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Chapter 4

Projecting the HEC (Health, Education, and Communication) Index for Latin America Back to 1940

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Introduction

In *Statistics and National Policy*,¹ Wilkie outlined a health, education and communication (HEC) Index to test the so-called widening gap between the developing and developed countries. Utilizing summary data for 12 items spanning the years 1950 to 1970 the social gap between Latin America (representing the developing world) and the United States (representing the developed world) was measured. For the present study, we set out to project the Index back to 1940 and even 1930.

After an exhaustive search of national and international data sources by Nilsson, we determined that although isolated statistics are available for some countries and/or some items for 1930, it is not possible to locate enough descriptive data to reconstruct a complete profile of the social condition of Latin America before 1940 that would be fully comparable with post-1950 data in the HEC index. In researching data for 1940, we often had to employ inductive analysis to fill in missing descriptive statistics to predict a complete picture for the social situation for that year sufficiently reliable for inclusion in the HEC index, an index that becomes more reliable after 1950. This study discusses the nature of the data for 1940 and how the lacunae were filled.²

[Editors' Note: Wilkie's study "The Narrowing Gap," originally planned for publication here, is being expanded into a book and will appear as Supplement 8 entitled *The Narrowing Social Gap: Latin America and the United States, 1940-1970*, forthcoming.]

¹ Statistical Abstract of Latin America Supplement 3 (Los Angeles: UCLA Latin American Center Publications, University of California, 1974), pp. 479-481.

² For methodological consultation we are indebted to Professor William J. Rosen, Department of Mathematics, Los Angeles Pierce College.

The HEC Index Introduced

Latin America's level of living or social condition is presented as a differential computed by calculating the gap between Latin America and the United States for individual items in the Index (Table 4-1, Part 1). The items in the Index are not explicitly weighted (but they are implicitly weighted by the fact that there are 5 health items, 4 education items, and 3 communication items (Table 4-1, Part IV). Since it is socially advantageous for 7 items to have a high number (e.g., life expectancy) and for 5 to have a low number (e.g., infant mortality), to get a consistent measure of the closing gap the difference between Latin America and the United States was computed as the percentage of change between low and high numbers, regardless of their Latin American or U.S. origin. Thus, in 1940, Latin America was 1,349 percent worse off than the United States in relation to the HEC items, this figure narrowing to 652 percent by 1970.³

The total rate of change in the level of living between 1940 and 1950, between 1950 and 1960, and between 1960 and 1970 was nearly 20 percent or more each decade, the level closing to meet the U.S. standard (Table 4-1, Part II).

Many American nations aspire to improve their relative position within the Latin American region, just as their citizens aspire to improve their living conditions in relation to the HEC components. Table 4-1, Part III, shows the HEC rankings of the 20 Latin American countries.

The 12 items included in the HEC Index (Table 4-1, Part IV) do not, of course, include all the possibilities that might be included in an ideal index; they catalog the data for which we have meaningful time series available for all countries since 1940. Latin America is measured against the

³ In the subindex for health, e.g., Latin America was 394.1 percent worse off than the United States in 1940.

Table 4-1
HEALTH, EDUCATION, AND COMMUNICATION (HEC) INDEX FOR
LATIN AMERICA, 1940-70

PART I HEC LEVEL (DIFFERENTIAL BETWEEN LATIN AMERICA AND THE UNITED STATES) ¹					PART II PERCENTAGE CHANGE			
Year	Health Average 5 items	Education Average 4 items	Communi- cation Average 3 items	Total Average 12 items	Health	Education	Communication	Total
1940	394.1	496.1	3,912.3	1,349.3	~	~	~	~
1950	341.2	403.8	3,282.8	1,097.5	-13.4	-18.6	-19.5	-18.7
1960	315.0	263.1	2,582.2	864.5	-7.7	-34.8	-21.3	-21.2
1970	255.3	228.2	1,879.7	652.4	-19.0	-13.3	-27.2	-24.5

PART III HEC TOTAL RANKINGS OF THE 20 LATIN AMERICAN COUNTRIES					PART IV HEC COMPONENTS
Country	1940	1950	1960	1970	
ARGENTINA	1	2	2	1	Health (H)
BOLIVIA	17	17	17	17	1. Life expectancy
BRAZIL	9	9	10	10	2. Infant mortality rate
CHILE	5	4	6	6	3. Persons per hospital bed
COLOMBIA	10**	8	9	11	4. Persons per physician
COSTA RICA	6	6**	7	5	5. Persons per dentist
CUBA	3	5	3	7	Education (E)
DOMINICAN REP.	16	15**	14	13	6. Literacy rate for population age 15 and over
ECUADOR	14**	13	13	14	7. Share of school-age population 13-18 enrolled in secondary school
EL SALVADOR	14**	15**	15	16	8. Share of school-age population 13-18 enrolled in secondary school
GUATEMALA	18	18	18	19	9. Share of students enrolled in higher schools as a share of students enrolled in primary schools
HAITI	20	20	20	20	Communication (C)
HONDURAS	19	19	19	18	10. Newspaper circulation, copies per 1,000 persons
MEXICO	8	12	11	9	11. Number of telephones per 100 persons
NICARAGUA	13	14	16	12	12. Number of persons per motor vehicle in use
PANAMA	4	3	4	3	
PARAGUAY	10**	11	12	15	
PERU	12	10	8	8	
URUGUAY	2	1	1	2	
VENEZUELA	7	6**	5	4	

1. The average HEC differential between Latin America and the United States closed from 1,349.3 in 1950 to 864.5 in 1960, and to 652.4 in 1970. (A zero differential means that Latin America would have the same HEC standard as the United States, which represents a convenient yardstick to which many Latin Americans compare their national level of living.)

SOURCE: James W. Wilkie, *The Narrowing Social Gap: Latin America and the United States, 1940-1970*, Statistical Abstract of Latin America Supplement 8 (Los Angeles: UCLA Latin American Center Publications, University of California, forthcoming).

