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## “Whatever average is:” understanding African-American mothers’ perceptions of infant weight, growth, and health

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### Abstract

Biomedical researchers have raised concerns that mothers’ inability to recognize infant and toddler overweight poses a barrier to stemming increasing rates of overweight and obesity, particularly among low-income or minority mothers. Little anthropological research has examined the sociocultural, economic or structural factors shaping maternal perceptions of infant and toddler size or addressed biomedical depictions of maternal misperception as a “socio-cultural problem.” We use qualitative and quantitative data from 237 low-income, African-American mothers to explore how they define ‘normal’ infant growth and infant overweight. Our quantitative results document that mothers’ perceptions of infant size change with infant age, are sensitive to the size of other infants in the community, and are associated with concerns over health and appetite. Qualitative analysis documents that mothers are concerned with their children’s weight status and assess size in relation to their infants’ cues, local and societal norms of appropriate size, interactions with biomedicine, and concerns about infant health and sufficiency. These findings suggest that mothers use multiple models to interpret and respond to child weight. An anthropological focus on the complex social and structural factors shaping what is considered ‘normal’ and ‘abnormal’ infant weight is critical for shaping appropriate and successful interventions.

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The idea that “bigger is better” when it comes to infant and young child size has long received attention in both biocultural anthropology and biomedicine (Ritenbaugh 1991). Evolutionarily, larger infant size has been portrayed as an adaptation promoting parental investment and improved survival during weaning (Kuzawa 1998; Wells 2003). In public health and medicine, larger infant size has served as a marker of healthy growth (Timmermans and Buchbinder 2012; Lampl and Thompson 2007), since low weight-for-age is associated with higher mortality from a range of illnesses (Caulfield et al. 2004). Consequently, parents and physicians have traditionally been concerned with preventing failure to thrive and low weight gain (Holub and Dolan 2012). With the increasing prevalence of overweight and obesity and weight-related health problems in even young

children (Adair 2008), however, biomedical concern in high-income countries has shifted from promoting infant weight gain to preventing overweight.

With this new focus on preventing overweight, concerns have been raised that few parents correctly identify overweight in infants and toddlers or recognize it as a problem requiring intervention (Doolen, Alpert, and Miller 2009). Much evidence documents that neither mothers nor many physicians are particularly good at identifying overweight (Chaimovitz et al. 2008); yet, misclassification is widely considered more likely if mothers are African-American or Hispanic, are themselves overweight or obese, or have low levels of income or education. These ‘failures’ of low-income and minority mothers to correctly identify child weight status have been portrayed as a barrier to -- or even a potential cause of -- childhood obesity (Jain et al. 2001; Sullivan et al. 2011). Further, limited evidence that African-American and Hispanic mothers may prefer larger infants has led some biomedical researchers to label childhood obesity “a sociocultural problem” (Killion et al. 2006). Despite interests in the symbolic meanings of body weight (Brown 1991; Brewis 2010) and how understandings of child growth and development are informed by class, locality, and cultural context (Hadley, Patil, and Gulas 2010; James 1993), anthropologists have not focused on maternal perceptions of infant overweight or how these perceptions are depicted in the current biomedical framework. Such an anthropological focus is critical for going beyond the biomedical model of “blaming and shaming” (Moffat 2010) African-American mothers’ presumed cultural preference for larger infants to understand how child weight and growth are conceptualized and understood.

Using quantitative and qualitative data from a sample of low-income African-American mothers from central North Carolina, we explore mothers’ perceptions of infant weight status within an ecocultural framework (Weisner 2002), positing that mothers’ assessments derive from personal experiences that are socially-constructed and contextualized in response to their social, cultural, and physical environments (James 2003). We examine how mothers assess the relative size of their infants compared to others in the community and, whether in addition to infant size, mothers’ concerns about infant growth, diet, and health influence their assessments. This focus on the multiple factors influencing mothers’ models of child growth is important for understanding how mothers assess ‘normal’ and ‘abnormal’ infant weight. Our findings suggest that, in contrast to biomedical assumption of a single cultural model, the African-American mothers in our sample do not uniformly subscribe to the idea that “bigger is better” when it comes to infant weight. Rather, peer- and community-based ideas of ‘normal,’ concerns about infant health, interactions with medical personnel, and their infants’ own bodily cues all shape how mothers respond to their children’s weight and interpret biomedical understandings of overweight.

