

POPULATION AND DEVELOPMENT IN A PERUVIAN COMMUNITY

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PREFACE

This paper has been prepared under contract AID/csd-296 between Cornell University and the United States Agency for International Development and is based on the analysis of data collected with the support of grants awarded to Cornell University by the Carnegie Corporation of New York. The paper has benefited from a critical reading by Allan R. Holmberg and Henry F. Dobyns of the program of Comparative Studies of Cultural Change and by George C. Myers of the International Population Program, all of Cornell University.

In December of 1951, the Cornell Peru Project, created under an agreement signed by Cornell University and the government of Peru, undertook a systematic program of research and development in the depressed highland Indian hacienda of Vicos, located in the Callejon de Huaylas, an intermontane valley some 270 miles north of Lima. In subsequent years Project personnel, in cooperation with functionaries of the Peruvian government, carried out a comprehensive program of development that significantly transformed the economic, educational, medical, and political institutions of the community. This program has included the introduction of innovations in farming techniques, the construction of an educational system, the building of a medical facility, and the transfer of local political power into the hands of the Indians.

This paper considers some of the ways in which the activities of the Project have affected population structure and change in the community and, in turn, how some of these population changes have affected, and are likely to affect, the efforts of the Project in the development of the community.¹ It thereby provides an early case study of the reciprocal relationship between population and development that may be experienced by hundreds of Indian communities as part of the modernization of Peru.

The study is based primarily on the analysis of data collected under the auspices of the Cornell Peru Project

1. The most comprehensive description of these efforts is contained in Allan R. Holmberg, "Changing Community Attitudes and Values in Peru: A Case Study in Guided Change," in Council on Foreign Relations, Social Change in Latin America Today (New York: Vintage Books, 1961).

in two censuses of the community, the first conducted in the months of January and February of 1951 and the second in the same months of 1963. Considerable caution must of course be exercised in the interpretation of the data to be reported, since they are in some respects deficient both as to coverage and quality. Thus, for example, the total population of the community in 1951 is known to have been underestimated by about five percent by the census taken in that year,² but the inhabitants of Vicos have gradually come to lose most of their early distrust of being the subject of a personal interview, so that the same is not true for the census of 1963. Similarly, while most Vicosinos probably did not know their exact age in 1951 (their reports have been checked and revised by local experts), the continued interest of the Project in these data had resulted in improved reporting by 1963. The current paper is limited primarily by the lack of a full series of data on births, deaths, and migration - the three variables basic to the study of population change - and by the absence of data series on appropriate indicators of social and economic development. But the available population data are believed to be more complete than any previously published for an Indian community in the Andean region of South America, and the data do permit a reasonably accurate assessment of the nature, antecedents, and consequences of population structure and change in the community.

2. Mario C. Vazquez, A Study of Technological Change in Vicos, Peru (Unpublished Master's Thesis, Cornell University, 1955), p. 47.

I. AREA AND POPULATION GROWTH

Until recently, Vicos has comprised a total area of some 18,940 acres.³ Of this, however, about 8,400 acres consist of virtually uninhabited wasteland and almost 6,700 acres are devoted to pasture. The inhabited and cultivated area of the estate is made up of 3,850 acres, or six square miles, of arable land - slightly more than one-fifth of the entire estate.

Within these boundaries the 1951 census enumerated a total population of 1,703 Quechua-speaking Indians, broadly scattered across the arable portions of the hacienda at the rate of 284 persons per square mile (Table 1). By 1963, the date of the most recent census, the number of Vicosinos had increased to 2,102, a rise of 23 percent, with a rate of growth of almost two percent per year during the intercensal period.⁴ Population density, with a constant land base, correspondingly rose to the level of 350 persons per square mile.

3. Henry F. Dobyns, "Monetary Credit and Transculturation, (Lima: Cornell Peru Project, 1962), p. 12.

In the late Spring of 1963, Vicos acquired the adjoining estate of Chancos, comprising over 110 acres of arable land and including 13 families with a total population estimated at 63 persons. Since this purchase occurred after the completion of the 1963 census, it does not affect the current paper, with the exception of the projections contained below.

4. The total population of Peru as a whole rose from 8,159,000 to 10,931,000 during the same period, an increase of 34 percent. See United Nations, Economic Commission for Latin America, Statistical Bulletin for Latin America, Vol. 1, No. 1 (March 1964), p. 17.

TABLE 1 - Area, Population, and Density

Year	Arable Area (Square Miles)	Enumerated Population	Persons per Square Mile
1951	6.0	1,703	284
1963	6.0	2,102	350

Although there was an increase in total population, the mean number of persons per household in Vicos has remained relatively constant (Table 2). This is due to the fact that the number of households has risen 27 percent between 1951 and 1963 - that is, at a slightly faster rate than the population as a whole.

TABLE 2 - Mean Number of Persons per Household

Year	Enumerated Population	Number of Households	Persons per Household
1951	1,703	363	4.69
1963	2,102	461	4.56

Four estimates of the population of Vicos prior to 1951 are listed in Table 3, together with the annual rate of growth experienced between each of the dates for which an estimate is available, including the two censuses. These data indicate that the annual rate of growth rose slowly but steadily between 1774 and 1940, increased rapidly between 1940 and 1951, and then declined again. Including the population and territory annexed by the purchase of Chancos, if the current rate of growth of 1.8 percent is sustained over the next 11 years, in 1975 there will be 2,672 Vicosinos distributed over the arable area at the rate of 429 persons per square mile.

TABLE 3 - Population Estimates and Annual Rates of Growth, 1774-1963^a

Year	Estimated Population	Annual Rate of Growth
1774	301	
1850	513	0.7%
1901	800	0.9%
1940	1,230	1.1%
1951	1,703	3.0%
1963	2,102	1.8%

a) Pre-1951 estimates compiled by Mario C. Vazquez, "La Antropologia Cultural y Nuestro Problem del Indio: Vicos, un Caso de Antropologia Aplicada," Peru Indigena, Vol. II, Nos. 5 y 6 (Junio 1952), p. 36, who claims that the data for 1940 appear to be "defective". Vazquez also records an estimate of 1,500 inhabitants for 1911 which has been omitted here as an extremely unlikely figure.

Annual rates of growth were calculated by fitting the population estimates to a logistic curve of growth, as described, for example, in George W. Barclay, Techniques of Population Analysis, (New York: John Wiley, 1958), p. 207.

Whether the current rate of growth is likely to rise, decline, or remain about the same depends in part on trends in fertility and mortality. Data on number of births and deaths for the years 1951 and 1963, obtained from the Registry of the District of Marcará - of which Vicos is a political subdivision - are presented in Table 4. Midyear population estimates were calculated by projecting the enumerated census populations forward six months at the rate of growth of 1.8 percent per year.

