REVIEW ARTICLE

A REVIEW OF THE LITERATURE ON BREAST-FEEDING — POLICY AND RESEARCH ISSUES

J Moodley, L Linley, R Saitowitz

Aim. To identify information that would support the development of a science-based and locally relevant breast-feeding policy.

Objectives. To describe the trends in infant feeding practices, examine the scientific evidence relating infant feeding to infant health, determine the factors associated with choice and duration of feeding, examine the policy implications of the HIV epidemic, describe codes and policies related to infant feeding, identify key research questions, and make policy recommendations.

Methods. A literature review was conducted concentrating on papers published after 1970.

Results. Findings from this review that need to be considered in drawing up a comprehensive breast-feeding policy for South Africa include: (*i*) breast-feeding is associated with lower rates of gastro-intestinal illness and with a lower mortality from gastro-intestinal and respiratory infections; (*ii*) developed countries appear to be experiencing an increase in breast-feeding initiation rates and duration of breast-feeding, while the rates and duration of breast-feeding appear to be decreasing in developing countries; adequate documentation of national trends in breast-feeding is unavailable for South Africa; (*iii*) in South Africa, breast-feeding initiation rates are generally high; however, there does appear to be a problem with regard to the duration of breast-feeding and with the early introduction of supplementary feeds; (*iv*) important reasons for terminating breast-feeding include milk insufficiency, maternal work and breast problems; and (*v*) HIV is transmissible through breast-milk — from a public health perspective, research that provides information on the factors needed to develop a local HIV breast-feeding policy should receive high priority.

Conclusion. This review assists in clarifying current scientific knowledge on certain aspects of breast-feeding. The challenge now is to utilise this information to ensure optimal infant nutrition.

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In recent years there has been a growing interest in breast-feeding and other infant feeding practices. The volume of research on breast-feeding is enormous, therefore this review focuses on identifying information that will support the development of a breast-feeding policy that is both science-based and locally relevant.

The specific aims of the review were to: (*i*) describe the trends in infant feeding practices; (*ii*) examine the scientific evidence relating infant feeding to infant health; (*iii*) determine the factors associated with choice and duration of breast-feeding; (*iv*) examine the policy implications of the HIV epidemic; (*v*) describe codes and policies related to infant feeding; (*vi*) identify key research questions; and (*vii*) make policy recommendations.

The decision to focus on specific areas meant that several issues were not addressed.

METHODS

A literature review was conducted between January 1997 and July 1997 using the Medline and Popline databases and concentrating on papers published after 1970. National and international literature were reviewed. Bibliographies from the identified articles were scanned to identify further articles. In addition, professionals knowledgeable in the field were contacted in order to locate further articles and appropriate documents. Studies were critically reviewed in terms of their study design, sample size, methods, analysis, results and conclusions.

FINDINGS OF REVIEW

International trends

Studies that reported changes in breast-feeding patterns were reviewed by Hendershot[1] and Notzon.[2] Although a number of the studies were found to be methodologically flawed, the authors concluded that definite changes were occurring in breast-feeding patterns in both developed and developing countries. Developed countries appear to be experiencing an increase in breast-feeding initiation rates and duration of breast-feeding, while the rates and duration of breast-feeding appear to be decreasing in developing countries.[1,2]

The World Health Organisation (WHO) has explained the changes in breast-feeding patterns using a 'cultural diffusion'

model.[3] In this model, populations are described as passing through different stages of 'development time'. Changes are first seen in the elite group who adopt artificial feeding methods, followed by the urban poor and finally the rural population. Then a turnaround point is reached where the elite group returns to breast-feeding and is followed by the rest of society. An important implication of this is that it would take a long time for any health impact resulting from a return to breast-feeding to be apparent since the groups presumed to be leading the way are the groups in which children are least likely to suffer morbidity and mortality.

