

# ASSESSMENT OF MIGRATION DATA IN LATIN AMERICA

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## INTRODUCTION

In the words of Horace Hamilton, "Movement which involves a change in the usual place of residence from one community to another is classed as a migration."<sup>1</sup>

The practical application of this general definition requires a statistical criterion in order to define the units of population, i.e., communities, between which the migratory movements occur. This problem is difficult to resolve satisfactorily, and admits of various solutions, since, to quote Horace Hamilton again, "Communities vary in size, type and complexity, and are difficult to define and delineate."

In practice, researchers in this field must generally accept the criteria implicit in census data or in information from other sources. Frequently the nature of the available data determines not only the unit of population but also the method of measurement.

In accordance with the type of census data normally available, it may be stated as a general principle that migratory movement is the result of a change in the place of residence when this involves crossing administrative boundaries. Consequently, the effective population unit is the internal administrative area; this is sometimes

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the principal area, and sometimes the intermediate or even the minor area (e.g., the municipality).

The administrative area, however, is not the ideal unit for the purposes of analyzing migratory movements, just as it is not the ideal unit for the study of the geographical distribution of the population. It would be better, for example, to deal with urban and rural zones, economic regions, urbanized or metropolitan areas. In the past it has rarely been possible to follow this procedure in Latin America because the census data were not subdivided by zones and because of limitations of tabulation.

An additional element which may be introduced into the definition is the period of time during which the migratory movement occurs. This period might vary from, say, one year—according to the estimates of the Bureau of the Census in the United States—to a lifetime. This criterion has been widely used in estimating the importance of migratory currents on the basis of place of birth as indicated in the census data; such information continues to be important, in the absence of more adequate data.<sup>2</sup> Between these two extremes one must decide on well-defined and relatively short periods, e.g., five or 10 years.

It must be borne in mind that the longer the period in question, the greater is the probability that the same person has moved several times. Although this can occur in one year, mobility may be expected to be less in a short period than in a relatively long one. This consideration is important because, whatever method is used to obtain census data on the subject,<sup>3</sup> we can hope to establish the number and characteristics of only those people who have the status of migrants at the time of the survey.

#### POPULATION CENSUSES AS SOURCES FOR THE STUDY OF INTERNAL MIGRATIONS

Around 1950, every country in Latin America, except Peru and Uruguay, held a population census. This continent-wide operation was for the majority of these countries the first demographic census carried out by modern methods of enumeration and of tabulation of data.

In these censuses, inquiries were made about the birthplace of persons born in the country, and the principal administrative area was generally recorded. Only the Guatemalan census involved a direct inquiry as to internal movements.<sup>4</sup>

Unfortunately, information on the place of birth was not sufficiently utilized in tabulating the data. The most frequent and most important published tables were of the following types:

1. Classification of population by the principal administrative area (of registration or residence) in relation to the place of birth in nine countries (Chile, Costa Rica, Cuba, the Dominican Republic, Guatemala, Honduras, Mexico, Nicaragua, and Panama); in only three countries (Honduras, Mexico, and Panama) did the information include the sex distribution.
2. Classification of population by sex and age groups, by principal administrative area (of registration or residence) in relation to birthplace, in three countries (Brazil, Colombia, and Venezuela).<sup>5</sup>
3. Classification of population by sex and age groups, by principal administrative area (of registration or residence) in relation to a summarized classification of place of birth, e.g., people born in the same administrative area in which they were enumerated, those born in other areas, and those born abroad—in three countries (Guatemala, Haiti, and Paraguay).

The tabulations for the first category give the figures for the native population of each of the principal administrative areas, and the corresponding numbers of immigrants and emigrants.<sup>6</sup> In addition, for the two latter groups the data include the birthplace or destination, as the case may be. The data for the second category include the same information, as well as ages. Finally, the third category shows the number and age structure of immigrants (without indicating the place of birth in detail), but contains no information on the number of emigrants from the various administrative areas.<sup>7</sup>

The published data give little information about intermediate administrative areas, and practically none about minor areas. The available information on intermediate administrative areas may be summarized as follows:

4. Classification of population living in each district (Venezuela) or municipality (Colombia) at the time of the census, by place of birth, as follows: (a) in the same district (or municipality); (b) in a different district (or municipality) within the same administrative area; (c) in another principal administrative area; and (d) in other countries. The Venezuelan census figures also give the number of people born in each district and registered in other districts.

5. Classification of population enumerated in each district, by sex and district of birth (Panama).

6. Classification of residents of each canton by place of birth; and classification of people born in each canton by canton of residence (Costa Rica).

The figures for categories 4, 5, and 6 allow one to establish the number of people who were not born in the intermediate administrative areas where they were enumerated (or where they resided), i.e., immigrants, with more or less detailed information regarding the place of origin. In general, the figures also include the corresponding total of emigrants.

This brief examination of the data regarding place of birth from the censuses of 1950 shows that, with certain exceptions, the information is not the best for an assessment of internal migratory movements. The information from previous censuses, except those of Brazil and Venezuela, is even more inadequate. In order to measure trends and directions of the migratory movements with a minimal degree of accuracy, it would be necessary to have the figures for the second and third categories and from at least two censuses separated by an interval of, say, 10 years.

Between 1960 and 1963, 15 Latin American countries held population censuses. In nine of them, the census questionnaire included inquiries on internal migration. This was an important experiment in this field in Latin America. In seven countries (Argentina, Brazil, Chile, Ecuador, Mexico, Panama, and Paraguay) information was obtained on both previous "place of residence" of persons not born within the geographical area in which they were registered, and the year in which they moved to this area. The previous "place of resi-

dence" was sometimes recorded as the intermediate administrative area (Argentina, Panama), and sometimes as the principal administrative area, with additional information regarding the urban or rural category of the place of residence (Brazil, Chile, and Ecuador), or without such information (Mexico).

The Peruvian census simplified the inquiries by omitting the year of arrival, merely establishing the intermediate administrative area of origin.

In the Venezuelan census, a different method was adopted, i.e., stating the place of residence (principal administrative area) one year before the census date. Consequently, the figures show net immigration into the place of registration during the previous year. In addition, they show changes in the place of residence by comparing this on two dates separated by an interval of one year.

The method adopted in the Venezuelan census follows that used in the annual surveys of mobility of population and in the recent censuses in the United States.

It will be seen from the foregoing that most research has concerned duration of residence, rather than place of residence at a previous fixed date, except in Venezuela. The duration of residence shows the length of time since the last move and, in the words of Karl Taeuber, "Duration-of-residence data . . . provide information on the latest segment of the residence history of each individual."<sup>8</sup> If inquiries are also made as to the place of origin, as they were in the Latin American censuses mentioned above, it is possible to establish the "last" place of origin. This is important in connection with the process of migration by stages, e.g., in the case of persons born in rural zones or small villages, who move one or more times before arriving in the large cities.

