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Young Child Feeding Transitions Vary by Birthweight, Income, and Race: Evidence from a National Survey

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Abstract

Introduction: Ages when young child feeding (YCF) transitions occur have strong impact on health. Even though parents may modify YCF to suit birth outcome, evidence is lacking especially from large national surveys. The objectives of this study are to determine ages when children transitioned to different foods and any associations with birthweight, income, and race. **Methods:** Existing cross-sectional data from the U.S. National Health and Nutrition Examination Survey 2011-2018 were analyzed to meet research objectives. Multinomial logistic regression models were used to estimate adjusted odds ratios after controlling for other determinants. The analytical sample comprised 10,169 children, aged 0-5 years.

Results: Low birthweight significantly associated with early cessation of breastfeeding, early transition to formula, longer months of feeding formula, and delayed start of complementary feeding. Low-income and middle-income parents were more likely to transition their children from breastmilk to formula, complementary food, or cowmilk at a younger age than high-income parents. Black parents were less likely to breastfeed, and like Mexican parents were more likely to transition from breastfeeding before their children reached 6 months of age.

Conclusion: Birthweight, income, and race are significant influential factors of child feeding transition. Perinatal nutrition programmers should integrate birthweight, income and racial factors into efforts to improve YCF.

Keywords

Feeding transition, birthweight breastfeeding, weaning birthweight, income child feeding, race feeding behavior

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1. Introduction

This study provides information on how birth outcome and sociodemographic factors impact young child feeding (YCF) transitions using a nationally representative dataset from a technologically advanced country. By Feeding transition, we mean the initiation or cessation of feeding breastmilk, formula, cowmilk, and complementary foods. The focus of the present study differs from the study on feeding practices and growth patterns of moderately low birthweight infants in resource-limited settings (Vesel, Bellad, & Manji, 2023), and differs from the study on racial/ethnic patterning of birth weight status (Ro, Goldberg, & Kane, 2019). It is most often assumed that ages at which children transition to different foods during weaning coincide with that stipulated in weaning guidelines. However, unfavorable birth outcome, socio-economic conditions, and race/ethnic norms are likely to modify feeding transitions. Nonetheless, how birth outcome, including low birthweight (LBW), modifies young child feeding transitions has not been specifically reported.

In physiological terms, the age at which children are fed various foods is a strong determinant of their overall health even in adulthood (Kelly et al., 2019, Young & Krebs, 2013, Burdette, 2006, Stettler et al., 2005). Timely feeding transition implies suitable exposure of children's immature gastrointestinal tract, physiology, immunity, and genome to bioactive food components. Thus, suitable feeding transitions during the early years of life are essential to the development of healthy dietary pattern, and reduction of cowmilk protein allergy (CMPA), protein-energy malnutrition (PEM), metabolic diseases, and adverse epigenetic changes (Kelly et al., 2019, Young & Krebs, 2013, Stettler et al., 2005, CPS, 2004). Premature child feeding transition has been associated with iron and protein deficiencies, faltering growth, and childhood obesity (Young & Krebs, 2013, Burdette, 2006, Stettler et al., 2005, Baker & Greer, 2010, Dewey, 1999).

