

MORTALITY DECLINE IN CUBA,
1900–1959:
Patterns, Comparisons, and Causes*

James W. McGuire, Wesleyan University

Laura B. Frankel, Wolfson College, University of Oxford

Received 7-7-2004; Accepted Conditionally 8-12-2004

Received Revised 9-10-2004; Final Acceptance 9-17-2004

Abstract: Revolutionary Cuba since 1959 has outpaced most other Latin American countries at raising life expectancy and reducing infant mortality. Pre-revolutionary Cuba from 1900 to 1959 did even better, however, outperforming all other Latin American countries for which data are available. Pre-revolutionary Cuba became Latin America's unlikely champion of mortality decline despite experiencing slow economic growth and high income inequality, a record that is inconsistent with the "wealthier is healthier" interpretation of mortality reduction. It also achieved this distinction despite being ruled by governments that are sometimes portrayed as corrupt, personalistic, patronage-ridden, subordinate to U.S. business interests, and neglectful, at best, of the exploited and downtrodden. We attribute pre-revolutionary Cuba's rapid mortality decline to its health care system's accessibility to a large fraction of the poor and to features of the island's history, geography, labor union movement, and political system that contributed to this accessibility.

Cuba has done well at expanding the survival-related capabilities of its citizens. The government newspaper, *Granma*, reported in early January 2003 that infant mortality per 1000 live births in 2002 was "¡6.5!" up

*The Harvard Center for Population and Development Studies and a Christian A. Johnson Endeavor Foundation Research Apprenticeship at Wesleyan University provided generous support for this research. We are particularly grateful for comments and suggestions by Juan Carlos Albizu-Campos Espiñeira, Lorena Barberia, Arachu Castro, Sergio Díaz-Briquets, Jorge Domínguez, Susan Eckstein, Julie Feinsilver, Richard Garfield, Steven Levitsky, Carmelo Mesa-Lago, and Michael Reich; by the *LARR* editors; by three anonymous *LARR* referees; and by participants in a March 2003 seminar at the Harvard Center for Population and Development Studies, a March 2003 panel at the Latin American Studies Association meeting in Dallas, and a December 2003 seminar at the David Rockefeller Center for Latin American Studies at Harvard. We also thank the staff of the Interlibrary Loan Office at Wesleyan University for helping us to obtain research materials. The authors take responsibility for any error of fact or interpretation.

Latin American Research Review, Vol. 40, No. 2, June 2005

© 2005 by the University of Texas Press, P.O. Box 7819, Austin, TX 78713-7819

slightly from “;6.2!” in 2001 (Osa 2002, 2003). In 2002, the infant mortality rate in the United States was 7.0 per 1000 (Kochanek and Martin 2004). For Cuba to have an infant mortality rate lower than that of the United States is a remarkable achievement. In 1996, the most recent year for which data are available, Cuba’s GDP per capita at purchasing power parity was US\$5,259, compared to \$29,194 in the United States (Heston, Summers, and Aten 2002).

The revolutionary government that has ruled Cuba since 1959 is proud of its universalistic and egalitarian social policies. Cuba’s leaders consider the infant mortality rate to be a telling indicator of how these policies have affected the population (Benjamin, Collins, and Scott 1984, 96; Feinsilver 1993, 51–52, 94). Castro and his colleagues have reason to be proud of these policies and their effects. In 1995, the most recent year for which comparable, high-quality data are available, Cuba had the lowest infant mortality rate in Latin America. The revolutionary government’s expansion of health care, family planning, education, sanitation, and water provisioning among the poor, together with its redistribution of income in favor of the poor, contributed decisively to this achievement (Díaz-Briquets 1983, 125; Drèze and Sen 1989, 249–50; Feinsilver 1993; Mehrotra 1997).

Compared to other Latin American countries, however, Cuba since 1959 has done well, rather than extremely well, at reducing infant mortality. Although revolutionary Cuba is often assumed to be way out ahead of the rest of the region on the mortality front, other Latin American countries have done at least as well as Cuba at reducing the risk of early death. The problem is not with Cuba’s statistics, which are defined conventionally and are among the most complete and accurate in the world. Rather, it is that Cuba’s reputation is based on the levels of life expectancy and infant mortality it had achieved in 1995, rather than on its progress at improving these indicators from 1960 to 1995. During this period, the longest for which high-quality comparable data are available, Cuba ranked fifth of twenty Latin American countries at progress at reducing infant mortality, and fourth among twenty at progress at raising life expectancy (table 1).

Cuba’s low level of infant mortality in 1995 was more impressive than its progress at reducing infant mortality from 1960 to 1995 mainly because the island started out in 1960 with a low infant mortality rate. This rate, 39 per 1000, was the lowest in Latin America, and was lower than the rates in 1960 in Italy or Spain (both of which wound up with rates below Cuba’s in 1995). Cuba’s lead over other Latin American countries in lowness of infant mortality was even wider in 1960 than in 1995, and Cuba’s progress relative to other Latin American countries at reducing infant mortality was even greater from 1900 to 1960 than from 1960 to 1995. During the earlier period, Cuba led all Latin American countries

Table 1 Infant Mortality and Life Expectancy, 1960 and 1995, Twenty Latin American Countries

Country	Infant Mortality			Country	Life Ex- pectancy		
	Infant Mortality 1960	Infant Mortality 1995	Percent Decline 1960– 1995		Life Ex- pectancy 1960	Life Ex- pectancy 1995	Percent Increase 1960– 1995
Chile	118	11	91%	Chile	57.3	74.9	63%
Costa Rica	87	12	86%	Costa Rica	61.9	76.2	62%
El Salvador	129	25	81%	Honduras	46.6	68.7	57%
Honduras	137	29	79%	Cuba	64.2	75.8	56%
Cuba	39	9	77%	Dom. Rep.	52.2	70.4	56%
Ecuador	107	27	75%	Peru	48.0	67.8	54%
Panama	58	16	72%	Nicaragua	47.3	67.3	53%
Peru	142	40	72%	Panama	60.9	73.6	53%
Nicaragua	130	38	71%	El Salvador	50.8	68.5	52%
Colombia	79	24	70%	Mexico	57.3	71.5	51%
Mexico	94	32	66%	Venezuela	59.8	72.4	50%
Guatemala	136	48	65%	Ecuador	53.4	68.1	46%
Brazil	115	41	64%	Colombia	56.8	69.8	46%
Venezuela	56	21	63%	Guatemala	45.9	63.6	45%
Argentina	60	23	62%	Bolivia	42.8	60.6	42%
Paraguay	67	26	61%	Brazil	54.9	66.5	39%
Uruguay	48	20	58%	Argentina	65.2	72.7	38%
Dom. Rep.	102	47	54%	Uruguay	68.0	73.4	32%
Bolivia	152	77	49%	Haiti	42.4	53.6	26%
Haiti	169	95	44%	Paraguay	63.9	69.2	25%

Notes and Sources: Infant mortality: Infant (0-1) deaths per 1000 live births. Percent decline is toward a stipulated minimum of 0. Source: Hill et al. 1999, from census, survey, and/or vital registration statistics. Life expectancy: in years, at birth. Source: World Bank 2002, from unspecified original data. Percent increase is toward a stipulated maximum of 85 years.

for which data are available at raising life expectancy and reducing infant mortality (table 2). In short, compared to other Latin American countries, Cuba did at least as well at reducing premature mortality before the revolution as after it.

It might be objected that additional infant mortality decline gets harder as the absolute level of infant mortality gets lower, such that revolutionary Cuba was handicapped in a way that pre-revolutionary Cuba was not. This objection would be persuasive if the indicator of progress used in the comparison were the *absolute* decline of the infant mortality rate. In fact, however, the indicator used is *percent* decline, as is customary in comparisons of mortality reduction when initial levels differ. Using the percent decline indicator, a drop from 10 to 9 per 1000 gets exactly as

Table 2 *Infant Mortality and Life Expectancy, 1900 and 1960, Eight or Twelve Latin American Countries*

	Infant Mortality			Life Expectancy			
	Infant Mortality 1900–1904	Infant Mortality 1960	Percent Decline 1900–1960	Life Expectancy 1900	Life Expectancy 1960	Percent Increase 1900–1960	
Note	1	2	3	4	5	6	
Cuba	136	39	71%	Cuba	32	64	60%
Venezuela	169	56	67%	Venezuela	25	60	58%
Argentina	146	60	59%	Costa Rica	32	62	57%
Costa Rica	208	87	58%	Argentina	39	65	57%
Colombia	186	79	58%	Mexico	25	57	53%
Mexico	220	94	57%	Uruguay	49	68	53%
Panama	130	58	55%	Chile	29	57	50%
Chile	261	118	55%	Colombia	29	57	50%
				Paraguay	25	55	50%
				Brazil	29	55	46%
				Guatemala	24	46	36%
				Bolivia	26	43	29%

Notes and Sources:

1. Infant deaths per 1000 live births. Source: Collver 1965. As noted in the text, recent estimates suggest that Cuba's infant mortality rate in 1900–1904 was closer to 195 per 1000. Collver's statistics for Argentina and Costa Rica conform more closely to those derived from alternative sources, whereas alternative estimates for Chile and Mexico are, like those for Cuba, considerably higher, although not so high as to make their percent declines from 1900 to 1960 greater than Cuba's (McGuire and Frankel 2004, 12–13).
2. Source: Hill et al. 1999.
3. Calculated from columns 1 and 2; percent decline is toward a stipulated minimum of 0.
- 4, 5. Source: Astorga and FitzGerald 1998.
6. Calculated from columns 4 and 5; percent increase is toward a stipulated maximum of 85 years.

much credit as a drop from 100 to 90 per 1000 (10 percent in each case). The claim that it is “easier” to achieve this 10 percent decline by reducing the rate from 100 to 90 per 1000 than from 10 to 9 per 1000 is hard to sustain. In the first case an absolute decline of 10 per 1000 is required; in the second case the required drop is only 1 per 1000. It is not self-evident that the former reduction can be achieved more cheaply than the latter, and even if it could be, “cheaper” is not the same thing as “easier.” Countries with infant mortality rates of 100 per 1000 tend not only to have lower GDPs per capita, but also lower administrative capacity. In a rich country, a program to stop drug and alcohol use by expectant mothers might achieve a decline from 10 to 9 per 1000; in a poor country, a program to educate traditional midwives about hand washing might achieve a decline from 100 per 90 per 1000. The latter program would not

obviously be cheaper than the former program, and it would probably put more strain on available administrative resources.

It might also be objected that the revolutionary government had to overcome another handicap that did not burden its predecessors, namely the departure of about 3,000 of the country's 6,000 doctors shortly after 1959 (Feinsilver 1993, 157) and of a disproportionately wealthy sector of the population (Eckstein and Barberia 2002, 802–03). The flight of doctors may have posed a less serious challenge than it seems at first thought. The number of doctors per 10,000 inhabitants fell only from 10.0 in 1957 to 8.3 per 1000 in 1964, suggesting that many departing doctors were soon replaced. During the same period, moreover, per 10,000 inhabitants, the number of nurses rose from 4.5 to 8.1, the number of nurses' aides rose from 2.0 to 2.8, and the number of hospital beds rose from 26 to 55 (PAHO 1988, 32, 70, 86, 118). The flight of the affluent probably did leave behind a less-healthy population, but from 1959 to 1970 only 3–4 percent of the Cuban population emigrated to the United States (calculated from Schroeder 1982, 112), so the effect of this emigration on the island's mortality level was probably small. Moreover, the emigrants contributed to state resources both by leaving behind their properties, which were typically seized by the government, and by sending cash and goods back to the island (Eckstein 1994, 32, 69–70).

