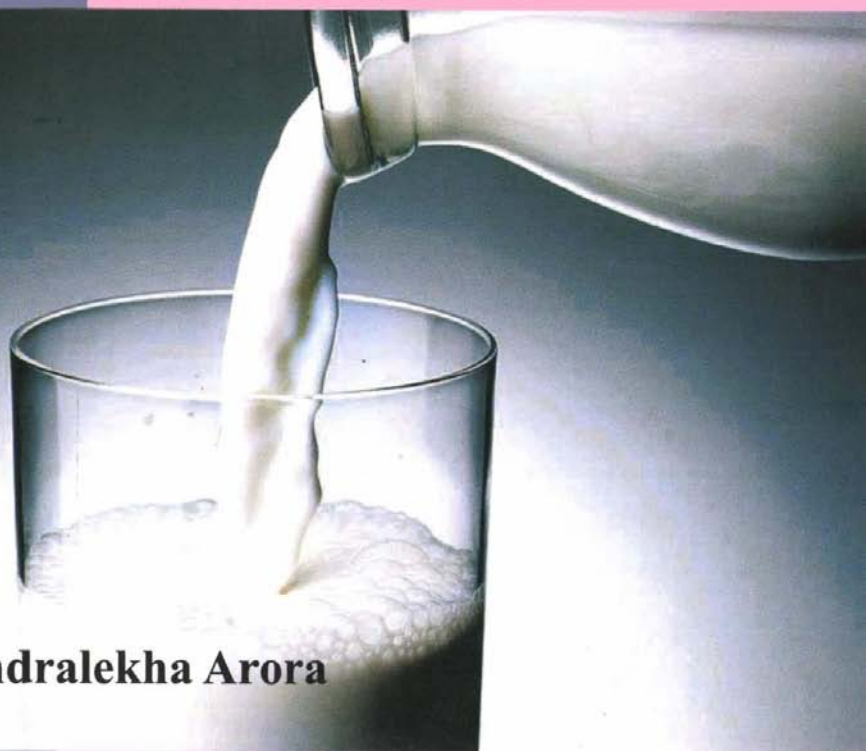


Child Nutrition



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Understanding Child Nutrition

Proper nutrition in childhood can reinforce lifelong eating habits that contribute to your children's overall well-being and help them to grow up to their full potential and a healthy life. Unfortunately, some parents over-think what to do about their child's eating habits, which give way to practices like forcing kids to clean their plates. And some parents don't think about nutrition at all, letting their kids eat a lot of junk food and drink a lot of juice. So, it's important to find a balance.

In addition to contributing to the current childhood obesity epidemic, kids who don't have healthy diets as young children are likely to continue to make unhealthy choices as teens and adults. Taking some time to understand the basics of child nutrition can help you avoid common mistakes, make healthy choices, learn about new things, like probiotics, and teach your kids healthy eating habits.

Healthy nutrition takes many forms and is understood differently in different countries and cultures. In general, healthy nutrition should be an integral part of daily life that contributes to the physiological, mental and social well-being of individuals. It is the combined effect of the food we consume, our health status, and the care we take in meeting the health needs of ourselves and others. Nutritional well-being is established by consuming safe

foods as part of a balanced diet that contains adequate amounts of nutrients in relation to bodily requirements.

Malnutrition is any physical condition resulting either from an inappropriate diet or from a physical inability to absorb or metabolize nutrients. Malnutrition includes:

- *over-nutrition*: more food energy is consumed than expended, resulting in excess body fat; and
- *under-nutrition*: not enough total food energy and nutrients are consumed, resulting in low body weight and/or nutrient deficiencies.

Malnutrition can be related to various factors, such as poverty, infections which lead to poor appetite, and lack of access to food, sanitation and/or health services. Malnutrition negatively affects quality of life and learning and can cause death and disease.

FEEDING YOUR BABY

There are still a lot of decisions to make later on though, including:

- when to start rice cereal
- baby food next steps, including other types of baby cereal and baby foods, such as vegetables and fruits
- feeding homemade baby food vs. store bought baby food
- when to give your baby water and juice
- starting finger foods, such as Zwieback toast, Cheerios, and veggie puffs and then table foods
- switching to whole milk

Understanding the Toddler Diet

Feeding a toddler can be frustrating. You may go from having an infant who eats a large variety of vegetables and fruits and three big meals a day, to a toddler who is a much more picky eater and eats much less. Surprisingly to many

parents, that can be very normal — as long as their toddler is gaining weight and growing and developing normally, and isn't filling up on milk and juice. In fact, many toddlers simply eat one good meal each day, and then just pick at their other meals.

Your toddler's diet will likely be made up of about 16 to 24 ounces of milk (low fat milk once your child is 2 years old) and 4 to 6 ounces of juice, and be eating 2 snacks and 2 to 3 meals.

Even though your toddler may be a picky eater now or even go on binges where he will only want to eat a certain food, you should continue to offer a variety of foods. This includes small amounts of fruits and vegetables, as he may eventually try them if he isn't pressured or forced into eating them.

Remember that this is a period in your child's development where he is not growing very fast and doesn't need a lot of calories. Also, most children do not eat a balanced diet each and every day, but over the course of a week or so, their diet will usually be well balanced.

Parents often worry that their kids don't get enough vitamins, minerals, and other nutrients from the foods they are eating. This often leads to their kids getting vitamins and other supplements.

Many parents have a very hard time getting their kids to eat few if any vegetables on a regular basis. Most experts advise that you can often get kids to eat more veggies if you start early by offering your older infant and toddler a large variety of vegetables, set a good example by eating vegetables yourself, offering a lot of choices, and mixing vegetables into a food that your child already likes.

Getting kids to eat fruits is often a little easier, but are your kids eating enough fruits each day? Do you know how many servings of fruits your kids should be eating each day? The food pyramid is a good place to learn. For

example, a 3-year-old male who is fairly active should eat 1.5 cups of vegetables and 1.5 cups of fruits each day. If you consider that 1/2 of a large apple or 1 large banana is equal to a cup of fruit, then it shouldn't be too hard to get your kids enough fruit each day.

Food labels provide nutrition facts and information about the foods that your family eats. From the amount of calories, fiber, and total fat grams, to the food's ingredients, the food label is your key to the nutrition information in the foods you provide to your family.

Proper child nutrition should usually include eating three meals a day and two nutritious snacks, limiting high-sugar and high-fat foods, eating fruits, vegetables, lean meats and low-fat dairy products, including 3 servings of milk, cheese or yogurt to meet your child's calcium needs. These healthy practices can also prevent many medical problems, including becoming overweight, developing weak bones, and developing diabetes. It will also help ensure that your child physically grows to his full potential.

Healthy Snacks for Kids

In addition to their three regular meals, kids often get quite a few calories from the snacks they eat throughout the day. Unfortunately, for too many kids, that means a lot of extra calories, sugar, and fat. In addition to increasing the risks of childhood obesity, snacks that aren't healthy can put your kids at risk for cavities, especially if they are eating sticky foods like fruit snacks or candy.

Snacks can be a good part of your child's diet, though, including low-calorie snacks and low-fat snacks like fresh fruit.

In addition to fresh fruit, which are often high in fiber and Vitamin C, low in fat, and have no added sugar, other healthy snacks that are quick and easy for kids to eat can include:

- fresh fruit, such as apples, bananas, grapes, oranges, strawberries, watermelon, etc.
- dried fruits, including raisins and prunes, although these are considered sticky foods that can put kids at increased risk for cavities, so consider having your kids brush and floss after eating
- fruit cups or canned fruit in water, 100% fruit juice or light syrup
- raw vegetables, including carrots, celery, or broccoli, that can be served with a low-fat dip or dressing
- dairy products, such as low-fat cheese, yogurt, and pudding, or a homemade fruit smoothie
- whole grain snacks, which can include some breakfast cereals, crackers, cereal bars, baked chips, and popcorn (without added butter), or pretzels
- popsicles made with 100% fruit juice

Although not low in fat or calories, nuts and trail mix can also be considered a healthy snack from if a child is only given a single serving and it is not eaten on a daily basis.

What your child has to drink when he snacks can also be important. Many kids drink juice, tea, soda, or fruit drinks when they have their daily snack, which can greatly increase the amount of calories they are getting at snack time. Instead, limit your child to drinking water, low-fat or fat-free milk, and 100% fruit juice.

Unhealthy Snacks Habits

In addition to getting snacks with a lot of sugar and fat, getting too many snacks or snack serving sizes that are simply too large are habits that are unhealthy for kids.

You can avoid most unhealthy snack habits by:

- not letting your kids eat unhealthy snacks, including high-fat snacks and high-calorie snacks, except as an

occasional treat. These can include cookies, chips, candy, doughnuts, fruit drinks, soda, etc.

- having a regular snack time for your kids — usually late morning and early afternoon for toddlers and preschoolers and just after-school for older kids. Keep in mind that most kids shouldn't need a bedtime snack though.
- having nutritious snacks handy and ready for your kids to eat
- limiting snacks to just 100 to 150 calorie servings so that they don't turn into an extra meal
- not allowing snacks to be too close to lunch or dinner

If you do nothing else, at least monitor the serving size of your child's snacks, especially if you give your child prepackaged snack foods. For example, if your child's after-school snack consists of Oreo cookies, keep in mind that it takes just three Oreos to 160 calories and a lot of extra fat and sugar in his diet. And if he eats six or nine Oreo cookies, that quickly adds up to an extra meal — and not a very healthy meal, either.

Children and High Fat Foods

Parents are getting used to the idea that there are certain foods they should encourage their kids to eat and others that they should avoid.

Among the foods that are usually considered to be a part of a healthy diet:

- foods that are low in fat, saturated fat, and cholesterol
- high-fiber foods, including whole grain foods, vegetables and fruits
- foods that have only a moderate amount of sugar and salt
- calcium-rich foods, to meet a child's daily calcium requirements

- iron-rich foods, to meet a child's daily requirements for iron

Of course, kids should also avoid a lot of high-fat foods and high-calorie foods. Kids do need some fat in their diet, but in general, only about 30% of a child's daily calories should come from fat — most of which should be unsaturated fat.

Food labels and the % Daily Value are based on the nutritional needs of adults, so that absolute number of fat grams that the average adult requires each day, which is about 65g, is more than that for a five year old who only needs about 1400 calories and 45g of fat each day. You can still use the food label and % Daily Value for fat as a guide when choose low fat foods for your kids though.

High-Fat Foods

Parents are often told to choose low-fat foods, but it may be easier to avoid some of the popular high-fat foods that your kids are likely already eating. A good next step would be to learn how to recognize foods that are high or low in fat. Read food labels, and begin to choose those foods that are lower in fat.

In general, a food that is high in total fat will have 13g or 20% Daily Value (or daily requirements) of fat per serving or more. On the other hand, a low-fat food will usually have about 3g or 5% Daily Value of fat per serving or less.

Common high-fat foods, which you can look for lower fat alternatives for or only eat in moderation, include:

- Chocolate candies
- Trail mix (especially varieties containing chocolate chips)
- Cheese sauce
- Ricotta cheese made with whole or part skim milk
- Chicken pot pie

- Pie (pecan, cherry, chocolate creme, for example)
- Condensed milk (sweetened)
- Homemade white sauce
- Ribs
- Macadamia nuts, pecans and cashews
- Potato salad
- Au Gratin potatoes
- Hash brown potatoes
- Cheesecake
- Spinach souffle
- Baked beans with franks

Beef, pork, lamb, turkey, and chicken can also have a lot of fat, although that can be reduced if you trim off visible fat before preparing and serving them. Also, instead of serving them fried or with extra breading — which will increase the fat content of the meal — serve them broiled, grilled, boiled, or roasted.

The United States Department of Agriculture (USDA) offers some additional tips to help you choose low-fat meats and poultry:

- Buy the leanest beef cuts (which will have the least amount of fat), including round steaks and roasts (round eye, top round, bottom round, round tip), top loin, top sirloin, chuck shoulder and arm roasts.
- Cook the leanest pork choices, including pork loin, pork tenderloin, center loin, and ham.
- Choose ground beef that is at least 90% lean.
- Either buy skinless chicken parts or remove the skin before cooking and serving.
- Give your kids lean turkey, roast beef, ham, or other low-fat luncheon meats, keeping in mind that regular bologna and salami can have more fat.

High-Fat Fast Foods

It shouldn't be a surprise that many high-fat foods are fast foods. In fact, 33% of the USDA's top 100 high-fat foods are fast foods. Some include:

- Egg and sausage biscuits
- Double meat hamburgers and cheeseburgers
- Tacos
- Chicken fillet sandwiches
- French fries
- Milk shakes
- Fish sandwich with cheese
- Croissant, with egg, cheese, and bacon
- Tuna salad submarine sandwich
- French toast sticks
- Chicken pieces (fried nuggets or strips)
- Nachos
- Corndogs
- Enchiladas
- Cold cuts submarine sandwich
- Onion rings

Of course, the amount of fat and calories your kids consume when they sit down to fast food is going to depend on the serving sizes they are eating. For example, a 12 oz Vanilla Triple Thick Shake at McDonald's has 10g of fat and 420 calories. On the other hand, a 32 oz version has 26g of fat (41% Daily Value) and 1110 calories, which is almost half the fat and two-thirds of the calories that most older children need all day long.

Similarly, a small order of french fries at McDonald's has 13g of fat (20% Daily Value) and 250 calories. If you up-size that to a large order, you will increase the fat to 30g (47% Daily Value) and calories to 570.

It's clear from the above examples that a child could get almost all of the fat she needs for the day (and then some) just from a large order of french fries and a large shake. That makes it important to read the fast food nutrition facts at your favorite fast food restaurants and learn to choose low-fat foods, even if you're out to eat.

Limiting fast food all together can also be a good idea to help limit your child's intake of high-fat foods.

Low Fat Foods

Although most kids get too much fat in their diets, there is one age group of kids for which you shouldn't limit fat intake — infants and toddlers under age two years. These children are still growing and need more fat in their diet than older kids. That doesn't mean that you have to go out of your way to give your 18 month old French fries or have to avoid naturally low-fat foods, including most fruits and vegetables, but they shouldn't drink low-fat milk, eat commercially made fat-free foods, or be put on a low fat diet.

As you learn to avoid high-fat foods for all other children, it is just as important to learn to choose low-fat foods as part of your family's healthy diet.

It is often easy to choose low-fat foods, many clues are on the food label when a food is low, including nutrition claims that the food is:

- fat free (less than 0.5g of fat per serving)
- low fat (less than 3g of fat per serving)
- lean (less than 10g of fat per serving and 4.5g of saturated fat)
- extra lean (less than 5g of fat per serving and 2g of saturated fat)

Nutrition claims that are less helpful when choosing low-fat foods include the terms reduced, less, and light, since

they only mean that the food has fewer calories or grams of fat than the regular version of the food.

Low-Fat Foods

Unfortunately, just because something is low in fat doesn't mean that it is low in calories. So while you want to avoid high-fat foods, you also want to avoid foods that are high in sugar and calories. Healthy low-fat foods, in addition to those that are labeled low fat or fat free, include:

- Lettuce
- Carrots
- Tomatoes
- Strawberries
- Spinach
- Egg whites
- Baked potatoes
- Grapes
- Angel food cake
- Oatmeal cookies
- Breakfast cereals (most brands)
- Watermelon
- Air-popped popcorn (without added butter)
- Light tuna fish (canned in water)
- Green peas
- Wheat bread
- Pancakes
- Beans
- Rice
- Pretzels
- Vegetable soup
- Chicken soup with rice
- Milk - 1% reduced fat and skim milk

In addition to the fruits and vegetables listed above, keep in mind that most raw fruits and vegetables, except for avocados and olives, are naturally low in fat. Hot dogs, cheese burgers, French fries, milk shakes, chicken nuggets, tacos, and many other high-fat kid's favorites.

Hidden Fats

Many low-fat foods become high fat foods when parents unknowingly add high fat or hidden fat ingredients to them, including:

- oils, which are 100% fat and should only be used in limited amounts, with an emphasis on monounsaturated and polyunsaturated oils
- butter and margarine
- cheese
- mayonnaise (1 tablespoon = 10g of fat and 90 calories)
- ranch dressing (2 tablespoons = 15g of fat and 140 calories)
- nuts

Other foods made with hydrogenated vegetable oils, palm kernel oil, or coconut oil, are likely also high in fat.

High Fiber Foods

Many children, since they don't eat a lot of fruits and vegetables and they have a relatively high fat diet, tend to have diets that are low in fiber. This can lead to unhealthy diets and one of the more common and immediate consequences - constipation.

How much fiber do kids need

According to the American Academy of Pediatrics, in their Guide to Your Child's Nutrition, "a person's daily intake of fiber should equal his or her age plus 5 grams (thus, for

a 7-year-old, $7 + 5 = 12$ grams a day) up to a maximum of 35 grams a day."

In general, good sources of fiber include many fruits, vegetables, legumes (beans), breads, and cereals. To find foods high in fiber for your family, it can help to read the nutrition label of foods to see how much fiber is in it. In general, a food that is high in fiber would have at least 5g of fiber per serving or more. Those that are good sources of fiber have at least 2.5g of fiber per server.

You can also look for these high fiber foods (they have 5g of fiber or more per serving):

- Barley
- Navy Beans
- Baked Beans
- Split Peas
- Lentils
- Wheat Flour
- Oat Bran
- Dates
- Refried Beans
- Raspberries
- Asian Pears
- Green Peas
- Kellogg's All-Bran Cereal
- Couscous, dry
- Prunes
- Kellogg's Raisin Bran Cereal
- Spinach
- Spaghetti and Meatballs
- Artichokes
- Brussels sprouts

- Progresso Healthy Classics Lentil Soup
- Shredded Wheat Cereal
- Broccoli
- Pears
- Kellogg's Frosted Mini-Wheats Cereal
- Raisins
- General Mills Total Raisin Bran cereal

Other high fiber foods include other bran cereals, bran muffins, etc.

Foods that are still pretty good sources of fiber (about 2 to 4.9g of fiber per serving), at least as compared to other foods without fiber, but not as high as the high fiber foods listed above, include:

- Mixed Vegetables
- Strawberries
- Carrots
- Potatoes (with the skin on)
- Corn
- Rice
- Figs
- General Mills Cheerios cereal
- Apples (with the skin on)
- Oranges
- Air Popped Popcorn
- Oatmeal
- Applesauce
- Tomato Soup
- Fruit Cocktail
- Graham Crackers
- Whole Wheat Bread

- General Mills Honey Nut Cheerios cereal
- Pistachio Nuts
- Peanuts
- Celery

Again, don't forget to check the nutrition label to find high fiber foods, avoid adding high fat toppings to your high fiber foods, and encourage your kids to eat their fruits, like apples, with the skin on. Foods that have some fiber, but not as much as most parents think include grapes, melons, granola bars, non-bran cereals, oatmeal cookies, lettuce, and apples without the skin on them.

Iron Rich Foods

Fortunately, iron deficiency anemia isn't as big a problem as it once was.

The use of vitamins, iron rich baby foods, and/or iron fortified baby foods have helped both breast feeding babies and babies who drink an iron fortified infant formula avoid becoming anemic from a lack of iron.

Iron deficiency is still a problem for some kids though, especially toddlers who are picky eaters and drink too much milk and not enough iron rich foods. In general, your child should eat at least two or iron rich foods each day. Knowing which foods actually have iron in them can be confusing for parents though.

Iron Rich Foods

Foods that are a good source of iron include:

- liver
- lean red meats, including beef, pork, lamb
- seafood, such as oysters, clams, tuna, salmon, and shrimp, etc.
- beans, including kidney, lima, navy, black, pinto, soy beans, and lentils

- iron fortified whole grains, including cereals, breads, rice, and pasta
- greens, including collard greens, kale, mustard greens, spinach, and turnip greens
- tofu
- vegetables, including broccoli, swiss chard, asparagus, parsley, watercress, brussel sprouts
- chicken and turkey
- blackstrap molasses
- nuts
- egg yolks
- dried fruits, such as raisins, prunes, dates and apricots

At first, unless your baby was premature or is already anemic, your baby will usually get all of the iron she needs from breast milk or an iron fortified infant formula. Once she is 4-6 months old though, she will likely begin to need some extra iron, which usually comes in the form of an iron fortified baby cereal. Later on, be sure to choose from a good variety of iron rich baby foods, which you can often find by comparing food labels and choosing foods with a high iron content. Or choose age appropriate iron rich foods when making your own baby food to make sure your infant gets enough iron.

Iron Fortified Foods

In addition to foods that naturally have a lot of iron in them, many foods are now fortified with iron or have iron added to them. This is good news, because many kids, especially younger ones don't usually like many of the best iron rich foods, such as liver, oysters, clams, and lentils.

Check food labels to find foods fortified with iron, including:

- Instant Oatmeal

- Ready-to-eat Cereals, such as Total, Product 19, Raisin Bran
- Grits
- Iron Kids Bread
- Carnation Instant Breakfast Mix
- Pasta
- Iron Fortified Toddler Formula, such as Enfamil Next Step or Similac 2

Remember that a food that provides 10-19% DV or more for a nutrient, such as iron, is usually considered to be a good source of that nutrient, so compare food labels and look for foods that have higher numbers for iron on the food label.

What You Need to Know

- Risk factors for iron deficiency include toddlers and older children who drink more than 24 ounces of milk each day and have a diet low in iron and Vitamin C.
- Vitamin C can help your body absorb iron, so it is a good idea to pair iron rich foods with foods that have a lot of Vitamin C, including citrus fruits and iron fortified orange juice.
- It is harder for the body to absorb the nonheme iron that is found in fruits, vegetables, and grains, than the heme iron that is found in animal foods, including red meats, poultry, and fish.
- Remember that nuts and shellfish can pose a food allergy danger for younger kids and too much seafood can expose younger kids to mercury, so follow current fish and mercury warnings* when feeding children seafood.
- Keep in mind that the %DV for iron on food labels is based on the adult needs of 18mg of iron a day, while a toddler only needs about 7 to 10mg a day. So while an egg provides 4% DV of iron for an adult, it would

actually provide about 7 to 10% DV of iron for a toddler.

Foods High in Salt

Adults often know that they should avoid a lot of added salt in their diets, and in fact, are sometimes on salt restriction diets because of health problems, especially high blood pressure.

Eating salt is often thought to be less of a problem for kids though, as many parents assume that their kids don't have a lot of salt in their diets. This is only true if you don't add a lot of salt to the foods that you cook. Keep in mind that many of the processed and prepared foods that are popular with parents and kids — usually because they are quick and easy — are often loaded with salt.

Some studies have reported that children with low-salt diets may avoid high blood pressure as adults. And maybe even more important, salt intake has been linked to childhood obesity, as kids with high-salt diets have been reported to drink a lot of high-sugar, high-calorie drinks, which increases their risk for obesity.

Of course, any foods that you add table salt (sodium chloride) to will be high in salt. In addition, foods that are usually high in salt (more than 400mg per serving) include:

- Onion soup
- Foods made with seasoned bread crumbs
- Sauerkraut
- Spaghetti sauce (ready to serve)
- Potato salad
- Cheese sauce
- Baked beans with franks
- Macaroni and cheese
- Pizza slice

- Cheeseburgers, hamburgers, hot dogs, tacos, and many other fast foods
- Beef stew (from a can)
- Cottage cheese
- Minestrone soup
- Submarine sandwiches
- Tunafish salad
- Pretzels, potato chips, and other snacks
- Sliced ham, bologna, salami and other cold cuts
- Cream-style corn (from a can)
- Pickles
- Beef jerky snacks
- Egg bagels

This is just a partial list, but reviewing it and then getting in the habit of reading food labels can help you spot other foods high in salt. As you can now see, high-salt items are typically many canned foods (especially soups), cold cuts, snack foods, and fast food.

Low Salt Diet

Most kids don't actually need a low-salt diet. Instead, they need a normal salt diet and to learn to avoid too many foods that are high in salt and to eat a healthy diet with a variety of foods. They should get their daily requirement of salt and sodium (about 500mg per day), but not too much, which would be more than about 2,400mg.

In general, if you simply don't add extra salt to the foods you prepare and your child eats and avoid a lot of the foods high in salt, then you shouldn't have to worry about your child's salt intake. Keep in mind that like adults, kids can develop a taste or preference for salty foods. That makes it important to avoid salty foods and not add extra salt to foods when your child first begins solids as an infant and

toddler. And if you are concerned about your child's salt intake, especially if he is overweight, then look for more foods that are low in salt, with less than 140mg of salt per serving.

Protein Rich Foods

Surprisingly, some parents don't worry about finding calcium rich foods or iron rich foods, which kids often don't get enough of. Instead, they worry that their kids don't get enough protein in their diet because they don't like to eat meat.

Most can be reassured that their kids are getting plenty of protein in their diet though, especially when you consider that according to the American Academy of Pediatrics, 'protein is so abundant in the foods Americans eat, that most of us, children and adults alike, consume more than we need.'

Protein Requirements

Protein requirements depend on a child's age and weight. For example, the average 4-6 year old preschooler requires about 22 grams of protein a day, while an older 7-1 year old requires about 28 grams of protein a day. Making things a little more complicated, protein requirements also depend on the 'quality' of protein your child eats and how easily digestible it is.

In general, animal proteins, such as from milk, eggs, and meats, are considered highly digestible and higher quality than plant sources of protein. You don't have to worry about this though, as long as you vary which protein foods your child eats. Even if your child only eats plant sources of protein, as long as you pair them, such as by eating grains and legumes, you can get the right amounts of proteins in your child's diet.

Many foods besides red meat are high in protein, which means that your kids are likely getting much more protein in their diet than you think. Common protein rich foods can include:

- Milk
- Soy Milk
- Eggs
- Cheese
- Yogurt
- Peanut Butter
- Lean Meats, Fish, and Poultry
- Beans, Tofu, Lentils, and other Legumes
- Grains, including bread and pasta
- Nuts and Seeds

It can also be easy to find high protein foods by reading food labels and looking for foods with a higher protein number than other foods, such as from 6 to 10g or more.

Protein Foods Kids Like

Some ideas for high protein foods that can combine more than one protein rich food, such as a cheeseburger, which includes meat, cheese, and a bun, include:

- Tuna Fish Sandwich
- Cheeseburger
- Cheese Pizza
- Peanut Butter and Jelly Sandwich
- Macaroni and Cheese
- Grilled Cheese Sandwich

Eggs and Child Nutrition

General dietary recommendations from the American Heart Association are that adults eat no more than 3-4 eggs

yolks each week. There aren't any formal recommendations for children, but like adults, it is recommended that children limit their intake of cholesterol to 300mg each day. Since an egg contains about 213mg of cholesterol, eating eggs too often can cause your child to have a diet that is high in cholesterol.

Eggs can be a healthy part of your child's diet though and shouldn't be avoided altogether. In addition to being high in cholesterol, eggs also have a lot of benefits, including being high in protein, iron, minerals and B vitamins. In the Food Pyramid, eggs are a part of the Meat, Poultry, Fish, Dry Beans and Nuts food group. Younger children, aged 2-6, should get two servings from this food group each day, while older children can have 2-3 servings.

In addition to recommended daily servings from the Meat food group, it is important to look at how much cholesterol your child is getting from other foods. If he already has a diet that is high in cholesterol, with large amounts of whole milk, cheese, yogurt, processed meats or ice cream, then eating eggs on a regular basis is probably not a good idea. If his diet is low in cholesterol and saturated fats and he eats a lot of foods with fiber, then routinely eating eggs is probably okay.

It is also important to keep in mind that the general recommendations for eating 3-4 eggs per week include eggs that are eaten as an ingredient of other foods, such as cakes. For example, if you use 4 eggs to bake a cake and your child eats 2 of the 8 pieces of the cake, then that is equal to eating one whole egg.

And the relationship between dietary cholesterol and how or whether or not it influences your blood cholesterol level is controversial. Many critics of the American Heart Association's recommendations think that it is much more important to limit the amount of saturated fats in a person's diet, instead of limiting cholesterol.

CHILDREN'S VITAMINS

Most children do not need supplemental vitamins or minerals. According to the American Academy of Pediatrics, 'a diet based on the Food Guide Pyramid provides adequate amounts of all the vitamins' a child needs. Still, there are situations where children's vitamins are necessary, especially if your child is a very picky eater or has a poor diet, that doesn't include a lot of iron rich foods. Some vegetarians may also need vitamins to meet all of their nutritional needs.

According to new AAP recommendations, exclusively breastfed infants should receive 200 IU of Vitamin D each day. Older children who don't drink at least 500ml (about 17 ounces) of Vitamin D fortified milk will also need Vitamin D supplements if they don't get regular sunlight exposure.

Iron

Children and adolescents need the mineral iron to prevent anemia. Those most at risk of iron deficiency are infants who are not given extra iron after six months of age (usually in the form of an iron fortified infant cereal), and babies who drink low-iron formula, cow's milk or goats milk. Good sources of iron include meats, fish, legumes, and fortified foods, such as breads and cereals. Adolescent girls are also at risk of anemia once they begin having their periods.

- Flintstones Children's Chewable Multivitamin, Tablets, plus Iron
- Poly-Vi-Sol Vitamin Drops With Iron
- Pokemon Children's Multiple Vitamin with Iron, Chewable Tablets
- Fer-In-Sol Iron Supplement Drops
- Feosol Tablets and Caplets

Calcium

Calcium is another important mineral, and it is necessary for healthy bones and teeth. Children who drink milk and eat dairy products, such as yogurt, ice cream and cheese, usually get enough calcium from their diet. Children with milk allergies or who just don't like milk are a little more of a challenge to meet these requirements, but it is still easy if you find other foods high in calcium, such as calcium fortified orange juice. Vitamins, even those with extra calcium, generally only have about 200mg, or 20% of daily requirements, so you usually also need to supplement these vitamins with foods labeled 'High in Calcium'.

- Calcium Gummy Bears
- Herbasaurs Calcium for Kids
- Flintstones Children's Chewable Multivitamin, Tablets, plus Calcium

Fluoride

Most children get enough fluoride to build healthy teeth if they are drinking fluoridated water, either from tap water in a city that adds fluoride to the water, or bottled water that also has added fluoride. Since too much fluoride can cause staining of your child's teeth, talk with your Pediatrician or Dentist before giving your child fluoride supplements.

Infant's Multivitamins

Multivitamins for infants are available as drops and usually contain Vitamin A, Vitamin C, and Vitamin D. They may also have added iron and other vitamins and minerals, such as thiamine, riboflavin, niacin, pyridoxine, Vitamin B12, and Vitamin E.

- Tri-Vi-Sol Drops
- Poly-Vi-Sol Drops
- Gerber Vitamin Drops

Children's Multivitamins

Multivitamins for older children are usually given as a chewable tablet. Finding your child's favorite character may make taking vitamins easy and fun.

Keep in mind that many 'complete' multivitamins do not have all of the recommended amounts of the vitamins and minerals that your child needs each day and most don't have enough calcium.

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Essential Food Groups for Children

VEGETABLES

Vegetables are an important food group and a key part of the food pyramid, so ideally, your kids would eat some each day.

In addition to being high in fiber, most vegetables are low in calories, low in fat, and don't have any cholesterol. Most are also important sources of many vitamins and minerals, including calcium, potassium, vitamin C, and vitamin A. Eating fruits and vegetables can also decrease a person's chances of developing many chronic diseases, including type 2 diabetes, stroke, some types of cancer, and may even help prevent cardiovascular disease and high blood pressure.

One of the first questions parents have about vegetables is how many do their kids actually need to eat each day. Following the food pyramid, some general recommendations include that:

- 2- to 3-year-old children eat 1 cup of vegetables each day
- 4- to 8-year-old children eat 1 1/2 cups of vegetables each day
- 9- to 13-year-old girls eat 2 cups of vegetables each day
- 14- to 18-year-old girls eat 2 1/2 cups of vegetables each day

- 9- to 13-year-old boys eat 2 1/2 cups of vegetables each day
- 14- to 18-year-old boys eat 3 cups of vegetables each day

When thinking of serving sizes and daily recommendations for vegetables, keep in mind that 1 cup of vegetables is usually equal to:

- a medium baked potato
- a large ear of corn on the cob
- 3 spears of 5-inch long broccoli
- 2 medium carrots
- 2 large stalks of celery
- 1 cup of cooked vegetables

And since that can be spread over two or three of your child's meals and perhaps even at a healthy snack, it becomes much more reasonable to think about your kids eating their vegetables each day.

Nutrient Vegetables

In addition to eating their recommended serving of vegetables each day, it can be important to try to vary the types of vegetables that your child eats so that he gets all the nutrients that different vegetables have to offer. For example, it would be better if your child eats, broccoli, peas, lettuce, carrots, celery, beans, and potatoes, instead of carrots being the only vegetable that he eats.

When serving vegetables to your kids, try to vary their diet and choose different ones from this list of vegetables:

- Dark green vegetables (broccoli, greens, spinach, dark green leafy lettuce)
- Orange vegetables (carrots, pumpkin, sweet potato, winter squash)
- Dry beans and peas (dry beans, black eyed peas, tofu)

- Starchy vegetables (corn, green peas, white potatoes)
- Other vegetables (cabbage, cauliflower, celery, cucumbers, peppers, lettuce, mushrooms, onions, tomatoes, zucchini)

Vegetable Recipes

You may have to do some experimenting, but you can likely find some fun ways to get your kids to eat more vegetables. For example, it often works to buy fresh vegetables and not overcook them. These vegetables will have a lot of flavor and will still be crunchy, which is a big plus for many kids.

Some popular and kid-friendly vegetable recipes include:

- vegetable soup
- vegetable lasagna
- pizza with vegetable toppings
- egg omelet with bell peppers, broccoli, spinach, mushrooms or tomatoes
- sandwiches with lettuce, tomato, cucumbers, bell peppers, or onions as toppings
- whole grain pasta with vegetables added to the sauce
- carrots and broccoli with a dip as a snack
- vegetable wraps

It can also help to let your kids choose vegetables at the grocery store or farmer's market, or even grow their own in your backyard.

What about hiding vegetables in your child's food? This is one way to get your kids to eat more vegetables, but you aren't really teaching them healthy eating habits. Instead, it can be better to offer your child small amounts of vegetables at each meal, don't force him to eat them, and model healthy eating habits yourself.

GRAINS

Grains, especially whole grains, are good sources of fiber, iron, magnesium, selenium, and several B vitamins, including thiamin, riboflavin, niacin, and folate. Refined grains, such as white bread, white rice, non-whole grain pasta do not have as much fiber as whole grain varieties. Grains include foods made with wheat, rice, oats, cornmeal, and barley, etc., such as bread, pasta, breakfast cereal, popcorn, tortillas, and oatmeal. Whole grains are cereal grains that retain the bran and germ as well as the endosperm, in contrast to refined grains, which retain only the endosperm. Whole-meal products are made from whole-grain flour.

Common whole-grain products include oatmeal, popcorn, brown rice, whole-wheat flour, sprouted grains, and whole-wheat bread. Common refined-grain products include white rice, white bread, hominy, and pasta (although whole-grain varieties of pasta are available).

Wheat flour" (as opposed to "whole-grain wheat flour" or "whole-wheat flour") as the first ingredient is not a clear indicator of the product's whole grain content. If two ingredients are listed as grain products but only the second is listed as whole grain, the entire product may contain between 1% and 49% whole grain. Many breads are colored brown (often with molasses) and made to look like whole grain, but are not.

In addition, some food manufacturers make foods with whole-grain ingredients, but, because whole-grain ingredients are not the dominant ingredient, they are not whole-grain products. Contrary to popular belief, fiber is not indicative of whole-grains. The amount of fiber varies from grain to grain, and some products may have things like bran, peas, or other foods added to boost the fiber content.

Other misleading descriptions include:

- “whole grain”
- “contains whole grain”
- “100% wheat”
- “made with whole wheat”
- “multigrain”
- “pumpernickel”
- “stone-ground”

These do not correspond to any government standards and thus imply nothing about the product's nutritional makeup.

In Canada, it is legal to advertise any food product as “whole wheat” with up to 70% of the germ removed. While the resulting product will contain the benefit of fiber in the nutritional information, it lacks the more recently-discovered health benefits of anti-oxidants found in the wheat germ. Canadian consumers can be assured of whole-grain products by a label stating 100% whole grain whole wheat.

Whole grains are often more expensive than refined grains because their higher oil content is susceptible to rancidification, complicating processing, storage, and transport. Similar to the distinction between whole and refined grains is that between whole pulses and refined dal.

Whole grains are believed to be nutritionally superior to refined grains, richer in dietary fiber, antioxidants, protein (however lacking in the amino acid lysine), dietary minerals (including magnesium, manganese, phosphorus, and selenium), and vitamins (including niacin, vitamin B6, and vitamin E). Manufacturers are sometimes required by law to fortify refined grain products to make up for the loss of vitamins and minerals.

The greater amount of dietary fiber, as much as four times that found in refined grains, is likely the most important benefit, as it has been shown to reduce the

incidence of some forms of cancer, digestive system diseases, gum disease, coronary heart disease, diabetes, and obesity. Some of these protective effects occur because carbohydrates from whole grains are digested and enter the bloodstream more slowly. Many health studies have shown that whole grains have numerous cardiovascular benefits.

When searching for whole-grain foods, it is important to note that any products made with flour can have the same effect on blood sugar, whether the flour is produced from whole grains or not. For example, whole-grain wheat bread and white bread can have the same glycemic index. Grinding grains into flour increases the surface area upon which enzymes work to more quickly convert starch into glucose. Keeping grains as close to their original form as possible slows or prevents the digestion of starch, and a slower digestion is responsible for preventing spikes in blood sugar (which over time may lead to insulin resistance).

FRUITS

Most kids like fruits, which are usually a good source of potassium, fiber, vitamin C, and folate. Although 100% fruit juice counts as a fruit in this food group, remember that it is almost always better to eat whole foods.

Fruits are important too, though, as they are:

- a good low-fat food
- low in salt
- low in calories
- a healthy food with no cholesterol
- usually good sources of potassium, fiber, vitamin C, and folate

Fruit Recommendations

Following the food pyramid, some general recommendations include that:

- 2-3 year old children eat 1 cup of fruit each day
- 4-8 year old children eat 1 to 1 $\frac{1}{2}$ cups of fruit each day
- 9-13 year old girls eat 1 $\frac{1}{2}$ cups of fruit each day
- 14-18 year old girls eat 1 $\frac{1}{2}$ cups of fruit each day
- 9-13 year old boys eat 1 $\frac{1}{2}$ cups of fruit each day
- 14-18 year old boys eat 2 cups of fruit each day

When thinking of serving sizes and daily recommendations for fruits, keep in mind that 1 cup of fruit is usually equal to a cup of sliced or chopped fruit or:

- a small apple or half of a large apple
- a cup of applesauce
- a large banana
- about 32 seedless grapes
- a medium grapefruit
- a large orange
- a large peach
- a medium pear
- 3 medium plus
- about 8 large strawberries
- a 1" thick wedge of watermelon
- $\frac{1}{2}$ cup of raisins

Although a cup of 100% fruit juice, including apple juice and orange juice, can count as a cup of fruit, it is much better to eat whole fruits, which have more fiber, instead of juice.

Getting kids to eat fruit isn't usually as hard as it is to get them to eat vegetables. Most fruits have a nice sweet taste and are already generally viewed as a fun snack. Still, if your child doesn't eat a lot of fruit, some easy tips to encourage him to eat more fruit includes that you:

- simply make fruits more available in your home, including having whole fruit and cut up fruit around for a quick snack
- offer a variety of choices, including fresh fruits that are in season, and let your child help pick them out at the grocery store or during a trip to a farmer's market
- add fruit, such as bananas or berries, as a topping to your child's breakfast cereal, yogurt, etc.
- allow your child to dip fruit slices in a low-fat dressing
- make a fruit smoothie.

MILK

Milk - this food group is important because it provides kids with calcium, potassium, vitamin D, and protein in their diet. It includes milk, cheese, yogurt, and milk-based desserts, such as ice cream, frozen yogurt, and pudding made with milk. In general, parents should choose low-fat milk products that do not have added sugar. For example, 2% milk would be better than whole milk with chocolate flavoring.

Drinking Raw Milk

Surprisingly, more and more people are starting to drink raw, unpasteurized cow's milk. Or maybe that shouldn't be too surprising as most people associate things that are raw or natural as being safer and healthier for them. Unfortunately, drinking raw milk can be dangerous, especially for young children.

Just as you would have thought, raw milk is basically "straight from the cow," and hasn't been processed or pasteurized. Although most experts consider pasteurization to be one of the most important health advances of the last century, some people think that it removes nutrients and kills beneficial bacteria. They also claim that raw milk can taste better than pasteurized milk.

Is raw milk healthier than pasteurized milk? There is no research to support that raw milk is healthier or, according to the FDA, that there is a "meaningful difference between the nutrient content of pasteurized and unpasteurized milk."

Dangers of Drinking Raw Milk

According to the FDA, raw milk can be contaminated with bacteria, including:

- *Brucella* species
- *Campylobacter jejuni*
- *Coxiella Burnetii*
- *Escherichia coli*
- Enterotoxigenic *Staphylococcus aureus*
- *Listeria monocytogenes*
- *Mycobacterium bovis*
- *Mycobacterium tuberculosis*
- *Salmonella* species
- *Yersinia enterocolitica*

These bacteria can cause people to get sick, leading to symptoms such as diarrhea, vomiting, fever, stomach cramps, and headaches. The Centers for Disease Control and Prevention reports that about 200 to 300 people get sick each year from drinking raw milk or eating cheese made from raw milk.

