FACTORS IN THE UNPRECEDENTED DECLINE IN INFANT MORTALITY IN NEW YORK CITY*

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STUDIES of infant mortality in the past have usually concentrated on possible explanations for high mortality rates. Infant mortality achieved an unprecedented decline in New York City in 1972, with a further reduction in 1973. The intent of the present report is to examine the trends and changing patterns in births in New York City, along with the changes which occurred in infant mortality during the past decade, in the hope that this analysis will point out the paths to pursue most productively for future decreases.

The 1960s in New York City witnessed a number of changes, including the establishment of new programs, many of which were federally sponsored and supported. Among these were the Maternity and Infant Care (MIC) projects, which were first launched in 1964 and were designed to supplement and enhance prenatal care in areas of high risk and deprivation. At this time too, special programs for unmarried mothers, especially teen-agers, were developing in the city.

Soon thereafter, official recognition was given to the opening of family-planning services in municipal and voluntary hospital clinics of the city. Prior to 1965 very few services of this special kind were available for the poor and for those who depended on clinics for care. Only those who had private physicians or who attended Planned Parenthood clinics were offered counselling in contraception. It was the exception rather than the rule for hospitals to maintain family-planning services before 1965. It was only after 1965 that such services became more

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widely available. During the latter half of the decade increasing efforts were exerted—through neighborhood counsellors, peer groups, and community organizations—to reach women who might need help.

Concomitantly the program of centers for the premature, launched in November 1948 in New York City, had begun to pay increasing dividends with the emergence of a group of highly skilled pediatricians and nurses who specialized in neonatology and applied their knowledge and expertness to developing intensive care units for infants at risk, whether born prematurely or otherwise jeopardized.

During the latter half of the decade advances occurred in obstetrics also. Fetal monitoring techniques have been applied more widely in the conduct of labor so that appropriate and timely decisions can be made as to the management of labor and the mode of delivery.

The years from 1960 to the present have been outstanding in terms of medical advances and legislative measures designed to extend medical care. The availability of legal abortions after July 1970 is especially noteworthy. At the same time some social problems—such as drug addiction among the young, illegitimacy, and family instability—have become increasingly prominent.

It is obvious that difficulties might be encountered in attempting a quantitative approach to the various elements that affected birth patterns and infant-mortality trends, since an interplay of factors existed. Nevertheless, we shall attempt to assess the various factors separately where possible.

In studying birth and infant mortality data from 1962 to 1971, three periods were designated as a framework:

1) Prior to 1965: i.e., before the establishment of widely available family-planning services.

2) 1966 to June 1970: family-planning; these services became available in most hospitals and clinics.*

3) July 1970 to the present: legalized abortion plus family-planning services.

While examining our data in the framework of these three periods, full recognition has been given to coexisting influences which might affect births and infant deaths, such as socioeconomic changes and significant recent advances in perinatal and neonatal medicine.

*MIC clinics and a variety of community outreach programs were also developing at this time.

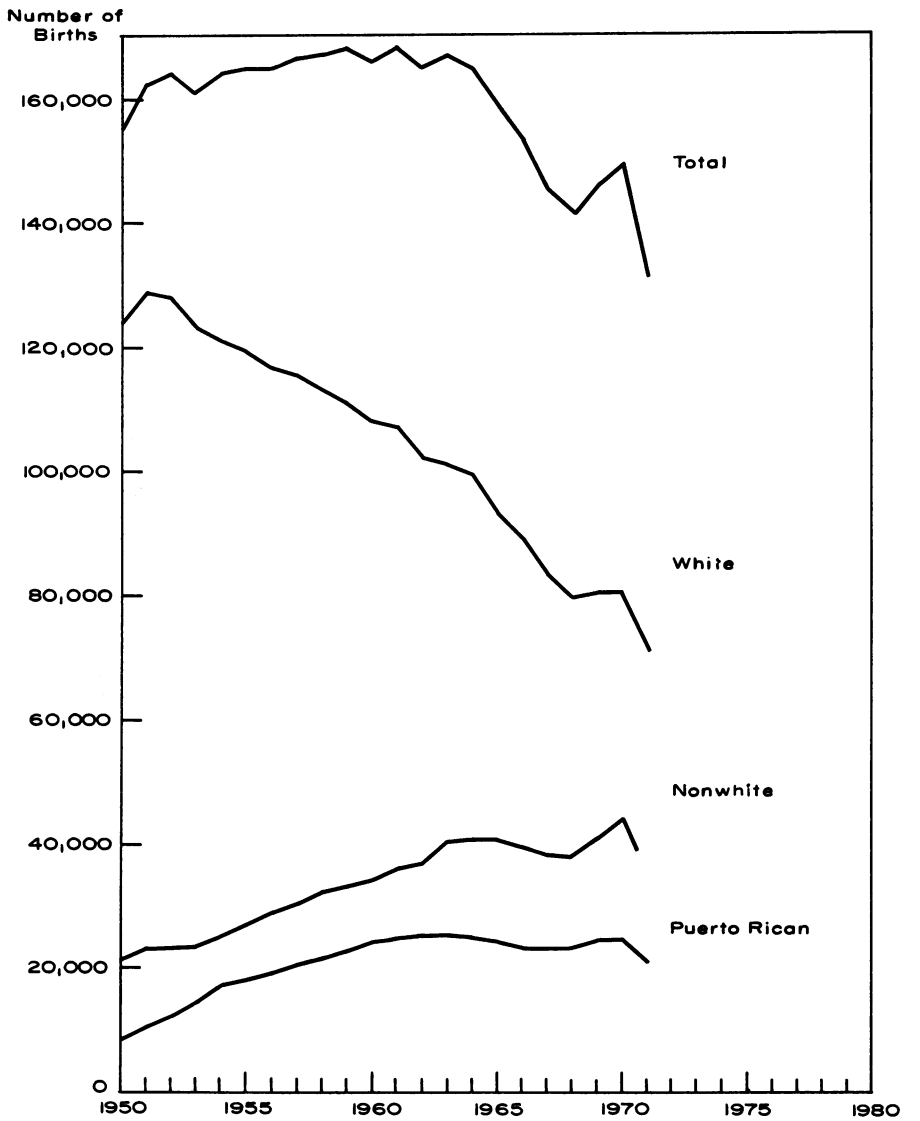

Fig. 1. Number of live births in New York City by ethnic group: 1950-1971.

Methodology

The following were utilized for this study:

1) Data from birth certificates which yielded information on births by mother's age, parity, marital status, and ethnic group; service or private category of hospital of birth; and birth-weight groupings.

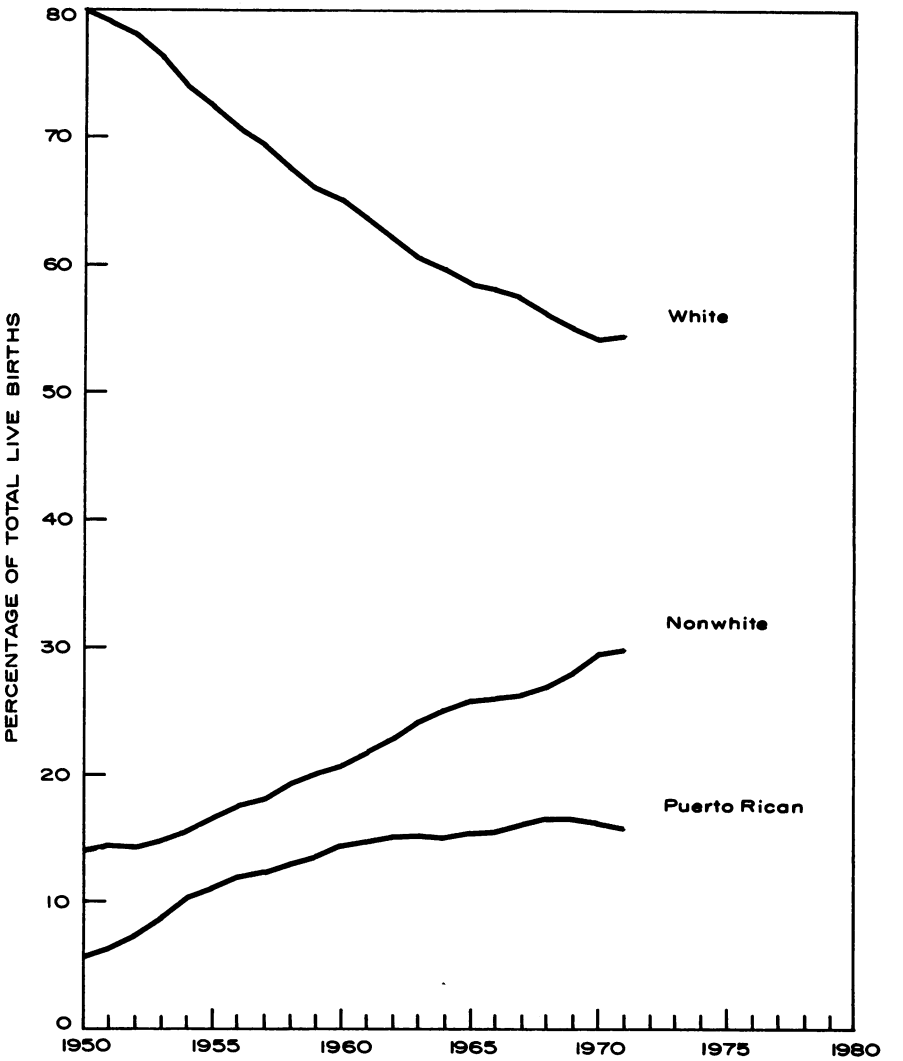

Fig. 2. Percentage of total live births in New York City contributed by each ethnic group: 1950-1971.

