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# Feeding Practices of Mothers in the Gobi Desert of Mongolia

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A thesis  
presented to  
the faculty of the Department of Allied Health Sciences  
East Tennessee State University

In partial fulfillment  
of the requirements for the Degree  
Master of Science in Clinical Nutrition

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by  
Julie Frances Tate  
December 2011

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Dr. Michelle Lee, Chair  
Elizabeth Lowe  
Dr. Deborah Slawson

Keywords: Infant Nutrition, Mongolia, Feeding Practices

## ABSTRACT

### Feeding Practices of Mothers in the Gobi Desert of Mongolia

by

Julie Frances Tate

The diets of Mongolia infants are deficient in vitamins and minerals and complementary foods are introduced too early. Breastfeeding is the best source of nutrition for infants until 6 months of age. A survey of 50 Mongolian mothers with children under the age of 5 in the town of Sainshand, Dornogobi, was conducted in July 2011. Mongolian infants are among the highest percent of infants in the world who are exclusively breastfed for the first 6 months of their lives, thus providing them with excellent nutrition. However, complementary feedings and supplements are not appropriately used or understood. Therefore, the diets of Mongolian infants are still lacking key nutrients and they are exposed to complementary foods too soon. By obtaining more information on the feeding practices of Mongolian mothers, better education materials and seminars on infant nutrition can be developed, which will improve the overall nutrition and health of the children of Mongolia.

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## CHAPTER 1

### INTRODUCTION


The diet of Mongolian infants, based on previous limited research, is lacking in key nutrients and foods are introduced at earlier ages than appropriate. The World Health Organization (WHO) recommends that, “Infants should be exclusively breastfed for the first 6 months of life, and thereafter should receive nutritionally adequate and safe complementary foods to meet their evolving nutritional requirements.”<sup>1</sup> Diets in Mongolia mainly consist of meat and dairy products with limited consumption of fruits and vegetables. Most infants appear to be adequately breast fed but are not given enough fruits and vegetables; in turn they are given dairy products consistently. The introduction of cow’s milk is another important consideration with infant nutrition. Introducing cow’s milk before 1 year of age can lead to increased renal solute load, increased gastrointestinal blood loss, chronic constipation and anal fissures, and an increase in risk for subsequent Type 1 and Type 2 diabetes.<sup>1</sup> In addition, the “Low intake of fruits and vegetables may be responsible for approximately 31% of ischemic heart disease, 19% of gastrointestinal cancer, 11% of strokes, and 2.7 million deaths each year worldwide.”<sup>2</sup> A clear link between poor diet and chronic diseases has been established.<sup>3</sup> Thus, if the diets of Mongolian infants are lacking in key nutrients, their growth and health will be compromised now and in the future. Currently, the diet of Mongolian infants is deficient in nutrient quality, and their health could benefit from following the World Health Organization recommendations for infant nutrition.



### Purpose of the Study

The purpose of the study is to gain a better understanding of the feeding practices of Mothers in the Gobi Desert and what the infants in Mongolia are consuming. Limited research has been conducted in Mongolia specifically related to nutrition. By delving into the feeding practices of mothers and their infants, a small insight into the health of infants can be better assessed, resulting in increased awareness of diet quality as a whole for the population of Mongolia. In addition, by having a better understanding of what once typical diets are for infants, a greater understanding of why specific trends in certain non-communicable diseases and possibly communicable diseases are prevalent can be attained.

## Definitions

<b>Table 1. Terms and definitions</b>	
<b>Term</b>	<b>Definitions</b>
Renal solute load	The sum of materials that need to be excreted by the kidneys <sup>4</sup>
Ischemic heart disease	A lack of oxygen supply to the heart altering cardiac function <sup>4 (p944)</sup>
Gastrointestinal cancer	Cancer of the gastrointestinal tract, pertaining to the entire digestive tract from mouth to anus.
Provincial capitals	The capital of a province or state in Mongolia
Soums	Small towns outside of the provincial capitals in Mongolia
Eezgii	Milk product made by boiling most of the whey from the curdled milk of sheep, goats or cows and setting the residue to dry on a screen {kind of like aaruul, but the color is yellow-brownish}
Цөцгий/Tsotsgee	Cream on milk and yogurt
Aaruul	Dried curds
Galactosemia	“An autosomal recessive disorder marked by an inability to metabolize galactose because of a congenital absence of 1 of 2 enzymes needed to convert galactose to glucose” <sup>4 (p845)</sup>
Wet Nurse	A woman who breast-feeds the infant of another <sup>5</sup>
Complementary Foods	Foods other than breast milk or infant formula (liquids, semisolids, and solids) introduced to an infant to provide nutrients <sup>6</sup>
Gers	Felt tents, also known as yurts in Russia, that Mongolians live in. 
Byclig	Cheese
Tarag	Homemade yogurt
Airag	Fermented mare's milk
Ascorbic acid	Vitamin C
Linoleic acid	An unsaturated fatty acid <sup>4 (24)</sup>
Iron deficiency anemia	“Anemia resulting from a greater demand on stored iron than can be supplied. The red blood cell count may sometimes be normal, but there will be insufficient hemoglobin.” <sup>4 (107)</sup>
Bioavailable	The degree to which or rate at which a drug or other substance is absorbed or becomes available at the site of physiological activity after administration. <sup>7</sup> Buuz-steamed meat dumplings
Cash	Grain cereal similar to cream of wheat
Boortsog	Fried dough

## CHAPTER 2

### REVIEW OF THE LITERATURE

#### Infant Nutrition

Infant nutrition is commonly acknowledged to be of key importance, not only as the infant is growing, but also as it grows into a toddler and subsequent stages in life. Proper infant and young child feeding is key to improving child survival and promoting healthy growth and development.<sup>8</sup> If the nutritional well-being of the infant is sufficient, this will be reflected in their growth. The first year of life for humans is critically important nutritionally. In that first year, infants grow faster than ever again in their life, thus adequate nutrition is important to support such a rapid rate of growth and development.<sup>8</sup> In addition, without proper nutrition, children are more susceptible to diseases and other health problems. Undernutrition is actually associated with 35% of the disease burden in children under 5 years of age in the world.<sup>9</sup> Thus, a child needs the proper nutrition to thrive and be healthy.

Optimal breastfeeding is essential to providing proper nutrition for infants. In fact, according to the World Health Organization (WHO), the lives of 1.5 million children under the age of 5 can be saved by optimal breastfeeding and complementary feeding practices.<sup>9</sup> If infants are not breastfed to optimal standards or at all, their risk of mortality due to diarrhea and other infections can increase.<sup>9</sup> By breastfeeding a child and introducing a wide variety of solid foods at appropriate ages, a mother is providing the best opportunity for optimal growth and health to her infant.

## Infant Feeding Recommendations

To provide adequate nutrition to infants, the World Health Organization and United Nations Children's Fund (UNICEF) promote the following recommendations:

- Early initiation of breastfeeding within 1 hour of birth;
- Exclusive breastfeeding for the first 6 months of life;
- Introduction of nutritionally adequate and safe complementary foods at 6 months of age together with continued breast feeding up to 2 years and beyond.<sup>7</sup>

Exclusive breastfeeding is when only breast milk (including milk from a wet nurse) is given to an infant and nothing else, except Oral Rehydration Salts (ORS), drops, or syrups (vitamins, minerals, medicines).<sup>10</sup> Exclusive breastfeeding, as stated above, is recommended for the first 6 months of life. However, the average percent of infants birth to 6 months of age who are exclusively breast fed is approximately 35% throughout the world.<sup>9</sup>

The *Healthy People 2020* initiative hopes breastfeeding levels will reach 81.9% who initiate breastfeeding and 60.6% who maintain breastfeeding for at least 6 months.<sup>12</sup> If 35% of infants are exclusively breastfed, it can, with some reason, be assumed that on average 50% or more continue to receive breast milk after the age of 6 months though not exclusively. While the major benefits of breastfeeding are demonstrated in the first few months of life, these benefits do continue to increase with the duration of breastfeeding.<sup>13</sup> Breastfeeding is extremely beneficial because it provides crucial immunological protection to the infant, which is greatest during the first few months.<sup>13</sup> Breastfeeding can also protect against allergy development and the act of suckling favors normal tooth and jaw alignment.<sup>8</sup> Breastfed babies are also less likely to be

overfed, unlike when mothers force babies to finish formula from a bottle, thus are less prone to become obese.<sup>8</sup> Therefore, the more an infant is breastfed, the healthier it will be. If it is exclusively breastfed for the first 6 months of life, then these benefits will be maximized, as opposed to being decreased, by consuming other food and beverage items. Encouraging mothers to solely breastfeed increases the likelihood that their infant will be fed optimally for those first few crucial months of life, and in turn provide the infant with the appropriate nutrition it needs to grow physically and develop mentally.

