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The importance of good nutrition during pregnancy. A comparison between the UK and Brazil

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Introduction

The UK and Brazil are two sizable populations with significant demands on antenatal and maternity care (table one). However, access to different health care professionals and knowledge regarding the importance of maternal nutrition vary widely between the two countries. This paper compares the different approaches employed towards maternal nutrition between the UK and Brazil, seeking to share best practice and subsequently improve antenatal care.

Table One: Demographic maternal data for Brazil and the UK

	Brazil	**UK**
Population	207, 653	65, 789
Life expectancy	71 years (men) 78 years (women).	79 years (men) 83 years (women)
Expenditure on health (as % GDP)	8.32%	9.12%
Births attended by skilled health personnel	99%	100%
Live births	2935,000	779,000
Maternal Mortality Ratio (MMR) (per 100,000 live births)	60 (n=1700)	7 (n=52)
Obesity	22%	30%
Cesarean sections	55.5%	20-25%*

Taken from: WHO (2017), Global Health Observatory and NICE (2013)*

The importance of good nutrition during pregnancy

Good nutrition during the first 1000 days of life (from the point of conception to a child's second birthday) has the most influence on an individual's future than any other time in their life. It is a critical period for growth and development, and any harm caused by inadequate nutrition may influence health for the whole lifetime (UNICEF 2016). Therefore, good nutrition during pregnancy is of utmost importance in achieving optimal health for individuals and populations globally. During the first 1000 days of life, nutrition quality can influence the prevalence of Non-Communicable Disease (NCD) later in life. Barker's hypothesis stated that low birth weight (reflecting poor nutrition in utero) was associated with an increased lifetime incidence of cardiovascular disease, stroke and type two diabetes, suggesting that the nutrient environment of early life could permanently alter gene expression (Barker 1995).

The World Health Organisation (2016) acknowledged that good nutrition during early life was the most important factor in tackling both the double burden of disease and health inequalities worldwide. They emphasise that poor nutrition during early life, including pregnancy, can have detrimental, short-term and long-lasting effects. As non-communicable diseases (NCDs) are now the leading cause of premature death and disability worldwide, imposing a significant burden on national health services, finding health interventions that reduce such burdens are urgently required (WHO 2016). Globally, 161 million children under the age of 5 are chronically undernourished (stunted), and 51 million are acutely undernourished (wasted), whilst 42 million are reported to be overweight (UNICEF 2016). Undernutrition during pregnancy is strongly associated with stunted growth in childhood, significantly restricting physical and mental development. Therefore, promoting good eating habits, optimising maternal nutritional status and gestational weight gain, will reduce nutritional deficiencies during pregnancy and reduce the risk of adverse pregnancy outcomes associated with undernutrition and the development of NCDs (UNICEF 2016; WHO 2016).

Historically, Brazil had significant problems with under nutrition, especially in children. Although this has improved considerably in recent decades due to rising living standards (Wagstaff and Watanabe 2000); this could explain the increased focus on nutrition during antenatal care, compared to the UK.

Across the world, the prevalence of micronutrient deficiencies remains common, though there is a higher prevalence in low-income countries (UNICEF 2016). In the UK, severe forms of under nutrition are rare (in the absence of other health problems), however national surveys shown that inadequate intakes of micronutrients remain a common problem (PHE 2018). Several key micronutrients are associated with optimal fetal development (summarised in Table 2). A number of factors are associated with low birth weight (LBW), including genetics, ethnicity and living in an income deprived area; however the avoidance of alcohol and smoking, alongside a nutritionally adequate diet are some of the modifiable aspects for reducing the risk of LBW (NICE 2020).

Across the world, the prevalence of micronutrient deficiencies remains common, though there is a higher prevalence in low-income countries (UNICEF 2016). Multiple micronutrient deficiencies in pregnant women can adversely affect fetal metabolic programming, restricting growth and development and increasing mortality (WHO 2016). Iron deficiency anaemia the most prevalent nutrient deficiency globally, affecting 500 million people, including 38% of pregnant women (NICE 2021). During preconception or early pregnancy, anaemia is related to poor fetal development, low birth weight, or pre-term delivery (WHO 2016). During pregnancy and early childhood, iron deficiency adversely affects brain development and cognitive function; for example, it is associated with attention deficit hyperactivity disorder and/or autism in children (Pivina et al., 2019). Areas of the body with high metabolism require more iron and so have increased risk of dysfunction with iron deficiency. In utero, the fetal brain is developing rapidly and poor maternal iron intake has been associated with abnormal brain structure at birth, and also with autism and schizophrenia in later life (Georgieff 2020). Maternal vitamin D and calcium deficiencies are associated with poor fetal bone development, pre-eclampsia, pre-term birth and small-for-gestational-age babies (WHO 2016).

