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Effects of maternal nutritional status and maternal energy supplementation on length of postpartum amenorrhea among Guatemalan women[1-3]

Kathleen M. Kurz[4], Jean-Pierre Habicht, Kathleen M. Rasmussen, Steven J. Schwager

[1]From the Division of Nutritional Sciences and the Biometrics Unit, Cornell University, Ithaca, NY

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[3]Address reprint requests to Dr. J-P. Habicht, Division of Nutritional Sciences, Savage Hall, Cornell University, Ithaca, NY 14853.

[4]Current address is International Center for Research on Women, 1717 Massachusetts Ave., NW, Suite 302, Washington, D.C. 20036

Author responsible for correspondence:

Dr. Kathleen M. Kurz

International Center for Research on Women

1717 Massachusetts Ave., NW, Suite 302

Washington, D.C. 20036

TEL: 202-797-0007 FAX: 202-797-0020

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ABSTRACT

To investigate the extent to which better maternal nutrition leads to reduction in length of postpartum amenorrhea, multivariate logistic and linear regression analyses were applied to data on 339 women-infant pairs from the longitudinal Guatemalan Four Village Study, 1969-1977. Maternal triceps skinfold was negatively associated with length of amenorrhea when infant supplementation (a proxy for reduced suckling) was accounted for. However, its effect was small: amenorrhea was only 0.5 mo shorter among women at the 75th percentile than among those at the 25th, equivalent to less than even one additional child during the women's reproductive years. Maternal supplementation was not associated with length of amenorrhea when infant supplementation was controlled. This is in contrast to previous studies in which breastfeeding or infant supplementation was not controlled. These results suggest that infant, not maternal, supplementation influences length of postpartum amenorrhea, and that maternal nutritional status has minimal influence.

KEY WORDS Postpartum amenorrhea, maternal nutritional status, maternal supplementation, breastfeeding

INTRODUCTION

Prolonged postpartum infertility due to breastfeeding is the major determinant of birthspacing, family size and population growth in developing countries (1). This is due solely to the tactile stimulation of suckling on the nipple that is then mediated through neuronal pathways to the hypothalamus, which controls fecundability by inhibiting the release of ovulatory hormones (2).

Many mothers in developing countries are malnourished. Previous studies have suggested that improving maternal nutrition will shorten this period of infecundability considerably, an undesirable outcome where other effective methods of contraception are not available.

Well-nourished women had shorter amenorrhea, a good measure of infecundability during lactation than undernourished women (3-5), and undernourished women given energy supplementation during lactation had shorter amenorrhea than those receiving no supplementation (6-8). Results were most dramatic in The Gambia: A net increase of 3054 kJ/d (730 kcal/d) to lactating women led to hormonal conditions indicating that ovulation and therefore menstruation occurred 5 mo earlier than in similar unsupplemented women. However, the nursing infants were also supplemented in these studies, either as part of the intervention, or at home, or both. It might be that the infant supplementation reduced suckling and this is why postpartum amenorrhea was shortened. This possible mechanism was not adequately accounted for in the analyses of these studies.

This report assesses the association of maternal nutritional status and maternal energy supplementation with the length of postpartum amenorrhea while accounting for factors related to the suckling stimulus of breastfeeding, such as infant supplementation.

SUBJECTS AND METHODS

Research design

The research presented here used data on mother-infant pairs from a longitudinal study conducted by the Institute of Nutrition of Central America and Panama (INCAP) in four villages in the Guatemalan department of El Progreso from 1969 to 1977. This study has been described in detail elsewhere (7, 9); only salient details are reiterated here. Mothers were followed during pregnancy and lactation and children were followed from birth up to 7 y. The study protocol was reviewed by an INCAP panel on human subjects and the study was conducted according to National Institutes of Health guidelines. The present use of the data was approved by the Cornell Committee on Human Subjects.

Menstruation, breastfeeding, and morbidity of women and children were monitored retrospectively every 2 wk. Length of amenorrhea was defined as either a) the months between a birth and the incidence of the first of 2 menses occurring within 3 mo, which avoided misclassifying an episode of spotting as the first postpartum menstruation; or b) the months between a birth and a subsequent pregnancy without menstruation having resumed (15% of the sample). Breastfeeding frequency was assessed by asking women how many times they breastfed in the previous 24 hr. They were asked separately for frequency during the day and night. Breastmilk intake was not measured in the longitudinal study.

