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**Dietary interventions and
physical activity
interventions for weight
management before, during
and after pregnancy**

NICE public health guidance 27
Dietary interventions and physical activity interventions for weight management before, during and after pregnancy

Ordering information

You can download the following documents from

www.nice.org.uk/guidance/PH27

- The NICE guidance (this document) which includes all the recommendations, details of how they were developed and evidence statements.
- A quick reference guide for professionals and the public.
- Supporting documents, including an evidence review and an economic analysis.

For printed copies of the quick reference guide, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk and quote N2223.

This guidance represents the views of the Institute and was arrived at after careful consideration of the evidence available. Those working in the NHS, local authorities, the wider public, voluntary and community sectors and the private sector should take it into account when carrying out their professional, managerial or voluntary duties.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

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Introduction

The Department of Health (DH) asked the National Institute for Health and Clinical Excellence (NICE) to produce public health guidance on dietary and physical activity interventions for weight management before, during and after pregnancy.

The guidance does not cover:

- women who are underweight (that is, those who have a body mass index [BMI] less than 18.5 kg/m²)
- clinical management of women who are obese during pregnancy
- those who have been diagnosed with, or who are receiving treatment for, an existing condition such as type 1 or type 2 diabetes
- food safety advice.

The guidance is for NHS and other commissioners, managers and professionals who have a direct or indirect role in, and responsibility for, women who are pregnant or who are planning a pregnancy and mothers who have had a baby in the last 2 years. This includes those working in local authorities, education and the wider public, private, voluntary and community sectors.

It is particularly aimed at: GPs, obstetricians, midwives, health visitors, dietitians, community pharmacists and all those working in antenatal and postnatal services and children's centres. It may also be of interest to women before, during and after pregnancy and their partners and families, and other members of the public.

The guidance complements but does not replace NICE guidance on: obesity, maternal and child nutrition, antenatal care, postnatal care, physical activity, behaviour change, antenatal and postnatal mental health and diabetes in pregnancy (for further details, see section 7).

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The Public Health Interventions Advisory Committee (PHIAC) developed these recommendations on the basis of a review of the evidence, economic modelling, expert advice, stakeholder comments and fieldwork.

Members of PHIAC are listed in appendix A. The methods used to develop the guidance are summarised in appendix B.

Supporting documents used to prepare this document are listed in appendix E. Full details of the evidence collated, including fieldwork data and activities and stakeholder comments, are available on the NICE website, along with a list of the stakeholders involved and NICE's supporting process and methods manuals. The website address is: www.nice.org.uk

This guidance was developed using the NICE public health intervention process.

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1 Recommendations

This is NICE's formal guidance on dietary interventions and physical activity interventions for weight management before, during and after pregnancy.

When writing the recommendations, the Public Health Interventions Advisory Committee (PHIAC) (see appendix A) considered the evidence of effectiveness (including cost effectiveness), fieldwork data and comments from stakeholders and experts. Full details are available at www.nice.org.uk/guidance/PH27

The evidence statements underpinning the recommendations are listed in appendix C.

The evidence review, supporting evidence statements and economic analysis are available at www.nice.org.uk/guidance/PH27

PHIAC considers that the recommendations are cost effective.

For the research recommendations and gaps in research, see section 5 and appendix D respectively.

Weight management: a definition

In this guidance the term 'weight management' includes:

- assessing and monitoring body weight
- preventing someone from becoming overweight (body mass index [BMI] 25–29.9 kg/m²) or obese (BMI greater than or equal to 30 kg/m²)
- helping someone to achieve and maintain a healthy weight before, during and after pregnancy by eating healthily and being physically active and gradually losing weight after pregnancy.

The recommendations are based on strategies and weight-loss programmes that are proven to be effective for the whole population. The criteria for effective programmes are listed below. Programmes that do not meet these criteria are unlikely to help women to maintain a healthy weight in the long term.

Achieving and maintaining a healthy weight

Women will be more likely to achieve and maintain a healthy weight before, during and after pregnancy if they¹:

- base meals on starchy foods such as potatoes, bread, rice and pasta, choosing wholegrain where possible
- eat fibre-rich foods such as oats, beans, peas, lentils, grains, seeds, fruit and vegetables, as well as wholegrain bread and brown rice and pasta
- eat at least five portions of a variety of fruit and vegetables each day, in place of foods higher in fat and calories
- eat a low-fat diet and avoid increasing their fat and/or calorie intake
- eat as little as possible of fried food; drinks and confectionery high in added sugars (such as cakes, pastries and fizzy drinks); and other food high in fat and sugar (such as some take-away and fast foods)
- eat breakfast
- watch the portion size of meals and snacks, and how often they are eating
- make activities such as walking, cycling, swimming, aerobics and gardening part of everyday life and build activity into daily life – for example, by taking the stairs instead of the lift or taking a walk at lunchtime
- minimise sedentary activities, such as sitting for long periods watching television, at a computer or playing video games
- walk, cycle or use another mode of transport involving physical activity.

Effective weight-loss programmes:

- address the reasons why someone might find it difficult to lose weight
- are tailored to individual needs and choices
- are sensitive to the person's weight concerns²
- are based on a balanced, healthy diet²
- encourage regular physical activity²

¹ The first nine criteria in this list are an edited extract from a recommendation in 'Obesity'. NICE clinical guideline 43. The last criterion is from a recommendation in 'Physical activity in the workplace'. NICE public health guidance 13.

² This is an edited extract from a recommendation that appears in 'Obesity'. NICE clinical guideline 43.

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- expect people to lose no more than 0.5–1 kg (1–2 lb) a week²
- identify and address barriers to change.

Weight loss programmes are not recommended during pregnancy as they may harm the health of the unborn child, see recommendation 2.

Reputable sources of information and advice about diet and physical activity for women before, during and after pregnancy include: 'The pregnancy book'³, 'Birth to five'⁴ and the 'Eat well' website⁵.

Changing behaviour

Evidence-based behaviour change advice includes:

- understanding the short, medium and longer-term consequences of women's health-related behaviour
- helping women to feel positive about the benefits of health-enhancing behaviours and changing their behaviours
- recognising how women's social contexts and relationships may affect their behaviour
- helping plan women's changes in terms of easy steps over time
- identifying and planning situations that might undermine the changes women are trying to make and plan explicit 'if-then' coping strategies to prevent relapse⁶.

³ Department of Health (2009) The pregnancy book. London: Department of Health.

⁴ Department of Health (2009) Birth to five. London: Department of Health.

⁵ www.eatwell.gov.uk

⁶ This is an edited extract from a recommendation that appears in 'Behaviour change'. NICE public health guidance 6.

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Recommendation 1 Preparing for pregnancy: women with a BMI of 30 or more

Whose health will benefit?

Women with a BMI of 30 or more who may become pregnant, including those who have previously been pregnant.

Who should take action?

- NHS and other commissioners and managers.
- GPs, health visitors, midwives, practice nurses, pharmacists and other health professionals working in weight management, fertility, pre-conception advice and care services, gynaecology and contraceptive services.
- Managers and health professionals in children's centres.
- Directors of public health, planners and organisers of public health campaigns and occupational health advisers.
- Dietitians and public health nutritionists working in NHS and non-NHS settings.

What action should they take?

- NHS and other commissioners and managers, directors of public health and planners and organisers of public health campaigns should ensure health professionals understand the importance of achieving a healthy weight before pregnancy. Local education initiatives should also stress the health risks of being obese, including during pregnancy.
- Health professionals should use any opportunity, as appropriate, to provide women with a BMI of 30 or more with information about the health benefits of losing weight before becoming pregnant (for themselves and the baby they may conceive). This should include information on the increased

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health risks their weight poses to themselves and would pose to their unborn child.