TABLE 4 - Crude Birth Rates, Death Rates, and Rates of Natural Increase

Year	Midyear Population Estimate (A)	No. of Births (B)	No. of Deaths (C)	Crude Birth Rate (B/A)1000	Crude Death Rate (C/A)1000	Rate of Natural Increase (B-C/A)1000
1951	1,720	75	23	43.6	13.4	30.2
1963	2,123 ^a	109	37	51.3	17.4	33.9

a) The 63 inhabitants gained by the acquisition of Chancos are excluded from this figure.

Birth and death statistics are not currently available for each year during the intercensal period, but it should be noted that there were no serious epidemics in Vicos in either 1951 or 1963. This, along with the fact that Vicos has a very young population - as will be seen in the following section - probably accounts for the rather low observed death rates. Part of the increase in the birth and death rates may doubtlessly be attributed to improved registration, but since it is likely that there was no differential in the registration of these two events, the rise in the rate of natural increase is probably more reliable.

In 1958, the Cornell Peru Project undertook the task of registering births and deaths in Vicos, and the data collected by means of this effort permit the calculation of an infant mortality rate for that year (Table 5). The resulting rate is quite low - it compares with a rate of 103.4 for Peru as a whole in 1960⁵ - and is consistent with the low death rates

5. Center of Latin American Studies, University of California, Los Angeles, Statistical Abstract of Latin America, 1962 (Los Angeles: The Center, 1963), p. 17.

obtained for the entire population of Vicos, though it must again be noted that there was no epidemic in Vicos in 1958.

TABLE 5 - Rate of Infant Mortality, 1958

Number of Live Births (A)	Number of Deaths in First Year of Life (B)	Infant Mortality (B/A)1000
98	5	51.0

The assessment of fertility trends is further complicated by the fact that, as measured by the child-woman ratio - that is, the ratio of children under five to women in the child-bearing years - fertility has actually declined in Vicos during the intercensal period (Table 6). This is in direct conflict with the observed increase in the birth rate.

TABLE 6 - Child-woman Ratios^a

Year	Number of Children 0-4 Years of Age (A)	Number of Women 15-44 Years of Age (B)	Child-woman Ratio (A/B)1000
1951	270	371	728
1963	312	484	645

a) One female in 1951 and two males and three females in 1963 have been excluded for lack of age data from this and all subsequent tables where age appears as a variable.

If the birth rate, as indicated, is affected by the vagaries of registration, the child-woman ratio is subject to extreme fluctuations due to sudden shifts in the number of deaths in early childhood. In fact, evidence to be presented in the following section indicates that the incidence of epidemics in Vicos has been such as to reduce the number of children aged 0-4 in 1963 to a figure below what might normally be expected, without exerting any effect on women aged 15-44, and that the reverse has been the case for 1951.

The affect of these epidemics would thus be to reduce the child-woman ratio for 1951 and to increase the ratio for 1963, thereby bringing them closer together than they now are. But this effect is probably not strong enough to reverse the magnitude of the ratios for the two census years.

However this may be, the population of Vicos has clearly expanded, and even at their low points a birth rate of 43.6 and a child-woman ratio of 645 are both rather high - the former comparing with a birth rate of 32.5 for Peru as a whole in 1960⁶ - so that the prospect as far as fertility is concerned is for an increasng rate of growth as well. This conclusion is strenghtened by the fact that the number of Vicosino women of child-bearing age increased by 2.3 per cent per year between 1951 and 1963, a faster rate of growth than that of the population of Vicos as a whole during this period, and also by the evidence that the general fertility rate, a more direct measure of fertility than either the crude birth rate or the child-woman ratio, has also increased between 1951 and 1963 (Table 7).⁷

6. Ibid

7. That Vicosino women are concerned about their frequent pregnancies is signalled by the fact that they often approach female visitors to the community for information about modern methods of birth control.

TABLE 7 - General Fertility Rates

Year	Number of Women 15-44 Years of Age (Midyear Estimate) (A)	Number of Live Births (B)	General Fertility Rate (B/A)1000
1951	375	75	200
1963	489	109	223

The great bulk of arable land in Vicos has been and still is tied up in tiny subsistence plots, and the rise in population has reached the point where it is creating increased pressure on the land. Changes in the mode of property inheritance have contributed to this development. Under the traditional hacienda system the prevailing arrangement was one of patrilineal ultimogeniture, whereby the landed property of the father passed on to the youngest son, although provision was made for the son's older brothers to assume control of the land in the event of their father's death during the childhood of the youngest son. It is now coming to be accepted, however - though not without considerable conflict - that all adult sons have a right to a parcel of their father's land, and during the past few years this principle has come to be extended to the daughters as well.⁸ In this context, Vazquez has recorded several cases of interfamilial as well as intrafamilial conflicts and the conflicts and the impression of the Vicosinos themselves that disputes over land ownership have become more prevalent in recent years than ever before.⁹

8. Mario C. Vazquez, "The 'Castas': Unilinear Kin Groups in Vicos, Peru" (Ithaca, New York: Comparative Studies of Cultural Change, Cornell University, 1964), p. 34.

9. Ibid., pp. 35-37.

With the shift in the rules of property inheritance in the direction indicated, together with a rising population, it is to be expected that conflicts over property will continue to increase, and that the land will be subject to even further fractionation.

II. AGE AND SEX COMPOSITION

Any assessment of likely future population trends must take into account the age and sex structure of the population under study. A young population is likely to grow at a faster rate than an old one because growth depends basically on the supply of children from whom future parents may be drawn. Similarly, assuming monogamous marriage (as is the case in Vicos), a population with an equal ratio of men and women makes it theoretically possible for each woman to marry and bear children, whereas a population with an overabundance of women relative to men makes it likely that the reproductive potential of a portion of these women will never be fully exploited. With respect to age, in 1951 Vicos had a very young population, and by 1963 it had become slightly younger (Table 8). The median age of females has also remained consistently higher than for males.

TABLE 8 - Median Age, by Sex

Year	Male	Female	Total
1951	17.5	21.3	19.4
1963	18.0	20.7	18.3

One of the salient features of the population of Vicos is the dearth of males relative to females. The sex ratio has remained virtually unaltered during the intercensal period, not only for the population as a whole, but within the three major age groups as well (Table 9). It will also be noted that the ratio experiences a steady decline over the major age groups, so that there are almost twice as many Vicosino women as men in the age bracket over 45. The ratio of males to females is not quite so low during the child-bearing years from 15 to 44, but almost one out of

every ten women in this age group will still find it difficult if not impossible to find a mate in Vicos.

