Southwest Rural HEALTH RESEARCH CENTER

Are Rural Infants Benefiting from WIC Food Package Rule Changes? Breastfeeding and Infant Feeding Behaviors

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Purpose

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides healthy foods and services to low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, as well as to infants and children up to age five.[1] In 2009, revisions were made to the WIC program to further improve the nutrition and health of infants by providing benefits to promote and support breastfeeding among those who are able, and to improve infant feeding practices. Based on breastfeeding status, WIC offers three distinct food packages:

- Fully Breastfeeding Package with no infant formula, but a larger amount of food ration;
- Partially Breastfeeding Package with some infant formula; and
- Fully Formula Feeding Package with more infant formula than the partially breastfeeding package, but a smaller ration of the postpartum food package for the mother.

It is not yet known if changes to the WIC food packages (WIC-FPs) have benefited low-income rural and urban infants and women differently. This study compared breastfeeding initiation for rural and urban WIC participants before and after the changes in WIC-FPs. In addition, changes in breastfeeding and infant feeding practices before and after changes in WIC program benefits were explored.

Background

The WIC program provides supplemental nutritious foods and services (e.g., nutrition education, breastfeeding support, and health care referrals) to about eight million pregnant and lactating women, infants, and children up to five years of age in low-income households.[1] Over half of all infants born in the U.S. (53%), and about a quarter of children ages one through four years and their mothers, participate in WIC.[1]

Key Findings

- Fewer rural WIC mothers initiated breastfeeding compared to urban WIC mothers, both before and after the 2009 WIC food package revisions.
- After the WIC food package revision, breastfeeding initiation increased slightly for all mothers; however, the increase was smaller (0.6%) for rural WIC mothers than for urban WIC mothers (0.9%).
- A significant increase was seen in the proportion of WIC participants receiving Fully Breastfeeding Packages in both rural (4.8%) and urban (4.3%) areas.
- Despite a non-significant decrease in the proportion of participants receiving Formula Feeding Packages after the revision, a higher proportion of rural infants were fully formula fed (Pre=70.0%; Post=68.7%) compared to urban (Pre=66.4%; Post=66.1%).
- Although the American Academy of Pediatrics recommends introducing solid foods at about six months of age, a significantly higher proportion of rural infants (Pre=22.9; Post=21.6%) were introduced to cereal early (<four months) compared to urban infants (Pre=18.8%; Post=17.6%).
- At four to five months of age, there was a 2.2% decrease in early introduction of cereal after WIC food package revisions for rural infants, and a smaller decrease (1.5%) for urban infants.
- An increase of approximately 2% was observed in the proportion of infants introduced to vegetables and fruits at six months.
- The feeding behavior regarding meats did not change significantly after the WIC-FP revision.

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Breastfeeding has been shown to be beneficial to both mothers and their babies with proven financial, health, social, and developmental benefits.[2] The American Academy of Pediatrics (AAP) recommends exclusive breastfeeding of infants for the first six months, and partial breastfeeding for up to one year or longer as desired by the mother.[3] Yet, less than half of U.S. infants are still breastfed at six months.[4] The lowest breastfeeding rates (23.1%) are historically found among low-income families (e.g., WIC participants) who also live in rural areas.[4,5]

In addition to breastfeeding, the AAP recommends the introduction of solid foods, such as cereal, meats, vegetables, and fruits at approximately six months of age to ensure babies receive proper nutrition for healthy growth.[6] Early introduction of solid foods may lead to premature discontinuation of breastfeeding, exposure to pathogens at a vulnerable age, and increased risk of chronic diseases. WIC does not provide solid foods to participating infants who are less than six months old. Delayed introduction of solid food after the recommended age may pose the risk of deficiencies in zinc, protein, iron, and vitamin B and D which may, in turn, suppress growth.[7,8]

In 2009, significant changes were made to WIC-FP benefits. Specific examples of these WIC-FP changes include the addition of yogurt as a partial substitute for milk, more whole grain and fish options for women and children, and additional fruits and vegetables for children. The revised WIC-FPs are now consistent with the Dietary Guidelines for Americans and infant feeding practice guidelines of the AAP.[9] The Final Rule, published in 2014, was made to incentivize breastfeeding and support healthier infant feeding practices by increasing the variety and amount of food in the WIC-FPs for mothers who breastfeed.