Breast milk also provides the majority of energy and nutrients to infants beyond the age of 6 months.<sup>9</sup> Breast milk, in addition to complementary foods, provides an enormous amount of energy and nutrients to children 6 months to 23 months of age. In fact, it can provide half, or more, of the calories that an infant needs between 6 to 12 months of age. During illness, breast milk can also provide critical energy and nutrients and can reduce mortality among children who are malnourished.<sup>9</sup> The nutritional need, physiological maturation, behavioral and developmental aspects of feeding, immunological safety and environmental influences provide a basis for the recommendations that breast milk should be given exclusively for the first 6 months and that complementary foods should be introduced after 6 months. Therefore, it is not recommended to introduce complementary foods before 2 to 3 months of age or later than 6 months of age. The risks of introducing complementary foods too early or too late actually outweigh the benefits.<sup>13</sup>

Breastfeeding is only contraindicated in infants with galactosemia, or for infants with mothers who have untreated, active tuberculosis or are antibody positive for Human Immunodeficiency Virus (HIV).<sup>13</sup> Thus, with the exception of these specific health problems,

breastfeeding should always be recommended and encouraged. It is common for mothers to change to formula or animal's milk to either supplement the child's diet or to wean from the breast. However, the American Academy of Pediatrics recommends against giving whole cow's milk during the first year of life. Therefore, it is extremely important that a mother shift to formula and not any type of plain animal's milk when she chooses to wean her infant from breast milk during the first 6 months of life.<sup>8,14</sup>

After the initial 6 months of life, appropriate complementary foods should be introduced in a planned succession. Across the world, very few children receive nutritionally adequate and safe complementary foods.<sup>9</sup> Infants between the ages of 6 to 23 months of age rarely consume the variety of foods and frequency of appropriate foods for their age. In fact, only one-third of breastfed infants meet such a criteria for foods.<sup>9</sup> The variety of complementary foods given to infants should be rich in nutrients and given in adequate amounts. These nutrient rich foods include meat, poultry, fish, grains, fruits and vegetables. Starting at approximately 6 months of age, appropriate foods can be introduced in pureed, mashed, or semi-solid form. The amounts of food should be small at first and gradually increase with age. At 8 months of age, infants can eat 'finger' foods and around 12 months of age will begin eating the same types of foods consumed by the rest of the family.<sup>15</sup>

Complementary or solid foods should be introduced to an infant's diet between the age of 4 and 6 months.<sup>8</sup> It is recommended for complementary foods to be introduced at 6 months of age, but they can be introduced at 4 months of age. At 4 months of age, an infant is typically developed enough to consume pureed foods. Also, between 4 and 6 months of age, an infant's iron stores begin to decrease and additional iron is needed in the infant's diet, which cannot be

obtained solely from breast milk. This holds true for both breastfed and formula fed infants, depending on readiness. If solid foods are introduced too early to an infant's diet, allergies are more likely to develop.<sup>8</sup> The culture and practices of a society will also play an important role in the timing and type of complementary foods introduced.<sup>13</sup>

## Mongolia



Figure 1. Map of Mongolia

“To understand the issues surrounding global and maternal and child health, one must better understand the environment, conditions, and cultures throughout the world that influence decision making and behaviors of individuals and communities.”<sup>17</sup> Before the culture and practices of Mongolia can be explained, Mongolia as a whole must be explained. To begin, Mongolia is a landlocked country located between Russia and China. Mongolia is a country that runs deep with traditions and customs that have survived hundreds and possibly thousands of years. In the past century, Mongolia has seen many changes that have affected the way of life for Mongolians. However, while a growing number of the population is living in the capital and

settling for city life, a large percentage of Mongolians still live in small towns or as herders in the vast open country. Mongolia has a population of roughly 3 million people with half of those people living in the capital. The other 1.5 million live in provincial capitals, small soums, or in the countryside. Sainshand, where the survey was conducted, is the capital of Dornogobi Province. It is located in the Eastern Gobi desert steppe 456 kilometers away from the capital on the Trans-Siberian Railway. Sainshand has a population of approximately 25,000 people. Sainshand is not a town of herders, but many within the town still live a life similar to herders and have yet to adapt to a more modern lifestyle.

While the majority of the population is not nomadic, a large portion still live in gers, or felt tents, which were designed to be used as permanent homes that can easily be broken down and rebuilt often. Gers are adaptable for the ever-changing temperature in Mongolia. Mongolia is one of the coldest countries in the world and its capital, Ulaanbaatar, records the lowest average temperature in the world. While it snows every month of the year in certain parts of the country, temperatures can reach above 100 degrees Fahrenheit in the summer, but drop to -60 degrees Fahrenheit in the winter. Gers are easily changed to allow for temperature differences. In the summer, only one thin layer of felt adorns the walls of the ger and can be tied up to allow air flow. In the winter, 3 to 4 layers of felt are added to the ger to provide insulation. The gers range in diameter of approximately 10-25 feet. While the gers are small in size, this aids in the ability to heat them during the long, cold winter months.

Family is another important part of Mongolian life. A family consisting of several generations and 3 to 8 people can live in one apartment or ger. While the mother is usually the breadwinner of the family, she is also usually the one who cooks and cleans and keeps the family



going. As mentioned before though, a family can consist of many different people living under one small roof. In addition, more distant family members, not immediate family, are considered to be close family as well and will stay with other family members and assist in day to day activities. Thus, children are cared for not only by their mother, but a variety of family members. In fact, the older children in the family will often be in charge of taking care of the younger children in the family.

In Mongolia, breastfeeding is common and one of the best things nutritionally that they do as a society. It is extremely uncommon to see a woman feeding her infant or child formula. Breast feeding is such a societal norm that it takes foreigners off guard when a woman starts breastfeeding her child in public without a cover up. Breastfeeding is promoted minimally within the country but not to any great lengths. Breastfeeding is a cultural norm that has been passed down from mother to mother for hundreds of generations.

While breastfeeding is how an infant is generally fed, especially in the first few months of life, formula is used on occasion. However, formula is costly and in a developing country, such as Mongolia this limits the percentage of the population that can even consider it an option. In addition, it is not customary for Mongolians to use formula. Most Mongolians only use formula when it is necessary for the mother to be away from the infant for an extended period of time or in the situation in which a mother passed away during childbirth. In these cases, it is even more common for a wet nurse or family/friend who is also lactating to breastfeed the child as opposed to giving the child formula.

Another suspected reason that formula is not used often is that the labels are not in Mongolian, the native language of Mongolians. It is even impossible to get some of the

information in the English language. Thus, the mother or family members of the infant do not know what ingredients are in the formulas and what they are feeding them. The two brands of formula and jarred baby food available in Sainshand are Nan and Milasan. The limited amount of information that can be found related to Milasan infant milk states it is for children 1 to 3 years of age. The milk is ready to drink and can be served either hot or cold. The information provided also lists a comparison of the infant milk to cow's milk, which states that it provides 7 times more iodine, 5 times more vitamin C, 3 times more vitamin B1, twice as much zinc, and a reduced amount of protein.<sup>18</sup>

The Nan formula product has more information available, though it is still in English and not in Mongolian. The Nan product available is a powder formula that must be mixed with water and heated before it is ready to be consumed.<sup>19</sup> Adding to the confusion, one product is an infant formula and one is toddler formula.

When a child is born in Mongolia, he or she is considered to be 1 year of age. Thus, when a child by American terms is 2 years old, a Mongolian child is actually 3 years old. This difference in age can drastically affect what a child is fed and how recommendations are interpreted. The recommendation on an infant milk container states it is to be given to a child between the ages of 1 to 3. The Mongolian mother will be introducing the product earlier than is recommended.

### Nutritional Content of Milks

Another common product that is introduced early into a Mongolian infant's diet is milk or a product of milk. Milk is something that is easily accessible and cheap due to the vast

number of livestock within the country. Mongolia is a country that is known for consuming diets high in meat and dairy products. While fruits and vegetables are severely limited in a large portion of the country, Sainshand has adequate amounts of both available. However, this variety has only come about in the past few years. In addition, the cost of both, especially fruit, can be quite high for limited incomes. Thus, most people still consume diets high in meat, dairy products, and fat, which holds true for infants and children as well.