United States for the following reasons: (1) Items chosen are neutral in that they deal with better living conditions regardless of ideology. All countries strive to improve these levels, eventually if not immediately, except notably for Castro's Cuba which turned away from the communication component in its attempt to create a "New Man." (2) Because of possible debate over the communication component as involving a material, economic, or nonsocial basis, data are presented in Table 4-1 for the subindexes health, education, and communication in order that we may see how the

components affect the total as well as to permit other investigators to develop their own indexes. (3) Regardless of the wishes of leaders or intellectuals who would like to see Latin America become "independent" of the United States, U.S. influence in Latin America has been paramount not only directly in international affairs but also indirectly in establishing a standard of living accepted by a large share of the population. (4) It is conceptually more intelligible to speak here of a concrete U.S. HEC standard than of an average standard for many countries of the developed world which

would include both better levels (e.g., infant mortality rates) and worse levels (e.g., share of students enrolled in higher schools as a share of students enrolled in primary schools).

The HEC Index differs in an important respect from the Wilkie Poverty Index for Mexico.⁴ The latter is based upon census data of 7 items for each person surveyed individually by census takers; the former is based upon a per capita approach. If the Poverty Index for Mexico declines for each of the 7 items, we can know how the population censused is faring; the same is not true for the HEC Index, because if, for example, the number of persons per motor vehicle declines, we cannot say definitely that more people own vehicles: per capita data covers the situation where fewer persons are acquiring a larger number of autos, not necessarily that more persons are acquiring them. All we can say is that the chances for ownership of or access to vehicles in general, including buses and trucks, increase. With these considerations in mind, it is appropriate to assess the data for 1940.

HEC-Index Data for 1940

Writing in 1942 Charles Morrow Wilson painted a bleak picture of health conditions in Latin America:

There are roughly a hundred and twenty million people in Latin America. . . . At this very moment it is a good bet that at least fifty million of them are sick. Sick of everything from sprue to leprosy. Sick of almost all the diseases that we in the United States encounter in our lives, and of other savage and highly fatal diseases about which we know almost nothing.⁵

About the specific conditions in Haiti, in 1941 James G. Leyburn called attention to problems faced:

Historians who seek to explain the rise and fall of nations in terms of a single cause might do worse than hit upon health and disease as the all-important explanation. Unless spectacular epidemics have appeared in a country's history, the average person is rarely aware of how diet may affect a people, or of how backwardness in achievement is often directly related to disease. It may well be that the development of *medical* history will yet cause a radical revision of certain philosophies of history. . . .

The "triple threat" to Haitian health is the morbid group: malaria, hookworm, and yaws. The first two are familiar enough in part of the United States, and

require only short comment. For centuries malaria has sapped the vitality of people in southern lands, giving them a reputation for indolence which is not wholly deserved. Haitian peasants were during the entire nineteenth century accused of laziness; when a strapping man lay all day in the shade of a tree, it was logical enough for a white visitor to suppose that he was willfully loafing. The critics might have been more temperate if they had known what it was to be perpetually full of malaria, with a body apparently hale and hearty, but lassitude sapping all energy. A group of doctors from the Rockefeller Foundation discovered that among 4,439 persons examined in various surveys two decades ago sixty-seven per cent showed malarial parasites in the blood. Since the American Occupation steps have been taken to control the disease and much progress has resulted: some of the towns are now practically free of it. But the battle against malaria will never be won so long as the anopheles mosquito breeds in the island; it means an endless war of constant vigilance as well as education — one which must be carried on simultaneously in the neighboring Dominican Republic.

Hookworm, like malaria, is also ordinarily quite undramatic in its symptoms. There is no specific pain, but rather a progressive inertia. Since practically every country person goes barefoot it would be miraculous if hookworm were not widespread, for sanitation is entirely lacking in peasant communities. Dr. Lhérisson reported in 1935 that twenty-six per cent of the mass of Haitian people examined up to that time had been found infested by hookworms. The final figure will probably be revised upward, for the persons most easily examined are townspeople who have better sanitation and more shoes. . . .

Yaws is, of the morbid triad, the most virulent and the commonest. It was brought over from Africa apparently as early as 1509. Oviedo describes it in 1526 as "a terrible pustular disease." It so closely resembles syphilis that it has often been mistaken for that malady. Untreated or wrongly treated it ravages the bodies of its victims, making them loathsome to behold. . . .

Hard work and a simple mode of outdoor life prove, in Haiti at least, not to be the keys to good health which a romantic might fancy them. Haiti has been one of the unhealthiest places in the world. One feels that it has been lucky to escape such scourges as typhus, cholera, and bubonic plague; that smallpox has not been violent in its epidemics, and that the people developed an immunity to yellow fever. It has, indeed, been luck rather than cleanliness and proper medical care which has protected the people in these instances. . . .

Dysentery, when caused by bacilli, is epidemic in nature. In Haiti this form, known as "colerin,"

⁴Items included in the Poverty Index involve population regularly wearing sandals, eating tortillas, living in isolated areas under 2,500 persons, being illiterate, living without sewage disposal, going barefoot, and speaking only an Indian language. See James W. Wilkie, *The Mexican Revolution: Federal Expenditure and Social Change Since 1910* (2d ed.; Berkeley: University of California Press, 1970), pp. 204-245; and followup methodological analysis in Wilkie "On Quantitative History: The Poverty Index for Mexico," *Latin American Research Review* 10:1 (1975), pp. 63-75.

⁵Charles Morrow Wilson, "How Latin Americans Die," *Harper's Magazine*, July 1942, p. 140.

annually affects about a quarter of the rural population. Another type, caused by a variety of amoeba, affects another ten or twenty per cent, according to the region. Enteritis is less serious than dysentery but just as prevalent, being caused by protozoa and intestinal worms. Poor diet, the abuse of alcohol, premature weaning, and unwise nursing are also responsible.⁶

Although Leyburn was writing about the region's poorest country, public health campaigns in much of Latin America had yet to get underway in 1940, and Leyburn's comments apply to problems faced in tropical zones throughout Latin America. Too, parasitic diseases and tuberculosis have made life difficult for the highland masses who have also suffered from extreme temperature and atmospheric conditions. Only in such capital cities as Buenos Aires, Santiago, Lima, Bogotá, Mexico City, and Havana were modern health facilities firmly established, and even there the masses have not been well cared.