Despite the fact that, fortunately, there has been a considerable broadening of the field of census research concerning internal migration, the tabulation of data in this field is not as advanced as it should be, and in several cases a definite tabulation program probably does not yet exist. It would be most desirable to have these tabulations carried out after the quality of the data collected has been established by internally consistent proofs.

One danger that can nullify the efforts made in these censuses is the lack of model programs for the full utilization of this type of data, and the lack of practical experience with such a program. One cannot expect, therefore, to obtain the minimal degree of uniformity required for comparison or, in all cases, the essential tabulations required for certain analyses.

#### STATISTICAL DATA USED AND MOST FREQUENT ERRORS

The nature of the available data has frequently determined the method to be used in measuring internal migrations. Census data and vital statistics have been used for such estimates.

It is well known that census data are affected by errors of various kinds. The most serious errors in the calculations of geographical movements are probably the following: 1. underestimation (occasionally overestimation) of the population;<sup>9</sup> 2. lack of comparability, because of changes in the boundaries of administrative areas, which frequently occur with the expansion of large cities; 3. erroneous declarations affecting the age structure of the population; 4. erroneous declarations as to place of birth, owing to the tendency to adopt the place of registration as the place of birth by long-time residents in the former; 5. erroneous declarations regarding migrant status (duration of residence, previous place of residence).

Past experience with censuses in Latin America shows that the data are affected by serious errors arising from mistaken declarations of age (with such rare exceptions as the 1947 census in Argentina); underestimation of the number of children under five years of age, and, probably, of young male adults; and, of course, underestimation of the total population, which, according to estimates based on the last censuses, may be over 5 per cent.

Statistics relating to births and deaths are usually affected by two kinds of errors, which affect the calculation of migratory movements when these statistics are taken into account. These are under-registration and late registration,<sup>10</sup> and tabulation based on place of occurrence of the birth instead of place of residence of the mother. With few exceptions, only in the last few years has the practice of

tabulating by place of residence become general in Latin America, and in many countries there are no published data on this basis.

If we are to examine some of the above-mentioned errors, it is worth while to make a brief survey of the methods of measuring internal migratory movements, using data from the Latin American countries.

#### THE USE OF VITAL STATISTICS

A rough estimate of net migration during a given intercensal period may be made with the well-known compensatory equation:

$$(N^n - N^o) - (B - D) = M$$

where  $N^n$  and  $N^o$  represent, respectively, the population registered in a given area at the moments  $o$  and  $n$ , and  $B$  and  $D$  represent, respectively, the live births and deaths in the same period, and  $M$  represents the net balance of immigrants and emigrants during the same period.<sup>11</sup>

The use of the method described above is justified when more appropriate data are lacking, or as a first estimate which is, in principle, capable of being carried out rapidly.

Errors in estimating  $M$  obviously depend on any errors contained in the first part of the equation. The increase of the population ( $N^n - N^o$ ) is affected by errors of underestimation (or occasionally of overestimation), which are not necessarily self-compensating. As for the data relating to births and deaths in large cities, one must ask whether the results have been tabulated on the basis of the place of residence or the place of occurrence. It is well known that in urban centers many births occur to mothers who live elsewhere but take advantage of the maternity services in cities. Similar distortions of data occur in the case of the deaths of persons temporarily residing in cities to secure treatment in clinics or hospitals. But the most serious errors are the result of inadequate registration, especially the registration of births.

It may be expected that the compensatory equation will not produce satisfactory results unless the statistics on which it is based are reliable. Chile has one of the best records in Latin America as regards

demographic statistics; her vital statistics are the most accurate in the region. Consequently, applying the above-described method to Chile would give us an idea of its possibilities under comparatively favorable conditions in Latin America.

The intercensal increase of the population of Chile between 1952 and 1960 (approximately eight years and seven months) was 1,441,100. Deducting the international balance of migration of foreigners, estimated as 25,000, the natural increase would be 1,416,100. However, according to official vital statistics (births minus deaths), the natural increase in the same period should have been 1,254,000.<sup>12</sup> The difference between these estimates, 162,100, shows the inconsistency between the two sources used, i.e., that there have been errors in the census figures for the total population, or in the vital statistics, or in both.

Unless the figures are corrected, the above-mentioned difference of 162,100 people will affect the calculation of internal migratory movements. If the figures used are higher or lower than they should be, they will lead to an overestimation of the balance of migration in areas with a positive balance and to an underestimation in areas with a negative balance.

An examination of the data indicates that the principal source of this difference is underregistration of births.<sup>13</sup> In fact, subsequent registration by sampling in the census of 1960 indicated an underregistration of 5.4 per cent. For the intercensal increase ( $N^n - N^o$ ) to be affected by an error tending to exaggerate it, the 1952 census would have had to underestimate the population by 6.7 per cent.<sup>14</sup> If the underestimation in the 1952 census were a little less, then the error would tend to diminish the figure; in this case the compensatory equation would give a difference of even more than 162,100.

Moreover, since it is reasonable to assume that national statistics relating to births and deaths are influenced by certain errors due to underregistration (more marked in births than deaths), the error due to underregistration of deaths would imply a greater underregistration of births than would have been the case if the deaths had been correctly registered.

For these reasons it has been assumed, for the purposes of this

TABLE 1. BALANCE OF MIGRATION IN SOME PROVINCES OF CHILE, 1952-1960.<sup>a</sup>

*Annual Percentage Rate of Net Migration  
Calculated on the Basis of:*

*Births, Corrected on  
the Basis of:*

Province	Population in Mid-period (‘000s)	Official Statistics (uncorrected) (I)	Uniform Under- registration <sup>b</sup> (II)	Under- registration Estimated by Provinces <sup>c</sup> (III)
	1	2	3	4
<b>Immigration:</b>				
Santiago	2,068.2	1.38	1.20	1.19
Valparaíso	555.6	0.37	0.19	0.29
Concepción	471.2	0.44	0.21	0.33
<b>Emigration:</b>				
Cautín	379.6	-0.44	-0.60	-1.09
Coquimbo	284.6	-0.83	-1.05	-0.97
Ñuble	267.9	-0.49	-0.67	-0.77
Valdivia	245.8	-0.83	-1.03	-1.30
Malleco	166.7	-1.00	-1.21	-1.41
Aconcagua	134.3	-1.36	-1.54	-1.51
Maule	75.9	-0.84	-1.01	-0.98

<sup>a</sup> Calculated according to the compensatory equation (see text, p. 82).