Animal's milk, which includes milk from cows, goats, horses and even camels, and milk products are consumed on a daily basis. Besides milk, several products are consumed including: byclig, aaruul, tarag, cream, and airag, which is a fermented mare's milk. As previously stated, concerning infant nutrition, it is not recommended to use animal's milk of any kind before 1 year of age. "In comparison to human milk and iron fortified formula, cow's milk is higher in nutrients such as protein, calcium, phosphorus, sodium, and potassium and significantly lower in iron, zinc, ascorbic acid, and linoleic acid."<sup>13</sup> Nutrients in solid foods emphasize these excesses and deficiencies, so cow's milk-fed infants receive a higher renal solute load and are at great risk of eating an unbalanced diet. In particular, the risk for iron depletion and iron deficiency anemia is higher because the iron content of cow's milk is low and not readily bioavailable, and its absorption may be impaired by the high concentrations of calcium and phosphorus and low concentration of ascorbic acid in cow's milk. In addition, intestinal loss of (blood) iron in the stool is associated with cow's milk-feeding in the first 6 months of life."<sup>13</sup> Pasteurized goat's milk is inappropriate for infants before 1 year of age for the same reason as cow's milk. Also, if infants are allergic to cow's milk protein, then they are likely to be allergic to goat's milk.<sup>11</sup>

A brief comparison of human milk, formula, cow's milk, goat's milk, and camel's milk per liter is in Table 2.<sup>13,20,21</sup> The table reiterates how cow's milk is higher in protein, sodium, and potassium, which also holds true for goat and camel milk. Thus, it can be ascertained that the same recommendations would hold true for goat and camel's milk as cow's milk.

<b>Table 2.</b> Nutrient content of human milk, formula, cow's milk, goat's milk, and camel's milk per liter					
<b>Nutrient</b>	<b>Human milk mature</b>	<b>Formula (Nan)</b>	<b>Cow's milk 3.3 % fat</b>	<b>Goat's milk</b>	<b>Camel's Milk</b>
Energy (kcal)	680	670	640	708	759
Protein (g)	10	13	32	36.7	34.6
Fat (g)	39	36	36	42.6	
Carbohydrate (g)	72	74	48	46	
Sodium (millimol)	8	9.44	22	28.6	32.2
Potassium (mmol)	14	37.7	40	116.7	99.4
Chloride (mmol)	12	26.1	27	NA	
Vitamin D (µg)	<0.5	9	9 <sup>a</sup>	3.089	
Iron (mg) <sup>c</sup>	0.4	7	0.4	.422	2.1

<sup>a</sup> if fortified

## Supplements

In addition to breast milk, formula, and complementary foods, vitamin and mineral supplements are common in Mongolia. Vitamin D is the most common supplement given to infants in Mongolia as rickets is very prevalent today. While breast milk is tailor-made to meet the nutrient needs of the young infant, usually a nutritional supplement of vitamin D is necessary.<sup>8</sup> Breast milk does not contain enough vitamin D to provide an infant with the required amount necessary, Therefore, it is necessary and recommended to have an additional source of vitamin D.<sup>13</sup> The American Academy of Pediatrics actually recommends that breastfed and partially breastfed infants should receive a supplement of 400 IU a day starting within the first few days of life and all non-breastfed infants who are consuming less than 1 quart of vitamin D-fortified formula or milk per day.<sup>22</sup> Infants who have the highest risk for vitamin D deficiency and developing rickets are usually dark-skinned, exclusively breastfed, live at high northern or southern latitudes, or are weaned to vegan diets.<sup>13</sup> While few Mongolians are vegans, Mongolia is located around the 45 degree north latitude, Mongolians do tan very easily, and most are breastfed. Thus, Mongolian infants are at high risk for developing a deficiency of vitamin D.

Vitamin D supplementation is of greater importance to people who live in the Nordic latitudes. In these areas, there is limited exposure to sunlight in the winter months. Thus, it is necessary to supplement or fortify the diets of those living in northern latitudes to prevent a deficiency and maintain optimal body function. Vitamin D deficiency has also been linked to several diseases, which increases the need to maintain a proper level of vitamin D within the body to stay healthy.<sup>23</sup> In addition to Mongolia being in the northern latitudes and having

decreased amounts of sunlight in the winter, it is also one of the coldest countries in the world, as previously stated. In a country as high north and as cold as Mongolia, which discourages people from going outside and in turn encourages them to cover all exposed skin, vitamin D supplementation is crucial to not only the health of infants, but people of all ages.

In addition to vitamin D supplementation, an iron supplement may also be necessary depending on food intake.<sup>8</sup> “Iron deficiency is most common among infants between the ages of 6 and 24 months. The major risks factors for iron deficiency anemia in infants relate to socioeconomic status and include the early consumption of cow’s milk, inadequate funds for appropriate food and poor knowledge of nutrition.”<sup>12</sup> As stated earlier, Mongolia is a developing country, the consumption of animal’s milk before the age of one is extremely common, most families live on a limited income, and most mothers, while literate, have not been exposed to nutrition education nor have the means to find such information. Thus, all these factors put most infants at high risk of iron deficiency and an iron supplement should be recommended. WHO recommends iron supplementation for pre-school and school aged children where anemia is prevalent.<sup>24</sup>

Other vitamin and mineral supplementation is not normally required if a child is consuming the appropriate quantity and quality of foods for age and developmental stage.<sup>12</sup> Water supplementation is also unnecessary in the otherwise healthy infant.<sup>11</sup> Therefore, if a Mongolian infant is consuming breast milk and a diet of appropriate complementary foods, no other supplements should be needed.

Beyond vitamin D supplements, which are common in Mongolia, a product called Herbalife is given to infants on a regular basis. Herbalife is a company that is based in

California, with a Herbalife branch in the capital of Mongolia that opened in September of 2011. Herbalife products are extremely popular and marketed heavily in Mongolia. Seminars and taste testing promotion classes are held regularly to promote the product. The most common product consumed is Ready Herbal Aloe, which is used for digestive health. This Herbalife product<sup>25</sup> contains: 0 calories, 45 milligrams (mg) sodium, 20 mg potassium, and 14.46 grams (g) of purified aloe vera per 4 fluid ounces (fl oz). Other ingredients include: water, citric acid, sodium citrate, potassium sorbate (preservative), sodium benzoate (preservative), lemon juice concentrate, maltodextrin, and chamomile extract. Based on what is in the Ready Herbal Aloe supplement, infants are consuming additional water, sodium, and potassium that is unnecessary and being exposed to preservatives and additives at an early age.

### Trends and Indicators

After learning about customs and practices, trends and indicators are necessary to be examined as well. In order to track the progress to improve nutrition and health during the first years of life, simple, valid, and reliable indicators are essential.<sup>10</sup> The WHO and UNICEF published indicators for assessing breastfeeding practices in 1991. The indicators have been frequently measured and used to guide programs. However, the indicators have not been very informative. Limited knowledge about the type, scale, and distribution of inadequate complementary feedings in children 6 to 23 months of age has hampered the ability to improve child feeding.<sup>10</sup> “Child feeding practices are multidimensional and they change rapidly within short age-intervals in the first years of life. Unlike exclusive breastfeeding, which can be summarized in a single indicator, the measurement of feeding practices in children aged 6 months and older involves assessing various dimensions of feeding simultaneously. These

dimensions include continued breastfeeding, appropriate timing of introduction of complementary foods, and optimum quantity and quality of the foods consumed.”<sup>10</sup>

In 2007, new core indicators were agreed upon by the World Health Organization, UNICEF and additional partners.<sup>10</sup> The core and optional indicators are listed below and Table 3 provides definitions for specific indicators. The core indicators are:

- Early initiation of breastfeeding
- Exclusive breastfeeding under six months
- Continued breastfeeding at 1 year
- Introduction of solid, semi-solid or soft foods
- Minimum dietary diversity
- Minimum meal frequency
- Minimum acceptable diet
- Consumption of iron-rich or iron-fortified foods

Optional indicators include:

- Children ever breastfed
- Continued breastfeeding at 2 years
- Age-appropriate breastfeeding
- Predominant breastfeeding under 6 months
- Duration of breastfeeding
- Bottle feeding
- Milk feeding frequency of non-breastfed children



