The Association Between Breastfeeding Practices in Mongolia and Geographical Location of the Mother and Child

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Abstract

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Background A large body of research has shown that breastfeeding is optimal for infants and mothers. Previously high rates of exclusive breastfeeding in Mongolia have declined in recent years. Increased urban migration may be a factor in breastfeeding practices in rural compared to urban settings.

Methods This cross-sectional study analyzed a subset of infants aged 6-23 months from the 3rd National Nutrition Survey in Mongolia to compare breastfeeding practices in urban and rural areas including exclusive breastfeeding for at least 6 months and duration of breastfeeding.

Analysis Logistic regression was used to compare likelihood of exclusive breastfeeding for at least 6 months between rural and urban subjects. Cox regression was used to estimate hazard ratios between rural and urban subjects for likelihood of weaning.

Results Of 495 infants who were aged 6-23 months at time of survey, 202 (41%) were 6-11 months, and 293 (59%) were 11-23 months of age. In this sample, 309 (62%) of the subjects were categorized as rural residence, while 186 (38%) were categorized as urban. Mothers living in rural areas were significantly more likely to exclusively breastfeed for longer than 6 months compared to mothers in rural areas (OR 1.92, 95% CI: 1.29-2.87). Urban women were more likely to wean earlier than rural women (HR 1.55, CI: .999-2.52).

Conclusions The significant association between living in a rural areas and exclusively

breastfeeding for more than 6 months indicates that further study is warranted to identify influences upon women's breastfeeding decisions in the city. More education and intervention is needed to prevent further declines in rates and duration of breastfeeding among urban dwelling women in Mongolia.

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Background

A large body of research supports the now universally accepted recommendation that the healthiest source of nutrition for infants is human breast milk.[1,2] Immediate and exclusive breastfeeding strengthens the immune system and provides the optimum nutrition for the newborn.[3] Breast milk is not only the best source of nutrition in infancy, but may also impart protective effects against chronic disease in adulthood.[4] Based on a large meta-analysis, the World Health Organization (WHO) in its recent report "Exclusive Breastfeeding for Six Months Best for Babies Everywhere", stated that exclusive breastfeeding (no other food or liquid is given) for the first 6 months of life reduces the risk of gastrointestinal and respiratory infections in infants and assists with maternal weight loss after birth.[1,2] WHO recommends that infants be exclusively breastfed for 6 months and given breast milk with appropriate complementary foods up to the age of 2 years and beyond.[1]

Breastfeeding in Mongolia

Mongolia is a large country approximately the size of Western Europe with a population of 2.6 million people.[5] Traditionally, Mongolia has experienced high rates of breastfeeding. Breastfeeding is widely accepted and prolonged throughout Mongolia; 65% of children aged 20-23 months are still breastfeeding.[6] The World Health Organization recommends immediate initiation of breastfeeding after birth to ensure the infant receives the benefits of "first milk".[7] Early initiation of breastfeeding is also associated with longer duration of breastfeeding.[8,9] The rate of early initiation of breastfeeding is currently high in Mongolia at 82%. According to UNICEF's "The State of the World's Children 2009", 37% of infants in the developing world are exclusively breastfed for at least 6 months.[3] In Mongolia, the rate of exclusive breastfeeding for at least 6 months in 2004 was 38.3%. This represented a decline from 64% in 2000.[6] UNICEF has postulated that the decline in exclusive breastfeeding rates in Mongolia is due in part to the greater availability of breast milk substitute in the capital city of Ulaanbaatar, which has a population of 1.5 million.[10]

In Mongolia, efforts to improve breastfeeding practices have concentrated on the WHO/UNICEF Baby Friendly Hospital Initiative. Hospitals certified as "baby-friendly" promote breastfeeding and support the "10 steps for Healthy Breastfeeding".[11] Baby Friendly Hospitals train staff to support and educate mothers to make the choice to breastfeed and to restrict marketing of free samples of breast milk substitutes to new mothers while they are

still in the hospital. Baby Friendly Hospitals also help mothers initiate breastfeeding within 30 minutes of birth, as well as allow mothers and infants to remain together 24 hours a day while they are in the hospital.[11] All three major hospitals in Ulaanbaatar are certified "Baby Friendly". The Government of Mongolia adopted the Baby Friendly Hospital Initiative in 1992; in 2008, 75% of all hospitals in Mongolia were certified as "Baby-Friendly."[12] In July 2005, Mongolia became one of 25 countries in the world to pass the National Code on the Marketing of Breast-milk Substitutes. This was an important step designed to promote breastfeeding and regulate marketing of breast milk substitutes to lactating women, especially in hospitals. This code, developed by the WHO and adopted as a recommendation to all governments by the 34th World Health Assembly in May 1981, states that its aim is: "to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breast-feeding, and by ensuring the proper use of breast-milk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution".[13,p.8] Mongolia's 1999 labor code allows new mothers 120 days of maternity leave by law, as well as up to two hours of breaks per day for breastfeeding infants under 6 months, and one hour of breaks per day for breastfeeding infants aged 6-12 months.[14,15]

