Volume ISBN: 0-691-04268-3

THREE

DIFFERENCES IN CHILD MORTALITY AMONG SOCIAL, ECONOMIC, AND RESIDENTIAL GROUPS

MORTALITY is one of the most important measures of social inequality because it indicates a group's success in providing members with the most highly prized of all attributes, life itself. The sample of census enumerators' schedules from the 1900 U.S. Census affords the first opportunity to examine differences in child mortality among major social groups throughout the United States at the turn of the century.

We use this resource in the present chapter to draw a map of this largely uncharted territory. In so doing, we draw upon and extend some of the discussion in Chapter 1 about causal factors influencing mortality. Most of the effort to disentangle the influence of variables, however, is deferred until Chapters 4 and 5. The aim of the present chapter is more modest: to describe the implications for childhood mortality of membership in particular social and residential groups at the turn of the century. In a sense, the chapter constitutes a volume of the 1900 Census of Population that census officials, perhaps daunted by the difficulties of interpreting their data, and certainly lacking modern techniques for doing so, never prepared.

Sample and Methods: The Mortality Index

The underlying data source in this chapter is the nationally representative, 1-in-750 sample of enumerators' manuscripts from the U.S. Census of 1900 that was described in Chapter 2. The data set used in most of this chapter is a subset of the "woman file," consisting of 13,429 currently married women who had been in their present marriage less than 25 years and who had legible responses to the questions both on children ever born and on children surviving.

The body of indirect techniques for estimation of child mortality has been covered in detail in Chapter 2. The techniques involve calculating the proportions of children who have died to women of various intervals of ages or of marital durations and then adjusting the proportions according to the shape of the age-specific fertility schedule. This adjustment produces an estimate of a life table parameter representing child mortality. There are three advantages of indirect estimation: first, the data come from a single source (a census or survey) instead of two or more (e.g., vital statistics and census data), and are thus more consistent in coverage and in categories used; second, estimation of mortality is possible along dimensions not usually available from vital statistics (e.g., ethnicity of mother; occupation of father or mother); and third, mortality estimates can be made when vital registration is absent or defective, as was the case in the United States in the late nineteenth century.

The conventional indirect methods used in the previous chapter have several drawbacks, however, when one is attempting to study mortality levels of a large number of specific groups. Some of these groups may be quite small in size. The conventional methods produce many independent estimates for different age or duration categories, making it difficult and awkward to summarize the relative mortality of a group. Also, many of the individual age or duration intervals for smaller groups lack a sufficient number of observations to permit reliable analysis. Finally, a variable will eventually be needed that is suitable for multivariate analysis at a micro level.

Our solution to these problems was developed by Trussell and Preston (1982). An index is created that combines the child mortality experience of women with marital durations of 0–24 years. It takes the form of the ratio of actual to expected child deaths and can be calculated either for individuals or for groups. The number of actual child deaths for a woman is found, of course, directly from the difference between her reported number of children ever born and children surviving.

Expected child deaths are calculated by multiplying the number of children ever born to a woman by the expected proportion dead for her marital-duration group (that is, for marital durations 0–4, 5–9, 10–14, 15–19, and 20–24 years). The expected proportion dead is calculated from a standard model life table, in this case Coale and Demeny [1966] West model level 13, which has an expectation of life at birth of 48.5 years for both sexes combined.[1] The procedure involves taking the appropriate $q(a)$ for each duration group–$q(2)$ for women married 0–4 years, $q(3)$ for durations 5–9 years, $q(5)$ for durations 10–14 years, $q(10)$ for durations 15–19 years, and $q(15)$ for durations 20–24 years—and converting it into an expected proportion dead. This conversion is effected by rearranging the conventional estimation equations that are used to estimate $q(a)$'s from actual proportions dead and from average numbers of children ever born. The multipliers that are normally used to convert proportions dead into $q(a)$'s now become divisors when the procedure is reversed, but continue to reflect the pace of childbearing among the women and hence the average exposure of children to the risk of mortality (United Nations 1983a:82). The details of construction of the mortality index are presented in Appendix C. The West model mortality pattern is chosen because American data were used in the construction of the original model and because, as we have shown in Chapter 2, the West model replicates the experience of the 1900–1902 Death Registration Area quite closely.

The index has the advantage of representing on one scale the child mortality experience of a whole group of women of varying ages, marital durations, and parities. It has been investigated elsewhere and found to be robust and econometrically well-behaved when used as a dependent variable in a regression model (Trussell and Preston 1982). The index is readily interpretable. A value of unity means that a woman or a group of women was experiencing child mortality at about the national average, while a value above unity means that child mortality exceeded the national average. A disadvantage of the index is that, if mortality was changing in the past, its value will be a weighted average of the past mortality regimes, with the weights depending on the marital-duration composition of the group in question. Since groups may not be homogeneous with respect to marital-duration composition, this feature can lead to some bias.[2] Because the national mortality decline was relatively slow in the years preceding 1900—Chapter 2 suggests a rate of gain of 2.8 years in life expectancy at birth per decade—the biases in intergroup comparisons should be minor.

Differentials in Child Mortality

The mortality indices for various categories and groups are presented in Table 3.1, along with the numbers of women and of children ever born that were used in calculating the index. Also presented are estimated values of $q(5)$ (the proportion of children dying before reaching age 5) and the standard error associated with the $q(5)$ values. The $q(5)$'s were computed by multiplying the mortality index by the $q(5)$ for the standard life table used to calculate the index. That life table is Coale and Demeny's (1966) Model west level 13.0 for both sexes combined, which has a $q(5)$ of .19119. This value is somewhat higher than the $q(5)$ of .180 estimated in Chapter 2 for 1895 because women's child mortality experience is weighted by their number of births.

TABLE 3.1
Child Mortality Index in Various Social, Economic, and Residential Categories: U.S., 1900

	Mortality index	*Total women*	*Total children ever born*	*q*(5)	Standard error
1. Total	1.0088	13,429	41,386	0.19287	0.00194
2. Race					
White	0.9404	11,952	35,993	0.17979	0.00202
Black	1.4650	1,410	5,211	0.28009	0.00622
Other	1.7658	67	182	0.33759	0.03505
3. Residence					
Urban	1.1263	6,302	17,292	0.21533	0.00313
Top 10 cities	1.1445	1,765	4,934	0.21881	0.00589
Other cities 25,000+	1.2813	1,781	4,874	0.24497	0.00616
Cities 5,000–24,999	1.0994	1,408	3,763	0.21019	0.00664
Cities 1,000–4,999	0.9270	1,348	3,721	0.17724	0.00626
Rural	0.9230	7,023	23,742	0.17647	0.00247
Top 10 cities					
New York	1.2415	667	1,932	0.23735	0.00968
Chicago	1.0956	309	820	0.20947	0.01421
Philadelphia	1.1475	229	590	0.21940	0.01704
St. Louis	0.9595	106	324	0.18345	0.02150
Boston	1.3269	85	211	0.25369	0.02995
Baltimore	1.2557	101	314	0.24008	0.02410
Cleveland	0.5763	79	204	0.11019	0.02192
Buffalo	1.0304	68	195	0.19700	0.02848
San Francisco	0.9990	51	114	0.19100	0.03682
Cincinnati	1.1074	70	230	0.21172	0.02694
4. Census divisions[a]					
New England	1.1556	980	2,520	0.22094	0.00826
Middle Atlantic	1.0688	2,813	7,946	0.20434	0.00452
East North Central	0.9184	2,897	8,326	0.17559	0.00417
West North Central	0.8161	1,859	5,916	0.15603	0.00472
South Atlantic	1.0685	1,765	6,268	0.20429	0.00509
East South Central	1.0478	1,301	4,475	0.20033	0.00598
West South Central	1.1554	1,131	4,120	0.22090	0.00646
Mountain	1.1140	277	777	0.21299	0.01469
Pacific	0.8405	406	1,038	0.16070	0.01140
5. Literacy					
Wife					
Literate	0.9382	11,598	33,995	0.17937	0.00208
Illiterate	1.3467	1,571	6,683	0.25748	0.00535
Husband					
Literate	0.9545	11,562	34,732	0.18249	0.00207
Illiterate	1.3097	1,333	5,457	0.25040	0.00586
Husband and wife					
Both literate	0.9186	10,704	31,352	0.17563	0.00215
Only husband literate	1.3298	668	2,891	0.25424	0.00810
Only wife literate	1.2239	481	1,852	0.23400	0.00984
Neither literate	1.3482	830	3,532	0.25776	0.00736

TABLE 3.1 (*cont.*)

	Mortality index	Total women	Total children ever born	q(5)	Standard error
6. Ability to speak English					
Wife					
Speaks English	0.9915	12,652	38,586	0.18956	0.00200
Does not speak English	1.2667	530	2,124	0.24218	0.00930
Husband					
Speaks English	0.9928	12,618	39,139	0.18981	0.00198
Does not speak English	1.3758	285	1,078	0.26304	0.01341
Husband and Wife					
Both speak English	0.9836	12,154	37,485	0.18805	0.00202
Only husband speaks English	1.2424	265	1,131	0.23753	0.01265
Only wife speaks English	1.9579	26	88	0.37433	0.05159
Neither speaks English	1.3097	251	962	0.25040	0.01397
7. Occupation of husband[b]					
Professional, Technical	0.9450	443	943	0.18067	0.01253
Agricultural (excluding Laborers)	0.8637	4,296	15,762	0.16514	0.00296
Agricultural Laborers	1.1448	626	1,702	0.21888	0.01002
Managers, Officials, Proprietors	0.9344	899	2,341	0.17865	0.00792
Clerical & Kindred Workers	0.9121	366	712	0.17438	0.01422
Sales Workers	0.8312	398	905	0.15891	0.01215
Craftsmen, Foremen, etc.	1.1208	1,877	5,676	0.21429	0.00545
Operative & Kindred Workers	1.0458	1,301	3,916	0.19995	0.00639
Service Workers	1.0010	344	868	0.19137	0.01335
Laborers	1.2463	1,853	5,947	0.23827	0.00552
Miscellaneous & other	1.0049	221	554	0.19212	0.01674
8. Wife's labor force status					
Working	1.4149	758	2,191	0.27051	0.00949
Not working/Not in labor force	0.9865	12,671	39,195	0.18861	0.00198
9. Husband unemployed during year					
Not unemployed	0.9563	9,211	27,826	0.18283	0.00232
Unemployed at least one month during year	1.2102	1,989	6,558	0.23138	0.00521
10. Farm and Homeownership					
Own farm	0.8010	2,785	10,472	0.15314	0.00352
Rents farms	0.9688	1,814	6,292	0.18522	0.00490
Own home (non-farm)	1.0223	2,519	7,838	0.19545	0.00448
Rent home (non-farm)	1.1562	5,821	15,602	0.22105	0.00332
11. Nativity of husband & wife					
Both native-born	0.9713	9,521	28,332	0.18570	0.00231
Only husband native	1.0513	499	1,388	0.20100	0.01076
Only wife native	0.9175	887	2,694	0.17542	0.00733
Both foreign-born	1.1359	2,019	7,854	0.21717	0.00465
12. Structure of woman's household					
No unrelated individuals in household	0.9983	10,994	35,288	0.19086	0.00209
Servant(s) in household	0.8594	731	1,880	0.16431	0.00855
Boarder(s) in household	1.1702	1,371	3,690	0.22373	0.00686

TABLE 3.1. (*cont.*)