TABLE 9 - Sex Ratios, by Major Age Groups

Age Group	1951			1963		
	No. of Males (A)	No. of Females (B)	Sex Ratio (A/B)100	No. of Males (A)	No. of Females (B)	Sex Ratio (A/B)100
Total	804	898	89.5	991	1106	89.6
0-14	351	341	102.9	422	416	101.4
15-44	347	371	90.9	447	484	92.6
45 +	106	186	56.4	122	206	56.9

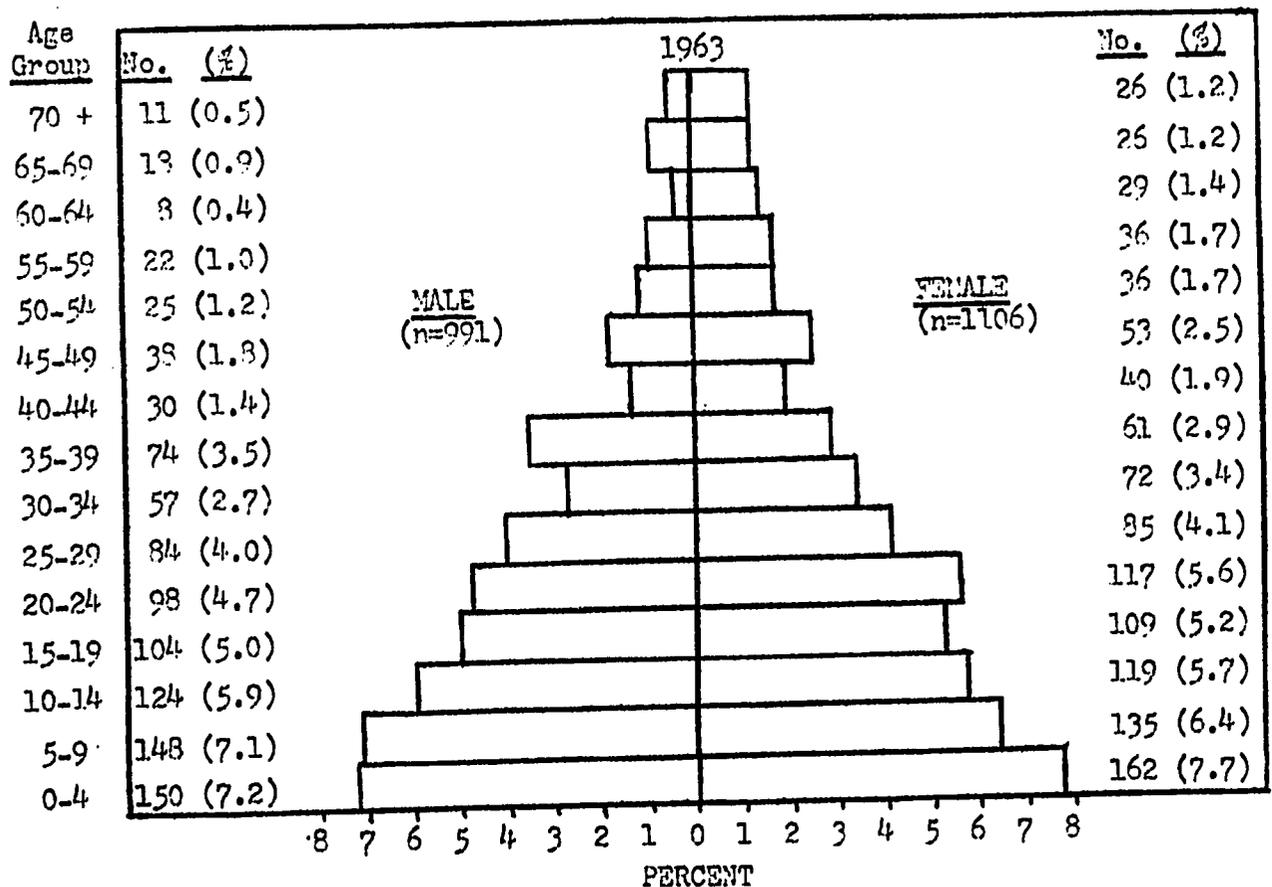
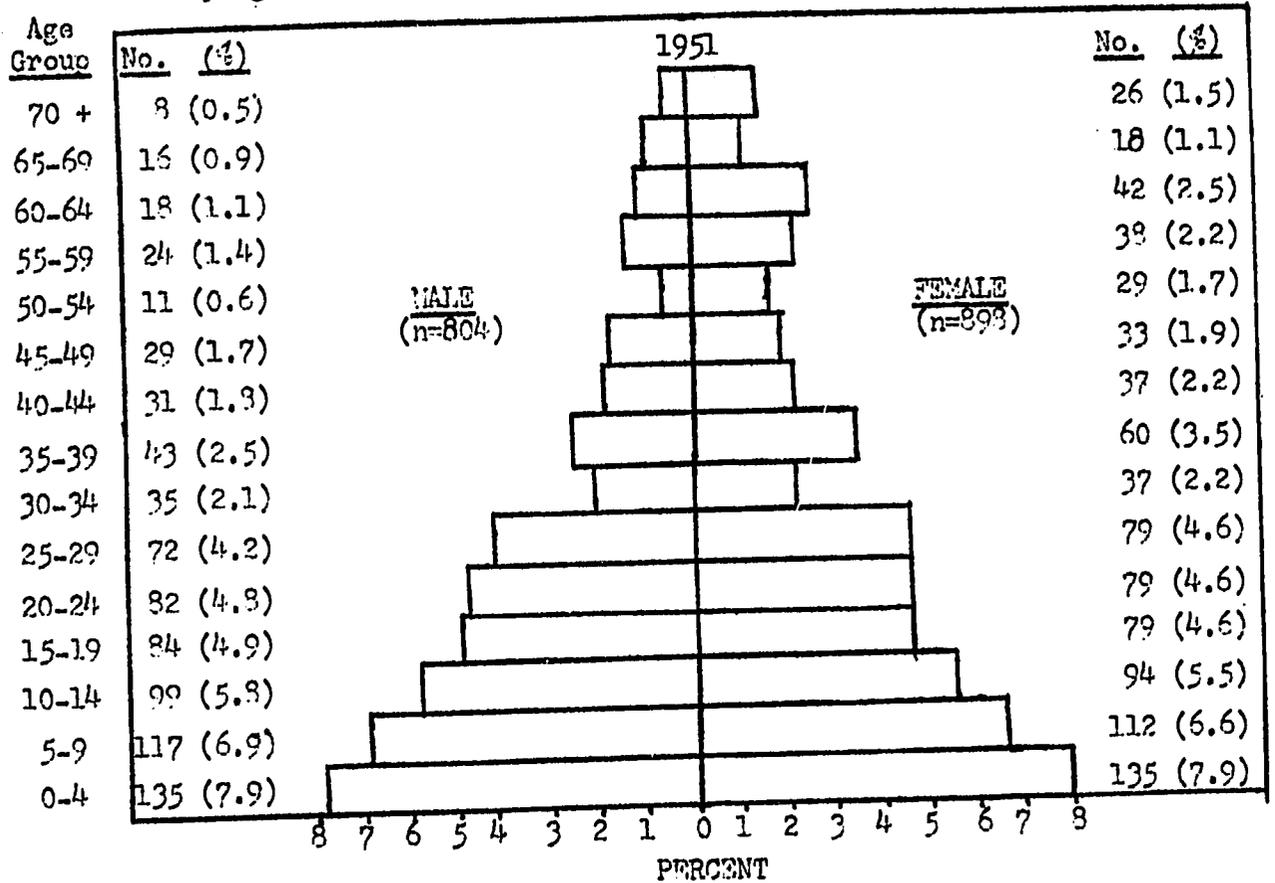
These data also indicate the extent of the drain on the supply of manpower, especially for work on the communal lands of Vicos (which is confined to men), but the burden of dependency carried by the active population has remained virtually constant between 1951 and 1963, as shown by the dependency index (Table 10), defined as the proportion of the total population consisting of dependent children and the dependent aged.

