Photo courtesy of Bobbi Gray, Grameen Foundation

Who Breastfeeds Among Women Living in Tribal Communities in Rural Rajasthan, India?

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Professional Assistance for Development Action (PRADAN)

PRADAN was established in 1983 and is a widely-recognized national-level organization that specializes in promoting livelihood opportunities among SHGs of women. PRADAN follows a four-pronged approach to achieve its goals: 1) Promoting and nurturing SHGs of poor women and strengthening them as organizations to leverage institutional finances for members' livelihoods; 2) Developing and introducing locally suitable economic activities to increase productivity and income among SHG members and building synergic collaboration with a wide variety of stakeholders; 3) Mobilizing finances for livelihood assets and infrastructure from government bodies, donors, banks and other financial institutions; and 4) Setting up mechanisms to sustain the livelihood gains made by the poor communities. In Sirohi, Rajasthan, PRADAN currently is reaching over 450 women's SHGs and implementing a variety of agriculture, livestock improvement, and nutrition and health projects.

Voluntary Association of Agricultural General Development Health (VAAGDHARA)

VAAGDHARA was formed in the 1980s to augment livelihood sources and options through improving traditional agricultural practices among the tribal population and other marginalized groups in Rajasthan. VAAGDHARA has broad expertise in developing and implementing programs that link interventions across multiple sectors to address poverty, women's empowerment, child protection, agricultural development and livelihood development and poverty alleviation. VAAGDHARA is currently reaching thousands of families in Banswara with livelihood, agriculture and food security initiatives and will use this as the foundation for increased focus on health, nutrition and gender.

Grameen Foundation

Grameen Foundation is a global nonprofit organization that helps the world's poorest people achieve their full potential by providing access to essential financial services and information on health and agriculture that can transform their lives. In 2016, Grameen Foundation and the global non-profit Freedom from Hunger decided to join forces under the banner of Grameen Foundation. The integration of the two organizations brings together Grameen Foundation's expertise in digital innovation to end poverty and Freedom from Hunger's focus on providing the world's poorest women with self-help tools to reduce hunger and poverty. Grameen Foundation is headquartered in Washington, D.C., with offices in the U.S., Asia, Africa, and Latin America. For more information, please visit www.grameenfoundation.org or follow us on Twitter: @GrameenFdn.

Freedom from Hunger India Trust

Established in 2012, Freedom from Hunger India Trust (FFHIT) is an independent Indian non-profit organization based in New Delhi with offices in West Bengal and Madhya Pradesh. The technical staff of FFHIT oversee health, nutrition, financial inclusion, vulnerable youth and savings group methodologies, and provide expert advice on leamer-centered curriculum design. FFHIT's goal is to achieve nutrition and food security, reduce poverty and improve economic and social status of poor and marginalized women and their families through increased integration of financial services with other essential services such as health, nutrition and livelihood opportunities. FFHIT is also an active member of National Coalition of Food and Nutrition Security.

Executive Summary

While breastfeeding is culturally accepted in India, exclusive breastfeeding rates remain low, especially as the infant increases in age. Research shows that 69 percent of infants in India are exclusively breastfed in their first two months of life, but only 27 percent for their first four-to-five months. This study explores factors that are associated with initiation of breastfeeding and exclusive breastfeeding among mothers in rural Rajasthan in order to identify and design sustainable solutions that can improve breastfeeding rates, infant and child nutrition, and developmental outcomes.

Freedom from Hunger, in partnership with two local implementing partners, PRADAN and VAAGDHARA, conducted a baseline assessment with 400 women in tribal communities in rural Rajasthan. Baseline findings indicated that of those who had a child under 12 months of age, 47 percent reported breastfeeding their child within one hour after birth and 28 percent reported that they exclusively breastfed for the first six months of the child's life.

Women who initiated breastfeeding within one hour after delivery were more likely to be food secure, receive growth monitoring and breastfeeding support from the anganwadi or Integrated Child Development Services (ICDS) centers, and have correct knowledge of how long a mother should wait to breastfeed after delivery. Poverty status, dietary diversity, and the number of coping strategies used to cope with food insecurity were not associated with initial breastfeeding.

Women who exclusively breastfed for six months were slightly less likely to fall under the National Poverty Line and the $1.25/day international poverty line, were more likely to report greater levels of dietary diversity and having received nutrition messages from a private doctor but were also more likely to use more strategies to cope with food insecurity. There was no association found between food security, use of ICDS centers and the likelihood of exclusive breastfeeding. Women who had spoken to their spouse about household food and nutrition needs, and had unrestricted access to any income were more likely to initially breastfeed as well as to breastfeed exclusively for six months. Women who breastfed exclusively were also significantly more likely to make joint decisions with their husband about money and health care. Breastfeeding outcomes remain suboptimal, possibly as a result of food insecurity, financial status, and autonomy. Practitioners should explore supplemental interventions that are more comprehensive than just breastfeeding promotion alone and which include a focus on improving women's earnings, increasing women's autonomy, and addressing periods of food insecurity.

