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Resources Lack as Food Environments Become More Rural: Development and Implementation of an Infant Feeding Resource Tool (InFeed)

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Abstract

Evaluating the availability and affordability of breastfeeding and formula-feeding supplies are critical for building food environments that support healthy infant development. This study details the development and implementation of the Infant Feeding Resource Tool (InFeed) in retail settings across Montana (n = 21). Interrater reliability was tested (n = 9), kappa 0.620. Analysis of variance found significant differences by rurality for InFeed scores, with infant feeding resources lacking in more rural Montana retail settings: Formula, p = .05 (rounded value); Equipment, p = .02; and Total, p = .03. Prices of infant feeding resources did not differ by rurality and InFeed scores did not differ by store type.

Keywords

Food environment; breastfeeding; formula feeding; environmental measure; health disparities

Introduction

Breastfeeding is a preventative health behavior for many acute and chronic illnesses including childhood obesity.^{1,2} In the United States (US), breastmilk is recommended as the sole source of infant nutrition until about six months of age.^{1,2} While many women initiate breastfeeding (82.2%), a large number discontinue prior to six months (57.6%), and few continue to breastfeed until at least one year after birth as recommended (35.9%).³ Barriers

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Conflicts of Interest

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to breastfeeding in rural US areas may extend beyond common challenges including lactation issues, early return to work, and a lack of social or societal support,⁴ as rural US infants are more commonly fed formulas than breast milk. Fewer than one-quarter (23.9%) of rural infants are exclusively breastfed until three months of age in comparison to infants in central (30.7%) and non-central cities (32.8%).⁵ In these communities, poor economic resources and unfavorable workplace policies may be additional barriers to breastfeed.^{6,7}

Environmental settings within communities also influence health behaviors,⁸ and may prove an additional barrier to the maternal-infant feeding decision. For example, the influence of ‘food environments’ on health has been a topic of investigation within retail settings, regarding consumer access to healthy and unhealthy foods.^{9–12} Few studies have examined connections between the food environment and infant feeding behaviors. This is a large knowledge gap as breastfeeding initiation and duration rates are increasing¹³ alongside consumers’ infant formula purchases in retail environments.¹⁴ Access to infant formulas and breastfeeding supplies are crucial to support the maternal-infant feeding decision and ensure adequate infant nutrition.

It is possible that variables of the food environment that influence consumers’ food and beverage purchases, such as product availability, affordability, desirability, and convenience,^{15,16} also impact infant feeding behaviors and resource purchasing. Further, rural US retail environments may score poorly on these access indicators when compared to urban settings. For example, in rural Montana, the quality^{17,18} and desirability¹⁹ of available produce options have been found to decrease as food stores became more rural. Additional disparities in food access have been captured among many underserved places in the US.^{20,21} As such, rural communities may also experience a disparity in the access to and affordability of infant feeding resources and is a topic that requires investigation.

Some research approaches have explored the potential for promotional environments and media to sway US Department of Agriculture’s Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants to breastfeed.²² WIC provides low-income, at-risk families with supplemental foods, formulas, and support for breastfeeding.²³ WIC is one of the federal food assistance programs with progressive policies that have favorably impacted consumers’ dietary behaviors in WIC-authorized stores.²⁴ WIC and non-WIC mothers may find support to breastfeed through health-care networks, government assistance programs, and community structures (e.g., retail stores).^{2,22} Therefore, the extent of infant feeding resources offered within a variety of retail stores may promote or hinder breastfeeding success.

To explore the potential for food retail environments to influence health behaviors, or to inform the need for health behavior interventions, the development of data collection tools are a critical initial step.^{25,26} Currently there are no tools that explore the availability and affordability of infant feeding resources in food retail environments. The purpose of this study was two-fold: (1) to develop and validate an infant feeding resource tool for use in retail settings, and; (2) to measure the availability and affordability of infant feeding resources in food retail environments across rural counties in Montana. Researchers hypothesized that infant feeding resources would be less accessible and more expensive in

more rural settings.¹⁷ It was also hypothesized that infant feeding resources would be more available in larger retail stores (e.g., department stores) than grocery or convenience stores, for example.