	Mortality index	Total women	Total children ever born	q(5)	Standard error
Woman is a servant	1.7685	40	58	0.33812	0.06212
Woman is a boarder	1.2458	173	139	0.23818	0.03613
Woman resident at an institution	1.2618	31	80	0.24124	0.04783
13. Migration status of woman					
Resident in state of birth	0.9566	7,825	23,008	0.18289	0.00255
Resident in census region of birth	1.0157	1,735	5,179	0.19419	0.00550
Born in different census region	0.9952	1,237	3,621	0.19027	0.00652
Foreign-born	1.1321	2,602	9,475	0.21645	0.00423
14. Relation of woman to household head					
Head	1.2152	151	536	0.23233	0.01824
Wife	1.0015	12,412	39,742	0.19148	0.00197
Child of head	1.0022	287	337	0.19161	0.02144
Daughter-in-law	0.9372	208	267	0.17918	0.02347
Sister	1.6863	27	32	0.32240	0.08262
Sister-in-law	1.5642	38	50	0.29906	0.06475
Niece	0.7848	14	14	0.15005	0.09544
Servant	1.7572	36	52	0.33596	0.06550
Boarder/lodger	0.9088	35	43	0.17375	0.05778
Wife of boarder/lodger	1.2127	135	87	0.23186	0.04525
15. Ethnicity (white, husband present)					
Husband & wife					
Both native	0.8660	8,157	23,220	0.16557	0.00244
Husband native, wife foreign-born	1.0513	498	1,388	0.20100	0.01076
Husband foreign-born, wife native	0.9204	881	2,684	0.17596	0.00735
Both foreign-born	1.1349	2,004	7,825	0.21697	0.00466
Wife & wife's mother					
Native white wife	0.8698	9,344	26,466	0.16630	0.00229
Native white mother	0.8656	7,245	20,417	0.16550	0.00260
British mother	0.8939	258	672	0.17090	0.01452
Irish mother	1.0189	503	1,479	0.19480	0.01030
Scandinavian mother	0.7225	83	217	0.13814	0.02342
German mother	0.8714	869	2,601	0.16659	0.00731
Other West European mother	0.5083	67	196	0.09718	0.02116
East European mother	0.5694	51	125	0.10886	0.02786
South European mother	0.2385	11	23	0.04559	0.04350
Other foreign-born mother	0.8651	257	736	0.16539	0.01369
Foreign-born wife (white)	1.1315	2,584	9,444	0.21633	0.00424
Britain	1.0993	241	822	0.21017	0.01421
Ireland	1.2883	348	1,257	0.24630	0.01215
Scandinavia	0.9408	305	1,088	0.17987	0.01164
Germany	1.1981	695	2,755	0.22906	0.00801
Other West European	0.7656	91	329	0.14637	0.01949
East Europe	1.0265	398	1,464	0.19626	0.01038
South Europe	1.1341	153	514	0.21682	0.01818
Other foreign	1.2330	353	1,215	0.23573	0.01218

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: Sample consists of currently married women, married 0–24 years. The mortal-

TABLE 3.1 (*cont.*)

ity index is the ratio of actual to expected deaths to women in each group. For the calculation of expected child deaths, see text. $Q(5)$ is the proportion of children dying before age 5 for each group. The values for $q(5)$ are derived by multiplying the mortality index by the $q(5)$ value (.19119) for the standard life table (Model West level 13.0 for both sexes combined). The standard error assumes that the $q(5)$ value is the outcome of a binomial process with variance (p^*q/n), where q is the $q(5)$ value, $p = (1 - q)$, and n = the number of children ever born.

[a] The census divisions were composed as follows: (1) New England: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island; (2) Middle Atlantic: New York, New Jersey, Pennsylvania; (3) East North Central: Ohio, Michigan, Indiana, Illinois, Wisconsin; (4) West North Central: Minnesota, North Dakota, South Dakota, Iowa, Missouri, Nebraska, Kansas; (5) South Atlantic: Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Florida; (6) East South Central: Kentucky, Tennessee, Alabama, Mississippi; (7) West South Central: Arkansas, Louisiana, Texas, Oklahoma Territory; (8) Mountain: Montana, Idaho, Wyoming, Colorado, Nevada, Utah, New Mexico Territory, Arizona Territory; (9) Pacific: Washington, Oregon, California, Alaska Territory, Hawaii Territory.

[b] The occupation classification system is that used for the 1950 U.S. Census.

Hence older women, whose births are more numerous than those of younger women and whose children were exposed to higher mortality conditions, receive heavier weight in the index.

The $q(5)$ life table parameter is chosen because it is likely to be least sensitive to time trends or to an error in the choice of model life tables. The standard error is computed assuming that the $q(5)$ values were generated by an underlying binomial process, which has a standard error of the square root of (pq/n), where q is $q(5)$, p is $(1 - q)$, and n is the number of "trials," i.e., children ever born.[3]

Race

As shown in Chapter 2, child mortality was considerably higher for blacks than for whites. The racial difference for the nation as a whole was, however, not as great as that in the Glover (1921) life tables for the Death Registration Area, whose base populations were concentrated in the Northeast and North Central regions. For example, the probability of dying before age 5 was 89 percent higher for blacks than whites in the Death Registration Area, but only 58 percent higher for the entire nation. Our differential of 56 percent shown in Table 3.1 (based upon a slightly more selective data set) replicates the results presented in Chapter 2. Southern rural blacks were clearly doing much better than the northern urban blacks that were over-represented in the Death Registration Area data. This fact had been suspected by the Census Bureau in 1918 (U.S. Bureau of the Census 1918:314). They conjectured that blacks in northern cities (and in cities generally) were largely migrants from the rural South and hence were subjected to many of the same mortality hazards as foreign immigrants to cities. But urban blacks were essentially beyond the pale of the social programs and settlement houses that were designed to ease the transition for immigrants to a new land (Katz 1986: 175–78).

Confirmation of the high urban mortality of blacks may be found in Table 3.2, which presents the mortality index for blacks and whites by rural/urban residence, city size, census region, race, and nativity. Rural blacks enjoyed a considerable advantage over urban blacks in both the North and the South. Black children, however, had much higher mortality than children of foreign-born white women in every residential category. Overall, northern blacks had slightly higher mortality than southern blacks in both rural and urban areas; as a whole, blacks in the North did much worse than blacks in the South, primarily because they were much more highly urbanized. It is noteworthy that blacks were slowly migrating out of the comparatively healthier rural South in the late nineteenth century for the much less salubrious urban areas of the South and North. The irony was not lost on DuBois (1899:147). Table 3.2 indicates that the urban-rural child mortality differential was higher for blacks (with 46 percent higher urban mortality) than for whites (with 29 percent higher urban mortality). Evidently, economic and social pressures in the South were sufficient to induce migration despite the much less healthy environment into which blacks were moving.

There is little evidence on which to base an assessment of the biomedical variables that may have contributed most heavily to the excess child mortality of blacks. Undoubtedly, nearly every feature of life was less conducive to a black child's survival: housing, sanitation, diet, and medical attention. As noted in Chapter 1, racial differences in breastfeeding practices were not noteworthy, although black mothers appeared to introduce (probably harmful) weaning foods at an earlier age. Black mothers were unquestionably much less likely to have had trained attendants at birth. And syphilis was undoubtedly a major threat to child survival (Rose 1989).

As noted above, these results call for further revision of views on the demographic history of blacks in the United States. Mortality among the children of southern rural blacks, who comprised a majority of the black population, was much more favorable than hitherto supposed. Contemporary claims that the black population was doomed to demographic decline because of its extravagant mortality (Hoffman 1896) were thus highly exaggerated.

TABLE 3.2
Child Mortality Index by Race, Nativity of Woman, Region, and Size of Place: U.S., 1900

	Urban	*Top 10 cities*	*Other cities 25,000+*	*Cities 5,000–24,999*	*Cities 1,000–4,999*	*Rural*	*Total*
All women	1.1263	1.1445	1.2813	1.0994	.9270	.9230	1.0088
North Atlantic	1.1554	1.2145	1.2868	1.0028	.9406	.8985	1.0897
North Central	1.0094	1.0037	1.1530	1.1070	.7764	.7832	.8758
South Atlantic	1.3101	1.2557	1.2812	1.2806	1.4248	1.0020	1.0685
South Central	1.3588	—[a]	1.6401	1.4295	1.0550	1.0371	1.0994
West	.9432	.9990	1.1996	.7030	.7658	.9735	.9577
White	1.0709	1.1425	1.1955	1.0108	.8634	.8312	.9404
North Atlantic	1.1490	1.2124	1.2858	.9819	.9338	.8831	1.0808
North Central	.9790	.9999	1.0843	1.0657	.7680	.7746	.8579
South Atlantic	1.0750	1.2637	.9594	.8993	1.1053	.8017	.8673
South Central	1.0978	—[a]	1.2380	1.1619	.9262	.8993	.9472
West	.9321	1.0071	1.1996	.6308	.7658	.9236	.9216
Native white	.9732	1.1172	1.0676	.8981	.8266	.8077	.8698
North Atlantic	1.0587	1.2561	1.1690	.8088	.8725	.8386	.9808
North Central	.8760	.8961	.9438	.9541	.7576	.7455	.7919
South Atlantic	1.0481	1.1933	.9795	.8536	1.1180	.7959	.8496
South Central	1.0255	—[a]	1.1046	1.1693	.8733	.8769	.9109
West	.7110	.6498	.9609	.5744	.6012	.8596	.8059
Foreign-born white	1.2093	1.1641	1.3529	1.2143	.9887	.9601	1.1315
North Atlantic	1.2366	1.1822	1.3855	1.2150	1.0690	1.0827	1.2186
North Central	1.1352	1.0884	1.2448	1.2603	.8118	.8670	1.0074
South Atlantic	1.2355	1.5411	*	*	*	*	1.2312
South Central	1.7626	—[a]	2.0282	*	*	1.4031	1.5579
West	1.2415	1.3548	1.4650	.7396	1.0817	1.0885	1.1530
Black	1.9654	1.4208	2.4203	1.9713	1.5863	1.3382	1.4650
North[b]	2.1130	1.5136	2.2460	2.9116	*	1.4109	1.8726
South[c]	1.9238	*	2.4898	1.8010	1.6073	1.3359	1.4343
Native white with native mother	.9420	1.0942	.9928	.8991	.8703	.8306	.8656
North Atlantic	.9043	1.0741	1.0048	.7235	.8502	.8446	.8791
North Central	.9141	.9655	.9019	1.0121	.8377	.7785	.8207
South Atlantic	1.0676	1.4230	.9414	.8505	1.0951	.8024	.8521
South Central	1.0632	—[a]	1.2162	1.2307	.8714	.8913	.9242
West	.7854	*	.8581	.6161	.8542	.9027	.8623
Native white with foreign mother	1.0253	1.1331	1.1788	.8961	.6717	.6708	.8840
North Atlantic	1.2572	1.3671	1.3463	.9762	.9581	.7974	1.1934
North Central	.8194	.8500	1.0001	.8621	.5455	.6498	.7274
South Atlantic	.9609	.8103	1.1832	*	*	*	.8069
South Central	.8458	—[a]	.8828	.8666	*	.6463	.7572
West	.6054	.6589	1.2157	*	.2634	.7518	.6924

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: The mortality index is the ratio of actual to expected child deaths to women in each group. For the calculation of expected child deaths, see text. Sample consists of currently married women, married 0–24 years.

[a] Not available.

[b] North is North Atlantic, North Central, and West.

[c] South is South Atlantic and South Central.

* Fewer than 40 children ever born for this cell.

4. Most blacks lived in the rural South and were victims of discriminatory practices that prevented their economic advance. Two black children from Georgia have just broken a trace on their goat team.

Rural/Urban Residence, Nativity, and Ethnicity

As noted in Chapter 1, urban mortality appears to have exceeded rural mortality around 1900 in the U.S. and other industrializing nations. This difference suggests that cities' efficiency in spreading communicable diseases more than offset any political or economic advantages that they may have presented for instituting health-related public works and services. But by the late nineteenth century, public-health and medical/scientific improvements had apparently begun to reduce rural/urban differentials (American Public Works Association 1976: chs. 12–13; Rosen 1958: chs. 7–8; Cassedy 1962a; Meeker 1972, 1974, 1980; Melosi 1980: chs. 1–3; Shryock 1947: ch. 15; Higgs and Booth 1979; Condran and Crimmins 1980). In England, mortality improved faster in urban areas than in rural areas after 1861 (Woods 1985:6). Watterson (1986), studying data on children ever born and surviving data from the 1911 Census of England and Wales, found that London had experienced the fastest mortality decline and rural areas the slowest. We expect that these relationships will also appear in data from the census sample.[4]

Tables 3.1 and 3.2 support the expectation that urban mortality will exceed rural. For the country as a whole, urban mortality was 22 percent higher than rural, and an excess was visible in all regions except the West, where urban mortality was exceptionally low. A clear relation also emerges between mortality and city size. Except for the group of 10 largest cities, mortality rose systematically as size of place increased. The largest cities, however, did somewhat better than the next largest group. It appears that the positive correlation between death rates and size of place that had been so characteristic of the nineteenth century was beginning to break down by the 1890s at the top of the city-size pyramid. It has now virtually disappeared (Kitagawa and Hauser 1973).

The relationship between mortality and city size varies somewhat with nativity. For native whites, the relationship is one of monotonic decline from the largest size category to the smallest, whereas the curvilinear pattern noted above holds for foreign-born whites and blacks. What appears to account for this pattern was not that native whites did particularly poorly in the largest cities, but that foreign-born whites and blacks fared relatively well in the largest cities and did *much* worse than native whites in the medium-sized cities. The relationship between nativity and race, place of residence and mortality may be summarized by indexing the child mortality index to native white rates:

	Native white	*Foreign white*	*Black*
Total	100	129	168
Rural	100	116	165
Urban	100	124	202
Top 10 cities	100	103	126
Other cities 25,000 +	100	125	226
Cities 5,000–24,999	100	136	220
Cities 1,000–4,999	100	120	194

Relative to native whites, both blacks and foreign-born whites had their lowest child mortality in the largest cities.

