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Exploring obstetricians, midwives and general practitioners approach to weight management in pregnant women with a BMI ≥25: a qualitative study

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ABSTRACT

Objective: The aim of this study was to explore health care professionals (HCPs) beliefs and attitudes towards weight management for pregnant women with a BMI ≥25kg/m^2.

Design: Qualitative study.

Setting: A public antenatal clinic in a large academic maternity hospital in Cork, Ireland and general practice clinics in the same region.

Participants: HCPs such as hospital-based midwives and consultant obstetricians and general practitioners (GPs).

Method: Semi-structured interviews were conducted with a purposive sample of hospital-based HCPs and a sample of GPs working in the same region. Interviews were recorded, transcribed and thematically analysed using NVivo software.

Results: Seventeen HCPs were interviewed (Hospital based=10; GPs=7). HCPs acknowledged weight as a sensitive conversation topic, leading to a "*softly-softly approach"* to weigh management. HCPs tried to strike a balance between being woman-centred and empathetic and medicalising the conversation. HCPs described "*doing what you can with what you have*" and *shifting the focus to managing obstetric complications*. Furthermore, there were *unclear roles and responsibilities* in terms of weight management.

Conclusion: Four themes identified by HCPs reflect the complexity of weight management and the challenges faced when trying to balance the medical and psychosocial needs of the women. HCPs need to have standardised approaches and evidence-based policies that support the consistent monitoring and management of weight during pregnancy.

Key words: Overweight, Obesity, Pregnancy, Gestational weight gain, General Practitioners, Health care professionals, Qualitative, Antenatal, Obstetrics

Strengths and limitations of this study

- The inductive approach used in this qualitative study revealed the nuances and tensions involved in the management of overweight and obese pregnant women.
- The recruitment HCPs across settings, including hospital based HCPs and GPs with a range of experiences is a further strength of this study.
- Most of the HCPs were recruited from a limited geographical area and their perceptions and approach to weight management for overweight and obese pregnant women may not reflect those of HCPs working elsewhere.
- Variation in interview length occurred due to constraints and demands on participants' time.

INTRODUCTION

The prevalence of obesity during pregnancy is increasing [1]. Although some weight gain is to be expected during pregnancy, many women appear at their first antenatal appointment with a Body Mass Index (BMI) >29.9 kg/m^2 representing a significant and increasing problem faced by health care professionals (HCPs) in obstetric practices [1, 2]. Recent studies, in Ireland, reported that between 19% and 25% of women were categorised as obese in the first trimester [3] or at their first antenatal visit [4]. Similarly, high levels have been reported in Britain with at least 20% being obese and 5% having severe or morbid obesity [1, 5-7].

Maternal obesity is defined as a BMI ≥30 kg/m^2 at the first antenatal consultation [8]. Gestational weight gain (GWG) is the total weight gained during pregnancy, with the largest weight gains generally occurring in the second and third trimester [9]. Problems associated with obesity during pregnancy include an increased risk of hypertensive disorders, higher rates of caesarean section and preterm delivery [10]. Moreover, excessive GWG in pregnancy increases the risk of developing gestational diabetes mellitus (GDM) and is a strong risk factor of long term obesity [11-13]. Obesity also presents a greater risk of perinatal complication such as macrosomia [14]. Recent literature reviews have identified diet and lifestyle interventions as a means of reducing the risk of GWG, GDM, and postnatal weight retention [15-17]. However, due to the poor quality of these studies the results should be interpreted with caution and uncertainty persists around their effectiveness [7].

While the delivery of antenatal care is different in many countries, a number of HCPs, including hospital-based HCPs (such as midwives and obstetricians) and general practitioners (GPs) provide care throughout pregnancy [18]. In Ireland, antenatal care is shared between hospital based HCPs and GPs [19]. The regular interactions with women during this time provide opportunities to support women to achieve positive lifestyle changes, particularly in terms of weight management [20]. While these HCPs have been identified as vital contributors to the antenatal services, little is known about the ways in which such professionals engage with overweight and obese pregnant women [21]. HCPs have key opportunities to influence lifestyle and weight management in this shared care arena which are not currently fully availed of [22, 23].

Few studies focus on the approach taken by HCPs regarding antenatal lifestyle advice and weight management [24]. Little is known about the use of guidelines in clinical practice and whether HCPs address the needs of overweight and obese pregnant women. A survey among obstetrics and trainee doctors in the United States found little knowledge of the revised Institute of

Medicine (IOM) guidelines for appropriate GWG [25]. Over half of those surveyed were not aware of the new guidelines and less than 10% selected the correct BMI ranges or the correct GWG ranges. Previous qualitative studies have highlighted a number of barriers to weight management for HCPs including communication difficulties [26], lack of confidence and training [27] and a lack of resources [28]. Understanding the ways in which HCPs currently manage maternal obesity is necessary to inform the development of antenatal lifestyle interventions. Therefore, the aim of this study was to explore HCPs beliefs and attitudes towards weight management and the factors that influence their approach for overweight and obese pregnant women.

METHODS

Study design

A qualitative study was conducted to understand HCPs experiences of weight management for pregnant women with a BMI ≥25kg/m^2. Ethical approval was obtained from the University College Cork (UCC) Clinical Research Ethics Committee of the Cork Teaching Hospitals (ref: ECM 4 (y) 06/01/15).

Sampling and recruitment

A purposive sample of hospital based HCPs were identified at Grand Rounds from a public antenatal clinic in a large academic maternity hospital, Cork University Maternity Hospital (CUMH), Ireland. Hospital based HCPs included midwives and consultant obstetricians who provide care for women either during pregnancy, labour and birth, or in the postnatal period. GPs in the Cork-Kerry region were identified using a GP list provided by the Department of General Practice, UCC, which included GP names and contact details. GPs were purposive sample based on gender and location of practice (urban/rural). Purposive sampling was supplemented by snowball sampling for all HCPs to maximise diversity. HCPs were eligible if they were engaged in clinical practice during the time of the study and regularly consulted with pregnant women with a BMI ≥25kg/m^2. HCPs were provided with an invitation letter and study information sheet and were informed that (CF) was conducting this research as part of her PhD work. Follow up phone calls were made to determine if they were interested in participating.

Interview process

Face-to-face semi-structured interviews were carried out by a single trained qualitative researcher (CF) at the hospital antenatal clinic or in the primary care setting between January and July 2016. Written informed consent was obtained from all HCPs prior to the interview. The topic guide was

developed based on previous literature [10, 15, 29, 30]. Key areas for discussion included addressing weight, lifestyle advice and resources and supports available (Supplementary file 1). The topic guide and interview process were piloted by interviewing two HCPs (a midwife working in Australia and a nurse no longer involved in clinical practice). Following this, refinements were made to the prompts used to ensure the interview was designed to capture HCPs experiences. Pilot interviews were not included in the final sample. Data saturation was defined as being reached when no new themes emerged [31].

Data Analysis

Interviews were audio recorded and transcribed verbatim. NVivo software was used to facilitate data analysis. Thematic analysis as described by Braun and Clarke, 2006 was used to analyse the data [32]. An inductive approach was used, where; transcripts were read and open-coded. These codes were grouped according to HCPs beliefs and attitudes, their approach to weight management and the reasons for this approach. Codes, and categories where discussed and sub-themes were synthesised and organised to develop broader themes (CF and SMH). The data were analysed independently by one researcher (CF) with a subset of the transcripts dual coded (CF and SMH). To ensure the consistency of the findings an audit trail was kept for transparency in the analysis. Hospital based HCPs and GPs were reported as HCPs when similar views and attitudes were expressed. Differences between hospital based HCPs and GPs were also recorded. The consolidated criteria for reporting qualitative research (COREQ) statement was used to inform reporting of the findings (Supplementary File 2).

RESULTS

Thirty-six HCPs were invited; seventeen participated (hospital based n=10) and (GPs n=7). Data saturation was deemed to have been reached after twelve interviews, as no new themes emerged in the preceding five interviews [33, 34]. Table 1 provides details of the participants' characteristics including gender, occupation and location of practice. The interviews for hospital based HCPs ranged from 23 to 50 minutes in duration and GP interviews ranged from 14 to 35 minutes.

Insert Table 1 here

Four major themes were identified that relate to HCPs attitudes and approaches to weight management: the *'softly-softly' approach to weight management*; *'doing what you can with what you have'*, *shifting the focus to* the *management of obstetric complications* and *'unclear roles and*

responsibilities for lifestyle advice. Together these four themes reflect the complexity of weight management and how hospital based HCPs and GPs discuss and approach weight management. Furthermore, HCPs describe the constraints within the system and highlight their attitudes to weight. Hospital based HCPs and GPs shared similar views in terms of weight management, with differences emerging on issues such as weighing practices and concerns about who is ultimately responsible for the management of overweight and obese pregnant women. The themes are presented in Figure 1.

Insert Figure 1 here

The 'softly-softly' approach to weight management

HCPs identified the tension between attitudes towards weight at a population and individual level. At the population level, concerns were clear about the dramatic increase in maternal obesity and the attitude that '*being overweight is fine...people look at themselves and say, "Well, I'm just the same size as her." or "I'm thinner than her", therefore, I'm not overweight (Obstetrician 03)*. Furthermore, socialisation and family norms have resulted in unhealthy learned behaviours and an environment in which obesity is now acceptable; '*we're normalising obesity, it's not perceived as a problem' (GP 05)*. Despite this, at an individual level when managing maternal obesity, HCPs recognised the presence of stigma relating to weight and obesity. As a result, a '*softly-softly' approach to weight management* among overweight and obese pregnant women was adopted. HCPs used this approach to raise and address the topic of weight throughout pregnancy. This cautious and diplomatic approach involved trying to strike a balance between being empathetic towards the women, medicalising the issue and acknowledging their duty as HCPs to inform the woman about the risks associated with overweight and obesity.

