

Did Low Birthweight among US Blacks Really Increase?

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Abstract: The low birthweight (LBW) rate among reported United States non-White births increased 32 per cent from 1950 to 1967. States with large increments in non-White LBW rates over the period 1950-67 ("rising LBW states") were compared to states with more stable LBW rates. Paradoxically, states with the most deterioration in LBW rates had the most improvement in LBW risk factors (low income, mothers under age 20 or over age 35, birth order over four). In 1950, at least 9.7 per cent of non-White births in rising LBW states went unreported, and underreporting was biased, with out-of-hospital LBW births who die young least likely to be reported.

From 1950 to 1967, non-White out-of-hospital births for the US declined from 42 per cent to 7 per cent, and yearly values for per cent of non-White births in hospital and LBW rates were highly correlated ($r = .98$). These data suggest that the observed rise in non-White LBW rates from 1950 to 1967 was due in large part to systematic underreporting of LBW births among non-White out-of-hospital deliveries in the 1950s. This underreporting essentially ceased when hospital delivery for non-Whites became nearly universal in the late 1950s and 1960s. (*Am J Public Health* 1986; 76:380-384.)

Introduction

The leveling off of the decline in neonatal mortality in the 1950s and early 1960s has puzzled and concerned perinatal public health workers for some time.¹⁻⁵ Since birthweight is the major risk marker of neonatal mortality, the rising incidence of births with low birthweight (LBW, ≤ 2500 g) in the United States during this same period must be considered important to the mortality picture.

From 1950, when the National Center for Health Statistics first began publishing annual data on birthweight, to 1967, there was a rise in LBW nationally from 7.50 to 8.21, a 9 per cent increase; LBW among Whites increased only 1 per cent while that among non-Whites increased 32 per cent. Of the overall increase in the rate of LBW births between 1950 and 1967, 80 per cent is accounted for by the formidable rise reported for non-Whites. In one government study covering this 18-year period,⁶ about half of the rise in LBW was attributed to artifact. Unfortunately, subsequent analyses of LBW trends have largely overlooked this early work.^{7,8}

Is a 32 per cent increase in LBW plausible? Increases of this magnitude were described during Nazi-imposed food shortages in Holland⁹ and Leningrad¹⁰ when adult caloric intakes were limited drastically (500 to 1,200 kcal/day). Many maternal factors besides nutrition are known to affect birthweight, including age and birth order,¹¹ income,¹² strenuous work during pregnancy,^{13,14} smoking,^{15,16} and hypertension.^{17,18} It is reasonable to hypothesize that any of these factors might change in a maternal population over time, but the magnitude of increase in LBW for the non-White population suggests social and environmental phenomena of an order comparable to wartime food shortage, a notion difficult to reconcile with what we know about conditions of life in the US during the 1950s and 1960s.

This study attempts to re-examine the marked rise in Black LBW rates over the period 1950 to 1967 and to characterize the changes in the maternal populations which showed the most increase.

Methods

All data used in this study were taken from published government documents for the various years.^{19,20} The distinction between Black and other non-White groups was not made in vital statistics reports prior to 1969. Blacks are by far the largest racial minority in the US, accounting for 89 per cent of all non-White births in 1970. In contrast to other minority groups such as Asians,²¹ Blacks have a very high rate of LBW compared to Whites. To minimize any confounding of results from the reporting of Blacks and other non-Whites together, states were excluded from most of the comparisons unless their non-White populations were at least 90 per cent Black. For this study, the two terms Black and non-White are nearly interchangeable.

Rates of LBW among non-White mothers were calculated for 1950 and 1967 for all reporting areas with more than 2,500 non-White births per year in which Blacks made up at least 90 per cent of non-Whites. These 22 reporting areas (21 states plus the District of Columbia) accounted for 89 per cent and 82 per cent of all non-White births (and a higher percentage of Black births) in 1950 and 1967, respectively. Based on the increase in non-White LBW rate over the period 1950 to 1967, states were divided into three LBW groups: Rising, Intermediate, and Stable (Table 1). While this study focuses on the contrast between the Rising and Stable LBW states, findings from the Intermediate group are presented throughout for completeness.