## Methods

Low-income African-American mothers were recruited from WIC (Supplemental Services to Women, Infants and Children) clinics in central North Carolina for a formative, qualitative study or a longitudinal cohort of the Infant Care and Risk of Obesity Study.

The formative sample included 20 African-American women, 18–36 years of age, with healthy infants under the age of two. A trained African-American female interviewer sequentially recruited mothers to yield comparable numbers of infants in five age categories (3–6, 7–10, 11–14 and 15–20 months). All but three of the mothers participated in two 90-minute semi-structured interviews in their homes, yielding a total of 37 total interviews. Interviews were conducted using guides based on the existing literature and the researchers' previous work with infant feeding in a similar population (Bentley et al. 1999). Open-ended questions probed mothers' characterizations of healthy infants, how they determine if their child is growing and developing well, whether infants can be under/overweight, and how they know whether a child is under/overweight.

Interviews were tape-recorded and transcribed. Themes related to infant health, growth, underweight and overweight were coded manually. Text related to these larger themes was extracted from the data and iteratively coded to obtain a more refined understanding of particular issues (i.e. the role of physicians in defining infant overweight or medical problems as a marker of obesity). Codes were entered into data matrices to facilitate comparison of similarities and differences across responses. Similar responses were grouped and representative quotes were chosen as examples of each theme.

Quantitative measures of maternal perception of infant size and infant anthropometrics were collected in the separate cohort sample of 217 first-time mothers, aged 18–35 years, and infants followed in their homes at 3, 6, 9, 12, and 18 months postpartum. Maternal perception of infant size was assessed through a questionnaire administered at each home visit. Mothers' responses to the statements "my infant is fat right now" and "my infant is thin right now," which ranged from strongly disagree to strongly agree, were dichotomized to create the maternal perception of overweight and underweight variables, respectively. A positive value indicates agreement/strong agreement and 0 value indicates neutrality, disagreement or strong disagreement. Items assessing maternal concerns about infant weight and beliefs about healthy infant size and appetite (listed in Table 5) were similarly dichotomized to represent agreement and neutrality/disagreement.

Trained study personnel collected infants' anthropometry using standard techniques. Weight was measured on a digital scale to the nearest 10g and recumbent length was measured to the nearest 0.1cm with a portable length board. Subcutaneous skinfolds were measured to the nearest 0.2mm at three sites (subscapular, triceps, and abdominal) and summed to create a measure of overall infant adiposity. All anthropometric measurements were done in triplicate and the mean of these measures was used in analysis. Infant overweight was defined as a weight-for-length (WFL) above the 90<sup>th</sup> age- and sex-specific percentile and underweight as WFL below the 10<sup>th</sup> age- and sex-specific percentile of the CDC/NCHS 2000 growth reference (Ogden et al. 2002). We also created within-sample age- and sex-specific weight-for-length and sum of skinfolds z-scores as markers of infant size relative to others in the community. Since low-income, African-American infants in North Carolina have a greater prevalence of overweight than the national reference (Dalenius et al. 2012), sample infants may be more representative of the other infants mothers would see while at doctors' visits, daycares, and other locations.

Kappa measures of agreement were used to compare maternal perception of infant size to biomedically-defined infant under- and overweight. We used multinomial logistic regression models with a three-level outcome comparing perceived thin and overweight to perceived normal weight to assess whether maternal perception is associated with maternal and infant characteristics. We used similarly structured models to test whether maternal perception is associated with relative infant size and whether, in addition to infant size, maternal concerns about infant weight, health, and feeding shaped their assessments. These latter models are adjusted for infant sex, infant age at measurement, breastfeeding status, household food security, and repeated measures by subject. Food security was measured using the US Department of Agriculture Core Food Security Module and a scoring schema devised by Laraia and colleagues (2009) for this sample. A positive value indicates that the household is at least marginally food insecure, experiencing food unavailability and/or hunger due to lack of money in the past 12 months. In these models, the relative risk ratio can be interpreted as the likelihood that an infant with the exposure, such as higher relative weight-for-length z-score or mothers' concern that an infant will be overweight, will be perceived as overweight compared to normal weight holding other variables constant. All statistical analysis was performed with STATA software (version 12; STATA Corporation, College Station, TX).