Interestingly, data from Malaysia[4] contradict the 'cultural diffusion' model. Malaysia has recently experienced an increase in breast-feeding initiation rates among poorly educated as well as among better-educated groups of women. Further studies exploring the reasons for this particular pattern of resurgence are needed so that other countries can benefit, and if possible influence the pattern of resurgence.

South African trends

Unfortunately, adequate documentation of national trends in breast-feeding is unavailable for South Africa. If data are to be collected on trends, then given existing budget constraints, the methodology used must strike a balance between the range of information to be collected and the costs of data collection. Cost is particularly important because the study will need to be repeated at regular intervals.

Prevalence and other data are available from a number of South African studies;[5-17] however it is important to remember that while prevalence data provide interesting information, they are unable to measure change over time.

The following conclusions on South African breast-feeding patterns can be drawn: (*i*) breast-feeding initiation rates in South Africa are fairly high (national rate above 80%), with rates being higher in rural areas compared with urban areas; (*ii*) the duration of breast-feeding is generally longer in rural compared with urban areas; (*iii*) a large proportion of children under the age of 3 months receive supplementary feeds; and (*iv*) there appears to be a pattern of early introduction of solids.

The relationship between infant feeding and infant health

Breast-milk has unique anti-infective properties and it has been hypothesised that breast-feeding protects against many types of disease. Numerous host resistance factors are present in human milk, including immunoglobulins, lactoferrin, lymphocytes and others.[18] Exclusive breast-feeding also reduces the likelihood of exposure to infection that arises when contaminated food is introduced. Conversely, infectious agents may also be transmitted through breast-milk. This section attempts to answer the question — is breast-feeding associated with a lower morbidity and mortality than other forms of feeding?

Morbidity

Of the infectious diseases reviewed to assess the protective effect of breast-feeding, evidence was strongest for protection against gastro-intestinal infections. The relationship between feeding method and gastro-intestinal illness has been studied extensively. Although most studies have limitations, the majority of the findings in both developed and developing countries show that breast-feeding is associated with lower rates of gastro-intestinal infections.[19-22] The benefit of this protection against gastro-intestinal disease is, as expected, greater in lower socio-economic groups and those communities with poor water and sanitation facilities.

Howie *et al.*[22] studied the effect of breast-feeding on childhood illness in Scotland and found that breast-fed babies had not only a lower incidence of symptoms but also a reduced hospitalisation rate for gastro-intestinal infection. Furthermore, the protective effect against gastro-intestinal illness was maintained beyond the breast-feeding period, irrespective of whether supplements were introduced or not. This latter finding suggests that a positive factor in breast-milk, rather than the avoidance of infected milk feeds, reduced the incidence of disease. The fact that feeding for at least 3 months conferred benefit for a period after breast-feeding discontinued, strengthens the case for adequate maternity leave and nursing facilities at work.

The findings with regard to respiratory infections are conflicting.[19-22] These contradictions have arisen in part because of various methodological problems such as the failure to separate breast- and bottle-fed categories adequately, as well as a failure to control for confounders and to differentiate asthma from respiratory infection.

There has been conflicting evidence as regards the association between breast-feeding and otitis media.[19-22] It is postulated that bottle-fed infants (especially those who are fed with bottles propped up) are more likely to get milk into the eustachian tube and thus develop an infection.[19] However, none of the studies that found a protective effect have examined whether the protective effect was direct or related to feeding position.

It has been suggested that breast-feeding protects against various other infections, e.g. urinary tract infection, septicaemia and infection with *Haemophilus influenzae*.[19-22] Various methodological problems preclude a definitive answer and further studies are needed to confirm the protective effect of breast-feeding for these conditions.

It has been hypothesised that breast-feeding offers protection against allergies via the protective effect of immunoglobulin A and by the avoidance of exposure to allergens at an early age. Studies have looked at the protective effect for eczema, asthma

and allergic rhinitis, but the results are conflicting.[19-22] It is also not clear whether breast-feeding is protective or whether one or more feeding regimens is allergenic.