- GPs, dietitians and other appropriately trained health professionals should advise, encourage and help women with a BMI of 30 or more to reduce weight before becoming pregnant. They should explain that losing 5–10% of their weight (a realistic target) would have significant health benefits⁷ and could increase their chances of becoming pregnant. Further weight loss, to achieve a BMI within the healthy range (between 24.9 and 18.5 kg/m²) should also be encouraged, using evidence-based behaviour change techniques. Losing weight to within this range may be difficult and women will need to be motivated and supported.
- Health professionals should encourage women to check their weight and waist measurement periodically or, as a simple alternative, check the fit of their clothes.
- Health professionals should offer a weight-loss support programme involving diet and physical activity. The programme should follow the principles of good practice, as outlined at the beginning of this section.
- Health professionals should offer specific dietary advice in preparation for pregnancy, including the need to take daily folic acid supplements. This includes professionals working in pre-conception clinics, fertility clinics, sexual and reproductive health services and children's centres.

Recommendation 2 Pregnant women

Context

If a pregnant woman is obese this will have a greater influence on her health and the health of her unborn child than the amount of weight she may gain during pregnancy. That is why it is important, when necessary, to help women lose weight before they become pregnant.

⁷ This is an edited extract from a recommendation that appears in 'Obesity'. NICE clinical guideline 43.

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Dieting during pregnancy is not recommended as it may harm the health of the unborn child.

Many pregnant women ask health professionals for advice on what constitutes appropriate weight gain during pregnancy. However, there are no evidence-based UK guidelines on recommended weight-gain ranges during pregnancy.

The amount of weight a woman may gain in pregnancy can vary a great deal. Only some of it is due to increased body fat – the unborn child, placenta, amniotic fluid and increases in maternal blood and fluid volume all contribute.

Whose health will benefit?

All pregnant women but, in particular, those with a BMI of 30 or more.

Who should take action?

- Obstetricians, midwives, GPs and practice nurses.
- Dietitians and public health nutritionists.
- Managers and health professionals in children's centres.
- Midwifery assistants, support workers and other healthcare practitioners.

What action should they take?

- At the earliest opportunity, for example, during a pregnant woman's first visit to a health professional, discuss her eating habits and how physically active she is. Find out if she has any concerns about diet and the amount of physical activity she does and try to address them.
- Advise that a healthy diet and being physically active will benefit both the woman and her unborn child during pregnancy and will also help her to achieve a healthy weight after giving birth. Advise her to seek information and advice on diet and activity from a reputable source.

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- Offer practical and tailored information. This includes advice on how to use Healthy Start vouchers to increase the fruit and vegetable intake⁸ of those eligible for the Healthy Start scheme (women under 18 years and those who are receiving benefit payments).
- Dispel any myths about what and how much to eat during pregnancy. For example, advise that there is no need to 'eat for two' or to drink full-fat milk. Explain that energy needs do not change in the first 6 months of pregnancy and increase only slightly in the last 3 months (and then only by around 200 calories per day).
- Advise that moderate-intensity physical activity will not harm her or her unborn child. At least 30 minutes per day of moderate intensity activity is recommended.
- Give specific and practical advice about being physically active during pregnancy⁹:
 - recreational exercise such as swimming or brisk walking and strength conditioning exercise is safe and beneficial
 - the aim of recreational exercise is to stay fit, rather than to reach peak fitness
 - if women have not exercised routinely they should begin with no more than 15 minutes of continuous exercise, three times per week, increasing gradually to daily 30-minute sessions¹⁰
 - if women exercised regularly before pregnancy, they should be able to continue with no adverse effects.
- Explain to those women who would find this level of physical activity difficult that it is important not to be sedentary, as far as possible. Encourage them

⁸ This is an edited extract from a recommendation that appears in 'Maternal and child nutrition'. NICE public health guidance 11.

⁹ See www.rcog.org.uk/womens-health/clinical-guidance/exercise-pregnancy

¹⁰ 'Obesity' NICE clinical guideline 43 recommends adults should be encouraged to do at least 30 minutes of at least moderate-intensity physical activity on 5 or more days a week. The activity can be in one session or several lasting 10 minutes or more.

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to start walking and to build physical activity into daily life, for example, by taking the stairs instead of the lift, rather than sitting for long periods.

- Measure weight and height at the first contact with the pregnant woman, being sensitive to any concerns she may have about her weight. If these data are not available at their first booking appointment, then the midwife should do this. Do not rely on self-reported measures of weight and height. Clearly explain why this information is needed and how it will be used to plan her care. Weigh her in light clothing using appropriate, calibrated weighing scales that are regularly checked. Calculate BMI by dividing weight (kg) by the square of height (m²), or use the BMI calculator¹¹ after measuring and weighing. Use BMI percentile charts for pregnant women under 18 years, as a BMI measure alone does not take growth into account and is inappropriate for this age group¹².
- Weight, height and BMI should be recorded in notes, the woman's hand-held record and the patient information system. If a hand-held record is not available, use local protocols to record this information.
- Do not weigh women repeatedly during pregnancy as a matter of routine. Only weigh again if clinical management can be influenced or if nutrition is a concern¹³.
- Explain to women with a BMI of 30 or more at the booking appointment how this poses a risk, both to their health and the health of the unborn child. Explain that they should not try to reduce this risk by dieting while pregnant and that the risk will be managed by the health professionals caring for them during their pregnancy.
- Offer women with a BMI of 30 or more at the booking appointment a referral to a dietitian or appropriately trained health professional for

¹¹ Visit www.eatwell.gov.uk/healthydiet/healthyweight/bmicalculator/

¹² A BMI calculator for children and young people under 18 is available from www.nhs.uk/tools/pages/healthyweightcalculator.aspx

¹³ This is an edited extract from a recommendation that appears in 'Antenatal care'. NICE clinical guideline 62.

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assessment and personalised advice on healthy eating and how to be physically active. Encourage them to lose weight after pregnancy¹⁴.

Recommendation 3 Supporting women after childbirth

Whose health will benefit?

Women who have had a baby in recent months.

Who should take action?

- GPs, health visitors, midwives, practice nurses, pharmacists and other health professionals working in weight management.
- Managers and health professionals in children's centres.
- Dietitians and public health nutritionists working in NHS and non-NHS settings.

What action should they take?

- Use the 6–8-week postnatal check as an opportunity to discuss the woman's weight. Ask those who are overweight, obese or who have concerns about their weight if they would like any further advice and support now – or later. If they say they would like help later, they should be asked whether they would like to make an appointment within the next 6 months for advice and support.
- During the 6–8-week postnatal check, or during the follow-up appointment within the next 6 months, provide clear, tailored, consistent, up-to-date and timely advice about how to lose weight safely after childbirth. Ensure women have a realistic expectation of the time it will take to lose weight gained during pregnancy. Discuss the benefits of a healthy diet and regular physical activity, acknowledging the woman's role within the family and how she can be supported by her partner and wider family. Advice on healthy eating and physical activity should be tailored to her circumstances. For

¹⁴ This is an extract from a recommendation that appears in 'Maternal and child nutrition'. NICE public health guidance 11.

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example, it should take into account the demands of caring for a baby and any other children, how tired she is and any health problems she may have (such as pelvic floor muscle weakness or backache).

- Health professionals should advise women, their partners and family to seek information and advice from a reputable source. Women who want support to lose weight should be given details of appropriate community-based services.
- Midwives and other health professionals should encourage women to breastfeed. They should reassure them that a healthy diet and regular, moderate-intensity physical activity and gradual weight loss will not adversely affect the ability to breastfeed or the quantity or quality of breast milk¹⁵.
- Health professionals should give advice on recreational exercise from the Royal College of Obstetrics and Gynaecology¹⁶. In summary, this states that:
 - If pregnancy and delivery are uncomplicated, a mild exercise programme consisting of walking, pelvic floor exercises and stretching may begin immediately. But women should not resume high-impact activity too soon after giving birth.
 - After complicated deliveries, or lower segment caesareans, a medical care-giver should be consulted before resuming pre-pregnancy levels of physical activity, usually after the first check-up at 6–8 weeks after giving birth.
- Health professionals should also emphasise the importance of participating in physical activities, such as walking, which can be built into daily life.

¹⁵ This is an edited extract from a recommendation that appears in 'Maternal and child nutrition'. NICE public health guidance 11.

¹⁶ Visit www.rcog.org.uk/womens-health/clinical-guidance/exercise-pregnancy

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Recommendation 4 Women with a BMI of 30 or more after childbirth

Whose health will benefit?