<b>Table 3.</b> Definitions of specific core indicators by the WHO, UNICEF and additional Partners (2007) <sup>10</sup>			
<b>Feeding Practice</b>	<b>Requires that the infant receive</b>	<b>Allows the infant to receive</b>	<b>Does not allow the infant to receive</b>
Exclusive breastfeeding	Breast milk (including milk expressed or from a wet nurse)	ORS, drops, syrups, (vitamins, minerals, medicines)	Anything else
Predominant breastfeeding	Breast milk (including milk expressed or from a wet nurse) as the predominant source of nourishment	Certain liquids (water and water-based drinks fruit juice), ritual fluids and ORS, drops or syrups (vitamins, minerals, medicines)	Anything else (in particular non-human milk, food-based fluids)
Complementary feeding	Breast milk (including milk expressed or from a wet-nurse) and solid or semi-solid foods	Anything else: any food or liquid including non-human milk and formula	NA
Breastfeeding	Breast milk (including milk expressed from a wet nurse)	Anything else: any food or liquid including non-human milk and formula	NA
Bottle feeding	Any liquid (including breast milk) or semi-solid food from a bottle with nipple/teat	Anything else: any food or liquid including non-human milk and formula	NA

Several studies have been conducted reviewing indicators specific to Mongolia. First, an analysis between 2000 and 2005 of National Survey Data was conducted to compare infant and young child feeding practices in children aged zero to 23 months across 9 East and Southeast Asian countries. In Mongolia, the data from the 2002 National Nutrition Assessment was used, although they do not include all the variables available in other data sets.<sup>23</sup> The estimated indicators were: ever breastfed rate, current breast-feeding rate, continued breastfeeding rate at

12-15 months and 20-23 months, Exclusive Breast Feeding (EBF), predominant breast-feeding rate, full breastfeeding rate, bottle-feeding rate, timely complementary-feeding rate, and the median duration of breast-feeding.<sup>23</sup> The results were 93.1% ever breast fed, 83.8% continued breastfeeding rate (1 year), 66.2% continued breastfeeding rate (2 years), no results for EBF, 98.5 timely complementary-feeding rate.<sup>26</sup> Key breastfeeding indicators were described by WHO in 1991 and infant feeding indicators were then estimated according to those indicators.<sup>26</sup>

The second study “The World Breastfeeding Trends Initiative” calculated percentages of exclusive breastfeeding and the percentage of breastfed babies receiving complementary foods at 6 to 9 months of age. In 2005, 57% of all children under the age of 6 months are exclusively breastfed. However, the percentage is higher in rural areas at 60% compared to urban areas at 55%. The key question asked to obtain this result was: “Percentage of babies zero to less than 6 months of age exclusively breast fed in the last 24 hours?”<sup>27</sup> Comparing this percentage to the estimated 35% worldwide, Mongolia appears to be doing much better than the world average concerning exclusive breastfeeding based on this indicator.

Another question asked from “The World Breastfeeding Trends Initiative” was: “Percentage of breastfed babies receiving complementary foods at 6 to 9 months of age?” Fifty-two percent were receiving complementary food, but appropriate feeding was still a problem. The summary comments for this question stated: “Appropriate complementary feeding is still a problem regarding the composition of daily food.”<sup>27</sup>

In the time between when the 2 studies were conducted, the term complementary feeding, which was a term reserved to describe appropriate feeding in breastfed children 6 months of age or beyond, is no longer used in the indicators to assess infant and young child feeding practices.

<sup>10</sup> It was found that the indicator “timely complementary feeding rate”<sup>26</sup>, which combined

continued breastfeeding with consumption of solid and soft foods, was difficult to interpret.<sup>10</sup> When comparing the difference between the National Survey where the indicator “timely complementary feeding rate”<sup>26</sup> is used and the World Breastfeeding Trend Initiative indicator “Percentage of breast fed babies receiving complementary foods”<sup>25</sup> there is a significant difference. The National Survey reported 98.5% for complementary feeding compared to 52% by the World Breastfeeding Initiative.<sup>10,26,27</sup>

### Feeding Practices of Mothers in Mongolia

Information for Mongolian mothers on what to feed their infants is limited. A pamphlet might be available depending on if there was a recent shipment. The pamphlets would only be available at the pediatrician’s office, which most infants do not visit unless they are sick. Thus, while most mothers know or choose to breastfeed their infants, little information on complementary feedings and length of breastfeeding is available. However, in the spring of 2011, several seminars were conducted to increase the knowledge of mothers in Sainshand by the principal investigator of this study. The seminars included information on basic nutrition, maternal nutrition, and infant nutrition and a baby food making demonstration. Each seminar provided a glimpse into the thought processes of Mongolian mothers and their feeding practices.

Mothers in Mongolia are eager to learn and increase their knowledge of nutrition to help not only their infant, but their entire family. Most recommendations for complementary feedings were understood and acknowledged as useful. However, customary feedings of dairy products, especially yogurt and dried curds, were not fully accepted. Mothers were not fully receptive to the idea of not giving dairy products to their infants. Dairy products are such a staple in Mongolians lives it is hard for them to comprehend that such foods are not the best for their

infants. Traditional beliefs even include drinking horse's milk for digestive health. Thus, when presenting information regarding something they have believed for generations is untrue, it is extremely difficult to convince them otherwise when they have seemingly healthy children.

A survey was conducted to gain a better idea of what Mongolian mothers actually feed their infants. The survey was used to determine actual breastfeeding rates and when complementary feedings were introduced into infants' diets. Questions were also asked pertaining to supplement, formula, and premade jarred baby foods to ascertain the prevalence of use for each.

#### Principle Investigator's Personal Observations and Insights into the Diets of Mongolians

While serving in Mongolia as a Health Specialist volunteer, I made many observations and gained a great deal of knowledge and insight into the diets of Mongolians. After 2 years of living in Mongolia, I have a vast understanding of what foods are commonly consumed and why. I also had the opportunity to conduct several seminars in the town of Sainshand, which covered information pertaining to maternal and child nutrition. At the end of each seminar, a question and answer session was conducted, which allowed me to not only provide information for them, but to also obtain information from the mothers as well.

Beyond specifically asking questions about Mongolian diets, observing was a crucial part of my understanding of what is typically consumed in Mongolia. Dairy products, meats, noodles, and rice are the most common products consumed. Mongolia is a nation made up of herders, which lends itself to having a large number of animals and their products to be consumed. Mongolia is also a very cold, windy, and dry country, which makes it extremely difficult to grow and harvest fruits and vegetables. The combination of these two elements

amplifies the lack of fruits and vegetables consumed and increase of dairy products, meats, fats, and flour products consumed.

Junk food, including chips, candy, cookies, and cakes, are readily available and fairly cheap. The consumption of junk food, in addition to meat, fat, and dairy products, means the diets of Mongolian are high in fat, cholesterol, and sugar. If you include the lack of fruits and vegetables consumed, then Mongolian diets are severely lacking in important vitamins and minerals. To clarify, fruits and vegetables are consumed, but on rare occasion. Fruit is considered a treat most times due to its cost and lack of availability to consumers. Vegetables are available and cheaper than fruit, but a large variety does not exist. In most towns, a consumer will only be able to find potatoes, carrots, onions, garlic, peppers, and occasionally beets and turnips.

The food available in Mongolia is only part of the problem. Nutrition information is not easily accessible or taught to Mongolians. Nutrition classes are not taught in grade school or later in higher learning. Thus, with limited education and limited resources, the diets of Mongolians are not as healthy as they could be.

The diets of infants are of greatest concern to me. As a health volunteer I wanted to help mothers learn what they should be feeding their infant and at the appropriate times. Throughout my time in Mongolia, I saw on multiple occasions an infant being fed candy, cookies, other junkfood, and dairy products. Infants are not fed drastically different than other members of the family. Jarred baby food is not available and mothers are not informed of what to feed their infant. Thus, they feed the infant food that is normally given to the rest of the family, just in smaller, bite-sized portions.

## CHAPTER 3

### METHODS

#### Study Sample

In the small city of Sainshand, Dornogobi, Mongolia, consisting of approximately 25,000 people, 50 mothers were surveyed (n=50). These mothers were able to participate due to the qualifying factor of having a child under the age of 5 years old. Mothers with children under the age of 5 were chosen as desired participants because they would be able to provide more up-to-date information on their feeding practices. They would have a better memory of what they fed their infants and the information would be current. Thus, mothers with children over the age of 5 were not asked to participate. The mothers who participated also randomly visited the city's pediatrician during a 2-day span at the first Hospital in Sainshand. The principal investigator, while possibly recognized by several participants, was not knowledgeable about any of the participants. Individuals were not required to give written informed consent, but verbal consent was made when they agreed to participate in the research study. This research study received Institutional Review Board approval through the East Tennessee State University (ETSU) Campus Office of Research and Sponsored Programs Administration in July 2011 (Appendix A).

#### Survey Design and Data Collection

The principal investigator and co-investigator developed the survey using select questions from the validated survey "Feeding Infants and Toddlers Study Survey (FITS)"<sup>28</sup> by Ziegler P, Briefel R, Clusen N, and Devaney B. The survey consisted of a total of 13 questions (Appendix B and C). The survey consisted of a mixture of multiple choice, fill in the blank, and listing questions.