Data from various sources were extracted to characterize the change in maternal populations and deliveries in these groups of states over the two decades beginning in 1950. Where annual vital statistics tables contained the needed information, 1950 and 1967 were used to define the study period. Where the information was derived from the census, the census reports of 1950, 1960, and 1970 were used. Information concerning the number of health facilities and physicians in each state was taken from the *Statistical Abstract of the United States*.²²

Economic analyses used census reports and were thus based on income for the years 1949, 1959, and 1969. All income figures were converted to constant 1969 dollars based on the Consumer Price Indexes of the various years.²³ To estimate the number of families living at extremely low income, the 1969 poverty threshold of about \$3,000 was taken as a standard.²⁴ This translates into \$2,384 in 1959 dollars. To estimate the number of families with extremely low income in 1959, it was necessary to interpolate between the \$2,000 and \$3,000 income categories. Unfortunately, race-specific

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TABLE 1—Changes in Non-White Births and Low Birthweight Rates from 1950 to 1967 for 22 Reporting Areas^a

Reporting Areas ^a	No. Non-White Births, 1950	Change Non-White Births, 1950-67	LBW Rate		Change from 1950 to 1967	
			1950	1967	Rate	Per Cent
Rising LBW						
Arkansas	12,376	-3,145	5.88	11.84	+5.96	+101
Louisiana	31,155	-1,270	8.61	14.33	+5.72	+66
Georgia	34,742	-5,268	8.56	13.91	+5.36	+63
South Carolina	26,695	-6,765	7.90	12.95	+5.05	+64
Tennessee	16,146	-1,250	10.09	14.73	+4.64	+64
North Carolina	36,281	-7,981	9.23	13.34	+4.12	+46
Mississippi	37,457	-13,553	8.30	12.29	+3.99	+48
Mean (7 States)	27,836	-5,605	8.37	13.34	+4.98	+62
Intermediate LBW						
Virginia	21,362	-1,393	9.72	13.31	+3.58	+37
Alabama	32,838	-9,943	8.57	12.13	+3.56	+42
Florida	18,764	+8,336	10.09	13.50	+3.40	+34
Kentucky	5,381	-448	10.67	14.03	+3.37	+32
Pennsylvania	17,458	+5,817	13.31	16.55	+3.24	+24
Missouri	8,347	+3,260	11.41	14.15	+2.74	+24
Maryland	11,949	+3,603	12.28	14.91	+2.63	+21
Michigan	14,037	+9,323	11.82	14.27	+2.45	+21
Mean (8 States)	16,267	+2,319	10.98	14.11	+3.12	+29
Stable LBW						
Indiana	5,154	+3,271	11.25	13.21	+1.96	+17
New York	27,239	+25,516	12.91	14.81	+1.90	+15
Ohio	14,829	+5,855	13.09	14.83	+1.74	+13
Texas	27,496	+5,682	11.31	13.02	+1.71	+15
New Jersey	9,506	+10,951	13.32	14.78	+1.46	+11
Illinois	19,899	+18,585	12.88	14.18	+1.30	+10
District of Columbia	8,724	+4,323	14.81	14.52	-0.29	-2
Mean (6 States and DC)	16,121	+10,583	12.79	14.19	+1.40	+11
United States Non-White Total	490,522	107,935	10.25	13.53	+3.28	+32

a) These are all reporting areas with at least 2,500 non-White births in 1950 and 1967 whose non-White populations were at least 90 per cent Black.

DATA SOURCE: Vital Statistics of the United States for 1950 and 1967.¹⁹

family income by dollar categories was not provided in the 1950 census reports so no comparable calculation was possible. In fact, the only race-specific economic comparison possible over the three census reports was for median income of families and unrelated individuals; even this was flawed by the absence of race-specific tables for eight of the 22 reporting areas in 1950.

Results

Over the 18 years of the study, the total number of non-White births in the 22 reporting areas increased from 437,835 to 491,241. The average LBW rate for the Rising LBW states increased from 8.37 to 13.34, a 62 per cent average increase over 18 years, while for the Stable states the average increase was only 11 per cent, from 12.79 in 1950 to 14.19 in 1967 (Table 1).

The 20 years between the 1950 and 1970 census witnessed a major shift of the Black population in the US from rural Southern states to the urban centers of the North. The Stable LBW states turned out to be states with rapidly growing urban Black populations, whereas the Rising LBW states were all Southern states with shrinking, predominantly rural, Black populations (Table 1). The absolute percentage of Blacks living in rural areas fell in the Rising LBW states as well (62 per cent in 1950, 43 per cent in 1970). By the end of the study period, the Black population and the number of Black births in the Stable LBW states had surpassed the levels in the Rising LBW states.