TABLE 10 - Dependency Index

Year	Age Group			Total (D)	Dependency Index (A+C/D)
	0-14 (A)	15-64 (B)	65+ (C)		
1951	692	942	68	1,702	.447
1963	838	1,178	81	2,097	.438

The distribution of the entire population by age and sex, presented in Figure 1, gives a detailed picture of the past history, the current structure, and possible future

FIGURE 1 - Frequency and Percentage Distributions of the Population of Vicos, by Age and Sex, 1951 and 1963.



trends of the population. The most salient overall characteristic of the two pyramids is their general shape, which is clearly that of an expanding population, with a broad base consisting of the youngest age groups from whom future parents will be drawn. There are also two especially striking breaks in the regularity of the distributions which require an explanation. One occurs in the three five-year age brackets between 40 and 54 of the pyramid for 1951 - especially in the last five-year bracket of this category - the other in the one five-year age group 30-34 for the same year. These two breaks for the most part should, and do, carry through into the 1963 pyramid in the age group corresponding to the 12-year lapse of time between the two censuses.¹⁰ That is, 1951 age group 50-54 moves up mostly into 1963 age group 60-64, with the 1951 age group of 30-34 aging into the 1963 category of persons between the ages of 40 and 44, inclusive. It follows that these two groups consist of persons who were born between 1899 and 1903, and between 1919 and 1923, respectively.

Age-specific losses of the magnitude encountered in these two groups immediately suggests that they may have been caused by epidemic diseases in the past. Mortality statistics for Vicos largely remain to be compiled, but it may be reported that five specific instances of epidemics in Vicos have stood out in the memory of informants. The first, and by all accounts the most severe, was a typhus epidemic that has been variously estimated as occurring sometime between 1905 and 1915. If 1910 is accepted as

10. The fact that they do so increases the degree of confidence that may be placed in the consistency of these data.

the most likely actual date, the losses in the 40-54 age group depicted in the 1951 pyramid would largely be explained, assuming that the epidemic affected mostly children under 15 years of age at the time.

There is no recollection of an epidemic during or immediately following the year 1919 that might explain the notably high age-specific rate of attrition for the 30-34 age group in the 1951 pyramid. It might conceivably have been due to a famine during this period, or to a natural disaster or a forced mass migration at some point thereafter, but the losses are actually much more likely to have been caused by the world influenza epidemic of 1918-1919.¹¹

The second epidemic that has been recalled is one described as a flu; it occurred during the year 1951 and was confined mostly to children. This would help to account for the losses experienced by the 10-19 year age group shown in the 1963 pyramid, but it does not explain why these losses should be confined mostly to females. Part of this may be attributed to the third epidemic, which consisted of measles, occurred sometime between 1955 and 1957, and did affect female children differentially. This third epidemic would also explain the rate of attrition among females aged 5-9 in 1963.

The fourth epidemic resulted in the death of about 60 children, mostly under the age of five, from whooping cough and measles in 1959. The effects of this double epidemic would thus be relevant to the losses experienced in the 0-4 age group in 1963, but again there is no explanation as to why the loss should be so heavy among males in particular.

11. Arthur H. Gale, Epidemic Diseases (London: Penguin Books, 1959), pp. 42-50.

One additional salient irregularity in the 1963 pyramid may be observed in the attrition of males in the age group 30-34. This is probably best explained by the increase in out-migration that followed from the acquisition of the hacienda by the Cornell Peru Project in December of 1951, and which had been suppressed until that point by the heavy labor obligations of the hacienda system.¹²

The effects of the fifth epidemic do not appear in the two population pyramids because it did not occur until January of 1964. The disease agent was whooping cough and struck mainly children under five years old. Estimates of mortality in this age group run as high as 100 children. If this estimate is approximately correct, its effect on the rate of growth of the population will be felt for the next forty-odd years.

Since its inception, the Cornell Peru Project in Vicos has given special attention to the problem of health in the community. A school lunch program was initiated to combat malnutrition and a clinic constructed, with arrangements for twice-weekly visits by a doctor and nurse under the auspices of UNICEF and in cooperation with the Peruvian government.¹³ After several years this program was discontinued when the medical team was shifted elsewhere by the Peruvian government, but it was resumed to some degree by the assignment to Vicos of a practical nurse by the United State Peace Corps in October of 1962. Despite these efforts, there have been four epidemics in the community since 1951, and their effect in

12. Mario C. Vazquez, "Proceso de Migracion en la Comunidad de Vicos, Ancash," in Henry F. Dobyns and Mario C. Vazquez (Eds.), Migracion e Integracion en el Peru (Lima: Editorial Estudios Andinos, 1963), pp. 95-96.

13. Holmberg, op. cit., pp. 91, 94.

slowing down the rate of population growth has undoubtedly been considerable. When the time comes that these epidemics are brought effectively under control, a very high rate of expansion can be expected in Vicos.

III. MOBILITY AND MIGRATION

Within the confines of the estate, Vicosinos have proved to be a rather stable population. On the average, 82 percent of all Vicosinos in 1951 were living in the same zone in which they had been born (Table 11). The only noticeable departures from this norm occurred in the zone of Ullmey, where the percentage of stayers was 95 percent, and in the zones of Paltash and Qoyroqsho, which were somewhat less stable. An indication of the contribution to the net growth of each zone attributable to internal shifts in the native-born population is given by the mobility index, which is obtained by subtracting the number of persons born in each zone, but residing outside of it, from the number of persons residing in the zone but born in another zone within Vicos. This index indicates that the zones of Ullmey, Jirkey, and Cullwash experienced a net gain in population through residential mobility, that Paltash experienced a substantial loss, and that the remaining five zones were virtually unaffected by these shifts.

Vicosinos have, however, engaged in extensive travels throughout Peru, and it is clear that the relative number of travelers and the distances they have covered have been increasing. Data presented in Table 12 show that while the number of Vicosinos one or more years old increased by 24 percent between 1951 and 1963, the number who had ever traveled to one or more of eight localities increased by 39 percent during the same period.

