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BREASTFEEDING AND DEMOGRAPHY  
IN TWO MEXICAN VILLAGES

by

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Abstract: A variety of factors shape patterns of breastfeeding, and in societies where lactation has a major effect on birth spacing, the configuration of breastfeeding practices ultimately affects demographic rates. In two central Mexican villages, interviews and observations reveal that breastfeeding patterns are determined by traditions governing mother-infant contact, maternal precautions to ensure adequate quantity and quality of breast milk, and by rules guiding weaning. Culture-specific meanings of demand feeding, supplementation, and abrupt weaning are evident from interview data collected in two Mexican villages, Tepetlaoxtoc and Amanalco, during 1976 and 1977. Because of the situational nature of beliefs and rules surrounding lactation and weaning, women vary considerably in timing the phases of weaning.

Villagers are generally unaware of the contraceptive effect of lactation. In Amanalco, lactation contraception is the major mechanism of birth spacing, thus constraining population growth. Another constraint is the high rate of child mortality. In Tepetlaoxtoc, additional contraceptive techniques apparently are used to increase birth spacing. Breastfeeding patterns, then, are the product of traditions and maternal decisions. They result in considerable variation in the timing of weaning, affect rates of fertility and possibly child mortality, and act to constrain population growth.

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## BREASTFEEDING AND DEMOGRAPHY IN TWO MEXICAN VILLAGES<sup>1</sup>

### Introduction

Breast milk is currently promoted as the natural food for babies (see for example La Leche League 1958, Olds and Eiger 1972) and the movement back to breastfeeding has been accompanied by a host of studies pointing to breast milk's unique characteristics as the appropriate food for the first six months of life (e.g., Burman 1976, Gordon 1979, Jelliffe and Jelliffe 1978). The process of breastfeeding, however, is not purely natural and biological. This study shows how cultural systems, in addition to biological constraints, shape lactation patterns and endow breastfeeding with social significance.

In two Mexican communities, people see lactation as a process that requires conscious efforts on the part of the mother with the support of her family and friends. To ensure adequate quantity and quality of breast milk, the mother chooses regimens congruent with an array of cultural rules. Two demographic aspects of infant feeding practices are evident in the communities. First, lactation contraception provides a major brake on birth rates. Second, patterns of child mortality seem to be related to the timing of weaning phases. Child mortality provides a second significant brake on population growth.

### Methods

The data for this study were gathered in 1976 and 1977 in two central Mexican farming communities, Tepetlaoxtoc Villa de Hidalgo and San Jeronimo Amanalco. Demographic data and children's breastfeeding histories were elicited from each woman participant during informal interviews, usually over the course of three or four visits to a household. The participants represent a substantial proportion of the women in each community. In Tepetlaoxtoc, 174 adult women drawn in random and availability samples participated in the study; they represent 46 percent of women at least 15 years of age. In Amanalco, 111 women drawn in an availability sample participated, and they represent 24 percent of all adult women. Statistical comparisons of data from different interviewers and of the random and availability samples from Tepetlaoxtoc showed no significant differences (for further information on sampling see Millard 1982a). These results, in combination with the large percentage of women included in the samples, give us confidence in the representativeness of the samples from both villages.

We consider the reliability of the interview data to be good on the basis of repeat interviews and elicitation of the same data from several informants. Women had little difficulty in remembering a child's month of birth; they calculated the year of birth from the child's current age or the timing of an event near the birth. They seemed, however, to require some

effort to recall the duration of breastfeeding. Less than 1% of the women in the samples were unable to recall this information adequately and the quantitative data collected from them have not been incorporated into the present study.

Villager's views and other ethnographic observations of breastfeeding were recorded after they emerged in free-ranging discussions. Unless otherwise noted, the ethnographic observations presented in this work represent widely distributed regularities in villagers' views and behavior. The weaning rules reported here were stated consistently by many women; discussions with other women revealed no disagreement. The extent of the distribution of these rules, however, cannot be quantified with the data at hand.

### Two Villages in Central Mexico

Tepetlaoxtoc and Amanalco are located in Acolhuacan, the northeastern region of the Valley of Mexico, one and one-half hours from Mexico City by bus. Although they are only fifteen kilometers apart, Tepetlaoxtoc and Amanalco differ in ethnic, historical, and ecological characteristics.<sup>2</sup> Nevertheless, they are similar in household composition, family economics, childrearing, and breastfeeding.

