



ESSENTIAL MICRONUTRIENTS

How do Micronutrients Impact Life and Health?

	Immune Deficiency More vulnerable to illness and death from serious infections - pneumonia, diarrhea, malaria, measles, TB, HIV "Nutritional AIDS"	Nutritional Anemia	Mental / Neurological Disease or Delay	Bleeding	Growth Stunting Slow healing and poor tissue	Nutritional Blindness	Noma Oral tissues, immunity	Birth Defects	Beriberi	Pellagra	Bone Weakness Rickets / Osteoporosis	Thyroid Disease Hypothyroidism / Goiter	Scurvy
A: Retinol	◆	◆			◆	◆	◆	◆					
B1: Thiamin		◆					◆	◆	◆				
B2: Riboflavin	◆	◆			◆		◆	◆		◆			
B3: Niacin	◆	◆	◆				◆	◆		◆			
B5: Pantothenic Acid		◆	◆										
B6: Pyridoxine		◆						◆		◆			
B9: Folic Acid	◆	◆					◆	◆					
B12: Cyanocobalamin		◆	◆	◆	◆		◆	◆					
C: Ascorbic Acid	◆			◆	◆		◆	◆					◆
D3: Calciferol	◆			◆	◆		◆				◆		
E: Tocopherol	◆	◆	◆		◆								
H: Biotin								◆					
K: Phylloquinone				◆	◆		◆				◆		
Iron	◆	◆	◆					◆		◆			
Iodine			◆		◆			◆				◆	
Selenium	◆	◆			◆		◆					◆	
Copper		◆						◆		◆	◆	◆	
Zinc	◆	◆	◆		◆	◆	◆						

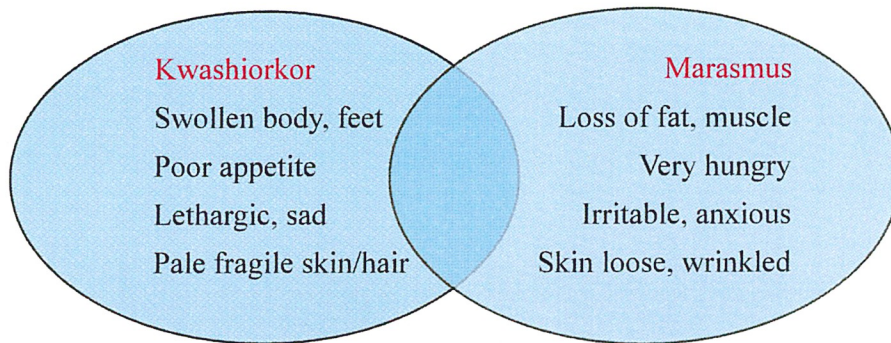
Disease caused by deficiency of more than one micronutrient are best prevented/treated by replenishing all necessary nutrients.

Other micronutrients that are not usually associated with a specific deficiency disease include three essential minerals: Chromium which is involved in metabolism; Manganese which plays a role in wound healing, cartilage and bone development, acts as an antioxidant and activates important enzymes; Molybdenum which is involved in many enzyme pathways.



ACUTE MALNUTRITION

Children who are suffering from extreme nutritional deficiency may fall into one or two distinct types, or may overlap both:



Kwashiorkor	Marasmus
Age usually over 18 months	Usually under 1 year old
Lacks protein-rich foods and other nutrients	Lacks energy-rich foods and other nutrients
Relatively more often in tropical countries	Often in dry climate/drought/disaster/war
“Wet” malnutrition, but may also be wasted	“Dry” malnutrition, but may have edema
Any edema means SEVERE malnutrition. Child is not “fat”	May be classified as moderate or severe
Swollen belly from fatty liver, edema and/or parasites	May have swollen belly from parasites or weak muscles

These children are in grave immediate danger, and require urgent nutritional rehabilitation. However, most children who die from malnutrition will not appear obviously ill with kwashiorkor and/or marasmus. Deadly “Hidden Hunger”, or micronutrient malnutrition, is found in growth stunted infants and children. Community-wide interventions are required to improve the survival rates of those chronically malnourished children who actually represent a much higher percentage of the vulnerable population.



Intestinal parasites, also called "Soil transmitted helminthes" are the most common infection worldwide. The prevalence rates of intestinal parasite infections in some resource poor communities can be over 90%. An estimated 2 billion people are infected with worms, and 300 million suffer severe impairments because of high worm burdens. Intestinal parasites are caused by environmental contamination by human and animal waste.