Anthropometric measurements of women and children were taken quarterly by trained and standardized anthropometrists. Weight, height or length, arm circumference, triceps, subscapular, and thigh skinfold thicknesses, and other indicators of nutritional status were measured. Home dietary intakes in children were estimated using 24-h recall interviews, quarterly for mothers, quarterly for children over 15 mo old for the whole study, and monthly for children below 1 y old during the second half of the study (1973-1977).

Although this study was designed as an experiment with residents in 2 village-pairs receiving a high-energy (atole) or low-energy (fresco) supplement (9), the data are presented here as an observational study because there was no significant treatment effect at the village-pair level of atole versus fresco on length of amenorrhea ($P = 0.54$). Thus, the unit of analysis used here was the individual woman. Attendance at the supplementation centers and consumption of the supplement were free and voluntary, which resulted in a wide range of supplement intake. Free medical care was provided. A Knowledge-Attitudes-Practices survey and ethnographic studies showed that modern contraception was virtually absent (10) and there was no bottle feeding.

Sample selection

The sample included 339 mothers and their singleton infants who were born between April 1973 and November 1975 (Fig 1). Data on infant diet were not available until this starting date and data on amenorrhea were not available on women whose children were born after this ending date. Women were excluded if they were suspected of having non-lactational amenorrhea (amenorrhea >4 mo longer than lactation), if the month of introduction of food to the child could not be determined, or if data on maternal nutritional status were not credible. The sample for the logistic regression analysis was 339 mother-infant pairs, and for the linear regression analysis, which excluded censored observations, it was 282 mother-infant pairs. The main reason for censoring was that the study ended before women resumed menstruation.

Statistical analysis

Two multivariate techniques were used: multiple logistic regression and multiple linear least squares regression. Logistic regression was used to investigate how the predictors of resuming menstruation changed over time. In each of 3 intervals (1-6, 7-12, and 13-18 mo postpartum), women who resumed menstruation were contrasted with women who remained amenorrheic (**Fig 2**). Women with censored amenorrhea were included in the analysis (n = 57); however, those with amenorrhea values censored in the interval were deleted from the analysis of that interval (n = 4 from the 1-6 mo interval, n = 38 from the 7-12 mo interval, and n = 2 from the 13-18 mo interval).

Odds ratios were calculated from the logistic regression analysis comparing the women whose value on this variable was at the 75th percentile to the women who were at the 25th percentile, adjusting for the other variables. An odds ratio <1 indicates a variable with a protective effect against resuming menstruation in the interval, and an odds ratio >1 indicates a variable that increases the risk. If the 95% confidence interval does not include 1.0, the variable is statistically significant at the $P < 0.05$ level.

Linear regression was used to compare our results with other studies and to estimate the overall magnitudes of explanatory variables on the duration of postpartum amenorrhea. Standard residual analysis was used to identify non-linearities and ascertain the effect of outliers. Standardized coefficients in the linear regression analysis provided summary measures of the magnitude of predictability on length of amenorrhea across the variables.

All logistic and linear regression analyses were performed using SYSTAT (11). Variables were retained in the model at $P < 0.10$.

Variable Construction

The results using maternal supplement energy intake from the INCAP supplementation during early lactation (first 3 mo) are reported here because it was the most statistically significant maternal intake variable found to be associated with postpartum amenorrhea. Maternal supplement intake was highly correlated with total maternal intake (supplement + home diet). However, neither total maternal intake nor maternal home diet were ever associated statistically ($P > 0.36$) with measures of postpartum amenorrhea. This is probably due to the usual large intraindividual unreliability (9) found in all dietary survey data (12).

Maternal nutritional status was expressed both as status at the beginning of lactation (3 mo postpartum), and as change in status from either the sixth or the ninth month of pregnancy to the third month of lactation. Five indicators of maternal nutritional status were used: triceps, subscapular, and thigh skinfold thicknesses, arm circumference, and body mass index (BMI, kg/m^2).

Child's weight gain from birth to 3 mo was obtained by subtracting child's birth weight from child's weight at 3 mo. Some children lost weight so the value may be negative. Since most women were fully, or nearly fully, breastfeeding during the first 3 mo postpartum, child's weight gain from birth to 3 mo was an indicator of the amount of breastmilk children received while fully breastfeeding, and thus of the suckling stimulus during the first 3 mo postpartum.