Acknowledgements

We would like to thank our partners PRADAN and VAAGDHARA for their valuable contribution to this research. In addition, many thanks go to the PRADAN and VAAGDHARA clients who gave of their time. We would also like to thank the data collection team at the Institute of Health Management Research in Rajasthan for collecting high-quality baseline data. Finally, we express our appreciation to the Barr Foundation for funding this program and research.

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Introduction

The landmark initiative of the Millennium Development Goals (MDGs) led to significant progress worldwide (You et al., 2015). Attention has now shifted toward the Sustainable Development Goals (SDGs). Specific target goals have been established and include an emphasis upon sustainable endeavors in order to achieve the overarching goals of reducing maternal, infant, and child mortality rates (United Nations [UN], 2015b; World Health Organization [WHO], 2015). These specific target goals include: "40% reduction in the number of children under-5 who are stunted; reduce and maintain childhood wasting to less than 5% and increase the rate of exclusive breastfeeding in the first 6 months of life up to at least 50%" by 2025 (WHO, 2014).

The majority of child deaths are from preventable causes (UN, 2015a). Malnutrition is a significant underlying factor for morbidity and mortality among children (Satija, Sharma, Chaudhary, Kaushal, & Girdhar, 2015). The quality of nutrition that a child receives in their first 1,000 days of life is critical for growth and development (UN, 2015a). Children who receive inadequate nutrition often experience poor growth outcomes such as stunting and wasting, especially the very poor (bottom 20 percent), who are twice as likely to be stunted (UN, 2015a).

To increase sustainable development globally, countries that are more susceptible to poor nutrition and child mortality rates will need to be targeted. In 2015, approximately 5.9 million children under the age of five died, estimated at 16,000 children per day (You et al., 2015). Of those deaths, 31 percent occurred in South Asia (You et al., 2015). India has one of the largest populations in the world and 29.8 percent of the population lives below the poverty line (*The World Factbook*, 2016). Forty-eight percent of the children are stunted and 20 percent are wasted; as a country, India ranks 47th in the world for children under-5 mortality rates (United Nations Children's Fund [UNICEF], 2013).

Given a third of India's population lives below the poverty line and India's infant (41 per 1,000) and child (53 per 1,000) mortality rates are relatively high compared to the world's average rates of infant (34 per 1,000) and child (46 per 1,000) mortality rates (UNICEF, 2013), it is imperative that cost-effective sustainable solutions be implemented to reduce the burden of stunting and mortality rates among children. Breastfeeding has been established as an essential component to reducing poor nutrition and mortality within the first years of life (Bhutta et al., 2013; Jones, Steketee, Black, Bhutta, & Morris, 2003; Sankar et al., 2015; Black et al., 2008), and is one of the specific targets of the new SDGs (WHO, 2014). The benefits associated with breastfeeding within the first hour and exclusively for six months to reduce malnutrition and stunting are well documented (Kumar, Goel, Mittal, & Misra, 2006b; Giugliani, Horta, Loret de Mola, Lisboa, & Victora, 2015). However, less is known about the variables associated with the practice of such behaviors.

While breastfeeding is culturally accepted in India, exclusive breastfeeding rates remain low, especially as the infant increases in age (Patwari, Kumar, & Beard, 2015). Patwari, Kumar, and Beard (2015) found that 69 percent of infants were exclusively breastfed in their first two months of life, 50 percent their first two-to-three months and only 27 percent for their first four-to-five months.

This study explores factors that are associated with immediate breastfeeding and exclusive breastfeeding among mothers in rural Rajasthan in order to identify and design sustainable solutions that can improve breastfeeding rates, infant and child nutrition, and developmental outcomes.

Methods

Study Setting

Freedom from Hunger[3], a supporting organization of Grameen Foundation, together with its Indian affiliate organization, Freedom from Hunger India Trust, New Delhi and its Indian implementing non-governmental organization (NGO) partners, Voluntary Association of Agricultural General Development Health and Reconstruction Alliance (VAAGDHARA) and Professional Assistance for Development Action (PRADAN), aim to improve the resilience, food security, and nutrition among poor tribal households in rural Rajasthan, specifically in the districts of Banswara and Sirohi, with an integrated program that includes self-help groups of women that come together for financial transactions such as savings and loans, agricultural livelihoods, nutrition education, and gender dialogues.

Banswara and Sirohi are two tribal districts located in the southern part of Rajasthan, India. Fifty-nine (59) percent of children under the age of three are stunted in Banswara, which is attributed to the lack resources to adequately address the underlying causes of poor nutrition (Foundation, 2011). Of the women living within Banswara and Sirohi districts with a child under the age of 5, 39.0 percent and 28.6 percent, respectively, reported breastfeeding their youngest child within the first hour and 57.1 percent and 39.6 percent reported exclusively breastfeeding for six months (International Institute for Population Sciences [IIPS], 2015-2016).

Study Design

In May 2015, baseline data was collected from 403 clients belonging to PRADAN and VAAGDHARA to assess knowledge, attitudes, and behaviors associated with food security and breastfeeding outcomes. Survey respondents were selected from Banswara and Sirohi districts and were self-help group (SHG) members who were either pregnant (in their 2nd or 3rd trimester of pregnancy) or had children with less than two years of age.