Appropriate young child feeding (YCF) transition begins with timely initiation of weaning, defined as the gradual transition from exclusive breastfeeding to complementary foods and culturally appropriate family foods (FNS, 2021, CDC, 2021a, Kleinman, 2000, WHO & UNICEF, 2003). However, child weaning practices vary across race/ethnic groups ranging from an abrupt transition from breastmilk to family food, to graduated transition from breastmilk or infant formula to pureed complementary foods, and subsequently to family foods (AAP, 2020, PHA, 2008, USDA, 2019). The precise nutritional needs of children for growth and development, in addition to their delicate gastrointestinal environment necessitate careful timing, planning, and efficient management of related resources. Thus, specific feeding guidelines have been established by health departments and pediatrician groups which stipulate ages parents should transition from breastmilk or infant formula (formula) to complementary foods and family diets (AAP, 2020, PHA, 2008, USDA, 2019). Among the sources of YCF guidelines are the American Academy of Pediatrics (AAP), the Division of Nutrition of the Centers for Disease Control and Prevention, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) of the Food and Nutrition Services of the USDA, and the Academy of Breastfeeding Medicine (FNS, 2021, CDC, 2021, Kleinman, 2000, AAP, 2020, Karmaus, Soto-Ramírez, & Zhang, 2017, WHO & UNICEF, 2014). Among the AAP recommendations are exclusive breastfeeding for the first 4-6 months of life, introduction of solid food at 4-6 months of age, and continued breastfeeding till the first birthday depending on the feeding prowess of the child (Kleinman, 2000, AAP, 2020, AAP, 1998). A frequent recommendation is to transition from breastfeeding at age 12 months, but parents may transition at an earlier or later age as they deem fit (FNS, 2021, CDC, 2021, Kleinman, 2000, PHA, 2008). Among these guidelines, the decision to transition from breastfeeding is deemed a personal choice by the child and parent (FNS, 2021, CDC, 2021). Consequently, feeding guidelines may be modified by parents and pediatricians when birth outcome is unusual. Parents may rely on experiences and motivating factors to guide transition from breastmilk or formula to complementary purees, cowmilk, or solid foods (PHA, 2008, USDA, 2019). Some of these motivating factors are late preterm birth (birth before 37 weeks of gestation), small for gestation age (SGA), premature birth (birth before 28 weeks of gestation), low birthweight (LBW) (birthweight <2.5 kg) and macrosomia (birthweight > 4.0 kg) (Vesel, Bellad, & Manji, 2023, Kleinman, 2000, AAP, 2020, USDA, 2019, AAP, 1998, Cashin & Oot, 2018). Even when birth outcome is normal, factors such as maternal health, dry nursing, socio-economic status, and maternal support may alter feeding transitions (Kleinman, 2000, PHA, 2008, USDA, 2019). Ability to latch, swallow, and to digest food are factors that influence YCF feeding transition (Kleinman, 2000, PHA, 2008, AAP, 1998). Other influential factors that alter feeding transition are race/ethnic affiliation and socioeconomic status (Vesel, Bellad, & Manji, 2023, Ro, Goldberg, & Kane, 2019, Dewey, 1999). Reports on the extent to which birthweight, race/ethnic affiliation and income influence YCF feeding transitions are lacking. The present study ascertains how birthweight, income and race alter YCF. The main outcome measure was child's age when transitioned from one food to another, such as from

breastmilk to formula. The percentages of children who transitioned at various ages were determined and then partitioned by birthweight status, family income and race/ethnic group to determine associations.

Methods

Participants and data sources

This study involves analysis of existing survey data from parents who responded to questions about their children, aged 0-5 years, during the National Health and Nutrition Examination Survey (NHANES) 2011-2018 cycles (CDC, 2023). Parents were included in this study if they had a child aged ≤ 5 years, and had data on birthweight, YCF, family income, race, and sex. The (NHANES) 2011-2018 demographics, early childhood, and diet behavior datasets were merged to obtain a composite analytical dataset comprising information on 10,169 children (CDC, 2023, CDC, 2019). This analytical sample comprised 5,164 boys and 5,005 girls. Children ages 0-5 years were included in the study to acquire large enough sample for reliable analysis.

During the NHANES 2011-2018 cycles, like in other NHANES, protocols involving human subjects received full review and approval by the Ethics Review Board of the National Center for Health Statistics, Centers for Disease Control and Prevention (Protocol #2011-17) (CDC, 2017). The current study involves secondary data analysis of publicly available deidentified datasets so it was exempted from local human subject review.

Data collection

Trained field staff collected in-person interview data from parents in Mobile Examination Centers (MEC) during the NHANES 2011-2018 cycles. Data collection involved use of a computer-assisted personal interview (CAPI) system (CDC, 2017, CDC, 2020). Interview data collection applied significant precautions, including repeated measures to improve reliability and validity. Further details of the data collection procedures are provided elsewhere (CDC, 2017, CDC, 2020). The datafiles used for this study contained parents' responses to demographic, diet behavior, early childhood and YCF questions (CDC, 2023). Excerpts of questions included: 1) was child ever breastfed, 2) age stopped breastfeeding, 3) age fed formula, 4) age stopped receiving formula, 5) age started other food/beverage, 6) age fed cowmilk, 7) family income, and 8) race/ethnic affiliation.

