There are compelling reasons for ensuring a nutritious diet for vulnerable pregnant women. Pregnancy is a critical period in the reproductive life of a woman due to the nutrient demands imposed by the growing foetus (James, Nelson, Ralph & Leather, 1997). What's more the health of a pregnant woman has direct implications for the health of her offspring (James et al.,1997). Indeed it is argued that the reproductive role of women should be prioritised for public health nutrition initiatives (Anderson, 2007).

This memorandum will outline policies to ensure that vulnerable pregnant women in England are supported to eat well. These policies include a national lunch club scheme; focus on the importance of vitamin D and folic acid; and extending the remit of the Healthy Start scheme. The potential nutritional health benefits of each policy will also be highlighted. Obviously such policies are inter-dependent but this memorandum will make explicit each area to ensure clarity.

Vulnerable in the context of this memorandum encompasses deprivation in pregnancy and may be classified by factors such as income, employment, housing, education and skills (Haggarty et al., 2009). Deprivation increases the risk of premature birth and is associated with diets low in protein, fibre, minerals and vitamins (Haggarty et al., 2009). Women from disadvantaged, vulnerable or excluded groups are more likely to experience poorer maternal and neonatal outcomes such as infant mortality, low birth weight and postnatal depression (National Institute for Health and Clinical Excellence (NICE), 2008).

The first priority for the government should be to continue to fund projects which increase the access of vulnerable pregnant women to a healthy diet, and which improve their food and nutrition knowledge. To date many initiatives tackling health inequalities have been unsustainable due to lack of funding (Dowler, 2008). There is inadequate national information describing the dietary intake and nutritional status of pregnant and breastfeeding women (Acheson, 1998). However the available evidence suggests the quality of a woman's diet during pregnancy decreases with income (Bull, Mulvihill & Quigley, 2003). A study of 250 Caucasian pregnant women in Sheffield found a relationship between financial hardship and nutrient intake (Mouratidou, Ford, Prountzou and Fraser, 2006). Pregnant women living in the most deprived areas had lower intakes of iron, thiamine, vitamin B6, vitamin B12, vitamin C and folate, compared to those pregnant women living in more affluent areas (Mouratidou et al., 2006).

One possible concept is a national lunch club scheme which would communicate clear and practical advice on healthy eating and cooking skills. The aim should be to build on the ethos of the child and family health services offered through the Sure Start Children's Centres (NICE, 2008).

Led by dietitians or public health nutritionists, the culturally appropriate, informal, non-judgemental sessions could be conducted via community groups, voluntary organisations, and social enterprises. The importance of vitamin D and folate would be emphasised, plus the advantages of exclusive breast feeding for the first six months communicated. In order to address their individual concerns, each woman would also receive a one-to-one session with the dietitian or public health nutritionist.

The lunch club scheme could be a vehicle for behaviour change. Distinct from knowledge and attitudes, behaviour change is one of the biggest hurdles when trying to instigate dietary improvement (NICE, 2008). It has been suggested that women from lower socio-economic groups do not make behavioural changes prior to or during pregnancy (Food Standards Agency, 2007). This is particularly relevant given the higher rate of overweight women from disadvantaged groups (NICE, 2008). Therefore the lunch clubs would also tackle the behavioural aspect of obesity by providing education on the importance of maintaining a healthy weight during pregnancy. Advice on weight management in the postnatal period would be provided, with emphasis placed on the risks posed to health by obesity.

This lunch club scheme could also involve a corporate partnership with a national supermarket chain. Such a partnership could facilitate the development of information packs containing recipes and advice leaflets plus money-off vouchers for basic commodities such as milk, cheese, yogurt, bread, fruit and vegetables. Provision of the discount vouchers would increase the availability of foodstuffs which support an adequate and affordable diet for the participants.

