

The Role of Cultural Factors in Human Breastfeeding: Adaptive Behaviour or Biopower ?

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INTRODUCTION

An ever-increasing number of medical scientific studies demonstrate the positive effects of breastfeeding on short-term and long-term health of the human infant. Such research has led the World Health Organisation (WHO) to produce feeding recommendations for all infants worldwide, which include the establishment of exclusive breast-feeding in the immediate period after birth, and its continued practice until 6 months of age (WHO, 1995).

Despite these global policies, the majority (up to 85%) of mothers worldwide appear not to conform with current recommendations (Dettwyler and Fishman, 1992). Furthermore, observations of diverse populations indicate a wide variety of infant feeding practices. The most obvious manifestation of inconsistency with recommendations comprises bottle-feeding, however even where breastfeeding plays a central role in infant nutrition, it varies in relation to the timing of its initiation, the schedule of suckling, the provision of extra water, the timing of first introduction of non-breastmilk foods, and the timing of final cessation. Such practices are often in direct conflict with the recommendations derived from medical research. For example, colostrum, which from a medical perspective plays an important role in priming the immune system, is or has been considered harmful in numerous societies including populations from the central Sahara, Mexico, Iran, Greece, Myanmar and Malaysia, and replaced with other food sources in the first days post-partum (Niehoff and Meister, 1972).

Such variability cannot be considered a recent phenomenon in human history. Evidence from a variety of sources, including isotopic analyses of prehistoric skeletons, and research on the ontogenetic profile of lactose intolerance, is consistent with the long-standing *primary* role of breast-feeding in infant nutrition (Stuart-Macadam, 1995), but both the historical and ethnographic literatures offer ample evidence that *exclusive* maternal breast-feeding for the first six months of life cannot be considered either “traditional” or the “natural” norm. Furthermore, even

when exclusive breast-feeding is practised it is not, as will be discussed in more detail below, an “instinctive” or uniform process.

Cultural factors therefore pervade breastfeeding at many levels. As the benefits of breastfeeding become clearer to the medical scientific community, those seeking to influence maternal behaviour, with the aim of improving maternal and child health, must develop an improved understanding of the role of cultural factors in infant feeding. This article seeks to examine both why breastfeeding is so open to cultural influences, and what factors (nutritional or otherwise) are involved. To begin with, it is important to put human breastfeeding within a broader mammalian context.

LACTATIONAL VARIABILITY IN PRIMATES

Suckling young at the breast is a defining feature of the order mammals, and for any given species, the forces of natural selection are assumed to have determined the broad characteristics of the process. Mother-infant suckling interactions can be considered through a continuum model which takes into account the state of development of the infant. At one extreme are altricial infant marsupials and monotremes, born in a premature condition and spending days or even weeks in the maternal pouch attached continuously to the teat. At the other extreme are the precocial ungulates and cetaceans, well developed and fully able to move on their own from birth. Primates lie between these extremes, and have been termed semi-altricial (Shillito-Walser, 1977).

In many species, whether altricial or precocial, suckling is a relatively instinctive process. The newborn kangaroo searches out the teat itself, despite its relatively early stage of physical development (Shillito-Walser, 1977). Similarly, the newborn pig is able actively to seek the nipple, while the mother remains still (Gunther, 1955). Many ungulates can stand very quickly after birth and orient towards the mother to search for the teat (Shillito-Walser, 1977). In contrast, primate infants contribute less proactively

to the initiation of feeding - for example, infant gorillas appear relatively helpless (Schaller, 1963). The role of offspring instinct appears to be decreased, and there is an increased role of the mother, including *learned* maternal behaviour, in instigating lactation. Such a scenario is not necessarily exclusive to primates, nor can all primates be assumed to be similar in this regard, but given our recent shared ancestry with primates this review focuses on primate evidence for the contribution of behaviour to variability in lactation.