Data analysis strategy

The percentages of children at various ages who were transitioned to different foods by their parents were ascertained by means of frequency tabulation and cross-tabulation analyses across birthweight, income, and race/ethnic groups. Significant differences between the proportions of children within groups were tested using the Pearson χ^2 -test of independence. To enable control of confounders, multinomial logistics regression models were used to determine associations between ages when feeding transitions occurred and birthweight, income, and race. Because the NHANES uses stratified multistage probability cluster sampling design including oversampling of minority populations, data are released with analytical weights and guidelines to safeguard unbiased estimation of nationally representative outcomes (CDC, 2017, CDC, 2018). To accommodate NHANES complex survey design and analytical weights, STATA version 12.1 software (STATA Corporation, College Station, Texas) was used for deriving inferential results. The NHANES analytical weights were applied during data analysis (CDC, 2018). Racial groups were collapsed into three categories: black (non-Hispanic), Mexican American and other Hispanics (Mexicans), and white (non-Hispanic). The white (non-Hispanic) category included other racial groups such as Asians and multi-racial populations whose sizes were inadequate for partitioning. Income was expressed as poverty income ratio (PIR) defined by the US Census Bureau (DHHS, 2019). Three income groups were defined in accordance with the individual family monthly poverty level index (INDFMMPPI) used to determine eligibility for federal assistance programs (CDC, 2019). Based on the INDFMMPPI, participants were classified as low-income (PIR < 1.30), middle-income (PIR = 1.30-1.85), and high-income (PIR > 1.85) (CDC, 2019, DHHS, 2019, Zhao et al., 2020). Birthweight was dichotomized as low birthweight (birthweight < 2.5 kg) and normal birthweight (birthweight $\geq$ 2.5 kg) (Ro, Goldberg, & Kane, 2019, Cashin & Oot, 2018, Tayie et al., 2021, Louer, Simon, & Switkowski, 2017). The low birthweight group includes children who had low birthweight because they were born SGA, late preterm, or premature. During the multinomial logistics regression analyses, associations were adjusted for income, race and sex to estimate adjusted odds ratios (aOR) where applicable. The high-income, normal birthweight, and white (non-Hispanic) categories were treated as referents to avoid collinearity. During data analyses, statistical significance was assessed at $P < 0.05$.

Results

Background and demographics

The mean ages in each category of birthweight, income and race were similar (Table 1). Overall, the observed mean birthweight was 3.09 ± 0.02 kg. The mean birthweight seemed dissimilar between boys (3.14 ± 0.01 kg) and girls (3.04 ± 0.02 kg), $p < 0.001$. The racial groups in this study comprised 13.3% black, 25.6% Mexican and 61.1% white. The income groups comprised low-income, 41.6%; middle-income, 13.3%; and high-income, 45.1%. The overall prevalence of LBW was 12.3%. Compared to whites (10.3%), blacks (21.4%, $p < 0.001$) had significantly higher prevalence of LBW, but not Mexicans (12.4%, $p = 0.378$). It is noteworthy that the prevalence of LBW among blacks was within the upper limit of the global prevalence of 15-20% around same period (Cutland et al., 2017). Greater proportion of the children were fed formula (86.3%) than were fed breastmilk (79.1%), $p < 0.001$. Among the children who were fed breastmilk, 52.9% of them received formula concurrently.

Overall, 14.9% of the parents stopped feeding breastmilk within the first month. Almost all the children (94.6%) who transitioned from breastmilk within the first month started formula. Among the children who transitioned from breastmilk before 6 months of age, over half (54.8%) started formula compared to those (42.8%) who transitioned from breastmilk after 6 months of age. Among the children who were breastfed, there was no prominent age when breastfeeding ceased as frequencies spanned from birth to many months (Figure 1A). Among those who were formula fed, most of them started on day 1 (42.5%). The most frequent age when parents stopped feeding formula was the 12th month (Figure 1B). Though initially erratic, the most frequent age when complementary feeding started was 6 months (31.2%) (Figure 1C). Overall, about 13.6% of the children were fed cowmilk before they reached their first birthday. However, majority of the children (84%) were transitioned to cowmilk sharply around age 12 months (Figure 1D).

