Appendix A

THE HAITIAN CENSUS OF 1918/19

A census, admittedly incomplete, was taken in this country between September 1918 and August 1919.[1] Apparently the census was limited to a head count only for the various political subdivisions of the country. The results were first published in a Haitian newspaper and subsequently reproduced by Victor. These are the census data with which this appendix is concerned.

Since 1900 (if not earlier), the Roman Catholic church has provided annual estimates of the Roman Catholic population of the country, by departments. Since the population is almost entirely Roman Catholic, these figures have been used as population estimates for Haiti.

The comparison of these two sets of data in chapter I showed such disagreement that no appraisal of the census could be made on this basis alone. It is necessary to apply more tests, some of which will be illustrated in this appendix.

The results of the tests presented here should not be considered as definitive; they are presented as a detailed illustration of methods of testing a census count with non-census data. There is probably no other country with identical conditions, where the tests illustrated here could be applied without modification. On the other hand, it is believed that the reasoning followed here could be adapted to the solution of a similar problem elsewhere.

This problem has several aspects each of which will be considered separately, namely:

(1) Appraising the church estimates;

(2) Comparing the church estimate and the 1918/1919 census count with the 1950 census count;

(3) Comparing the rate of growth with rates for other countries;

(4) Using the 1950 census data by age and sex to estimate the population 30 years earlier, that is to say, as of 1920.

If the original records from the 1918/19 census were available for examination, perhaps other appraisal procedures could be employed; also, detailed information on the social, economic and geographic factors in each of the parts of the country could be used to advantage in a definitive analysis, but that is beyond the scope of this manual.

Appraising the church estimates

The number of church members for each of the dioceses is available for each year since 1900 (if not

earlier).[2] Since the boundaries of the dioceses correspond fairly well to the boundaries of the departments, these figures are taken as the equivalent of population estimates for departments.

It is not clear exactly how the church estimates were made. It is clear, however, that the pattern of population growth which they imply is most improbable. Figure A1 shows the annual estimates for each department. It appears that the changes are in the nature of "steps." For several years the figure for a given department is carried unchanged; then it is abruptly raised to a new plateau. Occasionally, the figure is abruptly lowered. For example, in the Sud, the population for the years 1907 to 1913 is reported uniformly as 325,000. In 1914 the figure is suddenly boosted to 521,000, and it is kept at this size through 1917. In 1918 it is boosted to 541,000 and allowed to remain at this level through 1920. Between 1921 and 1924 the figure is decreased to 509,000. It is then reported without change until 1929, when it is raised to 628,000. It is reported at this level annually until 1943, when the round figure of 700,000 is substituted. It is not credible that the population of this department grew in this fashion.

Victor noticed this type of behavior in the figures and concluded that these data must be used with caution and reservations. He added that some of the variations were explainable in terms of epidemics and other events; many of the variations, however, are not explainable in such terms and may have resulted simply from the desire to present a larger estimate of the number of church members.

The totals reported for Haiti often do not agree with the sums of the figures for the departments. In 1918, for example, the church figures are as follows:

Artibonite	255,000
Nord	437,000
Nord-Ouest	108,000
Ouest	780,000
Sud	541,000

The total for Haiti obtained by adding these figures is 2,121,000; the total reported for the country is 2,150,000. For this year the discrepancy is small, but for some years it is as high as 10 per cent of the total for the country.

[1] See: M. Lubin, *Du Recensement en Haiti,* 1951. Also, René Victor, *Recensement et Demographie,* Port au Prince, 1947.

