

Original Article

UK health visitors' role in identifying and intervening with infants at risk of developing obesity

Sarah A. Redsell*, Judy A. Swift[†], Dilip Nathan[‡], A. Niroshan Siriwardena[§],
Philippa Atkinson[¶] and Cris Glazebrook^{**}

*School of Nursing, Midwifery and Physiotherapy, The University of Nottingham, Queen's Medical Centre, Nottingham, UK, [†]Division of Nutritional Sciences, The University of Nottingham North Lab, Sutton Bonington Campus, Loughborough, UK, [‡]Nottingham University Hospitals NHS Trust, Nottingham, UK, [§]School of Health and Social Care, University of Lincoln, Lincoln, UK, [¶]Nottingham CityCare Partnership, 1 Standard Court, Nottingham, UK, and ^{**}School of Community Health Sciences, The University of Nottingham, Nottingham, UK

Abstract

Childhood obesity is associated with a number of modifiable risk factors that can be identified during infancy or earlier. In the UK, health visitors advise parents about infant feeding, but little is known about their role in obesity prevention. The aim of this study was to investigate the beliefs and current practices of UK health visitors in relation to recognising and intervening with infants at risk of developing obesity. Thirty members of the health visiting team were interviewed. The interviews were audio-recorded and transcribed verbatim. Thematic analysis was applied using an interpretative, inductive approach. Health visitors were aware of some of the modifiable risk factors for childhood obesity such as infant feeding practices. They felt they had a role in advising parents about diet but did not formally identify and/or intervene with larger infants. Infant overweight was considered a sensitive issue that was difficult to raise with parents. They believed some parents preferred larger infants and were unaware that their feeding practices might be contributing to obesity risk. A need for training and guidance was identified together with strategies to overcome system barriers. Health visitors do not currently target parents of infants at risk of obesity largely because they do not perceive they have appropriate guidance and skills to enable them to do so. There is an urgent need for tools and training to enable all health care professionals to recognise and manage infants at risk of developing obesity without creating a sense of blame.

Keywords: infant, childhood obesity, public health nurse, prevention, health visitor.

Correspondence: Dr Sarah A. Redsell, School of Nursing, Midwifery and Physiotherapy, The University of Nottingham, Queen's Medical Centre, B Floor, South Block, Nottingham NG7 2HA, UK. E-mail: Sarah.Redsell@nottingham.ac.uk

Background

Childhood obesity is a global health problem (World Health Organisation 1998). In the UK, in 2010, 9.8% of children aged 4–5 years and 18.7% of 10–11-year-olds were obese (The NHS Information Centre 2010). The main risk factors are known and can be identified during infancy or even earlier. Non-modifiable risk factors are those that are already present in an infant and cannot be altered by intervention. These include maternal obesity (Reilly *et al.* 2005; Hawkins *et al.*

2009; Rooney *et al.* 2011), smoking during pregnancy (Reilly *et al.* 2005; Hawkins *et al.* 2009) and high birthweight (Stettler *et al.* 2002; Reilly *et al.* 2005; Hui *et al.* 2008; Hawkins *et al.* 2009; Rooney *et al.* 2011). Hawkins *et al.* (2009) found that black ethnicity has a higher risk of obesity compared with white ethnicity, while Indian ethnicity is associated with a lower risk (Hawkins *et al.* 2009). There is evidence for a socio-economic gradient for obesity, with children from lower socio-economic circumstances at higher risk (Shrewsbury & Wardle 2008).

Estimates vary, but it is thought that between 25% (Ekelund *et al.* 2006) and 33% (Hui *et al.* 2008) of infants gain weight more rapidly than desirable during the first 6 months of life. Rapid weight gain during early infancy is also a strong risk factor for the development of childhood obesity. Rapid weight gain might be attributable to nutritional and environmental factors or might be a marker of genetic risk (Druet *et al.* 2012). There is emerging evidence that some parental feeding practices such as breastfeeding and later weaning onto solid foods may reduce obesity risk, suggesting that early intervention might be needed.

There is a strong rationale for intervention during infancy to prevent obesity (Anzman *et al.* 2010; Lanigan *et al.* 2010). Overweight in infancy may be associated with delayed motor development (Slining *et al.* 2010), therefore creating a potential cycle of disadvantage with poor motor skills leading to lower levels of physical activity. Obesity may also be the consequence of latent, child behavioural issues as parents can sometimes misinterpret infant crying as a cue for hunger and respond by inappropriate feeding (Etelson *et al.* 2003; Baur 2005). Although UK health policy suggests early prevention is important (House of Commons Health Committee 2004; National Institute for Health and Clinical Excellence 2006; Darzi 2008), at the time of data collection, there was no national guidance for primary health care professionals (HCPs) to help them identify infants at risk of developing obesity. This, along with HCPs' reluctance to label infants as overweight or obese (McCormick *et al.* 2010; Redsell *et al.* 2011), is likely to make it difficult for them to identify infants who might benefit from early intervention. In contrast, in the United States, the Institute of Medicine's Early Childhood

Obesity Prevention Policies advise HCPs to undertake growth monitoring and consider obesity risk factors as part of every well-child visit (Institute of Medicine 2011).

