

Food-support programmes for low-income and socially disadvantaged childbearing women in developed countries

Systematic review summary

Introduction

Poverty predisposes childbearing women and their babies to poor nutritional and health outcomes (Institute of Medicine 1996), and to health behaviours such as smoking that worsen the negative impact of poverty on birth outcomes (Hamlyn et al. 2002; Penn and Owen 2002). Babies born to low-income women are at higher risk of low birth weight. Low birth weight babies are more likely to suffer serious morbidities during the first year of life and are more likely to die before their first birthday (Macfarlane and Mugford 2000). This disadvantage appears to follow them into adult life with greater odds of developing hypertension and diabetes (Barker 1992), and dying earlier than those born with birth weights within the normal range (Syddall et al. 2005).

Childbearing women living on low incomes have difficulty in accessing healthy diets (Rogers and Emmet 1998). The Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC) found that only three nutrients among the 20 studied in the diets of women were unaffected by financial constraints (Rogers and Emmet 1998). Pregnant teenagers, the large proportion of whom live on very low incomes, have unhealthy diets and often skip meals because of lack of money (Burchett 2003). Women from marginalised minority ethnic groups have

diets deficient in a number of key nutrients (Rees et al. 2005). However, the link between maternal diet and fetal and child health in industrialised countries is as yet unclear (Enkin et al. 2000).

Notwithstanding the lack of evidence linking maternal diet to perinatal outcomes, public health programmes provide food supplements and nutritional advice to childbearing women in the expectation that they will bring about improvements in the health not only of mothers but of their babies as well. Well-known programmes in developed countries are the Special Supplemental Nutrition Programme for Women, Infants and Children (WIC) in the USA, and the Welfare Food Scheme in the UK. Expected outcomes of such programmes include:

- improvements in maternal nutrient intake, haematological and biochemical indices and uptake of maternity services
- increase in maternal weight gain
- reduction in rates of low birth weight, intrauterine growth retardation, pre-term birth and perinatal mortality
- increases in mean birth weight and duration of gestation
- reduction in rates of health-related behaviours such as maternal smoking

This summary presents an overview of the findings from a systematic review of food-support programmes for low-income and socially disadvantaged childbearing women in developed countries. It was undertaken by the Health Development Agency (HDA) but published after the functions of the HDA were transferred to NICE on 1 April 2005. Neither this summary nor the full report represent NICE guidance. The full report – D'Souza L, Renfrew M, McCormick F (2006) *Food-support programmes for low-income and socially disadvantaged childbearing women in developed countries* – is available at www.publichealth.nice.org.uk

Introduction (cont.)

- improvements in other physical and psychological health outcomes in the first year of life
- increases in breastfeeding initiation and duration.

These outcomes are expected for a woman's first pregnancy. Existing national food-support programmes such as WIC do not aim to change long-term outcomes such as perinatal outcomes in subsequent pregnancies. The Welfare Food Scheme is scheduled to be replaced by a new scheme, Healthy Start, in 2006/7.

The health status and financial condition of mothers and their babies came into

focus after the release of the report, *Independent inquiry into inequalities in health* (Acheson 1998), and was addressed in a series of policy initiatives including a programme to tackle inequalities in infant mortality and life expectancy at birth (Department of Health (1999, 2000, 2003).

The public health white paper, *Choosing Health* (Department of Health 2004), continued the policy commitment to address health inequalities, giving high priority to tackling smoking, and supporting maternal and child nutrition in low-income groups through the new Healthy Start scheme.

This review studies the effectiveness and cost effectiveness of food-support programmes that aim to have an impact on low birth weight and other outcomes related to maternal and infant nutrition. It was commissioned by the Health Development Agency (HDA) as part of the work of the Public Health Collaborating Centre for Maternal and Child Nutrition and is published by the National Centre for Health and Clinical Excellence (NICE) as a result the HDA's functions being transferred to NICE in 2005.

Methodology

- A review of the literature was carried out in accordance with systematic review methodology.
- Studies of childbearing women in developed countries who were in low-income or in otherwise disadvantaged groups were included.
- Interventions of interest were those that aimed to improve maternal nutritional intake.
- The primary outcome of interest is low birth weight.
- Other indicators used as proxies for low birth weight were mean birth weight, gestational age at birth, intrauterine growth retardation, perinatal and infant mortality, maternal weight change and maternal nutritional status.
- A search strategy was developed on the basis of the inclusion criteria, and 15 electronic databases were searched.
- Studies were appraised for quality only after inclusion in the review.