Tepetlaoxtoc's families, who are mestizo, are heavily dependent on wages earned outside the community. Although agriculture has always been economically important to village families, it has never been successfully their sole means of support. Harvests vary greatly, depending on rainfall that is unpredictable; typically nonagricultural jobs provide an additional means of support. Historically, Tepetlaoxtoc was an important regional commercial town, but now it lies off the main road and more closely approximates a village (see Schaedel 1969).

Amanalco's proximity to a large spring has allowed it to develop and maintain an irrigation system, which probably originated in pre-Columbian times. Agriculture provides villagers with their primary means of livelihood, but is augmented by cash from selling crops and handicrafts and from employment outside the village. Amanalco is identified as Indian, and villagers speak Nahuatl, the language of the Aztecs, in addition to Spanish. Family organization, with a predominance of patrilocal stem or extended families, is similar to that of other Nahuatl communities (Madsen 1960; Montoya 1964; Nutini 1968; Sokolovsky 1978).

Amanalco contrasts with Tepetlaoxtoc in a number of ways. The rate of permanent out-migration is low; village-endogamous marriage is much more frequent; and the range from wealthy to poor is narrower in Amanalco than in Tepetlaoxtoc. Amanalco's families have fewer material possessions and more often have to stretch their resources to the limit in order to cover their basic necessities. Nevertheless, families in the two communities are similar for they function as important social and economic units that redistribute agricultural and cash incomes among members in times of need.

### Breastfeeding Attitudes and Behavior

Breastfeeding frequency. Women regard demand feeding as the proper way to breastfeed. Demand feeding is practiced in a wide variety of ways cross-culturally. In Tepetlaoxtoc and Amanalco, it is rationalized by the concept that the child should not go hungry (see Martínez and Chávez 1971). Sleeping next to the mother in the parental bed until breastfeeding ceases, a baby, upon attaining the ability to find the breast, can nurse at will, and often does so while the mother sleeps (see also Hull 1982). Further, from time to time during the day, babies can fondle the breast and suckle at their leisure.

Although feeding schedules are unknown, "demand feeding" is a somewhat misleading description of the rhythm of feedings. Mothers do not routinely delay feeding until their babies cry. Thus, lactation patterns are heavily shaped by maternal perceptions of infant needs. Additionally, a number of factors intervene to structure feeding frequency. Traditional swaddling techniques limit a child's self-initiated access to the breast early in the nursing career, but later, while carried on the mother's chest with arms free, the baby has easier access. Finally, at an older age, the mother's way of carrying the child, bound to her back, limits access once again. The rhythmic requirements of a mother's chores also tend to structure the timing of breastfeeding.

Thus, extremely frequent daytime suckling as practiced in some societies (see Konner and Worthman 1980 on the !Kung) is not salient in these villages. In a central Mexican village comparable to Tepetlaoxtoc and Amanalco, Chávez, Martínez and Bourges (1975) prospectively studied seventeen mother-child dyads. They find that early in life, variation is great in bouts per day and total suckling time per day. By the end of the first six months there is relative conformity among mother-child dyads. Children are breastfed twelve times a day on average through the first year, followed by a decline to nine times a day on average at eighteen months. The average time spent in suckling per day is 200 minutes throughout the first eighteen months. On the basis of unquantified observations, ethnographic similarity and geographic proximity, the communities in the present study seem to have similar lactation patterns.

Maternal sacrifice. Pregnancy, birth, and breastfeeding are seen as processes that involve maternal sacrifice for the sake of the child. Pregnancy obligates a woman to restrict her diet and social activities, and birth is seen as a life-threatening event that is the most physically painful of all human experiences.<sup>3</sup> The child, then, as life begins, owes the mother an unrepayable debt because of her self-sacrifice.<sup>4</sup>

The debt increases with lactation. In the eyes of villagers, breastfeeding drains some of the bodily substance from a woman and contributes nourishment to the child. Breastfeeding is not acknowledged to be in any way pleasurable to a mother, though it is to a child. Children, in the words of one woman, owe "companionship, labor and care" to their mothers in enfeebled old age to repay their debts incurred during gestation, birth and lactation.

Maternal precautions. Maternal abnegation is lived out by following specific regimens to produce healthful breast milk. Women are required to adjust their diets to improve the quantity and quality of their breast milk (see also Romney and Romney 1963, Sanjur et al. 1970) by: avoiding some foods for forty days after birth (see also Cosminsky 1977a); incorporating specific foods into their diets; and structuring their diets during lactation in accord with a set of hot-and-cold theories (see also Vargas 1979). Among foods incorporated as galactagogues are pulque (fermented juice of the maguey plant), that can be expected to improve the let-down reflex through moderate amounts of ethanol (Cobo 1973) and that probably provide additional nourishment for the mother; and ajonjolin (paste made from sesame seeds)<sup>5</sup>, that increases calcium and phosphorous intake (Church and Church 1975), though it is not known whether it improves the diet significantly. In addition to dietary changes, women are expected to avoid susto ("fright"; "soul loss"; see also Ruéel 1964), and colera ("anger"), and their social network is expected to assist in helping to maintain emotional equilibrium.