A systematic review of the qualitative studies exploring parental perceptions of healthy behaviours for preventing overweight and obesity in young children revealed some pertinent findings. Parents perceive that the advice they receive from HCPs in relation to childhood overweight and obesity prevention is conflicting (Pocock *et al.* 2010). Furthermore, many parents express a belief that strategies to promote healthy weight-related behaviours should start early in life (Pocock *et al.* 2010). In the UK, health visitors (HVs) have a statutory duty to offer a public health service to families with children under 5 years old (Department of Health 2009). This role includes offering advice about health and nutrition to parents of children younger than 5 years old. Although there are policy initiatives to give HVs additional responsibility (Department of Health 2011), they do not currently have a leadership role in relation to obesity prevention during infancy in the UK. The aim of this study was to investigate the beliefs and current practices of UK HVs and other nurses in their team in relation to identifying and intervening with infants at risk of developing obesity. There were three objectives:

1. What is HVs' understanding of the risk factors for childhood obesity?
2. What is HVs' current practice in relation to providing infant feeding advice and what training needs do they have?
3. How do HVs currently identify infants at greater risk of obesity and what interventions do they use?

Key messages

- UK HVs (public health nurses) attribute obesity risk to family feeding practices and are unsure how to intervene without alienating parents.
- UK HVs (public health nurses) currently lack the skills, knowledge and confidence to proactively manage obesity risk in infants.
- There is an urgent need for tools and training to enable health care professionals to recognise and manage infants at risk of developing obesity.

Materials and methods

Sampling and recruitment

HVs, nursery nurses (NNs) and registered nurses (RGNs) working in two counties in the East Midlands, UK, were recruited during 2008/2009. Study sites were selected to ensure a range of views from the staff working in rural/urban, deprived/affluent areas (Redsell *et al.* 2010). The sampling strategy was purposive to include all members of the health visiting team working in the study sites who were invited by letter. Nottingham 1 Research Ethics Committee

08/H0403/3 and Nottinghamshire and Lincolnshire Primary Care Trusts (PCTs) approved the study. All participants provided their written, informed consent prior to data collection.

Data collection

The interview guide (Table 1) was informed by previous literature (Baughcum *et al.* 1998) and piloted with a HV not involved in the study. The interviews were semi-structured and were conducted by a HV (PA), who was known to some of the participants.

Table 1. Prompt guide for semi-structured interviews

Questions about health visiting teams' current practice, training needs

Can you describe your role in relation to discussing diet with parents of children under 1 year old?

At what age is it recommended that parents give solid foods to their babies?

When would you choose to refer to another professional about weaning? Who might this be?

How do you think parents of children under 1 year old feel about your dietary advice?

Are there any aspects of your advice that parents are reluctant to implement or find difficult to implement?

Why do you think that might be?

Are there any parent characteristics that you believe make it more likely that they will follow your advice about diet in children under 1?

Which parents do you believe find it hard to follow advice or tend to not agree with your advice?

Have you undertaken any training in relation to providing advice about diet to children under 1 year old?

If no formal training, have you undertaken any personal or professional research/enquiry to help you with this aspect of your work?

If no, do you feel that you have needed it? If yes, do you feel that it was enough?

Questions about identification of 'infants at risk' and health visiting teams' strategies

What do you think are the risk factors for childhood overweight/obesity?

Which do you think are the most important?

Do you have infants or young children on your caseload that you think might become overweight or obese children?

Why do you think they are 'at risk'?

What actions have you taken with the infant's parents? (If none, why not?)

How do you manage situations where an infant's growth increases disproportionately on the percentile charts?

For example, if an infant's growth went up rapidly from the 50th to the 90th percentile or crosses three percentiles with no corresponding rapid growth in head circumference or length?

What else might you need to know?

Have you found anything that makes it difficult to discuss with parents that their infant or young child is 'at risk' of becoming overweight?

What would help you to discuss issues of infant overweight with parents?

How do you find dealing with parents whose infants are overweight/obese?

Questions about weight management and intervention

Can you describe any intervention you have initiated with parents whose infants or young children have grown too quickly?

How might members of the health visiting team work with parents of infants 'at risk' to prevent childhood overweight/obesity?

What type of approach do you think would be acceptable to parents and why?

What type of intervention might be needed to prevent infants and young children from growing too quickly and becoming overweight or obese?

Who should deliver it? When (what age of child?)

What information should an intervention contain to make it useful for members of the health visiting team to use with parents?

How could the intervention be used by different members of the Primary Health Care Team?

Is there anything else you would like to mention that you think would be useful?

Thank you

Data analysis

Telephone interviews lasting up to an hour were audio-recorded, transcribed verbatim by a member of the research team and entered into NVIVO 8.0 (QSR International 2008). The data were analysed thematically using an interpretative perspective in which the researchers looked beyond the spoken word in order to understand the meaning behind the dialogue (Fade & Swift 2010). All interview data were coded into broad categories based on the main themes that emerged from the transcripts. Each category was subjected to detailed analysis, which led to the formation of hierarchical categories. This coding frame was then explored for linked and explanatory themes (Braun & Clarke 2006). This resulted in a number of changes to the coding frame and some new sub-themes emerged. Where there was disagreement between the two coders, the original transcribed text was consulted to ensure a data-driven approach (Boyatzis 1998) was maintained. As agreement emerged and the themes and sub-themes became apparent, descriptive text and quotes were applied.