Results

The search resulted in approximately 9500 citations. A total of 348 papers were retrieved, of which 19 intervention studies met all the inclusion criteria, while 12 cost-analysis studies met the inclusion criteria for the economic section of this review. Of the 19 intervention papers, six studies of WIC were included, two of which were large-scale national evaluations. The others were three studies of stand-alone nutrition supplements, eight of nutritional advice/education/counselling, and two complex healthcare interventions that had a nutrition component.

With respect to the primary outcome of interest, low birth weight, the results of this review do not provide evidence that food-support programmes have any impact. However, there are favourable impacts on other outcomes. There is

indicative evidence* of an increase in mean birth weight of babies born to heavy smokers, a high proportion of whom are in low-income groups. There is also evidence of the beneficial impact of food support on maternal weight gain and dietary intake in a woman's first pregnancy.

The economic studies included in this review do not provide reliable evidence of the cost effectiveness of food-support programmes.

The key findings of the review follow (CT = controlled trial; RCT = randomised controlled trial).

* Indicative evidence – findings from the included studies that are plausible (and positive) but there may be problems with the methodology. More research is needed to confirm these findings.

Effectiveness of WIC

- Prenatal WIC participation is likely to result in increased maternal weight gain; this effect is enhanced when participation begins earlier in pregnancy and lasts longer (*moderately strong evidence from one CT*)
- Prenatal WIC participation is likely to result in increased intakes of energy, protein, vitamin B6, iron, thiamin, riboflavin, vitamin C and calcium (*moderately strong evidence from one CT*)
- Prenatal WIC participation is likely to result in higher energy intake among heavy smokers (*moderately strong evidence from one CT*)
- Postpartum WIC participation is likely to result in increased haemoglobin concentration and reduced rates of anaemia among non-lactating women,

if participation is uninterrupted for 6 months (*moderately strong evidence from one CT*)

- Prenatal WIC participation is likely to result in increased newborn head circumference (*moderately strong evidence from one CT*)
- Prenatal WIC participation is likely to result in reduced rates of premature rupture of membranes (*moderately strong evidence from one CT*)
- Prenatal WIC participation is likely to result in more women receiving nutrition counselling sessions and more receiving more than two sessions (*moderately strong evidence from one CT*)
- Mean birth weight of babies born to smokers, particularly heavy smokers, probably improves as a result of prenatal WIC participation (*moderately strong evidence from one RCT*)
- Higher programme quality may improve perinatal outcomes (*moderately strong evidence from one CT*)
- Prenatal WIC participation is unlikely to reduce rates of low birth weight (*moderately strong evidence from one RCT and one CT*)
- Prenatal WIC participation is unlikely to raise mean birth weight in the whole population, ie smokers and non-smokers (*moderately strong evidence from one RCT and one CT*)
- Prenatal WIC participation is unlikely to reduce rates of pre-term birth or increase duration of gestation (*moderately strong evidence from one RCT and one CT*)
- Prenatal WIC participation is unlikely to increase the uptake of prenatal care (*moderately strong evidence from one CT*)
- Prenatal WIC participation probably does not result in increased maternal haemoglobin concentration at 36 weeks gestation (*moderately strong evidence from one CT*)
- Prenatal WIC participation probably does not have an effect on reduction in the time women work outside the home during their pregnancy (*moderately strong evidence from one CT*)
- There is insufficient evidence of the effect of prenatal WIC participation on fetal survival.

Effectiveness of stand-alone high-protein and protein-energy supplements

- Stand-alone high-protein supplements are very likely to result in early pre-term births among women who had adequate protein intake at baseline (*strong evidence from one RCT*)
- Stand-alone high-protein supplements are very likely to result in intrauterine growth retardation among women who had adequate protein intake at baseline (*strong evidence from one RCT*)
- Stand-alone balanced protein-energy and high-protein supplements are very unlikely to result in increased mean birth weight among all study participants (smokers + non-smokers) (*strong evidence from one RCT*)
- Stand-alone balanced protein-energy supplements are very likely to result in an increase in length of gestation (*strong evidence from one RCT*)
- Stand-alone balanced protein-energy and high-protein supplements are likely to result in an increase in mean birth weight of babies born to heavy smokers (*strong evidence from one RCT*)
- Stand-alone high-protein supplements are likely to result in improvement in some infant psychological outcomes at 1 year (*strong evidence from one RCT*)
- Stand-alone protein-energy supplements are unlikely to improve somatic outcomes in infants (*strong evidence from one RCT*)