### Variable Section

Analysis variables of the survey included: breastfeeding, formula usage, introduction to animal's milk, complimentary feeding, commercially jarred baby food usage, supplements, vitamins, and mineral usage, and daily feedings. Breast feeding occurrence and age of child when breast feeding was stopped are measured with questions 1, 2, and 3. Was the child ever fed formula and at what age on a daily basis were measured with questions 4 and 5. Animal's milk consumption and at what age were measured with questions 6 and 7. Complimentary feeding and at what age were measured by question 8. The main person who chooses foods the infant consumes was measured by question 9. Commercial baby food usage and at what age was measured by question 10. Vitamin, mineral, or other dietary or herbal supplements usage and the specific types were measured by question 11. Questions 12 and 13 measured the types of foods fed to infants and on a typical day.

### Research Questions

The following research questions were investigated using information obtained from the survey conducted with Mongolian mothers who met the study criteria:

1. Are mothers in Mongolia lacking knowledge of basic nutrition information and therefore unable to provide nutritionally adequate diets to their infants?
2. Are there a variety of available complementary foods or formulas comparable to breast milk in Mongolia?
3. Do traditional foods and customs play a large role in the foods commonly fed or not fed to infants of Mongolia?

### Materials and Procedures

The survey and informed consent was translated from English into Mongolian by a professional translator. The survey with informed consent was given to participants who qualified for the study after visiting with the pediatrician at the local hospital. A translator was present with the principal investigator in case participants had questions, concerns, or needs.

After each survey was completed, it was placed without any coding into an envelope. The surveys were personally carried to the translator from Sainshand on the train from Sainshand to UB by the co-investigator. The surveys were directly handed to the translator. Once the surveys were translated into English, they were given to the co-investigator. The co-investigator carried the surveys back from Mongolia to the United States in an unmarked envelope. The surveys are being kept in a locked cabinet in the principle investigator's office at ETSU.

### Data Analysis

The Statistical Package for Social Sciences (SPSS) version 19.0 was used for all data analyses. Data from all the surveys were compiled into final English versions. Descriptive statistics (frequencies in percentage format) were calculated for each answer to questions 1 through 11. The percentages were calculated based on 50 responses (n=50). They were not adjusted for answers that had multiple responses per survey. An additional comparison of exclusive breast feeding (EBF) and complimentary feedings was conducted. EBF trends were determined by taking the responses of those who specified an age at which they stopped breast feeding and were compared to the ages from the responses related to first consumption of animal's milk, formula, complimentary feedings, and commercial baby foods. The complimentary feeding results were determined by using the responses where a specific age was



given. The statistical results were evaluated quantitatively and used to test the research questions.

The qualitative data from questions 12 and 13 were analyzed for frequency of foods. The statistical results were then evaluated and used to test the research questions.

## CHAPTER 4

### RESULTS

#### Quantitative Data

The majority of all infants had been breast fed (94%) with only 2% never having been breast fed and 72% of infants had not been fed formula compared to 28% who had been fed formula. The statistics for questions 1 and 4 reaffirms that breast feeding is extremely prevalent and the main form of nutrition for infants in Mongolia. Fifty-six percent of infants were still being breast fed at the time of the survey, but 38% were not currently breastfeeding. Question 4 statistics are seemingly useless because the mothers were not asked the age of their infants (Table 4). The percentages in the tables do not always add up to 100%. The difference is due to values being discarded because multiple conflicting answers were provided or the questions were not answered. These answers were not included in the table values.

Question 6 shows that 74% of infants had never been fed any animal's milk with 22% having fed animal's milk and 4% not knowing. These results are contradictory to observations that have been made by the principal investigator. Based on observations by the principal investigator and information from other Mongolian mothers during seminars on Infant Nutrition, almost all mothers give their infants dairy products from animals. Yogurt is the most common form, but airag, plain milk, and curds are also commonly given (Table 4).

A large percentage (42%) of infants had been given premade jarred baby food compared to 36% who had not been given premade jarred baby food and 10% did not know. The percentage of infants fed jarred baby food is higher than expected based on cost and lack of information about the baby food (Table 4).

<b>Table 4.</b> Percentage of yes/no responses for select questions from Feeding Survey (n=50)				
<b>Questions</b>	<b>No %</b>	<b>Yes %</b>	<b>Don't Know %</b>	<b>Refused to Answer %</b>
Q1: Child ever breastfed?	2	94	0	0
Q2: Currently breastfeeding?	38	56	0	0
Q4: Child ever been fed formula?	72	28	0	0
Q6: Child fed any animal's milk?	74	22	4	0
Q10: Child ever fed premade jarred baby food?	36	42	10	0
Q11: Child given any vitamin, mineral, or dietary/herbal supplement from birth to 1 year old?	44	38	12	0

Question 5 indicates that of the percentage of participants who answered they have given formula to their infant, a large number of responses (34%) indicated they had given formula to their infant after several months. Only 4% were given formula within a few weeks of birth, 2% since birth, 24% never on a daily basis, 10% don't know, and 8% refused to answer the question (Table 5). The average age at which infants who consumed formula daily started consuming formula daily is 5.5 months old with a range of 1 month old to 12 months of age.

<b>Table 5.</b> Percentage of responses for question 5 referring to formula introduction from Feeding Survey (n=50)						
<b>Question</b>	<b>Age in Weeks %</b>	<b>Age in Months %</b>	<b>Since Birth %</b>	<b>Never on a daily basis %</b>	<b>Don't Know %</b>	<b>Refused %</b>
Q5: How old was the child when he/she was first fed formula on a daily basis?	4	34	2	24	10	8

Question 11 results indicate 44% of infants do not receive any form of a supplement, but 38% do receive a supplement. The statistics for this question are misleading. Question 11 also asked participants: “Was the infant given any vitamin, mineral, or other dietary or herbal supplement from birth to 1 year of age? If yes, what was the name of the supplement(s)?” Responses are listed in Table 6. There seems to be a lack of understanding in relation to what is considered a supplement. The majority of responses were lists of foods given to the infants. Only 3 of the responses given were actual supplements of vitamin D, vitamin A and other dietary supplements. Nineteen responses were received out of 50 surveys.

**Table 6.** Responses from “Was the infant given any vitamin, mineral, or other dietary or herbal supplement from birth to 1 year of age?” from Feeding Survey (n=19)

<b>Response</b>	<b>Number of responses (n)</b>	<b>Frequency (%)</b>
Yogurt	8	42
Apple	8	42
Potatoes	7	37
Gruel	5	26
Milk	5	26
Cash	4	21
Carrots	4	21
Cabbage	3	16
Puree	3	16
Vitamin D	3	16
Raisin juice	2	10.5
Curds	2	10.5
Meat	2	10.5
Cheese	1	5.2
Vitamin A and other dietary Supplements	1	5.2
Vitamin rich foods	1	5.2
Cream	1	5.2

Question 7 indicates 40% of infants had not been fed animal’s milk on a daily basis.

Fourteen percent of infants had been fed animals milk at several months old, 2% within a few weeks of birth, 12% do not know, and 10% refused to answer (Table 7). The average age at which infants who consumed started consuming animal’s milk daily is 7.6 months old with a range of 1 month old to 36 months of age.

Question 8 reflects 80% of infants are fed complementary foods at several months of age. Four percent are not fed complementary foods on a daily basis, 6% percent do not know, and 2% of the participants refused to answer the question (Table 7). The average age at which infants were introduced to complementary foods is 6.4 months old with a range of 1 and a half months old to 24 months of age.

<b>Table 7.</b> Percentage of responses for questions 7 and 8 referring to the introduction of animal's milk and complementary foods from Feeding Survey (n=50)					
<b>Questions</b>	<b>Age in Weeks %</b>	<b>Age in Months %</b>	<b>Never on a daily basis %</b>	<b>Don't Know %</b>	<b>Refused %</b>
Q7: How old was the child when they were first fed cow's milk, camel's milk, goat's milk, horse's milk, or airag (not breast milk or formula) on a daily basis?	2	14	40	12	10
Q8: How old was the child when he/she was first fed any type of meat, vegetables, fruits, or grains (foods other than breast milk) on a daily basis?	0	80	4	6	2

Question 3 reflects 52% of infants were breast fed until they were several months old and only 2% stopped being breast fed within a few weeks. The other 20% do not know or refused to answer the question (Table 8). The average age at which infants stopped being breast fed is 20.8 months old with a range of 1 month old to 48 months of age.