The three most common agents worldwide, with the descriptions of patterns of behavior:

- *Ascaris the large roundworm with a voracious appetite for calories and vitamins.*
- *Hookworm the parasite that attaches itself to the intestinal lining and dines on the blood of its victim.*
- *Whipworm, the one which attaches to the rectum, causing prolapse and bleeding*

Intestinal parasites are a major contributor to morbidity and mortality in developing countries, predisposing the host to:

- *Anemia.*
- *Malnutrition.*
- *Impairment of physical growth - both stunting and wasting.*
- *Poor intellectual development.*

Deworming promotes child survival. Therefore, national level deworming campaigns have become standard in many developing countries. One tablet of deworming medicine, usually Albendazole, at a cost of \$.02, is given every 6 months according to standardized protocols. It is easy, effective in controlling the worm burden, and usually very well accepted on the community level.





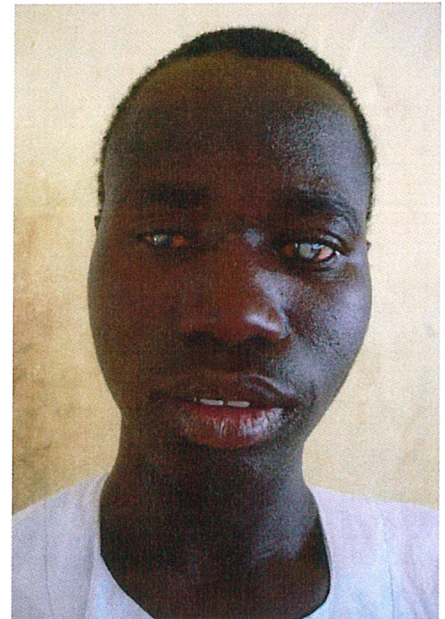
Vitamin A Deficiency (VAD) is a serious public health problem in many developing countries. It affects millions of women and children worldwide and is the leading cause of preventable blindness in children. About 250,000 to 500,000 children become blind every year due to VAD and half of those children die within a year of becoming blind.

Vitamin A is Essential for Optimal Health, Growth, and Development

In children, VAD compromises the immune system, increasing the risk of severe illness and death from serious infectious diseases such as diarrhea, pneumonia, measles, and malaria. Also, vitamin A plays a major role in the maturation of cells, tissues and organ systems. Therefore, lack of vitamin A leads to poor tissue integrity which results in lack of growth, slow healing, and weak barriers to invading microorganisms. Thus VAD It is a major cause of child mortality and blindness in the developing world. Improving the vitamin A status of young children in developing countries can reduce child death rates up to 50%.

More Action for Vitamin A Supplementation

Vitamin A supplementation is a high priority in Child Survival programs. Major progress has been made in combating VAD in many developing countries, but more urgent action is needed to accelerate the efforts to bring it under control. A quarter of the world's vitamin A deficient children live in Africa, with greatest number of children affected living in the Sahel, including Nigeria. In large areas of this region, vitamin A supplementation programs have not reached the most vulnerable children.



The mega-dose capsules are inexpensive, and supplied by UNICEF for mass distribution campaigns. The International Protocols are widely used, standardized, and have been proven to be safe and well tolerated.

The norms are easily implemented and integrated into other Child Health activities such as deworming and immunization campaigns. High dose vitamin A has also been shown to play a role decreasing mortality in life threatening infectious diseases such as measles, and can even prevent blindness in cases of vitamin A deficiency eye disease, even in many advanced cases, if given before irreversible damage occurs.



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The Importance of Breastfeeding

Exclusive breastfeeding for the first six months of a child's life promotes health in infants is the best and most cost-effective intervention to provide newborns with the nutrients they need. Every mother should follow the guidelines:

- Breastfeeding should start **immediately** at birth to get the benefit of colostrum
- **Exclusive** breastfeeding is to be practiced: No sugar water, tea or cereal for six months to avoid ingestion of microbes
- **Continue** breastfeeding for 24 months
- **Wean** to nutritious foods

Unfortunately, mothers in developing countries often choose not to breastfeed their children, or wean them too early. This denies them of the essential nutrients and antibodies they need for survival. Recent studies show that barely one in three infants is exclusively breastfed during the first 6 months of life, and up to 55% of annual infant deaths from diarrheal disease and acute respiratory infections may be the result of inappropriate feeding practices.