Child's non-breastmilk energy intake per child's weight was an inverse proxy of the suckling stimulus of breastfeeding over time. This is because a child who receives more non-breastmilk food will suckle less. This variable was an indicator of suckling during partial breastfeeding. It was summed from two sources: energy from home dietary intake, collected by 24-h recall each month and summarized quarterly, and energy from supplement (atole or fresco). For the logistic regression analysis of the risk of resuming menstruation 1-6, 7-12, and 13-18 mo postpartum, child's non-breastmilk energy intake within the interval was used (e.g., intake/weight at 3 mo for the 1-6 mo interval). For the linear regression analysis, a summary variable for child's non-breastmilk energy intake was constructed by adding child's non-breastmilk intake per child's weight at 3, 9, and 15 mo. Intakes at these times were chosen based on results from the logistic regression analysis.

Breastfeeding was defined as partial if the infant consumed >837 kJ/d (200 kcal/d) at any time or >146 kJ/d (35 kcal/d) without more than a month's interruption.

The value of 146 kJ/d (35 kcal/d) was thought not to interfere with breastfeeding, and corresponded to 100 ml of fresco (sugar water). Other breastfeeding was defined as full and corresponds to "almost exclusive" according to generally accepted criteria (13). For the linear regression analysis, a dichotomous variable was constructed for whether or not a woman stopped breastfeeding before she resumed menstruation.

Parity was coded as 0, 1, 2, or ≥ 3 previous children because, although women had a range of 0-14 children before the birth of the index child, the duration of amenorrhea increased as parity increased from 0 to 1 to 2 to 3 children, but not as it increased >3 children.

Durations of the following maternal and child morbidities were assessed: respiratory, diarrheal, and serious illnesses, and mastitis (women only).

RESULTS

Description of the sample

Characteristics of the 339 Guatemalan women and their children are shown in **Table 1**. Their characteristics did not differ substantially from those of the 282 women with uncensored amenorrhea data who were used in the linear regression analysis. Most women resumed menstruation while they were breastfeeding (n = 198, 70%), either while they were partially breastfeeding (n = 181, 64%) or while they were fully breastfeeding (n = 17, 6%). The others resumed after they stopped breastfeeding (n = 84, 30%). Of those who resumed menstruation during full breastfeeding, 14 did so ≤ 6 mo postpartum, 5% of the total sample. Only 14 non-menopausal women were over 40 y old, and they had lengths of amenorrhea of 1-20 mo. All women breastfed for at least 1 mo (range 1-35 mo).

Multiple logistic regression results

At 1-6 mo postpartum, greater parity and greater child's weight gain from birth to 3 mo each were associated with a lower estimated risk of the mother resuming menstruation, and greater maternal triceps skinfold thickness at 3 mo postpartum was associated with higher risk (**Table 2**). Child's non-breastmilk energy intake at 3 mo was associated with higher estimated risk of the mother resuming menstruation 1-6 mo postpartum, but this effect was not statistically significant when controlling for the other variables in the model. At 7-12 mo postpartum, higher parity was associated with lower estimated risk of the mother resuming menstruation, and higher child's non-breastmilk energy intake at 9 mo was associated with higher risk. At 13-18 mo postpartum, only higher child's non-breastmilk intake at 15 mo postpartum was associated with higher estimated risk of the mother resuming menstruation in this interval.

Breastfeeding frequency was tested instead of child's total non-breastmilk energy intake in all three intervals but was not a significant predictor of the risk of resuming menstruation. This was true when breastfeeding frequency per 24 h was tested, and when frequency during day and night were tested separately. This is probably because there was little variation in reported breastfeeding frequency among the women to explain variation in their lengths of amenorrhea. The pattern of breastfeeding frequency was constant over the course of lactation. Women breastfed an average of 10-11 times/24 h in all intervals until they stopped lactating.

Neither maternal energy intake from supplement nor maternal morbidity were significant predictors ($P > 0.17$) of the risk of resuming menstruation in any of the intervals, whether or not child's non-breastmilk energy intake or child's weight gain from birth to 3 mo were included in the analysis.

