State Variations in Infant Feeding Regulations for Child Care

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abstract

OBJECTIVES: Early care and education (ECE) settings have become primary targets for policy change in recent years. In our 2008 study, we assessed state and regional variation in infant feeding regulations for ECE and compared them to national standards. We conducted the same regulatory review to assess change over time. Because all but 2 states have updated their regulations, we hypothesized that states would have made substantial improvements in the number of regulations supporting infant feeding in ECE.

METHODS: For this cross-sectional study, we reviewed infant feeding regulations for all US states for child care centers (centers) and family child care homes (homes). We compared regulations with 10 national standards and assessed the number of new regulations consistent with these standards since our previous review.

RESULTS: Comparing results from 2008 and 2016, we observed significant improvements in 7 of the 10 standards for centers and 4 of the 10 standards for homes. Delaware was the only state with regulations meeting 9 of the 10 standards for centers in 2008. In 2016, Delaware and Michigan had regulations meeting 8 of the 10 standards. Previously, Arkansas, the District of Columbia, Minnesota, Mississippi, Ohio, and South Carolina had regulations consistent with 4 of the 10 standards for homes. In 2016, Delaware, Mississippi, and Vermont had regulations meeting 7 of the 10 standards.

CONCLUSIONS: Evidence suggests that enacting new regulations may improve child health outcomes. Given that many states recently enacted regulations governing infant feeding, our findings point to the growing interest in this area.

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Dr Benjamin-Neelon designed the study, oversaw the regulations review, and drafted the manuscript; Drs Gonzalez-Nahm and Grossman conducted the regulations review and reviewed and edited the manuscript; Ms Davis assisted with the analysis, created the maps, and reviewed the manuscript; Dr Neelon conducted the analysis and reviewed and edited the manuscript; Ms Ayers Looby assisted with the coding of state regulations and reviewed the manuscript; Ms Frost helped design the study, oversaw the coding of state regulations, and reviewed and edited the manuscript; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: In 2008, we found that the majority of states lacked infant feeding regulations, especially for family child care. Most states required that providers hold infants while feeding and feed according to a plan, but few had other infant feeding regulations.

WHAT THIS STUDY ADDS: Nearly all states have updated their regulations since our 2008 review. We observed a substantial increase in the number of new regulations enacted, especially for centers, highlighting the growing interest in governing infant feeding in early care and education settings.

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Infancy is considered a vulnerable or sensitive period for the development of obesity and other chronic diseases.[1–4] Excessive weight gain during infancy is associated with an increased risk of obesity, type 2 diabetes mellitus, and hypertension during later childhood and adulthood.[1,3–6] Given that a large number of infants attend out-of-home child care in the United States,[7] with many spending a substantial number of hours each week in care, these early care and education (ECE) settings have become targets for health promotion and obesity prevention.[8–10]

State licensing and administrative regulations that govern ECE settings have the potential to impact the health of children in care.[11–13] Most states regulate child care provider behaviors related to feeding children, and some regulate the quality and amounts of foods and beverages that can be served.[14–16] The American Academy of Pediatrics, in conjunction with the American Public Health Association and the National Resource Center for Health and Safety in Child Care and Early Education, puts forth national health and safety standards for ECE programs.[17] These standards include support for breastfeeding in the ECE setting, collaboration with parents and physicians to develop and adhere to an infant feeding plan, and restrictions on inappropriate feeding practices like bottle propping.

In 2008, we conducted a review of state regulations related to infant feeding and compared them to these national standards. We found that the majority of states lacked regulations consistent with the standards; this was especially true for family child care homes.[15] Since our previous review, all but 2 states have updated their regulations. The purpose of this study was to assess state and regional variations in infant feeding regulations for ECE facilities and compare them to national standards. We also aimed to assess the extent to which states have enacted new infant feeding regulations consistent with these standards since our previous review. Given the amount of time that has passed since our earlier review, and the fact that nearly all states updated their regulations in that time, we hypothesized that states would have substantially increased the number of regulations supporting appropriate infant feeding practices in ECE settings.