Methods

This research was exempt from review by the Montana State University Institutional Review Board (IRB), as the Infant Feeding Resource Tool (InFeed) did not utilize human subjects. The InFeed was approved for community implementation by the Fort Peck IRB for use alongside other nutrition-focused research with human subjects. The InFeed was modeled after the Nutrition Environment Measures Survey in Stores (NEMS-S)²⁵ and the NEMS-S-inspired Farmers' Market Audit Tool²⁶ for use outside of commonly measured food store types (e.g., convenience, grocery). NEMS-S was considered the gold standard for environmental assessments in nutrition (e.g., found to be valid and reliable).²⁵ The InFeed was designed for context specificity for infant feeding by reviewing relevant literature and through retail environment observations. The InFeed tool evolved iteratively with rigorous testing and revision over time. These processes are described below.

Development of Infant Feeding Resource Tool

Prior to field-testing, the InFeed tool included measures for: (1) formulas that contained docosahexaenoic acid and arachidonic acid due to health promotion evidence;²⁷ (2) vitamin supplements for child-bearing aged women;²⁸ (3) herbal galactagogues believed to aid breastfeeding physiology (e.g., facilitating the flow of mother's milk);^{29,30} (4) equipment available in support of either breast or formula-feeding, and; (5) marketing measures respective to each category to capture any influential consumer cues toward breast or formula-feeding. Three content experts (study co-authors who are investigators in the field of food access, breastfeeding support, and infant feeding) reviewed the first draft of the InFeed to examine face validity or the tool's ability to measure infant feeding resources in the retail environment. The InFeed was revised prior to in-field testing.

The InFeed was designed for use within a variety of retail settings. Short definitions of store types are provided. Grocery stores were considered primary points for household food acquisition and contained limited non-food products for sale. Department and pharmacy stores offered many food and non-food supplies, while pharmacies also offered prescription medications. The sites where the InFeed was implemented were located within rural communities and researchers were easily able to discern store type based on this criterion.

Infant Feeding Resource Tool Implementation

The InFeed was pilot-tested at 21 stores (October 2014-November 2015) within three geographic Montana regions, including northwestern (NW) (n = 9), northeastern (NE) (n = 9), and southwestern (SW) (n = 3) Montana. Store site selection for NW and SW Montana locations was based on previous research utilizing NEMS-S (random sampling; see published study.¹⁷) NE Montana stores were selected to complement ongoing maternal and child health research at the time.³¹ In this area, researchers targeted all stores with the

potential to sell any infant feeding products across four towns for a complete picture of retail environment resources available.

Each selected store site was assigned a Rural-Urban Continuum Code (RUCC).³² RUCC classification categorizes US counties as either urban or rural (1–9); highest numbers indicated increased rurality (4–9) and lowest numbers (1–3) represented metro areas.³² The InFeed was implemented in stores spanning six, rural Montana counties. Three counties were located in NW Montana (RUCC 6 and 7) and grocery (n = 8) and other (n = 1) stores were measured. The ‘other’ designation represented a grocery store that had recently re-opened after a period of closure and offered few products for consumer purchase. Stores assessed in SW Montana were within one county (RUCC 5) and included two groceries and a department store. NE Montana stores that were measured with the InFeed spanned two counties (both RUCC 7) and included a pharmacy in addition to department (n = 2) and grocery stores (n = 6).

The InFeed was first implemented by two raters across a subsample (n = 9) of store locations in NW Montana to test interrater reliability. Researcher observations during the pilot testing period, along with expert feedback, strengthened face validity and informed changes to finalize the InFeed: (1) WIC-accepted formulas and those brands not accepted by WIC were included as separate measures due to retail environment observations and WIC’s provision of infant formula vouchers; (2) measurement of infant formula varieties were aligned with US Food and Drug Administration (FDA) specifications;³³ (3) the InFeed equipment section was condensed to include only items realistically expected to be accessed spanning a variety of store settings; (4) nutrition supplement measures were reduced to only include pre and postnatal vitamins due to the difficulty of obtaining supplement information in product-rich aisles; (5) the breast pump measure was condensed to prompt documentation of only the lowest priced electric and/or manual offering to align with other InFeed equipment measurement methods and to enhance tool usability; (6) the herbal galactagogues measure was removed based on lack of FDA support for their use, and; (7) the marketing measure was reduced to a single category in an effort to streamline the data collection process.