<sup>b</sup> With a uniform correction factor: 1/0.93.

<sup>c</sup> Correction factors: Santiago, 1/0.92; Valparaíso, 1/0.95; Concepción, 1/0.95; Cautín, 1/0.79; Coquimbo, 1/0.94; Ñuble, 1/0.90; Valdivia, 1/0.86; Malleco, 1/0.88; Aconcagua, 1/0.93; Maule, 1/0.93. These figures represent average values taken from the annual series 1952-1960.

study, that the source of the error reflected in the compensatory equation is underregistration of births, and that, in any case, it would reflect a minimal error in these statistics. The correction necessary to make the birth figure for the compensatory equation for the country zero is 7.47 per cent; this correction is obtained directly by dividing the birth figure by 92.53 (the complement of 7.47).

Table 1 shows various calculations of the balance of migration in a group of provinces, using three different methods: 1. on the basis of uncorrected official statistics; 2. correcting the birth figure for each province by the nationally applicable factor of 92.53, which

TABLE 1. (CONTINUED)

<i>Province</i>	<i>Annual Rate of Intercensal Growth<sup>a</sup></i>	<i>Annual Percentage Rate of Natural Increase (Difference between Totals in Column 5 and Those in Columns 2, 3, and 4)<sup>b</sup></i>		
	5	(I) 6	(II) 7	(III) 8
<b>Immigration:</b>				
Santiago	3.89	2.51	2.69	2.70
Valparaíso	2.49	2.12	2.30	2.20
Concepción	3.20	2.76	2.99	2.87
<b>Emigration:</b>				
Cautín	0.91	1.35	1.51	2.00
Coquimbo	1.93	2.76	2.98	2.90
Ñuble	1.50	1.99	2.17	2.27
Valdivia	1.29	2.12	2.32	2.59
Malleco	1.04	2.04	2.25	2.45
Aconcagua	1.05	2.41	2.59	2.56
Maule	1.28	2.12	2.29	2.26

<sup>a</sup> Geometrical rate of increase. The rate for the country as a whole (excluding the international balance of migration of foreigners) was 2.52 per cent.

<sup>b</sup> This estimate is, therefore, only approximate.

presupposes a uniform degree of underregistration; and 3. correcting the birth figures with provincial factors calculated for the purpose.<sup>15</sup>

The figures obtained from the migration rates (columns 2, 3, and 4) are evaluated in relation to the rate of increase (column 5) and, even more directly, to the rate of natural increase of the province in question, estimated approximately by measuring the difference between the rate of intercensal increase and the migration rate (columns 6, 7, and 8). The intercensal rate of increase of the country—leaving out of consideration the international balance of migration of foreigners—was estimated as 2.52 per cent.<sup>16</sup> This

figure reflects a natural increase caused by a birth rate of 38.5 per 1,000 (the official figure being 35.2 per 1,000) and a death rate of 13.3 per 1,000.

These three calculations show consistently that three provinces had a positive balance of migration and the seven remaining ones had a negative balance. In the first group, this was the expected result, since these provinces contained the largest cities.

The first calculation, based on the uncorrected birth rate, exaggerates the migration rate of the provinces with a positive balance of migration and, at the same time, underestimates the rate of the provinces with a negative balance of migration (columns 2 and 4).

With the second calculation (based on uniform correction of the birth rate), if the local underregistration has been greater than that of the country as a whole, this gives rise to an error similar to that affecting the first calculation, but one of less magnitude. If the local underregistration is less than the average for the country as a whole, the resulting error is in the direction opposite to that described in the previous case.

The breakdown of the intercensal increase reveals some extremely high and low figures, such as those of Santiago (3.89) and Concepción (3.20), on the one hand, and those of Cautín (0.91), Malleco (1.04), and Aconcagua (1.05), on the other. In the first two provinces, any of the three estimates of the rate of migration could be compatible with the respective rates of natural increase (columns 6, 7, and 8), in the light of the official vital statistics themselves. On the other hand, it is hard to conceive of a rate of natural increase of 1.50 or even less (Cautín), and difficult to accept rates of the order of 2 per cent (Ñuble, Malleco, Maule, Valdivia), in provinces where the rural population constituted nearly 60 per cent of the total in 1960.

The calculation in column 4 generally produces acceptable results, when these are compared with the rates of natural increase based on the national rate. In any case, the results given for Cautín, Ñuble, and Maule should be treated with reserve, and should be further analyzed. The situation in Cautín can probably be partially explained by the presence of a considerable indigenous population.

THE USE OF CENSUS DATA  
RELATING TO AGE STRUCTURE

The balance of migration in an intercensal period may best be estimated by age cohorts, using survival ratios. This is a more certain and more rapid method than that of using statistics relating to births and to age at death. These figures are not often available for specific geographical areas in countries of the region, and even when they *are* available they give rise to serious problems of evaluation.

The compensatory equation for an initial age cohort  $x$ , over a period of  $n$  years, is:

$$N_{x+n}^n - N_x^0 \cdot {}_n P_x = M_{x, x+n}$$

where  ${}_n P_x$  is the ratio measuring the survival of the population of the cohort between the ages  $x$  and  $x+n$ . The value  $M_{x, x+n}$  represents the estimated balance of migration at the end of the period.

The above equation gives rise to two problems: The first is the elimination of census errors arising from incorrect declarations of age and, occasionally, of underestimation of  $N_{x+n}^n$  and  $N_x^0$ ; the second is the determination of the values of  ${}_n P_x$ .

The correction of errors arising from incorrect declarations of age presents serious difficulties in populations with an age structure modified by internal migratory movements.

Any error in age group  $x$  would not generally be compensated for, not only because we are dealing with data from different censuses, which are therefore probably not qualitatively comparable, but also because these are usually systematic errors that exaggerate the figures for certain age groups and underestimate them for others.

The determination of the values  ${}_n P_x$  involves the calculation of life tables (if these do not already exist) for the areas in which one intends to measure migration; or, at least, it requires estimates of the level of mortality to make use of model life tables.<sup>17</sup> It is often necessary to obviate this difficulty by using average values for the country as a whole.

There is, however, a fairly satisfactory solution to the two problems mentioned above. This consists of calculating the survival ratios by comparing the native population of each area registered for both

censuses by age cohorts, always supposing this to be a closed group. For this one needs tables relating to place of birth and to age. Such "observed" survival ratios really express, in addition to the survival of the cohort, the uncompensated errors contained in the census figures.<sup>18</sup>

This means that  ${}_nP_x$  includes a correction factor which, applied to the compensatory equation, gives a value of  $M_{x, x+n}$ ; this figure is substantially free of errors of the type described above.