Urbanization

While many Mongolians live a nomadic life, tending livestock and living in *gers*, (a round, felt-covered tent-like structure known in Russia as a *yurt*), there has been an increasing trend of migration to the capital city and to two smaller urban centers. Rural-urban migration in Mongolia has been steadily increasing since the 1950's. However, the mid-1990s marked a sharp increase in the numbers of families relocating to urban centers. In 2010, 62% of Mongolia's population lived in urban areas.[16] Recent economic booms in mining have accelerated this trend. Mongolia currently has the fastest growing economy in the world; at 21% growth in 2011.[17] This economic growth is drawing more rural dwellers to the city in search of better opportunities. The annual rate of growth of the capital city of Ulaanbaatar is 2%.[16]

Mongolia has a strong cultural tradition of breastfeeding, however, recent economic and social changes have contributed to a decline in breastfeeding rates. The shift from a nomadic/rural lifestyle to urban residence and an increase in women working outside the

home may contribute to changes in breastfeeding practices. In the city, women are exposed to more advertisements for breast milk substitute, they see breast milk substitute available for sale in the markets, and they see other mothers using breast milk substitutes. Also, mothers who work in urban areas are more likely to have jobs in which they cannot keep their babies with them, as opposed to herding in the countryside. When new mothers return to work in urban areas they may wean earlier. Breast pumps are uncommon in Mongolia even among wealthier apartment dwellers in the city.

The purpose of this study was to add to the body of knowledge on breastfeeding practices in Mongolia by comparing the occurrence of exclusive breastfeeding and the overall duration of breastfeeding for infants in rural and urban settings.

Methods

Subjects

This was a cross-sectional, population-based study comparing the breastfeeding practices of mothers living in urban and rural areas. The data was gathered at a single point in time in May/June, 2004 for the 3rd National Nutrition Survey of Women and Children. It is the most recently published National Nutrition Study in Mongolia. Approval to conduct the present study was granted by the University of Washington Institutional Review Board. Access to the de-identified dataset was granted by UNICEF Mongolia.

The survey was administered to a total of 1,247 mothers or caregivers of Mongolian children aged 6-59 months old throughout the country. The sample was comprised of 371 (30%) children who were residents of urban areas, defined as the cities of Ulaanbaatar, Darkhan or Erdenet, and 876 (70%) children who lived in rural areas, defined as all other locations in Mongolia. At the time of the survey, based on 2002 census data, there were an estimated 228,893 children aged 6-59 months in Mongolia, therefore the sample population of 1,247 children 6-59 months represented 0.54% of the total population. Power calculations determined that 384 subjects was the recommended minimum number of subjects necessary to achieve a 95% level of confidence, therefore this study had the minimum number of subjects (n=495).

To examine the difference in length of breastfeeding practices among rural and urban women, this study focused on a subset of infants who were aged 6-23 months at the time of the interview. This age group was selected for two reasons. First, the WHO recommends that infants be exclusively breastfed until age 6 months if possible, and then should be breastfed and given complementary foods until age 24 months. Breastfeeding beyond 24 months is not as important from a clinical or policy standpoint. Second, since child age in the overall survey extended to 59 months, recall bias is a possible limitation of the study. By focusing on a subset of children who were younger at the time of survey the possibility of recall bias is reduced, since the subjects were either still breastfeeding at the time of the interview or had stopped breastfeeding more recently.

Data Collection

A random sampling method was used, first by geographical area and then by child. First, 342 clusters were created to represent geographical regions and designate urban and

rural areas. Next, based on the number of children under five years by 2002 population census, 60 clusters were randomly selected and from these clusters rural townships and urban sectors were selected. These towns and villages then provided lists of children 6-59 months old. From these lists 1,247 children 6-59 months old were randomly selected. After households had been identified through the random sampling process, for the rural regions, the geographical area in the rural regions was divided into six sections.

A survey team of five people visited each household in its assigned area. Information was gathered by questionnaire, physical examination, anthropometric measurements and laboratory analysis. Parents and caretakers were asked about the birth and health status of the child including feeding patterns, parental knowledge of child caretaking, and household income and conditions. A physical exam was administered to check for signs of rickets and to measure and weigh the child. Blood sampling was done in some selected cases. Data was collected and recorded on laptop computers using Epi Info and MS Excel software.