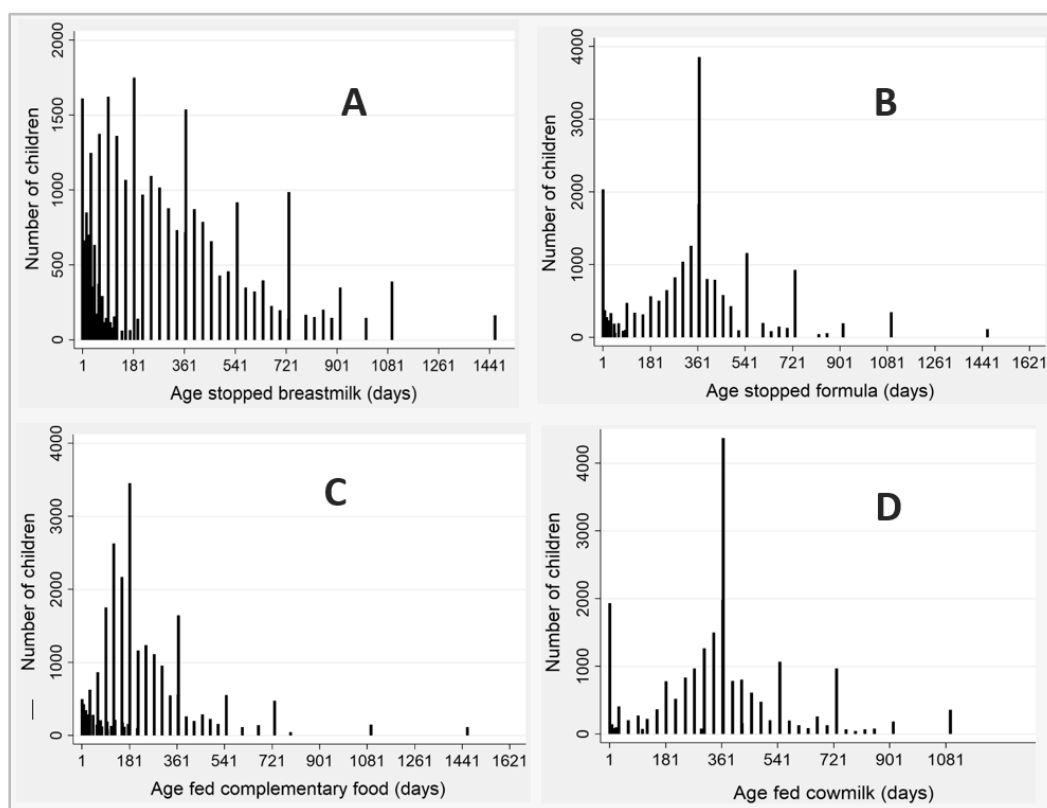


Figure 1. Spike plots showing ages when parents transitioned their children to various foods, (N=10,169)

- A: Ages when parents stopped feeding breastmilk
- B: Ages when parents fed foods other than breastmilk or formula
- C: Ages when parents stopped feeding formula
- D: Ages when parents fed cowmilk.

Table 1. Demographic characteristics and feeding transitions by income, race and birthweight

