ESTIMATES OF INTERSTATE MIGRATION IN MEXICO, 1950-1960: DATA AND METHODS

by Wm. W. WINNIE, Jr.

Men have moved from place to place over the face of earth since time immemorial. Each group of migrants has found it necessary to make certain adaptations in its way of life in order to survive in a new area; often, the migrants in turn have wrought changes in that area as well. Whether in response to economic, social, political, or other factors, migrations are among the most significant human phenomena in geography as well as in other fields of study, not only because of the changes the migrants produce in the landscape, but also because each group arriving in an area makes its contribution to the total culture which evolves there.

Mindful of the massive overseas migrations of Europeans and of the peopling of the humid grasslands of the world during the past century or so, some are quick to assert that the age of migrations has ended. One has but to look around him to see that this is not the case. Throughout the world, the movement from rural areas to nearby cities is going on at an unprecedented rate. Long distance movements from city to city as well as from country to city are characteristic of most countries of the world, and in many of them, important inter-regional movements of rural people also are taking place. Nor is international migration a thing of the past. Entirely apart from the great upheavals at the end of World War II, and in spite of the growth of restrictions and controls on international movements during the present century, many thousands of migrants leave their homes each year to take up permanent residence in other countries. There are even some indications that the peopling of the long-neglected lowlands of the humid tropics of the Western Hemisphere has begun. Many forces, not the least of them the development of modern transportation facilities and communications media, have made the middle of the Twentieth Century the period of greatest population mobility the world has yet experienced.

In spite of the great importance of migrations in all fields of learning concerned

with man and his behaviour, both qualitative and quantitative study of this subject has failed to develop as rapidly as that of some other human phenomena. Movements within the boundaries of a single country have received even less attention than overseas migrations: the latter are more adequately recorded in official statistics and, in addition, they usually involve sharper cultural contrasts and more marked changes in environment. This is not to say that the study of internal migration is a virgin field. Much of the literature of settlement geography is directly concerned with the subject, particularly in its qualitative aspects, and efforts in sociology to classify internal migrations and to quantify each type of movement are far from new. Nevertheless, neither qualitative nor quantitative research on internal migrations can be considered well developed.

The lack of development of even qualitative studies of internal migration rests in part on the scarcity of suitable numerical data on the movements involved. In turn, the absence of any widely-accepted classification of a suitable nature is among the major deterrents to the collection of such numerical data.

Statistics on internal migration are even less satisfactory than those on immigration and emigration. The collection of direct data by registration methods would require the creation of a costly and excessively burdensome recording system especially for this purpose; such a system is approximated by the population registers maintained in some European countries, but does not exist at all in the Western Hemisphere. Census techniques, on the other hand, are not well suited to the collection of direct data on migration since, by design, a census is analagous to an instantaneous photograph of a football game, in that it records the characteristics at one point in time of a population which is undergoing constant change. Responses to a question on place of residence several years before the date of the census appear to be subject to strong memory bias, and those dealing with a short time span may reflect an extremely unusual pattern of movements as was the case in the data on place of residence in 1949 collected in the 1950 United States Census of Population. The approach used in the 1960 census of Mexico appears advantageous at first sight: one question determines the individual's last previous place of residence and another asks the date on which he moved. This combination of responses, together with replies to other questions on the schedule, should produce a veritable mine of potential infomation — but a long and complex series of tabulations would be required to convert even a small part of that potential into reality. The first of those tabulations has yet to be prepared, and until it has been carefully studied there will be no indication of how well the procedure actually worked in practice (1).

Because of the lack of direct statistical data, quantitative studies of internal migration usually must be based on indirect methods. One of the two most common approaches is to treat migration as a residual element of change, that is, to assume that all of the change in the size of the population which cannot be accounted for by natural increase is due to migration. Obviously, this procedure is incapable of yielding any indication of the sources and destinations of migrants. However, its

(1) Juan C. Elizaga, "Assessment of Migration Data in Latin America" (*The Milbank Memorial Fund Quarterly*, Vol. XLIII, N° 1, January 1965, pp. 76-106) reviews the statistical data available to study internal migration in the various Latin American countries and comments in more detail on the complications involved in the use of such data.

results can be expressed as rates of net migration to and from each area. The second of these approaches is based on census data on the place of birth of the population, cross-classified by place of residence. Ordinarily, data from only one census are used to assess the cumulative effect of all movements during the lives of all people who survived to the date of the census. The results do not take into account any intermediate moves, nor do they refer to a specific time period. Hence they reflect the ultimate, rather than the immediate, sources and destinations of migrants and they cannot be used at all to calculate valid migration rates. In addition, where state boundaries pass through densely settled areas or near the edges of large cities, the estimates may show a large net movement between contiguous states when all that really is involved is local movement within the same small district and therefore not migration in the usual sense. As a special case of this general type, the data for individual states may be affected to some degree in areas where many births take place in hospitals outside the mother's state of residence. In spite of these shortcomings, census data on state of birth are the only source of quantitative information on internal migration unless the census also includes a question on previous place of residence. The possibilities for using such data to arrive at quantitave estimates of migration by type, source, and destination have been explored far less than is warranted by the importance of the subject and the nature of the basic statistics. The present article illustrates a major refinement of the place-of-birth approach, a refinement achieved by using data from two sucessive censuses. It presents the results of applying the refined method to estimate the direction and magnitude of interstate migrations in Mexico between 1950 and 1960, and compares the results with those arrived at by treating migration as the residual element of change in the population of each Mexican state during the same period to assess their general reliability and hence their usefulness as a basis for calculating migration rates ([2]). T. Lynn Smith has developed an even more refined method to estimate the amount of migration from other states of Brazil to the Distrito Federal (Rio de Janeiro) from 1940 to 1950 ([3]). That method is based on data on place of birth by place of residence, cross classified by age and sex, and hence is applicable only where such data are available.

THE METHOD

Place of birth data from a single census can be used to estimate the cumulative direct influence of migration on the size of the population of a particular area within a country and, if properly classified, they can yield such estimates on a state-to-state basis. The results leave a great deal to be desired, however, for they do not refer to any particular time span, and the extent to which they are influenced by mortality

([2]) Nathan L. Whetten and Robert G. Burnight based their article, "Internal Migration in Mexico" (*Rural Sociology*, Vol. 21, 1956, pp. 141-151) primarily on the analysis of the data on state of birth by state of residence from the 1950 census. However, they also considered the change which took place between 1940 and 1950 in the number of persons born in all other states who were living in each state, but erroneously referred to this figure as "net number of persons gained through migration."

([3]) T. Lynn Smith, *Brazil: People and Institutions* (Baton Rouge: Louisiana State University Press 1963), pp. 148-149; *Latin American Population Studies* (Gainesville: University of Florida Press, University of Florida Monographs, Social Sciences Nº 8, Fall 1960), pp. 55-59.

is entirely conjectural. The most frequently raised objection to the use of place-of-birth data to reflect migrations is that no cognizance is taken of the individual's intermediate places of residence between birth and enumeration. This consideration probably has relatively little effect on the grouped data: when combined, the effects of many individual moves appear to be self-cancelling to a considerable degree.