A simple representative random sample was applied, stratified to include at least 20 percent of currently pregnant women, with the remaining sample consisting of mothers with children between the ages of 0-2 years. Independent consultants from the Indian Institute of Health Management Research (IIHMR), developed the sampling strategy, pre-tested the survey instrument, and collected the data for the baseline survey. While the intervention is designed to reach all women clients of VAAGDHARA and PRADAN, currently pregnant and lactating women were targeted for the survey in order to detect changes in key variables related to breastfeeding and infant and child feeding.

Measures

Poverty was measured using the Progress out of Poverty Index® designed for India (India Progress out of Poverty [PPI], 2012). Dietary diversity was measured utilizing a standardized tool developed by the Food and Agriculture Organization of the United Nations (Kennedy, Ballard, and Dop, 2011). Coping strategies were measured using the Coping Strategies Index (CSI) from CARE (Maxwell and Caldwell, 2008), which uses 13 variables to assess respondent's coping behaviors during a food shortage. Many of

[3] Throughout the rest of this report, Grameen Foundation will be used to reference work started by Freedom from Hunger.

the health questions, such as the food security question, were drawn from a Health Outcomes Performance Indicators (HOPI) project conducted by Freedom from Hunger (Gray, 2015) or India's Demographic and Health Survey (IIPS, 2007).

Analysis

Poverty likelihoods were established per the guidelines set forth from the Progress out of Poverty (PPI) scorecard guidelines (India PPI, 2012). Scores from 10 variables were summed to obtain a composite raw PPI score for each individual. These questions, selected specifically for India, cover items such as number of people in the household, household type, primary source of energy used for cooking, etc. Raw PPI scores were then matched to a likelihood of poverty range found in the scorecard in order to obtain a mean likelihood of living below the national poverty line (NPL) using the 'National Tendulkar' poverty line (for example, if the PPI score was between 0-4, the likelihood of living below the NPL was 86.8 percent).

The food security questions used allow a practitioner to establish food security levels in the following ways, where "having enough food and of the kinds of nutritious foods we want to eat" is classified as "food secure"; "having enough food but not always nutritious food" is classified as "food insecure without hunger"; "sometimes not having enough food to eat and was sometimes hungry" is classified as "food insecure with moderate hunger"; and "often not enough food to eat, was often hungry" is classified as "food insecure with severe hunger." Survey respondents were asked to report both for themselves and for their children. For analysis purposes, clients were described as either food secure or food insecure, where food secure households were those who answered "had enough food and of the kinds of nutritious foods we want to eat" and food insecure households combined the remaining three answer options. Their response to the question related to their children was scored similarly. Table 1 summarizes these food security classifications.

Table 1: Food Security Classifications

Statement	Classification
1. We had enough and the kinds of nutritious food we want to eat	Food secure
2. We had enough but not always nutritious food	Food insecure without hunger
3. We sometimes did not have enough food to eat and were sometimes hungry	Food insecure with moderate hunger
4. We often didn't have enough to eat and were often hungry	Food insecure with severe hunger

Dietary diversity scores (DDS) were generated from guidelines by Kennedy, Ballard, and Dop (2011). Food categories were coded so that an answer of 'no' to having consumed a food in the past 24 hours equaled a score of 0, and an answer of 'yes' equaled a score of 1. Food groups included starches, legumes, milk and milk products, fish, eggs, meat, organ meat, fruits, vegetables, and fruits and vegetables high in Vitamin A. The scores for DDS ranged from 0-9. A score of 0 indicated none of the food consumed in the past 24 hours by the household surveyed fell under the categories of interest, and nine indicated food from all nine of the food groups were consumed by the family.

For the CSI, raw coping scores were computed per the guidelines set forth by Maxwell and Caldwell (2008). New variable names were created for each of the sub-questions that asked about specific coping strategies, such as borrowing food, limiting portion size, etc. The answer selections were re-coded using the same 0/1 scheme mentioned above in order to compute a new coping score. After this was done, all of the individual coping scores were totaled to create a raw total coping score.

For breastfeeding variables, the response option of "don't know" for how many complementary foods should be given to a child 6-8 months per day was coded to missing so that it would not interfere with analysis. Finally, the response options for how many months the child was breastfed exclusively and not given any other foods or liquids except breast milk were collapsed. The answer option "6 months" (for women who exclusively breastfed their child) was recoded as "one" and the two other answer options "Less than 6 months" and "More than 6 months" were recoded as "zero".

Statistical tests were performed using SAS 9.4. T-tests and Chi-square tests were conducted to compare key variables of interest, such as breastfeeding within the first hour and exclusive breastfeeding for six months with PPI, DDS, CSI, and other variables.

Results

Demographics

The participants' demographic information and the variables of interest, "child first breastfed within one hour after birth" and "child exclusively breastfed for six months," are provided in Table 2. Of the 403 total members surveyed, 188 were included in this assessment for those that had a child under 12 months of age. All but one of the respondents reported they were Hindu, 37 percent were from the Garasiya Tribe, 97 percent were married, and five percent were currently pregnant. Each household had an average of three children with a mean of 1.78 girls and 1.49 boys. A majority of the mothers ever breastfed, 47 percent reported breastfeeding their child within one hour after birth, and 28 percent reported that they exclusively breastfed for the first six months of the child's life.

