

Early Breastfeeding Cessation in Rural Senegal: Causes, Modes, and Consequences

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Breastfeeding is practiced by a vast majority of mothers in sub-Saharan Africa, often for long durations.¹ Results from all 34 countries for which Demographic and Health Survey data are available show that, since 1975, more than 95% of children have been initially breastfed, and the median age of the child at breastfeeding cessation has been more than 18 months in all 13 countries surveyed after 1990.² Although the prevalence and duration of breastfeeding decreased in some African countries between 1975 and 1990 owing to increased rates of urbanization and female employment, prevalence levels have remained stable or even increased when these factors are taken into account.³

Breastfeeding has a beneficial effect on mothers by decreasing risks of new pregnancies and thus increasing mean birth intervals,⁴ and it is considered an essential component of motherhood in African populations.⁵ Studies have shown that breastfeeding reduces the risk of diarrhea and of death from diarrhea and respiratory infectious diseases among African children 1 to 2 years of age.^{6,7} In Asia and South America, its protective effect has been shown to be strongest during infancy, but hazard ratios associated with lack of breastfeeding during infancy have not yet been estimated for African populations because virtually all children are breastfed for more than 1 year, particularly in rural areas.^{7,8}

Recent studies have emphasized the importance of reasons for early breastfeeding cessation in interpreting the protective effect of lactation on survival. Indeed, children may be weaned earlier than normal as a result of conditions increasing mortality risk per se.^{8,9} In the present study, we sought to estimate the prevalence of early maternal breastfeeding cessation (or noninitiation of breastfeeding) in a rural West African society and to describe reasons and alternative feeding options. Also, we assessed mortality rates before

Objectives. We studied reasons for cessation of breastfeeding before the age of 15 months, replacement feeding modes, and child mortality in West Africa.

Methods. Data were gathered for 12 208 children born between 1987 and 1997 in a rural area of Senegal. Interviews were conducted with caregivers of early-weaned children, and child mortality risks were assessed.

Results. Fewer than 1% of children had been weaned early. The main reasons for early weaning were maternal death and new pregnancy (in 41% and 27% of cases, respectively). Twenty percent of children had been relactated by a wet nurse, and 16% had received formula. Many early-weaned children died before the age of 2 years (26%), particularly those weaned early as a result of the mother's death (hazard ratio=5.1; 95% confidence interval [CI]=1.74, 15.0). Girls had a lower hazard ratio than boys (0.16; 95% CI=0.05, 0.41).

Conclusions. Our results showed that early cessation of breastfeeding was rare but that associated mortality was high, especially when the mother had died. (*Am J Public Health.* 2006;96:139–144. doi:10.2105/AJPH.2004.048553)

the age of 2 years in relation to reasons for weaning and to postweaning feeding modes.

METHODS

Study Design and Population

Our study was community based and observational in terms of its design; data on dates of birth, weaning, and death were collected in a prospective manner, and data on causes of early weaning, alternative feeding modes (replacement feeding or wet nursing), and perceived health consequences for infants and mothers were collected retrospectively (3 to 13 years later).

The study was conducted in a rural area of West Africa 150 km east of Dakar, among a population belonging to the Sereer ethnic group. Educational levels in the area are low, and electricity is not available. Water is taken from outdoor taps and stored. Wood and cow dung are the main combustibles used for cooking.

From 1989 through 1997, the average duration of breastfeeding was 23.7 months, and only 4.4% of children were breastfed for less than 18 months.¹⁰ In 1997, the percentage of HIV-1-positive adults was just 0.3% (95% confidence interval [CI]=0.0%,

0.7%).¹¹ The maternal mortality rate was 516 per 100 000 births, and mortality rates among infants and children younger than 5 years were 80 and 213 per 1000 live births, respectively.^{12,13}

Demographic surveillance was conducted with all 30 villages in the study area. Data, including dates of birth, breastfeeding cessation, death, and out-migration from the study area, were collected through home visits to compounds conducted weekly between January 1987 and February 1997 and at 3-month intervals thereafter.¹³ Children were eligible for the study if they had been born between January 1987 and February 1997 and registered as weaned before the age of 15 months. All children whose mothers had died prior to 15 months postpartum were also included.