An association between breast-feeding and intellectual functioning has been suggested, but there is little evidence to suggest an independent effect.[19,23]

Artificial feeding has been implicated as a risk factor for a number of chronic diseases, including Crohn's disease, ulcerative colitis, coeliac disease, childhood-onset insulin-dependent diabetes mellitus and childhood lymphoma.[24-28] However the evidence at this stage is conflicting and/or inconclusive. Further research into the long-term effects of breast-feeding is needed before definitive conclusions can be drawn.

The use of a cup and spoon has recently been introduced at Groote Schuur Hospital in Cape Town as an alternative form of feeding where direct breast-feeding is delayed or interrupted. It is postulated that cup feeding is associated with lower infection rates than bottle feeding and will prevent reluctance of the infant to return to sucking at the breast. However these claims still need to be scientifically proven.

Mortality

A number of studies have been conducted to address the question of whether breast-feeding is associated with a lower mortality rate than bottle-feeding.[19,20,29-33] Among those studies that did control for confounding factors, it was found that breast-feeding was associated with lower mortality rate than bottle-feeding.

In a study in rural Chile[29] it was found that mortality between 3 and 12 months was 3 times higher for those exclusively bottle-fed at 3 months of age compared with those exclusively breast-fed at 3 months of age. Goldberg *et al.*[30] conducted a study in Brazil and found that infants aged from 1 month to 1 year who had never been breast-fed had a mortality 1.7 times higher than breast-fed infants. In addition, a study by Butz *et al.*[31] in Malaysia found that each added month of breast-feeding decreased the infant mortality rate by 6.2/1 000.

Victora *et al.*[32] looked at the protection afforded against specific causes of death among infants in two metropolitan areas in Brazil with an infant mortality rate of 40/1 000. They found that compared with infants who were exclusively breast-fed, those artificially fed had 14.2 and 3.6 times the risk of death from diarrhoea and respiratory infections, respectively. This finding has important implications for countries with high infant mortality from these causes.

The hypothesis that breast-feeding could protect against sudden infant death syndrome (SIDS) has received considerable attention. However there is no epidemiological evidence to support this hypothesis.[19,34,35]

Implications for South Africa

Data on the mortality profile of South African children are scanty. However, the following has been reported: (*i*) intestinal infection accounts for 19% and respiratory disease for 8% of all infant deaths in South Africa;[36] (*ii*) a study of the utilisation of outpatient services at Red Cross War Memorial Children's Hospital in Cape Town, a tertiary-level hospital, showed that diarrhoeal diseases accounted for 6.4% of presenting diagnoses at first consultation at the hospital;[37] and (*iii*) household surveys conducted by various community health worker programmes have shown that diarrhoea is an important cause of morbidity among children.[38]

Given the mortality and morbidity profile of South Africa, the fact that breast-feeding offers protection against gastro-intestinal infection and against death from diarrhoea and respiratory infections has important implications. Substantial health benefits could be achieved by promoting breast-feeding. Benefits would be greatest in lower socio-economic areas, particularly those with poor water and sanitation facilities.

Factors associated with the choice and duration of breast-feeding

The decision to breast-feed is a complex one and is influenced by a number of social, economic, biological and attitudinal factors. Research in this area is therefore very difficult. Yet an understanding of these factors is critical if one wishes to influence infant feeding choices.

Developed and developing countries

Factors associated with infant feeding choices and duration differ between developed and developing countries.

Simopoulos and Grave,[39] reviewed studies that looked at determinants of choice in the USA. The major findings were: (*i*) education and family income were positively associated with the decision to breast-feed and the duration of breast-feeding; (*ii*) primiparous women are more likely to breast-feed than multiparous women; (*iii*) studies on maternal employment have produced conflicting results; (*iv*) most women decide whether or not to breast-feed before delivery; (*v*) physicians were not listed as having an important role to play in the decision to breast-feed compared with nurses and midwives; and (*vi*) insufficient milk was frequently given as the reason for termination of breast-feeding.

