70-74	0.7	0.8	0.8	0.8	0.9	1.0	1.3
75 and over	0.8	0.9	0.8	1.0	1.4	1.6	2.0

<sup>a</sup>U.S. Census of Population, 1960, Table 14.

TABLE 17

MEDIAN AGE BY PLACE OF RESIDENCE AND SEX (1960)<sup>a</sup>

Place of Residence	Both Sexes	Males	Females
Puerto Rico . . . . .	18.5	18.0	18.9
<u>Urban Territory</u> . . . . .	21.3	20.3	22.2
Central Cities . . . . .	22.0	21.2	22.7
Urban Fringes . . . . .	19.7	19.0	20.4
Other Urban . . . . .	20.6	19.2	21.9
Places 10,000 or more . . . . .	21.0	19.6	22.2
Places 2,500 to 10,000 . . . . .	20.3	19.0	21.8
<u>Rural Territory</u> . . . . .	16.6	16.5	16.7
Places 1,000-2,500 . . . . .	20.5	19.5	21.5
Other Rural . . . . .	16.5	16.4	16.5

<sup>a</sup>U.S. Census of Population, 1960, Table 13.

each female for the total non-native population, and more than six males to every female in the white Spanish group. This was perhaps the reason for interracial marriages, and for the appearance of an important element in the Island's ethnic composition--the Mulatto.

Since 1530, no reliable information by sex is available until the 1765 census when, in both the free and slave groups, males were predominant, but the sex ratio was considerably lower than in 1530.

There are two possible explanations for the unusually high sex ratio observed during the Spanish regime: immigration and mortality. Although reliable figures are not available, we know that two waves of immigration occurred in the Island during this period: one which covered the last quarter of the Eighteenth

Century, and another which lasted from about 1815 to 1840. Undoubtedly, males should have predominated among them. In the second place, as will be shown in Chapter VI, the sex ratio in general mortality was almost unity. Thus, the excess of males at birth was not counter-balanced by mortality.

TABLE 18  
SEX DISTRIBUTION OF THE POPULATION:  
1765-1960<sup>a</sup>

Year	Males	Females	Sex Ratio <sup>b</sup>
1765	22,932	21,951	104.5
1846	224,423	218,716	102.6
1860	296,414	286,746	103.4
1877	369,064	362,594	101.8
1887	399,021	399,544	99.9
1899	472,261	480,982	98.2
1910	557,301	560,711	99.4
1920	647,825	651,984	99.4
1930	771,761	772,152	99.9
1940	938,280	930,975	100.8
1950	1,110,946	1,099,757	101.0
1960	1,162,764	1,186,780	98.0

<sup>a</sup>Source: Official censuses for Puerto Rico.

<sup>b</sup>Number of males per 100 females.

Emigration of Spanish citizens as a result of the Spanish-American War and the United States invasion of Puerto Rico, and of native Puerto Ricans to Hawaii, Cuba, and Santo Domingo,<sup>1</sup> were probably the reasons for the unusually low figure of 98 males per each 100 females enumerated in 1899. From 1910 to 1950, it is proper to say that the sexes were in balance. The drop observed

---

<sup>1</sup>For an account of emigration to Hawaii, Cuba, and Santo Domingo, see First Annual Report of the Governor of Puerto Rico (Washington, 1901), pp. 74-75.



during the last decade was the result of emigration to the United States. According to official figures, there were 118.7 males for each 100 females among migrants during this period (255,000 males and 215,000 females).

TABLE 19

SEX RATIO AT BIRTH: 1888-1898 to 1951-1960<sup>a</sup>

Period <sup>b</sup>	Male Births	Female Births	Sex Ratio
1888 - 1898	12,652	12,116	104.4
1910 - 1912	20,275	19,247	105.3
1919 - 1921	25,347	23,950	105.8
1929 - 1931	29,535	28,045	105.3
1939 - 1941	37,699	36,155	104.3
1949 - 1951	43,441	41,589	104.4
1951 - 1960	39,952	38,062	105.0

<sup>a</sup>Source: Records of the Bureau of Demographic Registry and Vital Statistics of Puerto Rico.

<sup>b</sup>Annual averages.

### Sex Ratio by Age

In a population where mortality is more or less under control, and external migration insignificant, we should expect a continuous decline in the sex ratio from birth to the older groups. This is true because, although there are some 105 male births per 100 female, female mortality is, in general, lower than male mortality.

It was not until recently that female mortality in the Island became lower than male mortality throughout the whole age span. Prior to 1950, and especially during the first four decades of the present century, female mortality in the child-bearing ages

was considerably higher than male mortality in the corresponding age groups. This condition was responsible for a sex ratio of almost unity recorded during this period. The sex ratio in general mortality, which was only 103 in 1909-1911, increased gradually with time to 123 in 1958-1960 (see Table 100).

TABLE 20  
SEX RATIOS BY AGE: 1899-1960<sup>a</sup>

Age	1899	1910	1920	1930	1940	1950	1960
0- 4	104.3	103.5	101.6	101.4	103.0	102.2	102.8
5- 9	103.2	102.6	103.3	102.8	103.2	102.7	102.7
10-14	109.9	106.9	104.1	103.5	101.7	105.0	102.1
15-19	85.4	88.4	91.1	89.5	93.2	97.8	98.7
20-24	89.0	97.2	93.5	99.4	98.7	89.4	86.9
25-29	88.1	94.7	85.0	90.9	95.4	93.5	83.5
30-34	95.2	100.7	92.8	97.4	102.8	102.2	86.3
35-39	104.1	100.9	99.4	97.3	99.8	101.8	89.2
40-44	100.5	102.8	103.0	108.0	103.6	109.8	97.8
45-49	103.9	104.3	129.5	115.1	110.3	111.3	103.8
50-54	96.3	102.3	110.8	108.3	116.3	105.4	112.6
55-59	117.7	96.7	116.4	119.7	122.0	114.2	109.3
60-64	85.4	88.7	103.0	105.6	102.1	111.0	100.4
65-69	113.5	88.5	97.6	97.4	95.1	99.8	104.0
70-74	76.8	74.3	82.5	94.0	92.0	101.1	108.2
75 & over	74.1	69.0	62.0	78.3	73.2	78.5	82.0

<sup>a</sup>Sources: U. S. Census of Population, 1950, Report P-B 53, p. 29; and U. S. Census of Population, 1960, Final Report PC (1) - 53B.

The sex ratio by age in the enumerated population is not in complete agreement with the above discussed patterns of mortality and natality. As in the case of the United States there seems to be considerable undercount of males between ages 20 and 35.<sup>1</sup> In

<sup>1</sup>See Donald J. Bogue, The Population of the United States (Glencoe, 1959), pp. 157-158.

addition, part of the discrepancy can be attributed to sex differences in misreporting of age, especially in the older ages. Table 20 shows that this phenomenon is not recent, for it can be observed in all censuses since 1899.

As has been mentioned before, the 1950-1960 decade was characterized, among other things, by considerable emigration, the majority of which were males between ages 15 and 34. This fact is clearly depicted by census figures (see Table 20). Figure 6 shows that, with relatively small variations, there was close agreement between the 1950 and 1940 sex-ratio curves, but the 1960 curve shows considerable deviation, especially in the young adult ages. As will be shown in the chapter on fertility, these structural changes are of paramount importance for the adequate interpretation of recent natality trends.

#### Urban-Rural Differences

An interesting relationship exists between place of residence and the sex ratio by age groups. There is a clear preponderance of males in the rural areas and a deficiency of males in urban places. Neither fertility nor mortality can explain this phenomenon. The only possible explanation is a sex differential in internal migration. There is no other evidence, however, in relation to internal migration in Puerto Rico than the data collected in the 1940 census for the period of 1935-1940. Undoubtedly this was not a period of heavy internal migration if compared with the years following 1940. Nevertheless, these data show that, while the sex ratio in the non-migrant group and in the entire population was 100.8, the sex ratio for internal migrants

was 94.7, a figure reflecting a clear preponderance of females among this mobile group.

TABLE 21  
SEX RATIO BY AGE AND RESIDENCE: 1950 and 1960<sup>a</sup>

Age Group	1960		1950	
	Urban	Rural	Urban	Rural
0- 4	102.6	102.9	102.9	101.8
5- 9	101.8	103.3	100.3	104.0
10-14	99.5	103.7	97.6	109.3
15-19	89.1	106.3	84.4	108.1
20-24	82.2	91.3	79.8	98.1
25-29	82.0	85.2	89.3	97.4
30-34	85.6	87.2	94.4	109.4
35-39	87.6	90.7	93.6	108.8
40-44	92.6	103.2	97.9	120.7
45-49	94.6	113.0	95.6	126.0
50-54	98.5	127.9	90.1	119.9
55-59	93.3	126.9	94.9	133.4
60-64	83.4	119.4	89.1	132.1
65-69	84.3	125.3	77.7	122.3
70-74	85.9	136.1	78.1	124.4
75 and over	63.0	104.3	58.4	99.3

<sup>a</sup>Source: U. S. Census of Population, 1960.

Table 21 shows the effect of this sex selectivity in internal movements in the age structure of the population. From these figures it is evident that as age increases, the gap between the urban and rural sex ratios tends to become greater (see Figure 7). This fact also supports the hypothesis that the sex differential in rural-urban migration has been operant for many years in the Island.

### Nativity and Ethnicity

#### Nativity

During the last one hundred years or so, immigration to the Island has been insignificant. For this reason the great majority of the population is native. In 1960 about 64,000 persons

Figure 6

SEX RATIOS BY AGE  
PUERTO RICO: 1940, 1950 AND 1960

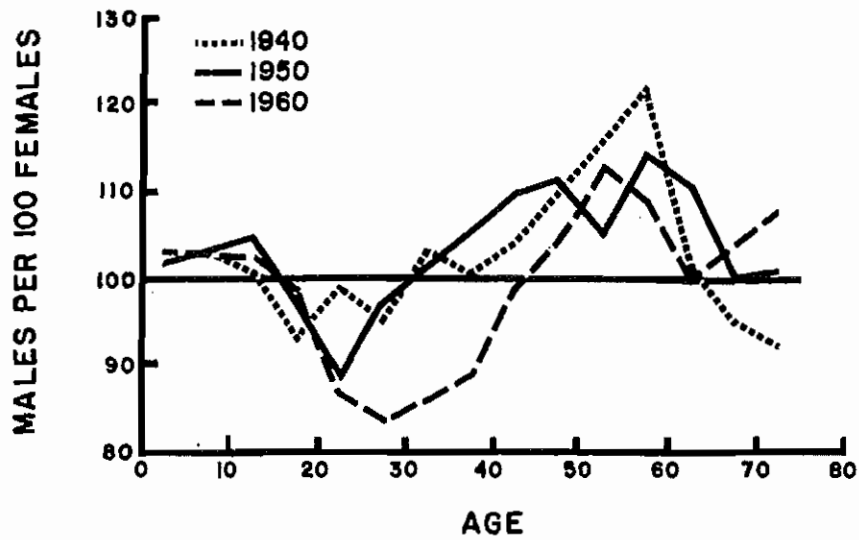
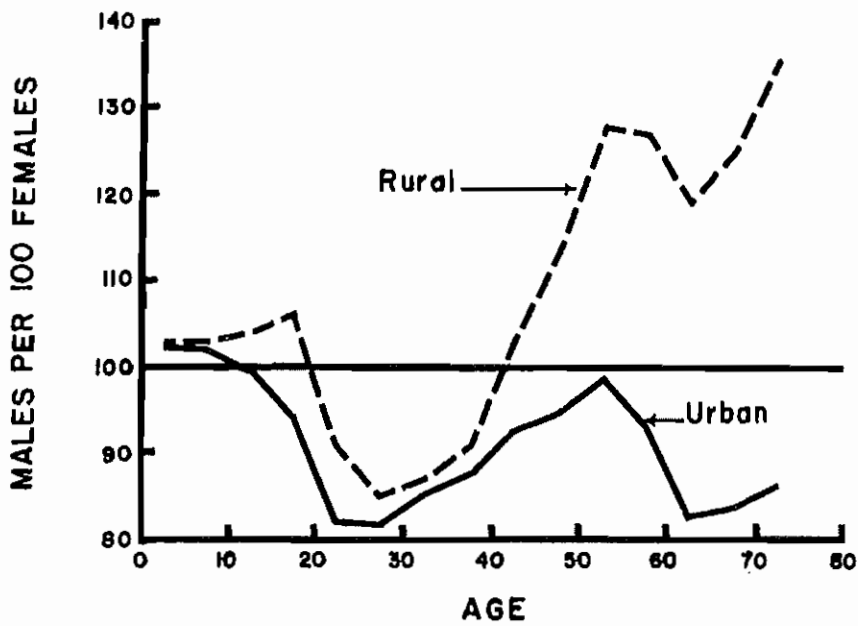


Figure 7

SEX RATIOS BY AGE AND RESIDENCE  
PUERTO RICO: 1960



were foreign born,<sup>1</sup> or slightly less than three per cent of the total population. Of these, 51,000 (or 2.2 per cent) were born in the United States.

TABLE 22  
PLACE OF BIRTH OF THE NON-NATIVE POPULATION: 1899-1960<sup>a</sup>

Year	U.S.	U.S. Territory or Possession	Foreign Country	Total	
				Number	Per Cent of Total Population
1899	1,069	.....	.....	13,872	1.5
1910	2,303	197	11,766	14,266	1.3
1920	1,617	1,111	8,167	10,895	0.8
1930	2,595	766	6,017	9,378	0.6
1940	6,639	1,439	5,039	13,117	0.7
1950	13,176	1,049	8,453	22,678	1.0
1960	50,910	2,955	10,414	64,279	2.7

<sup>a</sup>Sources: U.S. War Department Report (for year 1899); U.S. Census of Population, 1950, Table 21 (for 1910-1950); and U.S. Census of Population, 1960.

Perhaps the only important fact about the non-native population is the increase in the proportion born in the United States. In 1899, only one-tenth of one per cent fell in this category, but by 1960 it had already increased to slightly over two per cent. This may have been, to a large extent, the result of the recruitment of United States technicians and skilled laborers for the Island's industrialization program. During the last 20 years the number of persons born in the United States in the Puerto Rican population has increased 7.7 times.

<sup>1</sup>The census classifies as native any American citizen born in the Island, in the United States or a U. S. Territory, but for our purposes a foreign-born is any person born outside the Island.

Thus, as the Puerto Rican population is 97 per cent native there has been no need, so far, for a separate analysis of the characteristics of natives and non-natives.

### Ethnicity

Three races are so thoroughly blended in the Island that an accurate classification of population by color or race is frankly impossible. These are: the white, the Negro, and the Indian. Although Indian traits can be detected among a sizeable segment of the population, they are dominant in only a very small proportion. Therefore, for practical purposes, the population is classified at present as Negro or White depending upon the skin color.

Leaving out of consideration those few with some Indian blood, there is in the Island's population a color continuum from pure White to pure Negro. If a rough estimate were made, not more than 40 per cent of the population would be considered pure white, and much less than 10 per cent pure Negro, the majority being thus a White-Negro mixture. It is for this reason that census figures by race (or color) for Puerto Rico are of dubious statistical value. Mulattos with dominant White traits are usually classified as Whites. The White-Negro classification seems to be also a function of the color and color consciousness of the interviewer. Although there is no quantitative evidence of this tendency, the same person has been found classified in three different ways in three different documents. For example, he may be found classified as Negro in the birth certificate, as Mulatto in the marriage certificate, and as White in the death certificate.

Because of the lack of validity, the question pertaining to color was omitted in the 1960 census. Table 23 is presented here for the sole purpose of showing the lack of accuracy in color classification. It will be observed that the White proportion has increased from 62 to 80 per cent during this 50-year period. The Negro population increased from 363,742 to 446,946 from 1899 to 1950, which in relative terms represents a 23 per cent increase in 50 years of slightly less than one-half of one per cent per year. On the other hand, the White population increased at an average rate of four per cent per year during this period. These two figures are not only highly unreasonable, but in complete disagreement with vital statistics by color.

TABLE 23  
POPULATION BY COLOR: 1899-1950<sup>a</sup>

Year	White		Negro	
	Number	Per Cent	Number	Per Cent
1899	589,426	61.8	363,742	38.2
1910	732,555	65.5	385,437	34.5
1920	948,709	73.0	351,062	27.0
1930	1,146,719	74.3	397,156	25.7
1940	1,430,744	76.5	438,458	23.5
1950	1,762,411	79.7	446,948	20.2

<sup>a</sup>U. S. Census of Population, 1950, Table 11.



Further evidence of the lack of accuracy in color classification is that, according to a census taken on December 31, 1897, 65 per cent of the population was White,<sup>1</sup> while less than two years later, in 1899, only 62 per cent fell in this group.

Thus, for analytical purposes, color classification should not be used in Puerto Rico.

#### Marital Status and Nuptiality

Marriage is a universal phenomenon although varying in form among cultures. In Western civilization, marriage is characterized by free choice in the selection of the mate, and by the fact that following the ceremony the couple separate themselves from their respective parental families and establish a new family unit. In our cultural system, as in many others, subcultural variations of the general pattern may be observed.

In Puerto Rico there are at least three forms of marital relationships: legal marriage, common-law (or consensual) marriage, and concubinage. Concubinage differs from common-law in that there exists a third party; that is, the male (never the female) is legally or consensually married to another female. Common-law is monogamous; concubinage is a bigamous relationship. It has been said that common-law marriage is a subcultural alternative for legal marriage, although there is no complete agreement about this.<sup>2</sup>

---

<sup>1</sup>Coll y Toste, p. 368.

<sup>2</sup>William J. Goode, "Illegitimacy in the Caribbean Social Structure," American Sociological Review, XXV, No. 1 (1960), 21-30.

Some reasonable explanations may be offered for the high incidence of common-law marriage in Puerto Rico (see Table 24). The first is a historical one; during the early days of the colonizations an acute sex imbalance existed among the white population. Thus, white men were "forced" to enter marital relations with Indian and Negro female subordinates with whom they were not willing to establish permanent ties because of racial condition and color. With time, and also influenced by several other factors, consensual unions became a part of Puerto Rican marriage pattern. The Roman Catholic conception of marriage and nuptial ceremony were two important factors in the prevalence of consensual unions as an alternative for legal marriage. First of all, the Catholic nuptial ceremony is almost always celebrated in the town. Many authors have described how the country people, without shoes, became the laughing-stock of town people when they went to get married. This embarrassment discouraged the poor and rural folk from attempting the formalities, and probably many of them preferred to enter consensual unions to exposing themselves to the ridicule of the town people. Second, in the Catholic church (the state religion during the Spanish regime) divorce is prohibited. Thus, consensual marriage was an alternative arrangement, in which the risk of a marriage failure was minimized by the possibility of a separation.

A third factor contributing to the high incidence of common-law marriage was the customary opposition of the father to any love affair of the daughter. In Puerto Rican traditions, this initial opposition of the father to a daughter's love relationship was part of the father's social role. He should oppose, at least

initially, any love affair of a daughter. In many cases elopement was the alternative to this unreasonable opposition.

There is no quantitative evidence of the magnitude of the prevalence of consensual unions during the Spanish Regime. It is suspected that the proportion must have been very high; indirect evidence being the proportion of illegitimate children. According to some figures presented by Stahl, 53 per cent of the live births in the seven municipalities he surveyed in 1894 were illegitimate.<sup>1</sup> Additional evidence is obtained from the 1899 census. In that year, for each two persons legally married there was one consensually married.

As Table 24 shows, the proportion of never married (single) persons has decreased considerably since 1899, especially in the female population. Many factors have contributed to this trend, but perhaps the two most important variables are improvement in the economic conditions, and changes in the woman's social role. Improvements in the economic realm are discussed elsewhere in this work and, for this reason, we will not enter here in a discussion of this factor.

During the Spanish Regime, the married woman was merely the mother, highly subordinated to her husband, who was the decision-maker and breadwinner. She had no place in politics or the professions. Her participation in social life was limited, more or less, to religious activities. The unmarried woman was always at home, preparing for marriage that sometimes never came.

---

<sup>1</sup>Augustín Stahl, Estudio Demográfico-Estadísticas de Mortalidad y Nacimientos en Bayamón y Pueblos Limitrofes (Puerto Rico, 1895).

Her love contacts had to be made at home or on her way home, usually after church activities. In addition to this limitation of the "contact arc," her father, according to a traditional role, was always ready to oppose any love affair.

TABLE 24

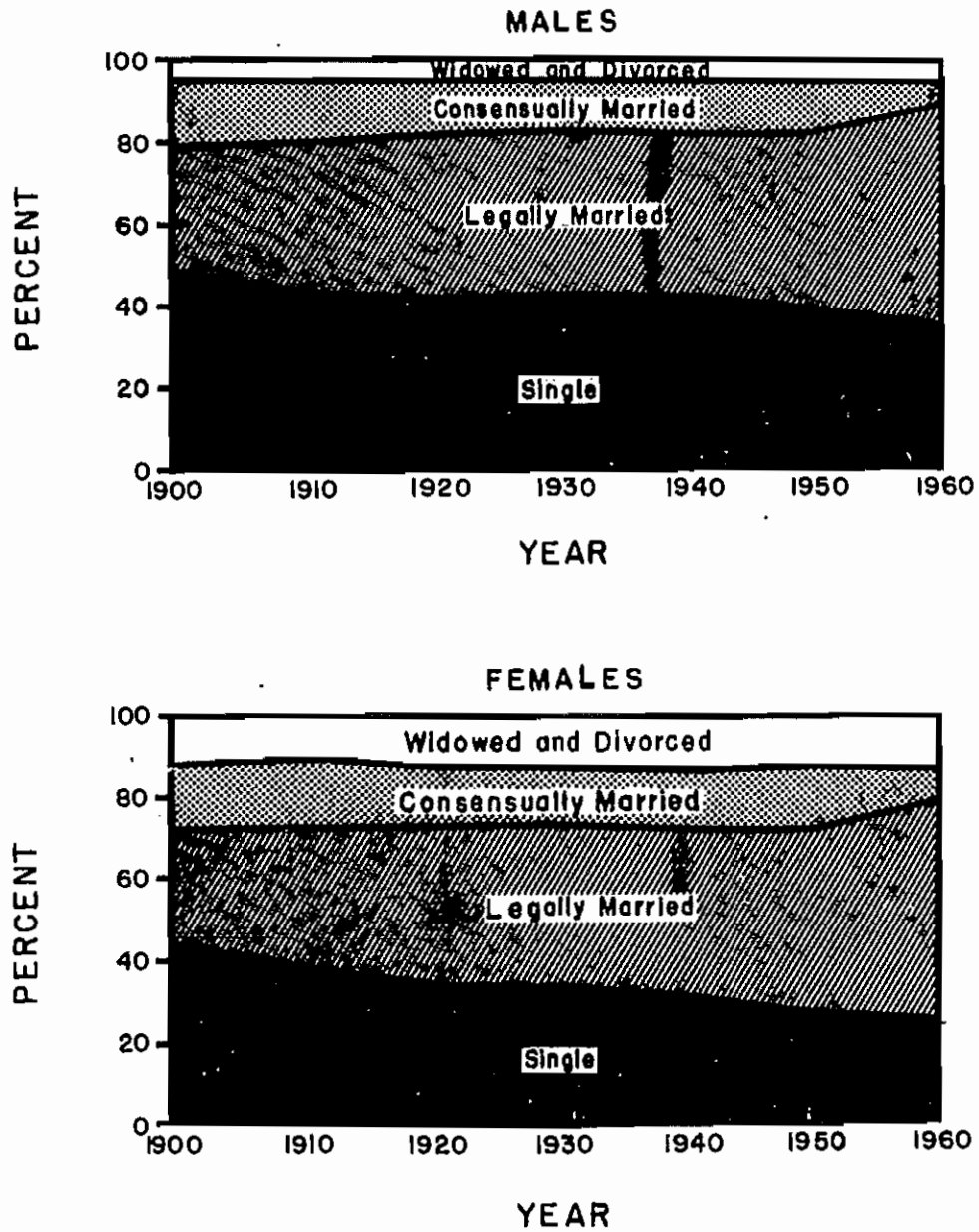
PERCENTAGE DISTRIBUTION OF THE POPULATION 15 YEARS OF AGE AND OVER BY MARITAL STATUS AND SEX: 1899-1960<sup>a</sup>

Year	Single	Married	Consensually Married	Widowed	Divorced	Total
M A L E S						
1899	48.4	30.6	16.3	4.7	....	100.0
1910	43.7	36.2	16.1	3.9	0.1	100.0
1920	41.9	40.1	13.4	4.3	0.3	100.0
1930	43.2	39.1	13.5	3.9	0.3	100.0
1940	42.4	39.2	14.1	3.8	0.5	100.0
1950	38.6	43.9	13.1	3.6	0.8	100.0
1960	35.3	52.3	7.8	3.4	1.2	100.0
F E M A L E S						
1899	43.8	28.8	15.2	12.3	....	100.0
1910	38.0	35.4	15.7	10.7	0.2	100.0
1920	34.0	39.4	14.0	12.0	0.6	100.0
1930	33.8	39.4	14.6	11.3	0.9	100.0
1940	31.4	40.2	15.2	11.6	1.6	100.0
1950	27.3	44.8	14.6	11.2	2.1	100.0
1960	25.7	53.0	8.2	10.4	2.7	100.0

<sup>a</sup>Sources: U. S. Census of Population, 1950, Report P-C53, Table 45; and U. S. Census of Population, 1960.

Figure 8.

MARITAL STATUS OF THE POPULATION  
15 YEARS OF AGE AND OVER BY SEX  
PUERTO RICO: 1899-1960



With the American invasion, Puerto Rican mores and role patterns began to change. During the 1899 census many women were hired as enumerators, thus opening the way for female participation in the labor force outside the home. Girls began to go to public schools together with boys. Women entered politics and professions. The unmarried woman began to have increased contact with men and was able to make choices in the selection of her mate.

As a result of these and other factors the proportion of single women declined from 44 per cent in 1899, to 26 per cent in 1960. The corresponding figures for males are 48 in 1899, and 35 per cent in 1960. At the same time the proportion of legally married for both sexes increased from around 30 per cent in 1899, to over 50 per cent in 1960. Consensual marriages declined somewhat from 1899 to 1950, but the real decline has been observed from 1950 to 1960.

It can be observed that throughout this period (1899-1960) the number of widows have been more than twice that of widowers, a result of a sex differential in remarriages (see Table 31). For both sexes, a declining trend of widowhood is evident, perhaps as a result of the decline in mortality. Divorce, which was unknown in 1899, began to increase since the American invasion. In 1960, over one per cent of adult males and about three per cent of the female population were divorced.

The trends observed in marital status of the adult population as a whole more or less repeat themselves in each age group.

Table 25 shows that the proportion of population actually married has increased considerably in all age groups, and

especially in the female groups. It can be observed also that males enter marriage later than females but remain married longer. For example, in 1950, in the age group 65 years and over, 24.5 per cent of the females were still married while the corresponding figure for males was 64.2 per cent.

TABLE 25

PERCENTAGE OF ACTUALLY MARRIED<sup>a</sup> POPULATION IN EACH AGE GROUP BY SEX: 1899-1960<sup>b</sup>

Age	1899	1910	1920	1930	1940	1950	1960
M A L E S							
15-19	1.5	1.2	0.9	1.6	1.4	2.4	3.3
20-24	18.1	25.7	24.5	27.1	27.3	30.8	36.4
25-29	47.7	59.6	58.8	59.3	61.5	65.1	71.0
30-34	65.3	74.0	75.1	74.7	76.1	77.6	81.7
35-44	73.7	80.0	81.5	82.9	82.7	82.5	85.6
45-54	73.9	79.3	81.1	81.9	83.7	82.7	86.9
55-64	69.8	71.7	74.5	76.5	78.5	79.2	83.5
65 & over	58.9	60.0	60.6	62.5	64.8	64.8	71.9
F E M A L E S							
15-19	11.0	14.0	12.2	17.7	16.6	18.7	17.3
20-24	41.7	55.7	54.9	58.0	57.9	61.0	58.4
25-29	60.3	70.9	74.3	74.6	75.3	79.6	80.3
30-34	64.2	73.3	77.9	79.2	80.2	83.7	86.0
35-44	61.1	68.1	72.8	75.9	77.6	81.3	86.0
45-54	46.7	52.5	57.2	59.8	64.6	69.0	78.8
55-64	31.4	34.5	36.9	39.4	44.9	50.6	60.2
65 & over	16.9	18.3	18.5	20.0	21.2	24.5	31.7

<sup>a</sup>Including consensually married.

<sup>b</sup>Sources: U.S. Census of Population, 1950, Table 45; and unofficial data from the 1960 census.

As the proportion of widowed plus divorced has remained more or less constant during this period, the proportion ever married has followed more or less the same trend of the group actually married (see Table 26).

TABLE 26

PERCENTAGE OF EVER MARRIED POPULATION<sup>a</sup> 15 YEARS OF AGE AND OVER BY AGE AND SEX: 1899-1960<sup>b</sup>

Sex and Age	1899	1910	1920	1930	1940	1950	1960
<u>Males</u>	51.6	56.3	58.1	56.8	57.6	61.4	65.4
15-19	1.6	1.3	1.0	1.7	1.5	2.4	3.4
20-24	18.5	26.1	25.3	27.6	27.9	31.4	36.9
25-29	48.9	60.7	60.5	60.8	63.0	66.5	72.5
30-34	67.7	76.1	77.8	77.1	78.4	79.5	83.5
35-44	78.4	83.9	85.8	87.0	86.4	85.7	88.2
45-54	83.7	87.2	89.0	89.6	90.9	89.1	91.2
55-64	87.3	87.3	89.4	90.2	91.7	91.0	92.5
65 & over	87.1	87.3	88.6	88.7	91.4	90.7	94.0
<u>Females</u>	56.2	62.0	66.0	66.2	68.6	72.7	74.5
15-19	11.1	14.2	12.6	18.0	16.9	19.1	17.7
20-24	42.7	57.1	56.9	59.9	60.0	63.2	60.4
25-29	63.3	73.3	78.3	78.4	79.3	83.3	84.3
30-34	70.7	77.8	84.4	85.4	86.4	89.1	91.6
35-44	75.9	78.8	85.4	88.1	89.9	90.9	94.2
45-54	77.4	78.2	84.5	86.6	90.9	91.4	94.5
55-64	77.5	77.5	83.8	84.6	89.8	91.6	93.9
65 & over	76.2	76.6	83.6	84.1	88.8	92.3	94.0

<sup>a</sup>Includes actually married plus widowed and divorced.

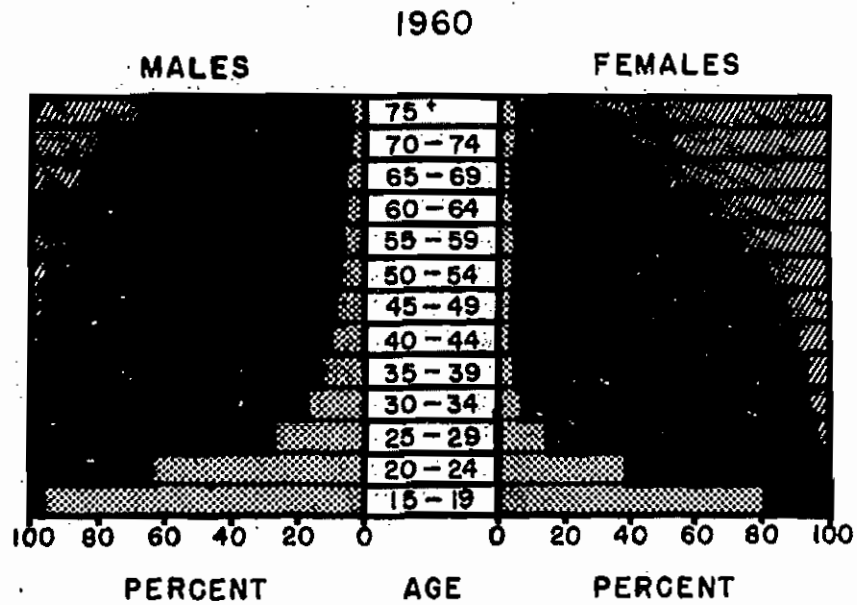
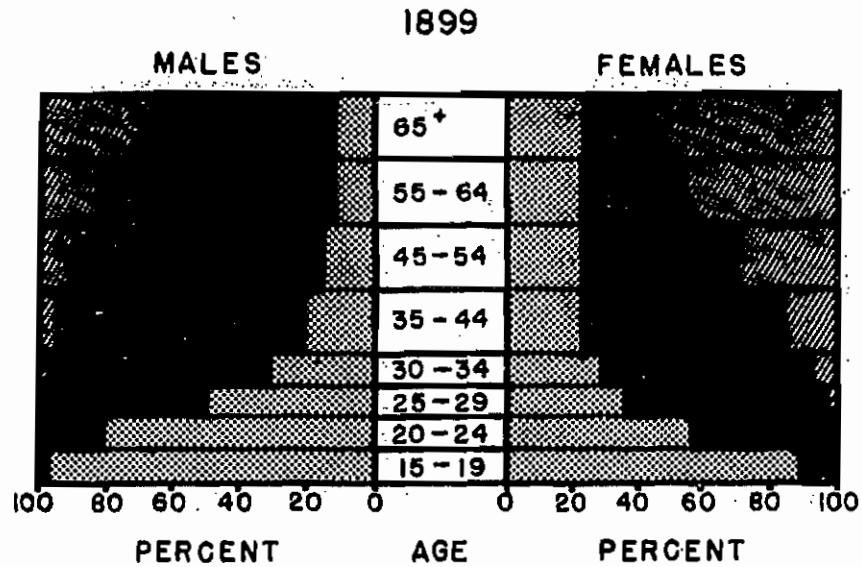
<sup>b</sup>Sources: Population censuses for Puerto Rico.

An interesting change has occurred in the sex pattern of the population ever married. Up to 1920, the proportion ever married was higher among males at ages above 35 years. Since 1930, and with the aging of these cohorts the pattern began to change, so that in 1950 the proportion ever married was greater among females throughout the entire age span. In other words, during the first two decades (or so) of the present century, proportionally, there were more spinsters than bachelors (single persons 35 years old and over), but in 1950 we have the inverse



Figure 9

MARITAL STATUS DISTRIBUTIONS BY AGE AND SEX  
PUERTO RICO: 1899 AND 1960



CODE:

- Single (Never Married)
- Legally and Consensually Married
- Widowed and Divorced

situation. From Table 26, it can be observed also that, while in 1899 the proportion ever married in the female group at age 55-64 was only 77.5 per cent, in 1950 and at age 25-29, we find that 83.3 per cent was ever married.

### Nuptiality and Divorce

Legal marriage was a "luxury" during the Spanish Regime as evidenced by the scarce available figures. According to the returns made to the Captain General by the magistrates of every town and village of the Island, 1,256 marriages were celebrated in 1828.<sup>1</sup> They were distributed in the following way: 734 whites, 489 free people of color, and 33 slaves. In relative terms this is equivalent to a rate of 4.1 marriages per 1,000 population for the whole Island. The rates by color were 4.9 for whites, 4.0 for free colored, and 1.0 for slaves.

This situation did not change at all during the rest of the Nineteenth Century. Official figures published in the Report of the Census of 1899 showed that with small fluctuations the marriage rate remained almost unchanged.

With the American invasion, marriage increased considerably as a result of improvement in the economic situation, and changes in the woman's role, among other things. As a good economic indicator, marriage has fluctuated following closely the "ups" and "downs" of the Island's economy. In addition, the effects of the two World Wars, and the Korean affair, are noticed in marriage figures. The highest marriage rate ever recorded was that for the year 1918, a result of the demobilization of the Armed Forces

---

<sup>1</sup>Flinter, p. 248.

after World War I. The mobilization of the Armed Forces in 1940 produced the second highest peak, followed by another in 1946 as a result of the end of World War II (see Table 28).

TABLE 27  
NUMBER OF MARRIAGES AND CORRESPONDING  
RATES: 1888-1898<sup>a</sup>

Year	Number of Marriages	Rate per 1,000 Population
1888	3,289	4.0
1889	2,401	2.9
1890	4,079	4.8
1891	3,894	4.6
1892	3,996	4.6
1893	4,297	4.9
1894	3,934	4.4
1895	4,265	4.7
1896	3,773	4.1
1897	3,729	4.0
1898	2,728	2.9
Average	3,671	4.2

<sup>a</sup>Source: U.S. War Department Report.

During the last decade the average marriage rate was 8.6, which represents an increase of more than 100 per cent over the figure of 4.2 for the period of 1888-1898.

According to registration data, age at marriage has not changed significantly during the last 30 years. Grooms median age at marriage, with some variations, has remained, more or less, constant around a figure of 25 years. In the case of brides, the situation is very similar, although the median age is some three years lower.

TABLE 28

NUMBER OF MARRIAGES AND CORRESPONDING RATES: 1900-1960<sup>a</sup>

Year	Number	Rate <sup>b</sup>	Year	Number	Rate <sup>b</sup>
1900-1901 <sup>c</sup>	5,030	5.2	1931	9,666	6.1
1901-1902	7,088	7.2	1932	8,815	5.5
1902-1903	6,343	6.3	1933	9,500	5.8
1903-1904	6,553	6.4	1934	12,184	7.2
1904-1905	5,555	5.4	1935	11,222	6.5
1905-1906	7,665	7.3			
1906-1907	9,302	8.7	1936	13,851	7.9
1907	9,488	8.8	1937	13,964	7.8
1908	8,691	8.0	1938	9,212	5.1
1909	8,692	7.9	1939	10,785	5.8
1910	9,607	8.6	1940	19,457	10.4
1911	8,755	7.7	1941	15,007	7.8
1912	8,770	7.6	1942	16,114	8.3
1913	7,907	6.7	1943	14,341	7.2
1914	7,451	6.2	1944	16,191	8.0
1915	6,679	5.5	1945	17,490	8.5
1916	7,375	6.0	1946	20,345	9.8
1917	9,105	7.3	1947	16,779	7.9
1918	14,170	11.1	1948	15,379	7.2
1919	8,201	6.4	1949	16,148	7.4
1920	9,016	6.9	1950	20,532	9.3
1921	8,178	6.1	1951	18,140	8.2
1922	8,157	6.0	1952	18,288	8.3
1923	9,500	6.9	1953	19,915	9.1
1924	9,471	6.7	1954	19,437	8.9
1925	9,816	6.9	1955	18,912	8.5
1926	10,374	7.1	1956	18,917	8.5
1927	10,234	6.9	1957	19,044	8.5
1928	9,389	6.3	1958	19,603	8.5
1929	8,303	5.4	1959	20,133	8.7
1930	9,961	6.4	1960	20,580	8.7

<sup>a</sup>Source: Files of the Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup>Number per 1,000 population.

<sup>c</sup>Fiscal years.

Figure 10

THE MARRIAGE RATE IN PUERTO RICO  
1900 TO 1960

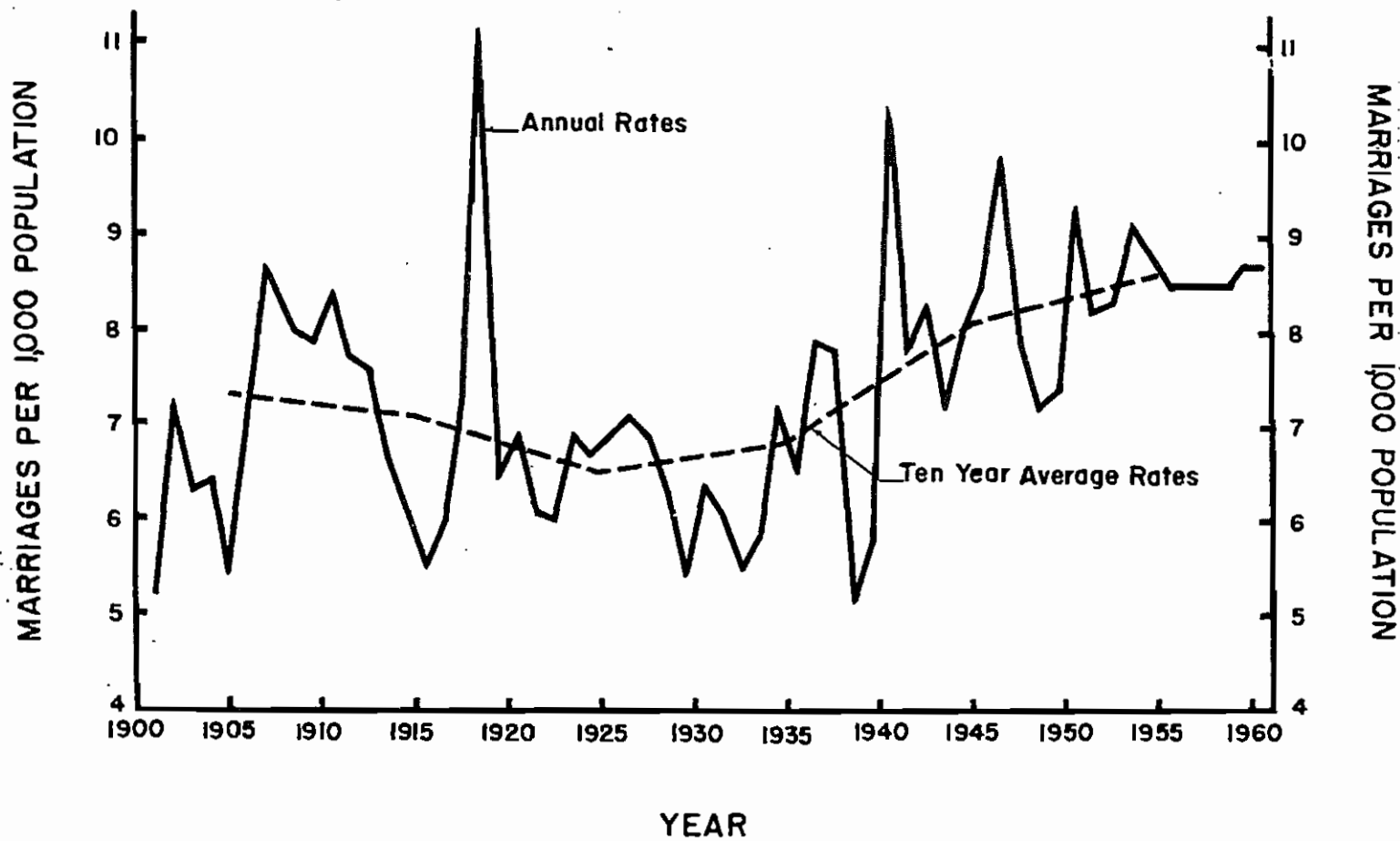


TABLE 29

MEDIAN AGE AT MARRIAGE, BY SEX: SELECTED YEARS (1932-1960)<sup>a</sup>

Year	Groom	Bride
1932	25.5	23.1
1940	25.9	22.6
1950	26.6	22.7
1951	25.4	22.0
1952	25.7	22.2
1953	25.9	22.4
1954	25.9	22.3
1955	24.2	20.8
1956	24.2	21.1
1957	25.9	22.3
1958	25.8	22.3
1959	25.1	22.1
1960	25.5	22.2

<sup>a</sup>Source: Files of the Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

As has been pointed out before, the median is sometimes a poor index when trying to detect structural changes in a distribution (for it is not affected by extreme values). Even when the median age at marriage has remained unchanged, there has been an increased dispersion in the age distribution.

As observed from Table 30, the proportion marrying at ages above 30 years has increased considerably for both sexes. In addition, more men are marrying at ages under 20. As a result, the proportion of persons marrying at ages 20-29 has been reduced significantly.

The increment in the proportion of persons marrying at ages above 30 is a result of the increase in remarriages. In 1913,

only ten per cent of the males and four per cent of the females marrying represented remarriages. In 1960, the corresponding figures were 17.2 and 10.5 per cent.

TABLE 30  
BROAD AGE DISTRIBUTION<sup>a</sup> AT MARRIAGE, BY SEX: 1913-1960<sup>b</sup>

Year	Grooms			Brides		
	Under 20	20-29	30 & Over	Under 20	20-29	30 & Over
1913	3.1	75.8	21.1	33.5	57.3	9.2
1920	3.0	75.6	21.4	31.1	61.1	7.8
1930	5.0	75.3	19.7	38.3	54.1	7.6
1940	2.7	66.9	30.4	24.5	61.7	13.8
1950	6.5	59.7	33.9	32.1	48.1	19.7
1960	10.3	56.9	32.8	36.1	42.8	21.1

<sup>a</sup>Per Cent distribution by sex. Total for a given sex in a given year equals to 100 per cent.

<sup>b</sup>Source: Files of the Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

It can be observed also, that the proportions of widows and widowers entering marriage has decreased, perhaps, as a result of the decline in mortality. On the other hand, the share of divorced persons has increased considerably since 1913.

It is evident that if the median age at marriage has remained more or less stationary, while remarriages have increased significantly, the median age at first marriage should have decreased. While the existent tabulations from marriage records

Figure II

PERCENT DISTRIBUTION OF MARRIAGES BY BROAD AGE GROUPS AND SEX: PUERTO RICO, 1913-1960

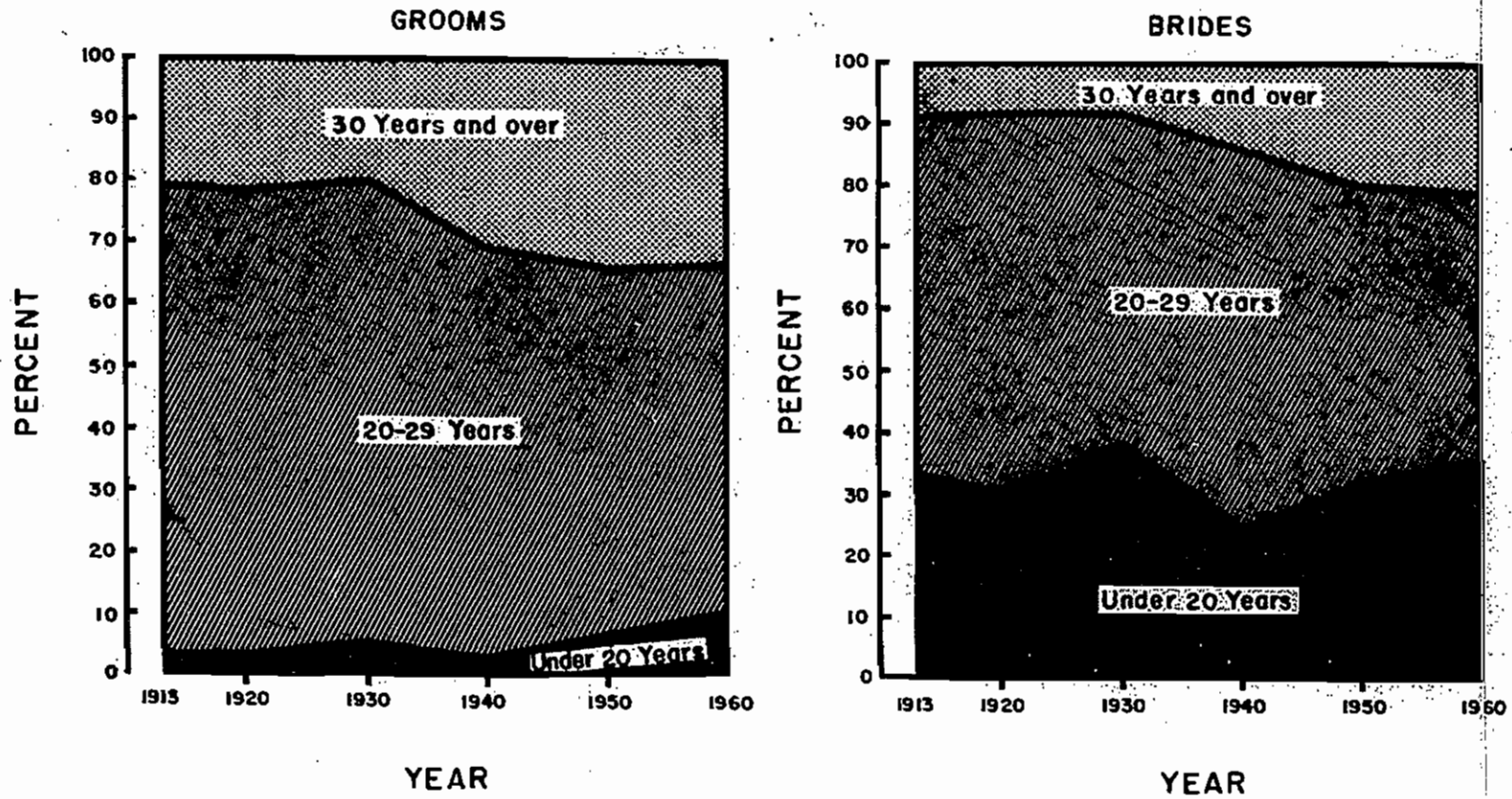




TABLE 31

DISTRIBUTION OF MARRIAGES BY PREVIOUS MARITAL  
CONDITION AND SEX: 1913-1960<sup>a</sup>

Year	Grooms			Brides		
	Single	Widowed	Divorced	Single	Widowed	Divorced
1913	89.4	8.6	1.9	96.1	3.2	0.7
1920	87.2	9.5	3.3	96.0	3.0	1.0
1930	88.6	7.6	3.6	96.4	2.6	1.0
1940	88.7	5.6	5.7	94.1	2.9	3.0
1951	85.8	4.5	9.7	92.1	2.5	5.4
1960	82.8	3.7	13.5	89.5	2.6	7.9

<sup>a</sup>Source: Files of the Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

TABLE 32

MEDIAN AGE AT FIRST MARRIAGE: 1899-1960<sup>a</sup>

Year	Males	Females
1899	26.0	21.5
1910	24.7	19.5
1920	24.9	20.1
1930	24.7	19.7
1940	24.6	20.0
1950	24.0	19.7
1960	22.8	20.2

<sup>a</sup>Source: Official censuses for Puerto Rico.

do not permit such a test, one can resort to census data to obtain, through an approximate procedure, the median age at first marriage.<sup>1</sup>

According to this approximate procedure, the median age at first marriage has declined three years for males and over one year for females during the present century, although much of the decline occurred between 1899 and 1910.

<sup>1</sup>For the method of computation, see Bureau of the Census, Series P-20, No. 10.

It can be observed that the difference in age is more than three years in favor of males. The increase in the median age for females during the last decade probably has been the result of heavy emigration of young single males.

The increment in remarriages, as has been observed in Table 31, has been the result of the remarriage of divorced persons. In part this phenomenon can be attributed to a change in people's attitudes toward divorced persons but more important is, perhaps, the increment in the divorced population. According to census figures in 1910 there was one male divorced per each 1,000 males aged 15 years and over. The corresponding figure for females was two out of 1,000. In 1960 we find 12 males and 27 females divorced per each 1,000 males and females, respectively, in ages 15 years and over, representing more than a ten-fold increase over the corresponding 1910 figures (see Table 24).

Registration data show a similar trend. In 1932, when divorce data became available for the first time, 13 divorces were recorded per each 100 marriages. In 1960 this rate has doubled and, as a result, more than one divorce per each four marriages can be found (see Table 33). Few countries in the world have a divorce rate as high as Puerto Rico. The United States is, perhaps, one of these exceptions. Unfortunately, outside these total figures not much is known about divorce.

#### Education

As far as history throws any light on the subject, it would appear that prior to the year 1799 there were no schools in Puerto Rico, outside of those in the cities of San Juan and San Germán. These cities had some free schools for girls and a few private

TABLE 33

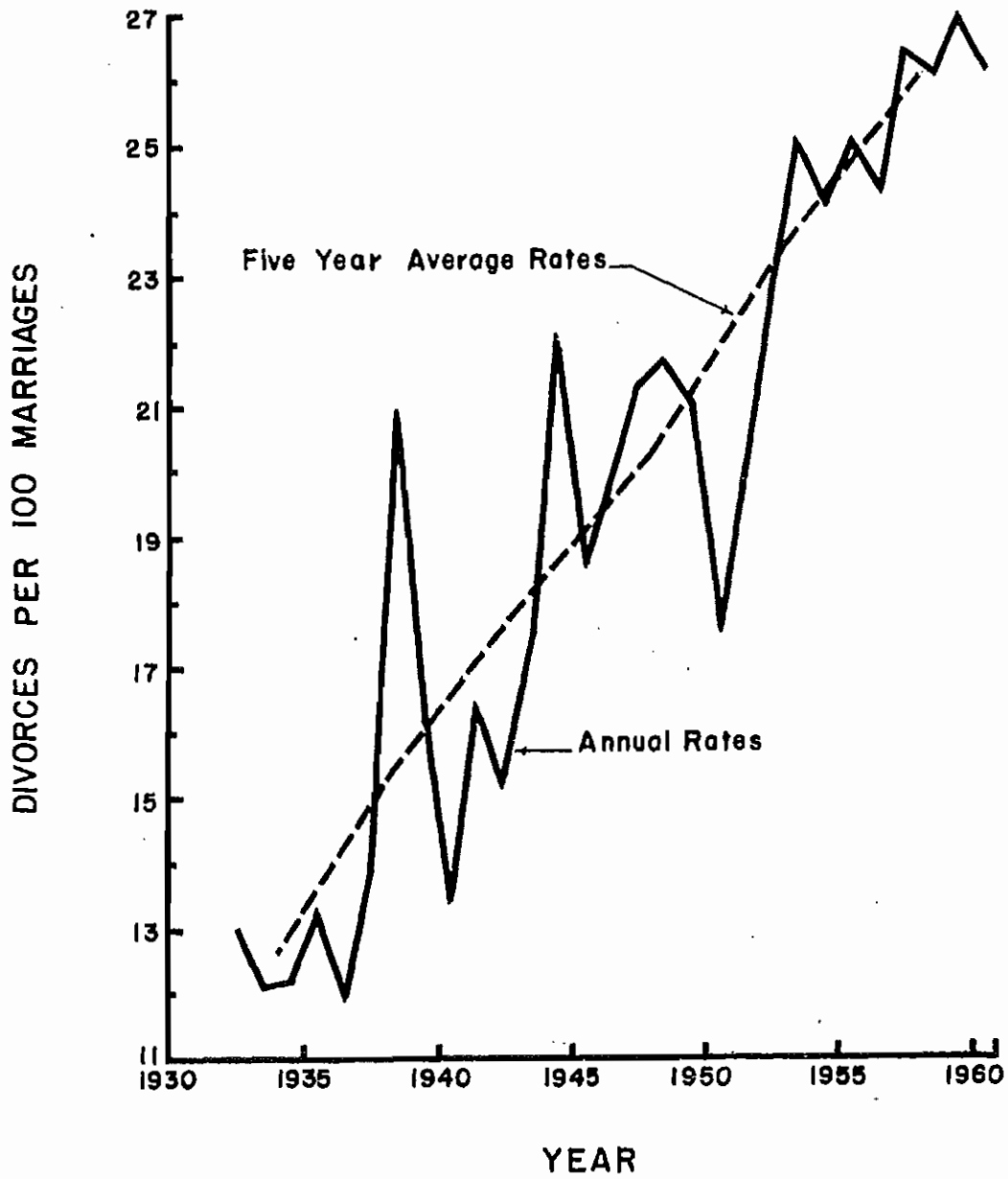
DIVORCE: 1932-1960<sup>a</sup>

Year	Number	Number per 1,000 Population	Number per 100 Marriages
1932	1,150	0.71	13.0
1933	1,151	0.70	12.1
1934	1,556	0.92	12.2
1935	1,483	0.86	13.2
1936	1,654	0.95	11.9
1937	1,945	1.09	13.9
1938	1,938	1.07	21.0
1939	1,742	0.94	16.2
1940	2,600	1.38	13.4
1941	2,464	1.29	16.4
1942	2,433	1.25	15.1
1943	2,508	1.27	17.5
1944	3,574	1.77	22.1
1945	3,243	1.58	18.5
1946	4,047	1.94	19.9
1947	3,582	1.69	21.3
1948	3,334	1.55	21.7
1949	3,387	1.55	21.0
1950	3,591	1.62	17.5
1951	3,676	1.65	20.3
1952	4,173	1.90	22.8
1953	4,973	2.28	25.0
1954	4,688	2.14	24.1
1955	4,738	2.12	25.1
1956	4,597	2.05	24.3
1957	5,031	2.23	26.4
1958	5,113	2.23	26.1
1959	5,423	2.34	26.9
1960	5,363	2.27	26.1

<sup>a</sup>Source: Files of the Bureau of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

Figure 12

DIVORCE IN PUERTO RICO  
1932-1960



schools attended by the children of the wealthier citizens. Not until 1845 were public primary schools provided.

According to official sources, on June 30, 1898, there were in the Island 380 public schools for boys, 148 for girls, one for adults, and 26 private schools, having a total enrollment of 44,861 pupils.<sup>1</sup>

It seems proper to say, therefore, that education in the Island began with the Nineteenth Century, although at the beginning of the Twentieth Century the vast majority of the population was still illiterate.

### Literacy

Evidence of the low educational level in the Island during the Nineteenth Century is obtained from the 1860 and 1887 censuses. In 1860, for example, only 10.5 per cent of the population 5 years of age and over was able to read. This proportion increased to 14.3 in 1887. According to the 1899 census the percentage of persons 10 years of age and over able to read and write was 20.4. Although the figure for 1899 is not strictly comparable to previous ones, it is evident that education improved during the last half of the Nineteenth Century (see Table 34).

During the present century education has received considerable attention and the proportion of illiterates has decreased significantly. In 1950, only 25 per cent of the population 10 years old and over was unable to read and write. By 1960, this proportion had been reduced to 17 per cent. In general, males

---

<sup>1</sup>U.S. War Department Report, p. 72.

TABLE 34

POPULATION 10 YEARS OF AGE AND OVER ABLE TO READ AND WRITE, BY SEX: 1860-1960<sup>a</sup>

Year	Both Sexes		Males		Females	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
1860 <sup>b</sup>	51,386	10.5	30,933	12.5	20,453	8.4
1887 <sup>b</sup>	96,867	14.3	57,216	16.9	39,651	11.7
1899	134,416	20.4	77,749	24.1	56,667	16.8
1910	261,516	33.5	145,795	37.7	115,721	29.3
1920	407,334	45.0	220,730	49.3	186,604	40.9
1930	641,085	58.6	342,943	63.0	298,142	54.3
1940	916,027	68.5	483,309	72.3	432,718	64.7
1950	1,148,988	75.3	597,533	78.2	551,455	72.4
1960	1,386,968	83.0	694,572	84.8	692,396	81.4

<sup>a</sup>Sources: U.S. War Department Report (for years 1860, 1887, and 1899); and Official Censuses for Puerto Rico (for years 1910 to 1960).

<sup>b</sup>Population 5 years of age and over.

TABLE 35

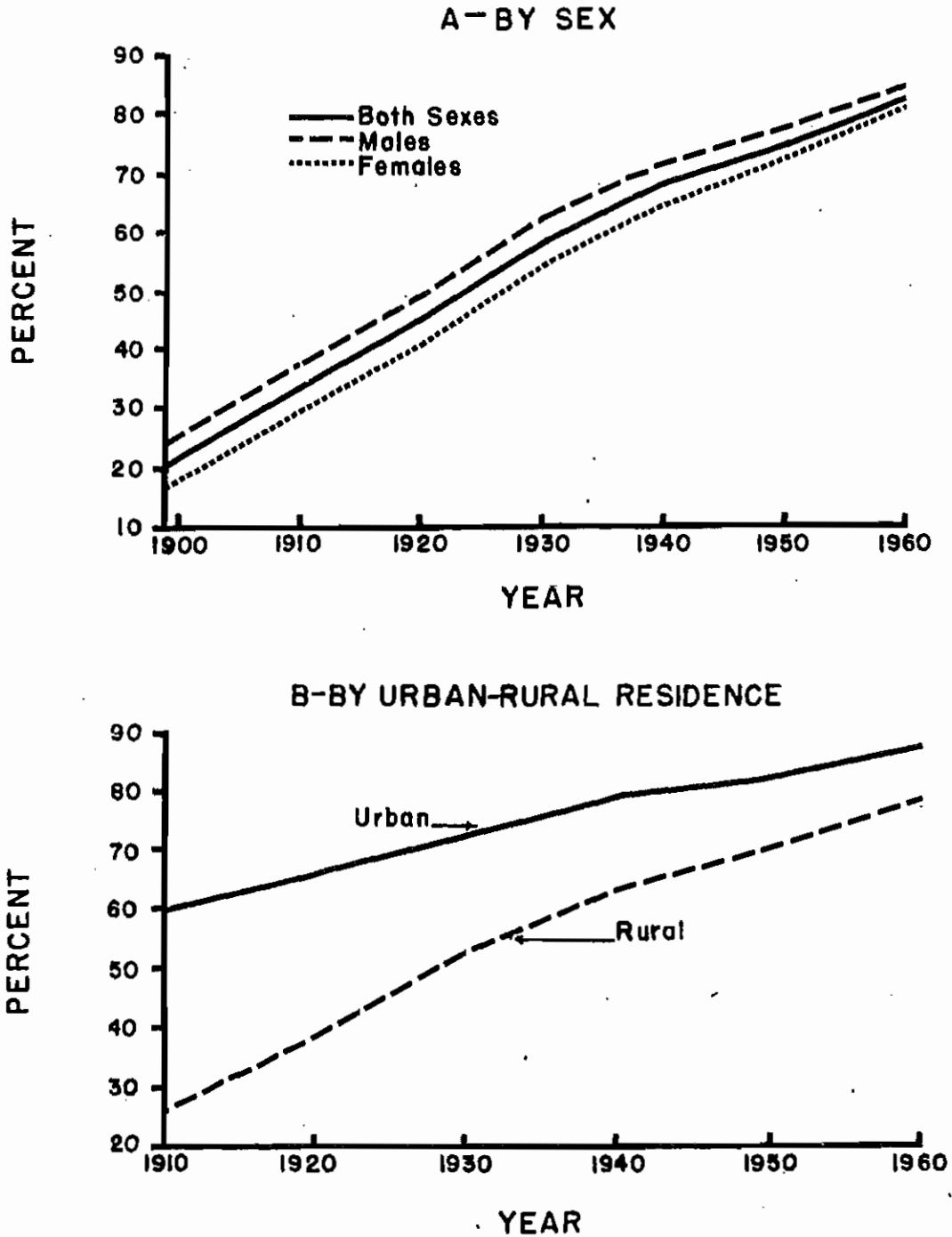
ABILITY TO READ AND WRITE FOR PERSONS 10 YEARS OF AGE AND OVER BY AGE AND SEX: 1899-1960<sup>a</sup>

Age Group	Both Sexes		Males		Females	
	1899	1960	1899	1960	1899	1960
10 & Over	20.4	83.0	24.1	84.8	16.8	81.4
10-14	17.9	93.2	19.4	91.9	16.1	94.5
15-19	22.1	92.6	23.6	91.8	20.9	93.3
20-24	24.7	89.9	29.6	90.4	20.4	89.5
25-29	22.2	89.6	27.6	90.6	17.3	88.7
30-34	21.0	87.9	26.4	89.8	15.9	86.3
35-44	20.2	85.0	25.4	88.6	15.0	81.8
45-54	17.4	77.8	21.8	83.4	13.0	71.5
55-64	16.0	60.5	19.7	66.9	12.3	53.6
65 & Over	16.0	39.8	19.7	44.7	12.7	35.2

<sup>a</sup>Sources: U.S. War Department Report; and U.S. Census of Population, 1960.

Figure 13

PROPORTION OF THE POPULATION 10 YEARS OF AGE AND OVER ABLE TO READ AND WRITE IN PUERTO RICO DURING THE PRESENT CENTURY



tend to be more educated than females, although Table 34 shows that, as a result of changes in traditions and in the woman's social role, this gap is becoming narrower with time. In 1860, for example, there were 150 male literates per each 100 females, but in 1960 this ratio had declined to 100.3.

While illiteracy in Puerto Rico is still high, the evidence is that in the near future illiteracy will be less than 10 per cent. This might be accomplished simply by maintaining the present level of literacy in the young groups constant, combined with the natural aging process in the population. From Table 35 it can be observed that only those age groups above 45 years have a very high percentage of illiterates. Analyzing the age differentials in literacy for the years 1899 and 1960, it is possible to show that progress in this realm was relatively slow during the last half of the Nineteenth Century but accelerated during the first 60 years of the present century. For example, those persons alive in 1899 who were 10 years of age and over in 1855 (aged 55 and over in 1899) had a literacy proportion of 16 per cent. For those 10 years of age and over in 1899, the corresponding figure was 20.4 per cent. This represents an increase of 4.4 per cent during a 45-year period.<sup>1</sup> The second column in Table 35 shows how fast and significant the progress in this field has been during the present century.

As expected, literacy is higher among urbanites, although progress in this realm has been more rapid for the rural population than for the urban.

---

<sup>1</sup>This difference, in fact, might have been slightly greater if, as expected, mortality was higher among the uneducated group.



According to the official figures presented in Table 36, in 1910 the proportion of the population able to read and write was more than twice as high in urban places as in the rural territory. This difference has been reduced with time, so that in 1960 the ratio in the proportions able to read and write was only 1.1 in favor of the urban population.

#### Years of School Completed

Parallel to the changes observed in literacy has been the progress in terms of schooling or years of school completed. Although this type of data became available for the first time in the 1950 census, the age distribution of this variable permits a historical comparison. The 1950 census figures tell that survivors of the population aged 25 years and over in 1900 (aged 75 years and over in 1950) had a median of school years completed of less than one (0.7). From this it can be inferred that the original cohort had a median of less than 0.7 years, if mortality, as expected, was higher among the less educated. In 1950 those persons aged 25 years and over had a median of school years completed of 3.7 years (4.1 for males and 3.3, for females). In other words, during the first fifty years of the present century, and for persons 25 years and over, there was at least an increase of three years of schooling. The 1960 census data show that the median of school years completed increased almost a year during the last 10 years. According to this source the median for the population 25 years old and over was 4.6 years of school completed; 4.8 for males and 4.3 for females (see Table 37).

TABLE 36

PERCENTAGE OF THE POPULATION 10 YEARS OF AGE AND OVER ABLE TO READ AND WRITE, BY RESIDENCE: 1910-1960<sup>a</sup>

Year	Puerto Rico	Urban	Rural
1910	33.5	60.3	25.8
1920	45.0	66.0	38.4
1930	58.6	72.6	52.8
1940	68.5	79.0	63.4
1950	75.3	82.0	70.3
1960	83.0	87.8	79.0

<sup>a</sup>Source: Official censuses for Puerto Rico.

TABLE 37

MEDIAN OF SCHOOL YEARS COMPLETED, BY AGE AND SEX, FOR THE POPULATION 25 YEARS OLD AND OVER: 1950 and 1960<sup>a</sup>

Age	Males		Females	
	1950	1960	1950	1960
25 and over	4.1	4.8	3.3	4.3
25-29	6.0	8.9	4.8	7.0
30-34	5.3	7.7	4.4	5.9
35-39	4.6	6.5	3.9	4.8
40-44	4.3	5.5	3.4	4.5
45-54	3.5	4.5	1.0	4.0
55-64	0.9	3.5	0.7	2.3
65-74	0.7	0.9	0.7	0.8
75 and over	0.7	0.7	0.6	0.7

<sup>a</sup>Source: U.S. Census of Population, 1960, Table 80.

Figure 14

PROPORTION OF THE POPULATION 25 YEARS OF AGE AND OVER WHO HAVE COMPLETED A SPECIFIED NUMBER OF YEARS OF SCHOOL OR MORE  
PUERTO RICO: 1950 AND 1960

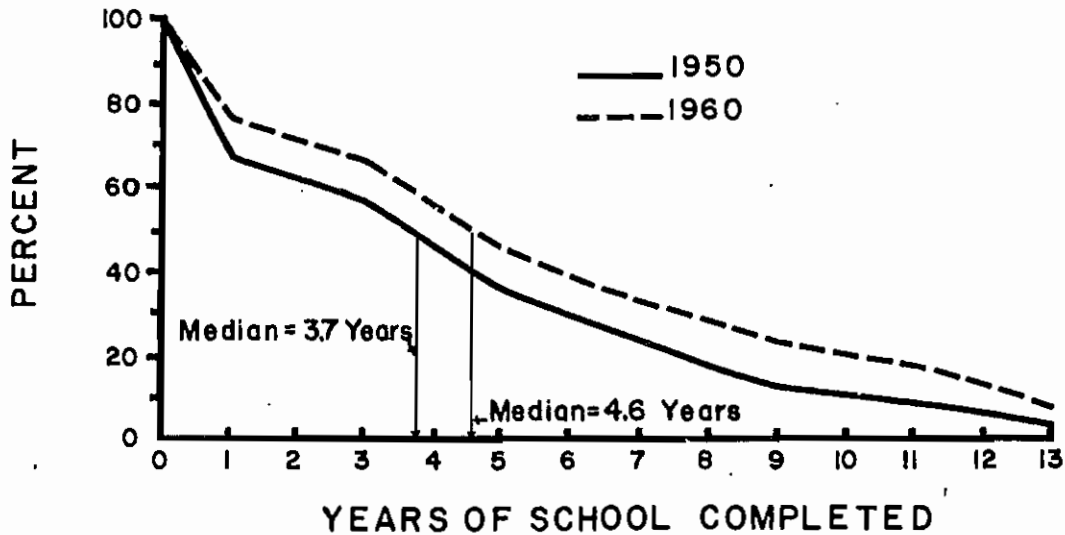


Figure 15

MEDIAN NUMBER OF SCHOOL YEARS COMPLETED AMONG PERSONS 25 YEARS OF AGE AND OVER BY AGE AND SEX  
PUERTO RICO: 1950 AND 1960

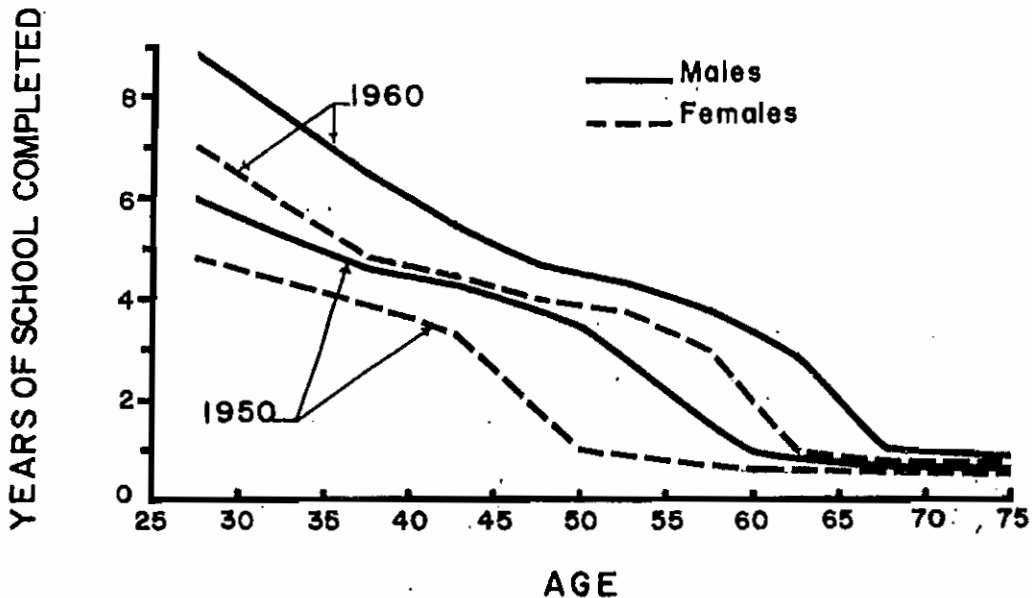


TABLE 38

PERCENTAGE DISTRIBUTION OF THE POPULATION 25 YEARS OLD AND OVER BY YEARS OF SCHOOL COMPLETED AND SEX: 1950 and 1960<sup>a</sup>

Years of School Completed	Both Sexes		Males		Females	
	1950	1960	1950	1960	1950	1960
None	33.3	23.1	28.3	19.7	38.5	26.3
1- 4	31.6	31.5	33.0	31.8	30.2	31.3
5- 8	23.1	22.8	25.0	23.1	21.2	22.5
9-12	8.3	14.7	9.9	16.7	6.6	12.8
13 and over	3.4	7.5	3.6	8.3	3.2	6.7
Not Reported	0.3	0.4	0.2	0.4	0.3	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Median	3.7	4.6	4.1	4.8	3.3	4.3

<sup>a</sup>U.S. Census of Population, 1960, Table 80.