The caregivers of included children were visited in April 2000 and interviewed about the child's approximate age at weaning, reasons for early weaning (both with an open-ended question and thereafter with a closed-ended list of 10 reasons: maternal death, pregnancy, illness, fatigue, travel/migration related to employment, child illness, faltering growth, breast milk bad for child, not enough breast milk, parents able to buy other foods), and subsequent feeding modes.

Among 12 208 live-born children, 123 were registered as having been weaned before the age of 15 months, and 43 mothers were registered as having died less than 15 months postpartum. Data on 11 of these 43 mothers were not included with the group of 123 children, suggesting that field workers had sometimes forgotten to register weaning events resulting from maternal deaths. Therefore, 134 children were eligible for the study. Nineteen of these children could not be included because their primary caregiver during early childhood had died or moved out of the area; thus, the study population was made up of 115 children. Gender, maternal age, and rates of maternal death before 15 months postpartum did not differ between children who were and were not included (data not shown).

Statistical Analysis

We analyzed child survival rates from weaning up to 2 years of age using a Cox proportional hazard model with child age as the time scale. Because only weaned children were included in the study, none could have died before breastfeeding cessation. Thus, by design, the before-weaning survival rate was 100%, and children could not be included at birth.¹⁴ Instead, their entry into the risk set was delayed until date of weaning.¹⁵ Thereafter, they remained in the risk set until death, emigration from the study area, or their second birthday, whichever came first.

The hazard model included reason for weaning (maternal death: yes or no), child gender, maternal schooling (any vs none), relactation (yes or no), and an indicator of recent birth (1992 or after vs 1987–1991). SAS Version 8.1 (SAS Institute Inc, Cary, NC) was used in conducting the analyses, which included χ^2 tests, χ^2 trend tests, Mantel–Haenszel statistics, and Fisher exact tests.

RESULTS

Confirmation of Early Weaning by Caregivers

Interviews with caregivers revealed that 30 of the 115 study children had in fact not been weaned early. One of them had refused breast milk during the last 4 days before

TABLE 1—Characteristics of Children Weaned at Less Than 15 Months of Age in a Rural Senegalese Area and Characteristics of Other Children Living in the Area

	Early-Weaned Children (n = 85), %	Other Children (n = 12 123), %	P
Female	45.9	49.5	>.10
Multiple birth	5.9	2.8	.087
Hospital birth ^a	5.1	1.8	.054
Birth rank ^b			<.0001
1	28.2	14.7	
2-3	28.2	25.3	
4-6	17.9	31.5	
7-13	25.7	28.4	
Maternal age, y			.0011
<25	55.3	36.3	
25-29	10.6	22.6	
30-34	12.9	20.5	
≥35	21.2	20.6	
Any maternal schooling ^b	22.9	9.6	<.0001

^aData were missing for 7 early-weaned children.

^bData were missing for 2 early-weaned children.

dying from an acute disease, while in 29 instances the demographic field worker had registered an erroneous date of weaning (precisely 1 year before the correct date in the case of most children).

Thus, 85 children had stopped being breastfed by their mothers before the age of 15 months or had never been breastfed by their mothers. Among these children, 18 had been relactated by other women. The estimated percentage of early weaning was 0.85% (95% CI=0.69, 1.00). With the exception of one mother, all had stopped breastfeeding abruptly (i.e., between one day and the next). Young, primiparous, and educated mothers were more likely to wean their children early (P s<.0001; Table 1).