Table 2 compares the results of two calculations, one based on "observed" survival ratios, and the other on "theoretical" ratios taken from the model life tables compiled by the United Nations Organization.<sup>19</sup>

A glance at the resulting figures convinces one of the superiority of the calculations based on "observed" survival ratios; it also demonstrates the magnitude of the errors that arise through using "theoretical" ratios and through assuming that the census data are reliable. The example given, that of the State of Bahía (Brazil), is

TABLE 2. BALANCE OF MIGRATION OF THE STATE OF BAHÍA (BRAZIL), 1940-1950.

Age in 1940	Males Born in Brazil	
	Estimated Balance of Migration at End of Period (1950)	
	Based on observed survival ratios <sup>a</sup>	Based on theoretical survival ratios <sup>b</sup>
	('000s)	
All ages	-51.6	-58.2
0-9	-10.8	+0.3
10-19	-31.7	-48.1
20-29	-7.8	-12.1
30-39	-1.6	+5.9
40-49	-0.1	-10.3
50-59	+0.3	+0.2
Over 60	+0.1	+5.9

<sup>a</sup> Figures refer to the population born in the State of Bahía and registered in Brazil.

<sup>b</sup> Based on a life expectancy at birth (both sexes) of 40 years, taken from the model life tables compiled by the United Nations Organization (see Reference 17).

not exceptional; on the contrary, it is frequently encountered in other areas of Latin America.

The advantages of using "observed" survival ratios are limited in practice by the lack of census tables covering the place of birth and age by geographical areas, as was pointed out above. For this reason, one has to fall back on observed survival ratios for the country as a whole. The level of mortality and the magnitude of the error in the age distribution of the population might differ too widely from the conditions obtaining in certain areas and, in consequence, seriously affect estimates of migratory movements. In any case, the use of observed survival ratios generally gives more acceptable results, to judge from the regularity of the age distribution of the migrants and the consistently negative balance of the migration.

#### USE OF CENSUS DATA ON POPULATION CLASSIFIED BY PLACE OF BIRTH AND AGE

Tabulation by birthplace and age helps greatly in the measurement of internal migrations. This is true even of the briefest method of classifying the birthplace, by the geographical area, distinguishing between natives and non-natives of such an area. However, despite the relatively low cost of securing it, this information has in the past not received the attention it deserves.

In the 1950 censuses, tabulations of this kind exist for only half a dozen countries. If these tabulations are again carried out in the same countries with the figures from the 1960 censuses, they will provide excellent material for investigation. This makes it even more important to improve the quality of census information relating to place of birth in general, and to that of aged people in particular.

Bogue<sup>20</sup> emphasizes the following adverse factors affecting calculation of place of birth: 1. changes in the boundaries of internal administrative areas; 2. inability to report data for individual cities ("the more precise the question is made, the greater the percentage of place of birth unknown becomes"); 3. mortality of migrants (in relation to age and to date of movement); 4. return of emigrants to

their birthplace; 5. the practice of *de facto* enumeration; 6. customs and other circumstances causing births to take place elsewhere than in the permanent residence of the mothers; and 7. the tendency of people (especially those with little education) to report as their birthplace the place where they have lived for a long time.

If one confines oneself to measuring migration over the relatively short period of time between two censuses, using survival ratios by age, and if one attempts to analyze this movement by place of origin, factors 1, 2, and 3 either do not apply or can be controlled by the same method of calculation. Factor 4, in the writer's opinion, in the past probably had only a small effect in Latin America, where the direction of migration appears to be irreversible.

It may be concluded from the foregoing that special attention should be paid to factors 5, 6, and 7.

The most important reason for births to occur elsewhere than the father's place of residence is probably the existence of medical and obstetric facilities in the large urban centers. Thus it may be assumed that the influence of this factor is limited by the distance and/or accessibility of the urban center in question. If, then, the migratory movement is measured in relation to the urban area, it is probable that "false" emigrants will be found in the zone of influence, and that, at the same time, real immigrants into the city will be unrecorded. If, however, the territorial unit used for measuring this movement is a comparatively extensive area (e.g., the principal administrative area, or a zone equivalent to what is called in some countries the "metropolitan area") this factor would have little or no adverse effect on the reliability of the data.<sup>21</sup>

The data from the Peruvian census of 1961 reveal a situation that could be explained in the terms outlined above. Table 3 shows percentages by age, up to 50 years, of Peruvian males born outside the city of Lima (immigrants), in relation to the Peruvian male population registered in that city; it also shows the percentage figures for those born in Lima and registered outside the city (emigrants), in relation to the total population born in Lima and registered in the country as a whole.<sup>22</sup>

The information in column 1 indicates a behavior pattern com-

TABLE 3. IMPORTANCE OF MALE IN-MIGRANTS INTO LIMA AND OF MALE OUT-MIGRANTS FROM LIMA, 1961.<sup>a</sup>

Age	<i>Percentages of Those:</i>	
	<i>Born in Peru but Outside Lima, in Relation to the Male Population Enumerated in Lima<sup>b</sup></i>	<i>Born in Lima and Enumerated Outside the City, in Relation to the Male Population Born in Lima<sup>c</sup></i>
	1	2
Under 1 year	3.5	16.7
1-4	7.2	19.7
5-9	14.1	22.3
10-14	26.1	17.7
15-19	51.6	13.2
20-24	67.6	12.6
25-29	69.5	13.0
30-34	66.3	13.2
35-39	67.5	16.3
40-44	69.4	18.0
45-49	66.8	16.0

<sup>a</sup> Including the city proper, various urbanized communes and the Province of Callao.

<sup>b</sup> Census figures.

<sup>c</sup> The figures for persons born in Lima and enumerated elsewhere are taken from a 1 per cent sample of the census figures.

monly found in areas that have been supplied for several quinquennia or decades with a continuous and substantial flow of immigrants. This is reflected in the percentage figures that rise continuously, at least until an age after which the movement loses numerical importance; this generally occurs around the age of 40, or even earlier.

The information given in column 2, which expresses the emigration of the population born in Lima, should show a similar trend, though at a lower level, since this is a case of emigration from a big city. However, almost up to the age of 15 years, the percentage figures are higher than those for higher ages. This is the opposite of what should occur, considering the age structure of the migrants around the date of the movement plus the cumulative effect of the passage of time. Such results probably stem from the fact that a large proportion of these children, registered as emigrants, were

born in Lima to mothers living elsewhere, who used the maternity services of the city. If the appropriate data were available, it would probably be found that the majority of these children, incorrectly classified as emigrants, were registered in districts near Lima.

