# Child and Antenatal Nutrition Bulletin

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## Iron supplementation during pregnancy

*Dr Tamara Hunter, Women's and Newborn Health Service, Perth, reviews the physiological need for iron throughout pregnancy and the value of selective supplementation.*

Iron deficiency is by far the most common cause of anaemia and iron deficiency anaemia is the most common haematological problem in pregnancy. Approximately 20 per cent of women in industrialized countries have iron deficiency during pregnancy. The reason why so many pregnant women become anaemic is that they enter pregnancy with depleted iron stores. Reasons for this include menorrhagia, inadequate diet, previous recent pregnancy (i.e. less than one year) and breastfeeding.

During pregnancy, iron deficiency adversely affects iron-dependent enzymes in each cell and has profound effects on muscle and neurotransmitter activity. Most importantly, iron deficiency is associated with low birthweight and preterm delivery. Growing evidence has also associated iron deficiency with increased blood loss at delivery. Conversely, iron supplementation of the mother is beneficial for the neonate. Studies reveal that supplementation increases the iron reserves in the newborn and prevents the incidence of iron deficiency in the infant's first year of life.

It is generally assumed that women who become anaemic during pregnancy are iron deficient but diagnosis needs to be confirmed.

Department of Health

## Inside this issue:



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Suppressed mean cell volume (MCV) and mean cell hemoglobin (MCH) levels are certainly suggestive of deficiency, however iron studies are necessary to assess stores. MCV can actually be normal in early deficiency. Serum iron and total iron binding capacity (TIBC) also fall in normal pregnancy. Levels of serum iron < 12 micromol/L and TIBC saturation of < 15 per cent indicate iron deficiency. Other markers such as increased serum transferrin receptor concentration (which responds to iron deficient erythropoiesis), serum iron transferrin saturation and red cell distribution width (an index of anisocytosis) are also too insensitive to be of diagnostic value.

Serum ferritin is recognised as the blood test of choice to determine the adequacy of iron stores in the body, particularly in the first trimester. Levels < 50 microgram/L are suggestive of low iron stores. Levels < 12-15 microgram/L suggest *empty* iron stores. However, it is important to note that concentrations of serum ferritin are reduced independent of changes in iron stores later in pregnancy, due to hemodilution. Other factors, including diurnal and day-to-day variations, can effect iron stores up to 25 per cent. Serum ferritin can also act as an acute phase reactant in an inflammatory reaction and can be elevated with excessive consumption of alcohol.

Therefore, early assessment of iron stores is recommended and serum ferritin should be diagnostic test of choice.

A combination of tests after the first trimester should also be considered to produce a meaningful result.

The total iron requirements change during pregnancy. In the first trimester, the daily requirement is 0.5 milligrams (mg) per day. This increases to 3.5-8.8 mg per day. The issue is whether or not diet alone is adequate to supply this or if supplementation is required. Even with the increased physiological absorption rate that occurs in pregnancy, the dietary iron intakes of industrialized nations do not provide adequate iron. Therefore, the best approach to iron deficiency in pregnancy is supplementation.

The World Health Organisation (WHO), in conjunction with the International Nutritional Anaemia Consultative Group and the United Nations Children's Fund (UNICEF), issued guidelines recommending routine supplementation of 60 mg of iron per day to all pregnant women for at least six months. These guidelines also state that these supplements should be recommended to women until three months post partum in high risk populations. In addition, it is important to emphasise the dietary factors that affect iron absorption, i.e. ascorbic acid (vitamin C) and meat enhance absorption and tannins in tea, coffee and chocolate inhibit absorption.

Recognised side effects of iron supplementation include gastrointestinal upset and constipation and these are dose related. Studies have shown that as little as 60mg per week is enough prophylactically. Therefore, second daily or even weekly dosing is probably sufficient in women who suffer side effects. Intramuscular or intravenous therapies are also helpful in dealing with the side effects but do not provide more rapid correction of depleted iron stores.

There are two basic public health strategies in recommending iron supplementation during pregnancy – either *selective* to high risk populations or *routine* to all pregnant women. Due to the lack of scientific support for either strategy, practitioners tend to use personal experience, economic considerations and selected knowledge. Some authorities recommend routine supplementation during the second half of pregnancy regardless of iron status.