Trends in Maternal Age and Birth Order

The Rising LBW states experienced a decline in births of high birth order, while the Stable LBW states ended the study period with an increased percentage of mothers in this high-risk group. Similarly, the Rising LBW states showed more favorable trends in percentages of mothers at the extremes of childbearing age. Only in percentage of first order births did the risk profile for the Rising LBW states deteriorate compared to the Stable states (Table 2).

TABLE 2—Trends in Maternal Age and Birth Order for Non-Whites in 22 Reporting Areas^a

% Non-White Births by Maternal Age, Birth Order	Reporting Areas	% 1950	% 1967	% Change 1950-67
Age < 20 years	Rising LBW	23	31	+33
	Intermediate	22	31	+38
	Stable LBW	20	28	+41
Age > 35 years	Rising LBW	11	9	-14
	Intermediate	9	9	-2
	Stable LBW	8	8	-3
Birth Order One	Rising LBW	22	30	+36
	Intermediate	26	32	+24
	Stable LBW	29	33	+16
Birth Order > Four	Rising LBW	31	28	-9
	Intermediate	23	23	+3
	Stable LBW	17	20	+17

a) DATA SOURCE: Vital Statistics of the United States¹⁹ for 1950 and 1967.

TABLE 3—Trends in Income and Female Employment for Blacks in 22 Reporting Areas^a

Categories	Reporting Areas	% Change				
		1950	1960	1970	1950-60	1960-70
% Black Families below Poverty Level	Rising LBW	NA	57	36	NA	-37
	Intermediate	NA	34	23	NA	-32
	Stable LBW	NA	24	17	NA	-29
Median Income 1969 Dollars Black Families	Rising LBW	NA	\$1927	\$4213	NA	+119
	Intermediate	NA	\$3257	\$6236	NA	+91
	Stable LBW	NA	\$4255	\$7462	NA	+75
Black Families and Unrelated Individuals	Rising LBW	\$887	\$1573	\$3225	+77	+105
	Intermediate	\$1770 ^b	\$2574	\$4747	+45	+84
	Stable LBW	\$2673 ^b	\$3388	\$5808	+27	+71
% Black Women Childbearing Age in Workforce	Rising LBW	35	39	42	+11	+10
	Intermediate	39	43	47	+10	+09
	Stable LBW	45	47	50	+04	+06

a) DATA SOURCE: Census of Population¹⁸ for 1950, 1960, 1970.

b) Probably overestimates 1949 Black income because not all states reported race-specific data.

NA: Race-specific data not available in 1950 census.

Trends in Economic Status

There was a steady improvement in the income status of Blacks in all reporting areas over the study period, but this improvement was best in the areas reporting the worst LBW trend, i.e., the Rising LBW states. In part, this increased income reflects the greater participation of women, including those of childbearing age, in employment outside the home (Table 3).

Trends in Health Facilities and Use

The most dramatic difference between the two groups of states under study emerged in the area of delivery practices (Table 4). The Black populations of the Rising LBW states delivered their babies out-of-hospital for the most part in 1950, a situation in sharp contrast to the Stable LBW states at that time. By 1967, although the Rising LBW states still had more out-of-hospital births than the Stable states, the absolute level had fallen to about one birth in six; in these same states 18 years earlier, two out of three Black births occurred out-of-hospital. Most of these out-of-hospital births were delivered by relatives, friends, or "granny" midwives. The shift of delivery site into hospitals in the Rising LBW states was reflected in a 61 per cent increase in the number of infant bassinets per 1,000 births in those states compared to a 1 per cent increase in the Stable LBW states. Both groups of states experienced a growth in the number of physicians per 1,000 births.

Figure 1 presents a scattergram of the percentage of all US non-White births occurring in hospitals versus the non-White LBW rates for the 18 years of the study. The association between these two variables is quite strong ($r = .98$). The change in per cent of births occurring in hospitals for non-Whites over the period 1950 to 1967 was plotted against the change in reported LBW rates over this time for the 22 reporting areas in Figure 2. Again, a strong relationship was observed ($r = .69$).

Discussion

Almost every reporting area with a sizable Black population experienced a rise in the frequency of non-White low birthweight between 1950 and 1967. In comparing two subsets of states—those with the most stable rates and those with the most dramatic rises—however, clear differences emerge.