If breastfeeding is not practiced or an infant is weaned too early, they are in turn fed complementary foods which lack nutrition and sufficient energy for growth and development. Health officials from the Pan American Health Organization affirm that complementary feeding practices are frequently ill-timed, inappropriate and unsafe.

Reaching Full Human Potential



Adequate nutrition in the first year of life is a key factor for infants to better develop their full human potential. Infants who receive adequate nutrients during the first year of life achieve optimal growth and brain development. Failure to nourish an infant properly can lead to permanent developmental problems. It is therefore imperative to stimulate optimal support conditions for all mothers while highlighting the fundamental benefits of breastfeeding for the health of both mothers and newborns.

Efforts to increase exclusive breastfeeding must be made. Educating mothers at the time of birth about breastfeeding while ridding developing nations of breastfeeding stigma must be a top priority to ensure a healthy population.



CHILD SURVIVAL FACTS SHEETS

GROWTH MONITORING

Children need to be weighed and measured regularly from birth to adulthood, while parents need to understand the results and learn what action to take.

Likewise, growth data of populations of children must be readily available to health authorities and policy makers so that the nutritional needs of children for whom they are responsible can be addressed by public health interventions. In order for growth monitoring data to promote child survival, it must be:

- **Accurate**
- **Correctly interpreted and understood**
- **Acted upon!**

In 2007, the World Health Organization released new International Child Growth Standards for children ages 0-19 **which apply to all populations.** The WHO states that the growth standards “depict normal childhood growth under optimal environmental conditions and can be used to assess children everywhere, regardless of ethnicity, socio-economic status and type of feeding.”

Practical Application

Understanding the science of “Anthropometry” and using the growth charts to assess children can be complicated for mothers, volunteers, and even Health Workers and other professionals. Therefore, MAMA Project created tools and systems, including easy to use interpretation charts to facilitate the application of these standards. The information gained and rapidly interpreted can help child survival efforts by helping to focus community-based nutritional rehabilitation efforts.



The basic data utilized when possible are accurate age, weight, length or height mid upper arm circumference, and, for women and children 5-19, Body Mass Index.

What tools can be used to monitor growth?

- **Lap Infantometer:** While mother holds young child, Health Worker measures length and gives instant interpretation with either congratulations or counsel on steps to take for growth faltering.
- **Health Flagpole:** Child age 2-19 steps on scale, then stands at flagpole. From the charts, the mother can be told immediately if her child is normal or acutely or chronically malnourished and to what severity.
- **Nutrition Ruler:** Children 12-60 months, can be screened for malnutrition and women of child-bearing age for higher maternity risk.



CHILD SURVIVAL KIT

Tools and supplies for Primary Care Health Workers:

- Family Health History cards
- Vitamin A Capsules
- Zinc-Enriched Dentifrice
- Essential Micronutrients for prevention and treatment of malnutrition
- Amoxicillin and Metronidazole for timely treatment of infections
- Albendazole for intestinal parasite control
- Work and Supply Logs / Reference Guidelines / Educational Materials
- Weighing scale
- Lap Infantometer for length of infants
- Health Flagpole for height after 24 months
- Mid Upper Arm Circumference tapes



The Primary Care Health Worker, with the assistance of village health workers, traditional healers, midwives and other volunteers, is responsible for the health of the most vulnerable members of the community. These materials facilitate their work, particularly vigilance of nutritional status of women and children, early detection and appropriate management of life threatening conditions including noma and nutritional blindness.

*Resourcing those who are the pillars of Community Primary Care
is crucial to the cause of child survival*



READY TO USE THERAPEUTIC FOOD (RUTF)

Widespread malnutrition is causing maternal and child illness, disability and death in many parts of the world. The Sahel region of Africa is one of the most critical areas.

Food supplementation programs using manufactured and imported therapeutic foods such as nutritious enriched biscuits or pastes have become an important part of community-based nutritional rehabilitation programs that are positively impacting the health of many populations at risk. But most communities that would benefit from inclusion in "RUTF" programs are not receiving these services.

Fortified nutritious foods that meet the World Health Organization guidelines for the recommended caloric, fat, protein and micronutrient composition of "RUTF" can be produced in rural agricultural villages out of foods that are readily available, and can be used to treat cases of malnutrition detected by surveillance growth monitoring activities.