Table 2. Demographic information and variables of interest

	Frequency (n=188)	Percent
Religion		
Hindu	187	99.5
Muslim	1	0.5
Caste/Tribe[a]		
Darbar	6	3.2
Gaimar	6	3.2
Gadasiya	15	8.0
Gamati	15	8.0
Garasiya	69	36.9
Marital status		
Single	3	1.6
Married	182	96.8
Separated/Divorced	1	0.5
Remarried	2	1.1
Currently pregnant		
Yes	10	5.3
No	178	94.7
Child ever breastfed		
Yes	187	99.5
No	1	0.5
Child first breastfed within one hour after birth		
Yes	88	47.1
No	99	52.9
Child exclusively breastfed for six months		
Yes	52	27.7
No	136	72.3
	Mean ± SD	
Age of Respondent	27.3±4.8	
Number of children	3.3±1.7	
Number of girls	1.8±1.4	
Number of boys	1.5±1.1	

[a] Castes and Tribes that had fewer than 3.0% of responses are not listed

Associations between breastfeeding behaviors and poverty, dietary diversity, and coping strategies

Table 3 provides a comparison of "Initiated breastfeeding within the first hour" and "Exclusively breastfed for the first six months" with selected indices, including the PPI at three levels, the DDS, and the CSI. There were no significant associations between initial breastfeeding and poverty, dietary diversity, or the number strategies used to cope with food insecurity.

There was a significant association between exclusive breastfeeding and the CSI; women who reported to have exclusively breastfed were more likely to use a greater number of coping strategies to cope with food insecurity. Although not significant at the p=0.05 level, there was also a trend towards an association between exclusively breastfeeding for six months and poverty as well as dietary diversity. Those who breastfed exclusively reported slightly more dietary diversity and were slightly less likely to fall under the National Poverty Line (NPL) and the $1.25/day poverty line.

Table 3. Initial and exclusive breastfeeding by poverty, dietary diversity, and coping strategies

	Breastfeeding - Initial			Breastfeeding - Exclusive		
	"Yes" Mean	"No" Mean	*P*-value [d]	"Yes" Mean	"No" Mean	*P*-value [d]
PPI* ($1.25/day)	60.4	64.9	0.1690 [h]	58.4	64.5	0.0942 [h]
PPI ($2.50/day)	97.0	98.0	0.1212 [g]	96.8	97.7	0.1841 [h]
PPI (NPL)	51.7	56.7	0.1375 [h]	49.8	56.1	0.0909 [h]
Dietary Diversity Scoring	3.7	3.5	0.4997 [h]	3.8	3.5	0.0906 [h]
Coping Strategies Index	4.3	3.9	0.2295 [h]	4.9	3.7	0.0004 [h]

[d] *T*-tests used
[g] Satterthwaite t-test used
[h] Pooled t-test used
*Progress out of Poverty Index

Additional factors associated with initial breastfeeding

Factors associated with women who breastfed initially within one hour after delivery are found in Table 4. Women who initiated breastfeeding within one hour after delivery were more likely to be food secure, consume seed stock held for next year's harvest, receive growth monitoring from the anganwadi or Integrated Child Development Services (ICDS) center, delay seeking medical treatment for themselves due to cost, and indicate that distance to a health facility was a "big problem". Consuming seed stock is equivalent to consuming more flour or wheat-based foods in this context due to very little sale of wheat among smallholder farmers who primarily grow wheat for consumption. Breastfeeding initially was significantly associated with a woman being more likely to speak to their spouse about household food and nutrition needs, generally have unrestricted access to any income, and more likely to know that a mother should breastfeed immediately or within an hour of a child's birth. Mothers who breastfed initially were also significantly less likely to report giving their child something other than breast milk to drink in the first three days of life or other milk products during the child's first six months of life. Breastfeeding initially was not associated with receiving breastfeeding support from the anganwadi or ICDS centers, receiving nutrition messages from private doctors, a woman's decision-making power in relation to how the money she earns is used or her personal health care, knowledge of how long a mother should exclusively breastfeed, nor whether she reported to have exclusively breastfed.