2) Census reports for 1960 and 1970 which yielded data on women of childbearing age (15-44 years) by age and ethnic groups.

3) Fertility rates, the measure of age-specific births by ethnic group, were determined by using population data (women of child-bearing age, 15-44 years) for the denominators and reported births (classified by age and ethnic group) for the numerators.

4) Data on infant mortality (deaths occurring in the first year of

life) were obtained from matched infant death and birth certificates classified by birth weight and ethnic group, as well as mother's age, parity, and marital status. Neonatal mortality was defined as deaths occurring from birth through 27 days of age. Postneonatal mortality was defined as deaths occurring from 28 days to one year of age.

5) Data on abortions were based on certificates of termination of pregnancy which yielded information on abortions by mother's age, ethnic group, residence, and other variables.

Results

Numbers and percentage of births by ethnic group (Figures 1 and 2). Contrary to prediction, births declined during the decade under review. For the white population the decline had begun earlier and in significant part was attributable to migration from the city. This decline accelerated additionally after 1970. In contrast, births among nonwhites had increased steadily through 1964. In 1965 a slight dip occurred, followed by a plateau through 1968. Thereafter, for the next two years (1969 and 1970) births rose among nonwhites. It was not until 1971 that a noticeable decline (10.9%) took place.

In the Puerto Rican group the trend was similar to that of the nonwhites in that the steady increase in births was altered after 1964. In this group there was a decline from 1965 through 1967, followed by a rise up to 1970. However, here too a significant downturn occurred in 1971, when there was a decline of 15%.

These data would indicate that family planning probably had altered the pattern of births to a varying degree for each ethnic group and had prevented the increase in births which had been predicted on the basis of increases in the childbearing population. It was not until 1971, however, that the dramatic decrease in births for all ethnic groups occurred. The changes then could be attributed in large measure to the effects of family planning and especially to liberalized abortion.

In summary, while births among whites became less numerous, nonwhite and Puerto Rican births increased during the first period, declined slightly during the second period, and declined quite distinctly in the third period. Despite these decreases, the proportion of nonwhite and Puerto Rican births continued to increase. The nonwhite proportion rose from 21% in 1960 to 30% in 1971 and the Puerto Rican from 14% in 1960 to 16% in 1971.

TABLE I. CHANGES IN NUMBER OF LIVE BIRTHS IN NEW YORK CITY BY AGE AND ETHNIC GROUP OF MOTHER: 1962-1971

Age of mother	*Percentage change*		
	1962-1965	*1966-1969*	*1970-1971*
White			
15-19	+ 2.4	— 6.2	—13.8
20-24	— 4.4	—13.0	—12.3
25-29	— 8.1	+ 0.9	— 8.7
30-34	—17.8	—15.7	—10.9
35-39	—14.5	—25.7	—14.2
40+	—12.6	—22.9	—20.1
Total	— 8.8	— 9.9	—11.2
Nonwhite			
15-19	+20.6	+12.8	—15.2
20-24	+ 8.4	+ 0.5	—10.3
25-29	+ 7.0	+ 3.3	— 9.2
30-34	— 0.5	+ 0.1	— 9.2
35-39	— 1.2	— 5.8	— 8.4
40+	+ 8.9	— 1.8	—10.6
Total	+ 8.1	+ 3.2	—10.9
Puerto Rican			
15-19	+ 3.5	+ 3.2	—15.4
20-24	— 2.6	+ 3.5	—15.4
25-29	— 6.6	+ 5.4	—13.4
30-34	— 1.4	— 4.1	—11.5
35-39	+ 3.3	— 9.7	— 6.0
40+	+10.2	—17.5	—21.3
Total	— 2.0	+ 1.9	—14.0
All ethnic groups			
15-19	+ 9.6	+ 3.4	—14.8
20-24	— 1.0	— 6.8	—12.3
25-29	— 4.9	+ 2.1	— 9.5
30-34	—12.7	—10.6	—10.5
35-39	—10.0	—19.3	—11.4
40+	— 6.2	—17.0	—17.6
Total	— 3.9	— 4.6	—11.6

TABLE II. AVERAGE AGE OF MOTHERS IN NEW YORK CITY BY ETHNIC GROUP: 1962-1971

Year	*White*	*Nonwhite*	*Puerto Rican*	*Total*
1962	27.5	25.7	25.3	26.8
1963	27.5	25.6	25.2	26.7
1964	27.3	25.6	25.2	26.6
1965	27.2	25.4	25.3	26.4
1966	27.0	25.3	25.2	26.2
1967	27.0	25.1	25.0	26.2
1968	26.9	25.0	25.1	26.1
1969	26.8	25.0	25.0	26.0
1970	26.6	25.1	25.2	25.9
1971	26.6	25.2	25.3	26.0

Births by age and ethnic group (Tables I and II). Births to teen-age mothers increased in the first period and continued to increase, although at a lower rate, in the second period. After 1970 a downturn occurred—these births declined almost 15% from 1970 to 1971. The exception was births to the white teen-age group, which declined slightly in the second period, while nonwhite and Puerto Rican teenagers registered a decrease only in the third period. Evidently family-planning services had less effect in curbing teen-age births than did availability of abortion.

Among women aged 20 to 24 years, births in the white group showed an accelerated decline in the second and third periods. For white women in this age group the period of family-planning apparently affected the percentage of decline in births as much if not more than the period of abortion.

For nonwhite women aged 20 to 24 years, family planning may have slowed the increase in births, but it was only after 1970 that a decline occurred; this was true also of the Puerto Rican group.

Among women aged 25 to 29 years, births in all ethnic groups increased at varying rates during the period of family planning; mothers in this age group may have planned to have babies even though family-planning services were available. Although decreases were also noted in this age group in the third period, the rate of decline in births was less for the 25 to 29-year-old group than was the total rate of decline in births for all age groups combined.

In all ethnic groups, among women aged 35 years and older, especially those over 40, the second and third periods were associated with decreases in births.

The average age of mothers decreased from 26.8 years in 1962 to 26.0 in 1971. Among whites the average decreased from 27.5 years to 26.6 years, among nonwhites from 25.7 years to 25.2 years; among Puerto Ricans it remained at 25.3 years.

Births by parity and ethnic group (Table III). Between 1963 and 1971 births by age groups showed a changing pattern. Women in their twenties had a relatively greater proportion of births than women in the later years. This was accompanied by a change in parity distribution: namely, a higher proportion of para I and para II and a lower proportion of higher parity. Births to para I and II women increased to 71% in 1971 from 61% in 1963 ; the proportion of births to para III and higher degrees of multiparity declined to 29% in 1971 from 39% in 1963.

TABLE III. PERCENTAGE OF LIVE BIRTHS IN NEW YORK CITY BY PARITY AND ETHNIC GROUP OF MOTHER: 1963-1971

Parity	*1963*	*1965*	*1966*	*1969*	*1970*	*1971*
White						
1	35.9	37.7	40.1	42.9	44.6	45.4
2	30.0	29.9	29.2	30.1	29.7	30.7
3	17.9	17.2	16.3	15.0	14.5	13.7
4	8.7	8.0	7.6	6.4	6.1	5.6
5	3.9	3.6	3.4	2.8	2.7	2.4
6+	3.5	3.5	3.4	2.8	2.4	2.1
Total	99.9	99.9	100.0	100.0	100.0	99.9
Nonwhite						
1	28.2	30.6	32.9	38.8	40.7	42.7
2	24.2	24.2	24.6	24.8	25.0	26.1
3	17.1	16.5	15.7	14.9	14.5	13.9
4	11.4	10.9	10.2	8.5	8.5	7.6
5	7.5	7.0	6.6	5.4	4.9	4.3
6+	11.5	10.8	10.0	7.6	6.4	5.5
Total	99.9	100.0	100.0	100.0	100.0	100.1
Puerto Rican						
1	29.6	29.3	30.4	31.6	33.7	33.7
2	25.4	25.8	25.6	25.7	25.4	26.9
3	17.4	17.3	17.5	17.3	17.1	17.2
4	10.7	11.0	10.5	10.6	10.3	10.0
5	6.5	6.3	6.3	6.4	6.1	5.8
6+	10.4	10.3	9.7	8.4	7.4	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
All ethnic groups						
1	33.1	34.6	36.7	39.9	41.6	42.7
2	27.9	27.8	27.5	27.9	27.6	28.7
3	17.7	17.0	16.4	15.4	14.9	14.3
4	9.6	9.2	8.7	7.7	7.5	6.9
5	5.2	4.9	4.7	4.1	3.9	3.5
6+	6.5	6.4	6.1	5.1	4.4	3.8
Total	100.0	99.9	100.1	100.1	99.9	99.9

Judging by the percentage declines of multiparas of each ethnic group in the three periods, it would appear that nonwhite women availed themselves of family planning more than Puerto Rican women. The Puerto Rican decline in multiparity was more evident after 1970, indicating greater reliance on abortion.