Multiple linear regression results

The multiple linear regression analysis indicated that the significant predictors of length of postpartum amenorrhea were: a) whether or not women stopped breastfeeding before menstruation resumed (a dichotomous variable), b) parity, c) child's non-breastmilk energy intake per child's weight, d) child's weight gain from birth to 3 mo, and e) maternal triceps skinfold thickness at 3 mo postpartum (**Table 3**). The predictors were similar to those indicated in the logistic regression analysis above. The model explained 40% of the variance in length of postpartum amenorrhea. All predictors were highly significant ($P < 0.001$), except maternal triceps skinfold thickness ($P = 0.09$).

Five indicators of maternal nutritional status at 3 mo postpartum were tested for their association with length of postpartum amenorrhea in the model shown in Table 3. Maternal triceps skinfold thickness, arm circumference, thigh skinfold thickness, and maternal BMI were all significant predictors of length of amenorrhea (at the $P < 0.1$ level), and all had similar predictive power. Maternal subscapular skinfold thickness was not a significant predictor of length of amenorrhea. When maternal nutritional status was expressed as change in maternal weight, in triceps, subscapular, or thigh skinfold thicknesses, or in arm circumference from the sixth or ninth month of pregnancy to the third month of lactation, none of these was a significant predictor of length of amenorrhea.

Maternal energy intake from supplement was not a factor explaining length of postpartum amenorrhea when the 5 significant variables were considered (Table 3). However, when the proxy for the suckling stimulus of breastfeeding over time, child's non-breastmilk energy intake, was not in the model, maternal supplement intake was significantly associated with length of amenorrhea ($P < 0.02$, $b = -0.50$ mo/418 kJ or -0.50 mo/100 kcal).

Maternal age was only a significant predictor of length of amenorrhea ($P < 0.001$, $b = 0.18$ mo/additional y of mother's age) when parity was not in the model. Parity (0, 1, 2, ≥ 3 previous children) was highly correlated with maternal age ($r = 0.65$). Parity was chosen for the final model because more variance in length of amenorrhea was explained ($R^2 = 40\%$) than when maternal age was used ($R^2 = 34\%$). Other variables were tested, including socioeconomic status, child morbidity, maternal morbidity, and interaction terms, but none was significant at the $P < 0.10$ level.

<u>Magnitude of predictability</u>

The magnitudes of the 5 predictors of length of postpartum amenorrhea were compared using beta coefficients standardized for the difference between values of the linear regression predictors at the 25th and 75th percentiles (last column of Table 3). The variable with the least predictive power was maternal triceps skinfold thickness; amenorrhea was 0.54 mo shorter for women who had high triceps skinfold thickness (9.5 mm, 75th percentile) than for those who had low triceps (6.5 mm, 25th percentile).

Intermediary in magnitude were two of the variables thought to be related to suckling (child's non-breastmilk energy intake, and child's weight gain from birth to 3 mo), each of which was 3 times greater than maternal triceps skinfold. The dichotomous variable for cessation of breastfeeding before menstruation resumed had the greatest power for predicting length of amenorrhea.

Correlations among the variables

Maternal energy intake from supplement and from home diet were positively, but not significantly, correlated ($r = 0.13$, $P < 0.11$ at 3 mo postpartum). This indicates that mothers' consumption of supplement did not replace their consumption of home diet.

Maternal energy intake from supplement was correlated with child's non-breastmilk energy intake ($r = 0.15$, $P < 0.02$). The correlation was greater when child supplementation was considered separately ($r = 0.49$, $P < 0.001$ between maternal energy intake from supplement at 3 mo and child energy intake from supplement at 3 mo). Thus, as mothers consumed more supplement, their children had higher intakes of food other than breastmilk, especially the supplement.

Child's non-breastmilk energy intake and the dichotomous variable for cessation of breastfeeding before menstruation resumed were each highly correlated with duration of lactation ($P < 0.001$), and child's weight gain from birth to 3 mo was correlated with duration of full breastfeeding ($P < 0.01$). This confirms the use of these variables as proxies of the suckling stimulus of breastfeeding.

DISCUSSION

Breastfeeding

These results confirm that breastfeeding is an important determinant of postpartum fecundability. Three variables in the analysis (child's weight gain from birth to 3 mo, child's non-breastmilk energy intake, and a dichotomous variable for cessation of breastfeeding before menstruation resumed) represented different aspects of breastfeeding, and were statistically significant predictors of length of amenorrhea.