The final InFeed tool included four sections, titled: (1) Formula, (2) Equipment, (3) Supplement, and (4) Marketing (Appendix I). Each section had detailed implementation instructions (Appendix II). The scoring process for InFeed was adapted from the NEMS-S scoring protocol²⁵ and is available in Appendix III. The purpose of InFeed was to assess overall access to infant feeding resources with the rationale that access to more options is favorable. The NEMS-S scores similarly, as consumer access to more dietary options is preferred.²⁵

Total InFeed scores had the potential to range from 0 to 36 and documented resource availability by store (low to high access). Scoring is also possible by InFeed section, and total points possible included 22 for Formula, 10 for Equipment, two for Supplement, and two for Marketing. The equipment section primarily included indicators for breastfeeding-specific resources. One item within this section was considered formula-feeding specific, and bottles may be used for either breast or formula-feeding (Appendix I). Therefore, scores between formula and equipment sections could be compared to determine if differences in

environmental resource support exist for the different modes of infant feeding. However, measuring resources separately was not a focus of this research.

Data Analysis

Store data ($n = 21$) resulting from InFeed implementation were coded for analysis in SPSS (version 22.0).³⁴ The InFeed scores by section and total scores (total points across the four sections) were calculated. The randomly selected stores ($n = 9$) were analyzed to determine interrater reliability. Percentage agreement and kappa statistics were calculated for each store and measure. It was hypothesized there would be a high agreement between scores for two auditors within the same store. Kappa values were considered: 0.01–0.20 slight agreement; 0.21–0.40 fair agreement; 0.41–0.60 moderate agreement; 0.61–0.80 substantial agreement; 0.81–1.0 high agreement.

Descriptive statistics (range, means, and standard deviations) were used to assess availability and price variables (across Formula, Equipment, Supplement, and Marketing InFeed sections). Frequency of store type, WIC acceptance rate, and time to complete the InFeed were also calculated. Kruskal-Wallis, an analysis of variance test for nonparametric data, was utilized to determine the potential for significant differences between RUCC and store type ($P < .05$) in InFeed scores overall and by section. One-sample t-tests were also used to determine if WIC and non-WIC accepted formula prices and InFeed formula and equipment sections (a comparison of formula and breastfeeding resource availability) differed ($P < .05$).

Results

Interrater reliability testing ($n = 9$) indicated complete agreement (100%) in both the Formula and Marketing measures, and minor discrepancies in Equipment (93.2%) and Supplement (92.6%) measures. The InFeed took an average of 17.5 (10.2) minutes to complete. Total InFeed scores ranged from 0 to 24 (potential range of 0–36) and scores varied by section: Formula, 0–13 (22 points possible); Equipment, 0–9 (10 points possible); Supplement, 0–1 (2 points possible); and Marketing, 0–1 (2 points possible). Table 1 presents Kappa value results in addition to the calculated InFeed scores overall and by section. Across stores, Formula scores were higher ($p = .001$) than Equipment scores. See Table 1 for means and standard deviations.

Stores measured using the InFeed ($n = 21$) were categorized as a department (14.29%), grocery (76.19%), pharmacy (4.76%), and other (4.76%). Of all stores documented, 80.95% accepted WIC benefits (foods and formulas) and 19.05% did not. See Table 2 for the descriptive results of available resources. Overall, WIC-accepted powdered formulas were more available across stores ($n = 17$) than non-WIC brands. Available WIC-accepted powdered formula varieties ranged from 1 to 7 ($M = 3.81$, $SD = 1.76$). Non-WIC accepted powdered formula varieties ranged from 1–6 ($M = 2.53$, $SD = 1.61$). Bottles were the most commonly documented equipment resource identified. In addition, no post-natal vitamin and mineral supplements were documented. Infant feeding promotions were only identified in one store (Table 2).

The average price of documented InFeed resources are also displayed in Table 2. Due to the observation that powdered formulas were more commonly available across stores than other formula types, the mean price was analyzed between WIC and non-WIC brands. Results indicated WIC accepted powdered formulas were more expensive than non-WIC accepted powdered formulas ($p < .001$) (Table 2).