To point out that pre-1959 Cuba did well at reducing infant mortality is not to imply that the revolutionary government has neglected or failed to attain this aim. On the contrary, Castro's government has made strenuous efforts to reduce infant mortality, perhaps even overinvesting in this goal (Alonso, Donate-Armada, and Lago 1994). Its policies have been very successful, even during a deep economic crisis in the early 1990s (Barracough 2000; Chomsky 2000). The government deserves credit for this achievement, and other countries, including the United States, have much to learn from it. It is not really surprising, however, that a government so firmly committed to reducing infant mortality should find the goal within reach. More remarkable is the progress that Cuba made before 1959, when it was ruled by governments that are sometimes portrayed as corrupt, personalistic, patronage-ridden, subordinate to U.S. business interests, and neglectful, at best, of the exploited and downtrodden. Making this rapid mortality decline even more remarkable, the island experienced slow economic growth and high income inequality from 1900 to 1959. How did Cuba manage to do so well at reducing mortality under these apparently inhospitable conditions?

The explanation lies partly with overall modernization, especially with fertility and urbanization, but Cuba's advantages in these areas, compared to other Latin American countries, were offset by handicaps in the areas of GDP per capita growth, which was sluggish, and income inequality, which was high. Our explanation highlights pre-revolutionary

Cuba's health care system, which was accessible to an unusually large fraction of the poor, and aspects of the island's history, geography, labor union movement, and political system that contributed to this accessibility. These characteristics were distinctive in the Latin American context, and there is a plausible story, backed by some evidence, as to how each of them might have helped the country achieve rapid mortality decline.

LIFE EXPECTANCY AND INFANT MORTALITY IN 1900, 1960, AND 1995

Vital registration records in pre-revolutionary Cuba had several deficiencies. First, until 1957, a death in the first 24 hours of life entered Cuba's vital registries, if at all, as a late fetal death rather than an infant death (Cuba. JUCEPLAN 1975, 84; González Quiñones and Debasa 1970, 5; United Nations 2000). Second, until 1967, parents could legally wait one year before registering a birth—as opposed to sixty days in Chile, twenty-five days in Costa Rica, and three days in Argentina (United Nations 1955, 84, 170). When an infant death occurs before birth registration, parents are much less likely to register either event (Hill 1991, 369). Third, births and deaths in pre-revolutionary Cuba were recorded by place of occurrence rather than by place of residence (United Nations 1955, 78). Hence, mortality in the city and metropolitan area of Havana was “inflated by the deaths of non-residents who sought Havana's medical facilities” (Díaz-Briquets 1981, 400; see also Díaz-Briquets 1983, 142–43). Fourth, underregistration plagued vital registries outside Havana. Using census data to assess the completeness of death records across Cuba in 1947, 1948, and 1949, González Quiñones and Debasa (1970, 14) found that only about 57 percent of all deaths, and only about 36 percent of under-five deaths, were registered. A scarcity of registration facilities contributed to the problem. Among thirteen Latin American countries in the early 1950s, Cuba ranked last on the ratio of registration facilities to population (United Nations 1955, 66).

Death registries were particularly incomplete during the early 1900s (Díaz-Briquets 1983, 141), so most scholars have used census data to estimate infant mortality during this era. For 1900–1904, González Quiñones and Ramos Piñol's (1996) census-based estimate of 195 per 1000 seems most authoritative. The estimate was produced recently, in a transparent and systematic fashion, and is open to replication and critique. It also falls midway between census-based estimates by Collver (1965, 108) and Catasus and Hernández (1977, 283), which Hollerbach and Díaz-Briquets (1983, 5) regard as too low and too high respectively. More consensus surrounds estimates of life expectancy around 1900. Astorga and FitzGerald (1998) provide a figure of 32 years; life tables calculated by the Cuban government in 1975 estimate 33.2 years (Centro de Estudios Demográficos 1976, 55; Farnos Morejón 1977, 359).

During the 1950s and 1960s Cuba began to improve its vital registration records. As of 1957, deaths in the first day of life were counted as infant deaths, and in 1965, Cuba adopted the World Health Organization definitions of live birth, infant death, and fetal death (Catasus Cervera and Hernández Castellón 1977, 282 n. 3; Cuba. JUCEPLAN 1975, 141; Rios Massabot 1983, 17; Riverón Corteguera 1996). In 1967, a new law reduced the birth reporting deadline from 365 to 20 days and required health personnel to register the births and, if necessary, deaths of infants whose parents neglected to do so (Rios Massabot 1983, 17–18). Most observers agree that Cuba's vital registration-based infant mortality statistics have been complete and accurate since the late 1960s (Díaz-Briquets 1986, 10; Drèze and Sen 1989, 186 n. 13; Feinsilver 1993, 97–98; Landstreet 1976, 102; Mesa-Lago 1969, 76; Rojas Ochoa and Sánchez Texidó 1977; Santana 1988). In March 1974, a researcher for the Pan American Health Organization (PAHO) concluded that Cuban vital statistics were substantially complete, and recommended that the organization label them so in its publications (Santana 1988, 108). PAHO estimated that Cuban vital registries in 1985–1990 recorded at least 90 percent of births, infant deaths, and child deaths, a proportion as high as the United States. Another PAHO study estimated that in 1996, Cuban registries recorded 99.9 percent of all deaths, more than the 97.2 percent in the United States (McGuire 2001, 1679).

Cuba's infant mortality level in 1960 is a matter of some controversy. The higher Cuba's infant mortality rate in 1960, the easier it is to credit the revolutionary government with significantly reducing infant mortality. Accordingly, an article in the official newspaper of the U.S. Communist Party assigns Cuba an infant mortality rate of 65 per 1000 in 1960 (Wheeler 1997), and others sympathetic to the revolution suggest the plausibility of rates as high as 125 per 1000 (Benjamin, Collins, and Scott 1984, 96). At the other extreme, the U.S. Department of State assigns Cuba an infant mortality rate of only 32 per 1000 in 1960 (Bureau of Inter-American Affairs 2002), below the reported rate in West Germany (World Bank 2002).

Columns 1–3 of table 3 present three different series of infant mortality rates for 1957–1963, all based on vital registration statistics. Columns 2 and 3 explicitly count infants dying in the first 24 hours of life as infant deaths. The U.S. Department of State estimate of 32 per 1000 in 1960 is lower than any of these vital registration-based estimates, which hover around 36 per 1000. The slightly higher estimates of infant mortality in columns 4 and 5 are based on vital registration records corrected for presumed underregistration. Neither source indicates the basis for this correction, but each produces an estimate for 1960 that is very close to the Hill et al. (1999) estimate of 39 per 1000, which is based on a knotted regression line that minimizes the squared distance between itself and

Table 3 Infant Mortality Estimates, Cuba, 1957–1963

Source	JUCE- PLAN 1974	UNDY- HS 2000	SALA 1970 reported	SALA 1970 corrected	Land- street 1976 corrected
Origin	VR	VR	VR	VR (corr)	VR (corr)
Note	1	2	3	4	5
1957		36			
1958	33	*70	33	36	36
1959	35	35			37
1960	36	37	35	40	40
1961	38	39	37	41	41
1962	42	42	40	44	44
1963	37	38	38	41	42

Notes and Sources:

1. Cuba. JUCEPLAN/DCE 1974, 28.

2. United Nations 2000. Identical figures for 1960–1963 appear in *Granma* (Osa 2002, 2003), and are thus apparently accepted by the Cuban government. From vital registration statistics, except for the estimate for 1958 (marked with *), which was prepared by the UN Population Division.

3. Roberts and Hamour 1970, 68. Vital statistics; figures include deaths within 24 hours of birth.

4. Roberts and Hamour 1970, 68. Vital statistics adjusted upward to take account of presumed omissions. Infants dying within 24 hours of birth are counted as infant deaths.

5. Landstreet 1976, 90. Data have been adjusted upward to take account of underregistration. Original data from Cuba. Junta Central de Planificación (JUCEPLAN).

6, 7. United Nations 1992, 105. Indirect estimates, West Model. From *Encuesta Nacional de Ingresos y Egresos de la Población, 1974* and *Encuesta Demográfica Nacional de 1979*.

three other estimates: an uncorrected vital registration estimate of 37 per 1000 (United Nations 1992, 104), and the 1974 and 1979 survey estimates recorded in columns 6 and 7. The survey data closely corroborate the corrected vital registration figures, and reassure us that the Hill et al. (1999) estimate of 39 per 1000 is in the neighborhood of the actual rate.

The 1960 estimates in columns 9 and 10, which, at around 60 per 1000, are much higher than the vital registration estimates, are interpolated from life tables based on data from the 1953 and 1970 censuses. These higher estimates are problematic. The long interval between the 1953 and 1970 censuses makes projections for 1960 imprecise. Moreover, none of the sources in columns 9–11 provide any explanation for the huge discrepancy between their census-based estimates of about 60 per 1000 and earlier survey- and vital-registration estimates of about 40 per 1000. Also boosting confidence in the Hill et al. (1999) estimate of 39 per 1000 for 1960, *Granma*, the official newspaper of the Cuban Communist Party, recorded the 1960 infant mortality rate as 37.3 per 1000 in two consecutive years (Osa 2002, 2003). The Party would seem to have an interest in endorsing a higher estimate for 1960, which would make the amount of infant mortality decline since the 1959 revolution look bigger.

<i>Income Survey</i> 1974	<i>Demog. Survey</i> 1979	<i>Hill et al.</i> 1999	<i>Catasus Cervera</i> 1977	<i>González Quiñones</i> 1996	<i>CEPAL/CELADE</i> 2002
<i>Survey</i>	<i>Survey</i>	<i>Surv/VR</i>	<i>Census</i>	<i>Census</i>	<i>Unknown</i>
6	7	8	9	10	11
				58	70
				58	70
43				58	70
		39	62		59
					59
38					59
	38				59

8. Hill et al. 1999, 70. The estimate is based on a knotted regression line fitted to vital registration statistics, indirect estimates based on the 1974 *Encuesta Nacional de Ingresos y Egresos de la Población*, and indirect estimates based on *Encuesta Demográfica Nacional 1979*.

9. Catasus Cervera and Hernández Castellón 1977, 283. Hollerbach and Díaz-Briquets (1983, 5) view these figures as overestimates. Original data from 1975 papers by Alfonso Farnos and by Elio Velásquez and Lázaro Toirao at the Centro de Estudios Demográficos, Universidad de La Habana.

10. González Quiñones and Ramos Piñol 1996, 34. Based on "method of inverse projection" from census data, incorporating new data on migration and correcting for underregistration of under-5 children by the censuses, apparently using CELADE and JUCEPLAN data for 1955-59.

11. CEPAL/CELADE 2002, 24. No information on source or method of estimate.

More agreement exists on life expectancy than on infant mortality in 1960. Farnos Morejón (1977, 359) and the Centro de Estudios Demográficos (1976, 55) each estimate that in 1960 a Cuban newborn could expect to live 64.0 years, and the mean of the CEPAL/CELADE (2002, 22) estimates for 1955-1960 and 1960-1965 is 63.9 years. Díaz-Briquets (1983, 19) accepts an estimate of 64.0 years for 1960, and the World Bank (2002) estimates 64.2 years for 1960. We therefore accept that Cuba's infant mortality rate in 1960 was about 39 per 1000, as Hill et al. (1999) suggest, and that its life expectancy at birth was about 64 years.