UNIVERSAL Micronutrient Home Food Fortification goes a step further to prevention of malnutrition by promoting supplemental fortified food for every woman and child at risk for under nutrition, not just those already suffering from malnutrition.

"*Nora Lynne*[™] **ESSENTIAL MICRONUTRIENTS**"* was formulated and is being introduced for this use. As an example, the following egg and oil mixture recipe creates a nutritious fortified food that can be consumed daily in every household, by every woman and child. It would also be an improved weaning food, ideally after 6 months of exclusive breast feeding, and/or recommended as part of nutritional rehabilitation 1-3 times per day depending upon state of nutrition.



Recipe: 1. Boil and mash one chicken egg.

2. Mix with 2 teaspoons of oil (red palm is best) per egg.

3. Sprinkle mixture with iodized salt and one scoop (.15cc) of "*Nora Lynne*[™] **ESSENTIAL MICRONUTRIENTS**".

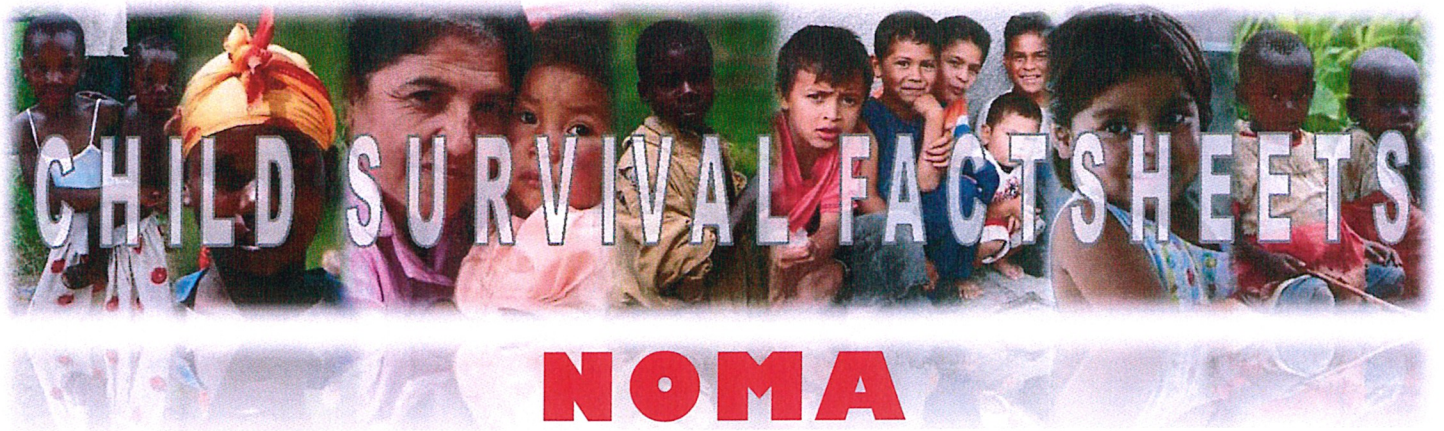
*Formula modified for micronutrient mineral and vitamin needs of malnourished women and children in Sub Saharan Africa, based on fortification formula used by MAMA Project in Honduras, in the Super Cookie being consumed by child pictured above.



World Health Organization (WHO) Immunization Schedule in Nigeria:

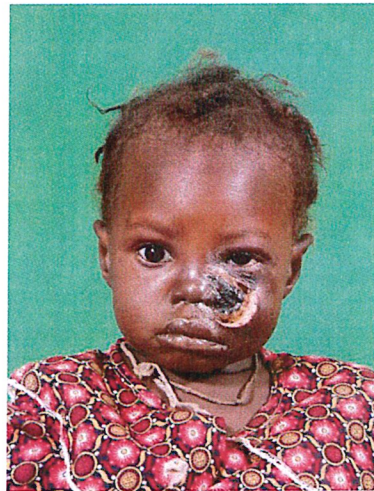
Vaccine	Age of Vaccination	Cost of Vaccine (WHO/UNICEF 2002)	Description of the Infectious Disease
BCG (Tuberculosis)	Birth	7 cents	Airborne. Usually causes pulmonary infection, but can spread to many other organs, causing serious illness, death and disability. An untreated person with active TB disease can infect on average between 10 and 15 people every year. In 2005, 30% of global incidence of TB occurred in Africa amounting over 2.5 million new infections. (WHO)
DTwP (Pertussis / Whooping Cough)	6, 10, 14 weeks	7 cents	Pertussis, or whooping cough, is a disease of the respiratory tract caused by bacteria that live in the mouth, nose, and throat. Many children who contract pertussis have coughing spells that last four to eight weeks. Very dangerous in infants. In 2000, approximately 39 million new cases emerged and the disease claimed 297,000 lives worldwide. (WHO) Diphtheria: an upper respiratory tract infection with throat swelling and an adherent membrane that can cause death by asphyxiation. Tetanus-see below
Hepatitis B	Birth; 10, 16 weeks	32-90 cents	Hepatitis B is a potentially life-threatening liver infection caused by the hepatitis B virus. It is a major global health problem and the most serious type of viral hepatitis. It can cause chronic liver disease and puts people at high risk of death from cirrhosis of the liver and liver cancer. Worldwide, an estimated two billion people have been infected with the hepatitis B virus (HBV), and more than 350 million have chronic (long-term) liver infections. A vaccine against hepatitis B has been available since 1982. Hepatitis B vaccine is 95% effective in preventing HBV infection and its chronic consequences, and is the first vaccine against a major human cancer. (WHO)
Measles	9 months	14 cents	Measles is a highly contagious, serious disease caused by a virus. It remains a leading cause of death among young children globally, despite the availability of a safe and effective vaccine. An estimated 197 000 people died from measles in 2007, mostly children under the age of five. It is a common precursor of nutritional blindness and noma.
Meningitis	High-risk groups	40 cents	Meningitis is an infection of the meninges, the thin lining that surrounds the brain and the spinal cord. Several different bacteria can cause meningitis and Neisseria meningitidis is one of the most important (WHO)
OPV (Polio)	Birth; 6, 10, 16 weeks	10 cents	Mainly affects children under five years of age. One in 200 infections leads to irreversible paralysis. Among those paralyzed, 5% to 10% die when their breathing muscles become immobilized. Persistent pockets of polio transmission in India, northern Nigeria and Afghanistan and Pakistan are key epidemiological challenges. (WHO)
TT (Tetanus toxoid)	1st contact pregnancy; TT2 +6 months after; TT3 +1 year after	7 cents	Tetanus is caused by the bacterium Clostridium tetani, the spores of which are widespread in the environment. The disease is caused by the action of a neurotoxin, produced by the bacteria when they grow in the absence of oxygen, e.g. in dirty wounds or in the umbilical cord if it is cut with a non-sterile instrument. Tetanus is characterized by muscle spasms, initially in the jaw muscles. As the disease progresses, mild stimuli may trigger generalized tetanic seizure-like activity, which contributes to serious complications and eventually death unless supportive treatment is given. Tetanus can be prevented by the administration of tetanus toxoid, which induces specific antitoxins. To prevent maternal and neonatal tetanus, tetanus toxoid needs to be given to the mother before or during pregnancy, and clean delivery and cord care needs to be ensured. (WHO)
Yellow Fever	9 months	12-25 cents	Yellow fever is a viral disease, found in tropical regions of Africa and the Americas. . There is no specific treatment for yellow fever. Vaccination is highly recommended as a preventive measure for travellers to, and people living in, endemic countries.

Vaccine preventable diseases account for approximately 22% of child deaths in Nigeria, amounting to over 200,000 deaths per year. International donor communities have recognized the need for control of childhood illnesses and polio eradication, creating an opportune time to control vaccine preventable illnesses in the region. Resistance to polio vaccine is reportedly persisting in some regions, however some recent reports suggest that in some communities there is a greater felt need for prevention of diseases that are far more common in the communities, such as measles, malaria and meningitis. This suggests that an integrated and permanent system for delivery of routine vaccination services may be more acceptable to some sectors of the populations that have resisted polio eradication efforts.



Noma (Cancrum oris):

- Is an opportunistic infection that occurs in children with immune systems compromised by malnutrition
- Starts as a mouth ulcer which if untreated in the early stage can rapidly penetrate and destroy soft tissues and bones of the face, permanently ravaging features, and leaving the child grotesquely disfigured
- Claims 140,000 children/year, mostly in the African Sahel, 70-90% of whom die



Predisposing factors:

- Chronic micronutrient malnutrition beginning before birth
- Lack of exclusive breast feeding in the first six months
- Poor oral hygiene
- Household exposure to livestock
- Fecal contamination of food and water
- Lack of timely access to medical care
- Extreme poverty

What can be done to prevent noma:

Micronutrient nutrition: Universal home food fortification for all women and children, to treat and prevent deficiency of essential micronutrients are known to be associated with noma and immune deficiency, oral lesions and poor healing.