It seems logical that if you are going to investigate anaemia and subsequently examine iron stores, selective supplementation based on the results is the preferred strategy for management. This would also be more ethically appropriate as iron supplementation can be harmful to certain populations – for example, those with undiagnosed haemachromatosis, a rare condition of iron overload.

In conclusion, iron stores should be assessed before supplementation. Preferentially use serum ferritin and assess as early as possible in pregnancy. Daily administration has been found to be superior to weekly in treating deficiency, however this is in context with side effects.

Until more evidence gives a reason to change practice, selective supplementation is the safest practice, along with dietary education to optimise iron absorption.

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# WA Feeding and Sleeping Study:

## selected preliminary results of the first 50 women from the preterm cohort

*Sharon Zuiderduyn, Nurse Researcher of Women's and Newborn Health Service, Perth, reports on breastfeeding intention and duration in preterm infants.*

Evidence for the benefits of breastmilk, and its particular benefits for sick and preterm infants, is widely accepted, as demonstrated in the *Innocenti Declaration*. Protection from illness and infection, enhanced development of eyesight, speech and development, enhanced mother-infant bonding and protective effects against allergies, diabetes and SIDS are just some of the significant benefits of breastmilk. The WHO guidelines recommend exclusive breastfeeding for six months and solid food introduction thereafter[1]. Published evidence suggests the Australian rate of exclusive breastfeeding for healthy term infants is high immediately after birth (approximately 80%) with a rapid decline during the early postnatal period[2,3]. Breastfeeding rates are reported to be even lower for preterm infants[4,5].

The mother's confidence in her ability to breastfeed, the timing of introduction of other foods and fluids, and infant settling and sleeping patterns may all impact on breastfeeding duration[6]. The infant's medical condition and the Neonatal Intensive Care Unit (NICU) environment itself have also been reported to impact negatively upon breastfeeding rates in the preterm population[4,5]. The research surrounding the association between maternal confidence, feeding and sleeping practices in both healthy term infants and sick/preterm infants following discharge is limited.

The WA Feeding and Sleeping Study aims to describe and compare maternal breastfeeding confidence and satisfaction, feeding practices, and women's perceptions of infant sleeping and settling behaviours for a cohort of women with sick/preterm infants that required NICU care, and a cohort of women with healthy term infants across the first nine months of life.

This longitudinal study replicates, in part, research being undertaken at the Royal Children's Hospital in Melbourne. One hundred women with term, healthy infants and 100 women whose infants required nursery care have been recruited from the postnatal wards at King Edward Memorial Hospital (KEMH) and the Neonatology Clinical Care Unit nurseries. Demographic data, infant clinical data, breastfeeding background data and maternal breastfeeding confidence levels are collected on recruitment to the study. A range of questions are also asked to determine women's experiences and expectations regarding providing breastmilk for this baby. Telephone interviews are used to collect subsequent data on the infant's settling and sleeping patterns, feeding method and maternal confidence in breastfeeding. This information is collected at five time points within the first nine months following discharge home (i.e. 2 weeks, 6 weeks, 3 months, 6 months and 9 months). Women that wean before 9 months complete an evaluation of their breastfeeding experience.

## Preliminary findings

The preliminary findings presented here relate to a cohort of 50 preterm infants receiving breastmilk (whether by breastfeeding, and/or bottle feeding of breastmilk) on discharge home from the KEMH Special Care Nurseries. It must be noted that our comments and findings relate only to mothers that were providing breastmilk to their infants on discharge home; women that never commenced breastfeeding, or weaned prior to discharge were not recruited to the study.

The vast majority of women in this study made the decision to breastfeed before pregnancy, and rated breastfeeding as "very important" to them. Similarly, almost all partners of the women recruited were

perceived to be “very supportive” of breastfeeding, with only a few rated as “supportive” and none rated as “unsupportive” or “very unsupportive”. Interestingly, only a small proportion of the women recruited had attended antenatal breastfeeding classes or accessed other breastfeeding information during pregnancy. Preterm birth may account for this, although preliminary data suggests a similar finding for the term, healthy cohort. There appears to be little difference between first-time or multiparous mothers in regards to accessing antenatal breastfeeding information/education. This confirms previous anecdotal evidence that suggests many pregnant women assume that breastfeeding is “natural” and therefore does not require preparation.