Results

Thirty members of the health visiting team were interviewed. This comprised 20 HVs, 7 NNs and 3 RGNs. All participants were female, 28 participants were white British, 1 British Asian and 1 Black Caribbean. Three main themes emerged from the data (Table 2).

Perceived risk factors for obesity

Participants found it difficult to identify with, and explicitly discuss, risk factors for obesity that can be identified during infancy.

The risk factors? I'm not very sure I suppose having recently watched that programme on the television the other week, I'd have to say that they're now saying that that if the babies are you know the mothers been very obese when the baby's born you know the mother has a history of obesity, apparently then the babies are much more likely to have similar issues. (HV102)

While there was acknowledgement of the role of genetics in the aetiology of obesity, participants regarded family feeding practices as the primary problem.

The mum herself is in her early 20s, she's very, she's obese herself . . . She has a very unhealthy diet herself, very high in fat, very little fruit and vegetables, and a lot of carbohydrates, she doesn't cook to sit down and eat with the children, and her two older children and the baby aren't obese at the moment but they eat very, very unhealthily, and they eat a lot of bought fatty foods like pasties and have a lot of crisps and a lot of sausage rolls and very little fruit and vegetables and she doesn't really know an awful lot about how to cook. I do feel sure that all three children will eventually become obese. (HV140)

There was a concern that some infants spend a large proportion of their time sedentary.

Table 2. Themes and sub-themes from the data analysis

	Identification	Management	
Main themes	Perceived risk factors for obesity	Current practice in relation to improving infant nutrition and preventing obesity	Challenges in relation to communicating obesity risk to parents
Sub-themes	Too much milk	Health visitors' resources are focused on providing infant feeding advice during the first 6 months of life	Parental lack of concern about overweight in infancy
	Reliance on pre-prepared infant food and other convenience foods.	Mismatch between the UK Department of Health guidelines and parental weaning practices	Communicating with parents about obesity is a sensitive
	Inappropriate 'adult' foods and portion sizes	Identifying obesity during infancy	The need for additional opportunity for intervention
	Feeding unrelated to hunger	Health visitors as gatekeepers	The need for additional training, guidance and resources

If the baby's not crawling around, you know if the baby's static and you're pumping high calorie value food into them, it's obvious what's going to happen isn't it? And of course the heavier you are the more effort it takes to move. (NN107)

Too much milk

Participants believed that overfeeding infants formula milk was a risk factor for obesity; both in terms of the size and frequency of feeds.

I've already got several babies who are above the 98th centile and again these have been fed just full of milk, just really sort of continually topped up. (HV108)

Early weaning onto solid foods was believed to put an infant at risk of obesity. Participants believed parents did not reduce the quantity of formula milk to compensate for the increased calories consumed through weaning.

That have grown too quickly. Yeah, it tends to be the ones that have introduced the weaning very early and they're still on the same amount of milk. (NN135b)

There was a widespread belief that many parents placed too great an emphasis on milk as an essential food.

Milk is the biggest sticking point in my caseload extra milk, loads and loads of milk when they're too old to have lots of milk, the parents have this perception that children should drink lots of milk. (HV111)

Breastfeeding was understood to protect an infant against the development of obesity.

I would say the most important [risk factor] is breastfeeding versus bottle feeding, and I think if they're breast feeding the likelihood of obesity is much, much less, it's much higher in bottle fed babies. (HV127)

Reliance on pre-prepared infant food and other convenience foods

Participants believed that weaning infants onto pre-prepared infant foods, usually in jars, the use of snacks or other convenience foods was less desirable than providing them with home-cooked foods. They provided a range of explanations about the adverse impact of convenience foods, which included

concerns about the content, i.e. high sugar/salt and other additives.

A lot of them would want to just give the babies things that are quick and easy without actually thinking what they're eating. (HV140)

Participants regarded an idealised 'norm' for infant diet, which involved considerable investment by parents. Given the lack of evidence supporting a link between the consumption of pre-prepared infant foods and health outcomes, the views expressed by participants in this study appear to be a moral rather than evidence-based perspective about parents' feeding choices.

There was a strong belief that some parents, particularly younger mothers, lacked the skills and knowledge to cook appropriate foods for their infants and that the use of pre-prepared infant weaning foods resulted from this.

A lot of the young mothers that I visit haven't really done cookery at school. They don't really seem to know what to do with the vegetables and things like that and so they're just wanting to use packets and jars and things. (HV102)

Inappropriate 'adult' foods and portion sizes

Participants described how some parents routinely provided their infant with foods that were more suitable as occasional foods for older children or adults, particularly carbohydrate-rich processed foods including chips and sweet puddings. Participants reported concerns around food portion sizes in families.

I've had a lengthy discussion about sort of healthy foods with them, but my concern is that the family diet is really poor, and also portion sizes, having seen the sort of thing that the little girl eats. (HV120)

Participants believed that a number of parents lacked knowledge regarding the harmful consequences of children regularly consuming inappropriate foods but did not feel they were being deliberately negligent.

Feeding unrelated to hunger

Participants described how some parents believed the majority of infant distress cues were caused by hunger

and responded to this misperception by feeding their infants.