The approach depended on how the women reacted to initial attempts to discuss weight and thus varied across women. In participants' experience, most women reacted negatively to the topic of weight and obesity in pregnancy; they *'disengage',* the *'shutters come down'*, they can get a *'bit defensive'* or '*dismissive of it'* and thus it's *'not a two-way interaction'*.

HCPs were conscious *of the 'patient experience'* and that their professional role required them to be *'sensitive'*, '*non-judging'*, encouraging, motivating and to act as a *'counsellor'* for each of their overweight patients. HCPs were concerned about using the right language so as not to cause offence, anger or upset. HCPs acknowledged that you cannot use the word *'fat'*, however, in some

cases HCPs highlighted the need to be 'upfront' and 'blunt' to get the message across. Hospital based HCPs also recognised the need to be *'clear'*, to *'state the facts'* and to be *'honest'* with the woman as it is their responsibility to help the woman manage her weight.

> *'No, I think we need to find a way of getting that message across and I think part of that is just normalising it…we've got to normalise chatting about weight….I've tried a whole range of different ways and sometimes it's regarded as confrontational and I can feel that they're looking at me thinking, "Well, I don't like that doctor." It's not that I'm trying to make her feel bad, I want to point this out and I try and medicalise it and say, "Well, you know your body mass index is over 30, that means you're obese, that puts you at risk of high blood pressure, diabetes' (Obstetrician 03)*

Broaching the subject of weight

HCPs felt the need to adopt a 'softly-softly' approach in relation to the topic of weight compared to a more direct approach they might take with issues such as blood pressure. Raising the subject of weight was influenced by confidence and experience. Some HCPs considered themselves experienced enough to discuss *'uncomfortable truths'* about obesity such as potential complications. Others found it difficult to broach the subject; in particular hospital based HCPs such as junior midwives found raising the topic *'awkward*'. To facilitate the conversation, more experienced hospital based HCPs drew on their personal weight issues to *'relate to the women'*.

> *'...I'm not the skinniest person in the world. I think it's easier when you can say, "Look, we all have our challenges and you've got to work hard at it"' (Obstetrician 06)*

More detached approaches were also described; with hospital based HCPs using tools such as a BMI categorisation tool to frame the conversation because using BMI '*isn't as upsetting to somebody as if you said, "You're fat."'.* Furthermore, because of women's weight, difficulties were often experienced when palpating a woman's abdomen and conducting fetal scans, offering an opportune situation to raise the issue and to discuss the potential complications.

> *'I actually say it straight out to them when I am scanning, look unfortunately you carry the extra adipose tissue I am finding it difficult , there is too much fat around you abdomen which you need to watch. I would say that straight-out…' (Midwife 01)*

HCPs acknowledged that conversations about weight occur frequently throughout pregnancy as they have continuous contact with pregnant women. However, these discussions were '*quick conversations'* due to large *'caseloads'*, time and due to the number of topics that needed to be addressed within the consultations. '*it would be a couple of minutes given to a discussion about their weight and the problems with it …' (Obstetrician 09)*

'Doing what you can with what you have' to manage overweight and obesity

In the current *'obesogenic environment'* HCPs faced numerous challenges when managing weight. It was identified that the woman's health, their level of risk in pregnancy and scarce resources dictated what HCPs could do to support women to manage their weight.

Hospital based HCPs were adapting the evidence to deal with large caseloads of women with high BMIs *'...so we don't talk about weight to the women who are overweight, we save that for the women who are obese...' (Obstetrician 03).* Due to scarce resources, priority was given to the obese women rather than overweight women: *'we have far too many women with BMIs in the 40s or even in the 50s in whom we focus our limited resources' (Obstetrician 03)* therefore, women with a BMI ≥25 '*doesn't raise as much of a red flag'*. Limited dietetic services within the hospital were discussed as an example of the inadequate resources, with this service only offered to those with a diagnosis of GDM. This reflected the *'doing what you can with what you have'* approach as hospital based HCPs could do more for these pregnant women. Hospital based HCPs emphasised that this service needed to reach all women, particularly overweight and obese women (without GDM) who could benefit from that type of intervention. Also, access to dietetics influenced GPs' management of weight; long waiting times for referrals meant that *'they lost that window'* to intervene with the woman.

Most hospital based HCPs did not have any *'specific written guidelines'* to follow while others described using and applying varying ranges of weight gain in pregnancy. A BMI ≥30kg/m^2 was so common, it was considered a low priority for services, management and advice rendering some guidelines *'inadequate'*.

> *'I think the guidelines and the public health policies that are out there are inadequate…..they're certainly not permeating into a lot of healthcare professionals' consciousness and I think many doctors don't regard a BMI of 30 [as priority] because it's becoming more and more common' (Obstetrician 07)*

The '*doing what you can with what you have'* approach to weight management was also reflected in weighing practices and attitudes towards weighing. Weighing practices varied amongst the HCPs and there were divergent attitudes towards its usefulness and appropriateness. GPs highlighted that the evidence and guidelines no longer recommend weight as a *'clinical indicator'*.

> '*...it was stopped being done as routine because it wasn't correlating with health outcomes. That's my understanding of it, but I certainly would be interested to see if there are new guidelines about it. So if it is significant, I think it should be included in the chart…' (GP 03)*

However, hospital based HCPs such as midwives were keeping track of women's weight, particularly at the booking visit and again at 28 weeks. Weight and BMI was used in the hospital to refer women for anaesthetic assessment to determine the woman's *'anaesthetic risk'.*

> *'They [women BMI≥35) would have anaesthetic risk; a higher risk of going into distress and having an emergency section, but even if they want epidural analgesia, they'd have to be assessed for that as well' (Midwife 02)*

Shifting the focus to the management of obstetric complications

The risk of obstetric complications at any stage in pregnancy takes precedent over efforts to manage weight with hospital based HCPs acknowledging *'it's too late [to manage weight] at that stage'*. For hospital based HCPs, weight management was superseded when obstetric complications arose. At this point the woman's complications required obstetric care, shifting the focus to the immediate health of the woman and baby.

> *'If they develop hypertension, I talk about hypertension and the treatment of. It's very difficult at that point, they're now hypertensive, the baby's at risk of growth restriction, they're at risk of early delivery, we need to get their blood pressure under control, take care of the maternal problems and make sure the foetus is okay. It's too late at that stage to start going, "Oh well, you have this now because you're fat." no, it's too late' (Obstetrician 03)*

Furthermore, hospital based HCPs discussed the right situation to encourage weight management and that when women experience an obstetric complication, discussing weight was not appropriate.

A midwife spoke about an overweight and obese young woman who experienced infection and sepsis after an emergency caesarean, highlighting this as an unsuitable time to focus on or address weight management.

> *"…I'm really sorry that this happened to you, let's not focus on your weight right now, let's just focus on you being quite unwell and very septic and get you off your ventilation…" (Midwife 10)*

Unclear roles and responsibilities for lifestyle advice

In the context of shared maternity care, HCPs highlighted the challenge of providing continuity of care and questioned who is ultimately responsible for managing weight. It was difficult for hospital based HCPs to provide continuous weight management and advice as they had limited opportunity to follow up with the same women. Therefore, responsibility of continuous care fell to the GPs. Hospital based HCPs suggested the GP would have a better *'family picture'* and would have the opportunity to engage with these women on numerous occasions preconception and throughout pregnancy. *'I think there GP should be one that keeps an eye on it [weight], he is the continuous person that's with them' (Midwife 01)*

In contrast, GPs tended to put onus on the hospital based HCPs, reporting *"Oh well look, the hospital will take care of that"* or we are *'very stretched'* in general practice. Even though both hospital based HCPs and GPs are taking part in shared antenatal care, GPs felt there was little communication between primary and secondary care and more clarity was required around role responsibilities and expectations within the shared care setting. This would ensure that weight related conversations were consistent and reliable.

DISCUSSION

This qualitative study demonstrates the tensions surrounding weight management during pregnancy for women with a BMI ≥25kg/m^2 from the perspective of hospital based HCPs and GPs. Four main themes relating to attitudes and approaches to weight management were identified: the *'softly-softly'* approach, *'doing what you can with what you have'*, '*shifting the focus to* the *management of obstetric complications'*, and *'unclear roles and responsibilities for lifestyle advice'.* These themes reflect how HCPs discuss and manage weight, and the challenges they face when trying to balance the medical and psychosocial needs of the women.

The 'softly-softly' approach is described as *'cautious and patient and avoids direct action or force'* which reflects HCPs accounts of their approach to providing care for overweight and obese pregnant women. Similar to this study, previous research identified an increased acceptance of obesity within the population [23, 35-37] with fewer people now defining themselves as overweight and obese and underestimating their weight status [35, 36, 38]. Furthermore, stigma in relation to obesity was also present in this study and in previous research with HCPs feeling the discomfort and awkwardness around weight conversations in pregnancy [37]. A lack of confidence and experience determined the approach used to broach the subject of weight, with younger midwives in particular finding the topic awkward. This is supported by existing literature, with junior HCPs having negative opinions about their skills for treating obese patients [39, 40]. HCPs in this study were aware that weight needs to be addressed with care, to avoid upsetting the women. Similarly, in other studies, HCPs were concerned about victimising the women or jeopardising their relationship with the women when raising the subject of weight [23, 28]. HCPs tried to broach the subject of weight by discussing their own weight loss journeys. In contrast, a study exploring the experiences of HCPs found that HCPs with high BMIs felt they were not in a position to address weight and therefore veered away from the conversation [39]. Standardised questions could be used with all pregnant women to reduce stigma associated with the conversation of weight and increase HCPs' confidence [41]. Experienced, well-informed HCPs need to share their training, knowledge and experience with more junior staff, including prompts and communication strategies, in order to improve addressing the subject of weight [26]. Scarce resources determined HCPs' approach to managing weight, particularly dietetic services which were consequently limited to women with GDM. Similarly, previous research identified limited resources available within maternity units as a barrier to managing weight during pregnancy [23, 37]. With a number of diet and physical activity interventions reducing GWG and GDM [7, 17, 42], it is clear that services such as dietetics need to reach all women, particularly women with a BMI ≥25kg/m^2. As revealed in this study, HCPs had different views on weighing practices. Furthermore, advice regarding the amount of weight to gain in pregnancy varied. This is perhaps not surprising as there is no formal guidance for appropriate GWG in Ireland. Similar findings were reported in the UK with HCPs unsure about appropriate GWG in pregnancy [24]. Further research and national guidance is needed to address divergent opinions about the benefits of weighting practices and lack of clarity on appropriate GWG to support standardised shared antenatal care.