## Results

The majority of mothers in the cohort sample perceived their infant's weight as normal at each home visit and several maternal and infant characteristics were associated with maternal assessment of infant size (Table 1). Mothers with a high school education, who were breastfeeding, or who had girls were less likely to assess their infant as overweight across visits.

The proportion of mothers describing their infants as overweight declined from 3-months to 18-months, when only 3% of mothers labeled their infant as overweight (Figure 1). The prevalence of measured infant overweight also declined over time from 29.5% at 3-months to 19.4% at 18-months; however, this prevalence was higher than maternal perception of overweight at all visits. Conversely, the proportion of mothers describing their infant as underweight increased across visits from 1.4% at 3-months to 23% at 18 months of age while measured infant underweight prevalence did not significantly differ across visits, remaining around 5%. Thus, maternal accuracy in perceiving infant weight status tended to be relatively low and declined with infant age (Table 2).

### Perceptions of growth and norms of infant size

We explored whether maternal perception of infant weight and adiposity were sensitive to infants' relative size using both quantitative and qualitative data. Overall, we found this to be the case (Table 3). Infants with higher sample-specific weight-for-length and sum of skinfold z-scores were more likely to be considered overweight across all visits. Conversely, infants with higher sample-specific weight-for-length and sum of skinfold z-scores were significantly less likely to be described as thin. Mothers' assessment of over- and underweight was more highly correlated with sample-defined under- and overweight than

with biomedically-defined over- and underweight at each visit (69.2% agreement vs. 64.5% at 3 months and 61.5% agreement vs. 56% at 18 months, respectively).

Formative interviews provided rich qualitative data on mothers' understandings of 'normal' and 'abnormal' infant growth (Table 4). Mothers' descriptions of healthy growth and development were linked to concepts of infant size and weight gain. As one mother described, a healthy baby is one who is "an average size, whatever average is, you know." Mothers described healthy infants as those, who in addition to having happy, content dispositions and meeting developmental milestones, gain adequate weight, have "normal growth patterns," and "eat enough food and drink enough." When asked about how they knew their child was growing and developing "the way they should," mothers mentioned comparing their infant's size to that of other infants either through direct comparison to the infants of friends and family members or indirectly through the use of growth charts during their pediatrician visits. Mothers described comparing their children to other children when they were "out and about" or to expected norms for their age based on clothing and diaper sizes. Similarly, discussion of the use of growth charts during pediatrician visits focused on the comparison between their infant's growth and other hypothetical infants. "When we go to the doctor, they put his little weight and his height on the chart," a mother of a 10 month-old boy explained. "They'll tell you if he's under scale or average or above."

Discussion of 'normal' growth in comparison to other infants also recurred in mothers' responses to how they can identify overweight in infants (Table 4). "Umm, I've seen babies" the mother of 6 month-old girl, responded when asked how she would know if her child was overweight. "First, the doctor will tell you if a baby is overweight or they'll tell you the percentile the baby's in ...and then you compare them to other babies and you can see- like my baby, she's kind of on the healthy side, but she's not really overweight." Similarly, the mother of a 10-month-old boy replied that overweight infants are those who "will just be bigger than the average child." Together, these quantitative and qualitative results suggest that mothers are assessing their infants in response to their own infants, local and societal norms, and biomedical models of 'normal' infant size.