The most commonly cited reason for choosing to breastfeed was that it is “best for baby”. Field note data recorded by the researchers during the telephone interviews suggest however that few participants were aware of the degree of advantage conferred by breastmilk, or the specific advantages of breastmilk with regard to infant health and development over time, or to maternal health.

In the early weeks following discharge, some mothers reported struggling with the unpredictability of the infant’s sleeping and feeding patterns and lack of routine that contrasted with their hospital experience and expectations. It is possible that for these women, the reality of full-time care and breastfeeding of the infant was a difficult adjustment.

On discharge home from hospital, the women’s average intended duration of breastfeeding was 12 months. However, 30 per cent weaned by 6 weeks and 40 per cent had weaned by 12 weeks following discharge home. The most commonly cited reason for weaning was “low milk supply”. Field note data suggest that there was a wide range of responses to perceived low milk supply, ranging from replacing breastfeeds or breastmilk with artificial feeds, to seeking professional assistance, and commencing regular breast expression in an effort to increase supply.

## Preliminary conclusions

In this cohort of 50 mothers of preterm infants, breastfeeding was highly valued, and women felt well supported by their partners in their decision to breastfeed. It is possible that inadequate knowledge, and/or difficulty in accessing lactation and breastfeeding information and support may have contributed to the high rate of weaning. There is a need to determine the specific forms of support and breastfeeding information that would assist families to achieve their goal of breastfeeding for around 12 months. Future statistical analysis will help us to determine the impact of maternal breastfeeding self-efficacy or confidence on breastfeeding duration.

## Acknowledgments:

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# Alcohol and lactation:

## how does it affect infants and what should mothers do?

*Roslyn Giglia, NHMRC PhD Public Health Postgraduate Scholar and Associate Lecturer Epidemiology, School of Public Health, Curtin University of Technology, Perth.*

Alcohol is a common element of Australian society. The 2001 National Health Survey (NHS)[1] showed that 56.5 per cent of women in the 18-44 year age group had consumed alcohol in the past week. Many of these women were in the age group for pregnancy or for breastfeeding. If they were breastfeeding were they aware of the affects of alcohol on the breastfeeding infant and their breastfeeding outcomes overall?

Considerable research has been conducted into the effects of alcohol on the developing embryo and fetal alcohol spectrum disorder has become recognised as the foremost preventable, non-genetic cause of intellectual impairment[2]. There are well documented recommendations to restrict or limit alcohol intake during pregnancy,[3] however the effects of alcohol during lactation are not well known and there is a lack of direction for mothers regarding alcohol consumption at this time. Many studies report a reduced maternal alcohol intake during pregnancy and a return to pre-pregnancy levels, or at least higher intakes than during pregnancy, shortly following birth [4-6].

In a review of the literature, Giglia and Binns[7] found that alcohol consumption at a level of two standard drinks per day (equivalent to 10g alcohol) during lactation can result in a deficit in motor development and consuming this amount of alcohol shortly before the beginning of a breastfeed can inhibit lactational performance and negatively disrupt an infant's sleep-wake behavioural patterns. In addition, women who consume alcohol during lactation have been shown to have a shorter duration of breastfeeding. In further research, Giglia and Binns (unpublished data) have found that after 6 months of follow up, women who consumed alcohol at levels of more than two standard drinks per day were almost twice as likely to discontinue breastfeeding earlier than women who drank below these levels.

There are a number of possible reasons for this relationship between drinking alcohol and the early cessation of breastfeeding. As discussed earlier, exposure to small amounts of alcohol in the mother's milk has been shown to disrupt infant sleeping patterns and the mother may interpret this unsettled behaviour as hunger, and in turn commence formula feeding and discontinue breastfeeding at this critical time in an effort to placate the infant. Secondly, alcohol is known to decrease the milk ejection reflex through the inhibition of oxytocin. This results in a diminished milk yield in lactating mothers and a decrease in the volume of milk received by the infant, which may further exacerbate their unsettled behaviour, further promoting a mother to try formula feeding to settle the infant.