A little girl who has just piled the weight on. I went to visit her at home and we talked about not feeding the child so frequently because I think what was happening was that she was having milk just whenever she was crying. (HV103)

There were numerous accounts of how parents used milk or food to soothe their infants.

Some mothers I think don't like getting their baby into a routine and don't like leaving them to cry or doing any of those sorts of things, and they will therefore feed their baby constantly rather than try to do controlled crying or anything like that. (HV137)

Participants described how parents supplement milk feeds with cereal which they believed helped the infant sleep longer and ensured they received an undisturbed night's sleep. Waking at night was cited as a rationale for early weaning.

Well from my experience a lot of it is their own mothers, grandmothers you know, we put a rusk in the bottle when you were only a few weeks old and that helped you sleep and so on. (RGN130)

There were accounts of parents' own emotional problems and difficult personal circumstances taking precedence over their child's needs for a healthy diet.

If they've got a lot more on their plate, then weaning becomes very low priority in terms of family cooked foods, it's much easier for them to get a jar and get the baby to sleep through the night so they've got the energy to deal with their life in the day time really. (HV122)

Current practice in relation to improving infant nutrition and preventing obesity

HVs' resources are focused on providing infant feeding advice during the first 6 months of life

Participants believed they had an established role in relation to advising parents about infant feeding and nutrition in early life.

I'd say we have a lot of contact with families certainly in the first six months around feeding and moving onto weaning

and then early young children's diet forms quite a significant part of my role. (HV105)

Participants suggested that most of the resources available to them to help parents were focused around initial weaning.

There is a lot of information starting with weaning but there is not much to back that up moving onto family foods. (HV105)

Mismatch between the UK Department of Health guidelines and parental weaning practices

Participants interpreted the UK Department of Health recommendations to refrain from weaning until an infant is 6 months old in different ways. Some endorsed this advice while others felt it was a step too far for most parents. These participants advised parents to provide 'tasters' and small amounts of solid food from around 4 months onwards.

Obviously parents know their children best, that's what I say really, it's just a guideline and that if you feel that they need food before then and you know there's different signs that you can tell if they are needing that, then it's fine as long as it's not before 17 weeks really. (HV138)

Participants generally negotiated a balance between dictating the 6-month guidance and working with parents. Although this model of working demonstrates client-centredness, it also undermines the guidance.

Identifying the appropriate time to discuss infant weaning was challenging for HVs. For many, the discussion came too late as parents had already commenced weaning.

I'd like to discuss it with the mothers, unfortunately sometimes the mothers just start to wean without you seeing them. (HV121)

Participants themselves did not have a clear understanding of the evidence underpinning the UK DH weaning guidance and expressed a range of beliefs about why parents should refrain from weaning until an infant is 6 months old. Despite this uncertainty, they gave accounts of how they might explain the consequences of weaning early to parents.

They don't really need solids until six months of age, and that their bodies are not ready to digest it, and the danger is if you start too early is that you then increase, so that you then increase the amount of solid and the type of solids too quickly, and that both the bowels and the kidneys are not designed to take all that amount of strain. (HV140)

If you say if you wean early you've got more risk of allergies and this sort of thing then most of them will listen to you. (HV103)

There were accounts of how the Department of Health 6-month guidance had helped delay weaning in a positive way, albeit not to 6 months.

I think that certainly now it's six months for weaning I think more families are you know they're maybe not weaning at six months, they're probably weaning earlier, but they're not as early as they used to be. (HV102)

Participants believed the guidelines and their advice were often superseded by the influence of the child's grandparents and the parents' peers. They suggested that grandmothers, in particular, encouraged their daughters to follow outdated feeding practices and reinforced this using lay evidence of doing 'no harm'.

There is still so much peer pressure from family pressure from grandmothers and aunties about their old practices about introducing weaning early and the illusion that people think even by just giving a little bit of solids that they will sleep through the night. (HV125)

Identifying obesity during infancy

Participants generally identified with the concept of rapid weight gain during infancy but were sometimes unsure about whether an infant could be obese.

I would have no problem with discussing, if somebody could say oh a child that's done that will definitely become obese, it's really very important, I would have no problem discussing that with the parents. But I don't feel I've got enough scientific proof behind me to show that I'm right about that child, because a lot of children do change. (HV127)

Let me think (pause), not really at the moment I don't think. We've got a couple that you know they're just kind of bonny babies. (HV114)

I have no problems at identifying obese sort of toddler, bigger than that, but really with babies I would feel quite concerned about saying that a child was obese as a baby, HV127. They offered suggestions such as monitoring the infant or child's weight on the centile charts, a practice referred to as 'watching and waiting'.

I probably would say well I'd like to see this baby you know whether it's monthly or two weekly to weigh the baby. (HV106)

There were some participants who were more familiar with infants who failed to thrive than those who gained weight rapidly.

Mostly on our caseload we've got children the other way round, they're failing to thrive and their quite poorly with poor diets. (HV121)

HVs as gatekeepers

HV participants seem to delegate up crucial decisions about managing infants who rapidly gain weight to general practitioners (GPs)/paediatricians and to delegate down to other nurses in their team one-to-one work around advising parents about infant feeding and growth.