METHODS

Review of Regulations

For this cross-sectional study, we reviewed state regulations for ECE facilities between September and December of 2016, which was 8 years after our previous review. We focused on 10 infant feeding standards put forth in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Out-of-Home Child Care Programs*.[17] These 10 standards were as follows: infants are fed according to a feeding plan from a parent or physician; breastfeeding is supported by the child care facility; no solid food is given before 6 months of age; infants are fed on demand; infants are fed by a consistent caregiver; infants are held while feeding; infants cannot carry or sleep with a bottle; caregivers cannot feed more than 1 infant at a time; no cow's milk is given to children <12 months of age; and no solid food is fed in a bottle.[17] States may consider these standards when enacting new regulations, but they are not required to do so.

We reviewed regulations for all 50 US states and the District of Columbia. A trained reviewer searched state regulations posted on a publicly available Web site maintained by the National Resource Center for Health and Safety in Child Care and highlighted relevant regulations. Two independent reviewers then coded each state's regulations to assess consistency with the standards by using a combination of keyword searches and review of the text. Regulations needed to include specific language embodying the spirit of each standard. Agreement between the 2 reviewers ranged from 83.4% (no solid food is given before 6 months of age) to 96.0% (no solid food is fed in a bottle), depending on the standard. We reconciled differences through a collective discussion until both reviewers and the principal investigator were in agreement.

We reviewed regulations for both child care centers (centers) and family child care homes (homes). Generally, centers have a greater number of staff members, care for more children, and are located in a dedicated building. Family child care homes typically include 1 provider (often the owner) with fewer children. As in our previous study,[15] we categorized facilities as either centers or homes for the purpose of this review. This categorization is especially important because centers and homes represent 2 distinct ECE settings, and thus the uptake of new regulations may vary substantially between the two. Ethical approval was not required by the Johns Hopkins Bloomberg School of Public Health because human subjects were not included in this policy review.

Analysis

We computed frequencies for the number of regulations by state according to type of facility. By using ArcGIS software (ArcGIS 10; Esri Inc, Redlands, CA), we mapped the number of regulations meeting the standards by state (possible range: 0–10) in 2008 and 2016 for centers and homes. We then performed exact McNemar's tests to compare the number of states meeting each standard in 2008 to those meeting the standards in 2016. We conducted analyses by using R version 3.3.2 (R Foundation for Statistical Computing,

Vienna, Austria) and SAS version 9.4 (SAS Institute, Cary, NC), with a significance level defined as $\alpha = .05$.

RESULTS

All but 2 states had updated their regulations for both centers and homes since our 2008 review. Hawaii had last updated its regulations in 2002, and South Carolina had last updated its regulations in 2005. We observed some variation in the number of states with regulations that were consistent with the standards for centers (Table 1) and for family child care homes (Table 2). Delaware was the only state with regulations meeting 9 out of the 10 standards for centers at the time of the 2008 review (Table 1). In 2016, Delaware and Michigan had the greatest number of regulations, meeting 8 of the 10 standards. For family child care homes, Arkansas, the District of Columbia, Minnesota, Mississippi, Ohio, and South Carolina previously had regulations consistent with 4 of the 10 standards (Table 2). In the current review, Delaware, Mississippi, and Vermont had regulations meeting 7 of the 10 standards.

For 7 of the 10 standards, the proportion of states with regulations meeting the standards for centers increased significantly from 2008 to 2016 (infants are fed according to a feeding plan from a parent or physician; infants are fed on demand; infants are fed by a consistent caregiver; infants cannot carry or sleep with a bottle; caregivers cannot feed more than one infant at a time; no cow's milk is given to children <12 months of age; and no solid food is fed in a bottle). For 4 of the 10 standards, the proportion of states with regulations meeting the standards for homes increased significantly (infants are fed according to a feeding plan from a parent or physician; infants are fed on demand; infants are held while feeding; and infants cannot carry or sleep with a bottle). We also observed changes in the total number of regulations per state. We depict these changes geographically in Fig 1, mapping the total number of infant feeding regulations per state in 2008 and 2016, for both centers and homes.