<b>Table 8.</b> Percentage of responses for question 3 referring to when breastfeeding was stopped from Feeding Survey (n=50)				
<b>Question</b>	<b>Age in Weeks %</b>	<b>Age in Months %</b>	<b>Don't Know %</b>	<b>Refused %</b>
Q3: How old was the child when you stopped breast feeding?	2	52	12	8

Figure 1 uses all the information from questions 3, 5, 7, 8, and 10. The months recorded from the surveys were compared to show how long infants were Exclusively Breast Fed and at what age they started receiving complementary feedings. Approximately 24% of infants are exclusively breastfed until 6 to 7 months of age. In contrast, approximately 61% of infants start receiving complementary foods at 6 to 7 months of age. The figure also shows that complementary feedings for infants started as early as 2 to 3 months of age and exclusive breast feeding was present in infants past 10 months of age.

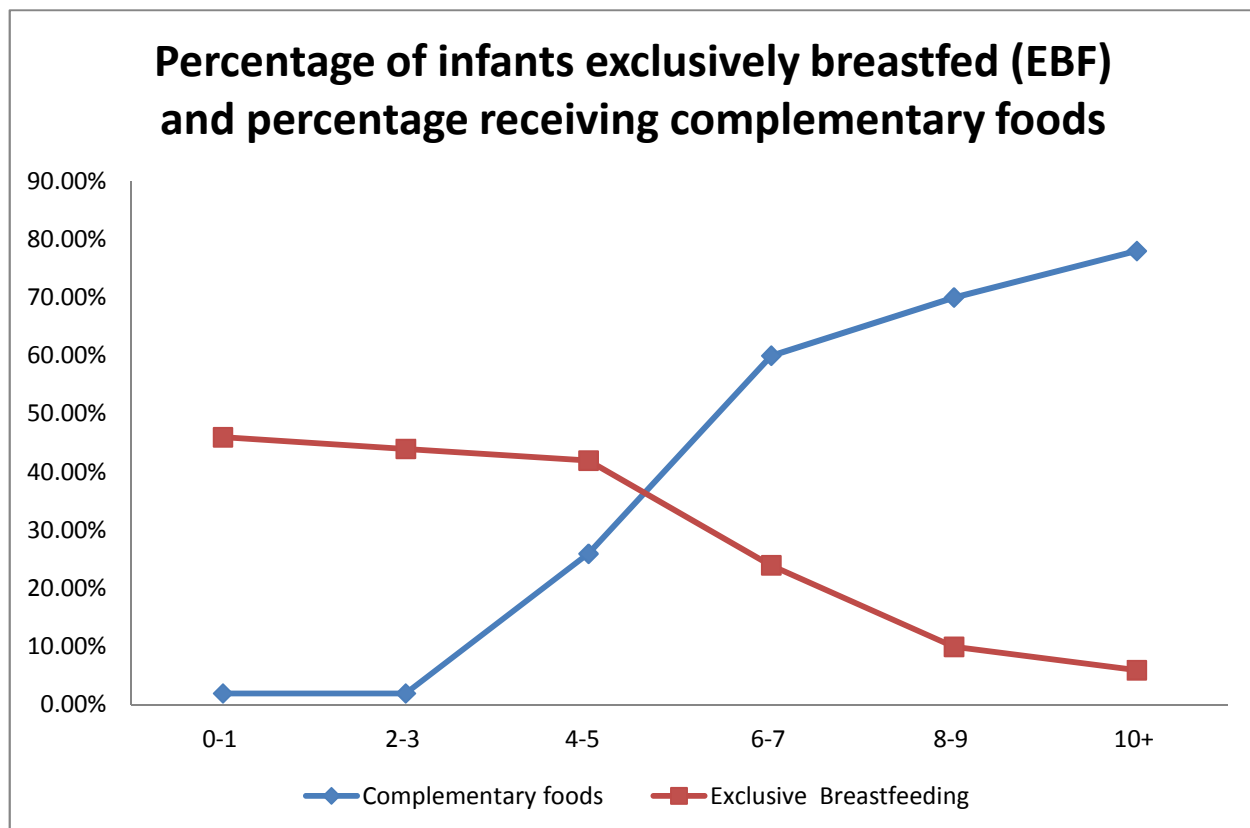


Figure 2. Percentage of infants exclusively breastfed (EBF) and percentage receiving complementary foods.

Question 9 indicates that the majority of the time, with 46 responses, mothers are the primary caregivers for their infants. However, grandmothers are often the primary caregivers with 8 responses and additionally fathers with 2 responses (Table 9).



<b>Table 9.</b> Number of responses for question 9 referring to the primary caregiver from Feeding Survey (n=50)	
Family Member	# of Responses
Mother	46
Father	2
Sibling (sister/brother)	0
Aunt	0
Uncle	0
Grandmother	8
Grandfather	0
Other	0
Responsibility split with other	0
Don't know	1
Refused	0

### Qualitative Data

To get a better understanding of feeding practices of Mongolian mothers, participants were asked: “What foods did you feed your infant when they were younger than 1 year of age? Please list as many as you can remember and include how often (daily, weekly, etc.) they were fed each said item.” Responses are listed in Table 10. Forty-two responses were received out of the 50 surveys received.

<b>Table 10:</b> Examples from the list of foods fed to infants younger than 1 year of age. (n=42)		
<b>Foods</b>	<b>Number of Responses (n)</b>	<b>Frequency (%)</b>
Gruel	33	82.5
Cash	26	65
Yogurt	20	47.6
Milk	13	30
Soup	11	26
Puree	11	26
Potatoes	9	21.4
Rice	9	21.4
Fruits	7	16.7
Meat	6	14
Vegetables	6	14
Buuz	6	14
Apples	6	14
Curds	5	12
Noodle	4	9.5
Breast milk	3	7
Carrots	3	7
Juice	3	7
Flour	3	7
Boortsog	2	4.7
Cookies	1	2.3
Bread	1	2.3
Jarred foods	1	2.3
Millet	1	2.3
Eezgii	1	2.3
Formula	1	2.3
Raisin Juice	1	2.3
Sheep's tail	1	2.3
Home meal	1	2.3
Cheese	1	2.3

Participants were asked: “On a typical day, what would you feed your infant? Please be as detailed as possible.” Responses are listed in Table 11. The major foods fed to infants were gruel and cash. Forty responses were received out of the 50 surveys received.

<b>Table 11.</b> Foods fed to infants and percentages (n=40)		
<b>Foods</b>	<b>Number of Responses (n)</b>	<b>Frequency (%)</b>
Gruel	34	85
Yogurt	27	67.5
Cash	19	47.5
Animal's milk	17	42.5
Fruits	10	25
Breast milk	9	22.5
Soup	9	22.5
Boortsog	7	17.5
Rice	7	17.5
Vegetables	7	17.5
Puree	6	15
Potatoes	5	12.5
Curds	5	12.5
Home meal	5	12.5
Tea	5	12.5
Bread	5	12.5
Noodles	4	10
Meat	4	10
Buuz	4	10
Flour	3	7.5
Carrots	3	7.5
Apples	3	7.5
Broth	2	5
Butter	2	5
Vitamin rich foods	1	2.5
Cream	1	2.5
Juice	1	2.5
Millet	1	2.5
Cookies	1	2.5
Formula	1	2.5
Sugar	1	2.5
Additional Supplements	1	2.5

### Research Questions

After analyzing the results, the 3 research questions can be answered. The first research question was, “Are mothers in Mongolia lacking knowledge of basic nutrition information and therefore unable to provide nutritionally adequate diets to their infants?” The responses from question 11 about supplements shows that there is clear misunderstanding of what is being asked, which indicates there is either a misunderstanding pertaining to what are supplements, what is being asked, or there is a problem with translation. Many fruits, vegetables, and dairy products are listed as supplements. Fruits and vegetables should be considered part of a healthy diet for their infant and not as a supplement. Many complementary foods are considered supplements instead of actual supplements such as vitamin D. Yogurt and fruits, which are not supplements, were listed as the most prevalent supplements given by Mongolian mothers. However, vitamin D, which is a supplement, was minimally used by a population that desperately needs it. Dairy products are shown to be commonly given but should not be given to infants. In addition, some complementary foods are introduced too early or too late in the infant’s diet. Between the combination of responses received on the surveys and the first-hand knowledge that nutrition information is not easily accessible or taught to Mongolians, it can be ascertained that there is a severe lack of basic nutrition knowledge with mothers in Mongolia.