TABLE 39

MEDIAN OF SCHOOL YEARS COMPLETED BY AGE, SEX, AND PLACE OF RESIDENCE (1960)<sup>a</sup>

Sex and Age	Urban	Rural	San Juan City
<u>Males 25 years old and over</u>	7.5	3.8	8.4
25-29	11.1	6.5	11.2
30-34	10.0	5.2	10.6
35-44	8.4	4.4	8.8
45-54	6.5	3.8	7.7
55-64	4.8	2.4	6.0
65-74	3.0	0.8	4.1
75 and over	0.9	0.7	1.3
<u>Females 25 years old and over</u>	6.0	3.3	7.4
25-29	9.6	5.0	10.6
30-34	8.4	4.3	9.3
35-44	6.9	3.7	8.1
45-54	5.1	3.1	6.5
55-64	4.0	0.9	5.0
65-74	1.1	0.6	3.3
75 and over	0.8	0.6	0.9

<sup>a</sup>Ibid.

Table 38 shows that while the proportion of persons with no schooling at all has decreased considerably for the successively born cohorts, the proportions of persons who have attended high school (9-12 years of school completed), and college (13 and over) have increased significantly. Again we observe that males tend to be more educated than females.

In connection with urban-rural residence we find that there is direct correlation between educational level and urbanism; the urban population having a higher median of school years completed than the rural counterpart. In cities where school facilities are greater, and where young uneducated persons have little working opportunities, people tend to remain longer in school than in any other residential place (see Table 39).

### School Enrollment

The progress achieved, both in literacy and schooling, has been an obvious result of improved school facilities and opportunities. Not only a larger proportion of children are entering school, but they are retained at school for a longer period of time.

During the Spanish Regime school attendance was insignificant. According to the 1899 census only 7.2 per cent of the population 5-19 years of age was enrolled at school. This proportion increased radically during the first decade of the American Regime, so that in 1910, 32 per cent of the population aged 5-19 years were school-enrolled. The corresponding figure for 1950 was 49 per cent, and 64 per cent for 1960. As Table 40 shows, the progress along this line has been more or less uniform at all age levels.

From Table 40 the effect of the economic crisis of the 30's

upon school enrollment becomes evident, declining significantly from 1920 to 1930, but increasing thereafter. Significant progress has been achieved since 1950 at all age levels.

TABLE 40  
SCHOOL ENROLLMENT BY AGE: 1910-1960<sup>a</sup>

Age	1910	1920	1930	1940	1950	1960
5-19	31.9	41.8	35.0	42.7	48.7	63.8
5- 6	15.4	18.3	5.2	8.9	9.1	29.5
7-13	45.3	57.8	56.0	66.8	68.4	83.7
14-15	32.9	44.3	35.5	42.6	57.7	64.7
16-17	18.7	25.6	17.4	22.4	38.4	47.1
18-19	7.0	12.2	6.5	8.7	19.8	29.5
20-24	.... <sup>b</sup>	....	2.3	2.3	6.9	11.2

<sup>a</sup>Sources: U.S. Census of Population, 1950, Table 15; and U. S. Census of Population, 1960.

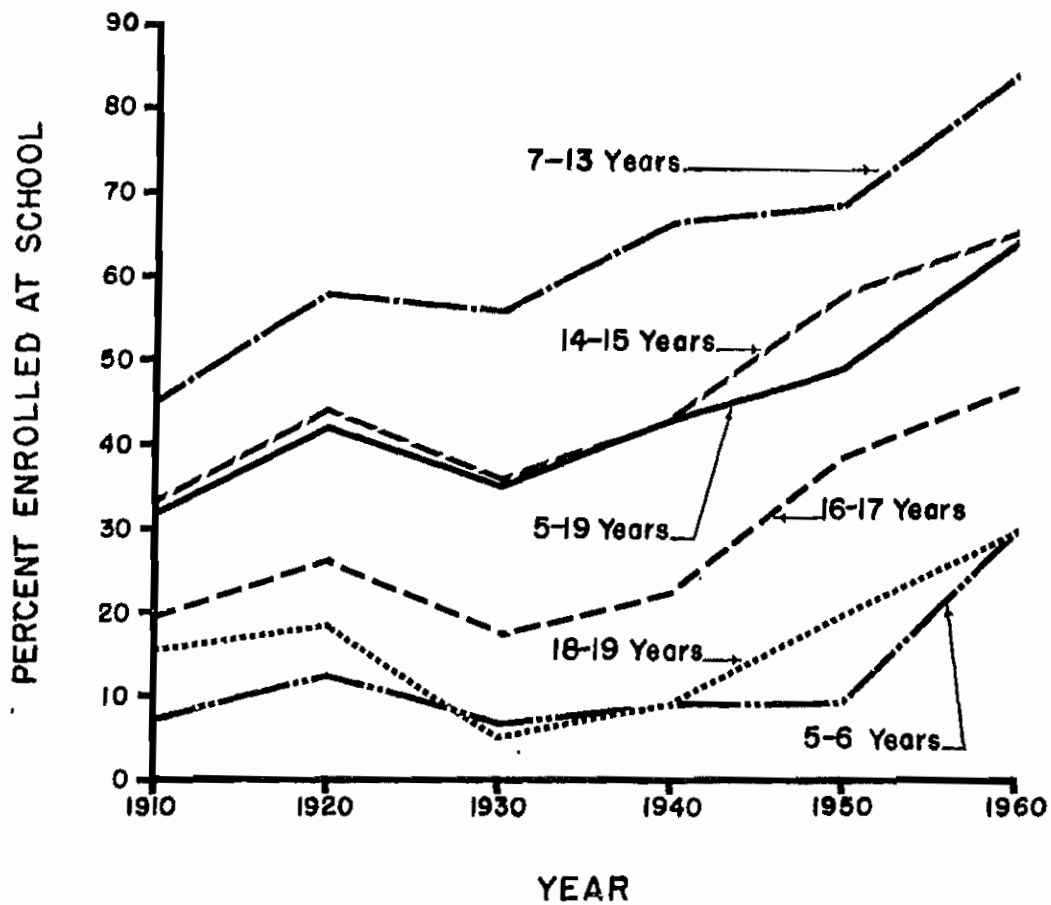
<sup>b</sup>Not available.

School enrollment tends to be higher for children 10 to 11 years of age. According to the 1960 census, the peak of school enrollment occurred at age 10, where over 90 per cent of the population were attending school. In general, school attendance is higher for males than for females, and higher for the urban population than for the rural counterpart.

Noteworthy as these improvements in the educational level of the Island's population have been, much remains to be accomplished in this area. Illiteracy is still too high, if compared with the

Figure 16

SCHOOL ENROLLMENT RATES  
BY AGE GROUPS  
1910-1960



United States and other industrial countries (in Sweden, for example, illiteracy is non-existent). Schooling (years of school completed) was still extremely low in 1960 (4.6 years) when compared with a median of 10.5 years of school completed for the United States in 1960. School attendance is still far below the levels achieved in most of the industrialized countries of the world. As will be shown, education is one of the most important sources of differentials in fertility, which in turn is the real challenge in the solution of the Puerto Rican population-resources problem.

### The Working Population<sup>1</sup>

Toward the end of the Nineteenth Century Puerto Rico was still a typical agrarian society. Subsistence farming was common, although commercial agriculture showed some development. Approximately 95 per cent of the value of the exports and more than 40 per cent of the value of the imports consisted of agricultural products. Farming implements were rudimentary and transportation highly inefficient. Industry was more or less limited to sugar grinding and distilling of rum.

### Labor Force Participation

In a society of this type, the family is necessarily the basic productive unit, and production a direct function of the number of family members working. It is no wonder, then, to find almost all adult males participating in the production of goods and services.

---

<sup>1</sup>For a more sophisticated and complete analysis of this topic, see Jaffe, People, Jobs, and Economic Development.



In 1899, for example, 93.7 per cent of all males aged 14 years and older were "gainfully occupied." The corresponding figure for females was 15.1 per cent. Since 1899 male participation has declined consistently so that in 1960 only 72.1 per cent of those aged 14 years and over was in the labor force.<sup>1</sup> In the female group an apparent increase was observed up to 1950, and afterwards a decline. The 1960 level, however, is significantly higher than the 1899 level (see Table 41).

The drop in the general male participation rate has been a product of significant declines in the very young and very old ages, although this declining trend has been evident at all age levels (see Table 42). The decline in the age group 14-19 is to a great extent explained by the increase in school enrollment at these ages (see previous section).

The decline in the participation rates at old ages is probably a consequence of industrial and occupational changes. In agriculture and domestic services (the two leading industrial groups at the beginning of the present century) old people usually find something to do, in many cases as unpaid workers. The gradual decline in importance of agriculture and domestic services has, undoubtedly, affected the participation of old persons in the labor force. In addition, Social Security benefits should have operated in the same direction during the last decade.

---

<sup>1</sup>The "gainfully employed" concept used up to 1930 is not strictly comparable with the "labor force" one used since 1940, as it includes retired people who had an occupation and excludes inexperienced persons seeking work.

TABLE 41

PROPORTION OF THE POPULATION 14 YEARS OF AGE AND OLDER GAINFULLY EMPLOYED OR IN THE LABOR FORCE,<sup>a</sup> BY SEX: 1899-1960<sup>b</sup>

Date	Both Sexes	Males	Females
1899 <sup>c</sup>	53.0	93.7	15.1
1910 <sup>c</sup>	56.7	93.1	21.7
1920 <sup>c</sup>	52.5	84.4	21.6
1930 <sup>c</sup>	53.3	81.0	26.1
1940 <sup>c</sup>	52.1	79.4	25.0
1950 <sup>d</sup>	54.6	79.8	30.1
1955 <sup>d</sup>	48.7	74.4	24.7
1960 <sup>d</sup>	44.9	72.1	22.5

<sup>a</sup>Up to 1930 the gainfully employed concept was used; since 1940 the labor force concept applies.

<sup>b</sup>Sources: Official censuses for Puerto Rico (for years 1899 to 1940); and Bureau of Labor Statistics, Department of Labor of Puerto Rico (from 1950 to 1960).

<sup>c</sup>Census date.

<sup>d</sup>Average for the calendar year.

In the most productive ages (25-54), the decline has been so small that it is difficult to establish clearly whether this represents a real fact or a consequence of a change in the concept used. As the "gainfully employed" concept (used up to 1930) included retired persons who had an occupation, but excluded inexperienced persons seeking work, it is probable that at these age levels there were more retired than inexperienced laborers. Under these conditions the net effect would be to produce figures somewhat higher than those that would be obtained by using the labor force concept. In fact, since 1940 insignificant declines have been observed in these age groups. No significant change has occurred at ages 35 to 64 since 1940.

TABLE 42

LABOR FORCE PARTICIPATION RATES<sup>a</sup> BY AGE AND SEX: 1899-1960<sup>b</sup>

Sex and Age	Year <sup>c</sup>				Per Cent Change		
	1899	1940	1950	1960	1899 to 1940	1940 to 1960	1899 to 1960
<u>Males--</u> <u>(14 &amp; over)</u>	93.7	79.3	79.6	72.1	-15.4	- 9.1	-23.1
14-19	82.3	46.3	45.2	29.1	-43.7	-37.1	-64.6
20-24	96.9	88.4	89.3	81.4	- 8.8	- 7.9	-16.0
25-34	97.6	93.2	89.0	91.5	- 4.5	- 1.8	- 6.2
35-44	97.4	93.9	96.1	93.0	- 3.6	- 1.0	- 4.5
45-54	96.2	91.4	95.3	91.1	- 5.0	- 0.3	- 5.3
55-64	94.6	82.1	87.0	84.1	-13.2	+ 2.4	-11.1
65 & over	86.6	51.1	57.7	37.5	-41.0	-26.6	-56.7
<u>Females--</u> <u>(14 &amp; over)</u>	15.1	25.0	30.0	22.5	+66.7	-10.0	+49.0
14-19	16.3	27.8	24.9	9.8	+70.6	-64.7	-39.9
20-24	16.6	31.3	39.0	35.2	+88.6	+12.5	+112.0
25-34	14.7	27.2	37.3	32.3	+85.0	+18.8	+119.7
35-44	15.5	25.4	36.9	28.1	+63.9	+10.6	+81.3
45-54	14.7	21.1	26.2	21.6	+43.5	+ 2.4	+49.9
55-64	12.3	15.1	15.4	14.2	+22.8	- 6.0	+15.4
65 & over	8.0	7.9	6.3	4.2	- 1.2	-46.8	-47.5

<sup>a</sup>Data for 1899 refers to the gainfully employed concept.

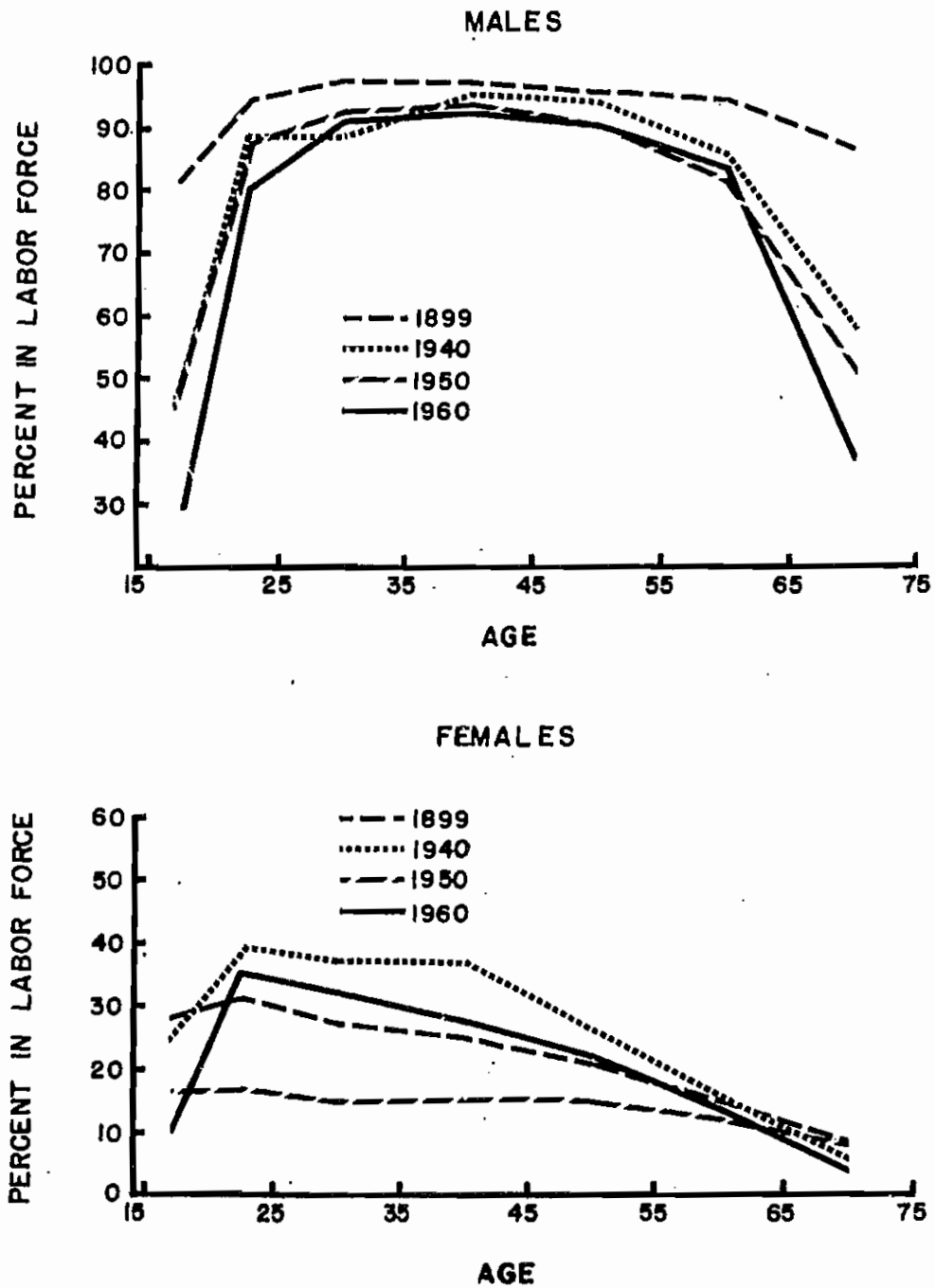
<sup>b</sup>Sources: Official censuses for Puerto Rico and Bureau of Labor Statistics, Department of Labor of Puerto Rico.

<sup>c</sup>For 1899 and 1940, data as of the census date; for 1950 and 1960, average for the calendar year.

The female group presents a quite different picture. Significant increase is observed at all age levels from 1899 to 1940. This, to a great extent, must be attributed to changes in the woman's social role and in the public attitude toward female participation in the labor force outside the home. During the

Figure 17

LABOR FORCE PARTICIPATION RATES  
BY AGE AND SEX  
PUERTO RICO: 1899, 1940, 1950 AND 1960



Spanish Regime, Puerto Rico was a man-dominated society; the woman was merely the housekeeper, the mother, the wife, completely subordinated to the man. Her participation in the labor force was limited to domestic services, unpaid family work (usually in agriculture), and home needle work. In 1899 many women were employed as census enumerators, thus opening the way for female participation in the working force outside the home. Today, almost any profession or job is open to females.

Since 1940, the female group shows declining participation in the age groups 14-19, and 55 and over, but increasing trends in all other ages. Although the combined result of all these changes has been an over-all increase in the female working force, their participation rates are considerably lower than those prevailing in other countries--the United States, for example. This, in part, has to be attributed to the high level of unemployment and the preference for males in many industries. There are enough males in the labor market to fill all jobs, if necessary; therefore, females face a strong competition for employment. Perhaps even more important is the fact of the high fertility of Puerto Rican females. Not only do they have more children at all age levels but their reproductive span is broader than that of their American counterparts. It is no mystery that child-rearing is in general inconsistent with work outside the home.

Another interesting fact about the labor force during the first decades of the present century was the high rate of child participation, a routine occurrence in agrarian communities. Census figures show that over 30 per cent of the male population 10-13 years of age was "gainfully employed" in 1899. This

proportion declined to 22.2 in 1910, and to 3.8 in 1930. The corresponding figures for females were: 8.0 in 1899, 5.9 in 1910, and 4.1 in 1930. Since 1940, data are obtained only for the population 14 years of age and over.

### Employment and Unemployment

Reliable employment figures in Puerto Rico are available since 1940. According to the 1940 census data, about 508,000 persons were employed of which some 380,000 were males and 128,000 were females.<sup>1</sup> Total employment increased 18 per cent during the decade of 1940-1950 but declined 8 per cent during the last intercensal period (1950-1960). In general terms, employment rose only 9 per cent during the last 20 years. There were in 1960 only 47,000 more jobs than in 1940.<sup>2</sup> Both in absolute and relative terms, the increment in female employment was greater than in male employment.

The significant decline observed during the last decade can be attributed to radical drops in agricultural, domestic services, and home needlework employment, as Table 44 shows.

Unemployment, a chronic malady in the Island's economy, has remained for the last 20 years well above the 10 per cent level. In April, 1940, the census data showed that 15 per cent of the

---

<sup>1</sup>Without counting some 24,000 persons employed in "public emergency work."

<sup>2</sup>For 1950 and 1960, we have used data from the Quarterly Survey carried on by the Department of Labor of Puerto Rico, as it is generally accepted that these data are more reliable than that from the Census. See, for example, U. S. Census of Population, 1950, PB-53, Introductory Explanations.

TABLE 43

TOTAL CIVILIAN EMPLOYMENT BY SEX:  
1940, 1950, AND 1960 (IN THOUSANDS)<sup>a</sup>

Year	Both Sexes	Males	Females
1940	508	380	128
1950	601	431	170
1960	555	400	155

<sup>a</sup>Sources: Census of Population (for 1940); and Bureau of Labor Statistics, Department of Labor of Puerto Rico (for years 1950 and 1960).

TABLE 44

TOTAL EMPLOYMENT BY INDUSTRIAL GROUPS:  
1950 AND 1960 (IN THOUSANDS)<sup>a</sup>

Industrial Group	1950	1960	Per Cent Change
Total Employment . . . . .	601	555	- 7.7
Agriculture . . . . .	210	127	-39.5
Non-Agriculture . . . . .	391	428	+ 9.5
Construction . . . . .	26	48	+84.6
Manufacturing . . . . .	111	93	-16.2
Home Needlework . . . . .	47	10	-78.7
Other . . . . .	64	83	+29.7
Trade . . . . .	92	96	+ 4.3
Domestic Services . . . . .	32	18	-43.8
Transportation, etc. . . . .	30	39	+30.0
Services, except domestic . . . . .	49	61	+24.5
Government . . . . .	47	65	+38.3
Other Industries . . . . .	4	8	+100.0

<sup>a</sup>Sources: Bureau of Labor Statistics, Special Report on the Labor Force, No. 24; and Quarterly Reports for 1960.

labor force was unemployed. Since 1950 more accurate figures have been obtained through a quarterly survey carried on by the Department of Labor of Puerto Rico. According to this source, 14.6 per cent of the labor force was unemployed during the calendar year 1950 but only 12.5 per cent in 1961. Moreover, this small decline has been, to a great extent, a result of a more rapidly declining trend in female unemployment. In the male group unemployment has remained almost stationary and at present it is considerably higher than in the female population. During the year 1961 male unemployment was estimated at almost 14 per cent, while for females the corresponding figure was 9 per cent.

TABLE 45

ANNUAL AVERAGE UNEMPLOYMENT BY SEX: 1950-1961<sup>a</sup>

Year	Both Sexes	Males	Females
1940 <sup>b</sup>	15.0	16.2	11.1
1950	14.6	15.3	13.3
1951	16.2	14.8	19.6
1952	15.2	14.8	16.2
1953	14.4	14.5	14.5
1954	15.4	15.0	16.4
1955	14.3	14.8	13.0
1956	13.0	13.5	11.4
1957	13.0	13.0	13.1
1958	13.9	14.1	13.4
1959	13.8	14.5	13.8
1960	11.6	12.1	9.9
1961	12.5	13.7	9.3

<sup>a</sup>Source: Bureau of Labor Force Statistics, Department of Labor of Puerto Rico.

<sup>b</sup>Census date: April 1, 1940.



It is evident that industrialization in Puerto Rico has generated many more job opportunities for females than for males. Not only has it been able to absorb the losses from home needlework and domestic services, but also to reduce considerably female unemployment. This has been the accidental result of the type of factories private enterprises have been able to establish with the help of the Island's government. Most of the factory enterprises established in Puerto Rico are "light" industries, chiefly apparel manufacturing where females are undoubtedly preferred.

We must conclude that the economic development program of Puerto Rico has had but little effect upon the total number of jobs and has failed to check chronic unemployment. It is likely, however, that the real effect of industrial development in the Island will be one of reduction of underemployment and submarginal employment, rather than unemployment. We should not forget, however, the role of mass emigration of Puerto Ricans to the United States. It has been estimated that without emigration during the period of 1940-1960, the labor force population would have been over 300,000 greater than that enumerated in 1960.<sup>1</sup> This would have meant that more than a quadruplication of governmental efforts would have been needed to meet the requirements of such a growth in the labor force population, as it has been claimed that during the 15 years of industrialization 100,000 jobs (direct and indirect) have been generated by the government promoted plants.

---

<sup>1</sup>See Chapter IV, below (Table 60).

### Industrial Composition

As pointed out before, Puerto Rico was a typical agrarian society toward the beginning of the present century. In 1899, for example, 63 per cent of all "gainfully occupied" workers were engaged in agricultural pursuits. "Domestic and personal services" were second in importance. These two "industries" were the source of employment for 83.3 per cent of all breadwinners. "Manufacturing and mechanical" industries ranked third with only 8.4 per cent of all workers in these pursuits (see Table 46).

Since then, agriculture has been declining consistently so that in 1960 only 25 per cent of all workers were included in this industrial category. "Domestic and personal services" show, also, a declining trend, due to a considerable decrease in the "domestic" subdivision.

On the other hand, trade, manufacturing, and professional services show a consistent upward trend. The share of manufacturing has doubled from 1899 to 1960, although there is an apparent decline from 1940 to 1950, and a stabilization thereafter. This has been a consequence of a sharp decline in home needlework (see Table 48).

Table 47 shows the industrial distribution of gainfully employed persons by sex for the years 1899 and 1930. In spite of the fact that significant changes occurred in the male group, such as a decline in agriculture, and domestic and personal services, the most radical changes are observed in the female working group. In 1899, more than 78 per cent of them were engaged in "domestic and personal" services, but only 30 per cent in 1930. The proportion attributed to "manufacturing" increased

TABLE 46

PERCENTAGE DISTRIBUTION OF EMPLOYED WORKERS<sup>a</sup>  
BY INDUSTRY; 1899-1960<sup>b</sup>

All Industry	1899	1910	1920	1930	1940	1950	1960
All Industries . . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, forestry and fishing . . . . .	62.8	61.1	60.0	52.3	45.4	38.8	24.9
Construction . . . . .	....	....	....	2.5	3.2	4.8	8.6
Manufacturing <sup>c</sup> . . . . .	8.4	13.5	17.5	19.3	19.8	16.5	17.1
Transport, communication & other utilities . . . . .	2.0	2.3	2.5	3.9	4.0	5.6	7.2
Trade . . . . .	5.6	6.5	6.3	7.1	10.5	12.2	14.8
Finance, insurance and real estate . . . . .	....	....	....	0.4	0.4	0.6	1.2
Domestic and personal services . . . . .	20.5	13.9	9.7	9.3	10.0	7.7	7.6
Professional . . . . .	0.7	1.1	1.7	2.3	3.2	6.1	10.1
Other, and not reported . . . . .	....	1.6	2.3	2.9	3.5	7.7	8.5

<sup>a</sup>Refers to gainfully employed workers (1899 to 1930); refers to the labor force concept (1940 to 1959).

<sup>b</sup>Source: Official censuses for Puerto Rico.

<sup>c</sup>Up to 1930 includes "Mechanical industries."

TABLE 47

PERCENTAGE DISTRIBUTION OF GAINFULLY EMPLOYED PERSONS  
BY INDUSTRY AND SEX: 1899 AND 1930<sup>a</sup>

Industry	Males		Females	
	1899	1930	1899	1930
All Industries . . . . .	100.0	100.0	100.0	100.0
Agriculture, forestry, & fishing . . . . .	73.3	66.4	3.9	9.5
Manufacturing & mechanical . . . . .	7.5	11.6	13.4	52.4
Transportation, communication, etc. . . . .	2.8	5.0	0.7	0.4
Trade . . . . .	5.5	9.6	2.9	1.5
Domestic & personal services . . . . .	10.2	3.8	78.4	29.8
Professional services . . . . .	0.7	1.5	0.7	4.5
Others . . . . .	....	2.0	....	2.0

<sup>a</sup>Sources: 1899 and 1930 Census Reports for Puerto Rico.

TABLE 48

PERCENTAGE DISTRIBUTION OF EMPLOYED WORKERS BY INDUSTRY GROUP AND SEX: SELECTED YEARS (1940 TO 1959)<sup>a</sup>

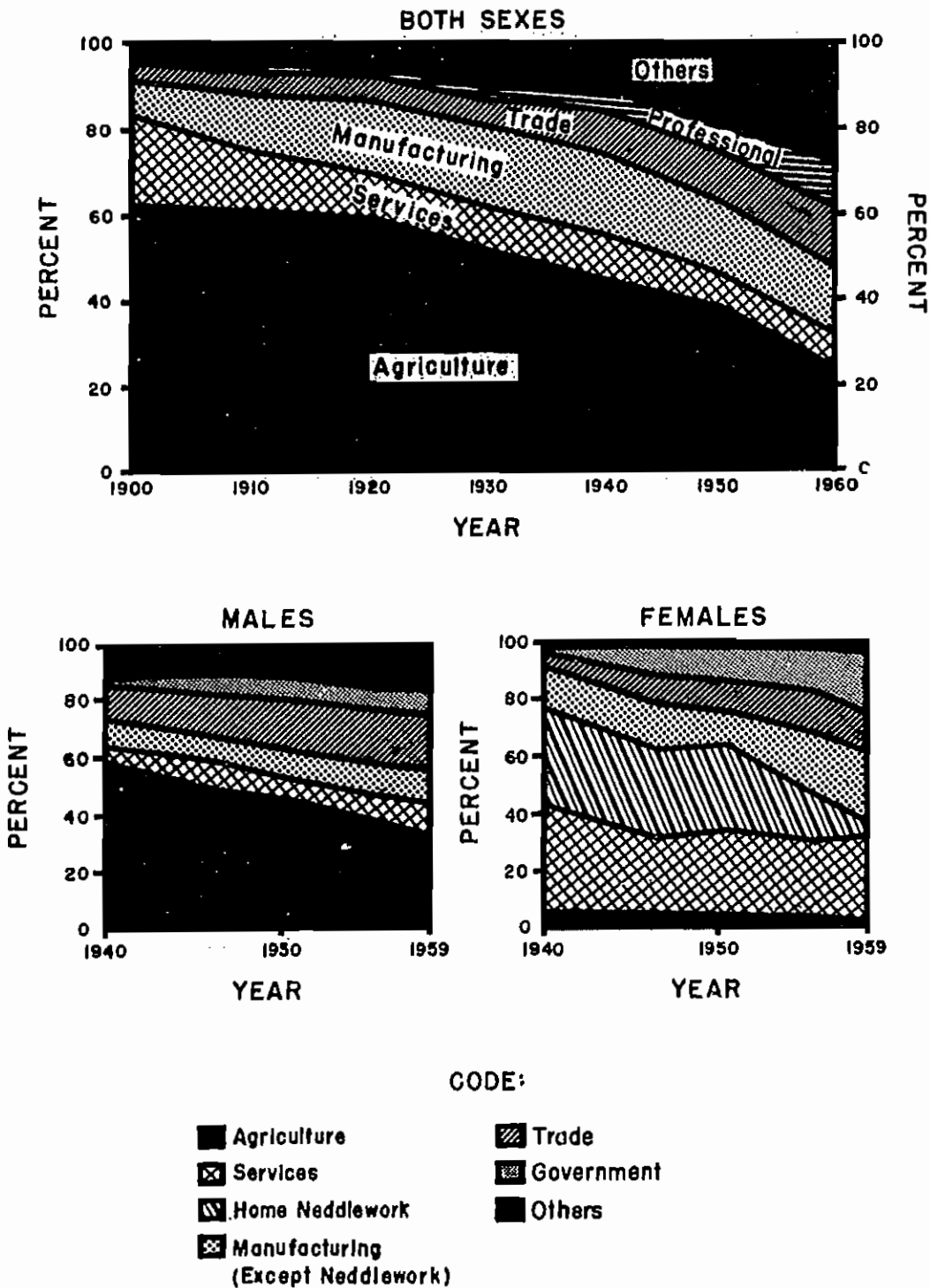
Industry Group	1940 <sup>b</sup>	1946-1947 <sup>c</sup>	1950-1951 <sup>c</sup>	1955-1956 <sup>c</sup>	1958-1959 <sup>c</sup>
<u>Males</u> . . . . .	100.0	100.0	100.0	100.0	100.0
Agriculture . . . . .	58.3	49.7	45.5	37.7	32.7
Manufacturing . . . . .	9.7	8.9	8.6	10.2	11.1
Home-needlework . . . . .	0.1	0.0	0.0	0.0	0.0
Others . . . . .	9.6	8.9	8.6	10.2	11.1
Trade . . . . .	12.2	14.7	17.4	17.6	18.3
Transportation, etc. . . . .	5.1	5.8	6.3	8.6	8.7
Construction . . . . .	4.2	6.0	6.3	9.3	9.2
Government . . . . .	2.8	6.7	6.7	7.3	8.7
Finance, etc. . . . .	0.4	0.4	0.5	0.5	1.0
Service Industries . . . . .	6.2	7.6	8.4	8.1	9.4
All Other Industries . . . . .	1.1	0.2	0.3	0.7	0.9
<u>Females</u> . . . . .	100.0	100.0	100.0	100.0	100.0
Agriculture . . . . .	4.7	4.4	4.0	3.4	2.1
Manufacturing . . . . .	49.4	47.8	42.8	38.5	30.1
Home-needlework . . . . .	34.5	31.2	31.2	16.9	7.0
Others . . . . .	14.9	16.6	11.6	21.6	23.1
Trade . . . . .	5.2	8.9	10.4	14.2	14.0
Transportation, etc. . . . .	0.5	0.0	0.6	0.7	2.1
Construction . . . . .	0.1	0.0	0.0	0.0	0.0
Government . . . . .	1.4	11.4	12.1	16.9	21.0
Finance, etc. . . . .	0.3	0.0	0.6	0.7	0.7
Service Industries . . . . .	37.8	26.7	28.9	25.6	28.7
All Other Industries . . . . .	0.6	0.8	0.6	0.0	1.3

<sup>a</sup>Source: Puerto Rico Planning Board, Puerto Rico Statistical Yearbook, Historical Statistics, 1959.

<sup>b</sup>As of April 1, 1940.

<sup>c</sup>Average for the fiscal year.

Figure 18  
 PERCENT DISTRIBUTION OF EMPLOYED WORKERS  
 BY INDUSTRY GROUP: 1899-1960  
 AND  
 BY SEX: 1940 TO FISCAL YEAR 1958-59



almost four times, probably as a result of an increment in "home needlework." Professional services increased significantly partly as a result of the great emphasis given to education and the utilization of women as school teachers.

Changes since 1940 are more or less a continuation of previous trends. In the male group, agriculture continues its declining trend, while manufacturing and trade continue to increase in importance. Construction, insignificant prior to 1940, more than doubled its percentage during the last 20 years, in great part a result of industrial development and housing projects.

In the female working force, a declining trend is observed in manufacturing due to a considerable reduction in home needlework. Trade has become an important source of employment for women. Government, which employed less than two per cent of the female working force in 1940, increased considerably in importance. During the fiscal year 1958-1959, approximately one out of each five women was employed by the government (see Table 48).

#### Occupational Structure

Substantial changes have occurred in the occupational composition of the population of the Island during the present century, with agrarian occupations following the same declining tendency observed in the industry. In 1899, 63 per cent of all "gainfully employed" workers had an agricultural occupation; in 1960, only 23.4 per cent were farm owners, managers or farm laborers (see Table 49).

On the other hand, non-agricultural occupations (white collar and manual workers) have increased considerably. In 1899,

for example, 7 out of 100 workers had a white-collar job; in 1960, almost 30 out of a 100 were in this group. Within the white collar group, clerical and professional occupations have increased considerably in importance. In the manual group all sub-categories, except service workers, have achieved significant progress, and especially the operative group.

In 1899, three out of each four working males had a farm occupation; more than 60 per cent worked as farm laborers. In 1960, only 33 per cent were engaged in agricultural occupations, while the proportions of white collar and manual occupations have increased significantly (see Table 50).

In the female group, there have been reductions in the proportion of manual workers, as well as in agricultural pursuits, but the most radical declines are observed in domestic workers and operatives. On the other hand, professional and clerical occupations have increased their shares considerably.

All these industrial and occupational changes clearly depict the nature of the economic transformation of the Island.

TABLE 49

PERCENTAGE DISTRIBUTION OF THE WORKING POPULATION BY BROAD OCCUPATIONAL GROUPS: 1899-1960<sup>a</sup>

Occupation	1899 <sup>b</sup>	1910	1920	1930	1940 <sup>c</sup>	1950	1960
Total. . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture. . . . .	64.9	60.7	59.9	52.4	44.2	37.1	23.4
Farm owners and managers . . . . .	12.7	15.1	9.6	10.5	9.3	6.3	3.3
Farm Laborers. . . . .	52.2	45.6	50.3	41.9	34.9	30.8	20.1
Non-Agriculture. . . . .	35.1	39.3	40.1	47.6	55.8	62.9	76.6
White Collar Workers . . . . .	7.2	9.0	9.7	12.5	16.0	20.9	29.6
Professional, technical, kindred . . . . .	0.7	1.1	1.9	2.2	3.0	4.8	7.9
Proprietary, managers, officials . . . . .	3.0	4.0	2.8	4.6	4.8	6.0	7.4
Clerical . . . . .	0.5	0.8	1.7	2.2	3.2	4.8	7.9
Sales. . . . .	3.0	3.2	3.3	3.5	5.0	5.3	6.4
Manual Workers . . . . .	27.9	30.2	30.4	35.1	39.8	42.0	47.0
Craftmen, foremen, kindred . . . . .	5.2	5.3	4.7	5.4	5.4	8.0	11.2
Operatives . . . . .	9.4	7.4	11.0	17.1	18.0	17.0	18.2
Service Workers. . . . .	9.9	13.8	10.9	9.2	11.3	11.2	11.2
Laborers . . . . .	3.4	3.7	3.8	3.4	5.1	5.8	6.4

<sup>a</sup>Source: Official censuses for Puerto Rico.<sup>b</sup>From 1899 to 1930 refers to gainfully employed.<sup>c</sup>From 1940 to 1955 refers to labor force.



TABLE 50

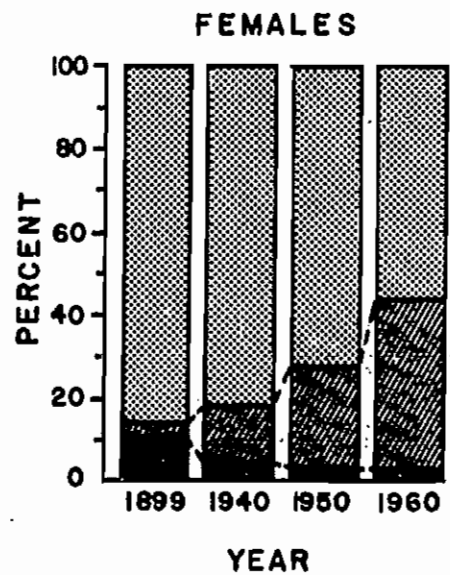
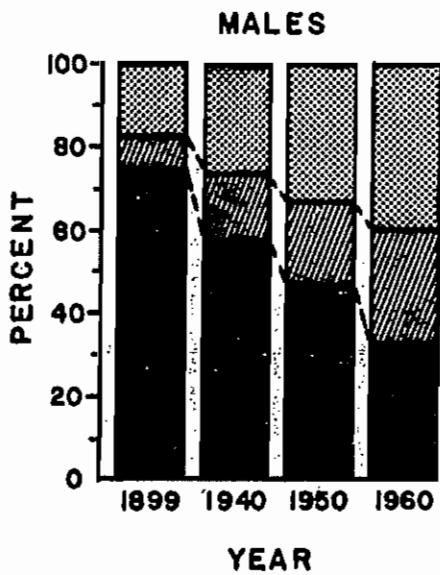
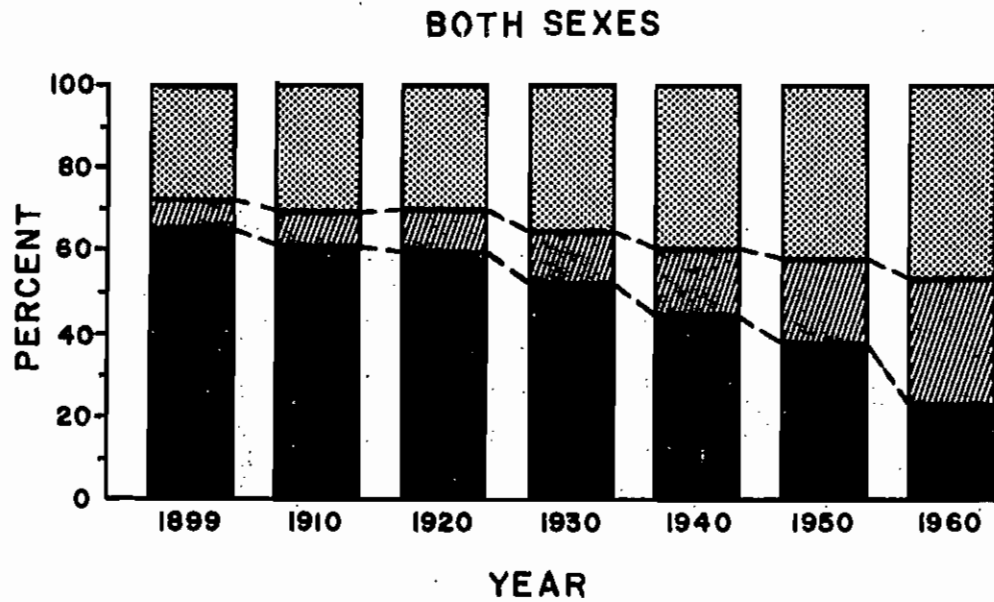
PERCENTAGE DISTRIBUTION OF THE WORKING POPULATION BY OCCUPATIONAL  
GROUPS AND SEX: 1899, 1940, 1950 and 1960<sup>a</sup>

Occupation	Males				Females			
	1899	1940	1950	1960	1899	1940	1950	1960
All Occupations . . . . .	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture . . . . .	75.0	57.5	47.4	33.1	10.7	4.7	3.0	2.5
Farmers, etc. . . . .	14.1	11.7	8.1	8.9	5.1	2.4	0.6	0.6
Laborers . . . . .	60.9	45.8	39.3	24.2	5.6	2.3	2.4	1.9
Non-Agriculture . . . . .	25.0	42.5	52.6	66.9	89.3	95.3	97.0	97.0
White Collar . . . . .	7.9	16.5	19.8	27.3	3.5	13.9	24.6	41.1
Professional, etc. . . . .	0.7	2.0	3.3	4.3	0.7	6.0	9.7	12.2
Proprietary, etc. . . . .	3.1	5.8	7.0	10.3	2.4	1.6	2.6	5.8
Clerical . . . . .	0.5	2.8	3.4	4.5	0.0	4.2	9.4	17.6
Sales . . . . .	3.6	5.9	6.1	8.2	0.4	2.1	2.9	5.5
Manual Workers . . . . .	17.1	26.0	32.8	39.6	85.8	81.4	72.4	56.4
Craftmen, etc. . . . .	6.1	7.1	10.3	10.6	0.7	0.2	0.4	1.3
Operatives . . . . .	2.4	7.3	10.0	13.6	46.8	49.9	40.4	28.2
Domestic Workers . . . . .	2.9	1.1	0.8	0.1	38.0	27.6	22.7	10.9
Other Service Workers . . . . .	1.7	3.7	4.4	5.7	0.1	3.4	8.2	15.4
Laborers . . . . .	4.0	6.8	7.3	9.6	0.2	0.3	0.7	0.6

<sup>a</sup> Sources: Official censuses for Puerto Rico; and Bureau of Labor Force Statistics, Department of Labor of Puerto Rico.

Figure 19

DISTRIBUTION OF THE WORKING POPULATION  
BY BROAD OCCUPATIONAL GROUPS AND SEX  
PUERTO RICO: 1899-1960



CODE:-

■ Agricultural

▨ White Collars

▩ Manual Workers

## CHAPTER IV

### EXTERNAL AND INTERNAL MIGRATION

#### External Migration

In most countries of the present world external migration is a relatively unimportant variable. The volume of migration is such that it has no appreciable effect upon the rate of growth and the composition of the population. Thus, in dealing with future population growth and its possible socio-economic effects, there is little need for taking this factor into account.

In Puerto Rico, emigration gained importance after World War II, and at present it is probably the most important variable in the population equation. As in the recent past, future changes in the rate of growth, as well as in the age-sex structure of the population, will depend considerably upon the future course of emigration.

In this chapter we will examine past and present trends of migration, as well as some of the characteristics of the migrants. In addition, the effects of external migration upon the rate of growth and age-sex structure of the population will be analyzed, including some estimates of internal migration.

The effects of migration upon fertility will be analyzed in a chapter concerned with the reproductive performance of the Puerto Rican population. Future prospects of emigration and

possible socio-economic effects will be presented in one of the last chapters.

#### Nature and Source of Data

Since the fiscal year 1908-1909, some migration figures were compiled by the Immigration and Naturalization Service of the United States Department of Justice. Until 1917, when Puerto Ricans became U. S. citizens, these data were highly deficient, as Puerto Ricans were counted neither as citizens nor aliens. In other words, they were not included in the migration figures. In spite of the improvement of the data with the inclusion of natives since 1917, it is evident that migration figures were (and are) incomplete.

From 1910 to 1940, according to recorded figures, the Island lost some 54,000 persons through emigration. Jaffe found these figures too low when compared with the number of persons born in Puerto Rico and residing in the United States as enumerated in the decennial censuses.<sup>1</sup> Subtracting the figures of one census from the next, and allowing for deaths, he arrived at an estimate of 70,000. This figure is 30 per cent higher than the recorded one.

Since 1930, birth and death figures are relatively accurate in Puerto Rico. Thus, with proper corrections (especially in the case of births) we can use the population equation to estimate migration. For all the three intercensal periods, we have found the recorded emigration to be lower than the estimated emigration. It is difficult to believe that census accuracy (in terms of

---

<sup>1</sup>Jaffe, p. 65.

coverage) has been declining and it is our opinion that migration figures are somewhat underrecorded.

Using the "population equation" method we estimated that something like 470,000 persons were lost through emigration during the 1950-1960 decade.<sup>1</sup> The recorded total was 444,000 or a deficiency of 26,000. This means that apparently emigration was 5.5 per cent underrecorded during this period.

Some of the possible reasons for this error, as expressed by persons well acquainted with the problem, are:

- (1) Emigration of civilians in military transportation.
- (2) Undercount of infants (they are estimated on the basis of a report of only one airline).
- (3) Emigration by boat from the islands of Vieques and Culebra, probably to Saint Croix and other Caribbean Islands.
- (4) Military on leave go to the United States via military transportation and return via commercial transportation.

In connection with characteristics of migrants, we have no information until 1946. In that year a 50 per cent sample of passenger manifests was taken, with tabulation of age, sex, and occupation of migrants.

In 1953, a continuous sample of departures and arrivals was established at the San Juan Airport,<sup>2</sup> and is presently carried on by the Department of Labor of Puerto Rico. This sample is so designed that every hour of the day and every day of the week have

---

<sup>1</sup>We have assumed 4 per cent of underregistration for births throughout the period.

<sup>2</sup>In 1960, 99 per cent of all departures and arrivals were by Air Transportation through the San Juan Airport.

equal probabilities of being included. During a given time interval, selected in a systematic way, all flights (departing and arriving) are included in the sample. In departing flights, one out of every five passengers is interviewed. In the case of arrivals the sampling fraction is one-tenth.

The selection procedure in arrivals is simple: as passengers leave the plane, one by one, they are counted and the selected ones interviewed on their way toward (or in) the luggage room. In the case of departures, passengers are counted and selected as they come to the counters of the airlines to check their baggage. The problem here is that one person may check the baggage of many others who do not come to the counter. To avoid "losses," the person in charge of the selection of the sample has to ask the passengers at the counter how many others are departing with him. The "one out of five" count is then a function of those at the counter and those departing with him. When the selected person is not at the counter he has to be located and interviewed, although this is not always possible. In addition, we have been told that during "rush" hours and days, it is impossible to follow strictly the count asking "how many will leave with you," and the sample is mainly selected from those at the counter alone.

Obviously all these difficulties should result in an over-inclusion in the sample of persons going to the counters. If this is true, young adult males should appear overestimated, while females, children, and old persons should be underestimated.

The author arrived at this conclusion when he compared the 1960 (April 1) population estimate based on the age-sex

distribution of migration obtained from the sample, with the 1960 census population. At his suggestion during the months of July to September of 1961, a complete age and sex count was made for all departing flights included in the sample. A comparison of these data with the regular 20 per cent sample show significant differences, all in line with the advanced hypothesis.

As observed in Table 51, males are apparently overestimated in the usual sample, as well as persons 15 to 39 years of age. On the other hand, children, old persons and females are clearly underestimated. A chi-square test shows that the differences are significant at the 0.1 per cent level.

In spite of this bias, data from the ramp survey are of some statistical value, if properly handled; that is, if the possible effect of these errors upon other variables is taken into account.

#### Migration Trends

Migration is not a new phenomenon in Puerto Rico. Shortly after the American invasion of the Island (1898), many Puerto Ricans emigrated to Hawaii, Cuba, and Santo Domingo as a result of the economic crisis created by the San Ciriaco Hurricane (1899), and the operation in the Island of emigration agents. Governor Allen reported in 1901 that "not more than 5,000 or 6,000 have migrated--scarcely one-half of one per cent" (of the total population).<sup>1</sup>

Table 52 shows that during the first 45 years of the present century net emigration from Puerto Rico was relatively

---

<sup>1</sup>First Annual Report of the Governor of Puerto Rico  
(Washington, 1901), p. 75.

TABLE 51

PERCENTAGE DISTRIBUTIONS OF THE USUAL 20 PER CENT SAMPLE AND  
A COMPLETE COUNT IN ALL DEPARTING FLIGHTS INCLUDED IN  
THE SAMPLE (JULY-SEPTEMBER, 1961)

Sex and Age	Usual 20 Per Cent Sample (a)	Complete Count (b)	Difference (a) - (b)
<u>Males</u>	55.3	52.1	3.2
0- 4	2.5	3.8	-1.3
5- 9	1.2	3.3	-2.1
10-14	2.2	3.0	-0.8
15-19	5.3	4.6	0.7
20-24	7.8	6.8	1.0
25-29	8.1	5.8	2.3
30-34	7.7	5.3	2.4
35-39	6.7	5.3	1.4
40-44	5.1	4.2	0.9
45-49	3.6	3.5	0.1
50-54	2.3	2.5	-0.2
55-59	1.2	1.8	-0.6
60-64	0.8	1.1	-0.3
65 and over	0.8	1.1	-0.3
<u>Females</u>	44.7	47.9	-3.2
0- 4	2.4	3.7	-1.3
5- 9	1.1	3.2	-2.1
10-14	1.7	3.2	-1.5
15-19	5.7	5.0	0.7
20-24	6.5	6.9	-0.4
25-29	8.3	5.1	3.2
30-34	5.9	4.3	1.6
35-39	4.3	3.9	0.4
40-44	3.0	3.5	-0.5
45-49	2.0	2.7	-0.7
50-54	1.6	2.4	-0.8
55-59	0.7	1.5	-0.8
60-64	0.7	1.1	-0.4
65 and over	0.8	1.4	-0.6
<u>Total--</u> <u>Both Sexes</u>	100.0	100.0	0.0



TABLE 52

NET EMIGRATION<sup>a</sup> FROM PUERTO RICO: 1910 TO 1961<sup>b</sup>

Year	Net Emigration		
	Total	Annual Average	Annual Rate <sup>c</sup>
1910 - 1919	5,588	478	0.5
1920 - 1929	35,638	3,564	2.5
1930 - 1939	12,645	1,264	0.7
1940 - 1944	15,826	3,165	1.6
1945 - 1949	134,589	26,918	12.5
1950	34,703	.... <sup>d</sup>	15.6
1951	52,900	....	23.8
1952	59,132	....	26.9
1953	69,124	....	31.7
1954	21,531	....	9.8
1950 - 1954	237,390	47,478	21.6
1955	45,464	....	20.3
1956	52,315	....	23.4
1957	37,704	....	16.7
1958	27,728	....	12.1
1959	29,989	....	12.9
1955 - 1959	193,200	38,640	16.8
1960	16,298	....	6.9
1961	- 1,754	....	- 0.7

<sup>a</sup> Excess of departures over arrivals.

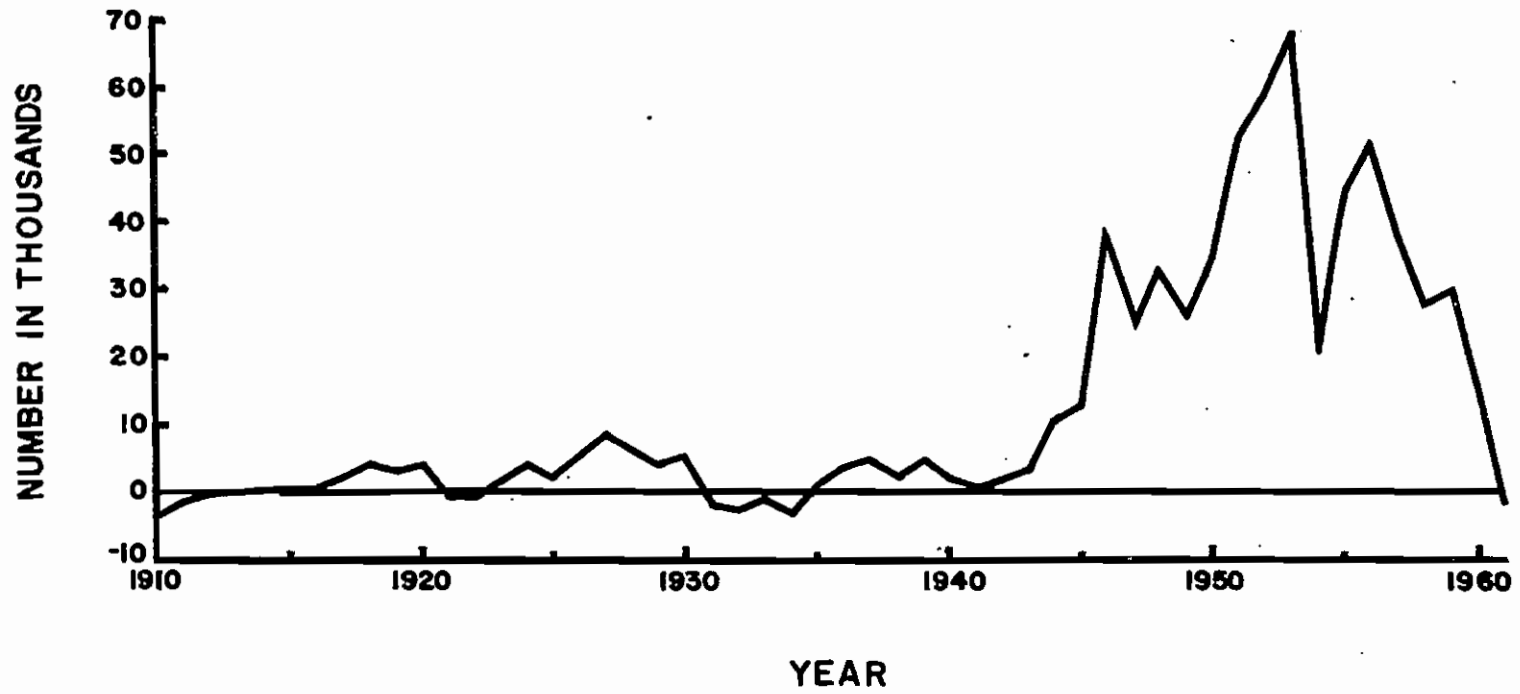
<sup>b</sup> F. P. Bartlett y B. Howell, Puerto Rico y su Problema Poblacional (Puerto Rico Planning Board, 1944), p. 67 (for years 1910 to 1939); and Puerto Rico Planning Board, Monthly Reports on Passenger Traffic (1940 to 1960).

<sup>c</sup> Annual net migration (or annual average) divided by the mid-term population multiplied by 1,000.

<sup>d</sup> Not applicable.

Figure 20

NET EMIGRATION FROM PUERTO RICO  
1910-1961



insignificant. The peak of emigration (for this period) was recorded during the decade of 1920-1930, when scarcely one-fourth of one per cent of the population left the Island annually.

The rapid expansion of air transportation between the Island and the United States after World War II and the reduction in air transportation fares contributed to increased emigration of Puerto Ricans. In addition, labor demands in the mainland labor market, and the traveling of Puerto Rican soldiers during the war (which undoubtedly helped to destroy the psychological barriers against migration) were two other important factors operating in the same direction. Thus, during the period 1945-1949, a net of 27 thousand Puerto Ricans left the Island annually. In relative terms, a net 12.6 persons per 1,000 population were lost annually. From 1950 to 1954, net emigration increased even more, reaching a peak of 69,000 in 1953, which coincided with the labor force shortage peak in the United States due to the "Korean incident." The annual average for this period was 47 thousand, or a rate of net emigration of 2.2 per cent (of the population) per year.

The economic recession in the United States slowed down emigration in 1954. During that year only a net of 22,000 persons left the Island, representing almost a 70 per cent decline over the previous year. During the years 1955 and 1956, there was an apparent recovery, but since 1957 a distinct declining tendency in net emigration has been observed. In 1960, net emigration amounted to 16 thousand and, in 1961, a net immigration balance of 1,800 was recorded (see Table 52).

This recent tendency has been attributed to the relatively

high unemployment level in the United States. There is apparently a close relationship between the level of unemployment in the United States and the magnitude of Puerto Rican net emigration.<sup>1</sup>

Fortunately since 1958-1959 data about the nativity of migrants has been collected through the ramp survey at the San Juan Airport and the above explanation for the decrease in emigration seems to be somewhat inadequate, or at least is not the unique explanation. Table 53 presents total net emigration as a distinctly declining tendency during the last three fiscal years, while net emigration of native Puerto Ricans has increased consistently. On the other hand, net immigration of persons born outside Puerto Rico has increased considerably. For 1960-1961 and 1961-1962, the only years for which the data are available, over 70 per cent of these non-native immigrants were of non-Puerto Rican ancestry.

Although we are conscious of the serious bias of the ramp survey, it is highly possible that the political situation in the Caribbean has something to do with this rapid increment of immigration of non-Puerto Ricans. Secondly, continental Americans are coming in great numbers to the Island as technicians, skilled operatives, and businessmen. Some evidence of this movement is obtained from a comparison of the 1950 and 1960 censuses.<sup>2</sup>

---

<sup>1</sup>For the post-war period of 1948-1961, the correlation coefficient between the number of unemployed persons in the United States and the number of Puerto Rican emigrants was 0.86 (see also Fig. 54).

<sup>2</sup>See Table 22.

TABLE 53

PLACE OF BIRTH AND ANCESTRY OF NET MIGRANTS;<sup>a</sup>  
FISCAL YEARS 1958-1959 TO 1961-1962<sup>b</sup>

Place of Birth	1961-1962	1960-1961	1959-1960	1958-1959
<u>All Places</u>	-13.1	-17.8	-22.7	-34.1
Puerto Rico	-66.3	-50.8	-46.6	-45.5
Outside Puerto Rico	+53.4	+34.1	+24.5	+11.3
Of Puerto Rican parents	+14.1	+ 9.7	.... <sup>c</sup>	....
Of Non-Puerto Rican Parents	+39.3	+24.4	....	....
Not Reported	- 0.2	- 1.1	- 0.6	0.0

<sup>a</sup>Minus sign (-) denotes excess of departures over arrivals; plus sign (+) denotes excess of arrivals over departures.

<sup>b</sup>Source: Commonwealth of Puerto Rico, Department of Labor, Special Reports on Migration.

<sup>c</sup>Not available.

Apparently during recent years there has been an interchange of population in the Island, and not such a radical decline in emigration of native Puerto Ricans as one might infer from net balance figures.<sup>1</sup> Puerto Rico emigration, in contrast with previous overseas movements, is the net result of a two-way current. Net migration, the difference between arrivals and departures, is a very small fraction of the total gross movement (arrivals plus departures). In 1960, the total gross movement amounted to 1,339,000 persons, but net emigration was only 16,000 (1.2 per cent

<sup>1</sup>Many persons in Puerto Rico feel that the figures for immigration of non-Puerto Ricans are overestimated. However, they admit the existence of such a current. (The author agrees with this point of view.)

of the total gross figure). It must be remembered that Puerto Ricans do not consider themselves permanent migrants. They go to the United States with the hope of making some money in order to come back, buy a farm, a house, or small business enterprise and spend the rest of their lives in Puerto Rico. As we will see, they also return after retirement, or when job opportunities are limited by age.

#### The Age and Sex Distribution

Until 1946, there is no evidence of the age and sex composition of migrants. In that year, a 50 per cent sample was taken from passenger manifests<sup>1</sup> and age and sex were among the variables tabulated. As Table 54 shows, females slightly outnumbered males, the sex ratio being 95 males per each 100 females.

In terms of age, all groups showed an emigration balance, although the proportion of persons 40 years and over was slightly less than 7 per cent, 22.5 per cent were under 15 years of age, and almost 71 per cent were 15 to 39 years of age. The median age for both sexes was 22.1 years (21.8 for males and 22.3 for females). Thus migrants were highly concentrated around a median which was more than three years higher than the corresponding figure for the Island's population.

In 1953, a continuous sample was established at the San Juan Airport and since then age and sex have been obtained for departing as well as arriving passengers. The age and sex

---

<sup>1</sup>This procedure was abandoned when the airlines claimed that United States-Puerto Rico travel should be considered an inter-state movement.

distribution for net migrants is obtained by subtraction but, as we have already discussed, there is serious bias in the age-sex distribution, so we have utilized census and vital statistics data to obtain a more reliable estimate.

TABLE 54  
NET MIGRATION BY AGE AND SEX: CALENDAR YEAR 1946<sup>a</sup>

Age	Both Sexes	Males	Females
0- 4	-1,770	- 929	- 841
5- 9	-1,596	- 785	- 811
10-14	-1,476	- 680	- 796
15-19	-3,623	-1,738	-1,885
20-24	-5,531	-2,933	-2,598
25-29	-3,291	-1,639	-1,652
30-34	-1,799	- 894	- 905
35-39	-1,021	- 475	- 546
40-44	- 427	- 145	- 282
45-49	- 314	- 69	- 245
50-54	- 234	- 91	- 143
55-59	- 190	- 47	- 143
60-64	- 128	- 25	- 103
65 and over	- 131	- 28	- 103
<u>All Ages</u>	-21,531	-10,478	-11,053

<sup>a</sup>Source: Fifty per cent sample taken from passenger manifests (Files of the Bureau of Vital Statistics, Department of Health of Puerto Rico).

If we add to the 1950 population figures as distributed by age the number of births (properly corrected for underregistration)<sup>1</sup> and subtract the number of deaths as distributed by age occurring during the intercensal period, we will obtain the 1960 expected population in the absence of migration. The difference between

<sup>1</sup>For underregistration of births, see Chapter V.

the 1960 enumerated population and this 1960 expected population, ideally represents net migration (see Table 55).

TABLE 55  
ESTIMATED OF NET MIGRATION BY AGE<sup>a</sup> AND SEX:  
APRIL 1, 1959 TO APRIL 1, 1960 (IN THOUSANDS)

Age Group	Census Estimate		
	Both Sexes	Males	Females
0- 4	- 8.2	- 4.9	- 3.3
5- 9	-42.5	-22.6	-19.9
10-14	-34.0	-17.2	-16.8
15-19	-68.1	-36.8	-31.3
20-24	-96.2	-57.3	-38.9
25-29	-80.3	-45.0	-35.3
30-34	-62.1	-30.2	-31.9
35-39	-22.8	-12.4	-10.4
40-44	-19.2	-10.7	- 8.5
45-49	-22.1	-10.4	-11.7
50-54	-10.4	- 4.7	- 5.7
55-59	- 3.6	- 1.7	- 1.9
60-64	- 6.1	- 3.2	- 2.9
65 and over	5.4	2.1	3.3
<u>All Ages</u>	-470.2	-255.0	-215.2

<sup>a</sup>Age as of the end of the period (April 1, 1960), not the age at the time of emigration.

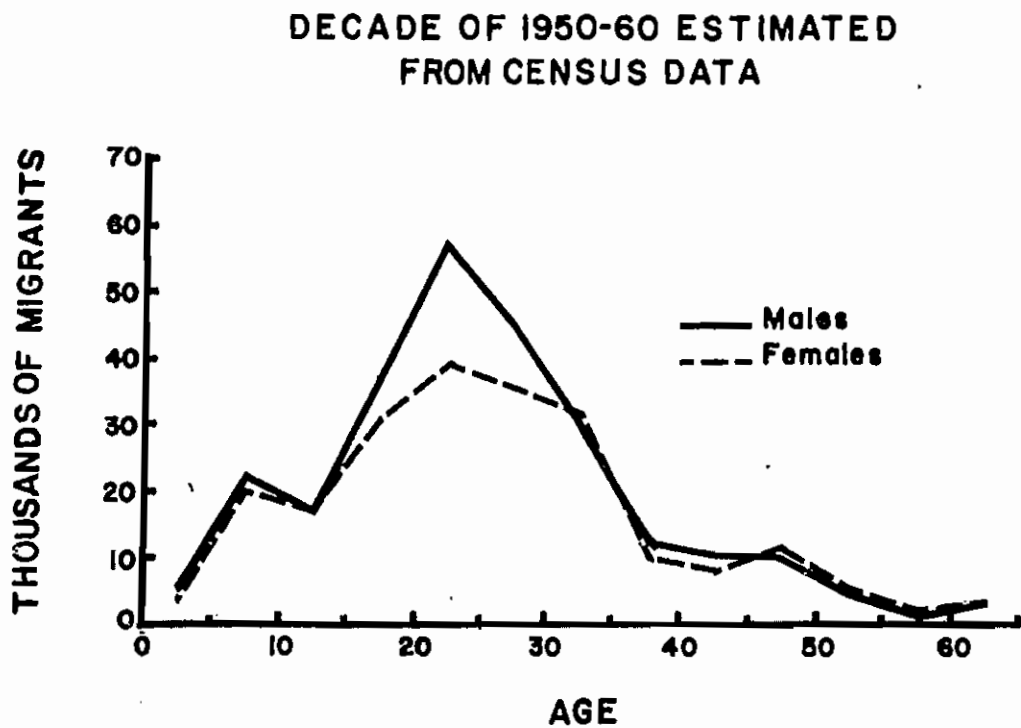
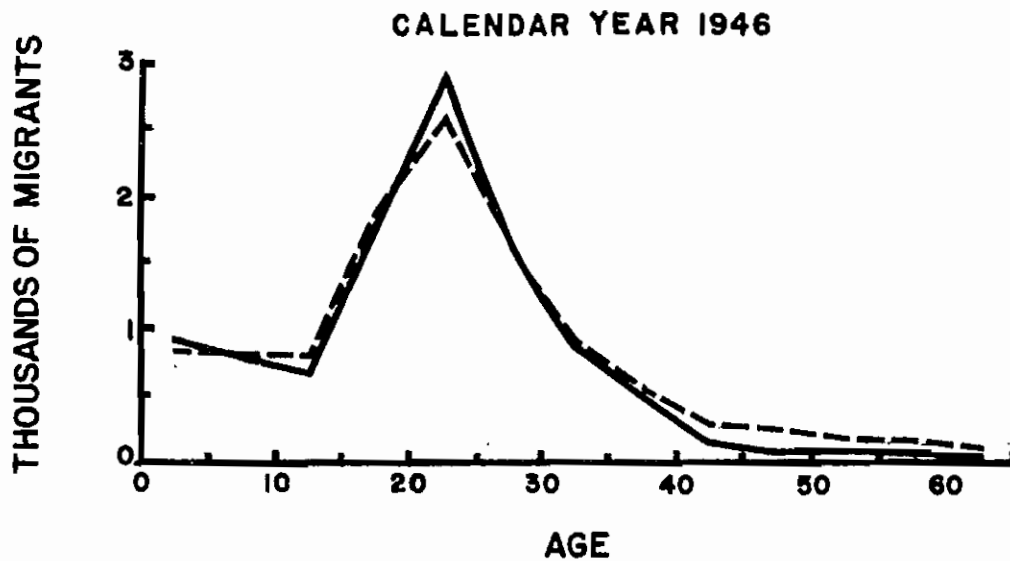
According to these data, the median age of emigrants at the end of the period was 24.3 years (24.1 for males and 24.6 for females). Thus, the median age at the time of migration should have been somewhat lower, probably similar to the figure of 22 years recorded for 1946.

There was a great concentration of emigrants in the highly productive ages; 70 per cent were aged 15 to 39 years, only 18 per cent were under 15 years of age, and only 12 per cent were 40 years and over. There is an apparent net immigration of persons 65 years of age and over.



Figure 21

**NET MIGRATION BY AGE AND SEX  
PUERTORICO: 1946 AND DECADE OF 1950-60**



This fact might be attributed to age reporting errors in census figures, but it is also possible that some Puerto Ricans are coming back to the Island after retirement.

Effects of Emigration Upon the Size, Rate  
of Growth, and the Age-Sex Composi-  
tion of the Population

As we have shown at the beginning of this chapter, external migration was, for all practical purposes, insignificant during the first four decades of the present century, but after World War II emigration gained impetus. For this reason we will limit the analysis of the effects of emigration upon the size, rate of growth, and age-sex composition of the population to the last two decades (1940-1960).

The size of a population is affected in two ways by heavy emigration: by the actual number of persons migrating, and by the number of children born to emigrants in the new residence who would have been added to the population had the migrants remained in the Island.