Reasons for Early Breastfeeding Cessation

The most frequent reason offered by caregivers for breastfeeding cessation before 15 months was maternal death (41%; Table 2). This reason was cited significantly more often for children weaned before the age of 9 months than for those weaned at 9 months or later (P <.001).

Four children were weaned because they were ill (1 fever episode, 2 accidental burn-

ings of the mouth with potassium chlorate, and 1 hospitalization in the capital city of Dakar for severe psychomotor retardation). Six children were weaned because their mother was severely ill (1 case each of cholera, leprosy, tuberculosis, and psychosis and 2 cases in which the type of illness was unknown), and one of the mothers was reported to have had a bilateral nipple malformation preventing milk ejection. Twelve children were weaned because their mothers had moved (as a result of employment or marriage) and left them behind with a grandmother. No caregiver spontaneously offered more than one reason in response to the open-ended question regarding reason for weaning.

When the closed-ended list of reasons for early weaning was used, the mean number of reasons cited per child was 1.6. Reasons were tested for bivariate associations. Maternal death was not associated with any other reasons, while weaning as a result of pregnancy was frequently associated with the following: (1) perceived growth faltering (P <.0001), (2) breast milk considered bad for the child (P <.0001), (3) child illness (P <.0001), and (4) parents' ability to buy other foods (P <.01).

Weaning Procedure

Among all of the children but one, the mother stopped breastfeeding abruptly. Many of the mothers noted that they knew of no other way, while one declared that although she had heard about young mothers ceasing gradually, she chose to do it in the traditional way. The only child weaned gradually (over a period of 1 week) lived with her mother in the capital city of Dakar at the time of weaning.

In the case of 46% of the children, a traditional Sereer “healer” or a Moslem *marabout* performed a ritual on the day of weaning. Some sort of “consolation” was offered to 90% of the newly weaned children (63 of the 67 with available data), always consisting of food given in the form of a snack (mainly bread or crackers but also fermented milk or fruits). No pacifiers or other specific objects to suck or embrace were used. Among the 50 children whose mother had not died, 20 continued to sleep in their mother’s bed after weaning, 10 slept on a blanket on the floor in her hut (usually with older siblings), and 18 slept with another adult woman in her hut (2 had missing data).

Relactation

Lactation by another female caregiver was initiated following maternal death, severe illness, or relocation associated with employ-

ment. Infants were significantly more likely than older children to be relactated (31% vs 8%; $P<.05$; Table 3).

The women in charge of relactation (wet nurses) were usually close relatives of the mother (in the case of 15 out of 18 children). Grandmothers who served this role were aged 40 to 67 years at the onset of relactation. Some wet nurses lactated their own child at the same time, while the others reported durations of 1 to 4 weeks until the milk had “come completely in.” Eleven children were relactated until at least 24 months of age.

Among the 67 children who were not relactated, this option had been considered for 15, but no woman acceptable to the family and willing to relactate had been identified. Three infants had refused relactation. Other caregivers indicated that they did not know the procedure ($n=13$) or that such practices were prohibited ($n=3$) or not commonly used ($n=2$) by Sereers.

Replacement Feeding

The utensils used to feed the children were spoons (74%), hands (49%), cups (13%), and feeding bottles (16%). Feeding bottles were more frequently used for younger infants (χ^2 test for trend: $P<.01$), but only half of those breastfed for less than 3 months (9 of 18) had been fed by bottle. Relactated children were no

less likely to have been fed by bottle (5 of 9 vs 4 of 9 among those not relactated; $P>.10$).

Formula was usually obtained free of charge from Catholic or Protestant missions and was more frequently offered to infants weaned at a very young age (less than 3 months; 44%) than to children weaned at a point beyond infancy (3%; trend $P<.001$). Fresh cow or goat milk was also used but not in a modified form (i.e., boiled, diluted with water, combined with sugar), even in the case of very young infants (data not shown).