A partial explanation for the better performance of the largest cities relative to other cities with populations greater than 25,000 may be their faster introduction of water and sewerage systems and certain medical/public-health improvements by the 1890s (Chapin 1901; Melosi 1980: chs. 1–3; Condran and Cheney 1982; Condran and Crimmins-Gardner 1978; Cain 1977). The largest cities had apparently been successful in lowering mortality in the 1890s, and public-health measures seem to have played a role (Condran and Crimmins-Gardner 1978; Weber 1899:367). The reduced penalty in the largest cities for children of foreign-born and black mothers, as opposed to the children of native white mothers, may well reflect the greater success of public-health activities in these cities in reaching the most disadvantaged groups.

Yet we also saw in Chapter 1 that public-health improvements in the large cities were fitful in the late nineteenth century, so that we must not be too facile in ascribing their superior mortality to public-health measures. Among the top 10 cities, the highest child mortality was found in the large eastern port cities of New York, Philadelphia, Boston, and Baltimore. These cities had experienced many of the consequences of the first stages of migration from Europe to the United States (Handlin 1973: chs. 3 and 6). They grew rapidly in the nineteenth century, and this growth placed strains on their antiquated water and sewerage disposal systems. Although New York had a fairly extensive sanitary water system by 1900, it was still having problems with sewage disposal (Duffy 1974:113–14). Philadelphia only began extensive water filtration after 1900, and there was frequent incidence of waterborne disease and other evidence of contamination of the water supply at the end of the nineteenth century (Condran and Cheney 1982). Baltimore had no sewerage system until after 1900, and the water supply in the late nineteenth century was subject to considerable criticism (Howard 1924:119–33). Boston, with the highest child death rate among the largest 10 cities, had a mixed record of providing public health in the form of good water and sewerage (U.S. Bureau of the Census 1902b:1xi-1xiii; Cain 1977:344–49; Meckel 1985). Thus, sanitary and public-health advances in these cities were clearly far from completely effective and allowed much room for twentieth-century improvements.

Table 3.2 shows that foreign-born white women had worse child mortality than native white women, regardless of residential category. And it is likely that differences in child mortality between native and foreign-born women were being reduced by the longer breastfeeding typical of foreign-born women. Woodbury (1925:114) shows that the excess infant mortality of foreign-born mothers in eight cities during 1911–15 increased from 30 per 1000 to 39 per 1000 when breastfeeding differences were controlled. Table 3.3 indicates that the disadvantage of foreign-born women did not pertain for all nativity groups. Irish-born women had very high mortality in urban areas above 5,000 inhabitants as well as in rural areas. Perhaps surprisingly, German-born women also did worse than average for the foreign born in all except rural areas. These two large immigrant

TABLE 3.3

Child Mortality Index by Race, Ethnicity, and Size of Place of Residence of Woman: U.S., 1900

	Urban	*Top 10 cities*	*Other cities 25,000+*	*Cities 5,000–24,999*	*Cities 1,000–4,999*	*Rural*	*Total*
All women	1.1263	1.1445	1.2813	1.0994	.9270	.9230	1.0088
White	1.0709	1.1425	1.1955	1.0108	.8634	.8312	.9404
Native white	.9732	1.1172	1.0676	.8981	.8266	.8077	.8698
Native white with native mother	.9420	1.0942	.9928	.8991	.8703	.8306	.8656
Native white with foreign mother	1.0253	1.1331	1.1788	.8961	.6717	.6708	.8840
Second-generation Irish	1.1730	1.3148	1.2884	.8942	.7455	.4856	1.0189
Second-generation German	.9805	.9990	1.1827	.9277	.5485	.6791	.8714
Second-generation British	.9782	1.6296	.9592	.5056	.7763	.8033	.8939
Foreign-born white	1.2093	1.1641	1.3529	1.2143	.9887	.9601	1.1315
British	1.1105	1.0606	1.2796	1.1608	.7087	1.0856	1.0993
Irish	1.3104	1.3837	1.3495	1.2352	.7513	1.0641	1.2882
German	1.3129	1.2488	1.4006	1.2423	1.4763	.9550	1.1981
Scandinavian	.9656	1.3909	.7738	1.0171	.7071	.9166	.9408
Other West European	.8140	.6104	1.1922	.8181	*	.6945	.7656
East European	1.0779	1.0315	1.0228	1.4009	1.0495	.8993	1.0265
South European	1.2081	.9636	1.7961	*	*	.8970	1.1341
Other	1.3188	.8095	1.6924	1.3019	1.1349	1.0913	1.2469
Black	1.9654	1.4208	2.4203	1.9713	1.5863	1.3382	1.4650
Nativity of both spouses (white only)[a]							
Both native-born	.9715	1.1444	1.0512	.8940	.8452	.8064	.8650
Husband native, wife foreign	1.2933	1.3949	1.4667	.8367	1.1570	.7991	1.1146
Husband foreign, wife native	.9927	1.0354	1.1501	.9487	.6383	.8313	.9204
Both foreign-born	1.1938	1.1289	1.3277	1.2763	.9448	.9980	1.1348

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: Sample consists of currently married women, married 0–24 years. The mortality index is the ratio of actual to expected child deaths to women in each group. For the calculation of expected child deaths, see text. In the table, unknown categories are not reported.

[a] Married women with husband present.

* Fewer than 40 children ever born for this category.

groups accounted for much of the excess child mortality of the foreign born. But British-born women did somewhat better than average for all foreign-born women in all except rural areas, while women of Scandinavian origin compared favorably to the average for all foreign-born women in all except the top 10 cities. In fact, their mortality in all urban areas combined was slightly below that of native white women. Child mortality among the immigrants from "newer" areas of origin, eastern Europe (Russia, Austria-Hungary, eastern Germany) and southern Europe (Italy), was not as high as one might have expected. Southern European mothers were about average for the foreign born in rural and urban areas, while the eastern Europeans (including many Jews) had child mortality well below the mean for foreign-born mothers, and about at the national average.

The favorable child mortality of the eastern Europeans and the relatively unfavorable experience of British and German women is inconsistent with their economic circumstances. Germans in Philadelphia in 1880 had a quite favorable male occupational structure, similar to that of native whites, while the Irish had a much higher representation in poorly paid occupations. (Hershberg et al. 1981:471). Woodbury noted that a much higher proportion of Poles and Italians than Germans had incomes below $650 in his urban sample (Woodbury 1926: Table 33). Although there are no definitive data, it does appear that migrants from southern and eastern Europe were not as successful economically as migrants from northern and western Europe in this era (Higgs 1971; Hill 1975; McGouldrick and Tannen 1977). For a slightly later period, Francine Blau found that Irish, French-Canadians, and southern and eastern Europeans had weekly wages that were 21 percent lower than those of northern and western European migrants (excluding Irish) in 1909. Much of the deficiency could be accounted for by differences in the distributions of skill, experience, and length of residence (Blau 1980: Table 1 and passim).

Ethnic differences in child mortality that were at variance with economic status may have been caused in part by differences in breastfeeding patterns among ethnic groups. Woodbury found that breastfeeding practices and economic status often offset each other, and also that Polish, Italian, and Jewish mothers tended to breastfeed more frequently and for longer periods than German women (Woodbury 1926: chs. 5 and 6). The lower-than-expected child mortality rates for eastern and southern European migrants are consistent with these behavioral differences, although Chapter 4 suggests that socioeconomic circumstances are able to account for most of the ethnic variation in child mortality.

Table 3.3 furnishes a tabulation of mortality by the nativity of both spouses for the white population. For the country as a whole and for the urban and rural populations, the most favorable conditions occurred when both spouses were native-born and the least favorable when both spouses were foreign-born. For the intermediate case, however, when one spouse was native-born and the other foreign-born, mortality was lower if the wife was a native. This relation held for the country as a whole and in urban areas, and was especially vivid in the largest cities. It may be that the foreign-born men who were able to attract native-born spouses in urban areas were unusually successful economically. In any event, it is clear that nativity of a child's mother was more important for child mortality than that of its father.

The 1900 census provides information not only about a woman's nativity, but also about the nativity of her parents. Table 3.3 presents mortality indices for native white women with native and with foreign-born mothers. Native white women of native parentage had a more favorable child mortality experience than did second-generation immigrants in large urban areas, but this difference was reversed in rural areas and in cities smaller than 5,000 inhabitants. Across all places, the mortality difference between the groups was less than 2 percent. Evidently, the assimilation process took roughly only one generation to complete in terms of child mortality, although it appears to have been somewhat arrested in the largest cities, where ethnic enclaves were perhaps most consequential (as Zunz 1982 documents effectively in Detroit).

Child Mortality of Migrants Compared to That in Countries of Origin

It is instructive to compare the child mortality levels for immigrants to levels in the countries where they were born. The latter comparison is somewhat crude because it is affected by migrant selectivity, including geographic factors that can cause migrants to be unrepresentative of the countries from which they were drawn. It should also be noted that some of the child deaths experienced by migrants may have occurred before their immigration, creating the possibility of a statistical link between mortality conditions in the country of origin and measured mortality among immigrants to the U.S.

Table 3.4 presents a comparison of $q(5)$'s, the most robustly estimated index that can be constructed from the census sample. Irish immigrants made up 15.6 percent of all the foreign born in the United States in 1900, second only to the Germans in numbers (U.S. Bureau of the Census 1975: Series C 228–295). It is apparent in Table 3.4 that, by the 1890s, Irish immigrants to the United States were experiencing significantly poorer child survival in the United States than was the case for those remaining behind in Ireland. Some of the disparity is attributable to residential differences. Ireland itself was largely rural, while Irish migrants to the U.S. settled mainly in higher mortality urban areas and had low incomes and poor housing (Hershberg et al., 1981). Of the 257 first-generation Irish women in the subsample used to calculate the mortality index, only 8 percent lived in rural areas and 74 percent lived in cities of 25,000 inhabitants and over. Of the urban dwellers, 54 percent lived in the 10 largest cities. Yet residential distributions are not the entire explanation of high Irish mortality, since Irish-born women displayed higher child mortality than average within every city-size category save one (1000–4999) in Table 3.3.

Second-generation Irish women had child mortality within 1 percent of the national average. This performance reflects the offsetting effects of an adverse residential distribution—74 percent were urban and 52 percent in places of 25,000 or more inhabitants—and unusually favorable mortality within most size-of-place categories. Only second-generation Irish women in the largest cities continued to suffer elevated mortality relative to others in their city-size group.

The largest group of the foreign born in the United States in 1900 were Germans, who comprised 25.8 percent of the foreign-born population. It appears that, in general, German immigrants (i.e., those whose birthplace was Germany, Prussia, or one of the other territories belonging to Germany in 1900) had better child mortality than German residents. Table 3.4 shows that Germany was an area of relatively high child (and overall) mortality in the late nineteenth century. It was characterized by particularly high infant mortality (Kintner 1982). It appears that duration of breastfeeding in Germany was, on average, unusually short, although there were striking regional variations that were clearly associated with infant mortality (Kintner 1985, 1987).

The probability of dying before age 5 was about 22 percent lower among offspring of German-born women who moved to the U.S. than for those who remained. Nonetheless, first-generation German immigrant women experienced mortality among their children nearly as high as among the Irish. Those living in urban areas had $q(5)$ values identical with first-generation Irish women and well above those for foreign-born white women overall. Relatively more German immigrants settled in rural areas, however; 29.6 percent of the sample of the German-born women used to calculate the mortality index lived in rural areas, as opposed to only 8.2 percent among the Irish. As a result, German immigrants had somewhat lower child mortality than immigrants from Ireland. As was the case for the Irish, there was a sharp drop in child mortality among the second-generation German migrant population, such that overall child survival ($q[5]$ = .167) was virtually identical to that for the native white population of native parentage ($q[5]$ = .164).