In any event the basis for Latin America's post-1940 health revolution apparently was laid in the 1930s. In one of the few 1930 health indicators that we have to compare with 1940, data on life expectancy at birth in Table 4-2 show that by 1940 the population could expect to live, on the average, 5 years longer, to the age of 40. Although some of the data are projected back to 1930 on a linear regression model (see Method I in the Methodological Appendix, below), actual data for other countries such as Costa Rica, Panama, and Venezuela (where the gain was 6 years) confirm that the computed average figure is relatively reliable. (Actual data for El Salvador and the Dominican Republic show a gain of as much as 8 years in life expectancy at birth, offsetting the low actual data that we would expect to find for Bolivia and Brazil, which experienced only 3-year gains.) Data for a country like Bolivia would appear largely to omit the Indian population, where it has been argued that to survive in the high altitudes Indians must be strong just to be born, even if they then age rapidly, age 40 being considered very old in 1940.

Infant mortality data, the second item in the HEC Index, can be problematic. How do we treat data when the rate for 1940 is lower than for 1950 (as in Bolivia and Paraguay, where the rates were 101 and 145, and 79 and 90, respectively)? Although the rate for Bolivia has been tested with modern statistical analysis by O. Andrew Collver,⁷ the official results that he accepts still appear to us to be suspiciously low. Figures of 1940 given in Table 4-3 for Haiti (estimated at 190, the same as the 1970 figure)⁸ are lower

⁶ James G. Leyburn, *The Haitian People* (New Haven: Yale University Press, 1941), pp. 272-277.

⁷ O. Andrew Collver, *Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations* (Berkeley: Institute of International Studies 1965), p. 72. Collver decided not to modify the rate of 101, noting that it may have involved an underregistration of only 5 to 7 percent.

⁸ James W. Wilkie, *The Narrowing Social Gap: Latin America and the United States, 1940-1970*, Statistical Abstract of Latin America Supplement 8 (Los Angeles: UCLA Latin American Center Publications, University of California, forthcoming), Appendix 1.

Table 4-2
HEC ITEM 1: LIFE EXPECTANCY AT BIRTH
IN LATIN AMERICA AND THE UNITED
STATES, 1930 AND 1940

Country	1930		1940	
	Age	Rank	Age	Rank
Total average	35	*	40	*
ARGENTINA	54.5 ^a	2	58.0 ^a	2
BOLIVIA	34.7	7	38.8	7**
BRAZIL	34	10**	36.7	14
CHILE	35.2	6	38.1	10
COLOMBIA	34.2	9	38.0	11
COSTA RICA	41.9	4	48.7	3
CUBA	42.3 ^a	3	48.3 ^a	4
DOMINICAN REP.	26.1	19	34.0	18
ECUADOR	27.5 ^a	17	35.0 ^a	16
EL SALVADOR	28.7	15	37.5	12**
GUATEMALA	26.6	18	30.4	19
HAITI	18.0 ^a	20	26.0 ^a	20
HONDURAS	34.0	10**	37.5	12**
MEXICO	33.9	12	38.8	7**
NICARAGUA	28.6	16	34.5	17
PANAMA	35.9	5	42.5	5
PARAGUAY	34.5	8	39.2	6
PERU	29.0 ^a	14	36.5	15
URUGUAY	66.7 ^a	1	67.7	1
VENEZUELA	32.5	13	38.7	9
UNITED STATES	60.0	*	63.0	*

a. For method used in calculating Argentina, Cuba, Ecuador, Haiti, and Uruguay in 1930 and 1940, and Peru in 1930, see Method I in the Methodological Appendix, below.

SOURCE: NLTLA, pp. 2-3. U.S. data are from SHUS, p. 25.

than for Chile's 1940 figure (at 217), suggesting that before World War II Haiti was in better control of infant mortality than was Chile. Is this credible? Or was Haiti still benefiting from the aftermath of the U.S. Marine Corps occupation that introduced radical health measures to the island between 1915 and 1934? At the same time one could only surmise that Chile had a series of infant disease epidemics that Haiti did not have.

On the one hand, it seems to be true that Haitian public health has declined since the marines departed (infant mortality has consistently gotten worse, being lower in 1960 (at 171) than in 1970 (at 190));⁹ on the other hand, the marine medical corps may never even have begun to reach the rural Haitian people about whom Leyburn writes. More probably the Chilean data are the most reliable of all countries, a fact meaning that Chile's rank is biased negatively for 1940. Chile's honesty does not go totally unrewarded, however, because the high figure for 1940 infant mortality will show a higher relative decrease by 1950 compared with countries where infant mortality is understated for 1940. In short, given these complex factors, it has seemed best not to

⁹ *Ibid.*

Table 4-3
 HEC ITEMS 2, 3, AND 4: INFANT MORTALITY RATE, PERSONS PER HOSPITAL
 BED, AND PERSONS PER PHYSICIAN IN LATIN AMERICA
 AND THE UNITED STATES, 1940

Country	2: Infant Mortality Rate [†]		3: Persons per Hospital Bed ^e		4: Persons per Physician ^f	
	Rate	Rank	Number	Rank	Number	Rank
Total average	127	*	735	*	4148	*
ARGENTINA	90	5	225	3	1,191	1
BOLIVIA	101 ^a	6	2,690	20	5,978	18
BRAZIL	189 ^b	18	529	10	2,022 ^g	5
CHILE	217	20	251	5	2,439	6
COLOMBIA	141	14	606	11	3,871	10
COSTA RICA	132	13	232	4	3,641	9
CUBA	61 ^a	1	277	6	1,384	3
DOMINICAN REP.	149 ^a	15	1,759	18	5,024	13
ECUADOR	159	17	429	8	4,110	12
EL SALVADOR	121	9	695	13	6,280	19
GUATEMALA	127 ^a	12	766	16	5,555	15**
HAITI	190 ^d	19	2,019	19	11,308	20
HONDURAS	106	7	923	17	5,832	17
MEXICO	126	11	683	12	1,965 ^g	4
NICARAGUA	109 ^c	8	756	15	4,095	11
PANAMA	81 ^a	3	173	2	3,560 ^h	8
PARAGUAY	79 ^c	2	741	14	5,555	15**
PERU	150 ^a	16	443	9	5,173	14
URUGUAY	87 ^c	4	132	1	1,233	2
VENEZUELA	122	10	371	7	2,748	7
UNITED STATES	47	*	107	*	751	*

[†]Deaths under 1 year of age per 1,000 live births.