Maternal Energy Intake from Supplement

This research shows that when child's non-breastmilk energy intake was accounted for, maternal energy intake from supplement was not an important negative influence on length of postpartum amenorrhea among Guatemalan women. When child's non-breastmilk energy intake was not accounted for, maternal supplement intake appeared to reduce length of amenorrhea. However, this was most likely due to the high correlation of mother's supplement energy intake with the intake of her child, and was not a true effect of mother's supplement intake. As mothers consumed more supplement, their children had higher intakes of food other than breastmilk, especially the supplement.

It is possible that the extent to which maternal supplementation was thought to shorten amenorrhea or anovulation might also have been overestimated in the other two studies in which women were supplemented during pregnancy and lactation (6, 8). However, there were not enough data reported in these studies to assess this. The amount of supplementation received by the children in the Mexican study (8) was not reported, nor was their non-breastmilk home dietary intake. In the Gambian study (14), all children were breastfed and all were supplemented after 3 mo of age, but neither the amount of supplement nor the amount of home dietary intake of the children was reported in enough detail to assess their influence on length of postpartum anovulation. However, breastfeeding frequency was reported to be reduced with supplementation (15).

Maternal Nutritional Status

Better maternal nutritional status, assessed as higher triceps skinfold thickness at the beginning of lactation, was associated with shorter length of postpartum amenorrhea among the Guatemalan women. However, it is important for public health and demographic purposes to know that the magnitude of the predictive power of maternal nutritional status on length of postpartum amenorrhea was small: amenorrhea was only 0.5 mo shorter for the women with maternal triceps skinfold thickness at the 75th percentile than for those at the 25th. Thus, even if women's nutritional status improved and their amenorrhea was 0.5 mo shorter after each of their children, they would not have time to bear even one additional child during their reproductive years. These results suggest that any negative effect of maternal nutritional status on length of postpartum amenorrhea is not a contraindication to improving maternal nutrition.

From the results of the other supplementation trials, one might have expected that improvement in maternal nutritional status of the Guatemalan women would have been associated with shorter amenorrhea. However, changes in maternal nutritional status from mid-pregnancy to early lactation were not significant predictors of length of postpartum amenorrhea. This could be explained in several ways: a) the indicators were not sensitive enough to detect a change in maternal nutritional status; b) change in maternal nutritional status may not have varied enough among the Guatemalan women to explain differences in length of postpartum amenorrhea; or c) improved maternal nutritional status between late pregnancy and early lactation actually does not shorten amenorrhea. The first explanation is unlikely because changes in the two indicators known to vary most during pregnancy and lactation, maternal weight and thigh skinfold thickness, did not explain length of postpartum amenorrhea. No distinction could be made for this population, however, between the second and third possible explanations.

Possible Mechanisms

Although the data in this study are not sufficient to elucidate their relative contributions, two possible mechanisms would explain the relationship between maternal nutritional status and length of postpartum amenorrhea.

The first possible mechanism regarding the relationship between maternal nutritional status and length of postpartum amenorrhea is that women with poor nutritional status may experience greater inhibition of the ovulatory hormones from the same amount of suckling as women with good nutritional status, and thus experience longer amenorrhea.

The second possible mechanism is that children of mothers with poor maternal nutritional status suckle more to get an adequate amount of breastmilk (6, 16). The increased suckling increases inhibition of the ovulatory hormones, and lengthens amenorrhea. The effect of increased demand for breastmilk can be seen in mothers of children with higher weight gain from birth to 3 mo who had longer amenorrhea. This probably occurred because the children with higher weight gain consumed more breastmilk, suckling more and providing greater inhibition to their mother's ovulatory hormones. Whether or not the infants of malnourished mothers suckled more for equal weight gain cannot be elucidated from the data in this study. However, such increased suckling has been seen in unsupplemented mothers compared to supplemented mothers, who produced more breastmilk during lactation (17).

Conclusions

Although the supplementation of suckling infants was associated with shorter postpartum amenorrhea of their mothers, the supplementation of the mothers was not. Among the Guatemalan women evaluated here, maternal energy intake from supplement was not associated with length of amenorrhea, and better maternal nutritional status was associated with only a small reduction in amenorrhea. This difference was so small that, even if women experienced a large improvement in their nutritional status, they would not have time to bear even one additional child during their reproductive years. Thus, the desirable outcomes from maternal supplementation, such as increased birthweight and improved health and nutritional status of women, are not outweighed by a small, undesirable reduction in postpartum amenorrhea and lactational infecundability.