The survey was administered via in-person interview by trained Mongolian researchers. At the beginning of the interview, information on the aims and objectives of the survey was given to potential subjects. After explaining the purpose of the survey, parents and caretakers were requested to authorize consent to participate in the survey; they were included in the survey only after signing an authorization. For 22% of the subjects, the person interviewed was not the mother, and of these 17.2% were the father or a grandparent. Information about eligible subjects who chose not to participate was not available.

Variables

Data on the following demographic variables were collected via the survey questions in the in-person interviews: rural or urban residence, maternal age, maternal education, maternal salary, maternal parity, child age in months at the time of the interview, whether the mother or another relative or caregiver was the respondent, and how long the mother had lived in the current area.

Because Mongolia is a traditionally nomadic society, designation of a subject's residence as rural or urban raises the classification issue of how long the family had lived there. To address this, the respondents were asked how long they had lived in their current residence. For this study, residential stability was categorized as more or less than four

years. Employment status was recorded on the survey as “herder”, “have regular salary”, “irregular time worker”, “business or sales”, “housewife”, “student”, “pensioner”, “unemployed”, or “other”. For the present study, this variable was dichotomized as “have regular salary” or “no regular salary” which included all other responses. Maternal education was dichotomized as more or less than 10^{th} grade education. Mongolia has a high rate of literacy and education (70% have completed at least 10^{th} grade), therefore variation in levels of education is more apparent in the higher grades.

The dependent variables were measures of breastfeeding practices. “Ever breastfed” was defined as the subject ever having been breastfed since birth. “Immediately breastfed” was defined as whether the child was breastfed immediately (on the delivery bed) after birth. “Exclusive breastfeeding” was defined as having been given only breast milk and no other food or drink. “Breastfed > 6 months” was defined as having been breastfed for at least 6 months or more. “Ever bottlefed” was defined as having ever been given breast milk substitute (not breast milk) by bottle or by cup. The primary dependent variables for this study were “exclusive breastfeeding for more or less than 6 months”, and “likelihood of early weaning”. Time of weaning was determined by the respondent's report of infant’s age in months when breastfeeding was discontinued.

Analysis

Bivariate analyses were conducted using chi-square analysis to compare baseline characteristics of rural and urban subjects. The relationship between exclusive breastfeeding for at least 6 months and urban/rural residence was examined using logistic regression. Cox regression survival analysis was used to compare rural and urban subjects for the likelihood of weaning at earlier age. Likelihood of weaning was measured by the hazard ratio of stopping breastfeeding between the two groups. Subjects who were still breastfeeding at the time of interview were recorded as “censored” for “when stopped breastfeeding”. An indicator variable was created denoting whether or not a record was censored using infant age as the time stopped.

Covariates were evaluated for statistical significance as potential confounders in the logistic regression and Cox regression analyses. They were included in the model if they changed the overall association more than 10%. Analyses were performed using SPSS (v. 19.0) statistical software.

Results

Of the 499 children who were 6-23 months old at the time of interview, four subjects were excluded because of missing data, yielding a final study sample of 495. Of these, 186 (37.6%) lived in urban areas while 309 (62.4%) lived in rural areas (Table 1). The mean age of the infants was 14.2 months. 54.3% of the infants were male, 45.7% were female. The mean birthweight of the infants was 3343 grams. The differences between urban and rural subjects relative to infant age at time of interview and gender were not significant. The mean age of the mothers was 27.9 years and a majority were either married or living with their partner (83.8%). A majority of the mothers did not have a regular salary (79.1%) and had less than a 10^{th} grade education (71.4%). Rural mothers (78.2%) were significantly more likely to have less than a 10^{th} grade education compared to urban women (60.1%) (p=.000) Urban and rural mothers did not differ significantly relative to having a regular salary (urban mothers 21.2%, rural mothers 20.8%, p=.501). Of urban mothers, 39.2% reported they had lived in their residence for less than 4 years, compared to 26.5% of rural mothers (p=.004) For 45.9% of the mothers, the subject child was her first-born. For 56% of the urban mothers, their infants were first-born, compared to 39.5% of infants of the rural mothers (p=.000). For 79.2% of the subjects, the mother was the person interviewed during the survey, while for 20.8% of the sample, someone other than the mother was interviewed. Interview of the mother differed significantly between urban and rural women (68% and 85.4%) (p =.000).