Another big danger of drinking raw milk that some people may overlook is that raw milk is very low in Vitamin D. In addition to being pasteurized, processed milk that you routinely buy in a store is typically fortified with vitamin D, which is important to keep your bones strong.

Since young children are at big risk for getting sick from any bacteria that may be in raw milk and they need vitamin D, it is important that you not give your child raw,

unpasteurized cow's milk. In fact, the American Academy of Pediatrics states that "children should not consume unpasteurized milk or products made from unpasteurized milk, such as cheese and butter, from species including cows, sheep, and goats."

Keep in mind that kids should also avoid unpasteurized fruit juices, including unpasteurized apple juice and apple cider.

Chocolate Milk

Milk is often thought of as an important part of a child's diet or more specifically, calcium and Vitamin D are important nutrients that kids need. To make sure that their kids drink milk, some parents resort to giving their kids chocolate milk.

In addition to flavoring regular 'white' milk with Nesquik Chocolate Powder and Hershey's Chocolate Syrup, other parents use products such as Ovaltine and Carnation Instant Breakfast Powder Drink Mix. While regular white milk is usually considered to be a healthy drink, adding chocolate flavoring usually adds extra sugar and calories

Perhaps one benefit to chocolate flavoring is that it might encourage your child to drink milk when he might otherwise not drink plain white milk. But even then, you are probably better off trying to give your child alternative sources of calcium, such as cheese, yogurt, and calcium fortified orange juice, etc.

Another benefit is that many chocolate flavorings are now fortified with some extra calcium and other vitamins and minerals, so if your child doesn't drink much milk or other things with calcium, then it might be a good way to make sure he gets enough of this important mineral. And in the case of Carnation Instant Breakfast Powder Mix, in addition to the chocolate flavoring, you can give your child

extra iron, calcium, protein, and many other vitamins and minerals. Ovaltine has extra iron in it too.

The biggest case against chocolate milk is that adding any flavoring to milk adds extra sugar and calories to an otherwise healthy drink. Even the newer 'no sugar added' varieties, like the Nesquik Chocolate No Sugar Added brand, has 3g of extra milk sugar and an extra 40 calories. And the more traditional varieties can add up to 18g of sugar and 90 calories per serving, which more than doubles the amount of calories that you would get from just the glass of milk.

Although milk is an important drink and an easy way for your child to get calcium and Vitamin D into his diet, it is usually best to encourage your kids to drink plain white milk. Adding chocolate flavoring just gives your child unnecessary sugar and calories. If your child won't drink plain milk, you might offer alternative sources of calcium before jumping to flavoring his milk with chocolate, as it is usually difficult to get kids to later go back to drinking plain milk once they start drinking chocolate milk.

If you are going to give your kids chocolate flavored milk, you might offer it only as a once in a while treat and not on a daily basis.

What about all of the extra vitamins and minerals that most chocolate flavorings now offer? You can get even more vitamins and minerals with a simple daily multivitamin that your child takes with her glass of plain white milk.

Low Fat vs. Whole Milk

Milk, in one form or another, is a big part of your younger child's nutrition. And fortunately, it isn't too hard to figure out which kind of 'milk' to give your newborn and younger infant, as most parents know to give them either breast milk or an iron fortified infant formula. Most parents also know

to switch to whole milk once their baby is a year old, or after that, once they decide to wean from breastfeeding. When to switch to low fat milk is a little more confusing for many parents though.

Milk is good for kids and teens. It is a good source of calcium, vitamin D, and protein. In fact, depending on their age, most kids should drink between 2 and 4 glasses of milk each day, especially if they aren't eating or drinking any other high calcium foods, such as yogurt, cheese, or calcium fortified orange juice.

The only problem is that whole milk has a lot of fat in it, especially as compared to lower fat 2%, 1% and skim milk, which the American Academy of Pediatrics recommends that children over age 2 drink. This extra fat is especially concerning considering the childhood obesity epidemic we are currently trying to deal with.

Whole milk is a good option for toddlers over age 12 months who aren't breastfeeding and who aren't drinking a toddler formula. The only other real benefit of whole milk over low fat milk is that many people do think it tastes better, so for kids who don't get used to low fat milk and simply refuse to drink it, whole milk may be the only way that they will drink any milk at all.

Whole milk might also be better if you have a very picky eater who is not overweight and is simply not getting enough fat and calories from the rest of his diet. A quick comparison of milk nutrition labels (per 8 ounce serving) shows that it really does:

- Whole Milk - 150 Calories - 8g Fat
- 2% Milk - 120 Calories - 4.5g Fat
- 1% Milk - 100 Calories - 2.5g Fat
- Skim Milk - 80 Calories - 0g Fat

So if your 5 year old goes from Whole Milk to 1% Milk and typically drinks 3 cups of milk a day, he would save 150 calories a day. Although that doesn't sound like much,

since you gain about a pound for every 3500 calories you consume, those extra 150 calories might cost you an extra pound in body weight every 3 weeks or so ($150 \text{ calories/day} \times 23 \text{ days} = 3450 \text{ calories} = 1 \text{ pound}$).

So what should you do? According to the AAP recommendations, if your toddler isn't going to continue breastfeeding, you should switch her to whole milk once she is 12 months old. Next, switch to skim or low fat milk at age 2 years.

Making the switch at an early age is much easier than doing it when your child is older, when they are more likely to notice and be resistant to switching to low fat milk. Still, even with your younger child, you can make a gradual switch, going first to 2% Milk and then later switching again, this time to 1% Milk or Skim Milk.

An early switch to low fat milk also helps to ensure healthy habits for the rest of your child's life, as he will be more likely to continue to drink low fat milk as a teen and adult, instead of higher fat and calorie Whole Milk.

Remember that soy milk and rice milk is typically low fat, so would also be a good choice once your child is 2 years old, especially if he is allergic to cow's milk or has a lactose intolerance.

Toddler Milk and Calcium Requirements

Toddlers don't necessarily need milk, but they do need calcium and Vitamin D, which are readily available from milk and dairy products. Without any milk, it will be difficult to get enough calcium into his diet. There are alternatives to milk, though, and other ways to give your child calcium.

One alternative is to give your child fortified soy milk. However, keep in mind that soy milk is all low fat, and it isn't recommended that you limit a child's fat intake until he is 2-3 years old. Still, you could give soy milk and make

up the extra fat with other foods in his diet. Is there a big difference? Not really. Whole milk has 8g of fat per 8oz serving vs. 3.5 or 5g for soy milk. So, based on an average requirement of 16oz of milk per day, whole milk provides 16g of fat vs. 7-10g from soy milk. Giving the extra 6-9g of fat from other sources should ensure that your child is getting enough fat in his diet. (Based on a 1300 calorie diet and with 30% of calories coming from fat, your toddler probably needs about 40g of fat each day).

Another alternative is to give a toddler soy formula, which is milk free and has all of the fat and calcium that a growing toddler needs. Brands of toddler soy formulas include Isomil 2 and Next Step Soy.

Although goat's milk is discouraged for children under age 12 months because it lacks iron, folate and Vitamin B12, pasteurized and fortified goat's milk can be given to older children. If your child is allergic to or doesn't tolerate cow's milk, then he is likely to have similar problems with goat's milk, as they share many proteins and both have lactose. Other foods that are good sources of calcium include calcium fortified orange juice, bread (like Iron Kids Bread), yogurt and cheese, especially some brands of American Cheese that can have up to 350mg of calcium per slice.

It becomes more difficult if your child has a true milk allergy, since he likely wouldn't be able to tolerate yogurt or cheese. On the other hand, children with a simple lactose intolerance, may be able to handle some dairy products. As more foods are fortified with calcium these days, it makes providing your child with a healthy diet easier. In addition to actually reading the nutrition label, you can also find foods that are good sources of calcium by looking for the following terms on the packaging:

- "High in Calcium," "Rich in Calcium" or "Excellent Source of Calcium," are found on foods that have at least 20% daily value of calcium or 200mg.

- “Contains Calcium,” “Provides Calcium” or “Good Source of Calcium,” are found on foods that have at least 10-19% daily value of calcium or 100-190mg.
- “Calcium Enriched”, “Calcium-Fortified” or have “More Calcium.” are found on foods that have more than 10% daily value of calcium as compared to similar foods without as much calcium. So, if you have two type of orange juice and one has 4% calcium and another has 15% daily value of calcium, then the one with more calcium can say the it is calcium enriched or fortified.

So choose food products that are high in calcium to get your child the calcium he needs, but make sure that they don't interfere with his allergies or food intolerances. And compare food labels to choose brands or types of foods that have a higher percentage of the daily value of calcium.

Some good choices, include:

- Golden Grahams cereal - 350mg per 3/4 cup
- Calcium fortified soy milk - 300mg per cup
- American Cheese - 50 - 350mg per slice depending on the brand you buy
- Iron Kids bread - 200mg per slice
- Yoo-hoo chocolate drink - 250mg per 8 oz serving
- Danimals low fat yogurt - 150mg per cup
- Honey Maid Graham Crackers (look for the ones that say 'Now a good source of calcium) - 150mg in 2 crackers

For children who can eat bread and cheese, a grilled cheese sandwich made with Iron Kids bread (2 slices) and a slice of American cheese, can provide almost a whole days worth of calcium or 750mg (200mg + 350mg + 200mg).

A supplemental vitamin may also be helpful if you don't think your child is getting enough Calcium from his diet. However, vitamins, even those with extra calcium,

generally only have about 200mg, or 20% of daily requirements, so you usually also need to supplement these vitamins with foods labeled 'High in Calcium'.

MEAT AND BEANS

In addition to meat and dry beans, this food group also includes poultry, fish, eggs, and nuts (including peanut butter), which are usually a good source of protein, iron, vitamin E, zinc, magnesium, and several B vitamins, including niacin, thiamin, riboflavin, and B6. Unless you choose lean or low-fat meat and poultry, food from this food group can also be a source of extra fat.

Meat, in its broadest definition, is animal tissue used as food. Most often it refers to skeletal muscle and associated fat, but it may also refer to non-muscle organs, including lungs, livers, skin, brains, bone marrow, blood and kidneys. The word meat is also used by the meat packing and butchering industry in a more restrictive sense - the flesh of mammalian species (pigs, cattle, etc.) raised and butchered for human consumption, to the exclusion of fish, poultry, and eggs. Eggs and seafood are rarely referred to as meat even though they consist of animal tissue. Animals that consume only or mostly animals are carnivores.

The meat packing industry slaughters, processes, and distributes meat for human consumption in many countries. All muscle tissue is very high in protein, containing all of the essential amino acids, and in most cases, is a good source of zinc, vitamin B12, selenium, phosphorus, niacin, vitamin B6, iron and riboflavin. However, meat tends to be high in fat (red meat in particular), low in carbohydrates, and contains no fiber. The fat content of meat can vary widely depending on the species and breed of animal, the way in which the animal was raised, including what it was fed, the anatomical part of the body, and the methods of butchering and cooking. Wild animals such as deer are typically leaner than farm

animals, leading those concerned about fat content to choose game such as venison. However, centuries of breeding meat animals for size and fatness is being reversed by consumer demand for meat with less fat.

In recent years, the health benefits of meat as a regular part of the human diet have come into question. In a large-scale study, the consumption of red meat over a lifetime was found to raise the risk of cancer by 20 to 60 percent, while causing adverse mutations in DNA. In particular, red meat and processed meat were found to be associated with higher risk of cancers of the lung, esophagus, liver, and colon, among others.

Animal fat is one of the only dietary sources of saturated fat, which have been linked to various health problems, including heart disease, bowel cancer, prostate cancer, breast cancer, osteoporosis, and arteriosclerosis. Meat, like any food, can also transmit certain diseases, but undercooked meat is especially susceptible. Undercooked pork sometimes contains the parasites that cause trichinosis or cysticercosis. Chicken is often contaminated with *Salmonella enterica* disease-causing bacteria. Minced beef can be contaminated during slaughter with disease-causing *Escherichia coli* O157:H7 deriving from the intestinal tract if proper precautions are not taken.

Red meat is darker-coloured meat, as contrasted with white meat. The exact definition varies, but the meat of adult mammals, such as beef, mutton, and horse is invariably considered "red", while domestic chicken and rabbit are invariably considered "white".

Ethical issues regarding the consumption of meat can include objections to the act of killing animals or the agricultural practices surrounding the production of meat. Reasons for objecting to the practice of killing animals for consumption may include animal rights, environmental ethics, religious doctrine, or an aversion to inflicting pain or harm on other living creatures. The religion of Jainism

has always opposed eating meat, and there are also many schools of Buddhism and Hinduism that condemn the eating of meat.

Some people, while not vegetarians, refuse to eat the flesh of certain animals due to cultural taboo, such as cats, dogs, horses, or rabbits. In some cases, specific meats (especially from pigs and cows) are forbidden within religious traditions. Some people eat only the flesh of animals who have not been mistreated, and abstain from the meat of animals reared in factory farms or from particular products such as foie gras and veal. Others believe that the treatment which animals undergo in the production of meat and animal products obliges them never to eat meat or use animal products

OILS

Although not a real food group, oils and fats are an important part of your diet - both because you need to eat some of them and because you don't want to overdo it. In general, your kids should eat mostly polyunsaturated or monounsaturated oils and fats, avoiding saturated fats, trans fats, and cholesterol. Essential oils are generally extracted by distillation. Other processes include expression, or solvent extraction. They are used in perfumes, cosmetics and bath products, for flavoring food and drink, and for scenting incense and household cleaning products.

Various essential oils have been used medicinally at different periods in history. Medical applications proposed by those who sell medicinal oils range from skin treatments to remedies for cancer, and are often based on historical use of these oils for these purposes. Such claims are now subject to regulation in most countries, and have grown correspondingly more vague, to stay within these regulations.

Interest in essential oils has revived in recent decades, with the popularity of aromatherapy, a branch of alternative medicine which claims that the specific aromas carried by essential oils have curative effects. Oils are volatilized or diluted in a carrier oil and used in massage, or burned as incense, for example.

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Breast-feeding: The Foundation of Child Care

Breast-feeding, which unites food security, health protection, and care, represents the strongest possible foundation for nutrition. A global consensus has evolved in recent years defining optimal feeding of infants and young children: exclusive breastfeeding from birth to about six months, followed by introduction of complementary foods drawn from the local diet at about six months. Breastfeeding should be sustained well into or beyond the second year of life, with increasing amounts of complementary foods.

INITIATION, EXCLUSIVITY, AND DURATION OF BREASTFEEDING

Dramatic differences between these recommendations and current practices are found. Not all families breastfeed, many give needless early supplementation, and in only a very few countries do mean breastfeeding durations exceed 18 months. Average figures for ever breastfed, i.e., initiation rates, drawn from the World Fertility Survey (WFS) and Demographic and Health Surveys (DHS) in developing countries, approximated 92% between 1977 and 1989. More recent DHS figures for breastfeeding initiation are 290% in a range of countries in Africa, Asia, and Latin America. Lower initiation rates are found among less comprehensive

data from Jordan (66%), Israel (84%), the Netherlands (66%), Luxembourg (64%), the United Kingdom (63%), Croatia (59%), the United States (56%), France (55%), and Ireland (30%) (sources for percentages not otherwise referenced are from the database maintained by WHO/NUT, Geneva). In a few parts of the industrialized world, breastfeeding initiation is higher, as in Copenhagen in 1987-1988 (99.5%). However, just as figures for admissions to preschools do not indicate overall national educational levels, initiation rates are not sufficient measures of a country's infant feeding patterns.

Although new WHO indicators for exclusive breastfeeding from 0 to 3 months are not yet widely used, available figures show few babies are exclusively breastfed to 3 months. In Denmark, 4% of babies are breastfed exclusively to 4 months. DHS data from 1990 to 1993 indicate supplementation from about 2 weeks of age in many countries. DHS data show exclusive breastfeeding exceeding a median of 6 weeks only in Indonesia, Cameroon, Egypt, and Morocco. In general, families are giving something else besides breastmilk at about 2 to 9 weeks.

The duration of breastfeeding may be high even where early supplementation prevails. In the countries covered by 1977-1989 WFS and DHS studies, the age at which 50% of mothers said their babies were no longer breastfeeding ranged from 1.5 months in Costa Rica to over 24 months in Benin, Burundi, Mauritania, Indonesia, and Nepal. On average, children in the countries surveyed were taken off the breast at around 16 to 18 months of age in Asia and Africa, and around 9 to 10 months of age in Latin America and the Caribbean.

Children who are classified as "breastfeeding," a category that includes "any breastfeeding" or "partial breastfeeding," consist of all children who take any milk at all from the breast, from those who are exclusively

breastfed to those who have a token 60 second feed once a day. Longer duration of breastfeeding might indicate a cultural and economic environment more supportive of families and good caring practices. Nevertheless, the nutritional, immunological, child-spacing, and care significance of breastfeeding rates cannot be judged without more differentiated and specific data.

Basic Determinants

The UNICEF conceptual framework for nutrition highlights some of the levels at which breastfeeding may be either supported or interfered with. When she gives birth, every woman has the potential resource of breastmilk for two years or more. This ample food resource is perfectly targeted, already distributed to households with the need, and should be controlled by the mother and baby.

Basic determinants that may deprive women of this resource include absence of family and social support; traditions of giving low household food priority to women; and young women's lack of status and power, allowing others to decide what they should do with their time and energy; and how babies are fed. Among additional factors are women's vulnerability to social pressures and to violence, their selection as targets for commercial messages, and the disproportionate demands made upon women to achieve family survival.

Cultural beliefs and practices, modern myths and misinformation, and, again, commercial influences affect perceptions at the level of education. Withholding of information, a deliberate practice of keeping women ignorant under the pretext of preventing them from feeling guilty, is another aspect of inadequate, disempowering education.

Mismanagement can arise from various underlying determinants associated with health services, including

professionals without up-to-date knowledge and skills, poor maternity care practices, inaccessible or inattentive health care, and commercial influences on medical thinking and practices.

Immediate determinants of poor breastfeeding outcomes include new or traditional mismanagement of lactation, such as early supplementation, poor positioning and ineffective suckling, infrequent or abbreviated feedings, omission of night feedings, use of feeding bottles and pacifiers, and inadequate treatment of breast problems. Improvement of breastfeeding management must be the focus of reeducation for health workers and mothers, as in WHO/UNICEF training materials. But improvement of the condition of women at basic and underlying levels is fundamental to restoring every woman's right to make free and full use of her breastfeeding resource.

Care for women who work

All women work; work itself does not prevent breastfeeding. In Botswana, for example, breastfeeding duration is 18 months for employed women and only 2 months longer for those at home. However, when women are overworked in paid or unpaid tasks, they may be too busy to breastfeed frequently or to be attentive to other aspects of care. Long separations from their children exacerbate the difficulties. The number of dependents in a family and the close spacing of children contribute to overwork, along with seasonal demands of food production, fetching of fuel and water, distance from markets and health care, and sole responsibility for a household. Economic and ideological structures, including gendered allocation of tasks, may make optimal care for children of any age unlikely.

Although maternity legislation provides some degree of protective entitlement in most countries, women with lower social status, such as domestics, plantation workers,

daily labourers, small traders, and piecework craftswomen, generally have little or no maternity leave. Yet women who work at home or in unregulated jobs do not necessarily find more time for infant feeding than those in salaried work. Breastfeeding breaks and workplace child care remain exceptions to the usual pattern, which is one of distance between mother and baby. Many official measures do not cover the most vulnerable and the poorest of working women. Their only maternity protection may come from traditional postpartum customs, for example, the 40 days of rest to which all new mothers are entitled in some Islamic cultures.

Care for women in the family

The household composition of extended unilocal families provides a sharing of child care and of household tasks that is widely assumed to simplify child rearing and breastfeeding. Looking after older relatives may increase the mother's workload, however, while she herself may receive little care and a minimal share of family food. In discussion, a group of Indian paediatricians expressed ambivalence about the role of grandparents. Their care for the family is generally valued, yet they may decide to add top feeds-needless supplementary bottles of formula- for their breastfed grandchild. By doing this they may replay their own parenting behaviour, express mistrust of the child's mother, or exert control through infant feeding.

Shrinking of the family to nuclear size increases care burdens but may give parents greater autonomy. In these families, the odds that mothers will breastfeed increase with male partner support (odds ratio in one study=32.8.). However, educating men about how to support breastfeeding and give care to their infants in ways other than feeding them is not yet widespread. A leaflet from Kenya, "Please help your wife to breastfeed," represents valuable re-education of men in care for women and babies.

When there is only one parent, the stresses of earning a living and carrying out all responsibilities for the children intensify the parent's difficulties. Although other household compositions are not guarantees of good care for women and children, in every socio-economic setting and culture, single parent families are at higher risk.

Social isolation of parents also increases risks to children, whether caused by recent rural to urban migration, distance from family and clan members, ostracization (of unmarried mothers), or characteristics such as youth, ethnicity, or language that put them out of communication with neighbours. Isolation can also be severe in industrialized nations, where expectations of autonomy may isolate the new mother and baby amid her household appliances.

Urbanization or modernization, general rubrics for complex social changes, may entail both positive and negative conditions for breastfeeding. Telephones, bookshops, libraries, community groups, and accessible health services may provide information and counselling; water, fuel, public transport, and food availability may lessen workloads. Yet overwork, isolation from family and friends, insecurity, struggles to gain access to cash income, and the pervasive presence of breastmilk substitutes may counteract breastfeeding. Like household composition, urbanization is an ambiguous factor in breastfeeding and nutrition care.

Jean-Gérard Pelletier urges appreciation of the multidisciplinary nature of malnutrition, including disturbance of dietary intake, the mother-child relationship, and the cultural reference system. Violence against women can be recognized among such disturbances. Instability and conflict were included in a multiple-risk factor model for adverse childhood outcomes, including failure to thrive and third degree malnutrition. However, this vital factor is frequently disregarded.

Domestic violence has not yet become a customary line of enquiry in history taking when a child's growth fails.

Effects of breastfeeding on the caring relationship

The breastfeeding relationship may itself be a factor in developing other caring behaviours, affecting the child's ability to elicit care, the parent's capacity to give it, and the synchrony of their responses to each other. A vigorous child appears to stimulate better parenting.

High-quality feeding interactions during the first years of life tend to be positively linked to the child's subsequent cognitive and linguistic competence and to more secure attachments to major caregivers.

Enhancing Infant care-eliciting capacities

Scent and recognition

The breastfed baby is able to recognize and respond to the mother from birth, using olfactory signals.

Early touch

Although the early postpartum hours and days are not the only period during which parent-child bonding can occur, they have long been recognized as a particularly sensitive time for parental learning. This learning may be facilitated by repeated skin contact, an interaction which is of necessity built into breastfeeding. Current emphasis on skin-to-skin contact in the first minutes of life is based on a growing literature that suggests easier and perhaps longer breastfeeding, possibly associated with long-term differences in the quality of parent-child relationships.

Whole-body care

Kangaroo Care, which gives both mothers and fathers hours or weeks of whole-body skin contact with premature

newborns, seems to overcome the estrangement necessitated by special care. In Colombia, Zimbabwe, and other countries, low birth-weight babies receive 24-hour skin-to-skin care from family members. It can be hypothesized that wherever visual and vocal interaction with babies is not frequent, sustained touching through breastfeeding and close-contact carrying may be an essential channel for eliciting parental care.

Rhythmic functions

When breastfeeding babies sleep with their mothers, their breathing and sleep-arousal cycles become synchronized. This responsiveness facilitates continued night breastfeeding not disruptive of the mother's sleep cycle.

Vision

Visual contact is a key element in baby-parent interaction in many societies, evoking positive parental attention. Newborns have a relatively fixed focal length and see best at about a 12-inch distance, approximately the distance from the breast to the mother's eyes in the en face position. Furthermore, infants fed breastmilk score better than formula-fed children on visual tests through the age of three years.

Attachment and emotional affect

The repeated day and night contact with the mother inherent in breastfeeding ensures continuity during the first year, a stage characterized as the time when a person develops trust. Conversely, patterns of multiple care may depress the infant's ability to trust parents and hence to elicit their care. In nuclear family societies, it is postulated that certain personality disorders may arise from multiple early caretakers:

Confronted with a situation in which the formation of attachments repeatedly leads to the trauma of having the bond abruptly broken, the child makes a highly adaptive adjustment of resisting any further deep relationships.

Substitute arrangements for the nurturing of infants inevitably involve shared, discontinuous and changing caretakers, an obvious disruption in the attachment process.... [Multiple separations] impair the later capacities for trust, empathy, and affection. It is time for us to become more concerned about the frequent separations and changes of caregivers in the lives of infants and toddlers .

Four premature infants who had no interested, consistent caretaker in their lives ... developed a reactive attachment disorder of infancy characterised by behavioural problems and/or failing physical states.

Brain development

Recent studies suggest that long-term intelligence or cognitive scores increase with the mother's choice to breastfeed and with duration of breastfeeding. Breastfeeding may be particularly important in neurological development when some impairment is present at birth.

Vocalization

Breastfeeding is often accompanied by interchanges between mother and child-humming noises, murmurs, the mother talking to the child, and the child playing with the mother's mouth. In boys, later language development is positively affected by Breast-feeding; the effect on girls is negligible. In those cultures where early verbalization is valued, language ability may encourage caretaker attentiveness.

Enhancing Parental caregiving capacities

Bonding

An environment that favours breastfeeding may also favour the early bonding now seen as a foundation for the development of parental caring behaviours. Skin-to-skin contact from the first half hour of life is recommended by the WHO/UNICEF Baby Friendly Hospital Initiative (BFHI) for all babies whether or not they are breastfed. Human adaptive capacity allows parents without this early contact to establish strong and permanent emotional ties with their children, but specific support for close touching and caregiving may be needed where cultural or medical inhibitions exist. In an intensive care unit, for example, parents treated as extraneous may withdraw from their infants.

Child spacing

The contraceptive effects of breastfeeding both protect maternal health and reduce the mother's workload, allowing the youngest child a longer dependency. It has been hypothesized that the shorter birth interval and larger families associated with recently adopted bottle-feeding in Yucatan result in less maternal and perhaps less overall family attention to infants.

Obligatory attention

In an industrialized culture, mothers busy with other tasks remark that breastfeeding ensures that they take time to enjoy their babies. Workplace day care for infants, if combined with the breastfeeding breaks mandated by International Labor Organization conventions, permits repeated daytime attention to children from mothers who are in paid employment. No equivalent contact is yet mandated for mothers who have stopped breastfeeding.

Maternal responsiveness

Objective scoring of videotaped interactions indicated that breastfeeding mothers in the United States were more closely attuned to their infants than those who bottle-fed. Mother-child breastfeeding relationships, even in the first days, can resemble play in being reciprocal, enjoyable, and totally absorbing to both baby and mother. Play interaction develops from secure attachment in infancy and signals the mother's ability to respond to her child's cues. Responsiveness, in turn, is higher in mothers who do not maltreat their children. Neglectful mothers were significantly less responsive to children than mothers with adequate rearing practices after statistically controlling for education.

Effects on parents when others give the care

These effects have yet to be studied, even in the many settings where household servants or informal care by neighbours are common. In cultures where parents do almost all of the child care, other forms of intimate contact may replace breastfeeding as channels for the growth of a mother's caregiving capacities. However, especially where maids do most of the baby care, breastfeeding may be the child's best assurance of contact with the mother. Once off the breast, the baby's strongest attachment may be to the maid, with the mother taking a more supervisory than intimate role. If the maid leaves, the baby may display a grieving anorexia while rejecting the mother. In the absence of studies in this area, sustained breastfeeding, with alternative care by permanent members of the baby's family, could be presumed to present fewer potential risks to the child's emotional and physical development and to the mother's relationship to the child.

ADVANTAGES OF BREASTFEEDING

Neither breastfeeding nor care can be summed up by

looking at only the child or the parent; both are processes of responsive interaction. Although a mother produces milk, both the amount and, to some extent, the composition are responsive to the baby's needs as expressed by suckling. The "calibrating phase" of the breastfeeding relationship, the early months during which the breasts and the baby get into harmony, has its equivalent in the early development of parent-child synchrony and responsiveness. The well-being of parents is fundamental to both processes.

Security in the family promotes both breastfeeding and other forms of good care. If mothers are subjected to verbal attack or physical abuse, if quarrels ricochet through the household, or if children live in fear, care for nutrition will be endangered. Symptoms that present as breastfeeding problems may in fact signal domestic violence. In the case of more generalized insecurity, as in emergencies or war, it may be essential to provide a micro-climate of woman-to-woman support to maintain both breastfeeding and other care. Replacing breastfeeding by formula in crisis settings or in conditions of domestic violence will exacerbate a woman's problems in keeping her family going.

Both breastfeeding and care are strongly mediated by culture, which prescribes normative practices such as sleeping with babies or putting them alone in another room. Parents' own capacities and characteristics also contribute to care, making parent-child relationships unique even within an established cultural framework. Breastfeeding and care grow out of the intersection of parental personality and social environment. If there is no such intersection, as when parents are socially isolated, both breastfeeding and care may be impaired.

Traditional patterns of both breastfeeding and other care for nutrition are subject to erosion. Wet nursing by grandmothers, a very valuable custom, rarely receives reinforcement from breastfeeding programmes and hence

is being lost. Patterns of breastfeeding and nutritional care shift with demographic and economic changes. These shifts may be nutritionally damaging when commercial advantage can be gained by replacing old eating patterns and foods with new products of higher cost and lower value.

Both breastfeeding and care are very time consuming. One cannot hurry a baby through a feed without depriving him or her of the fat-rich hind milk that fuels growth. A toddler slowly eating spoonfuls of complementary food cannot be rushed, and may require active feeding whenever appetite falters.

Both breastfeeding and care for nutrition require investment of time, energy, attention, and emotion. They cannot be done well by a caretaker whose own health, psychological state, or workload prevents her from being attentive to the children. Such conditions may affect very markedly the quality of interpersonal relations within the household.

However, because almost all of the work of breastfeeding and other child-feeding is done by women-mothers, female relatives, and maids-this investment of time and effort has been invisible to mainline economic analyses. Recent attempts have been made to calculate an economic value for breastfeeding. However, breastfeeding and care behaviours are not easily quantified and hence are undervalued. Both may deteriorate a great deal before social data collection records the negative trends.

Key decisions and behaviours are small-scale, taking place in the family. Large-scale policies by themselves cannot achieve more frequent breastfeeding or better care for nutrition. Vital daily decisions- what to eat, how to cook it, how much time to spend on feeding children, what to do with the child who lacks appetite-are cumulatively the significant decisions. Persuasion, education, and help must reach the caretakers in the household.

Entrenched caring patterns are not amenable to a quick fix. Child-feeding is entwined with multiple attitudes and practices. As both policy makers and parents have a strong investment in justifying and perpetuating whatever they themselves did, there may be no rapid solution to problematic feeding behaviours.

Appropriate feeding, from the breast or otherwise, changes with child development, approximately every six months. The frequency of feeding, how long it takes, and what is given all require adaptation to the child's growth and self-feeding skills. Caretakers may need help in recognizing and responding to the shifting needs of their children, and in teaching them new skills and tastes as their diets expand.

A pattern is set with the first child. Suboptimal breastfeeding of the first child will tend to be repeated with subsequent children. Patterns are familial. Primiparae, usually teenage mothers, are therefore the prime target for education and support. Extra care can compensate in part for a suboptimal diet. For some children, artificial infant feeding does not create major immediate problems where caring conditions are close to ideal. However, its long-term effects on chronic disease in later life or other lasting effects are still not fully known.

Endemic misinformation, the popular mythology about breastfeeding that distorts its practice and creates numerous problems for families, may have its equivalent in widely held misconceptions about other care-for-nutrition practices. In parts of West Africa, for example, a belief that all children will eat as much as they need prevents caretakers from urging anorexic toddlers to eat.

Both care and breastfeeding are vulnerable to institutional health-care practices. Both may terminate with hospital admission of a child without the mother or father. Risks of hospitalization without a parent include, besides a premature cessation of breastfeeding, emotional trauma,

estrangement from parents, inadequate understanding by families on how to feed the child well when back at home, and consequent repeated infections or malnutrition.

A tendency to blame the mother for malnutrition or for so-called breastfeeding failure can be found at all levels, from the overworked clinic nurse to the global communications system. However, in the absence of evidence to the contrary, we might well assume that every mother does her best for her children in her situation at the time, and with her knowledge at the time. As breastfeeding is sensitive to disruption, breastfeeding indicators may serve as the canary in a coal mine, giving an early warning of other stresses. Difficulties in infant feeding may indicate not that women are careless, but that they are prevented from providing their children good care and nutrition by underlying and basic determinants beyond their control.

Differences between Breastfeeding and Other Care for Nutrition

The child controls breastfeeding. A baby cannot be forced to accept the breast or to go on suckling more than she or he wishes. From the first day, if fed on demand, the breastfed infant controls time, length, and total milk intake during the feed. The intake and proportion of fat during a single breastfeeding correlate with the time since the last feeding. The child's suckling, if unimpeded from birth, can increase milk production as the child grows up to the age of 6 to 10 months. In contrast, bottle feeds and other foods are controlled by the caretaker, are usually less freely available, do not provide automatic increases in volume or adaptations in composition, and require a more intrusive style of feeding.

Breastfeeding ensures some degree of continuity of primary caretaker. Multiple breastfeeders for a single child are very rare, although they can exist, as with the 15 different women in a Jordanian village who breastfed a boy whose mother died in his infancy. Institutional initiatives

vary in feasibility. With breastfeeding, it has been possible to go to scale by establishing national policies to protect breastfeeding from commercial pressures, and to work through the maternity care institutions toward higher initiation rates. Other feeding is not so amenable to protection from adverse influences, nor are there institutions through which to affect household-level feeding behaviours.

In most cultures, there is social opposition to breastfeeding past a generally accepted age of the child. To breastfeed past this point may be seen as an indication of poor parenting. Giving other food to one's children may be hedged with cultural restrictions but is nowhere categorically condemned.

Breastfeeding is not the only traditional feeding practice being undermined by commercial forces. However, the profit-motivated competition with breastfeeding is global and pervasive. The issues are clearly delineated, and strategies to regulate this competition have already been articulated by the World Health Assembly and other agencies.

Normal Developmental Signals for Breastfeeding

Inattention to breastfeeding has characterized much Western child development research, which takes behaviours associated with artificial feeding to be the norm. The four-month-old who squirms away from close body and eye contact during feeds is showing an aversion response that may be observed in many artificially fed babies. This behaviour may not be perceived as suboptimal by researchers who have come to accept it as normal through primarily studying bottle-fed babies. At the same time, researchers may not observe or record behaviours particularly associated with breastfeeding, such as the en face close body contact during breastfeeding, the child's patting of the mother's breast, the vocal interactions during

milk feeding, the continuous nighttime contiguity, and the number of active responsive feeding episodes in 24 hours.

The breastfeeding mother's relationship with her child, seen by some researchers as a troublesome confounder that skews data, may instead be like the stray spore that spoiled Alexander Fleming's bacterial cultures—a hint at important unexplored terrain. All new research in this area should differentiate between exclusive breastfeeding, levels of partial breastfeeding, any bottle-feeding, and exclusive artificial feeding and should include trained observation of breastfeeds. Very little of the existing literature on care adequately reflects current knowledge about lactation. Specific training in feed assessment from specialists in lactation management will permit collection of less naive observational data.

Adequate Care for Mothers

The possibility that young women at risk of abusing their children might be helped toward more favourable relationships by early support for breastfeeding has not yet been explored. Observation of parent child feeding interaction suggests that certain correlates of difficult relationships may be commoner in non-breastfeeding dyads, such as eye aversion, lack of touch, and lack of synchrony. The possible factors of fear and insecurity arising from domestic violence, however, must be included in research that looks at any aspect of care for nutrition.

Helping mothers, during children severely at risk

What are the conditions in which parents have nothing left of energy or resources to invest in a child, and maternal responsiveness to dehydrated, malnourished, and ill children diminishes? Is it appropriate to intervene in such situations, and if so, how? In severely stressed Brazilian communities studied by Scheper-Hughes, because mothers are accustomed to respond to children's demands, if the

baby does not ask for food it may simply wither away more or less disregarded.

Investing resources In care for nutrition

In cultures where breastfeeding is customary, overall nutritional outcomes can also be poor. Even in impoverished settings, better weight gain may sometimes be seen among children who received bottles of milk and survived the much higher mortality associated with that feeding. Presumably the purchased object and contents indicate strong parental investment in the child—money for artificial milks and for more frequent health care at the very least, and time to prepare the feeds. It could be illuminating to delineate better the trade-offs between different forms of parental investment in care for nutrition, and to observe how parents make these decisions in resource allocation.

Increasing breastfeeding durations and ensure good complementary feeding as well

In many countries, the average duration of any breastfeeding may be between 6 and 15 months. Interventions achieving longer durations have yet to be developed, widely applied, and evaluated.

We also need to know what limitations on breastfeeding and what difficulties in the transition to other foods may affect families during the period of complementary feeding, between 6 and 24 months at least. For example, as a child grows, the family may insist that hunger for any food other than the breast should not be expressed, as in some sub-Saharan communities. The pattern of frequent breastfeeding that produced good growth at first may then be supplanted by a pattern of very brief breastfeeds, but without frequent meals.

Where good manners demand quiet waiting for other foods with the other children, punishment may be used to

teach the toddler not to express hunger. Where there are several children and no tradition of singling out the youngest for extra food, recommendations that toddlers be given complementary foods four or five times a day may be impossible to follow.

Breastfeeding or not breastfeeding affect care for the baby's siblings

Much existing literature studies the mother-baby dyad as if the existence of siblings was not the global norm. When a child is not breastfed, the family expenditure on breastmilk substitutes may be large enough to affect the dietary intake of all family members. In urban Bangladesh in January 1995, for example, a year's supply of the cheapest commercial infant formula required over 12,300 take (US\$310). A family that saved the money by breastfeeding could purchase 205 kg of rice, 91 kg of red lentils, 948 eggs, and 41 packages (16.4 kg) of dried full cream milk, if they used a quarter of the savings for each item.

Illness or death of the baby may also absorb a large proportion of family disposable income. No study has quantified the nutritional deficits and illness in other children that may result when a baby is not optimally breastfed. The implications of artificial feeding for the nutritional status and health of the baby's siblings can no longer be disregarded in research.

Value of breastfeeding In the second year

In order to advocate two years or more of breastfeeding, we need more complete knowledge of its nutritional, immunological, and cognitive effects on the baby and its nutritional and psychological effects on mothers and other caretakers. Studies of breastfeeding in the second year have often not observed the 24-hour breastfeeding pattern to determine if substantial milk transfer is taking place. The caretaker's management of other feeding also requires

careful observation. Existing evidence about nutritional effects of sustained breastfeeding is therefore ambiguous due to lack of such data.

In Mali, where breastfeeding continued on demand for sustained periods, a study found that many children improved growth after weaning, as did a less well-controlled study in Ghana. However, a Burkina Faso case-control study showed that malnourished children between 12 to 36 months of age were more likely to be receiving no breastmilk than were adequately nourished children. The researchers concluded that there was no evidence for a detrimental nutritional effect of sustained breastfeeding, although they acknowledged the possibility that mothers had stopped breastfeeding because the child was sick or malnourished. In rural China, positive associations have been found between nutritional status and breastfeeding between 12 and 47 months of age. More carefully collected and analysed data, including observation of feeding behaviour, are needed.

Nutritional Needs for Mothers during Sustained Breastfeeding

Studies of mothers and their nutritional status during two years of breastfeeding are long overdue. The nutritional circumstances under which extended breastfeeding contributes to maternal depletion are not known. In women who are not nutritionally depleted, lactation may actually improve maternal health by inhibiting menses, preventing pregnancy, increasing eventual bone density, and preventing cancer.

Breastfeeding affect child development and parental responsiveness in the long term

Mothers who have bottle-fed some babies and breastfed others report that the feeding does make a difference in their relationships with their children. Since anecdotal evidence abounds but controlled studies do not, it could be

helpful to follow for some years two groups of mothers who intend to breastfeed: those who breastfeed only a few times and those who breastfeed close to the optimal pattern.

Effects of pacifiers (dummies)

Pacifiers are suspected of causing low breastmilk production, the shift in a baby's suckling technique often called nipple confusion, and a switch to artificial feeding. To the extent that pacifiers are used as a substitute for caretaker investment of time and attention and to make the child accept distance from parents, they may also affect care.

Successful strategies

International breastfeeding programmes have demonstrated some possibilities for bringing care for nutrition into the arena of governmental action and support.

Global advocacy

The Innocenti Declaration and the World Summit for Children, both in 1990, produced a joint political commitment to improved breastfeeding. To some extent this made women's breastfeeding and caring activities more visible. Strategic advocacy by UNICEF and others, focusing on the Innocenti operational targets and the mid-decade goals derived from World Summit goals, has ensured that breastfeeding is now part of all national health agendas.

An international initiative

The BFHI, which includes both community and hospital support for breastfeeding and ending the supply of free or low-cost breastmilk substitutes to healthcare systems, has further focused national and international attention. A key

feature of this initiative is its global nature, the first UNICEF programme that is needed as much in industrialized nations as in developing countries. Its common ground is the Joint Statement of WHO and UNICEF of 1989, "Protecting, Promoting, and Supporting Breastfeeding: The Special Role of Maternity Services", defining the ten steps whose full implementation helps a hospital to earn the designation "baby-friendly." As of March 1995, more than 3,000 hospitals around the world in 86 countries have been awarded this recognition.