When the first zoo-kept chimpanzees and gorillas gave birth in captivity, they seemed bemused by their offspring and showed no inclination to breastfeed (Wyatt and Vevers, 1935; Budd and Smith, 1943; Schaller, 1963). The only chance for survival for these infants lay in their being hand-reared, and it was suggested that the problem arose because the mothers had never seen other females feeding infants from the breast (Gunther, 1955). This theory is reinforced by observations of non-maternal infant handling by females in a variety of primate species (Lancaster, 1971). Though such “allomothering” has been proposed to fulfill a variety of functions (Maestriperi, 1994), juvenile and sub-adult females are consistently the most frequent non-maternal infant handlers (Maestriperi, 1994), suggesting that adolescent females are acquiring useful “maternal experience” prior to the birth of their own offspring. Consistent with that hypothesis, female handling experience at an early stage has been found to be associated with greater reproductive success in adult life (Hrdy, 1976; Riedman 1982; Fairbanks, 1990). Realisation of the importance of such learning for maternal reproductive behaviour led to the use of film footage of lactating wild gorillas as an attempt to encourage nursing in a captive gorilla (Jelliffe and Jelliffe, 1978).

The enhanced role of the parent in offspring nutrition continues through the weaning process. Primate infants are introduced from an early age to the adult diet through the medium of the maternal diet. Various studies have shown that young primates begin sampling plant food at early age, although the foods may be merely chewed and then spat out (Richard, 1985). The nutritional contribution of such foods to the infant diet may be negligible, but the process allows the infant to assess the palatability of foods (Schaller, 1963) which are typically derived from debris left over from the mother’s feeding session (Maple and Hoff, 1982). Such a process can allow the incorporation of local tradition into the infant diet.

In chimpanzees, our closest primate relative, both tradition and learning contribute significantly to the ontogeny of the offspring’s diet. Whiten and colleagues (1999, 2001) analysed data from a number of relatively discretely distributed populations, and found that groups inhabiting similar ecological environments nevertheless differed in the types of behaviour demonstrated. This scenario extends to diet, with only a selection of all possible foods eaten by any given group. These analyses demonstrated that both innovation of behaviour within populations, and diffusion of behaviour between populations, were important factors in accounting for nutritional intake. Chimpanzee nutrition in general, including lactation, therefore involves “culture” - the learning of behaviour from others who have also learned it (Plotkin, 2002) - although the exact mechanisms of such learning remain unclear. This role of culture is relevant to our theoretical understanding of instinct in animal behaviour, and the notion of what is “natural” in human behaviour.

Consideration of the innate component of animal behaviour dates back to the time of ancient Greek Philosophy, for example Plato’s question as to whether virtue is learned by experience, acquired from teaching, or innate (Plotkin, 1997). Biologists now recognise that the categorisation of behaviour as innate or instinctive is an extremely complex issue. Behaviour is not present in the zygote, rather it emerges during development through interactions not between genes and environment, but between the *organism* and its environment, with the developmental stage of the organism at any one time making an important contribution (Lehrman, 1953). The role of the organism in its own development makes it difficult to specify exactly what, in behaviour, is inherited.

Appreciation of this issue has led to a focus on how information processing systems are supplied with information from the external environment. Organisms higher up phylogenetic trees process greater quantities of information at faster rates, conferring on the organism an increased range of potential responses to environmental variability, and hence greater potential capacity to adapt (Goonatilake, 1991). Whereas “instincts” must be able to function “fully-formed” the first time they are required (Plotkin, 2002), the information-processing capacities of brains allow rapid accommodation of local environmental circumstances.

The evidence reviewed above illustrates that non-genetic information, derived not only from the offspring’s own experience but also from maternal experience and learning, plays a significant role in

primate infant nutrition. Humans are very much part of this primate pattern – for example, cross-cultural studies show that girls are more likely to have responsibility for infants than boys, with this sex-difference typically starting at around 5 years, but varying in relation to maternal workload (Edwards, 1993). Through this means, girls' knowledge of and capacity for childcare begins to be culturally transmitted between generations, and knowledge of, and expectations about, breastfeeding are likely to develop well before more direct experience is acquired. Despite the tendency to portray human breastfeeding as a “natural” process, in opposition to supposedly “unnatural” approaches such as bottle feeding (Obermeyer and Castle, 1997), the reality is that there is no single “instinctive” or “natural” way to breastfeed. This will become even clearer in the final part of this article, focusing in more detail on the broader role of breastfeeding in social behaviour.