Differences by RUCC and Store Type

The counties of store locations captured within this research were assigned a RUCC of 5 ($n = 3$), 6 ($n = 6$), or 7 ($n = 12$). Formula ($p = .046$), Equipment ($p = .017$), and Total InFeed scores ($p = .027$) were significantly different by RUCC (Table 3), and indicated a lack of infant feeding resources in more rural locations. No InFeed resource prices (Table 2) were found to significantly differ by RUCC. However, a large variation in the price of WIC accepted term powdered formulas (more common than the availability of non-WIC formulas) was observed (Table 4). Last, no statistically significant differences were found between store type for total InFeed scores, InFeed scores by section, or prices of individual resources (Table 2).

Discussion

The InFeed was developed from existing retail measures^{25,26} and implemented to evaluate the accessibility and affordability of resources to support the infant feeding decision in rural Montana. The tool was pilot tested, confirmed by a panel of experts, and had a high agreement between raters. The InFeed captured reduced access to infant feeding resources in retail environments in more rural Montana counties. Resources did not differ by store type, indicating RUCC as the main factor for the captured disparity in this research. Further, in comparison to breastfeeding resources, formula-feeding items were more commonly available within retail stores measured.

The InFeed results were aligned with similar food environment work that identified disparities in the quality of fresh produce in more rural food stores in Montana using NEMS-S.¹⁷ This alignment adds validity to the InFeed tool.

As the InFeed was the first tool to elucidate the existence of infant feeding resource gaps, there are many points of discussion regarding InFeed interpretation and future applications. Ultimately, the InFeed requires application to diverse US urban and rural areas. The tool may be especially valuable to implement in low-income and rural US areas as these communities continue to experience more severe access and health issues than urban counterparts.^{20,21} Described below are points for further exploration for researchers and practitioners interested in environmental determinants of health behaviors within the context of infant feeding.

Breast milk is the gold standard for infant nutrition.¹ However, breastfeeding is not chosen or is not possible as the main source of nutrition for all infants for a variety of reasons. Beyond the commonly noted barriers to breastfeeding,⁴ underserved populations may experience additional challenges to breastfeed. For example, mothers that are employed in hourly or shift work that disallows for maternity leave or the breaks required to successfully

pump and store breastmilk.⁶ Also, opiate-addicted mothers may experience social and mental health issues that further challenge the possibility for breastfeeding.³⁵ Such barriers are more common among low-income and rural populations, especially.³⁶ Further, some evidence has suggested the early provision of infant formula to reduce infant mortality and the likelihood of hospital readmission among certain infant populations.³⁷

Therefore, formula-feeding may be the ideal maternal choice in such circumstances where challenges to breastfeed cannot be overcome. It is critical that the appropriate infant formulas are available and affordable in order to support optimal macro and micronutrient intake and to meet diverse infants' dietary needs.³⁸ This may include term and pre-term options or more tolerated formulas if needed, such as lactose-free, and specialty allergen or anti-reflux formulas.³⁸ It is not known if a lack of access to these options results in suboptimal feeding practices that may influence nutrition insufficiencies for infants whom require certain formulas. Research on this topic is warranted. Overall, assessing the retail environment for both breast and formula-feeding resources is critical to support favorable health outcomes and mothers' decisions.

Resource access variables may influence breastfeeding initiation and duration behaviors in a similar manner as consumers' dietary purchases are influenced by food environment factors.^{9,16} This too requires investigation. For example, breast pumps may facilitate breastfeeding;³⁹ however, breast pumps were not commonly available within measured food retail environments in Montana. Research that aims to identify relationships between infant feeding resource environments and infant feeding behaviors/health outcomes are warranted. Possibly low observed rates of breastfeeding within rural locations are reinforced by food retail environment norms that favor the availability of formulas over equipment that supports breastfeeding. In addition, it will be necessary to understand how food retail environments' infant feeding resource support aligns or misaligns with local health center and/or hospital maternal infant feeding education and recommendations.

Affordability is also an important measurement variable to capture within food retail settings located in underserved communities.⁴⁰ The implementation of InFeed documented infant formula prices that widely varied (although were not found to meaningfully differ). Further, WIC-accepted powdered formulas were more expensive in comparison to non-WIC brands. The results of a qualitative infant feeding investigation in NE Montana identified the high price of formula as a familial stressor.³¹ The associated anxiety with experiencing low access to foods may be a motivator for families to choose less expensive, energy-dense and nutrient-poor foods that contribute to obesity.^{41,42} However, little is currently known about how infant feeding is affected by, or contributes to, a lack of access to nutritious options. The InFeed is able to serve as a valuable resource in future research intending to assess local food retail environments and their impact on low resource households with infants.