In Tepetlaoxtoc, one or two sweat baths following midwife-assisted births are routinely taken to promote recovery from child birth. In Amanalco, the lactating mother follows this pattern and continues to participate regularly in sweat baths. Because the sweat baths required for successful breastfeeding are often prolonged, they can cause some maternal discomfort (although this discomfort apparently is not medically problematic).<sup>6</sup> Thus, this activity further compounds the child's debt to the mother.

In Amanalco, the sweat bath is seen as crucial to the production of healthful breast milk. From the perspective of villagers, breast milk has qualities that are animalistic, contaminating, and possibly perverting to infants. Sweat baths transform breast milk into what women term a "cooked" (cocigo) food ideal for an infant. Thus, women in Amanalco demonstrate their concern for their babies' health through regular sweat baths.

The sweat bath regimen also affords a woman the opportunity for more intense and regularly occurring interaction with other women.<sup>7</sup> The event is focused on the needs of the lactating woman, and is generally celebratory in nature. Often it involves a woman's own social support group, creating a succession of regularly timed occasions when the mother can consult with other women about her own and her infant's health. Because the bath requires several hours for preparation, carrying out, and recuperation, it forces the mother to rest at regular intervals.

Weaning rules. Tepetlaoxtoc and Amanalco share a number of rules concerning weaning procedures (Figure 1). None of them stipulates a correct chronological age when breastfeeding should cease. The spirit of the weaning principles is that the proper pace of weaning depends on a specific child's physical and behavioral development.<sup>8</sup>

Women in the two communities generally state the same principles, except for the prohibition of animal milk found only in Amanalco. The rules have a set of acceptable interpretations; they cannot be followed blindly, but require judgment in their application. Rule 2, for example, allows women considerable latitude in interpretation, since teeth erupt starting around six months, continuing up to around two and one-half years of age (Jelliffe 1966); thus women can complete weaning anywhere within that time span and still be in agreement with the rule. Similarly, Rule 3 allows the woman considerable latitude in the chronological age at which weaning is completed. Rule 4 entails an abrupt shift from heavy dependence on breast milk to a narrow range of the adult foods already familiar to the child.<sup>9</sup> The rules shape the phases of weaning according to the child's biological and psychological development and according to the quality of maternal milk, perceived to be determined by maternal biological and psychological states.

Variability in Cessation of Breastfeeding. Women time the phases of weaning differently from child to child (Table 1 and Figure 2). The data in Table 1 show children's mean ages when mothers report they began to supplement the breast milk diet and when they cease to breastfeed. Village women do not count tea, which is routinely given in the first day of life or nibbles of other non-breast-milk food. Thus the supplementation data are culture-specific and inappropriate for quantitative cross-cultural comparison.

Considerable variation within each village in the age at which breastfeeding stops can be seen in Figure 2. The forms of the distributions are similar, even aside from the heaping at one year in Tepetlaoxtoc and at one and one-half years in Amanalco. It is unknown whether the heaping reflects actual practices or the process of recall during the interview; the latter is suspected, however, because a child's chronological age at reaching a new maturational stage is not salient in village life. Although women do not remark upon the variations in chronological age at the cessation of breastfeeding, the proper timing for a specific child is often a topic of discussion in relation to the child's biological and psychological maturation.

In Tepetlaoxtoc, women stop breastfeeding on average when a child is about 10 months of age, only half the age found in Amanalco (the means are significantly different, see Table 1). Shorter breastfeeding by mestizos in contrast to Indians appears in other studies also. Hernández et al. (n.d.) report that in four semi-rural mestizo areas in northern and coastal Mexico, 56 percent of women breastfeed for at least a year, and in four rural Indian communities in southern Mexico, 94 percent breastfeed for at least twelve months. Tepetlaoxtoc most resembles the semi-mestizo areas, while Amanalco resembles the Indian communities, as would be expected.