Iodine deficiency is thought to be the chief cause of preventable brain damage worldwide; it is vital for producing thyroid hormones, fetal brain development, growth, and metabolism (WHO 2016). Even a minor iodine deficiency during pregnancy, (defined as urinary iodine-to-creatinine ratio of < 150 µg/g), is associated with reduced IQ in offspring, and subsequent optimal iodine intakes do not improve this adverse effect during childhood (Bath et al., 2013; Hynes et al., 2013). Omega-3 fatty

acids, particularly Docosahexaenoic Acid (DHA), are well known for promoting fetal brain and neurological development (BDA 2017). Poor maternal omega-3 status is also associated with increased risk of gestational diabetes and pre-eclampsia; both potentially responsible for the reduced placental transfer of omega-3 to the fetus, imposing short-term and long-term impacts on brain health (Devarshi et al., 2019). Folate has a key role in fetal development, responsible for cell division, tissue growth and amino acid metabolism (BDA 2019). Supplementation during preconception and early pregnancy protects against fetal neural tube defects, whilst evidence is emerging that later supplementation (during the 2nd and 3rd trimesters) may positively affect child IQ (McNulty et al., 2019). See Table 2 for further details regarding key micronutrients.

Table 2: Certain micronutrients known to have a key role in fetal development

Nutrient	**Role**	**sources**	**deficiency**
Iron BDA 2017a	To make haemoglobin of red blood cells (mother & fetus); to maintain a healthy immune system.	Red meat, poultry, eggs, pulses, beans, nuts, tofu, fortified breakfast cereal	Anaemia, tiredness, reduced immune response, breathlessness (adults & children).
Calcium BDA 2017b	To make/maintain strong bones & teeth (mother & fetus); to maintain a healthy nervous system.	Milk, cheese, yoghurt, white bread, oranges, fortified soy products (milk, yoghurt), most plant milk (fortified),	Osteoporosis (adults); rickets (children).
Iodine BDA 2019a	To make thyroid hormone (mother & fetus); for brain development (fetus).	Milk, yoghurt, sea fish, *Some* plant milks are fortified – but not all (important to check).	Goitre (adults); Poor brain development, mental retardation, reduced IQ (fetus/children).
Omega 3 fatty acids BDA 2017c	For cardio-metabolic health (mother); for brain & neurological development (fetus)	Oily fish, walnuts, pumpkin seeds, rapeseed oil, soya & soya products	Increased risk of cardio-metabolic disease (adults); Poor brain and neurological development (fetus/children).

Vitamin D* BDA 2019b	To make/maintain strong bones, muscles and teeth (mother & fetus); to maintain a healthy immune system.	Sunlight on skin, oily fish, egg yolk, fortified breakfast cereal, margarine milk & yoghurt (fortified).	Osteomalacia (adults); Rickets (children)
Folic acid** BDA 2019c	To support rapidly developing spine and nerve cells in early pregnancy (fetus). Reduced risk of cardio-metabolic disease (mother).	Green leafy vegetables, beans, oranges, wholegrains, poultry, pork & fortified foods (bread/breakfast cereal).	Macrocytic anaemia; Neural tube defects (fetus); Increased risk of cardio-metabolic disease (adults).

*Supplement of 10 µg/day recommended during pregnancy and lactation (NICE); ** Supplement of 400 µg/day recommended before pregnancy and up to 12 weeks gestation (NICE 2014)

Some healthcare professionals may assume that adequate (or over adequate) Gestational Weight Gain (GWG) indicates adequate (or over adequate) nutritional intake, but this is not necessarily the case. Individuals in low-income households (in all parts of the world) may have no choice but to consume cheap, energy-rich, but low-quality food (JRF 2016). The UK National Diet and Nutrition Survey (PHE 2018), shows that UK women of childbearing age (19-49 years) are deficient in several key micronutrients, including iron, calcium and iodine; with 27%, 11% and 15% achieving lower than the Lower Reference Nutrient Intake (LRNI) (COMA 1991), respectively. Research with pregnant women living with obesity in the UK, reveals a more negative picture; despite having a Body Mass Index (BMI) >35 kg/m^2, 18-31% achieved intakes <LRNI (8 mg) for iron and 8-18% achieved <LRNI (69.9 μg/d) for iodine (Charnley et al., 2021). Iron, calcium and iodine are essential micronutrients for a healthy pregnancy and optimal fetal development. Pregnant women living with obesity (BMI >30 kg/m^2) are also at risk of having a poor-quality diet deficient in key micronutrients, demonstrating that conversations about healthy eating are crucial for <u>all</u> pregnant women, regardless of BMI (Charnley et al., 2021). There is a need to focus on maternal dietary quality as well as quantity to promote health in this and future generations.