Table 1: Selected Characteristics of the Study Population

Characteristics	Urban n= 186 n (%)	Rural n=309 n (%)	Total n=495 n (%)	P-value*
				.509
Infant age (months)				
6-11	72 (38.7)	130 (42.1)	202 (40.8)	
12-23	114 (61.3)	179 (57.9)	293 (59.2)	
Mean (SD)	14.0 (5.23)	14.3 (5.23)	14.2 (5.22)	
Sex				.853
Male	100 (53.8)	169 (54.7)	269 (54.3)	
Female	86 (46.2)	140 (45.3)	226 (45.7)	
Birthweight (g)				
Mean (SD)	3388 (513)	3317 (560)	3343 (544)	
Mother Age				.487
17-19	2 (1.1)	5 (1.6)	7 (1.4)	
20-29	123 (66.5)	181 (59.5)	304 (62.2)	
30-39	56 (30.3)	110 (36.2)	166 (33.9)	
40-49	4 (2.2)	8 (2.6)	12 (2.5)	
Missing (6)				
Mean (SD)	27.3 (4.98)	28.3 (5.52)	27.9 (5.34)	
Maternal Marital Status				.266
Not Married	27 (14.7)	39 (12.8)	66 (13.5)	
Married/Live Together	150 (81.5)	259 (85.2)	409 (83.8)	
Divorced	6 (3.3)	3 (1.0)	9 (1.8)	
Widowed	1 (0.5)	3 (1.0)	4 (0.8)	
Missing (7)				
Maternal Education				.000
$<10^{th}$ grade	110 (60.1)	237 (78.2)	347 (71.4)	
$>10^{th}$ grade	73 (39.9)	66 (21.8)	139 (28.6)	
Maternal Regular Salary				.909
Yes	39 (21.2)	63 (20.8)	102 (20.9)	
No	145 (78.8)	240 (79.2)	305 (79.1)	
Parity				.000
Primiparous	105 (56.5)	122 (39.5)	227 (45.9)	
Multiparous	81 (43.5)	187 (60.5)	268 (54.1)	
Current Residence (yrs.)				.004
≤ 3	73 (39.2)	82 (26.5)	155 (31.3)	
≥ 4	113 (60.8)	227 (73.5)	340 (68.7)	
Mother Respondent				.000
Yes	128 (68.8)	264 (85.4)	392 (79.2)	
No	58 (31.2)	45 (14.6)	103 (20.8)	

**Chi-square*

Comparisons of breastfeeding practices among rural and urban subjects are presented in Table 2. A majority (82%) began breastfeeding immediately after birth. Immediate initiation of breastfeeding did not differ significantly between rural (84.3%) and urban (78.3%) infants. The difference between urban and rural subjects in their experience of ever breastfeeding was not significant (p=.061). Significantly more urban mothers reported that their infants had ever been bottlefed prior to 6 months of age (35.5%) compared to rural infants (16.2%) (p=.000). In this sample, 95.2% of subjects were breastfed for at least 6 months. Of these, significantly more rural women breastfed for 6 or more months (97.7%) compared to urban women (90.9%) (p=.001). Urban women were less likely to exclusively breastfeed for at least 6 months (27.4%) compared to rural mothers (41.6%) (p=.002).

Table 2: Breastfeeding Practices

		Urban (n=186) n (%)	Rural (n=308) n (%)	P-Value*
Initiation of Breastfeeding Immediately After Birth				.114
	Yes	144 (78.3)	257 (84.3)	
	No	40 (21.7)	48 (15.7)	
Ever Breastfed				.559
	Yes	184 (98.9)	308 (99.7)	
	No	2 (1.1)	1 (0.3)	
Ever Bottlefed				.000
	Yes	66 (35.5)	50 (16.2)	
	No	120 (64.5)	259 (83.8)	
Breastfed > 6 months				.001
	Yes	169 (90.9)	302 (97.7)	
	No	17 (9.1)	7 (2.3)	
Exclusively Breastfed > 4 months				.004
	Yes	134 (72.0)	256 (83.1)	
	No	52 (28.0)	52 (16.9	
Exclusively Breastfed > 6 months				.002
	Yes	51 (27.4)	128 (41.6)	
	No	135 (72.6)	180 (58.4)	

**Chi-square*

Logistic regression was used to evaluate the association between urban or rural residence and exclusive breastfeeding for at least 6 months. Urban women were significantly more likely to exclusively breastfeed for less than 6 months compared to rural women (OR = 1.88, 95% CI: 1.27-2.79). When parity was included as a potential confounder, the association between urban/rural residence and exclusive breastfeeding was increased (OR= 1.92, 95% CI: 129-2.87).

Cox regression survival analysis was performed to compare the hazard or risk of earlier weaning between urban and rural subjects. Urban children were 1.59 times more likely to stop breastfeeding earlier than rural children (HR 1.55, 95% CI: .999-2.52), over 6-23 months. When adjusted for parity, the association between urban/rural residence and length of breastfeeding was slightly reduced (HR 1.45, 95% CI: .931-2.27). The association between urban/rural residence and time of weaning approached statistical

significance. None of the potential confounding covariates were a factor in either of the associations; therefore they were not included in the final models.