Two factors that may be responsible for the shorter duration of breastfeeding in Tepetlaoxtoc are related to closer adherence to Western medicine. According to village women, physicians encourage them to introduce breast milk supplements and to stop breastfeeding earlier than is traditional. Moreover, increasing numbers of villagers are giving birth in hospitals under circumstances that, according to villagers' beliefs,

preclude breastfeeding. Women view anesthetics and other medicines used in hospital birthing as substances that enter breast milk and harm the infant, an hypothesis currently under debate in Western medical circles. Thus, the greater incidence of hospital births in Tepetlaoxtoc may be one reason why over sixteen percent of the children in the sample did not breastfeed, compared to only two percent of Amanalco's children.

### Demography

Historical comparison. Aspects of historical demography of the two communities are presented in Table 2 and results from the present study of village families in Table 3. In comparing the two tables, it should be kept in mind that the data in Table 2 depict a demographically familiar decade-by-decade snapshot series, whereas those in Table 3 are calculated from longitudinal childbearing histories, more similar to the products of family reconstruction than to standard demography.

The data in Table 2 show that the rate of fertility in Tepetlaoxtoc has generally been lower than in Amanalco, although fertility in Tepetlaoxtoc has been increasing since 1940. Similarly, those in Table 3 show that Tepetlaoxtoc's women with completed fertility had fewer numbers of live births on average than women in Amanalco. Thus, the two tables are consistent with regard to the direction of fertility differences, giving us some confidence in the data collected for the present study.

Because of the similarities in their calculation, the rates of infant mortality in Table 2 could be expected to approximate child mortality rates in Table 3, although the latter span a longer period of childhood, from birth to five years of age. During the reproductive histories of most women in the present study (1921 through 1960), the average rate of infant mortality in Tepetlaoxtoc was 184 deaths per 1000 live births; in Amanalco it was 411. The rates of child mortality in Table 3--176 in Tepetlaoxtoc and 374 in Amanalco--fall slightly below these rates. This discrepancy may be partly a result of maternal mortality; the childbearing histories of women who had died by the time of interviews were included in Table 2 but not in Table 3.

Further, Pérez Lizaur expects that her infant mortality rates may be overestimates for two reasons. Infants' ages at death were not reported in months; thus a number of deaths at an older age than one year may be included in the infant mortality rates reported in Table 2. It also is possible that the death of a child may have obligated parents to register both the birth and the death in order to have a Church burial; the births of children who survived probably were registered less often. Generally, though, the mortality rates shown in Tables 2 and 3 are consistent with regard to their size and the direction of differentials between the two communities. This consistency lends support to the interview data.

Fertility. Given the near universality of breastfeeding, lactation contraception is the major factor that prolongs birth intervals.<sup>10</sup> It is especially important in Amanalco, where breastfeeding is prolonged,

accounting almost entirely for birth spacing (Millard 1982a). This finding is consistent with the fact that Amanalco's reproductively active women have a live birth rate exceeding nine per women--approximating that of Hutterite women, whose rates are among the highest recorded (i.e., in excess of nine per woman) (Eaton and Mayer 1954).

In Tepetlaoxtoc, factors in addition to lactation contraception apparently are at play in reducing rates of live birth. Although women breastfeed on average for only one half the time of those in Amanalco (Table 1), they have fewer live births (Table 3). Conjugal disruption is more frequent in Tepetlaoxtoc and may be a contributing factor; possibly conscious efforts are more often made to extend birth intervals through coitus interruptus. Fertility control in Tepetlaoxtoc thus may extend beyond breastfeeding to other effective techniques, although this is not normally thought to be the case in farming communities in less developed countries.

Child mortality. High rates of child mortality constitute a major brake on village population growth. Amanalco's rate of child mortality is over twice as high as Tepetlaoxtoc's. That health conditions, including possibly maternal nutritional status, are deficient in Amanalco is suggested by the fact that at almost every age in childhood, death rates are higher there than in Tepetlaoxtoc.

Scrimshaw (1978) and Cassidy (1980) point to traditional weaning diets as nutritionally insufficient in many agrarian societies and to other specific childrearing practices as also "potentiating malnutrition" and infection (Cassidy 1980). While this discussion draws on their work, it is important to note at the outset that the characterization of "traditional" weaning practices as life-threatening is without sufficient scientific support. The question is whether people in agrarian societies today generally lack the resources to follow a culturally prescribed traditional weaning pattern that may be nutritionally adequate. We return to this point below.