	Income level			Race/ethnicity			Birthweight status		
	Low <1.30 PIR [†]	Middle 1.30-1.85 PIR	High ^{††} >1.85 PIR	Black	Mexican Americans	White	Low <2.5 kg	Normal ≥2.5 kg	Total sample
	Column percentage (%)								
Boy (n=5,164)	51.1	56.6	49.6	49.9	51.4	51.3	45.9	51.8	50.8
Girl (n=5,005)	48.9	43.4	50.4	50.1	48.6	48.7	54.1	48.2	49.2
<i>Age stopped breastfeeding (days)</i>									
1-30 (n=1,144)	20.7*	16.2*	10.2	18.0*	17.3*	13.3	18.4*	14.5	14.8
31-180 (n=2,291)	33.3*	32.8*	26.2	36.9*	36.0*	26.8	38.6*	29.3	30.2
181-270 (n=1,309)	18.5	19.9	19.1	20.8	15.6	19.5	17.1	18.8	18.6
271-365 (n=1,149)	12.7*	15.9*	24.2	15.3*	15.3*	20.5	14.5*	19.2	18.6
>365 (n=1,018)	14.8*	15.2*	20.4	9.1*	15.8*	19.9	11.4*	18.3	17.7
<i>Age fed infant formula (days)</i>									
1-30 (n=5,624)	67.2*	64.5*	53.5	68.8*	66.6*	56.9	72.3*	59.3	61.1
31-180 (n=1,908)	20.7	22.5	26.0	19.6*	21.8	24.7	17.6*	24.2	23.3
≥181 (n=1,246)	12.1*	13.0*	20.5	11.6*	11.7*	18.4	10.1*	16.5	15.6
<i>Age stopped infant formula (days)</i>									
1-30 (n=152)	2.4	3.1	2.3	0.8*	2.5	2.8	2.0	2.5	2.5
31-180 (n=157)	1.6	0.9	2.7	1.7*	1.8	2.1	1.2*	2.1	2.0
181-270 (n=308)	5.1*	2.3	2.1	6.3*	2.7*	3.3	5.2*	3.4	3.5
271-365 (n=5,560)	78.4*	79.0*	74.4	80.9*	80.5*	73.8	70.7*	77.5	76.8
>365 (n=991)	12.5*	14.6	18.5	10.3*	12.6*	18.1	20.9*	14.5	15.3
<i>Age fed compl foods (mo)[‡]</i>									
1-3 (n=601)	6.5	7.63*	4.2	8.4*	5.7	5.0	5.2	5.7	5.6
4-6 (n=3,737)	34.2*	38.4*	44.7	32.5*	33.8*	42.5	33.4*	39.9	39.5
>6-12 (n=5,700)	59.4*	54.0	51.1	59.1*	60.5*	52.5	61.3*	54.4	54.9
<i>Age fed cowmilk (mo)</i>									
<6 (n=174)	2.0	1.2	1.8	2.5	1.3*	2.0	2.6*	1.7	2.0
≥6-11 (n=1,163)	14.9*	13.7*	9.0	16.0*	9.9	12.0	12.7	11.9	13.6
≥12 (n=7,237)	83.1*	85.1*	89.3	81.5*	88.7*	86.0	84.7	86.4	84.4

[†]PIR is poverty-income ratio. [‡]Compl is complementary. ^{††}Referent categories: High-income, white, and normal birthweight. NHANES analytical weights were applied. Low birthweight is birthweight <2.5 kg. Values within columns may not add up to exactly 100% due to rounding. *Significantly different from the referent category (p<0.05).

Birthweight and feeding transition

Birthweight associated with feeding transitions (Table 1). Ages when feeding transitions occurred in relation to birthweight status are shown in Figure 2. By age 6 months, 57.0% (p=0.001) of children born LBW had transitioned from breastmilk compared to 43.7% of children born normal birthweight status. After controlling for income, race and sex, children who were born LBW were more likely than those born normal birthweight to transition from breastmilk within the first 30 days (aOR: 1.56, 95% CI: 1.09-2.44). Significantly greater percentage of children who were born LBW (72.3%, p<0.001) were fed formula within the first 30 days compared to those born normal birthweight (59.3%). This difference remained significant after controlling for income, race and sex (aOR: 1.87, 95% CI: 1.29-2.71). Initiation of complementary feeding before 6 months of age seemed delayed for children born LBW (38.7%, p=0.003) than normal birthweight (45.6%).

Income and feeding transition

Children from low-income and middle-income parents differed from their high-income counterparts in feeding transitions (Table 1). Significantly lower percentages of children from low-income (72.2%, p=0.001) and middle income (73.9%, p=0.001) parents were breastfed compared to those from high-income (86.9%) parents. Generally, greater proportions of children from low-income (54.0%, p=0.001) and middle-income (49.0%, p=0.001) parents had ceased breastfeeding by 6 months of age compared to children from high-income (36.4%) parents.