Discussion

In our study of Mongolian infants aged 6-23 months, rural infants were more likely to be exclusively breastfed for at least 6 months compared to urban infants and urban infants were more likely to wean earlier than rural infants.

Exclusive breastfeeding until at least 6 months of age is considered optimal for proper child nutrition.[1,2,9] In a 2012 report comparing breastfeeding indicators among 27 developing countries, Mongolia was ranked the highest for duration of exclusive breastfeeding in 2005.[18] In the same report, Mongolia also reported the highest rate of exclusive breastfeeding for 0-5-month-old infants.[18] The association between exclusive breastfeeding until at least 6 months and rural residence observed in our study is supported by other research on breastfeeding practices in developing countries measuring breastfeeding indicators.[18-21] A 2009 study of exclusive breastfeeding among 63,071 infants under 24 months in rural and urban provinces in Iran reported that the highest rates of exclusive breastfeeding occurred in the more rural areas, independent of socioeconomic status.[21] Similarly, a 2007 study in Xinjiang, China observed a significant difference between rural and urban infants in the mean length of exclusive breastfeeding (3.6 and 1.2 months, respectively, p=.01, CI: 3.3-3.9).[22] A more recent study of 1,520 mothers in China observed a positive association between rural residence and exclusive breastfeeding on discharge from hospital, with rural mothers almost two times more likely to exclusively breastfeed compared to urban mothers (38% and 63% respectively).[20] The association between exclusive breastfeeding for at least 6 months and rural residence in Mongolia may be due to the rural mothers' proximity to family members and a stronger connection to traditional cultural practices of exclusive breastfeeding and longer duration of breastfeeding.

Overall, Mongolia has high median duration time of breastfeeding, 25.6 months among children 0-35 months old, according to a recent country comparison.[18] However, our study observed that urban subjects were more likely to wean earlier than rural subjects. Similarly, a 1996 study of breastfeeding trends in developing countries found that within all 15 countries included in the study urban infants breastfed for shorter duration than rural infants.[23] Some studies in developed countries have observed a contrasting association between rural residence and breastfeeding rates and duration. For example, a 2009 study of

rural populations in North Carolina and Pennsylvania reported that breastfeeding initiation and continuation rates were lower than national rates and lower than breastfeeding in urban populations in the United States.[26] For this reason, results of the present study may only be generalizable to developing countries.

The association between rural residence and exclusive breastfeeding observed in this study has important implications for Mongolia given the rapid demographic changes in urban areas. According to recent research in other countries, breastfeeding duration is influenced by factors which can be demographic (e.g. employment status, maternal education level, place of residence), biological (e.g. infant health, parity), and psychosocial (e.g. intention to breastfeed, family support, knowledge of infant feeding recommendations).[24,25] In our study, demographic and biological variables did not impact the association between time of weaning and rural/urban residence, and information about psychosocial factors was not available. Psychosocial factors identified in the literature include intention to breastfeed, knowledge of breastfeeding recommendations, and whether the mother was herself breastfed.[20,27-31] Studies that have evaluated demographic, physical and psychosocial factors relative to breastfeeding practices have found that psychosocial factors may be as or more significant than demographic factors. For example, the belief that breast milk alone is insufficient nourishment for the infant is commonly reported in a number of studies of exclusive breastfeeding around the world.[20,28,31] For this reason there is a need for more research into attitudes and knowledge about breastfeeding in Mongolia.

In our study, primiparous mothers tended to wean earlier, but parity was not a significant factor in the association between residence and breastfeeding. In other studies of breastfeeding duration, the role of parity has been mixed.[24,32,33] A 2007 study of 3,204 infants in Hong Kong found that mothers of two or more children were more likely to breastfeed longer,[34] while a 2007 study of 1,219 mother/infant pairs in Xinjiang, China, observed no relationship between parity and exclusive breastfeeding duration.[22] Similarly, a study in Thailand found no association between parity and "breastfeeding success".[35] A survey of 15 developing countries found that having more children was positively associated with longer duration of breastfeeding.[23]

Research on the effect of maternal education on breastfeeding duration has also reported varied findings. In our study, maternal education was not a factor in the

association between urban-rural residence and exclusive breastfeeding rates and risk of weaning. Studies assessing infant feeding practices in Nepal, Australia and Turkey found that maternal education was not a significant factor.[29,36,37] Studies in the U.S., Denmark, and Kenya[26,27,38] found a positive association between higher level of maternal education and breastfeeding duration. Conversely, studies in Hong Kong, Greece, Iran and Argentina, as well as the 1996 comparison of 15 developing countries all showed an association between lower level of maternal education and longer breastfeeding duration or exclusive breastfeeding.[21,23,31,34,39] The relationship between maternal education and breastfeeding is not clear. It may be that in some situations higher education is associated with better health knowledge and practice so breastfeeding is supported, while in other countries higher education is related to a weaker connection to traditional culture and higher socio-economic status so formula can be purchased. In our study, while higher education was correlated with urban residence, it was not related directly to weaning. This may be due in part to the high educational level in Mongolia, with a literacy rate of 97% and a primary school enrollment of 100%.[5]