The average parity for all women declined from 2.5 in 1963 to 2.1 in 1971, with each ethnic group sharing in the decline. Average parity for white women decreased from 2.3 to 2.0, for nonwhites from 2.9 to 2.3, and for Puerto Ricans from 2.8 to 2.5 in that time. Thus, in 1971 the Puerto Ricans had the highest average parity and the nonwhites the

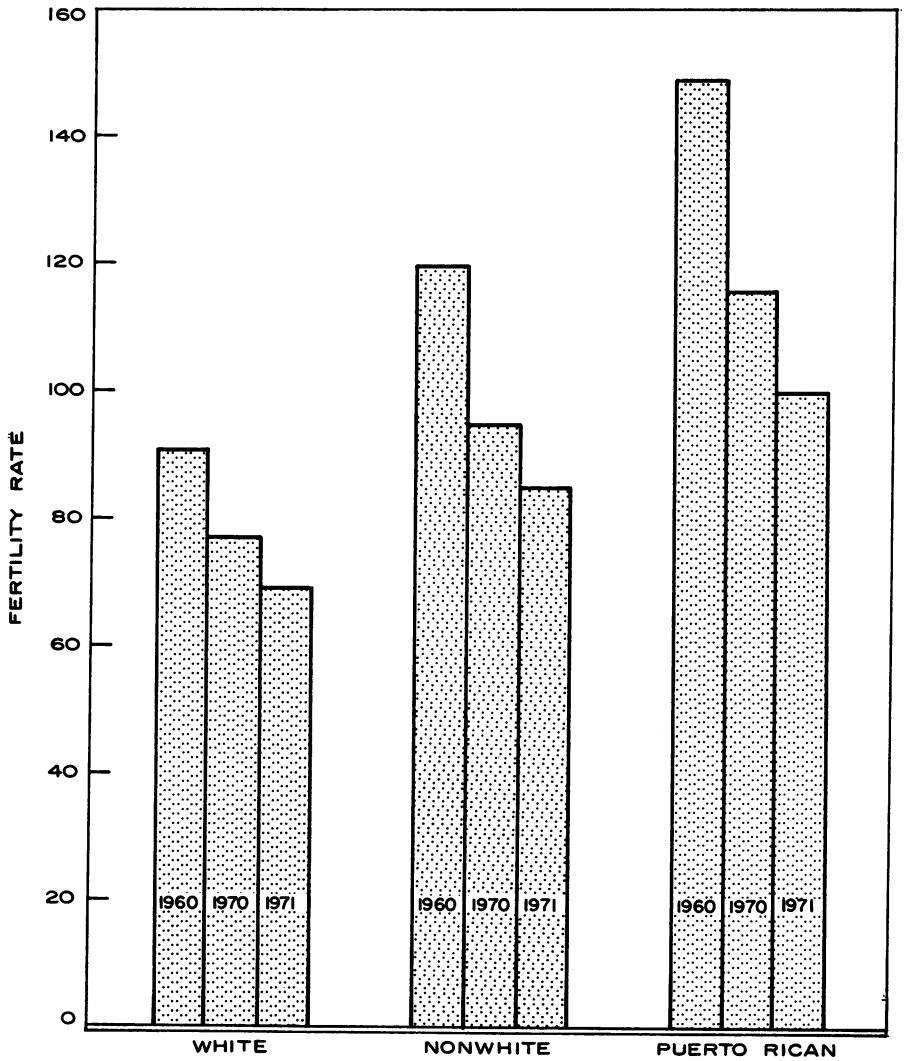

Fig. 3. Fertility rates in New York City by ethnic group: 1960, 1970, 1971.

second highest, reversing the order of 1963, when the nonwhite group was highest. Parity among whites continued to be lowest.

Fertility rates (Figure 3, Tables IV and V). Since birth trends are greatly influenced by the number of people in the childbearing ages, a review of census data is included in the present report. This showed that despite the decline for whites, the total number of females 15 to 44 years of age in New York City increased from 1.6 million in 1960 to

TABLE IV. FEMALE POPULATION IN NEW YORK CITY BY AGE AND ETHNIC GROUP: 1960 AND 1970

Age	*April 1, 1960*	*April 1, 1970*	*Percentage change: 1960 to 1970*
White			
15-19	187,543	180,956	— 3.5
20-24	182,693	229,415	+ 25.6
25-34	378,426	329,627	— 12.9
35-44	438,457	300,285	— 31.5
Total	1,187,119	1,040,283	— 12.4
Nonwhite			
15-19	35,846	82,709	+130.7
20-24	45,434	85,082	+ 87.3
25-34	102,955	160,274	+ 55.7
35-44	98,282	130,022	+ 32.3
Total	282,517	458,087	+ 62.1
Puerto Rican			
15-19	28,716	40,924	+ 42.5
20-24	32,157	42,848	+ 33.2
25-34	61,978	72,320	+ 16.7
35-44	37,560	53,318	+ 42.0
Total	160,411	209,410	+ 30.5
All ethnic groups			
15-19	252,105	304,589	+ 20.8
20-24	260,284	357,345	+ 37.3
25-34	543,359	562,221	+ 3.5
35-44	574,299	483,625	— 15.8
Total	1,630,047	1,707,780	+ 4.8

1.7 million in 1970, and the size of the nonwhite and Puerto Rican contingents increased. The proportion of nonwhites in the childbearing population increased from 17% in 1960 to 27% in 1970; for Puerto Ricans it increased from 10% to 12%; for whites the proportion decreased from 73% of the total in 1960 to 61% by 1970.

Were it not for the decline in the fertility rate in each ethnic group and each age subgroup during the decade, the resultant pattern of births would have been very different indeed. Fertility rates declined for each age group and in each ethnic group during the decade from 1960 to 1970; further decreases occurred in 1971. An exception was the rate for white teen-agers, which rose in 1970 and decreased in 1971.

Despite the decline in fertility rates in each of the ethnic groups, the increased proportion of nonwhites and Puerto Ricans of childbearing age—and the fact that their fertility rates were higher than those of whites—lessened the decline in the fertility rate of the total childbearing

TABLE V. FERTILITY RATES OF WOMEN IN NEW YORK CITY BY ETHNIC GROUP AND AGE: 1960, 1970, 1971

Age	1960	1970	1971	Percentage change: 1960 to 1970	Percentage change: 1970 to 1971
White					
15-19	31.2	35.9	31.0	+15.1	—17.6
20-24	178.7	120.8	105.9	—32.4	—12.3
25-34	148.9	121.3	109.9	—18.5	— 9.4
35-44	29.7	20.8	17.6	—30.0	—15.4
Total	90.8	77.3	68.7	—14.9	—11.1
Nonwhite					
15-19	156.1	112.2	95.5	—28.1	—14.9
20-24	259.0	173.7	155.7	—32.9	—10.4
25-34	130.6	103.6	94.0	—20.7	— 9.3
35-44	33.0	23.9	21.7	—27.6	— 9.2
Total	120.5	95.5	85.2	—20.7	—10.8
Puerto Rican					
15-19	134.0	96.2	81.6	—28.2	—15.2
20-24	290.0	222.9	188.6	—23.1	—15.4
25-34	145.7	129.9	113.2	—10.8	—12.9
35-44	46.8	27.6	25.1	—41.0	— 9.1
Total	149.4	116.3	100.0	—22.2	—14.0
All ethnic groups					
15-19	60.7	64.7	55.3	+ 6.6	—14.5
20-24	206.5	145.6	127.7	—29.5	—12.3
25-34	145.0	117.4	105.8	—19.0	— 9.9
35-44	31.4	22.4	19.5	—28.7	—12.9
Total	101.7	87.0	77.0	—14.5	—11.5

population in New York City. Nevertheless, the fertility rate of 101.7, which was found in 1960, decreased to 87.0 in 1970 and to 77.0 in 1971.

Analysis by the three periods showed that the first period was accompanied by a slight increase in the fertility rate, from 101.7 to 102.7. It was not until the latter part of the decade that the decreases in fertility in all ethnic groups were large enough to override the increased proportions of nonwhites and Puerto Ricans, with their continued comparatively high fertility rates, and to produce the 25% decline in the fertility rate among the totality of women aged 15 to 44.

If the fertility rates for all ethnic groups had remained unchanged at the levels reported for 1962, the births in 1971 would have numbered approximately 181,000—an unprecedented total predicted by many demographers.