- a. Data, for 1940-1944, are from BRLA.
 b. Data cover 826 places including 21 state capitals.
 c. Incomplete.
 d. Estimated, see text.
 e. Includes some approximate figures, according to source.
 f. Data subject to variation of 10 percent or more, according to source.
 g. Includes a number of irregular practitioners.
 h. Including Canal Zone.

SOURCE: For Item 2: UNSY (1951), pp. 50-53; except Brazil from SBS, p. 60, and see note a above.
 For Item 3: LAFW, p. 350; except Mexico from AAA, p. 159, and United States from SHUS, p. 35.
 For Item 4: AES, pp. 417-419; except United States from SHUS, p. 34.

tamper with reported data and to estimate each country's data in relation to its own history rather than in relation to other countries in Latin America.¹⁰

Number of persons per physician (Table 4-3) appears to be one of the less troublesome items in the Index. All medical graduates do not practice medicine though, having been the custom in the past in some Latin American families to have one son study medicine who would practice irregularly or not at all. Also, some physicians who have migrated out of Latin America in search of better working conditions and higher pay may continue to be counted in the statistics for some years, depending upon whether or not the data reflect licensing records or physicians in actual practice. (From a different point of view, data for 1940 may include

many cases of unqualified personnel who could practice medicine because of lax enforcement of the laws.) The midwife often substitutes for the doctor, and in Mexico, for example, the national university has offered a degree in midwifery. Although rural areas might be lacking physicians, there has often been a district nurse who is able to treat a number of illnesses, and who sends a patient to the city when in need of more sophisticated care. Finally, the pharmacist, who continues to play a different role in Latin America than in the United States, is often consulted to diagnose minor illnesses of persons, dispensing drugs over the counter—prescriptions are seldom needed in Latin America. According to one source, pharmacists were so common in the 1940s that in some countries there were as many of them as there were doctors.¹¹

¹⁰ Thus Haitian data for 1950 are estimated (at 179) to show higher percentage change during the 1940s (5.8 percent) under the Haitian "intellectual revolution" than during the 1950s (4.5 percent) under the dark days of "Papa Doc" Duvalier. See *ibid.*

¹¹ George Soule, David Effron, and Norman T. Ness, *Latin America in the Future World* (New York: Farrar and Rinehart for the National Planning Association, 1945), p. 351.

The data for persons per hospital bed in 1940 are relatively troublefree except that we are unsure whether or not coverage includes rest homes, nursing homes, and/or private sanitoriums and various kinds of "temporary beds" (Table 4-3). The ratios for persons per dentist are so puzzling that two different estimates have been reported for 1940 (Table 4-4). Both could be considered reliable taken by themselves; both used essentially the same sources and both can be thought of as prepared by reliable reporters. The estimates for 1940-A were calculated by the U.S.-based National Planning Association staff. And using the data reported by Dr. Aristades Moll, the then Secretary for the Pan American Sanitary Bureau, and UNESCO population estimates, we calculated ratios of people per dentist in 1940-B, which for some countries vary greatly compared with ratios in 1940-A. Thirteen countries had fewer persons per dentist in 1940-B than in 1940-A, variation between the ratios ranging from 3 to 283 percent. To know which to consider accurate for a study like this we need to know how the data were gathered and who reported it. Did U.S. officials gather them personally or did officials of the country do so, perhaps inflating their reports in the attempt to disguise

the true nature of the situation? What method was used by the National Planning Association? Did it have reliable estimates with which to work? The questions are numerous and cannot be answered here. To resolve it we averaged the two (Table 4-4, last col.). The result appears to give a fair estimate of the situation in 1940 compared with 1950.¹²

For the 1940 figures on literacy (Table 4-5), we found it necessary to adjust the data for all but 5 countries in order to achieve consistency in reporting for persons age 15 and over; figures for Brazil, Chile, Mexico, Peru, and Venezuela were consistently reported for the age group used here. The problem with reporting data for persons ages 6-14 is that it adds to the rate of illiteracy because much of that school-age population is not enrolled in primary school or has not been in school long enough to become literate. The method for adjusting the data meant increasing the literate percentage according to rank of each country in school-age population 7-14 enrolled in primary school (see Table 4-6) by adding percentages as follows: 1 percent for ranks 1-3; 2 percent for ranks 4-7; 3 percent for ranks 8-14; 4 percent for ranks

¹²Wilkie, *The Narrowing Social Gap*, Appendix I.

Table 4-4
HEC ITEM 5: PERSONS PER DENTIST IN LATIN AMERICA AND
THE UNITED STATES, 1940

Country	1940-A		1940-B		Average	
	Number	Rank	Number	Rank	Number	Rank
Total average	17,794 ^a	*	12,472	*	15,133	*
ARGENTINA	2,579	1	3,148	2	2,863	1
BOLIVIA	33,265	17	21,520	18	27,392	18
BRAZIL	4,412	4	4,123	4	4,267	4
CHILE	6,250	5	4,186	5	5,218	5
COLOMBIA	13,387	9	13,995	15	13,691	10
COSTA RICA	11,621	8	11,254	9	11,437	7
CUBA	3,877	2	4,087	3	3,982	3
DOMINICAN REP.	10,660	6	17,590	17	14,125	11
ECUADOR	14,537	11	8,220	7	11,378	6
EL SALVADOR	13,608 ^b	10	13,608	13	13,608	9
GUATEMALA	38,403	19	23,389	19	30,896	19
HAITI	50,000	20	37,693	20	43,846	20
HONDURAS	34,602	18	11,542	10	23,072	17
MEXICO	21,633	14	12,283	11	16,958	15
NICARAGUA	25,190	15	10,922	8	18,056	16
PANAMA	11,466	7	12,460	12	11,963	8
PARAGUAY	14,848	12	17,092	16	15,970	13
PERU	15,384	13	13,795	14	14,589	12
URUGUAY	4,120	3	1,795	1	2,957	2
VENEZUELA	25,859	16	6,745	6	16,302	14
UNITED STATES	*	*	*	*	1,883	*

a. Subject to a variation of 10 percent or more in many countries, according to source.

b. Data from 1940-B used as no other information available.