The number of survivors of net migration between two specific states may be estimated on the basis of place-of-birth data from only one census by subtracting the number of persons born in A and residing in B from the number born in B and residing in A. Such an estimate of migration from Coahuila to Durango is arrived at as follows on the basis of 1960 census data:

Born in Coahuila, living in Durango in 1960	14,981
Born in Durango, living in Coahuila in 1960	36,728
Estimated net migration	−21,747

Since the result is negative, the data indicate a net movement of about 22,000 persons from Durango to Coahuila.

What, precisely, is the relationship between this figure and the net amount of migration? The 15,000 persons born in Coahuila and living in Durango are the survivors of all Coahuila-born migrants to Durango who have not subsequently moved on to some other state or returned to Coahuila. Therefore, the result is not really a measurement of net migration during the lives of people now living: it is the cumulative direct effect of all migration of people born in these two states on the size of the population of each during that indeterminate period.

The chief advantage of using data from two censuses is that the period to which the estimates refer is made determinate. The procedure consits of comparing *changes* in the number of persons born in one state but living in another. For convenience, these changes are referred to in this paper as the estimated gross migration, even though they may not closely reflect gross migration in the usual sense in all cases. The net movement between Coahuila and Durango is estimated as follows:

Born in Coahuila, living in Durango:	
1960	14,981
1950	13,725
Change, 1950-60	+ 1,256
Born in Durango, living in Coahuila:	
1960	36,728
1950	33,241
Change, 1950-60	+ 3,487
Estimated net migration from Durango to Coahuila, 1950-60 (3,487 - 1,256)	2,231

The end result is likely to be more reliable than either of the intermediate results, for in it the effect of mortality upon each of the intermediate results is self-cancelling to a considerable extent. The change in the number of persons born in Coahuila and living in Durango is made up of the following components, and therefore the extraneous morality influence is partially self-cancelling even in it:

Coahuila-born migrants to Durango 1950-60.

LESS Mortality and subsequent departures among those migrants

PLUS Earlier Coahuila-born migrants to Durango who have since died or moved away.

The estimate of net change due to migration between the two states is thus made up of the following elements:

Coahuila-born migrants to Durango, 1950-1960

Less Durango-born migrants to Coahuila, 1950-60

LESS: Mortality and subsequent departures among these Coahuila-Durango migrants.

PLUS: Mortality and subsequent departures among these Durango-Coahuila migrants.

LESS: Earlier Durango-born migrants to Coahuila who have died or moved away since 1950.

PLUS: Earlier Coahuila-born migrants to Durango who have died or moved away since 1950.

The state-by-state estimates of the gross change due to migration are given in Table 1, which also shows the estimated net migration change in the population of each state. The net movement between each pair of states can be arrived at by taking the difference between the two figures given in this table for each pair of states, and, for reasons indicated above, it is likely to be more accurate than the estimates of each of the two gross movements. The latter are given separately, however, because they are needed for some types of substantive analysis as well as for the evaluation of the reliability of each estimate.

THE PATTERN OR INTERSTATE MIGRATIONS IN MEXICO

Detailed analysis of the patterns characteristic of Mexico's internal population movements will be presented in a later paper based on a study of other data in combination with the estimates presented here. For purposes of illustration, however, figures 1 through 4 depict some of the major patterns which are apparent from the data in Table 1. Two movements stand out above all others: the heavy migration from all parts of the country to the national capital (figures 1 and 2), and the peopling of newly-irrigated lands in the northern Pacific states, particularly Baja California (Figure 3). Practically every Mexican state contributed to the spectacular

rush to Northern Baja California, but the extent to which the migrants were drawn from only five states in the western portion of the Plateau is especially striking. Migration from the rural parts of the central region to less densely populated parts of the country might be expected from the high density of rural population and the scarcity of cultivable land characteristic of the states of the first group, but this actually occurred only in terms of the two movements already mentioned and a much lesser flow to Veracruz, Tamaulipas, Nuevo León, and Chihuahua. Otherwise, this region received, rather than lost, migrants in the exchange with other parts of the nation (Figure 2).

The importance of interstate migration to the Monterrey Metropolitan Area is reflected in the estimates of net migration between Nuevo León and other states (Figure 4). On the basis of their rate of population growth during the decade, most of the administrative divisions of Nuevo León outside the Metropoitan Area appear either to have lost population through migration, or to have been substantially unaffected by it. The net movement shown from neighboring states, especially Coahuila and San Luis Potosí, is undoubtedly smaller than the true movement from those states to Monterrey, for there is some as yet unmeasured rural-urban migration from the nearby parts of Nuevo León to the cities of those states. On the whole, Figure 4 confirms the supposition that migrants to Monterrey are drawn mostly from the northeastern part of the country, perhaps to an even greater extent than might have been expected, and sets a minimum of about 90,000 on the net migration from other states to that city. The net migration of about 10,000 people from Nuevo León to the national capital and surrounding area was probably drawn in part from Monterrey and in part from the rural municipios of the State.

The migrations represented in these four maps accounted for about two-thirds of all interstate migration in Mexico during the last decade. Nevertheless, they fall far short of exhausting the possibilities for graphic analysis of even the data in Table 1. Lesser flows, while of much smaller volume, are extremely significant with respect to the regions involved, and the study of gross as well as net movements is justified for some purposes. Moreover, maps of this type are only one of several devices which may be used to study internal migration patterns.

To a degree, these maps illustrate the need to bring additional data to bear on the problem before attempting to distinguish among various types of migration. Do movements to the State of Tamaulipas, for example, reflect migration to the border cities, to other cities, or to expanding agricultural districts? Data on the number of persons who were born in the same state, in other parts of Mexico, and abroad are given for each municipio in both the 1950 and 1960 census reports for each individual state. Therefore, the destinations of interstate migrants by municipio can be determined on exactly the same basis as that used to estimate gross interstate migration, thus showing not only the regional distribution of migrants within each state, but also making it possible to distinguish between rural and urban destinations. Additional data available only for 1960 on the population of each municipio by specific state of birth will shed further light on the origin of migrants to each area, but without providing any basis for distinguishing between rural and urban origins; furthermore, they will make possible some inferences concerning the extent to which movements between contiguous states are made up of movements within local border areas, as is the case in the net "migration" of 42,500 persons from the Federal District to the State of Mexico (Figure 5). Therefore, for most geographic

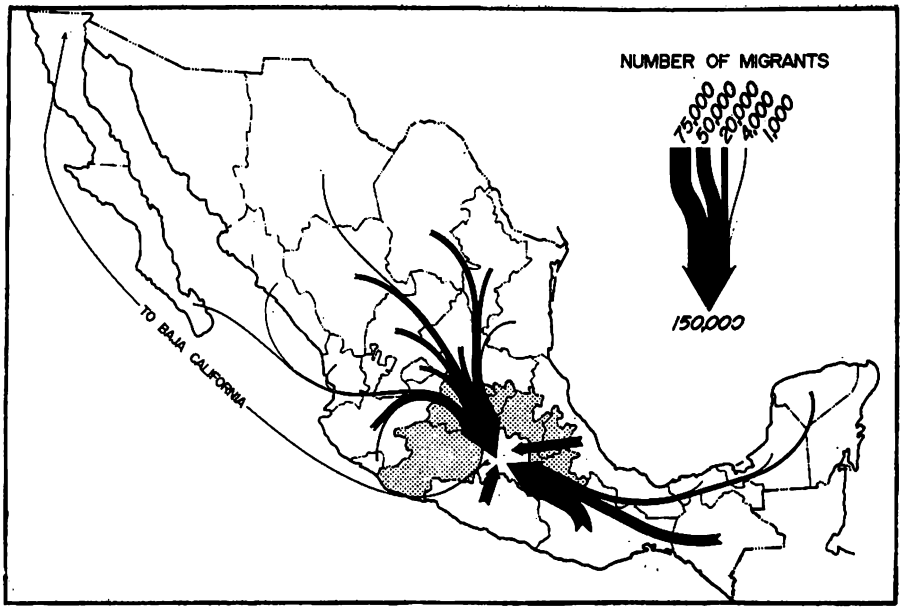

FIGURE 1

Net migration, 1950-60, other states outside shaded area to and from Federal District, Mexico, and Morelos.