- Women who had a pre-pregnancy BMI of 30 or more.
- Women with a BMI of 30 or more who have had a baby within recent months.

Who should take action?

- GPs, health visitors, practice nurses, pharmacists and other health professionals working in weight management.
- Managers and health professionals in children's centres.
- Dietitians and public health nutritionists working in NHS and non-NHS settings.

What action should they take?

- Explain the increased risks that being obese poses to them and, if they become pregnant again, their unborn child. Encourage them to lose weight.
- Offer a structured weight-loss programme. If more appropriate, offer a referral to a dietitian or an appropriately trained health professional. They will provide a personalised assessment, advice about diet and physical activity and advice on behaviour change strategies such as goal setting. Women who are not yet ready to lose weight should be provided with information about where they can get support when they are ready.
- Use evidence-based behaviour change techniques to motivate and support women to lose weight.

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- Encourage breastfeeding and advise women that losing weight by eating healthily and taking regular exercise will not affect the quantity or quality of their milk¹⁷.

Recommendation 5 Community-based services

Whose health will benefit?

- All women before, during and after pregnancy.

.Who should take action?

- NHS and other commissioners and managers.
- Managers of local authority leisure and community services including swimming pools and parks.
- Managers and health professionals in slimming and weight management clubs.
- Managers and health professionals in children's centres.
- NHS health trainers and health and fitness advisers working in local authority leisure services and voluntary, community and commercial organisations.

What action should they take?

- Local authority leisure and community services should offer women with babies and children the opportunity to take part in a range of physical or recreational activities. This could include swimming, organised walks, cycling or dancing. Activities need to be affordable and available at times that are suitable for women with older children as well as those with babies. Where possible, affordable childcare (for example, a creche) should be provided and provision made for women who wish to breastfeed.

¹⁷ This is an edited extract from a recommendation that appears in 'Maternal and child nutrition'. NICE public health guidance 11.

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- NHS and other commissioners and managers, local authority leisure services and slimming clubs should work together to offer women who wish to lose weight after childbirth the opportunity to join a weight management group or slimming club. Health professionals should continue to monitor, support and care for women with a BMI of 30 or more who join weight management groups and slimming clubs.
- Weight management groups and slimming clubs should adhere to the principles outlined at the beginning of this section. This includes giving advice about healthy eating and the importance of physical activity and using evidence-based behaviour-change techniques to motivate and support women to lose weight.
- NHS health trainers and non-NHS health and fitness advisers should advise women that a healthy diet and being physically active will benefit both them and their unborn child during pregnancy. They should also explain that it will help them to achieve a healthy weight after giving birth – and could encourage the whole family to eat healthily and be physically active.
- NHS health trainers and non-NHS health and fitness advisers should encourage those who have weight concerns before, during or after pregnancy to talk to a health professional such as a GP, practice nurse, dietitian, health visitor or pharmacist¹⁸. They should also advise women, their partners and family to seek information and advice on healthy eating and physical activity from a reputable source.
- NHS health trainers and non-NHS health and fitness advisers should offer specific dietary advice in preparation for pregnancy, including the need to take daily folic acid supplements.

¹⁸ This is an edited extract from a recommendation that appears in 'Obesity'. NICE clinical guideline 43.

Recommendation 6 Professional skills

Whose health will benefit?

All women before, during and after pregnancy, particularly those with a BMI of 30 or more.

Who should take action?

- Professional bodies and others responsible for setting competencies and developing continuing professional development programmes for health professionals, healthcare assistants and support staff.
- Training boards and organisations responsible for training health and fitness advisers and NHS health trainers.

What action should they take?

- Ensure health professionals, healthcare assistants and support workers have the skills to advise on the health benefits of weight management and risks of being overweight or obese before, during and after pregnancy, or after successive pregnancies.
- Ensure they can advise women on their nutritional needs before, during and after pregnancy and can explain why it is important to have a balanced diet and to be moderately physically active.
- Ensure they have behaviour change knowledge, skills and competencies. This includes being able to help people to identify how their behaviour is affecting their health, draw up an action plan, make the changes and maintain them.
- Ensure they have the communication techniques needed to broach the subject of weight management in a sensitive manner. They should be able to give women practical advice on how to improve their diet and become more physically active. They should be able to tailor this advice to individual needs and know when to refer them for specialist care and support.

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- Ensure they have the knowledge and skills to help dispel common myths. This includes myths about what to eat and what not to eat during pregnancy and about weight loss in relation to breastfeeding.
- Ensure they have knowledge, skills and competencies in group facilitation, are aware of the needs of minority ethnic groups and have knowledge of local services.
- Ensure their training is regularly monitored and updated.

2 Public health need and practice

About half of women of childbearing age are either overweight (BMI 25–29.9 kg/m²) or obese (BMI greater than or equal to 30 kg/m²) (The NHS Information Centre 2008).

At the start of pregnancy, 15.6% of women in England are obese (Heslehurst et al. 2010).

Maternal obesity and weight retention after birth are related to socioeconomic deprivation (Heslehurst et al. 2010).

Health risks for obese women and their babies

Women who are obese when they become pregnant face an increased risk of complications during pregnancy and childbirth. These include the risk of impaired glucose tolerance and gestational diabetes, miscarriage, pre-eclampsia, thromboembolism and maternal death (Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists 2010).

Even a relatively small gain of 1–2 BMI units (kg/m²) between pregnancies may increase the risk of gestational hypertension and gestational diabetes, even in women who are not overweight or obese. It also increases the likelihood of giving birth to a large baby (Villamor and Cnattingius 2006).

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An obese woman is more likely to have an induced or longer labour, instrumental delivery, caesarean section or postpartum haemorrhage (Yu et al. 2006). Reduced mobility during labour can result in the need for more pain relief, which can be difficult to administer in obese women, resulting in increased need for general anaesthesia with its associated risks. After birth, wound healing can be slower with an increased risk of infection, and obese women are more likely to require extra support in establishing breastfeeding, due to, for example, difficulties in latching the baby on to the breast (Heslehurst et al. 2007).

Obese women may also experience reduced choices about where and how they give birth. There may be restrictions on home births, the use of birthing pools and types of pain relief that can be given.

Obese women who are pregnant are likely to spend longer in hospital than those with a healthy weight because of morbidity during pregnancy and labour related to their weight (Chu et al. 2008). In the longer term, weight control after pregnancy may reduce the woman's risk of obesity, coronary heart disease, some cancers and type 2 diabetes.

Babies born to obese women also face several health risks. These include a higher risk of fetal death, stillbirth, congenital abnormality, shoulder dystocia, macrosomia and subsequent obesity (Ramachenderan et al. 2008).

Weight gain during pregnancy

US Institute of Medicine guidelines (Rasmussen and Yaktine 2009), based on observational data, state that healthy American women who are a normal weight for their height (BMI 18.5–24.9) should gain 11.5–16 kg (25–35 pounds) during pregnancy. Overweight women (BMI 25–29.9) should gain 7–11.5 kg (15–25 pounds) and obese women (BMI greater than 30) should only put on 5–9 kg (11–20 pounds).

Observational studies of American women suggest that those who gain weight within the Institute of Medicine ranges are more likely to have better

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maternal and infant outcomes than those who gain more or less weight. (The evidence is stronger for some outcomes – such as postpartum weight retention and birthweight – than for others [Siega-Riz et al. 2009]).

There are no formal, evidence-based guidelines from the UK government or professional bodies on what constitutes appropriate weight gain during pregnancy.

The Committee on Medical Aspects of Food Policy report on dietary reference values recommends that women should only have around 200 calories more a day in the last trimester of pregnancy (DH 1991). UK health professionals do not, as a matter of course, give women information about the risks of obesity and the importance of weight management before or during pregnancy (Heslehurst et al. 2007a). Pregnant women are advised not to diet, and to talk to their GP or midwife if they are concerned about their weight (Department of Health 2009).

Weight management after pregnancy

NICE's obesity guideline (clinical guideline 43 [2006] available from www.nice.org.uk/guidance/CG43) identified the period after pregnancy and childbirth as a time when women are likely to gain weight. In addition, many conceive again during this period. Hence, managing the woman's weight in the first few years after childbirth may reduce her risk of entering the next pregnancy overweight or obese.