Results from studies in developing countries indicate the following as the main factors associated with choice and duration of breast-feeding:[40] (*i*) normal delivery of an infant weighing more than 2 500 g was positively associated with the decision to breast-feed; (*ii*) having breast-fed previously, rural residence, low income and low level of education were frequently associated with longer duration of breast-feeding; (*iii*) high socio-economic status, urban residence, use of oral contraceptives and maternal employment away from home were generally associated with a shorter duration of breast-

model.[3] In this model, populations are described as passing through different stages of 'development time'. Changes are first seen in the elite group who adopt artificial feeding methods, followed by the urban poor and finally the rural population. Then a turnaround point is reached where the elite group returns to breast-feeding and is followed by the rest of society. An important implication of this is that it would take a long time for any health impact resulting from a return to breast-feeding to be apparent since the groups presumed to be leading the way are the groups in which children are least likely to suffer morbidity and mortality.

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feeding; (*iv*) breast-milk insufficiency and maternal employment were frequently given as reasons for supplementation; and (*v*) milk insufficiency, pregnancy, maternal or infant illness and infant rejecting the breast were the most common reasons for terminating breast-feeding.

Little scientific information exists on the influence of marketing of infant formulas on infant feeding practices in both developed and developing countries.

South Africa

Factors found to be associated with early cessation of breast-feeding and/or early use of supplements include: (*i*) milk insufficiency;[6,7,9,10] (*ii*) maternal employment;[6,7,9,10] (*iii*) breast-related problems;[7,10] (*iv*) a dissatisfied baby or a baby that refused milk;[6,10,14] (*v*) maternal illness;[6] and (*vi*) infant illness or prematurity.[6]

There is limited information available on the role of health personnel and of the formula market in infant feeding choice in South Africa.

Breast-feeding and HIV

It has now been established that HIV is transmissible through breast-milk.[41-49] The risk of transmission differs for those infants with mothers infected pre-delivery and those with mothers infected post-delivery. In the former scenario it has been estimated that breast-feeding may increase the rate of transmission by 14% (95% confidence intervals (CIs) 7 - 22%).[48] In the latter situation, infants may be especially vulnerable to infection as they are potentially exposed to a higher virus load while their mothers are HIV antibody-negative.[47] The risk of transmission in this scenario has been estimated to be 29% (95% CIs 16 - 42%).[48] The timing of viral shedding into breast-milk also has important policy implications. If shedding is evenly spread throughout breast-feeding duration, then there would be arguments for early weaning. A number of studies have been done to determine the timing of viral shedding.[49-52] From these studies it appears that the shedding of HIV-1 in breast-milk is intermittent, and therefore timing of maximum infectivity of breast-milk is difficult to determine accurately.

The above facts complicate any advice one now gives on breast-feeding. In 1992 the WHO and the United National International Children's Emergency Fund (UNICEF) acknowledged that breast-feeding was associated with HIV transmission.[53] It recommended that where infectious diseases were not the primary cause of infant death, HIV-infected women should be advised not to breast-feed and to use a safe feeding alternative. Where the primary causes of infant death were infections and malnutrition, breast-feeding should continue to be protected, promoted and supported.

However, applying this policy in a blanket manner ignores the vast social, economic and other disparities that exist within a country. Policies regarding appropriate feeding practices should be determined at local level.

Nicoll *et al.*[54] describe two policy options with regard to breast-feeding and HIV,[54] namely: (*i*) whole population feeding policy (either encourage breast-feeding or artificial feeding by all mothers); and (*ii*) selective feeding policy options (one policy for mothers considered to be at high risk of HIV infection or known to be HIV-positive, and another for those with a low risk of HIV infection or known to be HIV-negative).