For both centers and homes, we observed significant improvement in the number of states meeting the standard requiring infants to be fed according to a feeding plan from a parent or physician. For centers, 30 states had regulations that met the standard in 2008, compared with 41 in 2016 ($P = .007$; Table 1). For homes, the number of states meeting this standard increased from 20 to 35 ($P < .001$; Table 2). We also found significant improvement for the standard requiring infants to be fed on demand. In our previous review, 18 states met this standard for centers, and 12 states met this standard for homes. We observed significant improvements in the current review, in that 25 states met this standard for centers ($P = .02$) and 21 states met this standard for homes ($P = .004$). Similarly, we observed significant improvements for the standard prohibiting infants from carrying or sleeping with a bottle. In our 2008 review, 19 states met this standard for centers, which increased to 31 in 2016 ($P = .005$). For homes, the number of states meeting the standard increased from 14 to 30 ($P < .001$).

In 2008, Delaware was the only state requiring infants to be fed by a consistent caregiver for centers; no state met this standard for homes. In 2016, 12 states for centers and 3 states for homes met this standard. This was a significant improvement for centers ($P = .003$), but not for homes ($P = .25$). For centers, nearly all states (46) met the standard requiring infants to be held while feeding in 2008, and that number increased to 49 in 2016. However, this change was not significant ($P = .25$). For homes, 37 states met this standard in the previous review, and 46 met this standard in the current review ($P = .002$).

Delaware was also the only state that met the standard prohibiting caregivers from feeding more than 1 infant at a time for centers in the previous review; no state met this standard for homes. Five states for centers and 7 states for homes had regulations that met this standard in the current review, which was a significant improvement for centers ($P = .03$), but not for homes ($P = .06$). Additionally, we also observed mixed findings for the standard prohibiting cow's milk for children <12 months of age. For centers, 5 states met this standard in 2008, which increased to 14 states in 2016 ($P = .01$). For homes, there was some improvement, with 6 states that met the standard for homes in our previous review and 11 states that met the standard in 2016. However, this change was not significant ($P = .06$). We did not observe significant improvements for the standard requiring support for breastfeeding for centers or homes.

DISCUSSION

We observed substantial changes in the number of regulations that met the infant feeding standards; there were significant improvements for 7 of the 10 standards for centers and 4 of the 10 standards for homes. All but 2 states had updated their licensing and administrative regulations since our previous review in 2008. On the basis of the findings from the current study, we concluded that most states had also included new regulations related to infant feeding. When we examined the number of states meeting the standards geographically, infant feeding regulations appeared more evenly distributed across the United States in 2016 than they were in

TABLE 1 State Regulations for Child Care Centers Consistent With Infant Feeding Recommendations, 2008 and 2016

	Infants Are Fed According to a Feeding Plan From a Parent or Physician		Breastfeeding Is Supported by the Child Care Facility		No Solid Food Is Given Before 6 mo of Age		Infants Are Fed on Demand		Infants Are Fed by a Consistent Caregiver		Infants Are Held While Feeding		Infants Cannot Carry or Sleep With a Bottle		Caregivers Cannot Feed >1 Infant at a Time		No Cow's Milk Is Given to Children <12 mo of Age		No Solid Food Is Fed in a Bottle	
	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016
AL	X	X		X			X	X			X	X								X
AK	X	X					X	X			X	X	X	X						
AZ	X	X									X	X	X	X					X	X
AR	X	X		X							X	X						X		
CA	X	X	X								X	X	X	X						
CO		X										X		X						X
CT	X	X									X	X								
DC	X	X	X								X	X	X	X						
DE	X	X	X	X			X	X	X		X	X	X	X	X	X	X	X	X	X
FL		X									X	X								X
GA	X	X		X							X	X								X
HI		X						X		X	X	X				X				
ID										X										
IL		X					X	X		X	X	X	X	X				X	X	X
IN		X	X					X			X	X							X	
IA		X					X	X		X	X	X	X	X						
KS											X	X	X	X				X		
KY												X		X				X		
LA				X							X	X	X	X						
ME							X	X			X	X								
MD	X	X									X	X		X						
MA	X	X					X	X			X	X								
MI		X	X	X			X	X		X	X	X	X	X				X	X	X
MN	X	X						V												
MS	X	X	X	X				X			X	X		X				X	X	X
MO	X	X								X	X	X								
MT	X	X									X	X		X						
NE	X	X								X	X	X		X						
NV	X	X									X	X				X				
NH	X	X									X	X	X	X						
NJ	X	X		X		X				X	X	X						X		
NM								X			X	X	X	X						
NY	X	X	X	X							X	X		X						
NC	X	X		X						X	X	X		X						
ND		X				X					X	X		X				X	X	X
OH	X	X	X	X							X	X		X				X		
OK	X			X			X	X			X	X	X	X						
OR		X					X	X			X	X		X			X	X		X
PA											X	X								
RI		X		X			X	X			X	X	X	X		X	X			
SC	X	X									X	X	X	X				X		