The perspectives of Scrimshaw and Cassidy suggest that today's weaning conditions may be important in explaining the difference between Tepetlaoxtoc and Amanalco in rates of child mortality. In Amanalco, the greater reliance on breast milk over a longer period may lead to malnutrition. Currently, breast milk is thought to provide sufficient quantities of nutrients for the first six months of life, if the mother is well-nourished (Jelliffe and Jelliffe 1978). The lack of significant amounts of food other than breast milk in the diets of Amanalco's children until the average age of eight months may promote undernutrition. Continued reliance on breast milk as a major source of nutrients until an average age of twenty months may continue the undernourished state well into the child's second year of life.

In both villages, the distribution of children's ages at death suggests that major peaks in mortality are associated with weaning events. The first mortality peak follows the average age when supplementation is reported to

begin, and another peak follows the average age when breastfeeding stops. In Amanalco, a higher proportion of children die after their first year of life than in Tepetlaoxtoc, possibly a repercussion of longer lactation in Amanalco. Thus, child mortality seems to be associated with weaning practices. Other contributing factors may include Tepetlaoxtoc's greater use of Western medicine, as well as differences between the communities in epidemiology, water quality, and other sanitation conditions.

The comparison of Tepetlaoxtoc and Amanalco in the context of Scrimshaw and Cassidy's work implies that traditions endanger child health, but this conclusion cannot be drawn from the present study. Independently of traditions, in both communities poverty significantly correlates with family rates of child mortality (Millard n.d.). Thus, weaning practices may be mechanisms leading to child mortality, but they are not necessarily the array of practices prescribed by cultural tradition nor favored by present-day villagers. They may instead represent the affordable cultural remnants of a nutritionally adequate traditional infant feeding pattern.

Population control. Amanalco, despite its high rate of child mortality, faces an internal crisis from overpopulation. Both the tradition of endogamous marriage and the inaccessibility of lucrative urban jobs discourage villagers from migrating out. Population size is increasing, but the amount of irrigable farm land is limited.

As this study was ending, villagers were paying substantial sums of cash for the services of government workers to break up areas of hardpan and extend the irrigation system. Although the addition of high-quality farm land will allow villagers a respite from the problem of population pressure, relief can only be temporary under current demographic conditions (for further discussion see Millard 1982b).

Tepetlaoxtoc also faces continual population growth. The problem is not as serious there, however, because long-established patterns of out-migration and commuting provide a release of population pressure. Tepetlaoxtoc's mestizos have better access to higher paying urban jobs than Amanalco's Indians. Furthermore, the exogamous marital tradition in Tepetlaoxtoc promotes ties with other communities, providing other possible places of residence. Medical contraception, including maternal sterilization, also has come into some use in Tepetlaoxtoc, whereas it remains much more rare in Amanalco.

Contraceptive attitudes and motivations. In conversations with villagers, birth spacing emerges as a general concern. Villagers view prolonged intervals between births as a benefit to the health of infants. The two common fertility-control mechanisms are coitus interruptus and lactation contraception. Coitus interruptus is well known (Otero, personal communication); its extent in these two villages is not known, however. Traditional abortifacients made of herbs are readily available in regional markets (Monzon, personal communication), and at least one of them contains oxytocin, which stimulates uterine contractions (Cosminsky 1977b; Quezada

1975). The extent of their use in the two villages is unknown, though participants in the present study reported occasional voluntary abortions in neighboring villages. Secrecy surrounds the topic, because villagers hold that voluntary abortion is punished with stiff mandatory prison sentences.

When the issue of lactation contraception is raised with village women, they deny its effectiveness, confidently and laughingly pointing to their own repeated experiences of returning to pregnancy while breastfeeding. They volunteered no information about the return of menses in relation to the probability of conception. Of the women queried about lactation contraception, only one woman in Amanalco stated that she thought breastfeeding probably did reduce the chance of a rapidly ensuing pregnancy.

Contraceptive techniques such as pills, intrauterine devices, injections, and sterilization generally were controversial in both communities during this study. Many villagers voiced the conviction that contraceptive pills cause maternal cancer and infant birth defects. Although the use of medical contraception may have been increasing slightly, there was massive resistance to its adoption.

Medical contraception is avoided for reasons of health, rather than religion. Coitus interruptus is equated by at least some women in Tepetlaoxtoc with the rhythm method. The Roman Catholic Church's position on contraception is not a concern of villagers in general. Although many of them subscribe to rural Roman Catholicism, which is actually a syncretic religion combining precolumbian and Catholic beliefs, villagers regard themselves as flawed Catholics, in that their ways are generally not saintly. They are suspicious of priests, whom they generally regard as petty money-grabbers. Thus, villagers are neither versed in Church contraception instruction nor particularly susceptible to it.