We would look at just how much they're having and then look at maybe ways that we could decrease some of that and if we still really don't get anywhere with that then we probably refer them to the growth clinic at (name) Health Centre you know paediatrician (Dr name) to have a look at that and then have some more expert dietary advice maybe from the dietician. (HV108)

Quite often my intervention would be to refer to the community nursery nurse for a further assessment and support programme. (HV102)

Challenges in relation to communicating obesity risk to parents

Parental lack of concern about overweight in infancy

Participants described how some parents preferred 'chubby' babies and reflected that in certain cultures larger infants were seen as a sign of wealth.

Mum hasn't really taken anything on board she keeps saying she loves chubby babies. (NN116)

Well there are definitely in the Asian community it's definitely a sign of prosperity to have nice chubby children. (HV111)

Participants reported that some parents were unconcerned about their large infant's size.

You know I think some parents very much see it just you know it's puppy fat you know, he's just well built. (HV108)

Participants described the way some parents gained satisfaction when their infant fed 'well' and grew. Weight gain was perceived to be a sign of successful parenting, but weight loss was not. They reported that many of their encounters with parents were about faddy eating and a perception that an infant was eating insufficient rather than too much.

It's a maternal thing isn't it to feed your child, and when the child is rejecting the food that they've cooked them, they get stressed about it, but they actually don't seem to be stressed when the children eat and eat and eat, because it is sort of maternal love isn't it for them. (HV125)

Communicating with parents about obesity is a sensitive issue

Participants were aware that any discussions, about potential or actual obesity, with parents of infants needed to be conducted sensitively.

I think the most important thing is that you've got a relationship with the parents, that you don't go to a mother that you don't know and start belting on about the child's weight, but you work at it gradually by seeing them and reviewing it and talking and talking about the diet. (HV125)

Participants reported a range of different approaches to parents around overweight or obese infants or children. Few participants were sufficiently confident in their practice to confront parents about the issue: they felt the direct approach was not always appropriate and their confidence was undermined when parents rejected their message.

I did actually plot her on the charts where you can do their BMI, and I showed her [the mother] that, the child was

obese, and well you know the dangers really, the risks and the dangers of the child carrying on like that. And I could see she didn't like what I was saying, you know, she felt it was criticism and you're trying very hard not to criticise, to find the positive things to say. (HV137)

The need for additional opportunity for intervention

Participants described how their role involved offering regular formal contacts with families of very young infants up to 6 months old and routine development checks for children up to 5 years old. However, they felt they lacked the time and opportunity to provide the in-depth support some parents of older infants needed.

Some parents need a lot of support, and it's obviously then it's very time consuming. (HV106)

There were accounts that the 'system' that included care pathways, guidance and training was not really set up to deliver continuity of care to parents of infants whose upward growth continued unchecked.

Sometimes I think you refer a child to the paediatrician say if they're you know really high up the centiles, but if you referred someone whose very to, over two centiles higher you tend to get from the paediatricians oh well why are you referring this child really, as a kind of I don't think this is too important and when the paediatricians are overloaded themselves with other problems that they think the message you know I think we get mixed messages about what is obese. (HV104)

There were concerns that parents received inconsistent information from members of the primary health care team.

They'll [parents] say the GP said so and so and some GPs will send them off to us and other GPs will send them to the Practice Nurse or you know may not be giving the same advice that we're giving and so certainly you need to involve everybody so that we're saying the same things. (HV106)

The need for additional training, guidance and resources

No participants identified any training or resources in relation to obesity prevention and management of

rapid weight gain in the early years. They made some suggestions about tools that might be helpful.

I think something like some information to give them about the dangers of obesity, which we don't actually have. Again a leaflet just with either pictures on it, or in just one word, high blood pressure, you know, heart attacks when you're older, not fitting in at school because they're overweight, not being able to do sports, body image, the sorts of things that you could perhaps just have in a really simple leaflet naming all these reasons why it's best for. (HV140)

Participants reported patchy availability and up-take of training in relation to infant feeding. The most easily identifiable course was one delivered by dietitians but most reported attending this historically.

Err, training? Well no I haven't had any training recently I've been doing the job for a long time but I haven't done any recent training. (HV121)

Discussion

The aim of this study was to explore UK HVs' beliefs and current practice in relation to identifying and intervening with infants at risk of developing childhood obesity. The results suggest that they understood some of the modifiable risk factors for childhood obesity such as infant feeding practices. While they were aware that maternal obesity may contribute to childhood obesity, they were uncertain about other non-modifiable risk factors such as high birthweight and smoking during pregnancy. At the time of data collection, HVs felt they had a role in advising parents about early feeding practices but did not formally identify and/or intervene with larger infants. They considered infant overweight a sensitive issue and provided accounts of how difficult it was to raise it as an issue with parents. HVs believed that some parents preferred larger infants and were unaware, or did not acknowledge, that their feeding practices might be contributing to obesity risk. A need for training and guidance was identified together with strategies to overcome system barriers and differences in approach between HCPs in relation to managing larger infants.