Births by weight groupings (Figure 4, Tables VI and VII). The decade was marked by changes in the trends of births by weight dis-

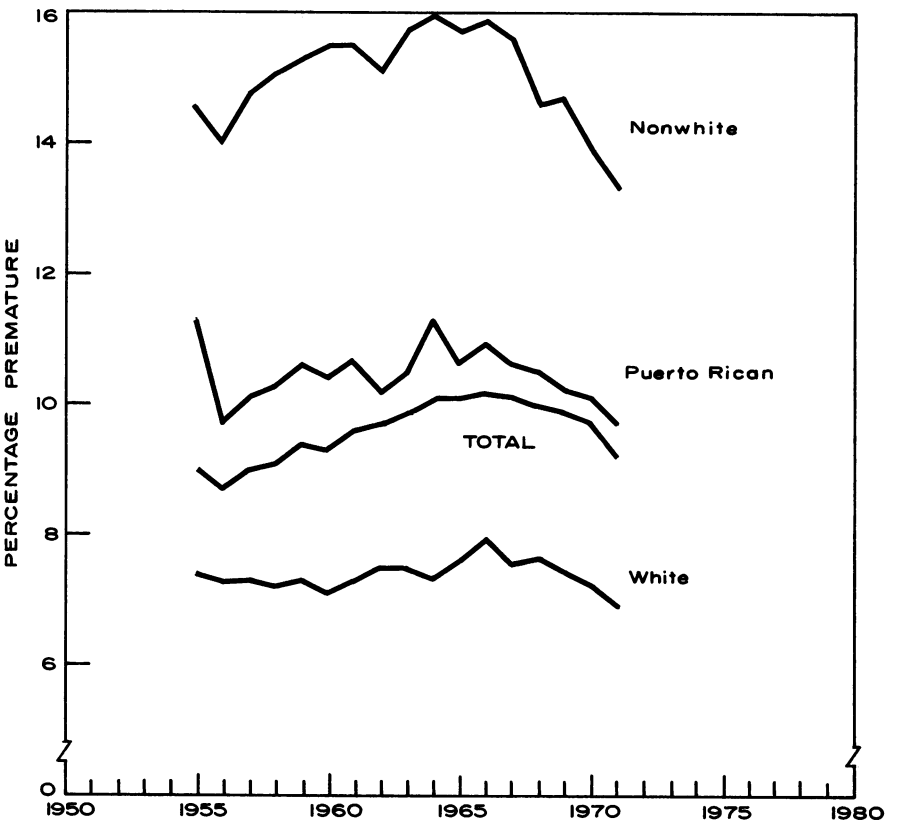

Fig. 4. Incidence of prematurity (births of less than 2,501 grams) in New York City by ethnic group: 1955-1971.

tribution. In the first period, prior to 1965, the number and percentage of infants weighing 2,500 gm. or less increased among nonwhites and Puerto Ricans. Among the whites, although the number of low-birth-weight infants was declining, their percentage did not decline appreciably since the number of infants weighing more than 2,500 gm. declined more.

However, during the second period (after 1965), a distinct decline was noted for each ethnic group. By the third period (1970 to 1971) the decline became even more evident, especially among nonwhites and Puerto Ricans.

The smallest infants in all ethnic groups, that is, those weighing 1,500 gm. or less at birth, whose proportion had increased in the first period, showed the greatest decline of all weight groups, starting in the

TABLE VI. CHANGE IN NUMBER OF LIVE BIRTHS IN NEW YORK CITY BY WEIGHT AND ETHNIC GROUP: 1962-1971

Weight at birth (in grams)	*Percentage change*		
	1962-1965	*1966-1969*	*1970-1971*
White			
Under 1,001	— 1.6	— 7.7	—25.1
1,001-1,500	— 2.4	—12.7	—18.9
1,501-2,000	—14.7	—13.9	—17.8
2,001-2,500	— 7.2	—15.7	—14.2
Under 2,501	— 7.8	—14.8	—15.7
2,501+	— 8.9	— 9.4	—10.8
Total	— 8.8	— 9.9	—11.8
Nonwhite			
Under 1,001	+10.0	— 1.5	—23.6
1,001-1,500	+19.2	— 5.8	—20.6
1,501-2,000	+11.0	— 0.2	— 8.0
2,001-2,500	+11.4	— 6.9	—14.8
Under 2,501	+11.9	— 5.0	—14.8
2,501+	+ 7.5	+ 4.9	—10.2
Total	+ 8.1	+ 3.2	—10.9
Puerto Rican			
Under 1,001	— 7.6	—11.0	—16.3
1,001-1,500	+12.9	— 9.5	—24.9
1,501-2,000	— 0.4	+ 4.2	—19.5
2,001-2,500	+ 2.4	— 5.0	—16.3
Under 2,501	+ 1.8	— 4.1	—17.6
2,501+	— 2.3	+ 2.9	—13.6
Total	— 2.0	+ 1.9	—14.0
All ethnic groups			
Under 1,001	+ 3.3	— 4.9	—27.8
1,001-1,500	+ 9.2	— 9.0	—20.6
1,501-2,000	— 2.5	— 5.2	—13.5
2,001-2,500	+ 0.5	—10.7	—14.8
Under 2,501	+ 0.8	— 9.2	—15.6
2,501+	— 4.4	— 4.0	—11.1
Total	— 3.9	— 4.4	—11.6

second period, with even further declines in the third period. It would appear that the era of family planning and other concomitant health measures were having an impact which was distinctly intensified in the third period. Since this group of infants had constituted the highest mortality risk, this change was bound to have a favorable influence in lowering the infant-mortality rates.

Births by mother's marital status (Table VIII). It is striking that during the first period, although total births were declining, out-of-wedlock births were rising. In 1962 16,412 births, or 9.9% of all births in New York City, were out-of-wedlock. By 1965 the number rose to

TABLE VII. CHANGE IN BIRTH WEIGHTS IN NEW YORK CITY BY ETHNIC GROUP: 1962-1971

Weight at birth (in grams)	*Percentage change*		
	1962-1965	*1966-1969*	*1970-1971*
White			
Under 2,501	— 7.8	—14.8	—15.7
2,501+	— 8.9	— 9.4	—10.8
Nonwhite			
Under 2,501	+11.9	— 5.0	—14.8
2,501+	+ 7.5	+ 4.9	—10.2
Puerto Rican			
Under 2,501	+ 1.8	— 4.1	—17.6
2,501+	— 2.3	+ 2.9	—13.6
All ethnic groups			
Under 2,501	+ 0.8	— 9.2	—15.6
2,501+	— 4.4	— 4.0	—11.1

20,980, or 13.2%. This rise continued unabated during the second period, and by 1969 the number rose to 29,325, or 20.1% of all births. One might postulate that if family-planning services had not been available the rate of increase might have been even steeper, since the young childbearing population, with its relatively high proportion of out-of-wedlock births, had increased. By 1970 a peak of 31,903 such births, or 21.4%, was reached. It was only after 1970 that a reversal in the steady upward trend took place, with every ethnic group showing a downturn. In 1971 the number declined to 28,099, a decrease of almost 12% since 1970. Quite obviously, it was only after abortions became available that the number of out-of-wedlock births began to diminish. Two thirds of the terminations of pregnancy for New York City residents were among the unmarried, and 90% of the teen-agers undergoing abortions were unmarried.

Births by socioeconomic status (Table IX). The socioeconomic status of the childbearing population can be gauged roughly by the proportion of births on private or general hospital service. Births on private service for Puerto Ricans rose from 8.5% of the total in 1962 to more than 21% in 1971, while births on private service for nonwhites rose from 14% in 1962 to more than 27% in 1971. Births to whites on private service, conversely, dropped from 83% in 1962 to 77.6% in 1971.

It should be pointed out that a certain proportion of patients covered by Medicaid have been cared for on private services. Therefore, it can-

TABLE VIII. CHANGE IN NUMBER OF LIVE BIRTHS IN NEW YORK CITY BY LEGITIMACY AND ETHNIC GROUP: 1962-1971

	Percentage change		
	1962-1965	*1966-1969*	*1970-1971*
White			
In-wedlock	—10.2	—11.5	—10.7
Out-of-wedlock	+39.2	+21.4	—18.1
Total	— 8.8	— 9.9	—11.2
Nonwhite			
In-wedlock	+ 1.1	— 6.2	—10.5
Out-of-wedlock	+26.7	+20.6	—11.4
Total	+ 8.1	+ 3.2	—10.9
Puerto Rican			
In-wedlock	— 5.3	—12.0	—16.5
Out-of-wedlock	+21.0	+64.1	— 8.7
Total	— 2.0	+ 1.9	—14.0
All ethnic groups			
In-wedlock	— 7.4	—10.5	—11.5
Out-of-wedlock	+27.8	+29.1	—11.9
Total	— 3.9	— 4.6	—11.6

not be assumed that the economic status of all patients on private service was necessarily good. However, the increasing proportion suggests that the economic status of the minority groups had been improving.

Another indicator of economic status is the median family income. This increased for all ethnic groups from 1960 to 1970, the greatest increase being for whites and the least for Puerto Ricans. These income data are limited in value since they were not restricted to the population of childbearing age alone. Median annual income for whites in New York City rose from $6,627 in 1959 to $11,183 in 1969, for nonwhites from $4,437 to $7,150, and for Puerto Ricans from $3,811 to $5,575. These gains in earnings have been offset to some degree (the consumer price index in the New York area rose by 29.3% during this period*) by inflation and the increased cost of living which is presently worsening. Accordingly, the economic gains may be lost or present conditions even worsened in the forseeable future.

Another approach to the question of socioeconomic level is to review the welfare or public assistance rolls throughout the decade. Births to families on public assistance had increased steadily during the first pe-

*Glazier, R. A.: *Census Bulletin No. 16.* Research and Program Planning Information Dept., Community Council of Greater New York, August 10, 1972.