These options and various other issues were considered at a workshop on 'Breast-feeding choices for HIV-seropositive mothers' held in May 1996 in Durban and attended by delegates from southern Africa. Delegates recommended that breast-feeding should continue to be protected, promoted and supported and that all women should have access to voluntary HIV testing. Those found to be HIV-positive should be counselled about their reproductive and feeding options; where the mother chooses not to breast-feed, artificial feeding should be considered medicinal and provided in accordance with the International Code of Breast-milk Substitutes. (Discussion and final statement on HIV transmission and breast-feeding — unpublished workshop proceedings.)

HIV prevalence in South Africa is increasing[55] and a breast-feeding policy based on local information needs to be developed as quickly as possible. Factors to be considered in developing a local policy include: (*i*) the HIV serostatus of the woman at the time of delivery or an approximation, which best describes her risk; (*ii*) the feasibility of HIV testing in pregnant women; (*iii*) quality of care available for HIV-infected mothers; (*iv*) ability to conduct confidential HIV testing and counselling; (*v*) the availability of treatment that could reduce HIV transmission to infants; (*vi*) stigmatisation of those known to be infected; (*vii*) the causes of infant mortality for different subgroups; (*viii*) the expected disadvantage to health and survival of the artificially fed compared with the breast-fed infant in various settings; (*ix*) ability to provide, afford and sustain safe artificial feeding for different subgroups; (*x*) existing feeding practices and duration of feeding for different subgroups; and (*xi*) the prevalence, advantages and disadvantages of wet nursing.

From a public health perspective, research that provides information on the factors needed to develop local policy should receive high priority.

Codes and policies

Several codes and policies have been adopted in South Africa to guide practice in both the formula market and hospitals.

Code of Marketing of Breast-milk Substitutes

The WHO/UNICEF Code of Marketing of Breast-milk Substitutes is an international statement that seeks to end the glamorisation of artificial feeds and to prevent products from being used unnecessarily.[56] In 1986, South Africa developed its version of the code, the South African Code of Ethics for the Marketing of Breast-milk Substitutes.[57] Major companies

producing and distributing breast-milk substitutes have become voluntary signatories. However, monitoring adherence to the code is difficult. A recent survey carried out by the Interagency Group on Breast-feeding Monitoring in four countries (including South Africa) found that aspects of the international code were being violated in all countries.[58,59]

In South Africa the survey was conducted in Durban. Twenty-one cluster areas were randomly selected and within these clusters, 800 pregnant women and mothers, 123 health workers and 50 health facilities were randomly selected and studied.[59] Violations of the international code included: (*i*) 47.8% of health facilities had been visited by company personnel to provide product information to mothers; (*ii*) 2.3% of the mothers had received a free sample of a product within the scope of the code; (*iii*) some of the information and educational materials failed to point out the difficulty in reversing the decision not to breast-feed; and (*iv*) 28% of women had received negative information on breast-feeding from a company ('negative information' was defined as a message that was understood by the mother to promote bottle-feeding or to discourage breast-feeding) — the negative messages found in the survey, however, were verbal and could not be validated; details on the exact messages were not stated in the report.

Generally, little scientific information exists on the influence of marketing of infant formulas on infant feeding practices in both developed and developing countries.

It is important to note that the WHO/UNICEF Code has been criticised for focusing narrowly on almost a single aspect of the infant feeding problem and as having a limited approach to an issue that is complex and involves extensive social, economic and motivational factors.[60]

Hospital policies

In 1991, UNICEF and the WHO launched a worldwide Baby-Friendly Hospital Initiative (BFHI) in an effort to encourage and recognise hospitals that implement optimal lactation management.[61] The basis of the BFHI is the 'Ten Steps to Successful Breast-feeding'. If the hospital implements the 10 steps, it is accredited as a Baby-Friendly Hospital. Currently three hospitals in South Africa have been accredited.

The Department of Health has recently released a draft breast-feeding policy for health workers and health facilities (unpublished departmental document). The stated aim of the policy is to protect, promote and support breast-feeding; encourage the proper use of appropriate complementary foods; reduce the impact of practices that negatively affect breast-feeding; create a health care system free from commercial pressure; and encourage all health facilities to implement the international BFHI guidelines.