The Brazilian approach to promoting healthy eating.

In Brazil, the Ministry of Health (MH) has produced a significant collection of guides and manuals on healthy eating, with the objective of promoting health through balanced eating. Such documents are intended for both the population in general and healthcare professionals, such as midwives. Regarding materials aimed at professionals, the recent publication “Demystifying doubts about food and nutrition - Support Material for HCPs” (MS 2016a) aims to guide and subsidize the practice of these professionals, as well as expand the autonomy of people, families and communities, facilitating access to knowledge about food and nutrition. In the state of São Paulo, the State Department of Health produced the document “Care Line - Pregnant and Postpartum Women” (SES/SP 2018), which elaborated the objective of improving the organization of assistance to women during the pregnancy, childbirth and the puerperium. This is through articulation between the different levels of care and services, discussing the importance of nutritional counselling and providing support for guidance by the professional. Food guides, on the other hand, are instruments that seek to help the population to make healthier and more appropriate food choices, which in a country like Brazil, can be very challenging.

Brazil has a population that is not only amalgamated, but also very heterogeneous in terms of food culture and the most prevalent health problems in each region of the country. According to Pinheiro (2001) and Abreu et al., (2001), Brazilian eating habits were formed from the merger of Indigenous, Portuguese and African cuisines, which over time acquired their own characteristics and peculiarities. Each region has developed a rich and diversified popular culture, with its own cuisine, due to the influence of migratory currents and adaptations to the climate and availability of food. For a long time, undernutrition and its related conditions represented one of the main health problems for management. In the last twenty-five years, the country has been experiencing the double burden of malnutrition, with under nutrition, still prevalent (especially in children), alongside obesity and overweight, whose incidence continues to advance in the population in general (MS 2019a). This diversity of countries within one, when considered in public policies related to food, requires

approaches for each region. It is not by chance that the “Food Guide for the Brazilian Population” (MS 2014) provides specific guidelines for each region regarding food consumption.

Although the Food Guide for the Brazilian Population is an important technology to guide the work of health professionals in nutritional care in the Unified Health System (UHS), its use in the daily life of health services can be greatly enhanced. In this sense, we highlight the Ministry of Health's commitment to the production of materials and collective educational actions for the dissemination of the Food Guide in the context of primary health care. Among the most recent publications we cite the "Instruction Manual: Implementing the Food Guide for the Brazilian Population in Basic Health Care Teams" (MS 2019a), published in 2019 and the first issue of the "Protocols for using the Food Guide for the Brazilian Population in guidance food: theoretical-methodological bases for the adult population” published in 2021 (MS 2021). Bringing the focus to the work of midwives around pregnancy and puerperium, in 2019, the Brazilian Ministry of Health published another official document with recommendations and information on feeding children in the first two years of life– “The Food Guide for Brazilian Children under 2 Years”. It focusses on breastfeeding, aiming to promote children's health, growth and development. The document also supports professionals in the development of actions of food and nutrition education on an individual and collective level in the UHS and in other sectors (MS 2021).

Despite these many initiatives, Brazil lacks guides aimed at pregnant women and/or in the postpartum period. The only official initiative of a nutritional guidance for pregnant women, is present in the “Pregnancy Booklet” (MS 2016b), a production of the MH in conjunction with the State, Municipal and Federal Secretariats; distributed free of charge at all Basic Health Units. It covers several important subjects – besides healthy eating in pregnancy – such as: rights before and after childbirth, tips for a healthy pregnancy and warning signs, information and guidance on pregnancy and baby development, childbirth and the postpartum (MS 2019c).

Regarding healthy eating in pregnancy, the booklet suggests ten steps summarized below:

1) Eat at least three meals and two healthy snacks a day and drink a lot of water between meals.
2) Prefer natural and minimally processed foods.
3) The traditional Brazilian combination: rice with beans is nutritionally balanced and is very good for health.
4) It is important to consume milk and dairy products and a portion of meat, fish or eggs, every day.
5) Consume a maximum of one tablespoon of vegetable oils or olive oil or ½ tablespoon of butter per day. Read food labels and avoid trans-fats.
6) Eat seasonal vegetables and fruits every day.
7) Avoid soft drinks and processed juices, chocolates, sweets, cookies and other goodies in your daily life.
8) Decrease the amount of salt in food and remove the salt shaker from the table. Do the same with sugar.
9) *To avoid anaemia, consume foods rich in iron daily, such as meat, beans, lentils, chickpeas, soybeans, dark green leaves, whole grains, nuts and others. Consume together with sources of vitamin C, such as acerola, guava, orange, cashew, lemon and others.
10) All these precautions will help you maintain health and weight gain within healthy limits. Practice some physical activity and avoid alcoholic beverages and smoking.