Another important source of emigration to the United States was Great Britain (England, Scotland, and Wales), which contributed 11.3 percent of the foreign-born population in 1900. British migrants to the United States experienced slightly more favorable childhood mor-

TABLE 3.4

Mortality among Immigrant Groups Compared to Mortality in Countries of Origin: U.S. and Europe, ca. 1900

Immigrant group	$q(5)$	*Immigrant group*	$q(5)$
Irish		British	
First generation in U.S.	0.246	First generation in U.S.	0.210
Urban	0.251	Urban	0.212
Rural	0.203	Rural	0.208
Second generation in U.S.	0.195	Second generation in U.S.	0.171
Urban	0.224	Urban	0.187
Rural	0.093	Rural	0.154
Ireland, 1890–92	0.157	England & Wales, 1891–1900	0.234
Ireland, 1900–1902	0.159	Scotland, 1891–1900	0.212
		Australia, 1891–1900	0.151
German		New Zealand, 1891–95	0.118
First generation in U.S.	0.229	New Zealand, 1896–1900	0.104
Urban	0.251		
Rural	0.183	Eastern European	
Second generation in U.S.	0.167	First generation in U.S.	0.196
Urban	0.187	Urban	0.206
Rural	0.130	Rural	0.172
Germany, 1891–1900	0.292	Austria, 1900–1901	0.321
Prussia, 1891–1900	0.282	Bohemia, 1899–1902	0.307
		Bulgaria, 1899–1902	0.289
Southern European		Russia, 1896–97	0.422
First generation in U.S.	0.217		

Urban	0.231	Other West European	
Rural	0.172	First generation in U.S.	0.146
Italy, 1891	0.339	Urban	0.156
Italy, 1900–1902	0.283	Rural	0.133
Spain, 1900	0.368	France, 1890–92	0.250
		France, 1895–97	0.220
Scandinavian		Belgium, 1891–1900	0.224
First generation in U.S.	0.180	Netherlands, 1890–99	0.226
Urban	0.185	Switzerland, 1889–1900	0.199
Rural	0.175		
Sweden, 1891–1900	0.160		
Denmark, 1895–1900	0.177		
Norway, 1891–1900	0.149		

Source: Sample of census enumerators' manuscripts, U.S., 1900. Specific countries: published official life tables used by Coale and Demeny 1966, except those for Ireland, which were constructed from data given in Mitchell and Deane 1971 using the Reed-Merrell method (U.S. Bureau of the Census 1971: ch. 15).

Note: Male and female life tables were combined assuming a sex ratio at birth of 105 males per 100 females.

tality than in contemporary England, Wales, or Scotland. British immigrants in the United States, however, even those living in the healthier rural areas, did not do as well as the contemporary populations of Australia and New Zealand, two areas that received a large number of migrants from the British Isles. As was the case for immigrants from Ireland and Germany, there was a substantial mortality improvement among second-generation British migrants.

Scandinavian immigrants (from Norway, Denmark, and Sweden) made up 10.4 percent of all the foreign born residing in the United States in 1900, nearly as many as the British. Scandinavia was a low-mortality area, and from the results in Table 3.4, it seems that child mortality among Scandinavians was only slightly worse in the United States than in their countries of origin. Unfortunately, there are too few cases in the sample to permit an analysis of mortality among the second-generation Scandinavian immigrant population. A favorable factor in the United States relative to other immigrant groups was the more rural character of Scandinavian settlement: 49.2 percent of women in the sample lived in rural areas, and only 31.1 percent lived in cities of 25,000 and over in population. But even among the residents of these larger cities, the child mortality index was only 1.0606 (compiled from Table 3.3), compared to a value of 1.1609 for all inhabitants of cities of 25,000 and over. Thus, the child mortality experience of northern European women in the United States seemed favorable, and some carryover of child-care practices may have occurred. Among migrant women from other areas of western Europe (i.e., France, Belgium, the Netherlands, and Switzerland), the survival rate of children was apparently rather good relative to national average child survival in the countries of origin. These nationalities, however, constituted less than 4 percent of the total foreign-born population.

Toward the end of the nineteenth century, the "new" immigration from eastern and southern Europe began to displace the "old" immigration from western and northern Europe. Although migrants from Austria, Bohemia, Hungary, Russia, Italy, and the Polish parts of Germany, Russia, and Austria made up 18.1 percent of the foreign-born population of the United States in 1900, they comprised 54.4 percent of the migration flow over the years 1895–99 (U.S. Bureau of the Census 1902a: Table 82; 1975: Series C 89–119, 228–95). As may be seen in Table 3.4, migrants from eastern and southern Europe seemed to have substantially better child survival in the United States than in their countries of origin, judging from life tables for Austria, Bohemia, European Russia, Bulgaria, and Italy.

This advantage emerged despite the fact that most of these "new" immigrants were urban dwellers in 1900. Of the women born in southern and eastern Europe making up the sample used to compute the mortality index, 79.9 percent were living in urban areas in 1900, and 62.6 percent in cities with populations of 25,000 and over. Their child mortality was not particularly good compared to that of the native white population or even to that of the native white population living in urban areas. But it was no worse than, and, in the case of eastern European women, sometimes better than, that of the total foreign-born white population, both in rural and in urban areas. As described in Chapter 1, immigrants from these areas generally breastfed their children longer than other groups. In comparison to the ethnic stock in countries of origin, migrants from eastern Europe were disproportionately Jewish. We have no direct information on this proportion in 1900, but a tabulation by Gretchen Condran from a public use sample from the 1910 U.S. Census of Population produced at the University of Pennsylvania finds that 34 percent of reproductive-age women born in eastern Europe listed "Yiddish" as their mother tongue (Condran, personal communication). The favorable child mortality among Jewish women was noted at the time, as seen in Chapter 1, and long periods of breastfeeding by Jewish mothers may provide a partial explanation. But the surprisingly favorable child mortality of eastern Europeans was matched by favorable adult mortality as well, judging from 1910 results in Pennsylvania and New York (Dublin and Baker 1920). Their improved mortality relative to their countries of origin probably reflects their improved economic conditions, a primary goal that stimulated the migration streams in the first place.

In general, then, both first- and second-generation European migrants to the United States seemed to have had better mortality than those remaining in their country of origin, despite the fact that they concentrated heavily in larger American cities. This conclusion must be heavily qualified by the selectivity factors noted above; we cannot know what mortality conditions of the migrants themselves would have been had they remained in their countries of origin. A major exception to this conclusion applies to the Irish, who lived overwhelmingly in cities and towns in the United States, often had low-income occupations, and experienced child survival significantly worse than that in Ireland. Irish-born adults in the eastern United States also had exceptionally high mortality in 1910 from most causes of death, and especially from tuberculosis (Dublin and Baker 1920). The transplantation from highly rural Ireland to large cities in the United States seems to have exacted a special toll among the Irish.

When data are sufficiently numerous to judge, there appeared to be a convergence of the child mortality rates among the second-generation foreign born toward the more favorable patterns among the native white population of native parentage. This convergence was especially marked among the Germans, but it also occurred among the populations of Irish and British stock. Migrant populations also had uniformly better child survival than the American black population, in some cases by a wide margin.

Although migrants to the United States in general had better mortality than those in the countries they left behind (with the exception of the Irish), the nations of Australia and New Zealand, heavily populated by first- and second-generation migrants from Britain, were able to achieve child mortality rates by the 1890s that were lower than those for any immigrant group in the United States. Australia in the 1890s had a mortality rate comparable to that of rural American native whites, and New Zealand had an even lower rate. The heavily rural and agrarian character of both of these nations undoubtedly played a role in this performance, but significant medical and public-health measures had been undertaken as well. Woodbury (1926) was so impressed by the achievements of New Zealand in reducing infant mortality after 1875 that he devoted an entire chapter to discussing it in his seminal work. Infant mortality declined about 22 percent in New Zealand between 1872–74 and 1895–99 (from 105.9 to 82.7 infant deaths per 1000 live births). While pointing out that a number of conditions favored lower infant mortality in that nation, including an exceptionally favorable climate, relatively good and uncrowded housing conditions, and little or no poverty among the general population, Woodbury also noted other factors at work to promote the decline in the infant mortality rate:

> Certain influences have been operating steadily toward a decrease in infant mortality throughout the period. These influences include the gradual increase in medical knowledge of the best methods of disease prevention, the raising of the level of training in the medical profession, the improvements in public sanitation, the gradual extension of the public-health work in the Dominion as shown in the increase of powers and the improvements in methods of administration in the health department, and the gradual education of the public in methods of preventing disease and of maintaining health. These movements are difficult to trace in their individual effects upon infant mortality, but their combined influence is written plainly in the gradual and steady improvement in the rates of infant mortality from epidemic diseases and tuberculosis, as well as in the decline in infant mortality from respiratory and from gas-

tric and intestinal diseases which occurred during the period from about 1875 to 1905. (Woodbury 1926:177)

It appears that the same factors that influenced infant and child mortality were also at work in the United States, but that the extent and pace of change were slower. The United States was also more urbanized than either Australia or New Zealand, a substantial disadvantage for child mortality at the time.

Region of Residence

Geographic differences in mortality have evidently long existed in the United States (Taeuber and Taeuber 1958:282–86; Thompson and Whelpton 1933:241–42), although previous studies could not accurately trace them back to the nineteenth century. Considerable differences still existed in 1950 (Dorn 1959:468), but these largely disappeared when the rates for blacks and whites were examined separately (Bogue 1959:195–96). The South appears to have had a faster decline in mortality than the North between 1750 and 1850 (Fogel, et al., 1978), perhaps because improved drainage of swampy areas reduced the incidence of insect-borne diseases such as malaria, which were less of a threat in the North (Kunitz 1986). But in the late nineteenth century, there were few data on which a view of the relative mortality of the South could be constructed, and analysts (e.g., Fisher 1899) simply stressed the uncertainty.

Geographic differences should reflect influences of climate and prevalence of disease vectors, once other factors such as race, socioeconomic level, and rural/urban residence are controlled. Our expectation is that the South was less healthy because of a higher incidence of infectious, parasitic, and diarrheal disease related to its higher temperatures. Such a difference was evident in 1959–61, when mortality for children aged 1–14 years in the South was 16 percent higher than the national average, a difference that was partly caused by gastroenteritis and infectious and parasitic disease (Shapiro, Schlesinger, and Nesbitt 1968:205). Such a climatic affect is also evident internationally and seasonally, with summers posing special threats to child survival through most of the nineteenth and early twentieth centuries. On the other hand, the respiratory diseases that were so devastating at the time were probably spread more efficiently in the poorly ventilated conditions accompanying winters in the North.

In our sample, as Table 3.2 shows, mortality variation by region was relatively limited, with a range stretching from an index of .88 for the North Central states to 1.10 for the South Central. The North

Atlantic region, industrially the most advanced, was a close second to the South Central with an index of 1.09. Much of the disadvantage of the South Central region is traceable to the high percentage of blacks who lived and died there. Among whites, the North Atlantic region was by far the unhealthiest, with an index 15 percent higher than its nearest competitor. The North Atlantic was so unhealthy for whites that it was the only region to exceed the national average for whites by more than 1 percent. Here we can see again how the Death Registration Area, dominated by the Northeast, gave a distorted view of national mortality conditions.

The mortality problems of the Northeast were not simply a reflection of its higher degree of urbanization and large city concentration. These factors played a part; but within every residence and city-size category save one (5,000–24,999), the North Atlantic region had above-average mortality. Nor was the disadvantage principally attributable to a high percentage of foreign-born persons among North Atlantic residents; the region also had the highest mortality for native whites. Nor was it a result of below-average incomes, as we show below. Rather, settlement patterns may be the key to relatively high mortality. The Northeast not only had the highest concentration of large cities but also, as the region of earliest settlement, the most densely populated rural areas. Massachusetts and Rhode Island were the two most densely populated states in 1900, and Connecticut ranked fourth (U.S. Bureau of the Census 1975: Series A210–263). It seems plausible that density of habitation was affecting mortality in ways not fully captured by city size, a matter to which we return below.

Another anomaly associated with the North Atlantic region is that childhood mortality for native white women in the largest cities (New York, Philadelphia, Boston, and Buffalo) was *higher* than that among foreign-born white women in these cities (indices of 1.256 versus 1.182). Table 3.2 indicates that it was native white women of foreign parentage who contributed most to the higher childhood mortality among native white women in the 10 largest cities. The childhood mortality ratio for native white women who had native white mothers was only 1.074 in the largest four cities of the North Atlantic region. The ratio was 1.367 for native white women with foreign-born mothers. That this category of women did so well in rural areas suggests that selective migration patterns may have been playing a role in fashioning mortality differentials by residence among second-generation immigrants. Whatever the source, living in a large city was associated with a special health disadvantage for the children of second-generation Americans.

The North Central region had the most favorable child mortality, and its advantage carried through to rural white mothers, both native and foreign-born, and to many categories of urban population as well. The pattern of high child mortality in the Northeast and low child mortality in the North Central region arose largely from the high mortality of New England and the low mortality of the West North Central region, according to Table 3.1. An investigation of individual states reveals that Maine, Massachusetts, Rhode Island, and New Jersey were high child mortality areas in the North Atlantic region and that every state in North Central region except Illinois had below-average child mortality. Some states—Minnesota, Iowa, North Dakota, and Nebraska—had child mortality indices more than 20 percent below the national average.

The West region (Mountain and Pacific census divisions) exhibited a peculiar pattern, with much smaller rural/urban differences than prevailed in the rest of the country. A combination of favorable incomes, climate, and relatively small cities was probably instrumental in this outcome. Rural mortality was not especially advantageous in the West.

We hypothesized that the South would have above-average mortality. The mortality index was, in fact, 6–9 percent higher in the South Atlantic and South Central regions than in the nation as a whole. Combining the two regions, however, we find that child mortality was below the national average for both blacks and whites when considered separately. Its combined ranking was poor because an unusually high proportion of the population was black.