The policy relates specifically to health facilities and health workers and does not address the broader societal issues that impact on breast-feeding. The document is under discussion at this stage.

Research issues

Substantial gaps still exist in our knowledge with regard to various aspects of breast-feeding. Important research questions that need to be addressed in order to develop a local breast-feeding policy that supports women in their infant feeding choices include: (*i*) what is the influence of the infant formula market on infant feeding practices? (*ii*) what is the role of health professionals in influencing maternal behaviour? (*iii*) what are the economic factors that affect choices? (*iv*) how do social networks influence infant feeding choices? (*v*) in terms of milk insufficiency, what is meant by the term milk insufficiency, what is the profile of women who experience this problem (socio-demographic, biological, behavioural, etc.), what are factors that influence this syndrome, and does it have a psychosocial and/or a biological basis? (*vi*) are there 'other' underlying reasons for not commencing breast-feeding or for early cessation? (*vii*) how can working mothers be supported in their infant feeding choices? (*viii*) what are the advantages and disadvantages of the cup and spoon method of feeding? and (*ix*) what information is needed to develop a local HIV and breast-feeding policy?

Research needs to take a multi-disciplinary approach and be oriented toward providing effective intervention strategies.

Recommendations for a breast-feeding policy for South Africa

Currently there are major reforms occurring in the health sector in South Africa. One of the challenges facing the health sector is the development of health policy that is science-based and locally relevant. In developing a breast-feeding policy for South Africa, the following issues need to be considered.

The policy should: (*i*) be based on scientific fact; (*ii*) recognise local realities; (*iii*) recognise that the issues surrounding breast-feeding are multiple, complex and changing; (*iv*) recognise the basic right of a mother to choose how to feed her infant according to her particular circumstance; (*v*) recognise the need for research to inform any further policy updates; and (*vi*) make provision for ongoing monitoring and evaluation.

In drawing up the policy, an intersectoral approach should be adopted and all relevant role players should be consulted. Strategies should be directed at various sectors including health, labour, and education, and should include role players involved in health training and service provision, the infant formula industry, and the advertising media. A policy that aims to promote infant nutrition will also need to consider the nutritional requirements of the child after weaning from the breast.

Findings from this review that need to be considered in

drawing up a comprehensive breast-feeding policy for South Africa include:

1. Breast-feeding is associated with lower rates of gastro-intestinal illness and with a lower mortality from gastro-intestinal and respiratory infections. Given the mortality and morbidity profile of South African infants, benefits could be achieved by promoting breast-feeding. The extent of the benefit will vary depending on the socio-economic setting.

2. There are definite changes occurring in breast-feeding patterns worldwide. Adequate documentation of national trends in breast-feeding is unavailable for South Africa. If data are to be collected on trends, then given existing budget constraints, the methodology used must strike a balance between the range of information to be collected and the costs of data collection.

3. In South Africa, breast-feeding initiation rates are generally high (national rate above 80%). However there does appear to be a problem with the duration of breast-feeding and with the early introduction of supplementary feeds.

4. Important reasons for terminating breast-feeding include milk insufficiency, maternal work and breast problems. Programmes and policies need to address these problems.

5. It is critical that there is collaboration between the health and labour sectors so that a maternity policy that provides for paid maternity leave with guaranteed job security is put in place.

6. HIV is transmissible through breast-milk. A number of factors affect the infant feeding choice made by the HIV-positive mother. From a public health perspective research that provides information on the factors needed to develop local policy should receive high priority.

Ultimately the aim of any breast-feeding policy and research agenda should be to promote the optimal form of nutrition for infants.

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A detailed version of this review is available from the Child Health Policy Institute, Child Health Unit, University of Cape Town, 46 Sawkins Road, Rondebosch, 7700.

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