Caregiver-Reported Effects of Early Weaning on Children

Among 80 caregivers able to answer the question regarding effects of early weaning, 18 (28%) stated that the child had often been ill after weaning, mainly as a result of diarrhea ($n=13$) or fever ($n=10$). Examples of caregivers’ comments included “Everything depends on whether the caregiver is experienced and dedicated and on the means she has in her possession” and, conversely, “With regards to child health, everything depends on God.”

Caregiver-Reported Effects of Early Weaning on Mothers

Two women cited the child’s problems as having negative effects on the caregiver (e.g., “Children weaned early cry so much and that is very tiring for the mother”), 5 spoke of the difficulties of feeding the child properly without breast milk, 9 mentioned painful breast engorgement, 3 cited the greater risk of an early new pregnancy, and 1 indicated a sensation of guilt. Eight women stated that, on the contrary, early weaning was convenient for the mother because she could rest more, and 7 noted that weaning was better for the mother unless she became pregnant again quickly. Finally, 10 caregivers stated that whether early weaning had positive or negative effects on the mother “depended entirely on God.”

Mortality Among Early-Weaned Children

Twenty-two children (26%) died before reaching their second birthday, and 29% of those breastfed for less than 9 months died prior to their first birthday. Forty-two percent of those breastfed for less than 6 months died before the age of 2 years (Table 3). Mortality

TABLE 2—Reasons for Early Breastfeeding Cessation, by Child Age at Cessation: Senegal, 1987–1997

	Age at Cessation, mo, No. (%)			P^a
	<9	9–14.9	Overall	
Maternal death	26 (77)	9 (18)	35 (41)	<.0001
Maternal pregnancy	1 (3)	22 (43)	23 (27)	<.0001
Maternal illness	4 (12)	3 (6)	7 (8)	NS
Maternal migration	1 (3)	9 (18)	10 (12)	<.05
Child illness	1 (3)	3 (6)	4 (5)	NS
Child ready	0	1 (2)	1 (1)	NS
Maternal marriage	0	2 (4)	2 (2)	NS
Maternal fatigue	0	1 (2)	1 (1)	NS
New birth	0	1 (2)	1 (1)	NS
Not enough milk	1 (3)	0	1 (1)	NS
Any reason	34 (100)	51 (100)	85 (100)	

Note. NS = nonsignificant. No caregiver spontaneously cited more than one reason in response to the open-ended question regarding reasons for early breastfeeding cessation.

^aFrom Fisher exact tests comparing those weaned before 9 months with those weaned from 9–14.9 months.

TABLE 3—Distribution of Children According to Relactation Status, by Child Age at Weaning: Senegal, 1987–1997

Child Age, mo	No Relactation, No. (No. Deceased ^a)	Relactation, No. (No. Deceased ^a)	Total, No. (No. Deceased ^a)
0–2.9	12 (6)	9 (2)	21 (8)
3–5.9	3 (3)	2 (0)	5 (3)
6–8.9	6 (2)	2 (0)	8 (2)
9–11.9	12 (3)	2 (1)	14 (4)
12–15	34 (5)	3 (0)	37 (5)
Total	67 (19)	18 (3)	85 (22)

Note. A Mantel–Haenszel age-adjusted test for mortality differences between relactated and other children produced a *P* value of .057.

^aBy 2 years of age.

TABLE 4—Adjusted Hazard Ratios (HRs) Before the Age of 2 Years for Selected Risk Factors: Children Weaned Before 15 Months in Rural Senegal, 1987–1997

Explanatory Variable	No.	Deaths	Child-Months at Risk ^a	HR	(95% CI)	<i>P</i>
Reason for weaning				5.11	(1.74, 15.0)	.003
Maternal death	35	16	320.7			
Other	50	6	530.7			
Relactation				0.50	(0.13, 2.02)	>.10
Yes	18	3	184.0			
No	67	19	667.4			
Child gender				0.16	(0.05, 0.41)	.0002
Female	39	6	483.9			
Male	46	16	367.5			
Maternal schooling				0.47	(0.10, 2.29)	>.10
Any	20	2	245.0			
None	65	20	606.4			
Year of child birth				0.52	(0.20, 1.30)	>.10
≥1992	46	8	476.0			
1987–1991	39	14	375.4			

Note. CI = confidence interval. Cox proportional hazards analyses were used in calculating HRs.