Cuba's infant mortality rate in 1995 was reported to be 9 per 1000, the lowest in Latin America (Hill et al. 1999). Life expectancy at birth was reported to be 75.8 years, second-highest in the region after Costa Rica (76.2) (World Bank 2002). Cuba's infant mortality rate in 1995 is more controversial than its level of life expectancy, perhaps because its infant mortality rate is updated every year and is calculated directly from government vital statistics. Cuban definitions of infant mortality and laws about birth and death registration have met international standards since the late 1960s, but critics have alleged that infant mortality statistics under Castro have been "fudged" or that they have been artificially biased

downward, either by the underreporting of the births and deaths of very low birthweight babies or by a high abortion rate.

In an article entitled "Did Fidel Fudge the Figures?" Eberstadt (1986, 38) noted that "Cuban authorities [may be] deliberately falsifying statistics on their nation's infant mortality rate," and pointed to other instances in which the government apparently falsified official statistics. Solomon (2003) wrote that "Castro's accomplishments are a hoax; his statistics have been fudged or fabricated," and argued that the government had covered up an outbreak of dengue fever in 1997. Both Eberstadt and Solomon cite a study by Hill (1983) that found large differences between infant mortality rates calculated from vital registration statistics from 1974 to 1978 and those estimated indirectly from child survivorship questions asked in the 1979 Demographic Survey. In 1978, infant mortality was 22 per 1000 according to vital statistics (Osa 2003), but 38 per 1000 according to indirect estimates based on the 1979 Demographic Survey (United Nations 1992, 105). Indirect estimates based on the 1987 Fertility Survey produced similarly high figures, 36 per 1000 for 1976 and 32 per 1000 for 1978. This survey, however, also produced estimates of 42 per 1000 for 1981 and 9 per 1000 for 1985 (United Nations 1992, 106). Such huge apparent changes over such a short span of time cast doubt on the survey's reliability.

Neither Eberstadt nor Solomon gives any direct evidence that the Cuban government has falsified its infant mortality statistics. Moreover, observation of a discrepancy between vital statistics and survey results does not entail the conclusion that the vital statistics are flawed whereas the survey results are accurate. Hill et al. (1999, 70) regard the estimates from the 1987 Fertility Survey as severely flawed and give them zero weight in their own estimates. Hill (1983, 89–92) views the vital registration-based estimate for 1978 (22 per 1000) as more credible than the estimate based on the 1979 Demographic Survey (38 per 1000), in part because the survey based its estimate on responses from women aged 15 to 19 (United Nations 1992, 105). Such women tend to be poorer than average, and tend to be bearing their first child, both of which are risk factors for infant death. Moreover, the number of births to 15–19 year-old women in sample surveys is often very small, making estimates based upon them unreliable (United Nations 1992, 7).

Although most observers and international agencies agree that Cuba's vital registration statistics were complete and accurate during the 1990s, some claim that Cuba underreports the births and deaths of newborns weighing less than 1500 grams (3.3 pounds). In 2000, the mortality rate for U.S. infants weighing less than 1500 grams was 247 per 1000, nearly 100 times as high as that for infants weighing 2500 grams (5.5 pounds) or more (2.5 per 1000) (United States. CDC 2002, table 21). Three studies carried out in individual Cuban hospitals during the 1990s found

similar mortality rates of 192 per 1000 (Cárdenas Rivero et al. 2001), 247 per 1000 (Enríquez Clavelo et al. 1999), and 261 per 1000 (Navarro Ruíz and Molina Hernández 1999) for infants weighing less than 1500 grams.

Very few newborns weigh less than 1500 grams, but their extremely high death rate means that the completeness of reporting of their births and deaths can have a pronounced effect on the infant mortality rate. In comparing the reported proportion of very low-birthweight infants in Cuba to the proportion in the United States, Carnell (2002) implies that U.S. reporting of the births and deaths of such infants is virtually complete, whereas Cuban reporting suffers from widespread omissions. This possibility is worth taking seriously, for cross-national differences in birth and death reporting of very low-birthweight infants complicate infant mortality comparisons, even among rich countries (Howell and Blondel 1994; Kramer et al. 2002; United States Congress 1994, 34–35).

Lending initial plausibility to Carnell's claim, the reported share of very low-birthweight babies was higher in the United States in 2000 (1.4 percent; United States. CDC 2003, table 15) than the average in three Cuban hospitals during the 1990s (calculated from Enríquez Clavelo et al. 1999; Navarro Ruíz and Molina Hernández 1999; and Cárdenas Rivero et al. 2001). Combining the results of the three studies, 451, or 0.6 percent, of 71,618 babies reported to have been born alive in the three hospitals put together weighed less than 1500 grams. Maternal health, however, rather than reporting differences, may explain some of the gap between the U.S. and Cuban incidence of very low-birthweight births. In 1995 inequalities of income, education, nutrition, and access to health care were greater in the United States than in Cuba, and disadvantaged mothers in the United States may well have been in poorer health than disadvantaged mothers in Cuba. In Sweden, where the social safety net is stronger than in the United States, the share of births under 1500 grams in the early 1990s was only 0.7 percent (Howell and Blondel 1994, 851), close to the average reported rate in the three Cuban hospitals. Moreover, the already high reported share of very low birthweight births in the United States is perhaps itself understated. Underreporting of the births of infants weighing less than 1500 grams has been found on American Indian reservations (Heck, Schoendorf, and Parker 1999).

Díaz-Briquets (1986, 40–41) has called attention to Cuba's high rate of abortion, which implies the termination of some pregnancies that might otherwise have resulted in births of vulnerable infants. In 1996, Cuba indeed had, after Vietnam, the highest abortion rate in the world, with nearly four times the U.S. ratio of abortions to pregnancies (Henshaw, Singh, and Haas 1999, 534). Feinsilver (1993, 101–02) writes that a high rate of abortion following genetic diagnosis "has given Cuba an advantage over others in the race to decrease the infant mortality rate," and adds that "given the intense effort to decrease infant mortality, it is

possible that, the free-choice abortion policy aside, many doctors may strongly advise and even pressure for abortion." Feinsilver also reports, however, that genetic diagnosis followed by abortion reduced infant mortality by less than 1 per 1000 at a time when the official rate was 10 per 1000. Hence, although Cuba's high abortion rate may contribute to its low infant mortality rate, the effect is probably small. Cuban doctors also often discourage pregnancies by women who are above the usual childbearing age or who already have several children, thereby reducing the proportion of high-risk births, but the provision of such advice does not amount to a cynical "tweaking" of the country's infant mortality statistics.

Cuba's official infant mortality estimate for 1995, 9.4 per 1000 (Osa 2003), is based on a standard definition of infant mortality and on reasonably complete and accurate vital registration statistics. Accordingly, we accept the Hill et al. (1999) estimate that infant mortality in 1995 was about 9 per 1000. A high rate of abortion contributed to the low infant mortality rate, but probably not much. As for life expectancy at birth in 1995, alternative estimates do not differ appreciably. The mean of CEPAL/CELADE's estimates for 1990–1995 and 1995–2000 is 75.7 years (2002, 22); the World Bank's (2002) is 75.8 years; and Astorga and FitzGerald's (1998, 32) is 76 years. It seems reasonable to conclude that Cuba's infant mortality rate in 1995 was about 9 per 1000, and that its life expectancy at birth was about 76 years.

THE PACE AND TEMPO OF MORTALITY DECLINE, 1900 TO 1960

Levels of infant mortality and life expectancy reflect decades or even centuries of ecological challenges, social contexts, institutional arrangements, and government policies. Progress over time at reducing premature mortality, by contrast, reflects shorter-term changes in socioeconomic conditions, institutional arrangements, and government policies that reduce the risk of early death. We are therefore interested not only in the levels of premature mortality that Cuba and other Latin American countries had achieved in 1900, 1960, and 1995, but also in the relative progress that each country made in raising life expectancy and reducing infant mortality in the intervening years, as well as in the tempo of mortality decline within each of these periods.

Cuba did well in both 1960 and 1995 at achieving a low level of premature death (tables 1 and 2). On infant mortality, Cuba led the region in both years, but by a greater margin in 1960 than in 1995. On life expectancy, Cuba came in third in 1960 and a close second in 1995. Where Cuba really excelled before the revolution, however, was in the progress it made at reducing mortality. From 1900 to 1960, Cuba enjoyed the sharpest percent rise in life expectancy and sharpest percent decline in infant

mortality of any Latin American country for which information is available (tables 1 and 2). Indeed, Cuba probably surpassed the other countries at reducing infant mortality by an even greater margin than is suggested by the figures in table 2, for Cuba's infant mortality rate in 1900, as was argued in the first section, was probably closer to 195 per 1000 than to Collver's (1965) estimate of 136 per 1000. If the true initial rate in 1900 were 195 rather than 136 per 1000, Cuba's decline from 1900 to 1960 would be 80 rather than 71 percent, giving it an even wider lead.

The Spanish-American War was a catastrophe for Cuba, reducing the population from 1.8 million in 1895 to 1.5 million in 1898. The decline resulted partly from a fall in the birth rate, but in 1897–1898 “war, starvation, and pestilence killed one person in ten in a single year” (Foreign Policy Association 1935, 97). The share of the Cuban population that died during the Spanish-American War has been compared to the share of the Soviet population lost in World War II (Thomas 1971, 423 n. 36). Over the next six decades, however, mortality fell rapidly, especially after World War II. Reviewing data for Cuba as a whole and for the city of Havana, Díaz-Briquets (1983, 21) found that “mortality declined gradually during the first two decades of [the twentieth] century. The decline gained momentum in the 1920s, may have slowed down during the 1930s, and accelerated rapidly after the Second World War. That rapid decline seems to have continued through the 1960s.” Other series confirm Díaz-Briquets's depiction of the tempo of mortality decline from 1900 to 1960 (McGuire and Frankel 2004, tables 1 and 2). This statistical information about the tempo of mortality decline can usefully be juxtaposed to the evolution of modernization indicators. The lack of fine-grained time series precludes more rigorous quantitative analysis, but census and other data collected periodically permit some preliminary conclusions about the relative weight of the factors that contributed to mortality decline in pre-1959 Cuba.

MODERNIZATION AND MORTALITY, 1900 TO 1960

Because pre-1959 Cuban governments have a reputation for neglecting the poor, it might be supposed that the gradual modernization of the entire society, more than government provisioning of social services, would account for Cuba's strong performance on survival-related measures. Such expectations are implicit in the “wealthier is healthier” perspective, which holds that GDP per capita and female education are the main determinants of cross-national variation in mortality levels and changes, with income inequality and cultural factors (dominant religion, ethnic fragmentation) playing a significant but smaller role (Pritchett and Summers 1996; Filmer and Pritchett 1999). Education, which we regard as an outcome of social provisioning rather than as an indicator of modernization, is discussed in

Table 4 *Modernization Indicators circa 1960*

<i>Infant Mortality</i>		<i>Life Expectancy</i>		<i>Fertility</i>	
Cub	39	Uru	68.0	Uru	2.9
Uru	48	Arg	65.2	Arg	3.1
Ven	56	Cub	64.2	Cub	4.2
Pan	58	Par	63.9	Chi	5.3
Arg	60	Cos	61.9	Pan	5.9
Par	67	Pan	60.9	Bra	6.2
Col	79	Ven	59.8	Hai	6.3
Cos	87	Chi	57.3	Ven	6.6
Mex	94	Mex	57.3	Bol	6.7
Dom	102	Col	56.8	Ecu	6.7
Ecu	107	Bra	54.9	Col	6.8
Bra	115	Ecu	53.4	EIS	6.8
Chi	118	Dom	52.2	Mex	6.8
EIS	129	EIS	50.8	Par	6.8
Nic	130	Per	48.0	Gua	6.9
Gua	136	Nic	47.3	Per	6.9
Hon	137	Hon	46.6	Cos	7.0
Per	142	Gua	45.9	Dom	7.4
Bol	152	Bol	42.8	Nic	7.4
Hai	169	Hai	42.4	Hon	7.5

Notes and Sources:

Infant mortality: Infant deaths per 1000 live births. In 1960, from Hill et al. 1999.