Limitations of study

One limitation of this study is the possibility of recall bias because mothers were asked to report breastfeeding practices that occurred months and years before the interview. Another limitation is a possible misunderstanding of the definition of "exclusive breastfeeding". Although the interviewers were trained and were native Mongolian speakers, some mothers may have reported that they "exclusively breastfed" even though water or other liquids were given in the first 6 months. Another limitation of this study is the high number of subjects who were still breastfeeding at the time of the study. For these infants, the specific time when breastfeeding was discontinued was not recorded. Consequently, it was not possible to directly compare the duration of breastfeeding between the urban and rural infants. Hazard rates were used to estimate the time of weaning and to compare rural and urban breastfeeding practices. Another limitation of the study was the possibility that categorization of rural or urban residence was imprecise due to the nomadic nature of the population. Although a majority of the subjects had lived in their current place of residence for four years or more, there remains the possibility of classification error.

Conclusion

Although breastfeeding initiation and ever breastfeeding rates were high among both urban and rural infants, urban residence is a risk factor for exclusively breastfeeding for less than 6 months and for shorter overall duration of breastfeeding. Because rural to urban migration is increasing in the country, breastfeeding trends should continue to be monitored. Mongolia has a strong cultural tradition of breastfeeding as well as high breastfeeding rates compared to other developing nations, and it is important to maintain these strengths. Mongolia has made progress toward improving infant nutrition through breastfeeding by supporting the Baby Friendly Hospital Initiative, endorsing the International Code of Marketing of Breast Milk Substitute, and mandating maternity leave and work breaks so mothers can breastfeed. As government revenues increase, resources should continue to be allocated to medical staff training and educational campaigns. This could counteract the adverse effects of urban migration on breastfeeding rates, however it will require advocacy by health officials of the government of Mongolia and by non-governmental organizations such as UNICEF.

The factors that influence breastfeeding outcomes are complex. The survey used for this analysis did not include questions about psychosocial factors related to the choice to breastfeed. Further research into breastfeeding attitudes among Mongolian mothers would be useful in understanding what factors influence the decision to breastfeed and the duration of breastfeeding. Educational campaigns, health care staff training, continued assessment of infant nutrition, and funding mechanisms for programs to promote breastfeeding are all recommended to ensure that Mongolia continues its strong track record in supporting infant nutrition. These efforts will be particularly important as Mongolia continues to be in an era of unprecedented economic growth and social change.

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Appendix A: Data Collection Forms

QUESTIONNAIRE
3rd NATIONAL NUTRITION SURVEY
"NUTRITION SITUATION OF POPULATION"

Aimag / City:_____
Soum / District: _____
Bagh / Khoroo: _____
Cluster number:
Household number:
Interviewer: _____
Team leader: _____
Survey date _____ day _____ month _____ year
Results code:

1. **Fully filled questionnaire**
2. **Half filled questionnaire**
3. **Refused to participate in survey**
4. **Other (ascertain) _____**

KNOWELEDGE, ATTITUDE, PRACTICE

How do you know your child is growing?

1. **Weigh every month**
2. Compare with same age children
3. **See a growth curve**
4. **See clothes size of own children**

Does your child get enough to eat?

Eat _____ per day _____ times _____ amount

How can you help to protect your child from illness?

1. **Vaccination**
2. **Good sanitation practices and hand washing**
3. **Adequate feeding, breastfeeding**
4. **Regular access to health care**

Involved in vaccination? When was the last vaccine received?

.....

Do you know about the importance of vitamin A? 1

1. Know
2. Don't know

If know the importance, please describe.....
How many doses of vitamin A should children take per year?

1. One
2. Two
3. Three
4. Four
5. Don't know

Would you say your child has taken all the necessary vitamin A doses since birth?

1. Yes
2. No
3. Took 50%
4. Took 30%
5. Don't know

Do you think your child needs to take vitamin A?

1. Yes
2. No

Is your child participating in growth monitoring every month?

1. Yes
2. No
3. Not regularly

ANTHROPOMETRY

Childs':

Weight kg

Height / Length cm

Were there any difficulties measuring child's height and length?

1. Yes 2. No

Child chest circumference cm

Mothers':

Is the mother pregnant? 1. Yes 2. No

Weight kg

Height cm

LABORATORY

Hemoglobin gr / dl
Was a blood sample taken? 1. Yes 2. No
Number of blood sample:
(Same as children number)
If a blood sample was not taken, why not?
1. Refused 2. Not possible to take blood 3. Not selected

THANK YOU FOR YOUR PARTICIPATION IN OUR SURVEY

Interviewed and checked by:

Name of interviewer .....
Name of team leader .....