HVs were aware that familial obesity might contribute to risk for a child but did not mention other (non-modifiable) factors. There is strong evidence that high birthweight and maternal smoking also contribute to risk (Reilly *et al.* 2005; Hawkins *et al.* 2009). This finding suggests that HVs may need additional tools to enable them to recognise infants most at risk to enable more targeted intervention. There are risk factor checklists currently in development (Daly & Rudolph 2010; Redsell 2010–2012), which require feasibility testing and piloting in the clinical field. HVs were more aware of the modifiable risk factors for childhood obesity and their views about the protective effect of breastfeeding and later weaning fit with the currently available evidence. Infants given solid foods before 4 months have been found to be at greater risk of obesity compared with those receiving solid foods later (Hawkins *et al.* 2009). More specifically, infants who are formula fed and who are introduced to solid food earlier than 4 months have been found to be at higher risk of obesity at 3 years (Huh *et al.* 2011). This was not so for breastfed infants. Later weaning has been found to be protective (Seach *et al.* 2010), although this finding is not universally supported (Neutzling *et al.* 2009). There is evidence from the United States that prolonged bottle use (>24 months) is associated with a greater risk of obesity at 5.5 years (Gooze *et al.* 2011).

HVs believed family feeding practices contributed to obesity risk. GPs and practice nurses also emphasise feeding behaviour within families as a key cause of obesity (Redsell *et al.* 2011). These HCPs may support this cause to enable them to intervene to improve family diet. However, the environmental causes of childhood obesity go beyond family feeding practices to the social, political and educational environment (Lobstein *et al.* 2004). HCP's ability to intervene appropriately may be compromised if parents perceive they are being stigmatised or blamed for family obesity (Puhl & Heuer 2010).

HVs believed there were differences between themselves and the general practice team in relation to providing parents with advice about infant feeding and identifying obesity risk which has been previously identified (Redsell *et al.* 2011). Maintaining a relationship with parents is important (Redsell *et al.* 2011)

and, in some cases, HCPs overlook poor infant feeding practices such as overfeeding for fear of losing family trust (Barton & Daniels 2006). HVs in our study tried to negotiate the mismatch between the Department of Health's advice to parents to refrain from weaning until an infant is 6 months old and family feeding practice. There is a clash between infant feeding idealism, such as exclusive breastfeeding for 6 months and the reality of family life (Hoddinott *et al.* 2012) which may result in parent perceiving that the advice they receive is inconsistent (Redsell *et al.* 2010). HVs suggested that there was a strong intergenerational influence on infant feeding practices that impacted on their ability to provide evidence-based advice around weaning. Hoddinott *et al.* (2012) suggested policy-makers should adopt a family-orientated approach to infant feeding practices rather than placing parents in a position where they cannot achieve unrealistic health goals.

There was a view that some parents overfed their infants. The explanations for this varied from feeding as comfort in response to infant distress to encouraging infants to consume too much food. Food is commonly used and widely sanctioned by parents as a reward for desired behaviour among all cultural and socio-economic groups (Pocock *et al.* 2010). However, parental preferences for larger infants (Redsell *et al.* 2010) may lead to overfeeding. Parenting styles that encourage or pressurise children to eat more without responding to child's hunger or satiety cues have been associated with poor self-regulation of feeding and increased weight (Johnson & Birch 1994). However, there is some evidence that baby-led weaning, which allows an infant to actively make choices about food preferences, protects against childhood obesity (Townsend & Pitchford 2012).

HVs believed that parental preference for larger infants made it difficult for them to approach some parents about inappropriate rapid growth. Parental misperception about their own child's overweight or obese status has been reported elsewhere (Etelson *et al.* 2003; Baur 2005). A recent study exploring perceptions of their child's weight status reported that parent's ability to identify when their young child was overweight was limited (Jones *et al.* 2011). Parents were concerned about child obesity as a national issue

but did not consider it related to them or their children (Jones *et al.* 2011). HVs also believed that it was challenging to alert parents about the possibility of infant obesity. Parents are sensitive about their overweight child and are reluctant to address the problem for fear of damaging their child's self-esteem or inducing an eating disorder (Pocock *et al.* 2010). Obesity is a highly stigmatised issue associated with blame and personal responsibility (Puhl & Heuer 2010) and it is, therefore, unsurprising that HCPs perceive some parents put up barriers towards them in relation to the possibility that their young child may be overweight. Guidance may be needed to further develop HCPs' skills in relation to communicating obesity risk to parents of young infants and children.

The suggestion that UK HVs delegate advice giving around infant feeding to NNs is of concern as this group has a low knowledge of obesity risk (Redsell *et al.* 2011). This may make it difficult for them to work with families at greater risk. At the time of data collection, UK HVs had little overall responsibility for identifying and managing obesity risk during infancy which is of concern as GPs in particular perceive this as their role (Redsell *et al.* 2011). Clearly, work needs to be undertaken to improve the skills, knowledge and confidence of HCPs in this area. In the UK, there are policy and clinical initiatives suggesting early identification of obesity risk is needed (National Institute for Health and Clinical Excellence 2006; Department of Health 2008). A Framework for Action was developed in 2009 to provide guidance for UK HVs in relation to managing early childhood obesity, but this still requires implementation into practice (Rudolf 2009). The findings of this study have led to the authors undertaking a systematic review of the literature around the risk factors for childhood obesity. An Infant Risk of Obesity Checklist is currently being developed, which will initially be piloted by UK HVs (Redsell 2010–2012).