Life expectancy: In years, at birth. In 1960, from World Bank 2002.

Fertility: Total fertility rate, the number of children a woman reaching the age of 15 in 1960 would be expected to bear in her lifetime. In 1960, from UNICEF 1997, 96-97.

Urbanization: Proportion of population in urban areas (defined differently in different countries). In 1960, from World Bank 2002.

GDP per capita: In 1990 international Geary-Khamis dollars. In 1960, from Maddison 1995, 288-290.

the fourth section. The present section assesses whether modernization indicators can explain Cuba's low level of infant mortality in 1960, its fast progress at reducing infant mortality from 1900 to 1960, or the tempo of its infant mortality decline between 1900 and 1960.

Higher GDP per capita reduces premature mortality not only by giving individuals more money to spend on food, shelter, health care, and other basic needs, but also by creating more resources for social services. In 1960, Cuba ranked sixth in Latin America in GDP per capita—not as high as infant mortality (first) or life expectancy (third), but well above the median (table 4). It should be noted, however, that Maddison's (1995) estimates of GDP per capita in 1960 place Cuba higher relative to other Latin American countries than do estimates provided by Astorga and FitzGerald (1998, 31), which rank Cuba seventh of nine countries for which data are available.

Urbanization		GDP (per capita)		Calorie Availability		Gini Index (inequality)	
Uru	80	Ven	9,646	Arg	3,073	Uru	39.5
Arg	74	Arg	5,559	Uru	2,794		
Chi	68	Uru	4,960	Chi	2,531		
Ven	61	Chi	4,320	Nic	2,523	Ven	44.8
Cub	55	Mex	3,155	Mex	2,490	Arg	46.2
Mex	51	Cub	3,118	Par	2,404		
Col	48	Per	3,023	Bra	2,320	Cos	50.0
Per	46	Cos	2,715	Cub	2,297		
Bra	45	Col	2,497	Per	2,223	Bra	53.0
Pan	41	Pan	2,391	Cos	2,197		
Nic	40	Bra	2,335	Ven	2,187	Mex	55.1
Bol	39	Ecu	2,290	Pan	2,169	Cub	57.1
EIS	38	Gua	2,262	Col	2,165		
Cos	37	Nic	1,983	Ecu	2,034		
Par	36	EIS	1,769	Hai	2,028		
Ecu	34	Bol	1,606	Hon	1,927		
Gua	32	Par	1,555	Gua	1,927		
Dom	30	Hon	1,398	Dom	1,850	Per	75.8
Hon	23	Dom	1,332	EIS	1,840		
Hai	16	Hai	1,055	Bol	1,798		

Calorie availability: In kcal per capita per day. In 1961–1963, from Wilkie, Alemán, and Ortega 1999, 200. Data for El Salvador and Nicaragua are from 1966–1968. In the 1990s, the Food and Agriculture Organization recommended minimum for Latin America was 2,200 kcal per capita per day.

Gini index: A measure of income inequality, with 0 lowest and 100 highest. Figures from 1953–1962 (Cuba figure from 1953), from Deininger and Squire 1998. Venezuelan and Uruguayan figures are composites of separate urban and rural figures.

According to Deininger and Squire (1998) Cuba had a Gini index of income inequality of 57.1 in 1953, one of the highest levels of income inequality in Latin America during this era (table 4; the derivation of this estimate is discussed in McGuire and Frankel 2004, 15). Some recent studies have found that income inequality is associated with higher premature mortality, including when controls are inserted for overall affluence and even for absolute poverty (Daniels, Kennedy, and Kawachi 2000; Filmer and Pritchett 1999; Flegg 1982; Hertzman 2001). One causal mechanism may lead from higher income inequality to higher stress, to excessive stimulation of the endocrine and nervous systems, to worse health (Wilkinson 2001). High income inequality also meant that people particularly vulnerable to premature mortality benefited less from Cuba's fairly high level of overall affluence than would otherwise have been the case.

In the 1960s, Cuba had the fifth-highest level of urbanization in Latin America (table 4). In Europe mortality was higher in cities than in rural areas until 1850, but thereafter the mortality-reducing effects of improved health care, better infrastructure, and greater biological resistance began to outweigh the mortality-increasing effects of crowding and exposure to disease (Easterlin 1996, 73–79). If Latin America evolved similarly, greater urbanization in the 1950s should have been associated with lower infant mortality. Most accounts of Cuban health and education services before the revolution highlight a huge imbalance in favor of the cities, particularly Havana. Hence, Cuba's fairly high level of urbanization may help to explain its low level of infant mortality in 1960.

Lower fertility encourages lower infant and child mortality by increasing birth spacing, lessening the number of higher-order parities, diminishing the share of births to very young and to very old mothers, enabling parents to devote more attention to each child, and reducing the burden on obstetric and pediatric services. Among twenty Latin American countries, Cuba had the third-lowest fertility rate in 1960 (table 4). Hence, low fertility, along with high urbanization and high GDP per capita, probably contributed to Cuba's low level of infant and child mortality in 1960, partly offsetting the handicap of high income inequality.

On the whole, the "wealthier is healthier" proposition does a fairly good job of explaining Cuba's low level of infant mortality in 1960. It does rather poorly at explaining the country's rapid decline of infant mortality from 1900 to 1960, however. By Latin American standards, Cuba had slow economic growth from 1900 to 1960. Astorga and FitzGerald (1998, 31) provide indirect GDP per capita estimates for nine Latin American countries for 1900 and 1960, basing their figures for Cuba on a series developed by Brundenius (1984). According to these estimates, Cuba went from having the third-highest GDP per capita in 1900 to having the third-lowest in 1960. As a result, it ranked ninth among the nine countries at GDP per capita growth during the 61-year period. From 1900 to 1960, Cuba thus came in first in Latin America on mortality decline, but last in GDP per capita growth (among countries for which data are available). Hence, the claim that modernization explains Cuba's rapid infant mortality decline gets off to a rough start. Maddison (1995, 288–90) provides a slightly higher GDP per capita figure for Cuba in 1960, implying somewhat greater economic growth over the six decades, but his estimate exceeds Astorga and FitzGerald's only by a factor of 7.99, compared to 6.89 for the nine countries taken as a group. If the discrepancy for Cuba were 6.89 rather than 7.99, Cuba's GDP per capita in 1960, according to the Astorga and FitzGerald measure, would be \$452 rather than \$390, implying that the economy from 1900 to 1960 would have grown by a factor of 1.66 rather than 1.43. Such a revision would still make Cuba the slowest-growing among the nine countries.

The definition of “urban” changed from census to census (Luzón 1987, 101–103), but from 1899 to 1953 the population share in Cuba’s 25 largest cities rose only from 31 to 39 percent, and the proportion in Havana changed little (table 5). Similar data for other Latin American countries are not available, but the pace of urbanization in Cuba from 1900 to 1960 was probably not among the highest in the region. Fertility, however, fell rapidly (Díaz-Briquets and Pérez 1982). Among five Latin American countries for which data are available, Cuba was second only to Argentina at decline in the age-specific birth rate from 1900 to 1950 (Collver 1965, 26–28). In assessing the “wealthier is healthier” claim, however, this rapid fertility decline must be set against slow urbanization and very slow economic growth, the latter all the more significant for occurring in the context of high income inequality. On the whole, Cuba from 1900 to 1960 achieved rapid progress at reducing infant mortality despite slow modernization.

To assess the strength of the relation between modernization and mortality in pre-revolutionary Cuba we can also compare the tempo of progress in each case. The pace of infant mortality decline increased gradually from 1899 to 1930, held steady from 1931 to 1943, and then rose rapidly from 1944 to 1960 (McGuire and Frankel 2004, table 1). Correspondingly, most scholars concur that GDP per capita rose from 1900 to 1925, plunged from 1925 to 1945, and recovered from 1945 to 1957 (Domínguez 2003). Combining several estimates, and recognizing that GDP per capita dipped in 1958 for conjunctural reasons (the revolution), GDP per capita probably grew a total of 20–30 percent between 1945 and 1957, perhaps 2 percent per year (Domínguez 1978, 74; Brundenius 1984, 145; Astorga and FitzGerald 1998, 31). This progress was solid, if not spectacular, and was much better than in the first half of the century, when GDP per capita rose little (Brundenius 1984, 5–7, 140, 145). Hence, although GDP per capita growth cannot explain why Cuba led Latin America in mortality decline from 1900 to 1960, faster GDP per capita growth after World War II may have had something to do with faster mortality decline from 1945 to 1960.

Urbanization proceeded at a stately pace throughout the period from 1899 to 1957, with no sign of a slowdown from 1931 to 1943 or of a speedup from 1944 to 1957. Moreover, most of the fertility decline took place before World War II, when infant mortality decline was slow, rather than after World War II, when it was faster (table 5; Hollerbach and Díaz-Briquets 1983, 15). Faster fertility decline in the 1920s and 1930s may have encouraged faster infant mortality decline in the 1940s and 1950s, but the mechanisms of such a lagged effect would have to be specified.

The “wealthier is healthier” proposition thus fares differently in the three comparisons of mortality and modernization. It fares well on the comparison of levels in 1960, but rather poorly on the overall amount of

Table 5 *Population, Urbanization, Literacy, and Health Personnel in Cuba According to National Census Data, 1899–1953*

	<i>Pop. of Cuba</i>	<i>Pop. in the 25 Largest Cities</i>	<i>Pop. in Havana Metro. Area</i>	<i>% Pop. in 25 Lrgst. Cities</i>	<i>% Pop. in Metro. Havana</i>
<i>Note</i>	1	2	3	4	5
1899	1,572,797				
1907	2,048,980	628,600	367,900	31	18.3
1919	2,889,004	919,300	472,900	32	16.5
1931	3,962,344	1,346,100	728,500	34	18.5
1943	4,778,583	1,744,100	947,000	36	20.0
1953	5,829,029	2,281,000	1,223,900	39	21.3

Notes and Sources:

1–4. Luzón 1987, 54, 116.

5–6. Díaz-Briquets 1983, 46. Luzón provides figures similar to those in column 5.

7. The total fertility rate is the number of children a woman reaching the age of 15 in the year given is expected to bear in her lifetime. Data from Hollerbach and Díaz Briquets 1983, 5, 15. Original data from Catusus Cervera et al. 1975, except for the figure for 1953 (which is really for 1950–1954), which is from Comité Estatal de Estadísticas 1980 and CEE/CELADE 1981 (1950–1980). Hill (1983) estimates that total fertility in 1950–1954 was 3.6.

progress from 1900 to 1960 and on the tempo of progress from 1900 to 1960. Given this mixed performance, it is well worth exploring the possibility that government provision of basic social services in pre-1959 Cuba had a major impact on mortality levels and changes, notwithstanding the reputation of most pre-revolutionary governments as failures in this area.