In order to establish the magnitude of the errors due to incorrect declarations of place of birth, direct inquiry would be necessary. Current techniques of postregistration by sampling are an ideal solution, but, so far as we know, this kind of test has not been used to evaluate the quality of information relating to place of birth in recent Latin American censuses.

It might reasonably be supposed that erroneous declarations regarding place of birth are more frequent among immigrants who have resided longer in the place of enumeration than among relatively recent immigrants, and would therefore be more frequent among the aged. Older people tend to adopt the place of residence as the place of origin, and to attribute the same origin to others in the family.

An indirect method of evaluating this information is to compare the results derived from it with those derived from another method which is not affected by place of birth. The Brazilian censuses of 1940 and 1950 make such a comparison possible, as is shown below. In the State of Bahía in 1950, 67,400 males over 10 years of age, natives of Brazil and born outside the State of Bahía, were registered. In the same year, 233,900 people were registered outside Bahía, who had been born in the State of Bahía and had the same sex and age characteristics. The difference totalled, therefore, 166,500 people. A calculation of net intercensal migration, using survival ratios, showed a negative balance of 51,600 males over 10 years of age surviving in 1950. The difference between 166,500 and 51,600 people is perfectly consistent, and shows that the net balance of migration in the decade 1940–1950 represented in 1950 approximately one-third of the past net migratory movement, measured by survivors, in the State of Bahía. This latter proportion is confirmed by the number of emigrants (196,100) and immigrants (56,400) registered in 1940.<sup>23</sup>

An examination of the percentage figures by age groups for people

not born in the place of registration might give, under certain conditions of migratory movement, an approximate idea of the validity of the supposition that erroneous declarations as to place of birth increase with the age of the person questioned.

Such percentages may be considered as accumulated immigration rates, up to the age in question, of people belonging to the same cohort. Therefore, one normally would expect the values to rise continuously. The same consideration applies to the percentage of emigrants in the native population of the place of registration.

The Brazilian censuses of 1940 and 1950 permit this analysis to be made, though only during a short period of life. Table 4 shows the percentages by age of Brazilians not born in the State of Paraná (immigrants), classified by sex; and also the percentage of native-born males in the State of Bahía registered outside that state (emigrants).

Columns 3 and 6 of Table 4 show that the proportion of immigrants in each age cohort increased in the State of Paraná between 1940 and 1950. This is the normal trend in a region where immigration is high. Such an increase is even marked in the older age groups, and this conflicts with the hypothesis that the systematic error arising from erroneous declarations of place of birth is higher in these age groups.

Column 9 shows a similar behavior pattern for emigrants from Bahía, except in the last two cohorts where the percentage falls instead of rising. There are at least three possible explanations of this phenomenon: the return of aged emigrants; a differential systematic error in the declarations of the ages of emigrants and nonmigrants; and defective, or relatively more defective, declarations of the place of birth by people over 60 years of age. Although the factor responsible for the behavior of the last cohort cannot be determined, it is obvious that the error, if there is one, has no practical effect on the measurement of migration.

Examining the percentages by age in each census separately often leads to erroneous conclusions. The percentages of immigrants in 1950 in Paraná (columns 2 and 5 of Table 4) begin to fall after the age of 40 years. From the age of 20, however, they increase less

TABLE 4. PERCENTAGE OF IN-MIGRANTS INTO PARANÁ<sup>a</sup> AND OUT-MIGRANTS FROM BAHIA<sup>b</sup> (1940 AND 1950), BY AGE.

Age in 1940 (x)	Native Brazilian Population									
	State of Paraná (Immigrants)					State of Bahia (Emigrants)				
	Men		Women			Men		Women		
	1940 (x)	1950 (x + 10)	Difference (Col. 2 minus Col. 1)	1940 (x)	1950 (x + 10)	Difference (Col. 5 minus Col. 4)	1940 (x)	1950 (x + 10)	Difference (Col. 8 minus Col. 7)	
0-9	—	18.6	18.6	—	18.2	18.2	—	2.2	2.2	
10-19	10.8	35.5	24.7	10.7	34.3	23.6	2.9	6.1	3.2	
20-29	18.0	43.9	25.9	17.4	39.5	22.1	6.5	16.1	9.6	
30-39	24.5	45.3	20.8	21.5	40.1	18.6	14.6	17.9	3.3	
40-49	27.8	44.7	16.9	23.4	39.3	15.9	16.4	17.7	1.3	
50-59	28.5	42.7	14.2	24.2	37.2	13.0	15.7	16.2	0.5	
Over 60	27.6	39.0	11.4	23.3	33.1	9.8	14.9	14.6	-0.3	
	29.0	38.9 <sup>c</sup>	9.9	24.9	33.3 <sup>c</sup>	8.4	13.3	13.2 <sup>c</sup>	-0.1	

Source: Brazilian Censuses.

<sup>a</sup> Percentage of persons born outside Paraná and enumerated in that state, in relation to the total registered population of Paraná.  
<sup>b</sup> Percentage of persons born in Bahia and enumerated in other states, in relation to the Bahia-born population enumerated in the whole of Brazil.  
<sup>c</sup> Over 70 years of age in 1950.

rapidly than would be expected if one took into consideration the probable distribution of the emigrants in terms of their age at the time of migration. This is chiefly due to the fact that immigration increased between 1940 and 1950 in comparison with the preceding decade, as is clearly demonstrated by the substantial change in the percentage represented by the 0-9 years age group, which rose from 11 to over 18 per cent. If the percentages by age of immigrants had remained constant for several decades, then a sectional analysis of a census would give results similar to those produced by a longitudinal analysis by cohorts.

In conclusion, it may be said that the analysis of the census data for the states of Paraná and Bahía, as well as other states of Brazil that are not examined here, gives the investigator confidence in the information relating to place of birth, at least for the purpose of measuring interstate migratory movements. The still unpublished results of the 1960 censuses will make possible a similar confirmation of the data in no less than six countries.

#### AN EXAMPLE OF THE PRINCIPLES OUTLINED

The data from the Brazilian censuses of 1940 and 1950 allow for the separate calculation of immigration and emigration in any particular state, using the method of survival ratios.

In order to measure immigration, one takes as a basis the Brazilian population not born in the state of registration. Emigration may be measured by taking the population born and registered in the same state, or the population born in the state in question and registered elsewhere (emigrants).

Survival ratios by sex and age are calculated for each state by comparing the total native population at the time of each census.

The results of applying the data from the State of Bahía are shown in Table 5. These data consist of the annual rates relating to the following trends: (I) net migration; (II) net immigration; and (III) net emigration.<sup>24</sup> The net migration rates were also calculated by a different method (IV), using percentages instead of absolute figures, as indicated in footnote b to Table 5.