TABLE 1 Continued

	Infants Are Fed According to a Feeding Plan From a Parent or Physician		Breastfeeding Is Supported by the Child Care Facility		No Solid Food Is Given Before 6 mo of Age		Infants Are Fed on Demand		Infants Are Fed by a Consistent Caregiver		Infants Are Held While Feeding		Infants Cannot Carry or Sleep With a Bottle		Caregivers Cannot Feed >1 Infant at a Time		No Cow's Milk Is Given to Children <12 mo of Age		No Solid Food Is Fed in a Bottle	
	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016
SD	X						X	X			X	X								
TN		X	X	X			X	X			X	X	X	X		X			X	X
TX	X	X		X				X		X	X	X	X	X						
UT							X	X			X	X								
VT		X						X		X	X	X	X	X		X				X
VA	X	X	X	X			X	X			X	X	X	X						X
WA	X	X			X		X	X			X	X					X	X		
WV	X	X	X	X	X			X		X	X	X								X
WI		X		X			X	X			X	X					X	X		
WY	X	X					X	X				X		X		X				
Total	30	41	11	18	2	2	18	25	1	12	46	49	19	31	1	7	5	14	8	15
P[a]	.007		.09		.99		.02		.003		.25		.006		.03		.01		.04	

X, regulation present.

[a] *P* values are from exact McNemar's tests to compare the number of states meeting each standard in 2008 with the number of states meeting the standards in 2016.

2008. This was especially true for the Midwestern states, where few regulations were in place in our previous review but were substantially improved in our current review.

A number of states significantly improved for both centers and homes. In 2016, for instance, more states included regulations promoting feeding infants on demand, rather than on a set schedule, for both centers and homes. The authors of a number of studies support this notion of responsive feeding for infants, which involves respecting their hunger and satiety cues and feeding, or not feeding, as appropriate. Nonresponsive feeding has been associated with unhealthy food intake, disinhibited eating and lack of self-regulation, and obesity in young children.[18–21]

States showed virtually no change for the standard prohibiting feeding of solid foods before 6 months of age. However, a number of states included a regulation prohibiting solid foods before 4 months of age or introducing solid foods with permission from a parent or physician only. Early introduction of solid foods to infants has been associated with later obesity in some studies,[4,22–24] but the authors of others have found no relationship.[25–29] Appropriate timing of the introduction of solid foods may depend, in part, on whether the infant is exclusively breastfeeding. Thus, the standard may need to be updated to allow for flexibility of introducing solid foods between 4 and 6 months of age, which would be consistent with recommendations from the American Academy of Pediatrics.[30,31] In fact, a number of states did not meet a strict interpretation of the standard prohibiting solid foods before 6 months because they included an age range in the regulations (8 states for centers and 5 states for homes). For example, Illinois regulations for centers provide that "[i]n accordance

TABLE 2 State Regulations for Family Child Care Homes Consistent With Infant Feeding Recommendations, 2008 and 2016