Table 4. Determinants of initial breastfeeding

	Breastfeeding - Initial		
	"Yes" (%)[i]	"No" (%)[i]	*P*-value[e]
Amount and variety of food that respondent (woman) has to eat			
Enough food and nutritious (food secure)	30.7	14.0	
Enough food; not always nutritious (food insecure without hunger)	53.4	74.0	0.0083
Sometimes not enough to eat (food insecure with moderate hunger)	15.9	12.0	
Highlighted questions from the CSI			
Consumed seed stock held for next season	55.7	40.0	0.0404[f]
Skipped entire days without eating	28.4	21.0	0.3077[f]
Received growth monitoring from anganwadi or ICDS[†] center	54.7	30.4	0.0093[f]
Received breastfeeding support from anganwadi or ICDS[†] center	18.9	10.1	0.1942[f]
Received nutrition messages from private doctor in past 12 months	30.7	21.0	0.1356[f]
In past year, delayed seeking medical treatment for self because of cost	76.1	59.0	0.0417
Problem/concern of distance to health facility			
Big problem	68.2	54.0	0.0231
Small problem	23.9	24.0	
No problem	8.0	22.0	
Who decides how the money you earn will be used			
Wife decides alone	3.4	6.0	
Husband decides	64.8	74.0	0.1504
Joint decision	31.8	20.0	
In the past 6 months, saved grain to cover any future food or health expenses	78.4	74.0	0.4986[f]
Who decides about health care for the wife			
Mainly wife's decision	2.3	5.0	0.3404
Mainly husband's decision	64.8	70.0	
Joint decision	33.0	25.0	
In past 6 months, wife spoke with spouse about household food/nutrition needs	91.0	60.0	<0.0001[f]
In general, wife has unrestricted access to any income	80.7	59.0	0.0015[f]
Knowledge - How long should a mother wait to breastfeed after delivery			
Immediately	38.6	11.0	
Within 1 hour of delivery	56.8	37.0	
Within 24 hours	2.3	33.0	<0.0001
Within 2 days	2.3	16.0	
Other	0.0	3.0	
Knowledge - How long should a mother exclusively breastfeed			
Less than one week	10.2	11.0	
Less than one month	13.6	23.0	0.1810
For one to three months	22.7	28.0	
For six months	45.5	29.0	
For more than six months	8.0	9.0	
Child given something other than breast milk to drink in the first three days of life	47.7	82.0	<0.0001[f]
Number of months child was breastfed exclusively			
Less than six months	64.8	74.0	
Six months	31.8	24.0	0.3761
More than six months	3.4	2.0	

Table 4 (continued)

	Breastfeeding - Initial		
	"Yes" (%)[i]	"No" (%)[i]	*P*-value[e]
Child given water in the first six months of life	75.0	75.0	1.0000[f]
Child given infant formula in the first six months of life	11.4	13.0	0.8251[f]
Child given milk (tinned, powdered, fresh animal) in first six months of life	40.9	63.0	0.0033[f]
Child given bread, chapatti, rice, noodles, biscuits, etc. in the first six months of life	28.4	25.0	0.6229[f]

[e] Chi-square test used, unless otherwise specified
[f] Fisher's Exact test used
[i] Percentage, unless otherwise specified
[†] Integrated Child Development Services

Additional factors associated with exclusive breastfeeding

Table 5 includes factors associated with women who reported to have breastfed their child exclusively for six months. Exclusive breastfeeding was associated with receiving nutrition messages from a private doctor, consumption of seed stock held for the next harvest season, and skipping entire days without eating. It was also associated with a woman reporting to have made joint decisions with her spouse regarding health care for her and how to spend money she earned, having unrestricted access to income, saving grain for future expenses, and having spoken with her spouse regarding nutritional needs of the household. Correct knowledge of how long a woman should exclusively breastfeed, offering less milk products, and giving infant formula to a child within the first six months of life were also associated with exclusive breastfeeding. Mothers who exclusively breastfed were slightly more likely to report giving a child bread products or cereals during the first six months of life.

There were no significant associations between breastfeeding exclusively and food security, receiving growth monitoring or breastfeeding support from the anganwadi or ICDS center, knowledge of how soon a child should be breastfed after birth, or the likelihood that a mother gave a child something other than breast milk in the first three days of life.

Table 5. Determinants of exclusive breastfeeding

	Breastfeeding - Exclusive		
	"Yes" (%)[i]	"No" (%)[i]	*P*-value[e]
Amount and variety of food that respondent (woman) has to eat			
Enough food and nutritious (food secure)	23.1	21.3	
Enough food; not always nutritious (food insecure without hunger)	61.5	65.4	0.8747
Sometimes not enough to eat (food insecure with moderate hunger	15.4	13.2	
Consume seed stock held for next season	63.5	41.2	0.0087[f]
Skip entire days without eating	40.4	18.4	0.0024[f]
Received growth monitoring from anganwadi or ICDS[†] center	44.1	39.8	0.6857[f]
Received breastfeeding support from anganwadi or ICDS[†] center	17.7	12.5	0.5605[f]

Table 5 (continued)

