

Advice about Weight Gain during Pregnancy and Actual Weight Gain

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Abstract: In the 1980 National Natality Survey, married mothers were asked whether their doctors had suggested a weight gain limit during pregnancy and, if so, what limit was suggested. Current obstetric recommendations call for 22–27 pound weight gain. Previous research indicates that gaining less than 16 pounds greatly increases the likelihood of a poor pregnancy outcome. Reported

advice varied by mother's race, education, parity, and prepregnancy weight. Mothers given no advice or advised to gain less than 22 pounds were far more likely than others to have an inadequate gain. The findings suggest that many more women should be told that it is appropriate to gain at least 22 pounds. (*Am J Public Health* 1986; 76:1396–1399.)

Introduction

For several decades prior to the early 1970s, it was common medical practice in the United States to minimize weight gain during pregnancy in the belief that excessive gain led to the development of toxemia and other obstetrical problems. The 1950 edition of *Williams Obstetrics*,¹ a widely used guideline for pregnancy care, observed that: "In normal pregnancy the diet should be no more or less than that to which the patient has been accustomed. . . . The more one practices obstetrics, the more one is convinced that an excessive weight gain in pregnancy is the cause of no end of complications, both major and minor. However, to keep weight gain down to 20 pounds may be difficult in many cases and will require careful dietary control and not a little discipline. It is an end however, much to be desired."

These same admonitions were repeated in successive editions of this textbook throughout the 1960s. But by 1970, it became apparent that severe dietary restriction during pregnancy resulted in an elevated risk of low birthweight and neurologic impairment of the infant.^{2,3} In 1970, the Committee on Maternal Nutrition of the National Academy of Sciences reviewed the current status of maternal nutrition as related to reproductive outcome and concluded that a gain of 20 to 25 pounds was associated with the most favorable outcome of pregnancy and that there was no scientific justification for routinely limiting weight gain to less than this amount.⁴ Since 1971, weight gain advice in *Williams Obstetrics* has been in accord with these recommendations, and physicians are warned that "rigid caloric restriction during pregnancy might be dangerous to the fetus."^{5–7} Since 1974, the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics have recommended a gain of 22–27 pounds during the course of a normal pregnancy.^{8,9}

The relationship between a woman's weight gain during pregnancy and the outcome of pregnancy has been explored in numerous clinical and hospital studies, but the 1980 National Natality Survey (NNS) conducted by the National Center for Health Statistics provides the first national data on this subject. Results from this survey indicate that there are substantial disparities in weight gain. Women who have a high prepregnancy weight, who smoke during pregnancy, who have a low family income, who are teenagers or 35 years or older, who have less than nine years of education, who are having a fourth or higher order birth, or who are unmarried

are all more likely to have a lower weight gain than their counterparts. Black mothers gain less than White mothers, even after taking into consideration the higher prepregnancy weight and shorter gestational period among Blacks.¹⁰ The NNS also provided information on the association between weight gain during pregnancy and pregnancy outcome. Women with inadequate weight gains generally had lower weight live-born infants and higher risks of a low-birthweight outcome.¹⁰

Because weight gain is closely associated with pregnancy outcome, it is of interest to determine how closely providers of prenatal care are following the more liberal weight gain guidelines set forth more than a decade ago, and to ascertain whether pregnant women are heeding the advice given to them. The 1980 NNS provided such an opportunity. The findings in this study are considered in terms of the medical community's current recommendation of a 22 to 27 pound weight gain during a normal pregnancy.

Methods

The NNS is based on a probability sample of registered live births in the United States for the year 1980. Approximately one in 95 infants weighing less than 2,500 grams and one in 400 infants of higher birthweights were included in the sample.¹¹ Information on prenatal health practices and social and demographic characteristics beyond that available from live-birth certificates was obtained from questionnaires mailed to married mothers and to the providers of prenatal care. The response rate for questionnaires sent to married mothers was 79.5 per cent.

The mother's questionnaire included two questions about weight gain advice: "Did your doctor suggest that you limit your total weight gain during your recent pregnancy?"; and "What limit in total weight gain did the doctor suggest?"

Both mothers and medical sources were asked to report prepregnancy weight and weight at delivery to determine weight gain during pregnancy. Data for 7,704 mothers who reported receiving prenatal care are analyzed. These cases represent approximately 2.9 million married mothers who received prenatal care prior to their deliveries in 1980.