Strengths and limitations

The inductive approach used in this qualitative study revealed the nuances and tensions involved in the management of overweight and obese pregnant women. The recruitment of a diverse sample of HCPs across settings, including hospital based HCPs and GPs with a range of experiences and specialities is a further strength of this study. Most of the HCPs were recruited from a limited geographical area and their perceptions and approach to weight management may not reflect those of HCPs working elsewhere. Variation in interview length occurred due to constraints and demands on participants' time. Theoretical saturation of themes across all groups of HCPs was reached after twelve interviews; however, it may be possible that theoretical saturation within each subgroup of HCPs was not achieved.

Practice Implications

HCPs are aware of the stigma around the topic of weight, particularly for women with a BMI ≥25kg/m^2. As part of encouraging healthy lifestyle choices, HCPs need to normalise the conversation around weight. Other health behaviours such as smoking and alcohol are considered more acceptable and easier to discuss [23], therefore HCPs need to approach weight conversations in a similar manner. Training, education and skill development is required for HCPs to care effectively for these women. Lack of continuity of care undermines the consistency of weight management conversations and advice. Therefore, HCPs need to have standardised approaches to weight management and where possible need to follow women during pregnancy to build rapport and ensure consistent information throughout.

Conclusion

How obesity is perceived in society is changing rapidly for the general public and for HCPs, with implications for the health and well-being of overweight and obese pregnant women. Building rapport is necessary to deal with the sensitive nature of weight which requires consistent contact and guidance from HCPs. HCPs' roles and responsibilities for weight management within shared care need to be clearer in this '*obeseogenic environment*'. By ensuring HCPs have the confidence, knowledge and opportunity to discuss weight and lifestyle factors with pregnant women, the women in turn may initiate or maintain healthy behaviours during pregnancy. This study provides important insights into the challenges HCPs face in managing weight for women with a BMI ≥25kg/m^2. Within shared care, evidence-based policies that support the consistent monitoring and management of weight during pregnancy could improve care and outcomes for these women. These

findings demonstrate the need for population level approaches and the development of antenatal lifestyle and weight management interventions.

FIGURE LEGEND

Figure 1: Drivers and approach to weight management for overweight and obese pregnant women

Supplementary data:

File 1: Topic Guide

File 2: COREQ Statement

Ethical approval and consent to participate

(CF) confirms that all patient identifiers have been removed so the patients described are not identifiable and cannot be identified through the details of the story. Ethical approval was obtained from the University College Cork Clinical Research Ethics Committee of the Cork Teaching Hospital (ref: ECM 4 (y) 06/01/15). Written informed consent was obtained from all participants.

Conflict of interest

The authors declare that they have no competing interests.

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Author's contributions

CF, SMH, PK and MB conceived and designed the study. CF, SMH developed the topic guide and study protocol. CB facilitated access to GPs for recruitment to the study. CF conducted and transcribed the interviews. CF and SMH coded the transcripts, developed and refined the themes. CF wrote the first draft of the paper. All authors (SMH, LK, MOR, FMA, CB, PMK and MB) contributed to successive drafts and read and approved the final manuscript

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Data sharing statement

No additional data are available

References

1. Dodd J, Grivell R, Crowther C, et al. Antenatal interventions for overweight or obese pregnant women: a systematic review of randomised trials. *BJOG* 2010;117(11):1316-26.
2. HSE. Obesity and Pregnancy Clinical Practice Guideline 2013 [http://www.hse.ie/eng/about/Who/clinical/natclinprog/obsandgynaeprogramme/guideobesity.pdf]. accessed 2 September 2016.
3. Fattah C, Farah N, Barry SC, et al. Maternal weight and body composition in the first trimester of pregnancy. *Acta Obstet Gynecol Scand* 2010;89(7):952-55.
4. Lynch C, Sexton D, Hession M, et al. Obesity and mode of delivery in primigravid and multigravid women. *Am J Perinatol* 2008;25(3):163-67.
5. Heslehurst N, Ells LJ, Simpson H, et al. Trends in maternal obesity incidence rates, demographic predictors, and health inequalities in 36 821 women over a 15-year period. *BJOG* 2007;114(2):187-94. doi: 10.1111/j.1471-0528.2006.01180.x
6. Obesity in pregnancy: prevalence and metabolic consequences. Seminars in Fetal and Neonatal Medicine; 2010. Elsevier.
7. Oteng-Ntim E, Varma R, Croker H, et al. Lifestyle interventions for overweight and obese pregnant women to improve pregnancy outcome: systematic review and meta-analysis. *BMC Med* 2012;10:47. doi: 10.1186/1741-7015-10-47
8. Centre for Public Health Excellence at Nice National Collaborating Centre for Primary C. National Institute for Health and Clinical Excellence: Guidance. Obesity: The Prevention, Identification, Assessment and Management of Overweight and Obesity in Adults and Children. London: National Institute for Health and Clinical Excellence (UK) 2006.
9. Council NR. Weight gain during pregnancy: reexamining the guidelines: National Academies Press 2010.
10. Johnson M, Campbell F, Messina J, et al. Weight management during pregnancy: a systematic review of qualitative evidence. *Midwifery* 2013;29(12):1287-96.
11. Herring SJ, Rose MZ, Skouteris H, et al. Optimizing weight gain in pregnancy to prevent obesity in women and children. *Diabetes, obesity and metabolism* 2012;14(3):195-203.
12. Hernandez DC. Gestational weight gain as a predictor of longitudinal body mass index transitions among socioeconomically disadvantaged women. *J Womens Health* 2012;21(10):1082-90.
13. Rooney BL, Schauberger CW. Excess pregnancy weight gain and long-term obesity: One decade later. *Obstet Gynecol* 2002;100(2):245-52.
14. Heiskanen N, Raatikainen K, Heinonen S. Fetal macrosomia–a continuing obstetric challenge. *Neonatology* 2006;90(2):98-103.

15. F Campbell JM, M Johnson, L Guillaume, J Madan, E Goyder. Systematic review of dietary and/or physical activity interventions for weight management in pregnancy. Sheffield: The University of Sheffield 2009.
16. Messina J, Johnson M, Campbell F, et al. Systematic review of weight management interventions after childbirth. *The University of Sheffield: ScHARR Public Health Collaboration Centre* 2009
17. Thangaratinam S, Rogozińska E, Jolly K, et al. Effects of interventions in pregnancy on maternal weight and obstetric outcomes: meta-analysis of randomised evidence. *BMJ* 2012;344 doi: 10.1136/bmj.e2088
18. Stotland NE, Gilbert P, Bogetz A, et al. Preventing excessive weight gain in pregnancy: how do prenatal care providers approach counseling? *J Womens Health* 2010;19(4):807-14.
19. Sinead Hanafin P, and, Emma Dwan O'Reilly P. National and International review of literature on models of care across selected jurisdictions to inform the development of a National Strategy for Maternity Services in Ireland. *http://healthgovie/wp-content/uploads/2016/01/Literature-review-on-maternity-models-of-carepdf* 2016
20. van der Pligt P, Campbell K, Willcox J, et al. Opportunities for primary and secondary prevention of excess gestational weight gain: General Practitioners' perspectives. *BMC Fam Pract* 2011;12:124. doi: 10.1186/1471-2296-12-124 [published Online First: 2011/11/05]
21. Widen E, Siega-Riz AM. Prenatal nutrition: A practical guide for assessment and counseling. *Journal of Midwifery & Women's Health* 2010;55(6):540-49.
22. Campbell K, Engel H, Timperio A, et al. Obesity management: Australian general practitioners' attitudes and practices. *Obes Res* 2000;8(6):459-66.
23. Heslehurst N, Moore H, Rankin J, et al. How can maternity services be developed to effectively address maternal obesity? A qualitative study. *Midwifery* 2011;27(5):e170-e77. doi: http://dx.doi.org/10.1016/j.midw.2010.01.007
24. Olander EK, Atkinson L, Edmunds JK, et al. The views of pre- and post-natal women and health professionals regarding gestational weight gain: An exploratory study. *Sex Reprod Healthc* 2011;2(1):43-8. doi: 10.1016/j.srhc.2010.10.004 [published Online First: 2010/12/15]
25. Moore Simas TA, Waring ME, Sullivan GM, et al. Institute of medicine 2009 gestational weight gain guideline knowledge: survey of obstetrics/gynecology and family medicine residents of the United States. *Birth* 2013;40(4):237-46.
26. Furness PJ, Arden MA, Duxbury AM, et al. Talking about weight in pregnancy: An exploration of practitioners' and women's perceptions. *Journal of Nursing Education and Practice* 2015;5(2):89.

27. Davis DL, Raymond JE, Clements V, et al. Addressing obesity in pregnancy: the design and feasibility of an innovative intervention in NSW, Australia. *Women and Birth* 2012;25(4):174-80.