TABLE IX. PERCENTAGE OF LIVE BIRTHS IN NEW YORK CITY BY TYPE OF HOSPITAL SERVICE AND ETHNIC GROUP: 1962-1971

	White		*Nonwhite*		*Puerto Rican*		*Total*	
	Private	*General*	*Private*	*General*	*Private*	*General*	*Private*	*General*
1962	83.2	16.3	14.2	80.2	8.5	87.5	56.1	41.7
1963	*	*	*	*	*	*	54.5	43.5
1964	81.3	17.4	13.8	81.8	7.8	89.8	53.3	45.6
1965	80.9	18.0	13.6	85.0	8.3	91.0	52.4	46.5
1966	80.4	19.2	14.6	83.5	8.8	89.3	52.1	46.9
1967	79.8	19.6	16.5	81.9	9.9	88.4	52.1	47.0
1968	80.6	19.0	22.7	75.8	14.4	83.8	53.9	45.2
1969	80.1	19.5	26.3	72.4	19.1	79.6	54.8	44.4
1970	78.5	21.1	26.9	71.9	21.2	77.8	53.9	45.4
1971	77.6	22.1	27.3	71.5	21.1	78.0	53.6	45.7

*Data not available.

riod, reaching a monthly average of 173 births per 1,000 women of childbearing age. During the second period, their birth rate declined to 115 in 1969. However, the numbers of families enrolled on Aid to Dependent Children (ADC) were mounting, causing the total number of births to continue to increase. It was only in the third period that the rate of decline (down to 72 per 1,000 in 1972, a decline of almost 60%), was so great as to achieve a reversal in the rising tide of births to the group supported by ADC, so that these births actually showed a drop for the first time.* The availability of abortions and counselling in family planning probably brought about this alteration.

Births in relation to prenatal care. According to birth-certificate data, the proportion of women estimated to have received early and intermediate prenatal care was more than 72% of the total. This is believed to be a very conservative estimate. If a patient has received prenatal care somewhere other than at the hospital of delivery, the birth certificate may not reflect this. Information from the MIC projects indicates that an even higher proportion (84%) of women received early or intermediate prenatal care; the proportion coming for care during the first trimester has been steadily increasing since the project got underway, with an acceleration after 1970, when pregnancy testing became readily available. By 1972 MIC project data show that 30% of MIC patients registered for care during the first trimester.†

*Rosner, H. J.: Personal communication based on Program Briefs No. 13, 1970, and No. 6, 1972. New York State Dept. of Social Services.

†Daily, E. and Nicholas N.: A free pregnancy testing service. *Family Planning Persp. 5:* 6, 1973.

TABLE X. RATIO OF ABORTIONS TO LIVE BIRTHS IN NEW YORK CITY BY ETHNIC GROUP: 7/1/70-6/30/71

Ethnic group	*Abortion rate*	*Ratio*
White	372.9/1,000 births	1:3
Nonwhite	562.8/1,000 births	1:2
Puerto Rican	250.4/1,000 births	1:4
Total	411.6/1,000 births	1:2

Supplementing hospital programs through these special clinics, Medicaid, and outreach programs (many federally funded) has undoubtedly significantly improved the availability of prenatal care.

Trends in obstetrics. Advances have also been made in obstetrics during this decade, for example in the judicious use of caesarean section as a substitute for a long, arduous, and traumatic labor and delivery by high forceps and breech extraction. The percentage of caesarean sections increased from 5.8% in 1962 to 9% in 1971. Monitoring of the fetal heart during labor and anticipatory approaches toward complications of labor and delivery have also succeeded in substantially lowering the risks to mothers and infants. The administration of Rhogam has prevented mothers from becoming sensitized, thereby reducing the incidence of erythroblastosis in infants.

Advent of liberalized abortions. Prior to 1970 the number of therapeutic abortions per year performed in New York City was very small; for example, 210 were performed in 1962. In 1964, due to a severe outbreak of rubella, therapeutic abortions increased to 588 (most were private patients). By 1965 the number dropped back to 285; with increases thereafter it reached 850 by 1969. Evidently "unofficial" liberalization had begun to occur.

With the advent of the change in the New York State law on July 1, 1970, abortions to residents in the ensuing 12-month period totalled close to 51,000 and in the following 12 months approximately 64,000. This enormous increase in legal abortions undoubtedly affected the number of births.

The ratios of abortions to births for residents in the first year (July 1, 1970-June 30, 1971) are shown in Table X. From this table it is apparent that the nonwhites had the highest ratio, one abortion for approximately every two births, whites were second with about one abortion

TABLE XI. ABORTIONS AND BIRTHS FOR RESIDENTS OF NEW YORK CITY BY AGE OF MOTHER

Age of mother	*7/1/70-6/30/71 Abortions per 1,000 females*	*1971 Births per 1,000 females*
15-19	35.4	55.3
20-24	59.5	127.7
25-29	47.8	128.9
30-34	34.8	76.7
35-39	19.6	32.9
40-44	6.5	7.1
Total	36.2	77.0

for every three births, and Puerto Ricans were third, with one abortion for every four births.

The actual decline in births for each ethnic group reflects this pattern. The pattern for abortions and for live births by age groups is shown in Table XI. For the over-all resident childbearing population, the ratio of abortions to births was one to approximately two, but for the youngest and oldest groups the ratio was even higher: one abortion to 1.6 births in the younger-than-20 group and one abortion to 1.5 births in the group 35 and older. Indeed, among women 40 or older the ratio was almost one-to-one. In view of these high ratios one would expect a decline in births, particularly among the very young and the older age groups. This was substantiated by our findings in the changes in patterns of live births.

Trends in conditions present during pregnancy. In general, "conditions present during pregnancy," as noted on birth certificates, have not changed in incidence during the 10-year period reviewed, with the exception of drug addiction.

The item "narcotic addiction" was reported for 0.2% of all births in 1968 (when first recorded), but by 1971 rose to 0.5% and in 1972 rose again to 0.8%. Even though this percentage appears low, the impact is great since this group of births is associated with high rates of low birth weight and infant mortality.

An analysis of birth certificates revealed that 37.5% of infants born to addicted mothers weighed less than 2,501 gm., in contrast to 9.1% of all births in New York City which were below that weight. In 1968 the infant-mortality rate among this group was 67.7/1,000 live births—almost three times as great as the city's over-all infant-mortality rate.

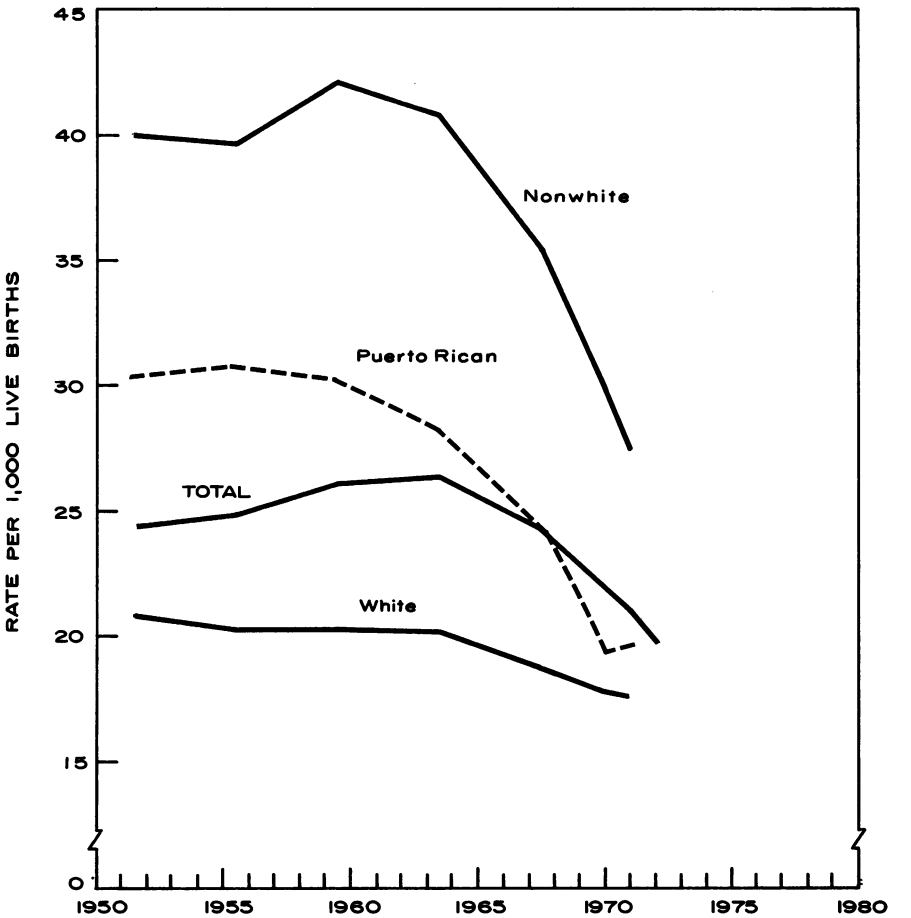

Fig. 5. Total infant mortality rates in New York City by ethnic group: 1950-1971. Rates for 1950-1969 are four-year averages.

Under-reporting* on birth certificates of complications and conditions present during pregnancy, especially drug addiction, exists. Therefore, the cited figures were a minimal estimate of the actual occurrence.