Additionally, the InFeed documented increased availability of WIC-authorized varieties of formula in comparison to other brands. WIC participants who choose non-breastfeeding packages are provided with formula vouchers.²³ A policy discussion of these options is outside of the scope of this research, although most WIC participants redeem their program benefits, including formula, from food stores.⁴³ Minimum stocking requirements do exist at

the state-level for WIC-authorized stores and specify the types and amount of formula to be available for purchase.⁴⁴ Therefore, WIC-authorized stocking guidelines for store retailers may enforce formula feeding as a cultural norm through establishing the availability of a wide variety of formula products (e.g., increased salience)⁴⁵ and requires research. The InFeed could also be a valuable tool to measure any future WIC policy changes at the level of the food retail environment. For example, if WIC-approved formula brand contracts change at the state level, how does this impact store formula access and price? Also, how would the provision of WIC vouchers for breast pumps and affiliated breastfeeding resources change variables of the food retail environment in support of breastfeeding?

In addition to the ideas described above, there are several ways the InFeed could be utilized in future research. Qualitative methods should complement future InFeed implementation to understand consumer infant feeding resource perspectives alongside quantitative access variables.³¹ Also needed is documented rationale for store managements' stocking of infant feeding resources and their perspectives regarding the store's role in promoting health in this capacity. A review of food store research identified common management barriers to the promotion of healthier dietary alternatives to include a lack of consumer demand, a high perceived profitability of current inventory, and a reduced capacity to implement changes (e.g., space, renovation costs, suppliers).⁴⁶ It is likely that management perspectives are similar with regard to infant feeding resources in retail settings, although this requires investigation.

Finally, researchers observed formulas to be generally available throughout stores in this study. Although, not documented by the InFeed were colorful formula packaging and a lack of difficulty in identifying formulas for purchase in comparison to potential breast pumps. Manufacturers expend a considerable amount (approximately 6.5 billion dollars) to promote infant and toddler food and drink products, inclusive of formula.⁴⁷ Understanding the relationship between formula promotions and access to breastfeeding resources on infant feeding decisions and childhood obesity rates is greatly needed. In the time since the InFeed's inception, behavioral economic cues have become a popular focus as a way to promote healthier dietary behaviors in retail environments.¹¹ The InFeed only captured explicit marketing techniques (e.g., promotion) in support of breast or formula-feeding. In the future, an additional module could be added to the InFeed to capture choice-architecture variables and more specific marketing-mix cues.⁴⁵

Limitations

Study authors acknowledge that there are several limitations to the InFeed. Primarily, this tool was proposed as a first step in measuring the availability and accessibility of infant feeding resources in retail environments. Authors recognize further measures to evaluate store characteristics are needed. For example, documentation of lowest prices offers a logical way to compare offerings spanning various locations, though may not accurately depict the most nutritious option.⁴⁸ Likewise, lower-priced breastfeeding or formula equipment may not be the most functional choice. The addition of infant feeding resource measures that document the accessibility of baby food products are also needed.

Next, Montana is primarily a rural state and although this research compared and found meaningful differences by rurality, a comparison to urban stores was not made. Future research utilizing the InFeed should include a larger sample size and carry out comparisons between rural and urban locations. Urban sites might have a wider range of store types available for measurement. Last, InFeed is the first environmental measure specific to infant feeding resources, and therefore minimizes the capacity for a comprehensive evaluation of validity without extensive funding support.

Conclusion

The InFeed is a novel and reliable tool to evaluate the accessibility and affordability of infant feeding resource support in food retail environments. Infant feeding resources were found to lack in more rural food retail environments in Montana. Additionally, there were notable price differences between WIC and non-WIC formula brands. More research is required to understand how these findings compare to other food retail environments in varying geographic and cultural contexts in the US. The InFeed should be used to explore (1) the influence of the food retail environment on infant feeding decisions, (2) the need for interventions in food retail environments, (3) and/or the potential for food retail environment changes as a result of federal or local WIC policy adjustments.