SOURCE: For 1940-A: LAFW, Table 14. Ratios prepared by the National Planning Association, Washington, D.C.

For 1940-B: Dentists from AES, p. 309; population data from SNP, table VIII-1.

For United States: SHUS, p. 34.

Table 4-5
**HEC ITEM 6: LITERATE POPULATION AGE
 15 AND OVER IN LATIN AMERICA
 AND THE UNITED STATES, 1940**

(ADJUSTED)^a

Country	1940	
	Percent	Rank
Total average	46	*
ARGENTINA	89	1
BOLIVIA	24	19
BRAZIL	40	13
CHILE	71	3
COLOMBIA	53	5
COSTA RICA	70	4
CUBA	42	10**
DOMINICAN REP.	43	9
ECUADOR	30	15
EL SALVADOR	49	6**
GUATEMALA	29	16**
HAITI	29	16**
HONDURAS	22	20
MEXICO	49	6**
NICARAGUA	34	14
PANAMA	42	10**
PARAGUAY	26	18
PERU	42	10**
URUGUAY	82	2
VENEZUELA	44	8
UNITED STATES	97	*

a. Except for Brazil, Chile, Mexico, Peru, and Venezuela data are adjusted here for consistency for series through 1970. For rationale and methodology, see text.

SOURCE: Data for unadjusted countries are from UNDY (1948); all other data adjusted here were originally estimated by the League of Nations and reported in ACA, p. 60.

15-20. This method was developed from an analysis of Cuban and Mexican data which suggested the above approximate adjustments. Of four countries, Argentina, Colombia, El Salvador, and Haiti, that show a decrease in literacy during the 1940s (Table 4-5) at least two no doubt involve incorrect reports — El Salvador and Haiti. The data are not changed on the assumption that since there are random errors throughout the reporting they may cancel each other out; in any case, the number of other items and the historical trajectory after 1950 assure that the relative overall ranks of Haiti and El Salvador are not affected by the discrepancy.¹³

The U.N. definition for literacy seems to render useless the Latin American simple concept of literacy which is only to be able to read and write on a basic level. According to the United Economic and Social Council, "A person is literate when he has acquired the essential knowledge and skill which enable him to engage in all those activities in which literacy is required for effective functioning in his group and community, and whose attainment in reading,

¹³ *Ibid.*

writing and arithmetic make it possible for him to use these skills toward his own and the community's development, and for the active participation in the life of his country."¹⁴ Clearly this definition would label many "literate" persons in Latin America as "functional illiterates," the situation varying from country to country.

Estimating the percentage of school-age population 7-14 enrolled in primary school (Table 4-6) involved inductive operations. Age-group data for 10 Latin American countries and the United States were projected backward to 1940 using Method II in the Methodological Appendix, below. This age-group data were then used in calculations based upon enrollment data in Table 4-7. To compute the percentage of school-age population 13-18 enrolled in secondary school (Table 4-6), enrollment figures in Table 4-7 were utilized along with Methods II and III in the Methodological Appendix, Method III involving nonlinear analysis. Figures on the higher school enrollment as a percentage of primary school enrollment (Table 4-6), calculated from Table 4-7, were built into the Index to prevent giving undue credit to a country like Paraguay which emphasizes primary education at the expense of education above grade 13.

For newspaper circulation we have data for 1930 and 1940 (Table 4-8). The problem here is one of propaganda, newspapers in the past tending to inflate their circulation figures in order to promote the importance needed to capture advertising and new readers while maintaining political influence. Seven countries showed a decline in circulation from 1930 to 1940, the same pattern as in the United States. Similarly, 10 Latin American countries saw a decline in circulation between 1940 and 1950,¹⁵ as in the United States. With the growing popularity of radio and the expansion of telephone and other communication systems (and television later), this decline makes sense, but some countries, Chile and Peru, show enormous increases during the 1930s, gains that did not hold up during the 1940s.¹⁶

Although it would be reasonable to expect a correlation between newspaper circulation and the literacy of a country in terms of ranking, only in Argentina, Chile, Honduras, Brazil, Uruguay, and Venezuela are the rankings approximately the same for 1940 (cf. Tables 4-5 and 4-8). Bolivia, Ecuador, and Panama newspapers, to the contrary, seemed to be rather plentiful even though illiteracy was high. It is difficult to assess the apparent contradictions, especially as we do not know if or to what extent the newspapers were subsidized by private political interests or by governments, and the data are therefore used as reported. Owing to the worldwide pressure exerted by the U.S. Audit Bureau of Circulation, leading Latin American newspapers have sought to make their circulation data more reliable and have adopted standard criteria in return for certification by the Bureau.

¹⁴ *World Campaign for Universal Literacy* (Paris: United Economic and Social Council, 1963), p. 39.¹⁵ Wilkie, *The Narrowing Social Gap*, Appendix I.¹⁶ *Ibid.*

Table 4-6

**HEC ITEMS 7, 8, AND 9: SCHOOL-AGE POPULATION (7-14 AND 13-18) ENROLLED
IN SCHOOL, AND HIGHER SCHOOL ENROLLMENT AS A SHARE OF PRIMARY
ENROLLMENT IN LATIN AMERICA AND THE UNITED STATES, 1940[†]**