Trends in infant mortality by ethnic group (Figures 5, 6, and 7, Table XII). Data on infant-mortality rates revealed that during the first period changes were slight and that, despite slight declines in neonatal mortality for each ethnic group, the increased proportions of nonwhite and Puerto Rican births offset the decline, resulting in a slight over-all increase in neonatal mortality.

*Knowledge of under-reporting is based on unpublished sample studies of hospitals in New York City by the Department of Health.

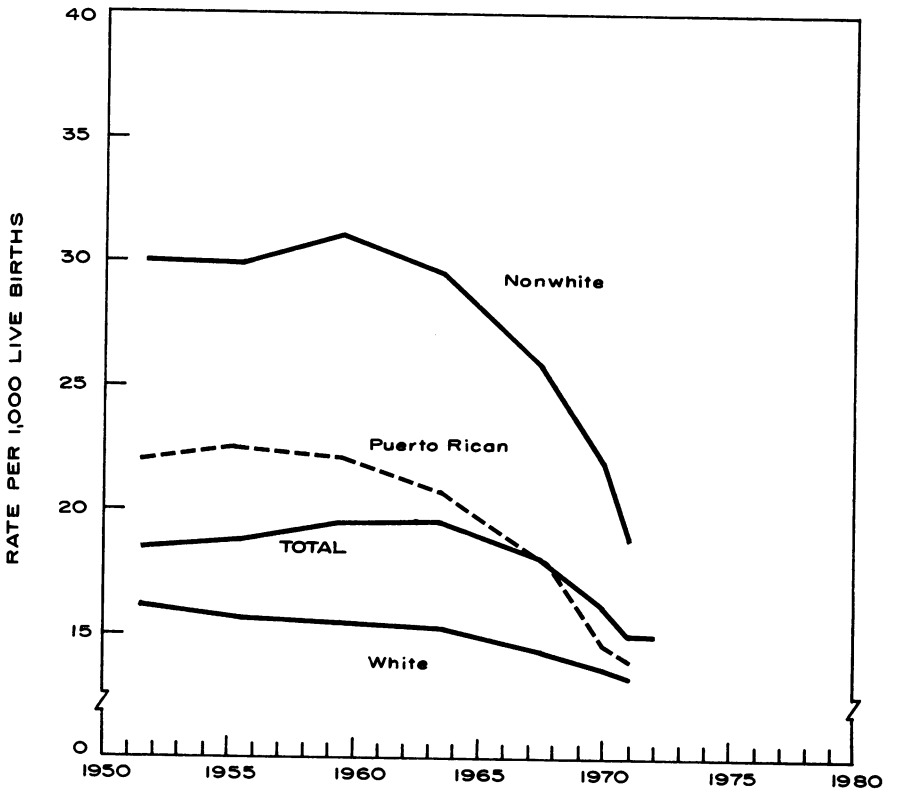

Fig. 6. Neonatal mortality rates in New York City by ethnic group: 1950-1971. Rates for 1950-1969 are four-year averages.

It was only after 1965 that a distinct pattern of decline emerged for infant mortality, primarily among neonates. The second and third periods witnessed a sustained decline, achieving an unprecedented minimum as of this date. Likewise, the perinatal mortality rate* declined, especially after 1970, to a new low of 24.7. This is all the more noteworthy in view of the increased proportion of nonwhite and Puerto Rican births with higher mortality rates than for whites. This disparity in rates was still evident in 1971, although the gaps have been narrowing, especially in comparing the infant-mortality rates for whites and Puerto Ricans.

*In the present study the perinatal mortality rate is defined as the number of deaths among infants less than seven days old plus the number of deaths among fetuses aged 28 weeks or older, multiplied by 1,000, and divided by the number of live births plus the number of deaths among fetuses aged 28 weeks or older.

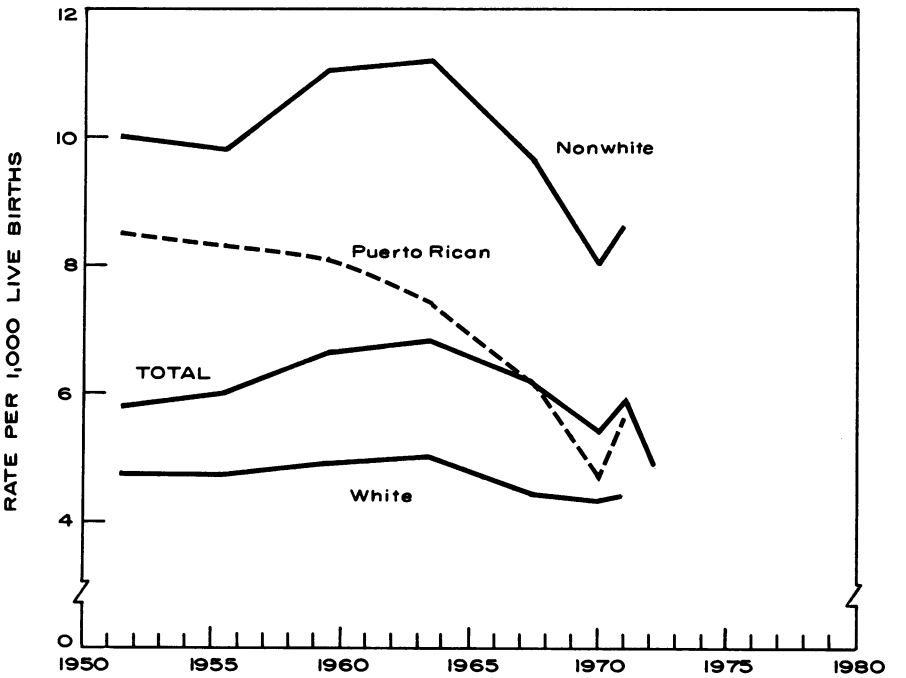

Fig. 7. Postneonatal mortality rates in New York City by ethnic group: 1950-1971. Rates for 1950-1969 are four-year averages.

Trends in infant mortality by weight group (Tables XIII and XIV). Great progress has been made in increasing the survival of low-birth-weight infants as well as normal-weight infants. Every weight group shared in this progress. These achievements have been brought about by advances in medical and nursing skills in delivery rooms and premature centers and the development of intensive care units staffed by neonatologists.

Neonatal mortality declined by 20% or more in the decade, with every weight group of every ethnic category sharing in the decline. Three fourths of the decline was made possible by the reduction in mortality of the low-birth-weight infants. (In fact, if 1962 infant-mortality rates had prevailed in 1971, despite the reduction in number of low-birth-weight infants, infant mortality would have been 24.6/1,000 instead of 20.9/1,000, or 18% higher.)

Trends in infant mortality by mother's age and parity (Table XV). A review of the statistical data since 1963 revealed that a steady decline had taken place in the infant-mortality rate for each age group and for

TABLE XII. AVERAGE INFANT MORTALITY RATES* IN NEW YORK CITY BY ETHNIC GROUP: 1950-1971

Period	Neonatal				Postneonatal				Total mortality			
	White	Non-white	Puerto Rican	Total	White	Non-white	Puerto Rican	Total	White	Non-white	Puerto Rican	Total
1950-1953	16.1	30.0	22.1	18.5	4.7	10.0	8.3	5.8	20.8	40.0	30.4	24.3
1954-1957	15.6	29.9	22.5	18.8	4.7	9.8	8.3	6.0	20.3	39.7	30.8	24.8
1958-1961	15.4	31.0	22.2	19.5	4.9	11.1	8.1	6.6	20.3	42.1	30.3	26.1
1962-1965	15.2	29.5	20.8	19.6	5.0	11.2	7.4	6.8	20.2	40.7	28.2	26.4
1966-1969	14.3	25.8	18.2	18.0	4.4	9.6	6.1	6.1	18.7	35.4	24.3	24.1
1970	13.6	21.9	14.6	16.2	4.3	8.0	4.7	5.4	17.9	29.9	19.3	21.6
1971	13.2	18.8	14.1	15.0	4.4	8.6	5.6	5.9	17.6	27.4	19.7	20.9

*Per 1,000 live births.

TABLE XIII. NEONATAL MORTALITY RATES* IN NEW YORK CITY BY WEIGHT AT BIRTH: 1962 AND 1971

Weight at birth (in grams)	*Year*		*Percentage change 1962 to 1971*
	1962	*1971*	
Under 1,001	87.5	79.0	— 9.7
1,001-1,500	45.0	33.8	—24.9
1,501-2,000	14.4	9.2	—36.1
2,001-2,500	3.2	2.5	—21.9
Under 2,501	14.8	10.9	—26.4
2,501+	0.5	0.4	—20.0
Total	2.0	1.5	—25.0

*Per 100 live births.

every parity. On the whole, the most favorable age group for low infant mortality has been and still appears to be the 25 to 29-year-old group in the para I and II groups.

The proportion of births to the 25 to 29-year-olds in the para I and II category rose from 15.6% in 1962 to 20.5% in 1971. No demonstrable change had occurred in this proportion until 1966, when it rose to 16.0%, and then rose steadily thereafter to 20.5% in 1971.

Thus, the increasing proportion of births to the lowest risk age and parity groups as well as the declining mortality during the decade has had a favorable impact on the over-all infant-mortality rates. If the distribution by age and parity had remained the same as in the first period, the infant-mortality rate would have been 21.7/1,000 live births in 1971 rather than the actual rate of 20.9/1,000 in 1971, or almost 4% higher. On the other hand, if the 1962 infant-mortality rates had remained unchanged, even though the distribution by age and parity was more favorable, the infant-mortality rate in 1971 would have been 26.3/1,000 live births rather than 20.9/1,000, or 26% higher.