The BFHI provides a common framework for diverse country-level approaches to increased breastfeeding. Mothers not choosing to breastfeed also benefit from baby-friendly practices: being in skin-to-skin contact with their baby, rooming in, feeding on demand, and being protected from commercial influences that might impede their freedom of choice.

Strategies of the BFHI applied at the country level usually have included advocacy to policy makers; public communications; provision of training, technical support, and consulting; and recognition of accomplishments through hospital assessment and designation. An interesting side-effect of this global effort has been the spontaneous development of adjunct strategies nationally to improve maternity legislation, make breastfeeding easier for hospital staff to promote, improve obstetric care and strengthen Safe Motherhood programmes, or establish better home delivery care.

Community support

The majority of breastfeeding difficulties arise from practical or cultural rather than medical conditions. Community support for breastfeeding has helped women to answer their questions, to increase the exclusivity and duration of breastfeeding, and to provide integrated child health and care advisory support.

Empowering women through fostering community level breastfeeding support groups, step 10 of the BFHI, is perhaps the most problematic. It must be carried out at the community level, where hospitals rarely have effective outreach and existing social structures may not be suitable for mother-to-mother help.

In order to be effective, community support work may address both the immediate and the underlying causes of difficulties: for example, improving the baby's intake of breastmilk while building the parents' confidence and responsiveness and providing accurate information. The Nursing Mothers Association of Australia, the La Leche League of Guatemala, and the Breastfeeding Information Group of Kenya exemplify freestanding programmes that help women although they are unattached to particular health institutions. Access to help is ensured through telephones, regular presence at clinics, or networks of neighbourhood counsellors. Mother-to-mother communication and help are fostered in group meetings, facilitated by leaders with sound knowledge and counselling skills.

An intermediate hospital-community programme is represented by a peer counsellor initiative begun by a group of health professionals and community women who formed the Chicago Breastfeeding Task Force (CBTF). Young mothers of various ethnic groups and economic levels are trained by the group, and then give volunteer counselling aid, with backup supervision as necessary, to other mothers in their communities. The reading load for training is not heavy, and the pedagogical approach is based on the work of Paulo Freire. The CBTF is now an ongoing programme of the large, urban Cook County Hospital, while retaining its woman controlled and community-based nature.

Community breastfeeding programmes may affect caring practices other than infant feeding. The woman

empowered to breastfeed and given self confidence may turn to the same source to discuss immunizations, child illness, family relations, and child rearing generally.

Personal empowerment

Breastfeeding support that reinforces the mother's skills works in the long term to encourage breastfeeding for all the children in a family. The woman who has breastfed her first child exclusively for some months and then continued for about two years will almost certainly breastfeed her subsequent children. Studies of long-term breastfeeders in the United States have found that these mothers tend to breastfeed each successive child longer. However, when they are chronically undernourished, mothers tend to breastfeed less, as they feel their strength diminishing; psychological empowerment must be accompanied by nutritional and other support that gives women strength.

Permanent disempowerment can take place when a woman starts her first child on early breastmilk substitutes. She often comes to believe that she is incapable of breastfeeding without supplements and that the supplementary bottle is the real food. Within a few months, breastfeeds may be eliminated, even if the baby shows no nipple confusion. If the second baby is also given bottles, the mother, whose confidence in her ability to breastfeed is now severely damaged, may not breastfeed any subsequent baby exclusively unless she receives help and reassurance on a daily or weekly basis during the critical early weeks of the new relationship. Fortunately, since the reason that a mother does not produce enough milk is rarely physiological, timely and accessible support can almost always ensure comfortable and exclusive breastfeeding.

COMPLEMENTATION, AND CARE OF SUSTAINED BREASTFEEDING

The duration of breastfeeding, especially exclusive

breastfeeding, may have decreased in some areas in recent decades due to inappropriate messages from health workers, in part due to a lack of careful definitions. A schematic figure depicts four separate processes, each referred to at times as "weaning." To reduce the incidence of early cessation of breastfeeding, it is important to separate the "complementation" and "replacement" components.

Modernization processes such as urbanization can occur so rapidly that new ideas for achieving infant care goals may be needed. However, in relatively stable resource-poor settings, care strategies such as sustained breastfeeding are likely to be well adapted, and outsiders would be wise to focus on protecting them. Indeed, breastfeeding programmes should place priority on protection (marketing codes) and support (breastfeeding-friendly practices at delivery and support measures for women in the market labour force) before promotion (mass media).

The younger the child, the more his or her physical as well as emotional welfare is dependent on care. Yet, the time and knowledge required for proper feeding increase to a maximum when the child is 6 to 18 months old. Up until 6 months of age, breastfeeding can meet the infant's nutritional needs; any additional time and resources spent on feeding of supplements are usually unnecessary and may be harmful. Most of the basic knowledge required in these first months is "automatically" transferred as a part of growing up and becoming a mother in traditional cultures. As the child grows older, language capabilities and motor skills enable him or her to better express and independently respond to his or her own hunger signals.

Breastfeeding contributes to care by fostering mother-infant bonding, stimulation, and skin and eye contact, as well as providing high-quality nutrients hygienically and countering infection. Human milk appears to contain

factors that promote brain growth and development, particularly visible in infants born pre-term. Breastmilk is rapidly digested. When breastmilk forms all or nearly all of the infant's food, the infant will want the breast open, and this will naturally lead to frequent contact between mother and infant.

Bottle-feeding levels reached their height in the West by about 1970. By that time Western culture was so bottle-oriented that it was assumed that there were no differences, even psychologically, between bottle-feeding and breastfeeding, as long as the bottle-feeding mother looked at and fondled the infant. This no doubt influenced the type of research done at the time.

Advantages of Sustained Breastfeeding

Breastfeeding for three years or longer is not as uncommon as most researchers assume, either in developing or in industrialized countries, though clearly prevalences are higher in the former. Even in developing countries, little attention is given to breastfeeding that takes place for several years. Some researchers seem unconsciously to adhere to norms that lead them to expect that little if any breastfeeding is taking place after a certain age (often two to three years).

A major reason for practicing sustained breastfeeding in industrialized countries in the face of social disapproval has been the belief that it provides a closer bond between mother and child. These children are often said to be more secure and more independent. They continue to remember this close bond, and their mothers believe that it continues, in some sense, even into adolescence, easing the difficulties in the mother-child relationship.

There are unquestionable nutritional and economic advantages of sustained breastfeeding. Even beyond infancy, young children return to the breast for comfort when they are sick and anorexic and thereby passively

receive more food. In poor countries, breastmilk can play a key role in vitamin A nutrition, irrespective of the child's age.

Its effects in promoting child survival seem to be more distinct than its effects in promoting child growth. For older children in very poor situations where household access to food is highly insecure, breastfeeding may have a trade-off effect, providing an increased chance for survival but at the cost of a reduced growth rate. If so, this would be an exception to the usual situation, in which increased growth is usually assumed to be a proxy for health and survival.

The duration of breastfeeding (as well as its exclusivity) does contribute to longer birth spacing. An extreme example of the importance of this for child survival is seen in Yemen, where combined breastfeeding and bottle-feeding was the norm according to the 1979 National Nutrition Survey. The 1979 World Fertility Survey estimated that only 2% of couples practiced a modern family planning method. Abstinence in this traditional Muslim setting was mandated for only the first 40 days. Thus breastfeeding practices were the major determinant of birth spacing. Mortality rates were much higher for younger infants when birth spaces were shorter, as well as for children one to four years old: when the birth space for the subsequent child was less than 24 months, the one- to four-year-old death rate was 141/1,000 alive at that age; with a birth space of two to three years it was 18/1,000; for three to five years it was 2/1,000; and for longer birth spaces it was 3/1,000.

As the recent adoption of "triple nipple" (combined breast and bottle) feeding has led to shorter birth spaces in Yemen, many women now are attempting to care for three or even four children under the age of five and cannot cope. Many who did breastfeed longer than average said they did so to achieve longer birth spacing. This birth spacing effect of breastfeeding has long been recognized by women in

many countries, although it may be less clear in areas where early supplementation is now the norm. In Ethiopia many women reported stopping breastfeeding in order to have more children.

Constraints related to care

The many factors that lead to less than optimal infant feeding patterns can be divided into "ideational" (knowledge, attitudes, and beliefs, often culturally informed) and "external" constraints. It is commonly assumed that "external" constraints are mainly responsible for the fact that exclusive breastfeeding is rare, particularly its high opportunity cost, at least in modern settings.

Any other kind of infant feeding requires someone to devote time specifically to food preparation, feeding this food to the infant, and maintaining hygiene during preparation of the food and cleaning of utensils (especially time-consuming where clean running water and modern cooking and refrigeration facilities are lacking). In artificial feeding, some of these time-consuming steps are often cut down beyond what good hygiene demands. Even when women are educated and make an effort to clean the bottle properly, resource constraints can prove impossible to overcome.

Other efforts to save time include offering older infants gruels either in a bottle (with the nipple cut open to allow a thicker fluid to pass through) or in a feeding cup with a lid and a perforated spout. The reason often given for adding solid foods early is that it reduces the frequency of infant crying, allowing the mother to get on with her work. Pacifiers (also called "dummies" or "soothers") are used for similar reasons. Much of this infant crying may be due to hunger or inherent sucking needs, but part is probably related to needs for care and comfort. Thus some of the "premature" supplementation seen in the early months of life throughout the world probably reflects an attempt to

cope with time constraints that prevent mothers from providing as much care as their infants need.

In using an economic model, it was pointed out that these ways of saving time incur other costs. Bottle-propping deprives the infant of body and eye contact and stimulation and may lead to increased ear infections. Older infants who carry the bottle around with them make little effort to keep it free from dirt and flies. Increased illness results in high costs for extra care. However, individuals are usually not aware of the trade-offs involved (in part due to lack of understanding of the causes of disease and malnutrition in infants) or feel they have no choice. Piece workers, for example, even if they work at home, may consciously reduce breastfeeding to increase the time available for earning money.

Furthermore, although other forms of feeding require more time than breastfeeding, they do not necessarily require the mother's time. The availability of very low-cost forms of child care probably leads to decreased breastfeeding in situations where opportunity costs for child care by the mother increase (e.g., when new demands are placed on the mother's time or when new opportunities arise for income earning). Then grandmothers, sisters, or others take over more of the care and feeding responsibilities for the young child. However, potentially negative trade-offs are involved here, too, particularly when young girls stop school to take over child care responsibilities.

The poor caring capabilities of uneducated younger siblings and housemaids are also sometimes cited by mothers and researchers as a cause of malnutrition. In a study in Sierra Leone, children who were sent away from their mothers suffered from higher mortality rates only if they were young at the time, suggesting that the biological mother's role in care is superior only at earlier ages, perhaps due in part to breastfeeding.

Breastfeeding may explain the evolution of patterns of child care based on the mother as the major caregiver at least during the early months of life. In traditional settings it is rarely perceived as something separate from or additional to her other child-care responsibilities. Breastfeeding commonly is done at the same time as the hands are busy with something else. Young babies are swung around from the back to the front to breastfeed. Older children take the breast on their own when it is easily available. In either case the mother may pay no attention and continue undisturbed with her work or sleep. When women do choose to take time off for breastfeeding, they sometimes describe this as a necessary rest and an advantage of breastfeeding. Breastfeeding even provides women with special status and benefits in some cultures.

In a study of several subsistence cultures, it was found that women tend to perform tasks compatible with child care. These tasks characteristically take place in an environment not likely to pose dangers to a young child, are repetitive and can be easily interrupted, and are carried out not too far from home. However, women lose power over the nature and location of their work as needs for earning cash increase.

In addressing this problem, attention commonly focuses on the need to overcome constraints for many employed women workers. This is an important strategy, especially for women working in the health and education sectors, since they are influential in society and could help lead the way towards change for others if enabled to care for and breastfeed their own infants better during the first year or so of life. Women doing paid agricultural work and employed in the informal sector also need to be enabled to breastfeed as much as possible, although little attention has been given to how to meet their needs.

"Ideational" factors are also important in explaining the lack of exclusive breastfeeding. In many cases, women need

not only to be "enabled" through correct information (rarely available where health workers are inadequately educated regarding breastfeeding or where the infant food industry is the major source of information) and assisted with health and lactation management problems that may interfere with breastfeeding. They also need to become "empowered" through emotional and practical support from their peers, spouses, employers, and others.

In traditional rural settings, approaches dealing with ideational aspects alone may be able to increase rates of exclusive breastfeeding substantially. In these settings, neither the financial nor the opportunity costs of breastfeeding are nearly as great as those of supplemental feeding, particularly where women's economic activities tend not to conflict much with breastfeeding. Information on the value of exclusive breastfeeding and the dangers of feeding unnecessary supplemental fluids is rarely available in appropriate or credible forms.

Like other aspects of infant and child care, breastfeeding is often considered unimportant or at least something simple that women can take care of alongside other tasks society expects them to handle. Women have been left to cope as best as they can, often expected to achieve some kind of "supermother" ideal of combining productive and reproductive work, with little support for either. If the importance of exclusive breastfeeding were appreciated, and if the trade-offs for not doing it were explicitly visible to all, society would make an effort to ensure that ideational and external constraints did not interfere with it.

In some settings the major resource available that could increase support for the breastfeeding mother would be the free time that fathers tend to have more of than mothers. However, models are needed to encourage men to provide a wide range of support in child care and household chores. Lacking this, the main model being offered in many places

now is the advertisers' image of the father bottle-feeding his baby.

Complementation Process

Thus mothers are rarely advised how to achieve complementation, that is, to avoid unintentionally replacing breastmilk by providing so much additional food and fluid that breastmilk production is reduced. Advice commonly a part of nutrition education, like, "Feed solids to your baby x number of times starting at age y months," does not even indicate the desirability of complementing rather than replacing breastmilk. Attention almost never focuses on how much breastmilk the child receives after the period of exclusive breastfeeding. It is assumed that breastmilk quantity gradually declines from high levels a few months after delivery to low levels a few months later, and that both of these levels are somehow biologically predetermined rather than the result of largely behavioural factors (e.g., frequency and intensity of suckling).

The components of the overall "weaning process" can best be illustrated by comparing a purely schematic plot of the infant's approximate total daily nutritional requirements with the amount of these nutrients that might be provided if the mother breastfed exclusively for the first six months and continued to breastfeed fully but with adequate complementary foods for many months thereafter. Four of these components are sometimes individually referred to as "weaning," but often the meaning is uncertain or vague. Numbers 1 and 2 refer to the initiation of breastfeeding and the period of exclusive breastfeeding.

The zone containing the number 3 illustrates complementation, and the dotted plateau at 4 illustrates the desirability of continuing to breastfeed at the same level even once complementation begins. The 5 is located in the area that illustrates replacement. Finally, the word "wean"

has commonly been used to refer to the cessation of breastfeeding (number 6), something else to which the child eventually must accustom himself.

When solid foods are added to the diet of exclusively breastfed infants in the United States, a partial replacement of breastmilk occurs, even when the mothers are "advised to maintain the same nursing pattern, not to decrease nursing frequency, and to feed solid foods after nursing". However, it cannot be assumed that such advice is optimally effective. Whether efforts to provide more effective communication and support can help women to achieve complementation without replacement needs to be tested.

Achieving conceptual clarity on this issue has been complicated by the fact that in industrialized countries (and among the urban elite in much of the developing world), many women begin reducing how much they breastfeed already by six months of age or earlier. They often do not sleep with their baby, carry the baby on their body, or provide the breast very often for comfort or other purposes besides feeding. For them (and the health care establishment that advises them to care for their infants this way), how to achieve complementation without replacement has never been an issue. Replacement feeding with various liquids is intentionally started in the early weeks of life.

In a controlled experiment in Honduras, infants offered complementary foods at four months of age consumed slightly less breastmilk than those who were offered nothing extra. By six months of age, there was no difference in growth rates between those who received complementary feeding and those who continued exclusive breastfeeding. Since the foods in the experiment were sterile and of high nutritional quality, complementation before six months of age in a poor setting would probably have a negative effect on growth.

However, until there is widespread cultural support for exclusive breastfeeding for six months (including among women working for pay), it is likely that very few women will be able to achieve it. The question of how many women may be physically or nutritionally unable to achieve it can be studied only incompletely until these cultural barriers are removed. The net effect of delaying complementation even later than six months also needs to be studied under different conditions if possible.

RECOMMENDATIONS IN RESEARCH DEVELOPMENT

People living in a relatively stable, resource-poor setting have developed approaches for care that are in many respects superior to anything that an outside agency or even a change agent from the nearest town could improve on much. Under conditions of rapid change, however, such as urban migration, much assistance and support may be needed.

Research on care could advantageously be done jointly or in "mirror studies" where similar protocols are used in both developing and industrialized countries. Care is an area in which anthropologists from developing countries could probably offer a lot to those dealing with the serious care deficiencies existing in most industrialized countries. The care aspects of exclusive breastfeeding as well as sustained breastfeeding deserve attention in both contexts, where policy makers, health workers, and others may be uninformed.

Intervention to increase the duration of breastfeeding is a huge topic integral to the entire question of how best to protect, support, and promote breastfeeding. Research should focus on the cultural factors that protect traditional practices of sustained breastfeeding. The advice and counsel of older women should be sought in cultures where the duration of breastfeeding appears to have declined in recent decades. Although protective actions deserve first

priority and are least likely to do harm, this does not mean that everything traditional is rational or needs to be protected.

Breastfeeding appears to work best in a carefree environment where it is given little specific attention by most women except when they perceive problems. Except in these self-perceived problematic situations, there is a danger that intervention will change perceptions about breastfeeding, with results that are difficult to predict. We know from historical experience that breastfeeding is biologically extremely robust but psychologically vulnerable. Thus breastfeeding projects should pilot promotional and supportive approaches before implementing them on a large scale, especially in countries where the median length of breastfeeding is still greater than one year or so. Even in countries where the duration of breastfeeding is already short, breastfeeding programmes have a responsibility to document what actions are taken and their impact.

Emphasizing the importance of breastfeeding may be a useful component of a breastfeeding programme, but must avoid putting pressure directly on women to breastfeed. If such advocacy does succeed in convincing leaders and decision makers of the importance of breastfeeding, it must be followed up with demands that society meet the needs of breastfeeding women and children.

The breastfeeding component of good infant care can be achieved only when adequate attention is given to the care of the mother. Women wanting to practice exclusive breastfeeding and full breastfeeding with complementation thereafter should be provided with correct information and relieved of nutritional and work burdens that stand in their way. Both the men in their families and society at large have roles to play in providing this support. The perception that these kinds of demands are radical or unrealistic may be characteristic of societies in which awareness about the

importance of breastfeeding is lacking or where the needs of women and children are considered to be of secondary importance.

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Factors Influencing Quality of Care

Household food security, health services, a healthy environment, and care for women and children are considered the underlying determinants of child survival and development.

MEASURING CARE

Access to health care and household food security are both easier to measure than care. Care requires attending to relationships, experiences, values, ethics, and emotions, the study of which runs counter to much of Western scientific tradition. Instead we rely on indicators or proxies that are measurable through psychological, economic, or nutritional instruments. Often these fail to capture the context within which caring relationships develop. These indicators include the time it takes the caregiver to respond to crying (distress signal), the proximity of the caregiver to the infant, caregiver availability, and breastfeeding rates as measures of care. Just as it would be difficult to find adequate indicators for spiritual values, there are few indicators that capture the complexity of care.

Psychologists have identified some possible scales. A working definition identifies caring capacity as “the ability to perform care behaviours, to use human, economic, and organisational resources to the benefit of infants and young children”. Researchers select certain factors for particular

attention, as was done in a study of child health in a Cairo settlement:

Among the multiplicity of resources which may be studied, we selected three as being particularly important in shaping the quality of the growth environment for children. These are the level of earned household income, the quality of housing as represented by the joint availability of piped water supply and a sewer connection, and the educational level of mothers ... Formal education for females, if sustained until a socially recognised minimum threshold such as primary schooling is thought to produce a different attitude towards one's personal relationship to the environment whereby one tends to view the world more as an actor than as a spectator.

However, variables such as women's education often presume a Western notion of self and result in policy suggestions such as consciousness-raising and assertiveness-training for women without adequately considering how nurturance fits within indigenous systems of gender ideology.

Care as Women's Work

The Women in Development (WID) literature of the 1970s and 1980s confirmed the degree to which women's work is undercounted and undervalued. However, in most economic surveys, work is still defined as an activity that produces cash income, and women are classified as either economically active or inactive. Further distinctions are made between full-time or part-time work, more or fewer than 40 hours per week, year-round or seasonal work, work at home or away from home.

Even in time-budget or time-allocation studies, child care, breastfeeding, and other caring tasks are either ignored or considered leisure activities. Perhaps two of the most inappropriate census categories are the "economically

inactive homemaker" and the "unpaid family worker." However, caring activities are very often carried out as part of joint production (occupying the same time and space as other tasks):

Patterns of women's time allocation were found to show great variability, both from household to household, and within households on different days .. . Child care which was analysed as primary (when no other task was being performed) or secondary (if there was no easily calculable "opportunity cost" to another activity such as food preparation or cash work) varied from 10% to 50%.

There already exist substantial literature reviews of the relation between women's work and child care, including breastfeeding. A review on breastfeeding and women's work reported studies that cited women's work as being influential in the mother's infant-feeding decision, starting the bottle, or stopping breastfeeding, and concluded that employment outside the home is not a major reason for not initiating breastfeeding starting bottle-feeding, or terminating breastfeeding.

In short, contrary to many common perceptions, there is little empirical evidence that women's employment of itself need necessarily affect breastfeeding negatively. This is not to suggest, however, that maternal employment is not a factor in decisions regarding breastfeeding. In most situations, modification of the work environment would increase women's options regarding infant feeding, so that women who choose to breastfeed would not incur a high opportunity cost for that decision.

Leslie's reviews of child care are also significant. She argues, "The majority of women of reproductive age in industrialised and less developed countries alike face the need at some point in their lives to combine economically productive work with nurturing their children". Mothers who are not working may be better able to ensure frequent meals and to monitor intrahousehold food distribution to

ensure that weaning-aged children get their fair share. On the other hand, mothers who are working may be better able to purchase the more expensive oils, legumes, and animal source proteins needed to provide energy- and protein-dense diets for their weaning-aged children.

Work Contexts

Women with children must work out ways to integrate their productive and their reproductive lives. The following ethnographic examples illustrate the wide range of contexts in which women combine child care with other kinds of work. Note that, as with the integration of breastfeeding and other work, caregiving always requires trade-offs or adjustments; there is no one simple natural way to reconcile these tasks.

Caregiving in Small-scale Societies

Contemporary hunting and gathering societies provide examples of economic and social strategies that are almost forgotten as human alternatives. The relationship between the productive and the reproductive spheres of women's lives can be seen most clearly in small-scale societies such as the hunting and gathering people of northern Botswana, the Kung San. Here, women are both producers of food and reproducers who bear and raise the next generation. Women are thus at the intersection of two critical systems within the foraging economy: the productive system and the reproductive system, each with its conflicting demands.

In this society, breastfeeding continues into the third or fourth year and is frequent, on demand, and spaced throughout the day and night. However, changes in the subsistence system—a shift to settled village life and use of more cereal gruels for child-feeding, for example—upset this delicate balance between productive and reproductive work (in this case, mediated by lactation amenorrhoea). The result is more children and less breastfeeding. “Clearly,

marked changes in the patterns of child care and maternal behaviour will be required before the Kung can adjust emotionally to their new economic and demographic realities”.

Care for the elderly is a task shared by all adult members of the community. Caregiving and sharing are considered a natural part of being human, and myths reinforce what the world would be like, should caring and reciprocity cease.

Peasant communities follow a wide range of practices that may limit women's capacity to care for their children. In Melivar, a village on the outskirts of Mysore, India, an anthropologist studied poor women who needed to work in the fields or at other menial jobs before their babies were six months old. A young mother coping with hard physical labour outside the home, and without another woman to share the workload, was ready, even eager to give up breastfeeding as soon as the baby could manage without it.

The lace makers of Narsapur, India, integrate domestic work and child care into commodity production by making lace at home. Women shift between different types of work, none clearly demarcated from the other in spite of the Western terminological distinctions between productive and reproductive work. One 22-year-old mother whose labour time was carefully calculated worked about 13.5 hours per day, spending 5 hours and 55 minutes making lace, 1 hour and 17 minutes on other productive work, and 6 hours and 18 minutes in household work and child care, including breastfeeding (approximately 1 hour).

A report on infant-feeding practices in a mountainous region of Nepal underscores the difficulties women face when they work in places physically (and spiritually) dangerous to infants. The problems of transport and arduous travel in a region where there is a demand for women's agricultural labour result in breastfed infants receiving early cereal supplementation. When this is

introduced depends on the seasonal cycle and other subsistence considerations, rather than religious or ethnic identity.

A study in Nepal showed that "a strategy of combining work with child care is conditional upon a particular combination of ecological and socio-demographic characteristics, such as the seasonal demand for labour, the geographical dispersion of family members in nuclear families, long birth intervals, and an egalitarian and flexible distribution of work".

These examples from rural peasant communities suggest that our assumptions that women engaged in agricultural labour have no difficulties integrating work and child care are inaccurate or oversimplified, at best. In fact, rural women often face greater difficulties than urban women because there are seldom any child-care facilities available and the agricultural work is physically demanding. Policies addressing the integration of work and child care should also be directed to the work contexts of rural agricultural workers. Currently, few policies address this group of women.

Urbanisation and Change

Small-scale communal societies and even peasant villages are rapidly disappearing or being affected by global processes. These changes affect caregiving strategies. Although urban women will take advantage of opportunities for informal, temporary work, lack of preparation for the work opportunities and the inability to plan ahead cause disruption in child-care patterns for those women in the informal economy. Opportunities to bag charcoal, repair roads, collect and dry plastic bags, or sell a windfall of goods mysteriously obtained take priority over the needs of infants and young children. Mothers cannot plan for these occasions; they never know when work will be available. If they are able to obtain work for

a few days, the pay is too low and the occasion too brief to employ household help. In this situation, infants are left in the care of neighbours or relatives.

Although these work opportunities cannot be anticipated, informal work can often be carried out at or near home. In these cases, work and care of infants are compatible. For the majority of the urban poor, regular salaried employment is rare. It is only monthly salaried workers that receive either maternity leave or maternity entitlements of any kind. More often, women workers are fired when their pregnancy becomes obvious.

Another factor affecting women's capacity to care for their infants and young children is scheduling. Unpredictable shift changes, night work, and lack of control over work schedules make child care difficult. In addition, the patterns of feeding for infants and young children may change significantly from the beginning to the middle or end of the month or pay period, depending on available income.

There is a shortage of part-time jobs for women in cities like Singapore. Many do shift work in the electrical or electronic industries. It was reported that 58% of 16,017 shift workers in 419 manufacturing firms were women. Singapore women take up permanent night work nearly three times more often than men in order to meet their family obligations. A study of the child-care problems of low-income mothers found that 43% of the working mothers were shift workers. Often, women send their children out to board or to live with relatives and visit their children on weekends or less often. "The issue of whether a married woman can successfully combine home and a career arouses a strong emotional reaction from the public, which demonstrates that women's work is now defined as work outside the home and is therefore considered incompatible with family responsibilities".

In a breastfeeding study in a small Iranian city, the investigator found that for those women who were well educated and employed outside the home, the schedule of working from 8 a.m. to 1 p.m. and from 3 p.m. to 6 p.m. allowed them to breastfeed. Those few working women expressed no difficulty with breastfeeding because of this work schedule. However, in larger Iranian cities such as Tehran, work schedules were from 8 a.m. to 5 p.m., a pattern particularly difficult for employed breastfeeding mothers.

Scheduling, transportation, and predictability of work emerge as particularly important factors influencing caregiving in urban settings. In both homogeneous, small-scale societies and peasant communities, women are increasingly entering the cash economy and assuming new kinds of work in addition to domestic tasks. Even rural work is becoming more incompatible with child care, as population increase and environmental degradation encourage shifts to cash crops and increase the distance between home and fields. In addition, agriculture is becoming increasingly dependent on fertilisers and pesticides that make fields unsafe places for infants and children.

The migration of male family members into urban areas further increases women's workloads. Work sites are often more distant from a woman's home and family, requiring longer transportation time and higher costs, and adherence to fixed schedules. Cultural strategies that were effective in helping to integrate child care into old work contexts may well be unsuitable in these new work contexts. In addition, only rarely will newly industrialised countries implement legislation to protect working mothers. The countries' need for export earnings to pay off international debts means that industries must reduce costs to remain competitive. Hiring women at low salaries with no benefits is the most common cost-saving strategy.

The pressure on women in developing countries to enter the industrial work force is triggered by the need to offset the drop in earnings or unemployment of other household members. This increase in women's labour force participation decreases the amount of time mothers can allot to child care. Yet conditions often make it increasingly difficult for women to arrange adequate child care. Structural adjustments imposed by the World Bank and International Monetary Fund discouraged further government expenditure on social services, health, and education. In addition, national commissions on the status of women have not always been willing to give maternity entitlements priority over or even include them with other equity and justice policy issues.

CHILD-CARE DIFFICULTIES

Child-care difficulties epitomise the problems women face in integrating mother-work and other work. Only in child-focused societies do mothers have the social support necessary to delay their return to full-time work. Most women face questions about who will care for their infants, where this care will be located, and how much the care will cost—either in money, goods, or influence in the family.

Women who make use of reciprocal child care among informal groups of relatives or neighbours can only work part-time or sporadically because they must reciprocate by caring for other children. Women need dependable long-term child care with no reciprocal obligations if they are to take regular formal employment or travel long distances. However, informal and formal communal child care is compatible with shared breastfeeding, as has been demonstrated in the Philippines and elsewhere in Southeast Asia.

In capitalist economies in developed and developing countries, and even under socialist policies, employers are generally loath to take on the expense and responsibility of

assisting their employees with child care unless required by the state to do so. They are even less likely to do so if employees and unions do not make such a demand. However, child care is beginning to be incorporated into the benefits packages of some corporations that need to retain their skilled women employees. Nevertheless, it is clear that in North America, this is not yet a priority.

Finding and paying for adequate infant and child care is a concern for all mothers whose household arrangements do not include a capable adult who is prepared to take on this task. It is not a problem faced by breastfeeding mothers alone. But the breastfeeding working mother faces additional problems if the child minder is not supportive of breastfeeding. In small-scale and child-centered societies, this need not pose a problem if the mother can be called home to feed a hungry infant. In systems where work takes precedence over family responsibilities, it may be more difficult for mothers to respond to the changing demands of a growing infant when their workplaces are farther from home. In these cases, it is important for the child minder to be familiar with the care of breastfed babies and prepared to cope with a hungry breastfed baby whose mother is late from work.

Mothers of newborns take on new child-care tasks in addition to other tasks. Mothers simultaneously participate in social relationships that may affect how they relate to their infants. Those most likely to influence the care of infants include relations with siblings, grandmothers, and co-wives.

Sibling Caretakers

In studies of custodial care, sibling caretaking is generally seen as inadequate when the sibling is young (< 15 years of age). This is because the sibling may be too young to physically carry and care for the child and too inexperienced to know how to meet the child's needs for

food or cleaning; also, the caretaker may miss school or other valuable experiences by having to care for a sibling. "Evidence of failure to provide good care in humans exists but is anecdotal; child caretakers are likely to be clumsy ... neglectful of their duties ... and distracted by the games of other children".

There is no consensus on the effect of sibling caretakers on infant health. "It has been suggested that the distress caused by the mother's absence is much lower if there are other individuals available who can substitute for the mother ... although the effects of using sibling caretakers on infant survival are as yet unknown in any society".

In rural Thai society, adults will specifically identify the sibling to whom they are closest because they helped raise that child. Because the older sibling was totally responsible for the welfare of the younger sibling, the relationship between the two may be qualitatively different from relations with other older or younger siblings. There is a gender bias in sibling care incidence, but although sibling caretaking may be more common among girls, birth order may also be important.

In developing countries, sibling caretakers often take responsibilities for both infants and toddlers while mothers work, including entertaining, carrying, protecting, bathing, and feeding children. Children as young as five years of age care for their younger siblings and may be responsible for taking infants to their mothers while they are in the fields. The older sibling helps look after a baby when there is no caretaker available, as is often the case when nuclear families work singlehandedly rather than joining forces in a labour group.

In a review of sibling caretaking, the authors noted that social-structural conditions such as work pressures on parents, the structure of the daily routine, and kinship and residence patterns interact with demographic circumstances (such as numbers of children available in the

household and family size) to determine the likelihood and incidence of non-parental, child-child caretaking ... sibling care was more likely to occur when more children were present around the target child in the settings, the child was further from the home, and the daily schedule found the mother away from the home.

They concluded that we need to know more about the ethnography of the situations where cultural members (siblings among themselves, or mothers and their children) disagree regarding assignment of caretaking responsibility. Our analysis points to the kinds of circumstances where a more intensive study of how caretaking roles are assigned, self-ascribed, and denied would be most fruitful.

Role of Grandmothers

In many societies, grandmothers are the preferred caretakers of infants and toddlers. There has not been enough research to determine just how often a grandmother's care extends to breastfeeding her grandchildren. In some circumstances, infants from urban slums are sent back to rural communities to be raised. In Thailand, for example, the mother's mother or father's mother might raise an infant with the assistance of occasional funds from the parents. The parents' low income might not be adequate to care for an infant in Bangkok, but the extra money sent upcountry can more than compensate for the extra mouth to feed.

When grandmothers reside with the new grandchild in the city, they commonly assist their daughters after childbirth and might provide the support necessary for successful breastfeeding. Yet in Bangkok, for example, grandmothers are equally likely to encourage the use of breastmilk substitutes to relieve the mother entirely of her responsibility for feeding the child so that she can work full time. This may be one way an elderly member who no

longer contributes financially to the household can increase her influence and importance in the household.

Similarly, in the Philippines, the "presence of a grandmother significantly increased the likelihood that these mothers of young children would be working outside the home or in wage work paid on a time basis ... This is not surprising since grandmothers (either maternal or paternal) are the most frequent care givers for children when mothers work".

Co-wives and Husbands

Few studies consider the effect of fathers or plural spouses on child care. However, in a study of infant care among the Kipsigis of Kenya, no difference was found in quality of care between married women in polygynous and monogynous households. Although the mother may benefit from membership in a polygynous household insofar as the provisioning of infant care is concerned, the quality of infant care may not be affected. Infants may be affected by their mothers' marital status in that wives in a polygynous household individually may not be as well provided for, but cooperation between co-wives can be advantageous to both women and infants. It is critically important to examine the practices of fathers with regard to caregiving.

Coping with Child-feeding

In many societies, feeding is synonymous with care. Minimally, it is a metaphor for care. Consider the meanings of nurture in English. Child-feeding is a high-periodicity task; that is, it is non-postponable and must be undertaken frequently. It is generally seen as low-status work because it reduces the flexibility of the person assigned to this task. Although child-feeding is almost always considered the responsibility of the mother, she may delegate the task to a person of lower status, most commonly a young daughter.

The nutritional factors that influence dietary adequacy include: frequency of feeding;

- amount of food in meal;
- energy and nutrient content of food;
- utilisation of food within the body.

These factors are part of the caregiver's strategy for integrating the feeding of a toddler into the feeding of the rest of the household. It has been demonstrated that the caregiver may not always have control over this process, but instead may allow the child to decide how much to eat.

Although much attention has been focused on the relationship between breastfeeding, hygiene, diarrhoeal diseases, and growth retardation, less attention has been focused on the number of meals per day that young children eat and the timing of these meals as indicators of nutrition status. Poor households do not have regular access to two meals a day of the local staple, and the poorest households do not have access to even one meal a day. Although two meals a day might meet basic caloric requirements, one meal is not enough, resulting in chronic hunger; no meals per day denotes acute hunger.

This starkly simple measure of household food security encompasses the two central types of hunger in human experience—chronic and acute. The implications for childfeeding are obvious. If meals are prepared only once a day, the odds of a toddler's being fed three or four times a day are very low. Goldman found that children eating three meals a day obtained more calories than children eating two meals a day. Households dependent on seasonal employment or whose members become sick may easily drop from "nearly enough to eat" to "not nearly enough to eat" with subsequent risk to child survival.

Weaning Interval

The weaning interval, the period between the first

introduction of complementary foods and the completion of weaning, might be understood as an intensive period of food socialization. During this period, a number of important transformations take place in addition to the reduction of breastmilk intake. These include changes in feeding techniques, including the introduction and mastery of new objects such as spoons, bottles, cups, or utensils such as chopsticks; food provider, from the mother to the grandmother, sibling, or caretaker; foods consumed, from liquids to semi-solids and solids, and from finely ground to coarsely ground, to bite-sized chunks, and finally to adult foods; meal behaviour, from a passive, dependent infant to an individual expected to follow cultural rules about the correct way to eat.

These substitutions are not easily made, and can be thought of as trade-offs between the welfare of the mother (who may be pregnant or who may now have to give more time to other activities) and the toddler (who benefits from having the exclusive attention of the mother).

Dimension of commensality

Infant-feeding has a dimension of commensality or food-sharing seldom recognized. Food is the context of the first social interaction experienced by all humans. This experience may be totally pleasurable or anxiety-producing. In fact, the pattern of infant feeding may set a pattern for food-sharing later in life. Infants begin to participate in a system of food sharing in utero, and at birth, with their lactating mothers (and possibly with close female relatives who may breastfeed them on occasion).

In some societies, unrelated women breastfeed each other's children for pay, as with wet nursing, or as part of cooperative work strategies among friends. Gradually, the circle of commensuality expands to other members of the family and beyond. The commensal circle includes only mother and infant during exclusive maternal breastfeeding

and when mothers pre-chew food for their infants. For example, Thai mothers in Laos and northern and northeastern Thailand often pre-chew glutinous rice for their infants. Elsewhere mothers may squeeze fruit juice into an infant's mouth and then eat the pulp themselves.

The expansion of this circle of commensality is a key to understanding the transition to an adult diet. The next stage may be the ritual presentation of a highly valued food, either before or after breastfeeding begins. Honey, a common purifying substance according to Javanese mothers, is rapidly being replaced by glucose as hospital births increase. Glucose is routinely fed to newborns in hospitals in many third world countries. This second stage provides occasional tastes of key flavours in the adult diet: lemon, butter, banana, rice. The third stage includes special infant recipes not shared by other family members. Bubur (rice porridge) in Indonesia or pablum in Canada are examples of self-targeted complementary foods.

To this point infants and toddlers have protected access to the food supply, and as long as they are also breastfeeding, they are probably adequately fed. A crisis may occur when the circle of commensality enclosing mother and infant expands to include sharing food with other siblings and family members. For with this expansion, toddlers begin to lose protected access to their food supply. They are then most affected by the food system into which they are being socialized. Future research on young child-feeding should take into consideration the wide range of meal systems existing cross-culturally.

ENSURING CARE LEVEL STRATEGIES

Interventions to promote care must negotiate the different levels of analysis where care is institutionalized. Policy terminology, too, implies a kind of caring-intervention, protection, promotion, advocacy-without considering the

different political and conceptual bases for each. Strategies to ensure care take place at several different levels.

Individual Strategies

The biomedical literature provides very little evidence regarding women's experiences combining work and caring activities. However, ethnographic evidence suggests that there are always trade-offs in caring and coping. Most strategies are individual and short-term, entailing no institutional changes or community support. This reflects the fact that successful integration of caring activities and other work requires a strong, determined woman who can overcome obstacles. Women in industrialized societies who are highly motivated to breastfeed, for example, often take on multiple responsibilities as individual "superwomen," neither expecting, requesting, nor receiving assistance from other people, their institutions, or their communities. This "superwoman" model of care is totally inappropriate for export cross-culturally, and in fact has also been responsible for breastfeeding's being considered an unattainable mode of care for low-income mothers and immigrants to North America. "If you're not a superwoman, don't try it."

Cultural Strategies

Cultural strategies are distinguished from individual strategies because they refer to beliefs and practices that may be widely shared in a society. They are thus indigenous resources that may be utilized by some individuals and not by others, and may also form the basis for culturally appropriate interventions.

Surrogate mothering and postpartum seclusion are cultural practices that in many cases assist mothers in learning to care for their children. Wet-nursing has a long history as a coping strategy. Now, however, wet nursing is most common within families in small scale and peasant

societies. Even breastfeeding advocates express concern about the dangers of cross infections or of the infant's "bonding" to someone other than the mother.

Nevertheless, there is anecdotal evidence that wet nursing is far from rare when women with similar aged children organize for support and cooperative child care. Some wet-nursing exists among student mothers and others who work in unstructured jobs. In the Philippines, employed women organized a baby-care cooperative where babies were breastfed by surrogate mothers whose babies were also at the centre. Shared breastfeeding is the most intensive form of shared child care, and the practice emerges out of intimacy, mutual concern, cooperative work, and, usually, strong bonds of affection. Grandmothers who breastfeed their grandchildren may represent a more widespread caring strategy than many acknowledge. Support for cooperative child care may foster this practice, but shared breastfeeding is seldom openly discussed in planning and policy meetings, particularly in the era of AIDS.

Mothers of infants suffer from fatigue and, in some cases, excessive energy demands. However, fatigue is also a major complaint of mothers who are not employed outside the home and of women who are not breastfeeding. Any practices that encourage a period of social seclusion, rest, and special foods for mothers for the first few weeks postpartum will probably assist in breastfeeding. Religious texts often support a period of seclusion of women after birth, usually around 40 days, the period necessary to establish full lactation.