TABLE 5. ANNUAL MIGRATION RATES IN THE STATE OF BAHÍA (BRAZIL) 1940-1950 (PERCENTAGES).

Age in 1940	Based on Observed Survival Ratios <sup>a</sup>		Based on Proportional Method <sup>b</sup>	
	Net Migration		Net Migration	
	(I)	(I')	(II)	(III)
	1	2	3	4
0-9	-0.19	-0.18	0.12	-0.31
10-19	-0.76	-0.70	0.22	-0.98
20-29	-0.27	-0.25	0.08	-0.35
30-39	-0.08	-0.08	0.06	-0.14
40-49	-0.01	-0.01	0.04	-0.04
50-59	+0.04	+0.03	0.01	+0.03
Over 60	+0.01	+0.01	0.01	+0.01
				5
				-0.18
				-0.72
				-0.25
				-0.07
				-0.01
				+0.03
				+0.01

<sup>a</sup> Observed survival ratios of the population born in Bahia. The rates were calculated on the basis of the average population of each cohort, except the figures in col. 2 which refer to the initial (1940) population of the cohorts. The final figure (balance of migration, immigrants or emigrants) refers to the situation at the end of the period.

<sup>b</sup> Using the formula  $\frac{I - R_{x+10^{60}}}{(R_{x+10} - R_{x+10}^{60})} \cdot 10^2 x$ , where  $R_x = \frac{(\text{Immigrants} - \text{Emigrants})}{\text{Population}}$ , and  $10^2 x$  is a theoretical survival ratio for  $e_x = 40$  (both sexes). These rates, by definition, refer to the initial population of the cohorts, and net migration is estimated at the end of the period.

Calculation ( $I$ )—net migration—appears in column 1. Column 2 shows the second calculation ( $I'$ ), which differs from ( $I$ ) only in that the rates were based on the average population by age cohorts in the latter, whereas in ( $I'$ ) they were based on the initial population of the cohort (1940). Thus ( $I'$ ) is comparable to ( $IV$ ) (column 5), where the rates are also based on the initial population.

The similarity of the rates in ( $I'$ ) and ( $IV$ ), in addition to the age structure, lends support to this calculation. The obvious reasons for relying on the quality of these data also apply to the rates in ( $I$ ).

Immigration and emigration rates also show a regular pattern and, as was to be expected, the highest values relate to the 20-year-old age group and diminish rapidly as age increases. The algebraic sum of these two rates gives the net migration rate ( $I$ ).

The emigration rates show an apparent inconsistency from the age of 50 onward. If all the elements intervening in the calculation were exactly correct, this change would indicate a tendency on the part of emigrants to return home. However, when the figure is close to zero, as in this case, the rate may have a positive or negative value, because of minor errors which are, of course, inevitable. It is also interesting to note that the immigration rates maintain a constant trend throughout.

#### CENSUS DATA RELATING TO DURATION OF RESIDENCE

In recent population censuses, seven Latin American countries made innovations in internal migration research by inquiring about duration of residence (*see* page 79). However, it will be necessary to wait some time before we know the tabulated results of these inquiries and are able to make a general evaluation of the quality of the information thus obtained.

The first duration-of-residence data to be published have been those of the cities of Panamá and Colón (Panama). The writer has also had access to additional information on sample punch cards from the census, corresponding to the populations of Greater Santiago (Chile).<sup>25</sup> The comments below are an attempt at a brief analysis of the quality of the data available.

### *Panama City*

Volume II of the Panama Population Census of 1960, containing the data for Panama City,<sup>26</sup> includes information on immigrants from other parts of the country.<sup>27</sup> Table 79 in this volume gives the sex and age distribution of the immigrants.

To make even a partial evaluation of the quality of these data one must compare the total number of immigrants whose duration of residence is less than 10 years with an intercensal balance calculated in the following manner:

Since the quality of the data varies according to whether they relate to the child or to the adult population, each category is analyzed separately.

According to the census figures, in 1960 there were 6,561 immigrants under 10 years of age in Panama City. All of these, obviously, were born in the decade immediately preceding the census. This figure is then compared with the intercensal balance between the births in the Panama district from 1951 to 1960, to mothers residing there, and the population registered in the Panama district on December 11, 1960:<sup>28</sup>

Births in Panama district (1951–1960)	83,876
Population under 10 years of age in Panama district (December 11, 1960)	<u>– 77,607</u>
Balance	+ 6,269

This balance of 6,269 should express the difference between the deaths and births that occurred and the balance of migration of the district. Deaths could be estimated, without any serious error, as 4,000, so that the balance of 6,269 would signify a net negative migration (i.e., emigration) of 2,269 children under 10 years of age ( $4,000 + 2,269 = 6,269$ ).

If the total of deaths is estimated as 6,000, instead of 4,000, this would signify that the balance of migration is practically nil. This conclusion, however, is unacceptable, as it presupposes an emigration. The explanation is to be found in the errors affecting the birth and/or census figures.

If one assumes that the register of births was incomplete, the above-mentioned discrepancy would be even greater. Apparently, the only solution is that there was an underestimation of the population under 10 years of age. Instead of 77,600 children, there should be about 86,500 (i.e., an underestimation of over 10 per cent) for the intercensal balance to be (-) 2,600; this figure would reconcile the 6,600 immigrants recorded in the census with the 4,000 infant deaths. In short, it appears unlikely that there was a substantial error in the registration of immigrants under 10 years of age, and even if this had been the case, it would be due to a problem of global underestimation and not to incorrect recording of immigrant status.

The census figure for immigrants over 10 years of age with a duration of residence of less than 10 years can be compared with net migration in the district of Panama in the period 1950-1960:<sup>29</sup>

	<i>Men</i>	<i>Women</i>
	('000s)	
Net migration in the district of Panama of the population over 10 years old in 1960 (1950-1960)	16.6	23.8
Immigrants over 10 years old registered in the city of Panama in 1960, with a duration of residence of less than 10 years (excluding immigrants arriving directly from abroad)	15.0	20.9
Differences:	1.6	2.9

Differences of the order of 10-12 per cent cannot be considered as serious discrepancies if one takes into account various factors which would help to explain them. In fact, some of these factors tend to cause an exaggeration of net migration, while others cause an underestimation of the number of registered immigrants.

The following factors tend to exaggerate net migration:

1. Inclusion in the calculation of the population "in transit" and also of people living in certain institutions (asylums, hospitals,

prisons, boarding schools, etc.), whose migrant status was not investigated and who were excluded from the tabulations of immigrants. This figure may be assumed to be higher in 1960 than in 1950 (taking mortality into account).

2. The use in the calculation of net migration of survival ratios applicable to the total population of the country (whereas mortality in the Panama district was probably lower); this would cause an overestimation of the balance of migration.