Trends in infant mortality by mother's marital status (Figure 8, Table XVI). Infant-mortality rates, which were always much higher for out-of-wedlock than for in-wedlock births, declined for both groups, with the disparity persisting.

In 1971 the infant-mortality rate for in-wedlock births was 15.4/1,000, while the out-of-wedlock rate was 31.7/1,000, or twice as high.

The large number and proportion of out-of-wedlock births still occurring in New York City (28.099, or 21.3%, in 1971), despite the improvement in their mortality, have impeded what might have been

TABLE XIV. NEONATAL MORTALITY RATE* IN NEW YORK CITY BY WEIGHT AT BIRTH AND RACE:† 1962-1971

Weight at birth (in grams)	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*
Under 1,000	87.5	87.1	88.4	87.9	86.4	84.9	82.5	86.0	80.0	79.0
White	91.5	88.4	93.3	91.8	90.1	88.6	88.3	95.0	81.3	87.3
Nonwhite	83.6	85.8	83.9	84.5	83.3	82.1	77.4	78.8	78.8	71.8
1,001-1,500	45.0	44.3	43.8	40.8	36.6	35.9	34.5	39.0	33.4	33.8
White	50.5	49.8	52.6	48.0	40.9	43.2	38.9	47.5	38.4	12.8
Nonwhite	38.3	37.9	34.2	33.3	31.8	28.6	29.5	29.9	28.5	24.8
1,501-2,000	14.4	12.1	12.9	11.5	11.0	11.0	11.2	10.8	10.0	9.2
White	17.4	14.7	16.0	14.0	13.1	13.4	13.2	12.8	13.1	12.9
Nonwhite	9.9	8.6	8.9	8.4	8.2	7.7	8.4	8.4	6.3	5.8
2,001-2,500	3.2	2.8	2.8	2.6	2.4	2.2	2.3	2.6	2.3	2.5
White	3.5	3.2	3.1	3.1	2.8	2.5	2.9	2.9	2.7	3.2
Nonwhite	2.6	2.0	2.3	1.9	1.8	1.6	1.3	2.1	1.7	1.6
Under 2,501	14.8	14.0	14.6	13.9	12.8	12.8	12.5	13.3	11.5	10.9
White	14.3	13.6	14.5	13.4	12.3	12.1	12.4	13.3	11.5	11.8
Nonwhite	15.7	14.6	14.9	14.7	13.5	13.8	12.7	13.3	11.6	9.8
2,051+	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4
White	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
Nonwhite	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5
Total	2.0	1.9	2.0	1.9	1.9	1.8	1.7	1.8	1.6	1.5
White	1.7	1.6	1.7	1.6	1.5	1.5	1.5	1.6	1.4	1.3
Nonwhite	3.0	2.8	3.0	2.9	2.8	2.7	2.3	2.4	2.2	1.9

*Per 100 live births.

†Puerto Ricans are included in the white and nonwhite rates: 95% white, 5% nonwhite.

an even greater reduction in the city's over-all infant-mortality rate. Indeed, if the number of out-of-wedlock births had remained at the level of the previous decade, the infant-mortality rate would have declined even further, to 16.6/1,000, instead of 20.9/1,000 in 1971. On the other hand, if the infant-mortality rates had not improved for the out-of-wedlock births, the infant-mortality rate in 1971 would have been 29.1/1,000 live births or 39.2% higher.

Other factors in infant-mortality trends. One must be aware of the existing serious problems in New York City which are exerting unfavorable influences on infant survival. Drug addiction of mothers is certainly one of these; environmental and social factors are others.

Despite the advances in housing in the decade, inadequacies in housing and other environmental deprivations still exist which foster aberrant behavior and life styles inimical to motherhood and infant survival. A sample study of infant-mortality rates (1968-1970) among residents in housing projects showed a significantly lower rate for them as com-

TABLE XV. INFANT MORTALITY RATES* IN NEW YORK CITY BY AGE OF MOTHERS AND BIRTH ORDER: 1963-1971 (EXCLUDING 1968-1970)

Birth order	*Age of mother*						
	Under 20	*20-24*	*25-29*	*30-34*	*35-39*	*40 and older*	*All ages*
				1963-1965			
1	26.3	17.5	16.5	21.6	30.3	21.1	20.0
2	48.0	23.8	16.9	18.2	24.9	38.4	23.2
3	59.3	33.3	21.0	20.7	19.3	33.6	25.6
4	71.6	41.8	28.7	18.6	27.6	23.1	28.8
5+	93.8†	47.9	37.5	31.0	27.3	29.1	33.4
Total	33.3	24.0	21.5	22.8	26.5	29.8	24.4
				1966-1967			
1	24.9	15.8	15.9	21.3	29.4	26.7	18.9
2	46.0	22.0	14.4	19.2	17.1	28.6	21.4
3	54.9	29.2	17.7	16.9	19.4	18.9	22.2
4	64.4	33.3	27.1	22.3	25.8	29.4	27.4
5+	63.5†	47.5	31.0	28.7	25.6	18.6	29.5
Total	31.2	21.1	18.5	21.6	23.3	22.6	22.2
				1971			
1	26.7	13.7	13.3	16.3	18.6	10.6	17.0
2	41.8	15.7	13.3	14.0	18.3	21.3	17.0
3	54.5	28.1	16.1	15.5	21.5	31.9	21.0
4	42.6†	28.0	20.7	16.4	20.1	24.5	21.2
5+	71.4†	41.1	21.2	24.5	21.6	24.1	24.4
Total	30.7	17.0	15.0	17.0	20.2	22.8	20.9

*Per 1,000 live births.
†Based upon less than 100 births.

pared with the rest of the city. Infant mortality for whites in housing projects was 6.8% lower than for those living outside of projects. For nonwhites, the mortality was 14.2% lower for those in housing projects as compared with those residing outside of projects.

SUMMARY

Trends in births in New York City were compared with those of the United States for the period under study (Figure 9). Initially, when births in the country were decreasing, births in New York City were still increasing. When a decrease in the city's births first became apparent, it was less than the nationwide decrease. However, after 1966 (the second period) the decline in the city's births was steeper than that of the entire country. In the third period the percentage decrease in New York City births was greatly accentuated. The decline was 11.6% in the city from 1970 to 1971, compared with the national decline of 4.3%. From 1971 to 1972 the city's births declined another 11.2%, while the

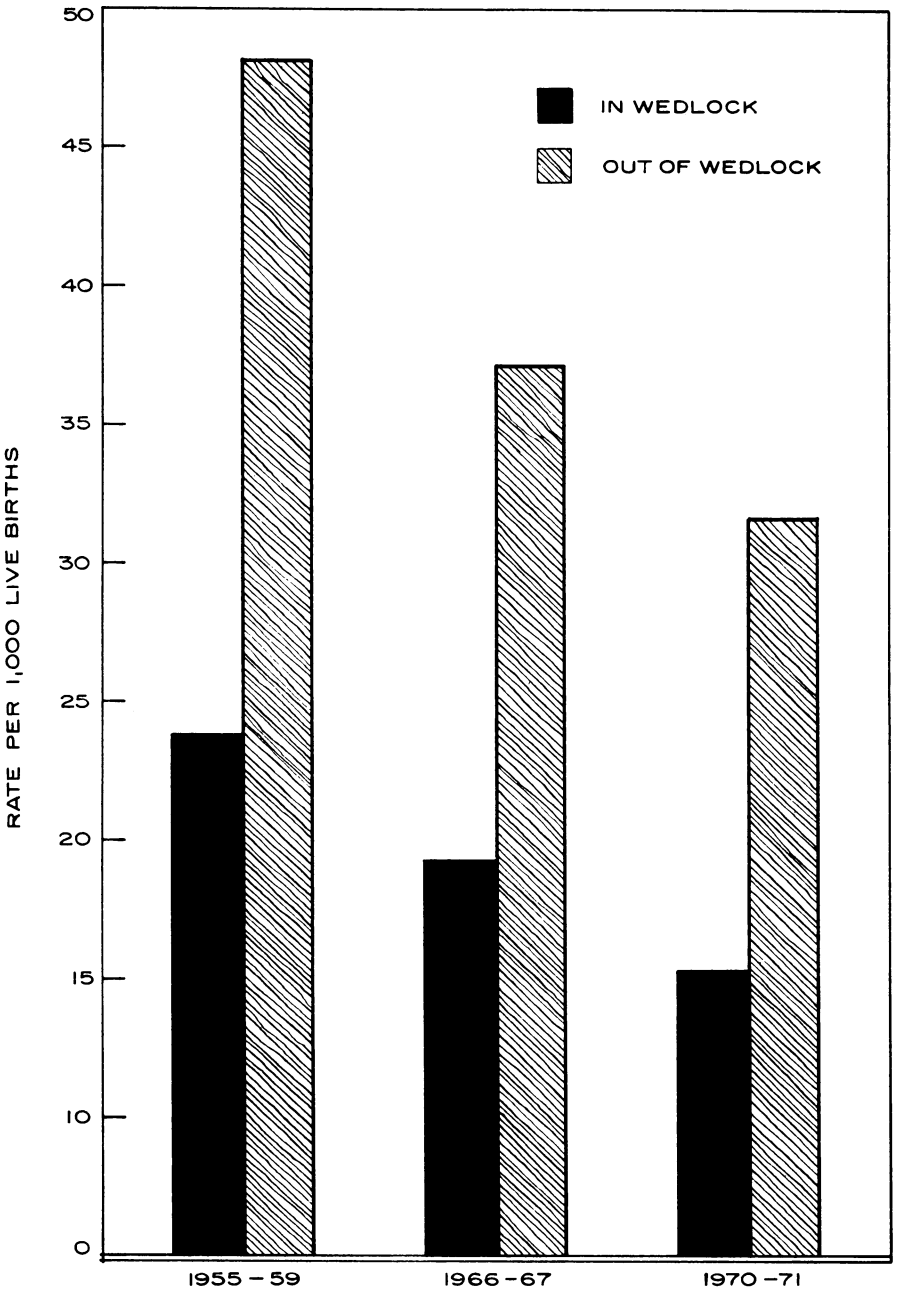

Fig. 8. In-wedlock and out-of-wedlock infant-mortality rates in New York City: 1955-1971.