Country	7: Ages 7-14 Enrolled		8: Ages 13-18 Enrolled		9: Higher school enrollment as a percentage of primary school enrollment	
	Percent	Rank	Percent	Rank	Percent	Rank
Total average	42	*	4.5	*	1.2	*
ARGENTINA	71 ^a	1	13.5 ^d	2	2.1	3
BOLIVIA	23 ^a	18**	2.2 ^d	10**	1.1	6
BRAZIL	37 ^b	11**	4.5 ^{b, 1}	8	.6	15**
CHILE	70 ^b	2	12.5 ^b	3	1.0	7
COLOMBIA	35 ^b	13	5.5 ^b	6	.6 ^e	15**
COSTA RICA	54 ^b	6**	2.2 ^b	10**	1.2 ^e	4**
CUBA	61 ^{a, 1}	4	1.1 ^d	18	2.8 ^e	2
DOMINICAN REP.	42 ^a	9	1.7 ^d	14**	.7	12**
ECUADOR	30 ^a	14	1.3 ^d	17	.9	8**
EL SALVADOR	28 ^a	16	1.0 ^d	20**	.4	20**
GUATEMALA	23 ^b	18**	1.5 ^{b, 2}	16	.7	12**
HAITI	16 ^{a, 2}	20	1.0	20**	.4	20**
HONDURAS	25 ^b	17	1.7 ^b	14**	.5	18
MEXICO	50 ^b	8	2.2 ^b	10**	.9	8**
NICARAGUA	29 ^{a, 1}	15	3.0 ^d	9	.9	8**
PANAMA	56 ^b	5	5.7 ^{b, 1}	5	1.2	4**
PARAGUAY	62 ^a	3	8.0 ^d	4	.6	15**
PERU	37 ^b	11**	5.3 ^{b, 2}	7	.7	12**
URUGUAY	54 ^{a, 3}	6**	16.1 ^d	1	5.5	1
VENEZUELA	38 ^b	10	2.0 ^b	13	.8	11
UNITED STATES	81 ^c	*	49.0 ^d	*	10.7	*

[†]Calculations based upon data in Table 4-7; and upon Methodological Appendix, where noted.

1. 1938.
2. 1942.
3. 1939.

a. Population ages 7-14 from ACA.

Of all the items in the HEC Index, telephones and motor vehicles are often considered to be luxury items in Latin America in contrast with the United States where they are considered to be important to the basic standard of living. The telephone is hard to obtain in Latin America, even when one has money; because few lines and telephones are available there are generally waiting periods of one year or more. Used telephones are sold at auction and command hundreds of dollars or more. Often the subscriber must buy stock in the telephone company. Thus the telephone is considered a status symbol in many countries. But it is more than a symbol of luxury. It is a means by which the masses can make contact with the world outside their own immediate locale. It offers a quick way to get medical aid and to report emergencies, as well as a means of communication to obviate expensive or time-consuming travel. Most of all, it is vital to illiterates who cannot otherwise communicate conveniently and inexpensively. Seen in this light, the number of

b. Age distribution from UNDY (1948) predicted for 1940 using Method II.

c. Age distribution from USA (1952) predicted for 1940 using Method II.

d. Population ages predicted for 1940 using Method III.

e. 1941.

SOURCE: As cited in notes above.

telephones per 100 persons becomes an important item in the HEC Index (Table 4-9).

The number of persons per motor vehicle in use can also be considered a crucial social factor (Table 4-10). Latin American governments tend to treat private motor vehicles as a luxury despite complaints from the middle and lower classes who aspire to the freedom of mobility. Taxes have made automobile imports prohibitive in many countries, where the cost of an auto is doubled or tripled by tariffs; other countries have decreed an outright ban on importation of large-sized autos. Even in Brazil, where autos are manufactured, the internal taxes on ownership may more than double the cost of a vehicle.

A government may limit the use of the auto to protect foreign exchange lost in import of automobile component parts and/or fuel, but in the twentieth century the public does not view the motor vehicle as a luxury except in price. The poor use buses which offer an inexpensive mode of

Table 4-7
EDUCATIONAL ENROLLMENTS IN LATIN AMERICA AND THE UNITED STATES, 1940

Country	Primary Grades 1-6 (thousands)	Secondary Grades 7-12	Higher Grades 13 and Above
ARGENTINA	1,930 ^a	140,000 ^a	42,000 ^a
BOLIVIA	136 ^g	10,137 ^{b,1}	1,482 ^b
BRAZIL	3,121 ^a	347,352 ^{b,1}	20,000 ^a
CHILE	633 ^a	80,000 ^a	6,448 ^b
COLOMBIA	614 ^a	63,000 ^a	3,713 ^{c,3}
COSTA RICA	65 ^h	2,000 ^a	820 ^{c,3}
CUBA	453 ^h	27,423 ^{c,4}	13,949 ^{c,3}
DOMINICAN REP.	132 ^a	7,000 ^a	868 ^c
ECUADOR	181 ^h	6,000 ^a	1,755 ^b
EL SALVADOR	96 ^a	3,309 ^c	395 ^b
GUATEMALA	137 ^a	6,552 ^{c,2}	1,000 ^a
HAITI	87 ^{d,2}	5,768 ^{c,3}	373 ^b
HONDURAS	55 ^a	2,544 ^{c,2}	298 ^b
MEXICO	1,800 ^h	54,000 ^a	19,000 ^a
NICARAGUA	53 ^{b,1}	1,253 ^{d,2}	450 ^b
PANAMA	61 ^a	4,060 ^{d,1}	725 ^b
PARAGUAY	115 ^h	6,000 ^{c,3}	1,238 ^b
PERU	566 ^a	40,393 ^{e,2}	4,000 ^a
URUGUAY	214 ^{b,4}	27,000 ^{c,3}	12,000 ⁱ
VENEZUELA	266 ^a	10,000 ^a	2,125 ^b
UNITED STATES	13,935 ^f	7,113,282 ^f	1,494,203 ^f

1. 1938
2. 1942
3. 1941
4. 1939

SOURCE: a. SNP e. FCY
 b. ISY f. SAUS
 c. BDOA g. IVP
 d. PAY h. ACA
 i. UAE

travel, reaching most villages that are accessible by road. Buses are always crowded even when they run frequently. They are used as transportation to markets where the rural people bring their products. This, in turn, leads to contact with people and communities, contact with new ideas and approaches, as well as a way of earning extra income. Trucks are used mainly for transportation of goods, but it is common sight to see them load people to earn money instead of returning empty.