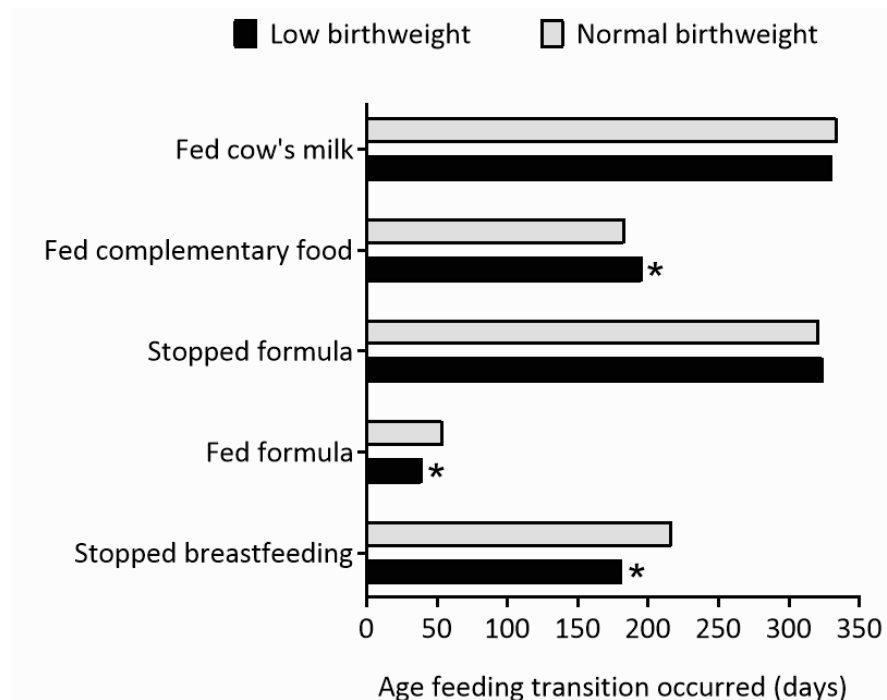


Figure 2. Age when parents transitioned their children to other foods in relation to birthweight status

*Significantly different from the normal birthweight category (all $p < 0.05$). Low birthweight, < 2.5 kg, normal birthweight ≥ 2.5 kg.

After controlling for race and sex, children from low-income parents (aOR: 2.61, 95% CI: 1.95-3.51) and middle-income parents (aOR: 1.88, 95% CI: 1.26-2.80) were more likely to transition from breastmilk within the first 30 days compared to children from high-income parents. Contrariwise, greater proportions of children from low-income (67.2%, $p=0.001$) and middle-income (64.5%, $p=0.001$) parents were fed formula within the first 30 days compared to children from high-income parents (53.5%). The differences persisted after controlling for confounders as children from low-income (aOR: 1.86, 95% CI: 1.44-2.41) and middle-income (aOR: 1.74, 95% CI: 1.10-2.86) parents were more likely to be fed formula within the first 30 days compared to children from high-income parents. Cessation of formula feeding did not significantly associate with income level. Similar percentages of children from low-income parents (40.7%), middle-income parents (46.0%) and high-income parents (48.9%) were fed complementary food within 6 months of age. Compared to children from high-income parents (10.7%), significantly higher percentage of children from low-income parents (17.0%, $p=0.008$) but not middle-income parents (14.9%, $p=0.181$) were fed cowmilk before 1 year of age. After adjusting for race and sex, children from low-income parents (aOR: 1.88, 95% CI: 1.37-2.58) and middle-income parents (aOR: 1.66, 95% CI: 1.12-2.45) were more likely to be fed cowmilk before 1 year of age compared to children from high-income parents.

Race and feeding transition

The proportions of children that had ever been breastfed differed significantly between blacks (58.7%, $p=0.001$) and whites (82.5%) but not between Mexicans (81.7% $p=0.419$) and whites. Compared to whites, blacks were less likely to feed breastmilk (aOR: 0.38, 95% CI: 0.32-0.46). Of those who transitioned from breastmilk within the first 30 days of life, blacks comprised 18.0%, Mexicans 17.3% and whites 13.3%. By the end of the 6th month, over half of black parents (54.9%, $p=0.001$) and Mexican parents (53.3%, $p=0.001$) had stopped breastfeeding, compared to white parents (40.1%) (Table 1). Thus, black parents (aOR: 1.53, 95% CI: 1.22-1.92) and Mexican parents (aOR: 1.41, 95% CI: 1.11-1.79) were more likely than white parents to transition their children from breastmilk by 6 months of age. Black and Mexican parents fed formula at an earlier age and stopped at a younger age than whites (Table 1). Similarly, black parents (aOR: 1.46, 95% CI: 1.13-1.90) and Mexican parents (aOR: 1.57, 95% CI: 1.17-2.10) were more likely than white parents to feed formula within the first 30 days. Before 6 months of age, significantly higher proportion of white parents (47.5%) had started feeding complementary food than black parents (40.9%, $p=0.001$) and Mexican parents (39.5%, $p=0.001$). Before the first birthdate, significantly greater proportion of black parents (18.5%, $p=0.002$), but not Mexican parents (11.3%, $p=0.224$) had fed cowmilk compared to white parents (14.0%).