28. Heslehurst N, Lang R, Rankin J, et al. Obesity in pregnancy: a study of the impact of maternal obesity on NHS maternity services. *BJOG* 2007;114(3):334-42. doi: 10.1111/j.1471-0528.2006.01230.x

29. Hill B, Skouteris H, Fuller-Tyszkiewicz M. Interventions designed to limit gestational weight gain: a systematic review of theory and meta-analysis of intervention components. *Obes Rev* 2013;14(6):435-50. doi: 10.1111/obr.12022 [published Online First: 2013/03/29]

30. Chang T, Llanes M, Gold KJ, et al. Perspectives about and approaches to weight gain in pregnancy: a qualitative study of physicians and nurse midwives. *BMC Pregnancy Childbirth* 2013;13(1):47. doi: 10.1186/1471-2393-13-47

31. Silverman D. Qualitative research: Sage 2016.

32. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology* 2006;3(2):77-101.

33. Patton MQ. Qualitative research: Wiley Online Library 2005.

34. Malterud K, Siersma VD, Guassora AD. Sample Size in Qualitative Interview Studies: Guided by Information Power. *Qual Health Res* 2015 doi: 10.1177/1049732315617444 [published Online First: 2015/11/29]

35. Johnson F, Cooke L, Croker H, et al. Changing perceptions of weight in Great Britain: comparison of two population surveys. *BMJ* 2008;337:a494.

36. Kirk SF, Cockbain AJ, Beazley J. Obesity in Tonga: A cross-sectional comparative study of perceptions of body size and beliefs about obesity in lay people and nurses. *Obes Res Clin Pract* 2008;2(1):35-41.

37. Schmied VA, Duff M, Dahlen HG, et al. 'Not waving but drowning': a study of the experiences and concerns of midwives and other health professionals caring for obese childbearing women. *Midwifery* 2011;27(4):424-30. doi: http://dx.doi.org/10.1016/j.midw.2010.02.010

38. Howard NJ, Hugo GJ, Taylor AW, et al. Our perception of weight: Socioeconomic and sociocultural explanations. *Obes Res Clin Pract* 2008;2(2):125-31.

39. Brown I, Thompson J. Primary care nurses' attitudes, beliefs and own body size in relation to obesity management. *J Adv Nurs* 2007;60(5):535-43.

40. Block JP, DeSalvo KB, Fisher WP. Are physicians equipped to address the obesity epidemic? knowledge and attitudes of internal medicine residents☆. *Prev Med* 2003;36(6):669-75.

41. Lee D, Haynes C, Garrod D. Exploring health promotion practice within maternity services. *National Health Service Foundation Trust Stockport, UK: National Health Service* 2010

42. Koivusalo SB, Rono K, Klemetti MM, et al. Gestational diabetes mellitus can be prevented by lifestyle intervention: the Finnish gestational diabetes prevention study (RADIEL): a randomized controlled trial. *Diabetes Care 2016 Jan;39(1):24-30* 2016

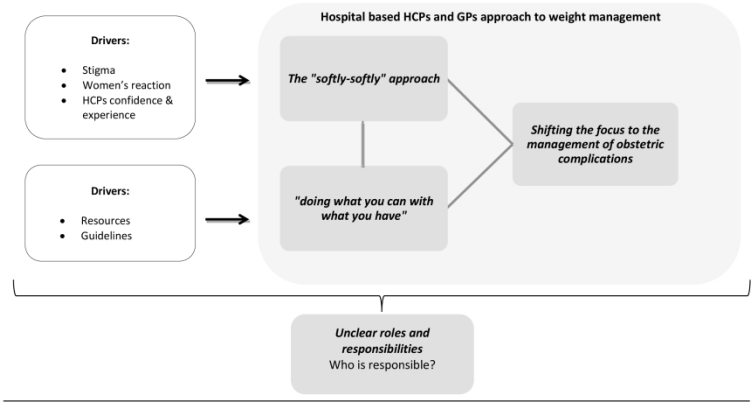
Table 1: Profile characteristics of HCPs (N=17)

	Male	Female
Occupation		
Midwife [A]	-	4
SHO Senior House Officer	-	1
Consultant Obstetrician [B]	2	3
General Practitioners	3	4
Location		
Cork	4	12
Kerry	1	-

[A] Midwife working in diabetic clinic (n=1); labour ward (n=1); outpatient department (n=2)

[B] Obstetrician's working in obstetrics with sub-specialist interests such as maternal medicine, high risk pregnancies, fetal medicine and complicated pregnancies (n=4); gynaecology (n=1)

Figure 1: Drivers and approach to weight management for overweight and obese pregnant women



HCPs, health care professionals; GPs, general practitioners

297x209mm (300 x 300 DPI)

Table S1: Topic Guide

	Questions	Prompts
Intro	Tell me a bit about what you do here in CUMH	Types of pregnant women Stage of pregnancy (booking visit, delivery)
Usual Care	When you see an OB woman for the 1st time during pregnancy, what usually happens?	What does the assessment/visit involve? Do you weigh them? What do you talk about? How do you think that information is usually received? What issues does the woman usually raise? Topics covered: diet, exercise, nausea, cravings
	Can you tell me a bit about the last women you saw?	What stage of pregnancy? When was this? Describe the mother… What did you talk about? What issues did she raise? Topics: diet, PA, nausea, cravings…
	Do you discuss the woman's weight specifically?	Tell me about that… - Appropriate weight gain - How do you judge (guidelines) - Do you know what advice to give?
	Having the conversation	How do you feel talking about weight and obesity? How is it received? (upset, shock, embarrassment) How could this conversation be made easier? (for you/the woman)
	And what about PA, would that come up?	- Women previously exercising? - Types of PA?
	How are these issues followed up during pregnancy?	If a woman is gaining EGW, what would you do?
	To what extent do resources influence your visit with an OB pregnant woman?	- Time available - Access to equipment (weighing scales) - Ability to refer to dietician - Patients co-operation
Behaviour Change	Can you think of times where women have made positive life style changes during pregnancy? And those who haven't made any changes, what were the barriers?	Tell me about that…. Motivations, Supports, Outcome Any targeted support available? - Dietetic services, exercise programmes, weight management programme. - Women's perceptions of PA (benefits)
	What do you think would help these women to change their behaviour during pregnancy?	Have you seen technology being used to support BC? - What kind, features, - Did someone recommend it? - What information was it providing to women? What about mobile phone apps, text message/phone, web based information forums, pedometer? Would these support mechanisms be useful? - If it provided you with information as well
	Any other comments or suggestions on how behaviour change could be supported during pregnancy?	- Individual meetings - Group peer led sessions

CUMH, Cork University Maternity Hospital; OB, overweight and obese; PA, Physical activity; HCP, Health care professional; EGW, Excessive gestational weight; BC, Behaviour change

Table S2: Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:
Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page no.
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Inter viewer/facilitator	Which author/s conducted the inter view or focus group?	5
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	1
3. Occupation	What was their occupation at the time of the study?	1
4. Gender	Was the researcher male or female?	1
5. Experience and training	What experience or training did the researcher have?	5
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	5
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	5
8. Interviewer characteristics	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	1, 5
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	5, 6
Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	5
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	5
12. Sample size	How many participants were in the study?	6
13. Non-participation	How many people refused to participate or dropped out? Reasons?	6
Setting		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	5, 6

15. Presence of non-participants	Was anyone else present besides the participants and researchers?	n/a
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	6, 20
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	5, 6
18. Repeat interviews	Were repeat inter views carried out? If yes, how many?	n/a
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	6
20. Field notes	Were field notes made during and/or after the inter view or focus group?	Yes
21. Duration	What was the duration of the inter views or focus group?	6
22. Data saturation	Was data saturation discussed?	6
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	6
25. Description of the coding tree	Did authors provide a description of the coding tree?	n/a
26. Derivation of themes	Were themes identified in advance or derived from the data?	6
27. Software	What software, if applicable, was used to manage the data?	6
28. Participant checking	Did participants provide feedback on the findings?	n/a
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	6-11
30. Data and findings consistent	Was there consistency between the data presented and the findings?	6-11
31. Clarity of major themes	Were major themes clearly presented in the findings?	6-11
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	6-11

Once you have completed this checklist, please save a copy and upload it as part of your submission. When requested to do so as part of the upload process, please select the file type: *Checklist*. You will NOT be able to proceed with submission unless the checklist has been uploaded. Please DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

BMJ Open

Exploring obstetricians, midwives and general practitioners approach to weight management in pregnant women with a BMI ≥25: a qualitative study

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Exploring obstetricians, midwives and general practitioners approach to weight management in pregnant women with a BMI ≥25: a qualitative study

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ABSTRACT

Objective: The aim of this study was to explore health care professionals (HCPs) beliefs and attitudes towards weight management for pregnant women with a BMI ≥25kg/m^2.

Design: Qualitative study.

Setting: A public antenatal clinic in a large academic maternity hospital in Cork, Ireland and general practice clinics in the same region.

Participants: HCPs such as hospital-based midwives and consultant obstetricians and general practitioners (GPs).

Method: Semi-structured interviews were conducted with a purposive sample of hospital-based HCPs and a sample of GPs working in the same region. Interviews were recorded, transcribed and thematically analysed using NVivo software.

Results: Seventeen HCPs were interviewed (Hospital based=10; GPs=7). Four themes identified the complexity of weight management in pregnancy and the challenges HCPs faced when trying to balance the medical and psychosocial needs of the women. HCPs acknowledged weight as a sensitive conversation topic, leading to a "*softly-softly approach"* to weight management. HCPs tried to strike a balance between being woman-centred and empathetic and medicalising the conversation. HCPs described "*doing what you can with what you have*" and *shifting the focus to managing obstetric complications*. Furthermore, there were *unclear roles and responsibilities* in terms of weight management.