This set of instructions is simple enough to be guided by any healthcare professional, and easily understood by the general population. There is an emphasis of the avoidance of micronutrient deficiencies (points 4, 5 and 9), particularly iron*. Most prenatal consultations, to monitor the mother's weight gain and health status and the fetus's development, will be performed by doctors, nurses or midwives, and only if necessary, the user will be referred to a nutritionist. Therefore, in Brazil, any healthcare professional, including midwives, are capable in providing nutritional guidance to health service users.

The role of UK Midwives regarding healthy eating and weight management during pregnancy

In recent years, there is an increased expectation that many UK healthcare professionals can deliver health promotion messages to their service users. 'Making Every Contact Count' a brief intervention, (PHE 2016) encourages healthcare professionals to use the "millions of day-to-day interactions" with service users to promote healthier lifestyles by encouraging physical activity and healthy eating PHE 2016, p7). Several UK, National Institute for Health and Care Excellence (NICE) guidelines highlight the role of HCPs as key providers of nutrition and healthy eating advice: For example, Antenatal Care Guidelines (NICE 2017) state that midwives should discuss nutrition, diet and vitamin supplementation at booking-in appointments.

The public generally considers doctors and other healthcare professionals as 'very credible' sources of nutrition information, but nutrition is usually limited in UK healthcare professionals training (Wongvibulsin et al., 2017), including midwifery. Midwives are reported to check if women are taking folic acid supplements, give advice about food hygiene and sometimes signpost women to sources of further information about nutrition during antenatal appointments, but this is often inconsistent and may include signposting to unreliable sources (McCann et al 2018). McCann *et al*., (2018), found that none of the UK midwives interviewed had received any nutrition or weight management training and consequently lacked the confidence and skills to deliver any in-depth advice to pregnant women. Moreover, pregnant women recognised that the advice they received from midwives, lacked depth and failed to meet their needs (Abayomi et al 2020). Olander *et al*., (2011) concurs with this, reporting that UK healthcare professionals lacked the knowledge and confidence to advise pregnant women regarding healthy weight during and after pregnancy. Mulliner *et al*., (1995) found that 86% of 77 registered midwives in the UK had no formal nutrition education, 46% scored poorly in a nutrition knowledge questionnaire and 75% felt unqualified to advise pregnant women about nutrition.

The current UK midwifery syllabus, intends to provide a professional, holistic, evidence- based programme; centred on a public health curriculum. It aims to prepare midwifery students for safe and effective practice, so at the point of registration they can assume full responsibility and accountability for their practice as midwives (Nursing and Midwifery Council, NMC 2009). The NMC provides the

guiding principles which relate to professional midwifery knowledge, skills and competence (NMC 2009; NMC 2018). The underpinning philosophy of UG midwifery education is the provision of individualised care for women and families via a public health framework to reflect the wider public health role of the midwife (NMR 2016; DH 2010). Overall health and well-being of women throughout the childbearing continuum, is a thread of contemporary midwifery practice, with nutrition forming an important element of care (Elia & Stewart 2005). Despite this, the public health and nutrition aspects of most UK midwifery programs are delivered by midwifery staff, with limited nutrition expertise; resulting in a dilution of key messages. Following registration, very few UK midwives receive any additional training or updates about nutrition (McCann et al., 2018).

The importance of healthy Gestational Weight Gain (GWG)

Optimal GWG is also known to be a key influencing factor regarding the health of offspring. The WHO (2016), reports an increased risk of obesity and co-morbidities in individuals whose mothers had a high BMI (> 30 kg/m^2), had excessive GWG or were poorly nourished (multiple micronutrient deficiencies) during pregnancy. In the UK the National Institute for Health and Care Excellence (NICE 2010) suggests that 1 in 1000 UK pregnancies are complicated by women living with severe obesity (BMI > 50 kg/m^2). Despite an increase in the prevalence and severity of obesity in pregnancy (NICE 2010), the UK currently does not have any GWG recommendations. NICE (2010; 2017) guidelines focus on referral to weight management services postpartum, and the Royal College of Obstetricians and Gynaecologists (2018) acknowledges a lack of consensus on recommendation of GWG targets, and therefore promote a healthy diet for all pregnant women. In the absence of specific GWG recommendations, healthcare professionals in the UK often refer to USA Institute of Medicine (IOM) guidelines (2009) for GWG; where GWG is recommended according to pre-pregnancy BMI (see Table 3). The GWG range for individuals according to their BMI category is associated with optimal birth weight (American College of Obstetricians and Gynaecologists (ACOG) 2013). However, the data used to determine these guidelines is now somewhat dated and precedes the substantial prevalence of maternal obesity (at BMI >50kg/m^2). More recent research suggests that