	Breastfeeding - Exclusive		
	"Yes" (%)[i]	"No" (%)[i]	*P*-value[e]
Received nutrition messages from private doctor in past 12 months	46.2	17.7	0.0001[f]
In past year, delayed seeking medical treatment for self because of cost	82.7	61.0	0.0164
Problem/concern of distance to health facility			
Big problem	48.1	65.4	
Small problem	34.6	19.9	0.0652
No problem	17.3	14.7	
Who decides how the money you earn will be used			
Wife decides alone	1.9	5.9	
Husband decides	51.9	76.5	0.0003
Joint decision	46.2	17.7	
In the past 6 months, saved grain to cover any future food or health expenses	86.5	72.1	0.0378[f]
Who decides about health care for the wife			
Mainly wife's decision	1.9	4.4	
Mainly husband's decision	42.3	77.2	<0.0001
Joint decision	55.8	18.4	
In past 6 months, wife spoke with spouse about household food/nutrition needs	88.5	69.1	0.0082[f]
In general, wife has unrestricted access to any income	84.6	63.2	0.0046[f]
Knowledge - How long should a mother wait to breastfeed after delivery			
Immediately	25.0	23.5	
Within 1 hour of delivery	53.9	43.4	
Within 24 hours	13.5	20.6	0.4990
Within 2 days	7.7	10.3	
Other	0.0	2.2	
Knowledge - How long should a mother exclusively breastfeed			
Less than one week	3.9	13.2	
Less than one month	9.6	22.1	
For one to three months	21.2	27.2	0.0014
For six months	59.7	27.9	
For more than six months	5.8	9.6	
Child given something other than breast milk to drink in the first three days of life	71.2	64.0	0.3932[f]
Child given water in the first six months of life	50.0	84.6	<0.0001[f]
Child given infant formula in the first six months of life	40.4	1.5	<0.0001[f]
Child given milk (tinned, powdered, fresh animal) in first six months of life	38.5	58.1	0.0219[f]
Child given bread, chapatti, rice, noodles, biscuits, etc. in the first six months of life	36.5	22.8	0.0661[f]

[e] Chi-square test used, unless otherwise specified
[f] Fisher's Exact test used
[i] Percentage, unless otherwise specified
[†] Integrated Child Development Services

Discussion and Conclusion

Significant Findings

Findings from this baseline assessment indicate that approximately half (47.1 percent) of women living in the Banswara and Sirohi tribal districts initiate breastfeeding within one hour of life while approximately one quarter (27.7 percent) exclusively breastfeed for the first six months of life. Women who initiated breastfeeding within one hour after delivery were more likely to be food secure, receive growth monitoring and breastfeeding support, and demonstrate correct knowledge of optimal breastfeeding behaviors. Women who exclusively breastfed for six months were more likely to report greater levels of dietary diversity, receive nutrition messages from a private doctor, but were also more likely to employ numerous strategies to cope with food insecurity. Women's autonomy within the home such as speaking to spouse about household food and nutrition needs, having unrestricted access to any income, and making joint-decisions with their spouse were associated with both breastfeeding outcomes.

Breastfeeding rates among our sample were lower compared to other studies conducted in India. For example, Satija et al. (2015) found in a rural area of Punjab, India, that 56.7 percent of children born in the past 23 months were breastfed within an hour after birth. In the 2015-2016 Indian National Family Health Survey (NFHS-4), 58.2 percent of children under six months were exclusively breastfed in Rajasthan (IIPS, 2015-2016). Possible reasons for the variation in exclusive breastfeeding rates are possibly due to how exclusive breastfeeding was defined. These studies asked respondents what foods/liquids they had given to their child within the last 24 hours compared to our study which asked what foods/liquids were given within the first six months of life. Pullum (2014) suggests that surveys tend to capture "prevalence" of exclusive breastfeeding such that exclusive breastfeeding of a child during any point during the first six months of life is captured but this is not the same as measuring "duration" of actually completing six months of exclusive breastfeeding. In our study, it was common among those who reported having breastfed exclusively to also report giving their child other milk products, water, infant formula, and bread products, suggesting that breastfeeding was not altogether exclusive.

The majority of our respondents experienced food insecurity. Food insecurity did not appear to differ by exclusive breastfeeding behaviors--of women who breastfed exclusively, 62 percent reported being food insecure compared to 65 percent who did not breastfeed exclusively. However, initiation of breastfeeding was significantly associated with food security. Also, it appears that families who employed more coping strategies (indicator of household food insecurity) did breastfeed longer. Higher average scores may indicate that these women are more resourceful when challenges arise by employing a variety of strategies to overcome them. Research exploring the relationship between a high prevalence of food insecurity and lower rates of exclusive breastfeeding is limited (Webb-Girard et al., 2012). In urban Kenya, women living in households with moderate to severe food insecurity were significantly more likely to report that mothers needed adequate food intake in order to produce enough breast milk for the first six months (Webb-Girard et al., 2012). In our study, more than half (59.6 percent) of women who exclusively breastfed had correct knowledge of when to wean suggesting that food insecurity, in addition to knowledge, may be an important determinant if or when a woman introduces other liquids/foods during the first six months.

Our results suggest a significant association between a woman's autonomy with household decision-making and whether she will breastfeed. Women who had spoken to their spouse about household

food and nutrition needs and had unrestricted access to any income were more likely to breastfeed within one hour as well as to breastfeed exclusively. Shroff et al. (2011) have also found that mothers in India with higher financial autonomy within the home are more likely to exclusively breastfeed. Additionally, those who breastfed exclusively were more likely to make joint decisions in their home about money and health care for themselves, compared to women who did not exclusively breastfeed. More autonomy in household decision-making may also signify less influence of a grandmother or mother-in-law and decisions about breastfeeding. Kaushal et al. (2005) have suggested that although mothers in rural Haryana, India in general had better knowledge of appropriate breastfeeding behaviors, grandmothers and sometimes the mothers-in-law would determine when a child was breastfed and complementary foods were introduced. While mothers and mothers-in-law may be present in the self-help groups supported by PRADAN and VAAGDHARA and receive the breastfeeding education, men typically are not included in this education. Given the positive role that spousal communication and a woman's autonomy in the home plays on breastfeeding behaviors, future breastfeeding education programs should consider including husbands. Research from neighboring Pakistan suggests that fathers can play an important role in the breastfeeding decisions, but require knowledge on how to provide optimum support to their wives (Mithani et al, 2015).