Conclusion: HCPs need to have standardised approaches and evidence-based guidelines that support the consistent monitoring and management of weight during pregnancy.

Key words: Overweight, Obesity, Pregnancy, Gestational weight gain, General Practitioners, Health care professionals, Qualitative, Antenatal, Obstetrics

Strengths and limitations of this study

- The inductive approach used in this qualitative study revealed the nuances and tensions involved in the management of overweight and obese pregnant women.
- The recruitment HCPs across settings, including hospital based HCPs and GPs with a range of experiences is a further strength of this study.
- Most of the HCPs were recruited from a limited geographical area and their perceptions and approach to weight management for overweight and obese pregnant women may not reflect those of HCPs working elsewhere.
- Variation in interview length occurred due to constraints and demands on participants' time.

INTRODUCTION

The prevalence of overweight and obesity during pregnancy is increasing [1]. Although some weight gain is to be expected during pregnancy, many women appear at their first antenatal appointment with a Body Mass Index (BMI) ≥25 kg/m^2 representing a significant and increasing problem faced by health care professionals (HCPs) in obstetric practices [1, 2]. Recent studies, in Ireland, reported that between 19% and 25% of women were categorised as overweight or obese in the first trimester [3] or at their first antenatal visit [4]. Furthermore, obesity in women was most widespread in high income countries with a prevalence of 25% in the UK and 34% in the USA [5]. In Europe, the prevalence of overweight and obesity among pregnant women ranged between 33% and 50% [6]

Overweight is defined as BMI ≥25 kg/m^2 and obesity is defined as a BMI ≥30 kg/m^2 which is assessed at the first antenatal consultation [7]. Gestational weight gain (GWG) is the total weight gained during pregnancy, with the largest weight gains generally occurring in the second and third trimester [7, 8]. The Institute of Medicine (IOM) recommends different gestational weight gain for each BMI category [7, 9]. These guidelines are individualised to pre-pregnancy BMI and are based on evidence of weight gain patterns in pregnancy and on health outcomes for mother and baby. A recent review that compared national gestational weight gain guidelines and energy intake recommendations found that 31% of countries were adopting these gestational weight gain guidelines [10]. Furthermore, after two different searches of available guidelines, the authors of the review found no gestational weight gain guidelines or recommendations available for Ireland [10].

Problems associated with obesity during pregnancy include an increased risk of hypertensive disorders, higher rates of caesarean section and preterm delivery [11]. Moreover, excessive GWG in pregnancy increases the risk of developing gestational diabetes mellitus (GDM) and is a strong risk factor of long term obesity [12-14]. Obesity also presents a greater risk of perinatal complication such as macrosomia [15]. Recent literature reviews have identified diet and lifestyle interventions as a means of reducing the risk of GWG, GDM, and postnatal weight retention [16-18]. However, due to the poor quality of these studies and heterogeneity in the intervention designs the results should be interpreted with caution and uncertainty persists around their effectiveness [19].

While the delivery of antenatal care is different in many countries, a number of HCPs, including hospital-based HCPs (such as midwives and obstetricians) and general practitioners (GPs) provide care throughout pregnancy [20]. In Ireland, antenatal care is shared between hospital based HCPs and GPs [21]. Pregnancy has been identified as a "teachable moment" where woman's health motivations could be harnessed for long-term behaviour change and wider public health benefits beyond pregnancy, given women's vital role in supporting healthy lifestyles in the wider family unit [22]. The regular interactions between HCPs and women during pregnancy provide opportunities to support women to achieve positive lifestyle changes, particularly in terms of weight management [23, 24]. While these HCPs have been identified as vital contributors to the antenatal services, in Ireland, little is known about the ways in which such professionals engage with overweight and obese pregnant women. HCPs have key opportunities to influence lifestyle and weight management in this shared care arena which are not currently fully availed of [25, 26].

Few studies in Ireland focus on the approach taken by HCPs regarding antenatal lifestyle advice and weight management [27-29]. Little is known about the use of guidelines in clinical practice and whether HCPs address the needs of overweight and obese pregnant women. A survey among obstetrics and trainee doctors in the United States found little knowledge of the revised Institute of Medicine (IOM) guidelines for appropriate GWG [30]. Over half of those surveyed were not aware of the new guidelines and less than 10% selected the correct BMI ranges or the correct GWG ranges. Previous qualitative studies have highlighted a number of barriers to weight management for HCPs including communication difficulties between health care professionals and patient [31], lack of confidence and training to provide weight advice [32] and a lack of resources within antenatal care [33]. Understanding the ways in which HCPs currently manage maternal obesity in an Irish context is necessary to inform the development of antenatal lifestyle interventions. Therefore, the aim of this study was to explore HCPs beliefs and attitudes towards weight management and their approach to working with overweight and obese pregnant women at a large academic maternity hospital in Cork, Ireland and primary care settings in the same region.

METHODS

Study design

A qualitative study was conducted to understand HCPs experiences of weight management for both overweight and obese pregnant women. Ethical approval was obtained from the University College Cork (UCC) Clinical Research Ethics Committee of the Cork Teaching Hospitals (ref: ECM 4 (y) 06/01/15).

Sampling and recruitment

Hospital based HCPs were purposively sampled and identified at Grand Rounds from a public antenatal clinic in a large academic maternity hospital, Cork University Maternity Hospital (CUMH), Ireland. CUMH is a large academic maternity hospital in the South of Ireland where approximately 6,657 new obstetrics patients entered in 2015 [34]. Hospital based HCPs included midwives and consultant obstetricians who provide care for women either during pregnancy, labour and birth, or in the postnatal period. GPs in the Cork-Kerry region were identified using a GP list provided by the Department of General Practice, UCC, which included GP names and contact details. GPs were purposively sample based on gender and location of practice (urban/rural). GPs were recruited from single or group practices serving both public and private patients. HCPs were eligible if they were engaged in clinical practice during the time of the study and regularly consulted with pregnant women with a BMI ≥25kg/m^2. HCPs were provided with an invitation letter and study information sheet and were informed that (CF) was conducting this research as part of her PhD work. Follow up phone calls were made to determine if they were interested in participating.

Interview process

Face-to-face semi-structured interviews were carried out by a single trained qualitative researcher (CF) at the hospital antenatal clinic or in the primary care setting between January and July 2016. Written informed consent was obtained from all HCPs prior to the interview. The topic guide was developed based on previous literature [11, 18, 35, 36]. Key areas for discussion included addressing weight, lifestyle advice and resources and supports available (Supplementary file 1). The topic guide and interview process were piloted by interviewing two HCPs (a midwife working in Australia and a nurse no longer involved in clinical practice). Following this, refinements were made to the prompts used to ensure the interview was designed to capture HCPs experiences. Pilot interviews were not included in the final sample.

Patient and public involvement

As the interviews focused on HCPs beliefs and attitudes, patients were not directly involved in the design or administration of this research.

Data Analysis

Interviews were audio recorded and transcribed verbatim. NVivo software was used to facilitate data analysis. Thematic analysis as described by Braun and Clarke, 2006 was used to analyse the data [37]. An inductive approach was used, where; transcripts were read and open-coded. These codes were grouped according to HCPs beliefs and attitudes, their approach to weight management and the reasons for this approach. Codes, and categories where discussed and sub-themes were synthesised and organised to develop broader themes (CF and SMH). The data were analysed independently by one researcher (CF) with a subset of the transcripts dual coded (CF and SMH). To ensure the consistency of the findings an audit trail was kept for transparency in the analysis. Hospital based HCPs and GPs were reported as HCPs when similar views and attitudes were expressed. Differences between hospital based HCPs and GPs were also recorded. The consolidated criteria for reporting qualitative research (COREQ) statement was used to inform reporting of the findings (Supplementary File 2).

RESULTS

Thirty-six HCPs were invited; seventeen participated (hospital based n=10) and (GPs n=7). The 17 interviews were analysed chronologically. With no new themes emerging it was agreed that no more interviews were required. Table 1 provides details of the participants' characteristics including gender, occupation and location of practice. The interviews for hospital based HCPs ranged from 23 to 50 minutes in duration and GP interviews ranged from 14 to 35 minutes.

Insert Table 1 here

Four major themes were identified that relate to HCPs attitudes and approaches to weight management: the *"softly-softly" approach to weight management*; *"doing what you can with what you have"*, *shifting the focus to* the *management of obstetric complications* and *unclear roles and responsibilities for lifestyle advice.* Together these four themes reflect the complexity of weight management and how hospital based HCPs and GPs discuss and approach weight management. Furthermore, HCPs describe the constraints within the system and highlight their attitudes to weight during pregnancy. Hospital based HCPs and GPs shared similar views in terms of weight management,

with differences emerging on issues such as weighing practices and concerns about who is ultimately responsible for the management of overweight and obese pregnant women. The themes are presented in Figure 1.

Insert Figure 1 here

The "softly-softly" approach to weight management

Hospital based HCPs and GPs identified the tension between attitudes towards weight at a population and individual level. At the population level, concerns were clear about the dramatic increase in maternal obesity and the attitude that '*being overweight is fine...people look at themselves and say, "Well, I'm just the same size as her." or "I'm thinner than her", therefore, I'm not overweight (Obstetrician 03)*. Furthermore, socialisation and family norms have resulted in unhealthy learned behaviours and an environment in which obesity is now acceptable; "*we're normalising obesity, it's not perceived as a problem"(GP 05)*. Despite this, at an individual level when managing maternal obesity, HCPs recognised the presence of stigma relating to weight and obesity. As a result, a "*softly-softly" approach to weight management* among overweight and obese pregnant women was adopted.

> *"…we have a very softly-softly approach to obesity and overeating and over nourishment…" (Obstetrician 07)*

This cautious and diplomatic approach involved trying to strike a balance between being empathetic towards the women, medicalising the issue and acknowledging their duty as HCPs to inform the woman about the risks associated with overweight and obesity. This approach was used to raise and address the topic of weight throughout pregnancy.