For purposes of estimating the effects of migration, we have constructed the 1950 and 1960 population that would have resulted in the absence of migration, using the 1940 enumerated population as base. The procedure followed was the "component method" of population projection.<sup>1</sup> Survival ratios were obtained from the 1940, 1950, and 1960 abridged life tables for Puerto Rico computed by the author for his Master's thesis; the age-specific

---

<sup>1</sup>United Nations, Methods of Population Projections by Age and Sex, Population Studies, No. 25 (Manual III), especially pp. 54-58.

fertility rates used were those recorded, properly corrected for underregistration of births.

This method can be summarized for the total population by the following mathematical expression:

$$P_1^* = P_0 + B^* - D^*$$

- Where:  $P_1^*$  = expected population at the latest date.  
 $P_0$  = base population.  
 $B^*$  = expected number of births during the interval (with zero migration).  
 $D^*$  = expected number of deaths during the interval (with zero migration).

On the other hand, the enumerated population is a function of migration:

$$P_1 = P_0 + B - D - E$$

- Where:  $P_1$  = enumerated population in the latest date.  
 $P_0$  = base population.  
 $B = B^* - B^{**}$  = actual number of births occurred during the interval. It is the difference between the number of expected births in the absence of migration ( $B^*$ ) and the number of births expected to have occurred to migrants after departure ( $B^{**}$ ).  
 $D = D^* - D^{**}$  = actual number of deaths occurred during the interval. Difference between the number of deaths expected without migration and number of deaths expected to occur to migrants (and children migrants) after departure.  
 $E =$  Net migration recorded during the interval.

It is obvious that from two censuses we can estimate net migration using the above equation if birth and death registration is relatively complete (as in Puerto Rico since 1940).

The difference between the expected population ( $P_1^*$ ) and the enumerated population ( $P_1$ ) is necessarily the net effect of emigration upon the size of population.

$$\text{That is: } P_1^* - P_1 = B^* - B - D + D^* + E$$

$$\text{or } P_1^* - P_1 = B^{**} - D^{**} + E$$

The results obtained from the projections are compared with the enumerated population in the following table:

TABLE 56

ENUMERATED AND EXPECTED POPULATION IN THE ABSENCE OF EMIGRATION  
SINCE 1940: 1950 AND 1960 (IN THOUSANDS)

Population	1950	1960	Annual Rate of Increase <sup>a</sup> (Per Cent)	
			1940-1950	1950-1960
Expected. . . . .	2,496	3,377	3.0	3.1
Enumerated. . . . .	2,211	2,350	1.7	0.6
Ratio Enumerated to Expected (Per Cent).	88.6%	69.6%	56.7%	19.4%

<sup>a</sup>Computed by the compound interest formula. The rate of increase computed for both the expected and enumerated population during the period of 1940-1950 was based on the 1940 enumerated population (1,896,000).

In the computation of the projected population ( $P_1^*$ ) both in 1950 and 1960, we have used the 1940 enumerated population as base. Thus, the 1960 figures represent the cumulative effect of two decades of emigration.

TABLE 57

EXPECTED POPULATION IN THE ABSENCE OF EMIGRATION SINCE 1940,  
BY AGE AND SEX:<sup>a</sup> 1950 AND 1960 (IN THOUSANDS)

Age	1 9 5 0			1 9 6 0		
	Males	Females	Both Sexes	Males	Females	Both Sexes
0- 4	225	218	443	268	260	528
5- 9	183	179	362	247	240	487
10-14	132	128	260	219	212	431
15-19	124	121	245	181	177	358
20-24	111	108	219	130	127	257
25-29	94	101	195	122	118	240
30-34	95	96	191	107	106	213
35-39	66	70	136	91	98	189
40-44	48	46	94	91	93	184
45-49	45	46	91	63	66	129
50-54	38	38	76	44	44	88
55-59	31	29	60	41	43	84
60-64	25	22	47	34	34	68
65 and over	37	40	77	59	62	121
<u>All Ages</u>	1,254	1,242	2,496	1,697	1,680	3,377

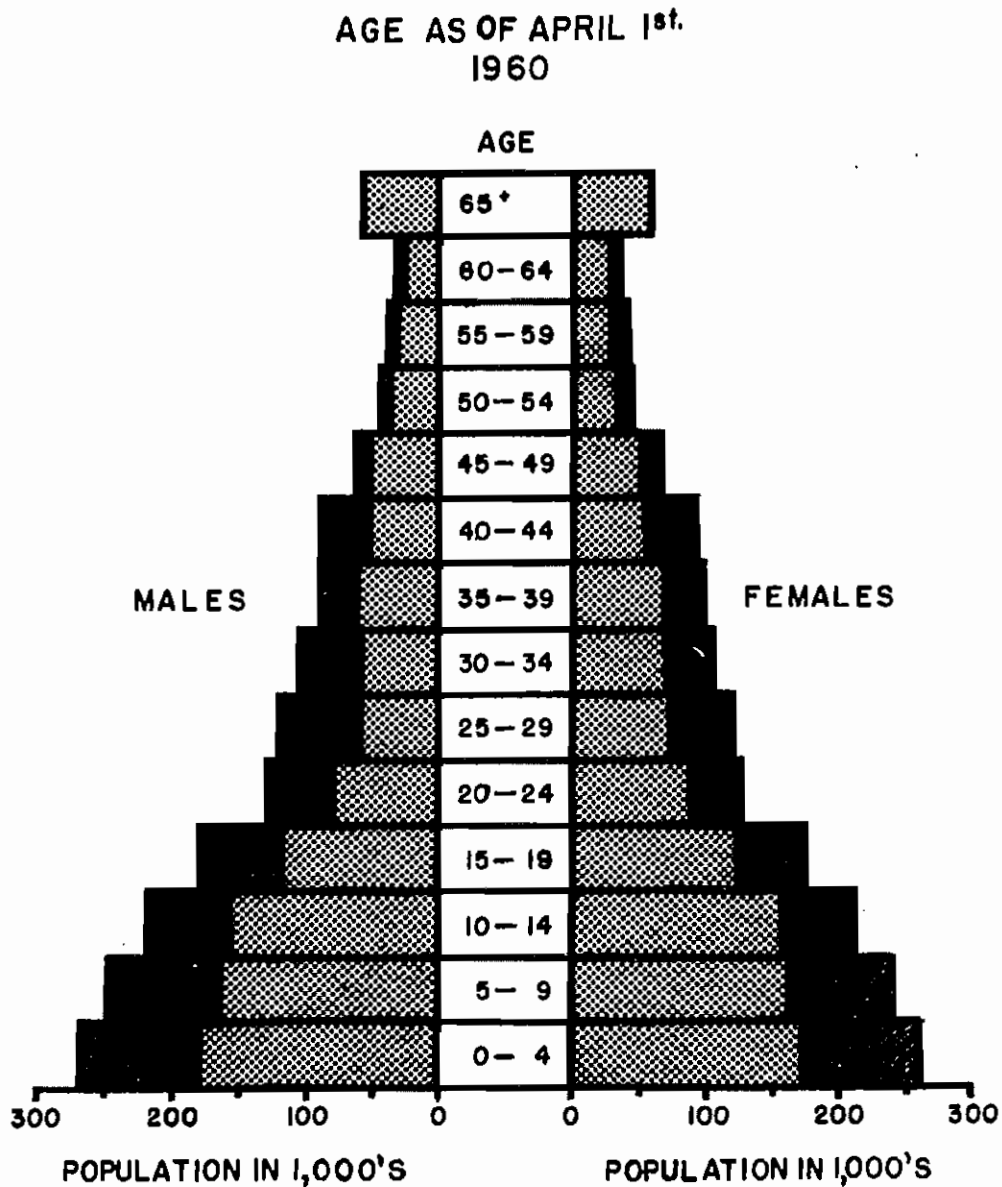
<sup>a</sup>The base population used was the 1940 enumerated population. Survival factors used were those obtained from life tables computed for the Island for 1940, 1950, and 1960. Age-specific fertility rates used were those recorded for the Island, properly corrected for underregistration (see Chapter V).

The above data tells us that the 1950 census population was only 89 per cent of the figure that would have resulted in the absence of migration. In the same way, the 1960 enumerated population represents 70 per cent of expectation with zero emigration since 1940.

As seen in Chapter II, the rate of growth of the population increased from 1899 to 1940, but decreased thereafter (see Table 6). During the last decade (1950-1960) the recorded rate of 0.6 per cent per year was the lowest in all the censal history of the Island (1765-1960).

Figure 22

EFFECTS TWO DECADES OF EMIGRATION (1940-1960)  
UPON THE SEX-AGE STRUCTURE OF THE POPULATION



CODE:

- ☒ Enumerated 1960 population
- Emigrants during 1940-1960 surviving to specified age
- Children of emigrants born outside Puerto Rico from 1940 to 1960 surviving to specified age

The decline in the rate since 1940, as well as the record low observed during the last decade, are products of emigration. Strictly in terms of the recorded natural increase (births minus deaths), the Island's population should have increased at a rate of 2.9 per cent per year during the 1940-1950 decade and at 2.8 per cent per year during the last decade. If we add the "loss" due to children of migrants born after departure, who would have been born in the Island with no migration, the rate of growth would be even greater (see Table 56).

Thus, during the 1940-1950 decade, the recorded rate of growth was only 57 per cent of expectation in the absence of migration, and similarly during the period of 1950-1960 the recorded rate was only 19 per cent of expectation with no migration since 1940.

Emigration had but little effect upon the sex ratio in the total population during the decade of 1940-1950. In both the projected (in the absence of migration) and the enumerated population for 1950, the ratio was 101 males per each 100 females. Apparently the sexes were more or less in balance among migrants during this period.

Probably as a result of the tendency of the new small industries to provide more job opportunities for females than for males, there was a considerably higher proportion of males among emigrants during the period 1950 to 1960. According to net emigration estimates obtained from census figures, there were 119 males per 100 females during this decade; as a result, the sex ratio in the total population declined from 101 in 1950 to 98 in 1960 (see Table 57).

TABLE 58

BROAD AGE DISTRIBUTION OF THE EXPECTED AND ENUMERATED POPULATION BY SEX: 1950 AND 1960

Sex and Age	1 9 5 0		1 9 6 0	
	Expected	Enumerated	Expected	Enumerated
<u>Males--All Ages</u>	100.0	100.0	100.0	100.0
0-14	43.1	43.7	42.3	43.6
15-44	42.9	41.2	42.1	37.7
45-64	11.1	11.4	11.8	13.5
65 and over	2.9	3.7	3.8	5.2
<u>Females--All Ages</u>	100.0	100.0	100.0	100.0
0-14	42.3	42.7	41.5	41.6
15-44	43.6	42.7	43.1	40.6
45-64	10.9	10.6	11.4	12.5
65 and over	3.2	4.0	4.0	5.3

Significant changes have occurred in the age structure of the population as a result of emigration in spite of almost no difference in the median age. Emigration has considerably depleted the young adult ages (15-44 years), but especially the group aged 20-39 years. As a result, and in spite of the significant decline in the crude birth rate observed since 1950, the proportion of persons under 15 years of age has remained unchanged. Similarly, increases can be observed in the proportion of persons 45 years of age and over. As seen in Table 58, the differences between the enumerated and the expected population are greater for 1960 than for 1950. In 1960, the effect has been greater in the male than in the female group.

As a result of the predominance of males among migrants, the sex ratios by age in the enumerated population have departed



considerably from the expected, especially in the so-called reproductive ages (15-44). Table 59 shows that the most radical deviations have occurred at ages 20-24 and 25-29, the most fertile ages in the female group.<sup>1</sup>

TABLE 59  
SEX RATIOS BY AGE IN THE ENUMERATED AND  
EXPECTED POPULATIONS FOR 1960

Age Group	Expected	Enumerated	Difference
0- 4	103.1	102.8	0.3
5- 9	103.1	102.7	0.4
10-14	102.1	102.1	0.0
15-19	102.5	98.7	3.8
20-24	104.5	86.9	17.6
25-29	97.5	83.5	14.0
30-34	88.9	86.3	2.6
35-39	92.8	89.2	3.6
40-44	101.4	97.8	3.6
45-49	100.6	103.8	-3.2
50-54	108.0	112.6	-4.6
55-59	108.3	109.3	-1.0
60-64	100.1	100.4	-0.3
65 and over	96.5	96.7	-0.2
<u>All Ages</u>	100.9	98.0	2.9

At ages under 15 years, and 55 and over, no significant differences are observed. Apparently there were more females than males among emigrants 45 years of age and over.

This acute sex imbalance as a result of emigration is one of our explanations for the extraordinary decline in the crude

---

<sup>1</sup>The low sex ratios observed in both the expected and enumerated population between ages 25-39 years are probably the result of census errors (see Chapter III).

birth rate observed since 1960. This point of view will be fully elaborated in the chapter on fertility.

#### Effects Upon the Labor Force

As noted in previous sections, emigration has considerably depleted the age groups in which labor force participation tends to be high. For a quantitative idea of such drainage, we have computed the expected labor force population in the absence of emigration by applying to the total expected population the corresponding age-sex specific participation rates observed in 1950 and 1960.<sup>1</sup> In other words, we have assumed that labor force participation rates among emigrants equalled those prevailing in the non-migrant group. It is likely, however, that labor force participation was higher among emigrants as the lack of job opportunities is undoubtedly the "push" to Puerto Rican emigration. Persons out of the labor force, unable or unwilling to work, are most likely to remain in the Island. In fact, some economists have explained the radical drop observed during the decade 1950-1960 in labor force participation in Puerto Rico in these terms. It seems, then, that the expected labor force population we obtained represents a conservative estimate.

Table 60 shows that under the above-mentioned assumptions, the 1950 "expected" labor force population would have been 820,000 persons as compared with an "actual" number of 704,000. In other words, the 1950 labor force population was only 86 per cent of expectation in the absence of emigration. In relative terms, both

---

<sup>1</sup>See Chapter III, Table 42.

male and female labor force groups were reduced by 14 per cent as a result of emigration. In terms of age, considerable reductions occurred in the age interval 25-34 years for both sexes during the period 1940-1950.

In 1960, we find that the difference between the expected and the enumerated labor force population is around 334,000 persons, representing the cumulative effect of two decades of heavy emigration. Emigration since 1940 was able to reduce the 1960 expected labor force population by almost 35 per cent. The reduction in the male group was 38 per cent, and 25 per cent in the female group.

Extraordinary reductions are observed in the age group 25-34 years, for males and females, during the decade 1950-1960. However, age groups 20-24 and 35-44 were also affected considerably. In the male group about 220,000 persons aged 20-44 years were "subtracted" from the labor force by emigration. This figure is equal to 35 per cent of the total 1960 enumerated labor force population (628,000).

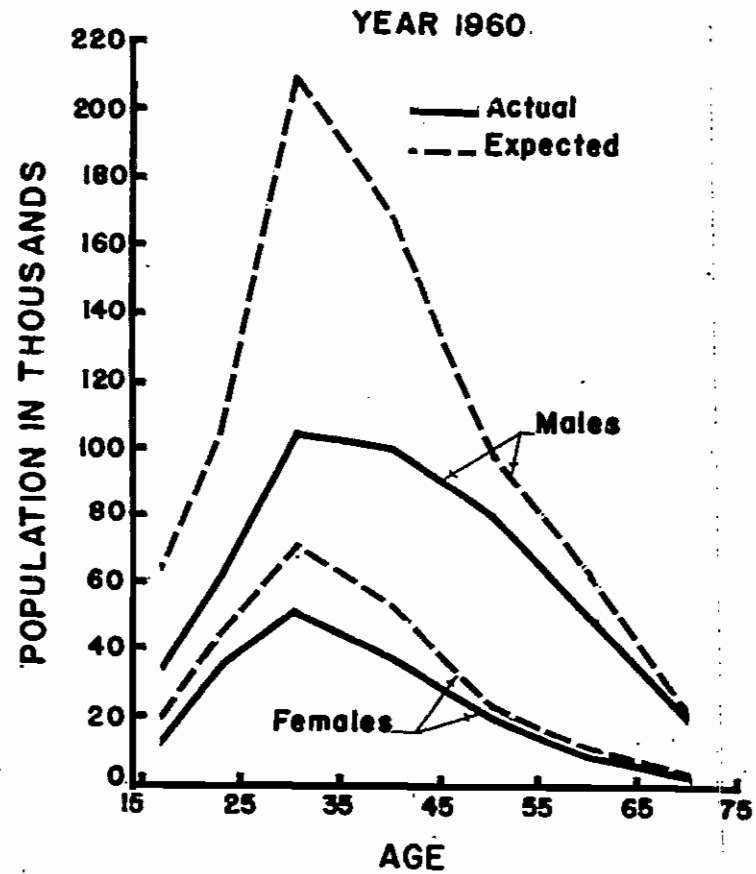
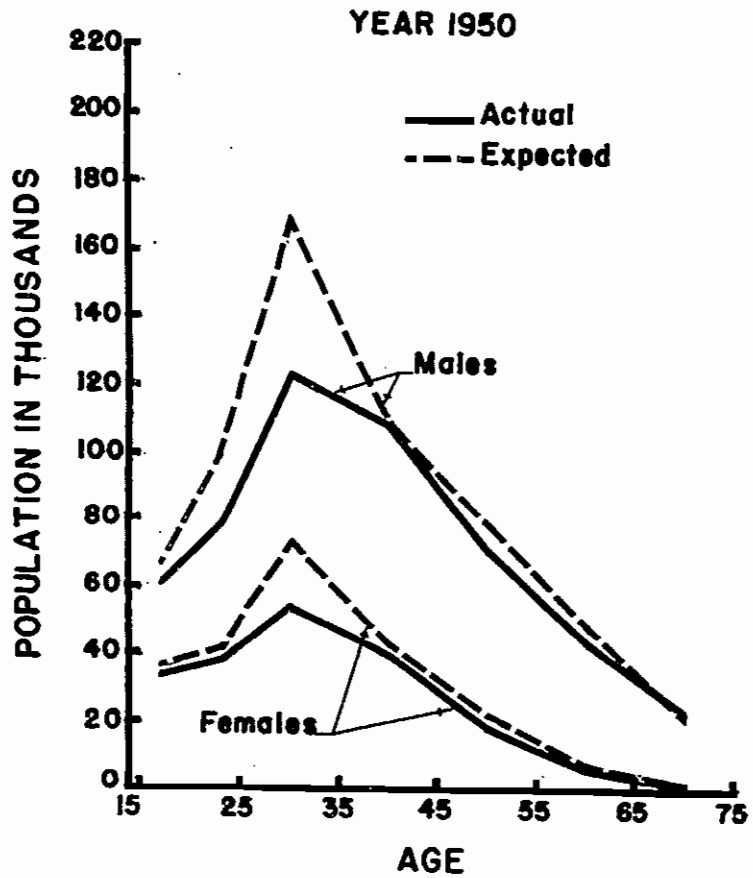
For a clearer idea of the meanings of these figures let us translate them to employment data. In 1950, some 601,000 persons of a total of 704,000 persons in the labor force were employed. That is, only 85 per cent of the labor force was employed. Merely to maintain this level of employment, some 699,000 jobs would have been needed in that year if emigration had been zero, which would have represented approximately 98,000 additional jobs. The situation would have deteriorated by 1960. To maintain the employment level equal to the observed level, some 295,000 additional jobs would have been needed in the absence of emigration. Of these, 243,000 correspond to the male group and 52,000 to females

TABLE 60

ACTUAL AND EXPECTED LABOR POPULATION BY AGE AND SEX: 1950 AND 1960 (IN THOUSANDS)

Sex and Age	1 9 5 0			1 9 6 0		
	Expected	Actual	Difference	Expected	Actual	Difference
<u>Males</u>	593	509	84	732	455	277
14-19	67	60	7	65	35	30
20-24	99	79	20	106	61	45
25-34	168	123	45	210	105	105
35-44	110	109	1	169	101	68
45-54	80	72	8	97	81	16
55-64	48	43	5	63	51	12
65 and over	21	23	- 2	22	21	1
<u>Females</u>	227	195	32	229	172	57
14-19	36	34	2	21	14	7
20-24	42	39	3	45	36	9
25-34	74	54	20	71	51	20
35-44	43	40	3	54	38	16
45-54	22	18	4	24	21	3
55-64	8	7	1	11	9	2
65 and over	2	3	- 1	3	3	0
<u>Total Both Sexes</u>	820	704	116	961	627	334

Figure 23  
**ACTUAL AND EXPECTED LABOR FORCE POPULATION  
 BY AGE AND SEX  
 PUERTO RICO: 1950 AND 1960**



(see Table 61). This means that the 1960 actual number of jobs would have had to be increased by 53 per cent just to maintain, unchanged, the level of employment.

TABLE 61  
ACTUAL AND EXPECTED EMPLOYMENT BY SEX:  
1950 AND 1960 (IN THOUSANDS)

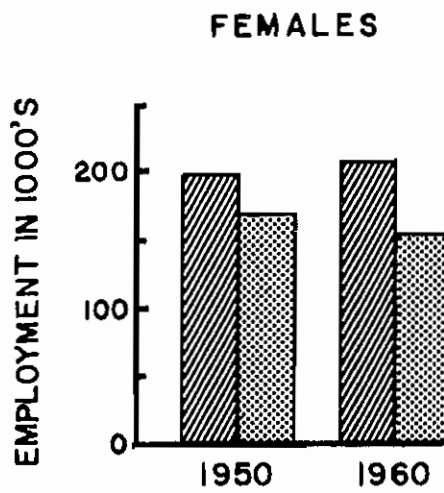
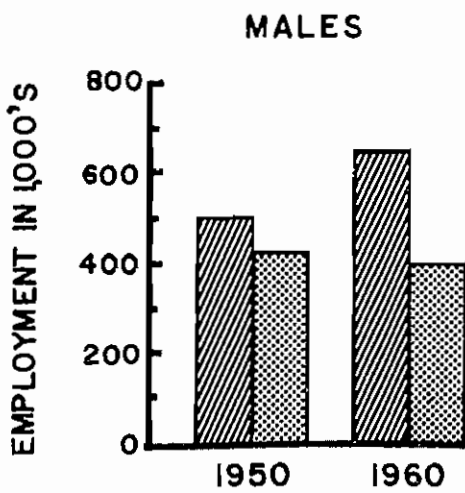
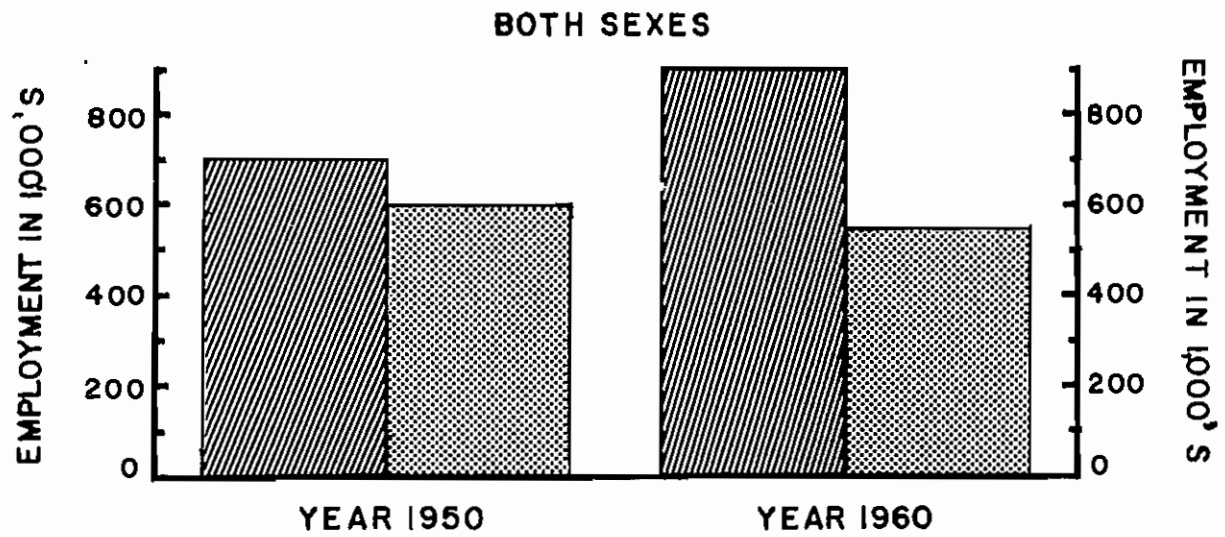
Employment	1 9 6 0			1 9 5 0		
	Both Sexes	Males	Females	Both Sexes	Males	Females
Recorded Per Cent of Employment. . . . .	88.4	87.9	90.1	85.3	84.7	86.7
Expected Labor Force Population. .	961	732	229	820	593	227
Expected Employment.	850	643	207	699	502	197
Actual Employment. .	555	400	155	601	431	170
Additional Employment Needed . . . .	295	243	52	98	71	27

We have no doubt that, in the absence of emigration, most (if not all) of the Island's socio-economic achievements would have been considerably minimized. We must remember that during this 20-year period of socio-economic progress, of which most of the Island's leaders are so euphoric, total employment has remained almost stationary. In fact, there occurred a significant reduction of some 46,000 jobs during the period 1950-1960, the decade of greatest socio-economic achievement (see Table 43).

As pointed out earlier, the Island's government claims to have generated some 100,000 jobs (direct and indirect) during the 15 years of industrialization efforts, jobs which have only served

Figure 24

### ACTUAL AND EXPECTED EMPLOYMENT BY SEX PUERTORICO: 1950 AND 1960



CODE: ▨ Expected    ▩ Actual

as substitutes for the radical decline in agricultural as well as other low-paid pursuits. Thus in the absence of emigration, the Puerto Rican government would have had to quadruplicate efforts in order to provide for the 300,000 additional jobs which would have been needed in 1960.

Even assuming that in the absence of emigration the number of low paid jobs (agricultural, etc.) had remained constant, more than 150,000 additional jobs would have been needed.

Moreover, many other problems resulting from an explosive population growth (in the absence of emigration) would have forced governmental efforts toward these many other problem areas. Many more schools and teaching facilities, more hospitals, public health personnel and activities, and extended housing facilities would have been needed if emigration to the States had been zero. Explosive metropolitan and urban growth would have made slum growth one of the most pressing problems, together with such social maladies as crime and delinquency.

Under such circumstances it would have been difficult (if not impossible) for the government to cope with the problem of an extraordinary growth in the labor force population. It is likely that unemployment would have increased over the too-high level we have observed since 1940. Considerable increases would have been observed also in underemployment and subsistence farming.

#### Other Effects

Not all the effects of emigration were favorable to the Island's economy. As emigration subtracts more "hands" than "mouths," the burden of dependency has increased markedly in the



Island. Defining dependents as persons under 20 years of age and 65 years and over, we find that the dependency ratio<sup>1</sup> remained more or less constant from 1899 to 1940. Since 1940 it has increased noticeably and in 1960 we find 140 dependents per each 100 "working" persons (20 to 64 years old) as compared with 126 in 1899 (see Table 62).

TABLE 62  
DEPENDENCY IN PUERTO RICO: 1899-1960<sup>a</sup>

Year	Total <sup>b</sup>	Young <sup>b</sup>	Old <sup>b</sup>
1899	125.9	121.2	4.7
1910	124.4	119.2	5.2
1920	124.4	119.0	5.4
1930	130.9	125.1	5.8
1940	122.3	114.8	7.5
1950	132.8	123.8	9.0
1960	140.4	127.9	12.5

<sup>a</sup>Source: U. S. Census of Population, 1960, Report PC(1)-53B, Table 14.

<sup>b</sup>Total equals persons under 20 years of age (young) plus persons 65 and over (old) as a ratio of persons 20-64 years of age.

During the last two decades dependency has increased both among minors (persons under 20 years of age) and old persons (65 years and over). It is really amazing to see that the number of persons under 20 years per 100 persons 15 to 64 increased during the last decade in spite of the radical decline observed in the crude birth rate. As a result of the depletion of the working

---

<sup>1</sup>The dependency ratio is equal to the number of persons aged 20 years or less plus persons 65 and over per 100 persons aged 20 to 64 years old.

Figure 25

PERSONS UNDER 20 YEARS OF AGE PLUS PERSONS  
65 YEARS OF AGE AND OVER PER 100 PERSONS  
20 TO 64 YEARS  
PUERTO RICO: 1899-1960

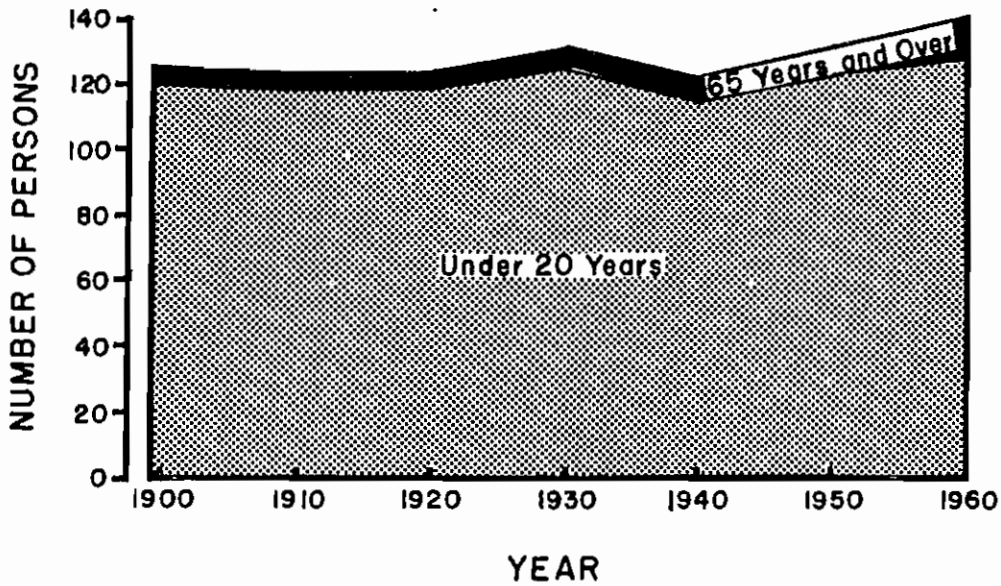
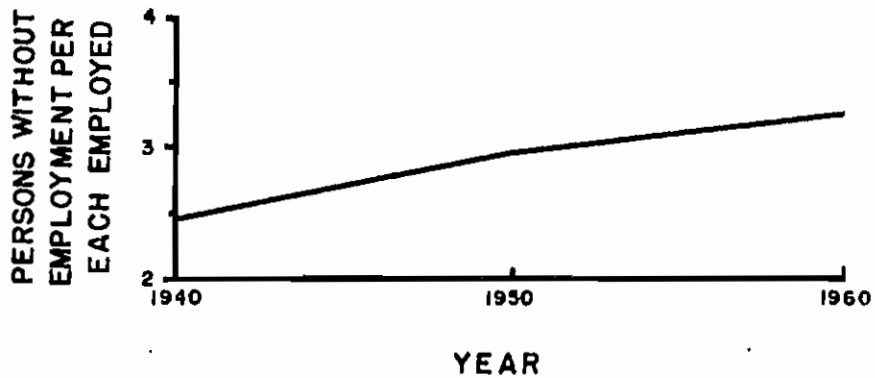


Figure 26

NUMBER OF PERSONS WITHOUT AN EMPLOYMENT  
PER EACH PERSON EMPLOYED  
PUERTO RICO: 1940, 1950 AND 1960



ages, lengthening of life expectancy, and of decline in the birth rate, the number of dependents 65 years and over increased significantly during the last decade.

If we define dependents more realistically as those persons without employment, we also find an important growth in dependency since 1940, when there were 2.5 dependents per person employed, while in 1960 we find 3.3 such dependents.

In other words, in 1940 the earnings of an employed person were in the average shared by 3.5 persons; in 1960, they were shared by 4.3 persons.

TABLE 63  
NUMBER OF PERSONS WITHOUT EMPLOYMENT PER  
PERSON EMPLOYED: 1940, 1950 AND 1960<sup>a</sup>

Item	1940	1950	1960
Persons Without Employment . .	1,333	1,651	1,798
Persons Employed . . . . .	536	560	552
Ratio . . . . .	2.49	2.95	3.26

<sup>a</sup>Source: Official censuses for Puerto Rico.

Internal Migration

We have no way of dealing quantitatively with internal migration for periods prior to 1930, due to the fact that vital statistics on a municipal or regional basis were not tabulated during this period for all years. In addition, for the years they are available, we will be unable to determine whether the differences

observed were true differences or due to differentials in the percentage of underregistration in vital events.

The tabulation of vital statistics by municipalities<sup>1</sup> since 1930 enables us to estimate, on a more accurate basis, the magnitude and patterns of internal movements in the Island.

All the results to be presented in this section were obtained from the population formula:

$$m = p_1 - p_0 - b + d$$

Where:

m = net migration in a given municipality during a given intercensal period.

p<sub>1</sub> = enumerated population for a given municipality in the latest census.

p<sub>0</sub> = enumerated population for the same municipality in the earliest census.

b = number of births occurred to residents of the municipality during the intercensal period.

d = number of deaths to residents of the municipality during the intercensal period.

Undoubtedly this method is subject to many errors, especially those resulting from census underenumeration and under-registration of deaths and births. In the case of Puerto Rico, for example, apparently there has always been a greater under-registration of births than of deaths, thus the above formula will result in an overestimation of internal migration.<sup>2</sup> In addition,

---

<sup>1</sup>See next section for the definition of a municipality.

<sup>2</sup>Properly speaking, the formula under such conditions will result in an overestimation of in-migration and an understatement of out-migration (in algebraic terms an overestimation of net migration in both cases).

any improvement in census coverage will make the difference between  $p_1$  and  $p_0$  greater than it should be, and thus we will also be overestimating internal migration.<sup>1</sup>

The indications are that overestimates of in-migration and underestimates of out-migration will be presented, as would be the case for any given municipality or region, especially for periods prior to 1950.

There is another problem in dealing with this method, particularly in the case of Puerto Rico. Any result for a given municipality or region will be the net product of internal and external migration and we will be unable to separate these components. The problem became serious after 1940, when external migration gained impetus; nevertheless, the figures presented here will give us a rough idea of internal movements in the Island.

#### Migration by Municipalities

Puerto Rico is politically divided into 77 small areas called municipalities.<sup>2</sup> Each one is composed of a central city or town or village, the seat of the municipal government, and other urban and rural territory. The city of San Juan, coextensive with the municipality, is the capital of the Island.

According to our estimates, during the 1930-1940 decade, 56 municipalities lost population through out-migration, while 21 others gained population. In general, out-migration predominated

---

<sup>1</sup>Even a constant percentage of underenumeration in an increasing population will result in an overestimation.

<sup>2</sup>Rio Piedras municipality was annexed to San Juan after 1950 but we are considering it here as one of the original 77 municipal districts.

TABLE 64

INTERNAL MIGRATION ESTIMATES FOR EACH INTERCENSAL PERIOD: 1930-1940 TO 1950-1960<sup>a</sup>

Municipalities	1930-1940		1940-1950		1950-1960	
	Number	Rate <sup>b</sup>	Number	Rate <sup>b</sup>	Number	Rate <sup>b</sup>
Adjuntas. . . . .	- 1,043	- 5.8	- 6,775	-30.0	- 8,506	-37.9
Aquada. . . . .	- 544	- 3.7	- 2,743	-15.3	- 4,692	-22.6
Aquadilla. . . . .	2,087	7.4	- 2,011	- 5.8	- 8,047	-18.1
Aguas Buenas. . . . .	- 2,376	-18.4	- 3,778	-25.8	- 3,515	-22.6
Aibonito. . . . .	- 3,585	-21.9	- 2,816	-16.7	- 4,982	-27.4
Anasco. . . . .	- 1,545	-10.8	- 2,667	-17.0	- 4,669	-27.1
Arecibo. . . . .	3,203	5.7	- 8,392	-12.1	-20,306	-26.9
Arroyo. . . . .	815	9.9	- 1,065	- 9.9	- 3,297	-25.5
Barceloneta. . . . .	- 690	- 4.4	- 3,816	-20.6	- 5,031	-25.3
Barranquitas. . . . .	- 2,114	-14.2	- 5,310	-31.1	- 5,609	-31.9
Bayamón. . . . .	660	2.2	- 2,635	- 7.1	7,082	14.8
Caguas. . . . .	- 2,855	- 6.0	- 6,419	-12.0	-11,737	-19.5
Cabo Rojo. . . . .	- 1,605	- 6.7	- 7,054	-24.7	-10,116	-34.2
Camuy. . . . .	- 700	- 4.3	- 3,823	-20.2	- 6,399	-30.6
Carolina. . . . .	52	0.0	- 1,134	- 4.7	3,694	12.6
Catano. . . . .	3	0.0	6,981	71.8	- 2,110	-10.6
Cayey. . . . .	- 2,666	- 9.3	- 5,225	-16.6	- 9,657	-26.3
Cejba. . . . .	- 1,777	-24.4	200	2.8	- 1,678	-18.2
Ciales. . . . .	- 3,115	-15.2	- 9,264	-40.4	- 7,016	-36.0
Cidra. . . . .	- 3,695	-18.8	- 5,376	-26.4	- 5,406	-26.4
Coamo. . . . .	183	1.0	- 3,409	-15.0	- 8,136	-30.7
Comerio. . . . .	- 2,953	-17.7	- 6,050	-32.6	- 4,670	-26.0
Corozal. . . . .	- 965	- 5.9	- 4,358	-21.3	- 7,094	-30.7
Culebra. . . . .	- 230	-27.2	210	-24.4	443	-49.9
Dorado. . . . .	288	3.8	150	1.6	- 1,323	-11.3
Fajardo. . . . .	814	5.0	- 3,533	-17.3	- 6,856	-31.0
Guanica. . . . .	- 439	- 4.3	- 1,571	-12.4	- 5,529	-35.4
Guayama. . . . .	3,321	14.1	- 5,226	-17.1	- 8,334	-25.4
Guayanilla. . . . .	- 911	- 6.9	- 2,606	-16.7	- 4,618	-26.5
Guaynabo. . . . .	1,567	11.6	4,901	26.8	2,713	9.3
Gurabo. . . . .	- 3,631	-24.1	- 3,824	-24.1	- 3,589	-21.9
Hatillo. . . . .	- 1,800	-11.1	- 2,821	-15.4	- 4,915	-23.5
Hormigueros. . . . .	167	3.4	644	-10.6	- 1,088	-15.7
Humacao. . . . .	- 766	- 3.0	- 3,759	-12.6	-10,318	-29.6
Isabela. . . . .	- 1,666	- 7.2	- 4,114	-15.9	- 7,310	-25.1
Jayuya. . . . .	- 1,489	-12.2	- 3,729	-25.6	- 5,266	-34.8
Juana Díaz. . . . .	225	1.2	- 2,160	- 9.2	- 6,202	-22.4
Juncos. . . . .	- 969	- 5.5	- 2,922	-15.0	- 5,882	-27.2
Lajas. . . . .	- 1,013	8.1	- 2,789	-18.9	- 4,360	-26.7
Lares. . . . .	- 4,518	-16.5	- 8,896	-29.7	-11,852	-39.6
Las Marías. . . . .	- 1,531	-17.2	- 1,619	-16.8	- 4,011	-37.1
Las Piedras. . . . .	- 1,070	- 8.3	- 3,941	-25.6	- 3,732	-23.0
Loiza. . . . .	- 1,311	- 7.0	- 4,077	-18.4	- 3,820	-15.4
Iuquillo. . . . .	- 721	- 9.2	- 1,312	-14.8	- 3,185	-32.0

TABLE 64--Continued

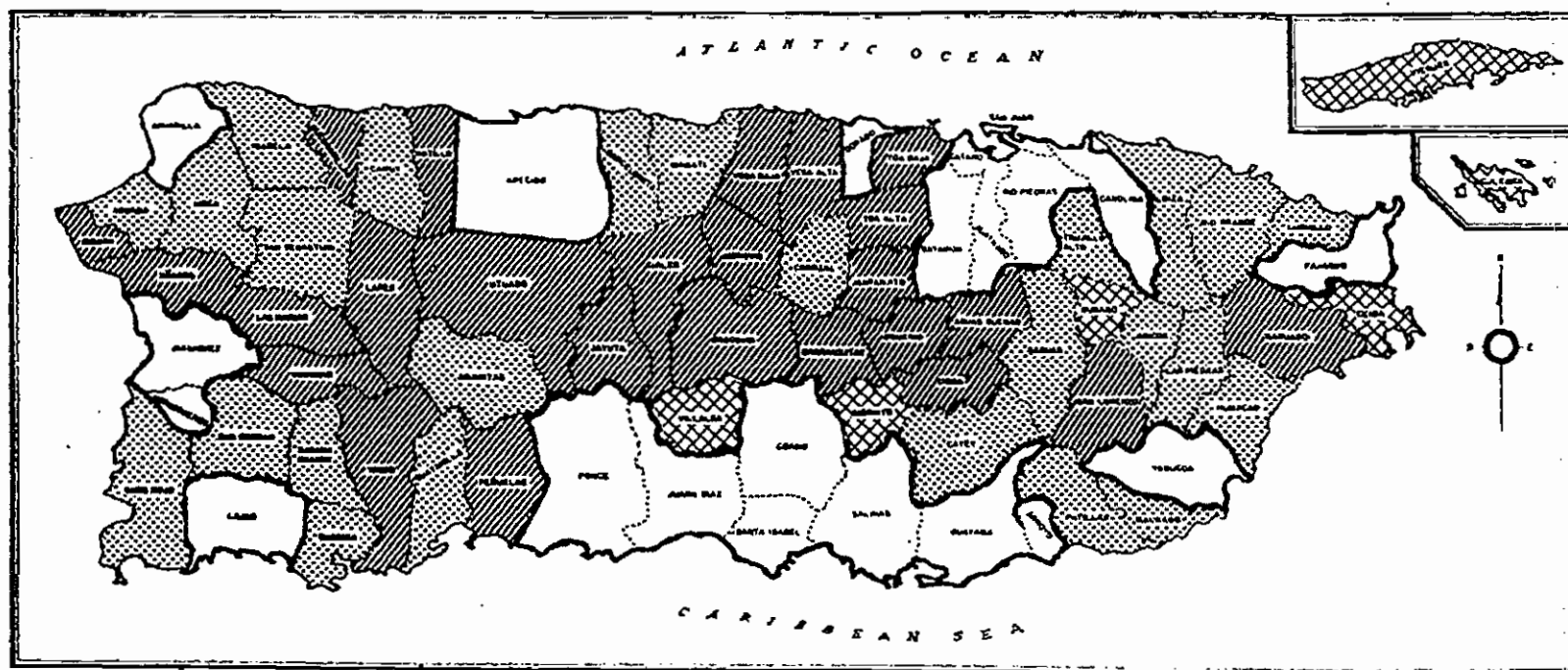
Municipal- ities	1930-1940		1940-1950		1950-1960	
	Number	Rate	Number	Rate	Number	Rate
Manati. . . . .	- 1,092	- 4.4	- 6,885	-23.4	- 8,932	-29.3
Maricao . . . . .	- 782	-12.1	- 2,506	-32.4	- 2,305	-31.1
Maunabo . . . . .	- 824	- 9.1	- 2,691	-24.9	- 4,342	-36.9
Mayaguez. . . . .	9,248	15.9	- 5,578	- 7.3	-20,995	-24.0
Moca. . . . .	- 815	- 5.4	- 4,132	-21.0	- 6,234	-28.8
Morovis . . . . .	- 2,851	-16.4	- 5,492	-28.7	- 6,810	-35.3
Naguabo . . . . .	- 3,300	-18.1	- 4,581	-23.9	- 8,225	-39.1
Naranjito . . . . .	- 1,311	-11.3	- 2,850	-20.4	- 3,824	-24.0
Orocovis. . . . .	- 1,795	-11.1	- 5,227	-26.4	- 8,118	-38.3
Patillas. . . . .	- 358	- 2.5	- 3,535	-20.4	- 7,196	-38.2
Peñuelas. . . . .	- 1,924	-14.5	- 3,324	-22.5	- 4,260	-28.5
Ponce . . . . .	7,970	9.1	- 3,528	- 3.3	-17,625	-13.9
Quebradillas. . . . .	- 1,112	-10.9	- 1,775	-15.4	- 4,327	-31.6
Rincón. . . . .	- 1,270	-15.5	- 1,921	-20.8	- 3,408	-34.5
Rio Grande. . . . .	- 1,251	- 8.9	- 3,598	-22.3	- 2,729	-16.4
Rio Piedras . . . . .	23,589	57.7	54,364	79.6	58,692	40.8
Sabana Grande . . . . .	- 1,152	- 9.7	- 2,632	-18.6	- 4,205	-26.1
Salinas . . . . .	659	4.3	- 2,234	-11.5	- 7,379	-31.5
San Germán. . . . .	- 1,991	- 8.4	- 3,768	-14.2	- 7,988	-27.0
San Juan. . . . .	31,573	27.5	5,975	3.5	-80,734	-35.6
San Lorenzo . . . . .	- 2,683	-11.4	- 5,781	-21.7	-10,082	-34.5
San Sebastián . . . . .	- 2,579	- 9.3	- 4,981	-16.5	-12,059	-34.1
Santa Isabel. . . . .	571	6.4	- 1,698	-14.8	- 3,101	-23.0
Toa Alta. . . . .	- 1,307	-11.2	- 2,872	-21.5	- 1,978	-14.0
Toa Baja. . . . .	- 1,581	-16.0	873	7.7	415	- 2.6
Trujillo Alto . . . . .	- 926	- 9.7	- 1,743	-14.9	886	6.5
Utua. . . . .	- 3,962	-10.6	- 7,202	-16.9	-16,997	-36.5
Vega Alta . . . . .	- 1,654	-13.4	- 2,445	-17.1	- 3,164	-19.2
Vega Baja . . . . .	- 2,276	-11.2	- 2,184	- 9.5	- 7,081	-24.5
Vieques . . . . .	- 2,749	-26.0	- 3,658	-35.3	- 3,708	-40.2
Villalba. . . . .	- 2,080	-21.8	- 2,516	-19.5	- 4,405	-29.4
Yabucoa . . . . .	948	4.3	- 6,218	-22.7	- 7,981	-27.7
Yauco . . . . .	- 3,262	-11.7	- 4,881	-19.3	- 9,809	-29.1

<sup>a</sup>Source: Vital statistics used in the computation of these estimates obtained from the Bureau of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup>Rate was computed using as denominator the enumerated population at the beginning of the period.

Figure 27

MIGRATION RATES BY MUNICIPALITIES  
 PUERTO RICO: 1930-1940



Out-migration Municipalities

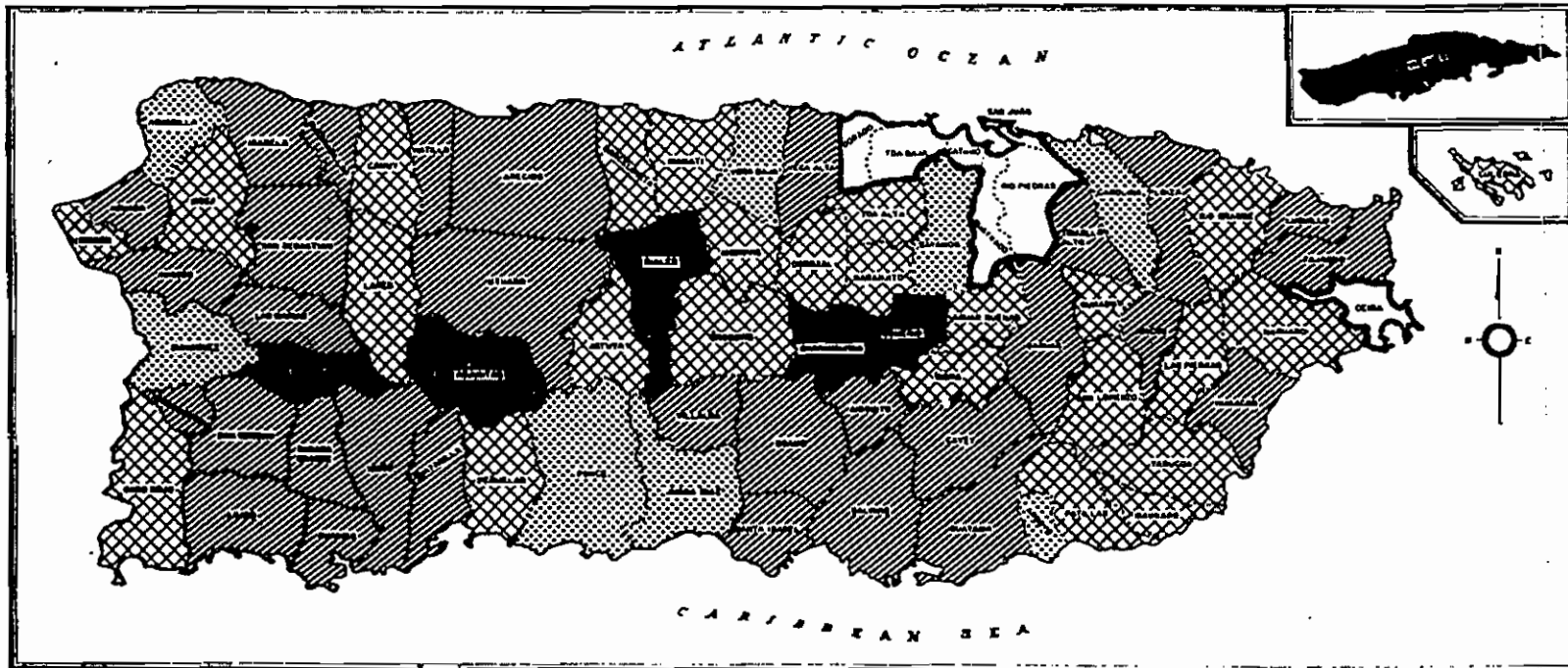
■ 30% or more	▨ 10-19 percent
⊠ 20-29 percent	⊞ Less than 10%

□ In-migration Municipalities



Figure 28

MIGRATION RATES BY MUNICIPALITIES  
PUERTO RICO: 1940-1950



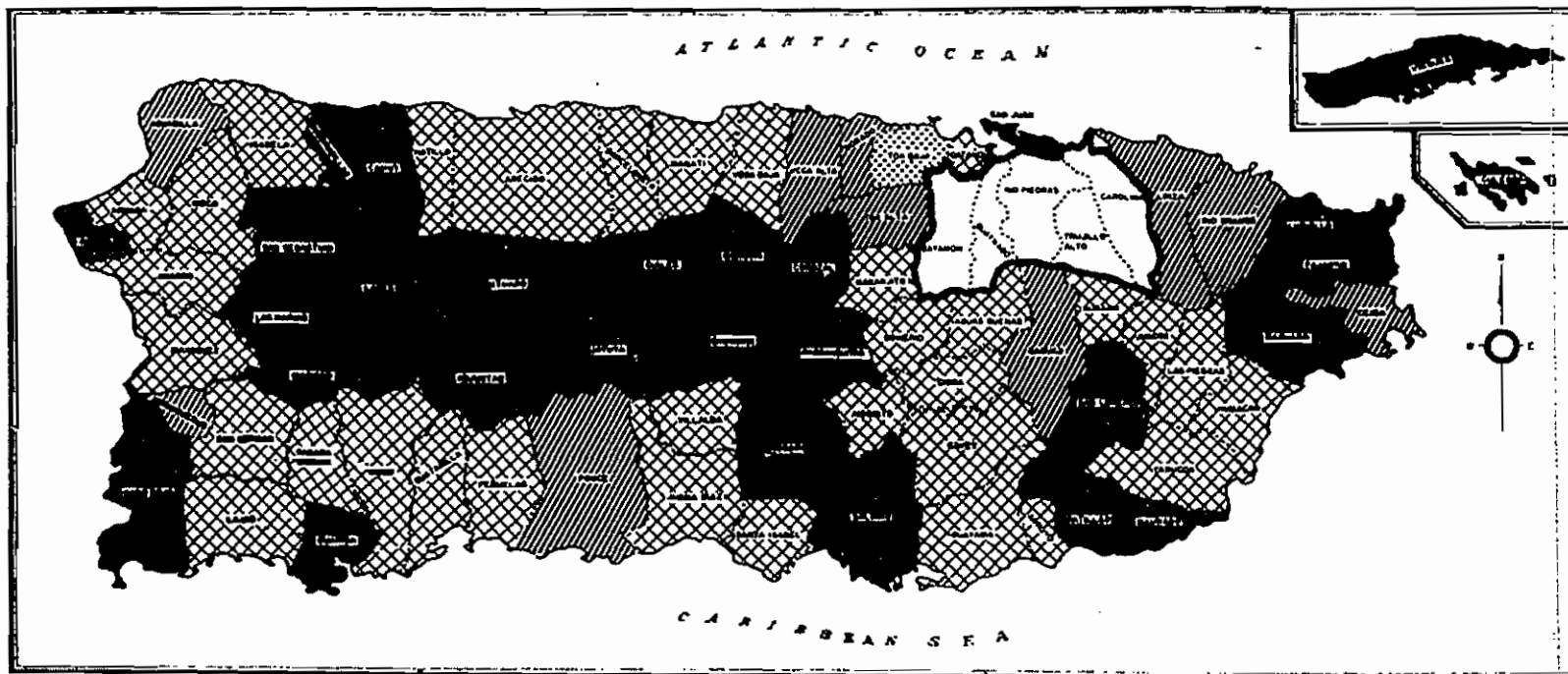
Out-migration Municipalities

■ 30% or more	▨ 10-19 percent
▩ 20-29 percent	▧ Less than 10%

□ In-migration Municipalities

Figure 29

MIGRATION RATES BY MUNICIPALITIES  
PUERTO RICO: 1950-1960



Out-migration Municipalities

- 30% or more
- ▨ 10-19 percent
- ▩ 20-29 percent
- ▧ Less than 10%

□ In-migration Municipalities

among the municipalities of the central part of the Island, although the highest out-migration rates were recorded in the municipal districts of the islands of Vieques and Culebra (see Table 64).

On the other hand, the municipalities of greater in-migration were: Rio Piedras (with a rate of 80 per cent), San Juan, Mayaguez, Guaynabo, and Ponce. In-migration, therefore, concentrated around the three biggest urban places of the Island: San Juan, in the north; Ponce, in the south; and Mayaguez, in the west (see Figures 27, 28, and 29).

As observed in Table 65, the number of municipalities which lost population through out-migration increased considerably during the next two decades. During the period 1940-1950, 7 municipalities gained population by in-migration but in only 4 of them was the increase greater than 1,000 persons. In relative terms, only Catano, Rio Piedras, and Guaynabo gained considerably from in-migration (see Table 64).

TABLE 65

DISTRIBUTION OF MUNICIPALITIES BY RATE OF MIGRATION:  
1930-1940, 1940-1950, AND 1950-1960<sup>a</sup>

Rate of Migration (Per Cent)	D E C A D E		
	1930-1940	1940-1950	1950-1960
<u>Out-Migration</u> . . . . .	56	70	72
30.0 and over . . . . .	0	5	28
20.0 - 29.9 . . . . .	6	26	32
10.0 - 19.9 . . . . .	25	31	11
0.1 - 9.9 . . . . .	25	8	1
<u>In-Migration</u> . . . . .	21	7	5
0.0 - 9.9 . . . . .	16	4	2
10.0 - 19.9 . . . . .	3	0	2
20.0 - 29.9 . . . . .	1	1	0
30.0 and over . . . . .	1	2	1
<u>All Municipalities</u> . . . . .	77	77	77

<sup>a</sup>Source: Table 64.

Among the 70 municipalities recording an out-migration balance, five had a rate of over 30 per cent: Maricao, Ciales, Barranquitas, Comerio, and the island of Vieques. During this decade even Ponce and Mayaguez, which ranked second and third among the Island's urban places, lost by out-migration.

In regional terms, out-migration concentrated among the municipalities of the central part of the Island, while in-migration predominated among the municipalities adjacent to San Juan, the capital.

The same pattern was maintained during the decade 1950-1960, although more intense, as all but five municipalities lost by out-migration. Even San Juan, the capital, lost over 80,000 persons (35.6 per cent) in this way. Apparently many San Juan residents moved out of the city to large-scale housing projects in the nearby municipalities during the last decade.

Heavy out-migration (30 per cent and over) was observed also in another 27 municipalities, most of them in the central part of the Island. In-migration, on the other hand, continued to be a characteristic of those municipalities adjacent to Rio Piedras, the focus of in-migration since 1930 (see Table 65 and Fig. 29).

Undoubtedly these changes are not a product of internal migration alone; emigration to the United States has played an important role, especially during the decades 1940 to 1960. During the 1940-1950 decade a net loss of some 267,000 persons was recorded among the 70 municipalities which exhibited an out-migration balance. Of this total, 73,000 were gained by other municipalities, while the rest (194,000) is attributed to emigration to the United States and other countries. Thus, only 27 per

cent of the net loss of these 70 municipalities was gained by the other 7 municipalities.

During the decade 1950-1960, only 73,000 of a total of 536,000 persons lost by 72 municipalities represent an in-migration balance for the remainder of the Island. The rest, 463 thousand, was approximately the net loss for the Island as a whole resulting from emigration to other countries. That is, of the total loss observed in the 72 municipalities which had an out-migration balance, only 14 per cent represented a net gain for the 5 municipalities which had an in-migration balance.

Under these conditions, probably the best index for the magnitude of internal migration is the net gain observed in those municipalities which had an in-migration balance. According to our estimates this figure shows a descending tendency since the 1930-1940 decade. During this period a net of about 88,000 persons was gained by 21 municipalities. During the next two decades the corresponding figures were 73.4, and 73.1 thousands, respectively.

It is evident that since 1940 or so, internal movements have been eclipsed by external migration. Only those municipalities in the San Juan Metropolitan area gained by in-migration, which support the hypothesis that urban and metropolitan growth in Puerto Rico has been more of a "push" than of a "pull." It is not the lure of big urban centers which causes people to leave the country and rural municipalities; it was (and is) the miserable socio-economic conditions prevailing in those areas which pushes them out.

Internal and external migration have operated in such an intricate fashion during the last 20 years that we are, to a great extent, unable to trace the currents of internal migration. Two

unquestionable facts, however, emerge from the data we have presented here. First, out-migrants tend to come from those municipalities located toward the center of the Island as well as from the Islands of Vieques and Culebra; and, second, the current out-migration has increased considerably with time. During the decade 1950-1960, for example, 72 out of 77 municipalities recorded an out-migration balance.

As Table 66 shows, out-migration seems to be closely associated with socio-economic conditions, such as family income and agricultural employment. In general, out-migration tends to be higher among low family income municipalities and among those with a high proportion of persons engaged in agriculture.

TABLE 66

DISTRIBUTION OF THE MUNICIPALITIES BY RATE OF OUT-MIGRATION, FAMILY INCOME, AND PROPORTION OF THE EMPLOYED MALE LABOR FORCE ENGAGED IN AGRICULTURE<sup>a</sup>

Rate of Out-Migration (1950-1960)	Number of Municipalities <sup>b</sup>	Average of Median Family Income (1959)	Average Per Cent of Males Engaged in Agriculture (1960)
30 per cent or more	26	\$ 803	47.1
20 - 29.9 per cent	32	\$ 909	40.1
10 - 19.9 per cent	11	\$1301	27.6
Less than 10 per cent of in-migration	6	\$1966	13.7

<sup>a</sup>Sources: Table 64, above; and U.S. Census of Population, 1960, Report PC(1)-53C.

<sup>b</sup>San Juan and Rio Piedras were combined and Culebra Municipality was not considered because of data not available from the 1960 census.

The correlation coefficient between median family income and the rate of out-migration for the municipalities is -0.78, and 0.67 between out-migration and agricultural employment.

## CHAPTER V

### NATALITY AND FERTILITY

Puerto Rico is one of the few under-developed countries which offers a great variety of demographic data. It is true that some of the available information is not altogether reliable and is in some cases highly incomplete; but for the demographer who deals with a country he knows thoroughly, both in the present and the historical past, these errors do not present serious handicaps. In this publication, in addition to presenting all collected data, we will call attention to possible errors and, in most cases, present "corrected" figures.

In the first section of this chapter we will discuss the trends in the crude birth rate since 1765. In the second, more refined indexes of fertility will be analyzed, and the last will be devoted to the study of fertility differentials.

#### The Crude Birth Rate

In the true sense of the word, there did not exist before 1885 a birth registration system in Puerto Rico. The Catholic Church maintained a register of baptisms, which logically excluded those live infants who died before baptism. Besides, as baptism could be celebrated any time after birth, baptism figures included persons born in different years.

Nevertheless, some censuses provide us with population

figures by age and sex from which we will be able to compute, within certain limits of accuracy, the crude birth rate. We have done this for the census years of 1765, 1860, and 1887. The procedure used is the following:<sup>1</sup>

(1) We assumed that a convenient enumerated population (0-9 years for 1765, and 6-10 years for 1860 and 1887) were survivors to persons born during some specified period of time prior to the census date.

(2) Making use of a reasonable survival factor, we compute the number of births which corresponds to the enumerated population cohort.

(3) We then divide the annual average number of births for the period by the midterm estimated total population to get the estimated crude birth rate.

According to this procedure the estimated birth rates were the following:

TABLE 67

ESTIMATED CRUDE BIRTH RATE: 1755-1765,  
1850-1855, AND 1877-1882<sup>a</sup>

Period	Crude Birth Rate
1755-1765	68
1850-1855	55
1877-1882	53

<sup>a</sup>Source: Appendix II.

Although the relative accuracy of these censuses could be

---

<sup>1</sup>See Appendix II for the computational procedure and the age distribution of the Spanish Censuses.



questioned<sup>1</sup> and thereby the above crude birth rate estimates, two independent sets of data tend to confirm the relative validity of these estimates.

In the excellent work written by George D. Flinter, An Account of the Present State of the Island of Puerto Rico, he presents the following information about births (baptisms) for 1828:

TABLE 68  
REGISTERED NUMBER OF BIRTHS (BAPTISMS) BY SEX FOR 1828

Color and Condition	Males	Females	Total	Sex Ratio
Whites. . . . .	3,273	2,364	5,637	138
Free Non-White. . . . .	3,688	3,328	7,016	111
Slaves. . . . .	985	800	1,785	123
Total. . . . .	7,946	6,492	14,438	122

It has been found that, in all countries where the registration of births is complete and reliable, the sex ratio at birth is around 105 males per each 100 females. For this reason, in the figures presented above there is a clear sex differential in the underregistration of "births," that is, proportionately more males were baptized than females. This is in accordance with

---

<sup>1</sup>Apparently the Spanish censuses, as total counts, were accurate enough. (See introductory notes to Report on the Census of Puerto Rico, 1899, and Chapter II of this thesis.) We have been unable, however, to test for accuracy in age reporting due to the large periods of time between one census and the next. Nevertheless, a comparison between the 1887 Spanish census and the 1899 U. S. Census for Puerto Rico shows close agreement in terms of age structure.

expectations for an agrarian male-dominated society, as Puerto Rico prior to the Twentieth Century.

Assuming the sex ratio at birth to be 105, the number of births will increase to 15,600, and the birth rate will be 51.5 instead of the recorded 47.7.<sup>1</sup> If we further assume, conservatively, that some 10 per cent of all live male births were not baptized, many because they died as infants before baptism could be arranged, the birth rate would increase to 57.3. Comparing this estimated birth rate with the recorded figure of 47.7, we would infer an overall underregistration of births (baptisms) of 17 per cent. This percentage, we will see, is considerably lower than our estimate on a more accurate basis for the whole period 1888 to 1920.

The second piece of evidence is the recorded rate of population growth observed during the last quarter of the Eighteenth Century and the first half of the Nineteenth Century (see Table 4). During the ten-year period 1765-1775, for example, the rate of population growth was 4.6 per cent. Assuming that the crude death rate was 4.0 per cent (40 deaths per 1,000 population), around 8.6 per cent increase per year has to be attributed to natality and immigration. Under the prevailing transportation facilities from Spain to the Island, it is difficult to see how the immigration rate could be greater than one per cent per year. Even assuming a death rate as low as 3.0 per cent and an immigration rate as high as 1.5 per cent per year, the resulting crude birth rate for the period 1765-1775 would be 6.1 per cent (61 births per 1,000 population).

---

<sup>1</sup>The estimated total population for 1828 was 303,000 inhabitants (see Table 3).

In the light of the available information it appears that the crude birth rate was about 60 births per 1,000 population during the last quarter of the Eighteenth Century, and has since followed a declining trend. We have estimated it at 57 for the year 1828, at 55 for the period 1850-1855, and at 53 for the period 1877-1882.

The declining trend in the rate of population growth is the best argument in support of the hypothesis of a declining tendency in the crude birth rate. As discussed in Chapter II, the rate of population increase declined steadily from 4.6 per cent per year during the decade 1765-1775, to slightly less than one per cent per annum during the decade 1877-1887 (see Table 4). Although this trend in the rate of population growth could be attributed to census error, it is difficult to believe that census accuracy deteriorated steadily over time.

Without claiming a high degree of reliability for the estimated crude birth rates presented above, these rough estimates reveal two important facts: first, that the crude birth rate was incredibly high during the Eighteenth and Nineteenth Centuries; and, second, that it was following a declining trend.

Both the high birth rate figures observed during the last quarter of the Eighteenth Century and the first half of the Nineteenth Century and its declining trend can be explained by the same factor--immigration. It was during the last half of the Eighteenth Century that the first great wave of immigration to the Island occurred.<sup>1</sup> Although we are reluctant to accept, in

---

<sup>1</sup>See Abbad y La Sierra.

light of the transportation facilities of the epoch, that an extraordinary amount of immigration (in absolute terms) occurred, it might well have been substantial in relative terms. In a population of 20,000 inhabitants,<sup>1</sup> as that of Puerto Rico in the mid-Eighteenth Century, an annual emigration of 500 persons represents a remarkably high rate of immigration (about 2.5 per cent).

In all probability these overseas migrants should have been, in the vast majority, young adult persons. A significant increase in the proportion of persons in the highly reproductive ages will produce, all other things being equal, a substantial increase in the crude birth rate.

Thus, the high birth rates observed during the last quarter of the Eighteenth Century could be the immediate and temporary result of the wave of immigration which has been reported by many historians. Once immigration lost relative importance, a decline in the birth rate was the logical consequence of the stabilization process in the population. That is, a population with an abnormally high proportion of persons in the reproductive ages will have a high birth rate, which will, in turn, result in an extraordinarily high proportion of persons in the very young ages during the next generation and in a lower birth rate. That is the logic of Lotka's stable population model.

Another factor undoubtedly associated with the high birth rates prevailing during the Eighteenth and Nineteenth Centuries was the rural agrarian type of society. During this period only San Juan in the northeastern part of the Island and San Germán in

---

<sup>1</sup>See Chapter II.

the southwest could be considered urban places. It is well known that in primitive agrarian societies children are a necessity, for in the production of goods and services the family is the basic unit, and production a function of the size of the family. In addition, a high natality is required to counter-balance the effect of a high infant and childhood mortality.

In 1885, a Civil System of Registration was established in Puerto Rico by placing a local register in each of the existing municipalities. Upon a request of the 1899 Census officials birth figures were tabulated for the period 1888 to 1898. These data were published in the 1899 Census Report.<sup>1</sup>

According to these data, the average birth rate for the whole period (1888-1898) was 28.2 births per 1,000 inhabitants, while the corresponding death rate was 30.2 deaths per 1,000 population. While the recorded rate of natural increase (the difference between the crude birth rate and crude death rate) was -2.0 per 1,000 population, the annual rate of population growth was 1.5 per cent.<sup>2</sup> The great inconsistency between the rate of population growth and the rate of natural increase, in a period when external migration was insignificant, means that there was a considerable underregistration of births.

Assuming the rate of population growth to be identical to the rate of natural increase and death registration to be 100 per cent complete, then the crude birth rate should have been 45.6.

---

<sup>1</sup> U. S. War Department Report.

<sup>2</sup> See Table 4.

This figure, compared with the recorded 28.2, shows that birth registration was, at the most, 62 per cent complete.

As a result of the American invasion and the Spanish-American War, it seems that the system deteriorated somewhat especially in the case of births. As seen from registered data, the birth rate declined radically from 28 in 1897, to 21 in 1898. For the fiscal year 1900-1901, the rate was 20.5; 26.2 in 1901-1902; 30.0 in 1902-1903; and 39.3 in 1903-1904. These abrupt changes, both in the absolute figures and in the rates, tend to support the above statement (see Table 69).

Once the crisis created by the war and the American invasion was past, the registration system improved slowly up to 1931, although the great problem of that system was the lack of a central authority. Each local registrar was supervised by the corresponding municipal authority, and only summary tabulations sent to a central office. Thus, in addition to the usual problem of underregistration, there was the problem of inaccurate reporting and tabulating by local officers appointed on a political basis.

In 1931, a centralized system was established in which the Local Register was completely separated from the Municipal government and placed under the supervision of the central office in the Department of Health. Today this central office is known as the Division of Demographic Registry and Vital Statistics.

Instead of receiving summary tabulations from the local offices, as under the former organization, the central office now receives on a monthly basis the original of each certificate forwarded by each of the local registrars. All certificates written

TABLE 69

NUMBER OF RECORDED BIRTHS AND CORRESPONDING  
BIRTH RATES: 1888-1960<sup>a</sup>

Year	Number of Births	Rate <sup>b</sup>	Year	Number of Births	Rate <sup>b</sup>
1888	27,401	33.5	1926	56,675	39.0
1889	25,113	30.2	1927	50,746	34.3
1890	24,231	28.8	1928	56,708	37.7
1891	23,496	27.5	1929	52,468	34.4
1892	25,302	29.2	1930	54,574	35.2
1893	25,457	29.0	1931	65,700	41.5
1894	24,548	27.6	1932	66,433	41.1
1895	25,090	27.8	1933	61,655	37.4
1896	26,270	28.8	1934	65,595	39.0
1897	25,827	27.9	1935	67,585	39.4
1898	19,719	21.0	1936	68,962	39.5
1900-01 <sup>c</sup>	19,930	20.5	1937	67,919	38.2
1901-02	25,898	26.2	1938	69,823	38.5
1902-03	30,123	30.0	1939	73,044	39.6
1903-04	40,053	39.3	1940	72,388	38.5
1904-05	28,472	27.5	1941	76,130	39.8
1905-06	32,226	30.7	1942	78,405	40.3
1907	34,669	32.3	1943	78,393	39.6
1908	36,875	33.8	1944	82,585	41.0
1909	37,461	33.9	1945	86,582	42.3
1910	37,806	33.7	1946	88,723	42.6
1911	39,106	34.3	1947	91,496	43.2
1912	40,708	35.1	1948	87,746	40.8
1913	42,994	36.5	1949	85,638	39.2
1914	47,578	39.8	1950	85,455	38.5
1915	45,268	37.2	1951	84,007	37.8
1916	43,360	35.1	1952	80,200	36.4
1917	44,396	35.4	1953	77,380	35.5
1918	52,003	40.9	1954	78,008	35.5
1919	46,285	35.9	1955	79,221	35.4
1920	50,416	38.4	1956	78,177	34.9
1921	51,190	38.3	1957	76,068	33.8
1922	50,830	37.4	1958	76,128	33.2
1923	51,162	37.0	1959	74,933	32.3
1924	53,876	38.3	1960	76,015	32.2
1925	56,295	39.3			

<sup>a</sup>Sources: Reports of the Commissioner of Health, and Files of the Division of Demographic Registry and Vital Statistics.