It was expected that mothers who breastfed initially were less likely to give their child other substances within the first three days of life compared to those who did not immediately breastfeed. It was unexpected that of those who breastfed initially, only 32 percent would be found to breastfeed exclusively. This result suggests different determinants influence whether a woman will initiate breastfeeding within the first hour compared to exclusively breastfeeding, which is a long-term behavior.

The treatment seeking behaviors of the women were also significantly associated with initial and exclusive breastfeeding. Several factors that influenced whether they would seek treatment included cost and the distance to a health facility. Of those who breastfed initially, 76 percent were more likely to delay medical treatment for themselves because of cost. However, it seems that India's ICDS centers are positively influencing some women living in rural areas. Women who received breastfeeding support and growth monitoring at these centers were more likely to breastfeed their child within the first hour, suggesting that the ICDS centers play a positive role in breastfeeding initially.

In this study, poorer women were slightly less likely to exclusively breastfeed than women from higher income households. Although breastfeeding is cheaper, women from poorer households may improperly assume that breastfeeding only is not effective, especially in times of scarcity. Kishore, Kumar, and Aggarwal (2009) found in northern rural India that poorer populations are less likely to understand what optimal behaviors are for breastfeeding, which may explain why foods or liquids were still given in this study as well. Likewise, in this study, of those who reported to breastfeed exclusively, 40 percent reported giving their child infant formula within the first six months and 46 percent received nutrition messages from a private doctor in the past 12 months. This potentially validates the finding that those who exclusively breastfeed are slightly better off given their ability to afford infant formula and seek treatment with a private doctor.

Limitations

Initial and exclusive breastfeeding data were taken from self-report and did not use dietary recall, which may have produced different results. Recall bias may have affected some of the responses given that respondents were asked if they had given their child certain liquids or foods during the first six months of life rather than the last 24-hours. The CSI is a real time rapid assessment tool used to measure food

insecurity, especially during emergencies. It primarily measures behaviors that people commonly employ when coping with limited access to food (Maxwell and Caldwell, 2008). This study used a 13-item scale to assess the amount of coping strategies ever used, which has been used in other studies to gain a quick measure of household food insecurity (Maxwell and Caldwell, 2008). Responses were not weighted and may not reflect the actual amount of food shortage within the household during the baseline assessment. However, given the complexity of measuring food security within resource-limited settings and time constraints, it provides a practical measure for practitioners in the field. Several other indices exist to measure food security, such as the Global Food Security Index (GSFI) and the Household Food Insecurity Access Scale (HFIAS) and they tend to measure similar circumstances, such as food affordability, availability, quality and safety, quantity, and uncertainty while the CSI primarily focuses upon behavior during food shortages (Coates et al. 2007; Maxwell and Caldwell, 2008).

Given one focus of the project is on gender dialogues between men and women, the role of other gatekeepers, such as mothers-in-law or grandmothers, were overlooked when assessing decision-making power within the household. This potentially could confound the reporting of the decision-making since, in some cases, an "other" decision-maker was not offered as an answer option. This study may lose some accuracy in decision-making; further research of this relationship and other third-party influences on breastfeeding could be interesting.

Conclusion

While breastfeeding is widely accepted in India, our results suggest that future studies should further investigate the possible association between food insecurity and optimal breastfeeding behaviors. Given the complexity of long-term behaviors, possible studies could research if there is an association between introduction of liquids and foods within the same months that households report a higher number of coping strategies or greater food insecurity. Other studies should further investigate women's autonomy in their households, especially the influence of grandmothers and mothers-in-law on breastfeeding behaviors, and the role that men can play in breastfeeding behaviors.

References

Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., . . . Rivera, J. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *Lancet (London, England), 371*(9608), 243-260. doi:10.1016/S0140-6736(07)61690-0

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., . . . Black, R. E. (2013). Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? *Lancet (London, England), 382*(9890), 452-477. doi:10.1016/S0140-6736(13)60996-4

Coates, J., Swindale, A. & Bilinsky, P. (2007) 'Household Food Insecurity Access Scale (HFIAS) for measurement of food access: indicator guide', Washington, DC: Food and Nutrition Technical Assistance Project, Academy for Educational Development.