From the perspective of villagers, the motivation for contraception lies principally in their desire to increase birth intervals. At the time of this study, however, the government's family planning campaign emphasized the limitation of family size to two children, an issue of little concern to villagers. Of all the campaign materials presented on posters and delivered over the radio, none addressed birth intervals. Additionally, to many villagers, limiting family size implied sterilization, frightening them away from experimenting with medical contraception.

An effective rural family planning campaign would have addressed villagers' needs for reproductive control; that is, it would have focused on birth spacing. It would have presented them with information and devices, rather than first attempting to indoctrinate them with alien values like the limitation of family size. Possibly the extension to villagers of information about lactation amenorrhea and the effective use of coitus interruptus would increase control of reproduction. Since fieldwork for this study, some slogans promoting increased birth spacing have been incorporated into the family planning campaign; but the response in Tepetlaoxtoc and Amanalco is unknown.

### Summary

Village women follow a dietary regimen that prohibits some foods and prescribes others to ensure adequate production of healthful breast milk. They avoid negative emotional states that are seen as making breast milk unhealthy. Thus, successful breastfeeding is not seen as a natural process, but as one that requires efforts by the mother and, to a lesser degree, by her relatives and friends.

Maternal efforts, in concert with the belief that lactation uses up maternally irreplaceable bodily substances, are seen to impose debts on children thereby obligating them to attend to their mothers' wants in old age. Maternal abnegation in the effort of lactation is one of the threads that binds children to their mothers, contributing to the family unity, crucial to the maintenance of the social order and economic livelihood.

The succession of sweat baths required to promote the production of healthful milk in Amanalco is seen as another form of maternal abnegation. Sweat baths also provide occasions for lactating women to rest, and to consult with relatives and friends about health matters. This cycle solidifies women's networks beyond the nuclear family. In Amanalco, this activity helps to maintain cooperation among segments of extended families. Ultimately, the fostering of cooperation within the community is crucial to keeping the irrigation system running smoothly, providing the primary livelihood of village families. Thus, in each village, women's activities to ensure successful lactation also serve to maintain the important units of society and cooperative relationships among them.

The rules that guide weaning allow considerable latitude in timing the introduction of non-breast milk foods and completing weaning. A major principle in applying the rules is that weaning is timed according to the child's biological and psychological maturation, rather than chronological age. In observing lactational precautions and regimens, and in applying weaning rules, women have considerable autonomy. While family members and friends, particularly women relatives, counsel one another on childrearing, the mother herself clearly is the ultimate authority. Specialists, both in the legitimized medical system and in the folk sector, are consulted about children only in cases of illness. Thus, lactation and weaning belong to the domain of the ordinary village woman. These points differ dramatically from the view in developed countries, where, breastfeeding is thought to require management by medical specialists.

Lactation provides the major contraceptive influence. In Tepetlaotoc, it appears that additional contraceptive techniques are used, in at least some cases, to increase birth spacing. The high rates of child mortality in Amanalco are hypothesized to result partly from prolonged lactation without adequate supplementation, in concert with today's weaning diets that may be nutritionally insufficient because of economic shortages. Though short birth intervals and high rates of child mortality are matters that concern villagers, they have not been appropriately addressed by the national family planning program and rural health programs. Programs informed by ethnographic studies of rural communities would look quite different, and probably would be more positively received by villagers.

NOTES

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2. See Campos de García 1973 on Tepetlaoxtoc, Pérez Lizaur 1975 on both communities, and Sokolovsky 1978 on a village similar to Amanalco.
3. See Sullivan 1969 on similar Aztec attitudes and Jordan 1980 on Yucatec Mayan birth practices. Jordan (1980:27) states that during labor Mayan women tend to begin pushing before the cervix is completely dilated, and speculates that the result may be more pain and exhaustion than necessary. A similar situation may apply to traditional birthing in central Mexico.
4. See also Browner and Lewin 1982 and Stevens 1973 on marianismo and Rubel 1966 on filial duty.
5. Elsewhere, the paste also is made from peanuts. See also Romney and Romney 1963, Sanjur et al. 1970.
6. Cosminsky 1982 describes a similar custom in Guatemala, where its use has not been shown to be medically injudicious, despite objections of physicians to the contrary.
7. See Cosminsky 1977b on support from the midwife during bathing.
8. See Cassioy 1980 and Cravioto and DeLicardie 1976 for further information on child maturity as a signal for the cessation of breastfeeding.
9. This finding disagrees with that reported in Martinez and Chavez 1971.
10. On lactation contraception see Cronin 1968, Gioiosa 1955, Hartfield 1972, Jelliffe and Jelliffe 1975 and 1978, Leridon 1977, Simpson-Hebert and Huffman 1981, Udesky 1950.