<sup>b</sup>Number of Births per 1,000 population.

<sup>c</sup>Fiscal years.

in December, for example, are sent during the first five days of January to the Central Office. A simple account of the number and type of certificates sent is also required from the Local Registrar each month.

The advantages of this system over the previous one are numerous, but the most important points are:

- (1) Political influences and manipulations with the statistical data were reduced to a minimal level; and
- (2) Only skilled personnel, with mechanical aids (not possible at a local level) handle the processing and analysis of the data.

This does not mean, of course, that underregistration of births reached zero. According to the Infant Card Procedure, the U. S. Bureau of the Census estimated this percentage at 14 for 1940 and at 4 for 1950.

For the periods prior to 1940 we have resorted to other methods to test the completeness of birth registration. One of these techniques was the "backward survival" procedure using the population 5-9 years of age, as enumerated in the census, to estimate births. All the evidence shows this age group to be more completely enumerated in the census than the population 0-4 years. The method is the following:<sup>1</sup>

$$\begin{array}{rcl} B_{z-10} \text{ to } z-5 & = & \frac{5 \text{ P } 5}{5-10 \text{ S } B} \\ 5-10 \text{ S } B & = & \frac{5 \text{ L } 5}{500,000} \end{array}$$

---

<sup>1</sup>See Appendix II for the computational procedure.



Where:

- $B_{z-10}^{z-5}$  = number of births occurring during a five-year period 5 to 10 years prior to the census year (z). The population 5-9 years in 1950, for example, were survivors to persons born between 1940 and 1944.
- ${}_5P_5^z$  = population 5-9 years old in the census year (z).
- ${}_{5-10}S_B$  = probability of surviving from birth to age 5-9.
- ${}_5L_5$  = life table stationary population in the age group 5-9.
- 500,000 = number of births occurring during a five-year interval in the life table.

The survival factors used were averages for the periods, as life tables have been constructed for censal years only. The results of such computations are shown on Table 71.

In analyzing the 1950 census data about children ever born, we observe that apparently little change has occurred in rural fertility during the present century. On the other hand, urban fertility seems to have declined slightly (see Table 70). If this is true, any change in the crude birth rate since 1900 should be largely the result of changes in the rural-urban composition of the population.

Thus we assumed that the 1940 age residence specific fertility rates were at least operant since 1900.<sup>1</sup> We applied these rates to the corresponding age-residence distribution of the

---

<sup>1</sup>We used the 1940 fertility rates because it was the earliest period for which we know the percentage of underregistration of births. See Table 93 for the schedule of age-residence specific rates used.

TABLE 70

NUMBER OF CHILDREN EVER BORN PER 1,000 FEMALES OF COMPLETED FERTILITY (45 YEARS OF AGE AND OVER): 1950<sup>a</sup>

Age Group	Total	Urban	Rural
45-49	5,549	4,211	6,801
50-54	5,744	4,561	6,854
55-64	5,912	4,945	6,857
65 and over	5,965	5,253	6,695

<sup>a</sup>U. S. Census of Population, 1950, Bulletin P-C53, pp. 120-121.

TABLE 71

ESTIMATES OF COMPLETENESS OF BIRTH REGISTRATION:  
1883-1893 TO 1930-1934<sup>a</sup>

Survival Method		1940 Fertility Constant Method	
Period	Per Cent Completeness	Period	Per Cent Completeness
1889-93	55	.....	..
1900-04	65	1902-03	62
1910-14	76	1909-11	72
1920-24	85	1919-21	82
1930-34	95	1929-31	84

<sup>a</sup>Source: Appendix II.

census population for earlier periods to obtain the expected number of births. When compared with the recorded numbers we obtain an estimate for underregistration of births. Table 71 shows the result of such a procedure.

There is close agreement for all periods except the last one (periods around 1930), but this inconsistency can be easily

explained by the different groups of years involved in each of the two sets of computations. In the "1940 fertility constant method," two of the three years included (1929 and 1930) were years prior to the establishment of the centralized system. In the other method only one of the five years utilized pertains to the period prior to the centralized system.

From the recorded data it is clearly evident that the publicity which accompanied the establishment of the new system, together with the provision for late registration without penalty, improved registration activity tremendously, at least during the first few years of operation. Table 72 shows the changes which occurred in the absolute and relative numbers with the establishment of the new system.

On the other hand, census data tell us that no substantial change occurred in the overall percentage of completeness since 1950. For this purpose the following computations are presented:

Registered Births: April, 1959 to April, 1960	75,573
Deaths occurring to the above cohort (April, 1959 to April, 1960)--According to 1960 vital statistics only 76 per cent of all infant deaths occurring during a given year corresponds to persons born during the same year. . . . .	- 2,814
Ramp Survey Estimate of Infant Migration April, 1959 to April, 1960. . . . .	+ 300
Expected Population, under 1 year, April, 1960	73,059
Enumerated Population, under 1 year, April, 1960. . . . .	<u>75,881</u>
Apparent Underestimation . . . . .	2,822
Apparent Per Cent of Underregistration . . .	3.6

$$\left[ \frac{(f)}{(f) + (a)} \right]$$

TABLE 72  
NUMBER OF BIRTHS AND CORRESPONDING  
BIRTH RATES: 1929-1939<sup>a</sup>

Year	Number	Rate
1929	52,468	34.4
1930	54,574	35.2
1931	65,700	41.5
1932	66,433	41.1
1933	61,655	37.4
1934	65,595	39.0
1935	67,585	39.4
1936	68,962	39.5
1937	67,919	38.2
1938	69,823	38.5
1939	73,044	39.6

<sup>a</sup> Source: Files of the Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

Although this figure is somewhat lower than the percentage estimated by the Infant Card Procedure for 1950 (4.1 per cent), all indications are that it is an underestimate. First of all, it is highly improbable that census enumeration of infants will be as complete as we have assumed. In almost all censuses this age is the one in which underenumeration is severe. Second, the immigration balance in this age estimated through the ramp survey is difficult to explain, and in all probability it is a reflection of the problem of underenumeration of infants in departures as discussed in the chapter on external migration.

Thus the figure of 3.7 per cent of incompleteness is an ideal lower limit. If, for example, infants are underenumerated by 5 per cent, the percentage of underregistration of births will increase to 8 per cent.

In a recent study, a 50 per cent sample of infant death certificates for 1958 was matched against their corresponding birth certificates by the Division of Demographic Registry and Vital Statistics of the Department of Health of Puerto Rico. Of a total of 2,058 infant death certificates, 106 were impossible to match. This represents a 5.1 per cent of incompleteness in this specific universe. However, as infant mortality is not a representative cross-section of births, it is likely that the figure of 5.1 represents a biased estimate for the actual universe of births.

Although the evidence we have presented here is by no means conclusive, it seems that birth registration completeness has remained more or less unchanged since 1950. Table 73 shows the estimates of birth registration completeness for several periods since 1888.

The first column of Table 74 shows the recorded birth rates for several periods since 1888. These figures give the impression of an increasing trend in the crude birth rate up to the period 1940-1949 (see also Table 69). This puzzling tendency which forced a number of social scientists and demographers to elaborate many intricate explanations, was only a product of a continuous improvement in birth registration in the Island as the "corrected figures" presented in Table 74 show.

According to the "corrected" figures there was a decline of 7 points in the crude death rate from 1888-1898 to 1930-1939. This is equivalent to a 14 per cent decline in 60 years or 2.3 per cent decline per decade. As seen, the increase observed in the crude birth rate during the period 1940-1949 was a product of the post-war "baby boom."

TABLE 73

ESTIMATED AVERAGE COMPLETENESS OF BIRTH REGISTRATION  
FOR SEVERAL PERIODS: 1888-1960<sup>a</sup>

Period	Per Cent Completeness of Birth Registration
1888-1898 <sup>b</sup> . . . . .	55
1900-1909 <sup>c</sup> . . . . .	66
1910-1919 <sup>c</sup> . . . . .	78
1920-1929 <sup>c</sup> . . . . .	83
1930-1939 <sup>c</sup> . . . . .	90
1940-1949 <sup>d</sup> . . . . .	91
1950-1959 <sup>e</sup> . . . . .	96
1960 <sup>e</sup> . . . . .	96

<sup>a</sup>Source: Table 71.

<sup>b</sup>Obtained from the survival method using an 1894 life table where  $e_0 = 30.4$  years and  $q_0 = 0.243$  (see Appendix III).

<sup>c</sup>Obtained by arithmetic interpolation of the averages obtained by the "survival method" and the "1940 fertility constant method" separately.

<sup>d</sup>Arithmetic interpolation between "Infant Card" estimates for 1940 and 1950.

<sup>e</sup>The 1950 "Infant Card" estimate has been assumed constant from 1950 to 1960.

TABLE 74

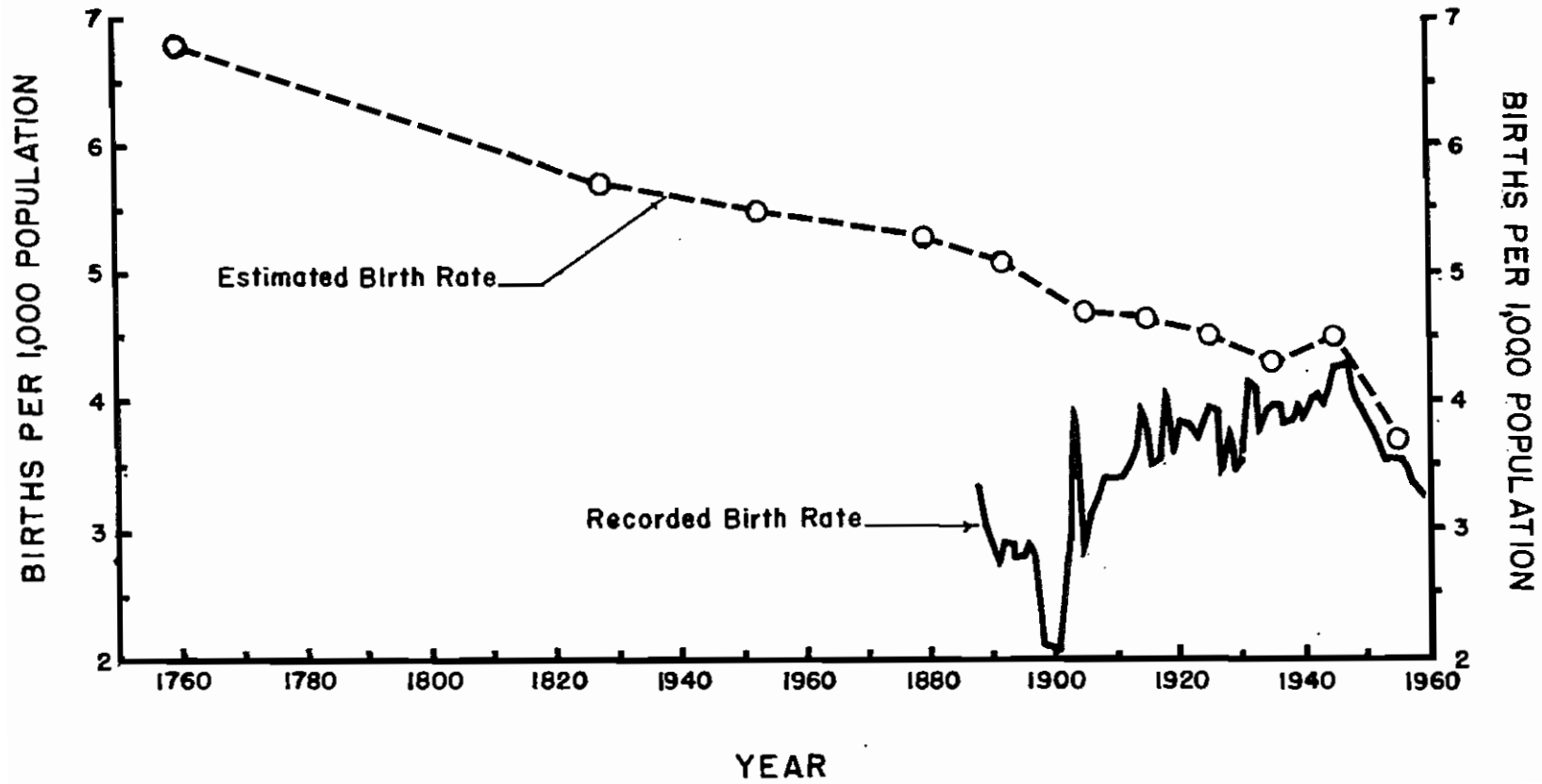
RECORDED AND CORRECTED BIRTH RATES FOR SEVERAL PERIODS: 1888-1960

Period	Recorded Birth Rate	Corrected Birth Rates <sup>a</sup>
1888-1898	28.2	51.3
1900-1910	30.9	46.8
1910-1919	36.4	46.7
1920-1929	37.4	45.0
1930-1939	38.9	43.3
1940-1949	40.8	44.8
1950-1959	35.3	37.1
1960	32.2	33.6

<sup>a</sup>Corrected for underregistration (see Table 73).

Figure 30

THE CRUDE BIRTH RATE IN PUERTO RICO  
1755-65 TO 1960



During the last decade the "corrected" crude birth rate declined from 40.1 (in 1950) to 33.6 (in 1960); that is, a 14 per cent decline during the ten-year period, which is identical to the decline observed during the 60-year period of 1888-1898 to 1930-1939.

Although these data tend to reject the hypothesis that the crude birth rate in Puerto Rico remained stationary until 1950, it shows that the decline was relatively small during the first 50 years of the present century. Since 1950 or so, a significant deviation from the prevailing trend has been observed; that is, the rate of decline has increased considerably. We shall discuss the reasons for this deviation in the next section.

In light of the data presented here, it seems clear that the crude birth rate has declined steadily during the present century, with the exception of the years of the "baby boom" after World War II. As the crude birth rate is significantly affected by structural changes in the population we will not discuss the reasons for such a declining trend until we test, in the next section, whether or not these changes are products of a real decline in the reproductive performance of the population.

#### Fertility Trends in Puerto Rico

Fertility has been defined as the actual reproductive performance of persons exposed to the risk of having children.<sup>1</sup> In dealing with population aggregates, it is very difficult to

---

<sup>1</sup>Fertility is a function of a biological capacity (fecundity), the existence of a mate, and human behavior.



separate the exposed from the non-exposed group, and generally the index used is far from being a true measure of fertility.

The crude birth rate, for example, is a very poor index of fertility, for it includes a great proportion of non-exposed population. Changes in this proportion alone will result in changes in the crude birth rate. On the other hand, changes in fertility can be cancelled out by changes in the proportion of the non-exposed group. The crude birth rate is also affected by changes in the age, sex, and marital composition of the population.

Many social scientists and demographers have forgotten these facts in analyzing Puerto Rican fertility; others have not taken account of changes in completeness of birth registration. For these reasons, the prevailing hypothesis about the trend of Puerto Rican fertility is that, up to 1950 or so, it had a more or less stationary character. In the late 1940's Combs and Davis, for example, found "no positive proof that fertility is declining." They argued that fertility "had not yet had a real chance to respond to the economic and social changes following 1940," prophesied that fertility might be expected to decline in the next 10 or 20 years, and concluded that "fertility is beginning to be sensitive to economic conditions in a modern way."<sup>1</sup>

Hill, Stycos, and Back, commenting on these statements, added: "The striking thing about the crude birth rate since these words were written [Combs and Davis words] has been its decline."<sup>2</sup>

---

<sup>1</sup>Combs and Davis, Population Studies, Vol. V, No. 2.

<sup>2</sup>Hill, Stycos, and Back, p. 14.

The puzzling fact about this hypothesis is the relationship between some important correlates of fertility and the trends those correlates have followed in the Island. It has been found by Combs and Davis, among others, that fertility is inversely correlated with education, economic conditions and urbanism.<sup>1</sup> On the other hand, as indicated in Chapter III, the tendencies in these three variables have been favorable for a reduction in fertility. The real enigma is that variables associated with fertility are unable, as they change, to produce changes in fertility. It might be that these relationships are fortuituous or that some important hidden factor is operating in an opposite direction.

In this chapter an effort will be made to clarify this intriguing situation through a more intensive analysis of the patterns and trends of fertility. Although it can be demonstrated that the crude birth rate has followed a declining tendency during the present century,<sup>2</sup> more sensitive indexes will be used due to the inadequacy of this measure for detecting real changes in fertility.

#### Age Specific Birth Rates by Age of Mother

Age specific birth rates are computed by dividing the number of births occurring to parents of a given sex and age by the corresponding sex-age population. Although female rates are usually preferred in fertility analysis, they do not always tell the whole story.

Table 75 shows female age specific birth rates for the

---

<sup>1</sup>Combs and Davis, Population Studies, Vol. V, No. 2.

<sup>2</sup>In 1954 (in his doctoral dissertation), Combs arrived at the conclusion that the birth rate in Puerto Rico declined since 1920 or so.

Island for selected years since 1932. From these data it is evident that age specific fertility has been declining during the last 30 years, although in relative terms the drops were greater during the period 1950-1960. An increasing trend is observed at ages under 20 years and practically no change is observed in the age groups 20-24, and 40-44. On the other hand, significant declines are registered between ages 25 to 39.

In order to achieve an overall picture of the changes over time, the "total fertility rate" and the "gross reproduction rate" have been computed for each of these years.<sup>1</sup> As Table 75 shows, a female passing through the reproductive span and bearing children at the rates recorded in 1932, without taking mortality into account, was capable of producing 6.43 children of which 3.15 were females. The replacement indexes have followed a declining trend so that the corresponding figures for 1960 were 4.80 and 2.35, respectively.

In order to investigate some of the immediate causes of these changes, age-specific fertility rates by birth order are presented in Table 76. From 1940 to 1960 a decline is observed in all birth orders, although the reduction has been greater among high birth orders with little change occurring among first, second and third birth order rates.

Significant decreases were recorded in the fourth and higher birth orders, however, as marked declines among fourth and higher birth order rates are observed between ages 25 and 39. No significant reduction occurred in the very young and very old groups of the reproductive span.

---

<sup>1</sup>For an explanation of the Method of Computation of such Indexes, see note to Table 75.

TABLE 75

SPECIFIC FERTILITY RATES BY AGE OF MOTHER, TOTAL FERTILITY RATES AND GROSS REPRODUCTION RATES: 1932, 1940, 1950 AND 1960<sup>a</sup>

Age of Mother	1932	1940	1950	1960
	R A T E S <sup>b</sup>			
Under 15	....	0.2	0.4	0.8
15-19	88.3	92.7	105.1	101.6
20-24	330.0	294.9	291.6	287.2
25-29	322.2	311.6	265.3	243.2
30-34	274.1	255.9	201.8	157.5
35-39	172.4	166.7	146.7	110.0
40-44	59.4	51.5	51.9	51.1
45 & over	40.0	10.8	11.2	9.6
Total Fertility Rate <sup>c</sup>	6.4	5.9	5.4	4.8
Gross Reproduction Rate <sup>d</sup>	3.1	2.9	2.6	2.3
	P E R C E N T C H A N G E			
	1932-1940	1940-1950	1950-1960	1940-1960
15-19	+ 5	+13	- 3	+10
20-24	+11	- 1	- 2	- 3
25-29	- 3	-15	- 8	-22
30-34	- 7	-21	-22	-38
35-39	- 3	-12	-25	-34
40-44	-13	+ 1	- 2	- 1
45 & over	-13	+ 4	-14	-11
Total Fertility Rate	- 8	- 8	-11	-19

<sup>a</sup>Source: Division of Demographic Registry and Vital Statistics of Puerto Rico.

<sup>b</sup>Number of Births (corrected for underregistration) occurring to mothers of a given age per 1,000 females in that age.

<sup>c</sup>The total fertility rate is the sum of the age specific fertility rates multiplied by the size of the age interval (5).

<sup>d</sup>The gross reproduction rate is approximately equal to the total fertility rate multiplied by the proportion of females at birth (0.49).

Figure 31  
SPECIFIC FERTILITY RATES  
BY AGE OF MOTHER  
PUERTO RICO: 1932, 1940, 1950 AND 1960

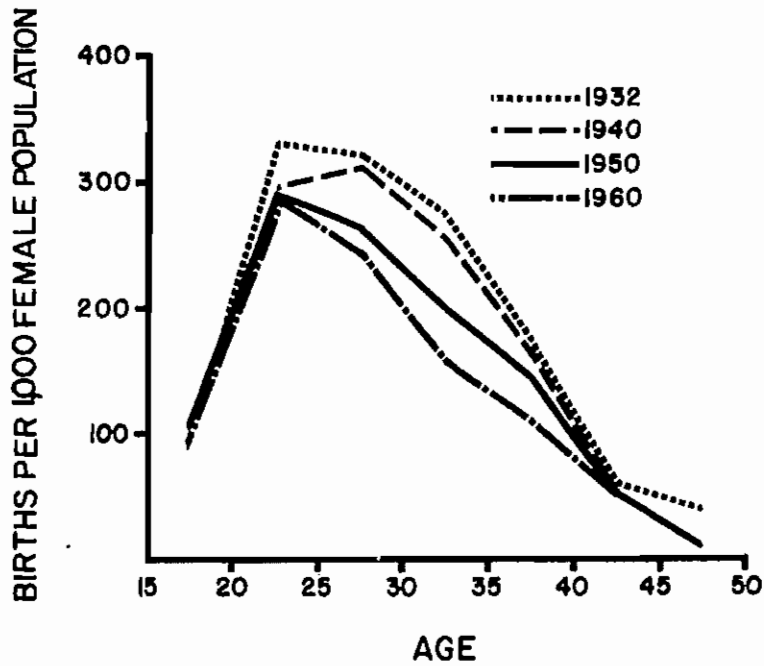


Figure 32  
GENERAL FERTILITY RATE AND  
GROSS REPRODUCTION RATE  
PUERTO RICO: 1932, 1940, 1950 AND 1960

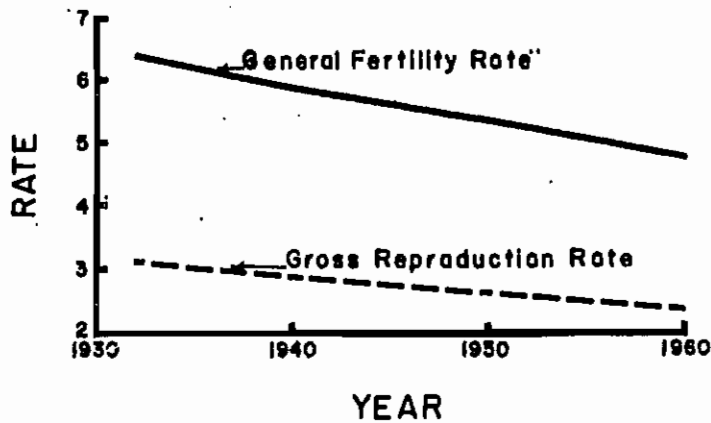


TABLE 76

AGE SPECIFIC FERTILITY RATES BY BIRTH ORDER:<sup>a</sup> 1940, 1950 AND 1960<sup>b</sup>

Order of Births	A G E G R O U P S							
	All Ages <sup>c</sup>	-20	20-24	25-29	30-34	35-39	40-44	45 and Over
<u>Year 1940</u>								
1	31.8	62.4	82.0	29.9	11.9	4.8	1.0	0.2
2	26.8	22.2	84.2	41.4	17.1	5.5	1.0	0.1
3	22.4	5.3	63.8	53.6	22.5	8.0	1.4	0.4
4	17.6	1.1	36.2	55.9	27.8	10.4	1.6	0.5
5	13.9	0.2	17.0	49.8	33.3	13.2	2.1	0.5
6	11.1	0.0	7.0	36.8	36.4	16.5	3.2	0.5
7	8.4	0.0	2.4	22.7	34.1	18.2	4.5	0.6
8	6.4	0.0	0.8	12.6	27.7	20.2	5.1	0.7
9	4.6	...	0.3	5.7	19.9	19.3	5.0	0.7
10 & over	9.9	...	0.2	4.3	26.9	51.9	26.9	6.6
<u>Year 1950</u>								
1	27.6	60.9	70.4	28.9	12.7	5.5	1.8	0.4
2	23.1	27.7	71.4	36.2	15.2	5.6	1.2	0.2
3	20.8	11.2	66.0	42.4	19.9	7.5	1.8	0.2
4	15.6	2.3	41.2	41.9	21.5	9.2	2.0	0.4
5	12.2	0.4	21.9	38.4	22.9	10.9	3.0	0.6
6	10.0	0.2	10.6	31.2	25.9	13.7	3.5	0.4
7	8.0	...	4.3	21.9	25.6	15.5	4.0	0.4
8	6.3	...	1.9	13.2	22.8	15.7	4.8	0.8
9	4.7	...	0.7	7.2	15.3	16.1	5.5	0.9
10 & over	10.6	...	0.4	6.2	23.9	48.8	27.2	7.0
<u>Year 1960</u>								
1	24.5	59.6	72.3	28.3	8.4	2.9	0.6	0.1
2	21.6	28.5	76.5	40.9	14.6	4.6	1.3	0.1
3	17.1	9.8	61.8	43.0	18.0	5.7	1.7	0.2
4	12.2	2.2	39.4	36.7	17.1	7.2	2.1	0.3
5	8.6	0.3	20.7	30.6	15.9	8.5	1.7	0.4
6	6.9	0.0	9.7	25.4	17.1	9.1	3.1	0.5
7	5.3	0.0	3.6	18.0	16.7	9.9	3.2	0.4
8	4.4	0.0	1.1	11.4	16.1	11.0	3.8	0.7
9	3.6	0.0	0.4	5.8	13.6	12.2	4.4	0.8
10 & over	9.5	...	0.2	4.6	21.6	40.3	30.2	6.1

<sup>a</sup>Number of births occurred to mothers of a given age per 1,000 females in the population in that age.

<sup>b</sup>Source: Division of Demographic Registry and Vital Statistics of Puerto Rico.

<sup>c</sup>Births of a given order per 1,000 females in the population 15-49 years old.

TABLE 77

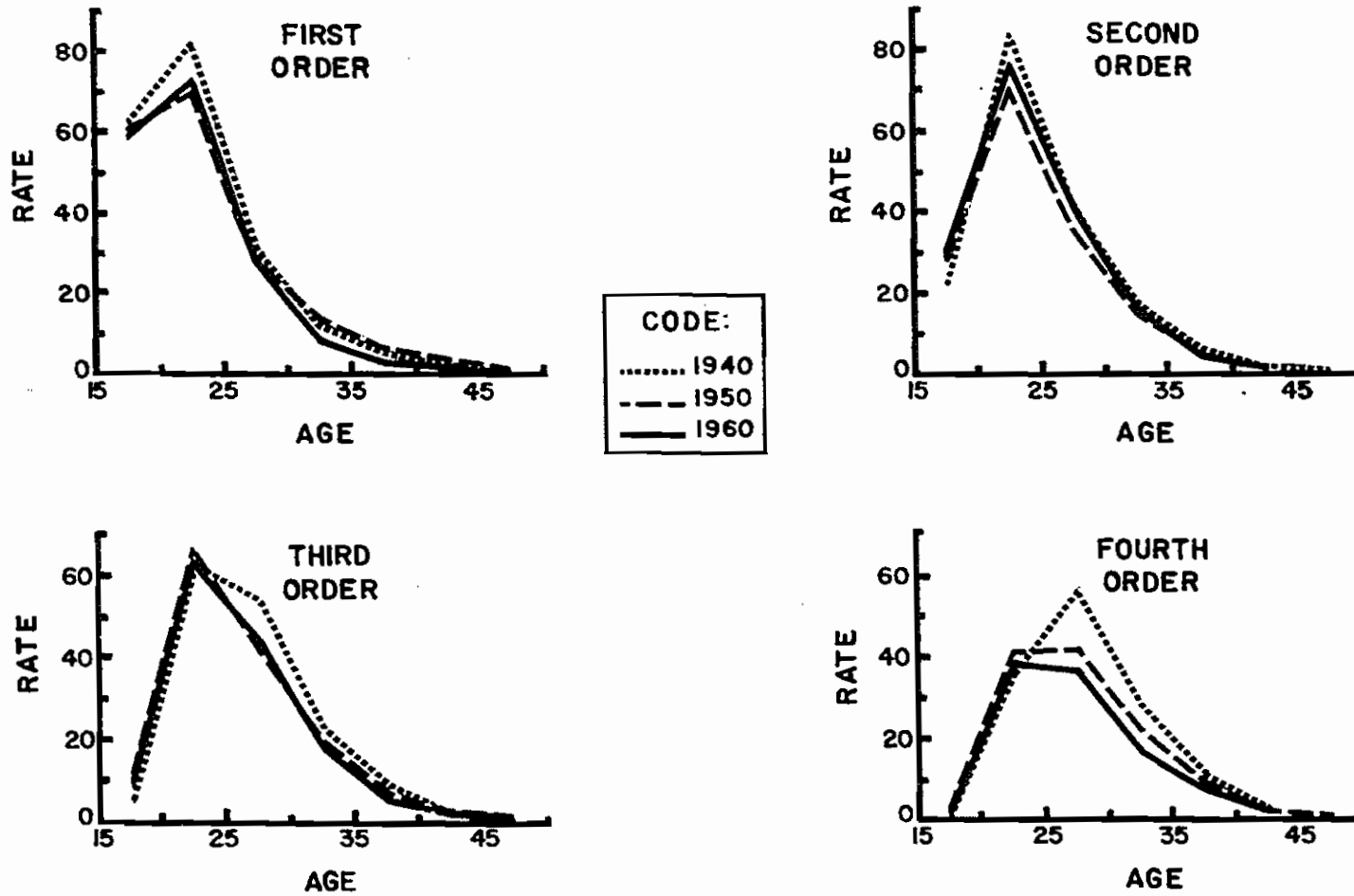
TOTAL FERTILITY RATES PER 1,000 FEMALES BY BIRTH  
ORDER: 1940, 1950 AND 1960<sup>a</sup>

Birth Order	Rate <sup>b</sup>			Per Cent Change		
	1940	1950	1960	1940-1950	1950-1960	1940-1960
1	961	903	861	- 6.1	- 4.7	-10.4
2	858	788	832	- 8.2	+ 5.7	- 2.9
3	775	745	701	- 3.9	- 5.9	- 9.5
4	668	592	525	-11.2	-11.4	-21.3
5	586	490	390	-15.5	-20.4	-32.7
6	502	428	324	-14.8	-24.1	-35.4
7	412	358	259	-13.1	-27.8	-37.2
8	336	296	220	-11.8	-25.5	-34.3
9	254	228	186	-10.2	-18.6	-26.9
10 & over	584	568	515	- 2.8	- 9.3	-11.8
<u>All Orders</u>	5936	5396	4813	- 9.1	-10.8	-18.9

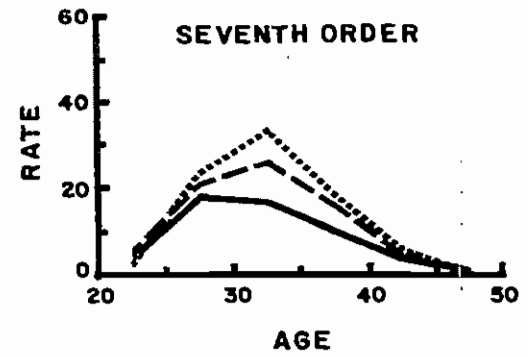
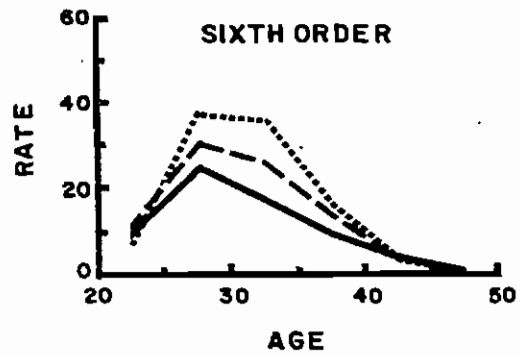
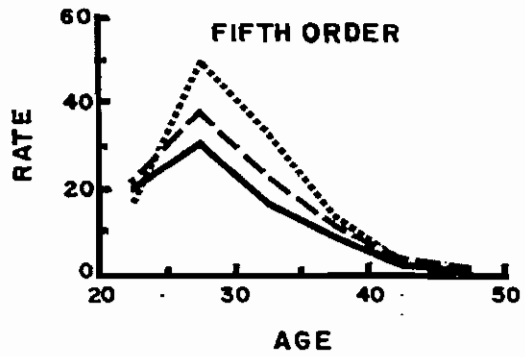
<sup>a</sup> Source: Table 76.

<sup>b</sup> Unweighted sum of age-specific fertility rates of a given order times 5 (size of the interval).

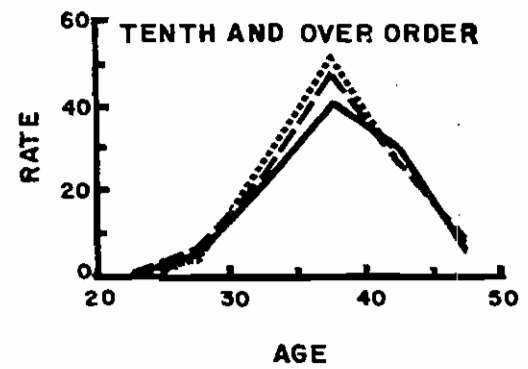
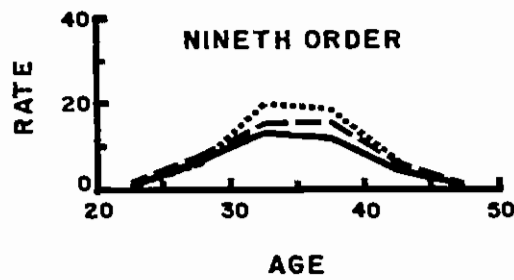
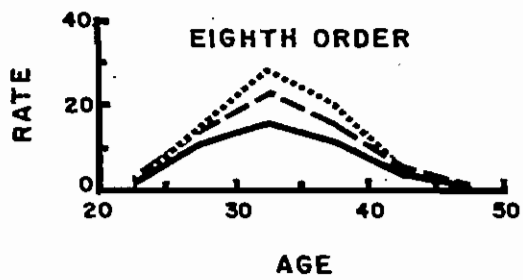
Figure 33  
 AGE SPECIFIC FERTILITY RATES BY BIRTH ORDER  
 PUERTO RICO: 1940, 1950 AND 1960







CODE: ..... 1940  
 - - - - - 1950  
 ———— 1960



Another way to assess changes in the birth order pattern is by computing an age standardized rate for each order in the same way that the total fertility rate is computed. The standardized rate for first-order births, for example, is the unweighted sum of the first-order age specific rates multiplied by the size of the age interval (five). Table 77 shows the results of such computations.

As observed from the table, the relative changes in the standardized rates were greater during the decade 1950-1960 than during the previous one. During the period 1940-1950 significant declines were observed among the fifth, sixth, and seventh orders, while in orders third or less, and tenth and over, the declines were lower than the average decline (9.1 per cent).

For the next decade (1950-1960) the peak of the decline curve shifted from the fifth to the seventh birth order. Highly significant drops were observed also among birth orders fifth to ninth. Again, birth orders third or less and tenth and over show but little change. Taking the period 1940-1960 as a whole, it is evident that the reduction in age specific fertility has been the immediate result of significant declines in birth orders fourth to ninth.

#### Specific Fertility Rates by Age of Father

In general, the trends in father's age specific fertility rates are similar to those observed in the mother's rates. As Table 78 shows, at age under 25 years, there have been considerable increases in the birth rates. In the age group 25-29 no

TABLE 78

SPECIFIC FERTILITY RATES BY AGE OF FATHER:  
1940, 1950, and 1960<sup>a</sup>

Age of Father	Rates <sup>b</sup>			Per Cent Change <sup>c</sup>		
	1940	1950	1960	1940- 1950	1950- 1960	1940- 1960
15-19	7.6	10.2	15.9	+34	+56	+109
20-24	150.2	168.4	207.4	+ 6	+23	+30
25-29	314.9	296.2	305.4	- 6	+ 3	- 3
30-34	321.5	263.8	238.2	-18	-10	-26
35-39	271.3	223.6	163.2	-18	-27	-40
40-44	194.8	175.0	131.0	-10	-25	-33
45-49	133.6	113.2	85.8	-16	-24	-36
50-54	72.6	67.5	56.3	- 7	-17	-22
55 & over	86.9	75.2	57.6	-13	-23	-34
Total Fertility <sup>c</sup>	7.8	7.0	6.3	-10	-10	-19
Gross Reproduction <sup>d</sup>	4.0	3.6	3.2	-10	-10	-19

<sup>a</sup>Source: Files of the Division of Demographic Registry and Vital Statistics of Puerto Rico.

<sup>b</sup>Number of births (corrected for underregistration) occurring to fathers of a given age per 1,000 males in the population in that age.

<sup>c</sup>As defined in Table 75.

<sup>d</sup>Total fertility rate multiplied by the proportions of males at birth (0.51).

Figure 34

SPECIFIC FERTILITY RATES BY AGE OF FATHER  
PUERTO RICO: 1940, 1950 AND 1960

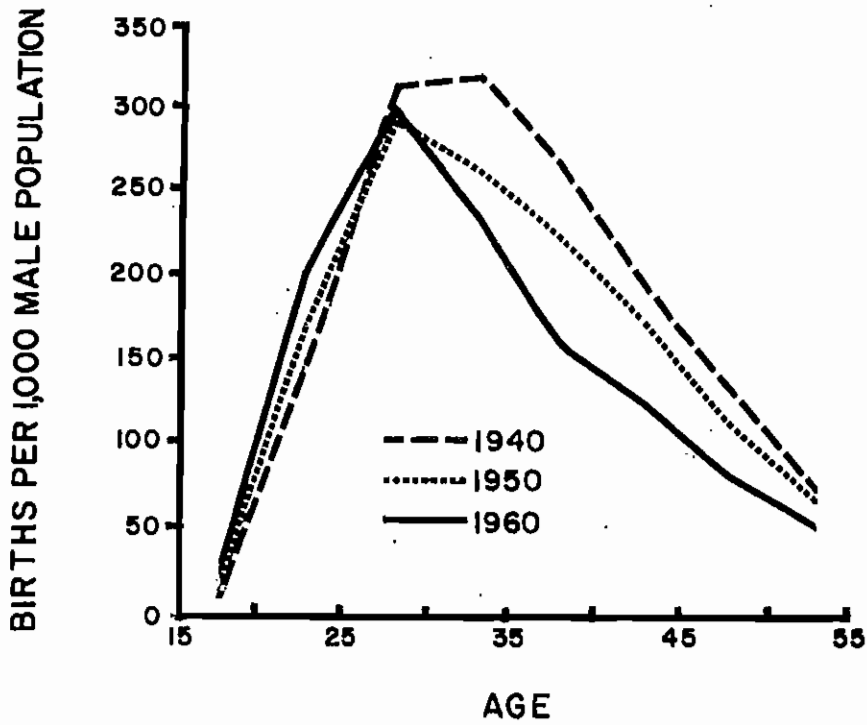
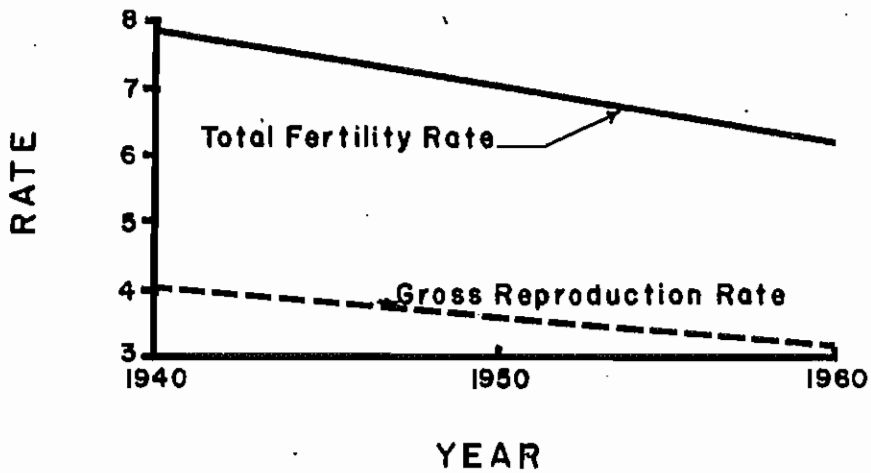


Figure 35

TOTAL FERTILITY AND GROSS REPRODUCTION RATES  
FOR MALES  
PUERTORICO: 1940, 1950 AND 1960



significant change occurred from 1940 to 1960. On the other hand, above age 30 substantial declines are observed.

Changes during this 20-year period reveal an interesting pattern. Above age 35 the relative declines were greater during the 1950-1960 decade than during the previous one; below that age, changes were more marked during the 1940-1950 decade.

To gain an overall picture of these changes, the total fertility rate and the gross reproduction rates were computed. These figures clearly show that, in general, male age-specific fertility has declined since 1940. Although the difference is not highly significant, it seems that the absolute decline was greater during the 1940-1950 decade than during the period 1950-1960.

#### Age-Sex Standardized Birth Rates

In order to determine the net effect of changes in age-sex specific fertility upon the crude birth rate, age-sex standardized birth rates were computed using the 1950 population as standard. Standardized rates were computed using the age specific fertility rates by age of mother and also by age of father.

The standardized birth rate by age of mother for 1940, for example, was obtained by applying the 1940 specific fertility rates by age of mother to the 1950 female population and dividing the resulting total of expected births by the total 1950 population. In general, the formula is as follows:

$$B^* = \sum \frac{b_i p_i}{P}$$

Where:

- $B^*$  = age-sex standardized birth rate for a given year.
- $b_i$  = birth rate in a given age group of a given sex for the year for which the standardized rate is being computed.
- $P_i$  = corresponding age-sex population in the standard population.
- $P$  = total standard population.

A comparison between the crude birth rate and the standardized birth rates are presented below:

TABLE 79

CRUDE BIRTH RATE AND AGE STANDARDIZED RATES BY AGE OF MOTHER AND FATHER:<sup>a</sup> 1940, 1950 AND 1960<sup>b</sup>

Year	Crude Birth Rate	Age Standardized Birth Rate	
		By Age of Mother	By Age of Father
1940	45.7	42.1	43.7
1950 <sup>c</sup>	40.1	40.1	40.1
1960	33.5	36.4	39.3

<sup>a</sup>1950 population as standard.

<sup>b</sup>Sources: Tables 75 and 78 for age specific rates; and, for 1950 population, U. S. Census of Population, 1950.

<sup>c</sup>The crude birth rate is equal to the standardized rates for the year used as standard (1950 in this case).

According to these data, the crude birth rate (corrected for underregistration--see Tables 71 and 73) declined over 12 per cent from 1940 to 1950, and over 16 per cent during the decade 1950-1960. On the other hand, the declines in the standardized rate based on female's age-specific fertility rates were 4.8 per cent and 9.2 per cent, respectively. The corresponding drops in

the standardized rates for males were 8.2 and 2.0 per cent. It seems that the decline in the crude birth rate during the last 20 years was in part a result of changes in the age composition of the population due to emigration.

A really interesting fact is that almost all the decline in the crude birth rate observed between 1950 and 1960 can be explained in terms of changes in the male age composition of the population, although only half of the decline can be attributed to changes in the age structure of the female population. During the previous decade (1940-1950) we observed a similar but inverse relationship (in terms of sex). This can be attributed to an inversion in the sex selectivity among emigrants: during the 1940-1950 decade there was a preponderance of females among immigrants while in 1950-1960 males were in the majority.

Janer has also explained this situation in terms of the age-sex selectivity of emigration.<sup>1</sup> His hypothesis states that not only has emigration during the 1950's affected the crude birth rate by depleting the reproductive ages, but also by limiting the mating chances of the female population as a result of heavy emigration of young single males. In other words, he attributes part of the decline in the crude birth rate to changes in the marital (or civil status) composition of the population.

#### Marital Fertility

One way of testing Janer's hypothesis is by analyzing marital fertility. For such purposes we have computed age specific rates

---

<sup>1</sup>José L. Janer, "The Present Demographic Position of Puerto Rico" (Unpublished manuscript in hands of the author, Section of Biostatistics, School of Medicine of Puerto Rico), pp. 34-35.

by age of mother and by age of father using as denominator persons actually married (including consensual unions).<sup>1</sup> Table 80 shows the results of the computations.

In the case of the female group, substantial increase is observed in the age interval 15-19 during the last two decades. While practically no change occurred in the age group 20-24, there is a clear declining tendency above that age group. The same pattern is observed, more or less, in the male group, although the most radical drops occurred at ages 30 years old and over.

The overall effect of changes in marital fertility upon the crude birth rate can be determined if age and marital status adjusted birth rates are computed for 1940 and 1960. This was done by applying the 1940 and 1950 schedules of marital rates (Table 80) to the 1950 "actually married" population. In that way standardized rates were obtained for both sexes separately.

Figures in Table 81 show that the crude birth rate and the age-marital status standardized birth rates for each sex were almost identical for 1940. This means that the decline observed in the crude birth rate, between 1940 and 1950, was not a result of changes in the age-marital status composition of the population but probably a real change in the overall reproductive performance of the "exposed to the risk" population.

On the other hand, there are significant differences between the crude birth rate and the standardized rates for 1960. During this period the decline in the crude birth rate was 16 per cent,

---

<sup>1</sup>In 1950 less than 4 per cent of all mothers reporting on children ever born were never married. Thus, actually married persons (including consensual unions) seems to be a good approximation of the exposed population.



TABLE 80

AGE SPECIFIC FERTILITY RATES PER 1,000 "ACTUALLY MARRIED  
POPULATION": 1940, 1950 AND 1960<sup>a</sup>

Age of Parent	1940	1950	1960
<u>Mother</u>			
15-19 <sup>b</sup>	548.3	565.0	586.5
20-24	498.4	476.4	495.7
25-29	405.1	334.6	305.2
30-34	314.2	244.3	183.3
35-39	205.8	176.3	125.3
40-44	67.2	69.7	58.7
45 and over <sup>c</sup>	15.1	16.0	11.9
<u>Father</u>			
15-19	511.6	439.1	480.5
20-24	569.0	544.8	593.1
25-29	501.1	452.8	452.4
30-34	428.7	338.5	297.7
35-39	326.8	272.0	198.6
40-44	228.5	211.4	151.3
45-49	151.1	136.9	98.6
50-54	88.9	82.7	64.9
55 and over <sup>d</sup>	92.8	93.5	69.4

<sup>a</sup>Sources: Division of Demographic Registry and Vital Statistics of Puerto Rico, and Official Censuses for Puerto Rico.

<sup>b</sup>Births to mothers under 15 years of age were included in the age group 15-19.

<sup>c</sup>Rate computed using the population 45-49 years of age.

<sup>d</sup>Rate computed using the population 55-59 years of age.

while the drops in the standardized rates were 8 and 7 per cent for males and females, respectively. It can be properly said that changes in the age-marital structure of the population contributed, to a significant extent, to the decline observed in the crude birth rate during the last decade.

There is a further consideration concerning marital status

Figure 36

NUMBER OF BIRTHS PER 1,000  
ACTUALLY MARRIED POPULATION  
BY AGE OF PARENT  
PUERTO RICO: 1940, 1950 AND 1960

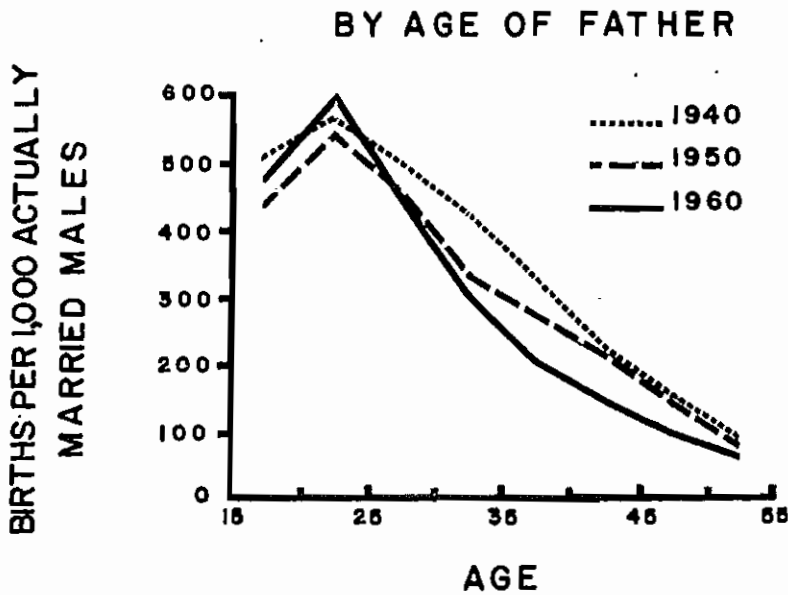
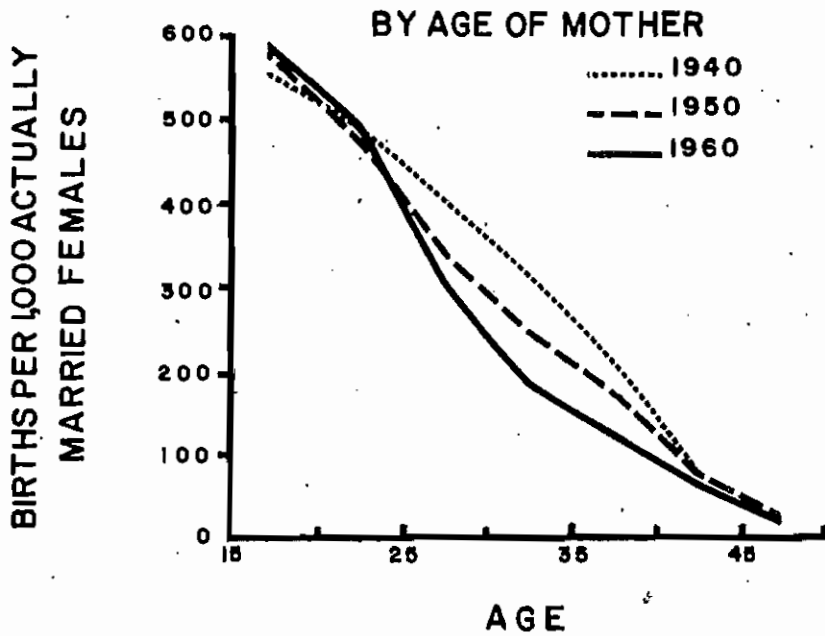


TABLE 81

AGE AND MARITAL STATUS STANDARDIZED BIRTH RATE FOR  
1940, 1950 AND 1960<sup>a</sup> (BY SEX)<sup>b</sup>

Year	Crude Birth Rate	Standardized Rates	
		Mother	Father
1940	45.7	45.1	45.8
1950 <sup>c</sup>	40.1	40.1	40.1
1960	33.5	37.1	36.8

<sup>a</sup>1950 "Actually Married Population" as standard.

<sup>b</sup>Sources: Table 80; and U. S. Census of Population, 1960, Bulletin P-C53.

<sup>c</sup>The crude birth rate and the standardized rates are identical for the year used as standard (1950).

changes and their probable effect upon the crude birth rate. During the last decade an important decline has occurred in the proportion of "married females (including consensual union) with husband present," undoubtedly a result of emigration. Table 82 shows the proportions of "married females with husband present" by age groups for 1950 and 1960. These data show that the proportion of married females with husband present has declined through all the reproductive span.

As it is evident that married females with husband absent are not equally exposed to the child bearing risk as those with husband present, we should take into account this factor in the analysis of the recent decline in the crude birth rate. Age specific birth rates computed using as denominator "actually married females with husband present" for 1950 and 1960 are shown in Table 83.

TABLE 82

PERCENTAGE OF ACTUALLY MARRIED WOMEN WITH HUSBAND  
PRESENT BY AGE: 1950 AND 1960<sup>a</sup>

Age of Women	1950	1960	Per Cent Difference
15-19	82.9	79.8	3.1
20-24	86.9	84.0	2.9
25-29	89.9	86.8	3.1
30-34	90.9	87.8	3.1
35-39	91.9	87.9	4.0
40-44	91.6	88.4	3.2
45-49	90.9	88.8	2.1

<sup>a</sup>Sources: 1950 and 1960 Censuses of Population.

TABLE 83

AGE SPECIFIC BIRTH RATES BY AGE OF MOTHER PER  
1,000 "ACTUALLY MARRIED FEMALES WITH  
HUSBAND PRESENT": 1950 AND 1960<sup>a</sup>

Age of Mother	1950	1960
15-19	681.9	734.8
20-24	548.4	590.2
25-29	372.1	351.5
30-34	268.6	208.7
35-39	191.7	142.6
40-44	76.1	66.4
45-49	17.6	13.4

<sup>a</sup>Sources: Same as for Table 80.

These figures show, again, that apparently fertility has increased among young females but declined considerably in the age groups 25 years and over.

The 1960 adjusted birth rate resulting from applying the 1960 rates to the 1950 "actually married females with husband

present" population is 39.1. That is, had the proportions of actually married females with husband present remained constant from 1950 to 1960, the resulting 1960 crude birth would have been 39.1 instead of the recorded 33.5. As the 1950 rate was 40.1, this means that apparently the real decline in fertility was much less than the 16 per cent observed in the crude birth rate (only 2.5 per cent).

Additional evidence in support of the hypothesis that fertility has changed but little since 1950 is obtained from children ever born data. According to official census figures, the number of children ever born to ever married women 15-44 years old increased from 1950 to 1960, as Table 84 shows. This trend is evident both in the urban and rural areas. For Puerto Rico as a whole, however, in the age group 35-44, there is a reduction in the number of children ever born. This age pattern is more or less in agreement with age specific fertility; that is, an apparent increase in the very young groups but a declining trend in the older groups.

One must be careful, however, in the interpretation of this type of data in Puerto Rico. It is likely that emigration of women was selective in terms of number of children per woman; that is, one would find a preponderance of women with few children among emigrants. Nevertheless, these data support the hypothesis that the radical change observed in the crude birth rate during the last decade was to a great extent a product of heavy emigration.

To determine whether or not the sharp decline in the crude birth rate observed during the last decade represents a real deviation from the previous trend in the reproductive performance

(fertility) of the exposed population, it is necessary to compute age-marital status standardized birth rates for other census years prior to 1940. We have resorted to the indirect method as prior to 1940 data on births by age of mother were not tabulated.

The mathematical formulation of this procedure is as follows:

$$B^{**} = \frac{B}{\sum \frac{P_i B_i}{P}} b$$

Where:

- $B^{**}$  = indirectly standardized rate by age and marital status for a given year.
- $B$  = crude birth rate for the year used as standard.
- $P_i$  = actually married female population in the year for which the standardized rate is being computed.
- $B_i$  = age specific birth rates by actually married females for the year used as standard.
- $P$  = total population in the year for which the standardized rate is being computed.
- $b$  = crude birth rate for the year for which the standardized rate is being computed.

The results from such computations are presented in Table 85.

This table shows that while in the crude birth rate there is an apparent acceleration in the trend of decline after 1940, in the age-marital status adjusted rate the same trend more or less has prevailed since 1910. From 1910 to 1950 the crude birth rate declined around 14 per cent or at an average rate of 3.5 per cent per decade. On the other hand, the standardized rate declined 19 per cent during the same period at an average rate of almost 5 per cent per decade. During the last decade the crude birth rate declined 16 per cent, which represents a radical deviation from the previous trend.

TABLE 84

NUMBER OF CHILDREN EVER BORN PER 1,000 WOMEN EVER  
MARRIED 15 TO 44 YEARS OLD BY AGE AND PLACE OF  
RESIDENCE: 1950 AND 1960<sup>a</sup>

Age of Women	1950			1960		
	Total	Urban	Rural	Total	Urban	Rural
15-44 years	3,695	2,947	4,310	3,850	3,115	4,534
15-24	1,768	1,566	1,925	1,884	1,707	2,021
25-34	3,649	2,917	4,275	3,661	3,012	4,318
35-44	5,412	4,139	6,454	5,269	4,016	6,454

<sup>a</sup>Source: U. S. Census of Population, 1960, Report PC(1)-53C, Table 46.

TABLE 85

CRUDE AND AGE-MARITAL STATUS ADJUSTED BIRTH RATES  
FOR CENSUS YEARS 1910 TO 1960<sup>a</sup>

Census Year	Crude Birth Rate	Adjusted Rate
1910 <sup>b</sup>	46.6	49.3
1920 <sup>b</sup>	46.1	48.8
1930 <sup>b</sup>	44.4	44.9
1940 <sup>b</sup>	45.7	44.1
1950	40.1	40.1
1960	33.5	37.1

<sup>a</sup>1950 rates as standard.

<sup>b</sup>Average for the three-year period centering around the census, corrected for underregistration.

Moreover, the drop in the standardized rate was only 7 per cent, a slight increase over the average trend observed from 1910 to 1950.

It might be claimed that the figures we have estimated for birth underregistration for periods prior to 1940 are very rough estimates, and thus that the trends in the crude and in the standardized birth rates might not be the ones presented here.

Figure 37

NUMBER OF BIRTHS PER 1000 FEMALES  
ACTUALLY MARRIED WITH HUSBAND PRESENT  
BY AGE  
PUERTO RICO: 1950 AND 1960

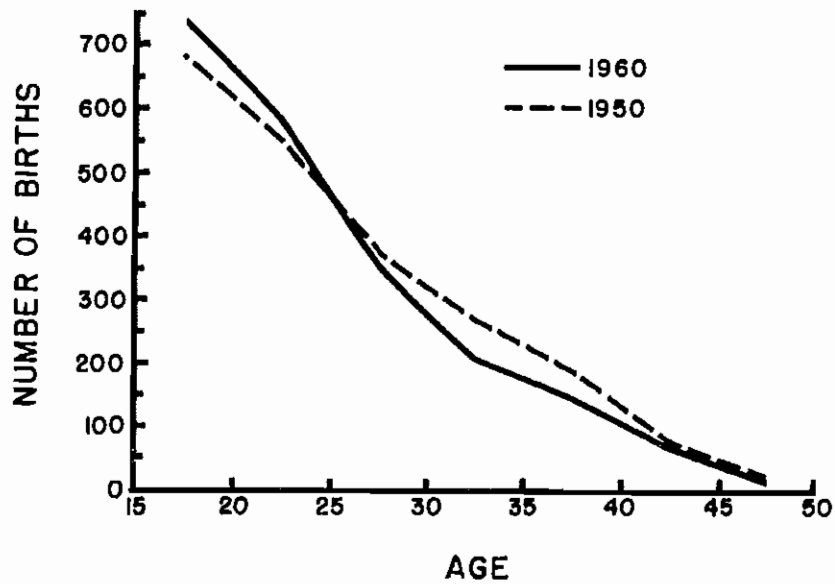
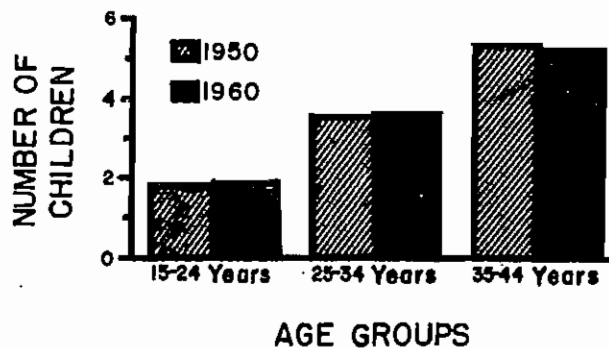


Figure 38

NUMBER OF CHILDREN EVER BORN  
PER WOMAN EVER MARRIED  
BY AGE GROUPS  
1950 AND 1960





We have, therefore, computed "children to women" ratios using actually married female population as denominator in an effort to test the relative validity of our estimates.

TABLE 86

NUMBER OF CHILDREN UNDER 5 YEARS OF AGE PER 1,000 "ACTUALLY MARRIED" FEMALES 15-44 YEARS OLD: 1899-1960<sup>a</sup>

Year	Children-Women Ratio
1899 . . . . .	603.9
1910 . . . . .	547.4
1920 . . . . .	497.2
1930 . . . . .	461.6
1940 . . . . .	448.6
1950 . . . . .	485.0
1960 . . . . .	412.8

<sup>a</sup>Source: Official censuses for Puerto Rico.

The above data tell us that there has been a clear declining tendency in marital fertility, except for the period 1940-1950, a fact easily explained by the "baby boom" of the late 1940's. Obviously, this declining tendency should have been considerably minimized by the significant drop in infant mortality observed throughout the century but especially since 1940, and probably by improvements in census enumeration of children.

In the light of this analysis and the figures presented, it is evident that fertility has declined in the Island throughout the present century. The stationary character of fertility (which it allegedly had until 1950 or so), was only a result of differentials in underregistration of births and of the inadequacy of using the crude birth rate and even the age specific birth rates as indexes of

Figure 39

CRUDE AND AGE MARITAL STATUS INDIRECTLY  
STANDARDIZED RATES(1950 RATES AS STANDARD)  
PUERTO RICO: 1910-1960

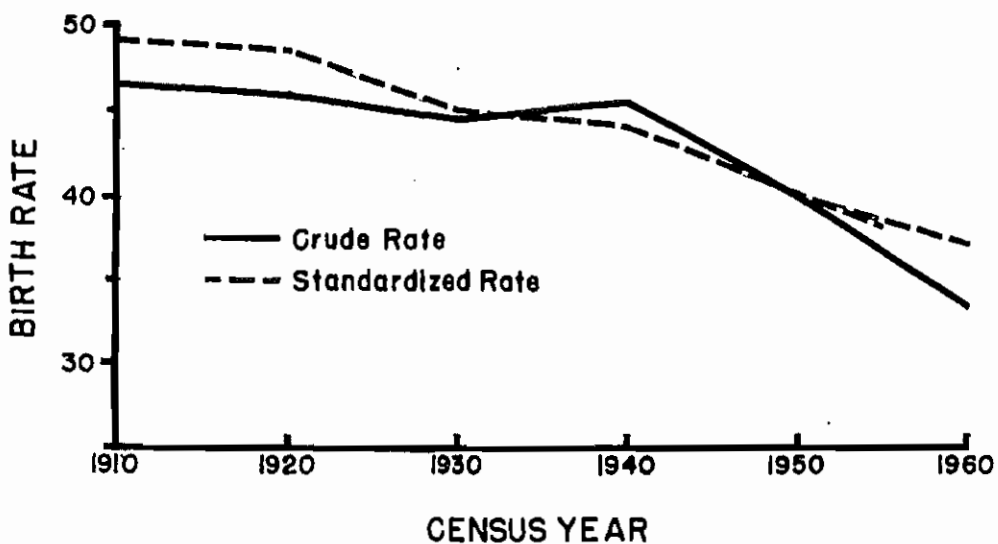
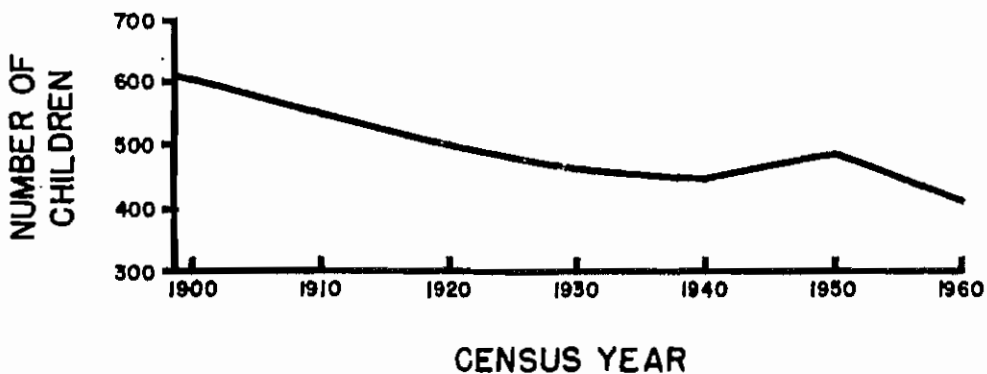


Figure 40

CHILDREN UNDER 5 YEARS OF AGE PER 1,000  
ACTUALLY MARRIED FEMALES 15-44 YEARS  
PUERTO RICO: 1899-1960



fertility. Changes in the marital condition of the population, which have been operating since the beginning of the present century, have been one of the variables overlooked by demographers and social scientists in analyzing Puerto Rican fertility. These changes, added to those occurring in the age-sex structure of the population were responsible, in great part, for the radical decline in the crude birth rate observed during the last decade. In addition, the significant decline in the proportion of married females with husband present has operated in the same direction. It should be emphasized that fertility in the Island has followed a more or less undisturbed declining tendency since the beginning of the present century and that the recent sharp decline in the crude birth rate is not a real deviation from the previous trend.

In contrast to this overall decrease, there is apparently an increasing trend in the fertility of young adult persons (age groups under 25 years). This tendency is evident even when we take into account marital status and presence or absence of the husband. This is also in agreement with children ever born data and with the pattern observed in birth order rates. As noted previously, from 1940 to 1960 no significant change was observed among low-order births, which are more frequent among young females.

From this we may infer that Puerto Rican couples, just as their counterparts in the United States, are having most of their wanted children early in married life, at the same time reducing the total number.

In the second place there has been a marked declining interest among governmental authorities to deal with birth control practices. In the late 1930's, and as a result of the prevailing

economic crisis, laws were passed by the Island's Legislature authorizing the Department of Health to provide information about birth control practices for socio-economic as well as health reasons. In addition, the Department was authorized to provide birth control facilities to persons requesting them. The debates on such issues, as well as the enthusiastic campaign initiated by the Department of Health providing contraceptive materials and facilities to low-income families free of charge, undoubtedly had some effect upon fertility.

With time, and as a result of the economic boom produced by World War II, and of heavy emigration of Puerto Ricans to the United States after the war, the population pressure was reduced and with it the government enthusiasm for birth control practices. Today, only a private association with highly limited funds is operating in this field. The government has taken a passive position and little, if anything, is being done in this respect.

On the other hand, knowledge about birth control methods has reached almost every family in the Island, but most of them must pay for birth control material which is sold in practically every drug store in Puerto Rico.

Under these conditions low-income couples probably do not use birth control material until they are forced to make such investments by their own population resources problem; that is, after they already have four or five children. Unfortunately, we cannot produce statistical evidence to support these explanations.

Despite the significant overall decline observed in the Island fertility, especially at ages above 30 years, the reproductive performance of the population is far above the levels achieved

by other countries of the world. A comparison with the United States, Japan, Sweden, and England and Wales is presented in Table 87.

TABLE 87  
SPECIFIC BIRTH RATES BY AGE OF MOTHER, PUERTO RICO  
AND SELECTED COUNTRIES, RECENT YEARS<sup>a</sup>

Age of Mother	Puerto Rico 1960	United States 1958	Japan 1958	Sweden 1958	England and Wales 1959
Under 20	100.4	91.2	4.0	36.5	31.6
20-24	281.7	252.1	106.3	132.7	160.2
25-29	238.5	196.8	181.3	137.6	163.8
30-34	154.5	114.8	89.0	85.8	94.7
35-39	107.9	57.6	32.5	42.4	44.1
40-44	50.2	15.3	7.5	12.9	12.3
45 & over	9.4	0.9	0.5	0.9	0.8
<u>Index Numbers<sup>b</sup></u>					
Under 20	100.0	90.8	4.0	36.4	31.5
20-24	100.0	89.5	37.7	47.1	56.9
25-29	100.0	82.5	76.0	57.7	68.7
30-34	100.0	74.3	57.6	55.5	61.3
35-39	100.0	53.4	30.1	39.3	40.9
40-44	100.0	30.5	14.9	25.7	24.5
45 & over	100.0	9.6	5.3	9.6	8.5

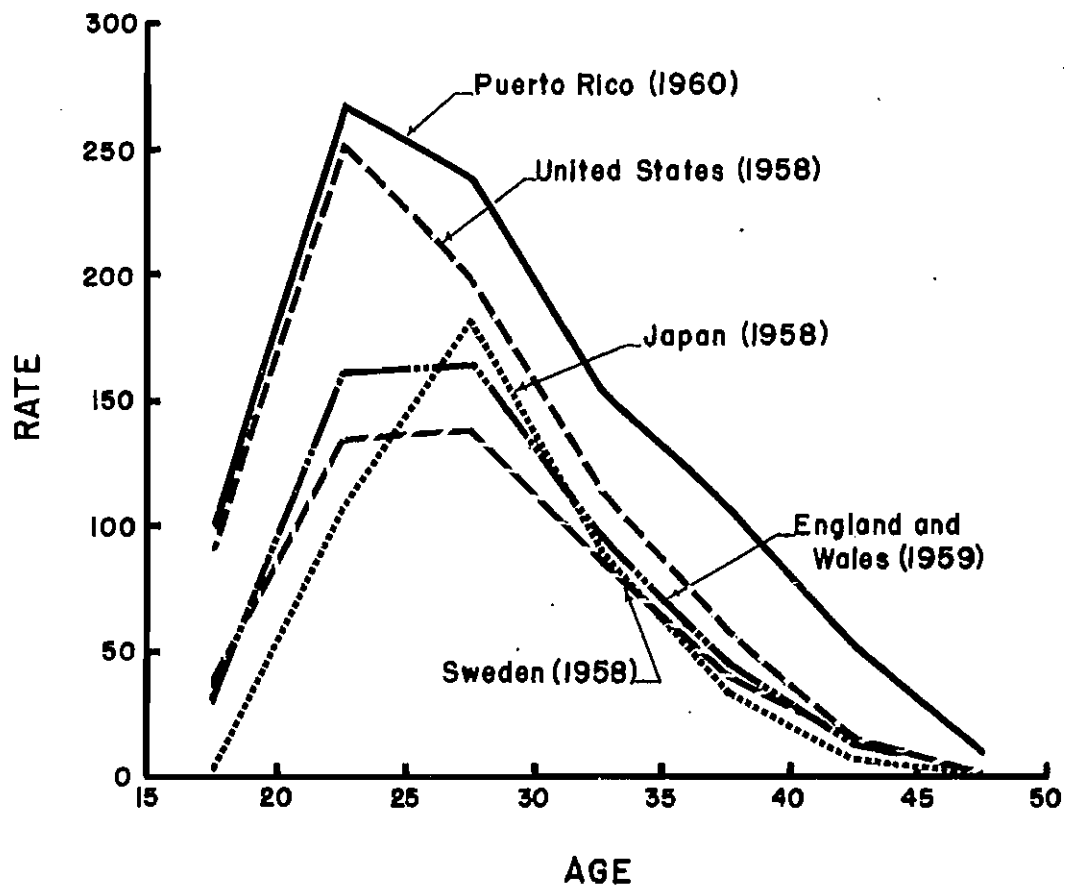
<sup>a</sup>Source: United Nations, Demographic Yearbook, 1959, pp. 310-389.