^aEntry into the risk set was delayed until the date of breastfeeding cessation.

rates did not differ according to reason for early weaning except among those weaned as a result of their mother's death, who were more likely to die than other children (cumulative mortality rates of 46% and 12%, respectively; *P* < .01). Their hazard ratio remained statistically higher than that of other children in an adjusted Cox regression model (*P* < .01; Table 4).

There was no significant difference in risk of death between relactated children and those given replacement feeding, despite a

hazard ratio of 0.50 (Table 4); however, girls had a significantly reduced hazard ratio relative to boys. Children who were born more recently or whose mothers had attended school tended to die less often, but their hazard ratio was not significantly below 1 (Table 4).

DISCUSSION

One important finding of this investigation involves the extreme rarity of breastfeeding cessation during infancy in the study commu-

nity: less than 1% of children had never been breastfed or had been weaned before 15 months of age. Maternal death was the major reason for early weaning, especially among infants less than 9 months of age (77%), and with the exception of one case of breast malformation, it was the sole reason for noninitiation of breastfeeding. Among older infants and children, the main reason for early breastfeeding cessation was maternal pregnancy, as shown in earlier studies conducted both in this setting^{10,16} and in many other settings in the less developed world.^{17,18}

The major strength of our study was the long-term follow-up of a large population, which enabled us to identify 85 children with short breastfeeding durations despite the very low prevalence of these short durations. Conversely, a possible limitation was the retrospective nature of the data related to replacement feeding and the long time span between the weaning events and interviews, necessarily affecting their accuracy. However, relactation is a major decision that is not easily forgotten. Duration of breastfeeding was recorded prospectively, but several omissions and incorrect dates of weaning were detected.

Mortality among early weaned children was high: 26% of children breastfed for less than 15 months died before 2 years of age (along with 42% of those breastfed for less than 6 months). In comparison, the mortality rate among children up to 2 years of age was 13.9% of live births during the same period (Marra AM, MS, unpublished data, April 2005).

Only their mother's death was associated with a significantly greater risk of death among the study children. The reasons for this association may be biological in some cases (e.g., complications of delivery, transmission of infectious disease from mother to child); in addition, however, maternal deaths were often unexpected, and thus relatives were not able to prepare for replacement feeding or relactation.

A recent study conducted in urban and rural Guinea Bissau in West Africa also showed that children whose mothers had died exhibited markedly higher mortality, but this was the case only among those younger than 2 years.¹⁹ The authors hypothesized that early cessation of breastfeeding was the rea-

son for the poor survival rate among these children, given that few had been relactated by a wet nurse. Similar results and conclusions were derived from a large cohort study of Ugandan children.²⁰ Our findings showed that even in comparison with children weaned early for other reasons, motherless children still die more frequently.

Two studies focusing on mortality among weaned children and the relation of mortality to reason for breastfeeding cessation have recently been published. Maternal or child illness was a frequent reason cited for relatively early weaning in both studies, and it was associated with increased risk of child death.^{8,9} However, Jakobsen et al.⁸ did not consider weaning events before the age of 12 months owing to insufficient power, while Brahmbhatt and Gray⁹ were not able to include weaning events attributable to maternal death because reasons for early weaning had been collected through interviews with mothers.