The approach depended on how the women reacted to initial attempts to discuss weight and thus varied across women. In participants' experience, most women reacted negatively to the topic of weight and obesity in pregnancy; they disengage, the shutters come down, they can get a bit defensive or dismissive of it and thus it's not a two-way interaction.

Hospital based HCPs and GPs were conscious of the patient experience and that their professional role required them to be sensitive, non-judging, encouraging, motivating and to act as a counsellor for each

of their overweight patients. They were concerned about using the right language so as not to cause offence, anger or upset and they acknowledged that you cannot use the word *"fat"*. However, in some cases HCPs highlighted the need to be upfront and blunt to get the message across. Hospital based HCPs also recognised the need to be clear, to state the facts and to be honest with the woman as it is their responsibility to help the woman manage her weight.

> *"No, I think we need to find a way of getting that message across and I think part of that is just normalising it…we've got to normalise chatting about weight….I've tried a whole range of different ways and sometimes it's regarded as confrontational and I can feel that they're looking at me thinking, "Well, I don't like that doctor." It's not that I'm trying to make her feel bad, I want to point this out and I try and medicalise it and say, "Well, you know your body mass index is over 30, that means you're obese, that puts you at risk of high blood pressure, diabetes" (Obstetrician 03)*

Broaching the subject of weight

Hospital HCPs and GPs felt the need to adopt a *"softly-softly"* approach in relation to the topic of weight compared to a more direct approach they might take with issues such as blood pressure. Raising the subject of weight was influenced by confidence and experience. Some HCPs considered themselves experienced enough to discuss *"uncomfortable truths"* about obesity such as potential complications. Others found it difficult to broach the subject; in particular hospital based HCPs such as junior midwives found raising the topic awkward. To facilitate the conversation, more experienced hospital based HCPs drew on their personal weight issues to relate to the women.

> *'...I'm not the skinniest person in the world. I think it's easier when you can say, "Look, we all have our challenges and you've got to work hard at it"' (Obstetrician 06)*

More detached approaches were also described; with hospital based HCPs using tools such as a BMI categorisation tool to frame the conversation because using BMI *"isn't as upsetting to somebody as if you said, You're fat." (Midwife 01).* Furthermore, because of women's weight, difficulties were often experienced when palpating a woman's abdomen and conducting fetal scans, offering an opportune situation to raise the issue and to discuss the potential complications.

"I actually say it straight out to them when I am scanning, look unfortunately you carry the extra adipose tissue I am finding it difficult , there is too much fat around you abdomen which you need to watch. I would say that straight-out…" (Midwife 01)

All HCPs acknowledged that conversations about weight occur frequently throughout pregnancy as they have continuous contact with pregnant women. However, these discussions were quick conversations due to large caseloads, time and due to the number of topics that needed to be addressed within the consultations. "*it would be a couple of minutes given to a discussion about their weight and the problems with it…" (Obstetrician 09)*

"Doing what you can with what you have" to support the management of overweight and obesity

In the current *"obesogenic environment"* HCPs faced numerous challenges when supporting women to manage their weight. It was identified that the woman's health, their level of risk in pregnancy and scarce resources dictated what HCPs could do to support women's weight management efforts.

Hospital based HCPs were adapting the evidence to deal with large caseloads of women with high BMIs *"...so we don't talk about weight to the women who are overweight, we save that for the women who are obese..."(Obstetrician 03).* Due to scarce resources, priority was given to the obese women rather than overweight women: *"we have far too many women with BMIs in the 40s or even in the 50s in whom we focus our limited resources" (Obstetrician 03)* therefore, women with a BMI ≥25 "*doesn't raise as much of a red flag"*. Limited dietetic services within the hospital were discussed as an example of the inadequate resources, with this service only offered to those with a diagnosis of GDM. This reflected the *"doing what you can with what you have"* approach as hospital based HCPs could do more for these pregnant women. Hospital based HCPs emphasised that this service needed to reach all women, particularly overweight and obese women (without GDM) who could benefit from that type of intervention. Also, access to dietetics influenced GPs' management of weight; long waiting times for referrals meant that they lost that window to intervene with the woman.

Most hospital based HCPs did not have any *'specific written guidelines'* to follow while others described using and applying varying ranges of weight gain in pregnancy. A BMI ≥30kg/m^2 was so common, it was considered a low priority for services, management and advice rendering some guidelines *'inadequate'*.

'I think the guidelines and the public health policies that are out there are inadequate…..they're certainly not permeating into a lot of healthcare professionals' consciousness and I think many doctors don't regard a BMI of 30 [as priority] because it's becoming more and more common' (Obstetrician 07)

The '*doing what you can with what you have*' approach to weight management was also reflected in weighing practices and attitudes towards weighing. Weighing practices varied amongst the HCPs and there were divergent attitudes towards its usefulness and appropriateness. GPs highlighted that the evidence and guidelines no longer recommend weight as a *'clinical indicator*'.

'*...it was stopped being done as routine because it wasn't correlating with health outcomes. That's my understanding of it, but I certainly would be interested to see if there are new guidelines about it. So if it is significant, I think it should be included in the chart…' (GP 03)*

However, hospital based HCPs such as midwives were keeping track of women's weight, particularly at the booking visit and again at 28 weeks. Weight and BMI was used in the hospital to refer women for anaesthetic assessment to determine the woman's *'anaesthetic risk'.*

Shifting the focus to the management of obstetric complications

The risk of obstetric complications at any stage in pregnancy takes precedent over efforts to manage weight with hospital based HCPs acknowledging *"it's too late [to manage weight] at that stage"*. For hospital based HCPs, weight management was superseded when obstetric complications arose. At this point the woman's complications required obstetric care, shifting the focus to the immediate health of the woman and baby.

"If they develop hypertension, I talk about hypertension and the treatment of. It's very difficult at that point, they're now hypertensive, the baby's at risk of growth restriction, they're at risk of early delivery, we need to get their blood pressure under control, take care of the maternal problems and make sure the foetus is okay. It's too late at that stage to start going, "Oh well, you have this now because you're fat." no, it's too late" (Obstetrician 03)

Unclear roles and responsibilities for lifestyle advice

In the context of shared maternity care, HCPs highlighted the challenge of providing continuity of care and questioned who is ultimately responsible for managing weight. It was difficult for hospital based HCPs to provide continuous weight management and advice as they had limited opportunity to follow up with the same women. Therefore, responsibility of continuous care fell to the GPs. Hospital based HCPs suggested the GP would have a better family picture and would have the opportunity to engage with these women on numerous occasions preconception and throughout pregnancy.

> *"I think there GP should be one that keeps an eye on it [weight], he is the continuous person that's with them"(Midwife 01)*

In contrast, GPs tended to put onus on the hospital based HCPs, reporting *"Oh well look, the hospital will take care of that" (GP 05)* or we are very stretched in general practice. Even though both hospital based HCPs and GPs are taking part in shared antenatal care, GPs felt there was little communication between primary and secondary care and more clarity was required around role responsibilities and expectations within the shared care setting. This would ensure that weight related conversations were consistent and reliable.

DISCUSSION

This qualitative study demonstrates the challenges surrounding weight management during pregnancy for overweight and obese women from the perspective of hospital based HCPs and GPs with more concerns for women in the higher BMI categories. Four major themes were identified: the *"softly-softly"* approach, *"doing what you can with what you have", shifting the focus to* the *management of obstetric complications*, and *unclear roles and responsibilities for lifestyle advice.* These themes reflect how HCPs discuss and manage weight, and the challenges they face when trying to balance the medical and psychosocial needs of the women.

The *"softly-softly"* approach is defined as cautious and patient and avoids direct action or force which reflects HCPs accounts of their approach to providing care for overweight and obese pregnant women. Similar to this study, previous research identified an increased acceptance of obesity within the population [26, 38-40] with fewer people now defining themselves as overweight and obese and underestimating their weight status [38, 39, 41]. Furthermore, stigma in relation to obesity was also present in this study and in previous research with HCPs feeling the discomfort and awkwardness

around weight conversations in pregnancy [40]. A lack of confidence and experience determined the approach used to broach the subject of weight, with younger midwives in particular finding the topic awkward. This is supported by existing literature, with junior HCPs having negative opinions about their skills for treating obese patients [28, 42, 43]. Hospital based HCPs and GPs in this study were aware that weight needs to be addressed with care, to avoid upsetting the women. Similarly, in other studies, HCPs were concerned about victimising the women or jeopardising their relationship with the women when raising the subject of weight [26, 28, 33]. Midwives tried to broach the subject of weight by discussing their own weight loss journeys. In contrast, a study exploring the experiences of HCPs found that HCPs with high BMIs felt they were not in a position to address weight and therefore veered away from the conversation [42]. Standardised questions could be used with all pregnant women to reduce stigma associated with the conversation of weight and increase HCPs' confidence [44]. Experienced, well-informed HCPs need to share their training, knowledge and experience with more junior staff, including prompts and communication strategies, in order to improve addressing the subject of weight [31]. Scarce resources determined HCPs' approach to managing weight, particularly dietetic services which were consequently limited to women with GDM. Similarly, previous research identified limited resources available within maternity units as a barrier to managing weight during pregnancy [26, 40]. With a number of diet and physical activity interventions reducing GWG and GDM [17, 19, 45], it is clear that services such as dietetics need to reach all women, particularly women with a BMI ≥25kg/m^2. As revealed in this study, HCPs had different views on routine weighing practices. Previous research indicated that while there are benefits to routine weighing, various challenges such as existing resources and time constraints need to be addressed in order to successfully implement the process of routine weighing of all women at every antenatal visit [46]. Furthermore, advice regarding the amount of weight to gain in pregnancy varied. This is perhaps not surprising as there is no formal guidance for appropriate GWG in Ireland. Previous research has demonstrated an evidence-practice gap relating to the provisional of clinical care of overweight and obese pregnant women [47]. Similarly, in the UK, HCPs were unsure about appropriate GWG in pregnancy [27]. Evidence suggests that women who are not advised about appropriate GWG are more likely to gain outside the recommended ranges [48]. Therefore, further research and national guidance is needed to address divergent opinions about the benefits of weighting practices and lack of clarity on appropriate GWG to support standardised shared antenatal care.