The distribution of travel by Vicosinos to the eight localities has also undergone a marked shift during the intercensal period. The increase in the number of persons who had ever traveled to the nearby towns of Marcara and Carhuaz (see map) was slightly less than what would be expected on the basis of the overall increase of 41 percent in the total volume

TABLE 11 - Number of Persons Residing in the Various Zones of Vicos in 1951, by Zone of Birth ^a

Zone of Residence	Zone of Birth								
	Ullmey	Wikus Pachan	Punko Corral	Paltash	Jirkey	Cullwash	Wiash	Parash	Qoyroqsho
Ullmey	183	-	14	12	2	1	1	1	1
Wikus Pachan	1	130	5	8	-	2	2	-	-
Punko Corral	2	8	156	8	3	1	5	-	-
Paltash	-	13	-	279	1	17	8	-	3
Jirkey	5	3	3	12	100	6	10	2	1
Cullwash	-	-	1	19	12	158	12	-	12
Wiash	1	3	4	19	6	7	252	3	1
Parash	1	-	-	6	-	1	6	31	-
Qoyroqsho	-	-	2	8	1	3	3	-	58
Total	193	157	185	371	125	196	299	37	76
Percent Stayers	95	83	84	75	80	81	84	84	76
Mobility Index	+22	-9	-2	-50	+17	+18	-3	+8	-1

a) Excludes 46 persons born outside of Vicos and 18 persons whose place of birth was unknown. Zonal boundaries according to original hacienda definitions; comparable data for 1963 are not presently available.

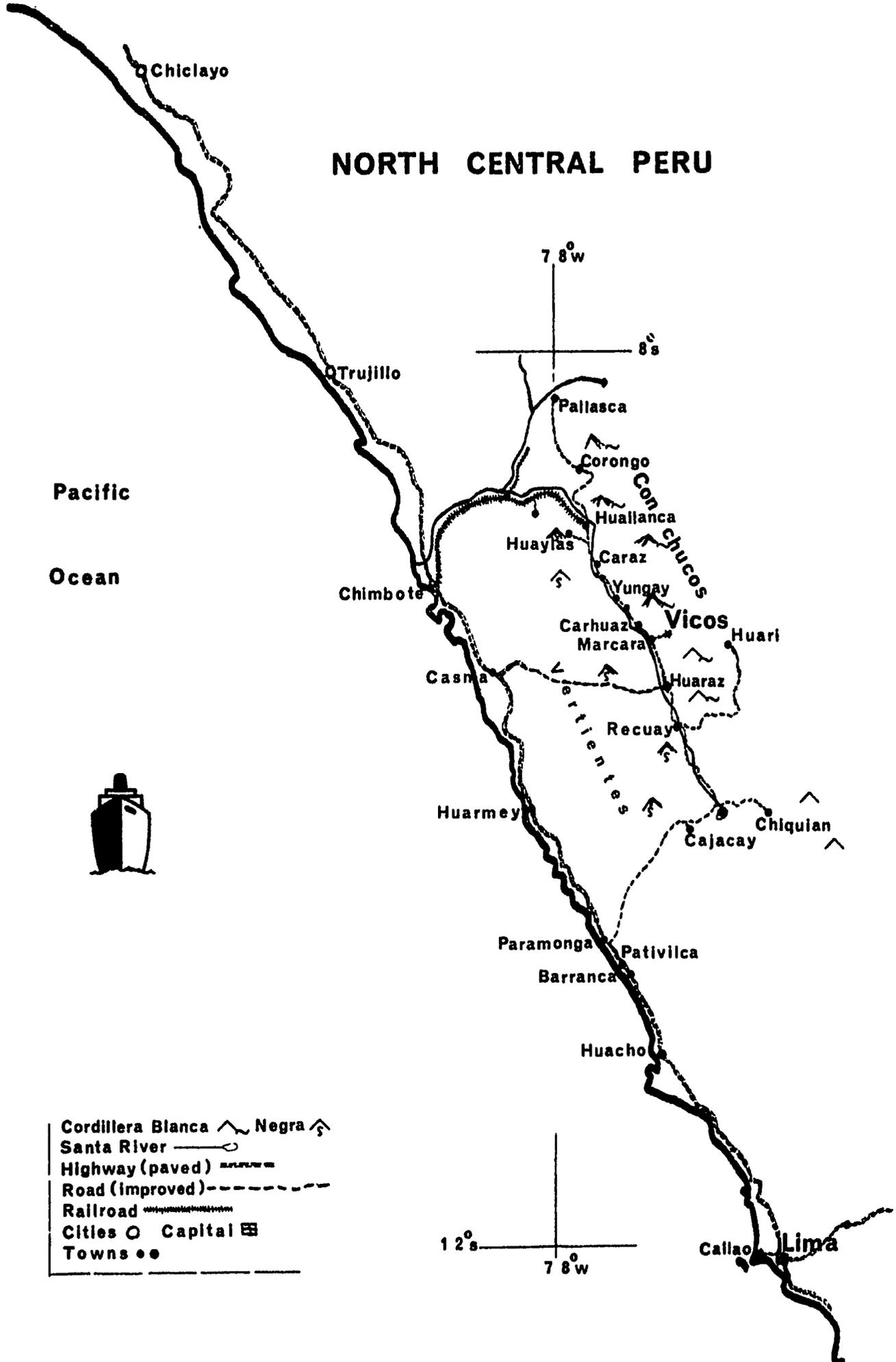
TABLE 12 - Number of Persons Aged One or More Ever Having Traveled to Selected Localities

<u>Locality</u>	<u>1951</u> (A)	<u>1963</u> (B)	Index Number (1951=100) $\frac{(B/A)100}{}$
Marcara	1,070	1,475	138
Carhuaz	915	1,216	133
Huaraz	712	1,044	147
Conchucos	426	410	96
The Coast	135	288	213
Vertientes	94	30	32
Lima (and other cities)	40	160	400
Callejon de Huaylas	-	169	-
No. of Locales Visited	3,392	4,792	141
No. of Travelers	1,072	1,488	139
No. of Persons Aged 1 +	1,655	2,048	124

of trips to the eight localities as a whole (counting only one trip per locality for each traveler). But there was a relative increase in travel to the departmental capital of Huaraz and an absolute decline in the number who had traveled to the haciendas located in the region of Conchucos (the eastern slopes of the mountain chain known as the Cordillera Blanca) or to the haciendas and small towns in the region of Vertientes on the western slopes of the Cordillera Negra.