Foundation, N. (2011). *HUNGaMA: Fighting Hunger and Malnutrition*. Retrieved from: Hyderabad, India: http://motherchildnutrition.org/resources/pdf/HungamaBKDec11LR.pdf

Giugliani, E. R., Horta, B. L., Loret de Mola, C., Lisboa, B. O., & Victora, C. G. (2015). Effect of breastfeeding promotion interventions on child growth: A systematic review and meta-analysis. *Acta Paediatrica,* 104(S467), 20-29. doi:10.1111/apa.13160

Gray, B. (2015) *Healthy, Wealthy and Wise: How Microfinance Institutions Can Track the Health of Clients*. Retrieved from: https://www.freedomfromhunger.org/sites/default/files/documents/HOPI_Report_Final.pdf

India Progress out of Poverty Index® (PPI®): Scorecard. 2012 . Innovations for Poverty Action. New Haven, CT. Available at: http://www.progressoutofpoverty.org/country/india

International Institute for Population Sciences (IIPS) (2015-2016). *National family health survey-4: State fact sheet Rajasthan* [Fact sheet]. Retrieved from http://rchiips.org/nfhs/pdf/NFHS4/RJ_FactSheet.pdf

Jones, G., Steketee, R. W., Black, R. E., Bhutta, Z. A., & Morris, S. S. (2003). How many child deaths can we prevent this year? *Lancet, 362*(9377), 65.

Kennedy, G., Ballard T., & Dop, M.C. et al., *Guidelines for Measuring Household and Individual Dietary Diversity* (Rome: Food and Agriculture Organization of the United Nations, 2011).

Kaushal, M., Aggarwal, R., Singal, A., Shukla, H., Kapoor, S. K., & Paul, V. K. (2005). Breastfeeding practices and health-seeking behavior for neonatal sickness in a rural community. *Journal Of Tropical Pediatrics, 51*(6), 366-376.

Kishore, M. S. S., Kumar, P., & Aggarwal, A. K. (2009). Breastfeeding knowledge and practices amongst mothers in a rural population of North India: A community-based study. *Journal Of Tropical Pediatrics, 55*(3), 183-188. doi:10.1093/tropej/fmn110

Kumar, D., Goel, N. K., Mittal, P. C., & Misra, P. (2006b). Influence of infant-feeding practices on nutritional status of under-five children. *Indian Journal Of Pediatrics, 73*(5), 417-421.

Maxwell D. & Caldwell R. (2008). "The Coping Strategies Index: Field Methods Manual." CARE, USA. Atlanta, GA. Available at: http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp211058.pdf

Mithani,Y., Premani, Z., Kurji, J., & Rashid, S. (2015). Exploring Fathers' Role in Breastfeeding Practices in the Urban and Semiurban Settings of Karachi, Pakistan. *The Journal of Perinatal Education*, 24(4), 249–260, http://dx.doi.org/10.1891/1058-1243.24.4.249

Patwari, A. K., Kumar, S., & Beard, J. (2015). Undernutrition among infants less than 6 months of age: An underestimated public health problem in India. *Maternal & Child Nutrition,* 11(1), 119-126. doi:10.1111/mcn.12030.

Pullum, T.W. (2014). Exclusive breastfeeding: aligning the indicator with the goal. Technical Note. *Global Health.* Science and Practice 2(3), 355-356. doi:10.9745/GHSP-D-14-00061.

Sankar, M. J., Sinha, B., Chowdhury, R., Bhandari, N., Taneja, S., Martines, J., & Bahl, R. (2015). Optimal breastfeeding practices and infant and child mortality: A systematic review and meta-analysis. *Acta Paediatrica,* 104(S467), 3-13. doi:10.1111/apa.13147

Satija, M., Sharma, S., Chaudhary, A., Kaushal, P., & Girdhar, S. (2015). Infant and young child feeding practices in a rural area of North India. *Asian Journal of Medical Sciences, 6*(6), 60-65. doi:10.3126/ajms.v6i6.12067

Shroff, M. R., Griffiths, P. L., Suchindran, C., Nagalla, B., Vazir, S., & Bentley, M. E. (2011). Does maternal autonomy influence feeding practices and infant growth in rural India? *Social Science & Medicine, 73*(3), 447-455. doi:10.1016/j.socscimed.2011.05.040

United Nations Children's Fund. (2013). India: Statistics. Retrieved from: http://www.unicef.org/infobycountry/india_statistics.html

United Nations. (2015a). The Millennium Development Goals Report 2015. New York. Retrieved from: http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

United Nations. (2015b). *Transforming our world: the 2030 Agenda for Sustainable Development*. Paper presented at the General Assembly. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

Webb-Girard, A., Cherobon, A., Mbugua, S., Kamau-Mbuthia, E., Amin, A., & Sellen, D. W. (2012). Food insecurity is associated with attitudes towards exclusive breastfeeding among women in urban Kenya. *Maternal & Child Nutrition, 8*(2), 199-214. doi:10.1111/j.1740-8709.2010.00272.x

The World Factbook. (2016). Retrieved from: https://www.cia.gov/library/publications/the-world-factbook/geos/in.html

World Health Organization. (2014). Global Nutrition Targets 2025 Policy Brief Series. Retrieved from: http://apps.who.int/iris/bitstream/10665/149018/1/WHO_NMH_NHD_14.2_eng.pdf

World Health Organization. (2015). Placing healthy women, children and adolescents at the heart of the Post 2015 Sustainable Development Indicator Framework. Retrieved from: http://www.who.int/pmnch/post2015_draft_indicator.pdf

You, D., Hug, L., Ejdemyr, S., Idele, P., Hogan, D., Mathers, C., Alkema, L. (2015). Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. *Lancet (London, England)*. doi:10.1016/S0140-6736(15)00120-8