Urban Poverty: Effects on Prenatal Nutrition

Abstract. *Infants of poor (as measured by an index) mothers were 15 percent smaller than infants of nonpoor mothers. Infants from poor families had multiple anatomic evidences of prenatal undernutrition.*

Perinatal mortality rates are higher in the United States than in many other nations (*1*). An excess of infants of low weight at birth accounts for much of this high perinatal mortality (*1*). Low birth weight and perinatal death are much more common in families of low socioeconomic status than in families that are better off (*1, 2*). We now identify undernutrition as the cause of low birth weight in a group of infants born of poor urban mothers.

Material was examined from 445 consecutive autopsies on stillborn and newborn infants at Babies Hospital, New York City. Gestational ages calculated from the mother's last menstrual period ranged from 20 to 44 weeks. One hundred ninety-three cases were excluded from further consideration because there were fetal or maternal disorders that may have affected fetal growth (*3, 4*). These included multiple births, hypertension and other manifestations of maternal toxemia, maternal diabetes mellitus, major congenital malformations in the newborn, chromosomal disorders in the newborn, any evidence of chronic fetal infection, and erythroblastosis fetalis. The remaining 252 cases were classified as poor or nonpoor, on the basis of weekly income and family size, the standard being the poverty-index tables (U.S. Social Security Administration) (*5*). This index is not generous. In 1966 for a family of four, it provided only 75 cents a day per person for total food expenditures (*5*). Of the infants, 49 were born to poor families, and 203 were born to nonpoor families. Thirty-seven percent of the poor and 27 percent of the nonpoor infants were stillborn. All other infants died within 48 hours of birth. Both the poor and the nonpoor constitute high-risk groups. The mean number of gestations for poor mothers was 3.9 and for the nonpoor 2.8. In the poor, 85 percent of the pregnancies before the current one resulted in surviving children; the figure was 76 percent for the nonpoor.

Table 1. Mean organ and body weights (± 1 S.D.) in newborn infants of poor and nonpoor families in percent of "normal" published values (*6*). Body length: poor infants, 97 ± 7; nonpoor infants, 103 ± 10; difference of 6 percent, $P < .005$.

Item	Poor	Nonpoor	Difference
Body	92 ± 18	107 ± 23	15*
Brain	101 ± 19	107 ± 25	6†
Heart	90 ± 27	105 ± 28	15*
Liver	83 ± 22	104 ± 31	21*
Spleen	81 ± 45	104 ± 49	23*
Thymus	66 ± 31	104 ± 49	38*
Kidney	91 ± 34	101 ± 37	10†
Adrenal	77 ± 38	102 ± 46	25*
Placenta	84 ± 35	88 ± 29	4‡

* $P < .005$; † $P < .05$; ‡ $P > .1$.

Weights of organs and body measurements were calculated in percent of mean values for "normal" infants (*6*). A mean percent of these "normal" values was then calculated for each organ or body measurement (Table 1). The method of point counting was used to determine the relative size of abdominal subcutaneous adipose cells (*7*).

The mean gestational age for both groups was 29 weeks. Mean thickness of abdominal subcutaneous fat was 2.9 mm ± 1.0 (1 S.D.) in the poor infants and 4.5 mm ± 1.2 in the nonpoor infants ($P < .05$). Mean volume of individual adipose cells in this locus was 2.92 ± 1.40 (arbitrary units) in poor infants and 4.47 ± 1.46 in nonpoor infants ($P < .05$).

Undernutrition appears responsible for the prenatal growth retardation in infants from poor families. Both mass of adipose tissue and size of individual fat cells were smaller in the infants from poverty families. Such infants had thymus, spleen, liver, and adrenal glands relatively smaller than brain, kidneys, heart, and skeletal bones. This particular ranking of organ growth has often been observed in both human beings and animals who have experienced chronic alimentary undernutrition (*3, 8*).

It has also been observed in a variety of placental and uterine disorders in which the flow of nutrients to the growing fetus was restricted (*4*). Since all multiple births and cases with a known uterine or placental disorder were excluded from the current study, it is possible that maternal malnutrition during gestation contributed to the fetal undergrowth. Other environmental or genetic factors have not been excluded, but most families in the two economic groups lived in the same area of New York City. The racial balance in the two economic groups was also similar.

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Postpartum Psychiatric Reactions: Time of Onset and Sex Ratio of Newborns

Abstract. *There is no predominance of male infants born to women who develop schizophrenic symptoms within 1 month after delivery. Moreover, there is no difference in the sex ratio of infants born to schizophrenic women whose onset of symptoms occurred within the first 10 days postpartum, which is the period of rapid hormonal changes that is most likely to reflect postnatal influences of fetal sex.*

Taylor (*1*) studied state hospital records of 26 pregnancies where the mother developed schizophrenic symptoms during the first month after delivery. Twenty-two of the offspring were male and four were female. From this finding, he postulated a causal relation between birth of a male infant and postpartum schizophrenia. He specu-

Table 1. Sex ratio of infants born to mothers who developed psychiatric symptoms within 1 month after delivery. No differences were significant. Numbers in parentheses indicate patients whom I interviewed.