GOVERNMENT PROVISION OF BASIC SOCIAL SERVICES AND MORTALITY LEVELS AND CHANGES

“Wealthier is healthier” analyses have found that education, especially female education, is the social service with the greatest impact on mortality levels and changes (Pritchett and Summers 1996; Filmer and Pritchett 1999). We find, by contrast, that relatively easy access to fairly high quality health care for an unusually large share of the population (by then-current Latin American standards) was a decisive determinant of infant mortality levels and changes in pre-1959 Cuba.

Literacy and schooling are valuable in themselves, and female education in particular is conducive to lower infant and child mortality (Caldwell 1986; Filmer and Pritchett 1999). Women with more education know more about nutrition, sanitation, and health; tend to be more assertive in demanding food and health care for children; are more inclined to go to modern health facilities; and are more likely to use child-care practices that improve health (Caldwell and Caldwell 1993).

<i>% Pop. in City of Havana</i>	<i>Total Fer- tility Rate</i>	<i>Literacy, Total</i>	<i>Literacy, Female</i>	<i>Pop. per Doctor, Cuba</i>	<i>Pop. per Doctor, Havana Province</i>	<i>Pop. per Doctor, Oriente Province</i>
6	7	8	9	10	11	12
16.1	4.01	43.2	38.1	1,286	649	2,625
14.8	5.82	56.6	54.6	1,648	805	3,610
12.6	5.79	61.6	61.0	1,631	691	4,630
13.7	4.50	71.7	73.7	1,958	696	3,155
14.2	4.00	77.9	72.8	1,846	556	3,140
13.5	4.01	76.4	78.8	940	400	2,490

8. Díaz-Briquets 1983, 45.

9. Losada 1999, 201.

10. Díaz-Briquets 1983, 50. Losada's figures for population per doctor in Cuba as a whole are identical to Díaz-Briquets's for all years except 1931 (1,559 persons per doctor) and 1943 (1,324 persons per doctor). The 1943 census put the population of Cuba at 4,778,583 (column 1) and the number of doctors at 2,589 (Cuba 1943, 1112). These figures work out to 1,845 persons per doctor, almost exactly the figure reported by Díaz-Briquets. Hence, we have used Díaz-Briquets's national series in preference to Losada's.

11–12. Losada 1999, 197.

Pre-revolutionary Cuban governments were publicly committed to education. The constitutions of 1901 and 1940 mandated free and compulsory education (MacGaffey and Barnett 1962, 157), and the 1920s were "a period of remarkable educational achievement" (Dominguez 1978, 71). Total literacy rose 10 percent, and female literacy 13 percent, between 1919 and 1931 (table 5). Cuban education had major defects, particularly in rural areas, but so did education in other Latin American nations. Accordingly, Cuba ranked fifth of eighteen Latin American countries in literacy in 1960 and sixth of eighteen in percent rise in literacy from 1900 to 1960 (calculated from Astorga and FitzGerald 1998, 32). Rapid literacy expansion, however, coincided with slow infant mortality decline (1899–1931), and vice versa. Literacy might have had a lagged effect on infant mortality decline, especially because it was measured in the population aged ten and older, but in 1931–1943, the decade before the post-1945 plunge in infant mortality, female literacy fell (table 5). Hence, as with urbanization and fertility decline, the tempo of literacy expansion in pre-revolutionary Cuba was out of phase with the tempo of infant mortality decline.

Access to safe water reduces infant mortality by lowering the costs of washing and by reducing the risk of contamination from well water and inadequate home storage. Adequate sanitation also lowers the risk of disease. Before 1959 Cuba did poorly at expanding access to safe water and adequate sanitation beyond the upper strata of the population in

Havana and other large cities. The proportion of Cubans who drew water from a spring, stream, or well (the latter "were everywhere suspect"; Thomas 1971, 433), rather than from a pipe or cistern, fell only from 62 percent in 1899 to 57 percent in 1953. The share of homes with a toilet or an outhouse rose from 47 to 77 percent during this period, but the proportion in rural areas rose only from 32 to 46 percent (Díaz-Briquets 1983, 41–45). According to a World Bank mission, as late as 1950 some 80 to 90 percent of rural children had intestinal parasites, due mainly to "widespread ignorance of even elementary sanitation and unsanitary water supplies" (IBRD 1951, 441).

Because pre-revolutionary Cuban governments did only moderately well at providing education and quite poorly at delivering safe water and adequate sanitation, health care provision remains a possible explanation for the rapid decline of premature mortality from 1900 to 1959. The island's health care system during these years was divided into contributory, private, and public sectors. The contributory sector served the middle classes, some organized workers, and many of the rich. The private sector, which was small by Latin American standards, served mainly the rich, although most people bought private medical services for some purposes. The purely public sector served mainly the poor, although many who were not poor used its services at one time or another.

Mutualist associations, which emerged in the late nineteenth century to help immigrants from Galicia, Asturias, and other Spanish regions, dominated the contributory sector in pre-1959 Cuba. These associations offered medical services through their own clinics, doctors, and hospitals, or through contracts with outside health facilities and personnel. Many eventually widened their memberships to include women (who had been initially excluded), as well as persons from places other than that of the initial group. Helping to minimize monthly fees, many doctors accepted low salaries "because of the prestige that accrued, as well as the advantages of the interesting work in the large, well-equipped hospitals, and the opportunity for professional advancement" (Foreign Policy Association 1935, 120). Mutualist associations served nearly half the people in metropolitan Havana by 1927, and the 350,000 members outside Havana in the 1950s had access to association facilities in the capital as well as in their home provinces (Danielson 1979, 76–78, 113–15, 120–121; Díaz-Briquets 1983, 51, 103; Hernández 1969, 538–41).

Although the mutualist associations provided important health services to a remarkably large share of the population, they "were removed from sanitary and preventive functions, were inadequately linked to hospital and specialty services, made ineffective use of auxiliary personnel and extravagant use of physicians, and were largely disconnected from a geographically defined base" (Danielson 1979, 178). Also, many ethnically based mutualist associations banned nonwhites altogether,

while others segregated patients by race (Danielson 1979, 120). In general, the mutualist associations served Cubans of moderate income in Havana and a few other large cities; those from the interior were often too poor to pay the monthly fee (Foreign Policy Association 1935, 120). Hence, racism and the need to make regular, if modest, prepayments meant that poor people generally received few direct benefits from mutualist health care services. On the other hand, by serving substantial numbers of Cubans, both poor and non-poor, the mutualist associations freed up resources that the government could devote to health care for the poor (Díaz-Briquets 2003).

In 1938, the communist-led transport workers' union launched a contributory health care plan funded by payroll deductions, similar to funds that existed during the 1940s in Argentina (*obras sociales*) and Brazil (*caixas*). The transport workers soon opened their plan to workers outside the sector, and by 1959 it had 25,000 members, some from outside Havana. The health facilities run by the transport workers, unlike those of the mutualist associations, "served a substantial number of nonwhite Cubans and served them without discrimination or segregation." The association employed many physicians who were sympathetic to the left, and by 1959 it had "become a center of considerable experimentation and innovation, with emphasis on preventive medical efforts" (Danielson 1979, 120, 150).

Few hospitals provided services exclusively for out-of-pocket payments; the private sector consisted mainly of doctors who worked part-time for public hospitals, mutualist associations, or medical cooperatives (Hernández 1969, 541, 557). In pre-1959 Cuba, then, the private sector was smaller, and the contributory sector larger, than in most other Latin American countries at similar levels of development. Moreover, although the contributory sector in Cuba included union-based health insurance funds, the mutualist associations dominated. The small role for the private sector and the unions, and big role for mutualist associations, may have made it easier to socialize the medical system in the 1960s (Danielson 1979, 121).

The poor usually received health care from the public system run by the Department of Public Health—Latin America's first (1909) executive ministry dedicated to health care. The government in the 1950s devoted about 7.5 percent of its budget to "health and welfare," but these funds were depleted by "graft and waste." Public health jobs were often allocated by patronage, and medical facilities were often built in accordance with "political rather than technical decisions" (MacGaffey and Barnett 1962, 167–68). As was also the case in the private and contributory sectors, public health facilities and health personnel were overconcentrated in Havana. Rural poor people nonetheless could often, although not always, get health care when they needed it. This access, we believe, goes

some way toward explaining why pre-1959 Cuba became Latin America's unlikely champion of premature mortality decline.

In 1957, Cuba ranked third among twenty Latin American countries in doctors per capita and fourth in nurses per capita, although nurse's aides and hospital beds were in comparatively shorter supply (PAHO 1988). One reason why Cuba had so many doctors may have been that many landowning families responded to the decline in their fortunes in the late 1800s (due to war, economic crisis, technological change, and the influx of U.S. capital) by sending their children to medical school (Danielson 1979, 75). Another reason may have been the free tuition and good medical training facilities at the University of Havana, which enrolled more than 1500 medical students in 1929 (Foreign Policy Association 1935, 116). The mutualist associations, by employing doctors during economic downturns, may also have slowed what might otherwise have been an exodus from the profession (Roemer 1991, 448).

Shifting health care resources from doctors and nurses to other types of health care workers can sometimes benefit the poor. All else equal, however, the more doctors and nurses a country has, the greater its potential to supply medical services. In Cuba, population per doctor rose (worsened) from 1899 to 1931, then fell only slightly from 1931 to 1943. From 1943 to 1953, however, persons per doctor fell from 1846 to 940 (table 5). No other indicator examined in this study shows such an abrupt change right at the point in time when decline in infant mortality accelerated.

Most accounts of health personnel in pre-1959 Cuba stress the overconcentration of doctors and health care facilities in the city of Havana. By 1955 the province of Havana contained 62 percent of Cuba's doctors, most of whom worked in the metropolitan Havana area (Hernández 1969, 550). Such overconcentration was bad for the rural poor, but probably benefited the poor in Havana, which in the early 1930s had one poor relief physician for every 2,964 inhabitants, or one for every 1,070 poor persons (the city's indigent population was estimated at 200,000). The city also had 3,000 free hospital beds, one for every 180 inhabitants and one for every 67 indigent persons (Foreign Policy Association 1935, 119). Also, "great numbers of indigents c[a]me to Havana from the interior for hospitalization" (Foreign Policy Association 1935, 119). Thus, Cuba's comparatively small geographical size and well-developed transport system partly attenuated the problem of the spatial maldistribution of doctors (Hernández 1969, 551).

Moreover, Cubans outside Havana were not entirely deprived of medical care. Larger cities provided free medicine to the poor as early as 1935, and each of Cuba's 124 districts or *municipios* hired at least one doctor to care for the sick poor. About 200 physicians outside Havana were employed in this fashion, usually on a part-time basis (Foreign Policy Association 1935, 107, 116–18). Interviews by Oscar Lewis and his collaborators

in 1969–70 record that even very poor women reported having gone to hospitals and doctors in pre-1959 Cuba, including for prenatal care (Lewis, Lewis, and Rigdon 1977, 131, 135, 147, 245). In the early 1950s, the government also launched a “Program for the Development of Rural Dwellers” that included housing and sanitation upgrades, disease control, and mobile medical units (Calvó Fonseca et al. 1952, 18).