However, after having a child, many mothers find it difficult to eat a healthy diet and take regular exercise (Hewison and Dowswell 1994). It may be because women receive little or no advice on weight management after childbirth.

Women who exclusively breastfeed their infants for the first 6 months may require around an additional 330 calories a day. Some of these additional calories will be derived from fat stores. An additional 400 calories a day may be required for the second 6 months if they continue to breastfeed (DH 1991).

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Breastfeeding is often recommended as a strategy for promoting weight loss, but findings from studies are mixed (Gore et al. 2003). The additional energy requirements of breastfeeding may help some women return to their pre-pregnancy weight. If women are moderately active on a regular basis, this will not adversely affect a woman's ability to breastfeed and could aid weight management.

The Department of Health (2009) does not make specific recommendations on weight management after childbirth. It advises against following a restricted-calorie diet while breastfeeding and suggests that women should talk to their GP if they feel they need to lose weight. However, there is no national guidance for professionals.

Women on low incomes may be eligible for Healthy Start vouchers to buy fruit and vegetables (as well as milk and infant formula). These are available to pregnant women and families with a child aged under 4 years. Those eligible include people on income support and income-based jobseekers allowance and those with low incomes. All pregnant women under 18 years also qualify, whether or not they are on state benefits.

3 Considerations

The Public Health Interventions Advisory Committee (PHIAC) took account of a number of factors and issues when developing the recommendations.

3.1 PHIAC was keen to adopt a 'life course approach' to this guidance, noting that pregnancy and around a year after childbirth are key points in a woman's life when she may gain excess weight. PHIAC also recognised that weight management can be difficult in the current obesogenic environment. Sedentary habits and a high calorie diet are common and physical activity, such as walking, is not part of daily life. However, the period before, during and after pregnancy does provide an opportunity to give women practical advice to help them to improve their diet, become more physically active or to help them manage their weight effectively. To ensure

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this opportunity is not missed, the recommendations emphasise the need for practical advice that takes into account the woman's particular social and economic circumstances and involves the whole family.

- 3.2 PHIAC recognised that health professionals would welcome UK guidance on weight gain in pregnancy. In the absence of such guidance, PHIAC discussed whether it would be appropriate to support the US Institute of Medicine's guidelines. These guidelines, which were revised in 2009, are based on observational data. The data show that women who gained weight within the specified ranges had better outcomes than those who did not. However, the recommendations were not validated by intervention studies. Without evidence from large-scale trials, it is not clear whether or not adhering to the recommended ranges lowers the risk of adverse outcomes for mothers and their babies. In addition, the guidelines were developed for the US population and it is not known whether or not they would apply to other populations with a different ethnic composition. PHIAC was therefore unable to support their use without more evidence and more information about their applicability to the UK population. This is an important area for future research.
- 3.3 PHIAC recognised that not only does weight gain in pregnancy vary between individuals, but that the components involved also vary. Weight gain in pregnancy is made up of the fetus, placenta, amniotic fluid, and increases in maternal blood and fluid volume, as well as an increase in body fat.
- 3.4 PHIAC noted the lack of intervention studies on weight management during pregnancy. Those that do exist are pilot studies with small sample sizes and insufficient statistical power to detect differences in health outcomes for mothers and their babies. Several large-scale, randomised controlled trials are underway

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worldwide, but no conclusions could be drawn from them before publication of this guidance. PHIAAC agreed to draw on existing NICE guidance which is based on evidence of effectiveness and cost effectiveness. This includes public health guidance on maternal and child nutrition and behaviour change and clinical guidelines on obesity, antenatal care and postnatal care.

- 3.5 PHIAAC emphasised the importance of women being a healthy weight before pregnancy. Pre-pregnancy BMI is a greater determinant of healthy outcomes for mothers and babies than any weight they may gain during pregnancy. Women with a high BMI might also find it more difficult to conceive.
- 3.6 For many women, the first year or two after birth is a time when they start to think about having another baby. Weight management during this time will help them to achieve a healthy weight when they next become pregnant – and help prevent incremental weight gain over successive pregnancies.
- 3.7 The guidance is targeted at women who are actively planning a pregnancy and those who are already pregnant or who have had a baby. It is, however, recognised that a population-based approach is important in reaching all women of childbearing age, as many pregnancies are unplanned.
- 3.8 Women receive a wealth of sometimes conflicting advice on what constitutes a healthy diet and how much physical activity they should do during pregnancy and after childbirth. This comes not just from health professionals and official sources but from family, friends, the media and new media (such as social networking sites). For example, the press regularly publishes celebrity claims of unrealistic and rapid weight loss after pregnancy. This may create additional pressure on women to lose weight inappropriately at an already stressful time.

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- 3.9 Concern about obesity or weight gain in pregnancy might lead some women to try to lose weight. Dieting is not advised during pregnancy because it is not known whether it is safe. Restrictive or 'crash' diets may increase blood ketone levels and could adversely affect the neuro-cognitive development of the fetus.
- 3.10 PHIAAC was aware that the health risks of being overweight or obese during pregnancy, for both the mother and her unborn child, are not routinely discussed. Health professionals recognise the risks but are often unsure what advice to give. In some cases, they lack the training, skills or confidence to discuss weight management. In addition, they may not know how to tailor advice and support for women who are pregnant.
- 3.11 The needs of pregnant teenagers may differ from those of pregnant older women. Their social circumstances may differ, as may the health professionals they come into contact with. For example, they may be cared for by specialist teenage pregnancy midwives and teenage pregnancy support nurses. In addition to supporting the growth of the baby, pregnant teenagers may still be growing themselves.
- 3.12 Some population groups, such as Asians, face co-morbidity risk at a lower BMI than other groups. However, there is no consensus on how to define overweight and obesity in different ethnic groups for women of childbearing age.
- 3.13 The period following childbirth is a time of great change for women and their partners, as they learn to cope with the demands of a new baby. Lack of sleep and a range of physical and psychological problems, such as backache, urinary and faecal incontinence, depression and fatigue, are common. These problems can be compounded when they are caring for another child (or children) as

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well. Some health problems may impact on a woman's ability to be physically active and therefore, her ability to manage her weight.

- 3.14 The additional energy requirements of breastfeeding may help some women return to their pre-pregnancy weight. Those who are breastfeeding and do not increase their energy intake, eat a healthy diet and are moderately active will be more likely to achieve this. Although it cannot be assumed that all women who breastfeed will lose weight, PHIAC considered it important to encourage exclusive breastfeeding for the first 6 months because of the wider health benefits for both the mother and her baby.
- 3.15 PHIAC noted that after childbirth, women may resume smoking and drinking alcohol. These habits may also affect their weight.
- 3.16 After the birth of their baby, women may not be in regular contact with health services and may need local, community-based sources of support to help them manage their weight.
- 3.17 PHIAC discussed the role of children's centres in working with pregnant women and their families in particular, working with teenage parents and families from low income and black and minority ethnic groups. Children's centre services might include: antenatal education, appropriate maternity services (including early antenatal engagement and postnatal support), breastfeeding promotion and support and advice on how to combat obesity and enjoy a healthy diet.
- 3.18 On balance, interventions during pregnancy were considered to be cost effective. However, the estimate of cost effectiveness was subject to considerable uncertainty. Weight management interventions during the 6 months after birth also appeared to be cost effective, but the results were sensitive to assumptions made in the modelling. PHIAC was mindful that most of the recommendations did not increase costs in the long term and, as

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they could be expected to do more good than harm, they are likely to be cost effective. Furthermore, some of the advice has been adapted from previous NICE guidance which has already been shown to be cost effective.

4 Implementation

NICE guidance can help:

- NHS organisations, social care and children's services meet the requirements of the DH's revised 'Operating framework for 2010/11'.
- National and local organisations improve quality and health outcomes and reduce health inequalities.
- Local authorities fulfil their remit to promote the wellbeing of communities.
- Local NHS organisations, local authorities and other local partners benefit from any identified cost savings, disinvestment opportunities or opportunities for re-directing resources.
- Provide a focus for multi-sector partnerships for health, such as the integration of health and social care and health improvement.