Figure 1. Rules that guide weaning

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1. Do not feed a baby colostrum because it is unhealthy food.
  2. Once a child has teeth, breastfeeding should cease, because the child is mature enough to eat weaning foods.
  3. Breastfeeding should cease before a child is too mature; otherwise the child will be boorish and ill-mannered (grosero).
  4. Weaning should not be gradual, because a diet of both mother's milk and other food will sicken a child.
  5. If a lactating woman knows she is pregnant, she must cease breastfeeding to avoid damage to the fetus she is carrying.
  6. Strong emotional states, such as severe fright (susto), profound anger (colera), or profound grief, can cause a woman's breast milk to be unhealthy for her child, in which case she must stop breastfeeding.
  7. Amanalco only: Babies should not be given animal milk, because it will contaminate an insufficiently mature human being.
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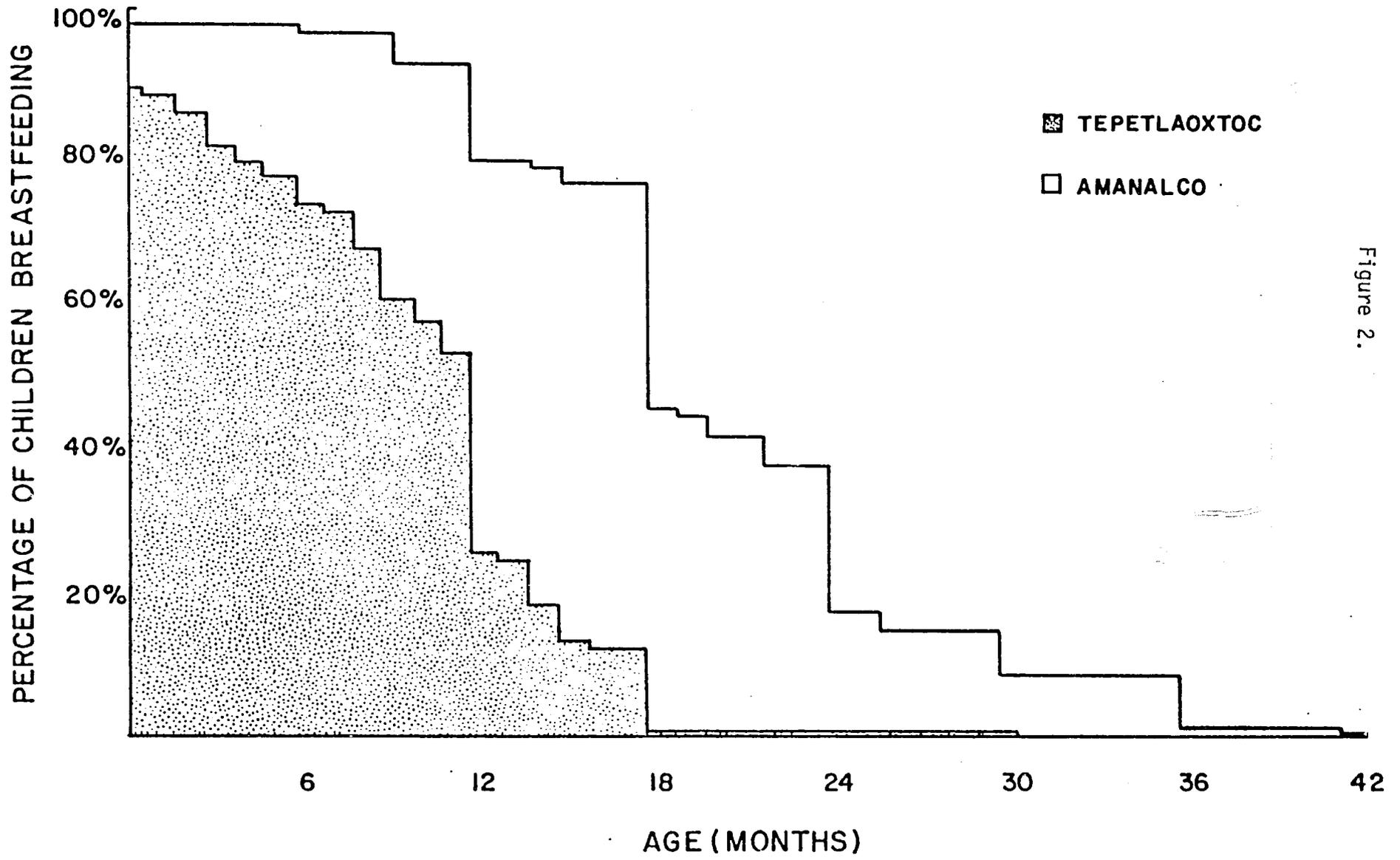


Figure 2.