The denial that there is a “natural” way to breastfeed should not of course imply that breastfeeding itself is “unnatural”. From the perspective of individual women, the experience of breastfeeding typically involves many spontaneous urges and sensations which have a well-established basis in human physiology and psychology. Oxytocin, the hormone that underlies the milk let-down reflex in response to the suckling stimulus, is known as the “hormone of love” on account of its association with feelings of contentment and sexual arousal.

Just as there is no single “natural” mode of breastfeeding, so it is also important to acknowledge that natural selection has acted primarily on maternal rather than offspring fitness. Whatever attributes of human lactation have been selected in human evolution, they have been preferred because of their capacity to increase the transmission of the underlying genes in the gene pool, rather than due to their direct promotion of infant health. Humans have been described as a colonising ape (Shennan, 2002), consistently producing offspring at a rate beyond the carrying capacity of the immediate environment. Evolution is likely to have favoured a human lactatory process that increased the number of offspring per mother, at the expense of investment in each individual offspring. Consistent with this hypothesis, typical interbirth intervals in humans - around 4 years in hunter-gatherer societies, 2 years in farming societies - are substantially lower than those observed in wild chimpanzee (5 years) or orang-utan (7 years) populations (Aiello and Key, 2002).

The capacity of breastfeeding to show cultural variability is representative of the vast majority of

human behaviour (Ingold, 2001) - even an activity that is seemingly wholly physical such as walking has been shown to have diverse adult phenotypes in different populations (Mauss, 1979), due to different “styles” of ontogenetic development (learning to walk). Optimal breastfeeding as defined on a medical basis by WHO is neither “natural”, “traditional” or even, possibly, “normal” in a species that has evolved to exploit “short-cuts” in parent-offspring energy allocation (Wells, 2003a).

Lactation in primates, including humans, therefore manifests as a biological phenomenon with a high degree of flexibility. Both mother and offspring (and indeed other individuals beyond this relationship) can pursue coherent strategies through the manipulation of behaviour. However, variability in itself is not necessarily valuable, and any benefits must be offset against potential costs. The brain tissue that makes learning possible is metabolically expensive (Plotkin, 2002), and organising behaviour on a “learning” as opposed to “instinctive” basis must confer net benefits to be favoured by natural selection. The next section of this article considers the extent to which flexibility in primate lactation allows beneficial adaptation, and then assesses humans within this context.

COSTS AND BENEFITS OF FLEXIBILITY IN PRIMATE LACTATION

Primate infant nutrition is strongly influenced by the ecological and social environment, generating the hypothesis that flexibility characterising the process is adaptive, allowing individual organisms to improve the fit between themselves and their local environment.

Compared to many other mammals, female primates produce relatively low numbers of offspring during their reproductive lifespan, despite spending most of this period either pregnant, lactating or both. Consequently, variability in lactation is a major determinant of female fertility patterns, particularly because of the effect of lactation on the interbirth interval. In this context, the interests of mother and offspring conflict. From an evolutionary perspective, mothers gain from early weaning of each offspring, in order to invest in future offspring. In contrast, each offspring gains from later weaning, in order to maintain the high quality supply of nutrition provided by lactation (Lee, 1987; Wells 2003a).

One physiological function of the suckling stimulus is to maintain post-partum amenorrhoea, such that breastfeeding acts as an important form of

contraception, particularly in marginally nourished populations. By this means, the offspring is able to conserve its own supply of milk. Lactational amenorrhoea has been shown to correlate with offspring suckling frequency in several wild primate populations including vervet monkeys (Lee, 1987), chimpanzees (Nicholson, 1977) and gorillas (Stewart, 1988). Recent studies show that this physiological relationship is mediated by variation in both infant feeding style, and maternal parenting style.

In poor environments, infant mammals must suck for longer and more frequently to gain the same milk intake as that provided by better-nourished mothers (Delgado et al., 1982; Loudon et al., 1983). In contrast the infant can be weaned earlier in an abundant environment, partly because alternative food is readily available for the infant and partly because the well-nourished mother can supply the infant with adequate milk without undergoing high levels of suckling. For example, captive gorillas with plentiful energy wean their offspring in half the time of gorillas living in the wild and subject to scarce resources (Lee et al., 1991).