<sup>b</sup>The rate of a given country in a given age as a percentage of Puerto Rico's rate.

As these data show, the rates for Japan, Sweden, England and Wales are considerably lower than Puerto Rico's at any age level. The United States rates are lower than in the Island, especially at ages 30 years and over, which are precisely the ages in which the Island has experienced the greatest reduction in fertility.

Figure 41

SPECIFIC BIRTH RATES BY AGE OF MOTHER, PUERTO RICO, AND SELECTED COUNTRIES, RECENT YEARS



In terms of general fertility and gross reproduction rates, we find that Puerto Rico's figures are 32 per cent higher than corresponding figures for the United States; 89 per cent higher than those for England; 114 per cent higher than the Sweden figures; and 127 per cent higher than Japan's (see Table 88).

TABLE 88

GENERAL FERTILITY AND GROSS REPRODUCTION RATES: PUERTO RICO AND SELECTED COUNTRIES, RECENT YEARS<sup>a</sup>

Country and Year	General Fertility Rate	Gross Reproduction Rate
Puerto Rico, 1960. . . . .	4.80	2.35
United States, 1958. . . . .	3.64	1.79
Japan, 1958. . . . .	2.11	1.03
Sweden, 1958 . . . . .	2.24	1.10
England, 1959. . . . .	2.54	1.24

<sup>a</sup>Source: Table 87.

Not only is Puerto Rican fertility significantly high, with the above countries taken as standard, but as pointed out before, decline is relatively slow. There is no evidence of an acceleration, after 1940, in the trend observed since the beginning of the present century. Chapter VII will show that the prevailing fertility level in Puerto Rico is still so high that an explosive population growth seems imminent in the absence of mass emigration.

Fertility Differentials

Urban-Rural Fertility

Vital statistics in Puerto Rico are not classified according to census urban-rural definitions, due in part to the great difficulty in allocating a vital event according to the census classification.

Secondly, it has been found more practical to classify as urban all towns or township seats of municipal governments without taking into account any population limit. Apparently villages (places of 1,000 to 2,499 inhabitants) do not differ significantly from small towns (2,500 to 10,000 population) in many demographic aspects.<sup>1</sup>

Thus for vital statistics purposes the classification used is: "in town" and "out of town." All 77 places (cities, towns, and villages), seats of municipal government, are considered "in town." This category also includes other territory classified as urban by the census. In other words, "in town" population is equal to the urban population, as classified in the census, plus villages (rural from the census standpoint) which are seats of municipal government. All other territory is considered "out of town."

This dichotomy in the classification of live births was attempted several times in the past but a continuous series is only available since 1936. Table 89 shows that, at least since 1930, natality in the rural area (out of town) has been always higher than in the urban (in town) zone, and that the magnitude of the differences has probably been significantly minimized by a greater underregistration of births in the rural area.

Evidence that this differential has existed at least throughout the present century is obtained from "children to women ratios" computed from census data. Although this measure has the shortcoming of being affected by differences in infant mortality,

---

<sup>1</sup>See, for example, Table 17.



underenumeration of children in the census and internal migration, it seems to be adequate enough for comparisons for a given census year. Moreover, it should be kept in mind that any change over time does not necessarily imply a real change in fertility.

TABLE 89  
RECORDED CRUDE BIRTH RATE BY PLACE OF MOTHER'S RESIDENCE  
FOR SEVERAL PERIODS SINCE 1930<sup>a</sup>

Period	In Town	Out of Town
1930	30.8	37.5
1936-1940	36.9	39.7
1941-1945	38.7	42.1
1946-1950	36.5	42.7
1951-1955	30.9	38.3
1956-1960	28.6	36.2

<sup>a</sup>Source: Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

The data presented in Table 90 show that, as early as 1899, an urban-rural differential in fertility existed. It seems that this gap has narrowed with time but this might be a result of a more rapidly declining urban infant mortality.

Age-specific fertility rates by mother's residence are available in Puerto Rico since 1940. These figures show, again, significant fertility differences between the urban and rural zones (see Fig. 42). It appears, in contrast with children to women ratios, that urban fertility has declined more rapidly than rural fertility. For example, in urban rates a decline of at least 8 per cent has been observed during the last 20 years, while in the rural figures increases have been recorded at ages 15 to 24.

and 40 years and over. Little change, in fact, occurred in the age specific rates for the rural zone during the decade 1940 to 1950 (see Table 91).

TABLE 90  
CHILDREN TO WOMEN RATIOS<sup>a</sup> BY URBAN-RURAL  
RESIDENCE: 1899-1960<sup>b</sup>

Year	Puerto Rico	Urban	Rural
1899	334	180	352
1910	354	... <sup>c</sup>	... <sup>c</sup>
1920	338	206	388
1930	317	214	368
1940	322	219	380
1950	386	300	460
1960	363	291	432

<sup>a</sup>Children under 5 years per 1,000 females 15-44 years.

<sup>b</sup>Official censuses for Puerto Rico.

<sup>c</sup>Population figures by age and urban-rural residence are not available from the 1910 census.

The gross reproduction rates computed from data in Table 91 demonstrate that the figures for the rural zone have been at least 50 per cent higher than the corresponding figures for the urban zone (see Table 92).

This chapter will show that more or less the same differences are observed in "children ever born to women," even when we control other variables such as schooling, income, etc. Thus the conclusion that, despite inability to determine whether the urban-rural gap has broadened or narrowed with time, there is yet sufficient evidence that such a difference exists throughout the present century.

TABLE 91

SPECIFIC FERTILITY RATES BY AGE AND RESIDENCE  
OF MOTHER: 1940, 1950, AND 1960<sup>a</sup>

Residence and Age of Mother	1940	1950	1960	Per Cent Change 1940-1960
<u>In Town</u> <sup>b</sup>	127.6	108.9	93.1	-27.0
-15	0.4	0.5	0.7	••••
15-19	98.3	86.9	83.3	-15.3
20-24	257.7	233.6	235.9	- 8.5
25-29	235.5	207.2	204.0	-13.4
30-34	174.9	135.2	114.8	-34.4
35-39	100.9	84.2	64.9	-35.7
40-44	26.2	26.2	23.9	- 8.8
45 & over	4.8	4.5	3.6	-25.0
<u>Out of Town</u> <sup>b</sup>	163.9	161.4	134.1	-18.2
-15	0.2	0.3	0.8	••••
15-19	84.8	112.4	118.0	+39.2
20-24	307.3	331.7	342.4	+11.4
25-29	353.4	321.6	290.2	-17.9
30-34	305.7	272.2	209.4	-31.5
35-39	207.5	202.5	159.5	-23.1
40-44	67.1	79.6	82.0	+22.2
45 & over	14.8	18.4	16.1	+ 8.8

<sup>a</sup>Source: Division of Demographic Registry and Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup>Total births per 1,000 female population 15-49 years old.

Figure 42

AGE SPECIFIC FERTILITY RATES  
BY RESIDENCE OF MOTHER  
PUERTO RICO: 1940, 1950 AND 1960

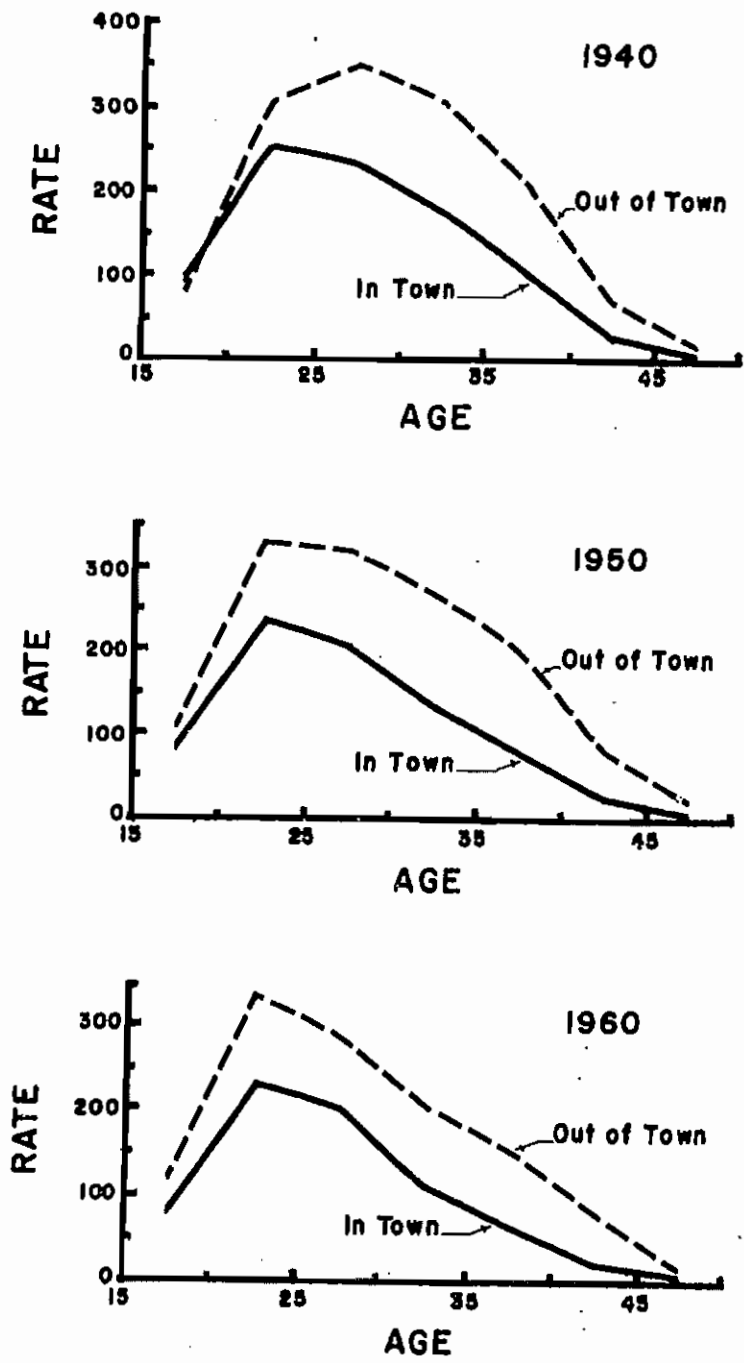


TABLE 92

GROSS REPRODUCTION RATES FOR URBAN AND  
RURAL ZONE: 1940-1960<sup>a</sup>

Year	Urban	Rural	Ratio Rural to Urban
1940	2.2	3.3	1.50
1950	1.9	3.3	1.74
1960	1.8	3.0	1.67

<sup>a</sup>Source: Table 91.

### Economic Differentials

In a survey under the supervision of Paul K. Hatt in 1947-1948, one of the relationships investigated was monthly rental value of the house and fertility.<sup>1</sup> He found that the correlation coefficients for these two variables were significant for the group of females who had married since 1920. He attributed the lack of correlation for women married prior to 1920 to the possibility "that family limitation practices and techniques were neither as widespread nor perhaps as reliable before date as in the latest years." Although this conclusion might be true, it is also possible that, for women married before 1920 and most of them of completed fertility by 1947, rental value of the house was to some extent a function of family size and thus not a pure index of socio-economic status.

A year earlier, more or less, Roberts and Stefani conducted a survey and among their findings was a negative relationship

---

<sup>1</sup>Hatt, pp. 296-300.

between number of children ever born per mother and annual family income<sup>1</sup> (see Table 93).

TABLE 93

NUMBER OF CHILDREN EVER BORN PER MOTHER (OF ALL AGES)  
BY INCOME GROUP AND RESIDENCE (1947)<sup>a</sup>

Family Annual Income (Dollars)	Puerto Rico	Urban	Rural
Less than 500	5.2	4.5	5.5
500-999	5.1	4.5	5.4
1,000-1,999	4.3	3.7	5.7
2,000 and over	3.9	3.1	4.9
<u>All Mothers</u>	4.9	4.1	5.5

<sup>a</sup>Roberts and Stefani, Patterns of Living in Puerto Rican Families (Rio Piedras, 1949), p. 289.

The above data tell us that for the Island as a whole there seems to be an inverse relationship between fertility and income. For the rural area, moreover, this association is not so clear and only those mothers whose annual family income amounted to \$2,000 or more seem to have had fewer children than the average mother. In the urban area no significant change is observed until the income limit of \$1,000 is reached.

In a recent study in which socio-psychological correlates of fertility were investigated, Hill, Stycos and Back found a small but significant correlation between rental value of the house and such fertility variables as use of birth control, length of use,

---

<sup>1</sup>Lydia Roberts and Rosa L. Stefani, Patterns of Living in Puerto Rican Families (Rio Piedras, 1949), p. 33.

and success rate.<sup>1</sup> They pointed out: "The restriction of the study to a lower social and economic class decreases the usually powerful impact of education and economic status on fertility behavior."

Although the three studies to which we have referred offer some support to the hypothesis of a negative relationship between economic status and fertility, the data are by no means conclusive. Possibly economic variables are difficult to handle in field surveys, but in light of the present evidence we cannot accept the economic status-fertility relationship as a proved fact.

#### Education and Fertility

Education is another sociological variable which has been found in many places to be negatively associated with fertility. In the Island, at least three indexes of educational level seem to be correlated with fertility behavior: ability to read and write, ability to speak English, and years of school completed.

According to data collected in the 1960 census, an ever married woman 14 years of age and over and illiterate has had on the average 2.3 more children than a woman able to read and write. Among those women of completed fertility (45 years and over) the difference was 1.5 children. The data tell us, in addition, that this gap exists at all age levels, from which we can infer that the fertility differential between women able and women unable to read and write has existed for a long time (see Table 94 and Fig. 43).

With respect to ability to speak English and number of children ever born, we find great differences. For example,

---

<sup>1</sup>Hill, Stycos, and Back, p. 223.

TABLE 94

NUMBER OF CHILDREN EVER BORN BY AGE AND ABILITY TO READ AND WRITE PER 1,000 EVER MARRIED WOMEN (1960)<sup>a</sup>

Age Group	Not Able	Able
14-19	1,553	1,010
20-24	2,874	2,096
25-29	4,507	3,050
30-34	5,686	3,880
35-44	6,802	4,975
45 & over	6,847	5,243
14 & over	6,329	4,063

<sup>a</sup>Source: 1960 Census Special Tabulation, Puerto Rico's Planning Board, San Juan, Puerto Rico.

women 35-44 years of age and unable to speak English had on the average 3 children more than those able to speak English.<sup>1</sup> It is interesting to observe that women able to speak English had less children than those able to read and write, the obvious reason being that ability to speak a non-native language in general represents a higher educational level than the mere ability to write and read.

In place of dichotomies as "able" and "unable," years of school completed provides a greater range of variation in the educational continuum, permitting us to see whether or not fertility is a monotonic decreasing function of educational level.

Table 95 and 96 show data about children ever born per 1,000 women by age, years of school completed and residence, as collected in the 1950 and 1960 censuses. These figures clearly

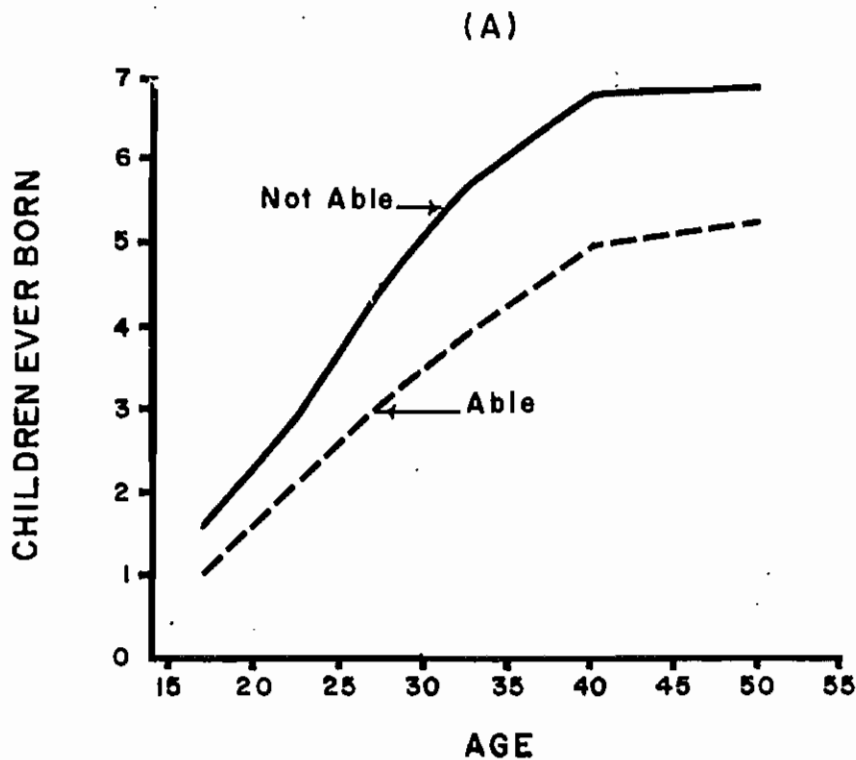
---

<sup>1</sup>U. S. Census of Population, 1960, Report PC(1)-53D, Table 95.



Figure 43

CHILDREN EVER BORN PER EVER MARRIED WOMAN  
BY AGE AND ABILITY TO READ AND WRITE  
PUERTO RICO: 1960



CHILDREN EVER BORN PER EVER MARRIED WOMAN  
35-44 YEARS OLD BY ABILITY TO SPEAK ENGLISH  
PUERTO RICO: 1960

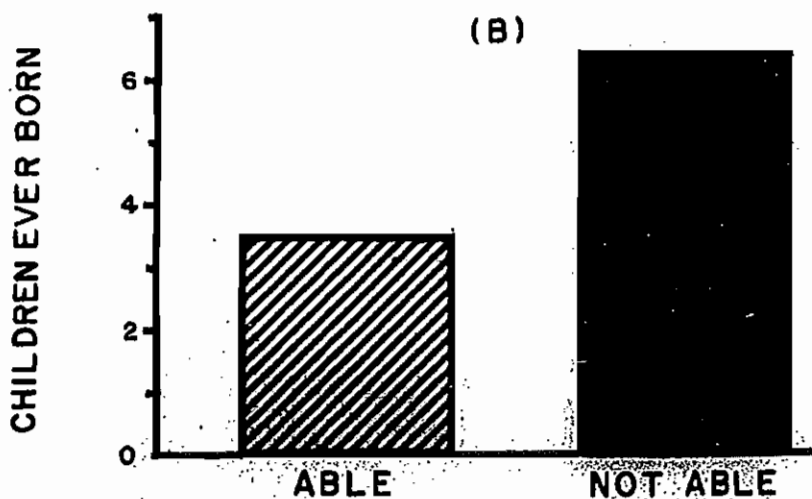


TABLE 95

NUMBER OF CHILDREN EVER BORN PER 1,000 WOMEN BY AGE, YEARS OF SCHOOL COMPLETED, AND RESIDENCE (1950)<sup>a</sup>

Residence and Age	Years of School Completed						
	0	1-3	4-7	8	9-11	12	13+
<u>Puerto Rico</u>							
15-19	309	278	206	128	75	47	26
20-24	1,920	1,780	1,513	1,220	832	336	262
25-29	3,457	3,433	2,894	1,982	1,641	1,002	900
30-34	4,682	4,588	3,938	2,519	2,067	1,461	1,384
35-39	5,751	5,605	4,892	3,104	2,576	1,684	1,452
40-44	6,227	5,834	5,293	3,419	2,861	1,951	1,539
45 & over	6,463	5,611	4,978	3,566	3,154	2,319	1,801
<u>Urban</u>							
15-19	320	308	220	136	77	48	22
20-24	1,721	1,604	1,436	1,155	806	340	253
25-29	2,905	2,875	2,500	1,826	1,553	949	866
30-34	3,809	3,728	3,278	2,345	1,976	1,405	1,341
35-39	4,561	4,428	3,964	2,824	2,401	1,627	1,390
40-44	4,932	4,541	4,236	3,171	2,705	1,894	1,467
45 & over	5,626	4,722	4,297	3,457	2,976	2,219	1,751
<u>Rural</u>							
15-19	305	266	196	118	73	45	47
20-24	2,013	1,870	1,571	1,318	880	326	297
25-29	3,711	3,728	3,218	2,271	1,872	1,251	1,054
30-34	5,122	5,066	4,528	2,916	2,421	1,757	1,604
35-39	6,320	6,279	5,735	3,893	3,194	2,078	1,809
40-44	6,920	6,757	6,335	4,177	3,519	2,321	1,919
45 & over	7,003	6,681	6,235	4,236	4,023	3,045	2,129

<sup>a</sup>Source: U. S. Census of Population, 1950, Series PC-14, No. 21, Table 2.

TABLE 96

NUMBER OF CHILDREN EVER BORN PER 1,000 EVER MARRIED WOMEN BY AGE, YEARS OF SCHOOL COMPLETED AND RESIDENCE (1960)<sup>a</sup>

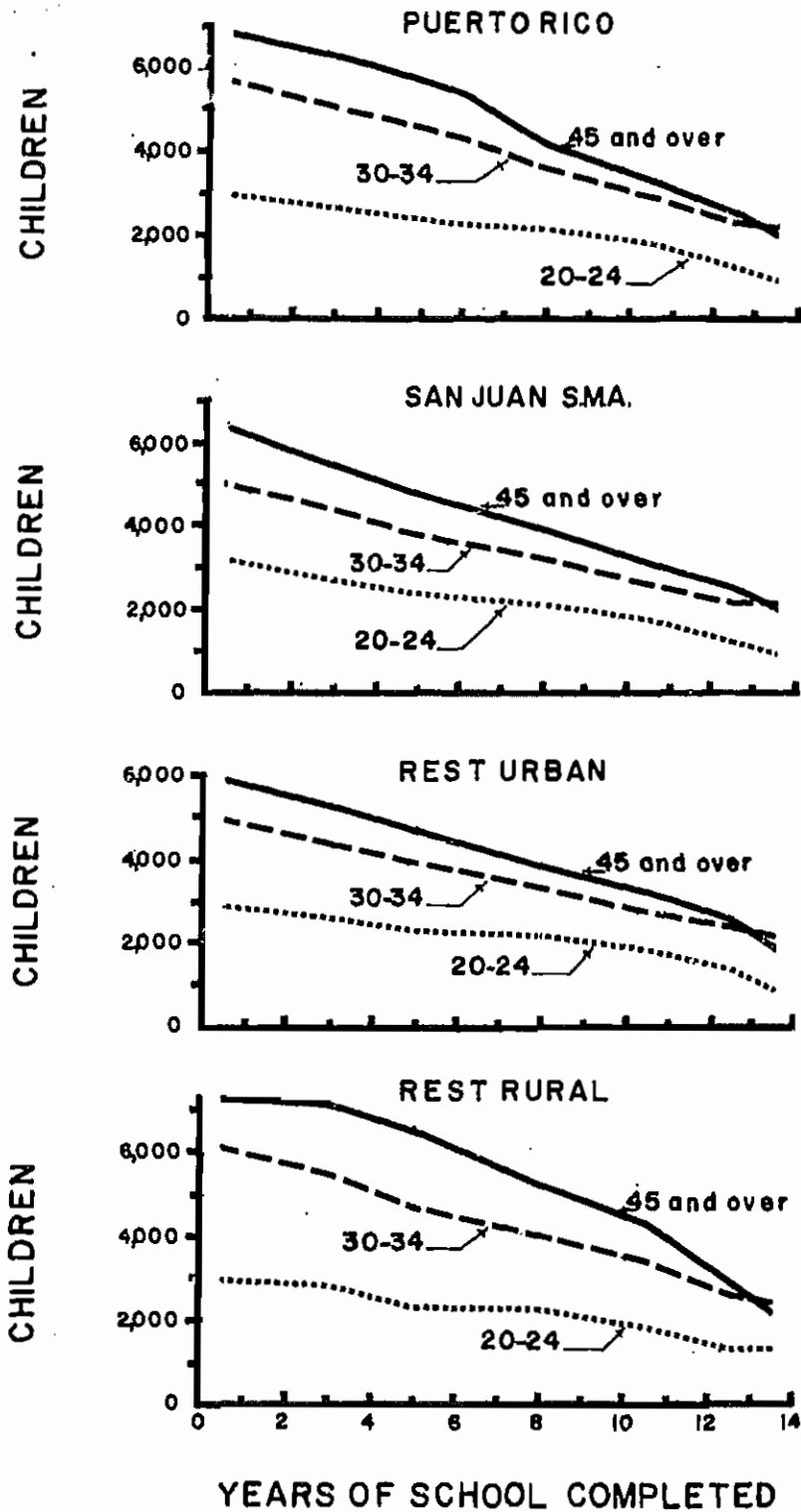
Residence and Age	Years of School Completed						
	0	1-4	5-6	7-8	9-11	12	13+
<u>Puerto Rico</u>							
14-19	1,735	1,253	1,037	956	808	563	839
20-24	2,975	2,729	2,341	2,201	1,800	1,237	986
25-29	4,537	3,990	3,490	3,013	2,661	1,948	1,699
30-34	5,716	5,051	4,290	3,594	2,888	2,328	2,170
35-44	6,761	6,385	5,256	3,960	3,105	2,355	2,352
45 & over	6,830	6,307	5,415	4,233	3,337	2,508	1,994
<u>San Juan Metropolitan Area</u>							
14-19	1,367	1,278	1,065	895	867	493	467
20-24	3,124	2,712	2,351	2,095	1,769	1,178	899
25-29	4,413	3,650	3,135	2,919	2,544	1,872	1,675
30-34	5,042	4,440	3,819	3,316	2,635	2,204	2,150
35-44	5,587	5,331	4,372	3,408	2,872	2,254	2,275
45 & over	6,422	5,527	4,823	4,008	3,097	2,469	2,027
<u>Rest Urban<sup>b</sup></u>							
14-19	2,239	1,222	978	941	824	658	1,364
20-24	2,872	2,588	2,321	2,187	1,757	1,275	918
25-29	4,220	3,731	3,178	2,924	2,627	1,958	1,697
30-34	4,935	4,413	3,884	3,354	2,750	2,374	2,122
35-44	5,779	5,468	4,612	3,595	3,142	2,403	2,376
45 & over	5,941	5,329	4,746	3,923	3,181	2,457	1,863
<u>Rest Rural<sup>b</sup></u>							
14-19	1,675	1,253	1,047	998	749	595	800
20-24	2,967	2,768	2,344	2,287	1,861	1,283	1,317
25-29	4,648	4,187	3,776	3,135	2,830	2,075	1,779
30-34	6,124	5,467	4,721	4,034	3,430	2,608	2,364
35-44	7,356	7,030	6,086	4,957	3,577	2,720	2,697
45 & over	7,344	7,192	6,479	5,314	4,355	2,888	2,196

<sup>a</sup>Source: Special 1960 Census Tabulation, Puerto Rico Planning Board.

<sup>b</sup>Excluding the Urban and Rural Parts included in the San Juan Metropolitan Area.

Figure 44

CHILDREN EVER BORN PER 1000 EVER MARRIED WOMEN  
BY YEARS OF SCHOOL COMPLETED AND RESIDENCE,  
FOR SELECTED AGE GROUPS PUERTO RICO: 1960



demonstrate the existence of a marked inverse correlation between school level and fertility, even when age and urban-rural residence are controlled. Among women of completed fertility (45 years and over) in 1950, for example, we find those with no schooling had on the average 6.5 children, while those with 13 or more years of school completed had only 1.8 children, a difference of 4.7 children. In the urban area in 1950, for women 45 years old and over, the difference in children ever born between these two educational levels (0 and 13 and over) was 3.9 children. Among rural women the corresponding gap amounted to slightly less than 5 children (4.9). More or less the same relationship is observed from the 1960 census data, although in this case only ever married women were considered (see Table 96). Fig. 44 shows the relationship between fertility and school years completed among ever married women for the Island as a whole, for the San Juan Statistical Metropolitan Area, and for the urban and rural zones. It is evident that fertility follows a monotonic decreasing trend with educational level, a fact that can be observed in all age groups.

Thus, the 1950 and 1960 data on children ever born tell us conclusively that schooling and urbanism are significant correlates of fertility. The fact that the education-fertility relationship holds even for women born in 1905 or before (45 years old in 1950) seems to be evidence that this educational differential has existed for many years.

#### Labor Force Participation

Although there is a clear association between fertility and labor force participation, we are unable to show the cause-effect direction (see Table 97). In our opinion labor force participation

is both a cause and an effect of low fertility. That is, women with few children because of other reasons will find it easier to enter the labor force if they want to do so than women with many children. On the other hand, women contemplating to enter (or actually in) the labor force must limit the number of children in order to be able to enter or to remain in it.

Among those in the labor force, fertility seems to be higher for unemployed women (see Table 98).

TABLE 97

TOTAL CHILDREN EVER BORN PER 1,000 EVER MARRIED WOMEN  
BY LABOR FORCE STATUS (1960)<sup>a</sup>

Age Groups	In the Labor Force	Not in the Labor Force	Total
14-19	1,079	1,082	1,082
20-24	1,507	2,366	2,192
25-29	2,206	3,525	3,197
30-34	2,955	4,545	4,121
35-44	3,751	5,786	5,304
45 & over	4,224	6,209	5,960

<sup>a</sup>Source: Special Tabulation from the 1960 Census.

TABLE 98

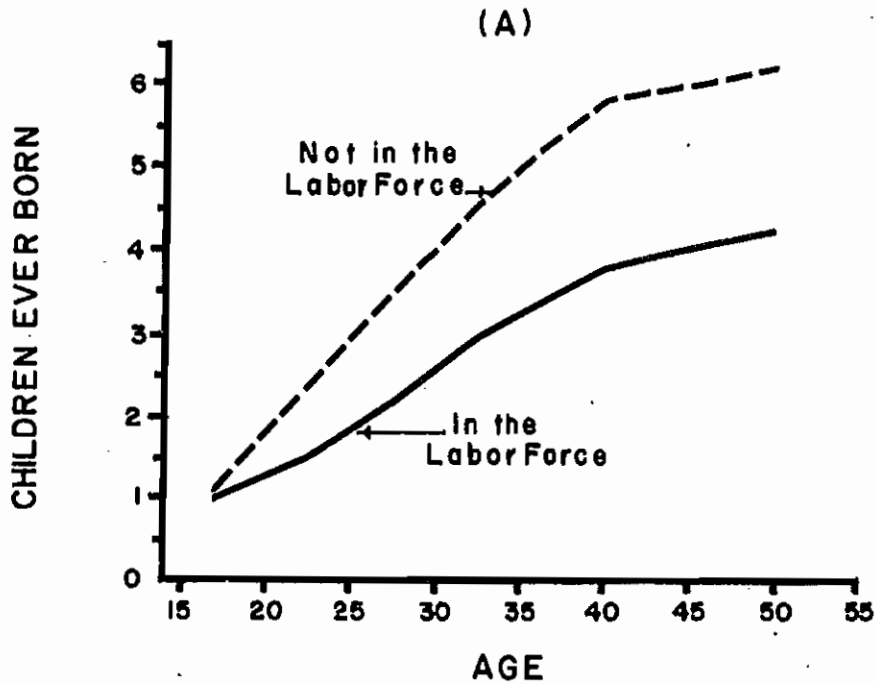
CHILDREN EVER BORN PER 1,000 EVER MARRIED WOMEN 35-44  
YEARS OLD BY LABOR FORCE AND EMPLOYMENT STATUS (1960)<sup>a</sup>

Labor Force and Employment Status	Children Ever Born
<u>In the Labor Force</u> . . . . .	3,745
Employed . . . . .	3,696
Unemployed . . . . .	4,555
<u>Not in Labor Force</u> . . . . .	5,740
Total . . . . .	5,304

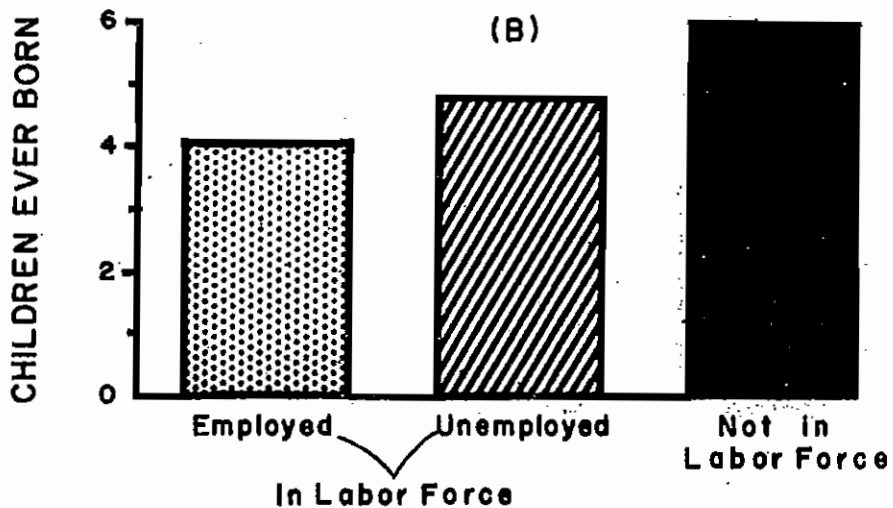
<sup>a</sup>Source: U. S. Census of Population, 1960, Report PC(1)-53D, Table 95.

Figure 45

CHILDREN EVER BORN PER EVER MARRIED WOMAN  
BY AGE AND LABOR FORCE STATUS  
PUERTO RICO: 1960



CHILDREN EVER BORN PER EVER MARRIED WOMAN  
35-44 YEARS OLD BY LABOR FORCE STATUS  
AND EMPLOYMENT STATUS  
PUERTO RICO: 1960



Religious Affiliation and  
Religiousness

Self-denominated Roman Catholics comprise over 80 per cent of the Island population. Paul K. Hatt estimated this percentage at around 85, while Hill, Stycos, and Back found only 82 per cent self-denominated Catholics.<sup>1</sup>

In terms of frequency of attendance at religious services, Hatt found that only 25 per cent of all adults interviewed attended religious services once or more monthly, 56 per cent attended occasionally, and 19 per cent never attended. Comparable percentages were obtained in the Hill, Stycos, and Back study.

Catholicism, according to Hatt's study, seemed to be negatively associated with socio-economic status (education and monthly rental value of the house). On the other hand, religiousness was directly associated with socio-economic status. Moreover, no significant correlation was found between fertility and either Catholicism or religiousness.<sup>2</sup>

Practically the same results were obtained by Hill, Stycos, and Back who found no significant association between religious affiliation and such fertility variables as use of birth control methods, length of use and success rate.<sup>3</sup> They found, in fact, that Catholics valued large families less than non-Catholics.

Thus, religious affiliation, from the member standpoint, seems not to be a great obstacle to family planning and use of "artificial" birth control methods. This fact, however, by no

---

<sup>1</sup>Hatt, p. 107; Hill, Stycos and Back, p. 53.

<sup>2</sup>Hatt, p. 333.

<sup>3</sup>Hill, Stycos and Back, pp. 222-223.



means minimizes the role of the powerful apparatus of the Roman Catholic Church as an impediment in the dissemination of birth control knowledge and methods in Puerto Rico.

Other Social and Psychological  
Differentials

One of the most comprehensive studies of factors associated with Puerto Rican fertility was undertaken by The Social Science Research Center of the University of Puerto Rico early in the 1950's.<sup>1</sup> The research problem was "the discovery of factors accounting for the success of some and the failure of most Puerto Ricans to contain their family size in line with their stated goals for family size."

Five blocks of factors were intensively analyzed: demographic background and influence of key reference groups; informational and attitudinal attributes; specific family size attitudes; family action possibilities; and effective family planning.<sup>2</sup> Of some 50 original items pertaining to the five groups stated above, only eight independent factors survived the reduction process of "factor analysis."

These variables were:

- (1) Communication--index of the degree of husband-wife communication on general marital issues and birth control.
- (2) Timing of perception--time of perception of family size as problem.
- (3) Planning-striving--index about beliefs in the value of education and planning.

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid., chap. viii.

(4) Social status--index resulting from rental value of the domicile, education of wife, education of husband, occupation of wife, and occupation of husband.

(5) Ideas about family size--index of ideal family size and related questions.

(6) Concern about family size--index of whether the couple had thought about the number of children they wanted when first married, whether they had thought about spacing of children and other related questions.

(7) Fatalism--index of value orientation dealing with traditionalism, modernism, satisfaction with life's conditions, advising one's children not to leave the home district and so on.

(8) Sex and marital adjustment--index of agreement between husband and wife on general issues, satisfaction with spouse, satisfaction with sex in marriage and denial of sex access by wife.

Two independent fertility variables were constructed: index of competence in utilizing means of birth control and index of fertility control. Competence in utilizing means index was made up of answers to questions about use of birth control clinics, number of birth control methods known, number of methods used, fertility planning and success rate. The index of fertility control included fertility planning items, failure rate and fertility rate.<sup>1</sup>

Combining and relating the eight independent variables to the dependent variables resulted in relatively small multiple

---

<sup>1</sup>For a more detailed explanation of such indexes, see ibid.

correlation coefficients: 0.36 with means-competence index and only 0.26 with the index of fertility control. In other words, these eight independent variables were only able to explain 13 per cent of the total variance of the "means-competence" variable and 7 per cent of the variance of the "fertility control" variable.

Of the eight variables the best predictors for both dependent variables were "communication" and "timing of perception."

TABLE 99

PARTIAL CORRELATION COEFFICIENTS BETWEEN EIGHT INDEPENDENT VARIABLES AND INDEX OF MEANS-COMPETENCE AND THE INDEX OF FERTILITY CONTROL, HOLDING SEVEN VARIABLES CONSTANT<sup>a</sup>

Independent Variables	Dependent Variables	
	Means Competence	Fertility Control
Communication . . . . .	0.27	0.20
Timing of Perception . . . . .	0.12	0.07
Planning . . . . .	0.07	0.06
Social Status . . . . .	0.10	0.03
Ideas About Family Size . . . . .	0.04	0.02
Concern About Family Size . . . . .	0.04	0.06
Fatalism . . . . .	-0.02	-0.03
Sex and Marital Adjustment . . . . .	-0.08	-0.08

<sup>a</sup>Source: Hill, Stycos and Back, p. 244.

The authors have offered some important and sound justifications for the low predictive value of their analytical model. In our opinion, and in addition to the reasons offered by the authors, the following might probably have operated in the same direction:

- (1) Limitation of the study to a low socio-economic class has minimized the importance of such variables as education and economic status and maximized biological factors. Fecundity

(biological reproductive capacity), an important variable when dealing with individual variations, being so difficult to measure, was left out of the analytical model.

(2) It might be that many of the indexes and scales used do not really measure what the authors intended to measure. At present, measurement in social sciences, and especially in the realms of attitudes, values and beliefs, is highly unreliable.

(3) Respondent's bias and inaccuracies one must really question--for example, how it is that females who feel much or some embarrassment at telling children about sex, being examined by a physician, discussing menstrual period with husband, undressing in front of husband, talking with husband about sex and so on, are able to report accurately about these matters.<sup>1</sup>

### Conclusion

Of all the socio-economic and socio-psychological correlates of fertility studied in the Island, education and urbanism emerge as the two most powerful predictors of fertility behavior. Economic status shows little association with fertility but it might be that the indexes used are not pure measures of economic position. For example, rental value of the domicile might be a function of family size. Religious affiliation as well as religiousness apparently are not associated with reproductive performance. The same situation is observed with type of marriage (legal vs. consensual). Labor force participation of the woman although clearly associated with fertility, obviously may be at

---

<sup>1</sup> See ibid., Table 10, p. 57.

the same time a cause and an effect of fertility level. In relation to values, attitudes and beliefs, and knowledge and utilization of birth control methods, Hill, Stycos and Back concluded:<sup>1</sup>

Family planning is neither hindered nor supported by institutional patterns and adherence to cultural norms. Religious beliefs, ideals of the male role (machismo) or of female modesty, ignorance of contraceptive methods and the supposed economic necessity of large families all were shown to have minimal influence on contraceptive use and fertility.

Knowledge of modern methods of contraception comes late in marriage, birth control is delayed past the point of ideal family size, even sterilization is typically performed after so many births that it does little to effect family size. Contraception thus takes the character of emergency action, undertaken seriously only under great pressure. It is little wonder that the most drastic method, sterilization, is the preferred one.

. . . the factors which turned out to be most closely related to the dependent variables involved family readiness for action. Communication and time of perception of problems of family size are by far the most important factors predicting competence and success in fertility control.

---

<sup>1</sup>Ibid., p. 248.

## CHAPTER VI

### MORTALITY TRENDS<sup>1</sup>

One of the most significant achievements in the Island's history has been the radical reduction of mortality during the present century. From a level well above 30 deaths per 1,000 inhabitants at the beginning of the present century, the crude death rate declined to 18 deaths per 1,000 population by 1940. The most radical drop, however, was observed during the decade of 1940-1950 when the crude death rate declined from 18.4 to 9.9. In relative terms, this represents almost a 50 per cent reduction in ten years. At present Puerto Rico is one of the low mortality countries of the world with a crude death rate of less than 7 deaths per 1,000 population.

As observed in Table 100, the relative reduction in mortality during the ten-year period 1940-1950 was almost identical to that observed during the first 40 years of the present century. From 1950 to 1960 the crude death rate was reduced by almost 33 per cent, but little change has occurred since 1955 (7.2 in 1955; 6.8 in 1961).

#### Sex and Age Differentials

##### The Sex Differential

In communities where mortality is out of human control there is almost no difference between the crude death rates by sex, because female mortality in such a community in the so-called

---

<sup>1</sup>This is only a summary of the author's Master's thesis.

TABLE 100

CRUDE DEATH RATE IN PUERTO RICO: 1888-1898 TO 1960<sup>a</sup>

Period or Year	Crude Rate
1888-1898 . . . . .	35.0 <sup>b</sup>
1899-1909 . . . . .	28.0 <sup>b</sup>
1910-1919 . . . . .	23.9
1920-1929 . . . . .	22.2
1930-1939 . . . . .	19.7
1940-1949 . . . . .	14.5
1950-1959 . . . . .	8.0
1940 . . . . .	18.4
1950 . . . . .	9.9
1960 . . . . .	6.7

<sup>a</sup> Source: Bureau of Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup> Corrected for underregistration estimated at ten per cent.

reproductive ages (15-44 years) tends to be higher than for males, cancelling out the effect of a lower female mortality in all other ages. A high maternal female mortality and tuberculosis are usually the reasons for the high female rates in the reproductive ages. With improvements in health conditions, maternal mortality (and tuberculosis) decline considerably and female rates in the reproductive ages drop below the male level. We have observed this trend in Puerto Rico since 1910, with the overall decline in the crude death rate accompanied by an increased gap between the sexes as seen in Table 101.

TABLE 101

CRUDE DEATH RATE BY SEX: 1909-1911 TO 1959-1961<sup>a</sup>

Period	Males	Females	Ratio Males to Females
1909-1911	23.0	22.4	1.03
1919-1921	23.4	22.6	1.04
1929-1931	22.0	20.8	1.06
1939-1941	18.8	17.6	1.07
1949-1951	10.7	9.7	1.10
1959-1961	7.6	6.0	1.27

<sup>a</sup>Source: Bureau of Vital Statistics, Department of Health of Puerto Rico.

Infant Mortality

One of the best single indexes of the force of mortality in a community is the infant mortality rate (deaths occurring to children under one year of age per 1,000 live births occurring during the same time period). At the beginning of the present century infant mortality in Puerto Rico was of a magnitude of around 200 infant deaths per 1,000 live births. Since then it has declined, following the same trend observed in the crude death rate, to a level of 41.7. Although a remarkable improvement, it is still far from the levels achieved by the most developed countries of the Western World.

TABLE 102

INFANT MORTALITY FOR SELECTED PERIODS: 1902-1903 TO 1959-1961<sup>a</sup>

Period	Rate	Per Cent Decline
1902-1903 <sup>b</sup>	203.8	••••
1909-1911 <sup>c</sup>	173.1	15.1
1919-1921 <sup>c</sup>	151.7	12.4
1929-1931 <sup>c</sup>	138.0	9.0
1939-1941 <sup>c</sup>	115.2	16.5
1949-1951 <sup>c</sup>	64.6	43.9
1959-1961 <sup>c</sup>	44.0	31.9

<sup>a</sup>Bureau of Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup>Fiscal year.

<sup>c</sup>Average for the triennium.



Figure 46  
THE CRUDE DEATH RATE  
PUERTO RICO: 1888-1898 TO 1950-59

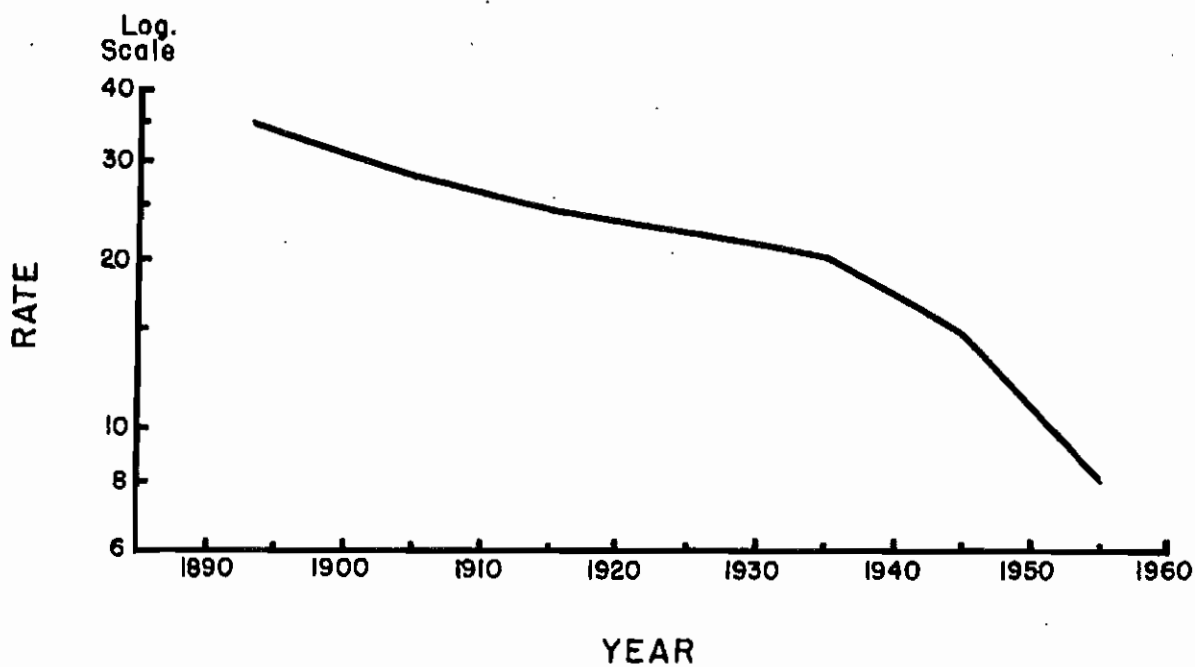


Figure 47  
THE CRUDE DEATH RATE BY SEX: 1910-1960

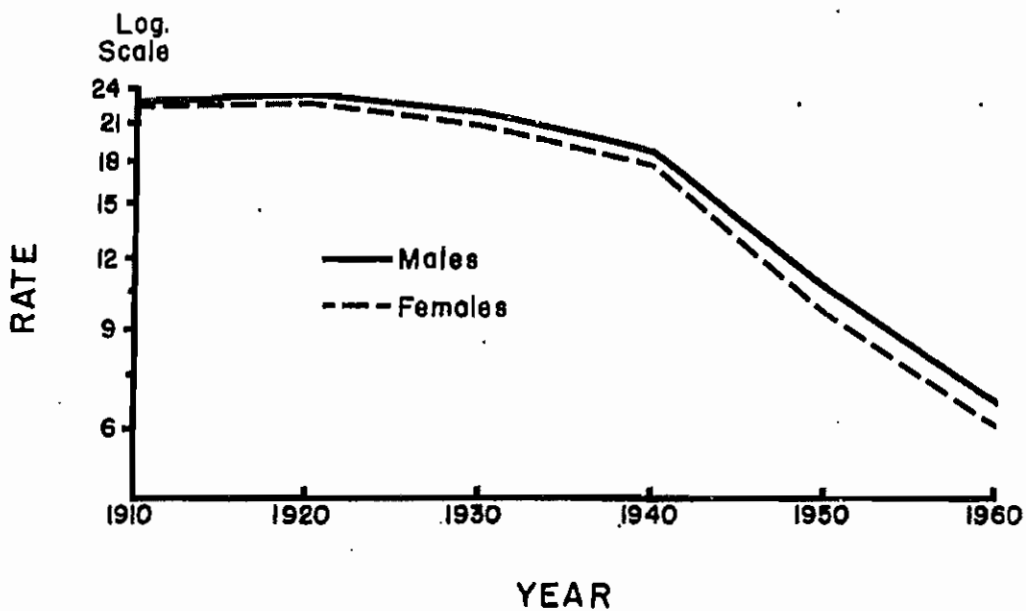


TABLE 103

NEONATAL, "LATE," AND TOTAL INFANT MORTALITY: 1932-1960<sup>a</sup>

Year	Total Infant Mortality <sup>b</sup>	Neonatal Mortality <sup>b</sup>	"Late" Infant Mortality <sup>b</sup>
1932	132.4	54.2	78.2
1933	139.4	56.9	82.5
1934	113.4	39.9	73.5
1935	114.7	35.6	79.1
1936	127.3	35.5	91.8
1937	138.4	39.9	98.5
1938	121.2	36.2	85.0
1939	112.5	33.7	78.8
1940	113.4	35.2	78.2
1941	116.2	35.2	81.0
1942	103.4	33.9	69.5
1943	95.3	30.4	64.9
1944	99.5	30.1	69.4
1945	93.4	29.6	63.8
1946	83.8	29.3	54.5
1947	71.5	29.1	42.4
1948	78.5	28.6	49.9
1949	67.6	27.1	40.5
1950	68.3	27.3	41.0
1951	67.1	25.7	41.4
1952	66.6	27.0	39.6
1953	63.3	26.7	36.6
1954	57.8	26.5	31.3
1955	55.1	25.6	29.5
1956	55.4	26.8	28.6
1957	50.3	25.3	25.0
1958	53.7	26.3	27.4
1959	48.1	25.4	22.7
1960	43.7	24.2	19.5

<sup>a</sup>Sources: For years 1932-1950: Bureau of Maternal and Infant Hygiene, Maternal, Infant and Childhood Mortality in Puerto Rico (Department of Health, San Juan, Puerto Rico, March, 1955), Table 2; and for years 1950-1960: Bureau of Demographic Registry and Statistics, Department of Health of Puerto Rico, San Juan, Puerto Rico (unpublished data).

<sup>b</sup>Number of deaths per 1,000 live births.

Figure 48

INFANT MORTALITY IN PUERTO RICO  
FOR SELECTED PERIODS  
1902-03 TO 1959-61

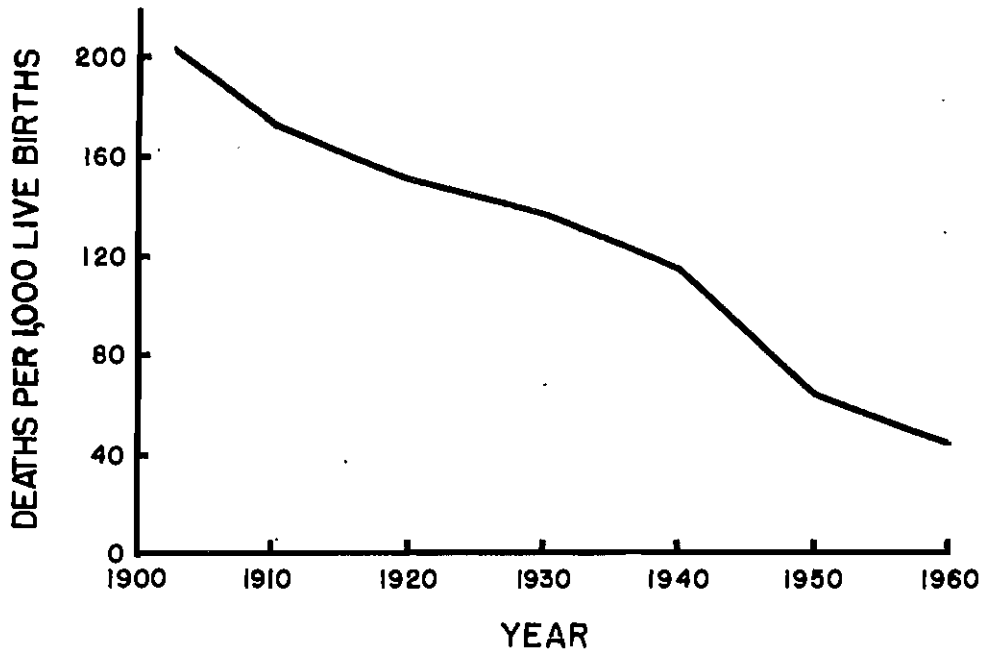
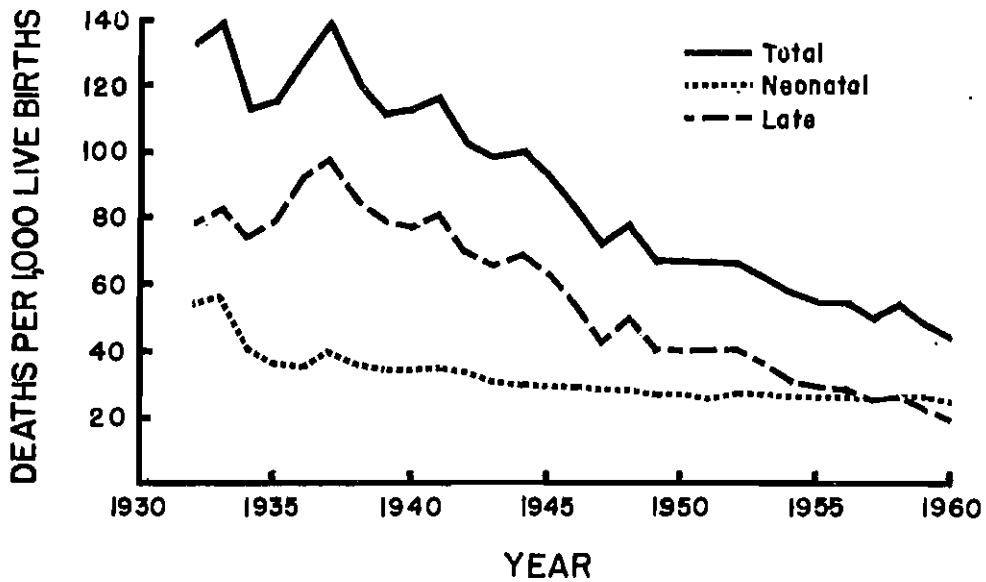


Figure 49

TOTAL, NEONATAL AND LATE INFANT  
MORTALITY IN PUERTO RICO  
1932-1960



A better indicator of health conditions in a country can be obtained from the "late" infant mortality rate (deaths occurring to children one to 11 months of age per 1,000 live births) because deaths to children under one month of age (neonatal mortality) are to a great extent a function of biological rather than socio-economic factors. Table 103 shows that the overall decline in infant mortality has been the result of changes in "late" infant mortality.

#### Age Specific Mortality Rates

It is common knowledge that improvements in mortality conditions are not equally shared by all age groups. In practically all countries, comparatively little progress has been made in mortality risks in the "advanced" ages. In Puerto Rico the most remarkable declines have occurred in the age groups 5 to 34, although the drops have been significant at all age levels. During the time interval of 1902-1903 (fiscal year) to 1960, at least a 40 per cent decline has been achieved in each age group. In the age groups between 5 and 19 years the reduction has been 94 per cent, with an average reduction (unweighted) of 80 per cent.

An interesting fact about the trend of decline is that, in relative terms, the drops have been smaller at the ends of the age span, that is, in the very young and very old groups. The smallest reduction is observed in the age groups 75 years and over, where the rate declined 23 per cent from 1902-1903 to 1960. The percentage of decrease in the age specific rates shows an inverted "U" shaped curve with age. In other words, the greatest relative improvement has been observed in those age groups that already had the lowest rates (see Table 104).

TABLE 104

AGE SPECIFIC MORTALITY RATES AND INDEXES FOR BOTH SEXES:  
1902-1903 (FISCAL YEAR) TO 1959-1961<sup>a</sup>

Age Group	1902- 1903	1909- 1911	1919- 1921	1929- 1931	1939- 1941	1949- 1951	1959- 1961
Under 1 <sup>b</sup>	203.8	173.1	151.7	138.0	115.2	64.6	44.0
1- 4	37.0	35.6	36.1	33.8	30.5	10.9	3.1
5- 9	14.1	8.2	7.7	7.5	5.5	2.1	0.8
10-14	9.4	5.0	4.8	3.6	2.7	1.1	0.6
15-19	16.1	8.3	9.1	6.9	4.8	2.2	0.9
20-24	21.3	12.6	14.2	12.8	8.6	4.0	1.5
25-29	22.5	14.4	16.4	14.8	10.4	4.9	1.9
30-34	22.8	14.6	16.6	13.2	11.0	5.4	2.2
35-39	23.5	15.4	17.3	14.0	11.9	6.3	3.0
40-44	26.3	17.0	17.6	16.1	12.6	7.2	4.1
45-49	29.8	19.9	19.9	19.2	15.6	8.9	5.1
50-54	36.9	24.1	26.5	24.1	18.7	10.8	8.0
55-59	42.8	29.2	31.5	30.2	24.3	14.8	11.1
60-64	52.1	46.0	38.5	38.6	31.3	21.0	16.1
65-69	64.4	52.3	48.1	53.3	43.7	31.8	24.3
70-74	77.5	80.2	68.2	80.5	63.4	46.5	37.6
75 and over	129.1	142.9	126.6	166.9	137.8	103.4	99.5
<u>Indexes (1902-1903 = 100)</u>							
Under 1 <sup>b</sup>	100	85.0	74.0	68.0	57.0	32.0	22.0
1- 4	100	96.0	98.0	91.0	82.0	29.0	8.0
5- 9	100	58.0	55.0	53.0	39.0	15.0	6.0
10-14	100	53.0	51.0	38.0	29.0	12.0	6.0
15-19	100	52.0	57.0	43.0	30.0	14.0	6.0
20-24	100	59.0	67.0	60.0	40.0	19.0	7.0
25-29	100	64.0	73.0	66.0	46.0	22.0	8.0
30-34	100	64.0	73.0	58.0	48.0	24.0	10.0
35-39	100	66.0	74.0	60.0	51.0	27.0	13.0
40-44	100	65.0	67.0	61.0	48.0	27.0	16.0
45-49	100	67.0	67.0	64.0	52.0	30.0	17.0
50-54	100	65.0	72.0	65.0	51.0	29.0	22.0
55-59	100	68.0	74.0	71.0	57.0	35.0	26.0
60-64	100	69.0	74.0	74.0	60.0	40.0	31.0
65-69	100	81.0	75.0	83.0	68.0	49.0	38.0
70-74	100	103.0	88.0	104.0	82.0	60.0	49.0
75 and over	100	111.0	98.0	129.0	107.0	80.0	77.0

<sup>a</sup>Source: Bureau of Vital Statistics, Department of Health of Puerto Rico.

<sup>b</sup>Infant mortality.

TABLE 105

AGE SPECIFIC DEATH RATES BY SEX: SELECTED PERIODS

Sex and Age	1929-1931	1939-1941	1949-1951	1959-1961
<u>Males</u>				
Under 1	190.9	151.8	87.2	49.5
1- 4	33.8	30.0	10.3	3.0
5- 9	7.8	5.5	2.2	0.9
10-14	3.8	2.7	1.1	0.8
15-19	6.2	4.4	2.1	1.2
20-24	12.5	8.4	4.1	1.9
25-29	13.9	10.0	5.0	2.4
30-34	12.0	10.6	5.7	2.8
35-39	13.2	12.0	6.4	3.6
40-44	16.2	13.0	7.6	4.8
45-49	20.3	16.9	9.4	5.8
50-54	26.6	20.3	12.1	10.3
55-59	33.6	27.8	16.8	13.3
60-64	43.4	36.2	23.8	19.3
65-69	59.9	50.4	36.3	28.5
70-74	90.1	78.2	53.9	45.2
75-79	123.7	101.1	71.2	55.2
<u>Females</u>				
Under 1	166.5	127.7	70.4	38.4
1- 4	33.8	31.0	11.5	3.2
5- 9	7.2	5.4	2.1	0.8
10-14	3.4	2.8	1.1	0.5
15-19	7.5	5.1	2.3	0.7
20-24	13.1	8.8	3.9	1.1
25-29	15.6	10.7	4.7	1.5
30-34	14.4	11.5	5.2	1.7
35-39	14.7	11.8	6.2	2.5
40-44	16.0	12.2	6.8	3.5
45-49	17.9	14.2	8.3	4.0
50-54	21.3	16.9	9.4	6.9
55-59	26.1	20.0	12.5	7.8
60-64	33.5	26.3	17.9	12.9
65-69	46.9	37.3	27.2	20.0
70-74	71.6	55.2	39.0	33.8
75-79	101.4	84.4	56.7	41.4

<sup>a</sup> Source: Bureau of Vital Statistics, Department of Health of Puerto Rico.

TABLE 106

RATIOS OF MALE TO FEMALE AGE SPECIFIC DEATH RATES  
BY AGE; SELECTED PERIODS<sup>a</sup>

Age Group	1929-1931	1939-1941	1949-1951	1959-1961
Under 1	1.15	1.19	1.24	1.29
1- 4	1.00	0.97	0.90	0.94
5- 9	1.08	1.02	1.05	1.12
10-14	1.12	0.96	1.00	1.60
15-19	0.83	0.86	0.91	1.71
20-24	0.95	0.95	1.05	1.72
25-29	0.89	0.93	1.06	1.60
30-34	0.83	0.92	1.10	1.65
35-39	0.90	1.02	1.03	1.44
40-44	1.01	1.07	1.12	1.37
45-49	1.13	1.19	1.13	1.45
50-54	1.25	1.20	1.29	1.49
55-59	1.29	1.39	1.34	1.71
60-64	1.30	1.38	1.33	1.50
65-69	1.28	1.35	1.33	1.42
70-74	1.26	1.31	1.38	1.34
75-79	1.22	1.20	1.26	1.33

<sup>a</sup>Source: Table 105.

In the reproductive ages (15-44 years) the reduction has been considerably greater for females than for males. For this reason the female group is enjoying, at present, lower mortality than males throughout the whole age span, except for the age group 1-4 years (see Tables 105 and 106).

Life Table Functions<sup>1</sup>

Probability of Dying (qx)

At present, mortality risks in Puerto Rico compare favorably with those prevailing in the most developed countries of the world.

<sup>1</sup>For the complete set of abridged life tables covering the period 1902-1903 to 1960, see Appendix III.

Mortality conditions in the early ages, however (especially in the infant ages), are still above the levels for countries like Sweden, the United States, England, and New Zealand. The probability of dying during the first year of life was, in 1960, at the level reached by Sweden during the decade 1921-1930, by the United States in the '30's, and by New Zealand in 1911-1915.<sup>1</sup> In the middle years mortality is comparable to that of the above mentioned countries, but in the "advanced" ages it is significantly lower. This unusual pattern of Puerto Rican mortality has been observed also in Islanders resident in New York City.<sup>2</sup>

Relatively low mortality in the "middle" and "advanced" ages is recent: prior to 1940 the mortality risks in the Island, for the whole life span, were characteristic of a backward country. Although significant progress was made during the first forty years of the present century, the most radical changes occurred since 1940 (see Table 107). At least a decline of 12 per cent has been observed in every age group since the fiscal year 1902-1903, but sometimes this decrease amounts to as much as 94 per cent.

The greatest achievements have been in the intermediate ages: in the childhood ages for males and in the reproductive ages for females. Table 108 shows that as a result of these changes, female mortality risks in the reproductive span have fallen below the male level.

---

<sup>1</sup>United Nations, Age and Sex Patterns of Mortality, Population Studies No. 22, Appendix Tables.

<sup>2</sup>Louis Weiner, "Vital Statistics in New York City's Puerto Rican Population" (Bureau of Applied Social Research, Columbia University, January, 1954) (Mimeographed).



TABLE 107

PROBABILITY OF DYING DURING EACH AGE INTERVAL (1,000 qx)  
FOR BOTH SEXES: 1902-1903 TO 1959-1961<sup>a</sup>

Age Interval	1902- 1903	1909- 1911	1919- 1921	1929- 1931	1939- 1941	1949- 1951	1959- 1961
0- 1	203.8	173.1	151.7	138.0	115.2	64.6	44.2
1- 5	125.1	121.1	122.6	115.7	105.9	41.0	12.0
5-10	68.1	40.1	37.8	36.8	27.0	10.7	3.2
10-15	45.9	24.8	24.0	17.8	13.6	5.5	3.0
15-20	77.9	40.6	44.7	33.8	23.6	10.9	4.6
20-25	101.5	61.4	68.8	62.1	42.2	19.9	7.4
25-30	107.0	69.6	78.9	71.6	50.7	24.0	9.7
30-35	108.3	70.7	79.8	64.0	53.7	26.8	11.1
35-40	111.3	74.5	83.0	67.7	58.0	30.9	14.9
40-45	124.0	81.7	84.7	77.6	61.2	35.2	20.5
45-50	139.0	95.1	94.9	91.8	75.4	43.6	25.3
50-55	169.7	114.2	124.9	114.0	89.7	52.7	39.3
55-60	194.2	136.5	146.6	140.7	114.8	71.4	54.4
60-65	231.5	165.6	176.5	176.7	145.8	100.1	77.6
65-70	278.2	232.2	215.7	236.2	197.8	147.7	115.0
70-75	325.3	334.7	292.3	335.8	274.5	209.0	172.5
75-80	385.1	428.2	359.6	436.5	374.7	276.0	251.3
80-85	474.9	506.1	444.1	533.2	474.0	370.2	377.1

<sup>a</sup>Source: Appendix III.

TABLE 108

PROBABILITY OF DYING DURING EACH AGE INTERVAL  
(1,000  $q_x$ ) BY SEX:<sup>a</sup> 1930-1960<sup>b</sup>

Age Interval	Males				Females			
	1930	1940	1950	1960	1930	1940	1950	1960
0- 1	145.2	123.5	70.5	48.8	130.5	106.5	58.5	39.6
1- 5	115.7	104.6	38.9	11.6	113.6	107.3	43.1	12.5
5-10	38.2	27.4	10.7	4.4	35.4	26.7	10.6	3.8
10-15	18.9	13.4	5.5	3.8	16.7	13.7	5.4	2.3
15-20	30.6	21.9	10.2	5.7	36.6	25.2	11.6	3.4
20-25	60.9	41.0	20.5	9.7	63.4	43.3	19.3	5.5
25-30	67.5	48.9	24.8	12.0	75.2	52.4	23.3	7.7
30-35	58.3	51.6	28.0	14.0	69.4	55.8	25.6	8.6
35-40	64.1	58.4	31.5	17.8	71.2	57.6	30.4	12.3
40-45	77.8	63.0	37.1	23.8	77.2	59.3	33.2	17.2
45-50	96.9	81.5	46.0	30.7	86.0	68.7	40.8	19.6
50-55	125.3	97.0	59.0	47.4	101.5	81.3	45.8	30.0
55-60	155.4	130.3	80.8	64.6	122.8	95.7	60.6	43.1
60-65	196.5	166.7	112.7	92.2	155.3	123.9	86.0	62.7
65-70	261.5	224.8	167.1	133.5	210.8	171.3	127.8	95.3
70-75	367.9	306.7	238.4	197.6	304.3	243.6	178.6	144.6
75-80	469.6	403.0	303.1	267.0	404.0	348.9	249.3	236.3
80-85	571.7	507.9	402.8	402.2	501.6	448.3	344.2	354.9

<sup>a</sup>Source: Appendix III.

<sup>b</sup>Refers to averages for the triennium centering around census years 1930, 1940, 1950, and 1960.