HOUSEHOLD INFORMATION

1	QUESTION	ANSWER		NOTE
1.	**How many years has your family lived in this area?**			Write by number
2.	**Does your family own livestock?**	**Yes - 1 No- 2**		go to 4
3.	**What kind and how many animals did your family have at the beginning of 2004?**	**Type of livestock**	**NUMBER**	Write by number
		Horse		
		Cow / yak		
		Camel		

Sheep			
Goat			
Other:			
4.	**Type of housing:**		**Apartment – 1** **House – 2** **Court – 3** **Ger – 1** Other (detail) - 88
5.	**Will you have a vegetable garden?**	**Yes - 1** **No- 2** **Don't know– 9**	**go to 7**
6.	**If yes, do you can or conserve vegetables?**		**Yes - 1** **No- 2** **Don't know– 9**
7.	**Drinking water source:** **(tell us the source of drinking water most used.)**		**Central/town system – 1** **From water porter – 2** **Water kiosk – 3** **Well – 4** **Deep well - 5** **River, spring water – 6** **Lake or pond – 7** **Other - 88**
8.	**What kind of latrine/toilet are your family members using?**		**Toilet with drawer connected to a cleaning system - 1** **Toilet with drawer not connected to a cleaning system - 2** **Sanitary latrine - 3** **Simple latrine - 4** **Do not have – 5** Other (detail) - 88

DEMOGRAPHY, ECONOMY

9.	**Number of family members:**	Write by number
10.	**Number of children under 5 years old at home**	Write by number

1st line is for a selected child!

Number of family members	Who is of child (A)	Age	Sex M – 1 F - 2	Marital status (B)	Job (C)	Education (D)
1						

2
3
4
5
6
7
8
9
10
11
12
13
14

A	B	C	D
1. Selected child 2. Mother of child 3. Father of child 4. Grandmother 5. Grandfather 6. Sister / brother 7. Younger sister / brother 8. Other	1. Not married 2. Married /live together 3. Divorced 4. Widow	1. Herder 2. Regularly have salary 3. Irregular hourly work 4. Business /salesman/ 5. Housewife / househusband 6. Student /school child/ 7. Retirement pension 8. Unemployed 9. In kindergarten 10. Other	1. Do not have 2. Low /1-4/ 3. Graduated 5-8 class 4. Graduated 9-10 class 5. College 6. Graduated university degree 7. Other

11.	**last month's average income of household /by tugrik/**	**Write by number**

Chest:		
62.	Rosary of rickets	**Yes - 1** **No- 2**
63.	Harrison's groove	**Yes - 1** **No- 2**
64.	Pigeon chest	**Yes – 1** **No– 2**
Abdomen:		
65.	Muscular hypotonia (abdominal)	**Yes – 1** **No– 2**

Spina:		
66.	Spinal deformation	**Yes – 1** **No– 2**
Leg:		
67.	Bowed leg	**Yes - 1** **No- 2**
68.	X legs	**Yes - 1** **No- 2**
69.	Hard swollen joints	**Yes - 1** **No- 2**
70.	Hard swollen joints of anklebone	**Yes - 1** **No- 2**
Wrist:		
71.	Symptom bracelet	**Yes - 1** **No- 2**

72.	**Please give amount of salt used in last evening's family meal.**	**Not iodised (didn't give color) – 1** **Iodised (did give color) – 2** **Do not have any salt at home – 3** **Not checked - 4**	**Circle number of corrected answer**
73.	**Salt sample number: (Cluster + Household number)**	Write by number	

48.	Marked 2003 last dose of vitamin A in the growth chart		**Yes - 1** **No- 2**
49.	Have you heard about the Vitamin A programme?	**Yes - 1** **No- 2**	**51 go to**
50.	If yes: from where?	**Health facility /hospital – 1** **TV / radio – 2** **Relatives or neighbors – 3** **Advertisement, newspapers, brochures – 4** **Other /detail/ - 5**	**Many answers possible**
51.	Has your child taken vitamin D since last October?	**Yes - 1** **No- 2**	**54 go to**

52.	If child has taken 50000 IU of vitamin D, how many doses were used?	_____ **Don't know/ not answered– 99**	Write by number
53.	If child has taken another type of vitamin D, what was the amount used?	_____ **days Don't know/ not answered– 99**	Write by number
54.	Has your child used iron supplements since the new year?	**Yes - 1 No- 2**	58 go to
55.	If yes: What kind of iron?	**Tablets – 1 Iron syrop – 2 Other /detail/ - 3**	
56.	If iron tablets were taken, how much was taken?	_____ **days Don't know/ not answered– 99**	Write by number
57.	If used iron syrup how much?	_____ **bottles Don't know/ not answered– 99**	Write by number