Terms in the text relating to differences such as "higher" or "less" indicate that the differences are statistically stable unless otherwise noted. An estimate is considered unreliable and is indicated by an asterisk if it is based on less than 30 cases, or if its relative standard error is 25 per cent or greater.

Results

In 1980, 60 per cent of married mothers reported that their doctors had suggested a weight gain limit during pregnancy (Table 1). Among those mothers who reported

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TABLE 1—Per Cent of Married Mothers Reporting a Weight Limit and Per Cent Distribution by Weight Limit Suggested According to Mother's Weight/Height Index and Race: United States, 1980 National Natality Survey

Race and Weight/Height Index ^a	All Married Mothers (thousands)	Per Cent of All Mothers	Mothers Reporting a Weight Limit					
			Total	Weight Limit Suggested				
				Less than 16 Pounds	16–21 Pounds	22–27 Pounds	28–34 Pounds	35 Pounds or More
Per Cent Distribution								
All Races ^b	2,904	60.1	100.0	4.1	22.8	47.9	22.1	3.1
Low	722	56.3	100.0	2.9	20.3	49.3	23.8	3.7
Average	1,464	61.8	100.0	2.4	21.6	49.2	23.8	3.1
High	717	60.6	100.0	8.8	27.6	43.8	17.2	2.6
White	2,576	60.5	100.0	3.5	22.7	49.0	21.6	3.2
Low	644	56.3	100.0	2.4*	20.3	50.7	23.0	3.6
Average	1,308	62.5	100.0	2.0	21.4	50.4	23.0	3.2
High	624	60.6	100.0	8.0	27.8	44.3	17.3	2.6*
Black	237	56.8	100.0	10.1	24.4	40.2	23.5	1.8*
Low	47	53.2	100.0	9.7*	20.8*	41.4*	24.4*	3.6*
Average	111	55.0	100.0	6.3*	24.7*	39.7*	29.2	0.2*
High	80	61.6	100.0	15.0*	25.7	40.3*	16.1*	3.0*

a) The weight/height index = weight/(height)². "Low" represents the first quartile of the study population, "average" the second and third quartiles, and "high" the fourth quartile.

b) Includes races other than White and Black.

NOTE: Refers to married mothers receiving prenatal care who had a live birth in 1980.

*Does not meet standards of reliability or precision.

being given a limit, about one-fourth reported a limit of less than 22 pounds, nearly half reported a limit of 22 to 27 pounds, and the remaining one-fourth reported a limit of 28 pounds or more. Only 4 per cent reported a limit of less than 16 pounds.

Although approximately the same proportion of Black and White mothers said they were given a weight gain limit, the advice reported was decidedly different. Black mothers were two and one-half times as likely as White mothers to report a limit of less than 16 pounds (10 per cent of Black mothers compared with 4 per cent of White mothers). Black mothers were also less likely to have a suggested limit of 22 to 27 pounds (40 per cent of Black mothers, and 49 per cent of White mothers).

Medical advice on weight gain was also associated with maternal size at the start of pregnancy. In this study, size was gauged by a woman's weight for her height (weight for height index = (weight/height)²). Mothers were considered to have a low weight for height if they were in the first quartile of the sample and a high weight for height if they were in the fourth quartile. Women in the high weight-for-height category were more likely to report a suggested weight limit of less than 16 pounds (9 per cent) than were women of average size (2 per cent) or women with low weight for height (3 per cent). More than one-third of high weight-for-height women (36 per cent) were advised to gain less than 22 pounds, a far higher proportion than either average size women (24 per cent) or women with low weight for height (23 per cent) (Table 1).

Differences in the limits reported by Black and White mothers cannot be completely accounted for by dissimilarities in maternal size. As shown in Table 1, for comparable maternal size, there is a consistent pattern that Black women are more likely than White women to report a limit of less than 16 pounds, and less likely to report a limit of 22 to 27 pounds. However, because of the limited representation of Black mothers in a number of categories, these differences must be interpreted with caution.

The mother's age is an additional factor influencing weight gain advice. Teenage mothers and mothers in the older years of childbearing (30 years or older) are more likely than mothers in their twenties to report weight gain limits of less than 22 pounds (Table 2). It is of particular concern that one out of three teenagers reported limits of less than 22 pounds. These young mothers are at increased risk of bearing a low-birthweight infant and are most in need of good advice about nutrition and adequate weight gain.