Brahmbhatt and Gray argued that relative mortality risks associated with early weaning in developing countries are overestimated because in many cases they are based on weaning events prompted by infant and maternal illness, which in themselves may lead to child death.⁹ However, this risk of a “reverse causality bias” (child illness leading to weaning rather than vice versa) has been adequately addressed in most published studies.^{6,7,21,22} In the present investigation, children weaned early because they were ill did not tend to die more frequently than those weaned for other reasons. However, in this setting mothers usually do not wean but, rather, prolong breastfeeding when their children are frequently ill.¹⁶ Among pregnant mothers only, morbidity was often cited as a secondary reason for weaning because of the widespread belief that a pregnant woman’s milk can provoke diarrhea.

Breastfeeding by an HIV-negative wet nurse has been suggested as a strategy allowing HIV-positive women in developing countries to avoid transmission of HIV through breast milk.²³ In this study, the hazard ratio among early weaned children who subsequently received relactation was 0.5, but it was not significantly lower than 1. Possible explanations for this finding are insufficient

milk secretion, especially during the first few weeks of relactation, and use of bottle feeding in parallel with breastfeeding. In addition, our statistical power was only about 50%, assuming a “true” hazard ratio of 0.50, as compared with a power level above 95% for differences related to child gender or maternal death as the reason for early weaning.²⁴

The wet nurses interviewed in this study confirmed the importance of frequent stimulation of breast milk production for several weeks prior to the onset of full wet nursing. Such stimulation may involve the use of either breast pumps²⁵ or a nursing child. The extent to which wet nurses are accepting of the practice of relactation is not well known, but in some African countries in which the prevalence of AIDS is high, women become very reluctant to breastfeed other women’s children, probably because they fear being infected by the suckling.²⁶ However, a recent study from Kenya suggests that wet nursing by “surrogate grandmothers” may be a feasible strategy in some settings.²⁵

Knowledge of adequate preparation of replacement foods was clearly insufficient. Fresh animal milk was seldom diluted with water, even in the case of the youngest infants, and infant gruels were seldom enriched with ingredients other than sugar. Formulas were offered free of charge by private dispensaries and nongovernmental organizations because of their prohibitive cost.

The strategies used in comforting early weaned children (e.g., weaning rituals and special snack foods) were not adapted to their young age. Also, many infants stopped sleeping in their mother’s bed and began sleeping with older children on the floor. As a result, persistent crying was a concern among many caregivers.

In summary, breastfeeding cessation before 15 months postpartum is extremely rare in rural Senegal, and in the present study the primary reason was maternal death, which was associated with a greater mortality risk than other causes. Forty-two percent of children breastfed for less than 6 months died before the age of 2 years.

Given the few cases in sub-Saharan Africa in which infants are not breastfed or are breastfed only briefly, prospective studies of infants of HIV-positive mothers are needed

to provide reliable estimates of the effects of early weaning and types of replacement feeding on infant morbidity and mortality in various African contexts. We found that relactation by wet nurses tended to be associated with lower child mortality rates, and thus this strategy, despite its multiple constraints, deserves further investigation in settings where it is culturally acceptable. ■

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Contributors

N.B. Mané and K.B. Simondon designed the study. N.B. Mané conducted all interviews and a majority of the analyses. K.B. Simondon contributed to the analysis and wrote the first version of the article. A. Diallo assisted with data collection, and A.M. Marra was responsible for management of the Niakhar study area database. All of the authors contributed to interpretation of the data and to revisions of the article.

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Human Participant Protection

This study was conducted in accordance with the Declaration of Helsinki. Caregivers provided oral informed consent to take part in the study. Institutional review board approval was not obtained, because no such boards existed either in Senegal or at the Institut de Recherche pour le Développement (France) at the time of the study.

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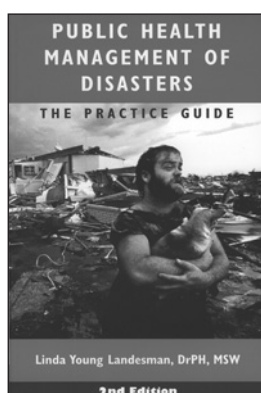
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