NICE has developed tools to help organisations put this guidance into practice. For details see our website at www.nice.org.uk/guidance/PH27

5 Recommendations for research

The Public Health Interventions Advisory Committee (PHIAC) recommends that the following research questions should be addressed. It notes that 'effectiveness' in this context relates not only to the size of the effect, but also to cost effectiveness and duration of effect in terms of outcomes for both the mother and infant. It also takes into account any harmful/negative side effects.

1. Are the US Institute of Medicine (2009) guidelines on weight gain in pregnancy appropriate for use with the UK population? Does adherence

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to these recommendations improve outcomes? Are they effective with women under 18 and those from minority ethnic groups?

2. What are the most effective and cost-effective ways of helping women to manage their weight before pregnancy? This includes women who are obese, those who are under 18 and those from disadvantaged, low income and minority ethnic groups.
3. What are the most effective and cost-effective ways of helping women to manage their weight during pregnancy? This includes women who are obese, those who are under 18 and those from disadvantaged, low income and minority ethnic groups.
4. What are the most effective and cost-effective ways of helping women to manage their weight after childbirth? This includes women who are obese, those who are under 18 and those from disadvantaged, low income and minority ethnic groups.
 - When is the most appropriate time to start managing weight after childbirth?
 - What is the optimal rate of weight loss to ensure long-term success?
 - How does resuming behaviours such as smoking and drinking influence postpartum weight management?
5. How can breastfeeding help with postpartum weight management, both in terms of energy expenditure and energy balance?

More detail on the gaps in the evidence identified during development of this guidance is provided in appendix D.

6 Updating the recommendations

This guidance will be reviewed at 3 and 5 years after publication to determine whether all or part of it should be updated. Information on the progress of any update will be posted at www.nice.org.uk/guidance/PH27

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7 Related NICE guidance

Published

Venous thromboembolism – reducing the risk. NICE clinical guideline 92 (2010). Available from www.nice.org.uk/guidance/CG92

Diabetes in pregnancy. NICE clinical guideline 63 (2008). Available from www.nice.org.uk/guidance/CG63

Antenatal care. NICE clinical guideline 62 (2008). Available from www.nice.org.uk/guidance/CG62

Promoting physical activity in the workplace. NICE public health guidance 13 (2008). Available from www.nice.org.uk/guidance/PH13

Maternal and child nutrition. NICE public health guidance 11 (2008). Available from www.nice.org.uk/guidance/PH11

Physical activity and the environment. NICE public health guidance 8 (2008). Available from www.nice.org.uk/guidance/PH8

Intrapartum care. NICE clinical guideline 55 (2007). Available from www.nice.org.uk/guidance/CG55

Antenatal and postnatal mental health. NICE clinical guideline 45 (2007). Available from www.nice.org.uk/guidance/CG45

Behaviour change. NICE public health guidance 6 (2007). Available from www.nice.org.uk/guidance/PH6

Obesity. NICE clinical guideline 43 (2006). Available from www.nice.org.uk/guidance/CG43

Postnatal care. NICE clinical guideline 37 (2006). Available from www.nice.org.uk/guidance/CG37

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Four commonly used methods to increase physical activity. NICE public health guidance 2 (2006). Available from www.nice.org.uk/guidance/PH2

Fertility. NICE clinical guideline 11 (2004). Available from www.nice.org.uk/guidance/CG11

Under development

Hypertensive disorders during pregnancy. NICE clinical guideline. Publication expected August 2010.

Pregnancy and complex social factors. NICE clinical guideline. Publication expected September 2010.

Multiple pregnancy. NICE clinical guideline. Publication expected September 2011.

Preventing obesity: whole system approaches. NICE public health guidance. Publication expected February 2012.

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Appendix A Membership of the Public Health Interventions Advisory Committee (PHIAC), the NICE project team and external contractors

Public Health Interventions Advisory Committee

NICE has set up a standing committee, the Public Health Interventions Advisory Committee (PHIAC), which reviews the evidence and develops recommendations on public health interventions. Membership of PHIAC is multidisciplinary, comprising public health practitioners, clinicians, local authority officers, teachers, social care professionals, representatives of the public, academics and technical experts as follows.

Professor Sue Atkinson CBE Independent Consultant and Visiting Professor, Department of Epidemiology and Public Health, University College London

Mr John F Barker Associate Foundation Stage Regional Adviser for the Parents as Partners in Early Learning Project, DfES National Strategies

Professor Michael Bury Emeritus Professor of Sociology, University of London. Honorary Professor of Sociology, University of Kent

Dr Sarah Byford Reader in Health Economics, Centre for the Economics of Mental Health, Institute of Psychiatry, King's College London

Professor K K Cheng Professor of Epidemiology, University of Birmingham

Ms Joanne Cooke Programme Manager, Collaboration and Leadership in Applied Health Research and Care for South Yorkshire

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Ms Muriel James Secretary, Northampton Healthy Communities Collaborative and the King Edward Road Surgery Patient Participation Group

Dr Matt Kearney General Practitioner, Castlefields, Runcorn. GP Public Health Practitioner, Knowsley PCT

CHAIR Professor Catherine Law Professor of Public Health and Epidemiology, UCL Institute of Child Health

Mr David McDaid Research Fellow, Department of Health and Social Care, London School of Economics and Political Science

Mr Bren McInerney Community Member

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Ms Joyce Rothschild Children's Services Improvement Adviser, Solihull Metropolitan Borough Council

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Dr Stephen Walters Reader in Medical Statistics, University of Sheffield

Dr Dagmar Zeuner Director of Public Health, NHS Richmond and London Borough of Richmond

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Expert co-optees to PHIAC:

Professor Annie Anderson Professor of Food Choice, Centre for Public Health Nutrition Research, University of Dundee

Ms Amanda Avery Lecturer in Nutrition and Dietetics, Nottingham University and Consultant Dietitian in weight management, Slimming World

Dr Ruth Bell Clinical Senior Lecturer in Public Health, Institute of Health and Society, Newcastle University

Professor Debra Bick Professor of Evidence-Based Midwifery Practice, Kings College London

Mr Robert Fraser, Reader in Obstetrics and Gynaecology, Department of Reproductive and Developmental Medicine, University of Sheffield.

Dr Gail Goldberg Senior Research Scientist, Medical Research Council, Human Nutrition Research, Cambridge

Janet Gordon Advanced Dietitian for Maternal Health, Birmingham Community Nutrition and Dietetic Department

Professor David Haslam General Practitioner and Chair of the National Obesity Forum

Professor Lucilla Poston Professor of Maternal and Fetal Health, Kings College London

Expert testimony to PHIAC:

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NICE project team

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Sue Jelley and Rachael Paterson Senior Editors

Alison Lake and Susan Burlace Editors

External contractors

Evidence reviews

Review one: 'Systematic review of dietary and/or physical activity interventions for weight management in pregnancy' was carried out by the School of Health and Related Research (SchARR) Public Health Collaborating Centre, University of Sheffield. The principal authors were: Fiona Campbell, Josie Messina, Maxine Johnson, Louise Guillaume, Jason Madan and Elizabeth Goyder.

Review two: 'Systematic review of weight management interventions after childbirth' was carried out by SchARR Public Health Collaborating Centre, University of Sheffield. The authors were: Josie Messina, Maxine Johnson, Fiona Campbell, Emma Everson Hock, Louise Guillaume, Alejandra Duenas, Andrew Rawdin, Elizabeth Goyder and Jim Chilcot.

Cost effectiveness

Economic analysis one: 'Interventions to manage weight gain in pregnancy' was carried out by SchARR Public Health Collaborating Centre, University of Sheffield. The principal author was Jason Madan.

Economic analysis two: 'The cost-effectiveness of weight management interventions after childbirth' was carried out by SchARR Public Health

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Collaborating Centre, University of Sheffield. The authors were: Alejandra Duenas, Andrew Rawdin, Jim Chilcott, Josie Messina, Maxine Johnson, Fiona Campbell, Emma Everson Hock, Louise Guillaume, Elizabeth Goyder and Nick Payne.