The number of Vicosinos who had traveled north of Carhuaz in the Callejon de Huaylas, the intermontane valley in which Vicos is located, were so few prior to 1951 that they were not recorded by the census of that year. By 1963, however, 169 Vicosinos had engaged in such travel, especially to the towns of Yungay and Huallanca. Trips to the large haciendas

NORTH CENTRAL PERU



- Cordillera Blanca  Negra 
- Santa River 
- Highway (paved) 
- Road (improved) 
- Railroad 
- Cities  Capital 
- Towns  

12°S 78°W

and towns on the coast of Peru more than doubled and trips to Lima and other large coastal cities, including Chiclayo, Trujillo, and Chimbote, quadrupled between 1951 and 1963. With the exception of the new pattern of travel to the northern portions of the Callejon de Huaylas, the overall increase in mobility has thus been distributed more in the direction of the distant and larger coastal cities and haciendas than to the smaller towns and haciendas of the highlands.¹⁴

Table 13 shows that the percentage of persons who had ever traveled to one or more of the eight localities was virtually identical for each of the sexes in both census years, so that on the whole females were just as likely as males to have been travelers. When this is broken down by age, however, it is found that males under the age of 15 are somewhat more likely to have traveled than the corresponding age group among females, a difference that is manifested in both census years. It will also be noted that virtually every Vicosino, of either sex and in either census year, has traveled outside of the community at least once prior to his or her 15th year of life. The most striking feature of these data, however, is the increase in the proportion of travelers among Vicosinos under the age of 15 when the two census years are compared, an increase that occurs in the same magnitude among young females as among young males. In other words, young Vicosinos of

14. This closely parallels the characteristics of migration for Peru as a whole. See J. Matos Mar, "Migration and Urbanization - The 'Barriadas' of Lima: An Example of Integration into Urban Life," in Philip M. Hauser (Ed.), Urbanization in Latin America (New York: Columbia University Press, 1961); and Joseph M. Stycos and Cara Richards de Dobyns, "Fuentes de la Migracion a la Gran Lima," in Henry F. Dobyns and Mario C. Vazquez (Eds.), Migracion e Integracion en el Peru (Lima: Editorial Estudios Andinos, 1963).

TABLE 13 - Number and Percent of Vicosinos Aged One or More Ever Having Traveled to Selected Localities, by Age and Sex

1951

	Males						Females					
	1-14		15 +		Total		1-14		15 +		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Travelers	54	(16)	448	(99)	502	(64)	21	(7)	549	(99)	570	(65)
Non-travelers	274	(84)	5	(1)	279	(36)	296	(93)	8	(1)	304	(35)
Total	328	(100)	453	(100)	781	(100)	317	(100)	557	(100)	874	(100)

1963

Travelers	146	(36)	563	(99)	709	(73)	109	(28)	670	(97)	779	(72)
Non-travelers	256	(64)	6	(1)	262	(27)	279	(72)	19	(3)	298	(28)
Total	402	(100)	569	(100)	971	(100)	388	(100)	689	(100)	1077	(100)

either sex had traveled outside of the community to a greater extent in 1963 than their parents had done under hacienda controls in 1951.

Although the percentage who had traveled is the same for males and females, on the average males had traveled to more localities per capita than females (Table 14). This differential holds true for all age groups with the exception of the youngest in 1951, and it has remained almost unaltered between the two census years, again with the exception of an increase among the youngest males. The data also indicate, as would be expected, that the mean number of localities visited per traveler increases directly and invariably with age within each sex group and time period.

In summary, compared with 1951, Vicosinos in 1963 were more likely to have traveled outside the community, at a younger age, and for greater distances, shifting their travels increasingly to the coastal regions of Peru. The subset of actual returning migrants is of course included within this group of travelers, but the question that remains to be answered is whether migrations have followed the same pattern. A full set of data on migration is not available at present, but there are some indications that this is in fact the case.

First, the decline in the ratio of males to females after age 15 (Table 9 above), while almost certainly due in part to higher male mortality or female longevity, is also probably attributable in part to a net out-migration of males relative to females, especially between the ages 15-44.

Second, the percentage of Vicosinos who have served in the Peruvian armed forces had increased sharply between 1951 and 1963 (Table 15). By the criterion of length of absence from the community, if not of intent, these veterans would qualify as former migrants. (Whether those who have returned to Vicos differ from those who have chosen to remain outside is unknown). These veterans have usually served at least two years each - mostly during their

TABLE 14 - Mean Number of Localities Visited by Vicosino Travelers, by Age and Sex.

	1951							
	Males				Females			
	1-14	15-44	45+	Total	1-14	15-44	45+	Total
No. of Travelers	54	342	106	502	21	363	186	570
No. of Trips	67	1,333	475	1,875	25	918	574	1,517
Locales per Traveler	1.2	3.9	4.5	3.7	1.2	2.5	3.1	2.7
	1963							
No. of Travelers	146	442	121	709	109	466	204	779
No. of Trips	287	1,842	532	2,661	160	1,310	661	2,131
Locales per Traveler	2.0	4.2	4.4	3.8	1.5	2.8	3.2	2.7

TABLE 15 - Number and Percent of Males 20 or More Years of Age Having Served in the Peruvian Armed Forces

Year	Number of Males Aged 20 or More	Number of Veterans	Percent Veterans
1951	369	33	9
1963	467	102	22

early twenties - and typically their military obligation is fulfilled on the coast, although there are a few who have served in the eastern jungle regions and on the Ecuadorian frontier.

Third, Vazquez has observed that, exclusive of military veterans, out-migration from Vicos increased sharply between 1952 and 1956, especially among adolescents, and that the direction of movement was primarily toward the coast, so that there were approximately 100 Vicosino families living mainly on the coast by the end of the latter year.¹⁵ It should be noted that this figure represents about 25 percent of the approximately 400 families residing in Vicos at that time.

There has, however, also been an appreciable amount of in-migration to Vicos since 1951. Census data presented in Table 16 indicate that persons who were born elsewhere and residing in Vicos have increased at a rate sufficient to maintain their proportion of the total population, though this proportion is itself quite low.

15. Vazquez, "Proceso de Migracion," op. cit., pp. 96-97.

TABLE 16 - Place of Birth of the Inhabitants of Vicos

Year	Vicos		Elsewhere		Unknown		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1951	1,639	(96)	46	(3)	18	(1)	1,703	(100)
1963	2,018	(96)	84	(4)	-	(-)	2,102	(100)

There has also been a considerable amount of in-migration by native-born Vicosinos who have returned to Vicos after a period of residence outside the community. In a study based on personal interviews with returnees conducted in March of 1961, Vazquez found that thirty families, totaling 68 persons, had returned to Vicos, virtually all of them since December of 1956 when the community became self-governing, and the rate of return had not diminished as of the time of the study.¹⁶ If anything, the number of returnees was underestimated by this study, since migrants were defined as persons having lived outside the community for at least two years and returning military veterans were excluded. All but four of these families had returned from the coast, and there is thus very little overlap between these returning migrants and those who had been born outside and taken up residence in Vicos (Table 16), since most of the latter (70 percent according to the 1963 census) had been born in two haciendas and one community physically contiguous with Vicos.