Discussions

Background findings

Most of the children who were transitioned from breastmilk before age 6 months were transitioned to formula, implying that premature cessation of breastfeeding results in formula feeding. Overall, more than half of the children were concurrently breastfed and formula fed which is indicative of mixed feeding by parents. Mixed feeding is associated with inadequate breastfeeding, dry nursing, premature weaning, and calorie splurging as some of the children gobble up formula and drink less breastmilk (FNS, 2021, Karmaus, Soto-Ramírez, & Zhang, 2017, Koletzko, 2009, Gartner, 2005, Heinig et al., 1993). There is ample evidence of benefits to both child and mother to transition from breastfeeding at recommended ages (CDC, 2023, AAP, 2021, Miliku & Azad, 2018, Dogaru et al., 2014, Kramer et al., 2007). Among the benefits, there is decreased risk of infant mortality, breast cancer, asthma, diarrhea, childhood obesity, and lower cost of YCF (Heinig et al., 1993, CDC, 2023, AAP, 2021, Miliku & Azad, 2018, Dogaru et al., 2014, Kramer et al., 2007). It is worthwhile to note that about a tenth of the children in this study were transitioned to cowmilk before their first birthdate. This practice is contrary to feeding guidelines and worrisome since premature exposure of children's delicate gastrointestinal tract to cowmilk is associated with rapid weight gain, CMPA, and higher level of insulin-like growth factor-1 (IGF-1) (Kelly et al., 2019, Young & Krebs, 2013, Koletzko, 2009, Ventura et al., 2020, Larnkjaer, 2009). Cessation of breastfeeding and initiation of complementary feeding were random and may be partly explained by the AAP overlapping guidelines for breastfeeding and complementary feeding (FNS, 2021, CDC, 2021, AAP, 2020, PHA, 2008, AAP, 1998). It is thus not unexpected that the pattern of initiation of complementary feeding was initially erratic but peaked around 6 months of age. Complementary feeding exposes children to additional bioactive food components and the erratic nature in which it was initiated is bothersome. Even though repeated exposure of children to bioactive food component could improve tolerance acquisition, premature exposures could trigger food allergy, food intolerance, and epigenetic changes which can adversely alter food habits and gastrointestinal health (Kelly et al., 2019, CDC, 2021, Calkins & Devaskar, 2011, Canani et al., 2012). The sharp overlap of the cessation of formula feeding and initiation of cowmilk feeding may be partly explained by YCF guidelines which specify not to initiate cowmilk feeding before the first birthdate (CDC, 2021, Kleinman, 2000, AAP, 2020, AAP, 1998). The recommendation not to feed cowmilk before the first birthdate was largely obeyed.

Feeding transition and birthweight

Significant associations between LBW and early cessation of breastmilk feeding, early transition to formula, longer duration of formula feeding, and delayed start of complementary feeding were observed. Among the reasons for these associations is modification of feeding practices by parents and pediatricians when birth outcome is unusual, such as in LBW. Intuitively, parents may transition from breastmilk to formula to aid body weight gain of LBW children (Stettler et al., 2005, Cohen, 1994, Larnkjaer, 2009). Inability to effectively breastfeed, latch, swallow or feed adequately are among the YCF issues of LBW which might encourage switching to more supportive foods (Kleinman, 2000, AAP, 2020, WHO & UNICEF, 2014, AAP, 1998). These YCF issues are likely to motivate transition from breastmilk to formula, extend formula feeding, or delay complementary feeding as observed in the current study (Dewey, 1999). Age when children were transitioned to cowmilk did not associate with birthweight status. A plausible explanation is that majority of the children, including those LBW, who transitioned to cowmilk on their first birthdate in accordance with AAP feeding guidelines may comfortably consume cowmilk at levels similar to normal birthweight children (FNS, 2021, CDC, 2021, AAP, 2020, PHA, 2008, AAP, 1998).