Strengths and limitations

The inductive approach used in this qualitative study revealed the nuances and tensions involved in the management of overweight and obese pregnant women. The recruitment of a diverse sample of HCPs across settings, including hospital based HCPs and GPs with a range of experiences and specialities is a further strength of this study. Most of the HCPs were recruited from a limited geographical area and their perceptions and approach to weight management may not reflect those of HCPs working elsewhere. Variation in interview length occurred due to constraints and demands on participants' time.

Practice Implications

Hospital based HCPs and GPs are aware of the stigma around the topic of weight, particularly for women with a BMI ≥25kg/m^2. As part of encouraging healthy lifestyle choices, HCPs need to normalise the conversation around weight. Other health behaviours such as smoking and alcohol are considered more acceptable and easier to discuss [26], therefore HCPs need to approach weight conversations in a similar manner. Training, education and skill development is required for HCPs to care effectively for these women. Lack of continuity of care undermines the consistency of weight management conversations and advice. Creating multidisciplinary teams or networks within the shared antenatal care setting would enhance and encourage knowledge sharing between HCPs allowing for effective communication between primary and secondary care. Furthermore, standardised approaches to weight management are needed and where possible, HCPs need to follow women during pregnancy to build rapport and ensure consistent information throughout. To address the sensitive nature of weight conversations, the most important question for HCPs is to ask how a patient feels about their weight in pregnancy. Negative reactions will alert HCPs that additional support may be required. Additionally, motivational interviewing could be used; this has been previously identified as an effective strategy when approaching sensitive issues such as obesity [49].

Conclusion

Building rapport is necessary to deal with the sensitive nature of weight which requires consistent contact and guidance from HCPs. Roles and responsibilities for weight management within shared care needs to be clearer in this "*obesogenic environment*". By ensuring hospital based HCPs and GPS have the confidence, knowledge and opportunity to discuss weight and lifestyle factors with pregnant women, the women in turn may initiate or maintain healthy behaviours during pregnancy. Within shared care, evidence-based guidelines that support the consistent monitoring and management of weight during pregnancy could improve care and outcomes for these women.

FIGURE LEGEND

Figure 1: Drivers and approach to weight management for overweight and obese pregnant women

Supplementary data:

File 1: Topic Guide

File 2: COREQ Statement

Ethical approval and consent to participate

(CF) confirms that all patient identifiers have been removed so the patients described are not identifiable and cannot be identified through the details of the story. Ethical approval was obtained from the University College Cork Clinical Research Ethics Committee of the Cork Teaching Hospital (ref: ECM 4 (y) 06/01/15). Written informed consent was obtained from all participants.

Conflict of interest

The authors declare that they have no competing interests.

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Author's contributions

CF, SMH, PK and MB conceived and designed the study. CF, SMH developed the topic guide and study protocol. CB facilitated access to GPs for recruitment to the study. CF conducted and transcribed the interviews. CF and SMH coded the transcripts, developed and refined the themes. CF wrote the first draft of the paper. All authors (SMH, LK, MOR, FMA, CB, PMK and MB) contributed to successive drafts and read and approved the final manuscript

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Data sharing statement

No additional data are available

References

1. Dodd JM, Grivell R, Crowther C, et al. Antenatal interventions for overweight or obese pregnant women: a systematic review of randomised trials. *BJOG* 2010;117(11):1316-26.
2. Health Service Executive. Obesity and Pregnancy Clinical Practice Guideline. 2013;Accessed 2016
3. Fattah C, Farah N, Barry SC, et al. Maternal weight and body composition in the first trimester of pregnancy. *Acta Obstet Gynecol Scand* 2010;89(7):952-55.
4. Lynch C, Sexton D, Hession M, et al. Obesity and mode of delivery in primigravid and multigravid women. *Am J Perinatol* 2008;25(3):163-67.
5. Ng M, Fleming T, Robinson M, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The lancet* 2014;384(9945):766-81.
6. World Health Organization. WHO European action plan for food and nutrition policy 2007–2012. *Copenhagen: WHO Regional Office for Europe* 2008
7. National Research Council. Weight gain during pregnancy: reexamining the guidelines: National Academies Press 2010.
8. Centre for Public Health Excellence at Nice National Collaborating Centre for Primary C. National Institute for Health and Clinical Excellence: Guidance. Obesity: The Prevention, Identification, Assessment and Management of Overweight and Obesity in Adults and Children. London: National Institute for Health and Clinical Excellence (UK) 2006.
9. Nascimento S, Surita F, Parpinelli M, et al. The effect of an antenatal physical exercise programme on maternal/perinatal outcomes and quality of life in overweight and obese pregnant women: a randomised clinical trial. *BJOG* 2011;118(12):1455-63.
10. Alavi N, Haley S, Chow K, et al. Comparison of national gestational weight gain guidelines and energy intake recommendations. *Obes Rev* 2013;14(1):68-85. doi: 10.1111/j.1467-789X.2012.01059.x [published Online First: 2012/10/31]
11. Johnson M, Campbell F, Messina J, et al. Weight management during pregnancy: a systematic review of qualitative evidence. *Midwifery* 2013;29(12):1287-96.
12. Herring SJ, Rose MZ, Skouteris H, et al. Optimizing weight gain in pregnancy to prevent obesity in women and children. *Diabetes, obesity and metabolism* 2012;14(3):195-203.
13. Hernandez DC. Gestational weight gain as a predictor of longitudinal body mass index transitions among socioeconomically disadvantaged women. *J Womens Health* 2012;21(10):1082-90.

14. Rooney BL, Schauberger CW. Excess pregnancy weight gain and long-term obesity: One decade later. *Obstet Gynecol* 2002;100(2):245-52.

15. Heiskanen N, Raatikainen K, Heinonen S. Fetal macrosomia–a continuing obstetric challenge. *Neonatology* 2006;90(2):98-103.

16. Messina J, Johnson M, Campbell F, et al. Systematic review of weight management interventions after childbirth. *The University of Sheffield: ScHARR Public Health Collaboration Centre* 2009

17. Thangaratinam S, Rogozińska E, Jolly K, et al. Effects of interventions in pregnancy on maternal weight and obstetric outcomes: meta-analysis of randomised evidence. *BMJ* 2012;344 doi: 10.1136/bmj.e2088

18. Campbell F, Messina J, Johnson M, et al. Systematic review of dietary and/or physical activity interventions for weight management in pregnancy. *The University of Sheffield: ScHARR Public Health Collaboration Centre* 2009

19. Oteng-Ntim E, Varma R, Croker H, et al. Lifestyle interventions for overweight and obese pregnant women to improve pregnancy outcome: systematic review and meta-analysis. *BMC Med* 2012;10:47. doi: 10.1186/1741-7015-10-47

20. Stotland NE, Gilbert P, Bogetz A, et al. Preventing excessive weight gain in pregnancy: how do prenatal care providers approach counseling? *J Womens Health* 2010;19(4):807-14.

21. Hanafin S, Dwan O'Reilly E. National and International review of literature on models of care across selected jurisdictions to inform the development of a National Strategy for Maternity Services in Ireland. *http://healthgovie/wp-content/uploads/2016/01/Literature-review-on-maternity-models-of-carepdf* 2016

22. Phelan S. Pregnancy: a "teachable moment" for weight control and obesity prevention. *Am J Obstet Gynecol* 2010;202(2):135. e1-35. e8.

23. van der Pligt P, Campbell K, Willcox J, et al. Opportunities for primary and secondary prevention of excess gestational weight gain: General Practitioners' perspectives. *BMC Fam Pract* 2011;12:124. doi: 10.1186/1471-2296-12-124 [published Online First: 2011/11/05]

24. Widen E, Siega-Riz AM. Prenatal nutrition: A practical guide for assessment and counseling. *Journal of Midwifery & Women's Health* 2010;55(6):540-49.

25. Campbell K, Engel H, Timperio A, et al. Obesity management: Australian general practitioners' attitudes and practices. *Obes Res* 2000;8(6):459-66.

26. Heslehurst N, Moore H, Rankin J, et al. How can maternity services be developed to effectively address maternal obesity? A qualitative study. *Midwifery* 2011;27(5):e170-e77. doi: http://dx.doi.org/10.1016/j.midw.2010.01.007

27. Olander EK, Atkinson L, Edmunds JK, et al. The views of pre- and post-natal women and health professionals regarding gestational weight gain: An exploratory study. *Sex Reprod Healthc* 2011;2(1):43-8. doi: 10.1016/j.srhc.2010.10.004 [published Online First: 2010/12/15]

28. Biro MA, Cant R, Hall H, et al. How effectively do midwives manage the care of obese pregnant women? A cross-sectional survey of Australian midwives. *Women and birth : journal of the Australian College of Midwives* 2013;26(2):119-24. doi: 10.1016/j.wombi.2013.01.006 [published Online First: 2013/03/15]

29. Stewart ZA, Wallace E, Allan C. Weight gain in pregnancy: a survey of current practices in a teaching hospital. *Aust N Z J Obstet Gynaecol* 2012;52(2):208-10.

30. Moore Simas TA, Waring ME, Sullivan GM, et al. Institute of medicine 2009 gestational weight gain guideline knowledge: survey of obstetrics/gynecology and family medicine residents of the United States. *Birth* 2013;40(4):237-46.