Fieldwork

The fieldwork 'Weight management during pregnancy and after childbirth' was carried out by Rachel Smith, Rachel Evans and Pretti Kathrecha of Greenstreet Berman Ltd.

Appendix B Summary of the methods used to develop this guidance

Introduction

The reviews and economic analyses include full details of the methods used to select the evidence (including search strategies), assess its quality and summarise it.

The minutes of the PHIAC meetings provide further detail about the Committee's interpretation of the evidence and development of the recommendations.

All supporting documents are listed in appendix E and are available at www.nice.org.uk/guidance/PH27

Guidance development

The stages involved in developing public health intervention guidance are outlined in the box below.

1. Draft scope released for consultation
2. Stakeholder meeting about the draft scope
3. Stakeholder comments used to revise the scope
4. Final scope and responses to comments published on website
5. Evidence reviews and economic analysis undertaken and submitted to PHIAC
6. PHIAC produces draft recommendations
7. Draft guidance (and evidence) released for consultation and for field testing
8. PHIAC amends recommendations.
9. Final guidance published on website.
10. Responses to comments published on website.

Key questions

The key questions were established as part of the scope. (Weight management before and during pregnancy and weight management after childbirth were scoped separately, but have now been amalgamated into one piece of guidance.) They formed the starting point for the reviews of evidence and were used by PHIAC to help develop the recommendations.

The overarching questions were:

- What is the effectiveness and cost effectiveness of weight management interventions before and during pregnancy?

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- What are the most effective and cost-effective interventions for managing women's weight after childbirth?

The subsidiary questions were:

- What types of dietary interventions and physical activity interventions are most effective and cost effective for weight management in women planning a pregnancy? Do they have any adverse effects?
- What are the most effective and cost-effective ways of measuring and monitoring weight gain in pregnancy? Are there any adverse effects?
- What are the views, perceptions and beliefs of health professionals, women actively planning a pregnancy, pregnant women, their partners and families about diet, physical activity and weight management in pregnancy and before pregnancy?
- What internal and external factors influence the effectiveness of the intervention (such as content, delivery, setting, who is delivering the intervention, intensity, duration and target setting)?
- What are the most effective and cost-effective dietary interventions for helping mothers, including breastfeeding mothers, achieve and maintain a healthy weight after childbirth?
- What are the most effective and cost-effective physical activity interventions for helping mothers, including breastfeeding mothers, achieve and maintain a healthy weight after childbirth?
- What are the most effective and cost effective interventions for helping mothers to avoid gaining more weight with each successive pregnancy?

These questions were made more specific for the reviews (see reviews for further details).

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Reviewing the evidence of effectiveness

Two reviews of effectiveness were conducted.

Identifying the evidence

The following databases were searched for all types of evidence (from 1990–2008):

- ASSIA (Applied Social Science Index and Abstracts)
- British Nursing Index
- CINAHL (Cumulative Index of Nursing and Allied Health Literature)
- Cochrane Central Register of Controlled Trials
- Cochrane Database of Systematic Reviews
- DARE (Database of Abstracts of Reviews of Effectiveness)
- Econlit
- EMBASE
- HTA (Health Technology Assessment)
- Maternity and Infant Care
- MEDLINE
- NHS EED (NHS Economic Evaluation Database)
- PsycINFO
- Science Citation Index
- Social Science Citation Index

A search was also conducted of the following websites:

- American College of Obstetricians and Gynaecologists (www.acog.org/)
- British Dietetic Association (www.bda.uk.com/)
- Chartered Society of Physiotherapy (www.csp.org.uk/)
- Department of Health (www.dh.gov.uk)
- Food Standards Agency (www.food.gov.uk/)
- Institute of Medicine (www.iom.edu/)
- Joseph Rowntree Foundation (www.jrf.org.uk/)
- NHS Evidence – Women’s Health (www.library.nhs.uk/womenshealth/)

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- NHS Scotland (www.scotland.gov.uk/Topics/Health/NHS-Scotland)
- NICE (www.nice.org.uk/)
- Public health observatories (www.apho.org.uk/)
- Royal College of Midwives (www.rcm.org.uk/)
- Royal College of Obstetricians and Gynaecologists (www.rcog.org.uk/)
- Scientific Advisory Committee on Nutrition (www.sacn.gov.uk/)
- Scottish Intercollegiate Guidelines Network (SIGN) (www.sign.ac.uk/)
- Welsh Assembly Government (<http://wales.gov.uk/>)

Further details of the databases, search terms and strategies are included in the reviews.

Selection criteria

Studies were included in effectiveness review one if they involved:

- pregnant women who were expecting a single baby
- women seeking preconception advice
- women who were actively planning a pregnancy
- women in the above groups who had a history of (or who developed) impaired glucose tolerance or gestational diabetes.

Studies were excluded if they:

- were not published in English
- were conducted in non-OECD (Organisation for Economic Cooperation and Development) countries
- involved pregnant women expecting more than one baby
- involved pregnant women who were underweight (BMI <18.5 kg/m²)
- involved pregnant women who had been diagnosed with pre-existing diabetes (type 1 and 2).

Studies were included in effectiveness review two if they involved women with a BMI greater than 18.5 kg/m² up to 2 years following the birth of their baby.

Studies were excluded if they involved:

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- women who had been diagnosed with, or who were receiving clinical treatment for, an existing condition such as type 1 or type 2 diabetes
- women who had been diagnosed with postnatal depression
- women who were underweight (BMI < 18.5 kg/m²) after childbirth
- women who had given birth more than 2 years before
- clinical interventions (such as surgery or drug treatment) or complementary therapies (for example, hypnotherapy or acupuncture) to treat obesity.

Studies were also excluded if they were:

- not published in English
- conducted in non-OECD (Organisation for Economic Cooperation and Development) countries.

Quality appraisal

Included papers were assessed for methodological rigour and quality using the NICE methodology checklist, as set out in the NICE technical manual 'Methods for the development of NICE public health guidance' (see appendix E). Each study was graded (++, +, –) to reflect the risk of potential bias arising from its design and execution.

Study quality

- ++ All or most of the methodology checklist criteria have been fulfilled. Where they have not been fulfilled, the conclusions are thought very unlikely to alter.
- + Some of the methodology checklist criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions.
- Few or no methodology checklist criteria have been fulfilled. The conclusions of the study are thought likely or very likely to alter.

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The 'Newcastle Ottawa' scale was used in effectiveness review one to assess the quality of cohort and case-control studies. Included studies were scored as follows to indicate the risk of bias:

++ Very low risk.

+ Low risk.

– High risk.

u Unclear.

Summarising the evidence and making evidence statements

The review data was summarised in evidence tables (see full reviews).

The findings from the reviews were synthesised and used as the basis for a number of evidence statements relating to each key question. The evidence statements were prepared by the public health collaborating centre (see appendix A). The statements reflect its judgement of the strength (quantity, type and quality) of evidence and its applicability to the populations and settings in the scope.

Cost effectiveness

For effectiveness review one, the economic analysis consisted of a cost-effectiveness analysis.

For effectiveness review two, the economic analysis consisted of a review of economic evaluations and a cost-effectiveness analysis.

Economic review

For the review of economic evaluations, studies were identified by searching EconLit and NHS EED during August 2009. Targeted searches were also undertaken where additional information was required.

Studies were included if they were cost-effectiveness, cost-benefit or cost-minimisation analyses of:

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- dietary or physical activity interventions to help manage the weight of postnatal women
- any dietary or physical activity intervention following pregnancy that may impact on the woman's weight.

Studies were excluded if they:

- were not published in English
- involved pharmacological interventions, surgery or complementary therapies.

Economic modelling

Two economic models were constructed to incorporate data from the reviews of effectiveness and cost effectiveness. The results are summarised in Appendix C and are reported in more detail in: 'Interventions to manage weight gain in pregnancy' and 'The cost-effectiveness of weight management interventions after childbirth'. The reports are available on the NICE website at www.nice.org.uk/guidance/PH27

Fieldwork

Fieldwork was carried out to evaluate how relevant and useful NICE's recommendations are for practitioners and how feasible it would be to put them into practice. It was conducted with practitioners and commissioners who are involved in antenatal and postnatal care services, fertility services, leisure services, community groups, weight management services and children's centres. They included those working in the NHS, local authorities and organisations in the private, voluntary and community sectors.