TABLE XVI. INFANT MORTALITY RATES* IN NEW YORK CITY BY LEGITIMACY AND ETHNIC GROUP: 1955-1971 (EXCLUDING 1968-1970)

	Infant Mortality			
Ethnic groups	*In-wedlock*	*Out-of-wedlock*	*Ratio of out-of-wedlock to in-wedlock*	*Total*
		1955-1959		
White	20.1	35.0	1.7:1	20.4
Nonwhite	38.3	51.9	1.4:1	41.6
Puerto Rican	29.3	48.3	1.7:1	31.4
Total	23.9	48.2	2.0:1	25.7
		1966-1967		
White	15.4	28.4	1.8:1	16.0
Nonwhite	30.7	41.1	1.3:1	34.5
Puerto Rican	22.3	32.7	1.5:1	24.4
Total	19.4	37.1	1.9:1	22.2
		1971		
White	13.0	28.9	2.2:1	17.6
Nonwhite	21.6	35.3	1.6:1	27.4
Puerto Rican	16.9	25.1	1.5:1	19.7
Total	15.4	31.7	2.1:1	20.9

*Per 1,000 live births.

national decline was 8.5%. Undoubtedly, family-planning services had an impact on trends, but abortions affected the degree of decline even more significantly in New York City—and to some extent nationally, in view of the many thousands of nonresidents who obtained abortions in New York City.

In New York City the decade from 1962 to 1971 was marked by changes in birth trends which were contrary to the expectations of many demographers who based their predictions on increases which had occurred in the childbearing population.

Analysis of births and infant mortality during this span of time was carried out largely in the framework of the three periods mentioned:

1) Before family planning, 1962-1965

2) After the advent of family-planning services concomitant with other medical advances in obstetrics and neonatology, 1966 through June 1970

3) After the advent of liberalized abortions, with the continuation of 2), July 1970 to the present.

The analysis revealed that favorable changes in birth patterns began in the second period and became accentuated in the third period. Among those changes recognized as favorable for viable births were:

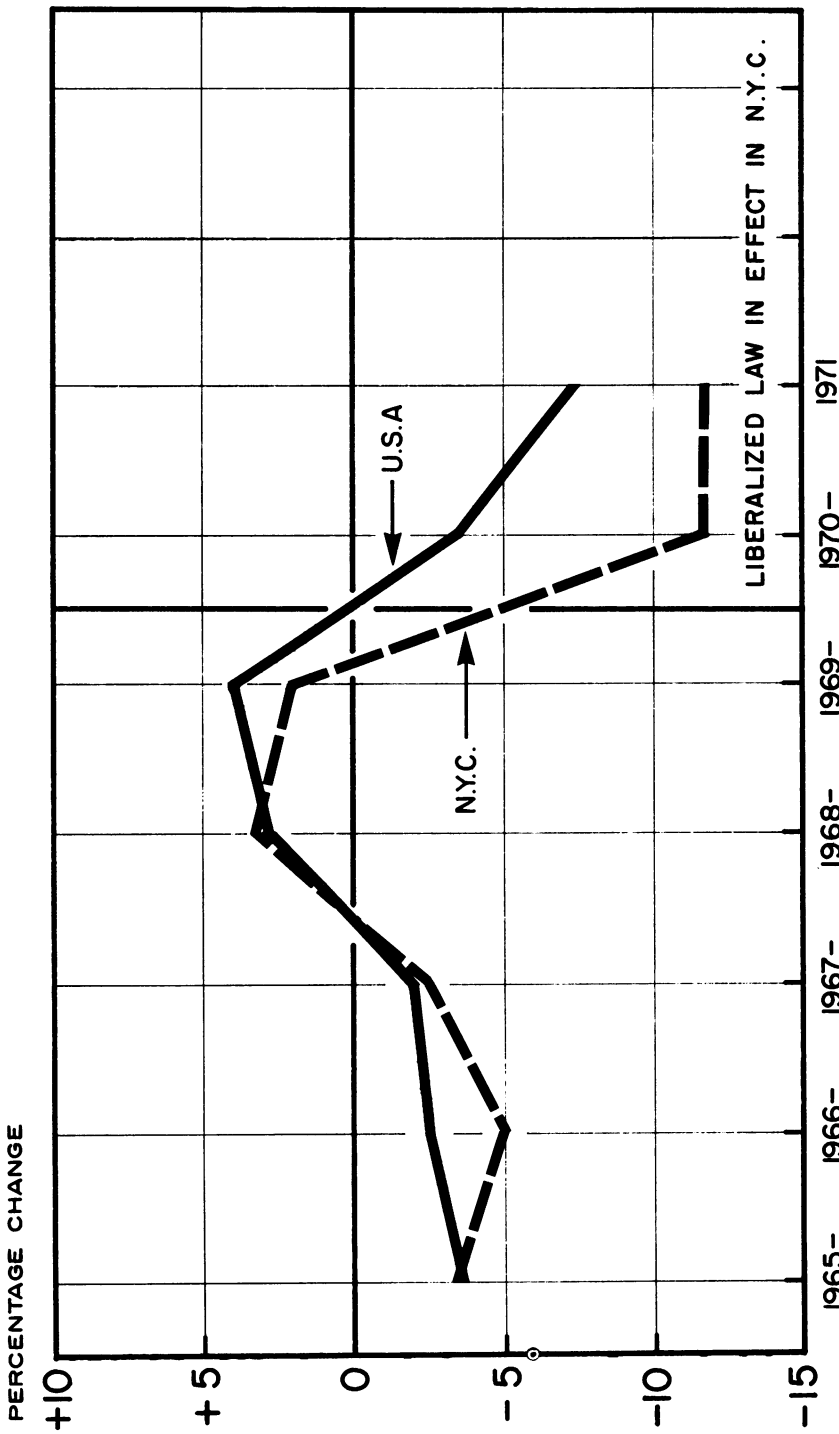

Fig. 9. Annual percentage change in the number of live births in the United States and New York City: 1965-1972.

1) A reduction in fertility rates in all ethnic groups

2) A reduction in births to the very young and relatively older women

3) A reduction in births to women of high parity

4) A reduction in low-birth-weight births, especially the very small (1,500 gm. or less)

5) A reduction in out-of-wedlock births

6) A reduction in births to women of low socioeconomic groups and those on ADC rolls

These changes have been coupled with noteworthy declines in mortality for all groups of babies, including those at high risk. Significant improvement in the mortality rates was evident for:

1) Low-birth-weight infants as well as normal-weight infants

2) Infants born to very young or older and high parity mothers

3) Babies born out of wedlock

Despite these improvements in specific mortality rates, a disparity still existed in relative rates of mortality by ethnic group, marital status, and weight categories. For example, the infant-mortality rate for out-of-wedlock births was still twice as high as for in-wedlock births. The continuing large number of out-of-wedlock births and the growing problem of drug addiction prevented greater reductions.

Conclusion

Infant mortality in New York City declined from 27.3/1,000 in 1962 to 20.1/1,000 in 1972, a 26.4% decline, with the most significant drop beginning in the second period and growing more marked in the third period to date.

The record-breaking low infant-mortality rate achieved in New York City has come about as a result of a combination of significant and remarkable advances in medical technology and skills, coupled with an impressive number of social advances. Family planning and safe abortions, which have become available to all women regardless of financial status, have played a decisive role.

Impediments to further declines include serious social problems such as drug addiction which afflict at least 1% of babies born (estimates from birth-certificate data), as well as the continuing large proportion of out-of-wedlock births, with their concomitant relatively high mortality.

Cutting back or eliminating social legislation which provides funding for the continuation and activation of programs for medical services and research, superimposed on the serious present-day inflation, can very well create a setback. This past decade was marked by encouraging and unprecedented progress in curbing infant mortality by medical advances which reduced the risks significantly and by measures which created more favorable birth patterns. We have pointed out those factors which contributed to this significant improvement as well as those which have impeded it.

It would be a tragedy if the great social measures and medical advances which have accounted for this progress are to be hampered by cutbacks and restrictions. Legislators and society must take heed.