Figure 50

PROBABILITY OF DYING DURING EACH AGE  
INTERVAL ( $1,000 nq_x$ )  
PUERTO RICO: SELECTED PERIODS

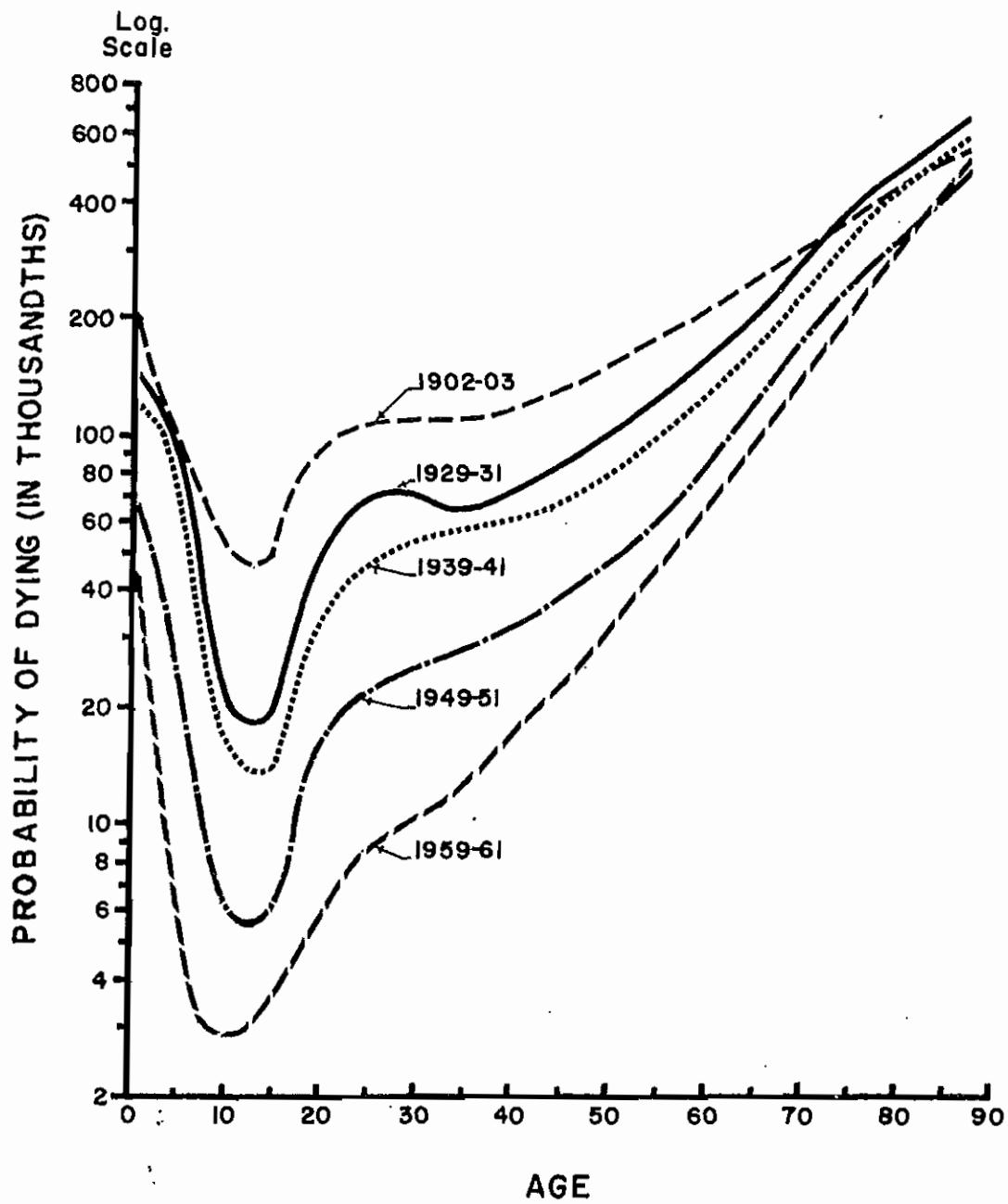


TABLE 109

AGE AT WHICH 25, 50 AND 75 PER CENT OF THE ORIGINAL COHORT  
DIES BY SEX: 1902-1903 TO 1959-1961<sup>a</sup>

Per Cent and Sex	1902- 1903	1909- 1911	1919- 1921	1929- 1931	1939- 1941	1949- 1951	1959- 1961
<u>25 Per Cent</u>							
Males	2.5	3.8	4.6	6.0	16.0	45.5	59.1
Females	3.2	4.3	5.0	8.8	19.1	47.7	65.8
Both Sexes	2.9	4.1	4.8	7.2	17.6	46.5	62.2
<u>50 Per Cent</u>							
Males	25.8	39.5	39.1	44.0	51.6	67.8	73.6
Females	26.6	38.2	37.3	43.3	53.2	71.3	78.2
Both Sexes	26.2	38.8	38.1	43.6	52.3	69.4	75.9
<u>75 Per Cent</u>							
Males	52.3	64.8	63.9	66.0	70.7	79.7	83.4
Females	53.0	66.9	65.8	68.7	74.4	83.3	86.4
Both Sexes	52.6	65.8	64.6	67.1	71.8	81.5	84.8

<sup>a</sup>Source: Appendix III.

Survivorship Column ( $l_x$ )

Perhaps a better picture of the changes in mortality risks can be obtained from an analysis of the survivorship life table function. According to the 1902-1903 experience, half of the original cohort died by the age of 26 years; the corresponding figure for 1960 was 76 years.

Before 1929-1931, 25 per cent of the original cohort died at or before its sixth birthday. In 1902-1903, one-fourth died before attaining its third year of life. In 1939-1941, 50 per cent of the original cohort survived age 53 years, and in 1959-1961, this proportion survived age 76 years (see Table 109). These are clear indications of the great waste of humans which prevailed during the first 40 years of the present century.

TABLE 110

NUMBER OF SURVIVORS TO SPECIFIED AGES OUT OF 1,000 BORN  
ALIVE BY SEX: 1902-1903 TO 1959-1961

Age and Sex	1902- 1903	1909- 1911	1919- 1921	1929- 1931	1939- 1941	1949- 1951	1959- 1961
<u>Males</u>							
0	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	787	820	842	855	877	930	951
5	689	721	740	756	785	893	940
10	640	691	711	727	763	884	936
15	608	673	693	713	753	879	932
20	565	649	665	691	737	870	927
25	508	610	621	649	706	852	918
30	456	570	575	606	672	831	907
35	411	534	534	570	637	808	894
40	367	496	493	534	600	782	878
45	321	456	451	492	562	753	858
50	274	411	406	444	516	719	831
55	222	359	351	389	466	676	792
60	174	305	295	328	406	622	741
65	129	248	237	264	338	552	672
70	89	185	181	195	262	459	582
75	57	117	123	123	182	350	467
80	33	63	76	65	108	244	343
85	16	29	40	28	53	146	205
90	7	11	17	9	21	70	91
<u>Females</u>							
0	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1	806	835	855	870	894	942	960
5	705	733	749	771	798	901	948
10	659	704	722	743	776	891	945
15	631	688	705	731	766	887	943
20	579	657	671	704	746	876	939
25	519	616	623	660	714	859	934
30	461	571	571	610	677	839	927
35	408	526	521	568	639	818	919
40	360	485	475	527	602	793	908
45	316	445	435	486	566	767	892
50	275	405	396	445	527	735	875
55	234	363	351	400	485	702	848
60	194	319	306	350	438	659	812
65	154	272	258	296	384	603	761
70	116	215	208	234	318	526	688
75	81	148	152	163	241	432	589
80	53	89	101	97	157	324	450
85	29	46	59	48	86	213	290
90	14	20	28	18	39	117	151

Figure 51

AGE AT WHICH 25, 50 AND 75 PERCENT  
OF THE ORIGINAL COHORT DIED BY SEX  
PUERTORICO:1902-03 TO 1959-61

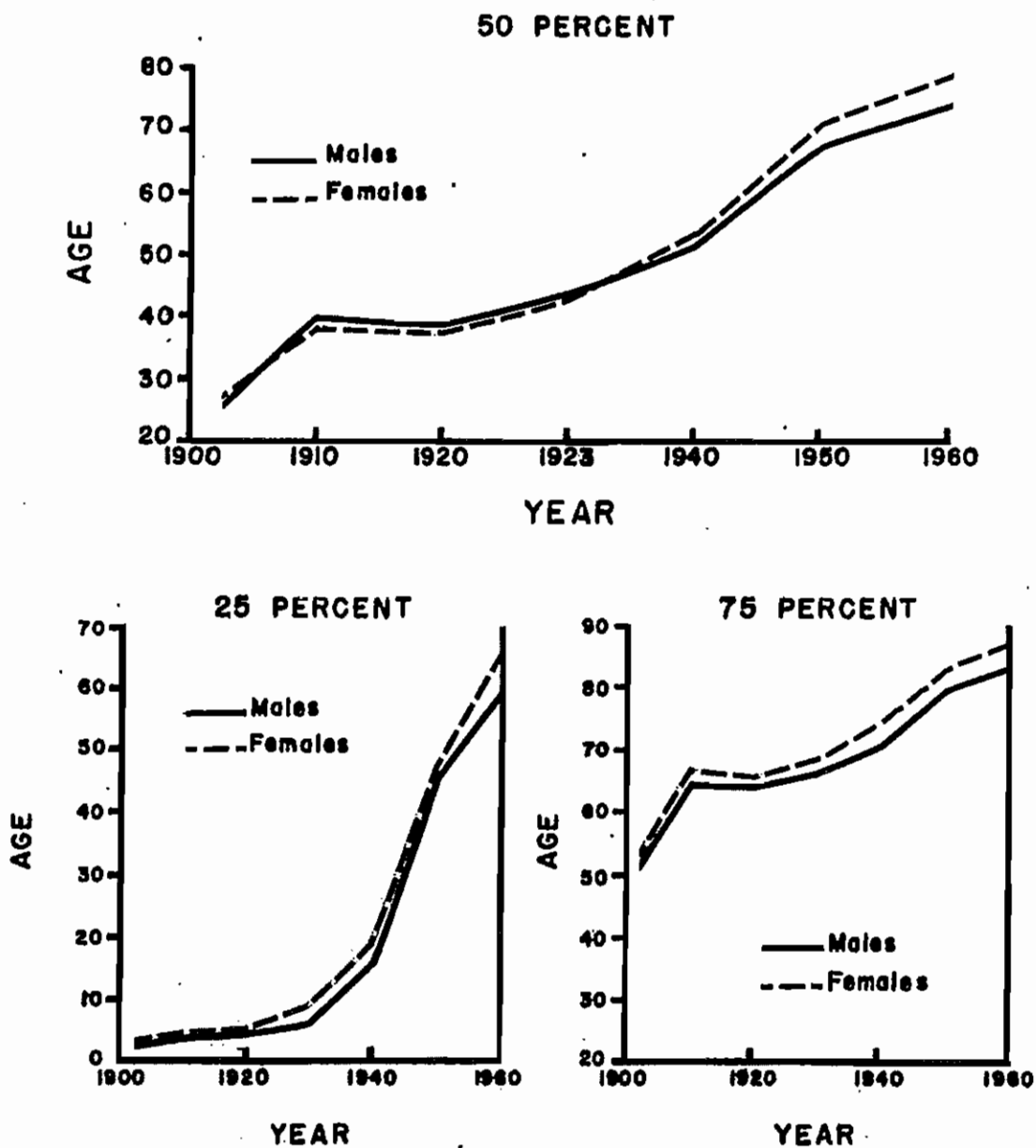


Table 109 also gives an idea of the great loss of females in the reproductive ages during periods prior to 1940. Until 1929-1931, 50 per cent of the male cohort survived to a higher age than the female. After 1930 the relationship reversed, and the difference in years favoring the female cohort has increased with time. In 1960, for example, half of the female cohort reached age 78.9 years while the corresponding male group reached age 76.5 years (see also Table 110).

#### Expectation of Life ( $e_x^0$ )

Health conditions in the Island were so deplorable at the beginning of the present century that the expectation of life at birth was only 30 years. By 1940 it had increased to 46 years, equivalent to an average increase of 4 years per decade. Moreover, since 1940, one of the greatest achievements in the history of public health in modern times has been observed in the Island. From 1940 to 1950, the expectation of life at birth increased from 46 years to 61 years, 15 years in one decade. This is equivalent to an average increase of 1.5 years in expectation of life per calendar year. During the decade 1950-1960, an increase of 9 years was achieved (from 61 to 70 years). Thus, during the last 20 years, expectation of life at birth increased almost 24 years.

As Table 111 shows, the difference between female and male expectation of life at birth, which fluctuated around one year from 1902-1903 to 1929-1931 has increased with time. In 1960, for example, the difference amounted to almost five years, the result of a radical decline in female mortality in the reproductive ages. One factor undoubtedly contributing to this decline has been the drop in maternal mortality.

TABLE 111

EXPECTATION OF LIFE AT BIRTH, BY SEX: 1902-1903 TO 1960<sup>a</sup>

Period	Both Sexes	Males	Females	Difference (Females Minus Males)
1902-1903	30.4	29.8	31.0	1.2
1909-1911	38.2	37.7	38.6	0.9
1919-1921	38.5	38.2	38.9	0.7
1929-1931	40.6	40.1	41.5	1.4
1939-1941	46.0	45.1	47.1	2.0
1949-1951	60.9	59.4	62.4	3.0
1959-1961	69.4	67.1	71.9	4.8

<sup>a</sup>Source: Appendix III.

A comparison with the United States is useful for a better picture of these changes. Shortly after the American invasion of Puerto Rico (1900-1902 for the United States, and 1902-1903 for Puerto Rico), the difference in expectation of life at birth between these two countries was 17 years in favor of the United States. Due to the almost stationary character of Puerto Rican mortality conditions during the period 1910-1930, this difference increased to 19 years in 1929-1931. Since then the gap has narrowed progressively, and at present (1960) it is less than a year (life expectancy at birth for the United States in 1960 was 69.7 years).

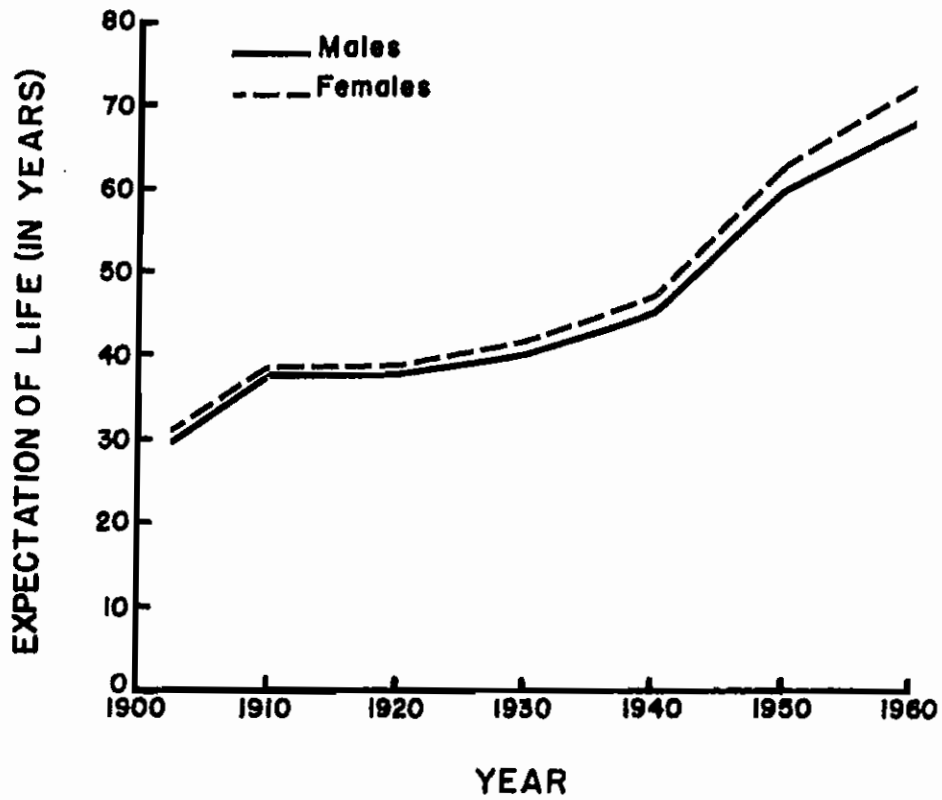
To emphasize the extent of the changes since 1940 we should add that, in that year, the difference was still of the magnitude of 17 years. From 1940 to 1960, Puerto Rico gained almost 24 years in expectation of life while the United States gained 8 years.

As a result, Puerto Rico is enjoying at present one of the highest expectations of life at birth in the world, in spite of the yet great human wastage in the childhood years.



Figure 52

EXPECTATION OF LIFE AT BIRTH  
BY SEX  
PUERTORICO 1902-03 TO 1959-61



### Causes of Death

The disease which produced the death is of interest not only to medical science and the public health authorities: for the demographer or sociologist it is an indicator of the prevailing socio-economic conditions of the community. We know, for example, that agricultural communities have a different pattern of cause of death than industrial ones. Infectious diseases predominate in backward areas, while chronic diseases are common in industrial societies. Tuberculosis is concentrated among low income groups, while heart ailments are an upper class modality.

In Puerto Rico, for most of the present century, "cause-of-death" statistics are available. However, the farther we reach into the past, the less reliable are these data. The vast majority of deaths occurring prior to 1950 were classified according to a diagnosis made by the physician on the basis of second hand information, for death occurred without "medical assistance." In 1945, for example, of the total number of deaths reported, only 25 per cent received medical attention during the last sickness. In 1961, however, the corresponding figure was 71 per cent.

In spite of this difficulty, the available data is adequate for a general picture of the changes occurring in pattern of causes of death. Tables 112-119 show the leading causes of death (as recorded) for selected years since 1907.

It is evident that up to 1950 or so, Puerto Rico was an area of infectious diseases. All the ten leading causes of death reported in 1907 were of this type, or of a nutritional deficiency. In 1913 and 1920 only one disease of degeneration (diseases of the

heart) was included among the ten leading causes, and it ranked eighth. Diarrhea and enteritis, and tuberculosis, were the two leading causes of death up to 1950. Pneumonia, nephritis and malaria also alternated among the most important causes of death.

In 1930 diseases of the heart ranked sixth, while cancer, for the first time included among the ten leading causes, ranked tenth. From 1940 to the present, radical changes in the pattern of causes of death have occurred, so that in 1960 the three leading causes of death were: diseases of the heart, cancer, and vascular lesions. Arteriosclerosis and diabetes mellitus were also among the 15 top causes. Diarrhea and enteritis, which up to 1950 was the leading killer, dropped to the fourth position in 1960.

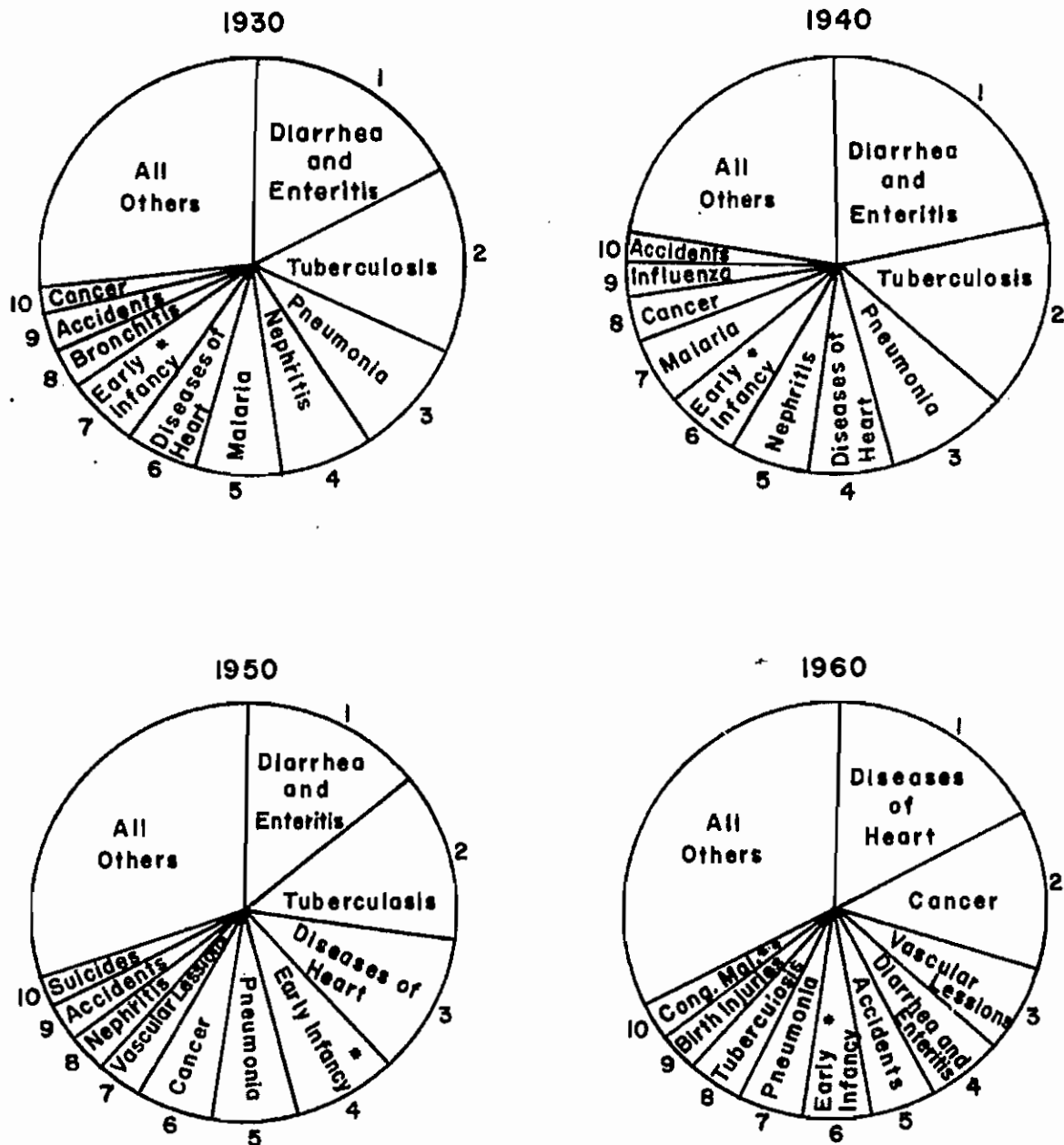
In 1930, 48 per cent of all deaths were attributed to diarrhea and enteritis, tuberculosis, pneumonia, and malaria; the most important infectious causes in Puerto Rico. Only 9 per cent was attributed to the leading chronic diseases (diseases of heart, cancer, vascular lesions, arteriosclerosis, and diabetes mellitus), while in 1960 these accounted for 40 per cent of mortality. On the other hand, only 15 per cent of all deaths were attributed in 1960 to the above mentioned infectious diseases.

Although organic (or chronic) diseases occupy the leading position among causes of death, the rates recorded in the Island are not in any sense comparable with those prevailing in the most industrialized and modern countries of the world. The death rate from diseases of the heart in the United States, for example, is three times higher than in Puerto Rico. Similar ratios prevail for other chronic diseases.<sup>1</sup> Age standardized rates, computed

<sup>1</sup>Vazquez, Table 41.

Figure 53

### THE TEN LEADING CAUSES OF DEATH IN PUERTO RICO 1930, 1940, 1950 AND 1960



\* Certain diseases of early infancy  
\*\* Congenital Malformations

for both Puerto Rico and the United States, reveal that arterio-sclerosis and diseases of the heart follow a declining tendency in Puerto Rico, while cancer and vascular lesions have increased with time. In the United States only cancer shows a clearly increasing trend.<sup>1</sup> Although the difference between the two countries was considerably reduced by standardization, the combined mortality rate from these four chronic diseases is still over 50 per cent higher in the United States than in Puerto Rico.

The extremely low mortality level in the advanced ages as well as in mortality from chronic diseases in Puerto Rico has received considerable attention during recent years. Unpublished studies show that errors in the data cannot account for this phenomenon. One of the most sound explanations offered in relation to this matter is what has been called the "postponed risk theory." According to this hypothesis old age persons in Puerto Rico are a group which survived the most precarious mortality conditions during their early years. Those surviving, obviously, were the fittest of the original cohort and thus capable of tolerating with unusual success the attacks of the so-called old age diseases. This is not the case in countries and among groups where infant and childhood mortality is extremely low and almost under control.

Mortality from some infectious diseases is still far from the levels achieved by other countries, e.g., the United States. Diarrhea and enteritis, practically unknown in the United States, is still the fourth cause of death in Puerto Rico (and the leading cause of death among infants). More or less the same situation prevails in relation to tuberculosis and pneumonia.

From this superficial analysis of causes of death statistics

---

<sup>1</sup>Ibid., Table 42.

it appears that Puerto Rico might achieve, in the near future, one of the lowest mortality schedules of the world. There is no evidence of an increasing mortality in the advanced ages and the increasing trend observed in chronic causes is only a product of the process of aging of the population. The still high mortality rates in the early ages is a function of the prevalence of infectious diseases, which in some countries have been practically eliminated.

#### Factors Influencing These Changes

As the author discussed in another work,<sup>1</sup> many factors have contributed to these radical changes in Puerto Rican mortality.

Among them are:

- (1) Improvements in sanitation, as in: water supply, means for the disposal of human excreta, and housing facilities and slum clearance.
- (2) Socio-economic achievements.
- (3) Discoveries in the realm of medicine and sanitation, e.g., mass inoculations, chlorination of water, the discovery of D.D.T. and the antibiotics.

Although some improvements have been achieved in the realm of medical and hospital care, the findings of a recent study were shocking.<sup>2</sup> According to modern public health norms, Puerto Rico is 44 per cent short in general and tuberculosis hospital beds, and more than 90 per cent short in chronic disease and nursing home beds.<sup>3</sup>

A study group headed by the President of the Puerto Rico Medical Association reported that the quality of medical and hospital care in Puerto Rico is extremely poor. Hospital

---

<sup>1</sup>Ibid., chap. iv.

<sup>2</sup>The School of Public Health and Administrative Medicine, Columbia University and the Department of Health of Puerto Rico, Medical and Hospital Care in Puerto Rico (February, 1962).

<sup>3</sup>Ibid., Tables 1-5.

facilities are deplorable, treatment is inadequate in most cases, the record system can scarcely be called by that name, and there is almost complete ignorance of modern hospital administrative procedures.<sup>1</sup> A relatively good index of the state of affairs in private, as well as in government hospitals, is the lack of a modern system of records and reporting. Medical and hospital statistics in Puerto Rico are highly incomplete and extremely inaccurate; in sum, they are of minimal practical value.

In the light of this and other similar studies,<sup>2</sup> it is clear that medical and hospital care in Puerto Rico was not an important factor in the radical reduction of mortality achieved during the last 20 years.<sup>3</sup> And more important, any future achievement in the fight against disease in Puerto Rico will be, to a considerable extent, a function of the quality and accessibility of medical and hospital care.

---

<sup>1</sup>Ibid., chap. iii.

<sup>2</sup>Harold W. Brown, Sc. D., M.D., Dr. P.H., and Bion R. East, D.D.D., A Study of Puerto Rico's Physician and Dental Needs (January, 1955).

<sup>3</sup>One must remember that during the period 1941 to 1947, when medical facilities and personnel were so scarce due to World War II, the death rate in the Island declined from 19 to 12 deaths per 1,000 inhabitants (a 37 per cent reduction).

TABLE 112

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH; 1907<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	3,889	15.3	362.1
2. Tuberculosis (all). . . . .	1,868	7.4	173.9
3. Bronchitis. . . . .	1,671	6.6	155.6
4. Tetanus . . . . .	1,245	4.9	115.9
5. Malaria . . . . .	1,140	4.5	106.2
6. Anemia. . . . .	945	3.7	88.0
7. Uncinariasis. . . . .	919	3.6	85.6
8. Malnutrition. . . . .	761	3.0	70.7
9. Pneumonia (all) . . . . .	454	1.8	42.3
10. Influenza . . . . .	321	1.3	29.9
<u>All Causes</u> . . . . .	25,400	100.0	2,365.0

<sup>a</sup>Source: Bureau of Vital Statistics of Puerto Rico.

TABLE 113

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH; 1913<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	4,623	19.8	392.4
2. Tuberculosis (all). . . . .	1,645	7.1	139.6
3. Certain diseases peculiar to Early Infancy . . . . .	1,520	6.5	129.0
4. Bronchitis. . . . .	1,336	5.7	113.4
5. Pneumonia (all) . . . . .	1,049	4.5	89.0
6. Nephritis . . . . .	979	4.2	83.1
7. Anaemia . . . . .	952	4.1	80.8
8. Diseases of Heart . . . . .	856	3.7	72.7
9. Malaria . . . . .	790	3.4	67.1
10. Tetanus . . . . .	699	3.0	59.3
<u>All Causes</u> . . . . .	23,307	100.0	1,978.5

<sup>a</sup>Ibid.



TABLE 114

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1920<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	5,292	17.7	403.4
2. Tuberculosis (all). . . . .	2,652	8.9	202.1
3. Pneumonia (all) . . . . .	2,514	8.4	191.6
4. Nephritis . . . . .	1,763	5.9	134.4
5. Certain diseases peculiar to Early Infancy . . . . .	1,595	5.3	121.6
6. Bronchitis. . . . .	1,592	5.3	121.3
7. Malaria . . . . .	1,557	5.2	118.7
8. Diseases of Heart . . . . .	1,033	3.5	78.3
9. Anaemia . . . . .	941	3.1	71.7
10. Uncinariasis. . . . .	780	2.6	59.4
<u>All Causes</u> . . . . .	29,918	100.0	2,280.3

<sup>a</sup>Source: Bureau of Vital Statistics of Puerto Rico.

TABLE 115

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1930<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	5,073	17.6	326.9
2. Tuberculosis (all). . . . .	4,080	14.1	262.9
3. Pneumonia (all) . . . . .	2,694	9.3	173.6
4. Nephritis . . . . .	2,074	7.2	133.6
5. Malaria . . . . .	1,887	6.5	121.6
6. Diseases of Heart . . . . .	1,597	5.5	102.9
7. Certain diseases peculiar to Early Infancy . . . . .	1,533	5.3	98.8
8. Bronchitis. . . . .	892	3.1	57.5
9. Accidents . . . . .	687	2.4	44.3
10. Cancer. . . . .	561	1.9	36.2
<u>All Causes</u> . . . . .	28,870	100.0	1,860.2

<sup>a</sup>Ibid.

TABLE 116

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1940<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	7,609	22.1	405.2
2. Tuberculosis (all). . . . .	4,886	14.2	260.2
3. Pneumonia (all) . . . . .	3,177	9.2	169.2
4. Diseases of Heart . . . . .	2,355	6.8	125.4
5. Nephritis . . . . .	2,035	5.9	108.4
6. Certain diseases of Early Infancy. . . . .	1,922	5.6	102.3
7. Malaria . . . . .	1,817	5.3	96.8
8. Cancer. . . . .	984	2.9	52.4
9. Influenza . . . . .	1,215	3.5	64.7
10. Accidents . . . . .	648	1.9	34.5
<u>All Causes</u> . . . . .	34,477	100.0	1,835.8

<sup>a</sup>Source: Bureau of Vital Statistics of Puerto Rico.

TABLE 117

DEATHS AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1950<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diarrhea and enteritis. . .	3,060	14.0	138.0
2. Tuberculosis (all). . . . .	2,861	13.1	129.0
3. Diseases of Heart . . . . .	2,308	10.5	104.1
4. Certain diseases of Early Infancy. . . . .	1,802	8.2	81.5
5. Pneumonia . . . . .	1,520	6.9	68.5
6. Cancer. . . . .	1,304	5.9	58.8
7. Vascular Lesions. . . . .	703	3.2	31.7
8. Nephritis . . . . .	660	3.0	29.8
9. Accidents . . . . .	625	2.9	28.2
10. Suicides. . . . .	378	1.7	17.0
<u>All Causes</u> . . . . .	21,917	100.0	993.1

<sup>a</sup>Ibid.

TABLE 118

DEATH AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1955<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diseases of Heart . . . . .	2,244	13.8	100.4
2. Diarrhea and enteritis. . . . .	1,901	11.7	85.1
3. Cancer. . . . .	1,592	9.8	71.2
4. Vascular lesions. . . . .	903	5.6	40.4
5. Certain diseases of Early Infancy. . . . .	876	5.4	39.2
6. Pneumonia (Except of New Born). . . . .	846	5.2	37.8
7. Tuberculosis (all). . . . .	743	4.6	33.2
8. Accidents . . . . .	630	3.9	28.2
9. Birth Injuries. . . . .	357	2.2	16.0
10. Congenital Malformation . . . . .	307	1.9	13.7
<u>All Causes</u> . . . . .	16,243	100.0	717.8

<sup>a</sup>Source: Bureau of Vital Statistics of Puerto Rico.

TABLE 119

DEATH AND DEATH RATES FROM EACH OF THE TEN LEADING  
CAUSES OF DEATH: 1960<sup>a</sup>

Cause of Death	Number	Per Cent of Total	Rate
1. Diseases of Heart . . . . .	2,719	17.1	115.3
2. Cancer. . . . .	1,975	12.4	83.8
3. Vascular lesions. . . . .	1,094	6.9	46.4
4. Diarrhea and enteritis. . . . .	934	5.9	39.6
5. Accidents . . . . .	891	5.6	37.8
6. Certain diseases of Early Infancy. . . . .	804	5.1	34.0
7. Pneumonia (Except of New Born). . . . .	763	4.8	32.3
8. Tuberculosis. . . . .	692	4.4	29.4
9. Birth Injuries. . . . .	391	2.5	16.6
10. Congenital Malformation . . . . .	390	2.5	16.5
<u>All Causes</u> . . . . .	15,866	100.0	666.9

<sup>a</sup>Ibid.

## CHAPTER VII

### PUERTO RICO'S DEMOGRAPHIC FUTURE

Many factors are capable of influencing population changes, although demographers have been unable to produce a sound formulation for this complex functional relationship. All that is known for certain is that population changes are the immediate result of fluctuation in three demographic variables: natality, mortality, and migration. It is known, in addition, that there are certain non-demographic factors capable of inducing changes in the trends and patterns of these demographic variables. It is also recognized that population changes tend to affect many non-demographic aspects of a given community. The exact mathematical relationship, however, is the real gap in our knowledge.

Under these circumstances, demographers are faced with a most difficult task when trying to cast the probable course of events of a given population. Demographers construct population projections instead of predictive models. A population projection takes the form of a mathematical proposition of "if" and "then," where the "ifs" are the premises about the "probable" future course of natality, mortality, and migration. The demographer usually tries to trace these "probable" trends, supported by some theoretical framework, some observations in relation to the tendencies and patterns of these three variables, and some knowledge or speculation

about the future course of events in the relevant non-demographic aspects of his theoretical framework.

This is the approach we will use in our analysis of the Island's demographic future. Population projections will be constructed after a determination of the probable trends in natality, mortality, and migration. Our task will be more difficult than usual because we will have to deal with a variable which in most countries of the present world has a negligible effect in population changes--migration.

### Future Prospects in Mortality, Fertility and Migration

#### Mortality Prospects

The level of mortality in the Island is at present one of the lowest among all the countries of the world. In 1960, for example, the crude death rate was 7 deaths per 1,000 population and life expectancy at birth almost 70 years. In spite of this, infant mortality, as well as mortality from infectious diseases, was still significantly higher than in the United States and other developed countries (see Chapter VI).

Under these circumstances substantial reductions might be expected only in infant mortality and in mortality from infectious diseases, and probably an increase in mortality from chronic diseases as a result of the aging process of the population. The net effect upon the crude death rate and life expectancy should be relatively small in years to come. Moreover, as has been mathematically demonstrated, changes in mortality ruling out calamities

such as wars, have had but little effect upon the age composition of the population.<sup>1</sup>

We have resorted to a very simple procedure for mortality projections present little difficulty. Analyzing the age-sex specific mortality rates, we found that mortality has followed, at least since 1940, a dampened rate of decrease. From a set of abridged life tables computed by the author<sup>2</sup> survival factors by age and sex were obtained for the years 1950, 1955, and 1960. In the great majority of the cases, the rate of increase decreases with time.<sup>3</sup> Thus:

$$\frac{s_{1955}}{s_{1950}} > \frac{s_{1960}}{s_{1955}}$$

Where S stands for the survival factor of a given age-sex group.

We then compute:

$$\frac{s_{1955}}{s_{1950}} - \frac{s_{1960}}{s_{1955}} = K$$

for each age-sex group and assumed that K will hold constant during each forthcoming quinquennium.

To compute the survival factor for 1965 (for a given age-sex group), for example, we proceeded as follows:

$$s_{1965} = s_{1960} \left( \frac{s_{1960}}{s_{1955}} - K \right)$$

In that way we obtained survival factor for each age-sex group for the years 1965, 1970, 1975, 1980, and 1985.

---

<sup>1</sup>Coale, pp. 79-114.

<sup>2</sup>See Appendix III.

<sup>3</sup>In few age groups where the survival rates showed a declining trend with time we arbitrarily assumed that 1960 survival rate will remain constant in the future.

Survival rates presented on Table 120 are arithmetic interpolations between two consecutive quinquennium. That is, the 1960-1965 rates are arithmetic averages of the rates obtained for 1960 and 1965.

Life tables computed from the 1985 survival ratios showed a life expectancy at birth of around 75 years for both sexes, 72 for males and 78 for females. When compared with the corresponding 1960 figures, an increase in life expectancy of 5 years during this 25 year period is found, which seems reasonable. The crude death rate obtained from the projected population was slightly less than 6 deaths per each 1,000 population for the period of 1980-1985 (the 1960 crude death rate was 7 deaths per 1,000 population).

#### Fertility Trends

As shown in Chapter V, fertility has declined throughout the present century, although in relative terms the decline has been rather small. Using the "age-marital status standardized rate" as index, we find that it has declined at a pace of 5 per cent per decade. The recent sharp decline observed in the crude rate, as well as in the female age specific birth rates, are the product of changes in the age, sex, and marital status composition of the population as a result of heavy emigration (see Chapter V).

According to our analysis of fertility differentials, education (years of school completed) emerges as the best predictor of fertility variations in Puerto Rico. Economic variables seem to have little association with fertility, especially when education is statistically controlled. Urban residence and urban birthplace of the mother are negatively associated with fertility, but their

TABLE 120

PROJECTED SURVIVAL FACTORS BY AGE AND SEX:  
1960-1965 TO 1980-1985<sup>a</sup>

Sex and Age Interval	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985
<u>Males</u>					
Birth to 0- 5	0.95310	0.96211	0.96957	0.97546	0.98138
0- 5 to 5-10	.99022	.99230	.99378	.99468	.99559
5-10 to 10-15	.99627	.99657	.99677	.99687	.99698
10-15 to 15-20	.99504	.99514	.99519	.99519	.99519
15-20 to 20-25	.99139	.99148	.99153	.99153	.99153
20-25 to 25-30	.99038	.99097	.99132	.99142	.99152
25-30 to 30-35	.98812	.98851	.98876	.98886	.98896
30-35 to 35-40	.98379	.98379	.98379	.98379	.98379
35-40 to 40-45	.98032	.98071	.98096	.98106	.98116
40-45 to 45-50	.97362	.97362	.97362	.97362	.97362
45-50 to 50-55	.96319	.96444	.96492	.96540	.96588
50-55 to 55-60	.94827	.95205	.95323	.95441	.95559
55-60 to 60-65	.92463	.92684	.92762	.92840	.92918
60-65 to 65-70	.89033	.89504	.89865	.90116	.90367
65-70 to 70-75	.85657	.86940	.87959	.88712	.89471
70+ to 75+	.62990	.63934	.64683	.65237	.65795
<u>Females</u>					
Birth to 0- 5	0.96085	0.96927	0.97616	0.98151	0.98669
0- 5 to 5-10	.99079	.99297	.99450	.99540	.99630
5-10 to 10-15	.99736	.99776	.99801	.99811	.99825
10-15 to 15-20	.99716	.99726	.99731	.99731	.99731
15-20 to 20-25	.99525	.99535	.99549	.99540	.99540
20-25 to 25-30	.99333	.99353	.99362	.99362	.99362
25-30 to 30-35	.99210	.99220	.99224	.99224	.99224
30-35 to 35-40	.99020	.99059	.99084	.99089	.99089
35-40 to 40-45	.98733	.98822	.98876	.98896	.98917
40-45 to 45-50	.98291	.98331	.98355	.98365	.98375
45-50 to 50-55	.97509	.97518	.97523	.97523	.97523
50-55 to 55-60	.96291	.96300	.96305	.96305	.96305
55-60 to 60-65	.97799	.95093	.95311	.95454	.95601
60-65 to 65-70	.93003	.93291	.93580	.93870	.94161
65-70 to 70-75	.90626	.90907	.91188	.91471	.91755
70+ to 75+	.67086	.68092	.69113	.70150	.71202

<sup>a</sup>Assuming a declining trend of increase based on the experience of 1950-1955 and 1955-1960. The expectation of live at birth resulting from the projected figures for 1985 will be of around 75 years (72 for males and 78 for females).



relationships are not as strong as in the case of education. In the socio-psychological realm we find some correlates of fertility, the type of family organization being the most important.

We do not foresee radical change in the variable correlates of fertility. Schooling, apparently the best fertility predictor, has followed a rather slowly increasing trend in the past and there are no indications of an acceleration in this tendency in the near future.<sup>1</sup> A median of 2.7 school years completed for persons 25 years old and over in 1940<sup>2</sup> increased to 3.7 years in 1950, and to 4.6 years in 1960. Thus, the increase from 1940 to 1950 was greater than during the decade 1950-1960, both in absolute and relative terms. According to the Superior Board of Education of Puerto Rico the proportion of persons enrolled at school declined during the last quinquennium as a result of the slowdown of emigration and a rapidly increasing school population. In 1956, 82 per cent of persons 6-18 years of age were enrolled in school as compared with 79 per cent in 1960. The reduction has been marked in elementary school years (6-12) where school enrollment declined from 94 to 88 per cent of the total population in this age group.

Family size and fertility behavior are functions of attitudes, values and beliefs, socio-psychological "facts" which are extremely difficult to modify. Even when attitudes are favorable for a reduction of family size, limitation is possible only when

---

<sup>1</sup>The correlation coefficient between number of children ever born per women and the number of school years completed obtained from census data is only -0.36.

<sup>2</sup>Estimated for the population 35 years and over in 1950, survivors to persons 25 years and over in 1940. This might well represent an overestimate if, as expected, mortality was higher among the uneducated.

TABLE 121

PROJECTED ANNUAL AGE-SPECIFIC FERTILITY ASSUMING THAT THE  
RELATIVE DECLINE OBSERVED BETWEEN 1950 AND 1960 IN EACH  
AGE GROUP IS TO CONTINUE IN THE FUTURE

Age Group	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985
Under 15	0.77	0.77	0.77	0.77	0.77
15-19	100.93	99.52	98.13	96.76	95.41
20-24	286.31	284.60	282.89	281.19	279.50
25-29	237.88	227.51	217.59	208.02	198.87
30-34	148.60	131.80	116.90	103.69	91.97
35-39	103.20	90.38	79.15	69.34	60.74
40-44	50.44	49.08	47.74	46.45	45.20
45 and over	9.22	8.44	7.72	7.07	6.48

TABLE 122

PROJECTED ANNUAL AGE-SPECIFIC FERTILITY ASSUMING A 50 PER CENT  
REDUCTION IN EACH AGE SPECIFIC BIRTH RATE BETWEEN 1960 AND 1985

Age Group	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985
Under 15	0.73	0.65	0.57	0.49	0.41
15-19	96.56	86.40	76.24	66.08	55.92
20-24	272.81	244.09	215.37	186.65	157.93
25-29	231.02	206.70	182.38	158.06	133.74
30-34	149.64	133.89	118.14	102.39	86.64
35-39	104.53	93.53	82.53	71.53	60.53
40-44	48.58	43.47	38.36	33.25	28.14
45 and over	9.14	8.18	7.22	6.26	5.30

means are available. People may know the "why's" but not the "how's" for birth control. Contraceptive methods in Puerto Rico are not available, from the economic point of view, to the great majority of the people, and are often used inefficiently and too late. Because of the economic burden it represents for low-income families, birth control is attempted seriously only when there are already too many children in the family. There are laws which enable the Puerto Rican government to take an active position in the distribution of birth control knowledge and materials, but it has decided to keep hands off in this controversial matter.

For all these reasons we cannot expect a radical decline in fertility in Puerto Rico in the near future, unless there is a radical change in the present government's attitude towards birth control. Therefore, the rather slowly declining trend we have observed throughout the present century will most probably continue. In our fertility projections we have accepted this as the most "probable" trend, and have extended the 1950-1960 declining experience into the future.

Data presented on Table 121 are annual specific fertility rates by age of the mother projected on the assumption that the percentage decline observed in each age group during the decade 1950-1960 will continue undisturbed in the future. According to this projection the gross reproduction rate, which was 2.35 in 1960, is expected to decline to 1.90 during the period 1980-1985, a still relatively high gross reproduction rate (see Table 90). In addition to this "probable" fertility projection, we have an alternative assumption of a 50 per cent reduction in each age-specific fertility rate from 1960 to 1985. This extremely

optimistic premise will be used as a "model" to afford a quantitative idea of the effects upon the population of a radical decline in fertility. This assumption, although highly improbable under present circumstances, is not totally impossible in light of the recent Japanese experience. However, it must be repeated that such a goal can be attained only if there is direct governmental action, which might well result from an increasing demographic pressure and by a significant slow-down or even a deterioration of recent socio-economic achievements.

### Migratory Prospects

Emigration was insignificant prior to 1945, but during the depression years an interesting event occurred which many political leaders and economists in the Island have apparently forgotten. In 1930, there were 50,000 Puerto Ricans in the United States and as a result of the great economic depression of the thirties, during the period of 1930 to 1934 about 9,000 of them returned to the Island. Thus, even during a period of relatively difficult and expensive travel, almost one out of six Puerto Ricans found his way back home. What could be the occurrence today, under a similar economic situation, with one million Puerto Ricans residing in the United States, when the trip from New York to San Juan can be made in just three hours, and when fares are so cheap (\$45.00 in Thrift Class)?

In 1945, emigration began to increase rapidly, reaching a peak during the year 1953 when a net of 69,000 Puerto Ricans left the Island. Emigration dropped sharply in 1954, as a result of the mild economic recession in the United States. During 1955

and 1956 there was apparent recovery but since 1957 emigration has followed a steady declining trend. In 1961, for the first time since 1934, an immigration balance was recorded.

In general terms, Puerto Rican emigration is a product of a "push"--lack of job opportunities in the Island. If measured in terms of unemployment we must agree that this "push" has remained more or less constant since 1940 (see Chapter III). As the level of unemployment in the Island has remained almost stationary at a high level, above 10 per cent, emigration has varied directly with the economic and employment conditions in the United States. In an unpublished study carried on at Columbia University, a 0.8 correlation was found between an index of economic activity in the United States and the volume of Puerto Rican emigration.<sup>1</sup>

Since 1945 emigration has been greater when employment opportunities are high in the States. Fig. 54 clearly demonstrates the close parallel that exists between emigration from Puerto Rico and United States unemployment. The correlation coefficient computed to these data is equal to 0.84. In other words, the level of unemployment in the United States seems to explain 70 per cent of the variance of emigration.

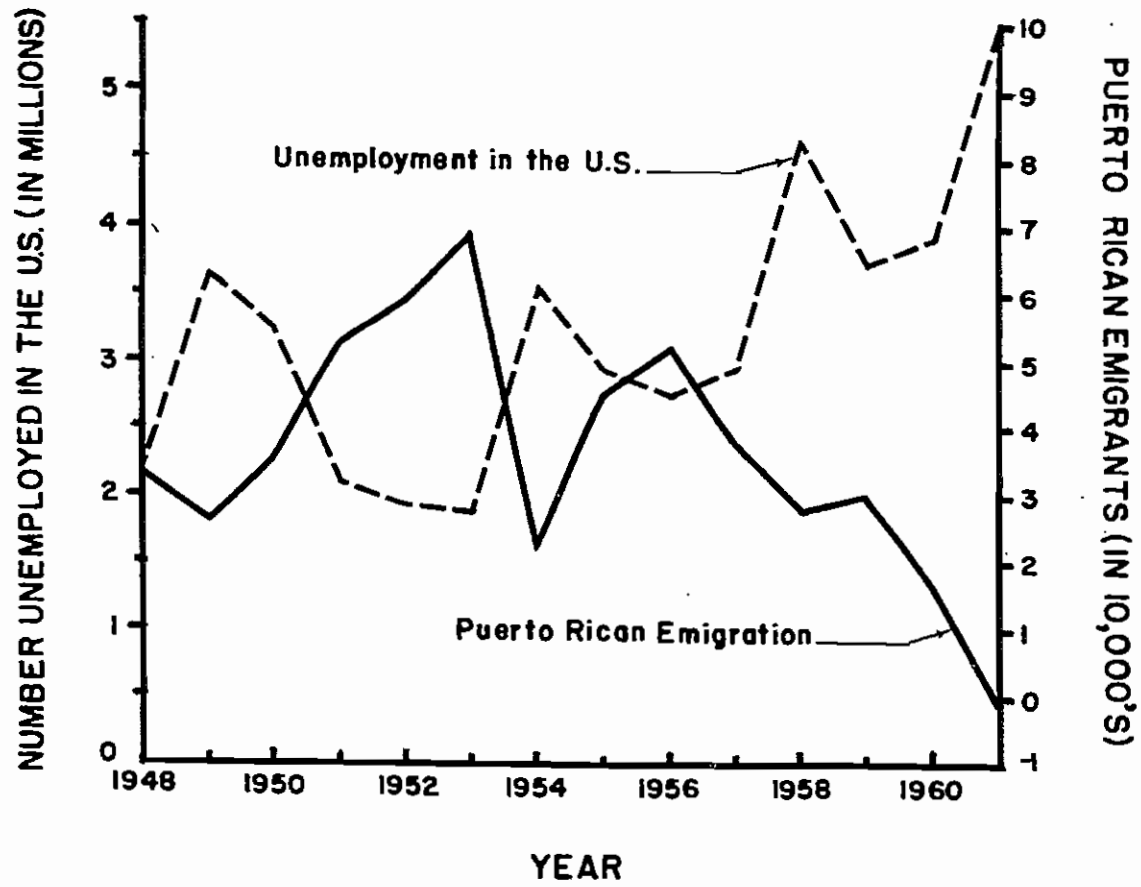
It is evident that the recent sharp decline in emigration is in great part of increasing unemployment in the United States and not a symptom of economic prosperity in Puerto Rico, as some political leaders and even some economists in the Island have

---

<sup>1</sup>Jaffe, "Demographic and Labor Force Characteristics of the New York Puerto Rican Population."

Figure 54

UNEMPLOYMENT IN THE UNITED STATES AND  
NET EMIGRATION FROM PUERTO RICO  
1948-1961



proclaimed. In fact, unemployment in the Island increased significantly during the last year (1961).

If the relationship between Puerto Rican emigration and unemployment continues to hold,<sup>1</sup> the prospects for future mass emigration cannot be too optimistic. At least three conditions lead us to believe that employment of Puerto Ricans in the United States will become an increasingly difficult task in the future. First of all, the American labor force will experience one of the greatest expansions of all its history as a result of the post war "baby boom" and the high natality level which has prevailed since then. During the past decade (1950-1960) the increase in the American labor force was smaller than during the period of 1940-1950, as a consequence of the low birth rates recorded during the depression of the thirties. According to official projections, the United States labor force will increase by some 13 million persons during the sixties in contrast with an increase of 8 million during the fifties.<sup>2</sup> "New entrants" to the labor force--persons aged 18 to 24 years--decreased by an average of 200,000 per year during the quinquennium of 1950-1955, but increased at a pace of 225,000 per annum during the period 1955-1960. The number of "new entrants" will continue to increase during the sixties, reaching a peak between 1965 and 1970, when the number of workers 18-24 years of age will be increased by over 900,000 per year.<sup>3</sup> As a result,

---

<sup>1</sup>We can expect a change in the relationship only when the intensity of the push (unemployment in the Island) is considerably changed.

<sup>2</sup>See, for example, Gertrude Bancroft, The American Labor Force (New York: 1958).

<sup>3</sup>Hauser, p.. 49.

"workers seeking their first job will, during the sixties and seventies, encounter stiffer competition and probably lower entrance wages than the smaller cohort of new workers during the fifties."<sup>1</sup>

Gertrude Bancroft, an eminent United States labor force expert, arrived at a similar conclusion when she expressed that "for the individual worker seeking to find the best possible job as a start for his career, the decade of 1965-1975 may be a hard one, however, because of the large number of competitors at the lower end of the ladder."<sup>2</sup>

In the second place, Puerto Ricans are not competitors of the 70 million persons in the American labor force. They are not mere "drops" in the "sea" of the American labor force as some economists in the Island have asserted. Puerto Rican emigrants are competitors among unskilled and semi-skilled laborers in two principal cities in the United States, e.g., New York and Chicago. And it is precisely in the unskilled and semi-skilled sector of the labor force that unemployment is really critical in the United States as a result of the increasing trend toward automation in industry. At present, 80 per cent of the bulk of unemployment in the United States is among semi-skilled and unskilled workers. Employment of unskilled workers declined by 20 per cent from 1950 to 1960. In addition, it is for unskilled and semi-skilled jobs that the majority of the native United States "new entrants" will compete. With such a great labor force supply, native U. S. workers will undoubtedly be preferred over Puerto Ricans because of language, education, and superiority of skill.

---

<sup>1</sup> Ibid., pp. 77-78.

<sup>2</sup> Bancroft, p. 145.



If the American industry is to provide additional jobs for the increasing labor force, some 13 million new jobs will be necessary from 1960 to 1970 and some 20 millions by 1975. This means a radical acceleration in the American industrial race. A substantial industrial expansion in the United States is possible, even in the absence of increases in the number of workers as a result of automation. But changes capable of utilizing the explosive increase in manpower and at the same time the advantages of mechanization, must be enormous. However, an acceleration of industrial production in the United States necessarily means an increasing need for more and more foreign resources and markets. It has been estimated that the United States, which is at present consuming over 50 per cent of the raw materials produced in the entire world, would be consuming 83 per cent of such raw materials by 1980, if the recent industrial race is to be projected into the future.<sup>1</sup>

On the other hand, the United States is apparently promoting industrialization in Latin America and other underdeveloped countries which for the United States, logically means (if materialized), a limitation of those needed foreign resources and markets.<sup>2</sup>

Eminent American experts, like Philip M. Hauser,<sup>3</sup> even without taking into account the possibility of problems of resources

---

<sup>1</sup>William Vogt, People (William Sloane Associated, 1960), p. 54.

<sup>2</sup>The European Common Market is another handicap for the American future industrial race.

<sup>3</sup>Chairman of the Sociology Department of the University of Chicago and Director of its Population Research and Training Center, President of the American Statistical Association, ex-deputy director of the U. S. Bureau of the Census, ex-representative of the U. S. to the Population Commission of the United Nations.

and markets, describe the United States future job needs as a "formidable task, particularly in view of the trend toward increased automation" and as a "challenge to the ingenuity of the nation."<sup>1</sup>

Under these circumstances we should agree that Puerto Ricans will encounter increasing difficulty in the United States labor force and a slow-down in the volume of emigration seems imminent, although we cannot predict exactly what will happen in the United States, or make a "reasonable" estimate of future Puerto Rican emigration. Some Puerto Rican economic planners accept a "guesstimate" ranging from 20 to 30 thousand emigrants annually. However, there are other less optimistic economists and labor force experts in Puerto Rico who "accept" a figure of 15,000 emigrants per year as a "probable" estimate. We are more in agreement with this last group, although we must accept that we cannot quite well defend the reasonability of such a "guesstimate."

In our population projection we have employed two emigration premises. In the first we have assumed zero migration. Although this assumption has mainly the purpose of serving as a mathematical model, zero migration is not an irrational premise. In 1961 there occurred an immigration balance and during the first four months of the current year (1963) more or less the same pattern is being observed. Even more, we should not discard the possibility of a reversal in the migratory movement if the actual situation in the United States remains unchanged for several years. It must be remembered that we already observed a similar trend during the period of 1930-1934.

---

<sup>1</sup>Hauser, pp. 80-81.

Our second emigration premise is moderately optimistic. We have assumed a net emigration balance of 15,000 per year from 1960 to 1985. This represents a total emigration of 375,000 persons during the next 25 years. The Puerto Rican Planning Board is using a population projection where total emigration during the next 25 years is identical to the total we have assumed (375,000). However, in contrast with our constant annual emigration, they assumed 15,000 annually from 1960 to 1965; 20,000 per year during the decade 1965-1975, and 10,000 annually thereafter.

The age-sex distribution used in our emigration projection is the one estimated from census data for the decade 1950-1960 (see Table 57).

Three population projections were computed, all of them covering the period of 1960 to 1985.<sup>1</sup> The base population used was the 1960 enumerated population and the set of premises are the following:

Projection I--

- (1) Mortality--declining at a decreasing rate based on the experience of the last decade (1950-1960).  
(See text explanations.)
- (2) Fertility--declining at a constant rate; based on the experience of the 1950-1960 decade, although more or less the same trend has prevailed throughout the present century (see text explanations).
- (3) Migration--zero.

---

<sup>1</sup>The method used was the so-called "component's method." See, for example, United Nations, Methods for Population Projections by Age and Sex, Population Studies, No. 25.

Projection II--

- (1) Mortality--as in Projection I.
- (2) Fertility--as in Projection I.
- (3) Migration--15,000 annually from 1960 to 1985.  
Age-sex distribution as estimated for the period  
of 1950-1960 (see text explanations).

Projection III--

- (1) Mortality--as in Projections I and II.
- (2) Fertility--a 50 per cent reduction in each age  
group from 1960 to 1985 (see text explanations).
- (3) Migration--zero.

The results of these computations are presented on Tables 123-125.

Population Perspectives

Population Growth

During the decade of 1950-1960, population growth in Puerto Rico showed a considerable deviation from its previous trend. In contrast to a 17 per cent increase observed during the forties, a 6 per cent increment was recorded during the period of 1950-1960. However, during the two-year period following the 1960 census (April, 1960 to April, 1962), the Island's population has increased by some 128,000 persons which in relative terms represents a 5.4 per cent increment over the 1960 enumerated population. This two-year increase, which is slightly less than the 6 per cent recorded during the whole decade of 1950-1960, is simply the consequence of the slow-down of emigration and an excellent example of the potentialities of population growth in the Island, should emigration come to a halt.

TABLE 123

POPULATION PROJECTION I: 1965-1985<sup>a</sup>

Sex and Age	1965	1970	1975	1980	1985
<u>Males, all ages</u>	1,336	1,544	1,785	2,043	2,342
0- 4	209	249	283	307	354
5- 9	178	208	247	282	306
10-14	165	177	207	246	281
15-19	161	164	176	206	245
20-24	122	160	163	175	204
25-29	79	120	159	162	174
30-34	61	78	119	157	160
35-39	58	60	77	117	154
40-44	60	57	59	75	115
45-49	52	59	55	58	73
50-54	52	50	57	53	55
55-59	38	49	48	54	51
60-64	32	35	46	44	50
65 and over	69	79	89	107	120
<u>Females, all ages</u>	1,362	1,572	1,811	2,065	2,358
0- 4	203	241	274	297	342
5- 9	173	201	239	273	296
10-14	161	173	201	239	272
15-19	159	161	172	200	238
20-24	124	158	160	171	199
25-29	91	123	157	159	171
30-34	74	90	122	155	158
35-39	67	73	90	121	154
40-44	68	67	72	89	120
45-49	53	67	66	71	87
50-54	51	52	65	64	69
55-59	34	49	50	63	62
60-64	30	32	46	48	60
65 and over	74	85	97	115	130
<u>Total, Both Sexes</u>	2,698	3,117	3,596	4,108	4,700

<sup>a</sup> Population in thousands.

TABLE 124  
POPULATION PROJECTION II: 1965-1985<sup>a</sup>

Sex and Age	1965	1970	1975	1980	1985
<u>Males, all ages</u>	1,290	1,443	1,618	1,811	2,030
0- 4	203	232	257	280	310
5- 9	174	198	227	252	275
10-14	163	171	194	223	249
15-19	156	156	164	187	216
20-24	112	145	146	154	177
25-29	72	104	137	137	145
30-34	56	66	98	130	131
35-39	56	54	63	95	126
40-44	59	53	51	60	91
45-49	50	55	50	48	57
50-54	51	48	53	48	45
55-59	37	48	45	50	45
60-64	31	34	44	41	46
65 and over	70	79	89	106	117
<u>Females, all ages</u>	1,322	1,483	1,664	1,860	2,079
0- 4	197	225	249	271	300
5- 9	170	192	220	245	267
10-14	158	167	189	217	242
15-19	154	153	162	183	211
20-24	117	147	146	155	176
25-29	86	111	140	140	148
30-34	68	80	105	134	133
35-39	66	66	77	102	131
40-44	67	64	64	75	100
45-49	51	64	61	61	72
50-54	50	59	61	58	59
55-59	34	47	47	59	56
60-64	29	32	45	45	56
65 and over	75	86	97	115	128
<u>Total, Both Sexes</u>	2,612	2,926	3,281	3,671	4,109

<sup>a</sup>Population in thousands.

TABLE 125  
POPULATION PROJECTION III: 1965-1985<sup>a</sup>

Sex and Age	1965	1970	1975	1980	1985
<u>Males, all ages</u>	1,330	1,514	1,705	1,889	2,053
0- 4	203	224	235	231	219
5- 9	... <sup>b</sup>	201	223	234	231
10-14	...	...	201	222	233
15-19	...	...	...	200	221
20-24	...	...	...	...	198
<u>Females, all ages</u>	1,355	1,542	1,734	1,916	2,079
0- 4	196	217	227	224	211
5- 9	... <sup>b</sup>	195	216	226	223
10-14	...	...	195	215	226
15-19	...	...	...	194	215
20-24	...	...	...	...	193
<u>Total, Both Sexes</u>	2,685	3,057	3,440	3,805	4,132

<sup>a</sup>Population in thousands.

<sup>b</sup>In these groups and in all ages not shown here, population figures are identical to those presented in Projection I.

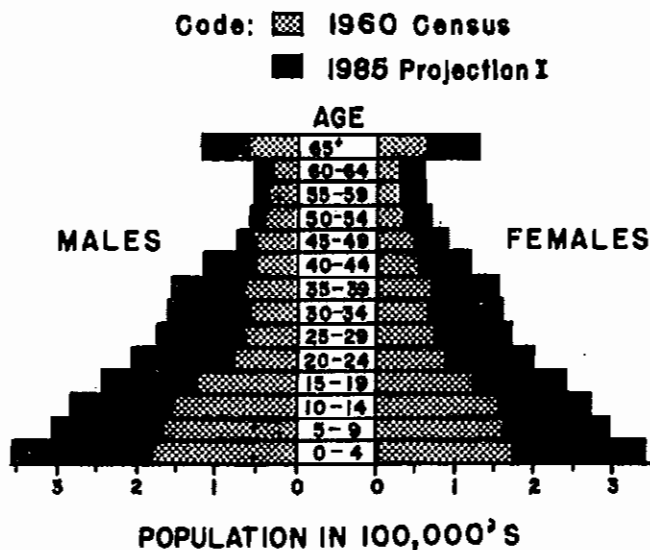
TABLE 126  
ACTUAL AND PROJECTED TOTAL POPULATION: 1960 TO 1985

Year	Projection I	Projection II	Projection III
1960 <sup>a</sup>	2.35	2.35	2.35
1965 <sup>b</sup>	2.70	2.61	2.69
1970 <sup>b</sup>	3.12	2.93	3.06
1975 <sup>b</sup>	3.60	3.28	3.44
1980 <sup>b</sup>	4.11	3.67	3.80
1985 <sup>b</sup>	4.70	4.11	4.13

<sup>a</sup>1960 enumerated population.

<sup>b</sup>Projected population.

Figure 55  
POPULATION PYRAMIDS FOR THE  
1960 ENUMERATED POPULATION AND  
THE 1985 PROJECTION I POPULATION



POPULATION PYRAMIDS FOR PROJECTION I  
AND III IN 1985

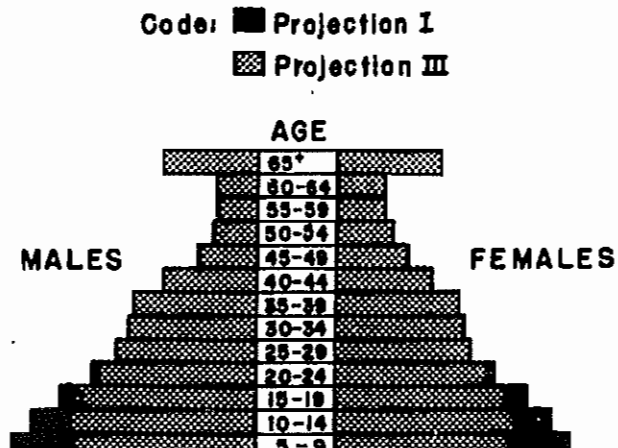
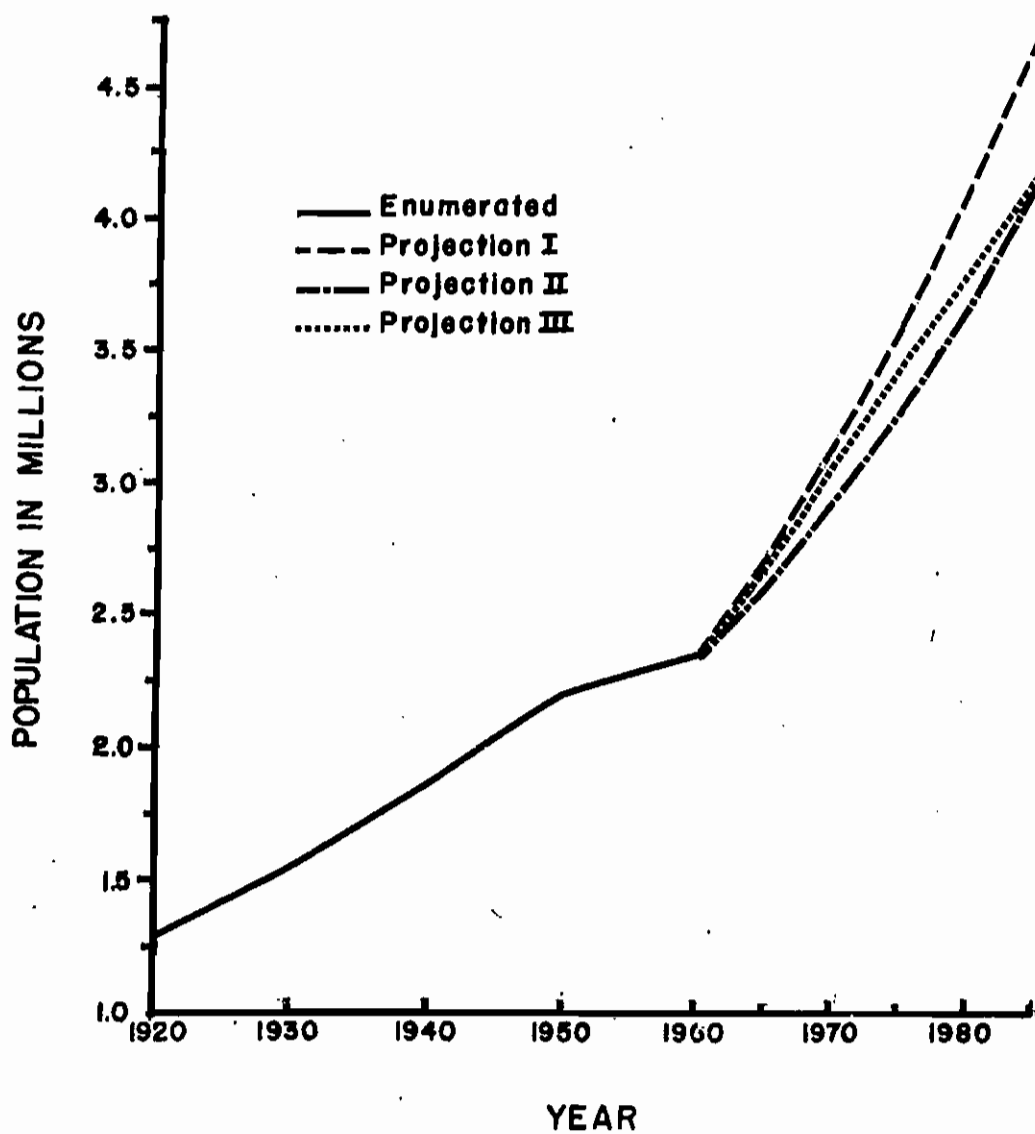




Figure 56

POPULATION GROWTH IN PUERTO RICO  
1920-1960 ENUMERATED  
1960-1985 PROJECTED



A continuation of the recorded declining trend in fertility and a stabilization of emigration at a zero level would result in tremendous increases in population (Projection I). Under such circumstances the Island's population would reach the 3 million mark by 1970 and by 1985 it would be 4.7 million inhabitants. In other words, the Island's population is capable of doubling during the next 25 years.

A "moderate" net emigration of 15,000 persons per year (an average of 0.5 per cent of the population per annum) will have a net effect of reducing the 1985 expected population by almost 600,000 persons (see Table 126). The 4.1 million figure for that year represents a 75 per cent increase during a period of 25 years; even under this emigration assumption, the Island's population would double by 1990.<sup>1</sup>

On the other hand, a radical decline in fertility, as we have assumed in Projection III, would have only long-run effects. By 1970, for example, the difference between Projection I and Projection III will be only 60,000 persons, but by 1985 this radical fertility reduction would have the same effect of a continuous net annual emigration of 15,000 persons; namely a reduction by more than half a million persons of the population that would have resulted under the present tendency of fertility and zero emigration.

Under any of the above discussed premises, the annual rate of growth in the population would be greater than during any other period of the present century (see Table 6 and Table 127).

---

<sup>1</sup>Computed by the compound interest formula.

TABLE 127

AVERAGE ANNUAL RATE OF POPULATION GROWTH (PER CENT):  
1950-1960 AND 1960 TO 1985

Period	Projection I	Projection II	Projection III
1950-1960 <sup>a</sup>	0.6	0.6	0.6
1960-1965 <sup>b</sup>	2.8	2.1	2.7
1965-1970 <sup>b</sup>	2.9	2.3	2.6
1970-1975 <sup>b</sup>	2.9	2.3	2.4
1975-1980 <sup>b</sup>	2.7	2.2	2.0
1980-1985 <sup>b</sup>	2.7	2.2	1.6

<sup>a</sup>Recorded.

<sup>b</sup>Projected.