Effectiveness of nutrition education and/or counselling

- Nutrition education interventions aimed at improving poor diets are likely to improve intakes of calcium, protein, carbohydrate, vitamin C, niacin, riboflavin and thiamin but not iron or fat intake (*moderately strong evidence from one RCT and one CT*)
- Nutrition education interventions aimed at improving poor diets are likely to reduce the proportion of women with low levels of calcium, ascorbic acid and riboflavin (*moderately strong evidence from one RCT*)
- Nutrition education aimed at reducing the risk of gestational diabetes in a high-risk group is likely to result in

improvements in folic acid intake at 6 months postpartum (*moderately strong evidence from one before-after study*)

- Nutrition counselling may have an impact on mean birth weight (*moderately strong evidence from one CT*)
- Nutrition education targeting a high-risk group is unlikely to reduce their risk of developing gestational diabetes, reduce their maternal energy intake during pregnancy, or reduce mean birth weight of their babies (*moderately strong evidence from one before-after study*)
- Nutrition counselling probably has no impact on rates of low birth weight (*moderately strong evidence from two CTs and one before-after study*)
- Nutrition counselling probably has no impact on gestational age at birth, newborn head circumference or length at birth (*moderately strong evidence from two CTs and one before-after study*)

Effectiveness of complex health and social care interventions including a nutrition component

- Complex health and social care interventions are very likely to reduce rates of pre-term birth among heavy smokers (≥ 15 cigarettes/day) (*strong evidence from one RCT*)
- Complex health and social care interventions are very likely to reduce the number of cigarettes smoked each day (*strong evidence from one RCT*)
- Complex health and social care interventions are very unlikely to have a favourable impact on low birth weight and mean birth weight (*strong evidence from two RCTs*)
- Complex health and social care interventions are very unlikely to have a favourable impact on gestational age at birth (*strong evidence from one RCT*)
- Complex health and social care interventions are unlikely to have an impact on maternal weight gain (*strong evidence from one RCT*)
- Complex health and social care interventions may have a small impact on mean birth weight of babies born to very young mothers (*moderately strong evidence from one RCT*)

Conclusions

Historically, food-support programmes have aimed at improving key maternal and perinatal outcomes (Institute of Medicine 1996). The lack of any significant impact on low birth weight, pre-term birth and other perinatal outcomes along with the favourable impact on maternal weight gain and nutrient intakes provide a basis both for re-thinking the aims and objectives of current food-support programmes, and for searching for other means of improving perinatal outcomes. Setting out-of-reach goals for food-support programmes such as reduction in rates of low birth weight and pre-term birth is probably not useful until there is strong evidence of what works to improve those outcomes.

Childbearing women in the UK have diets that are known to be deficient in key nutrients (Rogers and Emmet 1998). Furthermore those living on low incomes face financial difficulties in feeding themselves and their children (Rogers et al. 1998). In this respect, teenage mothers are perhaps the most vulnerable group. Programmes providing women with food supplements are therefore likely to help them and their children to eat healthier

diets. This in itself is a desirable outcome for any programme. In-depth studies of the diets of women from socially-disadvantaged groups would help to improve the efficiency of a food-support programme in a defined service area.

Women all over the world, particularly those in low-income groups, often complain of tiredness and exhaustion during pregnancy, postnatally and while breastfeeding. There has been little research into tiredness in pregnancy (Enkin et al. 2000). It is important for robust studies to be undertaken of the impact of food supplementation on these health outcomes and others such as postnatal depression. Improvements in maternal health outcomes will inevitably play a role in women's return to work.

Perhaps the most important gap in the evidence base is the lack of study of the long-term effects of food support on maternal and child health. Evaluations of interventions included in this review are limited to outcomes in the first pregnancy for both mother and baby; none of the included studies addressed outcomes in subsequent pregnancies. Experts in the

field of maternal nutrition recommend a life-course approach to improving perinatal outcomes among women living on low incomes. Therefore, evaluations of food-support programmes need to study the impact of maternal nutrition supplementation on subsequent births and on the health of infants, children and adults born to women who received food supplements during pregnancy. The results of on-going studies are awaited (Tang et al. 2004).

Further research is required to find out more about deficiencies in the diets of childbearing women in the UK, and to study the impact of the new welfare food scheme, Healthy Start. A robust national evaluation of the new programme should be prospective in design with a priori sample size calculation for key outcomes. Such a study should follow women through subsequent pregnancies, and their children through into adult life. A qualitative component to such a study would ensure that women's views of the importance of nutrition, barriers to accessing healthy diets, and the content and delivery of the new programme are given due importance.

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ISBN: 1-84629-253-0

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