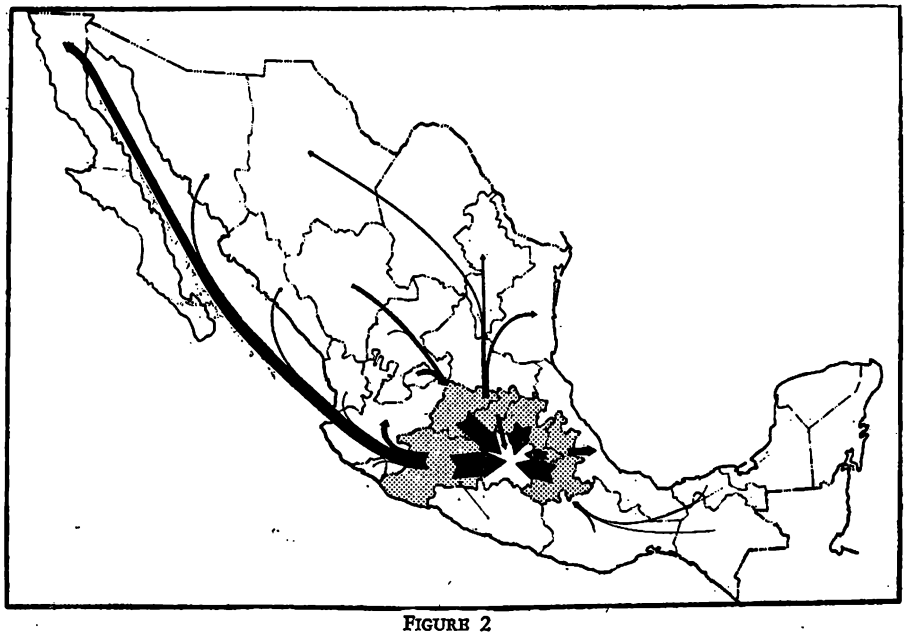

FIGURE 2

Net migration between shaded area and other states, 1950-60.

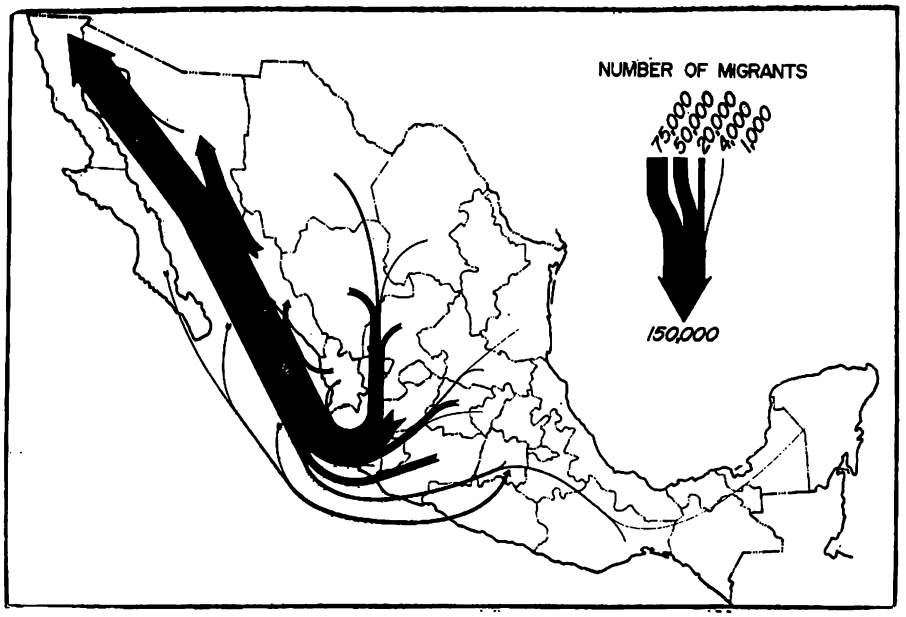

FIGURE 3

Net migration between Pacific states north of Jalisco and all other states, 1950-60.

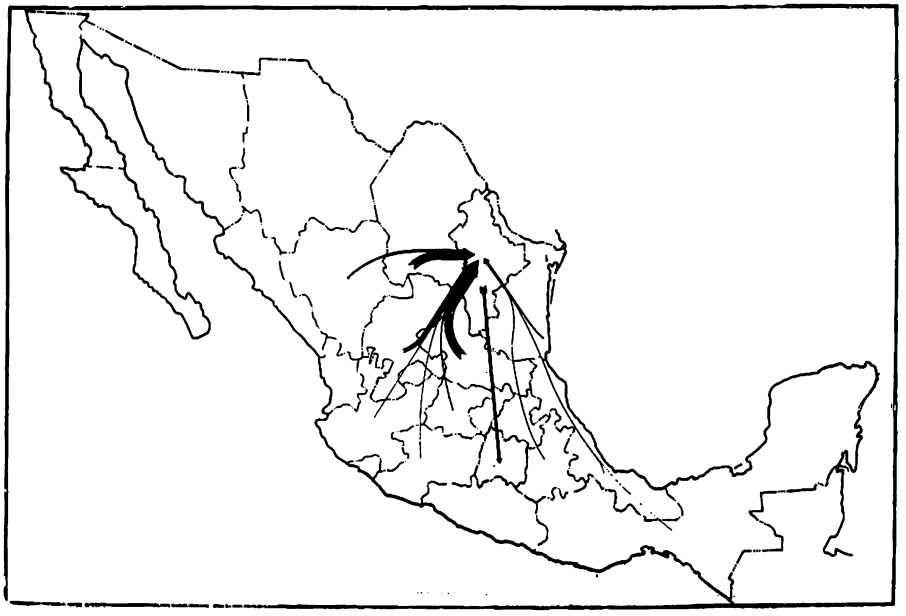

FIGURE 4

Net migration between Nuevo León and other states, 1950-60.