Strengths and limitations of study

Participants in this study were volunteers, and the sample may have been biased towards HVs (and other nurses in their team) with an interest in the subject. Therefore, the findings may not be generalis-

able to HVs working in other geographical locations in the UK. Thematic analysis is appropriate for the qualitative aspect of this study as it enables the researchers to identify, analyse and describe patterns in participants' experiences (Braun & Clarke 2006). The interviews were undertaken by a researcher who was also a practising HV (PA). Participants were aware of this and may have felt she was more knowledgeable than themselves about the subject. This may have had an impact on the value they put on their own contributions. There has been considerable media attention surrounding the timing of infant weaning; since data collection took place in 2008–2009, therefore HVs' views may have altered since the study took place.

Conclusions

HVs currently advise parents about their infant's diet; however, those interviewed for this study were unsure about how to intervene to prevent obesity. They were uncertain about the non-modifiable risk factors for childhood obesity; however, they understood some of the infant feeding practices that might contribute to risk. There is a need for tools and training that help HCPs to recognise infants at risk of developing obesity and to develop strategies to manage that risk without creating a sense of blame. Childhood obesity is a global health problem, and greater exploration of the role of HCPs in relation to early years' prevention is urgently needed.

Acknowledgements

The authors would like to thank the research governance teams and the HV locality managers in the East Midlands who helped us identify and recruit members of the health visiting team to this study. We would also like to thank the HVs and other nurses who participated.

Source of funding

The study sponsor was the University of Nottingham. This work was funded by the Burdett Trust for Nursing (448/510), London, UK. The study sponsor

and the funding body did not participate in the study design, data collection analysis and interpretation of data, writing of the report or the decision to submit the article for publication.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

SAR, DN, ANS, JAS and CG were involved in the study conception and design; PA undertook the data collection; SAR, JAS undertook the data analysis and interpretation. SAR, DN, ANS, JAS, CG and PA contributed to drafting and revising the article. SAR, DN, ANS, JAS, CG and PA have all approved the final version of the paper to be submitted for publication.

References

- Anzman S.L., Rollins B.Y. & Birch L.L. (2010) Parental influence on children's early eating environments and obesity risk: implications for prevention. *International Journal of Obesity* **34**, 1116–1124.
- Barton S. & Daniels J. (2006) Infant Feeding: Conflicts in Family and Healthcare Provider Advice. In: Sigma Theta Tau International.
- Baughcum A., Burklow K.A., Deeks C.M., Powers S.W. & Whitaker R.C. (1998) Maternal feeding practices and childhood obesity: a focus group study of low-income mothers. *Archives of Pediatrics & Adolescent Medicine* **152**, 1010–1014.
- Baur L. (2005) Childhood obesity: practically invisible. *International Journal of Obesity* **29**, 353–355.
- Boyatzis R. (1998) *Transforming Qualitative Information: Thematic Analysis and Code Development*. Sage Publications: Thousand Oaks, CA.
- Braun V. & Clarke V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* **3**, 77–101.
- Daly D. & Rudolph M. (2010) Identifying Obesity Risk in the Early Years. Cross Government Obesity Unity: Aylesbury, Buckinghamshire.
- Darzi A.D. (2008) High quality care for all: NHS next stage review final report – summary.
- Department of Health (2008) Healthy weight, healthy lives: a cross-government strategy for England. HM Government.