3. The inclusion in the balance of migration of the balance of *international* migration, which is not included in the census figures. If these factors are eliminated from the calculation, the net migration in the district of Panama would probably be reduced by a number greater than the differences encountered in the above comparison.

Moreover, the census figures for immigrants into Panama City should be increased by a certain number of cases that were probably included in the immigrant total (of persons over 10 years old) where the duration of residence was unknown. Although one may be inclined to suppose that the great majority of these are immigrants with a long duration of residence, this is not evident in the case under discussion. In the case of immigrants over and under 10 years of age approximately 7 per cent can provide no information as to duration of residence. This leads one to suppose that the immigrants without duration-of-residence information are distributed among all duration-of-residence categories. An exactly equal distribution would mean the addition to the census figure for immigrants with less than 10 years' duration of residence of some 1,200 males and 1,600 females.

It may be concluded from the foregoing that if one were to make the adjustments necessary for the census figures and the balance of migration to be strictly comparable, the former would probably be slightly higher than the latter. The excess, probably 3,000 or more persons, would represent the emigrants.

In conclusion, it may be said that the census figures for the total number of immigrants into Panama City with a duration of residence

of less than 10 years does not reveal the existence of serious errors in the declaration of migrant status and duration of residence.

*Greater Santiago (Chile)*<sup>30</sup>

The questionnaire used in the Chilean census of 1960 included the following queries:

1. Province (or country) of birth;
2. Year in which residence in the place of registration began (if the person had always lived in the place of registration, i.e., native-born, the questionnaire was marked "Always"; if the person's residence was not permanent, it was marked "Transitory");
3. Last province (or country) in which the immigrant resided before coming to the place of registration;
4. Urban-rural classification of the community of origin (city, town, rural area, etc.).

The migrant status of persons born outside the province of registration was decided on the basis of their answers to Question 1. In the case of those born in the province of registration, the migrant status in relation to the place of residence depended entirely on the answer given to Question 2. For the latter group, Question 3 signified, in most cases, a repetition of Question 1, and added no new information as to migrant status.

Duration of residence may also be deduced from the answers given to Question 2. Therefore, the quality of the information as a whole depends to a great extent on the accuracy of the answers given to this question.

This is especially true if one considers the situation in Greater Santiago (Province of Santiago), where it is obvious that the migrant status of persons resident in that urban center and born in the Province of Santiago depends on the answer to Question 2. The data in Table 6 refer to three communes of Greater Santiago, the source being sample figures from the 1960 census. The population of the three communes was approximately one-third that of Greater Santiago.

Before analyzing Table 6 it is worth pointing out, in general terms, the principal types of errors in declaration that probably affect the information:

1. Persons not born in Greater Santiago (immigrants), who declare that they have *always* lived in the place of registration (Greater Santiago); their use of the word *always* would appear to mean that they had not changed their place of residence within the Greater Santiago area, or it might constitute a deliberate omission or an erroneous decision as to migrant status.
2. The reverse of (1), i.e., cases of persons born in the Greater Santiago area who answered Question 2 by giving the year when they began to live in their present dwelling or commune (such people would therefore be erroneously classified as immigrants.)
3. Immigrants giving incorrect information as to the number of years they had resided in the Greater Santiago area, i.e., answering in a manner similar to that described in (2) above.

Errors of types (1) and (2) affect the information on migrant status. Those of types (2) and (3) affect duration-of-residence information.

Line 2 of Table 6 shows the number of persons born in the Province of Santiago who answers "always" to Question 2. Since they were not asked for information as to their place of origin—Questions 3 and 4—they are classified in the category "No information" (column 4). As regards the Province of Santiago, such persons might be considered as nonmigrants, but in the case of the Greater Santiago area a considerable margin of doubt exists.

Lines 4, 9, and 13 give information on immigrants. The same lines, in column 2, show the immigrants whose place of origin was the Province of Santiago. The figure in line 4 (993) may possibly include persons born in the Greater Santiago area who were placed in the category of immigrants owing to an error in classification. Also, the figure in line 9 (309) probably includes immigrants whose last place of residence was a province other than Santiago, but who answered Question 2 incorrectly, thinking it referred to a subsequent movement within the Greater Santiago area. This consideration also applies to immigrants born abroad (29).

TABLE 6. MIGRANT STATUS OF THE POPULATION OF THREE COMMUNES OF THE GREATER SANTIAGO AREA (CHILE), ACCORDING TO A SAMPLE FROM THE 1960 POPULATION CENSUS.<sup>a</sup>

<i>Migrant Status and Birthplace</i>	<i>Total</i>	<i>Province of Origin</i>		
		<i>Province of Santiago<sup>b</sup></i>	<i>Other Provinces</i>	<i>No Information</i>
	1	2	3	4
1. Born in the Province of Santiago	4,951	1,001	98	3,852
2. "Always"	3,452	—	1*	3,451**
3. "Transit"	83	—	—	83**
4. "Immigrant"	1,127	993	97	37
5. No information	289	8	—	281
6. Born in other provinces of Chile	2,287	309	1,505	473
7. "Always"	7*	—	1*	6*
8. "Transit"	111	—	3	108**
9. "Immigrants"	1,831	309	1,492	30
10. No information	338	—	9	329
11. Born abroad	182	29	128 <sup>c</sup>	25
12. "Transit"	10	—	—	10**
13. "Immigrants"	158	29	128	1
14. No information	14	—	—	14
15. Totals	7,420	1,339	1,731	4,350

<sup>a</sup> Communes of Nuñoa, Cisterna, and San Miguel. This information was compiled from punch cards from the 1 per cent sample taken from the 1960 census, lent to the Latin American Demographic Center by the Office of Statistics and Censuses of Chile for the purposes of this analysis.

<sup>b</sup> The Greater Santiago area is in the Province of Santiago.

<sup>c</sup> Including immigrants coming directly to Greater Santiago from abroad.

Note: The figures marked with an asterisk (\*) are inconsistent. The double asterisk (\*\*) means that, presumably, no inquiries were made as to place of birth since this was irrelevant.

The immigrants recorded in the above-mentioned lines, in column 2, total 1,331 and constitute 38 per cent of the total of registered immigrants (lines 4, 9, 10, 13, and 14 in column 1). This proportion is much higher than the 10 per cent recorded in the immigration inquiry held in the Greater Santiago area in 1962 by the Latin American Demographic Center. If this latter percentage were applicable to the data based on the sample from the census figures, the figure of 1,331 immigrants coming from the Province of Santiago would be reduced to less than 400. Although the data in Table 6 refer to three communes, and the data from the immigration inquiry refer to the entire Greater Santiago area, the variation from one commune to another of the place of origin is far too small to account for this substantial difference.