Looked at another way, however, the South did not fare so well. From Table 3.2, we can infer that overall mortality and white mortality for the combined South Atlantic and South Central regions was actually higher than the national average for each group within both rural and urban categories; the below-average child mortality rate for whites in this combined region resulted entirely from the South's disproportionately rural character. So the South's overall ranking reflected two offsetting influences: its high percentage of blacks and its rurality. Within categories of race and rural/urban residence, it appears to have had very slightly elevated mortality for whites and slightly reduced mortality for blacks.

The foreign born were subject to regional child mortality patterns similar to those of native whites, although typically at a higher level (Tables 3.3 and 3.5). The disadvantage among foreign-born women was exacerbated by their concentration in the Northeast and in larger cities. Irish mothers were concentrated in the North Atlantic region, particularly in the cities of New York, Boston, and Philadelphia. Irish

TABLE 3.5
Child Mortality Index by Region and Other Factors: U.S., 1900

	Census regions[a]					
	North Atlantic	*North Central*	*South Atlantic*	*South Central*	*West*	*Total*
All women	1.0897	.8758	1.0685	1.0994	.9577	1.0088
Woman's nativity and race						
White	1.0808	.8579	.8673	.9472	.9216	.9404
Native-born	.9808	.7919	.8496	.9109	.8059	.8698
Native mother	.8791	.8207	.8521	.9242	.8623	.8656
British mother	1.2875	.7500	.7163		.7470	.8939
Irish mother	1.1522	.8192	1.0831	.6770	.8092	1.0189
Scandinavian mother	*	.7963	*	*	*	.7225
German mother	1.2365	.7345	.7610	.7833	.6514	.8714
Other West European mother	*	.3577	*	*	*	.5083
East European mother	*	.6147	*	*	*	.5694
Other (including South European)	1.2951	.7118	.7358		.6440	.8468
Foreign-born	1.2186	1.0074	1.2312	1.5579	1.1530	1.1315
Britain	1.1440	.9172	*	*	1.4890	1.0993
Ireland	1.3591	.8390	1.0327		1.8326	1.2882
Scandinavia	1.2873	.8974	*	*	.8962	.9408
Germany	1.2481	1.1554	1.1627	1.8165	.9406	1.1981
Other West Europe	.6791	.9038	*	*	*	.7656
East Europe	1.0871	1.0132	.8894		.4729	1.0265
South Europe	1.0544	*	*	*	1.6896	1.1341
Other	1.3952	.8179	2.0536		1.0244	1.2469
Black	1.8364	1.8606	1.4225	1.4442	*	1.4650
Nativity of both spouses[b] (whites only)						
Both native-born	.9566	.7895	.8507	.9111	.8522	.8660
Husband native, wife foreign	1.1914	.7395	1.6684		1.7057	1.0513
Husband foreign, wife native	1.1485	.8378	.8542	.9999	.4712	.9204
Both foreign-born	1.2073	1.0433	1.2841	1.4631	1.0833	1.1348
Husband's occupation[c] (whites only)						
Professional, Technical	.9933	.9562	.7129	1.1386	.5095	.9417
Agricultural (excluding Laborers	.7399	.7098	.7383	.8835	.8398	.7714
Agricultural Laborers	.7298	.9240	.9660	1.0992	.9263	.9271
Managers, Officials, Proprietors	1.0172	.8823	.9290	1.0139	.7249	.9407
Clerical	.9365	.6254	.8634	1.2488	.9516	.8821
Sales	.8005	.9117	1.1110	.3760	.7749	.8354
Craftsmen, Foremen	1.2092	.9556	1.0640	1.2215	1.0636	1.0968
Operatives	1.0715	.8445	1.1118	1.1754	.9517	1.0028
Service Workers	1.1120	.8033	.7881	.7938	1.0103	.9457
Laborers	1.2571	1.1420	.9204	1.0448	1.0757	1.1653
Miscellaneous	1.0306	.8476	*	.6070	*	.9541
Wife working						
Total						
Works	1.1396	1.1203	1.6530	1.5123	.9726	1.4149
Not working/not in labor force	1.0883	.8686	1.0012	1.0599	.9572	.9865
White						
Works	1.0141	1.0317	1.1867	.7598	.8019	1.0024
Not working/not in labor force	1.0825	.8529	.8559	.9512	.9253	.9387
Black						
Works	2.7397		1.7432	1.6720	*	1.7416
Not working/not in labor force	1.6758	1.7616	1.3290	1.3730	*	1.3847

TABLE 3.5 (*cont.*)

	Census regions[a]					
	North Atlantic	*North Central*	*South Atlantic*	*South Central*	*West*	*Total*
Farm and homeownership						
Total						
Owns farm	.8313	.7090	.8113	.9037	.9152	.8010
Rents farm	.5470	.7229	1.0897	1.1603	.5703	.9688
Owns home	.9683	.9869	1.2596	1.0550	1.1079	1.0223
Rents home	1.2145	1.0092	1.1706	1.3736	.8655	1.1562
White						
Owns farm	.8285	.7078	.7067	.8488	.8356	.7617
Rents farm	.5518	.7247	.8487	.9451	.5703	.7935
Owns home	.9573	.9652	1.0652	.9423	1.0564	.9737
Rents home	1.2048	.9823	.9755	1.1523	.8451	1.0948

Source: Sample of census enumerators' manuscripts, U.S., 1900.
Note: The mortality index is the ratio of actual to expected child deaths to women in each group. For the calculation of expected child deaths, see text. Sample consists of currently married women, married 0–24 years.
[a] The census regions are: (1) North Atlantic: Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania; (2) North Central: Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas; (3) South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida; (4) South Central: Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma Territory, Texas; (5) West: Montana, Idaho, Wyoming, Colorado, Utah, Nevada, New Mexico Territory, Arizona Territory, Washington, Oregon, California, Hawaii Territory, Alaska Territory. When combining the South Atlantic and South Central regions provides the minimum of 40 observations, the mortality index is presented for the combined group.
[b] Only for married women with husbands present.
[c] The occupational classification is that used for the 1950 census.
* Fewer than 40 children born for this cell.

mortality was much lower in the North Central region. Mothers of German birth had above-average child mortality in all except the West region, where few of them lived. Interestingly, mothers of Scandinavian origins also experienced high mortality in the urban industrial North Atlantic region, but not in the North Central region, where many of them lived on farms or in small towns.

Because of a high concentration of the group in the high-mortality North Atlantic region, second-generation Irish women also had relatively high child mortality. In fact, all second-generation foreign-born groups (largely British, Irish, and German) in that region suffered high child mortality relative to native white women with native white mothers. These second-generation immigrants were heavily concentrated in large cities, whereas the native white women of native mothers were more dispersed among rural and urban areas. But, in general, the second-generation foreign born did relatively well, with child mortality levels much below those of first-generation women and comparable to those of native whites of native parentage.

The child mortality variations by region in the late nineteenth century that we have described are presumably related to differences in the burden of sickness as well. In turn, levels of morbidity should be reflected in measures of child growth. It is now generally accepted that both child mortality and child growth are affected by the same set of circumstances, those related primarily to the adequacy of nutritional intake and the environmental "charges" made against it, especially in the form of infectious diseases (Fogel 1986:11–14; Preston and van de Walle 1978; Mosley and Chen 1984).

The census sample affords an interesting possibility for examining the correspondence between child mortality and child growth at the turn of the century through a comparison of mortality results with the average heights and weights of military recruits for the United States Army in World War I (1917–18). These latter data were collected by the Medical Department of the United States Army (Davenport and Love 1921). Unfortunately, it is not possible to standardize the mean heights and weights for the age structure or racial composition of the recruits. Of these World War I recruits, however, 78 percent were between ages 22 and 29 and probably were no longer gaining stature (Davenport and Love 1921:64). These men would have been aged 0 to 6 in 1895, the cohort whose mortality is centrally located in the census sample analysis.

We have computed the interstate correlation between estimated levels of child mortality in 1895 and the mean weight and height of World War I recruits. Because of small sample sizes, Arizona, Nevada, and New Mexico were combined into one group and Idaho, Montana, and Wyoming into another, giving 45 observations, including the District of Columbia. The correlation between our mortality index for states or groups of states and the height of recruits was only moderate (−.294) while that between mortality and weight was quite high (−.649). Weighted by the number of children ever born in the states, the correlations are −.234 and −.611, respectively. All coefficients are statistically significant at a 5 percent level.

The reason for the stronger correlation of the mortality index with weight than with height becomes apparent when it is noted that the heaviest recruits came from the Midwest and West, both of which were low child mortality areas in 1900. This pattern does not hold for stature. The tallest recruits came from the South, which was an area of high child mortality area in 1900, at least before race is controlled. It is likely that racial differences in growth patterns, and a different

5. The hazards of urban living appeared both in sharply higher child mortality and in poorer indexes of physical development. Pictured here is an obviously stunted urban youth whose family is taking advantage of free ice distribution in New York City, 1919.

6. Robust rural schoolchildren in Keota, Iowa, are playing "drop the handkerchief" in the early 1890s.

social composition in the two samples, are confounding the height/mortality comparison. A comparison of heights of white recruits with the mortality of whites would likely show a closer relation than when heights of both races are compared to the mortality of both races. Yet our results do attain statistical significance and suggest that the geographic differences in mortality that we have described were also reflected in differences in child morbidity and physical development.

Literacy

Years of schooling, especially among mothers, has received considerable attention in recent demographic literature on child mortality (Cochrane 1980; Caldwell 1979, 1981). A United Nations survey of mortality conditions in developing countries since 1950 found that there was a fairly regular and pronounced inverse relationship between mother's education (measured in terms of years of school completed) and child mortality. This relation was particularly evident in Latin America, which has been most extensively studied (United Nations 1982). A subsequent United Nations monograph (1985) has documented this relation in many additional countries. On the other hand, we noted in Chapter 1 that literacy of the mother had such a weak effect on infant mortality in eight American cities during 1911–15 (cf. Rochester 1923) that it was dropped from consideration in the study's final report (Woodbury 1926).

The 1900 Census of the United States collected data only on ability to read and write in any language, instead of the more useful information on years of school completed; but, as Table 3.1 shows, there is a noticeable relationship between child mortality and the literacy of either the father or the mother.[5] Child mortality was higher for the illiterate and highest when both spouses were illiterate. It was lowest when both spouses were literate. As in the case of nativity, literacy of the wife made more difference than literacy of the husband. The mortality index was 1.33 when only the husband was literate and 1.22 when only the wife was literate. For 84 percent of the couples used to calculate the index, both partners were literate, and for only 6.5 percent were both illiterate. Adult literacy was clearly widespread in the United States at the turn of the century, as in many European countries, although the minimal and ambiguous census definitions render this information somewhat difficult to interpret (see, on this subject, Graff 1979a: Introduction and app. B).

Some additional information on literacy appears in Table 3.6. Differentials in child mortality between literate and illiterate women are largest among native white women and particularly among native white women of native parentage. For this group, being illiterate

TABLE 3.6
Ratio of Child Mortality Indices of Illiterate to Literate Women: U.S., 1900

	Urban	*Top 10 cities*	*Other cities 25,000+*	*Cities 5,000–24,999*	*Cities 1,000–4,999*	*Rural*	*Total*
All women	1.50	1.00	1.63	1.84	1.76	1.51	1.44
White	1.33	.99	1.34	1.72	1.75	1.39	1.33
Native white	1.78	1.69	1.42	2.09	2.08	1.44	1.39
Native white, native mother	2.12	—	—	—	2.26	1.45	1.47
Native white, foreign mother	1.27	—	—	—	—	.93	1.04
Foreign-born white	1.13	.90	1.20	1.43	1.41	1.16	1.14
Black	1.18	—	1.40	1.10	.98	1.06	1.03

Source: Sample of census enumerators' manuscripts, U.S., 1900.
Note: Sample consists of currently married women, married 0–24 years.

seems to have signalled a very serious deficit that was associated with exceptionally high child mortality. Among foreign-born white women, black women, and first-generation migrants, the differentials were smaller and sometimes reversed, with illiterate women occasionally having lower child mortality.

Selectivity factors probably affect these results. Native white women were more likely to have had access to schooling. Those who did not achieve literacy must have been quite disadvantaged, perhaps being exceptionally poor or disabled. Among this group, illiteracy most likely functions mainly as an indicator of these other deficits. A larger proportion of black and foreign-born women did not have an opportunity to achieve literacy. Whereas only 5.0 percent of native white women were illiterate in the sample underlying Table 3.6, 14.8 percent of foreign-born white women and 51.4 percent of black women were unable to read and write.[6] Among these women, the measured impact of illiteracy is less likely to be inflated by its association with other deficits. There is virtually no impact of literacy on child mortality among black women, perhaps because literacy bought them very little in the way of better chances in life.