### **Mothers' concerns about infant size and health**

In addition to infant size, mothers' concerns about infant size, feeding, and health were also associated with their assessment of their infants' weight (Table 5). Mothers who were "concerned that their child will be thin" or agreed that "thin infants are healthy" were more likely to assess their infants as thin. Similarly, mothers who thought their infant was a "picky eater" or had "a poor appetite" were more likely to view them as thin whereas mothers who thought their infants had good appetites or were healthy were significantly less likely to describe them as thin. Mothers who were "concerned that their child will be overweight," thought that "fat infants are healthy," or believed that their infant was a "greedy baby," a term used to describe vigorous, hungry infants (Bentley, Dee, and Jensen 2003), were more likely to perceive them as overweight.

The qualitative analysis supported these findings; generally, mothers perceived larger infants to be healthier and saw smaller size as indicative of poor appetites or health. While nearly all of the interviewed mothers (13 of 15 asked) agreed that babies can be overweight, their

responses indicated more ambivalence over whether infant overweight was indicative of health or a health problem. “To me he wasn’t overweight,” one mother of a 12-month-old boy related, “because he wasn’t like, he wasn’t where he didn’t do everything a normal child does.” Many of the described signals of an infant being overweight were quite extreme, such as interfering with age-appropriate development or causing health problems like shortness of breath. “You know, like, if they can’t move,” responded the mother of a 5 month-old boy. “They’re so cute, but they can’t move.” This tension between mothers’ knowledge of the biomedical view that obesity was associated with health problems and the idea that bigger babies are healthy was a recurrent theme. “I just think that babies are [overweight], you know. It’s a limit. But, most of the time, I just call it, you know, a healthy baby,” the mother of a 6-month-old girl described. When discussing their own children who had been identified as overweight, many mothers distinguished between doctors’ views of overweight and their own. “Just because her doctor says she’s overweight, I don’t think she is,” the mother of 6-month-old girl described. “So, some people see it differently. Because she looks like a healthy child to me.” Other mothers implicitly acknowledged the tension between the biomedical and “traditional” understandings of infant size noting that big doesn’t *necessarily* mean that a baby is healthy or in the words of one mother, “they don’t have to be obese to be healthy.”

In contrast, underweight was viewed as unhealthy. “If I saw a baby that was just like skinny, skinny, skinny for a baby, I wouldn’t think that baby was just like extremely healthy or eating well just because most babies are not like skinny...” one mother explained, “you [should] have a little bit of meat on your bones.” Thinness was associated with concerns that the infant was not getting enough food or care. As another mother described:

I think everybody has this little thing inside their head and you see a baby and they’re just skinny, especially a little baby, it’s just like, ‘Oh, they ain’t feeding that baby,’ you know, or something like that, where if you see a more plump baby, you know, you think okay, you just tend to think automatically in your mind that they’re a little healthier, which may not necessarily be the case, but that’s just the thing.”

Indeed, several mothers stated that they had not seen many low weight babies. They attributed infant underweight to ill health, neglect, or a lack of appropriate care by “upset” parents who “have money troubles or something like that” and are unable to “get what their kid needs.”

## Discussion

Our results, similar to those from other recent studies across a wide range of locations and ethnicities (see Doolen, Alpert, and Miller 2009), indicate that mothers are not particularly good at diagnosing biomedically-defined under- or overweight in their infants, with an accuracy that varied from 56–65% over the study period. Unlike much of the previous literature, however, we also found that mothers’ perceptions of infant weight status change over the course of infancy, that mothers are sensitive to their infant’s relative size in comparison to other infants in the community, and that concerns for health, growth, and development further shape mothers’ assessment of thinness and overweight. Together these



results suggest that, while mothers' assessments of weight status do not necessarily ally with biomedical definitions of under- and overweight, mothers do have explanatory models for evaluating infant size that draw from a number of sources including their individual infants, local and broader models of 'normal' size, and interactions with biomedicine.