avoiding any additional GWG, when pre-pregnancy women are living with obesity (BMI >35kg/m^2), may offer protection against adverse pregnancy outcomes (Narayanan et al., 2016). Cassidy et al., (2018), found women living with a healthy to overweight weight status (BMI 20 to 29.9kg/m^2) were more likely to have GWG in excess of IOM recommendations. Women with a pre-pregnancy weight within the healthy range (BMI 20 to 24.9 kg/m^2) and who experienced excessive GWG, were more likely to need an assisted delivery, compared to those with lower GWG. A systematic review and meta-analysis of 1 309 136 pregnancies GWG, reported a higher risk of adverse maternal and infant outcomes, who had a GWG above or below the IOM guidelines. Of these women, 47% had GWG greater than IOM recommendations and 23% had GWG less than IOM recommendations (Goldstein et al., 2017). This data highlights the need for appropriate support and intervention to help women manage GWG, as appropriate to their initial and changing weight needs, during pregnancy. So GWG may be more influential regarding adverse pregnancy outcomes than pre-pregnancy weight status (i.e. BMI alone). Thus highlighting the need for both monitoring of weight change and weight management advice for all during pregnancy. However, UK women are only routinely weighed at their first antenatal appointment; NICE (2010) recommends avoiding routine weighing beyond the initial appointment (unless clinical management can be influenced or if nutrition is a concern). The RCOG (2018), recommends the weighing of pregnant women living within obesity in the later stages of pregnancy, but this is for delivery planning (equipment needs), as opposed to consideration of nutritional and dietary needs.

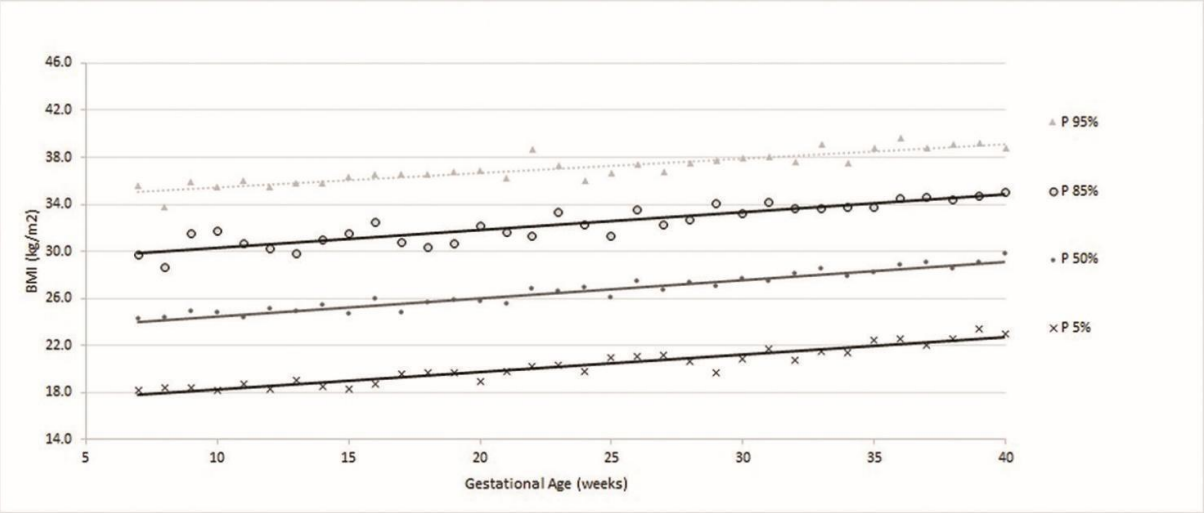
Table 3. IOM (2009) Recommendations for GWG

Pre-pregnancy BMI kg/m^2	**Recommended GWG (lb)**	**Recommended GWG (kg)**	**Mean GWG per week (kg)**
< 18.5	28-40	12.5-18	0.51
18.5 -25	25-35	11-16	0.42

25-30	15-25	6-11	0.28
>30	11-20	5-9	0.22

In Brazil, GWG is routinely monitored throughout pregnancy. Although Brazil has not developed their own reference curve for BMI values for gestational age, healthcare professionals use an assessment of the pregnant woman's nutritional status according to pre-pregnancy BMI, then refer to 'Atalah's curve' (Atalah et al., 1997), which is based on IOM recommendations, (see figure one).