Governments in pre-1959 Cuba initiated primary health care and mother-and-child health care initiatives that may also have contributed to mortality decline. “Child hygiene services” operated in Havana and some other large cities in the early 1930s (Foreign Policy Association 1935, 110). In 1934, congress passed a law mandating contributory maternity insurance for working women and for the wives of male workers. The contributions came from employers, workers, and the government, and were used to build, equip, and staff maternity hospitals and to pay for physician or midwife services for those who could not, or preferred not to, use hospitals. Services provided included prenatal care, postpartum care, and birth attendance (Hernández 1969, 537). In 1946, the government launched a campaign against intestinal parasites (Díaz-Briquets 1983, 82). Rural schools created by the army in the mid-1930s were headquartered at centers that were also staffed by a doctor, nurse, dentist, and medical technician. In 1952, the Fulgencio Batista government raised the number of such centers to sixty-two and added a new service employing 120 midwives. It also imposed a tax on beer to fund the National Organization of Infant Dispensaries which administered twenty-eight clinics around the country. From 1954 to 1958, these clinics delivered about a million infant and child consultations, inoculations, and medical tests per year (Batista 1961, 96–99, 144–46). Also contributing to mortality decline during and after World War II was the introduction of new insecticides (especially DDT) and pharmaceuticals (sulfa drugs and antibiotics) (Díaz-Briquets 1983, 67–101).

The foregoing description is not meant to imply that the poor had excellent health care in pre-1959 Cuba. The doctors who served the poor in the cities and towns of the interior had low salaries, eschewed home visits, and were “largely untrained in the technique of public health procedure.” The government budgeted no funds to permit these doctors to travel, although “many people from the country came to [their] office[s] for quinine and vaccination” (Foreign Policy Association 1935, 107, 116–18). Also, despite the country’s small size and good transportation, many Cubans still lived in remote areas. In a 1943 survey, 392 of 742 rural families lived along roads that vehicles could not use in the wet season (Nelson 1950, 17–18, 258). Health care for the poor before the revolution was not good in absolute terms, but a higher proportion of the poor may well have had access to minimally adequate medical care in Cuba than in most other Latin American countries.

DETERMINANTS OF HEALTH CARE PROVISION AND ACCESS

Relations with the United States, labor union strength, and political regime form influenced the provision of health care and disease control in the pre-revolutionary period. Cuba's proximity to the United States was partly responsible for keeping the U.S. government involved in Cuban affairs at a time when infectious disease control could still contribute significantly to mortality decline. In the 1800s, after devastating yellow fever epidemics in Philadelphia, Memphis, and New Orleans, there was talk in the United States of invading Cuba solely to eradicate yellow fever there (Spielman and D'Antonio 2001, 122). An estimated 80 percent of U.S. army troops came down with yellow fever during the U.S. occupation from 1898 to 1902 (Spielman and D'Antonio 2001, 122), and more Spanish and U.S. soldiers died of yellow fever and other diseases than of battle injuries during the Spanish-American War from 1895 to 1898 (Danielson 1979, 78–79; Thomas 1971, 405, 414).

The dangers of yellow fever and malaria encouraged the U.S. government to improve mosquito control, health education, quinine provision, trash collection, patient isolation, and other sanitary reforms when it occupied the island from 1898 to 1902 and from 1906 to 1909 (Centro de Estudios Demográficos 1976, 15; Danielson 1979, 89–92; Díaz-Briquets 1983, 28–36; Lockmiller 1938, 112–17). During the first occupation William Gorgas, the administrator of Havana's sanitation department, turned Havana into "what may have been the cleanest major city on earth." He also took action based on the hypothesis, first proposed by the Cuban physician Carlos Finlay, that mosquitoes spread yellow fever. Gorgas ordered soldiers to drain ditches, oil ponds, fumigate houses, isolate yellow fever sufferers in screened rooms, and "swat adult mosquitoes, one by one" (Spielman and D'Antonio 2001, 122). In Havana, yellow fever deaths fell from an annual average of 706 (for 1868–1898) to 310 in 1900 and to 0 in 1902 (Danielson 1979, 90). Malaria deaths, meanwhile, fell from 59 per 100,000 in 1901 to 8 per 100,000 in 1907 (Díaz-Briquets 1981, 403).

The goal of attracting tourists motivated the Cuban government to improve Havana's water and sewer systems; high sugar revenues from 1907 to 1919 provided the means (Schwartz 1997, 19). Even after lifting the military occupation of Cuba in 1909, moreover, the U.S. government insisted that the Cuban government pay close attention to sanitary conditions and disease outbreaks. The Platt Amendment to the Cuban Constitution of 1901, which was in effect until 1934, authorized the United States to invade and re-occupy the island if the government neglected disease control (Díaz-Briquets 1983, 35–37). These advances in sanitation and mosquito control in the first decade of the twentieth century did not produce an immediate decline in premature mortality, which fell more slowly in Cuba at the beginning of the twentieth century than

after World War II (McGuire and Frankel 2004, tables 1 and 2), but the rapid decline in later years would have been much harder without them.

Cuba's smallish land area, which gave many rural people access to health care in Havana, was conducive to the delivery of the basic health services to the poor. The concentration of much of the rural population around sugar mills also facilitated the provision of health services. About 42 percent of Cuba's labor force worked in agriculture in 1953, and more than half of agricultural workers earned a living from sugar (MacGaffey and Barnett 1962, 141). Big sugar mills were legally required to have a doctor on hand to treat job-related injuries and to supervise sanitary conditions. Moreover, "many plantations [went] much further than the legal requirements, supplying free medical care, nursing service, medicines and sometimes hospitalization for their employees" (Foreign Policy Association 1935, 118–19). By 1941 the United Fruit Company, Cuban-American Sugar, and Cuba Cane were each deducting 1–2 percent of their workers' salaries for health care. The United Fruit Company built two hospitals and several nursing stations on its holdings; it also took mosquito control measures and provided quinine to people with malaria (Zanetti and García 1976, 310–13). A United Fruit Company plantation in Oriente is reported to have used malaria-control methods that helped to "reduce the devastation of this disease to the vanishing point" (Foreign Policy Association 1935, 99). The health services delivered on sugar plantations were not beyond reproach. Around 1920, the hospital of the Santa Lucia sugar mill in Oriente had poor hygiene, according to a patient (Núñez Machín 1981, 30). On balance, however, the sugar industry probably facilitated the rapid decline of premature mortality in pre-1959 Cuba.

Labor unions in Cuba organized about 14 percent of the labor force in 1946 and about 60 percent in 1960. These figures were very high for Latin America. Among the eighteen to twenty Latin American countries for which data are available, Cuba in 1946 trailed only Chile (15 percent) on labor union members as a share of the labor force, and in 1960 it trailed only Venezuela (64 percent) (McGuire and Frankel 2004, table 16). According to O'Connor (1964, 148), pre-revolutionary Cuba, particularly after the mid-1930s, had one of the strongest labor movements in Latin America and possibly in the world. The role of labor union strength in reducing infant mortality is not clear-cut, however. Unlike industrialized countries, labor union strength in middle-income developing countries seems often to slow mortality decline, in part by biasing social policies toward the urban formal sector at the expense of the very poor (McGuire 1999). Not so in Cuba, which during the pre-revolutionary era combined one of the region's strongest labor union movements with the very fastest rate of mortality decline in Latin America. Moreover, mortality fell fastest during the 1940s and 1950s, when the labor movement was strongest. Besides organizing a large share of the labor

force, Cuban labor had a long history of militancy. Workers launched major strikes in 1917–1920 and 1923–1925, and strikes in Havana helped to bring down the dictatorship of General Gerardo Machado in 1933 (Alba 1968, 289–91; Domínguez 1978, 50–51).

Leaders had two options for dealing with labor: repression or concession. Machado used harsh repression from 1925 to 1933 but was unable to subdue the workers. President Ramón Grau San Martín courted labor during his first presidency in 1933–34, but the massive strike activity that followed his overthrow ushered in another year of harsh repression. By 1936, however, Batista, now the power behind the scenes, was seeking to legitimate his rule, and was concerned that the power and militancy of the communist-led labor movement could threaten political stability (Domínguez 1978, 79, 87, 96). At the same time, communist parties throughout Latin America, Cuba included, were turning to electoral politics in accordance with Stalin's united front strategy. Because most of his political opposition came from the left, Batista could move toward the center, where most of the votes were, by adopting more populist, pro-labor policies (Domínguez 2003). Partly in response to these incentives, Batista made an alliance with the communist-led unions and, in the late 1930s and early 1940s, legalized the Communist Party and passed several pro-labor laws. The Auténtico governments of 1944–1952 continued to support worker-friendly legislation, and after Batista returned to power in a 1952 coup, he attempted to buy off workers with employment and public works programs, even as he harassed unions and cracked down on strikes.

The Cuban labor movement had both significant electoral clout and the capacity to damage the economy through strikes and militancy. Because the labor movement repeatedly showed its ability to withstand repression, and because repression is a costly way to rule, post-1933 governments yielded, at least in part, to worker demands. So did employers. Cuban workers in 1957 are reported to have enjoyed relatively high wages: US\$6.00 in then-current U.S. dollars for an 8-hour day, compared to US\$5.80 in Norway and US\$4.29 in France. Some skilled workers could make US\$10.00–\$11.00 a day, and even agricultural and unskilled sugar workers received US\$3.00–4.00 a day (O'Connor 1964, 144; Batista (1961, 86) provides similar comparative wage figures for 1958). According to the International Labour Office (1961, 399–400), employee compensation in 1958 represented 66.6 percent of national income in Cuba, the second-highest share (after Panama at 68.4 percent) among the nine Latin American countries for which data are available. High wages gave workers a better standard of living and allowed some to join the mutualist associations.

The Cuban governments of 1934–1959 depended heavily on patronage and tended especially to exchange favors with labor bosses. Cuba

would seem therefore to be a strong candidate to fall into a pattern typical of Argentina, Brazil, and Chile, in which unions, allied with better-off groups, induce governments to enact urban-biased and formal sector-biased policies that contribute to the neglect or further impoverishment of the rural and urban poor (McGuire 1999). One difference between Cuba and other Latin American countries is, however, that sugar workers in Cuba comprised a significant share of both unionists and the rural poor. In 1955, the Cuban Workers' Confederation (CTC) claimed 1,234,900 workers, among them 500,000 sugar workers and 98,000 tobacco workers (Schroeder 1982, 210–11). In other Latin American countries during the 1930s and 1940s, union members were more exclusively urban. Hence, the Cuban labor movement represented less of a labor aristocracy than did, say, the labor movements of contemporary Argentina, Brazil, Chile, or Venezuela. During this era, Cuba had high income inequality, and many of the rural poor were not union members, but the significant share of poorer agricultural workers who did belong to unions in Cuba may well have enabled labor strength to contribute to, rather than detract from, the decline of premature mortality. There is little evidence that unions pressured specifically for better health care facilities, but their penetration of rural areas and success at securing wage hikes meant that union members could use health facilities that existed primarily for other reasons.

Political democracy from 1940 to 1952 may also have facilitated rapid mortality decline. Competition during this era was mainly between leftist parties and coalitions, so candidates often courted votes by promising and enacting social programs. It was often necessary to appeal to a "political organization" to gain access to a clinic or hospital bed, and medical "services were channeled to the rural population through leaders of the party in power. Those using the health services and facilities were strongly reminded of the source of the benefits, and many were required to vote accordingly" (MacGaffey and Barnett 1962, 168). Patronage is a suboptimal way to allocate health care access, but it may have benefited the Cuban poor more than the obvious alternative mechanism, ability to pay. In any case, mortality fell especially fast during this democratic period (Díaz-Briquets 1983, 21).