Mothers were significantly less likely to label their infants as underweight and more likely to label their infants as overweight with increasing weight-for-length and adiposity compared to other infants in the cohort study. These results suggest that one way mothers judge their infant's growth is in comparison to local norms, a finding supported by the qualitative results. Mothers in the qualitative study described comparing their infants to others that they saw out and about as a way of evaluating whether their child was growing and developing "as they should." Mothers also compared their infants to expected norms from growth charts and clothing and diaper sizes and discussed their infants' size with their pediatricians. These descriptions also tended to revolve around ideas of "normal" or "appropriate" growth. Indeed, previous biomedical and anthropological research across a range of contexts suggests that parents' and physicians' notions of appropriate infant size are dominated by constructions of normality (Lucas et al. 2007; Timmermans and Buchbinder 2012). However, parents and medical professionals interpret "normal" growth with different frames of reference. Physicians and epidemiologists, concerned with preventing failure to thrive and obesity, tend to focus on the extremes of the distribution on growth chart. Parents—similarly to mothers in our qualitative study—tend to compare infant growth more locally to family members and other children in the community and more broadly with growth charts and age-appropriate clothing and diaper sizes (Lucas et al. 2007). The result of these comparisons, as Timmermans and Buchbinder (2012) describe, is that normalization becomes a standard part of clinical practices as well as an everyday strategy used by mothers to make sense of their uncertainty about infant feeding and health.

These differing views of "normal," however, may create tensions between biomedical and parental views of infant weight and health. Results from the qualitative study suggest that, as long as infants were playing, eating, and meeting developmental milestones, mothers viewed them as healthy even if they were considered overweight by their pediatricians. Similarly, mothers in the cohort study tended to make statements that fit with their children's current weight and health, for example, describing overweight as healthy if they perceived their infant to be overweight.

Biomedical researchers have raised concerns that the presumed preference of African-American mothers for larger body size in infants (Killion et al. 2006) and higher prevalence of overweight in African-American children (Ogden, et al. 2012) may mean that mothers may not recognize 'overweight' in their children since the term itself implies that weight is higher than that perceived as 'normal' and/or desired (Parkinson et al. 2012). Our results suggest, however, that most mothers are concerned with overweight in infants and do not, as previously assumed, necessarily view very overweight babies as healthier. Mothers in our study were concerned that infants were getting enough to eat and gaining weight. However, they also displayed a good deal of ambivalence over whether larger infants are healthier, commenting "bigger babies are not necessarily healthier." This ambivalence suggests that the presumed cultural model that "bigger is better" is not universally accepted among the

mothers in our study. Rather, our results highlight that, while this “traditional” view that larger size is indicative of health is present in the community, mothers are also framing their understandings of infant growth in response to biomedical messages that overweight and obesity negatively impact health and development. This variability in mothers’ models may also underlie our somewhat paradoxical quantitative results that both mothers who were concerned that their infants would be overweight and those who took a more positive view of overweight, agreeing that “fat infants were healthy” or that their infant was “greedy,” were more likely to perceive them as overweight.

What was less contested was the association of smaller infant size with ill health. Infants perceived as thin were less likely to be considered healthy and more likely to be viewed as picky eaters with poorer appetites than those who were considered a ‘normal’ weight. Mothers in the qualitative sample also described thin infants as unhealthy or not receiving proper care. While no mothers in the qualitative study described their own experiences with underweight infants, mothers of underweight children in other studies describe feeling judged as poor parents (Pagnini et al. 2007). Low-income White mothers have raised concerns that underweight infants may indicate to social services agencies, such as Child Protective Services, that they were not properly taking care of their infants (Baughcum et al. 1998). Thus, while not exclusively an African-American or low-income concern, the belief that small infants are unhealthy and reflect poor parenting and, its converse, that larger, though not necessarily overweight, babies are healthier and indicative of good parenting, could be particularly salient in communities with histories of poverty or marginalization..

Equation of underweight with unhealthiness and concerns that infants are getting enough to eat may also underlie our finding that maternal perception changes over time. The number of mothers describing their infants as overweight declined and as underweight increased dramatically, suggesting that mothers recalibrate their perceptions of ‘normal’ as their infants grow and develop. This increasing concern with infant underweight seen with age may reflect mothers’ concerns that infants are not getting enough as they become developmentally pickier in their food choices (Cashdan 1994) and more physically mobile. Conversely, the reduced concern with overweight may also reflect developmental changes, since infants tend to become less adipose in later infancy (Butte et al. 2000) and increase their physical activity. This changing perception with time highlights the dynamic nature of mothers’ concepts of normalcy and health (Cunningham-Burley 1990) and the individualized definitions of ‘normal’ that mothers create in relation to their own child (Timmermans and Buchbinder 2012).