However, the advent of Western biomedical practice in many parts of the world has hastened the decline of these so-called traditional practices. In fact, these practices probably sustained breastfeeding through countless generations. It is difficult to turn back the clock and tell the Malay or Thai midwives and traditional healers that the

"old ways" had some useful features. However, with the recent sensitivity to indigenous medical practices in many parts of the world, it is worth reinforcing those cultural practices that encouraged women to rest, eat well, and be relieved of work in the first few weeks after birth.

National Strategies

There is great variation in national legislation on maternity protection, some providing better coverage than the International Labour Organization (ILO) legislation, some worse coverage. The Brasilia workshop on breastfeeding and women's work reviewed a number of national initiatives in Latin America that were intended to provide strategic help for breastfeeding mothers.

In Honduras, enterprises employing more than 20 women are required to provide a suitable place for mothers to breastfeed their children. In Uruguay, workers in the public sector are allowed to work half time so they may breastfeed their infants for the first six months of life. Brazil's national breastfeeding programme established a committee to review women's employment and breastfeeding. The committee surveyed existing legislation and found that it was not uniform across federal, state, and municipal levels. It also developed a programme to teach mothers to express their breastmilk in order to take advantage of nursing breaks. Mexico offers examples of workers who have negotiated better contracts with provisions for child care.

Socialist approaches to the work of care should provide evidence for the successful integration of caring work with productive work. In theory, men and women are considered equal under socialism, although in China, as in many other socialist countries, behaviour does not always follow rhetoric. Generally, maternity entitlements are guaranteed and the competitive promotion of infant formula is discouraged. However, these conditions are

changing rapidly with the collapse of socialist regimes. With regard to maternity entitlements and child care in socialist countries, it is difficult to determine "how much is owed to realistic planning and how much to totalitarian power structure". We might also ask how restricted access to commercial infant formula has affected breastfeeding rates in socialist countries.

International Strategies

International actions should build on existing international instruments such as the Innocenti Declaration, the Code for the Marketing of Breastmilk Substitutes, the Rights of the Child, and conventions to eliminate discrimination against women. The Clearinghouse on Infant Feeding and Maternal Nutrition regularly reports on existing legislation and policies to support breastfeeding mothers in the workplace, including information on maternity leave policy, salary during leave, provisions for nurseries, nursing breaks, and other considerations.

However, it is likely that data at the national level are unreliable and should be used only when confirmed by local professionals. Neither maternity entitlements nor lactation breaks are regularly implemented for formally employed women, and most working women are ineligible for these benefits because they work in subsistence agriculture or home based production, or are self-employed in a wide range of activities in the informal economy. Reviews of maternity legislation seldom specify how the laws are monitored at the local or national level.

The ILO is considering whether the best strategy is to revise the conventions on maternity protection legislation, encourage more countries to ratify and implement it, or develop policies on parental rights. Employed women with job security, maternity entitlements, and facilities for breastfeeding are exceptionally few in number in both developed and developing countries.

Policy Challenges

Elimination of all forms of discrimination against women is a requirement for addressing caregiving and the rights of the child. Agencies providing nutrition interventions recognize the need for a life-cycle approach to women's health. Any projects that empower mothers, support effective local practices, and provide care to caregivers are likely to be useful, particularly those that improve the health and nutrition status of women.

But women are often mentioned in the nutrition literature as a risk group or a target group for needed interventions rather than as gatekeepers of family health. The recent International Congress of Nutrition (ICN) guidelines are a notable exception. The ICN World Declaration and Plan of Action for Nutrition is unusually sensitive to the importance of women as caregivers. The document explicitly recognizes that nutritional well-being is hindered by the continuation of social, economic, and gender disparities and discriminatory practices and laws. "All forms of discrimination including detrimental traditional practices against women must be eliminated in accordance with the 1979 Convention on Elimination of all forms of Discrimination Against Women".

Women's nutritional needs should be met not simply because they are caregivers. "Women are inherently entitled to adequate nutrition in their own right as individuals". For women to provide the necessary care of others, priority must be given to enhancing the "legal and social status of women from birth onwards, assuring them of respect and equal access to caring, education, training, land, credit, equity in wages and remuneration and other services, including family planning services, and empower them economically so that they have better control over the family resources". Adding the concept of care to UNICEF's model of the determinants of undernutrition raises the

possibility of a whole new approach to integrating gender concerns with child survival policies. But it raises many difficult questions, such as:

- How do we understand the extent of caregiver distress, a core concept of burden, when caregivers in many societies are socialized to downplay their distress?
- What policies will support women as caregivers without using them as an unpaid workforce, a cost-saving measure?
- How can we organize society to make care for dependants more just and humane, when current policy focuses on adjustment of caregivers rather than the adjustment of society?
- How can we insure that international caregiving does not undercut existing household and community caregiving strategies, particularly those based on reciprocity and commensality?
- How do we avoid masculinizing care, over bureaucratizing it, and proposing technology to solve human problems?

HEALTH AND NUTRITIONAL STATUS OF THE CAREGIVER

In the Western world, health is often spoken of in the sense of ill health, i.e., as a pathological condition that can be verified by clinical examination. However, health is actually a multidimensional state, and conceptualizations of health vary from country to country and even from person to person. Recognizing these multiple dimensions, WHO defines health as "a state of complete physical, mental and social well being and not merely the absence of disease and infirmity". From a cultural point of view, illness is the social recognition that a person is unable to fulfill his or her normal roles adequately, and that the situation needs to be acted upon. Thus, from this perspective health is associated with ability to carry out one's social obligations.

Recently, the role of inadequate care has received considerable attention as an underlying cause of malnutrition among children, together with inadequate household food security and inadequate access to health services. Many factors contribute to a caregiver's ability to care for a young child, and health, both in the Western sense of absence of disease and in its many other dimensions, is likely one of them.

Providing Care

Longhurst describes care as the provision in the household and community of resources in the form of time, attention, love, and skills to meet the physical, mental, and social needs of nutritionally vulnerable groups. In this review, the focus is on care provided for children under three years of age, with special reference to the situation in developing countries.

Care of young children can be divided into behaviours that bring the child up to a minimally healthy level or return it to a previously accepted state of health or development (compensatory care), and those that serve to enhance further growth and development (enhancement care). Examples of caregiving behaviours include breastfeeding; providing emotional security and reducing the child's stress; providing shelter; clothing, feeding, and bathing; supervision of the child's toilet habits; preventing and attending to illness; nurturing and showing affection, interaction, and stimulation; playing and socializing; protecting from exposure to pathogens; and providing a relatively safe environment for exploration. Another set of behaviours includes using resources outside the family, such as curative and preventive health clinics, prenatal care, traditional healers, or members of an extended family.

Thus, some of the caring activities require physical effort, whereas others require attention, imagination, and inspiration. Therefore, ill health leading to reduced work

capacity, fatigue, apathy, or depression will likely limit caregiving ability, as will ill health leading to reduced status in the family with resulting decreased access to resources and support.

Women's Health and Nutrition Status

What is the current health status of young and adult women in developing countries? This straightforward question, unfortunately, does not have a straightforward answer. In international health, development work has focused primarily on improving child health, and therefore only limited data on women's health and nutrition status have been collected. Difficulties in evaluating these sparse data are compounded by the lack of appropriate standards for health and nutrition status of adults in general, and of pregnant and lactating women specifically. Further, the shortcomings of health indicators used traditionally in women are only starting to be appreciated, and more informative measures have yet to be developed and put in practice. Finally, women themselves may have different views on their health status than Western medical practitioners, and it may actually be this subjective dimension that affects their ability to provide good care. Thus, women's health needs to be understood from both epidemiological and anthropological perspectives.

Women's health usually is equated with reproductive performance defined in terms of infant outcomes. When women's health is conceptualized in terms of maternal outcomes, it is conceptualized narrowly in terms of maternal mortality (i.e., deaths for all women due to conditions related to pregnancy during the gestational period, labour, and birth, and the puerperium per 100,000 live births) for female life expectancy. For many countries, this may be the only health statistic on women available on a national scale. More importantly, maternal mortality rate is the public health indicator that shows the greatest

disparity between developing and industrialized countries; the difference is about 200-fold. In comparison, the corresponding difference in infant mortality rate is about tenfold.

Each year, around half a million women die from causes related to childbearing, and 99% of these deaths take place in developing countries. Direct causes (haemorrhage, puerperal sepsis, toxæmia, obstructed labour, and abortion) account for three fourths of these deaths. These conditions are aggravated by poor nutrition status; e.g., mortality rates from haemorrhage are higher among anaemic women. The rates are also higher for teenage women or women having their first child, and for women over 35 years of age or women of high parity. Over half of the maternal deaths could likely be prevented with known technology at low cost. Maternal mortality rates are usually low where there are good family planning, prenatal care, and safe abortions, as well as good delivery facilities.

However, maternal mortality is only the tip of the iceberg. It is estimated that for each maternal death, there are over 100 acute morbidity episodes precipitated or aggravated by pregnancy, such as anaemia, hypertension, fever, and eclampsia. In addition, an unknown number of women suffer from chronic morbidities as a result of childbearing, ranging from fatigue, diarrhoea, and sore back to disabling or life-threatening conditions like vesicovaginal fistula, malaria, and reactivated tuberculosis.

Ironically, even though the problem is on the scale of 62 million acute morbidities annually, these other outcomes of reproduction are much less recognized and monitored than are maternal deaths. Graham and Campbell, referring to the negative synergism between the low priority given to women's health and its limited documentation, describe "the measurement trap" in maternal health. They identify four interrelated components of "the measurement trap": narrow conceptualization of maternal health, poor existing

data sources, inappropriate outcome indicators, and limited measurement techniques. As a result, maternal health is defined as a discrete, negative state, characterized solely by physical manifestations and excluding important social and mental outcomes.

In addition to death, four other "Ds" may be monitored by appropriate measures, indexes, or proxies: discomfort, dissatisfaction, disability, and disease. For the first two, indicators of health outcomes may include stress incontinence at the end of puerperium, breast soreness preventing women from breastfeeding, and nausea during the first trimester preventing women from working adequately. Indicators of disability or disease may include reproductive tract infections as a result of intrauterine devices, reactivated tuberculosis, and anaemia. Finally, indicators of positive or optimum health may also be monitored, e.g., the proportion of women with uncomplicated deliveries or fully breastfeeding until four months postpartum.

Still, a woman's health is far more than her reproductive health. A useful definition of women's health should encompass all aspects of women's lives, including reproductive roles (childbirth), biological reality (menstrual cycles), and the social context in which women live, work, and age. The following broader definition of women's health has been suggested: "A woman's health is her total wellbeing, not determined solely by biological factors and reproduction, but also by effects of work load, nutrition, stress, war, and migration, among others". As in other sectors, women's health outside the reproductive window has been mostly overlooked in international development work.

There is limited information on the health and nutrition status of young women, although some initiatives on the health of adolescent girls have been undertaken. Even less is known about the health and nutritional problems of

postmenopausal women. Also, the understanding of health problems of importance to non-pregnant, non-lactating adult women is equally insufficient.

As examples of the inadequate information base, women's health in relation to nutrition status, work load, reproductive tract infections, AIDS, menstrual disturbances, substance abuse, and violence are reviewed. Among the 1,130 million women above 15 years of age in developing countries, a conservative estimate is that almost 500 million are stunted as a result of childhood protein-energy malnutrition (PEM), over 500 million are anaemic due to iron deficiency, about 250 million are at risk of disorders due to severe iodine deficiency, and almost 2 million are blind due to vitamin A deficiency. For vitamin A and iodine deficiency disorders, these estimates are based on the assumption that prevalences among men and women are equal; this may not be the case if resources differ between the sexes.

Anaemia (defined as haemoglobin <12 g/dl for non-pregnant women and <11 g/dl for pregnant women) due to iron deficiency is the most widespread nutritional problem among women, leading to reduced work capacity, increased fatigue, and loss of mental concentration. The prevalence has been estimated as 26% among adolescents, 54% to 60% among pregnant women, 41% to 47% among lactating as well as non-pregnant, non-lactating women, and 25% among postmenopausal women. The regions with the highest overall prevalence are South Asia, sub-Saharan Africa, and South-East Asia.

Women generally meet a smaller percentage of their current recommended daily requirements of most nutrients than men do, and increases in intake by pregnant and lactating women are usually inadequate. Studies of intrahousehold food allocations show that women receive less food than men both in absolute terms and relative to their nutritional needs. Women also spend more time in

total productive work (domestic and market production) than men, commonly experiencing total work days of 10 to 16 hours.

A review of 32 studies revealed that in most countries women's average weight-for-height was below the 50th percentile for small-frame women in the United States for most countries, and that women in Africa and Asia were more deficient in fat stores than those in Latin America or the Near East. In South Asia, the prevalence of PEM was significantly higher among women than men. A negative effect of childhood PEM on adult working capacity, through reduced muscle mass and aerobic capacity, is well documented. Clear evidence is lacking for a similar effect of current PEM on work capacity; evidence from supplementation trials is contradictory. However, even if work capacity is not significantly increased, higher food intake may allow an increased energy expenditure on other activities such as child care. Also, both breastmilk volume and protein concentration are affected adversely by current low maternal weight-for-height.

Women in developing countries spend between 25% and 60% of their reproductive years either pregnant or lactating. Reproduction often starts early; in countries where child marriage is practiced, teenage pregnancies account for more than 10% of all births. An effect of repeated, closely spaced reproduction on women's nutrition status (so-called maternal depletion) has been suggested. However, we are not yet able to document such an effect by relating broad exposure measures such as parity and interbirth interval to outcome measures at specific stages of the reproductive cycle.

Some researchers substitute length of depletion periods as a measure of exposure. Here, a negative effect on maternal fat stores of concurrent lactation and pregnancy has been reported among Guatemalan women, and of prolonged lactation among Filipino women. We have

suggested evaluating overall changes in women's nutrition status across one full reproductive cycle in relation to relative lengths of depletion and repletion periods during that cycle. Using this framework, an effect of reproduction on maternal weight was found among marginally nourished women in Pakistan and Guatemala. However, women with worst initial nutrition status instead experienced an overall weight increase concurrent with a negative trend in birth-weight of the two siblings born during the reproductive cycle. These results are consistent with findings from animal models. Thus, there may be some threshold below which relatively more of the nutrients are partitioned towards the mother.

Reproductive tract infections are common among women in the developing world, causing fever and pain in the lower abdomen, fatigue, personal embarrassment, and marital stress. Common infections include vaginitis, cervicitis, and pelvic inflammatory disease. Some reproductive tract infections are sexually transmitted diseases, e.g., chlamydia and gonorrhoea, but some are caused by overgrowth of normally occurring bacteria. Women are twice as likely as men to develop reproductive tract infections, because of factors like young age at coital debut, intravaginal preparations, materials used to absorb menstrual flow, and use of contraceptives.

For example, users of intrauterine devices are three to five times as likely to develop pelvic inflammatory disease. Women suffer more serious long-term complications than men, because lower reproductive tract infections are often asymptomatic in women and because of women's limited access to health care. However, if detected early, reproductive tract infections are relatively easily treated with antimicrobials. The prevalence of reproductive tract infections is higher in Africa, where more than 5% of women visiting antenatal, family planning, and gynecological clinics were affected, than in Asia or Latin America.

The current increase in sexually transmitted diseases worldwide is of great concern. In 1990, WHO estimated that more than three million women were infected with HIV (human immunodeficiency virus). Women in sub-Saharan Africa are currently most at risk and show the highest seroprevalence rates, but female risk is rapidly increasing in Asia and Latin America. In many African countries, the seroprevalence rates among urban people aged 15 to 25 years are higher among women than men. Women are more likely to receive blood transfusions because of pregnancy and childbirth and therefore to become infected through this route.

Further, women's position in society makes it difficult for them to adhere to preventive measures. The physical and social consequences of the AIDS epidemic are staggering, e.g., death, fatigue, and social ostracism.

Another neglected health issue that contributes to substantial morbidity among women is menstrual disturbances. For example, menstrual dysfunction and other abnormal vaginal bleeding are responsible for 350,000 hospitalizations annually in the United States, and in Niue Island, New Caledonia, half of all adult women have experienced excessive menstrual pain. Still, in spite of the magnitude of clinical morbidities directly attributable to menstrual disturbances, very little research has focused on normal menstruation or the aetiology of menstrual dysfunction.

Among women in developing countries, the prevalence of cigarette smoking is about 10%, compared with 50% among men. However, in some countries the prevalence among women is as high as 25% to 50%, and the numbers are increasing. Women with high rates of tobacco use tend to be young, poor, less educated, indigenous, institutionalized, or disadvantaged in other aspects. Women are more likely than men to have multiple

addictions and, especially among younger women, alcohol and drug abuse are increasing.

Finally, the consequences of violence against women must be recognized as a significant health problem, as it is a major cause of female morbidity and mortality worldwide. The United Nations Fund for Women (UNIFEM) emphasizes that "women cannot lend their labour or creative ideas fully if they are burdened with the physical and psychological scars of abuse". Gender-based abuse includes battering, sexual abuse of female children, dowry-related violence, marital rape, female genital mutilation and other traditional practices harmful to women, non-spousal violence, violence related to exploitation, sexual harassment at work, trafficking in women, and forced prostitution.

In the United States, wife abuse is the leading cause of injury among women of reproductive age, and reports from many other countries indicate that between 20% and 60% of women are battered as adults. Rape and sexual abuse are far more common than earlier perceived; it is estimated that one in five American women has been the victim of a completed rape. Sequelae include depression, sleep and eating disturbances, somatic health complaints, inability to concentrate, and unwillingness to breastfeed.

In sum, the large number of women dying in relation to childbearing is shocking and deserves the attention it is now receiving thanks to the Safe Motherhood Initiative. However, in sheer numbers, the problem of maternal morbidity is even more worrisome and, unfortunately, less emphasized in public health work. Acute as well as chronic morbidity episodes related to childbearing need to be recognized and prevented. In addition, health concerns of non pregnant, non-lactating women as well as women outside the reproductive window deserve attention.

Malnutrition, reproductive tract infections, AIDS, menstrual disturbances, and gender-based abuse affect

millions of women worldwide, draining their physical and emotional energy. Once these health issues have been defined, appropriate indicators and measurement techniques need to be developed and applied systematically. Only then will we obtain an adequate picture of health and nutritional problems affecting women globally.

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Care and Nutrition of Young Child

Good nutrition and health are essential parts of a good quality of life. The relationship between care and nutrition is stronger for those who depend on others for feeding and for other actions that contribute to nutritional well-being. Very young children, certain older people, some sick people, and those who are insane especially depend on care.

Care is also of value for pregnant women, for older children, and in some respect for most people. However, the infant and the young child up to age three years almost totally depend on others for food and therefore for good nutrition. Children three to five years of age have some ability to gather food, to select a diet, and to feed themselves, but in most societies children up to about age six years, or school age, are considered to need feeding care. Thereafter care is highly desirable but not essential for survival. But good care will positively influence nutrition status and well-being.

The conceptual framework suggests that the two most proximal causes of malnutrition are inadequate intake of nutrients and disease. The three underlying causes are inadequate food, poor health, and deficient care. Each of these is essential to good nutrition. Of these three, the least investigated and the least understood is care. Few

programmes designed to improve nutrition include a set of actions to address problems related to care.

The English word "care" is both a verb and a noun. In the Oxford dictionary the verb is defined as "feel[ing] concern or interest, provid[ing] food, attendance etc. for (children, invalids, etc.) . . ." and the noun as "solicitude, anxiety, serious attention, heed, caution, charge, protection ..." Other definitions of the verb include "to look after, to provide for."

Patrice Engle, who has written about care and nutrition, provided a working definition describing the care of young children as follows:

Care refers to caregiving behaviors such as breast feeding, diagnosing illnesses, determining when a child is ready for supplementary feeding, stimulating language and other cognitive capacities and providing emotional support.

In most developing countries, the mother is usually the main caregiver for the infant and very young child, but in the common extended family, grandmothers, siblings, fathers, and other family and non-family members often also contribute to child care. As the child gets older, care may be provided increasingly outside the home, for example, in day care facilities.

For the child, adequate care is important for survival but also to ensure optimal physical and mental development, and good health. Care also contributes to the child's general well-being and happiness, or what we term a good quality of life. It needs to be recognized that care influences the child, but also that the child influences the care.

The basic causes of inadequate food, health, and care that lead to malnutrition include those at the international, national, local, and family levels. Poor child care may be influenced by war, blockade, or other international factors that keep nations in poverty; national factors such as those

related to equity, to availability of good health and education services; local factors such as land distribution, climate, water supply, and primary health care; and finally, family factors such as presence of other family members, type of house, availability of water, household hygiene, and mother's knowledge.

PROMOTION OF GOOD CARING PRACTICES

Care giving behaviours that contribute to good nutrition, health, and well-being of the child vary enormously from society to society, from culture to culture. Traditional caring practices have been altered or eroded, often for the worse, as a result of modernization or westernization, as well as increasing urbanization. The decline of breastfeeding is an example of this. Breastfeeding was a traditional practice almost everywhere, and its decline has been influenced by modernization, including medical practices of Western-oriented health professionals and promotion by infant formula manufacturers.

A strategy for ensuring good nutrition status should first protect the good caring practices in a society. In a society where most mothers breastfeed their babies with no or few other foods introduced until the child is four to six months of age and where breastfeeding continues for 18 months or longer, protection of breastfeeding should take priority over its support and promotion. Similarly, if a society traditionally provides a lot of stimulation to children; if the infant is seldom left alone but is carried on the mother's back; if fathers, grandmothers, older siblings, and other relatives frequently help in child care; and if traditional weaning foods of peanuts, green leafy vegetables, and legumes with a local cereal gruel are the norm; then these caring norms deserve protection.

These practices may be threatened by modern or Western influences. A new television set in the family may result in adults' neglecting child stimulation; advertising

and promotion of manufactured expensive weaning foods may lead families to poorer diets at higher cost; or work away from home where the mother cannot take her baby may cause long separations of infant and mother.

Support is the next level in promoting good care. Supporting good caring practices is an intermediate approach, between protection and promotion of care. Support includes activities both formal and informal that help women in changing circumstances to practice those good caring practices that are threatened, and that were considered normal in previous times. This may involve restoring confidence in mothers, strengthening their belief that traditional good caring practices may be more desirable than new Western practices.

For example, westernization and modernization may suggest that modern women do not breastfeed their baby in a public place or that canned baby foods are superior to home-prepared foods, or that salt and sugar is better treatment for mild diarrhoea than family soups and breastfeeding, or that it is better for a child to stay at home and watch television than to go with the mother to the village market, or that eating with a fork is preferable to eating with one's hands after traditional handwashing.

In many developing countries, paid employment for women away from home is eroding traditional good caring practices. Three months of maternity leave may help support mothers in providing infant care, at least for that period. Later, during the 8 hours mothers are away from home, a crèche or daycare centre at the place of work could be supportive. Support for good traditional care may include mother support groups or arrangements for adequate child care while the mother is away from home. Staggered working hours for different family members and then a greater role for the father in child care may help.

Promotion of good caring practices is the third level needed. It involves motivation or re-education of mothers,

other family members, or whole communities. It is the most difficult and the most expensive of the three strategies. It is important to find what were the most important factors that led to the decline or disappearance of good caring practices. There must be evidence that the new caring practice is less desirable and less beneficial. Lack of such understanding will almost certainly lead to failure of a promotional campaign.

The promotion of good caring practices will often involve public education, mass media efforts, and political commitment. Promotional campaigns in Brazil in the 1970s and in Honduras in the 1980s have proved successful. The campaigns might promote such practices as traditional breastfeeding and family feeding for children with diarrhoea; carrying children on their mothers' backs rather than leaving them at home; and the use of good, village-based weaning foods in place of expensive, less nutritious manufactured foods.

Caring Practices

Mothers, fathers, families, and communities (and also, of course, governments and international institutions) take actions all the time that influence nutrition. These are actions in the area of food, health, or care. They may have either a positive or negative influence, or they may be neutral. The actions are based on, or arise from, everyday decisions. These decisions are nearly always based on three steps: assessment, analysis, and action. This so-called "Triple-A" approach is used for the smallest decision (for example, should the mother spend her morning working in the home garden or going to the market to sell produce harvested yesterday) or large decisions. In each case there is assessment of the situation, analysis of the information, and these lead to action.

This triple-A approach is also appropriate for protecting, supporting, and promoting good child care.

First, current caring practices affecting nutrition must be assessed. Many countries have fairly good knowledge about the food situation, health status, and health care, but may have very few published findings on child care, especially child care as it relates to nutrition. Gathering data rapidly on child care is an important activity. Often there will be some information on breastfeeding and on weaning practices, but very few data or even descriptions of caring practices influencing psychosocial and motor development, on factors such as mothers' self-esteem and their beliefs and attitudes related to child care, or on household and community factors that greatly influence child care.

A useful approach for finding which child caring practices seem to be desirable may be an investigation of "positive deviants" in a community, or a comparison of "negative deviants" and "positive deviants". Positive deviants are young children who have good nutrition status even though they come from very poor households, have uneducated mothers and limited family access to food and health services, and live in a community where most children are malnourished. If it can be found that mothers and families with positive deviants have a set of good caring practices, ones not usually used by other families and mothers, then it can be assumed that all or some of these caring practices deserve protection, support, and promotion.

Role of Actions

These can be divided into service delivery, capacity building, and empowerment, all three of which may be operative at different levels in society (from national to family) and which may be interdependent. All three will involve triple-A processes of assessment, analysis, action, and reassessment. Delivery of services in support of child care may address the most immediate causes, and some are curative rather than preventive. Examples might include

oral rehydration for diarrhoea, deworming, child-feeding targeted to malnourished children, and so on. Others may also be top-down and be preventive, such as immunization and organized day-care centres. Delivery of services may not be sustainable or may have to remain in place for a long period unless other changes prevent or permanently cure the problem in society, not in the individual child. For example, oral rehydration prevents death in a child and treats dehydration but does not reduce diarrhoea prevalence or incidence in society.

Capacity-building is likely to be more sustainable and often is preventive rather than curative, since its aim is to deal not with the immediate causes but more with the underlying causes of malnutrition. It is likely to be most successful if based mainly on bottom-up, not top-down, actions. Capacity-building is important for improved care in relation to nutrition, and may involve protection, support, and promotion. Examples include good feeding practices as the infant moves from exclusive breastfeeding, to mixed feeding, to an age when exclusive home foods are appropriate; child-care practices that are stimulating and influence good psychosocial development; health education to provide knowledge about protection against disease, including immunization or how to use home foods and fluids for diarrhoea; and home hygiene and sanitation to prevent diarrhoea and intestinal parasitic infections.

The third level, empowerment, crosses the boundaries of service delivery and capacity-building. Actions empowering mothers often address the more basic causes of child malnutrition. Empowerment for women includes giving women rights to have an income, not to be overburdened with work, to breastfeed, and to have reasonable access to services, resources, and capacity-building activities. Empowerment can consist of improving mothers' incomes or control of family income, providing good access to health care for women and children,

providing water supplies that lessen the burden on women, or reducing poverty and increasing equity (through trade and price policies). It includes both top-down and bottom-up approaches.

Investigating current good caring practices, how they might be threatened by new influences, and how they might be protected in changing, modernizing, urbanizing societies deserves a very high priority. Support for good caring practices is undoubtedly also important, although perhaps not such a high priority for research.

Finally, we know relatively little about which good caring practices should be promoted or how to do this. Where caring practices are inadequate and cause malnutrition, we need studies on appropriate alternatives and investigations.

There is some published research on intrafamily food distribution, meal frequency, energy density of foods, and other practical topics, but we know little about other important factors that influence nutrition related to care.

CONCEPTUAL MODEL FOR CARE AND NUTRITION

A conceptual model describing the various factors that influence quality of care and how care itself influences nutrition status was developed at Cornell University. Since care is such a broad area, this framework focused specifically on the care of children below the age of three years and its implication for improving nutrition status. It evolved from the UNICEF nutrition strategy, which defines household food security, care of women and children, and access to health services, along with a healthy environment, as the necessary ingredients to promote good nutrition.

Adequate dietary intake and health status are the immediate determinants of good nutrition, but caregiving ultimately determines the delivery of adequate food and health to the child. Although closely linked to household food security, the actual amount of food ingested by the

young child is determined by care-related feeding behaviours such as breastfeeding, complementation, food preparation, and overseeing the progression of the child from complete dependence to partaking of adult family food.

Similarly, care-related behaviours determine how available health services, for both preventive and curative purposes, are utilized to optimize child health and thereby influence nutrition. Finally, factors such as affection, psychosocial stimulation, emotional stability, predictability, and patterning are important to the overall development of the child.

In addition to these direct care-related behaviours, it is important to recognize that care is a highly interactive process between child and caregiver, with inputs by and rewards for both. It is vital to regard care in the context of a dyad while planning strategies. Although mothers are generally assumed to be the primary caregivers, it should not be overlooked that in many societies caregiving is shared by siblings, other relatives, fathers, neighbours, and caregivers in day-care centres and family day-care homes.

Planning strategies must consider several factors relating to both the caregiver and child that determine caregiving behaviour. These relate to the time demands, cultural attitudes, beliefs, and knowledge of the caregiver as well as several characteristics of the child including gender, age, birth order, appetite, and level of intellectual and motor development. The immediate environment of this interactive behaviour is in turn influenced by various other factors operating at the household, community, and national level.

The importance of care of older children and women was recognized but not included in order to limit the topic. The objectives for the workshop were defined to summarize present knowledge of inadequate care and nutrition as well as to identify gaps in knowledge. Our understanding of

care and nutrition can be classified as resolved issues, unresolved issues, need for further research, and application.

Breastfeeding

Breastfeeding is the only activity that satisfies the needs of food, health, and care at the same time. Although breastfeeding was acknowledged as an extremely important component of care, it was agreed that issues such as breastfeeding initiation, exclusive breastfeeding, and so on would not be addressed, since they have already been considered in detail by the breastfeeding promotion efforts of UNICEF. Yet the relevance of the overlap between breastfeeding and care (nearly 85%) was nominated as a special topic for the workshop. The need to address issues beyond the Innocenti Declaration was raised, especially within the protect, support, and promote framework.

Complementation

Introducing foods in addition to breast milk signals the beginning of one of the most vulnerable phases in the life of young children in developing countries. This period may begin from as early as 2 months to as late as 18 months of age in different cultures. Decisions related to when to introduce other supplementary foods, choice of food, and quantity and frequency of feeding are inherently linked with caregiving practices in different cultures. Complementary feeding was regarded as a high-priority area where inadequate care practices would affect the nutrition status of the child, and three major themes emerged.

1. Timing of complementation and replacement of breastmilk. There is considerable debate about the timing of complementary foods, especially their effect on children's eating behaviour and growth. It was agreed that the transition from exclusive breastfeeding

to introducing appropriate amounts of other foods merits high priority. Clarification of how much to replace breastmilk with other foods is intrinsic to the discussion of timing and quantity of complementary foods. It is important to understand the factors influencing total energy intake and the relative contributions from breastmilk and complementary foods when forming strategies that influence care.

2. Nutrient density and frequent feeding. Infrequent feeding and low nutrient and energy density of complementary foods have been recognized as major problems contributing to malnutrition. However, although caloric and nutrient density of complementary foods and feeding frequency can be regarded as two separate topics, they need to be addressed together. When the intake of bulky foods is coupled with infrequent feeding, it is difficult for the young child to obtain adequate nutrients. Limitations to frequent feeding could be addressed by promoting foods with higher nutrient density. Although the relationship between eating frequency and caloric density seems obvious, few studies have documented this under home conditions. Current scientific knowledge about the relationship between feeding frequency and nutrient density (not only calories but also micronutrients such as vitamin A and iron) should be used to plan strategies.
3. Appetite and feeding style. Palatability of foods, feeding style, and appetite were identified as extremely important and interrelated factors where inadequate care determines the actual food intake of the child.
4. Contamination.

Prevention of Illness

Hygiene was recognized as the most important aspect of

inadequate care to be included in the Colloquium. Although utilization of health services was also considered important, it was excluded as it is being addressed by other groups. Hygiene operates at the personal, household, and community levels. Household hygiene was given particular priority and included issues related to water and sanitation, i.e., disposal of faeces, especially among young children, quality of play area, relevance of handwashing, contamination of weaning foods, and the presence of domestic animals in living areas.

Care during Illness

Although health-seeking behaviours and the role of health professionals and traditional practices were recognized as important areas, only the nutritional management of illnesses was to be addressed at this meeting. In particular, nutritional management of symptoms such as pain, fever, ulcers, and breathlessness was addressed. The increasing privatization of primary health care and the need to establish standards for care were also regarded as important. The role of the service settings such as clinics and hospitals in determining the care that a child receives during illness, especially in relation to feeding, warranted special attention. Finally, the evaluation of public health messages, such as the promotion of oral rehydration salts in the management of diarrhoea, can also be addressed when considering care during illness within the protect, support, and promote framework.

Psychosocial Care

Research literature in developmental psychology and child development allows us to identify several characteristics of early child care or child rearing that are positively associated with socio-emotional, intellectual, and motor development in young children. These include maternal involvement and affection, sensitivity and regularity in

responding to the child's needs, engaging in mutually rewarding interactions with the child, and providing opportunities for play, exploration, and learning. Although these four dimensions of good care tend to be interrelated, there was some discussion of the possibility that the fourth characteristic (providing opportunities for play, exploration, and learning) should be given separate consideration, since it may be more closely linked to cognitive development.

Issues related to socialization and discipline were assigned lower priority, since considerably less is known about their impact on early behavioural development, and the issues are highly culture specific. However, this area may be addressed by examining the role of moral training in different cultures, as it is extremely important in determining the amount of food that the child may receive. Also, socialization and discipline practices that are clearly neglectful or abusive would be considered instances of poor care according to the four characteristics already mentioned.

SAFETY AND STABILITY OF THE HOME ENVIRONMENT

The nature of the physical environment in the home was regarded as important, especially in view of the fact that care is multidimensional and should not be restricted to feeding and psychosocial care. Factors related to the stability and safety of the child's environment, including the prevention of accidents and the availability and consistency of caregivers over time, cannot be ignored.

Child Characteristics

Child care is a highly interactive process in which the caregiver and the child operate as a dyad. Conventional approaches to care have tended to concentrate on the caregiver. There is increasing evidence that several child characteristics elicit different responses from different

caregivers, for example, temperament (irritability, crying), birth order, gender, the stage of motor and intellectual development (activity patterns, attention-seeking behaviours), and appetite. Infants differ in adaptability, activity level, irritability, exploratory behaviour, and response to new situations.

A child who is more active and explores more might increase his or her ability to locate caregivers and evoke caregiving, in contrast to the severely malnourished child who is listless, passive, and apathetic about his or her surroundings. The child's development stage also plays a key role in determining the nature of care-related behaviours elicited and consequently directly influences both the food intake and the health status of the young child. For example, the degree of vocalization can determine the ability of the child to demand food and consequently the amount of food he or she will receive. Similarly, the level of motor development is closely linked to exploratory behaviour and may influence child characteristics such as assertiveness and demand for attention.

Very little is known about mechanisms that characterize caregiver-child behaviour in developing and responding to cues for hunger, satiety, and food preferences during these vulnerable stages. Other special groups include children with physical handicaps or mental disorders and those subject to social discrimination because of their gender, parity, twin status, uncertain parentage, or membership in socially disadvantaged groups. Refugee children are a growing group whose needs are unique. Children who are of high birth order or who are female have been reported to receive less attention in parts of South Asia.

Caregiver Characteristics

The importance of the quality of the home environment and the mother-infant interaction in the psychological

development of the young child has been widely studied and recognized. These same factors could influence child growth through care. Inadequate child care in developing countries is often assumed to be due to mothers' limited knowledge. Although this may be partly true, the competing demands on poor mothers' time that prevent appropriate child care need to be recognized. The interaction between the time, knowledge, and income constraints of the caregiver needs high priority in planning strategies to improve child growth and development.

Caregiver time

Studies conducted throughout the developing world reveal that women commonly work longer hours than men and that women do more than their fair share of work in agricultural activities, as well as in household chores. They are largely responsible for maintaining household continuity through reproduction and nurturing children, and perform most of the key and energy-demanding tasks for the households. Heavy demands on women's time due to income-producing and home production activities limit the time available for child care. Yet social science research reveals that mothers resort to various compensatory mechanisms that might buffer the negative effects of time constraints.

An understanding of these mechanisms is useful in planning strategies to promote better child care. In particular, the role of factors such as family structure, control of household income, the time required for certain basic home production activities (food processing and preparation, obtaining fuel and water), and participation in and implementation of four key child survival activities (breastfeeding, immunization, growth monitoring, and oral rehydration) needs to be evaluated.

Psychological and emotional state of the caregiver

Studies have shown that mothers of severely malnourished children are often those with low self-esteem, low confidence, and less education. In contrast, positive deviance studies have shown that mothers of children who grow well despite adverse socio-economic constraints are highly motivated and spend more time on quality care. Consideration should be given to various maternal or caregiver personality characteristics, attitudes, and beliefs that may have a positive or negative influence on quality of child care. These might include a sense of empowerment or personal efficacy; self-esteem; knowledge, attitudes, and beliefs supportive of good child-care practices; and positive attitudes towards health care and education. Negative influences might result from maternal depression, passivity, low self-esteem, lack of basic knowledge regarding good care, and attitudes and beliefs likely to lead to poor child-care practices.

Health and nutrition status of the caregiver

The health and nutrition status of the primary caregiver, often the mother, was recognized as important in determining the quality of care that the child receives. High priority was assigned to reviewing the evidence demonstrating how the overall health and nutrition status of the mother or caregiver affects the amount and quality of care, specifically the impact of competing risks of both reproductive and productive demands on the woman of child-bearing age in most developing countries. Practical suggestions for action were also emphasized.

Organizational resources

Organizational resources are available at the community, district, and national levels that may be utilized to improve the quality of care. In particular, the role of out-of-home

care, including informal child-care arrangements in different settings and cultures; the role of the health professional; and, finally, the role of both government and non-government organizations from the community to the national level need to be considered. In most societies, especially in developing countries, child care is not the sole responsibility of a single caregiver, but is shared by alternative caregivers. It is important to understand the role of alternative caregivers, especially fathers.

Specific concerns included identification of the alternative caregivers and strategies available to make them more effective, evaluation of the proportion of time the child spends with the mother or other primary caregiver and the alternative caregiver, as well as time spent alone, and how these influence programmes aimed at improving nutrition and care. Also recommended was an evaluation of the different types of out-of-home care common in various settings, including both formal and informal arrangements, particularly arrangements having potential or actual nutritional benefits.

NUTRITION AND CARE DURING EMERGENCIES

UNICEF makes the distinction between "loud" and "silent" emergencies. The loud emergency relates to loss of life and injury as the result of a catastrophic event such as an earthquake, famine, or war, and receives lots of international publicity, whereas the silent type refers to the constant and generally unpublicized loss of life in situations associated with levels of extreme poverty. Silent emergencies probably affect more people. This is a useful distinction and has endured the recent reappraisal of the definition and concept of an emergency, which puts people's vulnerability to hazards as central.

Many say that an emergency reflects "development in crisis"; similarly, sociologists refer to disasters as "social crisis periods". A well-known definition is that of the

Harvard International Relief and Development Project: "Disasters can be defined as crises that overwhelm, at least for a time, people's capacity to manage and cope." UNICEF uses the following definition: "a situation of hardship and human suffering arising from events which cause physical loss or damage, social and/or economic disruption from which the country or community is unable to fully cope alone". The definitions point to people becoming destitute, having crossed a threshold where their behaviour becomes structurally different as a result of losing household and community.

This requires responses from outsiders. However, these new definitions would place many parts of the world in emergencies both silent and loud: places where infant and maternal mortality rates are high, where there are large numbers of landless, indebted people without access to clean water, satisfactory diets, and adequate housing. People are continually passing over the threshold of disempowerment, for reasons such as disease or severe malnutrition. However, relief may not be organized for them by outsiders because of differing definitions of emergencies.

This situation has prompted a wider definition encompassing loud and silent emergencies to focus on "shocks" categorized as: natural (drought, pests, diseases such as AIDS), pertaining to the state (reduction in services, asset redistribution), market (currency devaluation), community (breakdowns in sharing mechanisms), or conflict (war, theft). These have been refined to four different types of emergencies requiring outside interventions: sudden onset (such as earthquakes), slow onset (such as famine), complex (involving conflict), and permanent (large problem of structural poverty). Many loud emergencies are rooted in poverty, so that silent emergencies must be tackled if loud emergencies are to be avoided. Thus, readers reviewing information about care,

nutrition, and emergencies should always see care in the wider context of "shocks."

Reappraisal also points out that affected people should not be seen as helpless victims; they have capacities as well as vulnerabilities. In response to external threats, people continue to allocate their scarce resources and modify their behaviours. This will have profound implications for child care. Factors that influence care behaviours will be affected significantly: resources of food, water, sanitation, and health and education services will be reduced or eliminated. The time and resources that caregivers can allocate to the child will also be reduced. The caregiver may become separated from the child, perhaps permanently. Home and community conditions may disintegrate.