The Rising LBW states increasingly urbanized, had a more rapid improvement in income than the Stable LBW states (although they did not entirely catch up), and experienced changes in age, birth order, and employment status that made them more like the Stable LBW states. Most impressive, however, was a total change in the prevailing birth setting from home to hospital.

As Black births in the rural South occurred more and more commonly in hospitals throughout the 1950s and 1960s, it seems probable that they also were more uniformly recorded in vital records. A very similar hypothesis was explored in earlier studies, and the authors concluded that changes in reporting practices were responsible for about one-half of the observed rise in LBW.^{6,25}

There are many factors affecting LBW that could not be measured in this study, such as maternal smoking, diet, and hypertension. It is also possible that the observed migration from South to North was selective, leaving behind mothers with important risk factors for LBW. Nevertheless, one would have to assume that major changes took place in these unmeasured variables to account for our findings (an average rise in LBW rate from 8 to 13, a 62 per cent jump).

TABLE 4—Trends in Health Facilities and Utilization in 22 Reporting Areas

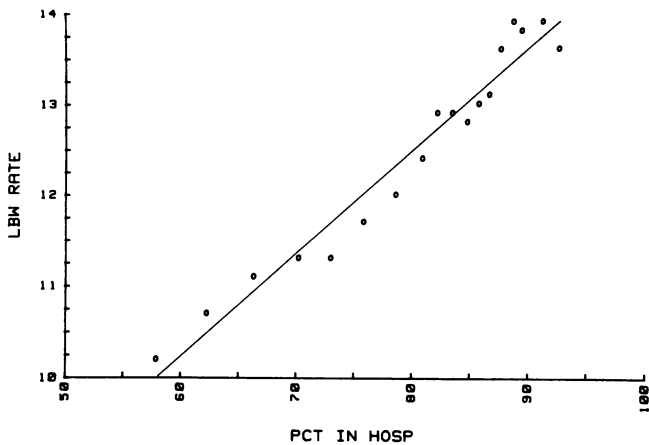
Categories	Reporting Areas	1950 or (1955)	1967	% Change 1950-1967
% Non-White Births in Hospitals ^a	Rising LBW	36	83	+128
	Intermediate	63	94	+49
	Stable LBW	85	98	+16
% Non-White Deliveries by Midwives, Out-of-Hospital	Rising LBW	45	13	-70
	Intermediate	20	05	-77
	Stable LBW	05	01	-80
No. Bassinets per 1000 Births, All Races ^b	Rising LBW	17	27	+61
	Intermediate	23	27	+15
	Stable LBW	28	28	+01
No. Physicians per 1000 Births, All Races ^c	Rising LBW	(34) ^d	51	+51
	Intermediate	(43) ^d	77	+80
	Stable LBW	(64) ^d	97	+52

a) DATA SOURCE: Vital Statistics of the United States¹⁹ 1950 and 1967.

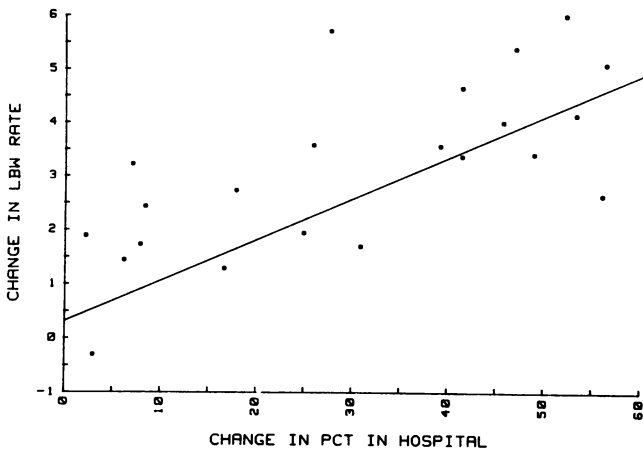
b) DATA SOURCE: Statistical Abstract of the United States,²⁰ 1952 and 1969 Editions (no race-specific data available).

c) DATA SOURCE: Statistical Abstract of the United States,²⁰ 1952 and 1969 Editions (no race-specific data available).

d) Physician data not available prior to 1955.