TABLE 128

IMPLICIT CRUDE BIRTH AND DEATH RATES IN POPULATION  
PROJECTIONS: 1960-1985

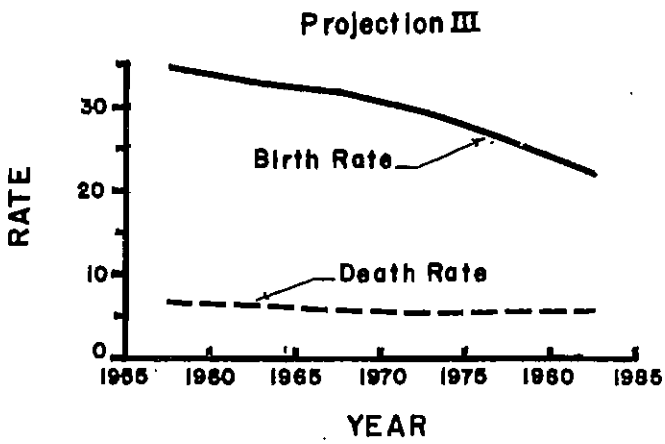
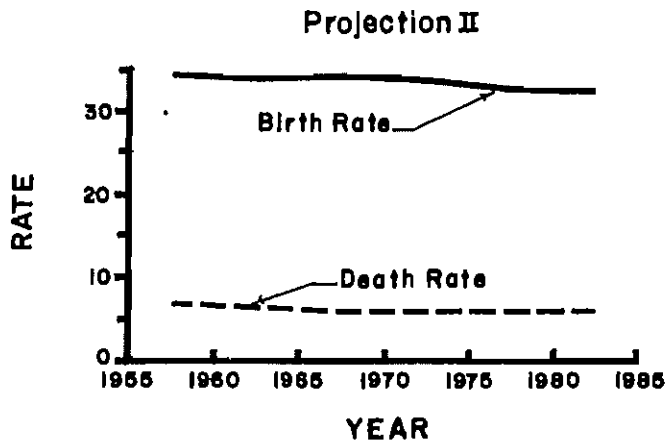
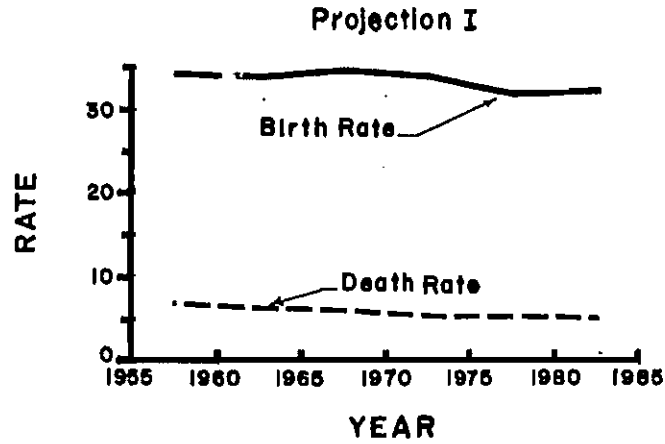
Period	Projection I		Projection II		Projection III	
	Birth Rate	Death Rate	Birth Rate	Death Rate	Birth Rate	Death Rate
1955-1960 <sup>a</sup>	34.5	6.9	34.5	6.9	34.5	6.9
1960-1965 <sup>b</sup>	34.1	6.5	33.8	6.6	33.2	6.5
1965-1970 <sup>b</sup>	34.9	6.0	34.2	6.1	31.8	5.9
1970-1975 <sup>b</sup>	34.1	5.6	33.6	5.9	29.2	5.6
1975-1980 <sup>b</sup>	32.0	5.4	32.4	5.7	25.7	5.6
1980-1985 <sup>b</sup>	32.2	5.3	32.0	5.7	22.1	5.6

<sup>a</sup>Recorded.

<sup>b</sup>Projected.

This explosive population growth is a result of a high crude birth rate and a very low crude death rate (see Table 128). In fact, the crude birth rate will remain almost stationary under the present declining trend in age-specific fertility as a result of an increasing proportion of females in the reproductive ages (15-44 years). Only significant reductions in age-specific fertility (as in Projection III) will result in an effective decline in natality during the next 25 years.

Figure 57  
PROJECTED CRUDE BIRTH AND  
DEATH RATES  
PUERTO RICO: 1955-60 TO 1980-85



### Changes in the Age Structure

Significant changes in the age structure of the population would result if, as in Projection III, fertility is considerably reduced in the future. If it were possible to reduce fertility by 50 per cent during the next 25 years (and migration maintained at a zero level), the median age of the population would increase from 18.5 years in 1960 to almost 24 years in 1985. At the same time the proportion of persons under 15 years would be considerably reduced (from 43 per cent in 1960 to 32 per cent in 1985). On the other hand, the proportion of persons in the working ages (15-64) would increase substantially. In 1960 only 52 per cent of the population was in this age bracket, but according to Projection III it would increase to 62 per cent by 1985 (see Table 129).

If, on the contrary, fertility continues undisturbed its recorded declining tendency (Projections I and II) only slight changes would occur in the age structure of the population. As Table 129 shows, a moderate increase in the median age of the population would be observed, a small decline in the proportion of persons under 15 years of age, and a slight increase in the proportion of persons 15-64 years old.

As evidenced by Projections I and II, emigration has the effect of preventing a more rapid increase in the median age, as well as the proportion of persons in the working ages (15-64 years) as it occurred during the 1950-1960 decade.

Under any of the three projection premises the proportion of persons 45-64 years of age will decrease, as a result of the depletion, during the period of 1945-1960 of age groups 15-44 by heavy emigration.

The percentage of old age persons (65 and over) will remain almost constant in the future under the premises of Projection I, but would increase significantly under any of the two other premises. In the case of Projection II, it would increase as a result of the depletion of the working ages (15-64) by emigration. In contrast, it would rise under the assumptions of Projection III as a consequence of the decline in the proportion of persons in the young age groups.

### Dependency Ratio

After remaining almost stationary at a very high level during the first 40 years of the present century, the burden of dependency<sup>1</sup> increased even more during the forties and sixties, as a result of heavy emigration. From a figure of 122 dependents per 100 persons in the working ages (20-64) in 1940, it increased to 133 in 1950, and to 140 in 1960.<sup>2</sup>

Under any of the premises we have used in our population projections, the dependency ratio would decline in the future. However, if the declining trend in fertility were not accelerated, the figure for 1985 would be 122 dependents per each 100 "working" persons. Of these, 110 would be young dependents (persons under 20 years) and 12 old dependents (65 and over). (See Table 130.)

Emigration has the effect (Projection II) of preventing a more rapid decline of this burden. Under the assumption of a

---

<sup>1</sup>Persons under 20 years of age and persons 65 years old and over per 100 persons 20-64 years of age.

<sup>2</sup>The dependency ratio for the United States was 91 in 1960.

continuous emigration of 15,000 persons annually, the dependency ratio would decline from 140 in 1960, to 131 in 1970, but it would become almost stationary thereafter. At the same time "old" dependency would increase significantly because emigration tends to concentrate among persons in the highly active sector of the labor force.

A substantial reduction of dependency can be achieved, however, if fertility's declining trend is accelerated as in Projection III. In that way, by 1985, the Island would have a dependency ratio of 96.5. This reduction would be entirely a result of a decrease in young dependents. Dependency resulting from persons 65 years and over would remain more or less constant throughout.

#### The Labor Force Population

In the projections of the labor force population presented in Tables 131-133, we have assumed that the 1960 age and sex labor force participation rates will remain constant in the future.<sup>1</sup>

Under any of the three population premises, labor force population will increase considerably in the future. According to Projections I and III, by 1970 some 902,000 persons would be working or seeking work if migration became stabilized at a zero level. This would represent an increase of 274,000 workers during the decade in contrast with a decrease of 76,000 observed during the period 1950-1960. If, on the contrary, a net emigration of 15,000 annually is recorded during the sixties, the labor

---

<sup>1</sup>A slow down in emigration will probably increase labor force participation, as the proportion in the labor force among migrants is higher than in the whole population.

force would increase by 201,000 persons. Thus, while the labor force population declined almost 9 per cent during the quinquennium of 1950-1954 and over 2 per cent during the period 1955-1960, it will increase at a rate of at least 15 per cent per quinquennium during the next decade.

As Table 134 shows, quinquennial additions to the labor force will continue increasing in magnitude during the next 25 years. According to Projection I (emigration equal to zero) the number of additions will increase from 27,000 per annum during the period 1960-1965 to 37,000 per year during the quinquennium of 1980-1985. On the other hand, with an emigration of 15,000 persons annually during the next 25 years, additions to the labor force would increase from 19,000 persons a year during the quinquennium of 1960-1965 to 22,000 by 1980-1985.

In absolute terms, the male labor force will increase much more than the female group under any of the population premises. During the quinquennium of 1960-1965 the male labor force will increase at least at a pace of 14,000 per annum (Projection II), while the female group will increase, during the same period at the most by 7,000 per year (Projection I). By 1980-1985 the minimum figure for males is 21,000 annually (Projection II) and the maximum for females 8,000 per year (Projection I).



TABLE 129

BROAD AGE DISTRIBUTION OF THE PROJECTED  
POPULATION: 1960-1985

Projection and Year	All Ages	Under 15	15-44	45-64	65 and Over	Median Age
<u>Projection I</u>						
1960 <sup>a</sup>	100.0	42.7	39.1	13.0	5.2	18.5
1965	100.0	40.4	41.6	12.7	5.3	19.1
1970	100.0	40.1	42.0	12.6	5.3	19.8
1975	100.0	40.4	42.4	12.0	5.2	20.0
1980	100.0	40.0	43.5	11.1	5.4	20.1
1985	100.0	39.4	44.5	10.8	5.3	20.2
<u>Projection II</u>						
1960 <sup>a</sup>	100.0	42.7	39.1	13.0	5.2	18.5
1965	100.0	40.8	40.9	12.7	5.6	18.9
1970	100.0	40.5	41.0	12.9	5.6	19.5
1975	100.0	40.7	41.2	12.4	5.7	19.7
1980	100.0	40.5	42.3	11.2	6.0	19.7
1985	100.0	40.0	43.4	10.6	6.0	19.8
<u>Projection III</u>						
1960 <sup>a</sup>	100.0	42.7	39.1	13.0	5.2	18.5
1965	100.0	40.1	41.9	12.7	5.3	19.2
1970	100.0	38.8	42.9	12.9	5.4	20.3
1975	100.0	37.6	44.4	12.6	5.4	21.2
1980	100.0	35.5	46.7	12.0	5.8	22.3
1985	100.0	32.5	49.2	12.3	6.0	23.7

<sup>a</sup>Enumerated.

Figure 58

### THE MEDIAN AGE IN THE PROJECTED POPULATIONS 1960-1985

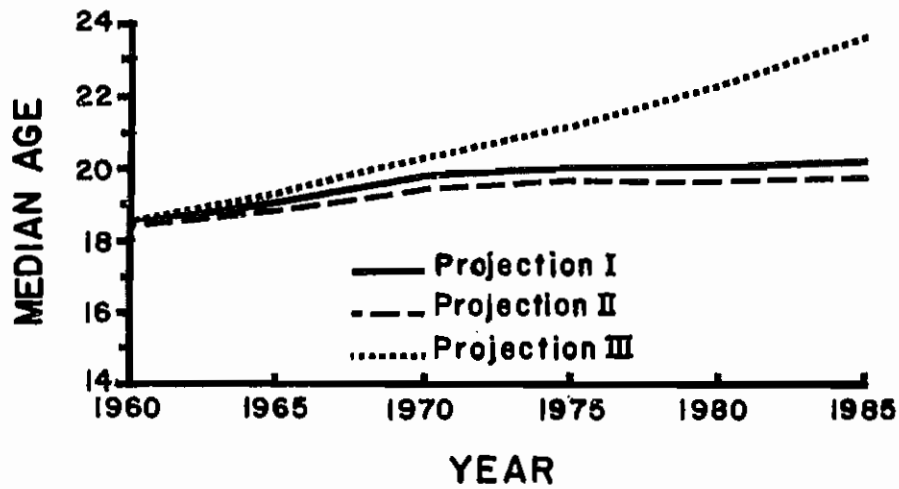


Figure 59

### BROAD AGE DISTRIBUTIONS OF THE 1960 CENSUS POPULATION AND THE 1985 PROJECTED POPULATION

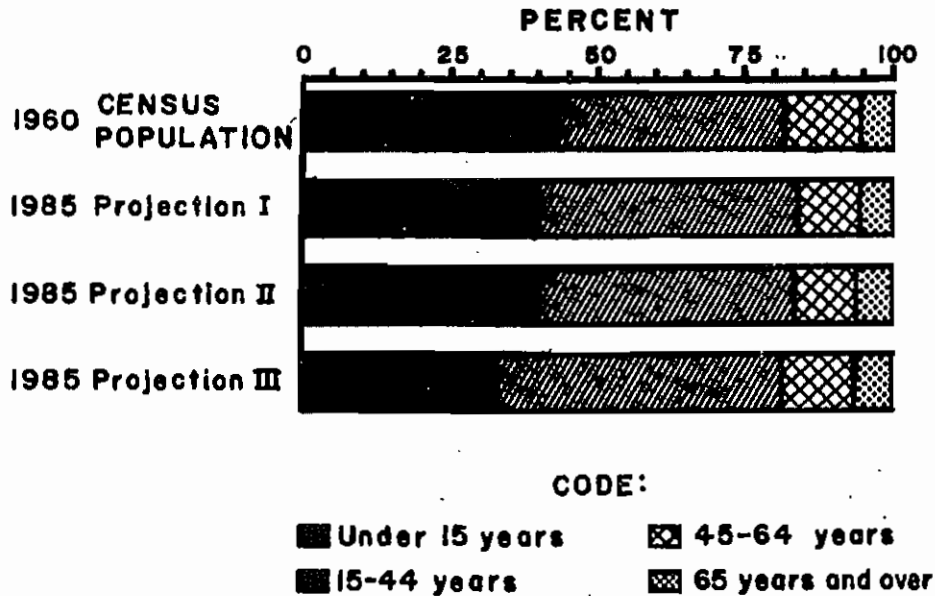


TABLE 130  
DEPENDENCY RATIOS:<sup>a</sup> 1960-1985

Projection and Year	Dependents per 1,000 Persons of Working Age <sup>b</sup>		
	Total	Young	Old
<u>Projection I</u>			
1960	140.3	127.8	12.5
1965	135.4	122.9	12.5
1970	126.0	114.1	11.9
1975	123.2	111.7	11.5
1980	123.7	111.6	12.1
1985	122.1	110.3	11.8
<u>Projection II</u>			
1960	140.3	127.8	12.5
1965	139.2	125.9	13.3
1970	130.9	117.9	13.0
1975	129.0	116.0	13.0
1980	130.6	116.7	13.9
1985	129.0	115.4	13.7
<u>Projection III</u>			
1960	140.3	127.8	12.5
1965	134.3	121.8	12.5
1970	121.4	109.5	11.9
1975	113.8	102.2	11.6
1980	107.1	95.0	12.1
1985	96.5	84.6	11.9

<sup>a</sup>Dependents: persons under 20 years of age (young dependents) plus persons 65 years old and over (old dependents).

<sup>b</sup>Working ages: persons 20-64 years of age.

Figure 60

DEPENDENCY IN THE PROJECTED POPULATIONS  
PUERTO RICO: 1960-1985

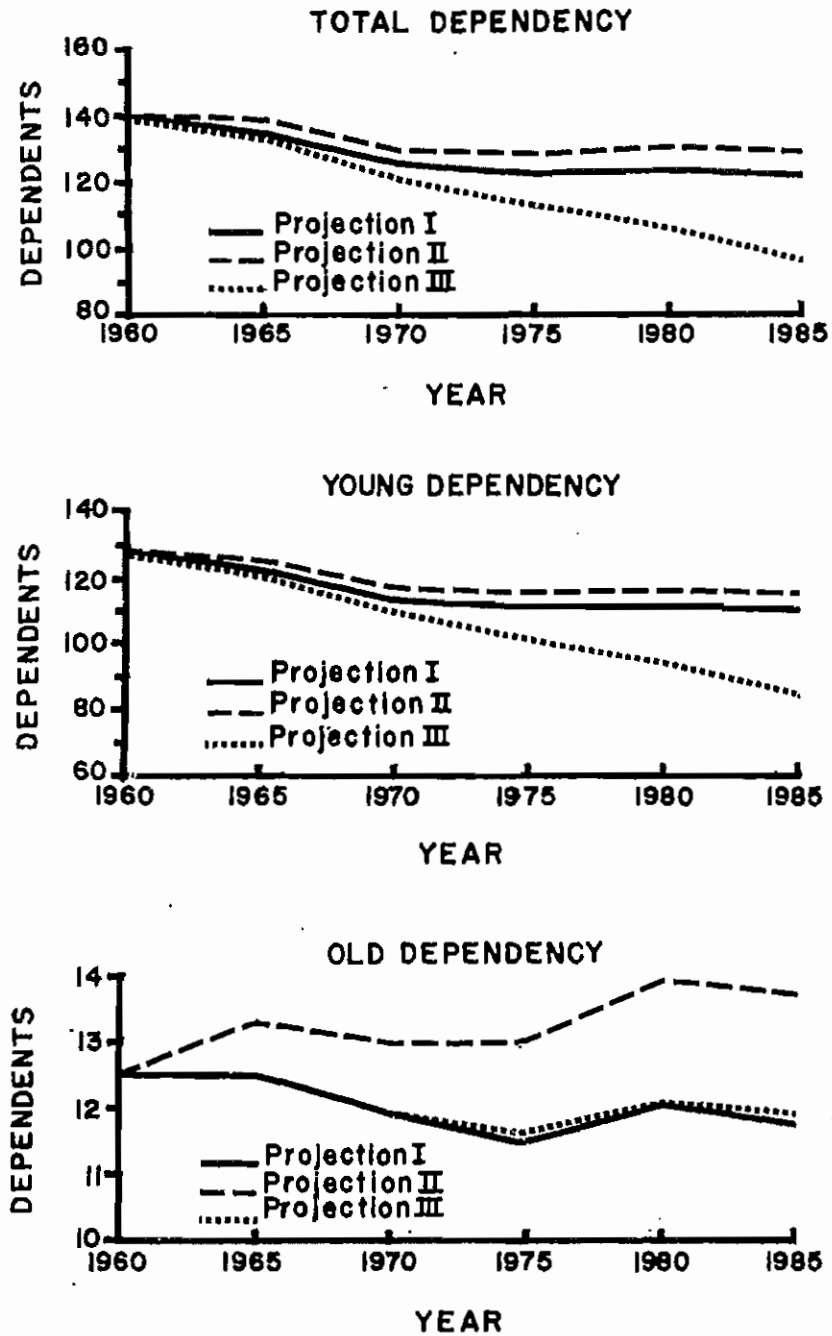


TABLE 131  
LABOR FORCE POPULATION (IN THOUSANDS):  
PROJECTION I

Sex and Age	1965	1970	1975	1980	1985
<u>Males</u>	573	677	790	910	1,055
14-19	56	57	63	74	86
20-24	99	130	133	142	166
25-34	128	181	254	292	306
35-44	110	109	126	179	250
45-54	95	99	102	101	117
55-64	59	71	79	82	85
65 and over	26	30	33	40	45
<u>Females</u>	188	225	259	295	337
14-19	19	19	21	25	28
20-24	44	56	56	60	70
25-34	53	69	90	101	106
35-44	38	39	46	59	77
45-54	22	26	28	29	34
55-64	9	12	14	16	17
65 and over	3	4	4	5	5
<u>Total, Both Sexes</u>	761	902	1,049	1,205	1,392

TABLE 132  
LABOR FORCE POPULATION (IN THOUSANDS):  
PROJECTION II

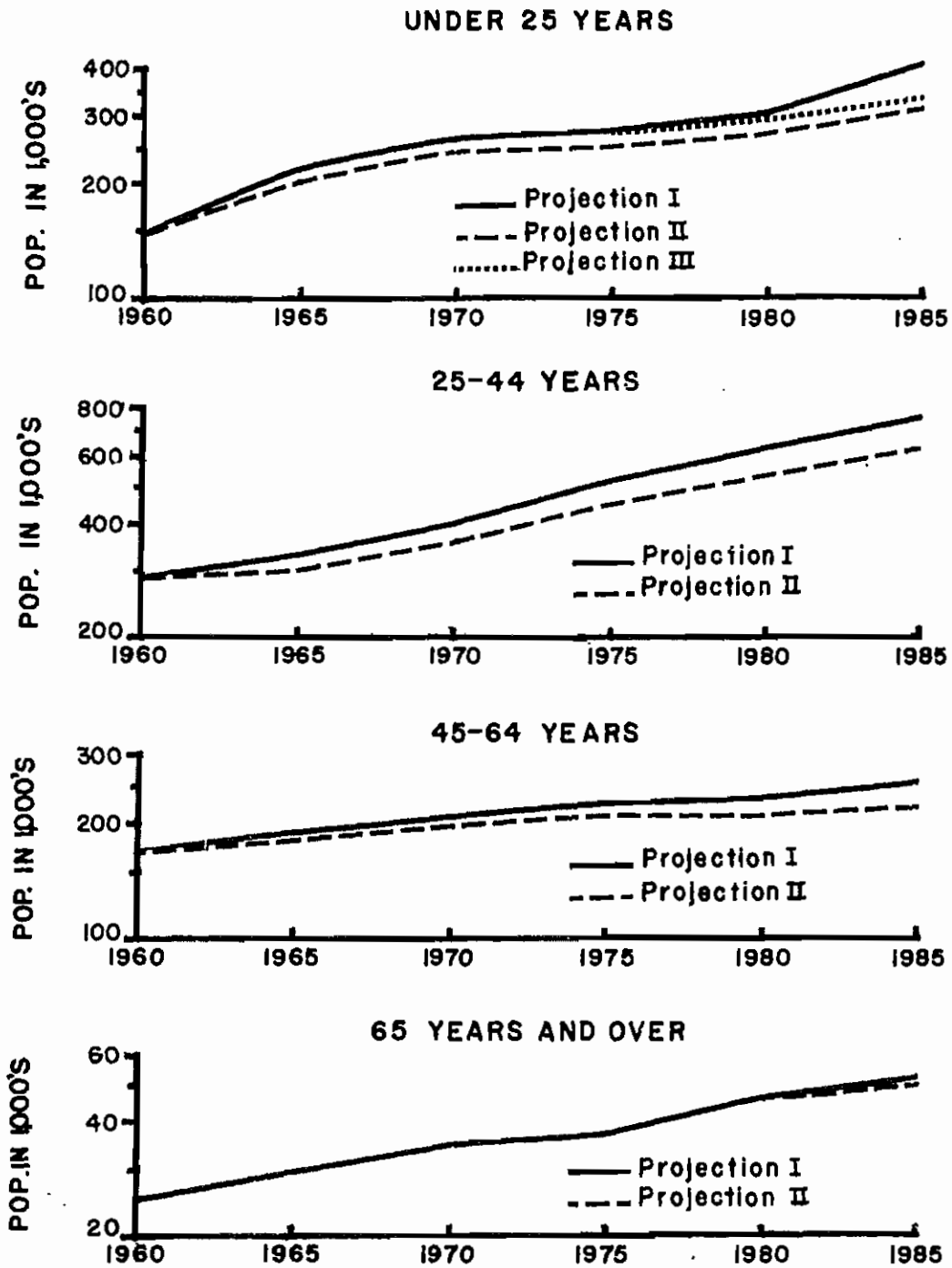
Sex and Age	1965	1970	1975	1980	1985
<u>Males</u>	544	621	701	783	890
14-19	54	54	59	66	77
20-24	91	118	119	125	144
25-34	117	156	215	244	253
35-44	107	100	106	144	202
45-54	92	94	94	87	93
55-64	57	69	75	77	77
65 and over	26	30	33	40	44
<u>Females</u>	180	208	233	262	296
14-19	18	18	20	22	26
20-24	41	52	51	55	62
25-34	50	62	79	89	91
35-44	37	37	40	50	65
45-54	22	24	26	26	28
55-64	9	11	13	15	19
65 and over	3	4	4	5	5
<u>Total, Both Sexes</u>	724	829	934	1,045	1,186

TABLE 133  
LABOR FORCE POPULATION (IN THOUSANDS):  
PROJECTION III

Sex and Age	1965	1970	1975	1980	1985
<u>Males</u>	573	677	790	905	1,040
14-19	... <sup>a</sup>	...	...	69	76
20-24	...	...	...	...	161
<u>Females</u>	188	225	259	293	333
15-19	...	...	...	23	26
20-24	...	...	...	...	68
<u>Total, Both Sexes</u>	761	902	1,049	1,198	1,373

<sup>a</sup>In these groups and in all ages not shown in this table, labor force figures are identical to those presented on Projection I.

Figure 61  
PROJECTIONS OF LABOR FORCE POPULATION  
BY BROAD AGE GROUPS  
1960-1985  
(Logarithmic Vertical Scales)





## CHAPTER VIII

### POLICY IMPLICATIONS

In its struggle of the last 20 years toward an equilibration of population and resources, Puerto Rico has been, to a significant extent, successful. The national gross product, for example, increased from \$499 millions of dollars in 1940 to \$1,415 millions of dollars in 1960 (1954 prices). Wages and salaries increased almost 250 per cent (1954 prices) during these two decades. On the other hand, income per capita, adjusted for price inflation, increased from \$210 in 1940 to \$508 in 1960, at an average rate of over 7 per cent per year.<sup>1</sup>

Census data tell us that the median income of persons 14 years of age and over (who were income recipients) rose from \$378 in 1950 to \$818 in 1960. (The median family income was \$1,082 in 1960.)<sup>2</sup>

In spite of these achievements much remains to be done in this realm. The median personal income (of recipients), for example, is still one-third of the corresponding figure for the United States. This is aggravated by the fact that, while in the United States only 28 per cent of all persons 14 years of age and

---

<sup>1</sup>Puerto Rico Planning Board, Selected Indexes of Social and Economic Progress: Fiscal Years 1939-40 to 1959-60.

<sup>2</sup>U. S. Census of Population, 1960, Report PC(1)-53C, Tables 57 and 58.

over were not income recipients, in Puerto Rico the proportion was 46 per cent. In other words, if non-recipients are taken into consideration, the gap between the income levels of the two countries becomes wider. For this reason, family income in the United States is over five times higher than in Puerto Rico.

According to the 1960 Census, 25 per cent of Puerto Rico's families had an annual income of less than \$500, 42 per cent had less than \$1,000, and almost two-thirds of all families were below the \$2,000 level which is, by the way, the government's minimum annual goal for all families.<sup>1</sup>

Additional evidence of this alarming problem is the fact that almost 20 per cent of the Island's population is under public assistance and almost 30 per cent is being nourished by the United States Government under the auspices of the Food Distribution Program.<sup>2</sup>

The economic problem of Puerto Rican families, however, is not per se a problem of the low income level of the Island as a country. We must remember that Puerto Rico has achieved a per capita income level comparable to those prevailing in some of the most progressive countries of the world, e.g., Denmark. The real problem is one of maldistribution of income. In 1947, Perloff estimated that 11 per cent of Puerto Rico's top income families received 42 per cent of the total income.<sup>3</sup> A rough estimate

---

<sup>1</sup>Ibid., Table 57.

<sup>2</sup>Official figures from the Office of Research of the Department of Health of Puerto Rico.

<sup>3</sup>Harvey S. Perloff, The Economic Future of Puerto Rico (Chicago, 1948), p. 58.

obtained from the 1960 census income distribution shows that the top ten per cent of the Island's families received, in 1959, 43 per cent of all income. From this we infer that maldistribution of income is at least as serious as it was in 1947.

This skewed income distribution was worse than that of the United States, the richest country of the world. In 1950 and in 1959, the top ten per cent of the United States families received 29 per cent of the total income. When we compute, from the 1960 family income distributions for Puerto Rico and the United States, an index of the income gap between the very poor and the very rich families, we find the index to be almost 80 per cent greater in Puerto Rico than in the United States.<sup>1</sup> And even worse, a comparison between the 1950 and the 1960 income distributions for Puerto Rico indicates that the income gap between the very rich and the very poor has become broader with time, as Table 142 shows. This table clearly shows that those persons receiving an annual income under the median (fifth decile) have gained much less, both in absolute and relative terms, than those persons above the median income.

There is eloquent factual evidence also that, in terms of economic progress, two quite different Puerto Rico's exist: the progressive and extremely industrialized San Juan Metropolitan Area, and the rest of the Island (with the exception of a few big towns), which have been left one or two decades behind.

---

<sup>1</sup>The index used was  $\frac{Q_3 - Q_1}{Q_2}$ , where  $Q_1$  and  $Q_3$  are the first and third quartiles of the income distribution and  $Q_2$  is the median. The corresponding values were: 1.63 for Puerto Rico and 0.91 for the United States.

TABLE 134

DECILES COMPUTED FROM THE CENSUS DISTRIBUTION  
OF INCOME: 1950 AND 1960<sup>a</sup>

Deciles	1950	1960	Absolute Gain	Per Cent Increase
1st	\$ 78	\$ 105	\$ 27	34.6
2nd	147	237	90	61.2
3rd	212	384	172	81.1
4th	278	564	286	102.9
5th	378	819	441	116.7
6th	496	1,135	639	128.8
7th	708	1,487	779	110.0
8th	1,054	1,994	940	89.2
9th	1,575	2,907	1,332	84.5

<sup>a</sup>Source: 1950 and 1960 Census of Population.

Unemployment is another serious and chronic problem in the Island. Recent estimates show that almost 13 per cent of the labor force is looking for work. And one must remember the low participation rates of the Puerto Rico labor force. According to the President of the Puerto Rico's Planning Board, all the 76 municipalities of the Island can be considered areas of chronic unemployment, and thus eligible to receive financial help through the Federal Program for the Acceleration of Public Works.<sup>1</sup>

The tasks of raising the still low level of living and checking the high level of unemployment are difficult enough due to the prospects of future population pressures. Evidently this is a serious obstacle to the achievement of badly needed socio-economic improvements, if not a menace for the progress already attained. In terms of working out a real and permanent relief

<sup>1</sup>El Mundo, November 28, 1962, p. 1.

from population pressures, Puerto Rico has been completely unsuccessful.

The population growth potential has become a more serious threat today than it was in the past, which may be attributed chiefly to radical improvements in the realm of mortality. Fertility has declined very slowly, and the recent sharp decline in the crude birth rate can be explained almost completely in terms of structural changes in the population resulting from mass emigration (see Chapter VI). As in the case of Japan, industrialization has failed to produce detectable changes in the reproductive performance of the Island's population. A plausible explanation for such a failure has been offered by Roy G. Francis:

The development of capitalism in the United States and other Western European countries, required the emergence of a culture which necessitated planning in life's affairs. The child competed with economic success, the family often had to decide whether to invest in a child or in a family business. It might have been this sentiment which generated the decline in the birth rate along with the industrialization of western society. If this were the case, the borrowing of a capitalist structure may not be accompanied by a decline in the birth rate in Puerto Rico.<sup>1</sup>

A substantial decline in fertility might be expected in a country where values, attitudes and beliefs are favorable to the use of birth control methods; where knowledge about the effective use of such methods is widespread; and where birth control material is available for the underprivileged families. Birth control in Puerto Rico is neither hindered nor supported by institutional patterns and adherence to cultural norms. Ideals about family

---

<sup>1</sup>Francis, p. 122.

size have little strength or consistency, and they change easily with different experiences.<sup>1</sup>

It has been found that knowledge of modern methods of birth control comes late in marriage and its utilization is delayed past the point of ideal family size. Contraception takes the character of an emergency action, undertaken seriously only under great pressure. But how can an effective use of birth control methods be achieved by persons, most of whom have been unable to complete even an elementary education (over 60 per cent of the 25 years and over population has had less than 6 grades of school completed)?

Besides, birth control methods are not available for the great majority of Puerto Rican families, although contraceptive materials are sold in almost every drug store in the Island. As Puerto Rico's government has decided to keep its hands off this controversial issue, families who are willing to limit their size cannot depend on the government health centers to obtain the necessary information and materials and are forced to purchase these from private sources. But as we have discussed in previous paragraphs, almost 30 per cent of the Island's families are being nourished by the government. How can families which are not capable of meeting this basic need by themselves afford the purchase of contraceptive material and medical advice on an uninterrupted basis? In other words, although they need to limit the size of families because of economic pressures, they are impeded in doing so by their economic situation.

It is clearly evident that the breakdown of this vicious

---

<sup>1</sup>Hill, Stycos and Back, p. 248.

circle and the attainment of a significant fertility reduction in Puerto Rico can be accomplished only through an Island-wide intensive educational campaign and by the provision, free of charge, of contraceptive material to the low income groups requesting it. One must not forget the low educational level of the vast majority of the Island's adult population, which necessarily results in a lack of motivation that can only be counter-checked through an intense and extensive educational campaign. But we honestly doubt, on the basis of pronouncements to this moment, that the present government will undertake such action.

Even under the assumption of a declining age-specific fertility, the crude birth rate would increase during the next 10 or 15 years if emigration were to be cut down considerably, e.g., to 15,000 persons per year, as a result of structural changes in the population. On the other hand, continued mass emigration will not produce much further decline in the crude birth rate, unless age specific birth rates show a marked decline, and will level off around a figure slightly above 30 per 1,000 population during the next 15 or 20 years.<sup>1</sup>

Under such circumstances, and with little to expect in relation to changes in the crude death rate (7 deaths per 1,000 population in 1960), the annual rate of "natural" increase will be at least 24 per 1,000 (2.4 per cent) during the next 25 years.

The event which relieved Puerto Rico, at least temporarily, from this tremendous population pressure, and which unquestionably contributed to a significant extent to the Island's economic boom

---

<sup>1</sup>See Table 128.

observed since 1940, was mass emigration. Emigration was able to subtract a million Puerto Ricans during the period 1940-1960 (see Table 62).<sup>1</sup> Thus, while during the 1940-1960 decade the recorded annual average rate of natural increase was 2.6 per cent, the annual rate of population growth was only 0.6 per cent. In other words, emigration removed 80 per cent of the recorded natural increase during the last decade.

As discussed in the previous chapter, future mass emigration of Puerto Ricans to the United States seems highly improbable at least during the next two decades, primarily due to an explosive labor force population growth in the United States during the sixties and seventies, and to the increasing tendency toward automation in American industry.

The bare fact is that Puerto Rican leaders have relied too much upon emigration as a solution to the Island's population problems. The privileged position of Puerto Rico, in this respect, has made them believe that heavy emigration can continue forever. Emigration as an emergency measure, to break up the vicious circle between population and resources, may be considered, with reservations, as an acceptable solution. But a healthy economy cannot be based, as implicitly as Puerto Rico's is, upon continuous mass emigration. Such a policy is not only dangerous, economically inefficient, and painful from the human point of view, but highly questionable morally.

It is a really dangerous palliative because the volume, and even the direction, of this movement depends to a great extent

---

<sup>1</sup>Of this number around 700,000 were emigrants and 300,000 were children of emigrants born outside Puerto Rico during this 20-year period.



upon conditions out of the Island's control. Migration seems to be strongly associated with the labor market and the economic situation in the United States, and the United States like any other country of the world, is not exempt from economic disturbances, temporary or otherwise. Due to the Island's economic dependency (direct and indirect) on the United States, any economic recession in the mainland will be felt in all its intensity in Puerto Rico. Examples of such a relationship were the 1930's economic crisis, and the two mild recessions of 1954 and 1958. The situation of Puerto Rico's economy becomes worse as a result of the slowdown in emigration which has been always observed during these economic crises. And we should not forget that during the years 1930-1934 around 9,000 of the 50,000 Puerto Ricans resident in the United States were able to find their way back to the Island, during a period of expensive and difficult travelling. That is, one out of every six Puerto Ricans returned home. A heavy concentration of Puerto Ricans in the United States might act like a boomerang upon the Island's economy under a severe economic crisis in the United States.

Emigration is, in the long run, a rather expensive solution to the population problem. As things now stand, Puerto Rico is training people to enter the United States labor market, paying the costs of rearing and educating and "reaping only the benefit of having fewer mouths to feed" and an occasional remittance to relatives or friends in the Island. The fact is that emigration is taking out, on the average, the better educated people; the median of school years completed for the emigrant group was over 8 years in 1960, as compared with only 4.6 years for the Island population.

In addition, emigration has depleted the "highly" productive ages (15-44), and as it takes out more "hands" than "mouths" the burden of dependency has increased considerably during the past 20 years. In 1940, for example, there were 2.5 persons without an employment per each one employed. This figure rose to 3.0 in 1950 and to 3.3 in 1960.

It seems too obvious that continuous mass emigration, although representing a population relief, is an inefficient and expensive solution from the economic point of view.

Emigration, however, must not continue to be viewed simply as an economic fact. The social and psychological problems accompanying it should not be ignored. Emigration is not only a physical movement, a simple geographical relocation; it represents a breakdown of cultural values, traditions, and norms, in many cases involving a separation between children and spouse. It almost always results in a loosening of social controls, and crime and delinquency is frequent among these "new comers." It is not sensible to continue to think only in terms of number; emigrants are human beings, unfortunate human beings, but human beings nevertheless. Their sufferings, their dreams, and their aspirations should be taken explicitly into account by those who view emigration as the unique solution for Puerto Rico's population problem

Continuous mass emigration, as a basis for an economy and as a solution to a demographic problem, is morally questionable. It is an abominable type of irresponsible parenthood. Puerto Rico ought not to be the irresponsible parent who continues procreating unwanted children in full knowledge that they cannot be properly reared and will have to be sent, sooner or later, to a "rich uncle"

to be cared for. Such a position is at best economic opportunism. And how, as Francis has recently asked,<sup>1</sup> can a country develop a culture acceptable to its people in full knowledge that it is, at best, a parasite of another society, dumping into it hundreds of thousands and eventually millions of unwanted children?

It is for these and other reasons that Alfred Sauvy, the eminent French demographer, in evaluating all possible solutions to the population problem, has considered emigration "as a barbarous remedy or at the most a precarious palliative." He added that the "essential aim is to find work for people in their own country."<sup>2</sup> According to his analysis, the unique and great dilemma is: should we adjust the resources to the population (the purely economic solution) or adjust the population (by lowering the birth rate) to the resources?

Neither of these two solutions alone will result in real, permanent, and rapid, advances toward a narrowing of the gap existing between the standards of living of the low and high income countries. In countries like Puerto Rico, the overpopulation is not a static question but one of speed of growth. Even a rich country like the United States would find it extremely difficult to meet a doubling of its population in each generation, particularly with regard to education, employment, and housing. As Sauvy concluded: "The economic solution is not enough and the demographic solution demands a preliminary or at least a simultaneous, economic

---

<sup>1</sup>Francis, pp. 112-115.

<sup>2</sup>Alfred Sauvy, Fertility and Survival (London, 1961), p. 83.

development. Both solutions must therefore be studied and envisaged."<sup>1</sup>

It has been for these reasons that Japan, India and even Communist China (the communist doctrine asserts that overpopulation is only a fruit of capitalism) have broken with traditional policies after finding that the economic solution is not enough. The Chinese government in 1957, under the guise of health reasons, announced that a 50 per cent reduction in the crude birth rate was their goal for the next 10 years,<sup>2</sup> because they realized that the real problem is accelerating advancement so as to close, as soon as possible, the existing gap between the developed countries (which are continually advancing) and the underdeveloped ones. The unquestionably ideal model, under such conditions, is one in which an increasing proportion of the national income can be diverted from purely "demographic investment"<sup>3</sup> toward economic investment in order to raise the level of living at an increasing rate. This can more easily be accomplished by reducing the population pressure.<sup>4</sup>

In a sense, Puerto Rico's leaders have chosen the purely economic solution, as emigration is merely a palliative and temporary relief for the population problem. United States' capital has been successfully attracted through the incentives of cheap labor and a ten-year tax exemption. As Puerto Rico is a country of

---

<sup>1</sup>Ibid., p. 227.

<sup>2</sup>Ibid., p. 192.

<sup>3</sup>Demographic investment is that which is utilized for giving to each additional inhabitant (product of population growth) the necessary installation for a standard of living equal to that of others (housing, schools, factories, etc.).

<sup>4</sup>See ibid., Sec. 10; and Joseph Marion Jones, Does Overpopulation Mean Poverty? (Washington, 1962).

extremely scarce natural resources, raw material (and semi-elaborated products) have to be transported to the Island while the finished products have to be returned to the continental market. Thus, the industrial enterprises attracted to the Island are only those for which there is a significant and favorable balance between transportation and production costs. Almost all of them are light industries, the great majority in apparel manufacturing.

There will be no problem in the Island as long as this differential between transportation and production costs exists. Two facts, however, tell us that this might not be so in the future. First, continued cheap labor is in contradiction with the Puerto Rican government's goals in relation to standards of living. The government's goal for annual minimum family income is \$2,000 for all families. The date for achieving this goal is not stated, although the fact is that family income in the Island is increasing more rapidly than in the United States. While in the United States the average salary for a manufacturing worker increased less than 20 per cent from 1956 to 1959, the corresponding increase in Puerto Rico was over 40 per cent.<sup>1</sup> At the same time, trade unions in Puerto Rico (usually branches of United States unions) are striving for wages comparable to those prevailing in the United States.

Secondly, mechanization or automation is an efficient substitute for unskilled cheap labor. A continuation of the trend to automation in the United States could make the incentive of cheap manpower in Puerto Rico an unimportant factor in investment decisions by American industrialists. In the near future, he

---

<sup>1</sup>Junta de Planificación de Puerto Rico, Informe Económico del Gobernador, 1959, p. 8.

might begin to think more in terms of availability of raw material or natural resources, a realm in which Puerto Rico cannot compete.

There is still another factor which, although impossible to predict in terms of timing and extent, will sooner or later occur--the industrialization of Latin America. If the anxiously expected industrialization of Latin America ever occurs, Puerto Rico would not only be in an unfavorable position for attracting American investors because of the Island's lack of raw materials and cheaper labor in Latin America, but also because of market possibilities. It is madness to think of industrialization in Latin America without thinking of market outlets for finished products.

Several other factors have undoubtedly influenced many American industrialists to choose Puerto Rico for factory location over any other country:

(1) As a result of its political association with the United States, Puerto Rico is in a very favorable situation to attract United States capital which might fear the possibility of undesirable governmental intervention or revolution elsewhere.

(2) As Puerto Rico is part of the United States market economy many American industrialists have chosen to locate in Puerto Rico because of the free access to mainland markets.

(3) There is great assurance of stability for the United States capitalist to know he is operating within the United States judicial system and that any dispute initiated in Puerto Rico can be carried to the Supreme Court of the U. S. if necessary.

(4) The United States capital is well aware and absolutely

confident in the overruling power of their government with respect to ultimate decisions in Puerto Rican affairs.<sup>1</sup>

Apart from such economic and political considerations, Puerto Rico's demographic solution to the population problem has no transfer value for other underdeveloped countries where explosive population growth is the real obstacle to economic progress. Other overpopulated and underdeveloped areas in the world cannot take advantage of a common citizenship with more prosperous areas to benefit from mass emigration. India, for example, to match Puerto Rico's migratory experience, would have to be sending away more than 6 million people each year.

Puerto Rico's developmental experience, however, may have some points of interest to other underdeveloped countries. An able and honest government administration is necessary in order to bring about significant socio-economic progress; improvement in public education is also a prime requisite. Capital, which is also badly needed in all underdeveloped countries is only secondary to a good public administration and education.

Puerto Rico's experience can demonstrate to other areas in which explosive population growth is a hindrance to economic development, that the "economic" solution to the population-resources problem alone is not enough and that industrialization is not a miracle pill for all the maladies of underdevelopment. Only by simultaneously striving for economic improvement and

---

<sup>1</sup>A recent example of the American overruling power over Puerto Rico's decisions has been the threat, by Congressman Adam C. Powell and others, to cut down Federal help to Puerto Rico's Schools as a result of controversy about the teaching in English (not of English) in Puerto Rico's private schools.

reduction in the birth rate can an underdeveloped country move swiftly and successfully into the future with the assurance of a more or less permanent achievement.

TABLE 135

AVERAGE ANNUAL ADDITIONS TO THE LABOR FORCE BY SEX  
(IN THOUSANDS): 1960-1965 TO 1980-1985

Projection and Sex	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985
<u>Projection I: Both Sexes</u>	26.6	28.2	29.4	31.2	37.4
Males	19.8	20.8	22.6	24.0	29.0
Females	6.8	7.4	6.8	7.2	8.4
<u>Projection II: Both Sexes</u>	19.2	21.0	21.0	22.2	28.2
Males	14.0	15.4	16.0	16.4	21.4
Females	5.2	5.6	5.0	5.8	6.8
<u>Projection III: Both Sexes</u>	26.6	28.2	29.4	29.8	35.0
Males	19.8	20.8	22.6	23.0	27.0
Females	6.8	7.4	6.8	6.8	8.0

In terms of age, future increases in the labor force will concentrate among persons 20 to 44 years of age. As Table 136 shows, during the period of 1960-1975 significant increases will be observed among persons 20-34 years old, but during the decade of 1975-1985, and as a result of the aging process, the most significant increments will occur in the age bracket 35-44 years.

These figures clearly indicate that employment will continue to be one of the most pressing needs in Puerto Rico. Merely to maintain the "too-high" 1960 level of unemployment constant, and prevent it from becoming worse, under the most favorable of emigration premises (Projection II), some 162,000 additional jobs



TABLE 136

AVERAGE ANNUAL ADDITIONS TO THE LABOR FORCE BY AGE  
(IN THOUSANDS): 1960-1965 TO 1980-1985

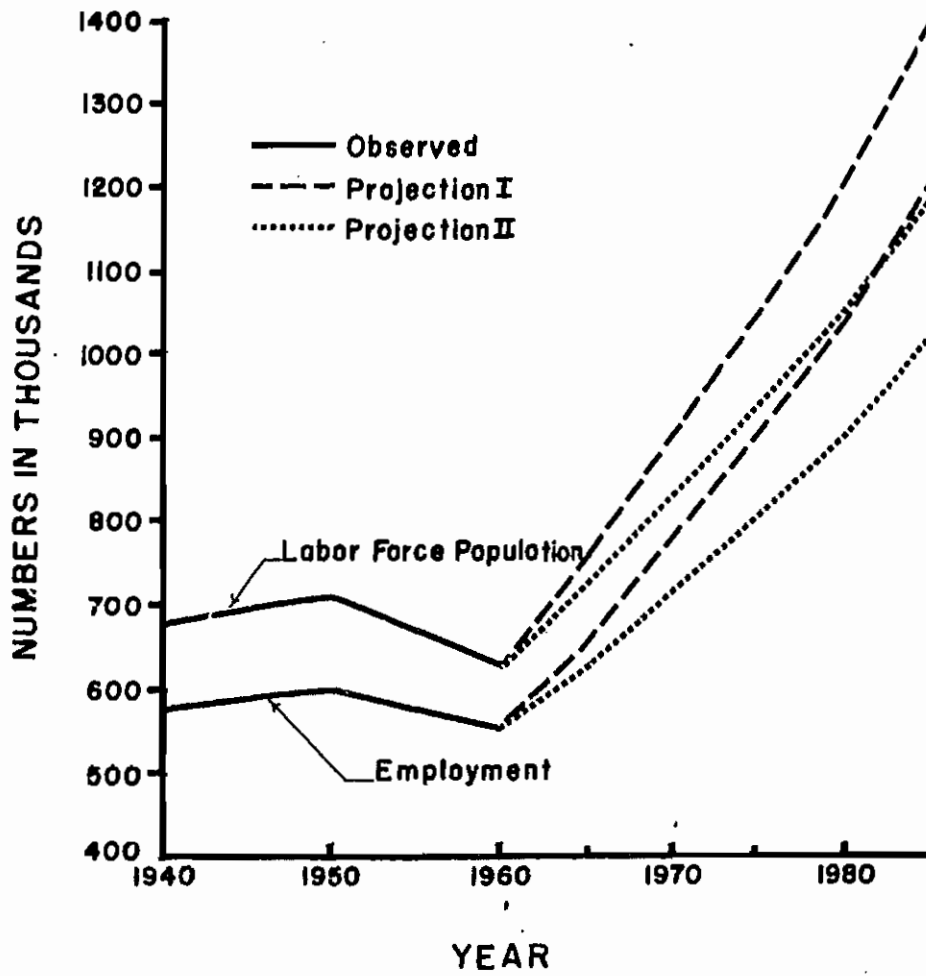
Projection and Age	1960- 1965	1965- 1970	1970- 1975	1975- 1980	1980- 1985
<u>Projection I</u>					
14-19	5.4	0.2	1.6	3.0	3.0
20-24	9.0	8.6	0.6	2.6	6.8
25-34	5.2	13.8	18.8	9.8	3.8
35-44	1.6	0.0	4.8	13.2	17.8
45-54	3.0	1.6	1.0	0.0	4.2
55-64	1.6	3.0	2.0	1.0	0.8
65 and over	0.8	1.0	0.6	1.6	1.0
<u>Projection II</u>					
14-19	4.8	0.0	1.4	1.8	3.0
20-24	6.8	7.6	0.0	2.0	5.2
25-34	2.4	10.2	15.2	7.8	2.2
35-44	0.8	-1.4	1.8	9.6	14.6
45-54	2.4	0.8	0.4	-1.4	1.6
55-64	1.2	2.8	1.6	0.8	0.8
65 and over	0.8	1.0	0.6	1.6	0.8
<u>Projection III</u>					
14-19	... <sup>a</sup>	...	...	1.6	2.0
20-24	...	...	...	...	5.4

<sup>a</sup>In these groups and in all ages not shown in this projection, figures are identical to those of Projection I.

will be needed during the next decade. In other words, employment would need to increase by almost 30 per cent during the sixties. On the average, over 16,000 additional jobs would have to be provided each year during the decade 1960-1970. During the seventies employment would have to increase at a pace of 18,500 per year to maintain constant the already critical present level of unemployment (13 per cent). By 1980-1985 some 24,000 annual additions would be necessary (see Table 137).

Figure 62

OBSERVED AND PROJECTED TOTAL  
LABOR FORCE POPULATION AND  
TOTAL EMPLOYMENT



Should emigration halt completely (Projection I), some 22,000 additional jobs would be needed each year during the sixties, over 25,000 during the seventies, and 32,000 per annum by 1980-1985.

These expected employment demands mean a tremendous acceleration of the 1940-1960 trends. Historical data show that employment increased by 26,000 during the forties but declined by 46,000 during the decade 1950-1960 (see Table 43). In other words, during the last 20 years employment declined by 20,000 jobs. According to official figures, during the decade 1950-1960 some 40,000 jobs were created in the industrial plants promoted by the government, while employment in other sectors of the economy declined by 86,000 jobs (for a net loss of 46,000 jobs). Government economists expect an increase of 66,000 employment opportunities in government sponsored factories during the sixties as a result of their industrial promotion efforts.<sup>1</sup> Assuming these will represent net additions over the 1960 total number of jobs, employment in other sectors of the economy would have to increase by some 96,000 jobs under the most favorable of the population premises (Projection II), in contrast with the 86,000 decline actually observed during the fifties.

If, on the contrary, emigration fails to attain an average of 15,000 persons annually, as assumed in Projection II, employment needs will be more pressing during the sixties. With zero emigration (Projection I, above) 225,000 additional jobs would be

---

<sup>1</sup>Junta de Planificación, Informe del Gobernador (Segunda Parte), Panorama Económico de la Década 1960-70, Table 7.

necessary during the decade 1960-1970 just to maintain unimproved the present level of unemployment. In other words, employment would have to be increased by over 40 per cent during the next 10 years.

TABLE 137

ADDITIONAL EMPLOYMENT NEEDED TO MAINTAIN THE 1960 UNEMPLOYMENT RATE CONSTANT: 1960-1965 TO 1980-1985

Period	Projection I		Projection II		Projection III	
	Total	Annual Average	Total	Annual Average	Total	Annual Average
1960-1965	103	20.6	71	14.2	103	20.6
1965-1970	122	24.4	91	18.2	122	24.4
1970-1975	125	25.0	89	17.8	125	25.0
1975-1980	134	26.8	96	19.2	131	26.2
1980-1985	163	32.6	121	24.2	151	30.2

### School Enrollment

School enrollment increased considerably during the last decade. According to official data, 455,000 pupils between ages 6 and 18 years were enrolled at school in 1951. Ten years later school enrollment in this age bracket totaled 622,000. In relative terms, these figures represented 65 and 79 per cent of the total population in this age group.

These achievements have been possible by overcrowding schools, double matriculation,<sup>1</sup> and by a very high teacher's load. In 1959, for example, the average number of pupils per elementary

---

<sup>1</sup>Double matriculation refers to the arrangement in which the same school facilities and personnel are used during the morning for three hours by a group of pupils and during the afternoon for the same time period by a different group of children.

school teacher was almost 60, while the average high school teacher's load was 38 pupils. Double matriculation reached its peak in 1955 when 300,000 pupils were being taught under this arrangement which represents (for the pupil) only three hours of teaching daily. In 1961, 184,000 elementary school pupils (48 per cent of all public elementary school pupils) were taught under this system. This problem is more serious in the rural area where 66 per cent of all elementary school children attended school only three hours daily.<sup>1</sup> A deterioration of quality is the price paid for the radical increase in quantity.

As a result of the saturation of existing school facilities, increases in enrollment began to fall off in 1956, a slight drop, in fact, has been observed since 1956. In other words, population among persons 6 to 18 years old has increased faster than school enrollment.

From population projections it seems evident that school enrollment in Puerto Rico will continue increasing at least during the next 25 years (if the proportion of persons enrolled at a school does not decline). Even under the most favorable assumption-- a 50 per cent reduction in fertility between 1960 and 1985--school age population (6 to 18 years) will increase in the future (Projection III). If fertility continues its observed declining tendency, school age population will rise considerably, under either emigration premise (Projections I and II).

School enrollment, however, should be expected to rise more rapidly than the school age population if there is to be some

---

<sup>1</sup>Press statement by the Secretary of Education of Puerto Rico, The San Juan Star, June 26, 1962, p. 8.

progress in terms of the proportion of the population enrolled at school. This is one of the goals of the present Puerto Rican government. The period of 1960-1970 has been proclaimed the "Decade of Education."

TABLE 138

PROJECTIONS OF SCHOOL AGE POPULATION BY AGE: 1960-1985<sup>a</sup>

Projection and Age	1960 <sup>b</sup>	1965	1970	1975	1980	1985
<u>Projection I</u>						
Total 6-18 years	790	859	931	1,072	1,256	1,425
6-12	462	471	535	635	740	818
13-15	180	195	201	229	272	317
16-18	148	193	195	208	224	290
<u>Projection II</u>						
Total 6-18 years	790	842	893	999	1,102	1,231
6-12	462	463	513	589	666	732
13-15	180	192	195	215	248	280
16-18	148	187	185	195	188	219
<u>Projection III</u>						
Total 6-18 years	790	859	921	1,018	1,122	1,186
6-12	462	471	526	593	635	641
13-15	180	195	200	217	243	265
16-18	148	193	195	208	244	280

<sup>a</sup>Source: Tables 123-125 (Interpolations with Sprague Multipliers).

<sup>b</sup>Actual.

In our projections of school enrollment we have used the United States experience as a "model," a "method" which has become rather popular in Puerto Rico.<sup>1</sup> Observing that the 1960 Puerto Rican school enrollment rates by age were almost identical to the

<sup>1</sup>This has been one of the major criticisms to all the Puerto Rico's Planning Board projections. See, for example, Francis, chap. vii.

Figure 63  
PROJECTIONS OF SCHOOL AGE POPULATION  
(6 TO 18 YEARS OLD) BY AGE  
PUERTO RICO: 1960-1985

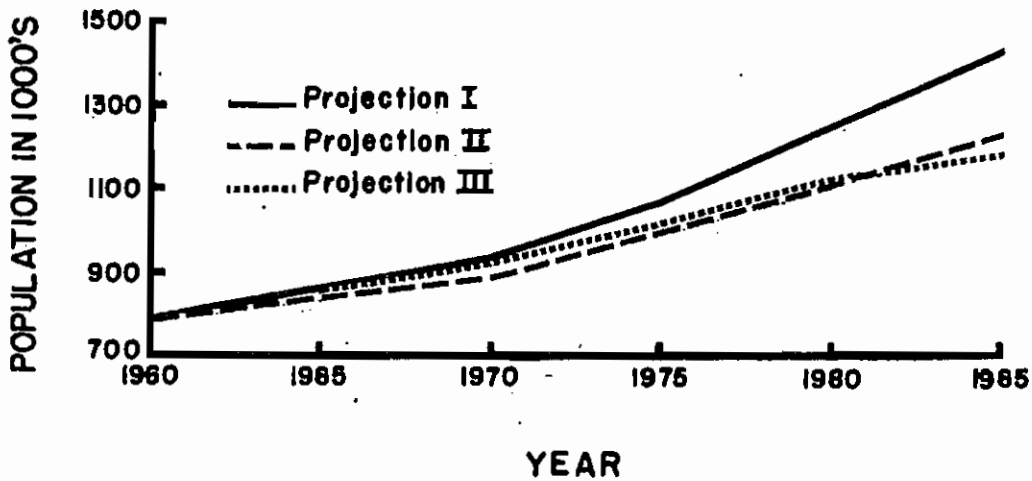
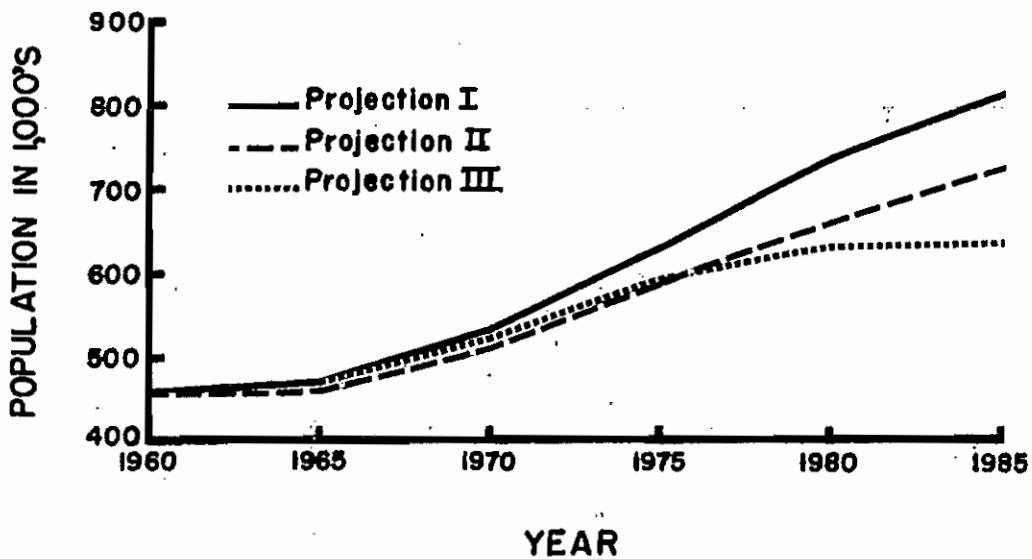


Figure 64  
PROJECTIONS OF ELEMENTARY SCHOOL AGE POPULATION  
(6-12 YEARS)  
PUERTO RICO: 1960-1985



1920 United States rates, we have assumed that the United States 1950 figures will be achieved in Puerto Rico by 1990. In other words, the educational time lag between these two countries will remain unchanged in the future.

In contrast with the expectations of the Superior Board of Education of Puerto Rico, we have assumed a rapid development in education because we wanted to point up the requisites in this field if the United States experience in education is to be repeated by Puerto Rico.

School enrollment increased over 36 per cent during the fifties due to a super-saturation of school facilities and overloading the school teaching personnel. A radical slow-down in school enrollment, however, was observed during the last five years of the decade. During the first 5 years of the 1950-1960 decade, school enrollment increased by an average of 24,000 pupils per year, at an average rate of 5.3 per cent per annum. From 1955 to 1960 it increased at an average rate of 1.6 per cent per year and in absolute terms by 9,000 pupils per year.

According to our projections, school enrollment would continue to increase at least during the next 25 years, even under the assumption of a 50 per cent reduction in fertility between 1960 and 1985. Emigration (of the magnitude we have assumed in Projection II) would have but little effect upon school enrollment during the sixties but by 1985 it would be able (all other things being equal) to reduce school enrollment by almost 170,000 persons (Projections I and II). A comparison of figures from Projections II and III shows that a significant reduction in fertility, in the



long run, would result in a lower school enrollment figure than a continuous emigration of 15,000 persons annually (see Table 139).

TABLE 139  
PROJECTIONS OF SCHOOL ENROLLMENT BY AGE  
(IN THOUSANDS): 1960-1985

Projection and Age	1960 <sup>a</sup>	1965	1970	1975	1980	1985
<u>Projection I</u>						
Total 6-18 years	622	682	764	908	1,089	1,262
6-12	407	420	481	576	677	755
13-15	150	166	174	203	246	292
16-18	65	96	109	129	166	215
<u>Projection II</u>						
Total 6-18 years	622	670	734	845	961	1,096
6-12	407	413	461	534	609	676
13-15	150	163	169	190	224	258
16-18	65	94	104	121	128	162
<u>Projection III</u>						
Total 6-18 years	622	682	756	859	967	1,043
6-12	407	420	473	538	581	592
13-15	150	166	174	192	220	244
16-18	65	96	109	129	166	207

<sup>a</sup>Actual figures.

A continuation of the observed trend in fertility in the absence of emigration would result in an annual average increase of 14,000 pupils during the sixties, in over 32,000 per annum during the seventies, and of slightly less than 35,000 a year during the quinquennium of 1980-1985. However, if a constant emigration of 15,000 persons annually is observed during the next 25 years, annual increases in school enrollment would be reduced significantly. The annual increases would be of 11,000 during

the sixties, of 23,000 during the decade of 1970-1980, and of 27,000 during the period of 1980-1985.

In contrast, if a 50 per cent reduction in fertility were possible during the next 25 years, even in the absence of emigration, annual additions in school enrollment would decline considerably after 1970. During the seventies, for example, school enrollment would increase by 21,000 pupils annually, and by 15,000 per year during the period of 1980-1985.

Elementary school years enrollment (6-12 years) would increase during this 25-year period under any of our premises. However, under the assumption of a radical decline in fertility (Projection III), after 1970 a significant slowdown would occur, both in absolute and relative terms.

For a better idea of the implications of these expected changes in school enrollment, let us review some relevant points of the projections of manpower needs and supply made in 1957 by the Committee on Human Resources of the Commonwealth of Puerto Rico.<sup>1</sup> The basis for this analysis was a population projection in which the crude birth rate was expected to decline from a level of 35 in 1955 to 25 in 1975 and emigration to average 50,000 persons per year during the same time period (both premises have already been abandoned and much less optimistic figures have been adopted by Puerto Rico's Planning Board).

According to this projection, school enrollment was expected to decline from 600,000 pupils in 1957 to 389,000 in 1975.

---

<sup>1</sup>Committee on Human Resources, Commonwealth of Puerto Rico, Puerto Rico's Manpower Needs and Supply (November, 1957). See Francis for a critical evaluation of such projections.

Elementary school enrollment would have declined from 430,000 to 228,000 during this 18-year period.<sup>1</sup> At the same time school enrollment rates were expected to increase significantly so that the 1950 United States level would be reached in Puerto Rico by 1975.

Even under this "too good to be true" premise, the Committee estimated that there would be by 1975 a labor force surplus of some 195,000 persons with less than 6 years of school completed. On the other hand, a shortage of around 160,000 workers with 6 or more years of school attainment was expected by 1975.<sup>2</sup> They concluded that "to meet the projected employment demand it seems to be necessary for Puerto Rico, during the next 17 years (1957-1975) to give at least 300,000 persons an average of six years more education than they would get without an accelerated education program."<sup>3</sup> And what they really meant by an accelerated education program is something more than the achievement, by 1975, of the 1950 enrollment levels of the United States.

If this was true in a population "model" where school enrollment was expected to decline by 34 per cent in only 18 years, what would be the case in a population which, barely maintaining the present rates of school enrollment constant, would increase between 26 and 36 per cent from 1960 to 1975? Or an increase of 36 to 46 per cent in school enrollment between 1960 and 1975 if the 1950 United States enrollment rates were to be attained in Puerto Rico by 1990? As the Committee on Human Resources admitted,

---

<sup>1</sup>Committee on Human Resources, p. 125.

<sup>2</sup>Ibid., p. 65.

<sup>3</sup>Ibid., p. 14.

that would limit considerably "the educational resources which can be diverted to higher level and adult education." All other things being equal, this would mean a lower proportion of persons attaining higher education by 1975 and, in relative terms, a greater shortage of professionals and skilled workers in the labor force than was formerly expected.

It seems evident enough that the Island's government will have to cope with enormous and important educational problems in the years to come, problems which have been the result of past demographic changes aggravated by future prospects of population growth. Three of the most pressing problems will be:

- (1) Provisions for a "non-expected" increasing school population.
- (2) Double matriculation and heavy teacher's load. Both factors have much to do with the low quality education Puerto Ricans receive at present.
- (3) Still too low entrance and retention rates among school age population. These proportions should increase in order to reduce the expected shortage in the labor force of persons with more than elementary school.

#### Health, Housing and Other Implications

There is value in a review of some of the important findings in a recent study of the present medical and hospital situation in Puerto Rico.<sup>1</sup> A considerable shortage of hospital beds exists in the Island, as Table 140 shows. This 56 per cent shortage in general hospital beds is a very serious problem and eloquent

---

<sup>1</sup>Escuela de Salud Pública y Medicina Preventiva de la Universidad de Columbia y Departamento de Salud de Puerto Rico, La Asistencia Médico-Hospitalaria en Puerto Rico (December, 1960).

TABLE 140

NEEDED AND EXISTING NUMBER OF HOSPITAL BEDS (1958)

Beds	Needed	Existing	Per Cent Existing to Needed
General Hospitals . . . . .	10,224	5,738	56.1
Tuberculosis Hospitals . . .	4,740	2,677	56.5
Psychiatric Hospitals . . . .	11,360	2,895	25.5
Chronic Diseases . . . . .	4,544	386	8.5
Nursing Homes . . . . .	2,272	87	3.8

<sup>a</sup>Source: Estudio Sobre Servicios Médico-Hospitalarios, Table 5, p. 58.

evidence of the low quality of hospital and medical care received by the great majority of Puerto Ricans at present.

Although there is a 44 per cent shortage of beds in tuberculosis hospitals we are of the opinion that this will not represent a serious problem in the future as tuberculosis shows consistent decline and efficient ambulatory treatment is at present feasible. The most pressing needs are for beds for the treatment of long duration diseases (chronic diseases), which is at present of the magnitude of 92 per cent, and beds in nursing homes which are short by 96 per cent. Both are problems of the aged population which will increase substantially (with or without emigration) in the future. For example, according to the 1960 census, Puerto Rico had over 126,000 persons 65 years and over, but by 1970 there will be 164,000 in these ages and at least 250,000 by 1985. Thus the old age population is expected to double during the next 25 years (see Tables 124-126).

The problem in psychiatric hospitals is also very serious.

In 1958 only 25 per cent of the bed need was achieved and it is likely that psychiatric disorders will continue increasing as a result of rapid social and demographic changes occurring in Puerto Rico.

The problems of health personnel are not less serious, although they have improved substantially in the past. According to official (although not highly reliable) figures there were in 1940, 3,700 persons per physician. According to the 1958 study there were in Puerto Rico some 1,400 active physicians for an average of 1,700 persons per physician. One of the goals set by the study group was a reduction of the population to physician ratio to 1,000 persons by 1970. According to our population figures this would represent 3,000 active physicians by 1970. In other words, the number of physicians should increase by an average of 133 physicians per year. But the School of Medicine of Puerto Rico is admitting slightly over 50 medical students per year, and a great proportion of the graduates who go to the States for the internship period, remain there.

Some 2,100 nurses were in active service in Puerto Rico in 1958; in relative terms, there were over 1,100 persons per nurse. One of the goals set by the study group just mentioned was 600 inhabitants per nurse by 1970, which would represent an increase of 2,800 nurses in 12 years, at an average of over 200 net additions per year. But as this study revealed, nursing is not an attractive profession in Puerto Rico and school facilities are at present highly inadequate.

All these problems we have briefly sketched are primarily

governmental problems; almost two-thirds of the population depend on governmental health facilities because of their economic inability to pay private medical and hospital fees.<sup>1</sup>

Housing facilities will be another serious problem in the future. According to the minimum population figures (Projection II), by 1970, 623,000 households will be needed just to maintain the present population-household ratio (4.7) constant. Compared with 495,000 occupied households in 1960 (census figure), a net increase of 128,000 will be needed during the sixties. This is considerably higher than the figure of 73,000 formerly expected by Puerto Rico's Planning Board on the assumption of a decline in the population per household ratio from 4.7 in 1960 to 4.3 in 1970.<sup>2</sup> Under such a decline and according to the minimum population figure (2,926,000), a net of 185,000 additional households will be needed by 1970, a figure 2.5 times higher than the Planning Board estimates. And this does not take into consideration the fact that a substantial proportion of present housing facilities is wholly inadequate and characteristic of slum conditions.

---

<sup>1</sup>As of December 1, 1962, almost 30 per cent of the population of Puerto Rico was on relief rolls for the distribution of free surplus food from the U. S. Food Distribution Program. Also as of almost the same date (December 3, 1962) the U. S. Area Development Administration (ADA) was considering designating Puerto Rico as an area of unemployment qualified to receive relief assistance from Washington, D. C.

<sup>2</sup>Junta de Planificación de Puerto Rico, Panorama Económico de la Década 1960-70, pp. 29-31.

TABLE 141

PROJECTIONS OF MEDICAL AND NURSING PERSONNEL NEEDS

Year	According to Population Projection I	According to Population Projection II
<u>Physicians</u>		
1940 <sup>a</sup>	675	675
1950 <sup>a</sup>	880	880
1958 <sup>b</sup>	1,400	1,400
1970	3,100	2,900
1980	4,100	3,700
1985	4,700	4,100
<u>Nurses</u>		
1940 <sup>a</sup>	1,536	1,536
1950 <sup>a</sup>	1,855	1,855
1958 <sup>b</sup>	2,100	2,100
1970	5,200	4,900
1980	6,800	6,100
1985	7,800	6,800

<sup>a</sup>Census figures.

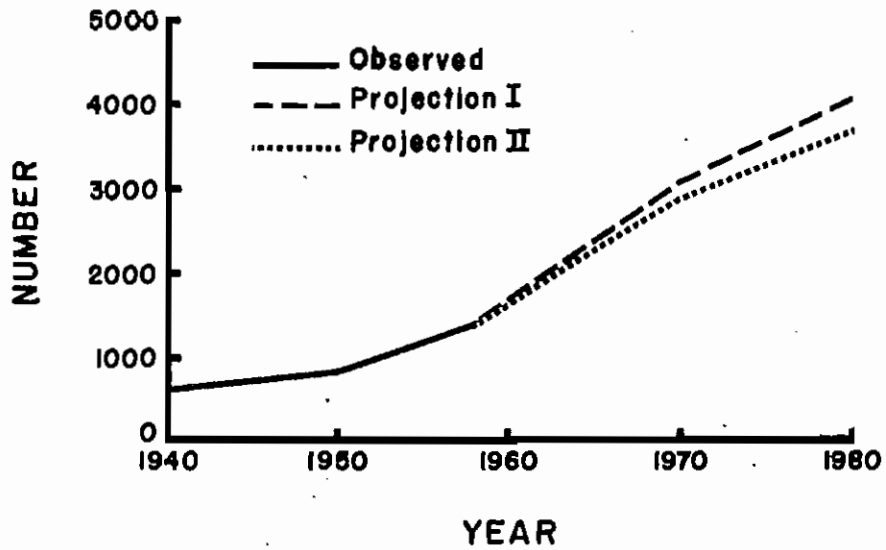
<sup>b</sup>Estudio Sobre Servicios Médico-Hospitalarios.