Feeding transition and income

Income levels significantly associated with feeding transitions, except for cessation of formula feeding. It was reasoned that income did not associate with cessation of formula feeding largely because most of the parents stopped formula feeding on their children's first birthdate, and then transitioned them to cowmilk likely as an inexpensive alternative. Low-income and middle-income parents were more likely to transition their children from breastmilk to formula, complementary food, or cowmilk at a younger age than high-income parents. Since breastmilk is least pricey but effective food for YCF, it was unexpected that low-income and middle-income parents ceased feeding breastmilk at a younger age than high-income parents. Some reasons may be lack of breastfeeding support for low-income and middle-income parents including lack of breastfeeding friendly locations, easy availability of weaning foods through the social support programs, time cost of breastfeeding, convenience to feed other foods, job-related limitations, and maternal smoking (Ro, Goldberg, & Kane, 2019, Karmaus, Soto-Ramírez, & Zhang, 2017, WHO & UNICEF, 2014, Walsh, Pieterse, & Mishra, 2023, Guldán et al., 2000). The significant association between low-income and early initiation of complementary feeding may be partly explained by limited resources of low-income parents which may encourage early transition to complementary foods. In essence, the associations between child feeding transition and income appear complicated by income-driven factors. The observed differences in feeding transitions between income levels is another instance in which income level contributes to health inequity.

Feeding transition and race

A casual glance at the patterns of feeding transition within the race/ethnic groups portrays resemblance although there were discernible differences. Similar to findings of other studies, black parents were less likely to feed breastmilk, and like Mexican parents were more likely to transition from breastmilk before their children were 6 months of age in relation to whites (Pesch et al., 2019, Feldman-Winter et al., 2018, Wright, Fawcett, & Crow, 1980). Among the racial groups, black and Mexican parents were more likely to initiate formula feeding within the first month. Access to social support systems such as WIC products has been cited as a reason (Singhal, 2017, Leunissen et al., 2009). This observation, however, did not translate into longer duration of complementary feeding since it is the children of white parents who received complementary feeding for greater number of months. The observed racial differences in child feeding transition are partly explained by inherent socio-cultural differences in feeding habits and apparent socioeconomic inequity (Ro, Goldberg, & Kane, 2019, Guldán et al., 2000). These differences connote racial inequality in the exposure of children's gastrointestinal tract to bioactive food components and may contribute to the persistent racial disparity in health outcomes (Ro, Goldberg, & Kane, 2019, Burdette, 2006, Cohen, 1994). The significant evidence of racial influence on child feeding transitions observed in the current study warrants tailored race-specific perinatal intervention programs that focus on improving child feeding practices (Guldán et al., 2000).

Like other cross-sectional studies, causation could not be asserted in this study. There is a remote possibility of social desirability bias in responding to survey questions (Perrin et al., 2014). However, many precautions were taken during the data collection to obtain accurate and reliable data (CDC, 2017, CDC, 2018). The use of large nationally representative datasets collected by trained field staff connotes reliability, validity, and generalizability of findings.

Conclusion

In conclusions, Birthweight, income and race are significant influential factors of child feeding transition. Both low birthweight and low-income are associated with early transition from breastmilk and early initiation of formula feeding. Being low-income and middle income are associated with early transition to cowmilk. Black and Mexican parents are more likely than whites to initiate formula feeding within the first month and to terminate breastmilk feeding before 6 months of age. Evidently, among the etiologic pathways for the constellation of poor health outcomes is unfitting child feeding transition in cognizance of the dietary origin of health and disease.

The outcome of this study is useful for improving child feeding transitions, evaluating existing YCF programs, and improving child mortality. It provides evidence that can be used to buttress targeted YCF education of demographic groups. Pediatricians and other healthcare professionals should monitor YCF transitions when birth outcome is unusual. Overall, an update to YCF intervention programs and guidelines to emphasize appropriate feeding transitions is clamant.

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