This mechanism is manipulated by both mother and infant, and suckling frequency can be seen as an expression of the conflict between the two parties. In rhesus macaques, the conflict peaks at the time of weaning, with infants seeking to defend their milk supply - using intense suckling to maintain lactational amenorrhoea - and mothers counteracting by withholding the nipple (Gomendio, 1989). In vervet monkeys earlier escalation of the conflict, where the mother rejects infant attempts to suckle, is associated with earlier age of weaning (Lee, 1987). The timing of the conflict has also been found to be related to the quality of the environment (Lee, 1987), and it has now been shown that earlier weaning in food-rich environments is a general feature of primate nutrition (Lee et al., 1991). Thus, mother-offspring behaviour mediates the relationship between environmental quality and the schedule of weaning.

Other factors related to suckling frequency include maternal parity and dominance rank. Primiparous rhesus macaque mothers were found to return to oestrus later than multiparous mothers, probably because the lower body weight of the younger primiparous mothers gave rise to lower milk yields which in turn stimulated higher infant suckling rates (Gomendio, 1989). High female dominance rank has in contrast been related to short inter-birth interval, since high rank is associated with priority of access to resources and hence a food-rich environment (Gomendio, 1990). Hence, the relationship between

rank, nutritional status and suckling patterns has a significant impact on fertility rates.

Suckling frequency is not the only way in which maternal physiology mediates the relationship between the ecological environment and nutrition of the offspring. Breastmilk also contains immunoglobins which prime the infant immune system. The availability of immunoglobins in maternal milk has been shown to reflect maternal disease history (Nathavitharam et al., 1994), hence through breast-feeding, offspring development is tailored not only to energy availability but also to potential local disease load. Thus, primate lactation allows Darwinian selection to operate on more than one non-genetic dimension of lactation. Selection favours both the transmission of beneficial behavioural patterns (through the pathway of learning) and the transmission of beneficial immune factors (through the pathway of breastmilk itself). In each case, the offspring benefits from relatively rapid maternal adaptation to the local environment.

The variation in human infant nutrition discussed in the introduction can therefore be seen to have at least some basis in our evolutionary heritage. Through their capacity to increase suckling intensity in relation to milk supply, infants can buffer themselves against low maternal energy stores, and can maintain lactational amenorrhoea to protect their supply of milk. This is particularly the case in societies where the mother allows the infant to determine its own weaning age (eg. Fouts et al., 2005). Equally, mothers can influence their likelihood of reconception through manipulation of the weaning schedule, and there is a direct relationship between duration of breast-feeding and inter-birth interval. Sellen (2001) has questioned whether variability in weaning practices is directly adaptive for the human offspring, but noted that there are significant relationships between weaning patterns and women's subsistence practices, indicating a more indirect adaptation to the local environment.

Human breastfeeding therefore broadly conforms with the general primate pattern, in which flexibility of the process allows individual mother-infant dyads to accommodate local environmental conditions. However, the notion that flexibility in primate lactation is inherently adaptive merits critical appraisal. There are several ways in which such flexibility can prove costly, and hence maladaptive.

First, the practice of allomothering benefits adolescent females, who may become more successful mothers (Riedman, 1982; Fairbanks, 1990), and mothers who may gain time for other functions, but

may prove costly to the mother of the infant if the handler behaves aggressively. In several primates species, allomothering behaviour declines as females acquire their own offspring, and is increasingly replaced by aggression to the offspring of other mothers (Hrdy, 1977; Altmann, 1980; Hiraiwa, 1981). Such aggression has been interpreted as one form of more general reproductive competition between females (Maestriperi, 1994). Second, the replacement of instinct by learning and experience makes individuals vulnerable if for any reason they are denied the opportunity to learn. Such a scenario is illustrated most starkly by the artificial isolation of primates in zoos, but to a lesser degree is apparent within wild populations of primates where reduced allomothering opportunities reduce subsequent reproductive success. Third, the relationship between female body size and social rank means that mothers of lower rank, with poorer access to nutritional resources during the periods of gestation and lactation, pass on their phenotype to their offspring whose own early growth is similarly compromised.