[2] These data are taken from United States, Department of Commerce, *Haiti, Summary of Biostatistics,* Washington, June 1945. This report is a compilation of all data on Haiti which could be located in both official and unofficial Haitian sources. The data are reproduced without alteration, but are fully annotated; for further information regarding sources, the reader is referred to this publication, as well as others mentioned in this appendix.
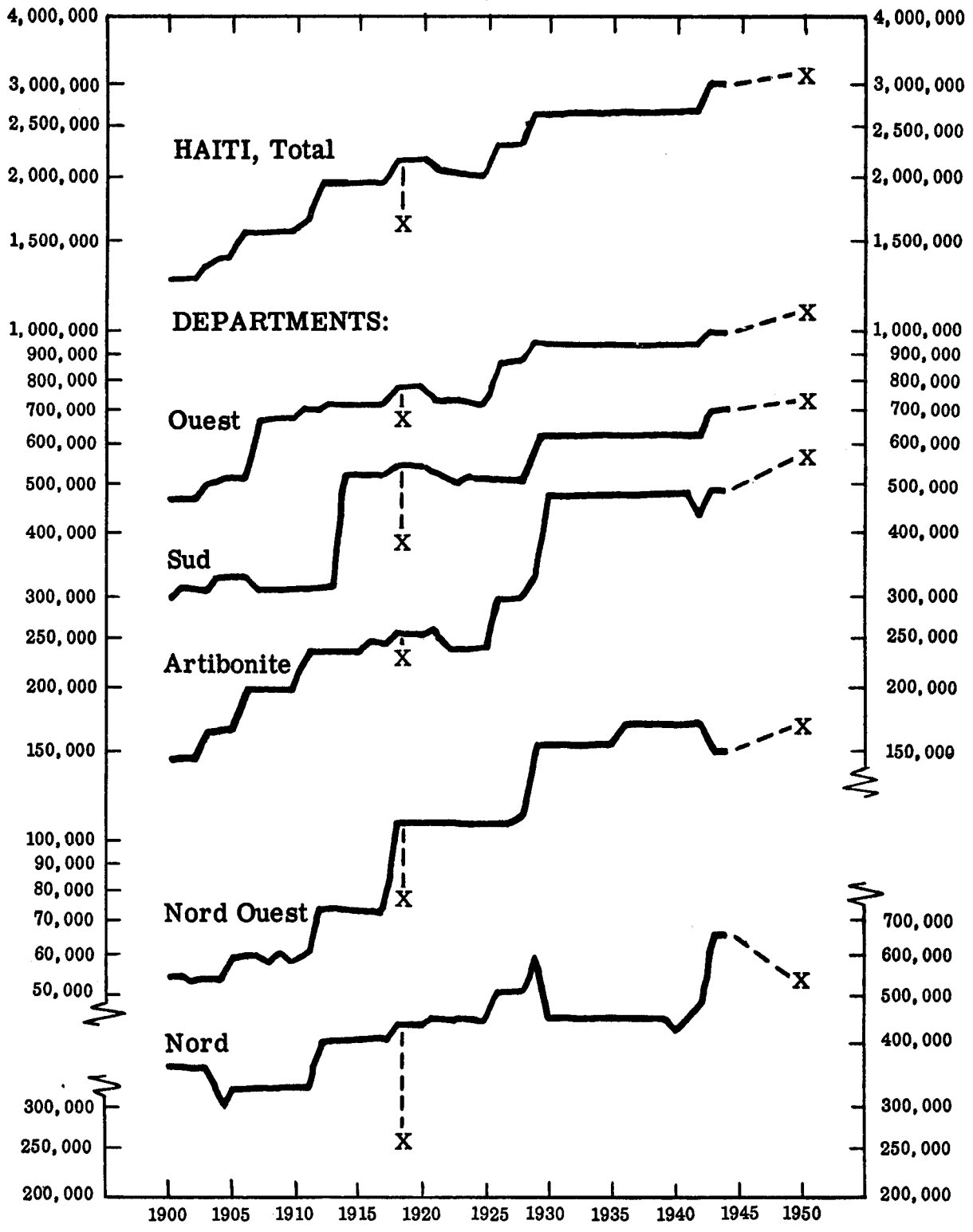
The census results for Haiti and departments are indicated on the chart by X

Figure A1. ANNUAL POPULATION ESTIMATES, 1900-1944, FOR HAITI AND DEPARTMENTS, AND CENSUS RESULTS, 1918/19 AND 1950

This type of error is mainly important in so far as it suggests that the figures were not carefully compiled and that all of them may be subject to error. Each of the totals for a department presumably was obtained by adding its component parts, and the possibility of arithmetic errors in these sums has to be considered. Those who compiled the figures were apparently not much concerned with accuracy. Perhaps approximate estimates were sufficient for church purposes, but these figures cannot be accepted as accurate standards against which to evaluate the census count of 1918/19. The fact that the two sets of figures do not agree cannot be taken as proof that the census count was wrong.