TABLE 1

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	Net Migration	Indicated gross movement: Gross Loss	Indicated gross movement: Gross Gain	Gain by source: Aguascalientes	Gain by source: Baja California Norte	Gain by source: Baja California Sur
ALL STATES	—	1,894,372	1,894,372	34,887	23,284	11,552
Aguascalientes	− 28,634	34,887	6,253	—	190	196
Baja California Norte	+149,112	23,284	172,396	2,002	—	1,423
Baja California Sur	− 2,739	11,552	8,813	95	1,610	—
Campeche	− 6,190	16,334	10,144	300	124	199
Coahuila	− 61,947	74,812	12,865	1,066	355	745
Colima	+ 2,221	15,282	17,503	152	184	227
Chiapas	− 20,107	48,750	28,643	677	515	1,638
Chihuahua	+ 78,535	25,333	103,868	3,978	887	915
Distrito Federal	+462,338	110,158	572,495	9,574	4,373	3,578
Durango	− 87,491	96,946	9,455	− 231	135	102
Guanajuato	− 58,665	110,180	51,515	8,524	355	226
Guerrero	− 37,798	52,033	14,235	295	1,372	19
Hidalgo	− 52,578	80,948	28,370	558	40	1,182
Jalisco	− 11,344	111,569	100,225	2,618	1,493	93
México	+164,038	20,856	184,894	1,717	352	270
Michoacán	−127,494	149,761	22,267	494	371	62
Morelos	+ 24,565	12,312	36,877	196	84	3
Nayarit	− 7,052	23,646	16,594	117	341	− 27
Nuevo León	+ 85,202	33,381	118,583	907	252	33
Oaxaca	− 82,633	93,573	10,940	53	177	22
Puebla	− 67,703	92,081	24,378	1,904	505	52
Querétaro	− 28,063	32,867	4,804	63	293	2
Quintana Roo	+ 6,628	6,356	12,984	65	15	25
San Luis Potosí	− 57,035	66,530	9,495	− 558	184	19
Sinaloa	− 24,099	58,232	34,133	229	1,096	−112
Sonora	+ 56,624	23,118	79,742	548	5,639	−668
Tabasco	− 11,240	20,410	9,170	24	63	30
Tamaulipas	+ 27,331	42,011	69,342	512	583	57
Tlaxcala	− 25,523	29,979	4,456	− 9	78	6
Veracruz	+ 42,947	69,521	112,468	338	319	834
Yucatán	− 27,290	32,313	5,023	919	16	104
Zacatecas	− 82,524	83,965	1,441	−2,240	1,283	297

TABLE 1 - Continued

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	*Indicated gross movement — gain by source*					
	Campeche	*Coahuila*	*Colima*	*Chiapas*	*Chihuahua*	*Distrito Federal*
ALL STATES	16,334	74,812	15,282	48,750	25,333	110,158
Aguascalientes	167	277	12	164	164	−17
Baja California Norte	308	2,035	2,159	1,467	2,500	5,873
Baja California Sur	15	371	25	72	217	320
Campeche	—	268	70	787	11	152
Coahuila	657	—	367	2,431	607	336
Colima	650	497	—	133	555	172
Chiapas	1,108	633	145	—	1,503	707
Chihuahua	509	14,974	365	1,123	—	4,309
Distrito Federal	3,172	8,937	5,588	22,781	7,668	—
Durango	48	1,256	14	349	−477	617
Guanajuato	346	332	43	453	345	3,855
Guerrero	22	46	81	534	89	1,551
Hidalgo	90	249	18	1,101	196	4,639
Jalisco	6,047	1,408	1,537	822	872	5,401
México	181	6,632	320	8,549	401	58,085
Michoacán	73	286	2,444	360	35	1,567
Morelos	2	180	40	1,098	81	2,435
Nayarit	90	79	42	− 16	618	62
Nuevo León	366	25,986	142	140	1,014	4,521
Oaxaca	306	16	56	1,071	−374	631
Puebla	28	154	61	227	139	2,195
Querétaro	− 33	19	11	17	45	858
Quintana Roo	154	1	16	−102	4	198
San Luis Potosí	918	−67	− 1	41	176	248
Sinaloa	119	1,913	262	103	976	1,078
Sonora	303	1,414	1,080	155	5,866	1,716
Tabasco	281	31	24	1,224	60	146
Tamaulipas	290	5,993	15	126	1,536	1,535
Tlaxcala	29	5	− 2	20	− 10	888
Veracruz	1,043	756	325	3,484	292	5,884
Yucatán	−1,061	33	34	39	21	194
Zacatecas	106	98	−11	− 3	203	2

TABLE 1 - Continued

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	*Indicated gross movement — gain by source*					
	Durango	*Guanajuato*	*Guerrero*	*Hidalgo*	*Jalisco*	*México*
ALL STATES	96,946	110,180	52,033	80,948	111,569	20,856
Aguascalientes	189	37	84	156	−2,183	222
Baja California Norte	7,445	10,790	838	757	39,708	2,931
Baja California Sur	370	722	32	36	926	125
Campeche	12	53	27	28	86	98
Coahuila	3,487	45	212	− 20	− 906	− 180
Colima	139	198	75	70	6,973	23
Chiapas	243	39	167	30	36	− 455
Chihuahua	29,942	2,887	555	392	3,889	− 164
Distrito Federal	8,586	48,622	21,215	49,809	19,636	15,563
Durango	—	744	912	426	− 552	− 627
Guanajuato	5,959	—	1,740	2,554	7,249	− 583
Guerrero	2,946	1,678	—	455	−3,622	376
Hidalgo	2,180	1,661	893	—	754	−2,256
Jalisco	3,268	6,178	1,490	1,665	—	2,191
México	3,791	18,871	1,397	12,026	7,118	—
Michoacán	2,547	−2,630	397	452	4,681	1,049
Morelos	458	679	15,666	460	834	5,052
Nayarit	1,203	588	91	152	5,491	− 125
Nuevo León	7,362	3,592	519	509	3,011	258
Oaxaca	494	410	−231	65	124	−1,123
Puebla	629	1,632	688	321	55	−2,072
Querétaro	94	1,070	204	82	355	310
Quintana Roo	14	280	39	28	39	102
San Luis Potosí	158	− 773	273	1,644	39	− 748
Sinaloa	6,473	2,190	293	215	3,414	774
Sonora	4,143	3,212	606	259	8,990	521
Tabasco	40	53	178	108	214	− 193
Tamaulipas	3,078	5,241	619	1,125	3,022	352
Tlaxcala	31	− 54	109	−782	49	− 274
Veracruz	1,302	1,531	2,677	7,835	3,065	1,932
Yucatán	226	810	60	50	79	− 169
Zacatecas	137	− 176	208	41	−1,005	−2,054