CONCLUSIONS

Revolutionary Cuba's acclaimed success at reducing mortality, although impressive, should not be overstated. Pre-revolutionary Cuba's unheralded success at reducing mortality should be more fully appreciated and studied, especially because it occurred despite slow economic growth and high income inequality. The case of Cuba from 1900 to 1960, although not entirely inconsistent with the "wealthier is healthier"

proposition, shows that rapid declines in premature mortality are possible despite unfavorable socioeconomic contexts. Other Latin American examples of this phenomenon include Cuba itself during the economic crisis of the 1990s (Barraclough 2000; Chomsky 2000); Chile under Pinochet from 1973 to 1983 (McGuire 2001; Scarpaci 1988); and El Salvador and Nicaragua in the war-torn 1980s (Garfield 1989; Ugalde et al. 2000). These cases, together with a cross-national quantitative study (McGuire 2002), suggest that the “wealthier is healthier” proposition may overstate the importance of modernization in contributing to rapid declines and low levels of premature mortality, and may understate the case for public provisioning of basic health services to the poor. We have argued that in Cuba from 1900 to 1959, modernization played a smaller role, and the public provisioning of basic health services a larger one, than the “wealthier is healthier” claim implies.

The factors that contributed to rapid mortality decline in pre-revolutionary Cuba included a bountiful supply of doctors and nurses, fairly good health services for the urban poor, and access to at least some health services for the rural poor. Among the contextual factors that made such services more accessible were U.S. pressure for and involvement in disease control; the island’s small geographical size; the semi-industrial character and spatial concentration of sugar production; a rural class structure in which a large fraction of the rural poor were wage workers; a powerful labor movement with an unusually rural constituency; and the presence of electoral competition from 1940 to 1952, which encouraged political brokers to trade health services for votes. By highlighting these factors we hope to provoke research on their evolution in other cases, and to provide inspiration for further inquiry into the characteristics and causes of mortality decline in Cuba.

REFERENCES

- Alba, Victor
1968 *Politics and the Labor Movement in Latin America*. Stanford, CA: Stanford University Press.
- Alonso, José F., Ricardo A. Donate-Armada, and Armando M. Lago
1994 “A First Approximation Design of the Social Safety Net for a Democratic Cuba.” In *Cuba in Transition*, Vol. 4. Proceedings of the Fourth Annual Meeting of the Association for the Study of the Cuban Economy (ASCE), Florida International University, Miami, FL, August 11–13, 1994. <http://lanic.utexas.edu/1a/cb/cuba/asce/cuba4/> (accessed March 2003).
- Astorga, Pablo, and Valpy FitzGerald
1998 “The Standard of Living in Latin America During the Twentieth Century.” Centro Studi Luca D’Agliano—Queen Elizabeth House Development Studies Working Paper No. 117, St. Antony’s College, University of Oxford.
- Barraclough, Solon
2000 “Protecting Social Achievements during Economic Crisis in Cuba.” In *Social Development and Public Policy: Some Lessons from Successful Experiences*, edited by

- Dharam Ghai, 229–76. London and New York: St. Martin's Press and United Nations Research Institute for Social Development.
- Batista, Fulgencio
1961 *Piedras y leyes*. México, DF: Ediciones Botas.
- Benjamin, Medea, Joseph Collins, and Michael Scott
1984 *No Free Lunch: Food and Revolution in Cuba*. San Francisco, CA: Institute for Food and Development Policy.
- Brundenius, Claes
1979 "Measuring Income Distribution in Pre- and Post-Revolutionary Cuba." *Cuban Studies/Estudios Cubanos* 9 (2): 29–44, (July).
1984 *Revolutionary Cuba: The Challenge of Economic Growth with Equity*. Boulder, CO: Westview Press.
- Bureau of Inter-American Affairs
2002 "Zenith and Eclipse: A Comparative Look at Socio-Economic Conditions in Pre-Castro and Present Day Cuba." Rev. ed. <http://www.state.gov/p/wha/ci/14776.htm> (accessed February 9, 2003).
- Caldwell, John C.
1986 "Routes to Low Mortality in Poor Countries." *Population and Development Review* 12 (2): 171–220 (June).
- Caldwell, John C., and Pat Caldwell
1993 "Women's Position and Child Mortality and Morbidity in Less Developed Countries." In *Women's Position and Demographic Change*, edited by Nora Federici, Karen Oppenheim Mason, and Sølvi Sogne, 122–39. New York, NY: Oxford University Press.
- Calvo Fonseca, Rafael, Alejandro Barrientos, Francisco Ortega, and Juan L. Radelat
1952 *Rural Sanitation*. Document CIH/6 Eng. First Inter-American Congress of Public Health. Transactions and Symposia. Havana.
- Cárdenas Rivero, Yairys, Mileydis Izquierdo Santa Cruz, Yohandra Crespo Ferrá, Yuleydis Félix Díaz, and Yudeisy Rodríguez Hernández
2001 "Comportamiento de los recién nacidos de muy bajo peso en el Hospital Docente Ginecoobstétrico de Guanabacoa." Paper prepared for the II Jornada Científica Estudiantil Virtual de Ciencias Médicas, April 18–May 15, 2001. Facultad de Ciencias Médicas, Universidad de La Habana. http://fcmfajardo.sld.cu/jornada/trabajos/comp_recien/Trabajo.htm (accessed April 5, 2003).
- Carnell, Brian
2002 "Cuba vs. the United States on Infant Mortality." <http://www.skepticism.net/print/articles/2002/000022.html> (accessed February 6, 2003).
- Catasus Cervera, Sonia, and Raúl Hernández Castellón
1977 "Algunas consideraciones en torno a la mortalidad infantil en Cuba." *Revista Cubana de Administración de Salud* 3 (3): 281–88 (July–September).
- Centro de Estudios Demográficos
1976 *La población de Cuba*. Havana: Editorial de Ciencias Sociales.
- CEPAL/CELADE [Comisión Económica para América Latina y el Caribe/Centro Latinoamericano y Caribeño de Demografía]
2002 "América Latina y Caribe: Estimaciones y Proyecciones de Población 1950–2050." *Demographic Bulletin* 35 (69): (January).
- Chomsky, Aviva
2000 "'The Threat of a Good Example': Health and Revolution in Cuba." *Dying for Growth: Global Inequality and the Health of the Poor*, edited by Jim Yong Kim, Alec Irwin, Joyce Millen, and John Gershman Monroe, 331–57. ME: Common Courage Press.
- Collver, O. Andrew
1965 *Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations*. Research Series No. 7. Berkeley, CA: Institute of International Studies, University of California.
- Cuba
1943 *Informe general del censo de 1943*. La Habana: P. Fernández.
- Cuba. JUCEPLAN [Junta Central de Planificación]
1975 *Las estadísticas demográficas cubanas*. La Habana: Editorial de Ciencias Sociales.

- Cuba. JUCEPLAN/DCE [Junta Central de Planificación, Dirección Central de Estadística]
1974 *Anuario estadístico de Cuba 1974*. La Habana: JUCEPLAN/DCE.
- Daniels, Norman, Bruce Kennedy, and Ichiro Kawachi
2000 *Is Inequality Bad for Our Health?* Boston, MA: Beacon Press.
- Danielson, Ross
1979 *Cuban Medicine*. New Brunswick, NJ: Transaction Books.
- Debasa, Jorge, and Fernando González Quiñones
1971 "Cuba: Los componentes de la mortalidad entre 1919–1954. Utilidad de la proyección de la mortalidad." Serie C, No. 132. September. Santiago, Chile: Centro Latinoamericano de Demografía (CELADE).
- Deininger, Klaus, and Lyn Squire
1998 "Measuring Income Inequality: A New Database." Washington, DC: World Bank, Policy Research Department. <http://www.worldbank.org/research/growth/deisqu2.zip> (accessed May 8, 2001).
- Díaz-Briquets, Sergio
1981 "Determinants of Mortality Transition in Developing Countries Before and After the Second World War: Some Evidence from Cuba." *Population Studies* 35 (3): 399–411 (November).
1983 *The Health Revolution in Cuba*. Austin, TX: University of Texas Press.
1986 "How to Figure Out Cuba: Development, Ideology and Mortality." *Caribbean Review* 15 (2): 8–11 and 39–42 (Spring).
2003 Personal communication, April 15.
- Díaz-Briquets, Sergio, and Lisandro Pérez
1982 "Fertility Decline in Cuba: A Socioeconomic Interpretation." *Population and Development Review* 8 (3): 515–37 (September).
- Domínguez, Jorge
1978 *Cuba: Order and Revolution*. Cambridge, MA: Harvard University Press.
2003 Personal communication, August 6.
- Drèze, Jean, and Amartya K. Sen
1989 *Hunger and Public Action*. Oxford: Clarendon Press.
- Easterlin, Richard A.
1996 *Growth Triumphant: The Twenty-first Century in Historical Perspective*. Ann Arbor: University of Michigan Press.
- Eberstadt, Nicholas
1986 "Did Fidel Fudge the Figures? Literacy and Health: The Cuban Model." *Caribbean Review* 15 (2): 5–7 and 37–38 (Spring).
- Eckstein, Susan
1994 *Back from the Future: Cuba under Castro*. Princeton, NJ: Princeton University Press.
- Eckstein, Susan, and Lorena Barberia
2002 "Grounding Immigrant Generations in History: Cuban-Americans and Their Transnational Ties." *International Migration Review* 36 (3): 799–837 (Fall).
- Enríquez Clavelo, José O., Olga María López Popa, Lina Noa Marrero, Maribel Alonso Ramírez, and Miriam Mildestein Pou.
1999 "Recién nacido de my bajo peso: Frecuencia de nacimiento, mortalidad y supervivencia." *Medicentro* 3 (1). <http://capiro.vcl.sld.cu/medicentro/v3n199/rec.html> (accessed April 5, 2003).
- Farnos Morejón, Alfonso
1977 "Los niveles de mortalidad en Cuba durante el siglo XX." *Revista Cubana de Administración de Salud* 3 (4): 351–63 (October–December).
- Feinsilver, Julie
1993 *Healing the Masses: Cuban Health Politics at Home and Abroad*. Berkeley, CA: University of California Press.
- Filmer, Deon, and Lant Pritchett
1999 "The Impact of Public Spending on Health: Does Money Matter?" *Social Science and Medicine* 49 (10): 1309–1323 (November).
- Flegg, A.T.
1982 "Inequality of Income, Illiteracy and Medical Care as Determinants of Infant Mortality in Underdeveloped Countries." *Population Studies* 36 (3): 441–53 (November).