The relatively large child mortality disadvantage for a native white illiterate mother in 1900 was retained in both rural and urban areas. One might expect that literacy would have had a higher payoff in urban than rural areas because it would open more occupational doors in cities. But Table 3.6 provides no support for this proposition, nor is it supported by tabulations (not presented) involving father's literacy. In the multivariate analysis of Chapter 4, however, father's literacy emerges as an important correlate of mortality in urban areas.

The child mortality effects of mother's literacy that are presented here are larger than those revealed in the later Children's Bureau study of eight American cities. One reason for the difference may be that the Children's Bureau study was limited to infant mortality, whereas our results extend through later ages of childhood. Hobcraft et al. (1985:374) have shown that the relative influence of mother's education on child mortality in 39 developing countries conducting a World Fertility Survey increased by a factor of three as the child aged.

Table 3.1 also contains information on mortality according to the ability of the parents to speak English. As for literacy, English-language capacity was strongly inversely related to child mortality, with much higher mortality among the children of those not able to speak English at the time of the census. There were relatively few of these people, and they were likely to have been recent immigrants. The number of cases in which only one spouse could speak English is smaller still, but the evidence here suggests that English ability was more important for father than mother, perhaps reflecting its impact on his economic opportunities.

Occupation of Husband

The 1900 census contains information on the economic situation of husbands, including their occupation, unemployment status in the year prior to the census, and whether the home or farm where they lived was owned or rented. Panels 7–10 of Table 3.1 provide tabulations of mortality along these dimensions, and also according to the wife's working status. The occupational classification is based on the 1950 United States Census occupational groupings. The occupational and unemployment tabulations are, of course, only for married women with husband present.

The occupational categories reveal a rough gradient in child mortality from white-collar groups (Professional and Technical; Managers, Officials, Proprietors; Clerical and Kindred Workers; Sales Workers) to blue-collar workers (Craftsmen, Foremen, etc.; Operatives and Kindred Workers; Service Workers; Laborers). The least-skilled group (and one of the most numerous) consisted of laborers; not surprisingly, children in that group exhibited the highest mortality. Farmers (that is, the category Agricultural [excluding Laborers]), who typically lived in healthier rural areas, had very favorable child mortality conditions. Children of agricultural laborers, on the other hand, did considerably worse than average, with an index value of 1.14. Interestingly, other than farmers, the lowest mortality groups were not professionals, technical personnel, managers, proprietors, or officials. Rather, the most favorable child mortality was found among families of workers in clerical and sales occupations.

Some of the peculiarities of the occupational ranking of the mortality index are related to differences in distributions by race, nativity, and residence as shown in Table 3.7 (see also Chapter 5). The high mortality of agricultural laborers is largely attributable to the disproportionate representation in this group of blacks and foreign-born whites. For native white women whose husbands were agricultural laborers, the child mortality index, at .89, was well below average, although not as low as that for native white women married to farmers (.75). Similarly, the high child mortality for laborers was also partly caused by racial and ethnic composition. Native white wives of laborers had an index of only 1.05, but the index was 1.33 for foreign-born white wives of laborers and 1.64 for black wives in this occupational class.

Rural/urban residence also played an important role in creating oc-

TABLE 3.7

Child Mortality Index by Race and Nativity of Woman, Size of Place of Residence, and Occupation of Husband: U.S., 1900

Race and nativity of woman, occupation of husband	*Urban*	*Top 10 cities*	*Other cities 25,000+*	*Cities 5,000–24,999*	*Cities 1,000–4,999*	*Rural*	*Total*
All women	1.1263	1.1445	1.2813	1.0994	.9270	.9230	1.0088
Professional, Technical	.9903	1.2804	.7517	.9335	.9250	.8702	.9450
Agricultural (excluding Laborers)	1.0900	1.2706	1.2515	1.0851	1.0514	.8502	.8637
Agricultural Laborers	.8502	*	*	*	1.0568	1.1806	1.1448
Managers, Officials, Proprietors	.9406	.8967	1.0860	.9236	.8272	.9360	.9344
Clerical	.9154	1.0595	.9633	.8152	.3834	.8944	.9121
Sales	.8465	.8892	1.0520	.6876	.6703	.7621	.8312
Craftsmen, Foremen	1.1758	1.1900	1.3647	1.0844	.8911	.9471	1.1208
Operatives	1.0367	1.1698	1.0453	1.0721	.7684	1.0539	1.0458
Service workers	.9888	.9366	1.2334	.8943	.8396	1.0622	1.0010
Laborers	1.3630	1.2581	1.6232	1.3836	1.1479	1.0531	1.2463
Miscellaneous	1.0326	1.1736	.8433	1.0193	1.0735	.9486	1.0049
White women	1.0709	1.1425	1.1955	1.0108	.8634	.8312	.9404
Professional, Technical	.9943	1.3035	.7395	.9098	.9401	.8500	.9417
Agricultural (excluding Laborers)	1.0506	1.2706	1.2515	1.0515	.9951	.7535	.7714
Agricultural Laborers	.7778	*	*	*	.9841	.9464	.9271
Managers, Officials, Proprietors	.9443	.8990	1.0770	.9423	.8342	.9496	.9407
Clerical	.9056	1.0595	.9633	.7094	.3834	.7430	.8821
Sales	.8446	.8892	1.0520	.6738	.6703	.8032	.8354
Craftsmen, Foremen	1.1462	1.1911	1.3249	1.0314	.8507	.9342	1.0968
Operatives	1.0075	1.1738	1.0073	1.0357	.6981	.9769	1.0028
Service Workers	.9585	.9206	1.1850	.8303	.8362	.8764	.9457
Laborers	1.2345	1.2625	1.3937	1.2212	1.0004	1.0384	1.1653
Miscellaneous	.9565	1.1584	.8417	.6988	1.0863	.9752	.9541
Native white women	.9732	1.1172	1.0676	.8981	.8266	.8077	.8698
Professional, Technical	.9572	1.0972	.7590	1.0160	.9424	.8971	.9333
Agricultural (excluding Laborers)	.9699	*	*	1.2539	.8536	.7406	.7518
Agricultural Laborers	.7268	*	*	*	1.1376	.9105	.8902
Managers, Officials, Proprietors	.8632	.8016	1.0361	.7842	.7962	.9358	.8843
Clerical	.8629	1.0836	.9233	.6729	.3165	.7529	.8452
Sales	.7547	.9633	.9254	.5751	.5139	.8369	.7646
Craftsmen, Foremen	1.0507	1.1913	1.1585	.9363	.8637	.9112	1.0103
Operative	.9979	1.1971	1.0728	1.0599	.6301	.9305	.9814
Service Workers	.9752	.9116	1.2536	.6975	.9317	.7236	.9246
Laborers	1.0464	1.2927	1.0915	.9206	.9684	1.0457	1.0450
Miscellaneous	.8519	*	.7541	.4093	1.0640	.7412	.8033
Foreign white women	1.2093	1.1641	1.3529	1.2143	.9881	.9601	1.1315
Professional, Technical	1.1759	1.6665	*	*	*	*	.9915
Agricultural (exluding Laborers)	1.1939	*	1.3796	.6287	1.4081	.8364	.8867
Agricultural Laborers	*	*	*	*	*	1.1190	1.1028
Managers, Officials, Proprietors	1.1474	1.0270	1.1708	1.3946	1.1162	1.0564	1.1185
Clerical	1.0886	1.0113	*	*	*	*	1.0570
Sales	1.0254	.8182	1.3163	*	*	*	1.0278
Craftsmen, Foremen	1.2658	1.1961	1.4837	1.1900	.8071	1.0848	1.2463
Operatives	1.0144	1.1542	.8977	1.0060	.8212	1.0226	1.0182
Service Workers	.9395	.9278	1.0504	*	*	*	.9950
Laborers	1.3802	1.2515	1.5544	1.5728	1.0791	.9963	1.3292
Miscellaneous	1.0790	1.0976	.9523	*	*	*	1.1928

TABLE 3.7 (*cont.*)

Race and nativity of woman, occupation of husband	*Urban*	*Top 10 cities*	*Other cities 25,000+*	*Cities 5,000–24,999*	*Cities 1,000–4,999*	*Rural*	*Total*
Black women	1.9654	1.4208	2.4203	1.9713	1.5863	1.3382	1.4650
Professional, Technical	(.9524)[a]					(.7463)[a]	(.8377)[a]
Agricultural (excluding Laborers)	1.5136					1.3273	1.3259
Agricultural Laborers	1.0189					1.5328	1.4901
Managers, Offcials, Prop. / Clerical / Sales	.9524[a]					.7463[a]	.8377[a]
Craftsmen, Foremen	2.6411					1.0748	1.9182
Operatives	1.7369					1.5609	1.6306
Service Workers	1.2470					*	1.3644
Laborers	2.2301					1.0936	1.6428
Miscellaneous	*					*	1.5556

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: Sample consists of currently married women, married 0–24 years. The mortality index is the ratio of actual to expected child deaths to women in each group. For the calculation of expected child deaths, see text. In this table, unknown categories are not reported. For occupational categories of husband, only women with husband present are given.

[a] Combined Professional and Technical, Managers, etc., Clerical, and Sales.

* Fewer than 40 children ever born in this category.

cupational differentials. Clearly, the two agricultural groups were favored by their residence in rural areas. As Table 3.7 shows, however, farmers in rural areas had low mortality even relative to the rural average. Native white wives of agricultural laborers in rural areas also had below-average child mortality, although it was higher than the rural average. Wives of laborers were more likely to be found in urban areas and also had relatively high mortality within those areas, especially among blacks and foreign-born spouses. Similarly, the high overall mortality among the children of craftsmen and foremen (an index of 1.12) was principally traceable to urban areas (1.18) and to families with a foreign-born white mother (1.25).

The failure of the children of the upper white-collar groups (professional, technical, managers, proprietors, officials) to have better mortality rates was only partly due to their disproportionate location in urban areas. Amazingly, within the largest 10 cities, children of professionals had higher mortality than children of any other occupational group. This disadvantage is largely traceable to the children of foreign-born women. For urban areas as a whole, however, wives of professionals had mortality that was below average (albeit only by 1 percent), as did wives of other white-collar classes. Indeed, the index was actually lower in urban areas (.86) than in rural areas (.94) for native white women with husbands in the category "Managers, Officials, Proprietors." We explore the anomalous position of the professional class's mortality in greater detail in Chapter 5.

Urban mortality tended to be higher than rural mortality within occupational and racial/ethnic groups, and the largest cities (above 25,000 population) usually had worse conditions than smaller cities. The curvilinear pattern noted above, with the top 10 cities having lower indices than other cities of 25,000 and over, did not hold uniformly. Within occupational categories, the pattern was more visible for foreign-born women than for native white women. It is also most visible among the lowest occupational groups, service workers and laborers. These relations are additional evidence that, by the late nineteenth century, the largest cities had had some success in reaching the lower economic groups with public-health and sanitation reforms.

Mortality differentials across occupational groups within regions were similar to those for the nation as a whole. Table 3.5 shows that children in agricultural families did well relative to other groups in all regions, and children of farmers did better than children of agricultural laborers (with the exception of the North Atlantic region, where the index values were very similar). White-collar groups typically had more favorable experiences than blue-collar groups, particularly in the North Atlantic region. There is, however, considerable variability in the mortality rankings of occupations within regions, perhaps attributable to smaller sample sizes. For a particular occupational group, it was usually the case that the low-mortality region (North Central) had below-average child mortality and that the high-mortality region (South Central) had higher levels.

It must be remembered that occupation, like residence (and even literacy), is a mutable characteristic. Mortality levels are presented here only in terms of father's occupation and residence at the time of the census, whereas the child mortality estimates pertain to a period about the middle of the 1890s. Geographic and occupational mobility can intervene to obscure underlying relationships. But current residence and occupation are certainly closely related, on average, to residence and occupation in the previous decade.

Economic Activity of Mothers

Table 3.1 (panel 8) indicates that child mortality among working women (i.e., those who reported an occupation) was 43 percent higher than that of women who didn't work, confirming impressions of observers at the turn of the century. Only a small proportion of the total currently married women in this subsample were working

(5.6 percent), and this proportion was even smaller for married women with husband present (4.4 percent). Black women were much more likely to work than white women, as were women whose husbands were reported as absent (Goldin 1981; Pleck 1978). The latter case included legal separations and desertions. According to Robert Smuts: "The married women who did work away from the home were those whose husbands were permanently or temporarily unable to support their families. . . . Round the turn of the century, in short, when a married woman worked it was usually a sign that something had gone wrong" (Smuts 1959: 23, 55). That economic stress was the overwhelming factor causing women to work is also suggested by Woodbury's results for eight American cities between 1911 and 1915. Of women whose husbands earned less than $450 per year, 28 percent worked during pregnancy, compared to only 2 percent of women whose husbands earned over $1250 per year (Woodbury 1925:156–58).