Comparing the church estimate and the 1918/19 census count with the 1950 census count

This comparison can be made department by department, in an effort to determine whether one of the earlier sets of figures seems more reasonable than the other in light of the 1950 census count. Such a comparison is shown in table A1.

The two sets of earlier data show entirely different rates of change when compared with the 1950 census count, except for the Artibonite. In the Nord, it appears that the population increased by 111 per cent on the basis of the 1918/19 census, but only 23 per cent on the basis of the 1919 church data. Which is more nearly correct? The answer should be sought by evaluating the indicated changes in the light of known social, economic and geographic conditions in each of the departments. This analysis is beyond the scope of the present manual.

Comparison of rate of growth with that of other countries

The annual geometric rate of increase shown by the 1918/19 census and the 1950 census is 2.1 per cent; the rate indicated by the church estimate for 1919 and the 1950 census is 1.2 per cent. For comparison, the rates of growth in neighbouring Caribbean areas were:

Dominican Republic (1920 to 1950) 2.9
Jamaica (1921 to 1953) 1.7
Other British West Indies (1921 to 1946) 1.2
Cuba (1919 to 1943) 2.1
French West Indies (1921 to 1946) 0.5

Since both rates for Haiti fall within the range of rates found in the neighbouring islands, the results of this test are inconclusive.

Estimation of 1920 population from 1950 census data

Given the 1950 population by age and sex, and a set of mortality rates, it is possible to work backwards and estimate the population of Haiti in 1920, of which the population in 1950, aged 30 years and over, were the survivors.[3]

The age and sex distribution of the Haitian population in 1950 is available, but the statistics by age are markedly inaccurate. Numbers reported at ages under 5, for example, appear much too small and, in the absence of any other explanation, it must be presumed that the enumeration of children was very incomplete in 1950, and this suggests the possibility that there were important omissions also in the enumeration of adults. Inaccurate enumeration of children does not affect our computation, since only the persons aged 30 years and over are relevant to an estimate of the population in 1920; however, if the adults were under-enumerated, the 1920 estimate may be too low.

A set of mortality rates for the period 1920-1950 is not available from Haitian sources. Accordingly, it is necessary to select a set of rates from among the life tables available for various countries. Mexico as of 1930 was chosen as a country which had about the same age composition of population as Haiti in 1950, where the level of economic development and health facilities, though probably superior to those of Haiti, were not grossly different, and for which a life table was available. The life table of some other country might have been used equally well, but the Mexican life table will serve for illustrative purposes.

Thirty-year survival rates were obtained from the Mexican life table and applied to the 1950 Haitian age and sex composition. These procedures can be illustrated very briefly as follows. For males, according to the life table, the survival rate between ages 20 to 24 and 50 to 54, is 623 per 1,000. In 1950 in Haiti there were 51,300 men aged 50 to 54 years; this number divided by 0.623 provides an estimate of 82,300 males aged 20 to 24 in 1920.

These calculations were carried through for each five year age and sex cohort, and the results summed. With the addition of suitable estimates for the highest age groups in 1920, from which there were few or no

[3] The census as of 1918/19 was taken about 31 years prior to the 1950 census. The 1950 data could have been projected backwards 31 years, but the computations are much simpler to make for a period of 30 years and the results are good enough for illustrative purposes.

Table A1

COMPARISON OF THE 1950 CENSUS COUNT WITH ESTIMATES FOR 1919 FOR HAITI, BY DEPARTMENTS

(Numbers in thousands)

Department	1950 census	1918/19 census	1919 church estimate	Per cent increase up to 1950 from	
				1918/19 census	1919 church estimate
Artibonite	569	241	255	136	123
Nord	540	256	437	111	23
Nord-Ouest	168	78	108	115	55
Ouest	1,095	671	780	63	40
Sud	740	385	541	92	37
TOTAL	3,112	1,631	2,121	91	47