- Foreign Policy Association
1935 *Problems of the New Cuba*. New York, NY: Foreign Policy Association.
- Garfield, Richard M.
1989 "War-Related Changes in Health and Health Services in Nicaragua." *Social Science & Medicine* 28 (7): 669–76.
- González Quiñones, Fernando, and Jorge Debasa
1970 *Cuba: Evaluación y ajuste del censo de 1953 y las estadísticas de nacimientos y defunciones entre 1943 y 1958. Tabla de mortalidad, por sexos, 1952–54. Serie C, No. 124* (June). Santiago, Chile: Centro Latinoamericano de Demografía (CELADE).
- González Quiñones, Fernando R., and Oscar R. Ramos Piñol
1996 *Cuba: Balance e indicadores demográficos estimados del período 1900–1959*. La Habana: Centro de Estudios Demográficos, Universidad de la Habana.
- Heck, K. E., K. C. Schoendorf, and J. Parker
1999 "Are Very Low Birthweight Births among American Indians and Alaska Natives Underregistered?" *International Journal of Epidemiology* 28 (6): 1096–1011 (December).
- Henshaw, Stanley K., Susheela Singh, and Taylor Haas
1999 "The Incidence of Abortion Worldwide." *International Family Planning Perspectives* 25 (Supplement): S30–S38 (January).
- Hernández, Roberto E.
1969 "La atención médica en Cuba hasta 1958." *Journal of Inter-American Studies* 11 (4): 533–57 (October).
- Hertzman, Clyde
2001 "Health and Human Society." *American Scientist* 89 (6): 538–45 (November–December).
- Heston, Alan, Robert Summers, and Bettina Aten
2002 Penn World Table Version 6.1. Center for International Comparisons at the University of Pennsylvania (CICUP), October 2002. <http://pwt.econ.upenn.edu> (accessed October 20, 2002).
- Hill, Kenneth E.
1983 "Appendix 1: An Evaluation of Cuban Demographic Statistics, 1938–1980." In "Fertility Determinants in Cuba," by Paula E. Hollerbach and Sergio Díaz-Briquets. Working Paper No. 102, Center for Policy Studies. New York, NY: The Population Council.
1991 "Approaches to the Measurement of Child Mortality: A Comparative Review." *Population Index* 57 (3): 368–82 (Fall).
- Hill, Kenneth E. et al.
1999 *Trends in Child Mortality in the Developing World: 1960–1996*. New York: UNICEF.
- Hollerbach, Paula E., and Sergio Díaz-Briquets
1983 "Fertility Determinants in Cuba." With an Appendix by Kenneth Hill. Working Paper No. 102, Center for Policy Studies. New York, NY: The Population Council.
- Howell, Embry M., and Béatrice Blondel
1994 "International Infant Mortality Rates: Biases from Reporting Differences." *American Journal of Public Health* 84 (5): 850–852 (May).
- IBRD [International Bank for Reconstruction and Development]
1951 *Report on Cuba: Findings and Recommendations of an Economic and Technical Mission*. Washington, DC: IBRD.
- Kochanek, Kenneth D., and Joyce A. Martin
2004 "Supplemental Analyses of Recent Trends in Infant Mortality." Hyattsville, MD: Centers for Disease Control and Prevention, National Center for Health Statistics. <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/infantmort/> (accessed June 16, 2004).
- Kramer, M.S., R.W. Platt, H. Yang, B. Haglund, S. Cnattingius, and P. Bergsjö
2002 "Registration Artifacts in International Comparisons of Infant Mortality." *Pediatric and Perinatal Epidemiology* 16 (1): 16–22 (January).
- Landstreet, Barent F., Jr.
1976 "Cuban Population Issues in Historical and Comparative Perspective." PhD Diss. Latin American Studies Program Dissertation Series No. 75. May. Cornell University.

- Lewis, Oscar, Ruth M. Lewis, and Susan M. Rigdon
1977 *Four Women: Living the Revolution, An Oral History of Contemporary Cuba*. Urbana, IL: University of Chicago Press.
- Lockmiller, David A.
1938 *Maqoon in Cuba: A History of the Second Intervention, 1906–1909*. Chapel Hill, NC: University of North Carolina Press.
- Losada, Abel F.
1999 *Cuba: Población y economía entre la independencia y la revolución*. Barcelona: Universidade de Vigo, Servicio de Publicaciones.
- Luzón, José Luis
1987 *Economía, población, y territorio en Cuba 1899–1983*. Madrid: Ediciones Cultura Hispánica del Instituto de Cooperación Iberoamericana.
- MacGaffey, Wyatt, and Clifford R. Barnett
1962 *Cuba: Its People, Its Society, Its Culture*. New Haven, CT: Human Relations Area Files.
- Maddison, Angus
1995 *Monitoring the World Economy 1820–1992*. Paris: Organisation for Economic Co-Operation and Development.
- McGuire, James W.
1999 "Labor Union Strength and Human Development in East Asia and Latin America." *Studies in Comparative International Development* 33 (4): 3–34 (Winter)
2001 "Social Policy and Mortality Decline in East Asia and Latin America." *World Development* 29 (10): 1673–1697 (October).
2002 "Democracy, Social Provisioning, and Under-5 Mortality: A Cross-National Analysis." Prepared for delivery at the 2002 Annual Meeting of the American Political Science Association, Boston, MA, August 29–September 1. <http://condor.wesleyan.edu/jmcguire>
- McGuire, James W., and Laura B. Frankel
2004 "Dimensions and Determinants of Mortality Decline in Pre-Revolutionary Cuba." Working Paper, Series 14 (6): (October). Harvard Center for Population and Development Studies. <http://www.hsph.harvard.edu/hcpds/workingpapers.html>
- Mehrotra, Santosh
1997 "Human Development in Cuba: Growing Risk of Reversal." In *Development with a Human Face: Experiences in Social Achievement and Economic Growth*, edited by Santosh Mehrotra and Richard Jolly, 384–417. Oxford: Clarendon Press.
- Mesa-Lago, Carmelo
1969 "Availability and Reliability of Statistics in Socialist Cuba." *Latin American Research Review* 4 (1): 53–91.
1981 *The Economy of Socialist Cuba: A Two-Decade Appraisal*. Albuquerque, NM: University of New Mexico Press.
2000 *Market, Socialist, and Mixed Economies: Comparative Policy and Performance—Chile, Cuba, and Costa Rica*. Baltimore, MD: Johns Hopkins University Press.
- Navarro Ruíz, Maribel, and Orlando R. Molina Hernández
1999 "Hospital Ginecoobstétrico Provincial Docente 'Mariana Grajales,' Santa Clara, Villa Clara. Factores asociados a la mortalidad neonatal." *Medicentro* 3 (2). <http://capiro.vcl.sld.cu/medicentro/v3n299/fact.htm> (accessed April 5, 2003).
- Nelson, Lowry
1950 *Rural Cuba*. Minneapolis, MN: University of Minnesota Press.
- Núñez Machín, Ana
1981 *Memoria amarga del azúcar*. La Habana: Editorial de Ciencias Sociales.
- O'Connor, James R.
1964 "The Political Economy of Pre-Revolutionary Cuba." PhD Diss., Department of Economics, Columbia University. Ann Arbor, MI: University Microfilms International.
- Osa, José A. de la
2002 "¡6,2! Mortalidad infantil en Cuba en el 2001." *Granma* 2 January 2002. <http://www.granma.cubaweb.cu/2002/01/02/nacional/articulo13.html> (accessed February 14, 2002).

- 2003 "Mortalidad infantil en el 2002: ¡6,5!" *Granma* 8 January 2003. <http://www.granma.cubaweb.cu/2003/01/08/index.html> (accessed February 14, 2002).
- PAHO [Pan American Health Organization]
- 1988 *Los servicios de salud en las Américas: Análisis de indicadores básicos*. Cuaderno Técnico No. 14. Washington, DC: PAHO.
- Pritchett, Lant, and Lawrence H. Summers
- 1996 "Wealthier is Healthier." *Journal of Human Resources* 31 (4): 841–868 (Fall).
- Rios Massabot, N. E.
- 1983 "Sistemas de información de estadísticas vitales en Cuba." *Revista Cubana de Administración de Salud* 9 (1): 16–31 (January–March).
- Riverón Corteguera, Raúl
- 1996 "Neonatal Mortality in Cuba, 1970–1993." *International Child Health* 7 (4): 35–48 (October).
- Roberts, C. Paul, and Mukhtar Hamour, eds.
- 1970 *Cuba 1968: Supplement to the Statistical Abstract of Latin America*. Statistical Abstract of Latin America Supplement Series, No. 1. Los Angeles, CA: Latin American Center, University of California, Los Angeles.
- Roemer, Milton I.
- 1991 *National Health Systems of the World*. Vol. 1, *The Countries*. New York, NY: Oxford University Press.
- Rojas Ochoa, Francisco, and Carlos Sánchez Texidó
- 1977 "Cobertura y calidad de la información estadística sobre la mortalidad perinatal en Cuba." *Boletín de la Oficina Sanitaria Panamericana* 82 (4): 334–43 (April).
- Santana, Sarah
- 1988 "Some Thoughts on Vital Statistics and Health Status in Cuba." In *Cuban Political Economy*, edited by Andrew Zimbalist, 107–18. Boulder, CO, and London: Westview Press.
- Scarpaci, Joseph L.
- 1988 *Primary Medical Care in Chile: Accessibility Under Military Rule*. Pittsburgh, PA: University of Pittsburgh Press.
- Schroeder, Susan
- 1982 *Cuba: A Handbook of Historical Statistics*. Boston, MA: G. K. Hall and Co.
- Schwartz, Rosalie
- 1997 *Pleasure Island: Tourism and Temptation in Cuba*. Lincoln, NE: University of Nebraska Press.
- Solomon, Lawrence
- 2003 "Castro's Dupes." *CubaNet News, Inc.* (Coral Gables, FL), February 4, 2003. <http://www.cubanet.org/CNews/y03/feb03/04e4.htm> (accessed February 11, 2003).
- Spielman, Andrew, and Michael D'Antonio
- 2001 *Mosquito: A Natural History of Our Most Persistent and Deadly Foe*. New York, NY: Hyperion.
- Thomas, Hugh
- 1971 *Cuba: The Pursuit of Freedom*. New York, NY: Harper and Row.
- Ugalde, Antonio, Ernesto Selva-Sutter, Carolina Castillo, Carolina Paz, and Sergio Cañas
- 2000 "Conflict and Health. The Health Costs of War: Can They Be Measured? Lessons from El Salvador." *British Medical Journal* 321 (7254): 169–172 (July 15).
- UNICEF (United Nations Children's Fund)
- 1997 *State of the World's Children*. New York, NY: Oxford University Press. <http://www.unicef.org/sowc97/download.htm> (accessed June 21, 2001).
- United Nations
- 1955 *Handbook of Vital Statistics Methods*. UN Document ST/STAT/Ser.F/7. New York, NY: United Nations Department of Economic and Social Affairs.
- 1992 *Child Mortality since the 1960s: A Database for Developing Countries*. New York: United Nations, Department of Economic and Social Development, Population Division.
- 2000 *Demographic Yearbook, Historical Supplement*. CD-ROM.

- United States. CDC (Centers for Disease Control and Prevention)
2002 *Health, United States, 2002. With Chartbook on Trends in the Health of Americans*. Hyattsville, MD: National Center for Health Statistics. Accessed February 23, 2003, at <http://www.cdc.gov/nchs/hus.htm>
- United States Congress. Office of Technology Assessment
1994 *International Health Statistics: What the Numbers Mean for the United States*. Background Paper OTA-BP-H-1 16. September. Washington, DC: U.S. Government Printing Office.
- Wheeler, Tim
1997 "The Children of Jose Marti." *People's Weekly World* [Communist Party USA], January 25, 1997. Accessed February 7, 2003, at <http://www.hartford-hwp.com/archives/43b/089.html>
- Wilkie, James W., Eduardo Alemán, and José Guadalupe Ortega, eds.
1999 *Statistical Abstract of Latin America*. Vol. 35. Los Angeles, CA: UCLA Latin American Center Publications.
- Wilkinson, Richard G.
2001 *Mind the Gap: Hierarchies, Health, and Human Evolution*. New Haven: Yale University Press.
- World Bank
2002 *World Development Indicators on CD-ROM*. Washington, DC: World Bank.
- Zanetti, Oscar and Alejandro García
1976 *United Fruit Company, un caso del dominio imperialista en Cuba*. La Habana: Editorial de Ciencias Sociales.