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Appendix I:: Infant Feeding Resource Tool (InFeed)

☐ Baby-specific store	Cash Registers (R): _____
☐ Convenience Store	Start _____ End _____
☐ Department Store	Start time _____ : AM : PM
☐ Grocery store	End time _____ : AM : PM
☐ Health Food Store	
☐ Pharmacy	
☐ Other: _____	
(Check one)	

RATER ID: _____	STORE CODE: _____
Store Name _____	
Store Address _____	
Store Phone # _____	
Does the store accept WIC? ☐ yes ☐ no	

NOTES: _____

MEASURE #1: FORMULA

Are formulas available? ☐ yes ☐ no

WIC ACCEPTED BRAND NAME: _____

NON-WIC ACCEPTED COMPARISON BRAND NAME: _____

Term Formula	Powder	Liquid Concentrate	Ready-To-Feed
☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no
\$55	\$55	\$55	

Term Formula	Powder	Liquid Concentrate	Ready-To-Feed
☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no
\$55	\$55	\$55	

NOTES:

MEASURE #2: EQUIPMENT

Is infant feeding equipment available? ☐ yes ☐ no

Equipment	Available	Quantity #	Price \$55
Breast Pump: Electronic	☐ yes ☐ no	1	
Breast Pump: Manual	☐ yes ☐ no	1	
Instant Formula Prep Machine	☐ yes ☐ no	1	
Nursing Pads	☐ yes ☐ no		
Breast Milk Storage Bags	☐ yes ☐ no		
Nipple Shields	☐ yes ☐ no		
Onionment Specific for Nipple Soreness	☐ yes ☐ no		
Bottles	☐ yes ☐ no		
Other:	☐ yes ☐ no		

NOTES:

MEASURE #3: NUTRITIONAL SUPPLEMENTS

Nutritional Supplement	Available	Quantity #	Price \$55
Prenatal Vitamins	☐ yes ☐ no		
Postnatal Vitamins	☐ yes ☐ no		

NOTES:

MEASURE #4: MARKETING

• Store or brand advertisements specific to breastfeeding promotion: ☐ yes ☐ no
Describe: _____

• Store or brand advertisements specific to formula promotion: ☐ yes ☐ no
Describe: _____

NOTES:

Appendix II:: Infant Feeding Resource Tool (InFeed) Instructions

SURVEY DESCRIPTION: The Infant Feeding Resource Tool (InFeed) is an adaptation to the Nutrition Environment Measure in Stores (NEM-S)¹ and aims to document affordable access to formula varieties, infant feeding equipment and resources, nutritional supplements to aid in breastfeeding, and infant-feeding focused marketing strategies in stores. Formula measures are based on FDA approved guidelines for infant formulas² and literature synthesizing formula options.³ Other measures are informed by researcher observations of available resources in retail settings and through face validity examinations.

STORE DOCUMENTATION INSTRUCTIONS: The first page of the InFeed seeks to document store specifics.

1. Check the box associated with the type of store that most accurately describes location being assessed (convenience, baby-specific, grocery, health food, pharmacy, or other). If other, document store type.
2. Count the number of cash registers total in store location, inclusive of customer service desk, pharmacy counter, and self-checkout lanes, if applicable.
3. Mark the date (MM/DD/YY) of survey implementation and the time it is begun. Be sure to mark appropriate AM or PM box. At the end of survey documentation, mark the time at which all survey measures are completed, including the appropriate AM or PM box.
4. The rater ID documents the person implementing the survey, in order to provide an avenue for follow up with any discrepancies. The store code provides enumeration of store location. Method of documentation is according to primary investigator's discretion.
5. Write the store name, address, city, and zip code.

6. Find out if the store accepts WIC. If yes, mark 'yes'. If no, mark, 'no'.
7. Document any notes that may be of interest specific to store location.

INFORMATION ABOUT MEASURE #1, FORMULA: Page 2 of the InFeed compares availability, variety, and price of both WIC accepted formulas and alternate options. Based on FDA guidelines, the three types of formulas available on the market (powder, liquid concentrate, and ready-to-feed) differ by liquid needed to prepare.² Measures in this survey will be based on this information.

SURVEY INSTRUCTIONS FOR MEASURE #1: FORMULA (page 2)

1. Locate aisle(s) dedicated to infant formulas.
2. If infant formulas are available in store, mark 'yes'. If there are no formulas available mark 'no' and proceed to Measure #2.