Figure One: Expected GWG according to pre-pregnancy BMI (Atalah's curve)

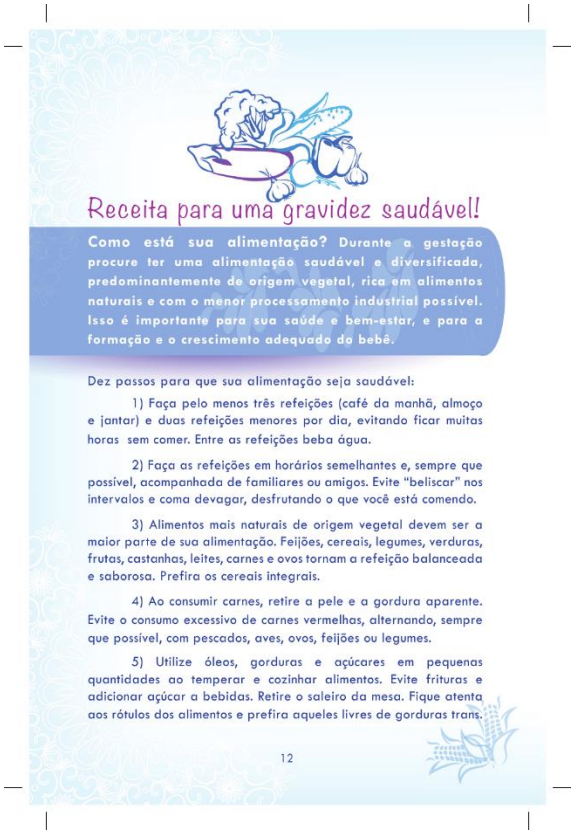


As directed by Pregnancy Booklet (Figure 2), the healthcare professional should record data from prenatal consultations, such as vaccines and/or tests, but also the height measurement and weight of the woman in all prenatal consultations; to monitor and evaluate GWG. During the first antenatal consultation, health professionals are advised to use Atalah's curve (figure one), to estimate optimal GWG in the first trimester and then each week, from the second trimester until the end of pregnancy. This information is shared with the pregnant woman, to encourage her to actively participate in monitoring her health and pregnancy development. Adequate monitoring allows the health professional to identify pregnant women at nutritional risk (underweight, overweight or with obesity)

early in the pregnancy; detect those with low or excessive GWG and outline the appropriate guidance for each case, aiming for optimal maternal nutritional status, conditions for delivery and offspring birth weight (Atalah et al., 1997). By offering this assistance, midwives play a fundamental role, since they have the chance to positively influence the acquisition of healthy eating habits at a time when women are highly motivated (MS 2006). This orientation during pregnancy will not only favour the birth outcome (a healthy baby), but also the management of GWG throughout the trimesters. As GWG is such an important indicator of both maternal and baby health, Brazil feels that it is essential to train midwives capable of contributing to the proper management of weight gain in this phase.

Figure 2. Images from pages of the Brazilian Pregnancy Booklet

Figure 2



Receita para uma gravidez saudável!

Como está sua alimentação? Durante a gestação procure ter uma alimentação saudável e diversificada, predominantemente de origem vegetal, rica em alimentos naturais e com o menor processamento industrial possível. Isso é importante para sua saúde e bem-estar, e para a formação e o crescimento adequado do bebê.

Dez passos para que sua alimentação seja saudável:

1) Faça pelo menos três refeições (café da manhã, almoço e jantar) e duas refeições menores por dia, evitando ficar muitas horas sem comer. Entre as refeições beba água.