Oral hygiene: A simple zinc enriched dentifrice used with a traditional chewing stick can promote oral health.

Immunizations: Especially measles vaccination, since noma usually follows measles, but also malaria and other diseases that cause overwhelming infection in malnourished children

Sanitary and nutrition practices: Community education for promotion of: Exclusive breast feeding for 6 months, better infant weaning practices, incorporation of locally available nutritious foods such as eggs and oil into the diet of young children, and food and water sanitation.

Deworming and Vitamin A Capsule distribution: Child survival interventions that have had good impact on maternal and child health in many developing countries.

Improved access at the village level to early detection and treatment of noma: Health workers in close proximity to children at risk for noma must have a dependable supply of curative medicines to prevent the progression of early noma lesions to irreversible gangrene and permanent loss of facial features.

Eradication of poverty: Interventions that improve maternal and child health will help to break the vicious cycle of poverty, improving the intellectual and physical potential of mothers and their children who represent the hope of the next generation.

Treatment for noma: Oral antibiotics must be started immediately in the earliest stage of noma, when there is viable tissue to be saved. Any delay in treatment increases the risk of loss facial features and death. While transportation to the hospital is being arranged, attention to oral hygiene, fluids, and nutrition must begin.



CHILD SURVIVAL FACT SHEETS

INFORMATION FOR DONORS

- **Essential Micronutrients:** Widespread malnutrition is causing maternal and child illness, disability and death in many parts of the world. MAMA Project's "*Nora Lynne*[™] ESSENTIAL MICRONUTRIENTS" can make a lifesaving difference for women and children for about \$.01 per day.
- **Deworming the community** costs less than \$.04 per person per year. MAMA is deworming millions of children and adults annually.
- **Teaching Health, Training Volunteer and Primary Care Health Workers to save lives:** To train and equip people to care for families at risk costs \$749 per village
- **Vitamin A Capsules are life and sight saving.** Cost is less than \$.04 per year and may be donated.
- **Noma Eradication is a priority for Child Survival.** Noma is a marker for conditions that kill children. Survival will require a coordinated effort to bring education and resources to many villages at risk.
- **Containers of donated lifesaving medicines and supplies** are shipped regularly by MAMA to support our work. The costs per container usually total over \$8,000.



MAMA Project, Inc. is a 501(c)3 non-profit organization.
Contributions are tax-deductible.



FAMILY POULTRY FLOCKS

Q: Why promote family **poultry** flocks?

A: Eggs are an ideal source of the **nutrients** that children need to **survive** and be **healthy**

Q: What poultry is MAMA Project focusing on?

A: GUINEA FOWL!



Important poultry traits to consider in rural communities:	Guinea	Chicken
Highly resistant to common poultry diseases	*	
Diet mostly composed of insects	*	
Excellent alarm for protection and warning of intruders	*	
Require little care or feeding after 1st two weeks of age	*	
Control mice, rats, snakes and disease carrying insects	*	
Good mother		*

Q: Who may receive guineas?

A: Families from target **communities** with **high** levels of childhood **malnutrition**

Q: When does a family get young guineas to begin their flock?

A: After receiving **training, building** a shelter, **and promising** to share the first offspring

Q: Where will training occur?

A: In our **Center** and in **communities** that commit to working together for vulnerable children

Q: How will the project **function**?

A: MAMA Project raise day old **Guinea keets** for 2 weeks, **then distribute** to trained families

Combined with nutrition education, promotion of home food fortification, deworming, Vitamin A distribution, and the ongoing Child Survival training that MAMA is doing in Honduras, we hope that this effort will make a positive impact. The Family Poultry Flocks initiative is being financed by donations to cover training, purchase of guinea keets, transportation, and feeding in our Center. An adult guinea fowl in Honduras sells for \$30. We calculate that the cost for each young guinea delivered to the village will be less. Each household will start with a small starter flock and increase their numbers by putting eggs under brooding hens who will adopt and raise guineas.

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