	Infants Are Fed According to a Feeding Plan From a Parent or Physician		Breastfeeding Is Supported by the Child Care Facility		No Solid Food Is Given Before 6 mo of Age		Infants Are Fed on Demand		Infants Are Fed by a Consistent Caregiver		Infants Are Held While Feeding		Infants Cannot Carry or Sleep With a Bottle		Caregivers Cannot Feed >1 Infant at a Time		No Cow's Milk Is Given to Children <12 mo of Age		No Solid Food Is Fed in a Bottle	
	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016
AL	X	X		X							X	X								
AK	X	X					X	X			X	X	X	X						
AZ	X	X						X			X	X		X					X	
AR	X	X		X			X	X			X	X						X		
CA																				
CO		X						X				X		X						
CT		X									X	X								
DC	X	X	X								X	X	X	X						
DE	X	X		X				X			X	X	X	X				X		X
FL																				X
GA	X	X									X	X								
HI		X									X	X				X				
ID																				
IL		X					X	X			X	X	X	X						
IN											X	X								
IA																				
KS											X	X	X	X						
KY												X		X				X		
LA																				
ME							X	X			X	X								
MD		X										X		X						
MA		X					X	X				X								
MI												X	X	X						
MN	X	X					X	X			X	X								
MS	X	X	X	X				X			X	X		X				X	X	X
MO	X	X								X	X	X								
MT	X	X									X	X		X						
NE		X									X	X		X						
NV	X	X									X	X				X				
NH	X	X									X	X	X	X						
NJ											X	X								
NM								X			X	X	X	X						
NY		X	X	X							X	X	X	X						
NC	X	X		X							X	X		X						
ND		X				X						X		X				X	X	X
OH	X	X	X	X							X	X		X			X	X		
OK		X									X	X	X	X						
OR							X	X			X	X		X			X	X		X
PA		X									X	X		X						
RI		X										X	X	X		X	X	X		
SC	X	X									X	X	X	X			X	X		

TABLE 2 Continued

	Infants Are Fed According to a Feeding Plan From a Parent or Physician		Breastfeeding Is Supported by the Child Care Facility		No Solid Food Is Given Before 6 mo of Age		Infants Are Fed on Demand		Infants Are Fed by a Consistent Caregiver		Infants Are Held While Feeding		Infants Cannot Carry or Sleep With a Bottle		Caregivers Cannot Feed >1 Infant at a Time		No Cow's Milk Is Given to Children <12 mo of Age		No Solid Food Is Fed in a Bottle	
	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016	2008	2016
SD							X	X			X	X								
TN	X	X	X				X	X				X		X						X
TX	X	X						X			X	X	X	X					X	
UT								X			X	X								
VT		X						X		X	X	X	X	X		X				X
VA							X	X			X	X		X						X
WA		X						X			X	X		X			X	X		X
WV	X	X								X	X	X								
WI		X		X			X	X			X	X					X	X		
WY	X	X					X	X				X		X		X				
Total	20	35	5	8	0	1	12	21	0	3	37	46	14	30	0	5	6	11	4	9
P[a]	<.001		.45		.99		.004		.25		.002		<.001		.06		.06		.18	

X, regulation present.

[a] *P* values are from exact McNemar's tests to compare the number states meeting each standard in 2008 with the number of states meeting the standards in 2016.

with the American Academy of Pediatrics recommendations, solid foods shall be introduced generally between 4 and 6 months of age. The time of introduction shall be indicated by each child's nutritional and developmental needs after consultation with the parents."[32] Similarly, Delaware regulations for homes provide that "[s]emi-solid foods may be introduced to infants 4 to 7 months of age as requested by parent(s)/guardian(s) and shall be required once an infant is 8 months of age."[33] An additional 4 states for centers and 8 states for homes required parental or physician approval before introducing solid foods to infants in care, regardless of age.