Young children (even those as young as two years of age) suffer direct trauma from the loss of personal security and aspects relating to their wider social needs, such as relocation to a new and perhaps hostile environment. The category of "complex, involving conflict" often includes traumatic experiences during conflict and lack of protection leading to abuse, even murder. In an emergency, therefore, care and nutrition of the young child must take on a much wider definition than in normal times. In its emergency programmes, UNICEF's conceptual framework for nutrition is redefined so that child survival and development outcomes include protection against injury and death from the external threat. The importance of care and protection of the child in emergencies is highlighted in the Convention of the Rights of the Child in Articles 19 (Protection from abuse and neglect), 20 (Protection of a child without a family), 22 (Refugee children), and 38 (Armed conflicts).

The number of people now caught up in an emergency has increased substantially over the last few years. About half of these people are children. The number of refugees in Africa, including both those displaced internally and

those who have crossed a national boundary, is at an all-time high of 20 million, the size of a large nation. Also, political instability is becoming a more common global feature. The number of ongoing wars has increased steadily, from 10 in 1960 to about 50 today. Each year more wars have started than have ended, and wars are also lasting longer. In 1993, there were 26 UN-designated "complex emergencies" affecting 59 million people, all, apart from Haiti, in the African-Eurasian zone. Also, the nature of violence has changed, becoming a significant element in economic and political survival. In the past, violence was usually linked to state formation; now it is associated with state disintegration that causes higher levels of insecurity and population displacement. Therefore a very significant number of children are caught in an emergency of some kind.

Care and Nutrition during Slow-onset Emergencies

New understanding of the causes of famine has led to the conceptual re-appraisal of emergencies as processes of human and community vulnerability. Previously, famine was seen as caused by a natural event such as drought that reduced food supplies, causing deaths by starvation. This could then be ameliorated by food aid from outside. The whole process was monitored using indicators of child nutrition status. Now it is understood that chronic vulnerability to food insecurity predisposes to famine. It is a long-term process, not an event, and short-term food aid may not be the most appropriate means of reducing mortality. Also, nutrition status data for children have proved very ambiguous indicators about the timing and intensity of the food crisis.

Responses to these slow-onset emergency stresses have been mostly studied during famines. These coping strategies involve a number of well-defined activities in three stages.

The first stage involves insurance mechanisms or nonerosive coping: changes in cropping and planting practices; reduction of dietary intake; switching to cheaper, less desirable, and maybe less nutritious foods; reduction of the number and size of meals eaten; sale of small stock; collection and consumption of wild food (consumed usually without sauces and relishes); and migration in search of employment. As stress becomes prolonged, children start to suffer a "crisis of care" as caregivers spend more time searching for income, water, and food. There is evidence from Sudan that food intake is reduced for all family members, including children, early in the crisis rather than later, although in Bosnia the food intake of children was protected in the early stages of the conflict. Water will be in short supply, so food preparation may be inadequate and food contamination may be greater. The young child may be faced with eating unusual foods. Further evidence from Sudan indicates that families protect assets and livelihoods as often as they do lives. Thus children are faced with a food crisis as well as a care crisis.

At the second stage, the care crisis deepens, and food continues to be rationed within the family. This stage is one of disposal of productive assets or erosive coping. Families sell livestock, agricultural tools, and land. Food prices rise and the prices of commodities being sold by families fall. They continue to search and scavenge for food. Stage three is that of destitution or non-coping. Families become entirely dependent on charity, with distress migration by entire family units to relief camps. Other distress and destitution activities include prostitution and selling off and abandoning children. Some families will be close to starvation and child malnutrition rates will continue to be high. One reference reviews socio-psychological behaviour during a famine emergency.

Social responses have been categorized into three phases of reaction: alarm (with general hyperactivation,

anxiety-related, increasing appetite for social interaction); then resistance (energy-conserving, family bonds remain intact but individuals drop friends); and finally exhaustion (failure to cope, only personal survival remains important, elderly may be pushed out, starving children form foraging and bandit gangs).

Care and Nutrition in Refugee Camps

Children arriving in a refugee camp will have suffered from reduced food availability for a greater or lesser time (depending on the nature of the emergency) and will be physically weak and highly vulnerable to infection. At a camp with feeding points, the crisis for children changes from being one of care and food to one of care and health. Food becomes available, but the large number of people in unsanitary conditions leads to outbreaks of communicable disease.

The nutrition of children in refugee camps has focused mostly on food availability in terms of ration size and the organization of feeding (issues of targeting, registration, etc). There are several manuals on how to make available a ration with a specific nutrient content. In addition, recognizing that large aggregations of weak people in unsanitary conditions can trigger epidemics, refugee camps, especially those responding to the acute phase of an emergency, provide health-care facilities and immunization for children. However, these activities are oriented to mechanically deliver food, immunizations, or water.

Services provided to children in camps will vary with factors such as resource availability and physical access to the camps, and also the stage in the emergency that determines priorities: whether the refugees are newly displaced, entirely dependent on external assistance, or in long-term camps where people have developed some degree of independence. In the former, lives are in danger

of being lost; in the latter, resources should be used to develop and strengthen livelihoods.

The food provided in the ration may be unfamiliar and unpalatable by local standards. Generally, African refugees receive only a cereal and infrequent supplies of pulses and a fat source. Other items such as dried fish, salt, and sugar are more rarely provided. Thus, refugees spend time and effort seeking to diversify their diet, especially for greens, animal products, and condiments to accompany the starchy staple. Emotional stress, combined with unpalatable food, compounds the effect on appetite, leading to withdrawal. The need for suitable care behaviours from caregivers is even more crucial but can rarely be met.

Refugees will try to obtain supplementary and other essential foods through a variety of employment and trade with very low returns, further reducing the time they can devote to their children's needs. Many refugees are obliged to sell or barter part of the ration to meet essential non-food needs such as clothing, soap, grinding of foods, firewood, and protection.

Attention to care behaviours will reduce the high mortality rates seen in young children in refugee camps, as it does in normal situations. There has been some speculation as to the causes of high mortality rates seen in young children in refugee camps and to what extent they are linked to adequacy of the ration or health care. It has been emphasized that it is not the type of infection that causes excess mortality among refugees but its greater severity and intensity. Factors other than technical and humanitarian ones may play important roles in making decisions about ration adequacy despite knowledge and agency guidelines, high death rates after emergencies, and other severe nutritional problems that persist in refugee populations.

Children will suffer the psychosocial trauma of leaving their community and possibly their family. Also, they may

suffer the further trauma of fleeing from violence, even seeing family and friends murdered. They may have suffered physical wounds and feel insecure within the camp. Refugee children's psychosocial well-being is as important as their physical health, but in practice these needs do not receive the degree of attention provided for physical health and food needs. Protecting and promoting the psychosocial well-being of children has two aspects: as a preventive measure, as compensatory care enhancing all those factors that promote well-being, and ensuring that children who have been harmed or who have special needs are provided assistance so that they can recover fully.

Even if the family has remained intact, the adults will still have suffered greatly, influencing their ability to provide care for their children. This can lead to child abuse, abandonment, family strife, and other forms of family disintegration, which may continue within the refugee camp. Children continue to miss out on essentials such as play and school. Extended residence in a camp may cause extremes of behaviour in children. Those young children living in camps as orphans will have special needs.

In camps people often sit around listlessly, exhausted and demoralized. Many visitors remark on the lack of support for family feeding units and how infrequently children laugh and play, and wonder why they are not encouraged. Feeding points may mean that families do not eat together. In large, unfamiliar camps young children can become cut off from their families. Mothers cannot or will not give malnourished children adequate stimulation. Where special efforts have been taken to teach and encourage mothers to play with and stimulate children as part of a programme of supplemental food assistance, good results are reported.

Nutrition and Care during War

Different types of conflict have different impacts on the

location and mobility of affected populations. Factors influencing the impact of conflict on communities are inter alia ethnicity, geographical location, and nature of asset holdings. For example, some families are able to continue subsistence activities in their villages through periods of conflict, whereas others have to leave home and community. Urban families often have different experiences than those living in rural areas. In some cases families have the opportunity to prepare for oncoming conflict, which means they may be able to organize their livelihoods and use services such as schools and health centres. In Bosnia, families consolidated to pool resources and create a source of trusted child care.

The impact of armed conflicts on children can be grouped into nine categories, all related directly or indirectly to care: 1) loss of and threat to life; 2) injury, illness, malnutrition, and disability; 3) torture, abuse, imprisonment, and recruitment; 4) separation from family; 5) psychosocial distress; 6) displacement; 7) poverty; 8) education disruption; 9) social and cultural disruption, and distortion of values. Conflict threatens family food supply, creates obstructions to the delivery of health services, and increases the need for health services. Often conflict is compounded by another shock such as drought or currency devaluation.

In terms of food supply, conflict can destroy crops, seeds, and tools; farm labour can be murdered or conscripted. Workers may be afraid of working in the fields, and markets can disintegrate. At a national level, agricultural services can stop functioning. Thus, families are abruptly forced from their coping strategies into destitution. Maintaining a stable food supply during a conflict places extra stresses on caregivers; families migrate further into the bush or head for urban areas, creating new environmental health problems.

In all conflicts, the delivery of health services to children is disrupted. Health staff leave their posts, supplies are not delivered, and facilities are ransacked. Health budgets are sacrificed for military and other needs. Existing services are requisitioned for treatment of war injuries. Displacement linked to conflict increases health risks to children.

Psychosocial distress of children and war-related experiences may be just as injurious and disabling as physical wounds. Distressed children show a number of symptoms: withdrawal, psychosomatic complaints, weight loss, failure to thrive, and loss of energy and appetite; all are related to nutrition. The food-health-nutrition interventions used in relief programmes cannot be regarded as effective if they do not take these symptoms into account.

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Child-feeding Practices

Feeding is an ideal context in which to examine the interaction between biological development and cultural variability in international efforts to promote children's survival and health. The transition from liquid to semi-solid and solid feeding is a major developmental milestone that occurs in the first year of life. Infants are faced with maturational, social, and cultural challenges as they learn to chew, swallow, and digest a wide array of culture-specific foods necessary to promote their growth and development.

Disruptions in growth, illness, or disruptions in the acquisition of feeding skills are serious problems that undermine children's survival and are the focus of concern by parents and healthcare providers. Strategies to facilitate adopting positive feeding practices must accommodate the multiple factors ranging from biological requirements to cultural practices that influence feeding.

Appetite is a central component in the decision making process used by caregivers to determine when and how much to feed their infants. Food may be limited and monotonous in flavour and texture. The monotony of the diet may act synergistically with the consequences of repeated infectious morbidity, and result in chronically depressed appetite and limited acceptance of additional food in quantity and variety at the time when this becomes

critical for meeting the nutritional needs of the growing infants.

Diets lacking variety are common in developing countries, particularly among weanlings. For example, in rural Guatemala, an average of eight foods accounted for almost 80% of children's energy intake. However, the relationships among low dietary diversity, nutrient intake, and nutrition status in infants of developing countries have not been examined systematically.

A longitudinal study of urban Peruvian infants has shown an incidence of anorexia during 15% of all days, with a parallel reduction in total energy intake. Fever, diarrhoea, and respiratory infection were also associated with reduced appetite. However, anorexia was not related to changes in maternal feeding behaviour. Perhaps this was because mothers rarely reported infant anorexia before solid foods were consumed regularly. Reports of reduced appetite were positively associated with children's age and usually followed, rather than preceded, changes in infant-feeding behaviour. Thus, maternal feeding practice decisions may be influenced by poor growth rather than by infant-feeding behaviour.

In rural Mexico, 45 children between the ages of 33 and 60 months were observed for one 12-hour day to assess their dietary intakes and growth. Children had access to more than 2,000 kcal/ day, but mean dietary intakes averaged only slightly more than 1,500 kcal/day. Children requested foods frequently and received positive responses 76% of the time, suggesting that food availability did not restrict intake. Many of the children were growth stunted, suggesting that factors such as anorexia should be included in analyses of dietary intake and growth.

CULTURAL NORMS

In every setting, there are cultural norms for when and how infants should receive foods and drinks in addition to

breastmilk. Cross-cultural studies of infant-feeding document wide variation in the timing, type, and amount of supplemental feeds and in beliefs about the appropriate styles of feeding. Although substantial variation can occur within a culture or a group, each culture has a set of generalised rules for feeding infants and for meeting their developmental milestones. Although these cultural norms are dynamic and undergo periodic changes, they are passed down through subsequent generations and retain at least some traditional features.

Cultural patterns of weaning often do not conform to paediatric recommendations to add semi-solid foods as a complement to breastmilk when the child is four to six months of age. For example, in many settings, weaning foods and drinks are offered very early, even during the first month of life, whereas in other settings, infants are not given any substantial supplemental foods until they are at least one year old. In addition, styles of infant-feeding also vary based on cultural norms. In some settings, infants are fed out of their own bowl with a spoon, whereas in others caretakers use their hands to feed infants, or infants eat out of a shared family pot. Likewise, the desired consistency of first foods usually has a strong cultural basis, in general being more liquid or semi-solid and soft.

In many settings, caretakers are relatively passive during the feeding process, following cues given by the child and often allowing the child to feed himself or herself. In other settings, caretakers have been socialised to be extremely proactive in their feeding mode, ranging from verbal encouragement, e.g., "Open the hatch for your vegetables, Jaime," to the use of rewards or bribery to achieve a clean plate.

Embedded within each culture or group's beliefs and norms of infant-feeding are caretakers' perceptions of children's appetite, including how appetite can change because of the infant's developmental stage or health status

and what, if anything, caretakers should do in response to short- or long-term changes in appetite.

Parent-child Interactions

Investigators observing children with poor growth and their mothers during mealtime have reported parent-child interaction patterns characterised by unclear messages, premature termination of feeding, inconsistent mealtimes, and limited food availability. Evidence also suggests that there is a high rate of insecure attachment between children with poor growth and their parents.

When parents do not structure mealtimes, children do not learn to anticipate when they will eat, and may feel anxious and irritable. In contrast, children who "fill up" on liquids, such as fruit juice, and do not eat regularly structured meals do not get adequate nutrients and are at risk for growth failure, even when they come from middle- and upper-income American families. Therefore, so that children will develop an expectation and an appetite around mealtime, mealtimes should be structured and children should not "graze" or feed *ad lib*.

In many developing countries, caretakers are generally passive in their feeding mode, allowing children to set the pace. Food is offered on the basis of specific signals children send, such as crying or grabbing for food. When a child sends a "food reject" signal, a common response is to give in to the child's will. In developing countries, a child is rarely forced to eat when he or she resists, with the Yoruba of Nigeria as a notable exception. In Guatemala, mothers report that "the child's stomach knows how much food it needs," and believe that forcing a child to eat could make the child sick or vomit or could worsen the illness of one who is already sick.

Most parents have a mental construct of what a "normal" child's appetite should be and recognise that anorexia-a child's refusal to eat-is not normal. However,

parents may not have ideas about how to cope with anorexia, and may be convinced that the primary solution is to administer vitamins or tonics to improve the child's appetite. They place the burden of eating on the child, often taking cues from their infants about when and what foods should be offered. This scenario has been described among Bangladeshi infants:

One of the most common reasons reported for not giving more complementary food was because "the child refused." Although normal interactive feeding behaviours have been observed between Bangladeshi infants and mothers ... the reasons why the children do not demand and consume food sufficient to sustain normal growth, as healthy children are expected to do, remain unclear. Caretaker inattentiveness to feeding, as well as frequent acute infections, chronic illnesses, and malnutrition in the child, may account for a portion of the energy deficit.

A Conceptual Framework

A framework adapted from one by Dettwyler represents two interacting continuums: the caretaker's feeding behaviour and the child's acceptance of food, or appetite. The range of caretaker behaviours is shown horizontally, with passive feeding behaviours on the left and active feeding behaviours on the right. In developing countries it is common for caretakers to be relatively passive, offering little physical or verbal encouragement to eat- unless a child is perceived to be ill or is exhibiting frank rejection of food. When this happens, caretakers often respond to the child's lack of interest in or rejection of food through more active feeding behaviour. When children recover from illness, however, caretakers resume their passive feeding behaviours once again, shifting back along the continuum. Moreover, although research evidence is sparse, it appears that when children experience chronic anorexia, caretaker behaviour may remain relatively passive until children's growth falters.

On the vertical axis, the child's acceptance of food, or appetite, is also represented on a continuum, so that the child's behaviour moves from positive appetite to negative appetite. This continuum is likely to be dynamic, so that when children experience repeated infections or illness symptoms, their behaviour will reflect reduced appetite during the illness and a return of appetite during recovery or convalescence. Anorexia associated with illness, particularly fever, may be an adaptive physiological response related to immune function, and emphasis for encouraging feeding should perhaps focus more on the convalescent period when appetite returns.

When chronic anorexia occurs, the appetite may remain below normal for extended periods. The child's cues that reflect a lack of interest in food or a rejection of food may not be as pronounced as when children are ill, and caretakers may assume such behaviours are normal.

The interaction between the caretaker's and the child's behaviours occur, there are several important factors influencing the interaction, including the age of the child; the quality, quantity, and characteristics of the weaning diet; breastfeeding status; health and nutrition status of the child; caretaker time; and the ability to recognise and respond to the child's feeding cues.

These factors represent the transactional nature of feeding whereby both the child and the caregiver are influenced by each other and the overall quality of their interaction. For example, a diet that is monotonous, non-nutritious, or of an inappropriate consistency may have a negative impact on a child's acceptance of food or appetite. An older child who receives primarily breastmilk rather than the more energy-dense weaning foods may not be receiving adequate nutrient intake even if the child appears to prefer breastmilk. The poor nutrition status or high morbidity of a child may influence the caretaker's behaviour. The ability of caretakers to respond to children's

cues may be influenced by their resources, time, or knowledge and by other demands.

The likelihood of malnutrition increases when a child has anorexia and the caretaker's style of feeding is passive. Although more research is needed to clarify the relationships among the caretaker's feeding style, the child's acceptance of food, and nutrient intake, programmes can use the diagram to promote healthy feeding behaviours. For caretakers, programmes should emphasise a shift from passive to more active feeding behaviours-regardless of the child's health status. For infants and children, programmes should promote foods, feeding styles, and contexts that are associated with positive appetite.

Although children may experience transitory anorexia, usually during an infectious disease episode (particularly fever), programmes that are culturally based and incorporate the caretaker-child interaction into their recommendations are likely to have most success in promoting positive appetite and reducing the occurrence of chronically negative appetite. For example, programmes that promote breastfeeding or improve overall hygiene to reduce morbidity and subsequent illness-related anorexia could be important for both caregivers and children. As important as these recommendations are, programmes that address the caregiver-child relationship are extremely important. Programmes should be designed to understand the caretaker's and the child's behaviours and feeding cues, and develop behavioural change programmes and messages to facilitate more active feeding.

Nutritional Management of Diarrhoea

Several landmarks in understanding the relationship between infection and nutrition have emerged from the study of nutrition in diarrhoea! disease. Moreover, through an examination of feeding children with diarrhoea, we have

come to a better understanding of approaches to feeding children with infectious diseases in general.

Diarrhoeal diseases may cause, precipitate, or exacerbate protein-energy and micronutrient malnutrition through five possible mechanisms: reduced food intake, decreased absorption of nutrients, increased catabolic losses, nutrient loss from the intestine, and metabolic inefficiency due to micronutrient deficiency.

Reduced food intake

Reduction of food intake during diarrhoea may be due to a child's anorexia, maternal food-withholding behaviour, or both. During episodes of diarrhoea or fever in 131 Peruvian infants, a significant decrease in total energy intake was found, representing up to 20% to 30% of energy intake. This decrease was due to reduced consumption of non-breastmilk foods. Structured observations in the homes of 40 Peruvian children aged 4 to 36 months revealed that anorexia reduced a child's acceptance of food, despite the mother's encouragement to eat.

In Guatemalan children aged 15 to 60 months, diarrhoea was found to be associated with an average reduction in daily food intake of nearly 20%, equivalent to 175 kcal and 4.8 g of protein. Children's anorexia is a consequence of clinical disturbances, including dehydration, electrolyte imbalance, fever, and vomiting or abdominal discomfort. Mothers may withhold food as a result of medical advice or on their own, either in response to their child's anorexia or as a practice for managing diarrhoea. Whatever the reason, the result may be the cessation of breastfeeding, compromises in the quality and quantity of weaning foods, and, in some cases, reduction of food intake by lactating mothers themselves.

Decreased absorption of nutrients

Structural damage to the intestine, as well as the physical

action of increased intestinal movement and reduced fluid transit time, interact to decrease absorption of nutrients during an episode of diarrhoea. In 1982, the effects of diarrhoea on nutrient intake of 19 hospitalised children with cholera and 13 with rotavirus infections were studied. Not only was the intake of nitrogen, fat, and calories reduced in the acute stage (by 44%, 32%, and 36%, respectively, in cholera, and 22%, 10%, and 27%, respectively, in rotavirus patients), but the coefficient of nitrogen absorption was reduced to an average of 45% for all children.

Increased catabolism

During the inflammatory process, muscle protein is converted into glucose through gluconeogenesis by the liver. This glucose is used as a fuel by the diseased tissues, immune system, liver, kidneys, brain, and tissues generally to sustain the hypermetabolism associated with the development of fever. Experimental studies in rabbits suggest that glucose may also be used by the intestine itself, in response to the diarrhoea, to sustain the secretory process that accompanies infectious diarrhoeas.

Although gluconeogenesis may seem to destroy muscle mass in acute diarrhoeal illness, it nevertheless appears to serve a critical purpose. In a study of patients aged 15 years or less admitted to a diarrhoea treatment center in Dhaka, Bangladesh, the investigators found that children who fail to mount a proper gluconeogenetic response are more likely to die. Further, the liver takes the amino acids usually used for forming albumin, transferrin, and other proteins to form the acute-phase proteins designed to protect the host against the infection.

Powanda has reviewed the metabolic changes present in patients with acute infections, noting that diarrhoea of infectious origin induced an average daily negative nitrogen balance of 0.9 g/kg/day. However, measurement

of increased protein catabolism in childhood diarrhoea has been complicated by the fact that the usual measure of protein catabolism, nitrogen balance, is affected by often very large intestinal protein losses.

Nutrient loss from the intestine

In diarrhoea nutrients are lost directly from the intestinal tract. An increased stool clearance of α_1 -antitrypsin, a serum protein marker present in the stools, has been observed in about half of all rotavirus diarrhoeas and even more frequently in shigellosis infection, in which tissue destruction is accompanied by losses of plasma, epithelia, and blood cells. Nearly two-thirds of patients with enterotoxigenic *Escherichia coli* also show an excessive loss of protein in the faeces. Structural alterations in the mucosal epithelium due to *Shigella* sp., rotavirus, and *Campylobacter* sp. infections also result in a "protein-losing enteropathy," similar to the measles-induced abrupt fall in plasma albumin through faecal losses. Losses of zinc and copper during early stages of acute diarrhoea in Chilean children have been documented. These losses were greater when stool losses were larger.

Metabolic Inefficiency due to micronutrient deficiency

Children recovering from protein-energy malnutrition show, on a magnified scale, several metabolic changes that take place during normal growth, as they gain weight at over 20 times the normal rate. In these cases, the increased rate of tissue synthesis may be hampered by a limited supply of nutrients from the body pool that may not be replenished fast enough by dietary intake. Limited growth associated with diets marginal in zinc has been found in North American children.

An acute depletion of plasma zinc has been shown in marasmic children recovering from malnutrition when they were fed an energy-dense diet meant to promote growth.

These children were in zinc balance before their energy intake was increased. Based on these observations, it is likely that zinc deficiency may be a limiting factor for children to recover the weight lost during an acute infection.

Nutritional support during illness

There is general agreement about the need for adequate nutritional support of the sick child; however, how to do this has been a subject of considerable debate. Health-care providers' (mainly physicians') advice and mothers' own beliefs are the two driving forces that determine the nutritional care of the sick child in the home. The social support network available to mothers or, conversely, social pressure to act in a specific way, is a third determinant of this care.

It is more likely that mothers will follow the recommendations given by the health care system (whether formal or informal) if these conform to cultural norms and the explanatory model of disease. However, these norms, like other aspects of human culture, are constantly evolving, being shaped by external forces. Therefore, mothers may eventually incorporate consistent advice from health workers in relation to a given aspect of care into their practices. This is, in fact, what has happened in relation to the restriction of food to the diarrhoea-affected child.

Dietary management of acute diarrhoea by health providers

For centuries, the dietary approach for treating diarrhoea recommended by physicians and other health workers consisted of a variable period of food reduction or, more likely, fasting, and then a gradual reintroduction of foods and nutrients during the recovery period. This practice was meant to avoid the clinical consequences of diarrhoea-induced malabsorption, based on the assumption that withholding food will reduce stool volume and duration of

diarrhoea. The practice was transmitted by physicians to mothers as a need to "keep the bowel at rest" during the bout of diarrhoea, and was incorporated into traditional home-based treatments of the illness.

At present, WHO, UNICEF, and several other international agencies recommend sustained feeding of the child with diarrhoea. This recommendation is based on the rationale that an important proportion of nutrients offered during the diarrhoea episode is actually absorbed; therefore, it is more important to emphasise absorption during diarrhoea, disregarding the degree of malabsorption that does occur when nutrients are offered, thus shortening the period during which nutritional requirements remain unsatisfied.

This approach is supported by evidence from several studies from clinical and field settings in developing and developed countries. As early as 1924, it was suggested that a child's net balance of nutrients, rather than the number of stools, should be the primary clinical concern in the treatment of a child with diarrhoea. In the late 1940s, a series of clinical studies revealed that the continued feeding approach for children with diarrhoea had better outcomes than the one- or two-day fasting routine treatment.

More recently, the effects of early versus delayed feeding on 128 non-malnourished children up to 36 months of age were compared. The children were randomly assigned to receive one of four dietary treatments: 1) full-strength formula (110 kcal/ kg/day) from the onset of the treatment regimen; 2) half-strength formula for two days and full-strength formula from then on; 3) oral glucose-electrolyte solution for two days, followed by half-strength formula for another two days, and finally full-strength formula; 4) intravenous rehydration with total fasting for two days, continuing thereafter with two days of glucose-electrolyte solution, two days of half-strength formula, and full-strength formula. Although the stool volume was

higher in the first group and lower in the others, the duration of illness was not significantly different among the four treatment groups, and therapeutic success rates were comparable.

On the other hand, net absorption of nitrogen, fat, and carbohydrate, as well as total energy intake, was higher in the first group, reflecting better nitrogen retention and larger increments in body weight, arm circumference, and skinfold thicknesses, from the onset of treatment and throughout the observation period.

The sustained feeding recommendation gives particular attention to foods eaten by the child before the onset of diarrhoea. This is particularly sound when dealing with diarrhoea at home (as opposed to the hospitalised child). Several studies have shown better acceptability and clinical outcomes using diets based on traditional foods than using more conventional therapeutic diets. For example, a shorter duration of diarrhoea was reported in children fed a diet based on local Peruvian staples than in children fed a potato and milk diet or those fed a soy-protein formula (1.5 vs. 2.7 and 4.9 days, respectively).

Similarly, a median duration of diarrhoea of 1.8 days was reported in children fed a pap of corn, cottonseed flour, lysine, sugar, and a vitamin-mineral mix, developed by the Institute of Nutrition for Central America and Panama (INCAP) and locally known as Incaparina, complemented with a mixture of rice, corn, beans, oil, and sugar. This was significantly shorter than the 5.3 days median duration of diarrhoea in children fed a lactose-hydrolysed milk and a mixture of rice, egg, oatmeal, oil, and sugar. Similar successful experiences were reported using fermented milks and yoghurts in an area where these foods are culturally acceptable.

The use of milk feedings during acute diarrhoea episodes is of particular concern in infants and toddlers. There is evidence from different clinical trials that

reintroducing normal feedings (including full strength milk) immediately after rehydration results in less weight loss and earlier hospital discharge. Current recommendations, based on clinical trials, are that breastfed infants should continue breastfeeding during acute diarrhoea. Non breastfed infants who receive cow's milk should continue to receive it with no dilution.

Malnourished children with acute diarrhoea may develop carbohydrate intolerance, including intolerance to monosaccharides, as well as protein hypersensitivity. These complications may lead to protracted diarrhoea or to more acute complications such as necrotising enterocolitis, so nutrition should be managed according to the clinical needs of each patient.

Dietary management of acute diarrhoea by mothers

Ethnographic studies of maternal behaviour when confronting diarrhoea (and other diseases) show that mothers have an ample repertoire of treatments that usually include a combination of Western medicine (either self-prescribed or prescribed by a physician or other member of the health team), home remedies, and indigenous practices. More often than not, a combination of treatments is used to manage an episode of illness. Mothers' infant-feeding practices are shaped by cultural aspects, including advice from elders (their own mothers, their mothers-in-law, or other women with ascendancy) and home-based practices passed from generation to generation. A particular choice will also be influenced by the availability of the remedy, its cost, and the social value of that particular mode of therapy. Mothers may also adopt new practices or change old ones depending on experience obtained in treating previous episodes of illness.

Therefore, there are multiple opportunities for influencing mothers' choices. However, successful changes

must be culture-sensitive. Thus, it is essential to understand maternal beliefs and practices regarding diet during acute diarrhoea in children. Several studies have consistently shown, across different cultures, that although some mothers tend to withhold food completely from the child during diarrhoea, most recognise the need to feed, although they tend to modify the usual diet. Reasons to withhold specific foods vary, as do reasons to offer particular foods during diarrhoea. Mothers usually recognise several different causes for diarrhoea, not all of which have an equivalent in Western medical culture.

In some cultures, for example, diarrhoea is seen under a "hot-cold" system of classification. Some types of diarrhoea are "hot" ("bloody" diarrhoea), whereas others are "cold" ("mucus" diarrhoea). Some forms of diarrhoea are associated with fright (*susto* in Hispanic America) or anger. Other forms of diarrhoea are associated with ingesting particular foods within a definite category (a "strong" food). Some forms of diarrhoea are thought to be due to malevolent supernatural causes ("evil eye"), whereas others, like those associated with teething, are considered to be part of the child's normal development.

Although these classifications may not make much sense to the health worker, the putative causes recognised by the community are closely linked to mothers' management of the disease at home. For example, giving or withholding a certain food may be related to its hot or cold quality. It is encouraging that several field studies have found that mothers often consider it important to continue giving breast milk the sick child. This practice is fully supported by epidemiological and intervention studies, which show that an infant's appetite for breastmilk does not seem to be diminished during uncomplicated diarrhoea episodes, and that breastfeeding practiced at adequate levels provides significant protection against diarrhoea.

Care practices during acute diarrhoea

Mothers and other close caregivers should provide emotional support, love, and comfort to the sick child. They should actively encourage the child to drink more fluids than usual, to eat small, frequent meals, and to eat more during convalescence. To do this, a mother requires sufficient time to devote to the child and access to good social support. Consider, for example, that she may have to change the diapers many times per day; take greater care of the child if the child has fever, cough, or vomiting; spend more time and energy trying to feed the child; calm her restless child; and hold the child in her arms. Preparing home remedies also takes time. She may take the child to a doctor, leaving her home chores undone or leaving the rest of the family unattended.

Yet the role of the social support structure goes beyond that of supporting a mother's time. It is important for the mother of a sick child that her husband, parents, in-laws, neighbours, and friends encourage her to practice good habits and discourage potentially harmful ones. She also needs appropriate advice from health workers, as well as access to adequate medical care services. Health-care providers' practices should take into account the points covered in this review. They should be knowledgeable about appropriate feeding management of illness, and should provide sound advice to mothers.

Feeding practices followed in health facilities should be consistent with those advised for mothers at home. In particular cases, it may be necessary to supplement specific nutrients (such as zinc or vitamin A) that may have been depleted during the illness. If a child needs to be hospitalised, care should not be limited to treating and managing the underlying disease and associated complications; the staff should also offer understanding and comfort to the child.

Even at home, caregivers should realise that illness is not a pleasant experience for the child. Consider even a mild diarrhoea in a toddler. The child has to be cleaned many times a day, or go around with dirty diapers or pants, smelly, and uncomfortable; he may suffer vomiting, cough, or fever; he may not be hungry, or may not have a taste for the food offered, or may even be unable to eat at all; he will be in a bad mood; he will be tired or weak, unable to play with siblings; he may be actually suffering pain.

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Optimal Complimentary Feeding Practices

The introduction of "complementary foods" (that is, foods consumed in addition to breastmilk to meet nutrient needs) is not, however, without risk. Recent evidence indicates that these foods may displace breastmilk, thereby producing a greater likelihood of nutrient deficiencies if, as is common in many low-income countries, the density and bioavailability of nutrients in the complementary foods are not equal to or greater than those of breastmilk. By the same token, these foods may interfere with the absorption of nutrients in breastmilk. Moreover, the frequent occurrence of microbial contamination of non-breastmilk foods in many developing countries can substantially increase the risk of diarrhoea and other infectious diseases, possibly resulting in a net negative impact of these foods on nutrition status and other adverse health outcomes. Thus, the presumed benefits of initiation of non-breastmilk food sources must be balanced against these possible risks.

TIMING OF INTRODUCTION OF COMPLEMENTARY FOODS

Full-term, Normal-birth-weight Infants

Until recently, our concept of the appropriate timing for introduction of complementary foods was based on a comparison of the theoretical energy requirements of

young infants and their energy intake from breastmilk at different ages. Thus, it was assumed that when the average energy intake from breastmilk falls below these theoretical requirements, additional energy sources need to be offered. This concept, however, ignored the fact that our understanding of the theoretical energy requirements of breastfed infants was limited and was based mostly on observed intakes by nonbreastfed infants who were fed infant formula in feeding bottles.

We now know that energy intakes of breastfed infants are less than those of formula-fed infants, and the patterns of weight gain of the two sets of children differ considerably. Although the current level of recommended energy intake for infants from 6 to 12 months of age is 98 kcal/kg/d, breastfed infants typically consume somewhat less than this, even in affluent populations. In such populations, the lower energy intake by breastfed compared with formula-fed infants is not due to inadequate milk production by their mothers or to inadequate amounts of complementary foods. Rather, it appears that breastfed infants voluntarily self-regulate their energy intake at about 80-90 kcal/kg/d,

Despite the different levels of energy intake by breastfed and formula-fed infants, there is no evidence of any functional impairment associated with the lower energy intakes and weight gains of breastfed infants. Indeed, a comparative study of matched breastfed and formula-fed infants in California found that the breastfed infants were at least as physically active as those receiving infant formula, and the breastfed infants had less morbidity from infections. Thus, it seems unlikely that breastfed infants are "underfed," and it is perhaps more plausible that formula-fed infants may be "overfed."

An alternative, experimental approach to deciding when to introduce complementary foods is to randomly assign exclusively breastfed infants to receive additional

foods at different ages. If the complementary foods add significantly to the infants' total energy intake and promote increased growth, it might be assumed that breastmilk alone was not meeting the children's physiological needs. If, on the other hand, these additional foods simply replace breastmilk without contributing to total energy intake and growth, it might be assumed that the infants' energy requirements were being satisfied with breastmilk alone. Because of the high frequency of microbial contamination of complementary foods in many developing countries, it would be concluded in the latter case that delayed introduction of these foods is preferable.

A study has recently been completed in Honduras using this experimental design. Exclusively breastfed infants were randomly assigned to receive complementary foods at four months of age or to continue being exclusively breastfed until six months of age. The foods offered to the former group were designed to satisfy the requirements for all essential nutrients and were commercially prepared, precooked, and packaged to ensure that they were of adequate nutritional quality and free from microbial contamination. This approach guaranteed that these factors would not adversely affect the intake and growth of the children assigned to earlier introduction of complementary foods. Notably, the children who received the complementary foods at four months consumed significantly less breastmilk at five and six months, thereby counterbalancing the energy consumed from the non-breastmilk sources.

There were no differences between groups in total energy intake or patterns of growth. Rates of infectious morbidity were similar across groups, presumably because of the ideal conditions under which the complementary foods were provided. It is unlikely that this would be true under usual field conditions, where introduction of non-breastmilk foods and liquids is consistently associated with

increased rates of illness. Of further importance, there were no differences between study groups in the children's subsequent acceptance of non-breastmilk foods or growth beyond six months of age. Thus, introducing the complementary foods before six months appeared to offer no advantage for the children's overall growth performance.

The results of a descriptive study of infant feeding practices and growth of poor Peruvian infants provide further support for these conclusions. This study found that infant growth during the first six months was positively related to the proportion of energy consumed from breastmilk. Moreover, the patterns of growth of predominantly breastfed, low-income Peruvian infants did not differ from those of predominantly breastfed Californian infants of relatively affluent mothers.

The Peruvian infants' growth may have been adequate for several reasons in addition to the generally excellent nutritional quality of breastmilk. Not only did the predominantly breastfed Peruvian infants have considerably less diarrhoea and other illnesses than their mixed-fed and non-breastfed counterparts, but the breastfed infants tended to maintain their usual energy intake even when they had diarrhoea.

Interestingly, whereas non-breastfed infants demonstrated the expected negative relationship between diarrhoea prevalence and growth, these illnesses were not associated with reduced growth rates among young breastfed infants.

There is also a need to consider the adequacy of micronutrient status of infants who are exclusively breastfed for varying lengths of time. In one study, exclusively breastfed infants had higher rates of anaemia at six months of age, especially in the subgroup with low birth weight. Nevertheless, for the reasons noted above, it would probably be ill-advised to recommend earlier

complementary feeding of these infants to prevent nutritional anaemia. Moreover, even among those infants who received the iron-fortified complementary foods provided by the project, nearly one-fourth developed anaemia by six months of age.

Thus, it may be preferable to focus on enhancing maternal health and nutrition status to reduce rates of low birth weight, and on promoting obstetrical practices such as late clamping of the umbilical cord to ensure maximal transfer of blood and associated nutrients to the newborn infant. Furthermore, in those situations where earlier supplementation of infants is necessary to prevent nutritional anaemia, this might be accomplished by providing specific nutrient supplements instead of potentially contaminated food.

Low-birth-weight Infants

It is still uncertain whether this same recommendation for withholding complementary foods until six months is appropriate for low-birth-weight infants (<2,500 g), particularly those who are small for gestational age. Because these infants are often born to undernourished women, concern has been raised that their mothers may not produce an adequate quantity and quality of breastmilk to maintain expected growth rates through the first six months of life. However, the relationship between maternal nutrition status and milk quantity and composition remains controversial, because few appropriately designed studies have explored these relationships across the full spectrum of maternal nutrition status. Evidence to date indicates that milk production is unlikely to be impaired unless maternal nutrition status is quite severely compromised.

The Honduras study described above had too few low-birth-weight infants to draw definitive conclusions regarding the effects of different ages of initiation of complementary foods. Nevertheless, the subgroup of low-

birth-weight children seemed to respond to early supplementation in the same way as those who were of normal birth weight, suggesting that the same conclusions might hold for low-birth-weight infants. Additional studies are needed to gather more empirical data on this subgroup of children.

OPTIMAL FEEDING BEHAVIOURS

“Feeding behaviours” refers specifically to those caregiver behaviours that may influence children’s consumption of non-breastmilk foods once they have been introduced. For example, the caregiver has primary control over the frequency with which foods are offered to the young child, the amount served, the technique with which they are provided (that is, by spoon, hand, feeding bottle, etc.), the composition of these foods, and the level of encouragement or forcefulness used to feed them.

Methodological Issues

The relationships between caregivers’ feeding behaviours and children’s total energy intakes have not been studied very extensively, so it is worth digressing for a moment to consider some critical methodological features that must be recognized for the proper interpretation of existing studies and planning of future ones. There are two primary methods of studying the relationships between caregiver feeding behaviours and children’s energy intakes, neither of which is perfect. Probably both methodologic approaches will be needed to understand these relationships fully.

One study method is simply to observe current feeding practices and to analyse subsequently the relationships between the caregiver behaviours and the children’s food consumption. This approach is extremely valuable because it provides descriptive information on current practices in the home environment. However, because there is no

control of the number of meals offered, timing of meals, types and preparation of foods, etc., the enormous number of variables makes the statistical modelling extremely complex. Moreover, these descriptive studies only permit an examination of associations between the independent variables (e.g., feeding behaviours, food composition) and total food (energy) consumption.

Because of the nature of the research design, it is impossible to draw definitive conclusions regarding the causal direction of any observed associations or the reasons for these associations. For example, caregivers may learn over time how much individual children are likely to eat at a particular meal. Thus, positive associations between the amount served and the amount consumed do not necessarily imply a causal relationship. Likewise, positive relationships between the frequency of meals and total daily energy consumption may indicate either that caregivers who feed more frequently are able to encourage children to eat more or that children with greater appetites demand more frequent meals.

An alternative research method is to implement an experimental design whereby complementary foods of defined composition are offered a specified number of times per day according to a fixed protocol, either in a clinical unit or in the child's home. The total amount of food consumed can then be assessed in relation to the number of meals offered and their composition. The person feeding the child may either be his or her usual home caregiver or a study aide specially trained to offer food in a consistent manner from one meal to the next. The advantage of this study design is the ability to control both the composition of the diet (to examine the effects of specific food components or organoleptic characteristics on total intake) and the frequency of feeding. By manipulating specific feeding behaviours or components of the diet in a controlled fashion, the experimental design permits causal

inferences regarding the effects of these factors on the children's intakes. The disadvantage of this design is the uncertainty regarding the applicability of these results to "natural conditions" in the home.

Regardless of the experimental approach, the research methods are complex, tedious, and costly because they are very labour-intensive. Not only is quantitative information regarding food intake needed, but breastmilk consumption must also be monitored to assess the impact of different complementary feeding regimens on consumption of milk by infants who are still breast-feeding.