Methods

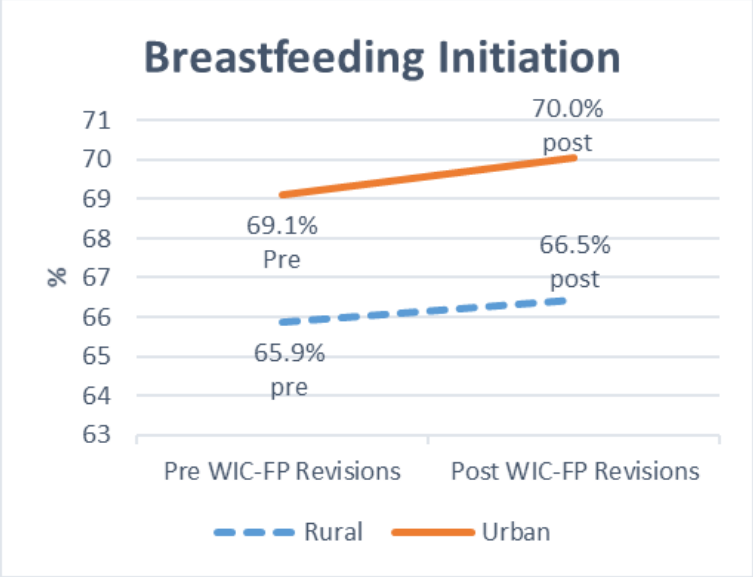
For this study, secondary data from the National Food and Nutrition (NATFAN) Survey were used, consisting of data from 58 WIC programs representing 38 states, two U.S. Districts & Territories, and ten Indian/ Tribal Organizations (ITOs). NAFTAN surveys were administered pre (2008-2009) and post (2010-2011) implementation of the New Food Package Rule (repeated cross-sectional design). A sample of 15,700 infants pre and 16,477 infants post were used in the analysis. A descriptive analysis of breastfeeding initiation by rural and urban areas was performed. Based on the zip code of the respondents' residences, rural and urban areas were categorized using the Rural-Urban Continuum Codes provided by the USDA Economic Research Services.[10] An analysis of infant feeding practices was also performed, including a rural versus urban examination of early cereal introduction and introduction of other solid foods. All analyses were performed using STATA 14 software.

Results

Breastfeeding Initiation

Figure 1 shows a significant but small increase in breastfeeding initiation from pre to post WIC-FP revisions for both rural and urban mothers. Compared to rural participants, a significantly higher proportion of urban participants initiated breastfeeding, both before and after the changes in WIC-FP.

Figure 1. Breastfeeding Initiation: Rural vs. Urban



WIC Package Types

One intention of the new WIC-FP revisions was to incentivize breastfeeding. As shown in **Table 1**, after the revisions there was a significant increase in the proportion of participants receiving Fully Breastfeeding Packages in both rural and urban areas, with a significantly higher proportion of rural participants utilizing the Fully Breastfeeding Package (16.4%) compared to urban (13.3%). The difference was accounted for by reductions in the utilization of the other packages, as seen in the 1.3% reduction of the Fully Formula Feeding Packages for rural participants, as well as movement from Partially Breastfeeding to Fully Breastfeeding Packages among both rural and urban.

For both pre and post revisions, a significantly higher proportion of rural WIC participants (11.6% pre and 16.4% post) utilized the Fully Breastfeeding Package compared to urban (9.0% pre and 13.3% post) **(Table 1)**. At the same time, a significantly higher proportion of rural WIC participants (70.0% pre and 68.7% post) utilized the Fully Formula Feeding Package compared to urban WIC participants (66.4% pre and 66.1% post).

Introduction of Cereal

Significant changes were observed in the introduction of cereal to infants both rural and urban areas. Although about 50% of infants were introduced to cereal at less than six months of age, significant delays in the timing of the introduction of cereal were observed post WIC changes for both rural and urban. As a result, more infants were introduced to cereal at six months of age **(Table 2)**. A significantly higher proportion of rural infants were introduced to cereal at less than four months of age compared to urban infants, both pre and post WIC changes. The gap between rural and urban narrowed for infants less than six months of age but widened for older infants.