Offspring		Z*
Male	Female	
	Schizophrenia	
18 (13)	25 (20)	1.26 (1.39)
	Affective disorders	
13 (13)	14 (8)	0.29 (0.95)
	Neurotic-character disorders	
6 (5)	7 (4)	0.38 (0.25)

* Test on normal distribution.

lated that delivery of a male child unmasks the mother's schizophrenia by allowing a "toxic blood factor," previously inhibited by the fetus, to take effect.

Based on a study (*2*) of 100 postpartum psychiatric patients admitted to Strong Memorial Hospital, Rochester, New York, I now report no predominance of male infants born to mothers with acute onset of schizophrenic symptoms during the first month after delivery (Table 1). There is even a slight trend toward more female infants born to 43 women who developed postpartum schizophrenia, when this group is compared to a group with other disorders that began within 1 month postpartum; but none of the differences in sex ratio of offspring is significant. There is also no significant difference between the sex ratio of newborns born to women who develop postpartum schizophrenia and the expected sex ratio of live births in the general population. (Z values for tests on binomial distribution were not greater than 1.39.)

To make my sample and criteria conform with Taylor's, I deleted 3 of the original 100 patients because of a "postpartum equivalent reaction" shortly after adoption of an infant, 1 because she gave birth to a macerated stillborn whose sex was unknown, and 13 more because their onset of illness took place beyond 1 month postpartum. Of the 83 patients with postpartum psychiatric reactions remaining, 27 had affective disorders (neurotic, psychotic, and manic-depressive reactions), 13 had neurotic or character reactions, and 43 developed postpartum schizophrenia. For all patients the diagnosis entered on the chart by the psychiatrist who treated the patient was used. The diagnosis of schizophrenia was substantiated by at least three of the following: thought disorder, inappropriate affect, autistic withdrawal, delusions, hallucinations, and catatonic motor behavior. Since an etiologic factor specific to postpartum schizophrenia cannot be posited unless this factor is found only in schizophrenia and not in other postpartum disorders, it is necessary to compare the sex ratio of infants born to women who develop postpartum schizophrenia with that of infants born to women who develop other types of postpartum psychiatric reactions.

Taylor derived his data from state hospital clinical charts. Hospital charts are occasionally inexact about the days postpartum of the onset of symptoms, particularly if a patient was hospitalized months later. To avoid this source of error, data from 63 women who met the above criteria, and whom I interviewed, along with their relatives, about the exact day of onset are presented in parentheses in Tables 1 and 2. Again, there is no significant difference in sex ratio in infants born to postpartum schizophrenic women, even when compared to the sex ratio in infants born to patients in other diagnostic categories.

Taylor's criterion of onset of symptoms within 1 month postpartum does not coincide precisely with the period of rapid postpartum hormonal changes. The latter take place largely within the first 7 to 10 days postpartum (*3*). Since the initial 10 days postpartum would be the period most likely to "unmask" a supposed "toxic blood factor" previously inhibited by the male fetus in utero, I compared the sex ratio of infants born to women whose psychiatric symptoms began 10 or fewer days postpartum to that of infants born to women whose symptoms began from 11 to 90 days postpartum. Again, there is no significant difference in sex ratio of infants born to mothers who developed schizophrenic symptoms within the first 10 days as opposed to those in whom the onset came later (Table 2).

Since the onset of psychiatric illness in 64 percent of these women took place within the first 10 days postpartum, it is tempting to postulate that postpartum physiological changes, hormonal or otherwise, are involved. However, unless these physiological changes are measured and specifically correlated with changes of well-defined psychiatric symptoms, there is no basis for asserting a relation between them. Moreover,

Table 2. Sex ratio of infants born to women with onset of psychiatric symptoms before and after 10 days postpartum. Numbers in parentheses indicate patients whom I interviewed. None of the comparisons between diagnoses as well as between before and after 10 days postpartum were significant (X^2 with 1 degree of freedom gave at least $P > 0.45$).

Offspring			
Before 10 days postpardum		11 to 90 days postpartum	
Male	Female	Male	Female
Postpartum schizophrenia			
14 (11)	21 (17)	7 (3)	7 (5)
Other postpartum disorders			
15 (14)	15 (9)	7 (7)	10 (6)

the psychological stresses of the postpartum period should not be neglected. A psychological conflict about mothering a relatively noncommunicative infant prevails in about 90 percent of women who require postpartum psychiatric hospitalization (*2*). These women often reject their infants as they themselves felt rejected by their own mothers. Hormonal changes may make some women more vulnerable to postpartum emotional illness, but since there are 12 reported cases of women requiring psychiatric care shortly after the adoption of an infant (*2*), physiological changes alone cannot be presumed to be the entire explanation for all postpartum psychiatric reactions.

Since there is a four- to fivefold increased risk for mental illness (especially psychosis) during the first 3 months postpartum for women in their reproductive years (*4*), the puerperium appears to be a period of increased vulnerability and stress. Whether the stress is physiological, psychological, or—as is more likely—a combination of factors, the data of this report indicate that the sex of the infants has no significant relation to the onset of postpartum psychiatric symptoms in these mothers.

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