These issues are all relevant to human populations, where the flexibility that characterises breastfeeding can be seen to underlie similar potential problems. Knowledge that is readily stored and transmitted may also be lost. The widespread practice of bottle-feeding in the United States in the 20th century has reduced the collective experience of breastfeeding from which contemporary American mothers can learn (Maher, 1992). Poor understanding of the dynamic component of breastfeeding has been proposed to contribute to the high prevalence of early feeding problems such as failure to thrive and colic (Wells, 2003b). Likewise, the transmission of maternal phenotype to offspring phenotype during the periods of gestation and lactation is now a major area of human medical research. This in turn has focused medical attention on the notion of *optimal breastfeeding* as a means to maximise long-term health of the human infant, which underlies current WHO policies.

From a conventional evolutionary perspective, this cost-benefit analysis may appear a sufficient framework within which to evaluate the behavioural practices comprising lactation. Biologists could then use gene-culture co-evolutionary or similar models to address the question of whether behavioural patterns transmitted through learning do indeed contribute to infant health and maternal reproductive success. However, contrary to contemporary medical orthodoxy, breastfeeding comprises more than nutrition, and must also be considered as a critical

component of social behaviour. It is in this context that the cultural component of breastfeeding offers the greatest challenge to those working in human healthcare.

BREAST-FEEDING AS SOCIAL BEHAVIOUR

The role of lactation in establishing social relationships is not peculiar to humans. Whereas infant rodents such as mice and voles may not recognise specific other individuals, and be aware only of the presence of nest-mates, lactation has a strong influence on socialisation in primates (Shillito-Walser, 1977). Infants macaques reared in isolation were subsequently deficient in all categories of social interaction (Evans, 1967), whereas guinea pigs reared in the same conditions showed no such defects (Harper, 1968).

Once again, therefore, the social dimension of human breastfeeding has its precursors in our recent evolutionary heritage. In our own species infant nutrition, central to early socialisation, comprises an ideal vehicle for exploitation in multiple symbolic contexts. One illustration of this is the tendency in various societies for non-maternal nursing to contribute to alternative social structures in the form of “milk kinship” (Hollis, 1905; Parkes, 2004). Islamic law for example defines three types of kinship, by blood, marriage and milk; all three types of relationship preclude marriage between certain categories of people (Khatib-Chahidi, 1992). Milk kinship may then be exploited for political purposes, as for example reported among the Masai where it symbolised the making of peace between “enemy tribes” (Hollis, 1905).

More generally, breastfeeding comprises a fundamental component of processes through which identity of both the mother and her offspring are constructed (Maher, 1992).

For example, amongst the Murik, a population from Papua New Guinea, considerable social and symbolic significance is attributed to foods and eating behaviour, and exchanges of food are central to all Murik ritual behaviour (Barlow, 1984). The role of nutrition in the construction and maintenance of identities and relationships commences prior to birth, with contributions to maternal diet from different kin acting as a vehicle for contest over the mother’s membership of rival groups. In the second week of life, the infant is fed a kind of sago pudding known as “the bones of the ancestors”, necessary for the infant to become fully Murik. The growth and development of the infant also influences

the timing of maternal visits to her parents during later infancy, during which her kin nourish her even as she nourishes her baby. Thus, infant nutrition in this population is located within a complex social context. However, it should also be noted that such Murik ideals represent a standard against which actual experience can be evaluated (Barlow, 1984).

In many populations, the quality of breastmilk is believed to influence character or health of the infant. In Nepal, goat's milk is used to counteract the effect of "negative qualities" in maternal character (Burghart and Reissland, 1987), while the Khmir of Tunisia attribute certain infant illnesses to "bad milk" provided by overworked mothers (Creyghton, 1992). Brouzet, physician to Louis XV of France, went so far as to recommend a law to prevent disreputable mothers from breastfeeding (Radbill, 1976). Many such beliefs focus on perceived negative maternal qualities, a point discussed further below. However, infant characteristics are also relevant, for example Italian mothers conform to cultural expectations of gender requirements in tending to wean boys later than girls (Maher, 1992).