The second research question, “Are there a variety of available complementary foods or formulas comparable to breast milk in Mongolia?” After reviewing the foods listed in Table 11, it is clear that the majority of foods given to infants are dairy products and cereal type foods such as cash, soups, rice, and noodles. Some fruits and vegetables are given to the infants, but not as often. In Sainshand, fruits and vegetables are available but not as cheap or as prevalent as meat,

dairy products, and grain products. Formulas are also available but can be costly and are not available with useful information. However, a significant portion of infants had been given formula and/or jarred baby food on a regular basis. This result was unexpected due to the cost and availability of formula and/or jarred baby food.

The last research question, “Do traditional foods and customs play a large role in the foods commonly fed or not fed to infants of Mongolia?” After reviewing the lists of foods from Questions 12 and 13 (Tables 10 and 11), many customary foods and traditional infant foods for Mongolians are consumed. Dairy products are given often along with cash, gruel, and buuzs. Other items such as sheep’s tail and raisin juice, though not listed in the survey responses as often, are common items consumed in Mongolia and clearly still consumed, even if minimally, by infants today.

### Limitations

Limitations of this study include:

- Only mothers who went to the hospital on the 2 days the survey was conducted participated.
- The sample size was fairly small.
- The survey was administered by the principal investigator only, thus possibly affecting the honesty of the patients and presenting bias to the study.
- Research was only conducted in one small city in the Gobi, therefore, not representing all provincial capitals or soums in the Gobi Desert.
- No face validity conducted to ensure questions were appropriate in translation to the Mongolian language.

Throughout the questions of the survey, multiple answers were given. When answers had multiple responses, these results were considered as missing. In addition, the age of the mothers and infants were not asked on the survey. Thus, it is hard to distinguish and analyze some of the results.

Many contradictory results were received. For example, mothers would answer they had never breast fed their infant and then respond they had stopped breast feeding their infant at 6 months of age. The questions were analyzed for overall results and not specific to each survey question.

## CHAPTER 5

### CONCLUSION

Upon completion of the study, the results and conclusions will be sent back to past co-workers in Mongolia. Those co-workers, with the help of the Registered Dietitian who conducted this study, will develop education materials, seminars, and programs based on the information provided from the study. Overall, the study will give an outsider and professional perspective and level of education to assist Mongolia to provide better nutrition and infant feeding information to mothers and their children.

Second, this study will provide greater knowledge to others about infants' diets unlike those in America and the typical infant food consumption that registered dietitians encounter daily. This study will increase the spectrum of diets that dietitians are knowledgeable about and know how to adjust appropriately. Dietitians will have a better understanding of what an infant's diet consists of in a foreign country and, more specifically, a developing foreign country.

This study has shown that breastfeeding is the most common method for feeding infants. A large portion of the infant population is exclusively breast fed for the first 6 months of their lives. This exclusive breastfeeding will help them to develop physically and mentally and lead healthier adult lives. However, the introduction of complementary foods are initiated during a wide age range. The age range begins extremely early in some infants, but can also be very late. The early introduction or delay of introduction of complementary foods could have a negative health impact on infants. Early introduction can cause increases in allergies and can be a choking hazard. Delayed introduction of complementary foods can foster nutrient deficiencies.

This study has shown that while several assumptions had been made about the Mongolian infant's diet, surprisingly though, some assumptions were incorrect. While most mothers do breast feed and do so exclusively at a higher rate than the majority of the world, formula and jarred baby foods were also commonly used to nourish infants. Supplements were almost non-existent, but these results may be due to lack of understanding of what is classified as a supplement. Overall complementary feedings were composed of a variety of foods easily available and customary, but were introduced over a vast age range. Thus, the diets of Mongolian infants may be nutritionally limited, but higher in quality than originally believed.



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## APPENDICES

### APPENDIX A

#### IRB Approval



East Tennessee State University

Office for the Protection of Human Research Subjects • Box 70565 • Johnson City, Tennessee 37614-1707  
Phone: (423) 439-6053 Fax: (423) 439-6060

#### **IRB APPROVAL – Initial Exempt**

July 15, 2011

Ms. Michelle Lee  
Box 70690

RE: Feeding Practices of Mothers in the Gobi Desert of Mongolia  
IRB#: c0711.5e

On **July 14, 2011**, an exempt approval was granted in accordance with 45 CFR 46.101(b)(2). It is understood this project will be conducted in full accordance with all applicable sections of the IRB Policies. No continuing review is required. The exempt approval will be reported to the convened board on the next agenda.

- Form 103; Narrative (06/26/11 stamped approved 07/14/11); Assurance Statement; Potential Conflict of Interest; Survey; Permission from Health Department (Mongolia)

Projects involving VA patients, facilities or employees must also be approved by the VA Research & Development Committee prior to initiating the study.

Unanticipated Problems Involving Risks to Subjects or Others must be reported to the IRB (and VA R&D if applicable) within 10 working days.

Proposed changes in approved research cannot be initiated without IRB review and approval. The only exception to this rule is that a change can be made prior to IRB approval when necessary to eliminate apparent immediate hazards to the research subjects [21 CFR 56.108 (a)(4)]. In such a case, the IRB must be promptly informed of the change following its implementation (within 10 working days) on Form 109 ([www.etsu.edu/irb](http://www.etsu.edu/irb)). The IRB will review the change to determine that it is consistent with ensuring the subject's continued welfare.

Sincerely,  
Chris Ayres, Chair  
ETSU Campus IRB



*Accredited Since December 2005*

## APPENDIX B

### English Survey

#### **Feeding Practices of Mothers in Mongolia**

##### PURPOSE:

The purpose(s) of this research study is/are as follows:

Research-This study is being conducted purely for research.

##### PROCEDURES

The procedures, which will involve you as a research subject, include:

Taking a survey. Please answer the survey. It will take about 10 minutes of your time.

##### VOLUNTARY PARTICIPATION

Participation in this research experiment is voluntary. You may refuse to participate. You can quit at any time. If you quit or refuse to participate, the benefits or treatment to which you are otherwise entitled will not be affected. You may quit by calling Julie Tate, whose phone number is 9571-5693. You will be told immediately if any of the results of the study should reasonably be expected to make you change your mind about staying in the study.

##### CONTACT FOR QUESTIONS

If you have any questions, you may call Julie Tate at 9571-5693, or Dr. Michelle L. Lee at 1-423-439-7524.

1. Was the child ever breastfed or fed breast milk?

- a. No
- b. Yes
- c. Don't know
- d. Refused to answer

2. Are you currently breastfeeding?

- a. No
- b. Yes
- c. Don't know
- d. Refused

3. How old was the child when you stopped breast feeding?
  - a. Age in weeks \_\_\_\_\_
  - b. Age in months \_\_\_\_\_
  - c. Don't know
  - d. Refused
4. Has the child ever been fed formula?
  - a. No
  - b. Yes
  - c. Don't know
  - d. Refused
5. How old was the child when he/she was first fed formula on a daily basis?
  - a. Age in weeks \_\_\_\_\_
  - b. Age in months \_\_\_\_\_
  - c. Since birth
  - d. Never on a daily basis
  - e. Don't know
  - f. Refused
6. Has the child ever been fed milk other than breast milk-like cow's milk, camel's milk, goat's milk, horse's milk or airag?
  - a. No
  - b. Yes
  - c. Don't know
  - d. Refused
7. How old was the child when they were first fed cow's milk, camel's milk, goat's milk, horse's milk, or airag (not breast milk or formula) on a daily basis?
  - a. Age in weeks \_\_\_\_\_
  - b. Age in months \_\_\_\_\_
  - c. Never on a daily basis
  - d. Don't know
  - e. Refused
8. How old was the child when he/she was first fed any type of meat, vegetables, fruits, or grains (foods other than breast milk) on a daily basis?
  - a. Age in weeks \_\_\_\_\_

- b. Age in months \_\_\_\_\_
  - c. Never on a daily basis
  - d. Don't know
  - e. Refused
9. Who is the main person who chooses the child's foods on a daily basis?
- a. Mother
  - b. Father
  - c. Sibling (sister/brother)
  - d. Aunt
  - e. Uncle
  - f. Grandmother
  - g. Grandfather
  - h. Other: \_\_\_\_\_
  - i. Responsibility split with other
  - j. Don't know
  - k. Refused
  - l.
10. Has the child ever been fed premade jarred baby food from a store?
- a. No
  - b. Yes (If yes, at what age was this fed to the child on a daily basis? \_\_\_\_weeks or \_\_\_\_months or \_\_\_\_don't know)
  - c. Don't know
  - d. Refused
11. Was the infant given any vitamin, mineral, or other dietary or herbal supplement from birth to one year of age?
- a. No
  - b. Yes (If yes, what was the name of the supplement(s)? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  - c. Don't know
  - d. Refused

12. What foods did you feed your infant when they were younger than one year of age?  
Please list as many as you can remember and include how often (daily, weekly, etc.) they  
were fed each said item.