TABLE 1 - Continued

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	*Indicated gross movement — gain by source*					
	Michoacán	*Morelos*	*Nayarit*	*Nuevo León*	*Oaxaca*	*Puebla*
ALL STATES	149,761	12,312	23,646	33,381	93,573	92,081
Aguascalientes	129	9	48	58	41	− 12
Baja California Norte	16,364	379	7,288	720	1,217	943
Baja California Sur	1,073	22	49	94	78	28
Campeche	85	10	10	1	8	12
Coahuila	249	34	53	−804	251	74
Colima	4,279	43	89	115	139	85
Chiapas	444	137	19	16	1,052	186
Chihuahua	1,256	141	588	573	512	542
Distrito Federal	68,023	6,090	1,912	12,219	45,834	52,367
Durango	−106	91	207	318	517	118
Guanajuato	4,444	519	351	569	191	1,254
Guerrero	312	402	130	286	1,298	474
Hidalgo	589	164	66	423	491	2,346
Jalisco	16,635	853	3,249	1,504	835	3,073
México	16,572	272	599	2,504	4,918	9,354
Michoacán	—	339	196	889	246	326
Morelos	2,378	—	320	157	949	2,256
Nayarit	1,301	92	—	365	27	169
Nuevo León	2,718	129	481	—	618	803
Oaxaca	−116	128	10	348	—	−2,168
Puebla	667	47	45	188	3,736	—
Querétaro	151	34	9	29	150	439
Quintana Roo	81	76	5	77	17	106
San Luis Potosí	221	62	35	174	1,102	− 203
Sinaloa	2,127	60	2,497	436	1,083	319
Sonora	4,046	191	4,503	357	1,777	871
Tabasco	125	280	24	1	955	248
Tamaulipas	2,601	823	552	10,704	2,263	412
Tlaxcala	− 25	12	13	123	595	− 34
Veracruz	2,949	775	195	864	22,298	17,243
Yucatán	64	38	14	16	206	301
Zacatecas	125	60	89	57	169	149

TABLE 1 - Continued

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	*Indicated gross movement — gain by source*					
	Querétaro	*Quintana Roo*	*San Luis Potosí*	*Sinaloa*	*Sonora*	*Tabasco*
ALL STATES	32,867	6,356	66,530	58,232	23,118	20,410
Aguascalientes	− 1	3	297	1,785	73	24
Baja California Norte	545	114	1,140	19,283	11,276	99
Baja California Sur	74	22	51	301	381	− 1
Campeche	36	380	18	6	− 2	1,966
Coahuila	142	23	−4,210	655	104	81
Colima	48	10	115	84	47	22
Chiapas	−46	−24	32	37	27	1,564
Chihuahua	177	33	1,347	525	−375	66
Distrito Federal	8,640	1,048	12,396	3,194	2,196	2,824
Durango	144	20	− 38	40	158	5
Guanajuato	537	91	2,002	134	167	135
Guerrero	2,259	40	172	249	− 14	37
Hidalgo	1,821	588	703	197	41	45
Jalisco	966	101	3,960	2,704	1,332	324
México	5,174	43	2,644	939	793	263
Michoacán	−91	23	265	79	1,074	19
Morelos	131	−11	137	40	67	185
Nayarit	− 1	27	137	426	322	57
Nuevo León	908	75	28,706	715	388	270
Oaxaca	619	995	− 228	252	240	224
Puebla	3,492	810	296	525	293	268
Querétaro	—	154	209	76	45	− 4
Quintana Roo	57	—	74	29	25	−38
San Luis Potosí	2,077	224	—	273	94	140
Sinaloa	403	314	793	—	2,668	135
Sonora	497	222	764	24,107	—	111
Tabasco	75	99	231	−23	− 50	—
Tamaulipas	1,836	203	11,794	618	249	395
Tlaxcala	544	126	178	32	348	1,797
Veracruz	450	391	3,118	815	434	9,355
Yucatán	184	125	—	42	535	58
Zacatecas	1,170	87	− 573	93	182	−16

TABLE 1 - Continued

ESTIMATED GROSS MIGRATION

STATE OF ORIGIN BY STATE OF DESTINATION, MEXICO, 1950-1960

States	*Indicated gross movement — gain by source*					
	Tamaulipas	*Tlaxcala*	*Veracruz*	*Yucatán*	*Zacatecas*	*Not reported*
ALL STATES	42,011	29,979	69,521	32,313	83,965	191,392
Aguascalientes	129	− 9	102	28	2,459	1,432
Baja California Norte	918	134	1,196	414	10,818	19,312
Baja California Sur	72	11	117	36	171	1,298
Campeche	50	1	389	4,448	74	437
Coahuila	1,195	− 1	154	172	−3,029	8,520
Colima	157	15	226	15	199	1,767
Chiapas	142	83	314	94	126	17,454
Chihuahua	913	99	743	266	17,363	14,538
Distrito Federal	6,649	22,503	34,653	8,472	10,559	43,815
Durango	150	16	484	105	−3,265	7,775
Guanajuato	2,531	125	868	−115	1,262	5,052
Guerrero	101	18	563	116	− 146	2,096
Hidalgo	168	961	2,006	419	213	5,824
Jalisco	1,196	294	1,613	440	18,348	7,715
México	863	3,639	3,953	426	2,123	10,105
Michoacán	243	58	612	351	266	5,184
Morelos	86	136	801	59	131	1,787
Nayarit	308	− 8	62	5	2,804	1,795
Nuevo León	15,114	885	1,842	312	12,756	3,251
Oaxaca	192	160	2,973	287	105	5,222
Puebla	493	−1,366	4,109	1,121	935	2,201
Querétaro	106	85	101	−615	251	194
Quintana Roo	9	48	125	11,139	21	255
San Luis Potosí	1,030	216	1,224	64	− 187	1,396
Sinaloa	939	116	371	51	1,275	1,523
Sonora	867	335	547	890	3,278	2,595
Tabasco	286	152	2,500	700	129	1,155
Tamaulipas	—	198	5,981	292	3,273	3,064
Tlaxcala	98	—	−37	− 2	− 5	609
Veracruz	6,815	1,139	—	3,010	1,358	9,642
Yucatán	−34	− 67	601	—	300	1,285
Zacatecas	225	3	328	−687	—	3,094

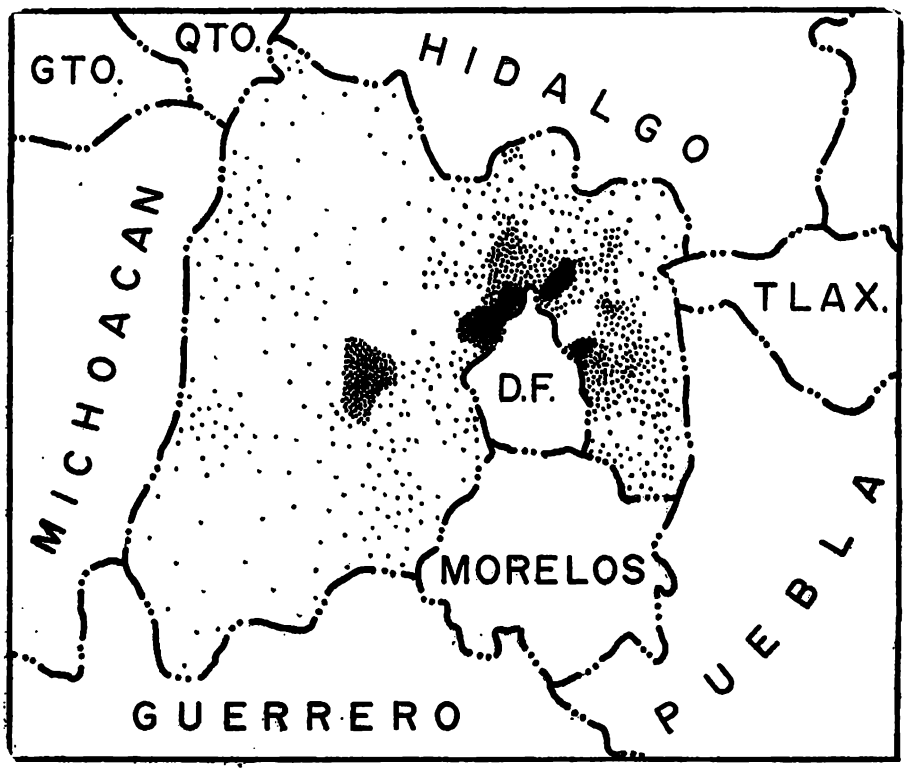

FIGURE 5

Distribution within State of Mexico of persons born in other states, 1960. Each dot represents 100 individuals. Most such persons are concentrated around the margins of the Federal District, where many of them were born. The only other important concentration, which includes eight per cent of the total, is in the Municipio of Toluca in which the State's capital and largest city is located.