Table 1. Changes in Breastfeeding Packages

	Rural			Urban		
Package Type	**Pre**	**Post**	**Change**	**Pre**	**Post**	**Change**
Fully Breastfeeding	11.6%	16.4%	*4.8%* *	9.0%	13.3%	*4.3%* *
Partially Breastfeeding	18.4%	14.9%	*-3.5%* *	24.6%	20.6%	*-4.0%* *
Fully Formula Feeding	70.0%	68.7%	*-1.3%*	66.4%	66.1%	*-0.3%*
Total	100%	100%		100%	100%	

*Change is significant at the 0.01 level.
Note: All changes are percentage point changes.

Table 2. Introduction of Cereal

	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
Cereal	**%**	**%**	**%**	**%**	**w/in Rural**	**w/in Urban**	**At Pre**	**At Post**	**Gap**
Infant does not eat this	34.8%	36.8%	37.6%	37.9%	2.0% =	0.3% =	2.8%*	1.1%	→←
Less than 4 months old	22.9%	21.6%	18.8%	17.6%	-1.3% =	-1.2% ↓ *	-4.2%*	-4.0%*	
4 to 5 months old	32.3%	30.1%	31.2%	29.8%	-2.2% ↓ *	-1.5% ↓ *	-1.1%	-0.3%	→←
6 months old	7.7%	9.5%	9.8%	11.9%	1.8% ↑ *	2.1% ↑ *	2.2%	2.5%*	←→
7 to 8 months old	1.7%	1.3%	1.8%	1.9%	-0.4% =	0.2% =	0.1%	0.7%*	←→
9 to 11 months old	0.6%	0.7%	0.8%	0.8%	0.1% =	0.0% =	0.2%	0.1%	
Total	**100%**	**100%**	**100%**	**100%**					

LEGEND
↓* Significant Decrease at the 0.01 level
↑* Significant Increase at the 0.01 level
= No significant change
→ ← Narrowing of Gap for Rural vs Urban
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Introduction of Vegetables and Fruits

There was an increase in the proportion of infants introduced to vegetables and fruits at six months **(Table 3 and Table 4, respectively)**. A significantly higher proportion of rural infants were introduced sooner than the recommended age of six months compared to urban infants. The gap between rural and urban narrowed for infants under the age of six months and increased for those age six months and older.

Table 3. Introduction of Vegetables

	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
Vegetable	**%**	**%**	**%**	**%**	**w/in Rural**	**w/in Urban**	**At Pre**	**At Post**	**Gap**
Infant does not eat this	42.5%	42.7%	44.7%	42.9%	0.3% =	-1.8% ↓ *	2.2%*	0.1%	→←
Less than 4 months old	6.3%	5.8%	4.9%	4.8%	-0.5% =	-0.1% =	-1.4%*	-1.1%*	→←
4 to 5 months old	30.0%	29.3%	26.9%	27.5%	-0.7% =	0.6% =	-3.1%*	-1.8%*	→←
6 months old	16.3%	18.3%	17.9%	20.2%	1.9% ↑ *	2.2% ↑ *	1.6%*	1.9%*	←→
7 to 8 months old	3.9%	3.0%	4.4%	3.8%	-0.9% ↓ *	-0.6% ↓ *	0.5%	0.8%*	←→
9 to 11 months old	0.9%	0.9%	1.1%	0.9%	-0.1% =	-0.2%	0.2%	0.1%	
Total	**100%**	**100%**	**100%**	**100%**					

Table 4. Introduction of Fruits

	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
Fruit	**%**	**%**	**%**	**%**	**w/in Rural**	**w/in Urban**	**At Pre**	**At Post**	**Gap**
Infant does not eat this	42.0%	42.3%	43.6%	42.1%	0.3% =	-1.5% ↓ *	1.6%	-0.2%	→←
Less than 4 months old	7.4%	6.6%	6.1%	6.1%	-0.8% =	0.0% =	-1.3%*	-0.5%	→←
4 to 5 months old	29.4%	29.4%	26.5%	27.5%	0.0% =	0.9% =	-2.9%*	-1.9%*	→←
6 months old	16.1%	17.6%	17.8%	19.7%	1.4% ↑ *	1.9% ↑ *	1.6%	2.1%*	←→
7 to 8 months old	4.2%	3.2%	4.7%	3.8%	-1.0% =	-0.9% ↓ *	0.5%	0.6%	
9 to 11 months old	0.9%	0.9%	1.3%	0.9%	-0.0% =	-0.3% =	0.4%*	0.1%	→←
Total	**100%**	**100%**	**100%**	**100%**					

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Introduction of Meats

The introduction of meats as a source of protein should be delayed until after six months per AAP guidelines.[6] There was no significant change between pre and post WIC-FP revisions for both rural and urban infants **(Table 5)**. However, there were changes between rural and urban infants with regard to the feeding of meats both pre and post WIC-FPs. The rural and urban gap widened for infants younger than four months, while narrowed for infants ages four to five months.