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Table 1. Characteristics of Guatemalan women and children

	n	mean	SD	min	max
Length of postpartum amenorrhea (mo)	282*	13.7	5.9	1	33
Length of breastfeeding (mo)	282*	17.9	5.4	1	35
Length of full breastfeeding (mo)	282*	4.2	3.7	0	14
Parity (# of previous children)	339	3.6	2.9	0	13
Maternal age (y)	339	27.9	7.0	14	47
Child's weight gain, 0 - 3 mo (kg)	313	2.3	0.8	-0.5	4.4
Child's weight (kg):					
3 mo	335	5.4	0.9	2.5	7.8
9 mo	323	7.5	1.1	4.2	10.9
15 mo	285	8.4	1.2	3.8	12.4
Child's non-breastmilk energy intake† (kJ/d):					
3 mo	320	322	473	0	2841
9 mo	326	1100	962	0	4569
15 mo	297	2678	1339	33	7113
Maternal characteristics at 3 mo postpartum					
Triceps skinfold thickness (mm)	330	8.4	2.7	2.8	18.9
Arm circumference (cm)	330	22.6	1.9	17.3	28.8
Thigh circumference (cm)	317	44.1	3.3	33.4	53.5
Lateral thigh skinfold (mm)	317	17.0	6.0	4.4	47.6

[Table 1 continued]

Anterior thigh skinfold (mm)	317	15.3	4.9	5.3	43.3
Body mass index (kg/m^2)	315	21.8	2.5	15.7	30.0
Weight (kg)	316	48.3	6.2	32.9	69.0
Energy intake, supplement (kJ/d)	337	590	586	0	3494

* Data for uncensored observations only

† Home dietary intake + supplement

Table 2. Multiple logistic regression: Factors explaining the risk of resuming menstruation 1-6 mo postpartum, 7-12 mo, and 13-18 mo