## Conclusion

Unlike most biomedical studies on maternal perception of infant size, we explored the multiple sources of individual, comparative and biomedical information that mothers’ use to interpret infant growth and development using both qualitative and longitudinally-collected quantitative data. Our results show that mothers are sensitive to their infants’ relative size in comparison to other infants in the community, even if they are not good at diagnosing biomedically-defined under- and overweight. Importantly, we found that mothers show ambivalence over the perception that “bigger babies are better” and are concerned with



overweight, particularly in larger infants. While confirming previous research that mothers' assessment of overweight does not closely ally with biomedical definitions, our research further highlights the dynamic nature of maternal perceptions of infant size and concerns for child health as infants' grow and develop. Rather than confirming the assumption from previous studies that low-income and African-American mothers view larger infant size as healthier, we found considerable ambivalence with this presumed cultural model. This finding is particularly important given recent concerns that reducing obesity in the most vulnerable groups in societies requires strategies that do not explain behavioral variation with "spurious theories of culture that equate an ethnic categorization with a worldview" (Brewis 2010).

Our data suggest that mothers draw from multiple sources in developing their models of appropriate and inappropriate infant weight. Further research is needed to formally define these models and to test whether they are associated with child health and well-being (Hruschka et al. 2008). Nonetheless, our focus on the multiple models mothers use to understand 'normal' infant growth and overweight shifts attention away from a single presumed cultural model and highlights the embeddedness of maternal views of infant size, growth and health in their ecological, psychosocial, and cultural context. This understanding is critical for designing interventions that go beyond blaming low-income or minority mothers for childhood obesity to more fully consider the relational, social and physical context underlying mothers' perceptions of and concerns about infant weight.

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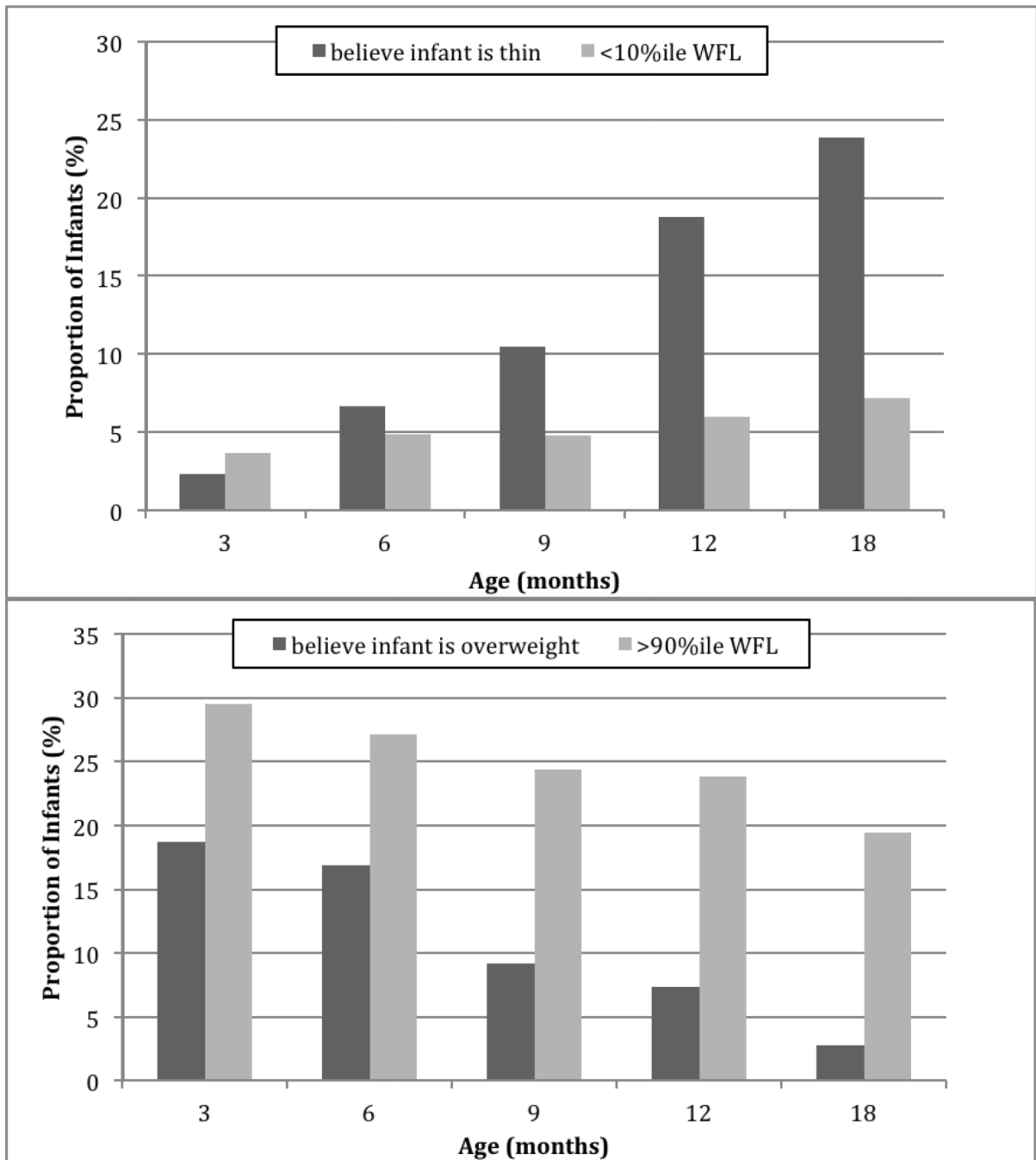
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**Figure 1.** Maternal Perception of Infant Size and Biomedically-Defined Infant Underweight and Overweight from 3–18 months of age