In terms of nutritional health benefits, optimising the nutritional status of a pregnant women, ensures the growth and development of the unborn child is also maximised (Acheson, 1998). Poor maternal nutritional status at conception and inadequate maternal nutrition during pregnancy increase the risk of low birth weight (Bull et al., 2003). Low birth weight is linked to childhood morbidity, a major factor in infant mortality (Kramer, Sèguin, Lydon & Goulet, 2000). Futhermore a mother with poor nutritional status influences the baby's risk of developing obesity, diabetes and cardiovascular disease in adulthood (Gluckman, Hanson & Buklijas, 2010).

The focus on weight management in the postnatal period will provide benefits for the participants' subsequent pregnancies if they achieve a healthy pre-pregnancy weight. Obese pregnant mothers have a 1.5 times increased risk of offspring with congenital abnormalities, compared to their peers whose weight is within the healthy body mass index weight range (King, 2006). In addition there is a higher risk of coronary heart disease in adulthood for children of overweight women (Forsen et al., 1997).

A second policy the government needs to instigate is the provision of clear and practical guidance on eating well during pregnancy, to all healthcare professionals who come into contact with pregnant women. Particular focus needs to be placed on more effective communication from the government to healthcare professionals on vitamin D supplementation for pregnant women (Lanham-New et al., 2011).

The Scientific Advisory Committee on Nutrition (SACN) is reviewing the levels of vitamin D needed by the population, with results expected in 2014 (SACN, 2012). Currently the Department of Health (1991) recommends pregnant or lactating women take a vitamin D supplement (10 micrograms daily) throughout their pregnancy. This ensures their own requirement for vitamin D is met and to build foetal stores for early infancy. Dietary sources and sunlight do not provide sufficient vitamin D for pregnant women (NICE, 2008).

Healthcare professionals play a crucial role in educating the groups at risk of vitamin D deficiency which includes pregnant women, on how they can achieve optimal vitamin D through supplementation (NICE, 2008). Furthermore it is the responsibility of primary care trusts to issue the maternal Healthy Start vitamin supplements (containing vitamin D) to low-income and disadvantaged families on the Healthy Start scheme (Department of Health, 2012). However the implementation of these recommendations is regarded as unsuccessful, as health professionals are considered to have inadequate knowledge of vitamin D (Pearce & Cheetham, 2010). Consequently pregnant women are unaware of how they can achieve maximum vitamin D through supplements (Pearce & Cheetham, 2010).

There is a need for an education campaign targeting healthcare professionals in order to ensure vulnerable pregnant women benefit from vitamin D supplementation. Midwives have claimed lack of information is a barrier to advising pregnant women about national guidance on vitamin D supplementation (Ling, Coren & Goldring, 2011). Likewise research found GPs were unfamiliar with vitamin D supplementation, and none were aware of the Healthy Start scheme (Jain, Raychaudhuri & Barry, 2011). Furthermore it was found less than half of health visitors and midwives routinely advised vitamin D supplementation to their patient groups (Jain et al., 2011).

Long-term deficiency of vitamin D results in rickets in children and osteomalacia in adults (Lanham-New et al., 2011). A pregnant woman with insufficient vitamin D increases the risk of her child having reduced bone density and possible fractures in adulthood due to brittle bones (Javaid et al., 2006). It has been claimed that childhood rickets is re-appearing in the UK, especially among children of Asian and Afro-Caribbean origin (McCarron, 2012).

The growing concern about vitamin D deficiency was highlighted in February 2012, when the four chief medical officers issued a letter to healthcare professionals on the dangers of vitamin D deficiency (Department of Health, 2012). National surveys show that a high proportion of women are likely to begin pregnancy with low vitamin D status (SACN, 2008). In addition The 2005 Infant Feeding Survey suggests the majority of pregnant women do not consume vitamin D supplements (Bolling, Grant, Hamlyn & Thornton, 2007). What's more further thought needs to be given to the fortification of foods with vitamin D, as a strategy to prevent vitamin D deficiency (Black, Seamans, Cashman & Kiely, 2012).