Under these circumstances, it is not surprising that working wives had higher child mortality. Table 3.8 provides additional tabulations of child mortality by mother's labor force status and certain other characteristics. Excess mortality for children of working women prevailed regardless of their occupation, except that children of the few women classified as "farmers" had mortality 3 percent below the national average. Agricultural and white- collar employments were relatively favorable for the total and native white populations. This sort of work indicated some possible wealth, either as real or personal property or in the form of human capital. Overall, mothers who were laborers and service workers had very high child mortality, especially among foreign-born and black women.

Nevertheless, the detailed tabulations in Table 3.8 also pose important qualifications to the view that working per se inevitably presented a serious problem for child health. The exceptionally high mortality of children of working women was largely attributable to the very high proportion of such women who were black, and to the child mortality hazards associated with such work among both black and foreign-born women. But among native white women, those who worked actually had lower child mortality than those who didn't.

This relationship is traceable to women whose husbands were absent. An unusually high proportion of these women were employed (30.1 percent), indicating that for many the husband's absence was a long-term phenomenon that impelled them into the labor market. The unusually low child mortality among native white women whose husbands were absent is particularly surprising because children

TABLE 3.8
Child Mortality Index by Race, Nativity, and Employment of Woman: U.S., 1900

	Total	*White*	*Native white*	*Foreign white*	*Black*
Total currently married women	1.0088	.9404	.8698	1.1315	1.4650
Working	1.4149	1.0024	.8026	1.4072	1.7416
Not working	.9865	.9387	.8715	1.1223	1.3847
(% Working)	(5.64)	(3.23)	(3.03)	(3.95)	(25.32)
Selected occupations[a]					
Agricultural	1.3361	.7528	.5072	1.3612	1.4801
Farmers	.9816	.8085	.4234	1.3784	1.2964
Agricultural labor	1.4315	.6706	.5907	*	1.5014
Non-agricultural	1.4594	1.0568	.8710	1.4161	2.0077
White-collar	1.0173	1.0341	.9511	*	*
Crafts, Operatives	1.2422	1.1773	1.1821	1.0460	*
(Seamstresses, Milliners)	(1.1896)	(1.1811)	(1.2259)	*	*
Service Workers	1.7769	1.2139	.6960	1.7465	2.0650
Laborers	1.5729	.8827	*	*	1.9923
Total currently married women, husband present	1.0034	.9386	.8708	1.1226	1.4442
Working	1.4619	1.0818	.9081	1.4510	1.7118
Not working	.9828	.9356	.8700	1.1148	1.3762
(% Working)	(4.42)	(2.27)	(2.18)	(2.60)	(22.59)
Total currently married women, husband absent	1.2367	1.0267	.8206	1.5053	1.9468
Working	1.2203	.7796	.4817	1.3053	1.9308
Not working	1.2494	1.1570	.9768	1.6466	1.9924
(% Working)	(40.30)	(33.42)	(30.10)	(45.68)	(69.51)

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: Sample consists of currently married women, married 0–24 years. The mortality index is the ratio of actual to expected child deaths in each group. For the calculation of expected child deaths, see text. In this table, categories of unknowns are not reported.

[a] Non-agricultural = Total employed minus employed in agriculture; White-collar = Professional, Technical; Managers, Officials, Proprietors; Clerical; and Sales.

* Fewer than 40 children ever born in this category.

born to these women would be expected to be somewhat older than average (assuming that the husband's absence, for some women, at least, was a recent phenomenon). The number of observations for this group of native white working women with absent husbands is fairly sizable: 160 children ever born, 31.1 expected deaths and only

15 actual deaths. It is possible that the relatively low mortality of women in this group reflects their better ability, when the husband was absent, to direct resources toward purchases associated with child survival, even though there may have been fewer resources *in toto* (see Blumberg 1988 for extensive evidence of similar processes in developing countries today).

A word needs to be said concerning potential biases in child mortality statistics for working mothers. As we have seen, higher infant and child mortality among working mothers was the subject of critical comment in the late nineteenth and early twentieth centuries. One hypothesis was that care by someone other than the mother and, in particular, artificial feeding rather than breastfeeding substantially increased the risk of child loss. But it is also possible that causation may run from child death to women's working, rather than in the reverse direction. The relation may be upwardly biased because the recent death of a child, especially a first birth, may facilitate a woman's working. Unfortunately, there is no way of testing the relative importance of the two causal paths with cross-sectional data. We can, however, make some headway in addressing the self-selection via economic stress hypothesis in the next chapter when we examine the importance of mother's work controlling many other factors.

Table 3.5 shows that, for the black population, the child mortality disadvantage for working women was consistent across the North and the South. But the mortality excess was considerably greater in the North, where work may have involved a sharper disjunction between home and workplace, than in the South. The child mortality index for working black women in the North Central and North Atlantic regions, where the black population was largely urban, was 59 percent above the index for nonworking women. The excess mortality was only 31 percent in the South Atlantic region and 22 percent in the South Central region.

Other Economic Variables

Two more indicators of economic status appear in Table 3.1 (panels 9 and 10): whether the husband had been unemployed (for at least one month) at some time during the census year and whether the family owned or rented its home or farm. If the husband was unemployed for at least a month during the year preceding the census, there was a substantially increased risk of child death in the family. The mortality index for families with some unemployment for the principal wage earner (which constituted 17.8 percent of families providing this information in Table 3.1) was 26 percent higher than for families with no reported loss of work.

As shown below, this variable retains a powerful influence in multivariate analysis and emerges as one of the most important predictors of child mortality. An inquiry by the U.S. Bureau of Labor into the conditions among 19 very poor working-class families in Washington, D.C. during 1905 provides some insight into the importance of this variable. The irregularity with which men were employed was claimed to be the single most powerful cause operating to bring families down to the poverty line and keep them there. Testimony by the wage-earners themselves was said to be nearly unanimous on this point (Forman 1906:617). The wages they were paid were adequate if only sufficient work could be found, but seasonal factors, weather, and labor-market conditions often prevented continuous employment. Our results add strength to this testimony.

Although the 1900 census did not ask questions concerning income, it did ask something about wealth: whether the family owned or rented its home or farm. Table 3.1 (panel 10) indicates that farm owners had an advantage over farm renters in child mortality, and that non-farm homeowners were better off than non-farm renters. Farm renters had a child mortality index 21 percent higher than farm-owner families, and non-farm renters were 13 percent above homeowners. Regionally, however, these differences did not consistently prevail, as Table 3.5 shows. The advantage of farm owners over farm renters was largely confined to the South, where sharecropping was prevalent. In the North, it is possible that many of the owners were occupying smaller, less viable farms, whereas renters might have included a group of more progressive, innovating tenants and owners. The disadvantage of renting as compared to owning a *home* was essentially confined to the North Atlantic and the South Central region. All of the expected ownership relations are turned upside-down in the West. It must be concluded that this particular measure of economic well-being did not have a simple or predictable relationship to child mortality. It is, after all, only a partial measure of property ownership and does not indicate the value of the property nor its contribution to or drain on income.

Earlier, we described the relative mortality of international migrants to the U.S. But there was also considerable migration of native-born people *within* the United States during the period prior to the census of 1900 (Eldridge and Thomas 1964), much of it economically driven. As Table 3.1 (panel 13) shows, variation in child mortality is relatively small across groups of native-born women who were resident in their state of birth, those who were resident in their census region but not of their state of birth, and those who were resident in a census region different from that in which they were born. Women resident in their state of birth had a slight mortality advantage over migrants across state and census region boundaries, but the differences were small. Evidently, interstate migration of the native born was not associated with major hazards to child survival.

Household Relations

Table 3.1 (panels 12 and 14) provides tabulations of child mortality by household structure and the relationship of the woman to the household head. The overwhelming majority (93 percent) of women in this subsample of the 1900 census were wives of the head of household, and 82 percent lived in families with no unrelated individuals in the household. Households having servants, a sign of greater affluence and of the availability of child care, show child mortality that is 14 percent lower than in households with no unrelated individuals. Taking in boarders, however, was associated with a 17 percent increase in child mortality. Taking in boarders was often an indication that the family needed additional income, and the boarders themselves furnished an additional focus of infection for children. The economic situation of the boarders was probably below average. The child mortality of women who were enumerated as boarders or wives of boarders was about 24 percent higher than average, and it was about 6 percent higher than for women in families that took in boarders. Women who were residents of institutions had child mortality similar to that of boarders, while married women who were live-in servants (a relatively unusual circumstance in the United States in 1900) had substantially elevated mortality—almost 77 percent above the national average. Of course, the deaths of their children may have occurred before they secured places as live-in servants.

When the relationship of the woman to head of household is considered (Table 3.1, panel 14), it is apparent that female-headed households experienced elevated mortality. Although relatively infrequent among married women (as opposed to widowed and divorced women, who are not included in this analysis), the absence of a husband was often a sign of family difficulty. As we saw earlier, much of the difficulty could be overcome, at least for native white women, by working.

Daughters of household heads had the same child mortality as wives of the heads, and both groups were about at the national average. Those whose relation to head was daughter-in-law or niece actually fared better than average, whereas sisters and sisters-in-law of heads of household had very high child mortality. The United States at this time was predominantly a society of husband/wife households without lateral or vertical extension.[7] Judging from these results, based as they are on relatively few observations in the nonnormative categories, vertical extension of the family was associated with fewer adverse consequences than lateral extension.

Time Trends in Child Mortality in the Late Nineteenth Century

The data available in the 1900 census provide an opportunity for us to examine time trends in child mortality for a period of 15 to 20 years before the census (United Nations 1983a: ch. 3). This examination can be made by comparing the child mortality experience of women whose children were born, on average, at different times (see Chapter 2). The longer a group of women have been married, the earlier the average date to which their children's mortality experience refers. Systematic changes in mortality should be identified through a comparison of the average model life table level pertaining to women of various marital-duration categories. This comparison captures, in a sense, the average mortality regime to which children of women of different ages or marital durations had been subjected.

Trends are analyzed separately for the total, white, native white, foreign-born white, and black populations, and also for women in various size-of-place categories. For each of the seven marital-duration categories of women per group (using quinquennial duration groups from 0–4 to 30–34 years), a corresponding $q(a)$ is computed, the probability of survival from birth to age (a) ($q[2]$, $q[3]$, $q[5]$, $q[10]$, $q[15]$, $q[20]$, and $q[25]$ respectively). This $q(a)$ was then converted into a particular "level" in the West model life table system and into the number of years prior to the census to which that particular mortality estimate applied, on average. (For the methodology, see Chapter 2 and United Nations 1983a: ch. 3.) Each higher "level" of mortality is associated with a gain of 2.45 years in life expectancy at birth.

The subsample of women used to make these calculations consisted of currently married with husband present, for whom children ever born and children surviving were known; the number of children ever born did not exceed the stated number of years of current marriage by more than two; the implied age at marriage (in the current marriage) was between 10 and 35; the inferred number of own-children present was not greater than the stated number of children surviving; and the stated number of children surviving did not exceed the stated number of children ever born. These stringent selection criteria were imposed in order to remove from the sample, as far as possible, women who had remarried. As discussed in Chapter 2, the 1900 census asked only a question about the number of years in the current marriage. If women had remarried and had children by previous marriages, then their children would have had a longer exposure to mortality risk than would be indicated by the duration of current marriage. Consequently, the implied trends in mortality would be biased by the conclusion of remarried women.

A summary of the estimated trends is provided in Table 3.9, where the "level" of mortality in the Model West life table corresponding to each marital-duration category was used as the dependent variable in a series of weighted least squares regressions. The independent variable was the negative of the number of years prior to 1900 to which that level applied. The weights are the number of children ever born in a category. The intercept term thus gives the predicted mortality "level" at the time of the census in June 1900, and the slope represents the average change in mortality "level" per year between approximately 1880 and 1900, i.e., the mortality trend. Positive values of the slope indicate improving mortality. For example, Table 3.9 shows that for the white population as a whole, the rate of mortality decline averaged .145 levels per year, which would have amounted to an improvement of about 7.1 years in expectation of life at birth over the two decades prior to 1900.