The following observations may be made in support of the theory that there was a serious error in the classification of migrant status:

In the three communes referred to in Table 6, the immigrants constitute approximately 47 per cent of the population. The percentage of immigrants found in the same communes in the 1962 immigration inquiry is approximately 33, that is to say, two-thirds of the former figure.

The classification of the immigrants by duration of residence reveals a very high proportion of immigrants with a short duration of residence: 20 per cent with less than one year; 66 per cent with less than 10 years. The immigration inquiry held in the Greater Santiago area revealed that 39 per cent of the immigrants had arrived within the previous 10 years (1952-1962). It is noteworthy that the high proportion of immigrants with residence of short duration in the sample taken from the census figures is especially attributable to the immigrants coming from the Province of Santiago: 29 per cent with less than one year's duration, and 85 per cent with less than 10 years' duration.

In short, the census figures exaggerate the total number of immigrants into the Greater Santiago area. This is due principally to erroneous information about the migrant status of persons born in the Province of Santiago.

## REFERENCES

<sup>1</sup> Hamilton, Horace C., Some Problems of Method in Internal Migration Research, *Population Index*, 27, 299, October, 1961.

<sup>2</sup> The topics of inquiry recommended for the national censuses of 1960 by the Statistical Office of the United Nations Organization include place of birth, but no other kinds of information directly connected with internal migrations; nor is this type of information included in the recommendations made by the Committee on Improvement of National Statistics (Inter-American Statistical Institute).

<sup>3</sup> The section "Population Censuses as Sources for the Study of Internal Migration" describes the usual methods of investigating internal migratory movements on the basis of census figures. To measure the mobility of the population one would have to investigate the migratory history of each person, which appears to be impracticable, at least at present, in a census.

<sup>4</sup> Inquiries were made as to the "departamento" (principal administrative area) in which each inhabitant was living on January 1, 1945, i.e., approximately five years before the date of the census (April 18, 1950).

<sup>5</sup> There is evidence that similar tabulations were compiled for the Argentine census of 1947, but these were never published.

<sup>6</sup> Defining as immigrants (or emigrants) persons born in a principal administrative area different from the area of census registration (or residence).

<sup>7</sup> The published tabulations of the censuses of El Salvador, Ecuador, and Bolivia do not include data of this kind. However, it is known that in the case of Bolivia there is an unpublished tabulation of category 1.

<sup>8</sup> Taeuber, Karl E., Duration-of-Residence Analysis of Internal Migration in the United States, *The Milbank Memorial Fund Quarterly*, 39, 116-131, January, 1961.

<sup>9</sup> De facto enumeration, a practice followed in recent censuses in Latin American countries, is a factor causing overestimation in the big cities, owing to the "in transit" population. It is not known to what degree this overestimation compensates or exceeds the probable omission of residents.

<sup>10</sup> Late registration is frequent in Latin America. In recent years circumstances have arisen that have caused, and continue to cause, late registration, e.g., certain legal requirements (school matriculation, family allowances for children, etc.). The subsequent legalization of conjugal unions also contributes to this trend.

<sup>11</sup> The value of  $M$  is an estimate referring to the middle of the period, bearing in mind that  $D$  includes the deaths of immigrants during the period.

<sup>12</sup> Figures are from the annual reports of the Office of Statistics and Censuses. These vital statistics are tabulated by place of residence.

<sup>13</sup> Such underregistration refers to the normal period of registration each year (until March 31st of the following year). No account is yet taken of late registration.

<sup>14</sup> An unofficial estimate indicates underestimation of the order of 5.8 per cent.

<sup>15</sup> The annual figures refer to registrations of children under two years, effective up to March 31st of the following year. To make the correction described

in (3) integrity coefficients were used; these were calculated by Héctor Gutiérrez (a former scholarship-holder of the Latin American Demographic Center) on the basis of late registrations in each province in the period 1952-1960 (extrapolating where necessary).

<sup>16</sup> The intercensal rate for the population as a whole was 2.56 per cent.

<sup>17</sup> Demographers are familiar with the model life tables compiled by the United Nations Organization (United Nations: METHODS FOR POPULATION PROJECTION BY SEX AND AGE, ST/SOA/Series A, No. 25, New York, 1956).

<sup>18</sup> This is due to survival and "error" in the population born in the area. In general, however, the majority of the population born in an area lives in that area. Therefore populations born and enumerated in an area have a high percentage of overlap. Survival ratios based on the former are also valid for the latter, and may consequently be applied to the compensatory equation.

<sup>19</sup> United Nations Organization; see Reference 17.

<sup>20</sup> Bogue, Donald J., The Use of Place-of-Birth and Duration-of-Residence Data for Studying Internal Migration, Document UNESCO, E/CN.9/CONF.1/L.10, United Nations Seminar on Evaluation and Utilization of Population Census Data in Latin America, 30 November-18 December 1959, Santiago, Chile.

<sup>21</sup> Bogue (*op. cit.*) mentions the traditional custom among women in India of going to their parents' home to have their first child, and generally the subsequent children as well.

<sup>22</sup> Lima consists of several urban districts, including the Province of El Callao.

<sup>23</sup> Bogue (*op. cit.*) comments on the figures from census data relating to place of birth, compiled in states of India and the United States, in relation to estimates of the net balance of migration, applying survival ratios by age groups. The discrepancies are of such magnitude that they cause serious doubts in the writer's mind as to the quality and possible use of such place-of-birth data.

<sup>24</sup> Migration rates calculated at the end of the period.

<sup>25</sup> Punch cards from a sample of the census held by the Office of Statistics and Censuses of Chile.

<sup>26</sup> Panama City, in accordance with the 1960 boundary limits, includes all the urban area of the Panama district.

<sup>27</sup> This information excludes immigrants arriving in Panama City directly from abroad.

<sup>28</sup> In comparing the balance of migration of the district of Panama with the number of immigrants recorded in the census in Panama City, the following points were borne in mind: In 1960 Panama City contained 93 per cent of the population of Panama district (294,400 inhabitants) and 100 per cent of its urban population. Immigration into the rural part of the district had no significance in the balance of migration of the whole population of the district; immigration into Panama City from the rural part of the district is very small in comparison with the figure for immigrants given in the census figures: 628 persons (with less than 10 years' residence), including about 100 children under 10 years of age.

<sup>29</sup> Comparison of the figures for immigrants in the city with the balance of migration of the district is justified by the reasons outlined in Reference 28.

<sup>30</sup> The Greater Santiago area consists of the Commune of Santiago and 10 other urban communes. The population was 1,933,500 in 1960.