Table 1. Duration of phases of weaning

	Tepetlaoxtoc	Amanalco
Percent of children not breastfed (N, total number of children)	16.2% (506)	2.3% (302)
Age when supplementation began, months		
Mean, $\bar{x} \pm$ s.d. (N)	5.27 $\pm$ 4.26 (506)	8.88 $\pm$ 5.44 (302)
Median	5	8
Range	0 to 24	0 to 30
Age when breastfeeding stopped, months		
Mean, $\bar{x} \pm$ s.d. (N)	10.04 $\pm$ 5.79 (507)	20.19 $\pm$ 7.75 (282)
Median	12	18
Range	0 to 30	0 to 42

Data are from retrospective breastfeeding histories provided by village women. Each child's breastfeeding history is included as long as the child had survived for at least four years. Differences in sample size (N) result from incomplete data. Supplementation is a culture-specific category discussed in the text.

Difference of means tests. To test whether differences between the two villages are statistically significant, the t-test was used, with an alpha level of 0.05. In view of the unusually large sample sizes, large enough to be considered infinite for both the F- and t-tests, the assumption of homogeneous variances is relatively unimportant (Hays 1981:287). Nonetheless to get an unbiased estimate, variances were pooled (Hays 1981:285). The timing of supplementation differs significantly between villages (d.f. calculated from each village sample = infinite;  $t = 10.50$ ;  $p \ll 0.001$ ). Further, the age when breastfeeding stopped differs significantly between villages (d.f. calculated from each village sample = infinite;  $t = 20.88$ ;  $p \ll 0.001$ ).

Table 2. Community demography by decade

Year	Tepetlaoxtoc		Amanalco	
	Fertility <sup>1</sup>	Infant mortality <sup>1</sup>	Fertility	Infant mortality
1900	18.31	586.89 <sup>2</sup>	55.15	352.51
1910	15.02	280.00	49.70	260.00
1921	36.45	229.53	58.41	409.71
1930	41.48	146.55	27.87 (51)	---
1940	34.37 (47)	198.02	43.53	365.35
1950	54.64	192.45	29.90 (42)	480.00
1960	50.11	154.00	42.87	390.00

Source: Pérez Lizaur 1975. Pérez Lizaur used national censuses and parish and civil archives to gather data for a historical demographic study. Numbers in parentheses are corrections obtained by graphing rates from the surrounding decades.

<sup>1</sup>Rates were calculated using three-point averages. "Births" in the following equations are defined as total live births in a given year. Fertility = [births/(total population)] x 1000; Infant Mortality =  $q_0$  = [(deaths of those aged less than one year)/(births in that year)] x 1000. Rates are approximations by Perez Lizaur; archives often did not show the age of death of infants in months.

<sup>2</sup>In view of subsequent rates as well as general information about mortality, this rate seems too high. There may have been an aberration magnified by small population size, or the rate could be the result of misrecording or misreporting.

Table 3. Family demography, women with completed reproduction<sup>1</sup>

	Tepetlaoxtoc	Amanalco
a. Percent of women with no live births	9%	17%
b. Woman's age at initiating marital union <sup>2</sup> , years, $\bar{x} \pm$ s.d.	20.61 $\pm$ 5.03	18.71 $\pm$ 3.98
c. Live births per mother, $\bar{x} \pm$ s.d.	7.95 $\pm$ 3.53	9.39 $\pm$ 3.68
d. Surviving children per mother <sup>3</sup> , $\bar{x} \pm$ s.d.	6.02 $\pm$ 3.33	5.65 $\pm$ 2.78
e. Rate of child mortality calculated from family demographic rates <sup>4</sup>	176	374

<sup>1</sup>Rates of birth, survivorship and child mortality are reported for women with at least one live birth and an age of at least 45 years by the time of the interview. Women from Tepetlaoxtoc number 49 to 53 and from Amanalco, 21 to 26.

<sup>2</sup>The age at beginning cohabitation regardless of marital status, reported only for women with live births.

<sup>3</sup>Includes only children who survived to the age of 5 years.

<sup>4</sup>e = [(c-d)/c] x 1000; i.e, {[(mean live births)-(mean survivors)]/(mean live births)} x 1000. Children who were too young to count as survivors were not counted as live births in this calculation.

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