The process of breastfeeding likewise contributes to the construction of maternal identity. For example, through breastfeeding Italian mothers tended to develop both a new relationship with their own mothers, and a strong sense of themselves as mothers (Balsamo et al., 1992). Conversely, the regimented practices and rules of hospital care can deny the personal element of motherhood, and have been likened to a form of social preparation of both mothers and "clockwork" infants for institutionalised life in industrial societies (Balsamo et al., 1992).

However, it is within the context of contest over women's identity that the social element of breastfeeding becomes critical. Breastfeeding is not merely a passive vehicle on which symbolic and cultural phenomena are projected, but a battleground through which power relations are generated, maintained and disputed. The final issue addressed in this article is therefore the relationship between breastfeeding and biopower.

BREASTFEEDING AND BIOPOWER

The concept of biopower was proposed by the French social philosopher Foucault (1980), to designate "a range of technologies, knowledges and discourses used to analyse, control and regulate human bodies and populations" (Murphy, 2003). From a historical perspective, Foucault focused in particular on the rise of the role of industrialised states

in generating passive and docile individuals acceptive of regulatory management (Foucault, 1991). Biopower does not involve overt repression or force, but employs quiet and subtle coercions whose very invisibility enhances their effectiveness (Murphy, 2003). Techniques include normalizing judgements which subtly define the properness of an individual's behaviour, the institutionalisation of knowledge through which individuals are objectified and devalued, and the "panoptic gaze" which subjects individuals to continual surveillance, and hence potentially to intervention (Foucault, 1991).

In contemporary western populations, biopower may indeed be closely associated with the goals and activities of the state. However, the historical literature illustrates that breastfeeding has long been subjected to the techniques of biopower, as is particularly evident from the ever-present, yet inconsistent, provision of recommendations for infant feeding.

Advocacy of breastfeeding dates back to the earliest historical records, such as the Egyptian Ebers Papyrus from the 16th century BC (Wickes, 1953). In ancient India, the Ayurvedic text of the 2nd millennium BC prescribed breast-milk as the sole food for infants until the end of the first year post-partum (Pal, 1973), and the Susruta Samhita dating from the last centuries BC likewise recommended breast-milk, as did the Talmud and Midrash (Fildes, 1986). Such recommendations remained characteristic of the ancient classical world, although the nature of the advice was less consistent. In 4th century BC Sparta, breastfeeding of infants was required by royal decree (Fildes, 1986). The Greek physician Soranus of Ephesus, influential in Rome in the first two centuries AD, favoured wet-nursing over maternal nutrition (Soranus transl. Temkin, 1956), whereas many Roman philosophers recommended the reverse. In the Qur'an, two years suckling time was recommended (Niehoff and Meister, 1972). The 11th century AD Persian physician Avicenna advised breast-feeding for optimum health of the infant, and pointed out that healthy mothers provided good quality milk (Duncum, 1947). The first printed text on the subject was published in 1473 by Bartholomeus Metlinger (Fildes, 1986), and was followed by an ever increasing literature on infant nutrition.

While the literature does not tell us what women actually did in previous generations, it shows that male institutions and interest groups have had a long-standing role in prescribing "optimal" feeding, while also simultaneously containing many normative judgements of acceptable and unacceptable maternal behaviour. Whether norms of infant feeding in

contemporary societies are likewise disproportionately influenced by male interests, as Maher (1992) has suggested, requires further study.

The central role of breastfeeding in the generation of biopower can be attributed to the competing demands on women's identities and hence behaviour. Women may simultaneously be daughters, sisters, wives or partners, and mothers. Perhaps most importantly, the sexual relationship between women and their partners may conflict with maternal roles, particularly given the relationships between lactational amenorrhoea and breastfeeding duration. Maher (1992) has argued that male control over breastfeeding tends to be stronger in societies emphasising marriage and childbearing as "institutions for the confirmation of wealth and status". More generally, the nature and duration of breastfeeding are a function of negotiation between the two sexes pursuing different goals (Obermeyer and Castle, 1997). Male involvement in breastfeeding behaviour - regulating the norms which benefit male interests - is a fundamental component of the way in which biopower is generated and maintained. Through women's choices, breastfeeding practices are also a way in which women resist biopower. It has been argued that formula-milks may appeal to women through passing some of the economic burden of infant feeding back to male cash income (Maher, 1992).