Each point represents one year. Includes all reported US non-White live births.⁶
FIGURE 1—Scattergram of Non-White Low Birthweight Rates versus Per Cent of Non-White Births in Hospitals, 1950-1967



Each point represents one of the 22 reporting areas in this study.
 SOURCE: Vital Statistics of the United States¹⁹ for 1950 and 1967.
FIGURE 2—Scattergram of Changes in Non-White Low Birthweight Rates versus Changes in Per Cent of Non-White Births Occurring in Hospitals

Moreover, several other arguments support the "underreporting artifact" hypothesis. First, the states with the most rise in non-White LBW were states that had unexpectedly low rates of LBW in 1950. The more recently reported rates for these states in the 12 to 14 range seem more consistent with their disadvantaged economic status and their overall historical performance in maternal and child health outcomes.

Second, incompleteness of birth registration was a well recognized problem in 1950, so that calculated corrections to measured birth rates were included in the vital statistics tables until the late 1960s. Nationwide, in 1950, 6.5 per cent of non-White births were unreported, with considerable variation among areas.²⁶ The Stable LBW states in this study had an average underreporting rate of 3.3 per cent for non-Whites, while in the Rising LBW states 9.7 per cent of births went unreported, with a range up to 25.2 per cent for the out-of-hospital births in Arkansas, where over three-fourths of non-White babies were born out-of-hospital in 1950. In addition, birthweight data were omitted from the 1950 birth certificates more often in the Rising LBW states

than in the Stable LBW states; Texas, an anomalous member of the Stable LBW group, was the only exception.

The final argument in support of the underreporting hypothesis deals with its quantitative plausibility. As noted above, 6.5 per cent of US non-White births went completely unreported in 1950, and an additional group of 5.3 per cent were reported but without BW data. Thus we have no birthweight information for a total of 11.8 per cent of 1950 non-White births. The reported non-White LBW rate was 10.2 in 1950 and 13.6 in 1967, an increase of 3.4 per 100 over the study period.

It has been widely assumed that the smallest babies are less well reported than larger babies.¹⁹ For those 1950 non-White births for which length of gestation was reported, the rate of prematurity (gestation \leq 35 weeks) was twice as high for certificates on which birthweight was not stated.¹⁹ These cases are the "best" of those for which we lack data, others lacking gestation as well as birthweight, or lacking a certificate altogether. We might reasonably estimate that the LBW rate in all missing data cases would be from two to three times the LBW rate for cases with complete certificates, or 20.4 to 30.6 per 100. Averaging these cases with the previously available cases of known birthweight, the 1950 LBW rate for the entire non-White population of births, registered and unregistered, would have been between 11.8 and 13.9, instead of the 10.2 per 100 officially reported.

The underreporting hypothesis is in keeping with the general improvement in the standard of living and health care access experienced by US Blacks in the 1950s and 1960s. This trend reflected overall US economic growth in the period following World War II, the first reductions of racial discrimination in response to the civil rights movement, and major increases in hospital facilities, especially in areas such as the rural South.

Nevertheless, it is possible that some portion of the apparent rise in the Black LBW rate was real. That portion would reflect the adverse outcomes experienced by Blacks migrating from predominantly rural Southern communities to the industrialized North. Stress-related health risks, including increased smoking and hypertension, would be anticipated for a population undergoing such a major relocation. Indeed, a 36 per cent rise in smoking prevalence among US women was observed during the time of this study.¹⁶

The significance of these findings lies mainly in their implication for trend analyses that utilize data for Black births in the Rising LBW states or in the entire US. Such studies, if they use birthweight data for the period before the late 1960s, are seriously flawed. This probably accounts for the discrepancy between such studies,^{7,8} and other work^{27,28} which used more recent data derived from populations giving birth largely in hospitals. Moreover, if about 25 per cent of the Black LBW births in 1950 went unreported, it is probable that an even larger percentage of deaths escaped detection. This underreporting could have been one contributing factor to the 1950s plateau in infant mortality, with the gradually improving vital records system increasingly reflecting the entire population, rather than a truncated portion which omitted some of the poorest mothers.

ACKNOWLEDGMENTS

The author thanks Dr. Earl Siegel for useful suggestions, the staff of the Government Publications Department of the Chicago Public Library for help in locating sources, and Monica Miles for data processing assistance and Susan Seidler for preparation of the manuscript. This paper was presented in part at the meeting of the Society for Epidemiological Research, Houston, Texas, June 1984.

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