Introduction of Desserts

Desserts were defined as sweet foods with added sugars, such as custards and puddings. Premature introduction (before six months of age) of sugary foods increases the risk for dental caries, obesity, and other health issues. Before the WIC-FP revisions, more rural infants (31.8%) were fed dessert compared to urban infants (27.9%) **(Table 6)**. However, the gap narrowed considerably post assessment, due mostly to a reduction in the proportion of rural infants fed desserts after the WIC-FP revisions.

Table 5. Introduction of Meats

	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
Meat	**%**	**%**	**%**	**%**	**w/in Rural**	**w/in Urban**	**At Pre**	**At Post**	**Gap**
Infant does not eat this	65.4%	67.0%	67.1%	66.9%	1.6% =	-0.2% =	1.6%	-0.2%	→←
Less than 4 months old	1.3%	1.5%	1.1%	1.0%	0.1% =	-0.1% =	-0.2%	-0.5%*	←→
4 to 5 months old	6.8%	6.3%	5.4%	5.6%	-0.5% =	0.1% =	-1.3%*	-0.7%	→←
6 months old	11.6%	11.4%	11.4%	11.9%	-0.1% =	0.5% =	-0.2%	0.5%	
7 to 8 months old	10.2%	9.3%	10.3%	9.9%	-1.0% =	-0.4% =	0.0%	0.6%	
9 to 11 months old	4.7%	4.5%	4.8%	4.8%	-0.2% =	0.0% =	0.1%	0.3%	
Total	**100%**	**100%**	**100%**	**100%**					

Table 6. Introduction of Desserts

	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
Dessert	**%**	**%**	**%**	**%**	**w/in Rural**	**w/in Urban**	**At Pre**	**At Post**	**Gap**
Infant does not eat this	68.3%	72.1%	70.2%	73.0%	3.9% ↑ *	2.8% ↑ *	1.9%*	0.9%	→←
Less than 4 months old	2.3%	2.4%	2.1%	1.8%	0.0% =	-0.3% =	-0.2%	-0.5%	
4 to 5 months old	9.3%	6.1%	7.4%	6.2%	-3.2% ↓ *	-1.2% ↓ *	-1.9%*	0.1%	→←
6 months old	9.7%	8.5%	9.5%	8.8%	-1.2% =	-0.7% =	-0.2%	0.3%	
7 to 8 months old	6.9%	6.5%	6.9%	6.4%	-0.4% =	-0.5% =	-0.0%	-0.1%	
9 to 11 months old	3.6%	4.4%	4.0%	3.8%	0.9% ↑ *	-0.2% =	0.4%	-0.7%	
Total	**100%**	**100%**	**100%**	**100%**					

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Introduction of Juices

Premature introduction of juices to infants younger than four months and between four to five months of age, were observed. However, significantly fewer infants were introduced to juices in both rural and urban areas post WIC-FP revisions compared to pre WIC-FP revisions **(Table 7)**. The gap between rural and urban was not significant.

Table 7. Introduction of Juices

Juice	Rural		Urban		Post-Pre Change		Urban vs Rural Difference		
	%	%	%	%	w/in Rural	w/in Urban	At Pre	At Post	Gap
Infant does not eat this	51.8%	55.2%	52.1%	55.5%	3.4% ↑ *	3.4% ↑ *	0.3%	0.3%	
Less than 4 months old	8.1%	7.2%	7.3%	6.5%	-1.0% =	-0.8% ↓ *	-0.9%	-0.7%	
4 to 5 months old	15.9%	13.9%	15.5%	14.0%	-1.9% ↓ *	-1.6% ↓ *	-0.3%	0.0%	
6 months old	15.6%	13.9%	15.8%	14.6%	-1.8% ↓ *	-1.2% ↓ *	0.1%	0.8%	
7 to 8 months old	6.3%	6.8%	7.1%	6.7%	0.5% =	-0.4% =	0.8%	-0.1%	
9 to 11 months old	2.3%	3.0%	2.2%	2.7%	0.7% =	0.5% ↓ *	-0.1%	-0.3%	
Total	**100%**	**100%**	**100%**	**100%**					