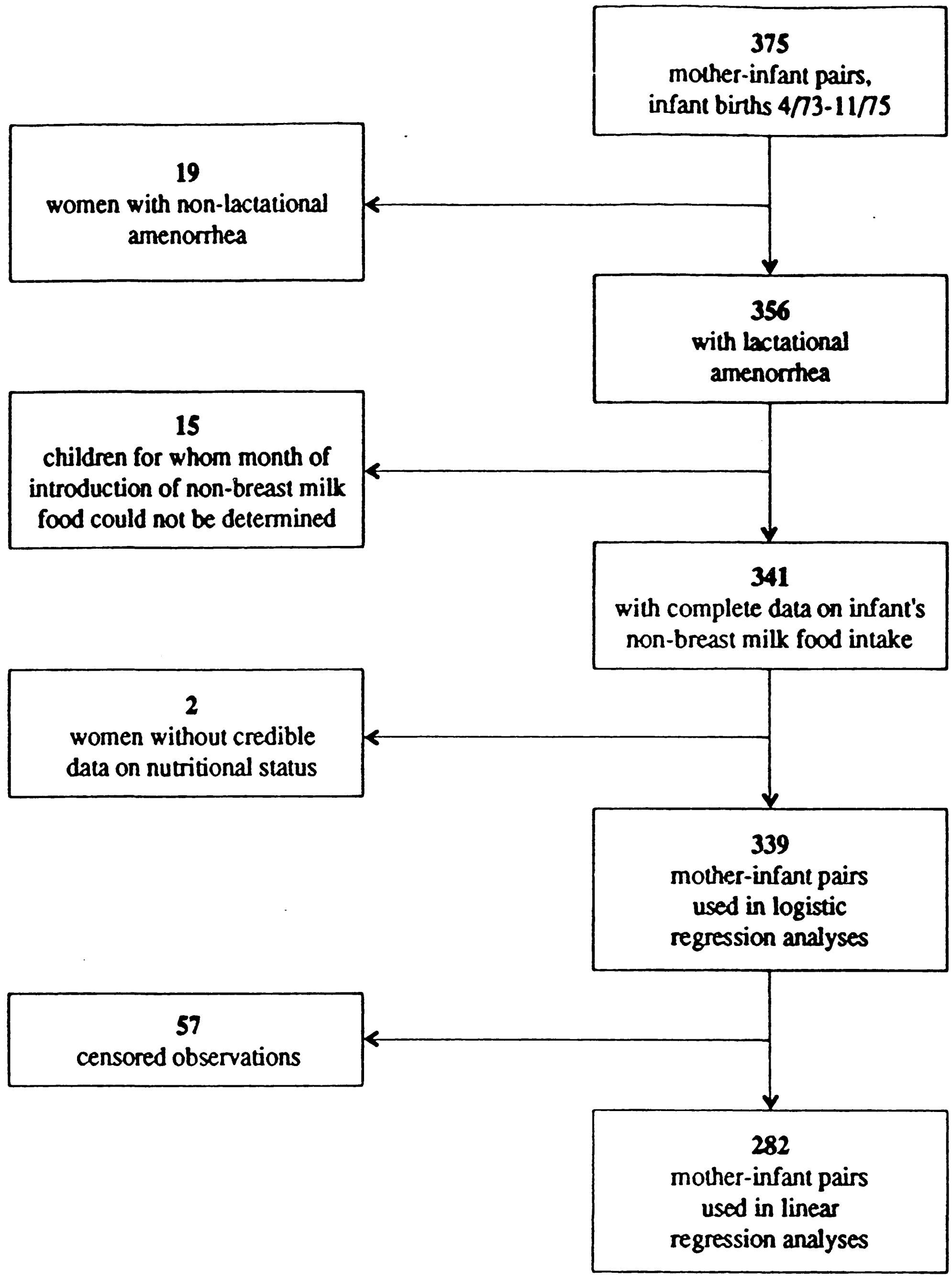
	Odds Ratio	95% C.I.	Explanatory factors at 25th, 75th %iles
1-6 months postpartum (n = 34 vs. 273*)			
Parity (0, 1, 2, ≥3 previous children)	0.21	0.11, 0.42	1, 3
Child's weight gain, 0-3 mo (kg)	0.38	0.23, 0.63	1.8, 2.9
Maternal triceps skinfold thickness, 3 mo PP (mm)	1.64	1.02, 2.65	6.6, 9.9
7-12 months postpartum (n = 66 vs. 186*)			
Parity (0, 1, 2, ≥3 previous children)	0.25	0.14, 0.43	1, 3
Child's non-breastmilk energy intake/child's weight, 9 mo (418 kJ/kg or 100 kcal/kg)	1.84	1.18, 2.88	0.08, 0.49
13-18 months postpartum (n = 120 vs. 64*)			
Child's non-breastmilk energy intake/child's weight, 15 mo (418 kJ/kg or 100 kcal/kg)	2.11	1.35, 3.31	0.45, 0.91

* n resuming menstruation vs. n remaining amenorrheic; excluded due to missing predictor values were 28 observations at 1-6 mo, 5 at 7-12 mo, and 5 at 13-18 mo