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13. On a typical day, what would you feed your infant? Please be as detailed as possible.

## APPENDIX C

### Mongolian Survey

#### Монгол дах эхчүүдийн хүүхдээ хооллох дадал, зуршил

Энэхүү судалгааны ажлын гол зорилго нь Монгол дах эхчүүдийн хүүхдээ хэрхэн хооллодог дадлыг тодорхойлоход оршино. Доорхи судалгаа нь таны хүүхэддээ ямар төрлийн хоол хүнс болон шингэнийг ямар хэмжээтэйгээр өгдөг талаар хариулахад тань тус дөхөм болохоор зориулагдан боловсруулагдсан болно. Энэхүү судалгааны хүрээнд авсан мэдээллийг Дэлхийн эрүүл мэндийн байгууллагаас гаргасан “Удирдамж” болон “Хоол тэжээлийн зохистой хэрэглээ”-тэй харьцуулан судлах болно.

Энэхүү судалгааг Зүүн Теннессийн их сургуулийн Хоол судлалын дадлага ажлын хөтөлбөрийн захирал доктор, хоол тэжээлийн мэргэжилтэн, профессор Мишээл. Л. Лий; Зүүн Теннессийн их сургуулийн хоол тэжээлийн мэргэжилтэн, Энх тайвны корпусын сайн дурын ажилтан (ЭТК-ын СДА) Жулио Тейт; болон Дорноговь аймгийн Эрүүл мэндийн газраас хамтран явуулж байна.

Холбоо барих мэдээлэл:

Доктор Мишээл. Л. Лий, хоол тэжээлийн мэргэжилтэн

Утас: 1-423-439-7524

Факс: 1-423-439-4030

Емэйл хаяг: [LEEML2@mail.etsu.edu](mailto:LEEML2@mail.etsu.edu)

Жулио Тейт, Хоол тэжээлийн мэргэжилтэн, ЭТК-ын СДА

Утас: 976-9571-5693

Емэйл хаяг: [julietate@gmail.com](mailto:julietate@gmail.com)

1. Та хүүхдээ хөхөөрөө буюу хөхний сүүгээрээ хооллодог байсан уу?
  - а. Үгүй
  - б. Тийм
  - в. Мэдэхгүй байна
  - г. Хариулахаас татгалзаж байна
2. Та хүүхдээ яг одоо хөхөөрөө хооллож байгаа юу?
  - а. Үгүй
  - б. Тийм
  - в. Мэдэхгүй байна



- г. Хариулахаас татгалзаж байна
3. Та хүүхдээ хэзээнээс эхлэн хөхөөрөө хооллохоо больсон бэ?
- а. Хэдэн долоо хоногтой байхад нь \_\_\_\_\_
- б. Хэдэн сартай байхад нь \_\_\_\_\_
- в. Мэдэхгүй байна
- г. Хариулахаас татгалзаж байна
4. Та хүүхдээ хүүхдийн тэжээлээр хооллодог байсан уу?
- а. Үгүй
- б. Тийм
- в. Мэдэхгүй байна
- г. Хариулахаас татгалзаж байна
5. Та хүүхдээ анх хэзээнээс эхлэн хүүхдийн тэжээлээр өдөр бүр тогтмол хооллож эхэлсэн бэ?
- а. Хэдэн долоо хоногтой байхад нь \_\_\_\_\_
- б. Хэдэн сартай байхад нь \_\_\_\_\_
- в. Төрснөөсөө хойш
- г. Хэзээ ч өдөр бүр тогтмол хооллож байгаагүй
- д. Мэдэхгүй байна
- е. Хариулахаас татгалзаж байна
6. Та хүүхдээ хөхний сүүнээс гадна үнээний сүү, ингэний сүү, ямааны сүү болон гүүний сүү буюу айргаар хооллож байсан уу?
- а. Үгүй
- б. Тийм
- в. Мэдэхгүй байна
- г. Хариулахаас татгалзаж байна
7. Та хүүхдээ анх хэзээнээс эхлэн үнээний сүү, ингэний сүү, ямааны сүү болон гүүний сүү буюу айргаар (үүнд хөхний сүү болон хүүхдийн тэжээл хамаарахгүй) өдөр бүр тогтмол хооллож эхэлсэн бэ?

- а. Хэдэн долоо хоногтой байхад нь \_\_\_\_\_
  - б. Хэдэн сартай байхад нь \_\_\_\_\_
  - в. Хэзээ ч өдөр бүр тогтмол хооллож байгаагүй
  - г. Мэдэхгүй байна
  - д. Хариулахаас татгалзаж байна
8. Та хүүхдээ анх хэзээнээс эхлэн мах, ногоо, жимс буюу үр тарианы бүтээгдэхүүнээр (үүнд хөхний сүүнээс бусад хоол хүнс хамаарна) өдөр бүр тогтмол хооллож эхэлсэн бэ?
- а. Хэдэн долоо хоногтой байхад нь \_\_\_\_\_
  - б. Хэдэн сартай байхад нь \_\_\_\_\_
  - в. Хэзээ ч өдөр бүр тогтмол хооллож байгаагүй
  - г. Мэдэхгүй байна
  - д. Хариулахаас татгалзаж байна
9. Танай хүүхдийн өдөр тутамд хэрэглэх хоол хүнсийг хэн нь ихэвчлэн сонгодог вэ?
- а. Ээж нь
  - б. Аав нь
  - в. Төрсөн ах эгч нь (эгч/ах)
  - г. Нагац/авга эгч нь
  - д. Нагац/авга ах нь
  - е. Эмээ нь
  - ё. Өвөө нь
  - ж. Бусад: \_\_\_\_\_
  - з. Энэ хариуцлагыг бусадтай хуваалцана
  - и. Мэдэхгүй байна
  - й. Хариулахаас татгалзаж байна

10. Та хүүхдээ дэлгүүрээс худалдан авсан, хүүхдэд зориулан шилэнд савалсан жимс/ногооны нухашаар өмнө нь хооллож байсан уу?

а. Үгүй

б. Тийм (Хэрэв тийм бол, үүнийг яг хэзээнээс эхлэн өдөр бүр тогтмол өгч эхэлсэн бэ?)

\_\_\_долоо хоногтой байхад нь буюу \_\_\_сартай байхад нь \_\_\_Мэдэхгүй байна)

в. Мэдэхгүй байна

г. Хариулахаас татгалзаж байна

11. Та хүүхэддээ 0-1 настай байхад нь ямар нэгэн төрлийн амин дэм, эрдэс болон бусад хоол тэжээлийн буюу ургамлын нэмэлт тэжээл өгч байсан уу?

а. Үгүй

б. Тийм (Хэрэв тийм бол, тухайн нэмэлт тэжээл/үүдийн нэрийг нь энд бичнэ  
үү?\_\_\_\_\_

\_\_\_\_\_

в. Мэдэхгүй байна

г. Хариулахаас татгалзаж байна

12. Та хүүхэддээ нэг нас хүртэл нь ямар хоол хүнс өгдөг байсан бэ? Сайтар санан аль болохоор олон зүйлийг нэрлэхийг хичээнэ үү! Тухайн хоолны төрөл зүйл бүрийг ямар давтамжтай өгдөг байсныг тодотгохын тулд ард нь хаалтан дотор өдөр бүр, долоо хоног бүр гэх мэтээр бичнэ үү!

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Таны өөрийн 0-1 насны хүүхдийн нэг өдрийн хоол хүнсний хэрэглээ буюу түүнд нэг өдөрт ямар ямар хоол хүнс өгдөг талаараа бичнэ үү! Аль болох дэлгэрэнгүй бичнэ үү!

## VITA

JULIE F. TATE

Personal Data:	Date of Birth: October 28, 1984
	Place of Birth: Kingsport, Tennessee
	Marital Status: Single
Education:	Public Schools, Sullivan County, Tennessee
	B.S. Nutrition and Foods and B.B.A Accounting, East Tennessee State University, Johnson City, Tennessee, 2007
	M.S. Clinical Nutrition, East Tennessee State University, Johnson City, Tennessee, 2011
Professional Experience:	Peace Corps Health Specialist Volunteer; Sainshand, Dornogobi Health Department; Mongolia 2009-20011
	Graduate Assistant, East Tennessee State University, School of Graduate Studies, 2007-2009
	Dietetic Intern, East Tennessee State University, 2007-2008
Honors and Awards:	Frankye B. Poole, Professional Award, 2007