61

survivors in 1950[4], an estimated population in 1920 of 1,900,000 is obtained. This should be reduced, to allow for increase from 1918/19 to 1920, to perhaps 1,850,000, which is intermediate between the 1918/19 census count and the 1919 church estimate. It must be admitted that this estimate is subject to a rather wide margin of error. So far as it can be trusted, it suggests that the census figure is too low and the church estimate too high. A figure as low as the 1918/19 census count could

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[4] These estimates are necessarily rather arbitrary, but the age groups concerned are too small to have an important effect on the result.

be accepted as roughly correct only on the assumption that Haitian mortality was much lower than that indicated by the Mexican life table. This life table gives an expectation of life at birth of about 33 years; if the expectation for Haiti had been as high as 45 years during the period in question—that is, about the same as for Trinidad and Tobago in 1930-1932—the 1950 and 1918/19 censuses would be reconciled; but this is highly improbable. Acceptance of the 1919 church estimate, on the other hand, would imply either extremely high Haitian mortality, at least equal to that of India for a comparable period, or a gross under-count of the adult population in the 1950 census.

Appendix B

THE RELIABILITY OF CENSUS DATA FOR LIBYA[1]

A check on the accuracy of the census figures for 1931 and 1936 is provided by a comparison of the annual rates of growth (geometric mean) of the native population during the interval for major geographical divisions of the country (table 1).

Table 1

INTERCENSAL INCREASE OF de facto NATIVE POPULATION BY REGIONS, 1931-6

Provinces	Population		Annual percentage rate of growth (geometric mean)
	1936	1931	
Libya	732,973	654,716	2.3
Tripoli	343,093	296,946	2.9
Misurata	203,922	182,953	2.2
Benghazi and Derna*..	137,582	136,215	0.2
Libyan Sahara	48,376	38,602	4.6

* Data for Benghazi and Derna are combined because of large interprovincial migration during this period. Source: Vol. v, p. 21.

The rate of 0.2% for Benghazi and Derna stands in marked contrast to the rates for the other regions, reflecting the possibility of higher mortality, lower fertility, and much larger emigration resulting from the Italian military custody of one-third to one-half or more of the regional population during 1923-35. The large increase in the Libyan Sahara is possibly due to underenumeration there in 1931. The increase of 3% per year in the province of Tripoli seems hardly possible without heavy immigration. It was alleged that many exiles who left the country during 1915-30 returned between 1931 and 1936. Their return may have in part accounted for the rapid increase in the province of Tripoli.

A higher rate of increase for females than for males is shown by the census figures for natives in all provinces except Benghazi and Derna (see Appendix, table 1). For the territory as a whole the figures show a ratio of 1094 males per 1000 females among the de facto native population of 1931, 1062 in the de facto population of 1936, and 1075 in the resident native population of 1936. These figures suggest a relatively greater underenumeration of women than of men in the 1931 census. The departure of exiles prior to the 1931 census and their return during 1931-6 does not explain these figures. On the contrary, since the exiles must have been mostly men the trend of the sex ratios is contrary to that which would have been expected to result from these movements.

The hypothesis of relatively greater underenumeration of women than of men in the 1931 census is also sup-

ported by a comparison of the total native population by sex for 1931 with the corresponding population aged 5 years and over in 1936. The percentage reduction of females, which should reflect in the main intercensal mortality if the data were accurate, is much lower than that of males (table 2).

Table 2

TOTAL de facto NATIVE POPULATION OF LIBYA 1931 COMPARED WITH THOSE AGED 5 YEARS AND OVER IN 1936

	Population		Difference	
	1931	1936	Number	Percentage
TOTAL	654,716	623,848	30,868	4.7
Males	341,984	322,691	19,293	5.6
Females ...	312,732	301,157	11,575	3.7

Source: Italy, VIII Censimento generale della popolazione ..., vol. v, pp. 24-5, 1939.