There are even greater differences in reported weight gain limits by the years of schooling a mother has completed (Table 2). As educational attainment increases, the proportion of mothers reporting a limit of less than 22 pounds declines dramatically. Among mothers who had not completed high school, 38 per cent reported this limit compared with only 28 per cent of the mothers who had completed high school and 21 per cent of the mothers who had completed one or more years of college. Since many teenagers have not had a chance to complete their education, it is not surprising that both teenagers and less educated mothers report similar weight gain advice.

There is also some difference in reported advice by live-birth order (Table 2). Mothers having their third or higher order birth are more likely than mothers of first or second order births to report weight gain limits of less than 22 pounds. About 25 per cent of mothers having their first or second birth reported a weight gain limit of less than 22 pounds, compared with 33 per cent of mothers having a third or higher order live birth. This difference is due in part to the older age and higher prepregnancy weight of mothers having higher order births.

The association between reported advice on weight gain and actual weight gain was also examined. This analysis was limited to mothers whose pregnancy extended to at least 37 weeks to exclude mothers with lower weight gain due to premature delivery. Overall, mothers who reported no weight gain limit were *more* likely to gain less than 22 pounds

TABLE 2—Per Cent of Married Mothers Reporting a Weight Limit and Per Cent Distribution by Weight Limit Suggested According to Selected Maternal Characteristics: United States, 1980 National Natality Survey

Maternal Characteristics	All Married Mothers (thousands)	Per Cent of All Mothers	Mothers Reporting a Weight Limit					
			Total	Weight Limit Suggested				
				Less than 16 Pounds	16–21 Pounds	22–27 Pounds	28–34 Pounds	35 Pounds or More
			Per Cent Distribution					
Total	2,904	60.1	100.0	4.1	22.8	47.9	22.1	3.1
Age (years)								
Under 20	285	59.5	100.0	5.5*	27.6	42.9	19.3	4.7*
20–29	1,973	61.7	100.0	3.8	21.6	48.9	22.6	3.1
30 and over	647	55.5	100.0	4.6	24.5	46.8	21.9	2.2*
Education (years)								
Less than 12	504	55.2	100.0	7.9	30.0	39.9	17.8	4.4*
12	1,302	61.8	100.0	4.4	23.9	48.3	20.3	3.1
13 or more	1,097	60.5	100.0	2.2	18.4	50.7	26.2	2.6
Live-birth Order								
First child	1,175	66.8	100.0	3.1	21.9	48.9	22.5	3.6
Second child	984	58.5	100.0	4.3	21.4	48.1	23.3	3.0
Third child and over	745	51.7	100.0	5.9	26.7	45.4	19.7	2.2*

NOTE: Refers to married mothers receiving prenatal care who had a live birth in 1980.
*Does not meet standards of reliability or precision.

TABLE 3—Per Cent Distribution of Married Mothers of Full-term Births by Weight Gain during Pregnancy According to Reported Weight Gain Limit: United States, 1980 National Natality Survey

Actual Weight Gain during Pregnancy	Mothers Reporting a Weight Limit				
	Total	Weight Limit Suggested			Mothers Reporting no Limit
		Less than 22 Pounds	22–27 Pounds	28 Pounds or More	
(Number in thousands)					
Total	1,609	428	776	404	1,049
Per Cent Distribution					
Total	100.0	100.0	100.0	100.0	100.0
Less than 22 pounds	20.6	30.0	18.9	12.9	26.3
22 to 27 pounds	22.0	20.7	24.5	18.3	22.2
28 pounds or more	57.4	48.4	56.5	68.7	51.6

NOTE: Refers to married mothers of full-term live births (37 weeks of gestation or longer) receiving prenatal care.

than mothers who reported any limit (Table 3). If no limit was suggested, 26 per cent of the mothers gained less than 22 pounds, but if a limit was suggested, 21 per cent of the mothers gained less than 22 pounds.

The more stringent the weight limit reported, the more likely it was for a mother to gain less than 22 pounds. Only 13 per cent of the mothers reporting a limit of 28 pounds or more gained less than 22 pounds, while 31 per cent of the mothers reporting a limit of less than 22 pounds gained this little. These data clearly suggest that reported weight gain limits are associated with actual weight gains.