**Table 1**

Sample characteristics of the Infant Care cohort study at the 3-month visit

	Overall (N=217)	Thin (N=3)	Perception	
			Normal Weight (N=171)	Overweight (N=40)
	%(N)/mean (SD)		% (N)/mean (SD)	
<i>Maternal and household characteristics</i>				
Maternal education (%hs grad)	73 (154)	66.7 (2)	76.5 (130)	57.9 (22)*
Marital status (%single)	88.8 (190)	100 (3)	88.8 (151)	86.8 (33)
Maternal age (years)	22.7 (3.8)	24.7 (3.2)	22.7 (3.8)	22.5 (3.8)
Maternal obesity (% BMI >30 kg/m <sup>2</sup> )	44.2 (96)	66.7 (2)	43.3 (74)	47.5 (19)
Food insecure (%moderate/ fully insecure) <sup>a</sup>	46.0 (98)	66.7 (2)	42.8 (72)	56.4 (22)
<i>Infant characteristics</i>				
Infant Sex (%female)	53.5 (116)	33.3 (1)	56.7 (97)	37.5 (15)*
Breastfed (% at visit) <sup>b</sup>	22.6 (49)	0 (3)	25.2 (43)	12.5 (5)*
Infant weight (kg)	6.39 (0.8)	6.38 (0.53)*	6.30 (0.80)	6.75 (0.84)*
Infant length (cm)	60.60 (2.46)	60.99 (0.28)*	60.56 (2.48)	60.75 (2.60)

\* p<0.05 significantly different from normal weight in multinomial regression models across visits controlling for infant age and repeated measures by subject.