Differences in the numbers of persons enumerated in 1931 and 1936 as nomads and semi-nomads in various districts also suggest the possibility of errors in enumeration. . . .[2] The figures for certain districts show fairly large numbers of nomads or semi-nomads in 1936 where none were enumerated in 1931, and vice versa. To be sure, the differences may be due partly to changes in the application of the terms "nomad" and "semi-nomad," which were rather loosely defined, or perhaps to errors in the identification of geographical areas, but they suggest the possibility that sizeable groups of these people were omitted from the enumeration in 1931 or 1936, or in both censuses. Even the figures for whole provinces, as given by the two censuses, seem inconsistent; they are also contrary to the generally held views that the people of Benghazi and Derna are relatively mobile and that those of the Libyan Sahara are more nomadic than those of the northern provinces. The figures by provinces are summarized in table 3.

Table 3

Province	Percentage of native population enumerated as nomads or semi-nomads	
	1931	1936
Tripoli	23.6	18.1
Misurata	35.0	15.4
Benghazi	23.8	6.0
Derna	—	13.7
Libyan Sahara	4.5	10.8

The population figures by sex and age groups also show evidence of errors. They are available only for

the resident native population of 1936. The sex ratios computed from these figures are presented in table 4.

The ratios for the age groups under 5, 20-24, and 25-29 seem to be too low in relation to those of the neighbouring age groups. On the other hand, those for the group 10-14 and for all groups above 50 seem too high. To some extent these variations may be due to mis-statement of ages of men or women; and the continued absence of male exiles at ages 20-29 may help to explain the ratio for that age. However, the figures suggest the possibility of serious underenumeration of males of ages 20-29 and of females of ages 10-14 and 50 and over.

Table 4

Age (years)	Males per 1000 females
Under 5	1016
5- 9	1143
10-14	1344
15-19	1111
20-24	885
25-29	968
30-39	1001
40-49	995
50-59	1173
60-69	1152
70-79	1093
80 and over	1083
All ages	1075

The proportionate distribution by age of the resident native population in 1936, which is shown in table 5, suggests underenumeration at ages under 10 and 20-29 for both sexes.

Table 5

Age (years)	Males	Females
0- 4	14.5	15.3
5- 9	15.0	14.1
10-19	17.6	15.1
20-29	11.6	13.4
30-39	13.7	14.7
40-49	10.5	11.4
50-59	8.1	7.4
60-69	5.1	4.7
70-79	2.7	2.7
80 and over	1.2	1.2
All ages	100.0	100.0

The census data for Italians appear to be much more accurate. The distributions by sex, age and marital status for the Italian population are characteristic of a population built up mainly by immigration. . . .[3]

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[3] Data are given in the Appendix (Tables 14-16) of the work cited.

Appendix

Table 1

PRESENT NATIVE POPULATION OF LIBYA, 1931 AND 1936, AND RESIDENT NATIVE POPULATION, 1936, BY SEX AND MAJOR ADMINISTRATIVE DIVISIONS

Administrative division and sex	Present population			Resident population 1936
	1931	1936	Percentage increase	
Libya, total	654,716	732,973	12.0	750,851
Males	341,984	377,416	10.4	388,948
Females	312,732	355,557	13.7	361,903
Province of Tripoli	296,946	343,093	15.5	351,774
Males	154,834	174,881	12.9	182,265
Females	142,112	168,212	18.4	169,509
Province of Misurata	182,953	203,922	11.5	213,486
Males	95,109	103,712	9.0	111,230
Females	87,844	100,210	14.1	102,256
Province of Benghazi and Derna*.	136,215	137,582	1.0	137,426
Males	72,376	75,079	− 3.7	71,908
Females	63,839	62,503	− 2.1	65,518
Libyan Sahara	38,602	48,376	25.3	48,165
Males	19,665	23,744	20.7	23,545
Females	18,937	24,632	30.1	24,620

* Data for Benghazi and Derna are combined because of large inter-provincial migration during this period.

THE CENSUSES OF HONDURAS

Because censuses have been taken at frequent intervals, the population statistics of Honduras provide excellent material for the application of various methods for their appraisal. In this example, it is intended chiefly to show how a series of several successive population counts can be utilized in a tentative evaluation of their relative degrees of accuracy. More definite appraisal becomes possible only after application of various balancing equations to specific census intervals, as described in the several chapters of this manual.