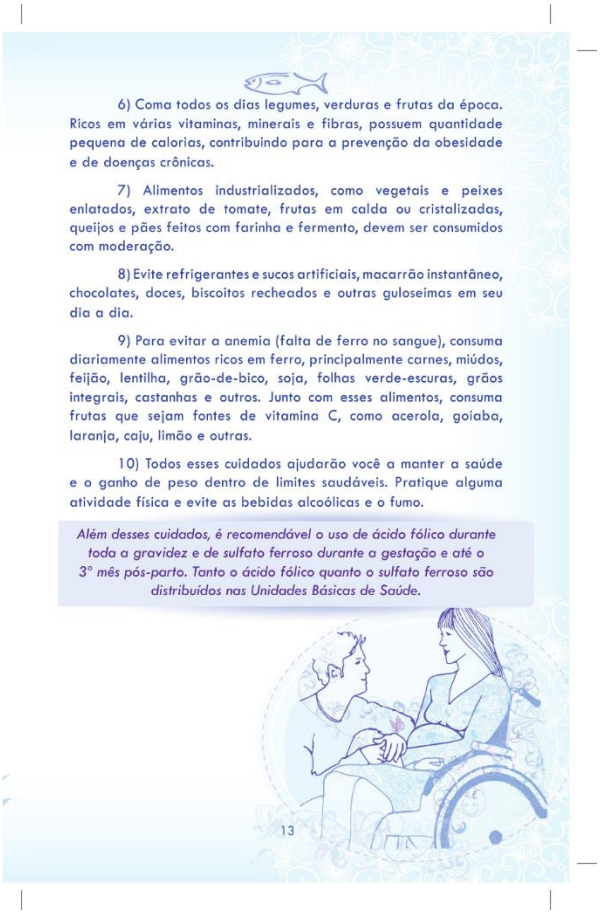
2) Faça as refeições em horários semelhantes e, sempre que possível, acompanhada de familiares ou amigos. Evite "beliscar" nos intervalos e coma devagar, desfrutando o que você está comendo.

3) Alimentos mais naturais de origem vegetal devem ser a maior parte de sua alimentação. Feijões, cereais, legumes, verduras, frutas, castanhas, leites, carnes e ovos tornam a refeição balanceada e saborosa. Prefira os cereais integrais.

4) Ao consumir carnes, retire a pele e a gordura aparente. Evite o consumo excessivo de carnes vermelhas, alternando, sempre que possível, com pescados, aves, ovos, feijões ou legumes.

5) Utilize óleos, gorduras e açúcares em pequenas quantidades ao temperar e cozinhar alimentos. Evite frituras e adicionar açúcar a bebidas. Retire o saleiro da mesa. Fique atenta aos rótulos dos alimentos e prefira aqueles livres de gorduras trans.

12



6) Coma todos os dias legumes, verduras e frutas da época. Ricos em várias vitaminas, minerais e fibras, possuem quantidade pequena de calorias, contribuindo para a prevenção da obesidade e de doenças crônicas.

7) Alimentos industrializados, como vegetais e peixes enlatados, extrato de tomate, frutas em calda ou cristalizadas, queijos e pães feitos com farinha e fermento, devem ser consumidos com moderação.

8) Evite refrigerantes e sucos artificiais, macarrão instantâneo, chocolates, doces, biscoitos recheados e outras guloseimas em seu dia a dia.

9) Para evitar a anemia (falta de ferro no sangue), consuma diariamente alimentos ricos em ferro, principalmente carnes, miúdos, feijão, lentilha, grão-de-bico, soja, folhas verde-escuras, grãos integrais, castanhas e outros. Junto com esses alimentos, consuma frutas que sejam fontes de vitamina C, como acerola, goiaba, laranja, caju, limão e outras.

10) Todos esses cuidados ajudarão você a manter a saúde e o ganho de peso dentro de limites saudáveis. Pratique alguma atividade física e evite as bebidas alcoólicas e o fumo.

Além desses cuidados, é recomendável o uso de ácido fólico durante toda a gravidez e de sulfato ferroso durante a gestação e até o 3° mês pós-parto. Tanto o ácido fólico quanto o sulfato ferroso são distribuídos nas Unidades Básicas de Saúde.

13

Nutrition in the Midwifery training in Brazil

In Brazil, the nutritional guidance of healthy individuals can be done by any healthcare professional; thus, including content related to nutrition is viewed as essential for the formation of midwives, trained to contribute to the development of healthy behaviour during pregnancy. The only course to train midwives in Brazil is the one at the University of São Paulo (USP), whose curriculum covers semi-annual subjects in biological sciences, human and social sciences and health, in addition to clinical practices and curricular internships. Specifically, the content on nutrition is discussed in different disciplines with varying degrees of depth. One of the first contacts with this subject is in the discipline “Biological Foundations of Obstetrics III”, which discusses in an integrated way, the fundamental knowledge of the morphology, physiology and biochemistry of the digestive and urinary systems. Importantly, the nutrition aspects of the course were designed and are delivered by a nutritionist, ensuring that the content is up-to-date, relevant, scientific and evidence-based. This course is offered in the sixth semester of the programme, with a total workload of sixty hours and

four credits, so that students can develop the main topics related to nutritional guidance, (see table 4 below). Since its insertion in the curriculum, the discipline has been integrating changes both in content, the didactic strategies experienced and also in the academic period in which it is offered. Currently the discipline is taught simultaneously to “Assistance to Women in Prenatal and Postpartum” and “Curricular Internship Integrated 1”, so that it allows undergraduates to study topics in nutrition at the same time they encounter primary health care.