purposes, the principal gaps on internal migration which cannot be filled on the basis of state-of-birth data as tabulated in the 1960 census of Mexico involve the specific sources of migrants within the various states and rural-urban and inter-regional movements within each state. Analysis of differential growth rates by municipio, as illustrated by the data for Nuevo León referred to above, sheds some light on these questions, but it provides no basis at all for determining the extent to which migrants to urban destinations in other states are drawn directly from rural origins or for assessing the extent to which rural-urban migration takes place in a series of stages. Since the two types of data do not yield comparable migration estimates, the analysis of migration estimates based on state of birth data in combination with the study of growth differentials is incapable of yielding satisfactory quantitative estimates of intrastate movements. It is extremely doubtful if any type of mass data on a national scale, alone or in combination with other types, could completely

satisfy the requirements for exhaustive geographical studies of internal migration in any country; as is the case with most other topics, mass data of national scope can be used to identify and quantify broad patterns, but considerable detail must be either omitted or filled in on the basis of more localized studies of either a quantitative or non-quantitative nature.

RELIABILITY OF THE STATE-OF-BIRTH ESTIMATES

Ideally, evaluation of the migration estimates presented in this article should separately identify discrepancies of two types: (1) those arising from the method itself and (2) those arising from defects in the data on which the estimates are based. However, this is impossible since neither the nature and extent of errors in the data nor the true volume of migration is known, and the residual method —the only alternative now available for comparison— is itself subject to discrepancies. Disagreement shows only that something is wrong with one estimate or the other. Moreover, the residual method is capable only of showing the net amount of change resulting from migration, without regard to either the size or the other terminae of gross movements to and from a state. Where the net migration is small in relation to gross migration, this point may be extremely important, for the net change as estimated by the state-of-birth procedure may be subject to a large relative error simply because it is smaller than the absolute error in the estimates of the gross movements, even if the latter are, in fact, subject to very small relative errors.

Two alternative procedures were used to estimate migration as a residual element of growth. Both of them, like the state-of-birth estimates, depend upon the basic counts of the 1950 and 1960 censures, but otherwise they are independant of one another and of the state-of-birth estimates. However, neither yields results which are directly comparable with those of the other or with those based on state-of-birth data.

Estimates based on birth and death registration. The simplest of the residual methods consists of adding registered births to and subtracting registered deaths from the population according to the 1950 census, and attributing to migration all of the difference between the result and the number of persons enumerated in the 1960 census. For Coahuila, this estimate is as follows:

Population in 1950	720,619
PLUS births mid-1950 to mid-1960	392,282
LESS deaths during the same period	106,410
Expected population, 1960	1,006,491
Enumerated population, 1960	907,734
Change attributed to migration	—98,757

Even if all the data involved in both types of estimate are complete and accurate, this result is not comprable to that derived by the state-of-birth procedure because it reflects the influence of international as well as internal migration. Application of the method to the nation as a whole yields an estimated net migration loss of 473,396, a figure which is too high to be accepted as consistent with the number

of Mexican-born persons enumerated in the 1950 and 1960 censuses of the United States. Migration to the United States is known to be important at least as far from the border as Jalisco, and it is therefore to be expected that for many states these estimates will be larger if negative and smaller if positive than the state-of-birth estimates.

Imperfections in the vital statistics clearly affect estimates based on birth and death registration data to whatever extent they are not self-cancelling. For the nation as a whole, these data may be considered reasonably reliable. The principal defects on this level probably arise from delayed birth registration, and are of a type which does not influence the estimates. In some states, however, the underregistration of births and deaths may be of considerable importance. The direction and magnitude of the resulting errors is not known for any state, but the high level of the birth rate inspires confidence in the completeness of registration in all states but Chiapas, Oaxaca, Quintana Roo, and Veracruz.

Underenumeration almost certainly is not uniform from one census to the next, and differences may be large enough to have a substantial effect on the results obtained by this procedure. Because underenumeration is demonstrably large among young children, the estimates based on vital registration are more likely to be seriously affected by this factor than those based on the state-of-birth procedure. The estimate of net emigration of 473,000 resulting from the registration estimate could be due to less complete coverage in this 1960 census or, less likely, to less complete registration of deaths than of births.

Estimates based on census survival ratios. Because of this possibility of important errors in the residual estimates based on vital statistics, a third group of migration estimates was prepared from data by age and sex from the 1950 and 1960 censuses. The basis of this method is the census survival ratio, an expression of the probability that a member of the specific age-sex group in 1950 would survive until 1960 and would be enumerated in the 1960 census. Once survival ratios had been calculated for the entire country, they were applied to the various age-sex groups of the 1950 population of each state to arrive at a "projected" population as of 1960. The difference between the projected population and that enumerated in the 1960 census is taken to be due to migration. Again, the results are not directly comparable to those obtained by the state-of-birth procedure, even though they are limited to internal migration, since estimates based on survival ratios can be prepared only for persons born before the date of the 1950 census.

This procedure is based entirely on census data, and therefore is not influenced by defects in birth and death registration. State-to-state differences in fertility and mortality, on the other hand, do affect the results, for the basic assumption underlying the method is that such differentials are negligible. Higher-than-average mortality results in underestimating positive migration. Such strong evidence of extensive omissions of persons under five years of age from the 1950 census was encountered in preparing the estimates by age-sex groups that two separate sets of totals were compiled, one for all persons born before the 1950 census and another for those of known age five years and over at that time, but it was found that the omissions had so little effect on the estimates in relation to other factors that it would be preferable to use those referring to the population of all ages in 1950.

Comparison of results by the three procedures. The lack of comparability makes it extremely difficult to assess the reliability of any one set of estimates on the basis of the other two. Allowances may be made to adjust the estimates based on birth and death registration for the effects of emigration, and to adjust those based on census survival ratios for the omission of children born after the 1950 census and for interstate differentials in mortality. However, in the final analysis, such allowances are no more than the systematic application of educated guesses. Therefore, only very simple adjustment procedures appear to be justified. Accordingly, the residual estimates were modified by allocating emigrants to the states of the North Pacific, the North, and the Central Region (exclusive of the Federal District) in proportion to the estimated total population in 1955. It was assumed that the migration of children born after 1950 was numerically equivalent to that of children 10 to 14 years of age in 1950 (4); and an adjustament was made for interstate differentials in mortality on the basis of differences in the crude death rate to adjust the survival ratio estimates which, by their nature, automatically allow for changes due to international migration. These adjustments generally do not bring the other two sets of estimates into closer agreement with the state-of-birth estimates. Consequently, the idea of adjusting the other two sets of estimates to make them more directly comparable with those arrived at by the two-census state-of-birth method was abandoned as a general procedure and, except in searching for explanations for discrepancies among the results for some particular states, all of the estimates were used in their original form.