Results for the black population show a slight deterioration in mortality conditions. A variety of data problems suggests that one should be very cautious in interpreting this result. Frequency of marital disruption was high in the black population, as discussed in Chapter 2, so that marital duration is not as effective an indicator of children's exposure to mortality as it is in the white population. That the deterioration is only evident in urban areas, where marital disruption is likely to be greatest, underscores this concern. Furthermore, as a higher mortality population, a higher proportion of mothers of black children would have died before the census of 1900. Since black women who died would be expected to have had higher child mortality (see Chapters 1 and 2) and disproportionately higher marital-duration, our estimated improvements in mortality may be biased downwards. The questionable suitability of the West Model life tables for blacks (see Chapter 2) adds to the uncertainty. On the other hand, black economic conditions may have worsened during 1880–1900, in part because of problems afflicting the cotton industry (Wright 1986: 56, 115). A cautious conclusion seems in order: our

TABLE 3.9
Regression Measuring the Pace of Mortality Decline by Race, Nativity, and Place of Residence: United States, ca. 1880–1900

	All marital durations (N = 7)				
	Intercept	*Slope*	*Significance*[a]	*Adj. R-square*	*F-ratio*
Total population					
Total	14.18	0.1057	***	0.868	40.43
Urban	13.59	0.1698	***	0.895	51.95
Top 10 cities	13.83	0.2923	**	0.660	12.67
Other cities 25,000+	12.47	0.1324	—	0.251	3.01
Cities 5,000–24,999	13.09	0.1058	—	0.214	2.63
Cities 1,000–4,999	15.55	0.1473	—	0.303	3.61
Rural	14.79	0.0784	***	0.739	17.97
White population					
Total	14.94	0.1449	***	0.882	46.02
Urban	14.15	0.2099	***	0.964	160.28
Top 10 cities	13.77	0.2907	**	0.666	12.96
Other cities 25,000+	13.18	0.1830	*	0.389	4.81
Cities 5,000–24,999	14.41	0.2048	***	0.752	19.17
Cities 1,000–4,999	16.10	0.1683	**	0.643	11.82
Rural	15.81	0.1173	***	0.748	18.83
Native white population					
Total	15.18	0.1086	***	0.729	17.13
Urban	14.30	0.1268	**	0.655	12.39
Top 10 cities	13.52	0.1878	*	0.423	5.40
Other cities 25,000+	12.93	0.0659	—	0.000	0.94
Cities 5,000–24,999	14.76	0.1062	—	0.077	1.50
Cities 1,000–4,999	16.47	0.1896	**	0.662	12.74
Rural	15.91	0.1184	***	0.733	17.48
Foreign white population					
Total	13.94	0.1947	**	0.607	10.27
Urban	13.71	0.2585	***	0.815	27.44
Top 10 cities	13.83	0.3552	**	0.605	10.19
Other cities 25,000+	13.06	0.2267	—	0.240	2.89
Cities 5,000–24,999	13.48	0.3489	**	0.634	11.42
Cities 1,000–4,999	15.13	0.1096	—	0.000	1.00
Rural	15.23	0.0870	—	0.023	1.14
Black population					
Total	9.55	−0.0736	—	0.000	0.44
Urban	5.39	−0.2596	*	0.392	4.87
Rural	10.71	0.0000	—	0.000	0.00

TABLE 3.9 *(cont.)*

Source: Sample of census enumerators' manuscripts, U.S., 1900.

Note: Regressions were of the form: Level = a + b*Years, where Level = the level of the Model West life table implied by a particular $q(x)$ (where x = 2, 3, 5, 10, 15, 20, 25) and Years = the negative of the number of years prior to the census (June 1, 1900) associated with each $q(x)$. The intercept, a, is the extrapolated mortality level at the time of the census. The slope, b, is the average change in level per year between approximately 1880 and 1900. The estimation technique was weighted least squares, with the weights being the number of children ever born for each category.

[a] *** = significant at least at a 1 percent level; ** = signigicant at least at a 5 percent level; * = significant at least at a 10 percent level; — = not significant at least at a 10 percent level (two-tailed test).

data provide no evidence of an improvement in black child mortality during the last two decades of the nineteenth century.

Results for all other groups suggest that child mortality was declining. The decline occurred more than twice as rapidly in urban as in rural areas for the total population; the native white population, however, experienced comparable rates of decline in rural and urban places. Watterson (1988), using a similar approach to data from England and Wales in 1911, also finds a much faster pace of decline in urban than in rural areas. The American decline was much more rapid in the 10 largest cities than in other cities, supporting the notion that those cities were benefitting disproportionately from public-health advances in the late nineteenth century. The decline of .29 levels per year suggests that life expectancy at birth increased by some 14 years in the 10 largest cities during the two decades preceding 1900, a remarkably rapid improvement. The pattern of improvement was stronger among the foreign-born white population, as might have been inferred from Table 3.2. Some of the rapid decline for the foreign-born mothers may reflect their experience with child mortality in the countries of origin, most of which had higher mortality than the U.S. (Ireland and Scandinavia being notable exceptions). But rapid mortality decline was also characteristic of the native white population in the largest cities.

In addition, however, it is clear that rural areas and the smallest urban areas (1,000–4,999 inhabitants) had also been experiencing child mortality improvements, notably among the native white population, who constituted the dominant portion of residents in these areas. Public-health and medical advances are less likely to be responsible for mortality declines in these types of places. Mortality improvements there are more plausibly ascribed to improvements in living standards. According to Higgs (1973:187) and others that he cites, the public-health movement in the late nineteenth and early twentieth centuries almost completely bypassed the countryside (see also Chapter 1). Higgs ascribes rural mortality gains to gains in per capita food availability resulting from higher agricultural production and better transportation, as well as to improved rural housing. The evidence for these improvements is patchy, however. Bennett and Pierce's (1961) reconstructions of the average American diet show little or no change between 1880 and 1900. But it is likely that better transportation increased the variety of foods available to the typical consumer.

In sum, Table 3.9 provides evidence of decline in child mortality in both rural and urban areas and for both the native and the foreign-born white populations in the United States during the last two decades of the nineteenth century. Declines appear to have been fastest in the 10 largest cities, especially for the foreign born, but progress was being made across the board. The rapid improvements occurred in the face of a severe economic downturn between 1893 and 1897, during which unemployment averaged 14.2 percent (U.S. Bureau of the Census 1975: Series D 85-86).

The improvement in child mortality that we have depicted is roughly congruent with the scattered evidence on trends in the final heights achieved by white American males. Fogel (1986, 1988) presents a graph of final heights achieved by five-year birth cohorts and notes that the modern rise of heights probably began with children born in the 1890s (Fogel 1988:35). Final height is largely determined by growth patterns below age 3 (Fogel 1988:42). The decade of the 1880s marked the low point in heights, according to this evidence, for the entire period from 1710 to 1930. This observation raises the possibility that the mortality decline that we describe was not part of a long-term secular decline, as it was in most European countries during this era, but was a reversal of mortality increases that occurred earlier in the nineteenth century. On the other hand, Steckel (1988) finds substantially higher levels of child mortality in the 1850s than we find for the 1890s, implying that the United States was similar to England, Sweden, and other European countries in its child mortality trends.

The more rapid reductions in child mortality in the largest cities are consistent with the leadership of those cities in public-health programs and also with the notion that the direct relationship of mortality and city size, which seems to have characterized the mid-nineteenth century, was breaking down by the turn of the century. Evidently, the United States was no exception to A. F. Weber's generalization at the turn of the century, based mainly upon European experience:

> There is no inherent reason for the relatively high urban mortality except man's neglect and indifference. Recent tendencies show that the great cities are leading the way in making sanitary improvements and, in several countries, . . . the large cities now make a more favorable showing as to mortality than do other communities. This holds true even of infant mortality, which is one of the most decisive indices of a locality's healthfulness. (Weber 1899:367)

Inferences about trends in mortality according to these and other characteristics can also be drawn by comparing our results to those of Daniel Scott Smith (1978, 1983). Smith also constructed a sample from the 1900 census, but he limited it to older women, principally those aged 55 or above. His sample consists of 5,000 noninstitutionalized older persons. Because the women in his study are much older than those in ours, their child mortality experience typically refers to the 1860s and 1870s, rather than to the two more recent decades studied here.

Most of the differentials revealed in Smith's analysis were comparable in direction and magnitude to those described here. Black/white differences and native/foreign-born differences were quite similar. German-born mothers, however, appear to have done better in the earlier period. Literacy differentials were also analogous. The Midwest was a low mortality area, as in later years, but the South fared worse than in our larger and "later" sample, perhaps because of the imprint of the Civil War and Reconstruction on Smith's results. Rural/urban differences showed some tendency to widen, although this apparent result may be attributable to more migration between rural and urban areas, and hence to a blurring of the distinctions between them, among Smith's older women. The largest cities did not enjoy any advantage over the next smaller size class in Smith's sample (1983: Table 1), lending support to the suggestion of faster decline in mortality for these cities towards the end of the century.

Occupational mortality differentials in Smith's sample are much as we have described, except that clerical, sales, and service workers did not enjoy the relative advantages they had achieved later in the century, whereas skilled manual workers and operatives were in somewhat better shape. Again, occupational mobility is a more serious problem in interpreting mortality differentials in Smith's sample. Interestingly, professional occupations did not fare particularly well either in Smith's sample or in ours.

A second study to which our results can be compared matched 1,600 male-headed households in the 1850 and 1860 censuses (Steckel 1988). Mortality was inferred by the absence from the household in 1860 of a child who was present at ages 0–4 in 1850. As in our results, Steckel finds mortality to be lowest among children of farmers and to be surprisingly similar among offspring of white-collar and blue-collar workers. Urban places larger than 25,000 had significantly higher child mortality than rural places, although smaller urban places were not significantly disadvantaged. The Midwest had lower child mortality than the Northeast, as in our results, and the South's relative position was unclear. The value of real estate owned by the household was insignificantly associated with child mortality. Mother's literacy also had weak effects on child mortality. Although we report substantial effects of literacy in this chapter, it should be noted that Steckel's results are products of a multivariate analysis, and when we introduce our own multivariate analysis in the next chapter, mother's literacy loses much of its explanatory power.

In general, Steckel's (and Smith's) results are similar to our own when comparable variables can be investigated. They suggest that the mosaic of child mortality variations that we describe was largely established by the middle of the nineteenth century.

Summary

Based on one-way tabulations of the mortality index (Table 3.1), childhood mortality at the turn of the century was higher among blacks than among whites, in urban than in rural areas, and in the larger cities than in smaller ones. An exception is the category of the 10 largest cities, which appeared to have achieved lower mortality than somewhat smaller cities by making exceptionally rapid progress in the two decades before 1900, especially among the foreign born. Regionally, the highest mortality was found in the Northeast (especially in New England) and in the western part of the South. The Midwest had very favorable childhood mortality experience in 1900. Contrary to many contemporary guesses and to our own expectations, the South as a whole had below-average mortality for both whites and blacks (below, that is, the respective racial averages for the nation as a whole). The South's advantage was entirely attributable to its rurality.

Literate mothers had better child survival than illiterate ones. Their husbands's literacy also reduced child mortality, but their own literacy was more important. Being illiterate was a special disadvantage for native white wives, perhaps because of associated circumstances that the condition connoted. Similar results apply to the ability to speak English, with higher child mortality apparent among non-English speakers, especially fathers.

Child mortality varied in predictable ways according to the economic status of the family. Working wives had poorer child survival, as did husbands who had experienced some unemployment in the year prior to the census. The apparent problems faced by working wives were concentrated among blacks and the foreign born. Among women with absent husbands, those who worked had lower child mortality than those who didn't, and mortality was exceptionally low for native white women in this category. Wives whose husbands were farmers or in professional, technical, managerial, clerical, and other white-collar activities did relatively well, while wives of farm laborers, non-farm laborers, and craftsmen did poorly. White-collar/blue-collar differences were surprisingly small, however. The lower mortality of farmers' children extended across regions and was due, in part, to their rural residence. The higher mortality of the children of agricultural laborers was partially traceable to the large numbers of blacks in this occupation in the South. Laborers tended to have high child mortality, regardless of ethnic composition, region, or rural/urban residence. Owners of homes and farms had lower mortality among their children than did renters, as did families with servants. Families with boarders, however, had elevated mortality.

Native-born white husbands and wives had lower child mortality than the foreign born, with native birth apparently being more important for wives. Generally, children of native white women with native white mothers had unusually favorable survivorship, while Irish- and German-born women did poorly. Women of Scandinavian origin (first and second generation) had relatively good child survival experience, as they did in Scandinavia itself. Foreign-born whites had higher child mortality than native whites across regions and size-of-place categories. The differences between native whites of native parentage and native whites of foreign parentage were unclear and varied from place to place, suggesting that, with regard to child mortality, the assimilation process essentially took only one generation to complete. The unfavorable child mortality experience of Irish mothers originated in urban areas of the Northeast, where they were predominantly located. The high child mortality of German mothers was especially attributable to those resident in urban areas.

We have considered it important to present these differentials in child mortality in some detail because there is no other comparable record of child mortality at the time. Discussion of mortality differences according to variables taken one or two at a time, however, inevitably raises as many questions as it answers, questions about whether the observed differences are products of other factors whose influences are not controlled. It is to these questions that we now turn.