- Department of Health (2009) Healthy Child Programme. Department of Health (2011) Health Visitor Implementation Plan 2011–2015. Department of Health.
- Druet C., Stettler N., Sharp S., Simmons R.K., Cooper C., Davey Smith G. *et al.* (2012) Prediction of childhood obesity by infancy weight gain: an individual-level meta-analysis. *Paediatric and Perinatal Epidemiology* **26**, 19–26.
- Ekelund U., Ong K., Linne Y., Neovius M., Brage S., Dunger D.B. *et al.* (2006) Upward weight percentile crossing in infancy and early childhood independently predicts fat mass in young adults: the Stockholm Weight Development Study (SWEDS). *The American Journal of Clinical Nutrition* **83**, 324–330.
- Etelson D., Brand D.A., Patrick P.A. & Shirali A. (2003) Childhood obesity: do parents recognize this health risk? *Obesity Research* **11**, 1362–1368.
- Fade S. & Swift J.A. (2010) Qualitative research in nutrition and dietetics: data analysis issues. *Journal of Human Nutrition and Dietetics* **24**, 106–114.
- Gooze R.A., Anderson S.A. & Whitaker R.C. (2011) Prolonged bottle use and obesity at 5.5 years of age in US children. *The Journal of Pediatrics* **159**, 431–436.
- Hawkins S.S., Cole T.J., Law C. and the Millenium Cohort Study Child Health Group (2009) An ecological systems approach to examining risk factors for early childhood overweight: findings from the UK Millenium Cohort Study. *Journal of Epidemiology & Community Health* **63**, 147–155.
- Hoddinott P., Craig L.C.A., Britten J. & McInnes R.M. (2012) A serial qualitative interview study of infant feeding experience: idealism meets realism. *BMJ Open* **14**:2, e000504.
- House of Commons Health Committee (2004) *Obesity. Third Report of Session 2003–04*. The Stationery Office Limited: London.
- Huh S., Rifas-Shiman S.L., Taveras E.M., Oken E. & Gillman M.W. (2011) Timing of solid food introduction and risk of obesity in preschool-aged children. *Pediatrics* **127**, E544–E551.
- Hui L.L., Schooling C.M., Leung S.S., Mak K.H., Ho L.M., Lam T.H. *et al.* (2008) Birth weight, infant growth, and childhood body mass index: Hong Kong's children of 1997 birth cohort. *Archives of Pediatrics & Adolescent Medicine* **162**, 212–218.
- Institute of Medicine (2011) *Early Childhood Obesity Prevention Policies*. Institute of Medicine (IoM): Washington, DC.
- Johnson S.L. & Birch L.L. (1994) Parents' and children's adiposity and eating style. *Pediatrics* **94**, 653–661.
- Jones A.R., Parkinson K.N., Drewett R.F., Hyland R.M., Pearce M.S. & Adamson A.J. (2011) Parental perceptions of weight status in children: the Gateshead Millennium Study. *International Journal of Obesity* **35**, 953–962.
- Lanigan J., Barber S. & Singhal A. (2010) Prevention of obesity in preschool children. *The Proceedings of the Nutrition Society* **69**, 204–210.
- Lobstein T., Baur L. & Uauy R. (2004) Obesity in children and young people: a crisis in public health. Report of the International Obesity TaskForce Childhood Obesity Working Group. *Obesity Reviews* **5**, 4–104.
- McCormick D.P., Sarpong K., Jordan L., Ray L.A. & Jain S. (2010) Infant obesity: are we ready to make this diagnosis? *The Journal of Pediatrics* **157**, 15–19.
- National Institute for Health and Clinical Excellence (2006) Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. In: Clinical Guideline 43.
- Neutzling M.B., Hallal P.R.C., Araujo C.L.P., Horta B.L., Vieira M.D.A., Menezes A.M.B. *et al.* (2009) Infant feeding and obesity at 11 years: prospective birth cohort study. *International Journal of Pediatric Obesity* **4**, 143–149.
- Pocock M., Trivedi D., Wills W., Bunn F. & Magnusson J. (2010) Parental perceptions regarding healthy behaviours for preventing overweight and obesity in young children: a systematic review of qualitative studies. *Obesity Reviews* **11**, 338–353.
- Puhl R.M. & Heuer C.A. (2010) Obesity stigma: important considerations for public health. *American Journal of Public Health* **100**, 1019–1028.
- QSR International (2008) NVIVO 8.0.
- Redsell S.A. (2010–2012) Systematic review of the risk factors for childhood obesity and development/ validation of an Infant Risk of Obesity Checklist. NHS Nottinghamshire County PCT Flexibility and Sustainability Fund.
- Redsell S.A., Atkinson P., Nathan D., Siriwardena A.N., Swift J. & Glazebrook C. (2010) Parents' beliefs about appropriate infant size, growth and feeding behaviour: implications for the prevention of childhood obesity. *BMC Public Health* **10**, 711.
- Redsell S.A., Atkinson P., Nathan D., Siriwardena A.N., Swift J.A. & Glazebrook C. (2011) Preventing childhood obesity during infancy in UK primary care: a mixed-methods study of HCPs' knowledge, beliefs and practice. *BMC Family Practice* **12**, 54.
- Reilly J.J., Armstrong J., Dorosty A.R., Emmett P.M., Ness A., Rogers I. *et al.*; Avon Longitudinal Study of Parents and Children Study Team (2005) Early life risk factors for obesity in childhood: cohort study. *BMJ* **330**, 1357. [see comment].
- Rooney B.L., Mathiason M.A. & Schauburger C.W. (2011) Predictors of obesity in childhood, adolescence, and adulthood in a birth cohort. *Maternal & Child Health Journal* **15**, 1166–1175.

- Rudolf M. (2009) *Tackling Obesity through the Healthy Child Programme*. National Obesity Observatory: Oxford. Available at: http://www.noo.org.uk/Mary_Rudolf (Accessed 4 June 2012).
- Seach K.A., Dharmage S.C., Lowe A.J. & Dixon J.B. (2010) Delayed introduction of solid feeding reduces child overweight and obesity at 10 years. *International Journal of Obesity* **34**, 1475–1479.
- Shrewsbury V. & Wardle J. (2008) Socioeconomic status and adiposity in childhood: a systematic review of cross-sectional studies 1990–2005. *Obesity (Silver Spring)* **16**, 275–284.
- Slining M., Adair L.S., Goldman B.D., Borja J.B. & Bentley M. (2010) Infant overweight is associated with delayed motor development. *The Journal of Pediatrics* **157**, 20–25 e21.
- Stettler N., Zemel B.S., Kumanyika S. & Stallings V.A. (2002) Infant weight gain and childhood overweight status in a multicenter, cohort study. *Pediatrics* **109**, 194–199.
- The NHS Information Centre (2010) *The National Child Measurement Programme: England 2009–2010 School Year*. The NHS Information Centre for Health and Social Care: London. Available at: <http://www.ic.nhs.uk/ncmp> (Accessed 4 June 2012).
- Townsend E. & Pitchford N.J. (2012) Baby knows best? The impact of weaning style on food preferences and body mass index in early childhood in a case-controlled sample. *BMJ Open* **2**, e000298.
- World Health Organisation (1998) Obesity: preventing and managing the global epidemic.