Frequency of meals

We are currently conducting a series of hospital based studies of the effects of different frequencies of feeding and composition of meals on total daily energy intake by fully weaned, recovering malnourished children. The ultimate objectives of these studies are to develop specific feeding recommendations and to design appropriate foods for young children. As indicated in the foregoing paragraph, these studies have the advantage of the exquisite degree of control of feeding practices and food composition that is possible in the metabolic ward, but the results must be interpreted with caution due to the nature of the study subjects and the fact that they are no longer receiving any breastmilk. Because the study subjects were recovering from severe malnutrition, their energy intakes were substantially greater than would be expected for normal infants. Thus, it is conceivable that these results may not be fully generalizable to non-malnourished children.

The first set of studies examined the effects of three meal frequencies and varied energy densities of semi-solid mixed diets composed of rice, milk, sugar, vegetable oil, and supplemental vitamins and minerals. Colouring, thickening, and flavouring agents were added to the diets so that they were generally indistinguishable in taste and

appearance. The preparations were fed *ad libitum* three, four, or five times per day to 18 children from 6 to 18 months of age whose total daily amounts of food and energy consumption were measured by weighing the feeding bowls before and after each meal.

The effects of varied energy density on the amounts of food and energy consumed are reviewed below. Controlling for the level of energy density, the total daily amount consumed was approximately 16% more when the number of meals was increased from three to four per day ($p < .001$) and 7% more when the feeding frequency rose from four to five meals per day ($p = .0.05$). The proportionately greater increase in intake with the change from three to four meals per day versus the change from four to five meals per day was statistically significant. Therefore, there may be diminishing returns with still further increases in meal frequency. Importantly, approximately 15 to 20 minutes were required per meal before the children reached satiety, regardless of the meal frequency. Thus, there is an obvious tradeoff between meal frequency and the amount of time required to provide additional meals. This time cost may be a severe constraint to greater meal frequency, especially when the caregivers have multiple competing responsibilities, including other child-care tasks. The total amount of time required to feed the children each day was related only to the number of meals served ($p < .001$), and not to energy density.

It is important to recognize that the clinical studies described in this section were conducted on fully weaned children. We have not yet completed similar studies in breastfed infants. Recommendations regarding the frequency of feeding complementary foods often fail to consider the potentially adverse effects of frequent meals on breastmilk intake. Even if a mother continues to offer the breast often, it is difficult to stimulate a child who has been satiated by other foods to breast-feed.

Thus, recommendations aimed at increasing the intake of complementary foods should take this into account, especially if the energy and nutrient densities of these foods are lower than those of breastmilk. Obviously, at some age the child will be completely weaned from the breast, but the speed at which this occurs may be influenced by the amount and frequency of other foods offered. Additional studies of the effects of different complementary feeding practices on both total energy and nutrient intakes and on intakes from breastmilk are urgently needed.

Although there are no empirical data from controlled studies of the effects of varied feeding frequency and energy density of complementary foods on total energy intakes by breastfed infants, the amounts of energy that might be required from complementary foods at different ages have been estimated. These calculations provide only very crude estimates of the average amounts of energy that must be offered from complementary foods, because there is tremendous variability in the amounts of breastmilk consumption that were reported from the different studies, possibly because of different complementary feeding practices, as well as substantial inter-child differences within studies. Also, it must be remembered that currently recommended levels of energy intake very likely overestimate the true needs of breastfed infants. Nevertheless, these estimates provide some idea of the general amounts of energy that might be necessary from complementary foods at different ages.

Appropriate composition of complementary foods

In addition to the particular ways in which foods are presented to children, the composition of the meals can independently affect intake. Children, like adults, respond to the organoleptic, or sensory, properties of food, such as aroma, flavour, "mouth-feel," colour, and appearance. Moreover, because of the relatively high energy

requirements of young children and their limited gastric capacity, the energy density or "bulkiness" of the diet can also influence total consumption. Finally, because the neuromuscular mechanisms of chewing and swallowing may not be fully developed in the young infant, the viscosity or consistency of the food may also influence consumption. Each of these issues will be discussed briefly in the following section.

Energy density

Despite the critical importance of adequate complementary foods in maintaining the nutrition and health of young children, there is surprisingly little recent scientific information on the optimal formulation of these foods in terms of their energy density and nutrient content and bioavailability. With regard to energy density, the classic manual on feeding infants and young children by Cameron and Hofvander states only that the energy density should be between 100 and 200 kcal/100 g of food, but no information is provided on the scientific basis for this recommendation.

To develop guidelines for appropriate energy density of semi-solid food mixtures, we varied the range of densities offered during the same clinical studies described above. Diets of four different densities (40, 70, 100, or 150 kcal/100 g) were provided in random sequence during each of the dietary periods when three, four, or five meals were offered per day. The mean amounts of the diet consumed (g/kg/d) were significantly greater with successive reductions in the energy density of the diet. Nevertheless, the total daily energy intakes (kcal/kg/d) increased significantly with the more concentrated diets ($p < .001$).

Surprisingly, there was no clear evidence of a threshold of energy density after which further increases in total energy consumption ceased. Moreover, there were no significant interactions between energy density and feeding

frequency. In other words, greater energy intakes occurred with each added meal regardless of the energy density of the diet, and these intakes increased with each higher level of energy density for all meal frequencies.

These results indicate that the children were able to adjust the amounts they consumed to compensate partially for the different energy densities of the diets. However, they still ingested greater total energy from the more concentrated diets. Similar conclusions were drawn in earlier studies of younger infants, older preschool children, and other recovering malnourished children.

Despite the children's apparent attempts to adjust intakes in response to differing energy density, their total energy intakes still varied according to energy concentration. At the lower densities, it is likely that the children were physically unable to consume enough to satisfy their physiological needs because of limitations in gastric capacity, which has been estimated at 30 to 40 ml/kg body weight. The absence of a plateau in intake at the higher densities may occur either because the children had not satisfied their requirements for post-malnutrition compensatory growth, even with the highest density diet, or because the adaptive decrease in intake with a high-density diet is not perfectly regulated. For reasons discussed at greater length elsewhere, the latter explanation seems more likely.

As indicated above, specific guidelines are needed on the minimal energy density that will satisfy children's theoretical energy requirements. These guidelines obviously will depend on the assumptions employed regarding the children's recommended level of energy intake. If we decide that the minimum energy density should be sufficient to ensure that nearly all fully weaned children can satisfy their theoretical energy needs from a mixed diet, the target level of energy intake should be set

at 2 SD above the assumed mean energy requirement for all children of a particular age.

The current recommended daily energy intake for children 6 to 24 months of age ranges from 95 to 108 kcal/kg, depending on age and sex, and the coefficient of variation in energy requirements is estimated to be 12.5%. Thus, the energy density of the diet of 24-month-old girls, whose mean theoretical energy requirement is 108 kcal/kg/d, should be sufficient to permit any one of them to consume as much as 135 kcal/kg/d, which is 25% greater than the average requirement for all children in this subgroup.

Methods to increase energy density

Unfortunately, it may not be possible to achieve increased energy density of the diet without sacrificing other critical features. For example, reduction of the water content to achieve greater energy concentration is accompanied by an increase in the thickness or viscosity of the diet. Cereal starches become extremely viscous because of their high water-holding capacity once they are gelatinized by cooking. Methods to reduce the viscosity of starches are described below. Alternative means of augmenting energy density are to add non-gelatinous carbohydrates, such as simple sugars or fats. However, each of these approaches implies the addition of empty calories without accompanying protein or micronutrients. Thus, it is extremely important that the entire nutrient profile of the final mixed diet be analysed before glibly recommending the addition of sugar or oil to complementary foods.

For example, adding one teaspoonful of vegetable oil to 100 g of a typical West African pap would increase its energy density from approximately 30 to 70 kcal/100 g but decrease the percentage of energy as protein from about 9% to about 4%. If consumed at a level sufficient to satisfy children's energy needs, the oil-supplemented pap would

not meet their protein requirements. A similar effect on micronutrient density (in relation to energy content) could have undesirable nutritional consequences if those micronutrients are ordinarily present in marginally adequate concentrations.

PREVENTING CHILDHOOD MALNUTRITION

Methods to Reduce Viscosity

Several methods have been described to reduce the viscosity of cereal mixtures, such as the addition of amylase, fermentation, and extrusion cooking. Of these, amylase has the greatest and most dramatic ability to reduce the viscosity of a cereal porridge rapidly. The use of this enzyme is particularly attractive because it can be produced at the household level in developing countries by germinating local grains and producing malt flour, which is rich in amylase.

However, the impact of viscosity reduction on total energy intake is still being debated. Whereas some investigators have reported a positive impact of adding amylase or malt flour to children's diets on their total energy intake, others have not.

Furthermore, a number of concerns have been expressed regarding the safety of this technology. Possible risks include the increased likelihood of microbial contamination of foods inoculated with home-produced malt flours after cooking, and the possibility of cyanide poisoning from improperly processed germinated grains. Because of the uncertain benefit of amylase-treated foods and the possible aforementioned risks, there does not presently seem to be sufficiently compelling evidence to warrant extensive promotion of this technique, except under controlled conditions.

Other Organoleptic Characteristics

Other organoleptic features, especially flavour, may affect children's intakes of complementary foods. A study of formula-fed infants in the United States, for example, found that they increased their consumption when sugars with a higher sweetness index were added to their formulas. By contrast, preliminary results from a study of semi-solid diets offered to recovering malnourished Peruvian children indicate that replacing starch with sugar did not affect intakes. However, the children consumed about 10% more when a non-caloric sweetener, saccharine, was added to the high-starch diet. Unlike sweetening agents, the addition of small amounts of salt to blended foods does not seem to affect consumption by young infants.

Nutrient Content and Bioavailability

Nevertheless, it is important to recognize that these factors may be more important determinants of physical growth and development than is energy consumption per se. For example, recent studies found that the growth of rural Mexican children was associated not with their total energy consumption, but with the proportion of their energy intake derived from animal sources.

Earlier intervention trials in New Guinea and Sudan have also shown that the quality of the diet, not just the amount of energy offered, influences children's growth. In these studies children who received milk supplements demonstrated greater linear growth than did those who received similar amounts of energy from either beans, tubers, or isolated fat sources. Even in the more affluent setting of western Europe, the physical growth and psychomotor development of vegetarian (macrobiotic) children lag behind those of children who receive animal products in the diet.

Although suggestions are available on the appropriate nutrient content of complementary foods, better guidelines are urgently needed on suitable ways of achieving these recommended levels of nutrients and assuring their bioavailability, especially when the complementary feeding mixtures are composed of local foods derived exclusively or almost exclusively from plant sources. These issues are of particular concern for the poorest families, because their economic conditions and educational and time constraints may limit their ability to improve the quality of the diet.

The data from the Peruvian infants were collected during longitudinal studies in Huascar, a low-income, perturban community on the eastern limits of Lima. A total of 153 singleton newborns weighing 22,500 g at birth were enrolled in the study for a period of one year. Dietary intake was measured in a subgroup of 131 infants on one or two days each month by means of direct observation and weighing of all foods and breastmilk consumed during 12 daytime hours, as described in detail previously. Nighttime intakes were obtained by recall history and by extrapolation of the amount of breastmilk consumed during the daytime observations.

The total amount of food intake was converted to energy and nutrient intakes using Peruvian and other regional food composition tables and direct measurement of the proximate components of samples of breastmilk. Information is available for 1,626 days of observation of these 131 infants. The index children were also visited in their homes three times weekly to inquire about the presence of specific symptoms of illness during the period since the previous visit. Body weight and recumbent length were measured monthly.

The dietary data were originally analysed as total energy and nutrient intakes per day. Data were also available from most children on intakes from individual

recipes, mode of feeding, time of day at which the food or recipe was provided, and amounts offered and consumed. These latter pieces of information provided the opportunity to examine the relationships among feeding frequency, energy density, feeding mode, amounts offered, and source of energy (independent variables), and the total energy consumed during the day of observation and total energy consumed from different food sources (dependent variables). To compare data for children of similar ages from both data sets (i.e., Peru and Nigeria), a total of 720 days of observation of 117 Peruvian children from 6 to 11 months of age were included in the present analyses.

The data for the Nigerian children were obtained during longitudinal studies conducted as part of the Dietary Management of Diarrhoea project in three villages near Ilorin, Kwara State. A total of 214 children from 6 to 28 months of age were included in daily surveillance for diarrhoea! disease and monthly anthropometric assessments. Children were enrolled in dietary studies only after the start of an episode of diarrhoea. Quantitative observations of dietary intake were completed for at least 12 hours on one or more days during diarrhoea, early convalescence, and after full recovery.

All foods prepared, all portions served, and any leftovers were weighed. The amounts of each ingredient consumed were converted into nutrient intakes, using African food composition tables. Breastmilk intakes were estimated from 12-hour test weighings. As with the Peruvian study, information was available on the number of meals, energy density, serving size and amounts consumed for each food and recipe item. Only data from 197 days of observation of 53 children from 6 to 11 months of age are presented in this report.

Description of Analytic Methods

The energy intake data from the Peruvian and Nigerian

children were analysed using multivariate analysis of covariance. Response variables were total energy intake, energy intake from breastmilk, and energy intake from other foods, all measured in kilocalories per kilogram body weight per day. Explanatory variables included country, presence of fever, presence of diarrhoea, body weight, age, number of breast-feeds, number of meals, average amount of food offered per kilogram body weight per meal, and average energy density of food offered. The original model included all of the above variables as well as a random subject effect (nested within the country effect) and all two-way interactions of country with the continuous variables. Variables that were not significant ($p < .05$) in the MANCOVA were removed in a stepwise fashion.

Although the children's energy intakes per kilogram body weight were somewhat less than current WHO recommendations, they were similar to observed intakes by breastfed infants of relatively well-off families in California. Nevertheless, because the Peruvian and Nigerian children were smaller than expected for age (mean weight-for-age SD score was $-0.51 z$ for the Peruvian children and $-1.94 z$ for the Nigerian children), their total energy intakes (647 ± 201 and 633 ± 167 kcal/d, respectively) were considerably less than the amounts currently recommended by WHO (720 to 1,050 kcal/d, depending on age and sex).

The children were fed quite frequently during the 12 hours of observation in their homes. Indeed, it was often difficult to decide exactly when one meal ended and another began, so a "feeding episode" was arbitrarily defined as any intake of non-breastmilk food separated from other occurrences of food consumption by at least 10 minutes. The Peruvian children received an average of four breast-feeds and nearly four additional meals during the observation period.

The Nigerian children received more than six breast-feeds and four other meals. The energy densities of the non-

breastmilk foods differed considerably in the two populations. Whereas the Peruvian children received mostly non-human milks and soups as complementary foods, with an average energy density of 67 kcal/100 g, the Nigerian children received mostly watery cereal paps, which had an average energy density of only 26 kcal/100g.

Interestingly, the magnitude of association of the two independent variables of primary interest (i.e., the number of meals and the energy density of complementary foods) differed for the two sets of children. In Peru, each additional meal was associated with an increase in total energy intake of 6.5 kcal/kg/d, but each kilocalorie augmentation in energy density was associated with an increase in total energy intake of only 0.11 kcal/kg/d. Thus, if all other factors are held constant, an increased consumption of 10 kcal/kg/d would be expected to occur if the meal frequency were increased by 1.5 meals per day or the energy density were increased by 91 kcal/100g.

In contrast with the findings in Peru, each additional feeding episode in Nigeria was associated with an increase of only 1.8 kcal/kg/d, whereas each kilocalorie increase in energy density was associated with 0.68 kcal/kg/d greater total energy intake. Thus, to achieve an increase in intake of 10 kcal/kg/d in Nigeria would require either 5.6 more meals per day or an increment in energy density of only 15 kcal/100 g. These results must be accepted with all the caution described above, because the original studies were observational and not experimental. Nevertheless, the results imply that different approaches to enhancing energy intake might be appropriate in these two settings.

Greater meal frequency might be expected to yield a more positive impact in Peru than increased energy density of complementary foods, especially considering the difficulty in achieving the densities that would be required. On the other hand, enhanced energy density would seem to be a more effective approach in Nigeria than an increased

frequency of feeding, particularly in view of the already high combined frequency of breast-feeding and other meals. These results also highlight the potential value of quantitative studies of dietary intake and the importance of defining current feeding practices before initiating programmatic interventions.

Importance of Child Appetite

Despite the important relationships described above, it should be obvious that children's dietary intakes are not only a function of caregiver feeding behaviours and the composition of the diet. Other factors intrinsic to the child, such as the presence of diarrhoea, fever, and parasitic infections, micronutrient status, and interactions with the caregiver, often determine whether foods that are offered will be accepted. To understand the frequency with which child-related factors interfere with eating patterns, we have recently completed studies of the epidemiology of reported poor appetite in a low-income community on the outskirts of Lima, Peru.

To assess the validity of maternal reports of poor infant appetite, we first compared these histories with measured energy consumption on days of observation. Mean $\pm$ SD total energy intakes on days with reported anorexia were 81 ± 21 kcal/kg in infants from 1 to 6 months of age and 71 ± 22 kcal/kg in infants greater than 6 months old compared with 94 ± 22 and 82 ± 21 kcal/kg in the respective age groups when appetites were reportedly normal ($p < .001$). Energy intake from non-breastmilk sources was more affected than energy intake from breastmilk.

The epidemiology of poor appetite was then assessed in 153 infants who were monitored longitudinally during their first year of life. The prevalence of reported anorexia increased progressively from 2.2% of days of observation at less than 1 month of age to 31.7% at 11 months of age. The presence of reduced appetite was positively associated

with infant age and with the presence of fever, diarrhoea, and respiratory illnesses and negatively associated with the consumption of breastmilk.

Previous analyses of data from a subset of these same children showed that the prevalence of poor appetite was negatively associated with growth increments from 6 to 12 months of age. Because of the high prevalence of reported anorexia and its relationship with impaired growth, it is likely that poor appetite, rather than lack of food or improper child feeding behaviours, may explain some proportion of the low energy intake and growth faltering of infants in this and similar communities.

PREVENTING MICROBIAL CONTAMINATION

Several studies have demonstrated that foods provided to young children in developing countries are frequently colonized with high levels of faecal indicator organisms. Because organisms transmitted in stool are potentially capable of causing enteric infections, optimal child care practices must include prevention of faecal contamination of their foods. Several studies have found that specific foodrelated practices that influence the likelihood of contamination are the methods of preparation, processing, and serving, as well as the amount of time elapsed between cooking and serving, and the method of storage. These issues are discussed briefly in the following section.

Food Preparation and Method of Serving

Because of the high rates of contamination of food and water in many low-income settings, the best way to ensure that these items are free of pathogens is to heat them to a sufficiently high temperature ($>70^{\circ}\text{C}$) immediately prior to serving. Despite the simplicity of this recommendation, the limitations of available time and cooking fuel often make this impractical for many child caregivers.

In household studies in Peru, we found that food rarely harboured faecal organisms immediately after cooking. However, the degree of subsequent contamination varied according to the type of serving utensil. For example, teas and herbal infusions served with a cup and spoon almost never had high levels of faecal organisms. By contrast, these same preparations given in feeding bottles had considerably greater rates of contamination. The results of subsequent studies indicated that the bottles themselves and the rubber nipples were frequently contaminated before any liquid was put into them. These findings support current recommendations to discourage bottle-feeding. In some countries hand-feeding of young children is the norm. Because the caregiver's hands may also be a source of potential pathogens, handwashing before feeding episodes is crucial.

Food Storage

In the aforementioned studies from Peru, the same foods that were free from contamination after cooking had progressively greater concentrations of bacteria with increased duration of storage, presumably because of multiplication of microbes introduced by contaminated utensils or hands at the time of initial serving. The bacterial counts were especially high during the warmer months of the year. Because a minimum dose of bacteria is required to induce some types of enteric infections, the multiplication of bacteria that occurs during food storage may be instrumental in the transmission of infection. Under typical conditions where refrigeration is not available, the only method to reduce this risk is to reheat the foods to a sufficiently high temperature long enough to kill bacteria before serving.

Use of Food Additives and Processing Techniques

A wide range of simple food preservation techniques, such

as drying, salting, and fermentation, is practiced commonly at the household level in traditional societies. On the other hand, there is little experience with low-cost food additives that might be used to prevent contamination of food once it is prepared. There is some suggestion that fermented foods may be more resistant to such contamination, possibly because of their low pH or other antimicrobial factors produced during fermentation, but this body of knowledge is still limited.

One recent study from Tanzania found that children in one village who received fermented cereal drinks had a reduced diarrhoeal incidence compared with children from another village and ethnic group who did not receive fermented foods. These results must be viewed with caution, however, because the study design did not control for the possibly confounding effects of village, ethnic group, and other factors that may have independently influenced the rates of diarrhoea.

PROGRAMMATIC APPROACHES TO IMPROVE COMPLEMENTARY FEEDING PRACTICES

Cultural Perceptions

Before attempting to promote changes in current child-feeding practices, it is crucial to understand the local beliefs governing them. Technical recommendations based strictly on the physiological considerations described above may be unacceptable if they are incompatible with local perceptions. For example, beliefs about the appropriate age to introduce complementary foods and the types of foods that are acceptable must be taken into account.

Age of introduction

In Peru, the perceived appropriate age for the introduction of complementary foods is related to the caregiver's notion of when the child is ready to eat. This, in turn, is generally

viewed in terms of the child's development: the presence of teeth, the "forming of the stomach," the ability to swallow food, or the demonstration of an active interest towards food. Recognition of these characteristics varies according to cultural setting. In coastal communities, an infant may be perceived as wanting to eat or needing to begin "forming the stomach" as early as 2 to 4 months of age; in rural highland populations, this is perceived to occur at 8 to 10 months, and the process of "forming the stomach" can last as long as 4 months. In each case, there is a concept that foods must be introduced gradually.

Types of food

Peruvian caregivers generally select more dilute preparations as first foods because they are considered easier to swallow and appropriate for "forming the stomach." Broths and soups are perceived as being especially valuable because the nutritious components of the food ingredients are "extracted" into the broth during cooking. Certain foods are considered more appropriate for small children, such as milk, chicken liver, and, to a lesser degree, egg. Yellow foods, such as squash or a local variety of banana, are also considered beneficial. On the other hand, some foods, such as beans and oil, are perceived as possibly causing harm. In some cultures, these perceptions are related to the humoral system.

Types of complementary food preparations

Improved complementary feeding regimens may incorporate home-prepared combinations of easily accessible foods; pre-cooked, centrally processed food mixtures; or "hybrids" of these two approaches. The relative advantages and disadvantages of each approach have been described. Experience with each of these types of interventions in Peru will be described.

Home-available mixed diets. There have been a number of recent attempts to promote improved home-prepared complementary foods in Peru. In each case, the interventions were developed in a stepwise fashion following a series of preliminary "formative" research activities. First, an understanding of the critical cultural concepts mentioned above was sought through interviews with key informants and discussions within focus groups composed of child caregivers.

Foods were then selected on the basis of their availability at the household level, their nutritional value, their cultural acceptability, and their cost (in the case of those that must be purchased). To ensure maximum efficiency, the cost per nutrient value was calculated periodically on the basis of the local market price for the candidate foods, and those providing the greatest energy or nutrient value at least cost were incorporated preferentially in the food mixture.

Food preparations or recipes using the selected foods were formulated through a participatory process of recipe trials with the beneficiaries. Behavioural change trials of the use of these preparations in the home were then conducted to explore the acceptability of the recommended foods and feeding practices, and any necessary modifications were made.

Using this methodology, improved child feeding practices were promoted at the community level in a shanty-town population of Lima, using a mix of interpersonal (video and demonstration), print, and local alternative media to promote appropriate complementary feeding concepts and recipes. The objectives of the intervention were to postpone the introduction of non-breastmilk foods until at least five months of age, encourage continued breast-feeding through the first year of life, and promote consumption of at least two portions daily of the

recommended complementary food mixtures, with or without additional snacks or other foods.

The complementary food mixtures were described both as specific recipes and in terms of improved preparation techniques, such as making thicker purees and puddings rather than broths and soups. No specific recommendations were given on the total number of feedings during the day, because this was not originally considered a principal problem in Lima.

The intervention achieved a significant delay in the timing of the introduction of foods, although the magnitude of change was modest. After the intervention, 37% of the population had introduced non-breastmilk foods before five months of age, compared with 54% at baseline. There was a significant increase in recommended complementary feeding practices from 15% of the population to 28% after the intervention. The concept of a thick food as nutritious appeared to be adopted more readily than the specific recipes promoted. Among the specific recipes, savory purees were preferred over sweet puddings. The use of energy- and nutrient-dense snacks, such as bread and biscuits, was a common practice reinforced during this intervention.

In another project, designed initially to improve the dietary management of diarrhoea (DMD project), a recipe for a home-prepared mixture, "Sanquito," was developed and promoted for use in children during and after diarrhoea in a highland region of Peru. Sanquito was a modification of a local preparation of wheat flour, sugar, and lard or oil, which was nutritionally improved by incorporating pea or broad bean flour and carrot. After five months of a pilot educational intervention conducted through a mix of radio, print, and face-to-face communication channels, 82% of the population had attained knowledge of the recipe, 16% had prepared it, and 12% reportedly used it regularly.

Considerably higher levels of trial and adoption occurred when the messages were received from a doctor or nurse or, to a slightly lesser extent, through a mothers' club, indicating the importance of interpersonal communication for use of the recipe. As Sanquito was promoted for treatment of diarrhoea, the presence of a recent episode of diarrhoea in the index child was associated with its use; children who had not had diarrhoea during the intervention period rarely had received the mixture.

As a result of the experience of the DMD project, a programme was subsequently implemented in an oral rehydration unit in a hospital in Lima to promote adoption of complementary feeding recipes for children admitted to this unit. A health facility was chosen for the intervention, not to make recommendations specifically for diarrhoea, but because health workers were shown to be a credible source of information in the DMD project. Also, it was assumed that the caregivers' heightened attention to the children's needs at that time might favour adoption of the nutrition message.

Two different educational approaches were used: one group of mothers received five minutes of counselling and a recipe pamphlet, the other group received the same counselling plus a 20-minute cooking demonstration. In both cases there was a significant impact on mothers' knowledge both at 48 hours and again at 30 days after the intervention (from 28% before the intervention to 74% and 75%, respectively, afterwards). Likewise, use of the promoted recipes at least once on the day before the interview increased from 3% to 58% and 38%, respectively, during the two follow-up assessments, which were conducted by 24-hour recall history. Interestingly, there was no difference between the two educational methods with respect to either of these outcome variables.

Centrally prepared complementary foods. Usually, centrally produced complementary foods are precooked, industrially processed mixtures that are distributed for community-based supplementary feeding programmes, home use, or both. Alternatively, mixtures of local foods may be cooked in community kitchens or feeding centres for distribution within the community. In both cases, responsibility for the formulation of the food mixture no longer remains with the individual caregiver.

Nevertheless, the caregiver must choose whether or not to participate in the programme and, in some cases, whether to prepare and serve the previously formulated mixture at home or in the community feeding centre. Until very recently we have had very little experience with precooked, industrially prepared formulations in Peru. However, we have attempted to promote improved complementary feeding practices through community kitchens, as described in the following section.

During a pilot project in Lima, complementary foods were prepared three times a day in community kitchens, where they were then collected by young children's caregivers or siblings. This permitted savings of time, fuel, and money, and further served as a way of demonstrating appropriate complementary feeding practices. In this study, daily energy intake following the intervention period was significantly greater in the intervention than the control group (100% versus 74% of FAD/WHO 1985 requirements for body weight for children 6 to 24 months of age). The mean total daily energy density (including breastmilk) was also significantly greater in the intervention than in the control group (81 versus 69 kcal/100 g). Participating children received 32% of their total daily energy intake from the community kitchens. Interestingly, there was a positive correlation between change in height and weight during the intervention period and the total number of rations received from the community kitchens.

In areas where appropriate ingredients for complementary foods are not easily accessible to high risk households, it may be necessary to prepare and distribute nutritionally fortified mixtures. Before initiating these programmes, acceptability trials need to be conducted and effective distribution channels identified or developed. Strong educational components are needed to ensure that the food is appropriately prepared and reaches the target group.

Promotion of Education and Communication

Communication channels

A combination of communication channels, including both mass media and interpersonal contact, is important for the motivation, dissemination of information, and training necessary to promote optimal complementary feeding practices. In the previously described community-based interventions, a combination of media were used: radio, print material, and face-to-face education. In Peru it was important to include health professionals as "agents of change" because they are considered credible sources of information. Face-to-face communication in the clinical setting was found to be an effective way of teaching the enhanced complementary feeding recipes.

Community organizations

Existing community organizations are potentially valuable channels for communication and intervention programmes. They can also be a useful base for distribution of centrally prepared foods, as shown in the community kitchens project. In the DMD project, belonging to a community organization was associated with higher trial and adoption rates. However, in Lima, where multiple organizations serve the same communities, it was necessary

to work with several community groups simultaneously to achieve adequate coverage.

Specific recipes versus general advice

Specific recipes were developed in each of the interventions described above. In some cases, concepts of appropriate food preparations for young children were also explained. For example, the importance of thick consistency, combinations of foods, and the use of animal products when available was emphasized. The acceptance of specific recipes versus general recommendations varied in the different projects. Mothers commented that they liked to have the recipes; however, more research is needed to explore which of these approaches might produce the greatest long-term impact on feeding practices.

Sustainability

Changes in child-feeding behaviours occur slowly and tend to revert to pre-existing practices if the new behaviours are not continuously reinforced. Thus, the sustainability of intervention programmes is critical in promoting long-term changes in feeding practices. Moreover, those segments of the target population in greatest need of improved feeding practices are often the most resistant to change. Interventions must be continued for even longer periods of time to reach these "late adopters." In each of the above-mentioned interventions, with the exception of the community kitchens trial, the recommended practices diminished with time as the caretakers forgot the new practices.

In the hospital intervention, 30 days after receiving the recommendations, use of the recipes had diminished, even though levels of knowledge had not changed. Interestingly, in the community interventions people requested a continued presence of nutrition advisers. Thus, effective

ways of institutionalizing these educational interventions need to be identified.

Constraints to adoption of improved feeding practices

From the above studies, a picture of the “adopters” has emerged. In two of the studies, the mothers of younger children (5-7 months of age) were found to be more likely to adopt the recommended practices than mothers of older children who were believed to be “already accustomed to soups.” Caregivers who adopted the recommended feeding practices also tended to be younger mothers, those with less advanced schooling, and those who lived independently of their own mothers or mothers-in-law. Participation in a community organization was associated with higher levels of adoption in the DMD highland intervention, although this was not the case in Lima, probably because many more community organizations exist in the capital. A brief description of specific constraints to adoption follows.

Cost and availability of foods

A lack of certain food ingredients may be a constraint to the use of appropriate complementary foods. This seems to have been the case with Sanquito, where pea or broad bean flour was found in only 38% of homes at the time of the evaluation. In the community kitchens project, the more expensive chicken liver was replaced by egg in some of the recipes. Similar constraints of food availability or cost have been reported elsewhere.

Caretaker time

An essential quality of complementary foods is that they must be easily prepared, as extra time for the preparation of special foods for the young child rarely exists. The community kitchens project successfully addressed this constraint by providing a prepared food three times a day. Selecting food from the family pot saves time for home-

prepared mixtures. Possibly for this reason, purees, which were generally made from ingredients already present in the soup prepared for the whole family, were more acceptable than the specially made puddings in the Lima community intervention. Time was not reported as a limiting factor in the preparation of Sanquito, which took only eight minutes.

Cultural Beliefs

Local perceptions about the acceptability of specific foods for young children or the appropriateness of combining different ingredients may have influenced adoption of the recommended practices. The concept of the addition of oil or margarine to the infant's food was not well accepted in the community interventions. In the DMD recipe, oil was the ingredient most frequently forgotten, and when not, it was used in less than recommended amounts.

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Psychological Aspects of Child Care and Nutrition

It is widely recognized that the normal growth and development of infants and young children requires care that adequately meets their basic physical needs (nutrition, health, clothing, housing, sanitation, protection from dangers, etc.) as well as their socio-emotional or psychological needs. The latter includes the availability of caring, loving adults with primary responsibility for the child's well-being, with whom the child can form an affectionate, stable, and trusting relationship, and who provide opportunities for positive social interactions, play, and learning appropriate to the cultural context in which families live. Characteristics of psychosocial care that meets these needs include the caregiver's responsiveness and sensitivity, affection and warmth, psychological involvement with the child, and encouragement of learning and development.

DEFINING PSYCHOSOCIAL CARE

A substantial body of research indicates that children's early mental, motor, and social development is significantly influenced by variations in their early experiences. This research can form the basis for understanding the possible influences of psychosocial care on child nutrition. Early experiences have been assessed using the nature of

children's home environments and the quality of care provided by their parents or other caregivers.

Children's early home environments have commonly been characterized in terms of various demographic or "structural" characteristics (family income, parent education or occupation, family size and composition), or in terms of various "distal" features of the physical or social environment in the home (housing quality, crowding, noise, birth order, presence of newspapers, radio).

In addition, various parental characteristics, such as age, child-rearing knowledge and attitudes, and mental and physical health, have sometimes been employed as "environmental" measures. Since many of these characteristics tend to be related to child developmental outcomes and may significantly influence the quality of care parents provide, they are often utilized as "proxies" for variations in early experience and child care.

We are particularly concerned with the child's functional environment, as reflected in more direct or proximal assessments of children's day-to-day experiences in their natural settings, including the quality of child care or rearing provided by parental or other caregivers. Although a variety of specific features of child care or parent-child interaction have been investigated and found to be related to behavioural development, the following broadly defined qualities of early psychosocial care are considered particularly important, and have generally been found to be associated with positive developmental outcomes in children in a variety of cultural settings:

- responsiveness, sensitivity, and consistency in responding to the child's cues or needs, versus lack of responsiveness, insensitivity, and inconsistency (the extent to which the caregiver is aware of the infant's signals and needs, interprets them accurately, and responds to them promptly, appropriately, and consistently);

- warmth, affection, and acceptance, versus rejection and hostility (reflects balance of positive and negative feelings toward the infant, including accepting characteristics of the infant that might be seen as undesirable);
- involvement with the child, versus lack of involvement and detachment (reflects the degree to which the caregiver or parent cares about the infant's well-being on a day-to-day basis, takes appropriate actions on the infant's behalf, and spends time with the infant when possible);
- encouragement of autonomy, exploration, and learning, versus restrictiveness and interference (extent to which the caregiver provides opportunities for motor, mental, and social development, including independence and self-confidence, through appropriate activities and verbal and social interactions).

Although researchers are inclined to distinguish among these broad aspects of child care for conceptual and analytic purposes, in the "real world" they tend to be interrelated to a considerable degree. All four dimensions are likely to be reflected in the extent to which caregiver and child engage in mutually rewarding, age-appropriate, reciprocal interactions. Also, cultural factors will influence the particular ways in which the characteristics of psychosocial care just outlined are expressed, as well as the extent to which particular child-care practices may be valued or discouraged, in the light of their adaptive value in a given setting. This is likely to be particularly true in the case of discipline and socialization practices, which are not discussed specifically here. Finally, there are a variety of social and economic factors in the ecology of the family and community that may either support or limit the primary caregiver's ability to provide good psychosocial care.

CONCEPTUAL MODEL

The conceptual model outlines the major pathways through which care may influence a child's growth and development. The psychosocial care and nutritional care are closely interconnected in the routine caregiving of everyday life, and thus should be considered holistically. Moreover, the quality of care a child receives will reflect, and to a considerable extent be influenced by, the nature of the overall child-caregiver relationship, a unique pattern of behaviours that develops over time between a parent or caregiver and a particular child. As indicated by the solid arrows, it is well known that the quality of psychosocial care has a direct influence on children's behavioural development (linguistic and cognitive development, growth of social skills, psychological adjustment and adaptation, and development of motor skills). Also, the nutritional and health care children receive has a direct effect on their nutrition status and physical growth.

However, of particular interest is the hypothesis that the quality of psychosocial care may influence the child's nutrition status and growth indirectly, through its linkage with, and possible effect on, the quality of nutritional and health care. Similarly, the child's developmental status and behaviour may also influence the quality of care received in both the psychosocial and the nutritional areas. Finally, the model indicates that the child's behavioural development may be directly influenced by his or her health and nutrition status. Thus it is apparent that the relationships among care, nutrition, growth, and behavioural development may be viewed as interactive or bidirectional.

Since the predisposing factors affecting development tend to interact with one another, we should not expect to find a single causal link between a particular input (e.g., psychosocial care) and an output (e.g., child growth). We are beginning to understand that the development of a

child is better represented by a series of feedback loops, with each change in the child influencing changes in the environment, and vice versa, in a continuous series of interactions. This ongoing pattern of interactions has been called transactional. There is not much known about these influences, particularly in situations with substantial resource constraints.

It is important to recognize that the nature of the caregiver-child relationship and the quality of psychosocial care or nutritional care that parents or other caregivers are able to provide for children are very much affected by several major sources of influence. These are

- 1) the characteristics of the child (age, developmental level, gender, irritability);
- 2) the characteristics of the relationship between child and caregiver;
- 3) the characteristics of the caregiver (attitudes and beliefs about caregiving, motivation and physical energy, emotional state, sense of personal efficacy, physical and mental health);
- 4) the support system (nature of available informational and emotional support); and
- 5) resource constraints (adverse environmental conditions affecting disease prevention, limited disposable income and unstable food supply, excessive demands on caregiver's time for other tasks).

Characteristics of the Child

Children bring very different strengths and weaknesses to the caregiving environment. Many of these are genetically determined (temperament, genetic predisposition for disease), but some are associated with nutritional conditions. For example, severely malnourished infants display a range of symptoms such as apathy, listlessness, and irritability that can make caregiving more difficult.

Motor development may be more advanced at 24 months in children receiving relatively small amounts of nutritional supplementation.

One of the most important characteristics of the child is developmental level. Psychosocial development involves dramatic changes over the first five years of a child's life, and caring requirements vary tremendously with the age or developmental status of the child. The possible risks to the child and the responsibilities of the caregiver vary with each developmental period: prenatal, early infancy (first 6 months), late infancy (6 to 12 months), early toddler (12 to 24 months), late toddler (24 to 36 months), and preschool (3 to 5 years).

Children may also differ in characteristics that affect how they are valued by their families. In Guatemala, children with lighter-coloured skin or children who resemble a particular parent may be seen as special. There is ample evidence in many societies for gender bias favouring males.

Characteristics of the child associated particularly with nutrition include sucking ability, appetite and hunger, temperament, and energy and motor skill to self-feed during critical early years. All aspects of the feeding situation vary according to the developmental status of the child.

Characteristics of the Relationship

The most important variable from a psychosocial point of view is the nature of the child-caregiver relationship. This will be strongly influenced by the characteristics of the child and caregiver, but over time it forms a unique pattern of behaviours between two individuals. Thus, within one family, a parent will have different relationships with different children. These relationships may be relatively durable and resistant to change. They are also synergistic and dynamic.

A poorly nourished infant may be less responsive to the caregiver, who in turn may believe that the child requires less attention than others, and she may direct her scarce time to other problems. Thus the early perturbations in the relationship will amplify over time, as with any dynamic or chaotic system. The caregiver's responsiveness to the child's cues is essential for timely feeding, particularly between meals. This relationship is important during breastfeeding as well as during supplementary feeding, and lays the groundwork for good care and nutrition during the early years of life.

Findings supporting the generalization that young children's behavioural development is significantly influenced by the nature of their early experiences and the quality of child care received are illustrated below. It is particularly important to note that variations in experience and child care associated with children's development are found not only among major socio-economic status (SES) groups, but within low-income populations as well.

Psychosocial Care and Mental Development

Many studies find that measures of the caregiver's psychosocial care early in life are associated with later cognitive or emotional development of the child. These include observational or interview measures of care and the "HOME" scale, which has been widely used both in the United States and in third world settings (with appropriate adaptations), and is based on interviewing the caregiver at home as well as observing the child with the caregiver. It provides an overall score and sub-scores on six scales: 1) emotional and verbal responsivity of caregiver, 2) avoidance of restriction and punishment (acceptance), 3) organization of the physical and temporal environment, 4) provision of appropriate play materials, 5) caregiver's involvement with child, and 6) opportunities for variety in daily stimulation.

Studies employing the HOME scale for assessing the quality of the home environment in the first few years of life have consistently reported significant associations between these measures and children's intellectual development. The HOME scale was used in a longitudinal study of a large, varying SES sample, and the investigators found that children's Binet IQ at 4 years of age was significantly associated with the quality of the home environment (total HOME score) at 24 months of age ($r=.60$) and even at 12 months ($r=.43$). Another measure of psychosocial care-mother's positive, encouraging teaching style on specific tasks observed at 24 months-correlated significantly ($r=.53$) with IQ at 4 years of age. The correlations were generally equivalent for the higher and lower SES groups when examined separately.

Several studies of premature infants in low-income families also provide evidence of the predictive value of the HOME scales. In a sample of low-income African-American mothers, verbal/emotional responsiveness measured on the HOME scale at 9 months was significantly correlated with Binet IQ at 3 years of age ($r=.41$). Also, maternal responsiveness at 20 months predicted social competence at 3 years, as rated by teachers in a 3-week summer camp ($r=.48$). In a more recent study of children of rural, low-income families, half of whom were premature, the quality of the home environment (total HOME) assessed when the infants were as young as 5 months old (corrected for gestational age) was found to be substantially associated with Binet IQ at 30 months ($r=.61$).