Figure 65

### PROJECTIONS OF MEDICAL AND NURSING PERSONNEL NEEDS IN PUERTO RICO

#### PHYSICIANS



#### NURSES

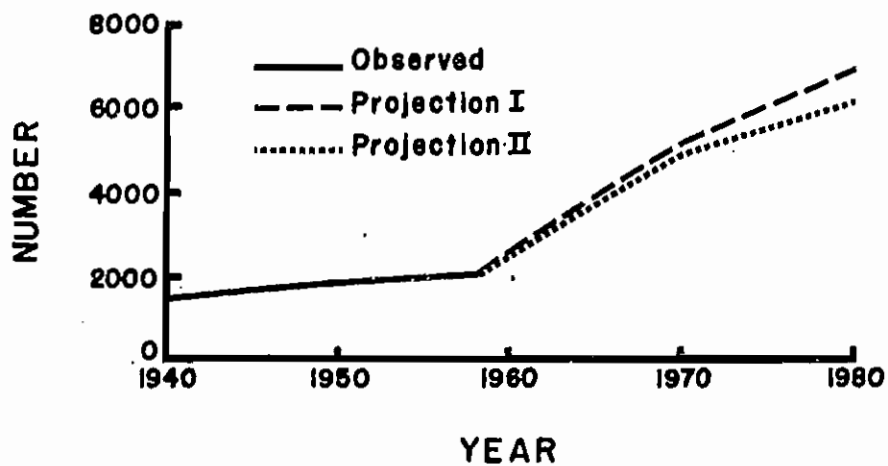


TABLE 142

PROJECTIONS OF HOUSEHOLD NEEDS (IN THOUSANDS)

Year	According to Population Projection I		According to Population Projection II	
	Number	Annual Increase	Number	Annual Increase
A. Assuming the 1960 Population-Household Ratio (4.7 persons per household) will remain constant in the future.				
1940 <sup>a</sup>	356	...	356	...
1950 <sup>a</sup>	431	7.5	431	7.5
1960 <sup>a</sup>	495	6.4	495	6.4
1965	575	16.0	556	12.2
1970	664	17.8	623	13.4
1975	766	20.4	699	15.2
1980	875	21.8	782	16.6
1985	1,000	25.0	875	18.8
B. Assuming the Population-Household Ratio will decline to 4.3 by 1970 and be constant from there on				
1960	495	...	495	...
1970	725	23.0	680	18.5
1975	836	22.2	763	16.6
1980	955	23.8	854	18.2
1985	1,093	27.6	956	20.4

<sup>a</sup> Number of occupied households from corresponding censuses.

Figure 66

PROJECTIONS OF HOUSEHOLD NEEDS ON THE ASSUMPTION THAT THE 1960 POPULATION-HOUSEHOLD RATIO WILL REMAIN CONSTANT IN THE FUTURE

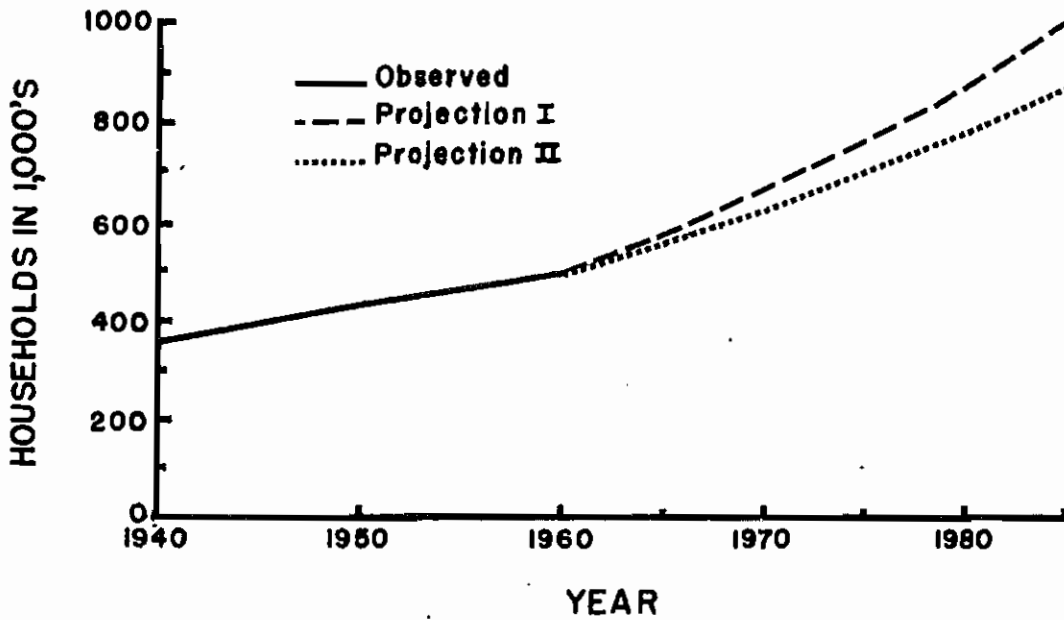
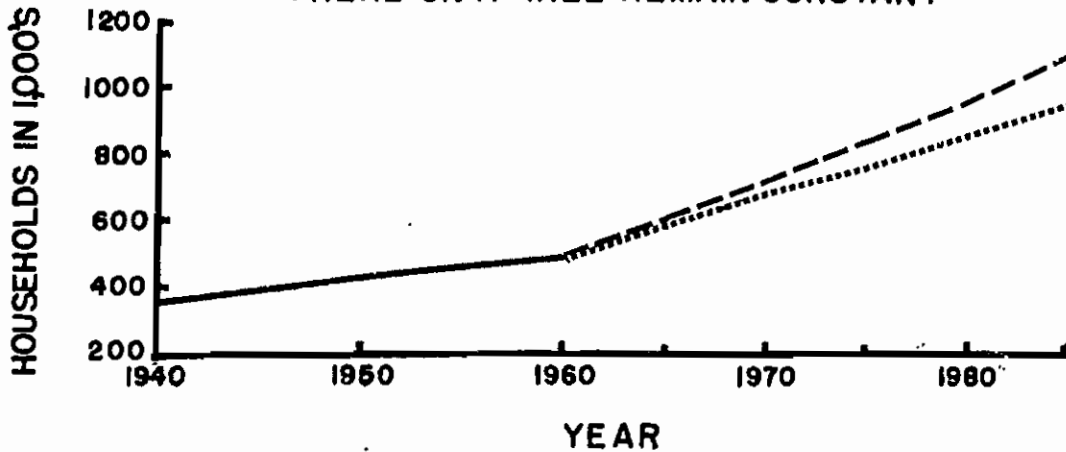


Figure 67

PROJECTIONS OF HOUSEHOLD NEEDS ON THE ASSUMPTION THAT THE POPULATION-HOUSEHOLD RATIO WILL DECLINE FROM 4.7 IN 1960 TO 4.3 IN 1970 AND FROM THERE ON IT WILL REMAIN CONSTANT



SELECTED BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

- Abbad y La Sierra, Iñigo. Historia Geográfica, Civil y Natural de la Isla de Puerto Rico. Puerto Rico, 1866.
- Allen, Charles H. First Annual Report of the Governor of Puerto Rico. Washington, 1901.
- Bancroft, Gertrude. The American Labor Force. New York, 1958.
- Bartlett, F. P., and Howell, B. Puerto Rico y Su Problema Poblacional. Puerto Rico Planning Board, 1944.
- Bogue, Donald J. The Population of the United States. Glencoe, Ill., 1959.
- Brau, Salvador. La Colonización de Puerto Rico. Puerto Rico, 1930.
- \_\_\_\_\_. Historia de Puerto Rico. New York, 1904.
- Brown, Harold W., and East, Bion R. A Study of Puerto Rico's Physician and Dental Needs. January, 1955.
- Coale, Ansley J. "The Effect of Changes in Mortality and Fertility on Age Composition," The Milbank Memorial Fund Quarterly, Vol. XXXIV, No. 1 (1956).
- Coll y Toste, Cayetano. Reseña del Estado Social, Económico e Industrial de la Isla de Puerto Rico. Puerto Rico, 1899.
- Combs, Jerry W. "Human Fertility in Puerto Rico." Unpublished Ph. D. dissertation, Columbia University, 1954.
- Combs, Jerry W., and Davis, Kingsley. "The Pattern of Puerto Rican Fertility," Population Studies, Vol. IV, No. 4 (December, 1950)
- Committee on Human Resources, Commonwealth of Puerto Rico. Puerto Rico's Manpower Needs and Supply. November, 1957.
- Department of Health of Puerto Rico. Report of the Commissioner of Health of Puerto Rico (1902-03 to 1959).
- Department of Health of Puerto Rico, Bureau of Demographic Registry and Vital Statistics. Annual Report on Vital Statistics, 1960.

- Department of Health of Puerto Rico. Maternal, Infant and Childhood Mortality in Puerto Rico. Puerto Rico, 1955.
- Department of Labor of Puerto Rico, Bureau of Labor Statistics. Special Report on the Labor Force, No. 24.
- Department of Labor of Puerto Rico. Special Report on Migration, 1961-B.
- Flinter, George D. An Account of the Present State of the Island of Puerto Rico. London, 1834.
- Francis, Roy G. The Predictive Process. The Social Science Research Center, University of Puerto Rico, 1960.
- Goode, William J. "Illegitimacy in the Caribbean Social Structure," American Sociological Review, Vol. XXV, No. 1 (February, 1960).
- Hatt, Paul K. Backgrounds in Human Fertility in Puerto Rico. Princeton, 1952.
- Houser, Philip M. Population Perspectives. New Jersey, 1960.
- Hawley, Amos H. Human Ecology. New York, 1950.
- Hill, Reuben, Stycos, Mayone, and Back, Kurt W. The Family and Population Control. Chapel Hill, N. C., 1959.
- Jaffe, A. J. People, Jobs and Economic Development. Glencoe, Ill., 1959.
- \_\_\_\_\_. "Demographic and Labor Force Characteristics of the New York Puerto Rican Population" (Bureau of Applied Social Research, Columbia University, 1954). (Mimeographed.)
- Janer, José L. "Population Growth in Puerto Rico and its Relation to Time Changes in Vital Statistics," Human Biology, Vol. 17, No. 4 (December, 1949).
- Janer, José L., Vázquez, José L., and Morales, Nidia R. "Puerto Rico's Demographic Situation" (Revision of a Paper Read in the Annual Meeting of the Southern Branch of the American Sociologist Society, April, 1962).
- Jones, Joseph Marion. Does Overpopulation Mean Poverty? Washington, 1962.
- Junta de Planificación de Puerto Rico, Informe Económico del Gobernador, 1959.
- Junta de Planificación, Informe del Gobernador, Segunda Parte, Panorama Económico de la Década, 1960-70.
- Perloff, Harvey S. The Economic Future of Puerto Rico. Chicago, 1948.

- Puerto Rico Planning Board. Puerto Rico Statistical Yearbook: Historical Statistics.
- Puerto Rico Planning Board, Monthly Reports on Passenger Traffic (several).
- Puerto Rico Planning Board. Selected Indexes of Social and Economic Progress: Fiscal Years 1939-40 to 1959-60.
- Roberts, George W. The Population of Jamaica. London, 1957.
- Roberts, Lydia, and Stefani, Rosa L. Patterns of Living in Puerto Rican Families. Rio Piedras, 1949.
- Sauvy, Alfred. Fertility and Survival. London, 1961.
- School of Public Health and Administrative Medicine, Colombia University and the Department of Health of Puerto Rico, Medical and Hospital Care in Puerto Rico (1962).
- Stahl, Agustín. Estudio Demográfico: Estadísticas de Mortalidad y Nacimientos en Bayamón y Pueblos Limitrofes. Puerto Rico, 1895.
- United Nations. Age and Sex Patterns of Mortality. Population Studies, No. 22.
- United Nations. Demographic Yearbook, 1959.
- United Nations. Methods of Population Projections by Age and Sex. Population Studies, No. 25.
- United States Bureau of the Census. Thirteenth Census of the United States (1910), Statistics for Puerto Rico.
- United States Bureau of the Census. Fourteenth Census of the United States (1920), Population: Puerto Rico.
- United States Bureau of the Census. Fifteenth Census of the United States (1930), Outlying Territories and Possessions.
- United States Bureau of the Census. 16th Census of the United States (1940): Puerto Rico.
- United States Bureau of the Census. 1950 United States Census of Population, Bulletins P-A53, P-B53, P-C53 and H-A53.
- United States Bureau of the Census. United States Census of Population: 1960, Final Reports PC(1)-53A, PC(1)-53B, PC(1)-53C and PC(1)-53D.
- United States Bureau of the Census. Population Series P-20, No. 10.
- United States Bureau of the Census. 1950 U. S. Census of Population, Series PC-14, No. 21.

United States War Department. Report on the Census of Puerto Rico, 1899. Washington, 1900.

Van Middeldyk, R. A. The History of Puerto Rico. New York, 1903.

Vazquez, Jose L. "Mortality Changes in a Society in Rapid Transition: Puerto Rico, a Case Study." Unpublished Master's thesis, University of Chicago, 1961.

Vogt, William. People. William Sloane Associated, 1960.

Weiner, Louis. "Vital Statistics in New York's City's Puerto Rican Population." Bureau of Applied Social Research, Columbia University, 1954. (Mimeographed.)



APPENDIX I

METHODS OF POPULATION ESTIMATION FOR  
THE PRECENSAL PERIOD (1500-1765)

APPENDIX I

METHODS OF POPULATION ESTIMATION FOR  
THE PRECENSAL PERIOD (1500-1765)

I. Estimates of the Slave Population

A. Year 1553--According to the 1530 population count 1,523 Negro slaves were enumerated. From 1530 to 1553, Negroes were legally introduced in the Island as follows:

1536 . . . . .	200
1540 . . . . .	300
1550 . . . . .	250
1551 . . . . .	150
1553 . . . . .	400

Total . . . . .	<u>1,300</u>
-----------------	--------------

Assuming that mortality and natality were nearly in balance and allowing for those illegally introduced, we arrive at a probable figure of 3,000 slaves in 1553.

B. Year 1673--In a population enumeration (count of adult church attendants) for the city of San Juan, the following slave figures were gathered:

Males . . . . .	222
Females . . . . .	445

Total . . . . .	<u>667</u>
-----------------	------------

There is clear disagreement between the recorded sex ratio and reports by historians; namely, that Negro slaves were introduced in a proportion of 2 males per each female. Perhaps the reasons for this discrepancy are: first, that females attend church more regularly than males; and second, that male slaves were used in farms far from the city.

Thus, assuming two males for each female, we have a total adult slave population in the city of San Juan of 1,335 (445 x 3) persons.

If we assume, somewhat arbitrarily, a figure of 0.8 children per each adult (according to the 1765 census in the free population there was one child per each adult), we estimate the total slave population in the city of San Juan at some 2,400.

Now, if the proportion between the total population of the Island and that for San Juan as of 1646 held for 1763 (100 to 54), the total slave population in the Island would have been 4,500.

Although we have assumed too many factors here, and the validity of this estimate may appear dubious, the 1765 census count tends to support it. In 1765 only 5,000 slaves were enumerated.

## II. Estimates of the Free Population

- A. Year 1510--Salvador Brau reported "that the European population in all the Island did not exceed, in 1510, the 300 figure."<sup>1</sup>
- B. Year 1515--According to Velaquez there were 35 "vecinos" at San Juan and 35 at San Germán (the only established settlements).

As used during this epoch, a "vecino" is roughly equivalent to a family head. Assuming a family size of 5, we estimate the total free population as some 350 persons (70 x 5).<sup>2</sup>

- C. Year 1530--A population count of adult males made in 1530 shows the following:

Married to White Females. . .	54
Married to Indian Females . .	14
Single. . . . .	298

Thus we have 54 white families or approximately 270 white persons (54 x 5). Adding the 14 white males married to Indians and the 298 single males, we have a total white population of approximately 600 persons (582).

- D. Year 1548--According to some historical sources, 130, "vecinos" were living at San Juan and 20 at San Germán.

Assuming the 5 to 1 ratio of persons per "vecino," we arrive at a probable population total of 750 persons.<sup>3</sup>

---

<sup>1</sup>Brau, La Colonización de Puerto Rico.

<sup>2</sup>See Colley Toste, p. 26.

<sup>3</sup>Ibid.

E. Year 1580--From Coll y Toste we know that some 250 "vecinos" were living in the Island. From this we estimate, as above, the total population as some 1,250 persons.<sup>1</sup>

F. Year 1646--According to several sources, the following number of "vecinos" were living in the four established settlements:

In San Juan, . . . . .	500
In San Germán. . . . .	200
In Coamo . . . . .	80
In Arecibo . . . . .	100

and several others scattered through the Island for an approximate total of 900 "vecinos." Thus, the total population is estimated at 4,500 inhabitants (900 x 5).<sup>2</sup>

G. Year 1673--A church count as of 1673 for the city of San Juan shows the following figures:

	<u>Males</u>	<u>Females</u>
Whites . . . . .	277	543
Free Colored . . . . .	88	216
Total. . . . .	365	759

This count only included adult church attendants.

Assuming that the female count was correct we should expect a total of 1,518 adult persons (759 x 2), as sexes should have been in balance (at least we cannot expect great discrepancies). If the relationship between children and adults recorded in 1765 was true in 1673, then we have an estimated total of free persons of 3,036 (one child per each adult).

In 1646, San Juan had 54 per cent of the total population of the Island. Assuming this to be true in 1673, then we estimate a total of 6,000 free persons in the Island.<sup>3</sup>

---

<sup>1</sup>Ibid.

<sup>2</sup>Ibid.

<sup>3</sup>Brau, Historia de Puerto Rico, p. 155.

APPENDIX II

ESTIMATION OF THE CRUDE BIRTH RATE  
AND ESTIMATION OF UNDERREGISTRATION OF BIRTHS

APPENDIX II

ESTIMATION OF THE CRUDE BIRTH RATE AND  
ESTIMATION OF UNDERREGISTRATION OF BIRTHS

I. Estimation of the Crude Birth Rate for the following periods:  
1755-1765, 1850-1854, and 1877-1881

A. Period of 1755-1765

TABLE 143

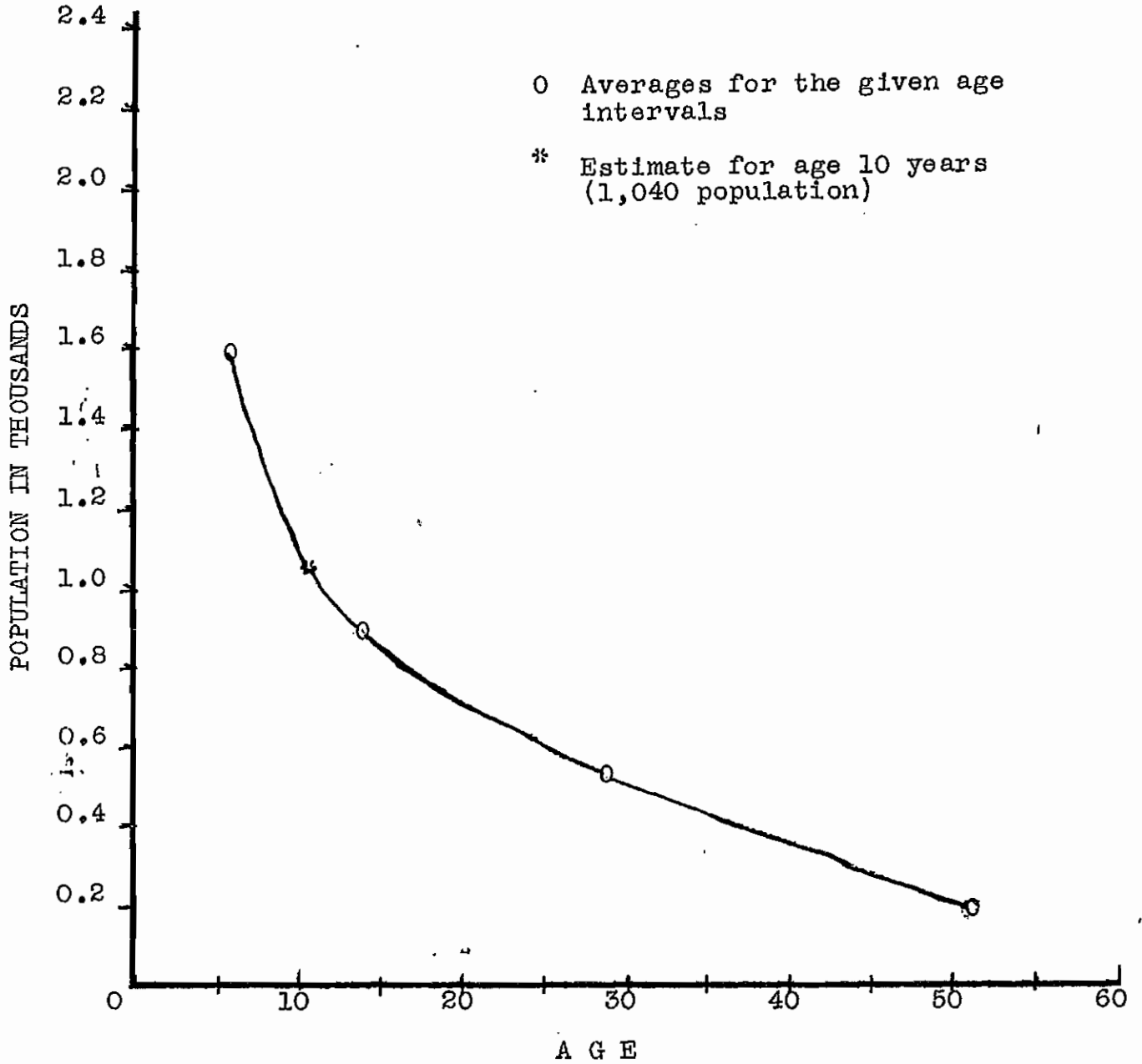
ENUMERATED FREE<sup>a</sup> POPULATION BY AGE AND SEX (1765)

Age Groups	Males	Females	Both Sexes
0-10	9,242	8,139	17,381
11-15	2,060	2,335	4,395
16-40	6,521	6,613	13,134
41-60	1,800	1,944	3,744
61 & over	587	605	1,192
<u>All Ages</u>	20,210	19,636	39,846

<sup>a</sup>Five thousand and thirty-seven slaves whose age and sex distribution is unknown are excluded.

We assume that the population 0-9 years old were survivors to births occurring during the period of 1755 to 1765. Thus, the number of births occurring during this period are estimated by applying to the estimated 0-9 years of age population the corresponding survival factor.

THE POPULATION OF PUERTO RICO BY  
BROAD AGE GROUPS; 1765



Population 0-9 years = Population 0-10 years  
 enumerated in the 1765 census--an estimate of the  
 population 10 years old.

Population 0-10 (census). . . . .	17,381
Population 10 years (estimated from Fig. 68). . . . .	1,040
Estimated population 0-9 years. . .	16,341

The survival factor for births occurring during a  
 ten-year period to age 0-9 according to the 1894  
 Life Table (Table 144) is:

$$S = \frac{{}_{10}L_0}{1,000,000}$$

$$S = 0.6822$$

The estimated number of births is then:

$$B = \frac{{}_{10}P_0}{S} = 23,953$$

And the annual average = 2,395

Estimate of the Mid-term Population--We assume that the  
 10 years of age and over population enumerated in the  
 1765 census were survivors of the total population as of  
 1755.

To estimate the 1755 total population we compute the  
 proper survival factor from the 1894 Life Table:

$$S = \frac{{}_{00}L_{10}}{{}_{00}L_0} = .7758$$

$${}_{00}P_0^{1755} = \frac{{}_{00}P_{10}^{1765}}{S} = 30,298$$

The average population for the period is obtained by  
 arithmetic interpolation between the 1755 estimated  
 population and the 1765 enumerated population.

$$p^{1755-1765} = 35,072$$

The estimated crude birth rate is then

$$BR = \frac{2,395}{35,072} = 68$$



TABLE 144

## ABRIDGED LIFE TABLE FOR BOTH SEXES (1894)

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.242504	100,000	24,250	82,443	3,042,952	30.43
1- 5	.129764	75,750	9,830	276,477	2,960,509	39.08
5-10	.034364	65,920	2,265	323,244	2,684,032	40.72
10-15	.034505	63,655	2,196	313,317	2,360,788	37.09
15-20	.078376	61,459	4,817	295,926	2,047,471	33.31
20-25	.095893	56,642	5,432	269,597	1,751,545	30.92
25-30	.090996	51,210	4,660	244,223	1,481,948	28.94
30-35	.098349	46,550	4,578	221,222	1,237,725	26.59
35-40	.101584	41,972	4,264	199,065	1,016,503	24.22
40-45	.104282	37,708	3,932	178,711	817,438	21.68
45-50	.126311	33,776	4,266	158,420	638,727	18.91
50-55	.166606	29,510	4,917	135,389	480,307	16.28
55-60	.199057	24,593	4,895	110,755	344,918	14.03
60-65	.256335	19,698	5,049	85,782	234,163	11.89
65-70	.306330	14,649	4,487	61,768	148,381	10.13
70-75	.374273	10,162	3,803	40,959	86,613	8.52
75-80	.446609	6,359	2,840	24,284	45,654	7.18
80-85	.519653	3,519	1,829	12,638	21,370	6.07
85-90	.586771	1,690	992	5,683	8,732	5.17
90-95	.645757	698	451	2,287	3,049	4.37
95-100	.699127	247	173	762	762	3.09
100-105	1.000000	74	74	.....	.....	.....

B. Period of 1850 to 1854

TABLE 145  
 ENUMERATED POPULATION BY AGE AND SEX  
 AS OF DECEMBER 25 AND 26, 1860

Age Groups	Males	Females	Both Sexes
Under 1 year	8,529	8,304	16,833
1- 5	48,805	44,605	93,410
6-10	46,587	42,351	88,938
11-15	35,103	30,980	66,083
16-20	27,362	34,148	61,510
21-25	27,466	30,197	57,663
26-30	27,647	29,832	57,479
31-40	34,628	30,286	64,914
41-50	18,081	17,402	35,483
51-60	12,023	10,717	22,740
61-70	7,022	4,666	11,688
71 & over	3,164	3,276	6,440
<u>All Ages</u>	296,417	286,764	583,181

We assumed that the population 6-10 years old in December, 1860 were survivors to births occurring during the calendar years 1850 to 1854.

The survival factor for births occurring during a year period to age 6-10 years is equal to:

$$S = \frac{{}_5L_6}{500,000}$$

From the 1894 Abridged Life Table values for  $L_5$  and  $L_{10}$  were interpolated using the Sprague Multipliers as:

$${}_5L_6 = {}_5L_5 - L_5 + L_{10}$$

$${}_5L_6 = 321,785$$

Then:  $S = 0.6436$

The estimated number of births occurring during the period 1850-1854 is then:

$$B = \frac{{}_5P_6^{1860}}{S}$$

$$B = 138,188$$

and the annual average - 27,638

The midterm population was obtained by arithmetic interpolation between the 1846 census (exact date unknown and assumed to be the same as that for 1860), and at the 1860 one. Total population in 1846 was 447,914 (see Table 3), and the 1860 one was 583,308. Thus the estimated midterm population for the period of 1850-1854 (as of July 1, 1852) is 501,105.

The estimated crude birth rate is then

$$BR = \frac{27,638}{501,105} = 55.2$$

C. Period of 1877-1881

TABLE 146

ENUMERATED POPULATION BY AGE AND SEX  
AS OF DECEMBER 31, 1887

Age Groups	Males	Females	Both Sexes
Under 1	11,273	10,833	22,106
1- 5	68,095	65,160	133,255
6-10	64,957	61,902	126,859
11-15	48,979	45,489	94,468
16-20	39,083	46,975	86,058
21-25	37,182	38,753	75,935
26-30	34,256	38,685	72,941
31-40	42,048	42,710	84,758
41-50	26,638	26,262	52,900
51-60	20,772	15,430	36,202
61-70	7,614	6,318	13,932
71 & over	3,390	3,904	7,294
<u>All Ages</u>	404,287	402,421	806,708

In the estimation of the number of births we followed the same steps as for the period 1850-1854.

The resulting number was 197,108 and the annual average 39,422.

The midterm population was obtained by arithmetic interpolation between the 1877 and 1887 censuses (see Table 3).

The resulting population was 741,686.

The estimated crude birth rate is then:

$$BR = \frac{39,422}{741,686} = 53.2$$

II. Estimation of Underregistration of Births for the Periods of 1889-1893, 1900-1904, 1910-1914, 1920-1924, and 1930-1934

A. In all these cases the procedure used was to survive (backward) the population 5-9 years of age as enumerated in the censuses to obtain an estimate of the number of births occurring during a five-year period, five to ten years prior to the census. When compared with the number of registered births we obtain an estimate of the percentage of underregistration of births.

B. The mathematical computations are presented below:

Survival factors from birth to ages 0-4 and 5-9 computed from corresponding abridged life tables as follows:

$$0-5^{S_B} = \frac{5L_0}{500,000}$$

$$5-10^{S_{0-5}} = \frac{5L_5}{5L_0}$$

$$5-10^{S_B} = 0-5^{S_B} \times 5-10^{S_{0-5}}$$

TABLE 147

SURVIVAL FACTORS

Period or Year	Birth to Age 0-4	Age 0-4 to Age 5-9
1894	.7178	.9007
1902-1903	.7534	.8896
1909-1911	.7820	.9087
1919-1921	.7998	.9109
1929-1931	.8151	.9160
1939-1941	.8398	.9278

TABLE 148  
 QUINQUENNIAL ESTIMATES OBTAINED BY  
 ARITHMETIC INTERPOLATIONS

Period	Birth to Age 0-4	Age 0-4 to Age 5-9
1900-1905	.7534	.8896
1905-1910	.7725	.9023
1910-1915	.7864	.9092
1915-1920	.7953	.9104
1920-1925	.8036	.9122
1925-1930	.8112	.9147
1930-1935	.8213	.9190
1935-1940	.8337	.9248

TABLE 149  
 SURVIVAL FACTORS FOR BIRTHS OCCURRING DURING A  
 GIVEN 5-YEAR TIME INTERVAL TO AGE 5-9

Birth Time Interval	Survival Factor <sup>a</sup>
1900-1905 . . . . .	.6798
1910-1915 . . . . .	.7159
1920-1925 . . . . .	.7350
1930-1935 . . . . .	.7595

<sup>a</sup>Obtained by multiplying the appropriate survival factor from birth to age 0-4 by the appropriate survival factor from age 0-4 to age 5-9.

Example: The survival factor for births occurring during the period of 1900-1905 to age 5-9 in the 1910 census date (.6798) is the product of the average survival factor from birth to age 0-4 for the period of 1900-1905 (.7534) and of the average survival factor from age 0-4 to age 5-9 for the period of 1905-1910 (.9023).

Estimation of the expected number of births and the percentage of underregistration for several periods.

APPENDIX III

ABRIDGED LIFE TABLES FOR PUERTO RICO

TABLE 150

ABRIDGED LIFE TABLE FOR BOTH SEXES: 1902-1903<sup>a</sup>

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000= 100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left At Beginning of Interval $e^o_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.203831	100,000	20,383	85,243	3,035,595	30.36
1- 5	.125142	79,617	9,963	291,444	2,950,353	37.06
5-10	.068070	69,654	4,741	335,089	2,658,908	38.17
10-15	.045923	64,913	2,981	317,130	2,323,819	35.80
15-20	.077858	61,932	4,822	298,191	2,006,689	32.40
20-25	.101521	57,110	5,798	271,195	1,708,498	29.92
25-30	.107028	51,312	5,492	242,656	1,437,303	28.01
30-35	.108312	45,820	4,963	216,496	1,194,647	26.07
35-40	.111339	40,857	4,549	192,817	978,151	23.94
40-45	.124024	36,308	4,503	170,256	785,334	21.63
45-50	.139015	31,805	4,421	148,002	615,078	19.34
50-55	.169700	27,384	4,647	125,302	467,076	17.06
55-60	.194209	22,737	4,416	102,560	341,774	15.03
60-65	.231466	18,321	4,241	80,899	239,214	13.06
65-70	.278244	14,080	3,918	60,410	158,315	11.24
70-75	.325252	10,162	3,305	42,281	97,905	9.63
75-80	.385138	6,857	2,641	27,411	55,624	8.11
80-85	.474933	4,216	2,002	15,775	28,213	6.69
85-90	.524004	2,214	1,200	7,785	12,438	5.62
90-95	.623627	1,014	632	3,141	4,653	4.59
95-100	.692362	382	264	1,095	1,512	3.96
100-105	1.000000	118	118	417	417	3.53

<sup>a</sup>The Abridged Life Table for Both Sexes for the year 1894 is on p. 342 above.

TABLE 151

## ABRIDGED LIFE TABLE FOR MALES: 1902-1903

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e^o_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.213473	100,000	21,347	84,545	2,982,031	29.82
1- 5	.124381	78,653	9,783	288,121	2,897,486	36.84
5-10	.071114	68,870	4,898	330,733	2,609,365	37.89
10-14	.048952	63,972	3,132	311,912	2,278,632	35.62
15-20	.071231	60,840	4,334	293,895	1,966,720	32.33
20-25	.100387	56,506	5,672	268,528	1,672,825	29.60
25-30	.102127	50,854	5,192	240,957	1,404,297	27.63
30-35	.099681	45,642	4,550	216,666	1,163,340	25.49
35-40	.106672	41,092	4,383	194,512	946,674	23.04
40-45	.125165	36,709	4,595	172,136	752,162	20.49
45-50	.148209	32,114	4,760	148,788	580,026	18.06
50-55	.188651	27,354	5,160	123,876	431,238	15.77
55-60	.215832	22,194	4,790	98,863	307,362	13.85
60-65	.260177	17,404	4,528	75,526	208,499	11.98
65-70	.307181	12,876	3,955	54,219	132,973	10.33
70-75	.360411	8,921	3,215	36,241	78,754	8.83
75-80	.418729	5,706	2,389	22,246	42,513	7.45
80-85	.517259	3,317	1,716	11,988	20,267	6.11
85-90	.574290	1,601	919	5,446	8,279	5.17
90-95	.670768	682	457	2,042	2,833	4.15
95-100	.744238	225	167	614	791	3.52
100-105	1.000000	58	58	177	177	3.05



TABLE 152

## ABRIDGED LIFE TABLE FOR FEMALES: 1902-1903

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 - 100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.193654	100,000	19,365	85,980	3,099,761	31.00
1- 5	.125927	80,635	10,154	294,950	3,013,781	37.38
5-10	.064923	70,481	4,576	339,682	2,718,831	38.58
10-15	.042618	65,905	2,809	322,641	2,379,149	36.10
15-20	.083044	63,096	5,240	303,031	2,056,508	32.59
20-25	.102557	57,856	5,934	274,558	1,753,477	30.31
25-30	.111424	51,922	5,785	245,033	1,478,919	28.48
30-35	.116608	46,137	5,380	217,015	1,233,886	26.74
35-40	.116112	40,757	4,732	191,756	1,016,871	24.95
40-45	.122870	36,025	4,426	168,926	825,115	22.90
45-50	.129342	31,599	4,087	147,719	656,189	20.77
50-55	.150711	27,512	4,146	127,170	508,470	18.48
55-60	.169788	23,366	3,967	106,881	381,300	16.32
60-65	.205823	19,399	3,993	86,979	274,419	14.15
65-70	.247263	15,406	3,809	67,395	187,440	12.17
70-75	.297379	11,597	3,449	49,168	120,045	10.35
75-80	.353394	8,148	2,879	33,314	70,877	8.70
80-85	.446336	5,269	2,352	20,179	37,563	7.13
85-90	.516777	2,917	1,507	10,502	17,384	5.96
90-95	.593799	1,410	837	4,443	6,882	4.88
95-100	.658471	573	377	1,689	2,439	4.26
100-105	1.000000	196	196	750	750	3.83

TABLE 153

## ABRIDGED LIFE TABLE FOR BOTH SEXES: 1909-1911

Age Interval $x-(x+n)$	Proportion Dying During Interval ( $1.000000 = 100\%$ ) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.173087	100,000	17,309	87,468	3,816,745	38.17
1- 5	.121057	82,691	10,010	303,505	3,729,277	45.10
5-10	.040085	72,681	2,913	355,280	3,425,772	47.13
10-15	.024836	69,768	1,733	344,476	3,070,492	44.01
15-20	.040561	68,035	2,760	333,748	2,726,016	40.07
20-25	.061354	65,275	4,005	316,676	2,392,268	36.65
25-30	.069599	61,270	4,264	295,695	2,075,592	33.88
30-35	.070693	57,006	4,030	274,889	1,779,897	31.22
35-40	.074527	52,976	3,948	255,005	1,505,008	28.41
40-45	.081744	49,028	4,008	235,190	1,250,003	25.50
45-50	.095059	45,020	4,280	214,534	1,014,813	22.54
50-55	.114175	40,740	4,651	192,206	800,279	19.64
55-60	.136468	36,089	4,925	168,239	608,073	16.85
60-65	.165630	31,164	5,162	143,147	439,834	14.11
65-70	.232205	26,002	6,038	115,232	296,687	11.41
70-75	.334676	19,964	6,681	83,044	181,455	9.09
75-80	.428233	13,283	5,688	51,604	98,411	7.41
80-85	.506069	7,595	3,844	27,640	46,807	6.16
85-90	.588627	3,751	2,208	12,646	19,167	5.11
90-95	.657689	1,543	1,015	4,679	6,521	4.23
95-100	.737142	528	389	1,453	1,842	3.49
100-105	1.000000	139	139	389	389	2.80

TABLE 154

## ABRIDGED LIFE TABLE FOR MALES: 1909-1911

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000=100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $^o_e_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.180396	100,000	18,040	86,939	3,772,210	37.72
1- 5	.120023	81,960	9,837	301,087	3,685,271	44.96
5-10	.041306	72,123	2,979	352,306	3,384,184	46.92
10-15	.026113	69,144	1,806	341,096	3,031,878	43.85
15-20	.036451	67,338	2,455	330,983	2,690,782	39.96
20-25	.059683	64,883	3,872	315,052	2,359,799	36.37
25-30	.065205	61,011	3,978	295,062	2,044,747	33.51
30-35	.063899	57,033	3,644	276,007	1,749,685	30.68
35-40	.070127	53,389	3,744	257,666	1,473,678	27.60
40-45	.081262	49,645	4,034	238,309	1,216,012	24.49
45-50	.099908	45,611	4,557	216,894	977,703	21.44
50-55	.125289	41,054	5,144	192,596	760,809	18.53
55-60	.151825	35,910	5,452	166,023	568,213	15.82
60-65	.184989	30,458	5,634	138,394	402,190	13.20
65-70	.256320	24,824	6,363	108,453	263,796	10.63
70-75	.367588	18,461	6,786	75,134	155,343	8.41
75-80	.460508	11,675	5,376	44,231	80,209	6.87
80-85	.540487	6,299	3,405	22,235	35,978	5.71
85-90	.617350	2,894	1,787	9,453	13,745	4.75
90-95	.694165	1,107	768	3,236	4,290	3.88
95-100	.786347	339	267	874	1,054	3.11
100-105	1.000000	72	72	180	180	2.50

TABLE 155

## ABRIDGED LIFE TABLE FOR FEMALES: 1909-1911

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.165371	100,000	16,537	88,027	3,864,025	38.64
1-5	.122132	83,463	10,194	306,055	3,775,998	45.24
5-10	.038832	73,269	2,845	358,410	3,469,943	47.36
10-15	.023470	70,424	1,653	348,028	3,111,533	44.18
15-20	.044185	68,771	3,039	336,775	2,763,505	40.18
20-25	.062973	65,732	4,139	318,626	2,426,730	36.92
25-30	.073736	61,593	4,542	296,669	2,108,104	34.23
30-35	.077477	57,051	4,420	274,129	1,811,435	31.75
35-40	.079409	52,631	4,179	252,617	1,537,306	29.21
40-45	.082233	48,452	3,984	232,262	1,284,689	26.51
45-50	.089941	44,468	3,999	212,378	1,052,427	23.67
50-55	.102639	40,469	4,154	192,045	840,049	20.76
55-60	.121298	36,315	4,405	170,681	648,004	17.84
60-65	.148019	31,910	4,723	148,015	477,323	14.96
65-70	.210211	27,187	5,715	122,047	329,308	12.11
70-75	.309144	21,472	6,638	90,814	207,261	9.65
75-80	.401280	14,834	5,953	58,797	116,447	7.85
80-85	.482388	8,881	4,284	32,998	57,650	6.49
85-90	.567130	4,597	2,607	15,840	24,652	5.36
90-95	.637966	1,990	1,270	6,141	8,812	4.43
95-100	.709204	720	511	2,048	2,671	3.71
100-105	1.000000	209	209	623	623	2.98

TABLE 156

ABRIDGED LIFE TABLE FOR BOTH SEXES: 1919-1921

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000=100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.151693	100,000	15,169	89,018	3,846,093	38.46
1-5	.122647	84,831	10,404	310,896	3,757,075	44.29
5-10	.037765	74,427	2,811	364,297	3,446,179	46.30
10-15	.023965	71,616	1,716	353,856	3,081,882	43.03
15-20	.044726	69,900	3,126	342,285	2,728,026	39.03
20-25	.068850	66,774	4,597	322,748	2,385,741	35.73
25-30	.078867	62,177	4,904	298,619	2,062,993	33.18
30-35	.079756	57,273	4,568	274,835	1,764,374	30.81
35-40	.083044	52,705	4,377	252,483	1,489,539	28.26
40-45	.084663	48,328	4,092	231,373	1,237,056	25.60
45-50	.094894	44,236	4,198	210,874	1,005,683	22.73
50-55	.124895	40,038	5,001	187,884	794,809	19.85
55-60	.146615	35,037	5,137	162,399	606,925	17.32
60-65	.176463	29,900	5,276	136,347	444,526	14.87
65-70	.215713	24,624	5,312	109,916	308,179	12.52
70-75	.292254	19,312	5,644	82,368	198,263	10.27
75-80	.359553	13,668	4,914	55,689	115,895	8.48
80-85	.444109	8,754	3,888	33,582	60,206	6.88
85-90	.548387	4,866	2,668	17,147	26,624	5.47
90-95	.649337	2,198	1,427	6,797	9,477	4.31
95-100	.746347	771	575	2,116	2,680	3.48
100-105	1.000000	196	196	564	564	2.88

TABLE 157

## ABRIDGED LIFE TABLE FOR MALES: 1919-1921

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000= 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.157849	100,000	15,785	88,572	3,818,195	38.18
1- 5	.121616	84,215	10,242	308,903	3,729,623	44.29
5-10	.038799	73,973	2,870	361,863	3,420,720	46.24
10-15	.025148	71,103	1,788	351,026	3,058,857	43.02
15-20	.040109	69,315	2,780	340,178	2,707,831	39.07
20-25	.066737	66,535	4,440	321,946	2,367,653	35.59
25-30	.073457	62,095	4,561	299,007	2,045,707	32.94
30-35	.071750	57,534	4,128	277,265	1,746,700	30.36
35-40	.077769	53,406	4,153	256,650	1,469,435	27.51
40-45	.084045	49,253	4,139	235,983	1,212,785	24.62
45-50	.099058	45,114	4,469	214,688	976,802	21.65
50-55	.136054	40,645	5,530	189,646	762,114	18.75
55-60	.160945	35,115	5,652	161,490	572,468	16.30
60-65	.194989	29,463	5,745	132,946	410,978	13.95
65-70	.237097	23,718	5,623	104,542	278,032	11.72
70-75	.319919	18,095	5,789	75,822	173,490	9.59
75-80	.386427	12,306	4,755	49,184	97,668	7.94
80-85	.475132	7,551	3,588	28,271	48,484	6.42
85-90	.577307	3,963	2,288	13,587	20,213	5.10
90-95	.687778	1,675	1,152	5,004	6,626	3.96
95-100	.794223	523	415	1,346	1,622	3.10
100-105	1.000000	108	108	276	276	2.56

TABLE 158

## ABRIDGED LIFE TABLE FOR FEMALES: 1919-1921

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e^o_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.145177	100,000	14,518	89,489	3,885,482	38.85
1- 5	.123684	85,482	10,573	313,008	3,795,993	44.41
5-10	.036698	74,909	2,749	366,880	3,482,985	46.50
10-15	.022736	72,160	1,641	356,843	3,116,105	43.18
15-20	.048914	70,519	3,449	344,620	2,759,262	39.13
20-25	.070824	67,070	4,750	323,840	2,414,642	36.00
25-30	.083455	62,320	5,201	298,645	2,090,802	33.55
30-35	.087154	57,119	4,978	273,025	1,792,157	31.38
35-40	.088261	52,141	4,602	249,008	1,519,132	29.14
40-45	.085304	47,539	4,055	227,410	1,270,124	26.72
45-50	.089505	43,484	3,892	207,772	1,042,714	23.98
50-55	.112393	39,592	4,450	186,973	834,942	21.09
55-60	.129628	35,142	4,555	164,396	647,969	18.44
60-65	.156946	30,587	4,801	141,027	483,573	15.81
65-70	.194308	25,786	5,010	116,567	342,546	13.28
70-75	.268466	20,776	5,578	89,954	225,979	10.88
75-80	.335605	15,198	5,101	62,959	136,025	8.95
80-85	.420223	10,097	4,243	39,457	73,066	7.24
85-90	.526105	5,854	3,080	21,048	33,609	5.74
90-95	.626050	2,774	1,737	8,748	12,561	4.53
95-100	.721133	1,037	748	2,932	3,813	3.68
100-105	1.000000	289	289	881	881	3.05

TABLE 159

## ABRIDGED LIFE TABLE FOR BOTH SEXES: 1929-1931

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $nq_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.137999	100,000	13,800	90,009	4,064,873	40.65
1-5	.115698	86,200	9,973	317,524	3,974,864	46.11
5-10	.036847	76,227	2,809	373,308	3,657,340	47.98
10-15	.017844	73,418	1,310	363,737	3,284,032	44.73
15-20	.033777	72,108	2,436	355,079	2,920,295	40.50
20-25	.062123	69,672	4,328	338,007	2,565,216	36.82
25-30	.071549	65,344	4,675	314,940	2,227,209	34.08
30-35	.064045	60,669	3,886	293,457	1,912,269	31.52
35-40	.067737	56,783	3,846	274,346	1,618,812	28.51
40-45	.077556	52,937	4,106	254,553	1,344,466	25.40
45-50	.091837	48,831	4,484	233,143	1,089,913	22.32
50-55	.113956	44,347	5,054	209,317	856,770	19.32
55-60	.140748	39,293	5,530	182,830	647,453	16.48
60-65	.176706	33,763	5,966	154,116	464,623	13.76
65-70	.236162	27,797	6,565	122,815	310,507	11.17
70-75	.335832	21,232	7,130	88,250	187,692	8.84
75-80	.436528	14,102	6,156	54,517	99,442	7.05
80-85	.533196	7,946	4,237	28,361	44,925	5.65
85-90	.654908	3,709	2,429	11,776	16,564	4.47
90-95	.695947	1,280	891	3,722	4,788	3.74
95-100	.827384	389	322	929	1,066	2.74
100-105	1.000000	67	67	137	137	2.04



TABLE 160

## ABRIDGED LIFE TABLE FOR MALES: 1929-1931

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $nq_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^0$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $nd_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.145150	100,000	14,515	89,491	4,006,626	40.07
1-5	.115749	85,485	9,895	314,906	3,917,135	45.82
5-10	.038248	75,590	2,891	369,895	3,602,229	47.65
10-15	.018907	72,699	1,375	359,910	3,232,334	44.46
15-20	.030570	71,324	2,180	351,760	2,872,424	40.27
20-25	.060887	69,144	4,210	335,654	2,520,664	36.46
25-30	.067502	64,934	4,383	313,572	2,185,010	33.65
30-35	.058347	60,551	3,533	293,771	1,871,438	30.91
35-40	.064139	57,018	3,657	276,077	1,577,667	27.67
40-45	.077843	53,361	4,154	256,651	1,301,590	24.39
45-50	.096912	49,207	4,769	234,408	1,044,939	21.24
50-55	.125307	44,438	5,568	208,535	810,531	18.24
55-60	.155495	38,870	6,044	179,424	601,996	15.49
60-65	.196529	32,826	6,451	148,180	422,572	12.87
65-70	.261469	26,375	6,896	114,784	274,392	10.40
70-75	.367898	19,479	7,166	79,248	159,608	8.19
75-80	.469556	12,313	5,782	46,395	80,360	6.53
80-85	.571682	6,531	3,734	22,516	33,965	5.20
85-90	.688198	2,797	1,925	8,530	11,449	4.09
90-95	.740348	872	646	2,379	2,919	5.35
95-100	.870866	226	197	489	540	2.39
100-105	1.000000	29	29	51	51	1.76

TABLE 161

## ABRIDGED LIFE TABLE FOR FEMALES: 1929-1931

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000= 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^0$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.130469	100,000	13,047	90,554	4,145,836	41.46
1- 5	.113647	86,953	9,882	320,764	4,055,282	46.64
5-10	.035413	77,071	2,729	377,751	3,734,518	48.46
10-15	.016747	74,342	1,245	368,587	3,356,767	45.15
15-20	.036640	73,097	2,678	359,460	2,988,180	40.88
20-25	.063354	70,419	4,461	341,418	2,628,720	37.33
25-30	.075221	65,958	4,961	317,339	2,287,302	34.68
30-35	.069366	60,997	4,231	294,217	1,969,963	32.30
35-40	.071221	56,766	4,043	273,689	1,675,746	29.52
40-45	.077245	52,723	4,073	253,462	1,402,057	26.59
45-50	.085973	48,650	4,183	232,884	1,148,595	23.61
50-55	.101475	44,467	4,512	211,205	915,711	20.59
55-60	.122772	39,955	4,905	187,707	704,506	17.63
60-65	.155302	35,050	5,443	161,920	516,799	14.74
65-70	.210775	29,607	6,240	132,783	354,879	11.99
70-75	.304346	23,367	7,112	99,123	222,096	9.50
75-80	.403996	16,255	6,567	64,388	122,973	7.57
80-85	.501582	9,688	4,859	35,556	58,585	6.05
85-90	.626989	4,829	3,028	15,813	23,029	4.77
90-95	.667639	1,801	1,202	5,438	7,216	4.01
95-100	.799604	599	479	1,511	1,778	2.97
100-105	1.000000	120	120	267	267	2.23

TABLE 162

ABRIDGED LIFE TABLE FOR BOTH SEXES: 1939-1941

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $nq_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^0$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $nd_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.115157	100,000	11,516	91,662	4,601,458	46.01
1- 5	.105919	88,484	9,372	328,255	4,509,796	50.97
5-10	.027040	79,112	2,139	389,592	4,181,541	52.86
10-15	.013577	76,973	1,045	382,180	3,791,949	49.26
15-20	.023597	75,928	1,792	375,594	3,409,769	44.91
20-25	.042195	74,136	3,128	363,237	3,034,175	40.93
25-30	.050719	71,008	3,601	346,139	2,670,938	37.61
30-35	.053667	67,407	3,618	328,011	2,324,799	34.49
35-40	.058006	63,789	3,700	309,707	1,996,788	31.30
40-45	.061179	60,089	3,676	291,371	1,687,081	28.08
45-50	.075421	56,413	4,255	271,637	1,395,710	24.74
50-55	.089743	52,158	4,681	249,337	1,124,073	21.55
55-60	.114835	47,477	5,452	224,056	874,736	18.42
60-65	.145833	42,025	6,129	195,146	650,680	15.48
65-70	.197848	35,896	7,102	162,095	455,534	12.69
70-75	.274481	28,794	7,903	124,364	293,439	10.19
75-80	.374736	20,891	7,829	84,526	169,075	8.09
80-85	.474011	13,062	6,192	49,027	84,549	6.47
85-90	.578775	6,870	3,976	23,524	35,522	5.17
90-95	.669421	2,894	1,937	8,736	11,998	4.15
95-100	.747436	957	715	2,618	3,262	3.41
100-105	1.000000	242	242	644	644	2.66

TABLE 163

## ABRIDGED LIFE TABLE FOR MALES: 1939-1941

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0-1	0.123452	100,000	12,345	91,062	4,506,573	45.07
1-5	.104615	87,655	9,170	325,529	4,415,511	50.37
5-10	.027352	78,485	2,147	386,433	4,089,982	52.11
10-15	.013419	76,338	1,024	379,026	3,703,549	48.52
15-20	.021884	75,314	1,648	372,866	3,324,523	44.14
20-25	.041027	73,666	3,022	361,152	2,951,657	40.07
25-30	.048937	70,644	3,457	344,670	2,590,505	36.67
30-35	.051595	67,187	3,467	327,323	2,245,835	33.43
35-40	.058413	63,720	3,722	309,359	1,918,512	30.11
40-45	.062968	59,998	3,778	290,725	1,609,153	26.82
45-50	.081498	56,220	4,582	269,901	1,318,428	23.45
50-55	.097007	51,638	5,009	245,979	1,048,527	20.31
55-60	.130315	46,629	6,076	218,320	802,548	17.21
60-65	.166749	40,553	6,762	186,177	584,228	14.41
65-70	.224843	33,791	7,598	150,225	398,051	11.78
70-75	.306658	26,193	8,032	110,826	247,826	9.46
75-80	.402973	18,161	7,318	71,984	137,000	7.54
80-85	.507857	10,843	5,507	39,603	65,016	6.00
85-90	.611258	5,336	3,262	17,687	25,413	4.76
90-95	.715664	2,074	1,484	5,955	7,726	3.73
95-100	.802875	590	474	1,492	1,771	3.00
100-105	1.000000	116	116	279	279	2.41

TABLE 164

## ABRIDGED LIFE TABLE FOR FEMALES: 1939-1941

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000=100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $o_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0-1	0.106491	100,000	10,649	92,290	4,710,928	47.11
1-5	.107266	89,351	9,584	331,103	4,618,638	51.69
5-10	.026713	79,767	2,131	392,891	4,287,535	53.75
10-15	.013740	77,636	1,067	385,471	3,894,644	50.17
15-20	.025202	76,569	1,930	378,472	3,509,173	45.83
20-25	.043344	74,639	3,235	365,485	3,130,701	41.94
25-30	.052414	71,404	3,743	347,775	2,765,216	38.73
30-35	.055791	67,661	3,775	328,854	2,417,441	35.73
35-40	.057603	63,886	3,680	310,188	2,088,587	32.69
40-45	.059320	60,206	3,571	292,146	1,778,399	29.54
45-50	.068673	56,635	3,889	273,601	1,486,253	26.24
50-55	.081262	52,746	4,286	253,171	1,212,652	22.99
55-60	.095652	48,460	4,635	230,951	959,481	19.80
60-65	.123927	43,825	5,431	205,952	728,530	16.62
65-70	.171344	38,394	6,579	176,006	522,578	13.61
70-75	.243583	31,815	7,750	140,078	346,572	10.89
75-80	.348882	24,065	8,396	99,184	206,494	8.58
80-85	.448340	15,669	7,025	60,032	107,310	6.85
85-90	.554403	8,644	4,792	30,291	47,278	5.47
90-95	.641839	3,852	2,472	11,902	16,987	4.41
95-100	.714667	1,380	986	3,918	5,085	3.68
100-105	1.000000	394	394	1,167	1,167	2.96

TABLE 165

ABRIDGED LIFE TABLE FOR BOTH SEXES: 1949-1951

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $nd_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.064600	100,000	6,460	95,323	6,085,302	60.85
1- 5	.040977	93,540	3,833	363,716	5,989,979	64.04
5-10	.010661	89,707	956	445,865	5,626,263	62.72
10-15	.005456	88,751	484	442,547	5,180,398	58.37
15-20	.010908	88,267	963	439,188	4,737,851	53.68
20-25	.019871	87,304	1,735	432,410	4,298,663	49.24
25-30	.023999	85,569	2,054	422,814	3,866,253	45.18
30-35	.026791	83,515	2,237	412,078	3,443,439	41.23
35-40	.030910	81,278	2,512	400,223	3,031,361	37.30
40-45	.035239	78,766	2,776	387,056	2,631,138	33.40
45-50	.043566	75,990	3,311	371,892	2,244,082	29.53
50-55	.052676	72,679	3,828	354,160	1,872,190	25.76
55-60	.071432	68,851	4,918	332,495	1,518,030	22.05
60-65	.100108	63,933	6,400	304,411	1,185,535	18.54
65-70	.147674	57,533	8,496	267,226	881,124	15.32
70-75	.208979	49,037	10,248	220,025	613,898	12.52
75-80	.275960	38,789	10,704	167,216	393,873	10.15
80-85	.370150	28,085	10,396	113,974	226,657	8.07
85-90	.479972	17,689	8,490	66,141	112,683	6.37
90-95	.567291	9,199	5,219	30,566	46,542	5.06
95-100	.673471	3,980	2,680	11,867	15,976	4.01
100-105	1.000000	1,300	1,300	4,109	4,109	3.16

TABLE 166

## ABRIDGED LIFE TABLE FOR MALES: 1949-1951

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.070467	100,000	7,047	94,898	5,944,758	59.45
1-5	.038889	92,953	3,615	361,995	5,849,860	62.93
5-10	.010745	89,338	960	444,007	5,487,865	61.43
10-15	.005525	88,378	488	440,657	5,043,858	57.07
15-20	.010206	87,890	897	437,476	4,603,201	52.37
20-25	.020478	86,993	1,781	430,776	4,165,725	47.89
25-30	.024812	85,212	2,114	420,889	3,734,959	43.83
30-35	.027991	83,098	2,326	409,764	3,314,070	39.88
35-40	.031453	80,772	2,541	397,627	2,904,306	35.96
40-45	.037099	78,231	2,902	384,093	2,506,679	32.04
45-50	.046028	75,329	3,467	368,257	2,122,586	28.18
50-55	.059032	71,862	4,242	349,120	1,754,329	24.41
55-60	.080757	67,620	5,461	325,024	1,405,209	20.78
60-65	.112711	62,159	7,006	294,063	1,080,185	17.38
65-70	.167146	55,153	9,219	253,539	786,122	14.25
70-75	.238379	45,934	10,950	202,584	532,583	11.59
75-80	.303125	34,984	10,605	148,172	329,999	9.43
80-85	.402837	24,379	9,821	96,715	181,827	7.46
85-90	.521744	14,558	7,596	52,634	85,112	5.85
90-95	.606354	6,962	4,221	22,388	32,478	4.67
95-100	.720485	2,741	1,975	7,756	10,090	3.68
100-105	1.000000	766	766	2,334	2,334	3.05

TABLE 167

ABRIDGED LIFE TABLE FOR FEMALES: 1949-1951

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000=100%). $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e^o_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.058474	100,000	5,847	95,767	6,242,835	62.43
1- 5	.043089	94,153	4,057	365,524	6,147,068	65.29
5-10	.010572	90,096	952	447,822	5,781,544	64.17
10-15	.005386	89,144	480	444,536	5,333,722	59.83
15-20	.011595	88,664	1,028	441,003	4,889,186	55.14
20-25	.019325	87,636	1,694	434,147	4,448,183	50.76
25-30	.023255	85,942	1,999	424,808	4,014,036	46.71
30-35	.025611	83,943	2,150	414,441	3,589,228	42.76
35-40	.030361	81,793	2,483	402,858	3,174,787	38.81
40-45	.033229	79,310	2,635	390,097	2,771,929	34.95
45-50	.040782	76,675	3,127	375,710	2,381,832	31.06
50-55	.045813	73,548	3,369	359,553	2,006,122	27.28
55-60	.060641	70,179	4,256	340,734	1,646,569	23.46
60-65	.085982	65,923	5,668	316,163	1,305,835	19.81
65-70	.127837	60,255	7,703	282,792	989,672	16.42
70-75	.178603	52,552	9,386	239,932	706,880	13.45
75-80	.249307	43,166	10,762	189,294	466,948	10.82
80-85	.344200	32,404	11,153	133,879	277,654	8.57
85-90	.448205	21,251	9,525	81,446	143,775	6.77
90-95	.542901	11,726	6,366	39,726	62,329	5.32
95-100	.644617	5,360	3,455	16,463	22,603	4.22
100-105	1.000000	1,905	1,905	6,140	6,140	3.22



TABLE 168

ABRIDGED LIFE TABLE FOR BOTH SEXES: 1954-1956

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.053865	100,000	5,386	96,101	6,771,417	67.71
1- 5	.019948	94,614	1,887	373,389	6,675,316	70.55
5-10	.006056	92,727	562	462,061	6,301,927	67.96
10-15	.003333	92,165	307	460,039	5,839,866	63.36
15-20	.005198	91,858	477	458,201	5,379,827	58.57
20-25	.008772	91,381	302	455,012	4,921,626	53.86
25-30	.011224	90,579	1,017	450,401	4,466,614	49.31
30-35	.011546	89,562	1,034	445,336	4,016,213	44.84
35-40	.017490	88,528	1,348	438,936	3,570,877	40.34
40-45	.021076	86,980	1,833	430,455	3,131,941	36.01
45-50	.025928	85,147	2,208	420,425	2,701,486	31.73
50-55	.034209	82,939	2,837	407,985	2,281,061	27.50
55-60	.050495	80,102	4,045	391,112	1,873,076	23.38
60-65	.082438	76,057	6,270	365,846	1,481,964	19.48
65-70	.142957	69,787	9,977	325,150	1,116,118	15.99
70-75	.197681	59,810	11,823	269,798	790,968	13.22
75-80	.238461	47,987	11,443	211,491	521,170	10.86
80-85	.345068	36,544	12,610	151,101	309,679	8.47
85-90	.459261	23,934	10,992	91,093	158,578	6.63
90-95	.567367	12,942	7,343	41,631	67,485	5.21
95-100	.608595	5,599	3,408	17,321	25,854	4.62
100-105	1.000000	2,191	2,191	8,533	8,533	3.89

TABLE 169

## ABRIDGED LIFE TABLE FOR MALES: 1954-1956

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $^o_e_x$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.058949	100,000	5,895	95,732	6,595,535	65.96
1- 5	.018918	94,105	1,780	371,668	6,499,803	69.07
5-10	.006523	92,325	602	459,940	6,128,135	66.38
10-15	.003747	91,723	344	457,742	5,668,195	61.80
15-20	.005947	91,379	543	455,658	5,210,453	57.02
20-25	.010127	90,836	920	452,036	4,754,795	52.34
25-30	.014363	89,916	1,291	446,425	4,302,759	47.85
30-35	.014324	88,625	1,269	440,040	3,856,334	43.51
35-40	.019571	87,356	1,710	432,675	3,416,294	39.11
40-45	.024391	85,646	2,089	423,156	2,983,619	34.84
45-50	.029000	83,557	2,423	411,915	2,560,463	30.64
50-55	.036823	81,134	2,988	398,557	2,148,548	26.48
55-60	.052919	78,146	4,135	381,142	1,749,991	22.39
60-65	.089009	74,011	6,588	354,926	1,368,849	18.50
65-70	.156753	67,423	10,569	311,980	1,013,923	15.04
70-75	.224571	56,854	12,768	252,671	701,943	12.35
75-80	.274708	44,086	12,111	189,871	449,272	10.19
80-85	.356983	31,975	11,415	130,913	259,401	8.11
85-90	.490136	20,560	10,077	76,527	128,488	6.25
90-95	.594005	10,483	6,227	33,142	51,961	4.96
95-100	.630110	4,256	2,682	12,981	18,819	4.42
100-105	1.000000	1,574	1,574	5,838	5,838	3.71

TABLE 170

## ABRIDGED LIFE TABLE FOR FEMALES: 1954-1956

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0-1	0.048548	100,000	4,855	96,485	6,958,009	69.58
1-5	.021002	95,145	1,998	375,187	6,861,524	72.12
5-10	.005580	93,147	520	464,279	6,486,337	69.64
10-15	.002904	92,627	269	462,440	6,022,058	65.01
15-20	.004455	92,358	411	460,852	5,559,618	60.20
20-25	.007611	91,947	700	458,071	5,098,766	55.45
25-30	.009011	91,247	822	454,211	4,640,695	50.86
30-35	.009433	90,425	853	450,114	4,186,484	46.30
35-40	.015645	89,572	1,401	444,507	3,736,370	41.71
40-45	.017844	88,171	1,573	437,038	3,291,863	37.33
45-50	.022584	86,598	1,956	428,316	2,854,825	32.97
50-55	.030852	84,642	2,611	417,079	2,426,509	28.67
55-60	.047047	82,031	3,859	401,189	2,009,430	24.50
60-65	.075193	78,172	5,878	377,288	1,608,241	20.57
65-70	.127951	72,294	9,250	339,351	1,230,953	17.03
70-75	.169868	63,044	10,709	288,709	891,602	14.14
75-80	.200696	52,335	10,503	236,108	602,893	11.52
80-85	.335259	41,832	14,025	174,427	366,785	8.77
85-90	.434662	27,807	12,087	107,697	192,358	6.92
90-95	.550015	15,720	8,646	51,135	84,661	5.39
95-100	.595468	7,074	4,212	22,065	33,526	4.74
100-105	1.000000	2,862	2,862	11,461	11,461	4.00

TABLE 171

## ABRIDGED LIFE TABLE FOR BOTH SEXES: 1959-1961

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^d_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $nL_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.044178	100,000	4,418	96,801	6,938,503	69.39
1- 5	.012043	95,582	1,151	379,276	6,841,702	71.58
5-10	.003164	94,431	299	471,313	6,462,426	68.44
10-15	.003043	94,132	286	459,972	5,991,113	63.65
15-20	.004590	93,846	431	468,238	5,531,141	58.94
20-25	.007422	93,415	693	465,439	5,062,903	54.20
25-30	.009656	92,722	895	461,440	4,597,464	49.58
30-35	.011091	91,827	1,018	456,685	4,136,024	45.04
35-40	.014897	90,809	1,353	450,832	3,679,339	40.52
40-45	.020454	89,456	1,830	442,885	3,228,507	36.09
45-50	.025299	87,626	2,217	432,905	2,785,622	31.79
50-55	.039272	85,409	3,354	419,128	2,352,717	27.55
55-60	.054388	82,055	4,463	399,674	1,933,589	23.56
60-65	.077630	77,592	6,023	373,687	1,533,915	19.77
65-70	.114974	71,569	8,229	338,294	1,160,228	16.21
70-75	.172512	63,340	10,927	290,412	821,934	12.98
75-80	.251305	52,413	13,172	229,941	531,522	10.14
80-85	.377080	39,241	14,797	159,071	301,581	7.69
85-90	.511069	24,444	12,493	89,490	142,510	5.83
90-95	.636606	11,951	7,608	37,182	53,020	4.44
95-100	.741502	4,343	3,220	11,916	15,838	3.65
100-105	1.000000	1,123	1,123	3,922	3,922	3.49

TABLE 172

## ABRIDGED LIFE TABLE FOR MALES: 1959-1961

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0- 1	0.048813	100,000	4,881	96,466	6,714,086	67.14
1- 5	.011624	95,119	1,106	377,565	6,617,620	69.57
5-10	.004440	94,013	417	468,896	6,240,055	66.37
10-15	.003792	93,596	355	467,117	5,771,159	61.66
15-20	.005734	93,241	535	464,980	5,304,042	56.89
20-25	.009656	92,706	895	461,410	4,839,062	52.20
25-30	.011981	91,811	1,100	456,383	4,377,652	47.68
30-35	.014007	90,711	1,271	450,480	3,921,269	43.23
35-40	.017800	89,440	1,592	443,392	3,470,789	38.81
40-45	.023833	87,848	2,094	434,223	3,027,397	34.46
45-50	.030754	85,754	2,637	422,562	2,593,174	30.24
50-54	.047430	83,117	3,942	406,247	2,170,612	26.12
55-60	.064641	79,175	5,118	383,682	1,764,365	22.28
60-65	.092235	74,057	6,831	354,011	1,380,683	18.64
65-70	.133514	67,226	8,976	314,665	1,026,672	15.27
70-75	.197644	58,250	11,513	263,197	712,007	12.22
75-80	.266965	46,737	12,477	202,965	448,810	9.60
80-85	.402153	34,260	13,778	136,620	245,845	7.18
85-90	.554204	20,482	11,351	72,464	109,225	5.33
90-95	.684181	9,131	6,247	27,163	36,761	4.03
95-100	.779486	2,884	2,248	7,545	9,598	3.33
100-105	1.000000	636	636	2,053	2,053	3.23

TABLE 173

## ABRIDGED LIFE TABLE FOR FEMALES: 1959-1961

Age Interval $x-(x+n)$	Proportion Dying During Interval (1.000000 = 100%) $n^q_x$	Of 100,000 Born Alive		Stationary Population		Average Years of Life Left at Beginning of Interval $e_x^o$
		No. Alive at Interval Beginning $l_x$	No. Dying During Interval $n^d_x$	In Age Interval $n^L_x$	In This and Subsequent Intervals $T_x$	
0-1	0.039606	100,000	3,961	97,132	7,188,351	71.88
1-5	.012501	96,039	1,201	380,949	7,091,219	73.84
5-10	.003792	94,838	360	473,181	6,710,270	70.76
10-15	.002345	94,478	222	471,828	6,237,089	66.02
15-20	.003442	94,256	324	470,531	5,765,261	61.17
20-25	.005485	93,932	515	468,454	5,294,730	56.37
25-30	.007670	93,417	717	465,352	4,826,276	51.66
30-35	.008613	92,700	798	461,590	4,360,924	47.04
35-40	.012277	91,902	1,128	456,849	3,899,334	42.43
40-45	.017160	90,774	1,558	450,104	3,442,485	37.92
45-50	.019620	89,216	1,750	441,927	2,992,381	33.54
50-55	.029978	87,466	2,622	431,172	2,550,454	29.16
55-60	.043118	84,844	3,658	415,590	2,119,282	24.98
60-65	.062713	81,186	5,091	393,952	1,703,692	20.99
65-70	.095342	76,095	7,255	363,351	1,309,740	17.21
70-75	.144623	68,840	9,956	320,697	946,389	13.75
75-80	.236349	58,884	13,917	260,878	625,692	10.63
80-85	.354884	44,967	15,958	184,940	364,814	8.11
85-90	.479691	29,009	13,915	108,837	179,874	6.20
90-95	.605440	15,094	9,139	48,215	71,037	4.71
95-100	.720303	5,955	4,289	16,719	22,822	3.83
100-105	1.000000	1,666	1,666	6,103	6,103	3.66