Though not entirely conclusive, the weight of the evidence reviewed appears to indicate that there has been a net loss of population in Vicos due to migration, though the

16. Ibid., p. 98

magnitude of the potential loss has been reduced by in-migration. This net loss is also suggested by the existing pattern of a decline in the rate of population growth in the face of a rising rate of natural increase. The effect of the returning migrants is not only to create additional pressure on the land in their own right but also, since they tend to be young adults, to contribute in a degree disproportionate to their numbers to the growth potential of the population. Thus, while the fact that many absent Vicosinos have chosen to return testifies to the success of the Cornell Peru Project in the development of the community, the long-range effects of their return may detract from the gains that have been achieved.

IV. EDUCATION AND ECONOMY

The gains achieved since 1951 by the integrated program of social and economic development initiated in Vicos by the Cornell Peru Project have to a considerable extent offset some of the negative effects that might have been expected from the increase in the population.

In 1951 there was one schoolteacher in Vicos, who held classes and lived in a substandard building that served as a school. With the initiative and the financing of the Project, by 1959 a modern school facility had been constructed, there were nine schoolteachers, and they resided in living quarters in a building specially constructed for the purpose. Concomitantly, the number of children attending school increased from 15 to 167 (Table 17). This slightly outstripped the rise in the number of teachers, so that the student-teacher ratio increased from 15 to 19, but this

TABLE 17 - School-Age Population Attending School and Ratio of Students to Teachers, 1951 and 1959^a

Year	No. of Children 7-16 Years Old (A)	No. of Students (B)	No. of Teachers (C)	Percent Students (B/A)100	No. of Students per Teacher (B/C)
1951	385	15	1	4	15
1959	478	167	9	35	19

a) Number of children aged 7-16 in 1951 from census; corresponding figure for 1959 and data on number of students and teachers from Mario C. Vazquez, Educacion Formal en una Comunidad Rural Indigena: Vicos (Lima: Proyecto Peru-Cornell, 1961), pp. 25, 32, 34.

still compares very favorably to the ratio of 37 students per teacher in primary schools in Peru as a whole in 1958.¹⁷ The percentage of school-age children actually attending school also increased substantially. By choice of the Vicosinos, formal schooling is characteristically defined as a male activity, so that the 35 percent of school-age children in attendance in 1959 breaks down to six percent for the girls and 70 percent for the boys.¹⁸ Part of the resulting slack in the education of females has been taken up by the sewing classes that have been offered for Vicosino women in recent years, where an attempt is also made to teach them the Spanish language at the same time. In 1963 a total of 143 women - mostly adolescents - attended these classes on a regular basis.¹⁹ The skills they have learned as a result of this instruction are of economic importance to the community, since their application has stemmed the outward flow of capital for the purchase of clothing.

Table 18 indicates that only 39 Vicosinos had ever attended school by 1951, despite the fact that a school had been in operation in Vicos since 1940. The subsequent increase till 1963 was at the rate of 16.8 percent per year, a figure which is an underestimate because of the increase in out-migration during the intercensal period.

17. Statistical Abstract, op. cit., p. 26.

18. Vazquez, Educacion Formal, op. cit., p. 34.

19. Peru, Ministerio de Trabajo y Asuntos Indigenas, Informe del Plan Nacional de Integracion de la Poblacion Aborigen (Lima: Ministerio, 1963), p. 83

TABLE 18 - Number and Percent of Persons Aged Seven or More Ever Having Attended School

Year	Persons Having Attended School		Persons Not Having Attended School		Total Persons	
	No.	(%)	No.	(%)	No.	(%)
1951	39	(3)	1,276	(97)	1,315 ^a	(100)
1963	295	(18)	1,378	(82)	1,673	(100)

a) Excludes nine persons whose school-attendance status was not determined.

Due in large part to the development of the educational system in Vicos, the number of Vicosinos who could speak Spanish in addition to their native Quechua rose from two percent in 1951 to 17 percent in 1963 (Table 19), and whereas not a single Vicosino was able to read or write in 1951, a total of 13 percent had become literate by 1959.²⁰

TABLE 19 - Number and Percent of Persons Aged Seven or More Able to Speak Spanish

Year	Able to Speak Spanish		Unable to Speak Spanish		Total Persons	
	No.	(%)	No.	(%)	No.-	(%)
1951	23	(2)	1,301	(98)	1,324	(100)
1963	279	(17)	1,394	(83)	1,673	(100)

20. Vazquez, Educacion Formal, op. cit., pp. 3-4.

While most of the gains registered in literacy and the ability of Vicosinos to speak Spanish are attributable directly to the experience of formal education in the primary school of Vicos, there were two other factors that also contributed to this development. First, literacy classes for men and for military reservists were established by the Cornell Peru Project in 1953 and continued into 1957, when the demand for them effectively ceased to exist.²¹ Second, a fair number of Vicosinos learned to speak Spanish while living as migrants outside of the community. This is especially true of the veterans of the armed forces, most of whom also received some instruction in reading and writing as part of their military training. It will be recalled that the number of Vicosinos who have served in the armed forces more than tripled between 1951 and 1963 (Table 15 above), but this increase was itself the result of the deliberate policy of the Project to encourage Vicosinos to fulfill their military service obligation, which they had typically evaded prior to 1951.

It has also been noted previously that general out-migration, exclusive of military service, was stimulated by the lifting of the heavy labor obligations of the former hacienda system by the Cornell Peru Project after 1951. It may now be added that out-migration was further encouraged by the development of the educational system, in that many Vicosinos were more willing to undergo the experience of migration by virtue of having learned the Spanish language, and, though unanticipated, because many adolescents migrated

21. Ibid., pp. 26, 55-57.

specifically to avoid the necessity of continued school attendance in Vicos.²² The importance of these developments is underscored by the fact that the decline in the annual rate of growth of the population during the intercensal period was due almost entirely to the increase in out-migration.

Farming is by far the principal economic activity in Vicos, with potatoes, maize, wheat, and barley accounting for about 90 percent of the total land area under cultivation. Between 1951 and 1963 the cultivation of maize kept pace with the increase in the total number of households, while wheat experienced a relative decrease and barley an absolute decline (Table 20). The only relative increase among the four principal crops was registered in the cultivation of potatoes, which corresponds to the heightened importance of

TABLE 20 - Number of Households Cultivating the Four Major Farm Crops

<u>Farm Crop</u>	<u>1951</u> (A)	<u>1963</u> (B)	Index Number (1951=100) <u>(B/A)100</u>
Potatoes	324	440	136
Maize	359	450	125
Wheat	357	428	120
Barley	356	338	95
Number of Crops	1,396	1,656	119
Number of Households	363	461	127

22. *Ibid.*, pp. 83-84. It is not at all uncommon for adolescents to attend the primary school in Vicos.

this crop in the economy of Vicos.