<sup>a</sup> Measured using the US Department of Agriculture Core Food Security Module and a scoring schema devised by Laraia and colleagues (2009) for this sample;

<sup>b</sup> Includes infants receiving any breastmilk during the month of the study visit

**Table 2**

Maternal perception of infant size compared to biomedically-defined weight status from 3 to 18 months of age

	Visit					
	3 (n=217)	6 (n=164)	9 (n=162)	12 (n=148)	18 (n=109)	
<b>Perceived weight</b>	%	%	%	%	%	%
Thin	1.4	6.6	10.4	18.1	22.9	
Normal weight	79.9	76.5	80.4	74.5	74.3	
Overweight	18.7	16.9	9.2	7.38	2.8	
<b>Biomedically-defined weight status</b>						
Underweight (<10 <sup>th</sup> %ile WHZ) <sup>a</sup>	3.7	4.8	4.8	6.0	7.2	
Normal weight (10–90 <sup>th</sup> %ile WHZ)	66.8	68.1	70.8	70.2	73.4	
Overweight (>90 <sup>th</sup> %ile WHZ)	29.5	27.1	24.4	23.8	19.4	
<b>Agreement (%)</b>	64.5	62.8	69.1	58.6	56.0	
<b>Kappa (p)</b>	0.13 (0.01)	0.13 (0.02)	0.24 (<0.01)	0.07 (0.11)	0.02 (0.39)	

<sup>a</sup>Compared to the 2000 CDC/NCHS reference



**Table 3**

Association between maternal perception of infant weight status and relative infant size across 3 to 18 months of age

	Maternal Perception	
	Thin <i>RRR<sup>a</sup>, 95%CI</i>	Overweight <i>RRR, 95%CI</i>
<b>Weight-for-length z-score</b>	0.31, 0.21–0.46*	2.09, 1.44–3.04*
<b>Sum of skinfolds z-score</b>	0.83, 0.77–0.90*	1.10, 1.05–1.15*

<sup>a</sup>Relative risk ratio for outcome compared to infants perceived as normal weight for a 1-SD increase in weight-for-length/ sum of skinfold z-score controlling for infant age, sex, breastfeeding, food security, and repeated measures by subject.

\* p<0.05

**Table 4**

Frequency of responses to interview questions regarding infant growth, health and overweight

<b>Response</b>	<b>What are the characteristics of a healthy baby? (N=15)<sup>a,b</sup></b>	<b>How do you know your infant is growing and developing as they should? (N=15)</b>	<b>How do you know an infant is overweight? (N=13)</b>
Observe own infant	--	5	1
Compare to other infants	--	3	5
Ask pediatrician	--	8	6
Growth charts	--	3	3
Growth/size	5	10	1
Compare to "norm," clothing or diaper size	2	2	2
Eating well	6	3	--
Meeting developmental milestones	2	5	--
Temperament (happy, content, etc)	23	3	--
(No) limitations/ health problems	2	--	4

<sup>a</sup> Responses do not sum to the number of mothers responding due to the multiple answers provided for each question.

<sup>b</sup> Not all mothers were asked every question on the interview script.

**Table 5**

Association between mothers' perception of infant size and concerns with weight, feeding, and health across 3 to 18 months of age

<i>Maternal Concerns</i>	Perception	
	Thin	Overweight
	<i>RRR, 95% CI<sup>a</sup></i>	<i>RRR, 95% CI<sup>a</sup></i>
Concern child will be overweight	1.28, 0.41–3.98	5.42, 2.90–10.11**
Concern child will be thin	7.17, 2.09–24.57**	2.09, 0.37–11.79
Fat infant healthy	0.93, 0.27–3.18	3.24, 0.92–11.50*
Thin infant healthy	1.96, 0.96–4.00*	1.19, 0.38–3.73
Greedy infant	1.20, 0.67–2.16	2.72, 1.61–4.59**
Infant is a picky eater	2.09, 1.23–3.55**	1.33, 0.73–2.42
Infant has a poor appetite	4.24, 1.35–13.32**	10.65, 0.70–163.39
Infant has a good appetite	0.42, 0.22–0.83**	0.56, 0.10–3.18
Infant is healthy now	0.37, 0.15–0.94**	0.69, 0.19–2.49

<sup>a</sup>Relative risk ratio represents the likelihood of being viewed as underweight or overweight (compared to normal weight) with a positive response to the health concern variable, controlling for infant age, sex, infant weight, breastfeeding, food insecurity, and repeated measures by subject.

\*\*  
p<0.05

\*  
p<0.10