Table 4: Nutrition topics delivered to midwifery students in Brazil

Table 4: Nutrition topics delivered to midwifery students in Brazil

1	Factual: introduction to Nutrition, behaviour and eating habits, biochemical composition of food, milk, nutritional needs during pregnancy and lactation.
2	Conceptual: breastfeeding, nutritional status of pregnant women, nutritional education and public policies in Nutrition.
3	Procedural: Assessment of nutritional habits, assessment and nutritional guidance in the context of pregnancy, search and update on official documents and national guidelines, as well as international, related to Nutrition in the context of the discipline.
4	Attitudinal: Empathy for colleagues and the population served in practice, respect for the food culture and socioeconomic status of others, respect for the woman's decision to breastfeed or not and to have a natural birth or not, respect for the diversity of opinions.

As for learning strategies, group work and the elaboration and resolution of three clinical case studies per group, are used throughout the semester. Each group agrees the management of the sequence, in which the topics agreed at the beginning of the semester are developed. After the elaboration of the cases, there are three opportunities for the discussion of these cases with the whole class, where the material produced by each group is shared collectively. Following these presentations, there is a synthesis, where the teacher explores a subject more deeply. This approach has allowed students to experience the translation of nutrition theory into the practice of prenatal and postpartum care; opportunities for offering nutritional guidance are highlighted as relevant to both the outcome of a healthy pregnancy and for the baby's development in its early years. In doing so, we strengthen midwives' confidence in their ability to advise women on healthy eating and weight management during pregnancy.

Sharing best practice - learning from others

Optimal nutrition and GWG are both key to maternal and fetal health. Moreover, they are both modifiable risk factors regarding the prevention of poor health and NCD. So, this is an ideal opportunity for HCPs to intervene and encourage healthy eating habits. In the UK, most pregnant women do not have routine access to dietitians during antenatal care; currently there are only 9,469 registered dietitians in the whole UK (HCPC 2017), compared to 26,778 registered midwives in England alone, (NHS digital 2020), so the role of encouraging healthy eating is largely left to midwives. This important midwifery role is acknowledged by the WHO (2016) and NICE (2017). Despite this, UK midwives have reported no training regarding nutrition and healthy eating (McCann et al., 2018) and others have reported a lack of skills, confidence and knowledge in this area (Abayomi et al., 2020; Mulliner et al., 1995).

In contrast, pregnant women in Brazil have very limited access to midwifery care, with only one undergraduate programme (in USP) for the whole population of 207, 653 people (WHO 2017). However, the content of their undergraduate training includes comprehensive nutrition input; with an emphasis on translating theory into practical application, resulting in midwives much better prepared

to support pregnant women regarding nutrition and healthy eating. Furthermore, nutrition appears to be more of a priority in Brazil, with nutrition experts designing and delivering the nutrition content of course curricula for other Healthcare Professionals.

Conclusion

Optimal nutrition prior to and during pregnancy is essential for fetal and maternal health, whilst optimal GWG strongly influences birth weight and protects against NCD. Midwives have a key role in interpreting and communicating key nutritional messages to pregnant women in their care, at a time when they are highly motivated to make changes. In the UK, midwives report a lack of training regarding nutrition, leading to poor skills and confidence in advising pregnant women about healthy eating and weight gain. In Brazil, nutrition appears to have greater priority; there are many more qualified nutritionists in the population and their expertise is influencing the training of other Health professionals, including midwives. Brazilian midwives undertake in-depth education about nutrition throughout their UG course and it designed and delivered by a nutritionist. Moreover, there is an emphasis on translating nutritional messages into practice, ensuring that qualified midwives have the knowledge and skills they need to support pregnant women. Brazil is keen to expand their scarce provision of midwives, ensuring much needed improvements in maternal morbidity and mortality, but UK midwives have much to learn regarding their approach to nutrition education.

Recommendations

- The UK needs to improve population access to dietitians/nutritionists by expanding education provision nationally.
- UK midwives would benefit from bespoke training regarding pregnancy specific nutrition and healthy GWH, as part of their undergraduate/postgraduate training.
- UK dietitians and nutritionists need to be more involved in the curriculum design and delivery of nutrition education to other Healthcare professionals, including midwives.

- Improved collaboration, between dietitians/nutritionists and midwives, that encourages sharing of best practice would help to ensure that pregnant women can access optimal care and advice about nutrition and GWG during antenatal care.

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