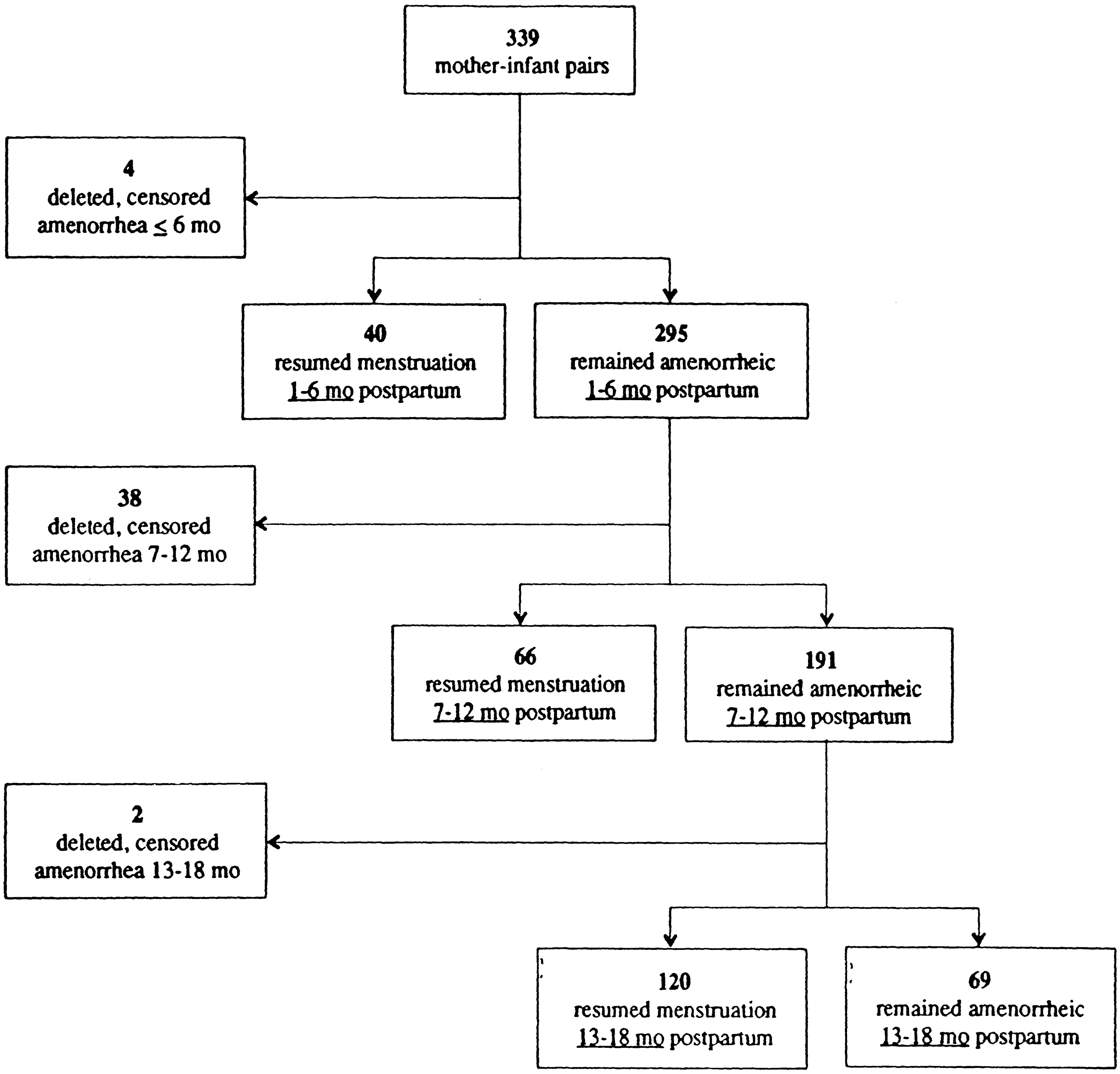
Table 3. Multiple linear regression: Factors explaining length of postpartum amenorrhea (PPA, n = 260)*

	b	SE	p	Explanatory factors at 25th, 75th %iles	Difference in PPA between 75th, 25th %iles (mo)
Stopped breastfeeding before menstruation resumed (yes/no)	4.28	0.60	<0.001	0, 1	4.28
Parity (0, 1, 2, or ≥3 previous children)	1.69	0.25	<0.001	1, 3	3.38
Child's non-breastmilk energy intake/child's weight (418 kJ/kg or 100 kcal/kg)	-5.96	1.24	<0.001	0.26, 0.54	-1.64
Child's weight gain, 0-3 mo (kg)	1.44	0.36	<0.001	1.8, 2.9	1.58
Maternal triceps skinfold thickness, 3 mo postpartum (mm)	-0.18	0.10	0.090	6.5, 9.5	-0.54

*Adjusted R^2 = 40%; constant = 3.437 ± 1.713 mo



375
mother-infant pairs,
infant births 4/73-11/75
19
women with non-lactational
amenorrhea
356
with lactational
amenorrhea
15
children for whom month of
introduction of non-breast milk
food could not be determined
341
with complete data on infant's
non-breast milk food intake
2
women without credible
data on nutritional status
339
mother-infant pairs
used in logistic
regression analyses
57
censored observations
282
mother-infant pairs
used in linear
regression analyses


339
mother-infant pairs
4
deleted, censored
amenorrhea ≤ 6 mo
40
resumed menstruation
1-6 mo postpartum
295
remained amenorrheic
1-6 mo postpartum
38
deleted, censored
amenorrhea 7-12 mo
66
resumed menstruation
7-12 mo postpartum
191
remained amenorrheic
7-12 mo postpartum
2
deleted, censored
amenorrhea 13-18 mo
120
resumed menstruation
13-18 mo postpartum
69
remained amenorrheic
13-18 mo postpartum