There were fewer persons per vehicle in 1930 than in 1940 for nine countries (Argentina, Brazil, Costa Rica, Cuba, Dominican Republic, Guatemala, Honduras, Nicaragua, and Venezuela), probably because before 1930 cars were freely imported. Cuba ranked fourth in Latin American number of persons per motor vehicle in 1940 but fell to sixteenth in 1970 owing both to external embargo by the United States and to Castro's internal embargo. Bolivia's seventeenth and thirteenth ranks in 1940 and 1950, respectively might appear to be incorrect but any visitor to Bolivia in the late 1960s or early 1970s can verify that there seemed to be more automo-

Table 4-8
HEC ITEM 10: NEWSPAPER CIRCULATION IN LATIN AMERICA AND THE UNITED STATES, 1930 AND 1940
(Copies per 1,000 persons)

	1930		1940	
	Ratio	Rank	Ratio	Rank
Total average	48	*	54	*
ARGENTINA	145 ^a	2	233	1
BOLIVIA	12	19	29	14
BRAZIL	50	6	38	10**
CHILE	82	4	122	4
COLOMBIA	14 ^b	17**	32	12**
COSTA RICA	48	7	43 ^c	9
CUBA	99	3	132	2
DOMINICAN REP.	14	17**	22	17
ECUADOR	33	9	38	10**
EL SALVADOR	29	11**	26	16
GUATEMALA	15	16	19	18**
HAITI	5	20	5	20
HONDURAS	21	15	19	18**
MEXICO	32	10	46	8
NICARAGUA	29	11**	27	15
PANAMA	52	5	71	5
PARAGUAY	28	13	32	12**
PERU	24	14	62	6
URUGUAY	201	1	125 ^d	3
VENEZUELA	34	8	57 ^e	7
UNITED STATES	345 ^f	*	328 ^g	*

- a. Circulation not given for all newspapers.
- b. Circulation not given for city of Bogotá.
- c. Circulation given for 3 of 5 newspapers.
- d. Circulation given for 12 of 60 newspapers.
- e. Circulation given for 15 of 30 newspapers.
- f. 1929.
- g. 1939.

SOURCE: EPIY (1931), 63:37, pp. 260-266; (1941), 74:4, pp. 212-227; (1950), 83:5, pp. 21-46, Part 2. U.S. data from USA (1952), p. 470.

biles vintage 1945-1950 than all others combined,¹⁷ most of these being in the taxi service.

Conclusion

Despite a number of difficulties we have been able to project the 12-item HEC Index backward to 1940. Although some of the data suffer from problems of reliability, the fact that there are as many as 12 items increases the reliability of the Index as a whole by decreasing the significance of any particularly unreliable statistic. Parsimony of factor analysis that reduces the number of items to a fewer, representative number would override individual variations in the Index from country to country with the result of increasing the significance of unreliability.¹⁸

¹⁷ *ibid.*

¹⁸ For factor analysis of the data, see *ibid.*, Appendix IV.

Table 4-9

HEC ITEM 11: NUMBER OF TELEPHONES PER
100 PERSONS IN LATIN AMERICA AND THE
UNITED STATES, 1940

Country	1940 ^a	
	Number	Rank
Total average	.80	*
ARGENTINA	3.20	1
BOLIVIA	.17	17
BRAZIL	.70	8
CHILE	1.80	3
COLOMBIA	.45	10
COSTA RICA	.40 ^b	11
CUBA	1.60 ^c	4
DOMINICAN REP.	.20 ^b	15
ECUADOR	.28	14
EL SALVADOR	.30 ^b	13
GUATEMALA	.10 ^b	18
HAITI	.07 ^d	19
HONDURAS	.06	20
MEXICO	.90 ^d	6
NICARAGUA	.18 ^b	16
PANAMA	1.00	5
PARAGUAY	.33	12
PERU	.50	9
URUGUAY	2.30	2
VENEZUELA	.80	7
UNITED STATES	15.90 ^b	*

- a. Data are for 1941 unless otherwise specified.
b. 1940.
c. 1942.
d. 1939.

SOURCE: BDOA, except U.S. data from ISY (1942), p. 303.

The summary data for four times of measurement — 1940, 1950, 1960, 1970 — indicate that Latin America has been undergoing a structural revolution unparalleled in proportion in the history of the region. The total social gap narrowed by 19 percent between 1940 and 1950, 21 percent between 1950 and 1960, and almost 25 percent between 1960 and 1970. Contrary to any assumption that health gains in Latin America made their greatest advance during the 1940s and 1950s, the highest gain for the region as a whole came during the 1960s, especially in comparison with the 1950s (see Table 4-1). For education factors the rate of change in the region was highest in the 1950s, followed by the 1940s, trailed by the 1960s in spite of the push promised by the Alliance for Progress. The highest change in the communication component of the Index came in the 1960s.

Methodological Appendix

Method I

Life expectancies were not available for Argentina, Cuba, Ecuador, Haiti and Uruguay for 1930 and 1940, nor for Peru for 1930. The data reported were predicted for

Table 4-10

HEC ITEM 12: NUMBER OF PERSONS PER MOTOR
VEHICLE IN USE^a IN LATIN AMERICA
AND THE UNITED STATES,
1930 AND 1940

Country	1930 ^b		1940 ^c	
	Number	Rank	Number	Rank
Total average	472	*	406	*
ARGENTINA	38	1	50	3
BOLIVIA	1,015	19	728	17
BRAZIL	199	8	232	9
CHILE	155	7	111	6
COLOMBIA	485	13	329	10
COSTA RICA	64	3	180	7
CUBA	86	6	96	4
DOMINICAN REP	279	11	609	15
ECUADOR	1,010	18	621	16
EL SALVADOR	645 ^d	14	487	12
GUATEMALA	252	9	538	14
HAITI	865 ^d	16	1,129	20
HONDURAS	1,942 ^d	20	855	18
MEXICO	277	10	192	8
NICARAGUA	908 ^d	17	932	19
PANAMA	71 ^d	4	45	2
PARAGUAY	676 ^d	15	505	13
PERU	362 ^d	12	345	11
URUGUAY	42	2	30	1
VENEZUELA	76	5	107	5
UNITED STATES	4.8	*	4.3	*

- a. Includes autos, buses, trucks; excludes motorcycles and farm trucks.
b. For 1929 unless otherwise indicated.
c. 1938.
d. 1928.

SOURCE: ISY (1942), pp. 284-285.