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Discussion

According to the AAP,[6] introduction of solid foods to infants should occur around age six months and no earlier than four months. Premature introduction of solid foods may expose infants to pathogens[11] and put them at risk of developing food-based allergies and at an increased risk for chronic diseases.[8] Overearly or premature introduction of solid foods has also been shown to be a risk factor for premature discontinuation of breastfeeding and increased consumption of fatty and sugary foods at age one.[12]

Evidence suggests that WIC-FP policies may have some effect on improving breastfeeding.[13] This study provides a unique analysis of breastfeeding and infant feeding behaviors in rural WIC participants compared to urban before and after WIC-FP revisions. In the present study, breastfeeding initiation increased among both rural and urban participants post WIC-FP revisions. However, our results revealed that urban WIC participants had higher breastfeeding initiation rates compared to rural participants. This is consistent with findings from Sparks (2010) that showed rural-urban differences in breastfeeding initiation and continuation, indicating that rural mothers are less likely to initiate breastfeeding.[14]

In rural and urban WIC participants, there was an increase in the proportion of participants who received the Fully Breastfeeding Package post WIC-FP revisions. Despite a large number of participants receiving Fully Formula Feeding Packages, there was a slight decrease post WIC-FP revisions in rural areas and no change in urban areas.

Differences in breastfeeding rates may be attributed to differences in resources available for rural participants, such as lower income levels, lack of health insurance, and limited access to health care resources compared to urban women. Additional barriers faced by WIC program participants in rural areas may include general misinformation about formula, lack of knowledge, lack of social support, and workplace environments.[15]

Our findings revealed an improvement in feeding practices post WIC-FP revisions; that is, fewer WIC participants introduced solid food to infants before four months. The WIC-FP revisions support a more nutritionally sound diet and better infant feeding practices, through healthier eating and delays in the introduction of solid food. These goals are closely aligned with dietary guidelines and AAP recommendations. However, despite AAP recommendations, rural participants had a higher proportion of cereal, vegetables and meat introduction at less than four months compared to urban infants. Interestingly, the early introduction of solid food before six months is common in the U.S.[16] Causes for overearly introduction of solid foods to infants are still being studied. Still, preliminary evidence shows mothers may be misinformed about infant feeding needs.[17]

Implications

Breastfeeding for WIC participants continues to move in a positive direction with evidence showing a significant increase in fully breastfeeding post WIC-FP revisions in both rural and urban participants. However, disparities are found in rural and urban participants. It is important that policies are formulated to help narrow the gap and increase breastfeeding rates among WIC participants from low-income and rural areas for women who are able to breastfeed.

Our findings also revealed that the introduction of solid food was delayed after the WIC-FP revisions. However, rural participants are still lagging behind their urban counterparts. The early introduction of solid food is of concern due to its detrimental health effects and its potential to reduce or replace breastfeeding in an infant's diet. Health policies should target WIC participants in rural areas because they face greater barriers to infant nutrition than their urban counterparts.

Considerations

There is disparity in the breastfeeding initiation rates of WIC participants, with lower rates of breastfeeding initiation found in rural areas compared to urban areas. Despite a reduction, although not significant, in the number of rural participants receiving Fully Formula Feeding Packages post WIC-FP revisions, the percentage of women who are fully formula feeding remains high in both rural and urban areas. Although introduction of solid foods to infants less than four months poses potential health risks[12], a higher proportion of rural WIC participants introduce solid food to infants compared to urban participants. Thus, there is a need to encourage breastfeeding and healthy infant feeding practices that meet AAP and World Health Organization recommendations through, but not limited to, the following:

- Developing support in social and work environments;
- Enhancing educational resources to dispel common misconceptions on breastfeeding and formula feeding;
- Developing culturally sensitive breastfeeding resources for low-income participants in rural areas;
- Promoting breastfeeding through obstetric and gynecology clinical practices;
- Developing campaigns to address barriers about breastfeeding anxiety and stigma; and
- Emphasizing the importance of breastfeeding for those that are able.

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