Another plausible explanation may be that mothers may be unsure of the health risks associated with drinking alcohol and breastfeeding.[8] In an effort to 'play it safe' and reduce possible risks to the infant and continue to consume alcohol, mothers may voluntarily stop breastfeeding.

Unfortunately, the adverse relationship between alcohol and breastfeeding has not been as well communicated in the health field and to the public as that of alcohol and pregnancy. Generally among breastfeeding women there is a lack of knowledge on the effect of alcohol on the breastfed infant and in some instances mothers may

actually increase their alcohol intake in the belief that alcohol can promote breastmilk production.[8]

It is important to provide guidelines which support continued breastfeeding and promote safe alcohol intake. While the safest choice is not to drink any alcohol during pregnancy, current Australian Alcohol guidelines for pregnancy and lactation state that if women choose to drink, they should have less than 7 standard drinks over a week AND, on any one day, no more than 2 standard drinks (spread over at least two hours) [3]. In support of this evidence based guideline

Giglia and Binns[7] provide direction for timing of alcohol intake in relation to breastfeeding in an effort to minimise the effect on lactational performance and the infant (see Box 1). However, mothers must also take into consideration how many drinks they have and the time before the next feed which can often be planned (e.g. in the case where an infant feeds two hourly) or unexpected (e.g. if the infant decides they are hungry if only a short time has elapsed since the last feed).

**BOX 1. Suggested Advice for Alcohol Intake of Breastfeeding Mothers**

**(1)** No alcohol in the first month.

**(2)** After that, if you choose to drink, limit alcohol intake.

a. Preferable 1 – 2 standard drinks per day

b. Drinking just after breastfeeding

**(3)** If wanting to drink more than (2) then expressing milk in advance and skipping one feed may be an option to consider.

Alcohol enters breastmilk by passive diffusion and reflects levels in maternal blood within 30 to 60 minutes after ingestion.[9, 10] Factors that influence the blood alcohol concentration (BAC) of the mother include body weight, amount of adipose tissue, stomach contents at the time of alcohol ingestion, rate at which alcohol beverages are consumed, and the amount and strength of alcohol in the drink.[11] It is therefore important for mothers to recognise that merely expressing and discarding breastmilk ('pumping and dumping') does not eradicate the alcohol content of the breastmilk and that women have to wait for the alcohol to be metabolised before breastfeeding. Table 1 outlines the time required until a zero alcohol level in milk is reached for women at different body weights.

Breastfeeding is the best way to feed infants and supporting mothers to breastfeed for longer will provide the greatest gains for the mother and infant. Providing safe guidelines for alcohol consumption during breastfeeding for mothers who choose to drink will provide the greatest gains for public health.

**TABLE 1** Alcohol and breastfeeding: time (h:min) until the zero level in milk is reached for women at different body weights

| Maternal Weight | Number of standard drinks | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| kg | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 45 | 1:54 | 3:50 | 5:45 | 7:40 | 9:36 | 11:31 | 13:27 | 15:22 | | |
| 47 | 1:52 | 3:44 | 5:37 | 7:29 | 9:22 | 11:14 | 13:07 | 14:59 | | |
| 50 | 1:51 | 3:43 | 5:35 | 7:27 | 9:18 | 11:11 | 13:03 | 14:54 | 16:52 | |
| 52 | 1:48 | 3:37 | 5:26 | 7:15 | 9:05 | 10:53 | 12:42 | 14:31 | 16:47 | |
| 54 | 1:46 | 3:32 | 5:19 | 7:05 | 8:52 | 10:38 | 12:25 | 14:11 | 16:21 | |
| 57 | 1:45 | 3:31 | 5:17 | 7:02 | 8:48 | 10:34 | 12:20 | 14:05 | 15:58 | |
| 59 | 1:42 | 3:26 | 5:09 | 6:52 | 8:36 | 10:19 | 12:02 | 13:45 | 15:52 | |
| 61 | 1:40 | 3:21 | 5:02 | 6:43 | 8:24 | 10:05 | 11:46 | 13:28 | 15:29 | 16:50 |
| 63 | 1:38 | 3:17 | 4:56 | 6:34 | 8:13 | 9:52 | 11:30 | 13:10 | 15:09 | 16:27 |
| 66 | 1:37 | 3:15 | 4:53 | 6:31 | 8:10 | 9:48 | 11:26 | 13:04 | 14:48 | 16:20 |
| 68 | 1:35 | 3:12 | 4:47 | 6:24 | 8:00 | 9:36 | 11:12 | 12:48 | 14:42 | 16:00 |
| 70 | 1:33 | 3:07 | 4:41 | 6:15 | 7:50 | 9:24 | 10:57 | 12:31 | 14:24 | 15:40 |

Adapted from (12)

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# What do parents want to know about nutrition?