31. Furness PJ, Arden MA, Duxbury AM, et al. Talking about weight in pregnancy: An exploration of practitioners' and women's perceptions. *Journal of Nursing Education and Practice* 2015;5(2):89.

32. Davis DL, Raymond JE, Clements V, et al. Addressing obesity in pregnancy: the design and feasibility of an innovative intervention in NSW, Australia. *Women and Birth* 2012;25(4):174-80.

33. Heslehurst N, Lang R, Rankin J, et al. Obesity in pregnancy: a study of the impact of maternal obesity on NHS maternity services. *BJOG* 2007;114(3):334-42. doi: 10.1111/j.1471-0528.2006.01230.x

34. Cork University Maternity Hospital. Cork University Maternity Hospital Annual Report 2015. 2015

35. Hill B, Skouteris H, Fuller-Tyszkiewicz M. Interventions designed to limit gestational weight gain: a systematic review of theory and meta-analysis of intervention components. *Obes Rev* 2013;14(6):435-50. doi: 10.1111/obr.12022 [published Online First: 2013/03/29]

36. Chang T, Llanes M, Gold KJ, et al. Perspectives about and approaches to weight gain in pregnancy: a qualitative study of physicians and nurse midwives. *BMC Pregnancy Childbirth* 2013;13(1):47. doi: 10.1186/1471-2393-13-47

37. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology* 2006;3(2):77-101.

38. Johnson F, Cooke L, Croker H, et al. Changing perceptions of weight in Great Britain: comparison of two population surveys. *BMJ* 2008;337:a494.

39. Kirk SF, Cockbain AJ, Beazley J. Obesity in Tonga: A cross-sectional comparative study of perceptions of body size and beliefs about obesity in lay people and nurses. *Obes Res Clin Pract* 2008;2(1):35-41.

40. Schmied VA, Duff M, Dahlen HG, et al. 'Not waving but drowning': a study of the experiences and concerns of midwives and other health professionals caring for obese childbearing women. *Midwifery* 2011;27(4):424-30. doi: http://dx.doi.org/10.1016/j.midw.2010.02.010

41. Howard NJ, Hugo GJ, Taylor AW, et al. Our perception of weight: Socioeconomic and sociocultural explanations. *Obes Res Clin Pract* 2008;2(2):125-31.

42. Brown I, Thompson J. Primary care nurses' attitudes, beliefs and own body size in relation to obesity management. *J Adv Nurs* 2007;60(5):535-43.

43. Block JP, DeSalvo KB, Fisher WP. Are physicians equipped to address the obesity epidemic? knowledge and attitudes of internal medicine residents☆. *Prev Med* 2003;36(6):669-75.

44. Lee D, Haynes C, Garrod D. Exploring health promotion practice within maternity services. *National Health Service Foundation Trust Stockport, UK: National Health Service* 2010

45. Koivusalo SB, Rono K, Klemetti MM, et al. Gestational diabetes mellitus can be prevented by lifestyle intervention: the Finnish gestational diabetes prevention study (RADIEL): a randomized controlled trial. *Diabetes Care 2016 Jan;39(1):24-30* 2016

46. Hasted T, Stapleton H, Beckmann MM, et al. Clinician's Attitudes to the Introduction of Routine Weighing in Pregnancy. *Journal of Pregnancy* 2016:1-9. doi: 10.1155/2016/2049673

47. Wilkinson SA, Stapleton H. Overweight and obesity in pregnancy: The evidence–practice gap in staff knowledge, attitudes and practices. *Aust N Z J Obstet Gynaecol* 2012;52(6):588-92.

48. Stotland NE, Haas JS, Brawarsky P, et al. Body mass index, provider advice, and target gestational weight gain. *Obstet Gynecol* 2005;105(3):633-38.

49. Raymond J, Clements V. motivational interviewing for midwives: creating 'enabling'conversations with women. *MIDIRS Midwifery Digest* 2013;23(4):435-40.

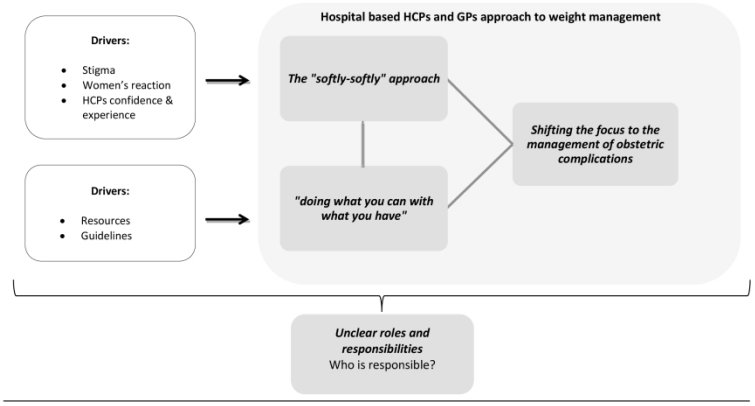
Table 1: Profile characteristics of HCPs (N=17)

	Male	Female
Occupation		
Midwife [A]	-	**4**
SHO Senior House Officer	-	**1**
Consultant Obstetrician [B]	**2**	**3**
General Practitioners	**3**	**4**
Location		
Cork	**4**	**12**
Kerry	**1**	-

[A] Midwife working in diabetic clinic (n=1); labour ward (n=1); outpatient department (n=2)

[B] Obstetrician's working in obstetrics with sub-specialist interests such as maternal medicine, high risk pregnancies, fetal medicine and complicated pregnancies (n=4); gynaecology (n=1)

Figure 1: Drivers and approach to weight management for overweight and obese pregnant women



HCPs, health care professionals; GPs, general practitioners

297x209mm (300 x 300 DPI)

Table S1: Topic Guide

	Questions	Prompts
Intro	Tell me a bit about what you do here in CUMH	Types of pregnant women Stage of pregnancy (booking visit, delivery)
Usual Care	When you see an OB woman for the 1st time during pregnancy, what usually happens?	What does the assessment/visit involve? Do you weigh them? What do you talk about? How do you think that information is usually received? What issues does the woman usually raise? Topics covered: diet, exercise, nausea, cravings
	Can you tell me a bit about the last women you saw?	What stage of pregnancy? When was this? Describe the mother… What did you talk about? What issues did she raise? Topics: diet, PA, nausea, cravings…
	Do you discuss the woman's weight specifically?	Tell me about that… - Appropriate weight gain - How do you judge (guidelines) - Do you know what advice to give?
	Having the conversation	How do you feel talking about weight and obesity? How is it received? (upset, shock, embarrassment) How could this conversation be made easier? (for you/the woman)
	And what about PA, would that come up?	- Women previously exercising? - Types of PA?
	How are these issues followed up during pregnancy?	If a woman is gaining EGW, what would you do?
	To what extent do resources influence your visit with an OB pregnant woman?	- Time available - Access to equipment (weighing scales) - Ability to refer to dietician - Patients co-operation
Behaviour Change	Can you think of times where women have made positive life style changes during pregnancy? And those who haven't made any changes, what were the barriers?	Tell me about that…. Motivations, Supports, Outcome Any targeted support available? - Dietetic services, exercise programmes, weight management programme. - Women's perceptions of PA (benefits)
	What do you think would help these women to change their behaviour during pregnancy?	Have you seen technology being used to support BC? - What kind, features, - Did someone recommend it? - What information was it providing to women? What about mobile phone apps, text message/phone, web based information forums, pedometer? Would these support mechanisms be useful? - If it provided you with information as well
	Any other comments or suggestions on how behaviour change could be supported during pregnancy?	- Individual meetings - Group peer led sessions

CUMH, Cork University Maternity Hospital; OB, overweight and obese; PA, Physical activity; HCP, Health care professional; EGW, Excessive gestational weight; BC, Behaviour change

Table S2: Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:
Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page no.
Domain 1: Research team and reflexivity		
Personal Characteristics		
1. Inter viewer/facilitator	Which author/s conducted the inter view or focus group?	5
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	1
3. Occupation	What was their occupation at the time of the study?	1
4. Gender	Was the researcher male or female?	1
5. Experience and training	What experience or training did the researcher have?	5
Relationship with participants		
6. Relationship established	Was a relationship established prior to study commencement?	5
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	5
8. Interviewer characteristics	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	1, 5
Domain 2: study design		
Theoretical framework		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	5, 6
Participant selection		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	5
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	5
12. Sample size	How many participants were in the study?	6
13. Non-participation	How many people refused to participate or dropped out? Reasons?	6
Setting		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	5, 6

15. Presence of non-participants	Was anyone else present besides the participants and researchers?	n/a
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	6, 20
Data collection		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	5, 6
18. Repeat interviews	Were repeat inter views carried out? If yes, how many?	n/a
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	6
20. Field notes	Were field notes made during and/or after the inter view or focus group?	Yes
21. Duration	What was the duration of the inter views or focus group?	6
22. Data saturation	Was data saturation discussed?	6
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings		
Data analysis		
24. Number of data coders	How many data coders coded the data?	6
25. Description of the coding tree	Did authors provide a description of the coding tree?	n/a
26. Derivation of themes	Were themes identified in advance or derived from the data?	6
27. Software	What software, if applicable, was used to manage the data?	6
28. Participant checking	Did participants provide feedback on the findings?	n/a
Reporting		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	6-11
30. Data and findings consistent	Was there consistency between the data presented and the findings?	6-11
31. Clarity of major themes	Were major themes clearly presented in the findings?	6-11
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	6-11

Once you have completed this checklist, please save a copy and upload it as part of your submission. When requested to do so as part of the upload process, please select the file type: *Checklist*. You will NOT be able to proceed with submission unless the checklist has been uploaded. Please DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.