Other measures of psychosocial care have also been associated with cognitive outcomes. Qualitative ratings of maternal sensitivity and acceptance/ warmth derived from a number of lengthy home observations of children 9 to 12 months of age were correlated with Griffiths Developmental Quotients (DQ) at 1 year ($r=.46, .45$). Ratings of the amount of "floor freedom" allowed these

pre-toddlers also correlated with Griffiths 1-year DQ ($r=.46$). Although these findings were based on a middleclass white sample, similar correlations were obtained with a low-income black group. Systematic observations of specific positive features of mother infant interaction, including play and teaching situations made at various points during the first 2 years of life, were significantly associated with intellectual competence at age 5 (Binet IQ) among premature infants.

Some investigators have been able to link particular features of the verbal interaction between mothers and infants to the children's language development. In one study, vocabulary progress during the second year of life was related to frequent, responsive mother-child language interchanges, even when family SES and maternal education were controlled. Increasing research emphasis is currently being placed on the need to link specific features of young children's early environment and experience to particular dimensions of behavioural development, and to determine whether such environmental effects vary as a function of characteristics of the child, such as age or developmental status.

Motor development has also been found to be associated with measures of the early environment. Black toddlers in Washington, DC, who were reared in a "permissive, accepting" rather than a "rigid" home environment (and thus had more opportunities for "floor freedom") tended to have higher Gesell Motor DQ scores at 18 months of age. This relationship was observed in both middle- and lower-class families.

In addition to these correlational studies, there have been some experimental studies that have altered the early experiences of children through random assignment, and have shown significant effects on cognitive development. The most striking results come from the Carolina Abecedarian Project, which placed poor children in an

educationally oriented day-care programme for 8 hours a day, 5 days a week, 50 weeks a year from age 4 months to 5 years. Significant effects on intellectual development and academic achievement were maintained through age 12, although the effects were greatest at the conclusion of the day-care experience. The authors conclude that intensive intervention during the first 5 years of life increases the likelihood of long-term cognitive effects.

Psychosocial Care and the Development of Mother-child Attachment

The relationship of the child to its caregiver has a significant effect on the quality of care the child receives. One aspect of this relationship is the formation in the child of an enduring, focused, affectionate relationship with the mother or other primary caregiver, referred to as child-caregiver attachment. A secure and trusting attachment relationship with the mother or primary caregiver is viewed as providing a very important base for the child's subsequent social and personality development, as well as adaptive behaviour more generally.

During the first 18 months of life, the characteristics of psychosocial care mentioned at the outset (particularly maternal responsiveness or sensitivity, warmth, and involvement) play a significant role in facilitating the development of a secure attachment relationship between infant and mother (or primary caregiver). Empirical evidence of the importance of maternal sensitivity and responsiveness comes from a variety of studies in which "security of attachment" was measured experimentally on the basis of the child's observed behaviour when left alone or with a stranger in a standard "strange situation" paradigm. Such measures of attachment security in 12- to 24-month-old children have been found to be significantly associated with maternal sensitivity and responsiveness based on home or laboratory observations.

The kinds of maternal sensitivity, warmth, and involvement that promote mental development, as well as a secure attachment relationship, begin to play an important role very early in life, and are often observable in the feeding situation. Moreover, variations in such maternal characteristics may well have significant implications for breastfeeding and the quality of early feeding practices.

Early psychosocial care has also been shown to be associated with subsequent behavioural development in a variety of third world populations exposed to significant nutritional and health risks. One of the earliest of these involved the use of an adaptation of the HOME scale in a prospective longitudinal study of a cohort of children growing up in a Mexican village. Children who came from home environments characterized as relatively less favourable in the first 2 years of life tended to have lower mental development scores at 5 years of age (and they also were more likely to be identified as clinically malnourished early in childhood).

Several more recent studies support these early findings from Mexico. In a study of 196 children from 10 rural villages in northern India, for example, the HOME scale correlated positively with children's IQ ($r = .51$) as well as Gesell DQ ($r = .46$) at 36 months. Moreover, in both instances HOME scores explained significant variance in IQ/DQ even after controlling for SES and nutrition status. Significant correlations were also found between HOME and the motor development sub-scale of the Gesell.

In a study of 5- to 6-year-old Philippine children of varying nutrition status, interviews were used to measure variety of stimulation and parental involvement in child care in the home. Both measures were significantly correlated with a composite measure of intellectual competence ($r = .35, .38$). In addition, the level of parental involvement added unique variance to the prediction of

intellectual competence beyond that provided by mother's IQ, parental education, and the quality of the physical environment in the home.

Similarly, detailed and extended home observations of rural Kenyan toddlers indicated that children who performed better on the Bayley Mental Scale at 24 to 30 months of age tended to have caregivers who had more frequently talked to them, responded to their vocalizations, and engaged them in sustained social interactions ($r = .19$ to $.29$). The latter two caregiver behaviours were also positively associated with children's smiling at 30 months ($r = .24, .34$).

Specific features of the child-care environment have been associated with particular aspects of infant and toddler development in a detailed observational study of Egyptian village toddlers. The frequency of toddlers' distress was significantly associated with the caregivers' lack of responsiveness to the child's fussiness ($r = .34, .48$), whereas the amount of toddlers' positive vocalization was related to the frequency of caregivers' vocal stimulation ($r = .58, .43$). Caregiver behaviour in this instance was not related significantly to measures of cognition.

One study in Jamaica found evidence of the importance of early psychosocial care in the behavioural development of nutritionally at-risk children. Stunted toddlers enrolled in a home visiting programme aimed at encouraging mothers to engage in play and interaction avoided a potential decline of about 7 to 8 points in Griffiths DO scores, about the same benefit as that provided by nutritional supplementation alone. (Additional benefits were gained when psychosocial and nutritional intervention were combined.) A second study compared previously hospitalized malnourished children receiving a similar home visit programme with malnourished control children and with previously hospitalized but not malnourished children, using a case-control design.

Positive mental development effects were found for the home visit group, which continued to be seen at a 14-year follow-up.

PSYCHOSOCIAL CARE WITH NUTRITION, HEALTH, AND GROWTH OUTCOMES

There is considerable evidence to suggest that good psychosocial care is not only associated with positive behavioural outcomes in poor children, but also with more favourable nutritional and growth outcomes, even within populations with nutritional and health risks. Conversely, where such positive features of psychosocial care are greatly reduced or lacking, children from poor families are also likely to be at increased risk of malnutrition.

Some research strategies have focused on identifying which family or demographic factors place some low-income children or families at increased nutritional risk. One method recently developed tries to identify maternal, family, or child-care variables characterizing families whose children tend to be adequately nourished although living in "high risk" nutritional environments: the "positive deviance" studies. This strategy has resulted in many important findings. However, the variables that make some children least likely and others most likely to be malnourished may not be the same.

A similar distinction has been made in psychological conceptualizations between "protective" factors, which prevent or minimize the likelihood of adverse developmental outcomes in children otherwise at high risk, and independently defined "risk" factors, which place some children at heightened likelihood of mal-adaptive behavioural outcomes. Psychologists tend to prefer these terms to the more statistically derived "positive deviance" concept. In both the psychology and the nutrition literature, increasing emphasis is being placed on the need for greater understanding of the positive features of parental child-

care practices, coping strengths, and adaptive strategies that may protect children in "high-risk" environments from adverse nutritional or developmental outcomes, rather than focusing primarily on parental or family risk factors.

In considering the potential linkages between psychosocial and nutritional care, one of the principal assumptions would be that caregivers who are minimally involved and show little affection for the baby, who are insensitive in responding to the child's needs and signals, and who fail to encourage exploration and learning, are also likely to provide relatively poor nutritional, feeding, and physical care. Thus, it is important to examine the quality of child care as an integrated whole, since psychosocial and nutritional or physical care are likely to be rather closely linked.

Psychosocial Care and Nutrition Status

Although there is little resource-shortage malnutrition in industrialized countries, some useful evidence about the role of psychosocial care can be found in a number of studies of "non-organic failure to thrive" (FTT), which have suggested a breakdown in parenting functions. These "parenting breakdowns" are often attributed to major family and socio-economic stresses, including having a difficult, sickly, or low-birth-weight infant. Unfavourable maternal mental health, personality characteristics, or attitudes may also contribute to the diminished quality of care received by such infants.

The homes of 23 low-income FTT children in Little Rock, Arkansas, USA, were rated lower on the HOME scale overall, but especially on scales indicating less maternal responsiveness to and acceptance of the child, as well as a more disorganized environment. Further evidence of the link between inadequate psychosocial and nutritional care comes from a large-scale study of five-year-old children of low-income families in Baltimore, Maryland, USA, which

indicated that those coming from homes characterized by generally inadequate overall "mothering" or child care tended to be at greater nutritional risk (based on dietary intake and biochemical measures).

One experimental study also suggested that favourable psychosocial care may ameliorate the negative effects of foetal malnutrition. Low-SES infants were placed in an intensive 8-hour per day child care programme, and controls who stayed home with their mothers were identified. A small number of infants in each group were foetally malnourished (low ponderal index). There were no differences in maternal involvement or 18-month test performance between foetally malnourished and normal children in the day-care treatment group, but the foetally malnourished children who were cared for at home had significantly lower maternal involvement and test scores than their home controls, as well as both day-care groups.

A number of correlational studies in developing countries have also linked inadequate psychosocial care and poor nutrition or health status. In one longitudinal study, children who were clinically malnourished some time in their first three years tended to come from homes scoring lower on the HOME scales as early as the first year of life. Mothers of these children were also found to be more passive, less responsive and sensitive to the child's needs, and less open to "modernization". Similar characteristics reflecting relatively poor "mothering competence" for mothers of children who had been clinically malnourished were reported from Jamaica; these mothers tended to be rather passive, have low self-esteem, and be socially isolated. Data suggesting that children hospitalized for clinical malnutrition early in life may have experienced less than optimal psychosocial caregiving have been reported from Jamaica and Barbados.

The transactional nature of the child-caregiver linkage is illustrated by a number of studies; poor psychosocial care

is often a response to a child's poor health or low nutrition status. Observations of chronically undernourished 7- to 18-month-old children and their mothers in West Bengal revealed less maternal responsiveness and mutual interaction. Although these differences were not replicated in a parallel study in Nepal, in both studies the undernourished children tended to show a greater need to maintain close proximity to the mother, which might be viewed as a sign of attachment insecurity. Similarly, mothers of undernourished 5- to 11-month-old Chilean babies were observed to show significantly less positive non-verbal emotional responsiveness (through facial expression and touch) than mothers of adequately nourished children, both in a feeding situation and when asked to talk about their child.

Consistent with the above findings suggesting attachment insecurity, a recent study reported that Chilean toddlers from low-income homes who had been chronically underweight showed an insecure attachment relationship with their mothers, as measured with the "strange situation" paradigm. It is interesting to note that the potential role of inadequate mother-infant attachment in the aetiology of clinical malnutrition was also suggested in a nutritional/anthropological study of 20 severely malnourished children under three years of age in an East African village.

Although no observations of mother-child interaction were reported, the investigators hypothesized that the basic risk factor was a failure in "bonding" (or attachment), since more malnourished than comparison children were cared for by someone other than the mother, were illegitimate, were premature, and were weaned before the end of the first year. Similar family background factors differentiating young Ugandan children with kwashiorkor from control children have been reported.

Several recent studies of mild-to-moderate undernutrition and toddler development in Egypt and Kenya also suggest that a number of specific caregiver behaviours are influenced to some extent by children's nutrition status, as indexed by dietary intake. Based on extensive and detailed home observations of toddlers' rearing experiences with mothers or other caregivers over a period of some 15 months, Sigman et al. found that Kenyan village children with reduced food intake were more frequently held, carried, or given physical care; these factors also tended to be negatively associated with behavioural development.

Using similar extended observations of Egyptian toddlers, modest relationships were found between toddlers' dietary intake and specific caregiver behaviours, primarily for girls. Comparisons with equivalent Kenyan data suggested similar patterns of relationships for some measures, but not for others, presumably because of differences in cultural practices and/or in toddler dietary intake in the two settings. A child's nutrition status was found to be associated with both the frequency of interactions and whom the child interacted with.

Maternal caregiving behaviour may be influenced by the nutrition or growth status of infants as young as 3 to 6 months. For example, rural Indian mothers' behaviour toward low-birth-weight (<2.5 kg) children was compared to their behaviour toward high birth-weight (>3.5 kg) children, observed systematically over an 8-hour period. The findings indicated that smaller babies received fewer shows of affection, smiling, talking to, and stimulation (though more feeding) than larger infants.

A study of infants from semi-rural Egyptian households reported that infant weight at 6 months was positively related ($r = .53$) to number of vocalizations received from caregivers, but not to amount of physical contact, identity or proximity of caregiver, or caregiver responses to infant

vocalization or distress. Finally, mothers of six-month-old Kenyan infants of lower weight and length were reported to hold and feed their babies more frequently.

Thus, considerable correlational and longitudinal evidence suggests that variations in psychosocial care may be a function of the health or nutrition status of the child, and that poor nutrition status arises in conditions where psychosocial care is less adequate. Although the direction of influence is not always clear in such studies, the findings suggest that it is important to conduct experimental studies to determine whether enhancing the quality of psychosocial care might result in improvements in nutritional care and thus in nutrition status as well. One of the few experimental studies is the analysis by Super et al. of the Bogota experiment that measured the combined effects of a home visiting programme and food supplementation on children's growth and cognitive development.

Quality of Psychosocial Care

Three factors influence significantly the quality of psychosocial care: the characteristics of the caregiver, the support system for the caregiver, and resource constraints.

Parenting, risk, and protective factors

A number of strategies have been devised for defining and categorizing these three classes of factors that can be associated with good psychosocial care. Since the most common caregivers are parents, the literature often discusses factors associated with parenting. However, we have used a more inclusive concept of psychosocial care, since a great deal of care is actually provided by siblings and other family members in the third world, and also since we will discuss fathers separately from mothers. Most literature suggests that fathers in many developing countries have relatively little contact with young children.

Belsky's model of parenting in the United States identifies three primary determinants of parenting: the personal and psychological resources of the parent, the characteristics of the child, and the broader context in which parent-child relationships evolve. Following Bronfenbrenner's ecological model of development, Okagaki and Divecha make a distinction between contextual variables located in the family, such as the nature of the marital relationship, and those located outside the home, including the extended family, neighbourhoods, livelihood system, and parental social support networks.

Several concepts have been used to describe possible threats to adequate psychosocial care. As noted previously, a risk factor is an environmental characteristic that has been associated with and may contribute to poor outcomes for a significant percentage of children, although not all. Examples might be prenatal and perinatal complications, poverty, or lack of social support. Cumulative risk occurs when more than one risk factor is present in a child's life, and may increase the chances for negative outcomes more than one might expect with an additive model.

Protective factors are those characteristics of the caregiving environment or the child that minimize the potential effects of risk (analogous to the positive deviance concept). "We need to understand not only how various factors combine in a cumulative fashion to exacerbate risk but also how they might interact so as to substantially attenuate or minimize potential risks". Examples might be the presence of a supportive grandmother or the development of a positive marital relationship. These factors are not simply an absence of risk factors but may reflect particular strengths despite risk. Finally, some children manage to have positive outcomes despite high levels of cumulative risk in their family and broader environments. These resilient children can teach us a lot about the kinds of interventions that might be effective

even if major reductions in environmental risk factors are not possible.

The number of possible risk factors investigated in these categories is quite large. We will focus on a few that could have special relevance for nutrition care. At the level of the caregiver, these are beliefs about parenting and parenting efficacy, and depression and anxiety. At the level of the family, we will examine alternative care systems in the home, including the father, and autonomy and income control for the woman in the family. At the level of the broader environment, we will consider alternative child care and social support.

Characteristics of the caregiver

Most non-psychological studies examining the effects of care on nutrition limit themselves to evaluating the time availability of the principal caregiver. This variable is important; however, more detailed studies have been able to conceptualize "time" as the "quality" or responsiveness of the caregiver-child interaction, using the four dimensions outlined above, generally a better predictor of early experience. Caregiver time is necessary but not sufficient in determining whether the child has received adequate care. Beliefs and attitudes about caregiving, emotional state, sense of personal efficacy and self esteem, and physical and mental health are other characteristics that influence a caregiver's quality of care.

These variables are related to the nutrition status of children because at each developmental stage they depend on caregiver behaviour and caregiver responsiveness to receive adequately prepared food in a timely manner (principally in response to the child's hunger signals). The caregiver's motivation and physical abilities can be as important as providing food. Thus these characteristics have important nutritional consequences for children.

Beliefs about Parenting

Frequently, development projects attempt to provide women with labour-saving devices (piped water, fuel substitutes) in order to free up their time for more child care. However, we examined the consequences of these devices and found that women will replace the time with additional domestic chores or income earning schemes rather than child care. Unless parents perceive that additional time with children will benefit themselves or their children, strategies to increase their available time will probably have minimal effects on actual child care time or quality. Therefore, it is essential to understand how a parent perceives the needs children have, particularly for psychosocial care. Both maternal and paternal views should be examined, since the father's opinion may greatly influence his wife, even if he spends little time in child care. Similarly, the child-rearing attitudes of the maternal or paternal grandmother need to be considered.

Beliefs about parenting that may influence child nutrition and development include the goals that parents have for children, their beliefs about developmental milestones (the age at which a child should be able to perform certain actions), beliefs about parental efficacy, and theories about how a parent can encourage development and growth.

It has been suggested that parents in all cultures have three general goals for their children: ensuring their health and survival, teaching them the skills for eventual attainment of economic security, and developing within them those traits that are consistent with local perceptions of virtue. Levine argues that the specific goal that the family finds most important will depend on the ecological context of the family. In agricultural families, when children are valued for their work and are expected to remain as loyal family members, but risks to survival are high, the first goal

is predominant. On the other hand, urban families may not need the children's work, and infant mortality may be lower. When survival is not in question, and children are valued for the affection that they bring to the family rather than their work, the second or third goal will predominate. In this case, parents may be more likely to encourage children's independence and assertiveness rather than obedience to expected patterns of behaviour.

These goals are similar to a dichotomy observed by others. Some caregivers may focus on the child's survival (as in agricultural families), whereas others may hope the child will develop according to a series of milestones (as in urban families). These can be called compensatory and enhancement goal orientations. Some behaviours are intended to return a child to a previously accepted state of health or development (compensatory care), and others serve to enhance further development (enhancement care). Examples of compensatory care are taking an ill child to a health centre to restore his or her health, or encouraging an anorexic child to eat until he or she achieves a normal appetite. Enhancement care includes stimulating a child in play and language, encouraging a well-eating child to finish the last bite, or taking a child to the health centre for preventative care or vaccinations.

The general orientation for psychosocial development is toward enhancement; given the care and the development of an appropriate relationship (attachment) with a caregiver, the child will be able to develop positively. Health care often appears to have a compensatory orientation. Thus we introduce the concept of enhancement care and propose that caregivers be encouraged to develop different goal orientations for their children.

Parenting Efficacy and Self-efficacy

Parenting efficacy refers to the parent's belief that the way the child turns out has something to do with the parent's

behaviour. A parent low in efficacy tends to believe that the child will develop according to genetic factors or the child's own efforts, whereas the parent with high efficacy believes that the child's development depends on the way the parent acts toward the child. This concept differs from self-efficacy, or a person's belief that he or she can perform well compared with others in a particular situation. A person might feel he or she was a very competent parent, for example, but feel that most of his or her child's behaviour was a function of the child's genetic background (low parental efficacy). Someone could have high parental efficacy and low self-efficacy beliefs, and vice versa.

Parents' beliefs or attributions about the causes of their children's behaviour may significantly influence feeding behaviours where undernutrition is endemic. In one study, low-income Nicaraguan mothers who reported that they would take some action to help an anorexic child eat (higher parental efficacy) had better-nourished children than mothers who felt that the child who refused food should be left alone. Malian mothers who left eating decisions to their children may also have had a low sense of parental efficacy; they believed that what the child ate depended on the child's desires rather than on the parent. These beliefs may be particularly important when appetite is a limiting factor, as is often the case in conditions of poverty.

Higher self-efficacy, and the related concept of self-esteem, have been associated with improved caring behaviours. Mothers with greater self-confidence have been observed to be more willing to try to feed anorexic children. Other researchers found that women with higher maternal self-efficacy were significantly more likely to be observed holding their 12- to 18-month-old children, even controlling for other possible explanatory variables. In the United States, significant associations were found between Bayley scores at 18 and 30 months and maternal self-

efficacy (assessed at 5 months), which were higher than associations with more distal measures such as parent education. All the foregoing studies are correlational, so causal links and pathways can only be hypothesized in the absence of experimental investigations.

Beliefs about Children's Developmental Milestones

Beliefs about the ages at which children should reach developmental milestones influence parental expectations for children's behaviour, and may result in too little stimulation on the one hand or excessive demands for mature behaviour on the other. One of the reasons cited for the poor performance of children of adolescent mothers in the United States is the inaccurate beliefs about developmental milestones the mothers hold. Expectations about milestones also vary by culture and may reflect values of that culture. For example, Japanese mothers expected their four-year-old children to be emotionally mature, obedient, and courteous earlier than US mothers. The latter group expected children to be verbally assertive and proficient in social skills with peers earlier. In both cases, mothers' expectations were reflected in the child's behaviour.

Similarly, parents' behaviour may be influenced by their theories of cognitive competence. Some parents believe that children learn from manipulating objects, constructing their reality, whereas others think that children learn from being told or from being shown. The way parents interact with their children reflects those beliefs.

The relationship of beliefs to behaviour is not strong; however, a number of studies suggesting low but significant associations between the two have been cited. Since so much effort is spent in changing parental beliefs, confirming the relationship between belief and behaviour,

particularly in non-US settings, should be a high research priority.

The role of schools in changing beliefs about child-rearing is another area needing further investigation. Many studies find relatively proximal changes in behaviour as a function of education; in Bangladesh, educated mothers were more responsive and attentive to their children in the feeding situation, even controlling for SES of the family (only 25% of the mothers had attended school). How this effect might operate needs to be investigated; it is unlikely that the actual content matter of school increased the mothers' knowledge.

Caregiver Stress, Depression, and Anxiety

Estimates worldwide of the incidence of depression suggest that it is widespread, that women report greater emotional distress than men, and that rates are higher (up to 40%) for women in the lower socio-economic strata and in conditions of powerlessness.

Maternal depression has been associated with deficiency in caring behaviour. A recent review of 20 years of research in the United States linked maternal depression with lack of adequate care and supervision of children, more medical problems and accidents among children, and more time spent in mutual child-caregiver negative states. Many studies show impaired patterns of synchrony in interactions between mother and child that seem to be related to the depression itself rather than to associated family risk factors.

Given the effects of maternal depression on caregiving in the United States, and its prevalence in developing countries, depression could be a factor in some cases of preschool undernutrition, including failure to thrive. We found an association between higher somatic symptoms of stress and preschool children's lower height-for-age in 300

women in a peri-urban area of Guatemala. Zeitlin et al. reported significant associations in Bangladesh between the nutrition status and growth rate of children and the mothers' happy mood state, rated according to operationally defined criteria and observed over several visits. Although the direction of causality is unclear, the results are provocative.

Many women live in conditions of extreme stress related to poverty and civil strife. A psychosomatic symptom frequency scale was used to measure stress in poor Guatemalan and Nicaraguan urban mothers. High rates of stress were found in both groups. Approximately half of each group reported a history of nervios, a psychosomatic illness. In both Guatemala and Nicaragua, the poorest women were under significantly more stress than the slightly better-off women living in the same neighbourhoods. The women under most stress were those who were working but had inadequate child-care arrangements (child watched by a sibling less than 11 years old) and those who were having problems with their husbands. Despite the need for further research, particularly in developing countries, it is reasonable to assume that high levels of maternal stress will have adverse effects on the quality of caregiving.

Characteristics of the Support System

The support system refers to three kinds of support: informational, emotional, and physical. Informational support refers to sources of information available to the caregiver, either from family or from local or regional institutions. Emotional support refers to the attitudes of family members toward the caregiver. Physical support, as used here, refers to actual assistance with child care and support for the family. The concept of the care/support niche has been used to describe the various combinations of this physical support that a child may experience. The

dimensions are the person who provides major financial support in the family, and the type of caregiving environment (person and location).

The support system influences nutritional care and psychosocial care in several ways. The emotional support system will influence the "motivational variables" that determine whether a caregiver uses her or his skills and knowledge for appropriate nutrition, health, and psychosocial care. Informational support can help the caregiver determine appropriate foods, and the care/support niche will affect the resources available for food and the time available for feeding.

Social Support: Family and Community

Social support refers to the help of the community and family, and includes emotional support, knowledge support, and actual assistance, which can reduce workloads and increase the amount or quality of caregiving available. Community support can be critical for solving problems of alternative child care, credit, or agricultural productivity through the formation of work groups, cooperatives, or informal sharing of tasks.

Support from other family members in child care may influence the quality and amount of care provided, both directly through freeing up the mother's time, and indirectly through influences on the mother, such as reducing her stress. Whether freed time is actually spent on child care may depend on a culture's beliefs about child care.

Fathers are rarely included in discussions of care, but they can substantially improve the welfare of their children. This can occur through a number of different avenues, such as contributing a higher proportion of their income to their children's welfare, performing more caregiving, or valuing and providing support to the mother for her caregiving. It

is important to understand local conceptions of fathering roles and responsibilities, since there are significant cultural differences in the role fathers play in their children's upbringing, ranging from "finding a good mother" to highly involved child-rearing. Strategies for increasing the role of the father in caregiving are beginning to be discussed, and represent an important area for future development.

Alternative child care in the home

It is sometimes assumed that when a mother is not working for income, she is the primary caregiver. However, there is evidence that caregiving is shared by other family members in many societies. A common pattern is for the mother to provide a higher percentage of care to the child through the first year of age and then to share more care of the child with other family members, especially the older girl child. In fact, sibling care, or multiple caregivers, is probably the most common arrangement worldwide. At the same time, women's income earning has major implications for the care/support environment of the child, with the effects of maternal employment being determined to some extent by the quality of the alternative care available.

In general, research from developing countries as well as the United States suggests that early child care in the home by adults other than the mother need not have negative effects if the quality of care is good. A small percentage of children in developing countries are cared for in formal day care centres or in family "day-care" group homes. The effects of these and of less formal non-maternal care arrangements on children's growth, morbidity, or psychosocial development have received relatively little study. However, research in the United States and also in developing countries suggests that high-quality day-care centres can have beneficial effects on children, particularly those from the poorest socio-economic backgrounds.

Resource Constraints

The ecological setting for these care behaviours will dramatically affect the kinds of care required and the difficulty in providing that care. The poorer the conditions of the environment for health maintenance and disease prevention, the more limited or more unstable the food supply, the more the health and development of the child will depend on the caring behaviours of the caregiver and family. Unfortunately, as is so often true, the more one needs, the less one gets. Thus behaviour that might seem maladaptive in one setting (not encouraging feeding) may make sense when children have to learn to deal with periodic food shortages.

Autonomy and income control

The low status of women in many cultures means that often they do not have much control over family resources, nor do they have much decision-making power in the household. They may have responsibility for child-rearing without control over the resources to carry out that responsibility. Control of resources may be greater if the woman earns the income, although this is not always the case. A few studies have shown that women who earn an income have more household decision-making power than those who do not.

The person who earns (and therefore presumably controls) the income has increasingly been seen as a factor in the nutrition status of the child. A number of correlational studies have shown that income in the control of women is more likely to be allocated for the immediate benefit of children, such as the purchase of food, than is income earned by men.

Two studies have linked women's perception of autonomy in the household with better nutrition status of children. In Amman, Jordan, the lower the mother's

autonomy in the household, the more poorly nourished the children, even controlling for other possible explanatory factors. Another study examining correlates of child nutrition in Chad reported that the single most predictive factor associated with child nutrition was the mother's statement that she made some decisions about food allocations.

It is important to recognize that increasing women's control of income is not sufficient to ensure good nutrition for mother or child. Without adequate resources, no amount of caregiving or resource control is sufficient. We must not blame the victim. For example, women in Guatemala who worked long hours with very low earnings had children who were poorly nourished, and women in Chile and Indonesia who earned reasonable wages had well-nourished children despite alternative care arrangements. Projects that have increased the workload of the mother, without increasing the amount of income under her control, have had only limited or no effect on children's nutrition status.

STRATEGIES FOR PROTECTING, SUPPORTING, AND PROMOTING GOOD PSYCHOSOCIAL CARE

Four intervention approaches can be distinguished: working directly with the child, improving the care giver-child relationship, increasing the resources available to the caregiver, and altering the social support available for the caregiving system.

All four types of intervention show promise, but probably the first will be least effective for its cost. Some of these approaches have been tested, whereas others are in need of evaluation. In general, psychosocial interventions should not be separate from health and nutrition interventions; psychosocial variables should be included in all projects in order to increase the possibility of positive change. However, this is more easily said than done.

Issues of territoriality, competition for scarce resources, and even the sense of the word "integration" probably make these combined programmes difficult. "The word integration is accompanied by false expectations ... it suggests a relationship that is interdependent and much more permanent than can be achieved by simply setting parts, or programmes, side by side". Yet the simple process of including several components in a single programme can be valuable. Integration can occur in the content of programmes, and finally, in the actions of caregivers, families, and communities. He suggests a number of strategies to assist programmes in integration.

Child-centred Interventions

Interventions with children alone (not caregivers) have often been successful but expensive. These programmes often focus on cognitive development as an outcome. Strategies include intensive intervention in hospital or rehabilitation settings with malnourished children, programmes to increase the health or nutrition status of children in order to improve psychosocial functioning, and programmes that combine health, nutrition, and psychosocial stimulation. In general, the earlier the programme starts, the longer it continues, and the more facets of development it includes, the greater is its long-term impact. It appears that the mechanism through which successful health and nutrition interventions work may be in part psychosocial; as the child's behaviour changes, the child's interaction with the environment begins to change. Such intervention efforts may be particularly effective for high-risk children, as one might suspect from the transactional model; when the child is less able to stimulate caregiving, teaching a caregiver to provide more input may be particularly valuable.

Although model child-care programmes appear to have beneficial effects on overall development, institutional day

care (not community-based programmes) in developing countries rarely provides this kind of benefit, and it is very costly. Systematic evaluations of the effects of these programmes on children are lacking. The vast majority of children without maternal care were cared for in informal settings, not day-care centres. The Integrated Centres for Child Development in south India represent an early attempt to provide integrated nutrition, health, and psychosocial stimulation to children, but they have not had the success expected. Although they are ostensibly community based, the centres' teachers are community workers selected by a central administration, and there is relatively little community input into the programme. The teachers are considered volunteers and receive little pay. However, most community-based pre-school programmes were found to be more cost-effective than formal day care.

Interventions to Enhance Child-caregiver Interactions

A more efficient strategy for improving outcomes for children is to modify the nature of the child-caregiver interaction. Programmes that work with families not only provide needed care for the child, but also serve as a vehicle for helping the mother or caregiver understand the nature of the child's development and how she can enhance that development.

Two main strategies have been used: home visiting programmes, in which a trained educator (often a paraprofessional) visits the caregiver on a regular basis and provides modeling, materials, and instruction about psychosocial care of the young child; and preschool programmes, in which mothers or caregivers take a more active role than the ones described earlier, either by sharing the teaching role with other parents, planning, and making decisions about the centre, or by becoming involved in parent education programmes with the centre.

Interventions that have attempted to improve children's cognitive development by improving the mother's caregiving skills have been shown to result in improved levels of cognitive development and even long-term nutritional effects. Home visiting programmes have been found to be effective in increasing children's cognitive development and even in having long-term effects on children's nutrition status, as previously noted.

Home visiting programmes can address feeding as well as non-feeding behaviours, reinforce indigenous positive caregiving behaviours, and model positive interactions with the infant and toddler. They attempt to sensitize the caregiver to the child's developmental progress, the importance of verbal and social interactions with the infant, and the usefulness of play materials. The aim is not simply to ensure adequate stimulation of the child, but to promote responsive, positive interactions between the caregiver and the child that will not only promote behavioural development but enhance nutritional care as well. One of the benefits of the home visitor approach is that the caregiver has the opportunity to observe someone else interacting with her child, and can develop skills by observation, a valid way of learning in most parts of the world.

Pre-school-type programmes can incorporate the caregiver in a number of ways. He or she can take turns with other mothers or caregivers to work with her child and their children, a model employed in Nepal and Senegal. Parents can be included in the planning and development of the programme, and sometimes a parent volunteer is hired to lead the programme, as has occurred in the Puno area of Peru. For parents who do not have time during the day, active parent involvement and education programmes can be a part of a pre-school programme, as in the Hogares del Bienestar in Colombia. Some countries have even included an experiential element in the parent-child

programme in which the parent receives information on child development and how to play with a child, then has the opportunity to interact with her or his child to apply these principles.

Interventions to enhance the caregiver's resources

Targeting the caregiver can lead to different types of interventions. If initial descriptive work suggests that many of the mothers are depressed or physically ill, an intervention could involve support groups for women, skill training, health improvement, or self-esteem building. If the primary caregivers are siblings, approaches that target their needs can be developed.

Although a number of recommendations for strategies to support the caregiver or to reduce workloads have been made based on correlational evidence (e.g., formal education, labour force participation), the number of careful intervention studies in developing countries based on this hypothesis is limited. A study in the United States found that enrolling poor black women in support groups was equally or more effective for changing children's cognitive levels as specific skill training in a home visiting programme. Whether social support groups or other alterations in women's health (physical or mental) would have similar effects on children's cognitive or nutritional development in a developing country is open for investigation. Empowerment of women appears to have positive effects on children, although research documenting this is lacking.

Increasing parental resources can have long-term effects. A programme was developed to provide resources to a small sample of high-risk mothers. The resources included medical care, day care, and a home visitor who offered "whatever psychological and social services were needed." Not only were significant differences seen in the children when they entered school, these effects apparently

carried over to the next youngest sibling when she or he entered school. The authors concluded that the mothers had learned more competent parenting.

Belief systems about child-rearing should be the subject of both investigations and interventions. Until parents perceive that there is a need for more extensive work with children, it is unlikely that psychosocial care will increase significantly. These beliefs can be the target of educational and mass media messages, which have shown effects on psychosocial behaviours. Zeitlin et al. observed that weaning food programmes that focused on behavioural change, using social marketing methods, such as the Nutrition Education and Behavioral Change Component of the Indonesian Nutritional Improvement Program and the Applied Nutrition Program in the Dominican Republic, tended to have a more measurable impact on anthropometric status than supplementary feeding programmes that focused on food distribution. Reductions in gender differences in weight following a nutrition education programme in India have been reported. However, it is essential to build on existing beliefs, rather than present a new set of "correct" beliefs, thereby undermining caregivers' confidence in their existing methods.

Increasing Social Support in Family and Community

Strategies to enhance interactions between parents and children need not be limited to the mother; since children are the major caregivers of young children, they should be involved in these programmes. The Child to Child programme, which has extended to 60 countries, teaches school children about nutrition and health care and empowers them to work with peers and their younger siblings. There is some evidence that it has resulted in changes in siblings' behaviour. This programme has developed a number of materials on health and nutrition

for school-age children; materials could be added on psychosocial care. An evaluation of the effects of these programmes on children is needed.

Fathers are often the unseen alternative caregivers. Fathers and men in families need to be included in the social support network for children. The dependency burden of children is too great for women alone to be able to support; men must take an active role if the next generation is to be healthy. Programmes to enhance fathers' interactions with their children have appeared in the United States in low-income areas, where they have resulted in significant changes in fathers' investment in children.

A number of intervention strategies to enhance the role of men as caregivers in families have been summarized elsewhere. These include research on the role of fathers and father substitutes in decision-making and informational support, on documenting the kinds of contributions they make, and on locating men who are supporting their children. Intervention programmes can operate at the level of direct services to men, strategies to improve the interaction patterns of fathers and children through experiential learning, and, finally, changing institutions, including the media, healthcare systems, educational systems, and employment, to be more responsive to the role of men in families as responsible nurturers.

Community-based early stimulation programmes for children from impoverished environments, using paraprofessionals, can result in significant changes in children's cognitive development, particularly if they are begun when the child is under three years of age and when the mother or primary caregiver is involved. An approach involving parents was described earlier; similar approaches can be developed if parents are not directly involved. What is unique about community-based approaches is that they

respond to community concerns and are under the direction of the community rather than the government.

Community-based programmes can include support groups for mothers, credit- and income-generating projects for women, or non-formal education interventions. Projects have been developed in six areas, which include credit for women, savings, and health and nutrition education through the Freedom from Hunger organization. Data from the Thailand project showed significantly more dry season cultivation, use of oral rehydration therapy, and providing colostrum to newborns. The project relies on a poverty-lending technique that makes small working capital loans available to groups of poor women in rural communities to increase their incomes and acquire more and better food.

The joint UNICEF/JNSP project located in Iringa, Tanzania, in four years reduced the incidence of severe and moderate malnutrition in 168 villages, compared with control villages, through a combination of improvements in health care, water and sanitation, agricultural development, and child care and development. Initial assessments of the factors associated with high rates of malnutrition suggested that children were being fed only two times a day, and that mothers' time was too limited by heavy workloads to increase the frequency.

One of the interventions was the establishment of community-level day-care projects to provide frequent and regular feeding of children. Rather than supplying them with supplementary foods, mothers were taught how to use existing foods to meet the children's nutrient needs. Because the project operated through community participation, it was possible to develop culturally acceptable child-caretaker organizations. Finally, the project identified the need for women to control the income generated from their labours in order to meet household food and nutritional needs. This project is an excellent example of incorporating a within-household perspective

into a larger effort. However, it was a demonstration study, and one cannot tease out the causal effects of any one intervention for child nutrition status.

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Modernisation and Nutritional Care

As shown in UNICEF's Conceptual Framework, resource availability is a basic determinant of the adequacy of care. Economic structures, formal and non-formal institutions, and political and ideological superstructures mediate the availability and allocation of resources for the care of young children. According to recent philosophers, we have entered an era in which the pace of change in these structures outstrips the vocabularies and the logical assumptions that we use for problem-solving.

When early humans began to use complex tools, a spear was no longer merely a stick tool attached to a stone tool. By analogy, we have entered an age in which language cannot be used merely for description, analysis, and rhetoric. Like the spear, speech acts, in their entirety, now are recognized as tools used to create shifting social realities. To quote philosopher Rorty, "The talent for speaking differently rather than arguing well is the chief instrument for social change".

There are three levels of modernization: premodern, modern, and postmodern. Urbanization and population expansion are considered as part of the modernization process, given that close to 50% of the world's expanding population will be urban at the turn of the millennium. The process of secular change in dimensions of care that are important to nutrition. These dimensions include the non-

formal and formal institutions governing care, economic resource control and responsibility, ideologies, and speed of technological change.

EVOLUTION OF CARE

The cross-cultural literature on child care reveals that care practices are the visible tip of the iceberg of an evolutionary process through which parents adjust their behaviours to the risks they perceive in the child's environment, the cultural and economic expectations they have of their children, and the skills required by the working conditions they expect their children to encounter as adults.

Child-care customs are codified systems of beliefs and practices. These cultural codes evolve as compromise formulas that optimize the probability of accomplishing the parents' and the society's multiple long- and short-term goals.

The family kinship unit is the major non-formal institution that provides care. According to the above definition, child care is interwoven with the roles of the family. The tasks performed by families for their members include physical maintenance; maintenance of morale and motivation; control of behaviour; socialization and education; acquisition of new members and new units through sexual partnership, procreation, and adoption; launching of juvenile members from the reproductive unit of the parents' generation to form the reproductive unit of the next generation; and reversing the dependency of care, so that the generation who was cared for as children now care for the dependent generations younger and older than themselves.

Although these family tasks hold true across levels of development and types of societies, they are accomplished through different care practices and ideologies, with differing implications for nutrition.

Stages of Social Development and Implications for Nutritional Care

The account that follows presents an overview of general or “modal” changes believed to be common to many populations. It should be kept in mind that a great deal of variation in the processes of change occurs across time and among specific populations.

Social evolution affects production technologies, the social structures and roles that support these technologies, and the various levels of resource control. These determine the food and care pathways that provide for and protect the child, as well as the life skills that the child must learn from her carers and care environment.

Early Premodern Families

Inferences drawn from the evolutionary fossil record are openly speculative and subject to dispute. Nevertheless, it is interesting to note that recently discovered fossil evidence has been interpreted to suggest that it was not tool-using on savannah grasslands, but rather advances in child care that promoted upright stature of our transitional ancestors 4.4 million years ago. Our newly alleged forebear, *Australopithecus ramidus*, is thought to have evolved not on the open plains but in thickly wooded flood-plains. The small canine teeth of these chimp-like bipeds apparently indicate that females selected mates based not on how they bared their teeth against rivals, but on their ability to care for infants. In this theory, upright posture conferred the advantage of being able to carry infants and food at the same time.

The earliest types of human families on which we have information do not practice private ownership of land and animals. Small tribal groups of hunter-gatherers tend to be cooperative, permissive, and lacking in organizational hierarchies. Infants tend to be spaced at intervals greater

than three years and to remain close to their mothers. Herders and pastoral nomads, who own animals but not agricultural land, tend to have patriarchal and polygynous families.