*Katherine Bathgate, Accredited Practising Dietitian (APD) and Associate Lecturer, School of Public Health, Curtin University of Technology, Perth.*

New research has looked at what parents thought about the food their primary school children ate at school. From October 2005 to August 2006, Katherine Bathgate, a dietitian from Curtin University conducted focus groups with parents from nine Perth primary schools, seeking opinions on canteen and lunchbox foods and investigating what resources parents need to help them make healthier school food choices.

## Background

In 2001, Meerilinga Young Childrens' Foundation Inc and the Nutrition and Physical Activity Branch, Department of Health WA, conducted a needs assessment for the *Lunch Box World – healthy eating online* project. This needs assessment project was made possible with funding under the National Child Nutrition Program, Commonwealth Department of Health and Ageing. The needs assessment showed that many children in WA were bringing food to school that was high in fat, sugar and/or salt. Katherine's research built on these findings, investigating what motivates parents, as the main food providers, to select the foods they provide their children.

## What do parents think?

### *School canteen*

- Parents reported their children purchased food from the canteen once a week on average.
- Some parents perceived the canteen as a treat and were happy for their children to select what they prefer to eat for lunch.
- Some parents are concerned about the additive and preservative content in canteen food. Respondents said, *'it's so hard to find things that don't have preservatives in them…your kid can't be full of chemicals'*.
- Many parents would like canteens to offer healthier options such as more fresh fruit and salads, however they understand these require extra time to prepare and may not be popular or profitable.
- Some parents expressed concern about the size of salad plates, especially for small children who are put off by a large plate of food and are unable to store leftovers.

### *Lunchbox*

- Several parents were concerned about the sugar, additive and preservative content of some supermarket foods.
- Cost, convenience, child preferences and health, particularly dental health, impacted on parent's food selections.
- Parents are confused about the 'nut free' rule in some school and what this means for food selection. Respondents said, *'nearly everything's got 'may contain nuts'...cracker biscuits, snack foods ...oils, dunkaroos'*.
- Food safety and keeping foods cold was a significant issue for several parents with parents showing a preference for lunchbox foods that were at low risk of spoilage. Parents said, *'…you don't want to go put a yogurt in their lunchbox in the middle of summer...chicken can get a bit dodgy as well'*. Parents would like schools to consider ways of helping to keep food cold at school.
- Many parents would like their children to eat more fruit at school but cite child preferences, cost (e.g. bananas), messiness and the time allowed for eating as reasons for their child not eating fruit at school. Comments include: *'it's rushed, you have to try and eat it before you go play, sometimes it's too hard and too long to peel'*. Parents need ideas on how to make fruit appealing and keep it fresh in a lunchbox.
- Parents also like brochures that are colourful, have practical recipes that are quick to make and use ingredients that parents would have in their kitchens.

## Tips for Canteens

- For younger children, offer smaller size salad plates, ½ wraps, small size rolls etc.
- Apple slinkies, fruit salad cups and kebabs were popular ideas with parents.
- Offer yogurt, plain milk, cheese, custard and other cold items in warmer months that parents may not feel comfortable including in a lunchbox.

## Tips for Parents

- Always include an icepack or frozen drink in the lunchbox, even in winter.
- Cut up fresh or canned fruit in a container is attractive, quick and easy for children to eat.
- Involving children in food shopping, preparation (and growing!) will increase their interest e.g. 'which fruit would you like this week?'. Pick a day when the supermarket is quieter and take them shopping with you.
- Resting tomato slices on paper towel before including in a sandwich will absorb the moisture and stop soggy sandwiches.
- Frozen tubs of yogurts will soften by lunchtime and be a cold treat.
- Use a variety of breads and fillings if children are getting bored.