With the social gap between the United States and Latin America closing rapidly, it is obvious that not only the aspirations but also the ability of the masses will increase. New demands are certain to be placed upon political leadership, demands that heretofore were limited by a low level of population stamina (owing to ill health), a low level of societal participation (owing to illiteracy and lack of school experience), and a low level of personal communication (owing to the inhibited spread of ideas either through newspapers, telephones, or vehicular mobility). The time is drawing near, then, when dictators will no longer be able to be "president for life" by simply restricting all forms of communication.

those years based on data for 1950, 1960, and 1970.¹⁹ A linear regression model was used. This is the best model assuming that the relationship is linear.

¹⁹ *Ibid.*, Appendix I.

The formula for finding the prediction of life expectancy given a particular year is:

$$y' = bx - b\bar{x} + \bar{y}$$

where

- y' = predicted life expectancy
- x = given year
- \bar{x} = average of the years known
- \bar{y} = average of life expectancies known

and

$$b = \frac{\sum(x_j - \bar{x}) y_j}{\sum(x_j - \bar{x})^2}$$

Readers who doubt that the linear assumption is reliable are encouraged to use an exponential function or parabolic function to predict these life expectancies.

Method II

Populations of age groups 7-14 and 13-18 were not available for any country. For half the countries population data was given for age groups 5-9, 10-14, and 15-19. We needed the populations for age groups 7-14 and 13-18 in order to calculate the percentages for these age groups which are enrolled in primary and secondary education, respectively. To obtain the necessary information the following method was employed:

1. The mean of each age group was calculated.

Age group	Mean age
5-9	7
10-14	12
15-19	17

2. The total population for each age group was divided by 5 years giving an estimate for the population for ages 7, 12, and 17. For example,

Age	Population	Mean age	Population
5-9	200	7	40 (200 ÷ 5)
10-14	150	12	30 (150 ÷ 5)
15-19	100	17	20 (100 ÷ 5)

3. The population distribution was assumed to be a linear function of age. Therefore using the data (in the box) a regression line was obtained, $\tilde{y} = bx + a$, where x = age and \tilde{y} = predicted population. Thus, given any age we estimated its population size.

4. To get the population for age-group 7-14, we found the estimated populations for ages, 7, 8, and 9, and added these to the existing populations for ages 10-14, giving a total population figure for ages 7-14. For the group 13-18 we took the population for 15-19, added the estimate for ages 13 and 14, and subtracted the estimate for age 19, giving the total population for ages 13-18.

Method III

For countries where these age groups were not available, the data from 1950, 1960, and 1970 were used to estimate the percentage of 13-18 year olds enrolled in 1940. Because of high percentage increases between 1950 and 1960 and between 1960 and 1970 the relationship was assumed *not to be* linear. (The data did not fit a $y = bx + a$ equation — if this equation were used, negative percentages would appear for 1940, which is not possible). Therefore, the relationship was assumed to be exponential, fitting the form $y = ae^{bt}$. Using a logarithmic transformation, we get

$$\log y = (\log a) + b(.4343t)$$

This is a linear equation of the form

$$Y' = A + bX \quad \text{where} \quad \begin{aligned} Y' &= \log y \\ X &= .4343t \\ A &= \log a \\ t &= \text{year} \end{aligned}$$

Using this equation one can apply linear regression techniques in order to estimate the desired percentage for a given year.

Source Abbreviation

AAA	Bustamente, Miguel. "Public Health and Medical Care," <i>Annals of The American Academy of Political and Social Science</i> , 208 (1940), pp. 153-161.	BRLA	Collver, O. Andrew. <i>Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations</i> . Berkeley: Institute of International Study, University of California, 1965.
ACA	Moreno y García, Roberto. <i>Analfabetismo y Cultura Popular en América</i> . México, D.F.: Editorial Atlantes, 1941.	EPIY	<i>Editor and Publisher International Yearbook</i> . New York, 1931, 1941, and 1950.
AES	Moll, Aristades A. <i>Aesculapius in Latin America</i> . Philadelphia: Saunders, 1944.	FCY	United States, Department of Commerce. <i>Foreign Commerce Yearbook</i> . Washington, D.C., 1948.
BDOA	<i>Basic Data on the Other American Countries</i> . Washington, D.C.: Coordinator of Inter-American Affairs, 1945.	ISY	<i>Inter-American Statistical Yearbook</i> . New York: MacMillan, 1940, 1942.

- IVP *Bolivia, Informe del Vice-Presidente [del Consejo Nacional de Educación]* La Paz: Editorial del Estado, 1942.
- LAFW Soule, George, David Efron, and Norman T. Ness. *Latin American in the Future World*. New York: Farrar and Rinehart for the National Planning Association, 1945.
- NLTLA Arriaga, Eduardo E. *New Life Tables for Latin American Populations in the Nineteenth and Twentieth Centuries*. Berkeley: Institute of International Studies, University of California, 1968.
- PAY *Pan American Yearbook*. New York, 1945.
- SBS United States, Bureau of the Census: *Summary of Bio-Statistics – Brazil*. Washington, D.C., 1944.
- SHUS *Historical Statistics of the United States: Colonial Times to the Present* [1962]. Stanford: Fairfield Publishers, [1965]. (Originally published as U.S. Bureau of the Census, *Historical Statistics of the United States*.)
- SNP Wilkie, James W. *Statistics and National Policy*. Statistical Abstract of Latin America Supplement 3. Los Angeles, UCLA Latin American Center Publications, University of California, 1974.
- SY *Stateman's Yearbook*. London, 1942.
- UAE Uruguay, Dirección General de Estadística. *Anuario Estadística de la República Oriental del Uruguay*. Montevideo, 1940.
- UNDY United Nations. *Demographic Yearbook*. New York, 1948.
- UNSY United Nations. *Statistical Yearbook*. New York, 1951.
- USA United States Bureau of the Census. *Statistical Abstract of the United States*. Washington, D.C.
- WPP Woytinsky, W. S., and E. S. Woytinsky. *World Population and Production: Trends and Outlook*. New York: Twentieth Century Fund, 1953.
- YOE Usill, Harley V., ed., *Yearbook of Education* London, 1937.