The three estimates of the net direct influence of migration on the size of the population of each state are presented in Table 2 and Figure 7. When converted to rates (change per 1,000 inhabitants in 1950), the various columns of this table are correlated as follows:

Col.	1	x	Col.	2	+0.94
Col.	1	x	Col.	3	+0.95
Col.	2	x	Col.	3	+0.95

For comparative purposes, two ratios which have long been widely accepted for the study of the rate at which a population is reproducing itself are plotted against one another in Figure 6. These measurements of fertility for the 15 independent countries of the Western Hemisphere for which suitable data are available in the 1963 *Demographic Yearbook* are no more closely correlated with each other ($r = +0.93$) than the various migration estimates under consideration; within Mexico, the only relationship between them is that both are very high for almost all states.

In the light of these findings, it is concluded that the two-census state-of-birth procedure is at least as adequate for the study of internal migrations as the fertility ratio is for the study of fertility and that, in general, its results are probably about as reliable as those of the other two procedures under consideration. At the

(4) In the United States, survival ratios for this age group are sometimes based on reported births to achieve the required adjustment. Extensive underenumeration of the population under ten years of age makes such an adjustment impractical in Mexico.

TABLE 2

ESTIMATED NET CHANGE DUE DIRECTLY TO MIGRATION

MEXICO, BY STATES, 1950-1960

State	*State-of-birth estimate*	*Registration estimate*	*Survival-ratio estimate*
Aguascalientes	− 28,634	− 20,457	− 8,172
Baja California Norte	+149,112	+138,755	+133,237
Baja California Sur	− 2,739	− 2,217	− 1,189
Campeche	− 6,190	− 7,943	+ 1,760
Coahuila	− 61,947	− 98,757	− 41,079
Colima	+ 2,221	+ 4,572	+ 7,119
Chiapas	− 20,107	+ 22,620	− 36,441
Chihuahua	+ 78,535	+ 52,607	+ 50,738
Distrito Federal	+462,338	+564,911	+612,674
Durango	− 87,491	−115,694	− 71,193
Guanajuato	− 58,665	− 85,801	− 59,606
Guerrero	− 37,798	− 99,898	− 49,552
Hidalgo	− 52,578	−112,538	−110,323
Jalisco	− 11,344	+ 16,451	+ 58,252
México	+164,038	+ 33,685	− 13,153
Michoacán	−127,494	−157,714	− 73,207
Morelos	+ 24,565	+ 1,667	+ 11,317
Nayarit	− 7,052	− 30,578	− 6,683
Nuevo León	+ 85,202	+ 33,801	+ 74,800
Oaxaca	− 82,633	− 58,980	−112,559
Puebla	− 67,703	−111,119	−147,301
Querétaro	− 28,063	− 36,842	− 24,999
Quintana Roo	+ 6,628	+ 11,994	+ 7,402
San Luis Potosí	− 57,035	−138,607	− 83,662
Sinaloa	− 24,099	− 54,808	− 25,529
Sonora	+ 56,624	+ 18,225	+ 56,265
Tabasco	− 11,240	− 20,648	− 15,780
Tamaulipas	+ 27,331	+ 1,654	+ 43,237
Tlaxcala	− 25,523	− 36,130	− 27,538
Veracruz	+ 42,947	+ 38,283	− 23,128
Yucatán	− 27,290	− 77,379	− 39,504
Zacatecas	− 82,524	−134,748	− 75,053
State not indicated	−191,392	− 11,763	− 11,150
Emigration	—	473,396	—

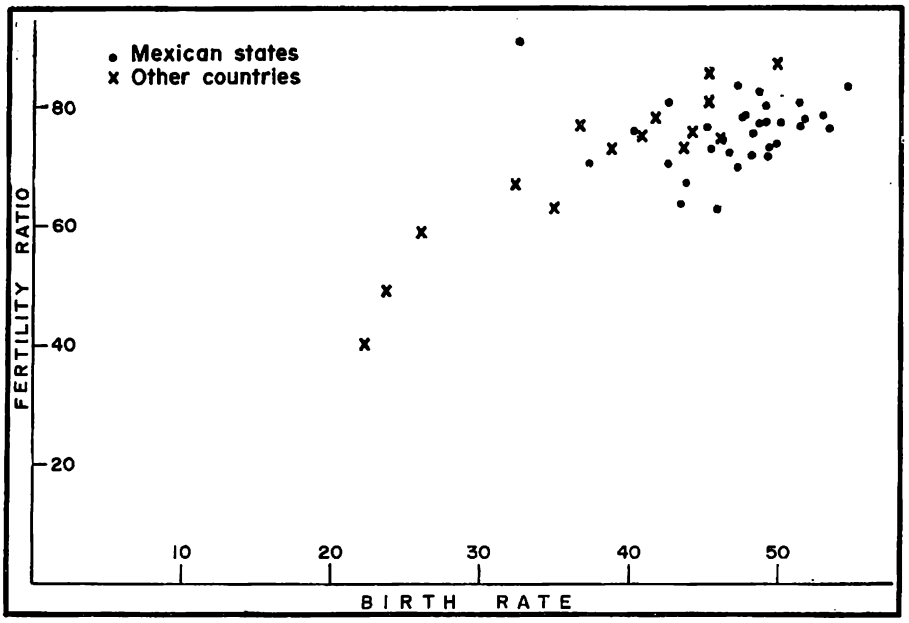

FIGURE 6

Relationship between the crude birth rate and the number of children under 5 per 100 women 15 to 49, states of Mexico and selected American nations, about 1960.

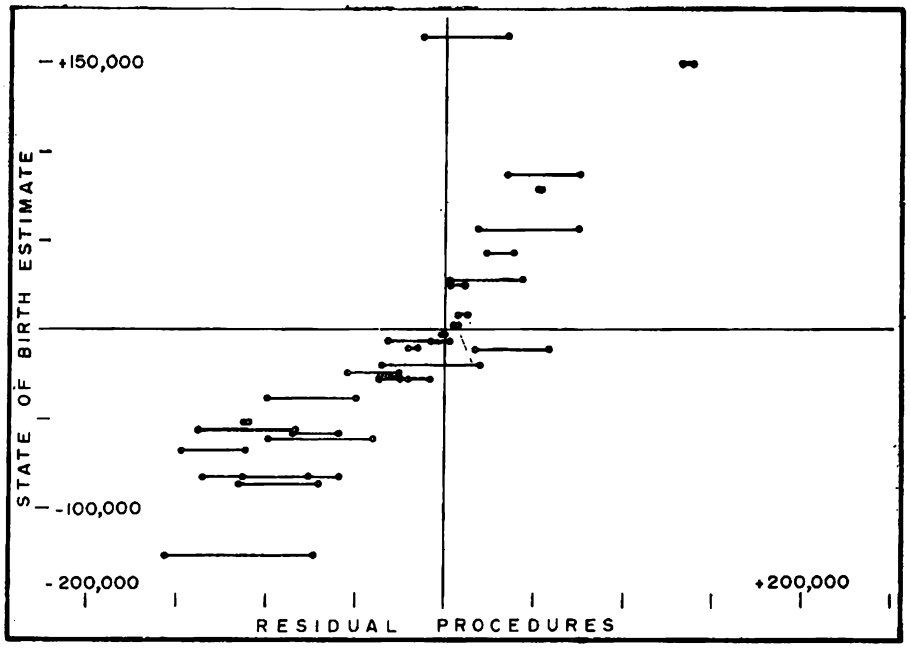

FIGURE 7

Relationship of net migration estimates by the two-census state-of-birth procedure to similar estimates by residual procedures, states of Mexico, 1950-60.

same time, the high degree of correlation among the various migration estimates should not be allowed to obscure the fact that they do differ markedly from one another in some cases.