PHYSICAL EXAMINATION

ñ"'ć"Ž:		
58.	**Soft fontanella**	**Yes - 1 No- 2**
59.	**Olympic forehead**	**Yes - 1 No- 2**
60.	**Craniotabes**	**Yes - 1 No- 2**
61.	Occipital alopecia	**Yes - 1 No- 2**

INFORMATION ABOUT 6-59 MONTHS CHILDREN

12.	**Child number: (Cluster + Household number + child number)**		Write by number
13.	**Date of birth**	. . . . / . . . . /	Write by number
14.	**Sex:**		**male – 1** female - 2

15.	**Who is respondent of child?** **(or who answered the questionnaire?)**		**mother – 1** **father – 2** **grandfather - 3** **grandmother – 4** **Other – 5**
16.	What number is this child among the mother's total pregnancies?		**Write by number**
17.	What number is this child among siblings? (first, second, third, last, etc)		**Write by number**
18.	Was the child born on time?		**On time – 1** **Early – 2** **Late – 3**
19.	Was your child weighed at birth?		**Yes - 1** **No– 2** **Don't know– 3**
20.	What was the weight of your children at birth? (If cannot remember check health record book)	_____ **Don't know/ did not answer – 99**	**Grams write by number**
21.	Did children first breastfeed on the delivery bed?	**Yes - 1** **No- 2**	**23 go to**
22.	If no, why not?		**Write by type**
23.	Until what month did your child exclusively breastfeed -not using tea, water, juice or other meals or fluids?	_____	**Months write by number**
24.	Does your child breastfeed now ?	**Yes - 1** **No- 2**	**27 go to**
25.	If no: Has he/she ever breastfed?		**Yes - 1** **No- 2**
26.	If yes: What month did he/she stop breastfeeding?	_____	**Months write by number**

27.	Was your child ever bottlefed?	**Yes - 1** **No- 2**	**29 go to**
28.	If yes : From what month?	_____	**Months write by number**

29.	At what month of age was first complementary food given?	_____	**Months write by number**
30.	What kind of food was first complementary food?		**Porridge with milk – 1** **Flour gruel – 2** **Yogurt – 3** **Bantan – 4** **Vegetable or fruit puree – 5** **Vegetable or fruit juice – 6** **Other /detail/ – 9**
31.	Has your child been ill during the last month?	**Yes - 1** **No- 2**	**33 go to**
32.	If yes: What kind?		**Write by name**

FOOD CONSUMPTION AND FREQUENCY

33.	In the past week, how many times did this child eat meat and meat products?	**Animal meat**	**Animal internal meat, liver, by dt**	**Chicken and pork**	**Fish, canned fish**	**Eggs**	**Other**		**Wri by nur**

34.	In the past week, how many times did this child eat milk and dairy products?	**Milk**	Mongolian	Imported and	**Sour milk**	**Dried curd**	Curdled ilk	**Cheese**		**Wri by nur**
Mongolian					**Other**					

35.	In the past week, how many times did this child eat milk, cream and butter?	**Milk cream**	**Sour cream**	**Clotted cream**	**Milk butter**	**Butter**	**Write by number**

36.

In the past week, how many times did this child eat vegetables?

Green onion

Chinese cabadge

Pepper

Tomato
Turnip
Carrot
Cucumber
Potato
Other
Write by number
37.
In the past week, how many times did this child eat flour products?
Write by number
38.
In the past week, how many times did this child eat rice?
Write by number
39.
In the past week, how many times did this child eat fruit?
Write by number
40.
In the past week, how many times did this child drink fruit juice?
Write by number
41.
In the past week, how many times did this child drink beverages?
Write by number
SUPPLEMENTATION OF VITAMINS AND MICRONUTRIENTS
42.
Did your child use vitamin A since last October? (Show it and ask)
Yes - 1
No– 2
Don't know– 3
45 go to
43.
If yes:
What colour were the pills and how many pills did your child take?
Red colour _____ piece – 1
Blue colour _____ piece – 2
White colour _____ piece – 3
44.
From where your child obtain vitamin A?
Went to health facility and took – 1
Was visited at home and took – 2
Other /detail/ - 3
45.
Does your child have a growth chart at home?
Yes - 1
No- 2
49 go to
46.
If yes, please show us this growth chart.
Have GC, fully filled – 1
Have GC, empty – 2
Have GC, not fully filled - 3
Should check all other marks of growth chart
47.
Marked 2003 first dose of vitamin A in the growth chart
Yes - 1
No- 2