The fieldwork comprised:

- Three 1-day workshops carried out in London and Manchester with a total of 66 practitioners. They included commissioners, consultants in public health, food and nutrition advisers, midwives, obstetricians and public health specialists. They discussed all the draft recommendations including

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the role of leisure services, the voluntary sector and other non NHS organisations.

- Three focus groups held in Doncaster, Harlow and Leicester with 26 practitioners. They included clinical and public health dietitians, consultant midwives, nurses, obesity coordinators and obstetric registrars. They discussed the recommendations in relation to pregnancy.
- Four focus groups held in children's centres in Leeds, Liverpool, Newham and Sandwell with 21 practitioner. They included breastfeeding coordinators, children's centre managers, commissioning managers, community dietitians, community nutritionists and health visitors. They discussed the recommendations related to the period following childbirth.
- Twenty-eight telephone interviews carried out with GPs, practice nurses and managers of children's centres and local authority leisure services. They discussed all the recommendations, particularly those most relevant to those professionals and services.

These four approaches were commissioned to ensure there was ample geographical coverage. The main issues arising are set out in appendix C under 'fieldwork findings'. The full fieldwork report 'Weight management during pregnancy and after childbirth' is available at

www.nice.org.uk/guidance/PH27

How PHAC formulated the recommendations

At its meetings in November 2009 and December 2009, PHAC considered the evidence of effectiveness and cost effectiveness to determine:

- whether there was sufficient evidence (in terms of quantity, quality and applicability) to form a judgment
- whether, on balance, the evidence demonstrates that the intervention is effective, ineffective or equivocal
- where there is an effect, the typical size of effect.

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PHIAC developed draft recommendations through informal consensus, based on the following criteria.

- Strength (type, quality, quantity and consistency) of the evidence.
- The applicability of the evidence to the populations/settings referred to in the scope.
- Effect size and potential impact on the target population's health.
- Impact on inequalities in health between different groups of the population.
- Equality and diversity legislation.
- Ethical issues and social value judgements.
- Cost effectiveness (for the NHS and other public sector organisations).
- Balance of harms and benefits.
- Ease of implementation and any anticipated changes in practice.

Where possible, recommendations were linked to evidence statements (see appendix C for details). Where a recommendation was inferred from the evidence, this was indicated by the reference 'IDE' (inference derived from the evidence).

The draft guidance, including the recommendations, was released for consultation in February 2010. At its meeting in April 2010, PHIAC amended the guidance in light of comments from stakeholders and experts and the fieldwork. The guidance was signed off by the NICE Guidance Executive in June 2010.

Appendix C The evidence

This appendix lists evidence statements from two reviews provided by a public health collaborating centre (see appendix A) and links them to the relevant recommendations. (See appendix B for the key to quality assessments.) The evidence statements are presented here without references – these can be found in the full review (see appendix E for details). It also sets out a brief summary of findings from the economic analysis.

The two reviews of effectiveness are:

- ‘Systematic review of dietary and/or physical activity interventions for weight management in pregnancy’.
- ‘Systematic review of weight management interventions after childbirth’.

Evidence statement 1.3 indicates that the linked statement is numbered 3 in review 1. **Evidence statement 2.3** indicates that the linked statement is numbered 3 in review 2.

The reviews, economic analysis and fieldwork report are available at www.nice.org.uk/guidance/PH27. Where a recommendation is not directly taken from the evidence statements but is inferred from the evidence, this is indicated by **IDE** (inference derived from the evidence).

Recommendation 1: evidence statements 1.19, 1.20, 1.21, 1.22; IDE

Recommendation 2: evidence statements 1.1, 1.18, 1.20, 1.21, 1.26; IDE

Recommendation 3: evidence statements 1.3, 1.4, 1.7, 1.12, 1.14, 1.15, 1.16, 1.17, 1.19, 1.21, 1.22; IDE

Recommendation 4: evidence statements 2.1, 2.3, 2.6, 2.12, 2.13; IDE

Recommendation 5: evidence statements 1.1, 1.18, 2.1, 2.3, 2.6, 2.12, 2.13; IDE

Recommendation 6: IDE

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Recommendation 7: evidence statements 1.16, 1.17, 1.19, 1.26; IDE

Evidence statements

Please note that the wording of some evidence statements has been altered slightly from those in the evidence reviews to make them more consistent with each other and NICE's standard house style.

Evidence statement 1.1

There is weak evidence from one Australian-based case series that obese women trying to become pregnant but experiencing infertility can achieve a statistically significant reduction in body mass index (BMI) through a programme that includes regular physical activity, advice about healthy eating and group support.

Evidence statement 1.3

There is evidence from two USA-based and one Canadian randomised controlled trial (RCT) (one [+] and two [-]) that interventions targeted at healthy weight or overweight pregnant women, encouraging a healthy diet and increased or regular physical activity, supported by weight monitoring, reduces the proportion of women exceeding Institute of Medicine (1990) guidelines for healthy weight gain in pregnancy.

Evidence statement 1.4

There is weak evidence from two studies (one [-] and one [+]), conducted in Denmark and Sweden among obese women that interventions promoting healthy eating and/or moderate physical activity leads to a reduction in weight retained postpartum when compared with controls.

Evidence statement 1.7

There were no adverse effects reported with moderate physical activity and/or dieting during pregnancy.

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Evidence statement 1.12

There is evidence from one US-based observational study (++) that overweight women who consumed three or more servings of fruit and vegetables per day gained significantly less weight than those who consumed fewer servings during pregnancy.

Evidence statement 1.14

There is evidence from one US-based observational study (+) that not receiving advice regarding appropriate weight gain was associated with weight gain outside the recommended levels among women across the BMI spectrum.

Evidence statement 1.15

UK-based qualitative evidence (+) suggests that the development and attendance in dietary interventions for young women may be facilitated by taking into account women's age, social, educational and psychological needs as well as provision of incentives such as free food and access to a midwife.

Evidence statement 1.16

One UK-based qualitative study (+) retrospectively explored mothers' views on monitoring during their pregnancy/ies.

Women reported feeling that interactions with health professionals in relation to routine weighing were not enabling, and that they felt a lack of control. Women tended to be given limited explanation or feedback on weighing practices, although they accepted professional advice and intervention.

Routine monitoring of weight may not be acceptable to any women anxious about their weight without their consent, meaningful explanation and feedback.

Evidence statement 1.17

Health professionals reported (one [++]) that routine weighing of pregnant women was dependent on the location of the initial booking session. NHS

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premises tended to have resources for weighing whereas this was more ad-hoc in the community where scales may not be available and community midwives were not supplied with portable equipment. It was reported that even in NHS premises, equipment may not be suitable for weighing obese women.

Evidence statement 1.18

No UK-based qualitative evidence was identified on the views, perceptions and beliefs of health professionals, women actively planning a pregnancy and their partners and families about diet, physical activity and weight management prior to pregnancy. However, there is UK-based qualitative evidence to suggest that women's eating habits during pregnancy are related to pre-pregnancy dietary attitudes and behaviour. Weight and body shape concerns are affected by size prior to pregnancy (+). Women's dietary restraint may be continued or relaxed during pregnancy (+).

Evidence statement 1.19

Evidence from three UK-based qualitative studies (all [++]) suggests that weight management information and advice from professionals is not received or assimilated by many women during pregnancy. Available information is often vague, confusing, contradictory, and is not linked to weight management.

Overweight women may feel they are not receiving relevant, tailored information about appropriate diet and weight gain during pregnancy (+).

Evidence statement 1.20

There is evidence from UK-based qualitative research (one [+] and one [++]) that women may be unaware of the potential effects of obesity during pregnancy. However, they may avoid information about their health if they find it distressing and will only action it when they feel the time is right for the well-being of themselves, their unborn baby and their partners (+).