## Tips for Schools

- Review the time given for children to eat lunch before going out to play – is it enough time for younger children?
- Investigate *Crunch n' Sip* as a program that encourages fruit and water consumption in the classroom.
- On hot days, allow children to bring their lunchboxes into air conditioned classrooms and encourage parents to pack frozen drinks or ice packs to help keep food cold all year round.
- Support changes that are occurring in school canteens, in line with the new Department of Education's *Policy and Standards for Healthy Food and Drink Choices in Public Schools,* with information for parents and activities in the classrooms. More information is available from www.det.wa.edu.au/healthyfoodanddrink

## For more tips and ideas

Refer to the WA Department of Health's *Food for Kids* brochure (available from HealthInfo on 1300 135 030) and Meerilinga's *Lunch Box World - healthy eating online* website:
www.meerilinga.org.au/Nutrition/LunchBoxWorld.aspx

# Nutrition workforce profiles

There are many people in various roles working in the area of nutrition across Western Australia. These people work day to day in a service, team, group and as individuals; they are connected through a common desire to improve the nutritional health of the population by delivering a range of services from clinical, community, consultative, policy, and research through to education.

This section of the bulletin showcases the people working in various nutrition fields across Western Australia with the purpose to establish links, share personal perspectives, promote services and extend opportunities for collaboration.

## Dr Lynda Chadwick, Paediatrician

I am a general paediatrician currently working in a number of different centres. Most of my work centres around issues related to child development, largely early child development issues.

I am currently employed at Princess Margaret Hospital and the State Child Development Centre in Rheola Street, West Perth, as well as Ngala Family Resource Centre. At Princesss Margaret Hospital, I work in a general medical clinic as well as the SIDS Monitoring clinic and have recently started working with the Feeding Service at PMH.

My work at the State Child Development Centre involves assessing children, both in infancy and early childhood years as well as school years, for developmental and behavioural concerns or concerns relating to a possible autism spectrum disorder. Much of this work involves initial assessments of children and evaluating what kind of support (medical, psychosocial or allied health) will benefit them. Much of this work involves liaising with other members of a child development team, including psychologists, social workers, physio, speech and occupational therapists, as well as member of a team outside of a tertiary referral centre, such as school teachers, and school psychologists. I also visit the Albany Child Development Centre every six weeks as part of my work at the State Child Development Centre.

Ngala has a hospital based service in addition to the education and telephone services they offer and I visit Ngala once a week, mainly to assess families in the overnight stay programme. Families will access these services at Ngala seeking help with sleeping and settling issues, as well as feeding or eating issues, many of these problems are closely related. My role there is to assess some of these issues and provide a medial perspective on some of the concerns.

My other interests include involvement with the Australian Association for Infant Mental Health, which is a group represented in Western Australia, to provide support and education for those of us working in the field of early childhood development. Interests of this group centre around how early childhood attachments with caregivers impacts on many aspects of the child's subsequent development, relating to self-regulation, behaviour, feeding and sleeping. I have also recently become involved with some breastfeeding research with Professor Peter Hartmann's team based at the Breastfeeding Centre at King Edward Memorial Hospital and the University of Western Australia. This research group use ultrasonography to study the infant's technique of breastfeeding and evaluate the problems that may be contributing to poor breastfeeding patterns.

# Upcoming events

## 6-10 November 2007

**5th International Congress on Developmental Origins of Health and Disease - DOHaD2007**

Held at Perth Convention Exhibition Centre, Perth

Program and registration details are available at www.DOHaD2007.org

## 31 January - 5 February 2008

**The Science of Human Lactation: the foundation of clinical practice**

14th Conference of the International Society for Research in Human Milk and Lactation (ISRHML)

Held at The University of Western Australia

Abstract submission closes 12 October 2007

Program and registration details are available at

www.isrhml.org

## 6 February 2008 (Early notice)

**Breastfeeding Forum for Child and Adolescent Community Health Division**

The forum will have a community health focus, with international and local speakers showcasing research and discussing its practical application.

Venue: To be confirmed, Perth

Look out for program and registration details in December.

**The Bulletin provides information for health professionals working with families. Three issues are produced annually, since 1987.**

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