Similarly, for other standards, states showed no significant improvements. We noted an increase in the number of states prohibiting solid foods in a bottle, but this change was significant for centers only. Research reveals that single mothers and mothers experiencing depression or depressive symptoms were more likely to introduce solids too early to their infants[34] or to add solid foods to the bottle.[35] However, there are no studies in which these feeding practices in child care providers in ECE settings are examined. In addition, in 2008, few states had regulations consistent with the standard requiring infants to be fed by a consistent caregiver or the standard prohibiting providers from feeding more than 1 infant at a time. Although these standards appear reasonable, there is little evidence linking these behaviors with infant health outcomes. The majority of the existing research including evaluations of infant feeding behaviors and later obesity is focused on parents, and mothers in particular. Less is known about child care provider behaviors related to feeding infants in care,

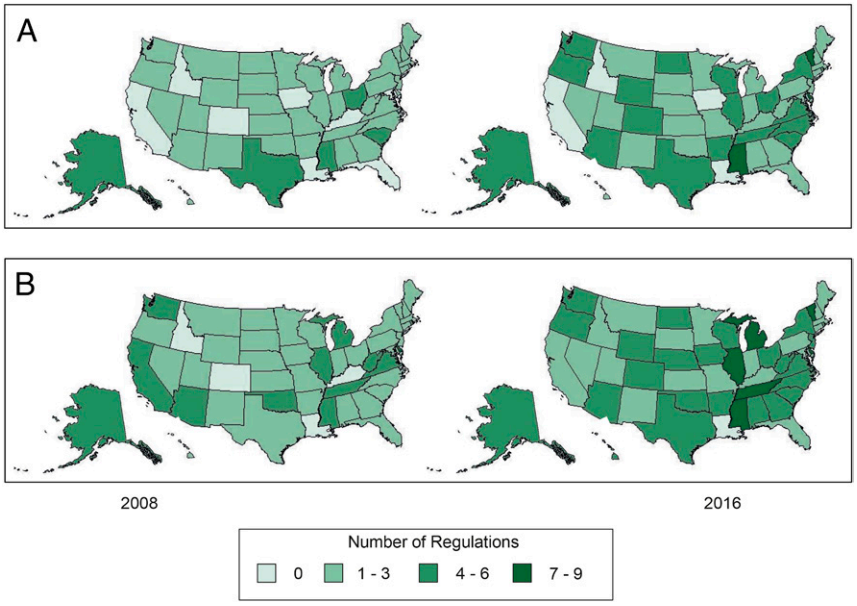

FIGURE 1
State infant feeding regulations in 2008 and 2016. A, Regulations for child care centers. B, Regulations for family child care homes.

but a large number of parents now share the responsibility of feeding infants with providers.[7] Thus, child care in infancy has become the subject of much investigation.[4,36]

We also did not observe significant improvements in the number of states with regulations supporting breastfeeding. Although the authors of studies assessing the relationship between breastfeeding and later obesity have found mixed results,[29,37–41] the importance of breastfeeding for a number of other health outcomes is widely accepted. With the lack of paid maternity leave in the United States,[42] women who return to work and rely on out-of-home child care are less likely to initiate or continue breastfeeding.[43–46] The authors of a previous study highlighted the wide variation in breastfeeding regulations for ECE across the United States.[47] In our current review, we found that many states have a regulation supporting breastfeeding, but there is still room for improvement.

There are limitations to this study. First, this review is current as of 2016, but states could be in the process of updating their regulations at any time. Second, while compliance with state regulations is compulsory, the presence of a regulation does not necessarily indicate actual practice. The authors of a handful of previous studies have prospectively assessed compliance with new regulations and have found some improvement.[11,12,48,49] Finally, not all of the standards assessed in this review have a clear association with obesity or other chronic diseases in infants; much of this literature includes studies with mixed results. However, all are recommended practice for infants cared for in ECE programs.

CONCLUSIONS

Nearly all states updated their regulations in the 8 years between our reviews. With these updates, most states included additional regulations that govern infant feeding. We observed the most significant improvements for centers, but improvements for homes increased as well. During this time, substantial emphasis has been placed on making environments where young children spend time healthier. As a result, ECE settings have become a primary target for obesity prevention.[8,50–53] Improving state regulations is 1 way to govern feeding practices and help enhance the health of children in out-of-home care.[11–13] Our findings reveal that a number of states have made great strides in implementing new regulations to improve infant feeding in child care. Given that state regulations governing ECE settings have the potential to impact the health of children in care, our study highlights the importance, and feasibility, of implementing state regulations to improve child health.[11–13]

ABBREVIATION

ECE: early care and education

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