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Child feeding style is associated with food intake and linear growth in rural Ethiopia

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ABSTRACT

Background: Little is known about mother-child feeding interactions and how this is associated with food intake and linear growth.
Objective: To characterize mother-child feeding styles and investigate their associations with accepted mouthful and linear growth in west Gojam, rural Ethiopia.
Subjects/design: Two, in-home, meal observations of children aged 12–23 months (n = 100) were videotaped. The number of mouthful accepted was counted and the caregiver/child feeding styles were coded into positive/negative categories of self-feeding, responsive-feeding, active-feeding, social-behavior and distraction. Data on socio-demographic characteristics, child feeding practices, perception about child's overall appetite, and strategies adopted to overcome food refusal were collected through questionnaire-based interviews. Child and mothers' anthropometric measurements were also taken.
Results: Stunting was highly prevalent (48%) and the number of mouthful accepted was very low. Offering breastmilk and threatening to harm were the main strategies adopted to overcome food refusal. Although all forms of feeding style were present, active positive feeding style was dominant (90%) and was positively associated with mouthful accepted. Talking with non-feeding partner (64%), and domestic animals (24%) surrounding the feeding place were common distractions of feeding. Feeding was mostly terminated by caregivers (75%), often prematurely. Overall, caregivers of stunted children had poorer complementary- and breast-feeding practices and were less responsive to child's hunger and satiation cues ($P < 0.05$). Positive responsive feeding behaviors were associated with child's number of mouthful accepted ($r = 0.27$; $P = 0.007$) and stunting ($r = 0.4$; $P < 0.001$).
Conclusion: Low complementary food intake in this setting is associated with caregivers' feeding style and stunting. Nutrition interventions that reinforce messages of optimal infant and young child feeding and integrate the promotion of responsive feeding behaviors are needed.

1. Background

Close to six million children under the age of five died in 2015 and ~45% of these deaths are believed to be linked with malnutrition (WHO, 2016). Children that survive this scourge are often undernourished and suffer from the consequences of stunting that includes diminished cognitive and physical development and reduced productivity later in life (Adair et al., 2013; Martorell et al., 2010). Stunted girls grow-up to become mothers with short stature, increasing the risk of delivering low-birth weight babies (Victora et al., 2008) and thus contributing to the inter-generational cycle of malnutrition. Reversing the consequences of stunting is often difficult past the age of two. Consequently, stunting prevention strategies are giving emphasis to the first 1000 days from conception to the child's second birthday (Baye & Faber, 2015).

Stunting often reaches a peak during the complementary feeding period (Victora, de Onis, Hallal, Blössner, & Shrimpton, 2010), partly because of inappropriate complementary feeding. In most developing countries, the amount of food consumed by infants and young children is lower than their theoretical gastric capacity; hence, making intake requirements even more difficult to meet (Baye, Guyot, Icard-Verniere, & Mouquet-Rivier, 2013; Gibson et al., 2009). For example, earlier studies in Ethiopia have consistently reported low energy and nutrient intake from

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complementary foods (Abebe, Haki, & Baye, 2017; Baye et al., 2013; Mengistu, Moges, Samuel, & Baye, 2017).

Efforts to improve complementary feeding have often relied in increasing the energy density through for example the addition of α-amylase and, or increasing the nutrient-density by fortifying the complementary foods with vitamins and minerals (Berger, Wieringa, Laillou, Van, & Dijkhuizen, 2013). However, very few studies investigated how feeding style behaviors adopted by caregivers can affect food/energy intake and thereby influence child growth in low income countries (Bentley, Wasser, & Creed-Kanashiro, 2011; Mouquet-Rivier et al., 2016; Vazir et al., 2013). Only a couple of studies specifically looked at the feeding style behaviors of Ethiopian mothers (Aboud & Alemu, 1995; Wondafrash, Amsalu, & Woldie, 2012). The first is an observational study that recorded feeding styles of mothers with children aged 16–42 months. The second was a questionnaire-based assessment of feeding styles of caregivers of children aged 6–23 months of age. Both studies had a very wide age range, especially when considering the dynamic nature of feeding behaviors in early childhood (Hodges et al., 2013).