Evidence statement 1.21

There is evidence from UK-based qualitative research (++) that health professionals working in maternity units may feel they have insufficient time to discuss weight issues with women during pregnancy and consider that it is too late to give advice on weight management once a woman is pregnant. Health professionals themselves report that women's access to the information and advice on weight management is often ad-hoc.

Evidence statement 1.22

Evidence from two UK-based qualitative studies (one [++] and one [+]) suggests that even relatively active women reduce their physical activity during pregnancy (although they are more likely to continue to be active at some level). One study (++) found that pregnant women decreased their activity levels based on advice from health professionals, or more commonly, on information they had read in books and magazines. Family members, friends, and even health trainers tended to discourage physical activity. Women balanced their fears of injury to themselves or harm to the baby with aims toward weight management. Women also reported reduced motivation, physical limitations due to larger size and tiredness during pregnancy and a lack of facilities. Another study reported that pregnant women may feel self-conscious when carrying out physical activity (+).

Evidence statement 1.26

Qualitative evidence from two UK-based studies (one [++] and one [+]) suggest there are communication difficulties between overweight women and health professionals. One study of health professionals found that they are often embarrassed to discuss issues of weight with overweight women, and that the women themselves were also embarrassed (++) . Such experiences may not be fixed, but may change over the course of a pregnancy.

One study (++) explored the views of health professionals, some of which found it difficult to raise this issue sensitively. They reported a lack of guidance on this issue, though were aware of the risks and benefit so raising

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the issue. They were concerned that some women may stop attending antenatal appointments if they felt victimised.

Evidence statement 2.1

There is limited evidence from one (+) US-based RCT that dietary intervention alone (aiming for 35% energy deficit) from 12 weeks postpartum, may help women across the BMI spectrum start to lose more weight after childbirth compared to usual care. However, the short length of this intervention (11 days) makes it difficult to draw conclusions on the effectiveness of the study. Four-day weighed food records suggested that calorie intake was not lower in the intervention compared to the control arm of the trial. The setting of this study (US) makes it somewhat relevant to the UK.

Evidence statement 2.3

Four out of five US-based RCTs addressing diet and physical activity postpartum found a significant reduction in total weight among women across the BMI spectrum in the intervention group compared to control (three [+] and one [-]). Only one (+) US-based RCT found that total weight was not significantly lower in the intervention group compared to control. Results did not appear to vary based on the start dates of intervention or the length of follow-up.

Evidence statement 2.6

In line with their results for weight loss, three RCTs from the US (two [+] and one [-]) found that an intervention focusing on diet and exercise resulted in decreased calorie intake and decreased consumption of foods such as sweet beverages, desserts and snacks. Of these studies, one also found a significant increase in energy expenditure between exercise groups (-) whereas another (+) found no significant difference in total energy expenditure between groups. One (+) did not report results for physical activity.

Evidence statement 2.12

The evidence suggests weight management interventions addressing diet and physical activity had little or no adverse effects on breastfeeding outcomes,

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including milk volume, infant intake and weight, time and frequency of feeding (two [+]). Milk protein was observed to decrease in one short US-based trial (+). Overweight women had higher milk energy outputs and leaner women saw a decrease in milk energy output.

Evidence statement 2.13

The one high quality (+) RCT which examined correlations between monitoring and weight loss found that there was a significant correlation between number of self-monitoring records returned and weight loss ($r = 0.50$, $p < 0.005$). However, homework completion or telephone contact with research staff was not significantly correlated with weight loss. Women enrolled in this trial had an above average BMI bordering on obese classification at start of the intervention. None of the included studies considered the effectiveness of monitoring alone.

Cost-effectiveness evidence

For weight management during pregnancy, a short-term model was applied. There was insufficient evidence of effect so the cost effectiveness estimation was subject to great uncertainty. For weight management after childbirth, the model used a study in which women's weight was measured at both 6 months and 15 years postpartum. This was compared with their pre- and post-pregnancy weight. Using a 15-year time horizon, the estimated cost per quality-adjusted life year (QALY) gained was £44,000. Using a lifetime horizon (the usual measure of cost effectiveness) it was £9000.

Fieldwork findings

Fieldwork aimed to test the relevance, usefulness and feasibility of putting the recommendations into practice. PHIAC considered the findings when developing the final recommendations. For details, go to the fieldwork section in appendix B and www.nice.org.uk/guidance/PH27

Fieldwork participants in antenatal and postnatal care services, fertility services, leisure services, community groups, weight management services and children's centres were generally positive about the recommendations.

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They believed they could potentially help encourage weight management before, during and after pregnancy by raising awareness of the issue, especially among non-health professionals.

However, more focus was needed on the psychological and emotional issues linked to weight management. In addition, the importance of helping not just the women, but her whole family, to change their behaviour was emphasised.

Participants also said that the importance of breastfeeding – highlighting the health benefits and its role in weight management – needed to be stressed.

Practitioners felt that the recommendations were less relevant to some hard-to-reach groups such as women with a lower socioeconomic status, those from some minority ethnic groups and pregnant teenagers. In addition, there was mixed feedback regarding the feasibility of implementing them. Some reported that they reflected current practice. Others felt it would be difficult to carry them out.

The feasibility of carrying out the 6–8 week postnatal check on a consistent basis and the limited availability of dietitians in some areas were both cited as obstacles to implementation.

Participants emphasised that weight management is a sensitive issue. Many health professionals try to avoid broaching the subject and, when they do, it takes time. Training in communications skills was needed to deal with this type of issue, they said.

It was felt that the impact of the recommendations would vary across the country but that they would generally be more effective if actions and services were tailored to meet a woman's individual needs.

Participants pointed out that they would have cost and resource implications, due to the large number of women that they would apply to.

Appendix D Gaps in the evidence

PHIAC identified a number of gaps in the evidence relating to the interventions under examination, based on an assessment of the evidence. These gaps are set out below.

1. There is a lack of evidence on the underlying mechanisms linking gestational weight gain and pregnancy outcomes. This is needed to help determine whether weight management is safe and appropriate for pregnant women.
2. There is a lack of evidence on how much weight should be gained during pregnancy, when is the most effective time for women to start managing their weight after childbirth and the optimal rate of weight loss.
3. There are few well-designed UK intervention studies on weight management in pregnancy and after childbirth. In particular, there is a lack of evidence on safe, effective interventions for women who are obese but who do not have diabetes, and those who are breastfeeding.
4. There is a lack of evidence about the effectiveness and cost effectiveness of weight management interventions for women before pregnancy – including for those who may be planning a pregnancy.
5. There is limited evidence about the effectiveness and cost effectiveness of weight management interventions in pregnancy and after childbirth for women from disadvantaged, low-income and minority ethnic groups.
6. Few weight management interventions include adequate and validated measures of diet and physical activity. They often rely on self-reporting.
7. Few studies of weight management before, during and after pregnancy include interventions that are evaluated using process and qualitative data to determine which components are effective.

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8. There is limited evidence on the role of breastfeeding in helping women to gain or retain a healthy weight after childbirth.

The Committee made 5 recommendations for research. These are listed in section 5.

Appendix E Supporting documents

Supporting documents are available at www.nice.org.uk/guidance/PH27

These include the following.

- Evidence reviews: ‘Systematic review of dietary and/or physical activity interventions for weight management in pregnancy’; ‘Systematic review of weight management interventions after childbirth’.
- Reviews of economic evaluations: ‘Interventions to manage weight gain in pregnancy’; ‘The cost-effectiveness of weight management interventions after childbirth’.
- Fieldwork report: ‘Weight management during pregnancy and after childbirth’.
- A quick reference guide for professionals whose remit includes public health and for interested members of the public. This is also available from NICE publications (0845 003 7783 or email publications@nice.org.uk – quote reference number Nxxxx).

For information on how NICE public health guidance is developed see:

- ‘Methods for development of NICE public health guidance (second edition, 2009)’ available from www.nice.org.uk/phmethods
- ‘The NICE public health guidance development process: An overview for stakeholders including public health practitioners, policy makers and the public (second edition, 2009)’ available from www.nice.org.uk/phprocess