Sources of disagreement. The differences between the state-of-birth estimate and the others are most striking in the case of the State of Mexico. This divergence is probably related in at least two ways to the location of the State, and particularly its eastern municipios, in relation to Mexico City. First, several of the municipios which border on the Federal District have experienced spectacular population increases in recent years as a result of the growth of suburbs and satellite communities around the national capital. Four of these municipios, which together more than trebeld in population between 1950 and 1960, accounted in the latter year for aproximately two-thirds of all residents of the State of Mexico who were born in other states (Figure 5). Many of those who moved to these municipios during the decade undoubtedly were persons born in other states who were already living in the Federal District in 1950. The local movement of such individuals across the boundary between the Federal District and the State of Mexico has greatly inflated the estimate of net migration to the latter state and reduced the estimated net migration to the national capital by the same amount.

The second way in which the location of parts of the State of Mexico in relation to Mexico City probably is related to the discrepancy in the state-of-birth estimate may influence the estimates for other states as well. Both public and private medical facilities are concentrated in the larger urban centers, and as transportation facilities improve, more and more women cross state lines to give birth to their children in city hospitals and maternity homes. As a result, their children appear in the next census as persons born in the state in which the city is located and, if the family has not moved in the meanwhile, living in the mothers' state of residence. It is for this reason, as well as the first, that the estimates for the Federal District were combined with those for the states of Mexico and Morelos in preparing figures 1 through 4.

The net migration balance is very small in relation to the size of the predominant gross movement in the summarized data for some states. In all cases, this probably occurs because two or more types of migration affect the state to an important extent, but in opposite ways, so that they cancel each other out in the state totals. Where this occurs, the small size of the net migration in relation to the predominant gross movement is clearly among the possible sources of discrepancy in the state-of-birth estimates. The reason is simple. Quite apart from the basic question of their accuracy, the estimates of migration to and from Jalisco —100,225 and 111,569— may not be fully reliable even in the second significant digit. This would imply accuracy within ± 10 per cent in the result of a procedure which is expected to yield only an approximation. Thus the estimate of a net migration loss of 11,344 for the State as a whole is the result of subtraction of numbers which in reality are of doubtful accuracy with respect to the tens-of-thousands digit and totally meaningless with respect to all those to the right of it. Jalisco is the extreme case of this type. Like its neighbors, it is losing migrants to other areas, particularly the national capital and newly irrigated districts of the northwest — but, unlike them, it is receiving many migrants from nearby states, most of whom probably go to Guadalajara. The net movenment is only 13 per cent the estimated

dominant gross for Colima, 24 per cent for Baja California Sur and 30 per cent for Nayarit. It is near 40 per cent for five other states (Campache, Chiapas, Sinaloa, Tamaulipas, and Veracruz), and is over one-half of the dominant gross for all of the others.

The most serious *a priori* reservation about the probable quality of migration estimates based on place-of-birth data from two successive censuses is based on the expected influence of mortality among earlier migrants. Unless the age composition of the latter group is known, attempts to adjust the estimates are unwarranted because of the close relationship between death rates and age: if these migrants were drawn most heavily from the young-adult age groups, as is most often the case, most of them are approaching or have attained the ages at which death rates increase greatly with increasing age by the time the second census is taken. Therefore, a relatively small difference in the average age of this group would be associated with a relatively large difference in its average death rate. It already has been mentioned that the influence of mortality is self-cancelling to an important extent in the estimates of net migration, and if it is assumed that the earlier migrants to a particular state are similar in age and mortality experience to those from that state, the population to which the morality influence under consideration applies consists of the survivors of all past net migration who are still living in the state at the time of the first of the two censures. The amount of the discrepancy in the migration estimates in that case depends upon (1) the size of that population, which is known, and (2) the average death rate to which it is subject, which is not. If the population resulting from earlier net migration is only a fraction of the size of the net migration from 1950 to 1960, the influence obviously will be small regardless of the level of the average death rate, for even if a large percentage of the earlier migrants died before the second census, the percentage of error introduced in the estimate will be only a fraction of the first percentage. Conversely, if the earlier migration was several times as large as that in the period under study, mortality may have a significant effect even if the average death rate is quite low. The number of survivors of past net migration as of 1950 in relation to the amount of net migration from 1950 to 1960 may be used as a rough indication of the probable amount of error in the latter estimate arising from mortality in the first group from 1950 to 1960. The population made up of survivors of past net migration as of 1950 was from two to six times as large as net migration between 1950 and 1960 for ten states. The discrepancy between the state-of-birth estimate and each of the residual estimates is opposite that which would result from mortality among earlier migrants in only one of these ten cases. The other two estimates differ in opposite directions from the state-of-birth estimate in three states, but, in the other six, the direction of the discrepancy is the same as would result from the mortality influence under consideration. Ironically, this is not so in the case of Jalisco, where the net migration loss up to 1950 was 20 times as large as the small net loss during the next decade.

GENERAL CONCLUSIONS

The "best" method for estimating internal migrations depends upon the use which is to be made of the results. In the absence of direct data, all procedures

appear to be subject to important discrepancies, and if birth and death registration are reasonably complete, there is no reason to believe that any one of them yields results which are either more or less accurate than those of the others. Unless the census includes a special question on place of previous residence, the state-of-birth procedure is the only one which permits estimates by state of origin and state of destination, and therefore is to be preferred for most geographical uses. By using data from two successive censuses, the estimates may be restricted to a particular time span, and by repeating the procedure for successive intercensal periods, changes in migration patterns may be studied more directly than by any other means.

The preparation of state-by-state migration estimates by the refined procedures described in this article is merely a first step in studying internal migration in Mexico. It is clear from these estimates that the attractive influence of the largest cities operates far beyond the borders of the states in which they are located; at the same time, many nearby rural communities are sending migrants not only to those cities but to other urban centers, to expanding agricultural districts elsewhere in the country, and even to the United States. By taking into account differential growth rates by administrative divisions within states, as was done to some extent in commenting above on migration to and from Nuevo León, and through use of state-of-birth data by municipios, it is possible to sort out the various types of migration which contribute to the net, and to arrive at an approximate basis for allocating the gross movements as estimated in Table 1 among the various types. This type of analysis and the inferences derived from it are left for later studies, as are other questions, of fundamental geographic and sociological significance, concerning the migrants' adaptation to their new surroundings and the changes they bring about in the areas to which they move.