To what extent feeding styles are associated with food intake and child growth remains unknown. This is unfortunate, as knowledge on current feeding practices and their association with food intake and child growth may inform policies and programs that aim to improve complementary feeding practices and thereby prevent stunting. Therefore, the objective of the present study was to characterize caregivers' feeding behaviors and examine their association with food intake and growth faltering.

2. Subjects and methods

2.1. Study area and participants

The study took place in rural Ethiopia. Hundred caregiver-child pairs participated in the study. The inclusion criteria were having an apparently healthy young child (12–23 months of age), be willing to be observed during two meal occasions, and living in the study area with no intention to leave until the study ends. This study is part of a series of studies that aimed to investigate complementary feeding in West Gojam. The sample size was calculated from power analyses calculated to detect a medium effect size (0.5 standard deviation difference between means [1-tailed], with $\alpha = 0.05$ and power of 0.80 to allow comparison of 2 groups in one or more of the outcomes considered (e.g. stunting). This resulted in a sample size of 102 that was augmented to 120 to allow 15% non-response rate. However, twenty dropped-out due to various reasons: child sickness that can affect food intake ($n = 10$) and incomplete anthropometric measures ($n = 10$).

2.2. Ethics

Ethical approval was granted by the Human Ethics Committees of the College of Natural Sciences, Addis Ababa University, and the Amhara National Regional State Health Bureau. Verbal informed consent was obtained from families prior to their participation. All questionnaires and consent forms were translated to Amharic prior the survey.

2.3. Socio-demographic characteristics

Questions on the socio-demographic characteristics of the caregivers were asked through face-to-face interviews. The questionnaire included questions on land ownership, livelihood, and parents' education.

2.4. Anthropometric measurements

The length/height and weight of the children/mothers were measured in triplicate using standardized techniques, with children and mothers wearing light clothing and no shoes. All anthropometric measurements were made by the same person to avoid inter-examiner errors. For the children, Z-scores for length-for-age (LAZ), weight-for-age (WAZ) and weight-for-length (WLZ) were calculated using WHO multicenter growth reference data (WHO, 2006) using the software ENA 2007. Stunting, underweight, and wasting were defined respectively as LAZ, WAZ or WLZ <-2. Maternal body mass index (BMI) was calculated as weight (kg)/height $(m)^2$.

2.5. Child feeding knowledge and practice

During the first visit, before the meal observations, mothers/caregivers were interviewed about their experiences concerning breastfeeding, feeding their child, and other caring practices. Questions were asked to gather information about feeding during and after sickness, child encouragement during feeding, mothers' perception about hunger and satiation cues, strategies used to overcome child food refusal.

2.6. Feeding event observation

To assess caregiver child interactions, children and their caregivers were video-taped on two different days, a week apart. The feeding episode was recorded during the day time meal (lunch). The date of the visit was not announced to the caregivers and the choice of food was free. The videographer had arrived at the participants' home before the feeding event started, and sat in a position that was not intrusive, but still allowing him to videotape the observed behaviors. Before videotaping, caregivers were instructed to feed their child as they would normally do. The families were told that the observer would return the following week again on an unspecified day. On the second visit, observations of the feeding event were repeated. Once the videotaping was completed, the recorded feeding episodes were transferred to a computer for coding and analysis.

2.7. Coding and analyses of feeding behaviors

The behavioral coding scheme was adapted from a previous study (Moore, Akhter, & Aboud, 2006) with slight modification to fit the Ethiopian context (Table 1).

Behaviors were coded in to five categories: self-feeding, responsiveness, active feeding, social behavior and distraction. Each category had a positive and negative classification: positive meaning that it promoted feeding and negative that it was aversive, intrusive or interrupted feeding. The behaviors of both the caregiver and the child were coded in which the unit of behavior was the smallest meaningful action or word/voice. The caregiver and the child behaviors were coded similarly. The coding was performed twice by the same coder (first author) and any inconsistencies were revised.

The number of times a single behavior occurred was counted. A behavior that occurred at least two times per feeding episode was recorded as present, otherwise not. Each caregiver and child received a behavioral category score reflecting the frequency with which it exhibited that behavior. Number of breast feedings, mouthfuls accepted, and rejected, duration of the feeding episode, and type of offered food were noted. Values for each variable were calculated, summed and averaged for the two visits to the household. The average values were used for the analysis. Also, caregiver