However, a woman's weight for height at the start of pregnancy influences how closely she follows weight gain advice (Figure 1). Mothers with a high weight-for-height were more likely than other women to gain less than 22 pounds, regardless of their reported weight gain limit. Among the high weight-for-height mothers, 44 per cent adhered to a weight gain limit of less than 22 pounds, but observance of this same

limit declined to 27 per cent of average weight-for-height women and to 18 per cent of low weight-for-height women. But as indicated in Figure 1, the percent of high weight-for-height mothers who gained less than 22 pounds declined from 44 per cent to 22 per cent as the reported weight limit increased from less than 22 pounds to 28 pounds or more.

Discussion

It is not known whether physicians typically give weight gain advice in terms of a limit that the mother should not exceed or whether they recommend a weight gain that they consider to be adequate. It is also not certain how mothers interpreted the NNS questions. If her doctor recommended a weight gain of 25 pounds, would she assume this also represented a weight gain limit and respond accordingly? Despite this uncertainty about the mothers' responses, the findings presented raise concerns about weight gain advice and mothers' beliefs about weight gain. Even if the advice

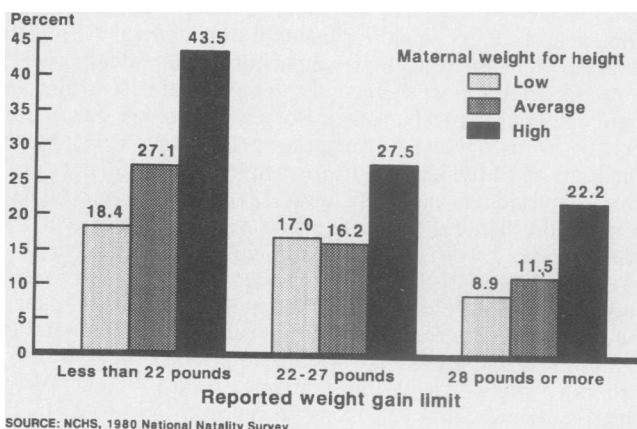


FIGURE 1—Per cent of Mothers Gaining Less Than 22 Pounds by Reported Weight Gain Limit and Maternal Weight for Height: United States, 1980 National Natality Survey

given was a recommended weight gain rather than a weight gain limit, the implication of an inappropriate recommendation for birth outcome is serious.

Based on the NNS data, 40 per cent of married mothers in 1980 reported that they were not given a weight gain limit. Another 12 to 21 per cent of married mothers reported a limit of less than 22 pounds. The majority of mothers therefore were given no weight gain limit or they were being advised to gain less than currently deemed advisable. One might suppose that mothers without a guideline would "eat to appetite" and therefore gain more than mothers given a weight gain limit. This was not the case. There are several possible explanations. One is that women given no medical direction may be guided by their own mothers, who were pregnant in an era of more severe weight gain restriction. Pregnant women may also be overly concerned about losing weight after their baby is born.

It is of particular concern that many high-risk mothers (those who are Black, in their teens, or with little education) are reporting inappropriate advice. Although maternal compliance with specific limits was far from perfect, the advice received apparently has a pronounced effect on final weight gain. It is therefore critical that both medical providers of prenatal care and pregnant women become more knowledgeable about current weight gain guidelines and the implications of inadequate weight gain for an adverse pregnancy outcome.

Many factors associated with low birthweight such as age, education,¹² and prepregnancy weight¹⁰ cannot be altered once a woman becomes pregnant. But weight gain has been associated with the incidence of low birthweight^{2,3,10} and this study indicates that actual weight gains are associated with weight gain advice. This implies that a substantial number of women might gain more weight if told to do so. Appropriate weight gain advice, especially for high-risk groups, could have a positive effect on birth outcomes.

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The Biomedical Consequences of the Chernobyl Disaster

"There are more important lessons from Chernobyl. Events there reveal that any nuclear accident is international in scope. They also underscore the willingness of the international community to help in the aftermath of a disaster. Scientists from more than 20 nations contributed their efforts, many of whom disregarded political differences in an attempt to save human lives, advance scientific knowledge, and prevent future accidents.

"Perhaps most important, the accident at Chernobyl illustrates the world's limited ability to respond to nuclear accidents and, by extension, to the far greater devastation of a nuclear war. The resources of more than 20 nations were needed to deal with the medical aftermath of what might be considered a modest release of radionuclides. This should put to rest any notion that there could ever be an adequate medical response to a thermonuclear war. If the events of Chernobyl in any way bring us nearer to peace, that may be Chernobyl's most important lesson."

—Excerpted from Chernobyl: Biomedical Consequences, by Robert Peter Gale, MD, PhD, in *Issues in Science and Technology*, Fall 1986; 3:14-20.