Term Formula	Powder	Liquid Concentrate	Ready-To-Feed
	☐ yes ☐ no	☐ yes ☐ no	☐ yes ☐ no
	oz. _____	oz. _____	oz. _____
	\$. \$\$ _____	\$. \$\$ _____	\$. \$\$ _____

3. Scan over all offerings to determine WIC accepted brand by searching for a label designating a certain brand of formula to be accepted by WIC. This is usually indicated by a sign below or above the formula and near the price.
4. If a WIC accepted brand is available in-store write the name of the brand beside WIC ACCEPTED BRAND NAME. This brand will be the only formula brand utilized in the first table.
5. Determine the term formula of the designated WIC ACCEPTED brand and document the name in the 'Term Formula' column. Term formulas are defined as standard formulas providing nutrition that benefits most infants, are modeled after breast milk, and include 20kcal/oz., lactose, and cow's milk protein.³
6. The 'Powder,' 'Liquid Concentrate,' and 'Ready-To-Feed' columns allow you to document the size and price of the term formula by differing powder, liquid, and ready-to-feed concentrates. Choose smallest size offered for each and document availability (mark 'yes' or 'no'), size in ounces, and price per container in each column.
7. In 'Total Number of Variations' row, determine number of available varieties (not including term formula offered, of each available WIC approved brand concentrate. Variations of formulas documented in survey include preterm and enriched formulas, and specialized term formulas (soy, lactose-free, hypoallergenic, non-allergenic, and antireflux).³ Again, choose smallest size offered for each.
8. In NON-WIC ACCEPTED COMPARISON BRAND NAME table, complete the same method described in steps 1 through 8 for a comparison brand that is not accepted by WIC. Choose the brand that is not WIC accepted and has the most shelf space.

9. Make notes as needed.

MEASURE #2, INFANT FEEDING EQUIPMENT INSTRUCTIONS: Next, page 3 of the InFeed offers insight into resources offered to support either formula and/or breast feeding.

Equipment	Available	Quantity #	Price \$.\$
Breast Pump: Electronic	☐ yes ☐ no	1	
Breast Pump: Manual	☐ yes ☐ no	1	
Instant Formula-Prep Machine	☐ yes ☐ no	1	
Nursing Pads	☐ yes ☐ no		
Breast Milk Storage Bags	☐ yes ☐ no		
Nipple Shields	☐ yes ☐ no		
Ointment Specific for Nipple Soreness	☐ yes ☐ no		
Bottles	☐ yes ☐ no		
Other:			
Other:			

1. Locate aisle(s) dedicated to infant feeding equipment.
2. If infant feeding equipment is available in store, mark 'yes'. If there is no infant feeding equipment available mark 'no' and proceed to Measure #3.
3. For each specified resource listed in the 'Equipment' column mark: either 'yes' or 'no' in the corresponding 'Available' column, quantity available in each package in the 'Quantity' column, and lowest priced options in the 'Price' column.
4. If there are other equipment resources available that directly support formula and/or breast feeding, document similarly in the 'other' rows.
5. Make notes as needed.

MEASURE #3, NUTRITIONAL SUPPLEMENTS INSTRUCTIONS: Page 4 of InFeed documents access to prenatal and postnatal vitamins and marketing techniques.

1. Locate aisle(s) dedicated to nutritional supplements.
2. Look for prenatal and postnatal vitamins in the nutritional supplement aisle. Mark 'yes' or 'no' in the corresponding 'Available' column depending on availability. Document the number of supplements per container, respectively.
3. Make notes as needed.

MEASURE #4, MARKETING INSTRUCTIONS: This measure documents any advertisements that promote formula or breast feeding viewed in the store at the time of completing this survey. Document any advertisement in promotion of an infant feeding resource or method.

1. Mark 'yes' or 'no' for each question in measure 4. If 'yes' document capacity of marketing technique.
2. Make notes as needed.

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Table 1.

Descriptive statistics of the Infant Feeding Resource Tool (InFeed) implementation across 21 stores in Montana.

Survey Measure	Mean ^a	SD ^{a,b}	Kappa ^c
Total Formula Score	6.2	4.0	1.0
Total Equipment Score	2.1	2.2	0.565
Total Supplement Score	0.67	0.48	0.769
Total Marketing Score	0.05	0.22	1.0
Total Store Score	8.9	6.0	0.620

^aCalculated for 21 total stores.

^bSD, Standard Deviation.

^cInterrater reliability based on a random sample of 9 stores.

Table 2.