Poor maternal vitamin D status has negative repercussions for foetal and infant growth and development, with poor bone development and possibly rickets (SACN, 2007). Therefore by ensuring sufficient amounts of vitamin D in the body, the absorption of dietary calcium and phosphorus is optimised which results in maximum mineralisation of the skeleton (Holick, 2007).

The third area of focus for the government is raising awareness of the importance of folic acid supplementation among vulnerable pregnant women such as ethnic minorities, the young and those from low-income households. Women in deprived areas are linked to increased rates of unplanned pregnancies, and a higher risk of pregnancies with neural tube defects (NTD) (Tedstone et al., 2007).

Vulnerable groups of women including the young, ethnic minorities and those from lower socio-economic groups tend not only to have a sub-standard diet (NICE, 2008). Evidence also suggests these vulnerable women have a low intake of folic acid supplementation before conception and during the first few weeks of pregnancy (Brough, Rees, Crawford & Dorman, 2009). The study of 250 Caucasian pregnant women in Sheffield described previously, found 54% of the higher income women reported taking periconceptual folic acid, compared to 14% of the low-income women living in the deprived locations (Mouratidou et al., 2006).

The low intake of folic acid has been attributed to lack of awareness of neural tube defects (NTD) and the importance of folic acid (Brough et al., 2009). Compared to the rest of the population, there is a marked increase in the amount of children born into ethnic minority communities in the United Kingdom who are affected by neural tube defects (Brough et al., 2009).

There is unequivocal evidence on the association between maternal folate status and the development of NTD (SACN, 2006). All women who could become pregnant are advised to take a 400 micrograms daily of a folic acid supplement prior to conception and until the twelfth week of pregnancy (SACN, 2006).

The government also needs to act on the recommendation by SACN for the mandatory fortification of flour with folic acid in the UK (SACN, 2009). Research among young women in deprived areas highlighted that the high rate of unplanned pregnancies in the UK was considered a key justification for mandatory fortification (Tedstone et al., 2007). Furthermore countries relying solely on advice to take folic acid supplements have proved unsuccessful in reducing NTD rates (SACN, 2006). Obviously there should be provision to avoid exposure to high intakes, especially among those at risk of colon cancer (SACN, 2006).

The nutritional benefits of mandatory fortification with folic acid are apparent in the United States of America (USA). The incidence of NTD affected pregnancies has been reduced since the introduction of mandatory fortification of grain products in 1998 (Centers for Disease Control and Prevention, 2004).

The next policy the government needs to address is extending the remit of the Healthy Start scheme. The latter has been criticised for its restrictive qualifying criteria which only considers those on very low incomes (Davies & Shaw, 2011). Pregnant women on income support represent 20% of the sub-population (Hyponnen & Boucher, 2010). Consideration needs to be given to the needs of exemptees which include asylum-seekers; those on low incomes but not receiving income support, and all women under 21 years (Crawley, 2008). Primary care trusts have not made the maternal supplements available at low cost in pharmacies to exemptees from the Healthy Start scheme (Lanham-New et al., 2011). Therefore if the government were to work in partnership with community pharmacies to increase the availability of maternal Healthy Start supplements, this could facilitate increasing optimal intakes of folic acid and vitamin D (Crawley, 2008).

The government should also consider making available the maternal Healthy Start vitamin supplements to women with a child between 1 and 4 years. This has the potential to decrease the occurrence of both rickets and neural tube defects (NICE, 2008). Moreover increasing the monetary value of the Healthy Start food vouchers, plus allowing them to be utilised at community based food initiatives, would help improve the nutritional intake of vulnerable pregnant women (NICE, 2008).

In conclusion this memorandum has proposed a number of policies to ensure that vulnerable pregnant women are supported to eat well. The proposals include a national lunch scheme to provide information on and to increase access to a healthy diet; a vitamin D education campaign for healthcare professionals; raising awareness of folic acid supplementation and mandatory fortification of flour; and extending the remit and entry criteria of the Healthy Start scheme in order to answer the needs of other vulnerable groups of pregnant women.

(2000 words excluding references)

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