CONCLUSION

Infants are not blank vessels for the reception of "optimal nutrition", and mothers are not passive providers of it. This scenario is illustrative of human biology in general, in that few components of human behaviour relevant to health are either "instinctive" or "natural", and so have no obvious biological norm.

This article has shown that the cultural component of breastfeeding has two powerful and conflicting implications. On the one hand, the fact that breastfeeding is not an instinctive behaviour means that advice, collectively acquired from the experience of previous generations, may prove valuable for contemporary mothers. From this perspective, the many traditions and rituals to be found amongst human societies might reflect a viable way to store and pass on beneficial knowledge, especially in non-western populations where the impact of writing remains minimal or absent, and knowledge can only be transmitted orally (Plotkin, 2002).

On the other hand, rules, norms and the

provision of advice represent a form of biopower through which men exert control over the identity and behaviour of women. As one of several components of physiology that differ profoundly between the sexes, breastfeeding is likely to have acted as a biopower battleground throughout a lengthy period of human prehistory and history, though the outcome of the battle clearly varies between different societies.

Recently updated international recommendations for infant feeding, advocating exclusive breastfeeding for 6 months (WHO, 1995) must be seen within both of these contexts. Medical researchers may assume that their recommendations represent valuable advice, capable of significantly reducing infant morbidity and mortality. Thus, they may claim to have discovered the optimum biological "norm". They may also assume that they have the right to dispense such advice on the grounds that it represents the sum of a vast quantity of collective experience gained through scientific study. From the perspective of this article, such a view merits two major criticisms.

First, the formulation of rigid guidelines conflicts with the concept of breastfeeding as an adaptive process where, as in other species of mammal, variability allows adaptation to local ecological circumstances. Since physiology and ecological environment vary between human populations, the likelihood that a "one size fits all" rule will be optimal for all individuals is counter-intuitive, and merits further empirical investigation. Existing studies already indicate that diverse feeding practices can represent beneficial adaptation to local subsistence practices (Sellen, 2001). Second, the provision of rigid guidelines negates the ability of individuals to benefit from their own experience or that of others from outside the institutional environment. In a study of UK infant feeding practices, Murphy (2003) describes how some midwives persisted in dispensing orthodox advice that was clearly inappropriate to the case in hand, whereas others subversively drew on their own experience of motherhood when advising new mothers. The lack of utilisation of women's experience of breastfeeding in western medicine is an issue deserving further attention.

This article has sought to emphasise the need for medical researchers to pay more attention to the cultural component of human behaviour. As scientists rapidly improve their understanding of the physical basis of diseases, advances in health have become increasingly dependent on alterations in behaviour. The rising prevalences of lifestyle diseases, including

those such as coronary heart disease and type 2 diabetes that are influenced by infant feeding patterns, demonstrate that behaviour, with all its cultural variability, plays a key role in the pathway to disease. Human health is likely to be addressed with far greater success if behavioural variability is incorporated into, rather than excluded from, the medical model. At present, however, medical researchers have much to learn from social scientists and anthropologists if their aims are to be achieved.

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KEYWORDS Breastfeeding. Nutrition. Health

ABSTRACT The positive effects of exclusive breastfeeding on infant health are increasingly demonstrated by medical researchers, yet the majority of mothers worldwide do not conform with infant feeding recommendations published by the World Health Organisation. This article considers the implications of cultural variability in breastfeeding in both nutritional and non-nutritional contexts. It is argued that exclusive breastfeeding in humans cannot be considered “natural”, “traditional” or even the norm. Consistent with other primate species, breastfeeding shows considerable physiological and behavioural variability, which is predicted to allow adaptation to local ecological conditions. However, breastfeeding also contributes to the development of social relations, including the construction of infant and maternal identity. From these joint perspectives, advocacy of “optimal infant nutrition” can be seen both as the adaptive distribution of beneficial information, and as the mechanism by which women are subjected to biopower. Those working in medicine and nutritional science have generally failed to appreciate that breastfeeding concerns more than nutrition, and must improve their understanding of human behaviour if their aims of improving health are to be achieved.

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