Descriptive statistics for the availability and price of individual Infant Feeding Resource Tool (InFeed) measures across Montana stores, n = 21.

Survey Measure	Percentage of stores (n = 21) where item was available for purchase	Mean Price ^b	SD ^c
WIC-accepted powdered formula (12.4 ounces ^a)	81.1%	\$17.59	\$1.59
WIC-accepted liquid concentrate formula (13 ounces ^a)	4.8%	\$5.55	N/A
WIC-accepted ready to feed formula (32 ounces ^a)	38.1%	\$7.18	\$0.46
Non-WIC-accepted powdered formula (12.4 ounces ^a)	38.1%	\$15.41	\$5.82
Non-WIC-accepted liquid concentrate formula	0%	N/A	N/A
Non-WIC-accepted ready to feed formula	0%	N/A	N/A
Electronic breast pump (each)	4.8%	\$34.97	N/A
Manual breast pump (each)	9.5%	\$19.99	\$0.01
Instant formula preparation machine (each)	4.8%	\$16.97	N/A
Nursing pads (each)	33.3%	\$0.15	\$0.04
Breastmilk storage bags (each)	19.1%	\$0.25	\$0.05
Nipple shields (package)	4.8%	\$9.97	N/A
Ointment for breastfeeding complications (package)	19.1%	\$10.11	\$0.62
Bottles (each)	66.7%	\$2.64	\$1.81
Prenatal vitamins (package)	76.2%	\$6.64	\$4.98
Postnatal vitamins (package)	0%	N/A	N/A

^a Average size.

^b Price in United States dollars.

^c SD, Standard Deviation.

Table 3.

Analysis of variance of Infant Feeding ResourceTool (Infeed) section scores by 2013 Rural-Urban Continuum Code (RUCC) (n = 21) classification.

InFeed Scoring Section	Maximum Survey Score	RUCC ^a	Mean	SD ^b
Formula ^c	22	5	11.3	1.5
		6	6.2	2.8
		7	5.0	4.1
Equipment ^d	10	5	5.3	3.2
		6	1.8	0.75
		7	1.2	1.8
Supplements ^e	2	5	1	0
		6	0.5	0.55
		7	0.67	0.49
Marketing ^f	2	5	0.33	0.58
		6	0	0
		7	0	0
Total Score ^g	36	5	18	5.2
		6	8.5	3.6
		7	6.8	5.3

^aRUCC range from 1 through 9: ranges 1 through 3 are classified as metro (urban; counties in metro areas; population ≥ 250,000), and 4 through 9 as non-metro (rural; counties not in metro areas; population <250,000). Three stores were classified as RUCC 5, 6 stores were classified as RUCC 6, and 12 stores were classified as RUCC 7.

^bSD, Standard Deviation.

^cP = 0.05 (rounded value) Kruskal-Wallis test for overall differences in InFeed section score by RUCC.

^dP = 0.02 Kruskal-Wallis test for overall differences in InFeed section score by RUCC.

^eP = 0.34 Kruskal-Wallis test for overall differences in InFeed section score by RUCC.

^fP = 0.05 Kruskal-Wallis test for overall differences in InFeed section score by RUCC.

^gP = 0.03 Kruskal-Wallis test for overall differences in InFeed section score by RUCC.

Table 4.

Analysis of variance and range of Infant Feeding Resource Tool (InFeed) scores for Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)-accepted term powdera prices (n = 17) by 2013 Rural-Urban Continuum Code (RUCC).

RUCC^b	N^c	Mean	SD^d	Price (\$) Range^{e,f}
5	3	16.3	0.41	15.8–16.5
6	6	18.1	2.2	16.5–21.9
7	8	17.6	1.6	16.5–19.9

^a Powdered formula with 20kcal/oz., lactose, and cow's milk protein designated as WIC-accepted brand by store-signage.

^b RUCC range from 1 through 9: ranges 1 through 3 are classified as metro (urban; counties in metro areas; population ≥ 250,000), and 4 through 9 as non-metro (rural; counties not in metro areas; population <250,000).

^c InFeed was implemented in 21 total stores. Four stores were excluded from this analysis because they did not offer WIC Term Powder.

^d SD, Standard Deviation.

^e Range displayed as minimum to maximum prices.

^f P = 0.08 Kruskal-Wallis test for overall differences in InFeed resource prices by RUCC.