The series of census results for Honduras since 1881 shown in table C1 is very irregular. If all censuses had been accurate, the series would indicate moderate rates of population growth in the periods 1881-1887, 1910-1916, 1916-1926, and 1940-1945; rapid growth in the periods 1905-1910, 1930-1935, 1935-1940, and 1945-1950; extraordinarily rapid growth in the periods 1887-1901 and 1926-1930 and a decline in the period 1901-1905. Only very unusual events could have resulted in such fluctuations of the rate of growth. Actually, it is highly improbable that all censuses could have been correct; if some of them were fairly accurate, some others must have been very inaccurate.

Table C1

POPULATION OF HONDURAS ACCORDING TO CENSUSES TAKEN FROM 1881 TO 1950, AND APPARENT INTER-CENSAL RATES OF INCREASE

Date of census	Population	Apparent annual rate of increase[a]
1881	307,289	—
1887	331,917	1.30
1901	543,841	3.59
31 XII 1905	500,136	— 2.07
18 XII 1910	553,446	2.06
18 XII 1916	605,997	1.52
26 XII 1926	700,811	1.46
29 VI 1930	854,184	5.80
30 VI 1935	962,000	2.41
30 VI 1940	1,107,859	2.86
24 VI 1945	1,200,542	1.63
18 VI 1950	1,368,605[b]	2.66

Apparent average annual rate of increase, 1881-1950 .... 2.19

[a] Average annual geometric rates.
[b] Unrevised result, as obtained from the enumeration.

Aware of these inconsistencies, the statisticians of Honduras have expressed their doubts as to the accuracy of the most recent census as well as of earlier censuses. Tosco and Mondragón have proceeded to construct a series of revised population estimates which they consider to be closer to reality than those which could be made on the basis of the census results, such

as they were.[1] It is not within the scope of this manual to discuss methods for the revision of past estimates. Although the revised figures to Tosco and Mondragón have been adopted for official purposes, we shall, in the present appendix, concern ourselves mainly with the raw census data, which were obtained directly from the admittedly inaccurate census enumerations.[2]

The consistency of the census totals

The inconsistency of the series of census results shown in table C1 is very obvious mainly because censuses have been taken in close succession. The effect of an error in a census enumeration on the apparent inter-censal rate of increase is very large if the census interval is short. For longer census intervals, the calculated average rates of increase are less severely affected by errors. For example, although both the 1881 and 1950 figures may have been in error, the apparent rate of increase for the entire period—2.19 per cent per annum—is plausible and is probably not much in error.[3] We may compute apparent rates of increases from the results of any two censuses in order to determine which figures could be consistent with one another, and which not. In this fashion, by accepting some censuses and eliminating others, we can obtain various series of census results which, taken by themselves, would not seem to be necessarily inconsistent.

One such possible series is obtained by accepting only the results of the censuses of 1887, 1905, 1910, 1916, 1926 and 1945, while rejecting the censuses of 1881, 1901, 1930, 1935, 1940 and 1950. Another possible series may include the censuses of 1881, 1910, 1930, 1935, 1940 and 1950, while rejecting those of 1887, 1901, 1905, 1916, 1926 and 1945. (See table C2.) Apparently consistent series may also be obtained by selecting other combinations of censuses. The census of 1901, however, cannot easily be fitted consistently into any series. Either the enumeration of 1901 was exaggerated (possibly intentionally) or else most, if not all, of the other enumerations were deficient.

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[1] Tosco, M., and Mondragón, R., *Análisis dinámico y económico-social de la población de Honduras*, Servicio Informativo del Banco Central de Honduras y del Banco Nacional de Fomento, Tegucigalpa, 1952.

[2] The revised census age distribution has been used in the example in chapter III on page 46 for the computation of hypothetical survival rates. It was found that the revised data for 1950 were not consistent with the unrevised census age distribution of 1940.

[3] This rate may be compared with long-term inter-censal rates of increase for neighbouring areas. For Nicaragua, from 1906 to 1950, the apparent rate amounts to 1.70 per cent per annum; for Costa Rica, from 1864 to 1950, 2.23 per cent per annum; for Panama, from 1906 to 1950, 2.48 per cent per annum; for Cuba, from 1899 to 1950, 2.45 per cent per annum; and for Mexico, from 1921 to 1950, 2.04 per cent.