In 1952 the Cornell Peru Project, after consultation with qualified agricultural specialists, introduced a new variety of seed potato into the community with the object of increasing the yield of the crop (Acceptance of this innovation was highest among those Vicosinos who had traveled most outside of the community).²³ As a result of this experiment, potato production doubled within one year. It doubled again between 1957 and 1958 after the community had become self-governing - with the democratic election of its own ruling council - and the hacienda lease had been transferred from the Cornell Peru Project to the community. Cultivated for purposes of subsistence prior to 1952, potatoes have become a commercial crop and Vicos has become the largest producer of potatoes in the region.²⁴

Second in importance to farming as an economic activity in Vicos is animal husbandry, which has the advantage of relying mostly on the extensive pasturelands of the estate and of thereby relieving some of the pressure on the arable portions of the land. Household ownership of domestic animals, however, has not quite kept pace with the total increase in households during the intercensal period (Table 21).²⁵

23. Vazquez, A Study of Technological Change, op. cit., pp. 80-81.

24. Holmberg, op. cit., pp. 86, 95-96.

25. No data are available on the total number of animals of each type owned per household. Guinea pigs are a local culinary delicacy.

TABLE 21 - Number of Households Possessing Major Domestic Animals

<u>Domestic Animal</u>	<u>1951</u> (A)	<u>1963</u> (B)	<u>Index Number</u> (1951=100) <u>(B/A)100</u>
Chickens	352	406	115
Cows	328	388	118
Sheep	320	338	106
Pigs	293	353	120
Goats	122	163	134
Donkeys	38	113	297
Horses	40	62	155
Guinea Pigs	308	360	117
No. of Animals	1,801	2,183	121
No. of Households	363	461	127

A relative gain was registered only by the number of households owning goats, donkeys, and horses, but this increase is especially significant as an indicator of the growth of income and savings that has occurred in the community, since Vicosinos characteristically put their profits into the purchase of donkeys and horses as a form of savings. Use of the national banking system for this purpose is alien to the community. The increasing number of beasts of burden has also resulted in a declining use of human energy for the purpose of transport.

Animal husbandry is distinctly a secondary economic pursuit - engaged in by most Vicosinos as a supplement to the primary activity of farming which nearly every household pursues - and the care of the herds is frequently entrusted to young children. The potential of animal husbandry as an alternative to dependance on the arable land is thus far from fully realized, and there are virtually no families

that have actually left the land and taken up animal husbandry as their primary means of gaining a livelihood. The possibility of converting some of the extensive pasturelands into farm land has not been fully explored either, although the pasturelands are apparently quite fertile, but the reasons for the under-utilization of the pasturelands either for pastoral or agricultural pursuits are rather clear: first, because the cultivation of potatoes has been quite profitable and, second, the pasturelands on the estate are extremely difficult of access. The elevation of Vicos ranges from 9,000 to 14,000 feet above sea level and the pasturelands are located in the upper altitudes. Vicosinos do, in fact, plant potatoes at these heights for their own personal consumption, but the commercial crop is restricted to the lower portions of the estate.

Aside from the dominant economic activities of agriculture and animal husbandry, Vicosinos also engage in a variety of occupational pursuits that serve to supplement their income and that do not depend on the land. The number of these specialties and the number of specialists engaged in them between 1951 and 1963 have both increased at an appreciably faster rate than the number of Vicosinos aged over 15 (Table 22).

Although the numbers involved are quite small and hence subject to fluctuation, the biggest percentage loss and one of the largest gains occurred in the medical arts of healer (curandero) and midwife, suggesting a decline in the reliance upon traditional medical remedies and an increase in the amount of care attending the process of birth. That the number of vendors - including grocers and other petty merchants - more than doubled is significant in that it indicates an increase in the amount of strictly commercial activity not based on a craft or a personal service. The activities of icemen, flavored ice dealers,

charcoal-makers, and firewood dealers are also commercial in the sense that they involve the sale of a product that is not the result of a craft, and they are only rarely performed as a personal service. Marked increases have also been registered in the building trades of carpenter and mason. Carpentry is taught in the primary school at Vicos (as is agriculture and animal husbandry) and, together with masonry, has been developed through the construction activities of the Cornell Peru Project in the community since 1951.

TABLE 22- Occupational Specialties of Persons Aged 15 or More

<u>Occupation</u>	<u>1951</u> (A)	<u>1963</u> (B)	<u>Index Number</u> (1951=100) (B/A)100
Weaver	58	106	183
Dyer	10	17	170
Cutter & Tailor	12	14	117
Basketmaker	32	51	159
Charcoal-maker	16	40	250
Vendor	21	48	229
Healer	5	3	60
Midwife	3	30	1000
Muleteer	31	52	168
Cantor	4	6	150
Musician	67	55	81
Iceman	5	15	300
Flavored Ice Dealer	-	12	-
Firewood Dealer	12	42	350
Carpenter	3	11	367
Mason	-	15	-
No. of Specialties	279	517	185
No. of Specialists	177	297	168
No. of Persons 15 +	1,010	1,260	125

V. CONCLUSIONS

The population of Vicos has grown steadily for almost 200 years and this fact, combined with the maintenance of a virtually constant land base, has resulted in an increasing pressure of population on the land. In the face of this growth, in recent years a change in the rules of property inheritance has conspired to insure that the land base, already divided into thousands of tiny plots, will be subject to increasing fragmentation.

The seriousness of these developments has been mitigated since 1951 by the intervention of the Cornell Peru Project in the community. As a direct consequence of this intervention, the barriers to migration imposed by the former hacienda owners have been lifted, and a modern educational system has been developed. The combined effect of these changes has been to stimulate out-migration and thereby to reduce the rate at which the population had been growing in the decade prior to 1951. The interplay of migration and education, together with the transfer of hacienda control to the Vicosinos, has also contributed substantially to the success of the program of planned economic development, so that the production of potatoes, the principal economic activity in Vicos, has multiplied at a rate many times faster than the growth of the population. Concomitantly, additional sources of income have been created through the expansion of the inventory of occupations not dependent on the limited base of arable land, and available evidence indicates that income and savings have also risen.

Vicosinos, however, started from an extremely depressed state in which famine threatened their daily lives, and in perspective the achievement amounts to bringing

them up perhaps to the level of development enjoyed by some of the more advanced farmers of Peru.

This, however, may prove to be insufficient and perhaps rather shortlived in light of the evidence that the rate of growth of the population will probably increase in the near future. The high and rising rate of natural increase resulting from the high birth rate and the low death rate; the high child-woman ratio; the increasing general fertility rate, and the youth of the Vicosinos as revealed by the shape of their population pyramids generally point toward further growth of the population and very likely toward an increasing rate of growth as well. Epidemics of infectious diseases and migration outside of the community have served as a partial brake on the expansion of the population, but with the further modernization of the community the incidence and destructiveness of these epidemics may be expected to decline, and the rate of out-migration has been slowed by the increasing extent to which Vicosinos, after a period in the outside world, have returned to enjoy the bounty of their developing community.