Women's work is limited to caring for small animals, dairying, food preparation, and child care. Families still living in these two modes can be difficult to integrate into the global dialogue. Their mobility makes it difficult to educate and provide health care for their children. Their concepts of property, time, obedience to authority, and attentiveness to tasks sometimes are incompatible with participation in modern labour markets. Yet fossil records of some pre-agricultural populations reveal tall adult stature and few signs of weanling malnutrition, suggesting adequate nutritional care when resources were adequate.

Premodern Institutional Families

Societies engaged in traditional agriculture, crafts, and trade are divided into those practicing communal land ownership and those practicing private land ownership. In sub-Saharan Africa, communal land ownership was predominant until recently. With the exception of the newly independent socialist states, most populations of Europe and Asia have practiced private land ownership for many generations.

Polygyny, as a family form, is well suited to shift in agriculture on communal land farmed by labour intensive technologies. Each additional wife and her children permit the family to farm more territory and to achieve economies of scale in domestic labour and trade. All children born to a man's wives are legally his. Male children may be more desired, but female children also have high value and in some populations are better nourished than males, possibly because they stay with the mother nearer to food preparation.

On privately owned land, however, strong cultural safeguards for the sexual fidelity of women are important. To sustain the kinship unit across generations, family land must be passed to male heirs whose paternity is beyond dispute. Cross-cousin marriages often are preferred because brothers whose children marry reunite the land and other possessions divided by separate inheritance. Monogamy predominates, and male children are agreed to be of highest value to the family.

In spite of ethnic variations, both types of agrarian families are recognized as institutional families, organized around agricultural production, traditional crafts, or other family business ventures.

When successful, they have hierarchical authoritarian governance extending beyond the nuclear family. Large family management requires a high degree of cooperation and social skills. The status of all family members tends to be measured by the size of the pyramidal hierarchy gathered beneath the leader(s) and the amount of production resources under control. If land is privately owned, it may be measured by land-size.

Many children are needed and valued as workers, apprentices, and next-generation managers of lands and enterprises. Concentration of decision-making in the few at the top and simple repetitive technologies encourage children to learn obedience and cooperation rather than decision making and autonomy. The highest family value is responsibility. Mate selection is arranged by elders to optimize family holdings.

Institutional families and their folkways remain common. Their sons and daughters make up the elite of most developing countries. In fact, much of our dialogue on child care concerns ways of converting the values and folkways of institutional families to the practices of modern families.

Implications for Nutritional Care

With the transition from small nomadic bands to agrarian families, economic decision-making and responsibility for care become increasingly centralized and concentrated in a social hierarchical structure. This centralization peaks in the large lineage stage of communal land ownership, when all significant decisions are made by the tribal elders. With private land ownership, decision-making and responsibility for care fall to the senior owner of the land parcel or other traditional production resources. In both cases, institutional families are producers, employers, consumers, and social welfare agencies in one. The family engaged in farming or crafts can be expanded, because extra hands can produce extra food and other products. Its caring boundaries are elastic, although standards of care may be at subsistence levels.

Technologies are repetitive, and the pace of technological change is so slow that highly sophisticated schooling and academic skills are not required (although the social skills needed to negotiate in these hierarchies may be cognitively demanding). Margaret Mead termed these societies "post-figurative," meaning that the young could learn life skills by imitating adults.

Weaning-age malnutrition typifies agrarian development in the fossil record. Subsistence diets of plant foods are less nutrient dense than diets based on animal products from hunting and herding. Survival and reward structures determine the ways in which families carry out the seven family caring tasks. In institutional families, these structures do not accord priority to the nutritional care of young children. The large pyramidal hierarchy of lineage land ownership teaches children to contribute economically, starting at the bottom of the status ladder. With increasing age, status and merit are rewarded by increasing entitlement to available resources, of which food is the most visible. Young children in apprenticeship for the

priesthood and other high offices, however, may start at a higher status level and may receive symbolic foods and meals from ceremonial animal sacrifices.

Private ownership of land or other inherited resources that are perceived to be limited makes sufficient child survival absolutely essential and excess child survival problematic. Nutritional ideologies tend to develop that deprive all weanling children to some degree. These belief systems permit parental manipulation of survival with the discreet favouring and disfavouring of certain children and the survival of the hardiest of the others.

Modern Families

The modern family evolved with industrialization, science, and technology. With the growth of specialized wage labour outside the kinship network, the small nuclear household, rather than the large extended family, became the unit of decision-making, and children were trained to become decision makers. From the mid-1600s in England, there was heightened regard for the infant as a person, the woman's role as a mother, intimacy and privacy for the couple, and love, personal attraction, and compatibility as the basis for mate selection. The need to train children in specialized skills that may differ from those of their parents calls for out-of-home schooling or apprenticeship and greater investment of resources per child, hence fewer children. Industrial production causes migration to cities. Where neighbours are strangers, the modern family becomes a "haven in a heartless world". The highest family value is emotional satisfaction.

Even where industrial growth is absent, the export of raw materials and the expansion of consumer markets, the mass media, and the civil service lead to the specialization of labour and the formation of modern urban families in developing countries. This change in Nigeria and Ghana has been described as "a movement toward monogamy, a

strengthening of the conjugal bond over all others, a strengthening of the parent-child bond over all relationships external to the nuclear family, and ultimately an emphasis on what parents owe children rather than what children owe parents".

Into the 1970s, successive waves of technological expansion raised living standards in both capitalist and socialist economies. In both types of state, the modern family's vital statistics were far better than those of the premodern institutional family and of all previous forms of the family. Quantum changes in income, mortality rates, life expectancy, nutrition status, educational opportunities, and other indicators of the quality of life occurred in response to industrialization, modern health care, education, and other aspects of scientific and socio-economic-development. Society is considered to be better off with these changes than without them.

Yet negative consequences have emerged to dominate the postmodern picture. The successes of both the capitalist and the socialist economic systems erode the high levels of social responsibility that evolved in the institutional family. In capitalist societies, as family relationships turn away from cooperative economic endeavour, the emotional fulfillment of the family takes on a self-centred focus, nurtured by consumer marketing. In socialist societies, the state takes over the social responsibility of the family.

To remain profitable, the capitalist economy expands the sphere of needs that can be met through market-mediated exchanges. Expanding markets render more and more human activities into commodities to create opportunities for economic growth. This process goes on at the expense of traditional crafts, entertainment, social support, personal relationships, and even biological functions when bottle-feeding replaces breastfeeding and when children are conceived through artificial insemination.

Implications of Changes for Nutritional Care

With the transition to industrial wage labour and the modern family, economic decision-making and responsibility for care become divided into formal public institutional functions on the one side and private, non-formal nuclear family functions on the other. In socialist systems, nonprofit state institutions tend to take over the out-of-home responsibilities for economic decisions and for providing care. In capitalist systems, private for-profit institutions predominate, at least in theory, over state services.

This differentiation of previous functions of the family into a public institutional domain of responsibility and a more limited private family domain has been termed the movement toward "public familism. The United Nations Children's Fund may be considered to represent the advance guard of this expansion of responsibility for children's welfare from the family to the public sector. The UNICEF nutritional care initiative, per se, is a wave in the advancing tide of this movement, as it now places responsibility for care at the agency level.

Mead termed the modern stage of technological change "cofigurative," since both parent and child generations participate in determining needed life skills. Children now need greater mastery of flexible academic skills; for parents, child-bearing becomes less essential. Their wage labour can provide the surplus savings needed for old-age support, and social institutions may care for the elderly. Social survival also is less dependent on handing down the production capital of kinship units from one generation to the next.

Implications for nutritional care are highly favourable. With declining child mortality and reduced parental need for children, the number of births can be limited. Parents increasingly become aware that their children need high

levels of nutritional investment, cognitive stimulation, and interaction with adults in order to be cofigurative and to compete effectively in the labour markets outside the safe haven of the home. Newly modernizing parents can expect a high payoff from successful children, in terms of consumer goods and improved housing.

Postmodern Families

Postmodernism is characterized by a concern with inner process and a close examination of small units rather than general theorizing about big ideas. Modernization progressively differentiates institutions, roles, and classifications. Postmodernism reemerges or dedifferentiates modern categories, because many previous distinctions have diminished meaning in the information era. The distinction between goods and services no longer applies to computer software, which is a good when sold on disk, but a service when sold on-line. Television blurs differences between art and life. Telecommuting merges workplace and home. Powerful computers mix variables from anthropology, biology, communications, demography, economics, psychology, and sociology in population research that tests hypotheses from these disciplines simultaneously.

Post moderns no longer think cheerfully of the future but view with awe and apprehension the unthinkable social changes that may be brought about by biotechnology and by increases in global information transmission by a factor of up to 60,000. Religious fundamentalists at one extreme and environmentalists and new age movements at the other express disillusionment with conventional concepts of progress. Postmoderns see social inequality increasing in the presence of diminishing natural resources and global stagnation of conventional economic growth. Public familism declines as conservative forces propel the privatization of state services.

A proliferation of consumer goods and marketing targeted to individual fulfilment, on the one hand, and an infusion of information technology into the workplace and the home, on the other, have relocated decision-making to the level of the individual. Persons living and working together engage in privately conducted specialized forms of technical employment. These technical tasks cut across the disciplinary categories created by the industrial revolution's differentiation of labour.

Preparing children for this autonomy tends to make them precocious and unruly. Relationships with children, spouses, and friends may be negotiated as disposable consumer goods rather than as production resources to be treasured and passed on to future generations. The highest value is personal fulfilment, and the individual at a minimum must "get a life." Status still is displayed in consumer goods but tends to be measured individually by defining one's style and following one's bliss.

The postmodern family consists of many small, free-flowing groupings that include nuclear and a few traditional families plus single parents (usually females), matriarchal, co-parents, adopted children, test-tube babies, surrogate mothers, and gay and lesbian families, with or without formal marriage contracts. Mates are joined for whatever duration by creating shared narratives, ideologies, or images that give meaning to their lives. The meaning so created is consensual and may shift when potential new partners appear.

Decision-making at the individual level gives new meaning to democracy, religious freedom, and cultural diversity. Residents of this postmodern world encounter many beliefs and multiple realities, an exhilarating and disruptive profusion of world views. They participate in a society that has lost its faith in absolute truth, a society in which individuals choose what to believe. Personal identity is deconstructed and redefined in terms of the individual's

choice of commitment to future goals, or of a shifting collage of imagery and myth.

The postmodern home is a switchboard for scheduling the activities of its individual members. It has been described as "the saturated family," whose members feel their lives scattering in intensified busyness. Family members become embedded in a multiplicity of relationships. The technologies of social saturation have created family turmoil and a sense of fragmentation, chaos, and discontinuity. In industrialized countries these technologies include the car, telephone, television, and jet plane.

In the urban sprawl of developing countries, the density and diversity of slum neighbourhoods also create social saturation, with less privacy. The postmodern family is permeable. Instead of providing the haven for intimacy in a heartless world, it sponsors anonymous intimacy with strangers through electronic mail, chat rooms on computer bulletin boards, 900 numbers, 12-step programmes, religious revival halls, the blur of strip-malls, and street-side markets in slums and shanty towns.

No longer a refuge of harmony, serenity, and understanding, the home is a site of competing personal needs among people of different ages and genders, who have diverse ideologies and social affiliations. Yet the best of postmodern families are what Elkind terms "vital families," discussed in the following section, in which the needs of all members are negotiated and honored equally, including needs for security, intimacy, understanding, and togetherness.

Implications of Changes for Nutritional Care

In Mead's terminology, the postmodern stage is "prefigurative," meaning that parents no longer have the knowledge to prepare their children for the future and must

rely on the child to become more competent than her elders. A certain desperation may pervade this reliance on children to be wiser than their parents. New information technologies create an economy that rewards strong cognitive skills, high performance speed, and lifelong flexible learning. Humans compete with evolving machines and with cheaper, less skilled labour of less advantaged classes and nations. Time taken off to bear and care for children competes increasingly with adult agendas. Children are hurried without regard for their developmental readiness and are neglected. They also are valued as symbols of adult life fulfilment for as long as adults continue to appreciate them in this somewhat narcissistic way.

Child nutrition may benefit from the attempt to achieve perfect parenthood. It is more likely to suffer from compromises made by parents juggling multiple lives, for whom parenthood is one agenda crammed with conflicting priorities. In industrialized countries, microwave ovens and instant, frozen, fast, and convenience foods make it possible for each person to eat differently and at different times.

In the cities of developing countries, small eateries and food vendors serve the same function. The concept of the competent, prefigurative child may lead parents to appease rather than influence their children's limited food preferences. When adults are too busy, child-feeding may be haphazard and monotonous. The need to turn small time slots with children into "quality time" or to appease the child while mother engages in work or business leads to a focus on the child's pleasure or whim (sweet snacks) rather than on nutritional health.

The postmodern family is adult-centered and the vital statistics of its children are declining. Care of children is provided by commercial child care, supplemented by increasingly stressed social services. In families, older

members contest their child-care duties. When families break apart, courts mediate these contests.

Vital Family

The vital family is a family unit in which equal attention is given to the priorities of adults and of children, with emphasis on continuous development of both in the course of their lives. The social context in which this occurs and the human satisfactions in play have yet to be fully defined. In the newly conscious use of language to create realities, satisfaction may lie in interweaving narratives, with a "new age" return to the creativity of dream-time and of childhood (analogous to the role-playing games that obsess our children and young teens).

As unlimited distance visual communications become available with persons and institutions, the need for physical travel will be reduced. One might feel a stronger distinction between the immediate tangible physical environment and the people in it and the non-immediate virtual world beyond. A strong sense of stewardship might crystallize toward the palpable inner circle, reinforced by the see-but-not-touch relationship with the world through digital windows. The environmental movement and the search by spiritually forward thinking movements to define community may presage a shift towards caring for all things near, and foremost our children.

Implications of changes for nutritional care

The vital family seeks a new haven in time and space. More employment relationships are temporary, on contract, or part-time. Social networks overload, shift, and may terminate through physical dislocation or through changes in the bonding narrative that network members have created in common. Parent, child, sibling, and long-term friend narratives are most enduring. Yet even parent-child

bonding narratives are at risk. Adult children can become permanently alienated from their parents in the wake of conversations with them that reinterpret their experience as having been abusive.

The search for time-enduring bonds and sustainable physical closeness in a saturated environment replaces autonomy training of children. Overloaded parents seek closeness with their children in some or all of the following ways: on-demand breastfeeding into toddler hood and beyond, a return to sleeping in the family bed, a shift in sleep so that children are awake at night when parents are home, and shift-work by parents so one is always home with the child. Most preferred is for at least one parent to be able to do part or most of his or her work from home so that he or she remains not far from the young child.

Vital family parents develop an inquiring interest into children's preferences and a strong concern for their well-being. They prefiguratively learn and search with their children through schools, churches, temples, and mosques. Members of the inner narrative circle may once again travel together like the hunter-gatherer band. Care at this level again benefits nutrition.

Increasing inequalities and disintegration of the social fabric

Except in the case of the grab bag of families we call postmodern, only those family types with sufficient economic surplus to make the transition have succeeded. Hunter-gatherers and nomads who fail in the transition to agrarian or urban life tend to be marooned on marginal lands and to become subservient labourers, beggars, and street people or gypsies as their resource bases are absorbed.

The successful nuclear family, with two parents and two to three children, and the vital family are mainly middle- and upper-middle-class phenomena in both

industrialized and developing countries. Among the urban and rural poor, the forces of industrialization often have been sufficient to destroy the livelihoods and social safeguards of institutional families. The poorest classes tend to have high rates of unstable consensual unions, low formal marriage rates, and high divorce rates. Less successful urbanizing families devolve toward transient, male-headed or small, women-headed units, or extended family clusters in which women and their children are subunits.

Poor women may bear children by different fathers, in a manner that optimizes the probability that at least one man will be able to provide money for child care or social connections that help the woman to find work. Often in Brazil, women live in unstable consensual unions only because their partners will not agree to formal marriage or cannot afford it. By modern family standards, these irregular units are failed families. Viewed as postmodern families in the era of individual choice, their members are forced to choose among unsatisfactory options.

Care ideals based on the golden age of the modern family

Widespread agreement remains today that the modern middle-class family, with its two parents, two or three children, child-centred social values, and healthful child-care practices, is the ideal end result of progress in the evolution of family forms.

Both the quality of social services and the ways in which parents train and stimulate their children change systematically as families change from institutional to modern. These changes produce children who are more cognitively advanced by modern performance standards and better nourished, and hence better prepared to participate in the modern work force. Werner documented such differences in parenting styles between modernizing and traditional parents in the United States, Mexico,

Lebanon, Indonesia, Nigeria, and Ghana. Similar differences have been reported in Indonesia and Nigeria. These differences were associated with better child growth and cognitive test performance. These transformations can be summarized as follows:

- a change in parental discipline away from immediate physical punishment to tolerance of slower obedience, but expectation of greater internalization of the reasons for rules, in preparation for greater decision-making responsibility;
- acceptance of the child's physical dependency up to an older age and protection of her health, growth, and innocence;
- more affection, a more personal relationship with the father, and more nuclear family togetherness and recreations shared by parents and children;
- increased verbal responsiveness of the parents to the child and use of explanation as well as physical demonstration in teaching, paced to match the child's developmental needs.

In transition from agrarian to modern societies, the first parents to alter their behaviours tend to be members of the elite and middle classes, who have the earliest contact with modernization. The same changes later occur among less privileged families. Our research demonstrated that the modernizing changes found in elite families in Ibadan in the 1960s are now also seen among intact low-income families in Lagos State, while postmodern problems have emerged among the elite and among poor disrupted families.

Dangers of a modern care movement in a postmodern world

It is no longer safe to assume that modern trends will continue or that their ideology remains adaptive to the world situation. Postmodernism reverses the focus of

attention from children's to adults' developmental needs. Adult priorities create an imbalance in which children are neglected. Assumptions that children are prematurely competent and able to take care of themselves lead to increasing child morbidity in terms of obesity, other growth disorders, physical and mental ill health, and delinquency. The emergence of the vital family still is hardly more than optimistic speculation.

These negative trends make the focus on nutritional care all the more important. Yet indiscriminating attempts to extend the golden age of child-centered modern care may fail to address postmodern negatives. An undiscerning focus on care as part of a waning social ideology would sweep the care movement out with the tide. Another danger is that nutritional care, separated from the other functions of care in the family, could encourage the belief that children can take care of themselves in areas other than nutrition.

In the presence of a disintegrating family and community and decreasing adult commitment to care, expenditures on public familism in the forms of health, education, day care, and other social services also are diminishing the world over. As socialist economic supports break down and the wage gap between working class and middle class widens, mothers of infants increasingly enter the workforce in out-of-home jobs. As families dissolve, the man more often retains his income and status, whereas the woman and her children enter the category of poor, female-headed households with inadequate child-care resources.

In capitalist societies, preparing children to be autonomous consumers has made them self-centred. Altruism in children's behaviour was studied in six cultures (Kenya, Mexico, the Philippines, Japan, India, and the United States), and the investigators found that the most altruistic children (spontaneously helpful to others) were from the most traditional society in rural Kenya and the

most egoistic from the most complex modern society of the United States. Socialist societies, on the other hand, assume that children are so malleable that they can be taught to support the public good without inherent personal material incentives. The inaccuracy of this belief system produces societies in shock, which expect to be cared for without engaging in adequate levels of material production.

Concurrent with these problems, world population is growing at a rate of 90 million per year, world fishery stocks decline, species extinction is rapid, and agricultural technologies that can be applied to create a new green revolution are not on the near horizon.

Strategies for Nutritional Care

UNICEF, in fact, leads the way in "speaking differently" in promoting the new paradigm that views all children of the world as part of one human family. The new one-family concept refers not to children's souls, but to their physical conditions of life and their entitlement to equal opportunities. In our goal of caring for (or preventing the arrival of) the 90 million born annually, we need to speed this process of speaking as one people, one human family, no longer "us" and "them," no longer strangers.

Creating monitoring indicators for the rights of the child

UNICEF leads in the emerging language of the rights of the child and of global ethics. These new vocabularies and new lenses require the definition of performance standards. Nutritional care should be added to the definition of children's rights. Performance standards for care should be spelled out in human rights phraseology: "Every child has a right to ." Performance standards also should be defined as functional indicators and built into the systems that monitor children's well-being both at the surveillance level and in the institutions through which care is provided.

Nutritional care should be integrated with other monitoring systems. Like the sound system of a theater, care should be one architectural concern in the context of the whole.

De-differentiating services

Another approach to speaking differently is to return the delivery of care services to the whole child in the whole family, served by a multipurpose network of agencies and activities. This approach may be viewed as a pan of the de-differentiation characteristic of the postmodern era. According to Myers, "Academic and bureaucratic divisions of labor cut the child and family into small pieces. The 'whole single child,' so often present in the rhetoric of child development, is dissected in a series of unconnected, narrowly conceived analyses. Doctors, psychologists, nutritionists, sociologists, educators, anthropologists, economists, and others, each approach the topic from a distinct point of view." Myers writes of the need to combine the "piecemeal thinking" of the various disciplines into approaches that foster development of the whole child.

Consistent with the above approach, the Positive Deviance in Nutrition Research Project in Nigeria found that parents and professionals were relatively uninterested in improving nutrition in isolation from the overall development of the child. Based on this finding, the project team conducted research on nutrition and child development together and presented the results as part of a single textbook for educators and for health and social welfare professionals.

Fostering vital family care

The need to be prefigurative and engage in lifetime learning in the presence of runaway technological change could create a situation in which child care drives evolutionary change, as was claimed for our chimp-like ancestors.

Successful family units may be those in which parents and children learn and develop together, protected by enduring biological and linguistic bonds that nurture both generations through time. Sustained breastfeeding, the foundation for nutritional care, fosters such bonds. Best suited to fostering prefigurative care are child and family development programmes that teach parents how to enhance their children's cognitive and physical development at home.

ETHICS AND CHILD NUTRITION

Science and Ethics

Both science and ethics pursue unachievable goals. Science seeks the truth and ethics seeks the ideal society. In both cases it is fully rational to pursue these unachievable goals. It is a scientific fact that iodine deficiency disorders (IDD) can be reduced by universal ionization of salt; it is an ethical choice of a government to decide to do so. It is a scientific fact that aggressive marketing of breastmilk substitutes contributes to the malnutrition of young children; it is an ethical choice of a government to decide to stop such a practice.

Theory and practice

Both science and ethics are driven and influenced by theory and practice. In science "we find what we look for". We all carry preconceived ideas about the nature of a problem. For years nutrition scientists thought that lack of protein was the primary cause of protein-energy malnutrition (PEM). They designed sophisticated instruments and methods to measure protein deficiency. They found what they were looking for. Today we know that in most cases, PEM is caused by a combination of inadequate dietary intake and the adverse effects of infection. Not until recently have nutrition scientists started to look for the prevalence and duration of exclusive breastfeeding.

Theory and practice of a scientific approach to nutrition problems

UNICEF's nutrition strategy promotes an explicit theory or conceptual framework for the immediate, underlying, and basic causes of malnutrition in young children. This strategy also outlines an operational framework for how nutrition can be improved in practice (the triple-A approach).

The Conceptual Framework

The nutrition status of an individual, including any of the four major forms of malnutrition (PEM, IDD, vitamin A deficiency, and iron deficiency anaemia).

Immediate causes

Inadequate dietary intake and disease are the immediate causes or determinants of malnutrition. The inadequacy may include total energy, protein, vitamins, or minerals. Inadequate dietary intake may increase the susceptibility to and severity of infection; conversely, many infectious diseases reduce dietary intake and nutrient utilization through loss of appetite and reduced absorption.

Underlying causes

The numbers of possible underlying causes seem almost endless and their interrelationships complex. All, however, reflect a particular utilization of resources in the past and the present. One way of grouping these causes is to identify a set of outcome conditions necessary for adequate nutrition or, more precisely, for adequate dietary intake and absence of disease. Three such conditions can be identified: adequate access to food (household food security); adequate care of children and women; and adequate access to preventive and basic health services together with a healthy environment. Each of these conditions is necessary but not sufficient for adequate nutrition.

If all three are fulfilled, however, it is likely that dietary intake will be satisfactory, disease will be controlled, and adequate nutrition will be secured.

Household food security is defined here as "access to food, adequate in quantity and quality, to fulfill all nutritional requirements for all household members throughout the year." Household food security is an outcome of technical and social processes in society, but it ultimately depends on the availability, accessibility, and use of resources.

Adequate care of children and women has only recently been fully recognized as having an important bearing on the nutrition status of mothers and children. "Care" refers to caregiving behaviour such as breastfeeding and complementary feeding practices, food and personal hygiene, diagnosing illnesses, stimulating language and other cognitive capabilities, and providing emotional support. Care also refers to the support that the family or community provides to members of the family and to behaviours within the household that determine the allocation of the food supply to members of the household. In addition, care includes the utilization of health services and water and sanitation systems to create a healthy micro-environment for family members.

Care, like household food security, is the outcome of complex processes in society, but it ultimately depends on the availability, accessibility, and use of resources. Important causes of inadequate child care include poor health of the mother; lack of education and wrong beliefs of caregivers; lack of self confidence of the mother; inadequate social support from community, family, and husband; excessive workload of the mother; and mother's lack of control of available resources.

Access to health services, together with a healthy environment, is the third necessary condition for good nutrition. Prenatal and post-natal care, immunization,

(particularly against measles), oral rehydration therapy, distribution of micronutrient supplements, de-worming, family planning, and health education are all important health services with great impact on nutrition. Access to water and safe excrete disposal are prerequisites for control of diarrhoea and other diseases influencing the nutrition status of children. The achievement of the "health" condition ultimately depends on resources in the same way that the achievement of the "food" and "care" conditions does.

Basic causes

There are three main types of resources: human resources (people, their knowledge, skills, and time); economic resources (assets, land, income, and so forth); and organizational resources (for instance, formal and non-formal institutions, extended families, and child-care organizations).

Resources are available at different levels of society and are controlled in many different ways. At the household level, men usually control more of the resources, which often constrains the achievement of the necessary conditions of food, care, and health.

The use of resources depends on the way a problem is understood as well as on the perception and priorities of those who control resources. Education plays a particularly important role in determining how resources are utilized to secure food, health, and care for children.

The availability and control of human, economic, and organizational resources at different levels of society are the results of historical processes in society. These processes can be seen as the basic causes of malnutrition and can be divided into four groups:

- ecological/technical conditions of production, including the environment (soil and climate), the

population-resource ratio, the level of technology used, and the levels of people's skills;

- social conditions of production, including such aspects as the ownership of the means of production, the division of labour, and power relationships;
- political factors (including state interventions), including policies on employment, prices, incomes, subsidies, health, education, and agriculture, as well as the legal system as a whole; and
- ideological factors, including habits, beliefs, cultural preferences, and all ideas that legitimize actions in society.

The development and interaction of these different factors explain the existing availability and control of resources, which in turn explain the degree of fulfillment of the three necessary conditions (food, health, and care) for good child nutrition.

The triple—A approach

Some of the problems causing malnutrition are amenable to effective actions at household and community levels. If decision-making at these levels were more supportive, more women and children would survive, and those surviving would be in better condition. Other problems can be addressed only with support from outside the community (for example, by medical services, which in turn require supplies that may need to be procured outside the country with foreign exchange).

International economic and political relations affect decision-making at these levels, with implications for the strategies adopted at the national level and the conditions under which households make their decisions. It is clearly important, therefore, that the critical actions and decision makers be identified and their decision-making processes

understood. Processes supportive of women and children should be encouraged and those detrimental changed.

Actions to improve the nutrition situation of women and children involve the reallocation of resources in their favour. Within households, this may mean more time spent by parents with their children, greater sharing of work among adults in the household, and a larger percentage of income earmarked for goods and services of benefit to women and children. At national and international levels, planning priorities might be changed and budgets reallocated. To make decisions to reallocate resources, those controlling the resources need information to justify their decisions.

Decision-making at all levels depends on an initial assessment, which is undertaken only when a problem is perceived and a commitment made to do something about it. Perception and commitment are dependent on the availability of information and the ability to understand the information. Analysis of the problem may be facilitated by the collaborative efforts of people most affected by and knowledgeable about the situation, together with people technically trained to undertake analyses of similar problems. Actions taken to improve the situation after this assessment and analysis may not lead to solutions of all aspects of the problems; they may, however, contribute to creating a new situation that is more conducive to actions that may not have been feasible before.

After this cycle of assessment, analysis, and action, the impact of actions is re-assessed and the situation re-analysed. For this process to take place, there must be an information system in place that must include information not only about the end result of the situation (malnutrition, for example) but also about its causes. In this way, the process will lead to more effective, better-focused actions.

Triple-A processes do not function in a vacuum. A number of factors are critical to their success and must be present to fuel their operation:

- perception and understanding of the nature of the nutrition problem. This influences, in particular, the choice of what is assessed, how it is analysed, and what actions are regarded as feasible;
- effective demand for nutrition-related information and motivation to act. Decision makers need information for designing actions as well as for convincing others that actions are necessary and feasible (creating coalitions);
- capabilities (primarily technical) to obtain information in assessment (monitoring) and to use information in analysis and design of actions;
- resources for the system, that is, for the establishment and maintenance of the nutrition information system, including human, economic, and organizational resources;
- resources for action. When there are inadequate human, economic, or organizational resources available to implement likely action, the focus of the nutrition information system must be to mobilize these resources.

Theory and Practice of Ethics

Ethics or moral philosophy aims at the “understanding of moral concepts and justifies moral principles and theories”. The French revolutionary slogan “liberty, equality, and fraternity” can be used to clarify the historical development of human rights. Liberty is represented by civil and political rights: the right of individuals to freedom from arbitrary interference by the state. Equality refers to social, economic, and cultural rights: the right to food, education, employment, shelter, etc. The state has an obligation to fulfil these conditions. Fraternity refers to rights of solidarity. The rights of developing countries to a more just world economic order belong to this last category.

Cultural relativism is another area in which human rights activists face problems. An increasing number of governments, accused of human rights violations, defend themselves by claiming that outsiders should not interfere with the internal affairs of a society, that these alleged violations are part of their internal culture, and that human rights cannot be universal. This raises the question whether the whole concept of human rights is "Western." There is no strong theoretical foundation for proving that this is not the case. It has been argued that when there is an international consensus about a particular set of rights, these rights exist and are universal.

Eide has defined three types of state obligation. First, states must respect the freedom of individuals to take actions by using the resources they control. Collective or group actions must also be respected. Second, states must protect individual freedom of action and use of resources from other more assertive or aggressive subjects. Individuals need to be protected from, for example, powerful economic interests and from unethical trade and marketing practices. Finally, states must fulfil the expectations of all to enjoy their rights, either indirectly, by providing opportunities, or directly, by providing commodities or services needed by the individual. The obligation of the state in relation to solidarity rights must be some form of sacrifice. Solidarity reflects an ethical position that poor people and nations have a right to get out of poverty as a matter of principle, even if it would mean reduced economic growth for the richer countries. Solidarity is a right; charity is not.

Towards a rights-based nutrition strategy

Politics has often been influenced by two different kinds of political theory: goal-based theories and duty-based theories. Each of them is founded on correlative moral theories (teleological vs. deontological). Both are forward-

looking, both aim at improving the lives of people, and both can pursue goals. But they are different in the different emphasis given to the goal itself and to the means to achieve the goal. They are also different in the approaches of their promoters. Promoters of the first type of strategy more often use scientific arguments, whereas promoters of the second use ethical ones.

Nutrition strategies reflect the same difference

Goal-based nutrition strategies emphasize the prime needs to achieve certain goals. These goals are legitimized when such an achievement is put to use. Better-nourished children need fewer health services, learn better at school, and grow up to be adults with higher productivity and income. The World Bank is pursuing such utilitarian goal-based nutrition strategies. It often means that the "unreachable" children among the poorest of the poor are left out in the name of maximizing the number of beneficiaries.

Duty-based nutrition strategies emphasize the quality of the process towards achieving goals. Such strategies promote participation, ownership, empowerment, and sustainability. They often focus on the poorest and the unreachable rather than maximizing the number of beneficiaries. Promoters of such strategies tend to be deeply committed and involved in assisting individual poor people. Many non-governmental organizations have adopted this type of strategy.

A rights-based strategy would provide an alternative not yet explored. Such a strategy would include some elements of both a goal-based and a duty based strategy. Psychologically most people find rights more acceptable than duties. Duty for duty's sake is absurd, while rights for their own sake are not. A rights-based strategy would first of all be people based. Poor people would be recognized as key actors rather than as passive beneficiaries of transfers

of services and commodities. Participation would not mean that "they" participated in "our" project, but rather that "we" were allowed to participate in "their" work. This would, of course, require a new kind of development worker—someone who knows how to listen and learn, rather than preach and command.

The most fundamental right is that of individuals to choose how they shall live. But this can only be a *prima facie* right, because one person's choice can reduce another person's choices. This will require constant compromises of the kind that only a democratic society can accommodate.

Rights imply goals. In other words, the achievement of a certain goal is a necessary, but not a sufficient, condition for the realization of a right. The World Summit for Children (WSC) nutritional goals represent moral minima, accepted and supported by all major religions and political ideologies. They are what Sen calls "cross-cultural moral minima". A rights-based strategy requires that these goals be achieved, but that the process of their achievement satisfy deontological criteria, such as empowerment, ownership, and sustainability.

UNICEF promotes a Triple-A approach in its nutrition strategy. Assessment, analysis, and action are influenced not only by the objective understanding of the problem (i.e., a conceptual framework) but also by ethical considerations. This is symbolically illustrated by the heart in the middle of the cycle. The Convention on the Rights of the Child (CRC) ensures that children have a claim against the state to be well-nourished. A rights-based nutrition strategy promoting the fulfillment of these moral minima would contribute to the development of a non-ethnocentric ethical consensus.

A first step has already been taken to initiate a global movement for promoting nutrition as a human right. In May 1994 in Florence, Italy, the World Alliance on Nutrition and Human Rights (WANHR) was launched at a meeting

of people from national and international non-governmental organizations and institutions dedicated to pursuing the condition for fulfilling human nutrition needs through the enjoyment of economic, social, and cultural rights.

Countries are used to being compared on the basis of their economic development. Now the time has come when countries should be compared by the way they take care of their children: how well they respond to the obligations they accept when they ratify the CRC. Gradually information from improved monitoring systems can be expected to contribute to an increasing global embarrassment for those countries that have the resources but avoid the necessary political choices to achieve the goals. This will eventually contribute to an environment where it becomes "good politics" to ensure the rights of children and "bad politics" to deny children their rights.

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Nutritional Problems of Child

There are two types of nutritional problems - one is under-nutrition and another is over-nutrition. Under-nutrition means too little food, too little care and too little health. More emphasis should be given not only to food but also to care and health, the reason being that even if children in the age group of 0-2 years are able to get food, they may have mothers who do not have enough time to pay attention to their children. Similarly, if there is no health-guaranteeing environment, and children suffer from diarrhoeal diseases, no amount of food will help prevent malnutrition.

Over-nutrition, on the other hand, means either too many calories or the wrong types of calories such as saturated fats or highly processed sugar that lead to obesity, vascular diseases, etc. Many developing countries have under-nutrition and those in Europe and North America have over-nutrition problems. There is this in-between category with countries like India that still have an enormous amount of under-nutrition and significant over-nutrition problems. In India, for instance, around 50 per cent of its children under the age of five are undernourished or malnourished. But in urban areas, the over-nutrition problem is shooting up, thanks to the change in lifestyle and food habits. The point is that many countries in Asia face the problem of having to deal with the over-nutrition

and under-nutrition simultaneously. As a result, their health systems are under huge stress.

UNDERWEIGHT

Good nutrition is the cornerstone for survival, health and development. Well-nourished children perform better in school, grow into healthy adults and in turn give their children a better start in life. Well-nourished women face fewer risks during pregnancy and childbirth, and their children set off on firmer developmental paths, both physically and mentally.

Undernutrition, conversely, has been estimated to be an underlying cause for around half of all child deaths worldwide. Undernourished children have lowered resistance to infection and are more likely to die from common childhood ailments like diarrhoeal disease and respiratory infection. Frequent illness saps the nutritional status of those who survive, locking them into a vicious cycle of recurring sickness and faltering growth. Their plight is largely invisible: Three quarters of the children who die from causes related to malnutrition were only mildly or moderately undernourished, showing no outward sign of their vulnerability.

Poverty, low levels of education, and poor access to health services are major contributors to childhood malnutrition, a complex issue that requires tackling on a wide number of fronts. To name only a few:

- Ensuring food security for poor households, in both quantity and nutrition
- Educating families on the nutritional needs of young children, including the value of breastfeeding and the importance of introducing suitable complementary foods at the right age
- Protecting children from infection by immunizing them against common childhood diseases and by providing safe water and sanitation

- Ensuring that children receive quality care when they fall ill
- Shielding children from micronutrient deficiencies, especially in iodine, iron and vitamin A, that can bring death and disability
- Paying special attention to the nutritional needs of girls and women, since chronically undernourished women tend to bear low-birthweight babies, perpetuating the vicious cycle of undernutrition

Factors vary among regions. In many Asian countries, poverty and the low status of women, poor care during pregnancy, high rates of low birth weight, high population densities, unfavourable child caring practices, and poor access to health care are underlying causes. In Sub-Saharan Africa, extreme poverty, inadequate caring practices for children, low education levels and poor access to health services are among the major factors causing undernutrition.

Conflicts and natural disasters have worsened the situation in many countries. The increase in the number of undernourished children in Africa reflects a rapid rate of population growth. In many countries in Africa, the devastating effects of HIV/AIDS, particularly in the second half of the past decade, have reversed some of the gains made in the decade's early years.

Underweight prevalence is a key indicator for monitoring progress toward the Millennium Development Goal, therefore more effort has been put in collecting, analyzing and publishing statistics on this indicator than the other two indicators of undernutrition, namely, stunting prevalence and wasting prevalence. The rest of this page presents information on underweight prevalence only. Statistics on stunting and wasting prevalence can be found in other parts of the Undernutrition section by clicking the relevant links on the navigation menu at left.

More than one-quarter of all under fives in the developing world are underweight. This accounts for about 143 million underweight children in developing countries. Of these 143 million underweight children, nearly three-quarters live in just 10 countries.

Significant variation in underweight prevalence exists among children under five of the developing world. The highest levels of underweight prevalence are found in South Asia, where more than 40 per cent of children under five are underweight. In Sub-Saharan Africa more than one-quarter of all children under five are underweight. The lowest levels are found in Latin America and the Caribbean and Central and Eastern Europe/Commonwealth of Independent States (CEE/CIS).

South Asia has staggeringly high levels of underweight prevalence, with more than 40 per cent of all under-five children underweight. Three countries in this region — India, Bangladesh and Pakistan — account for almost half the world's total underweight children, even though they are home to just 29 per cent of the developing world's under-five population.

In Sub-Saharan Africa more than one-quarter of children under five are underweight. Nigeria and Ethiopia alone account for more than one-third of all underweight children in Sub-Saharan Africa.

LOW BIRTH WEIGHT

Birthweight is a strong indicator not only of a birth mother's health and nutritional status but also a newborn's chances for survival, growth, long-term health and psychosocial development.

A low birthweight (less than 2,500 grams) raises grave health risks for children. Babies who are undernourished in the womb face a greatly increased risk of dying during their early months and years. Those who survive have impaired

immune function and increased risk of disease; they are likely to remain undernourished, with reduced muscle strength, throughout their lives, and to suffer a higher incidence of diabetes and heart disease. Children born underweight also tend to have cognitive disabilities and a lower IQ, affecting their performance in school and their job opportunities as adults.

In the developing world, low birthweight stems primarily from poor maternal health and nutrition. Three factors have most impact: Poor maternal nutritional status before conception, short stature (due mostly to undernutrition and infections during childhood), and poor nutrition during pregnancy.

Inadequate prenatal weight gain in particular is a main cause of fetal growth retardation. Teenagers who give birth when their own bodies have yet to finish growing also have a greater risk of bearing underweight babies. Moreover, maternal diseases such as diarrhea and malaria, which are common in many developing countries, can significantly impair fetal growth.

Key interventions to prevent low birthweight, therefore, include improved food intake, micronutrient supplementation, preventing and treating diseases such as malaria and HIV/AIDS, educating girls and expectant mothers, and preventing teenage pregnancies.

Problems Estimating Low Birthweight Incidence

Some 60 per cent of newborns in developing countries are not weighed; in South Asia, which has the highest incidence of low birthweight babies, that figure is almost 75 per cent. Those newborns who are weighed, meanwhile, are probably better off -- more likely to be born in health facilities, urban areas and of better educated mothers -- which can lead to biased data.

UNICEF and the World Health Organization (WHO) have adjusted the underreporting and misreporting of birthweights with results from household surveys (Demographic and Health Surveys and Multiple Indicator Cluster Surveys).

While improving unadjusted statistics, these rates may still underestimate the magnitude of the problem. It is critical, therefore, that all babies be properly weighed at birth.

Low birthweight has been defined by the World Health Organization (WHO) as weight at birth of less than 2,500 grams (5.5 pounds). This practical cut-off for international comparison is based on epidemiological observations that infants weighing less than 2,500 g are approximately 20 times more likely to die than heavier babies. More common in developing than developed countries, a birthweight below 2,500 g contributes to a range of poor health outcomes. The goal of reducing low birthweight incidence by at least one third between 2000 and 2010 is one of the major goals in 'A World Fit for Children,' the Declaration and Plan of Action adopted at the United Nations General Assembly Special Session on Children in 2002.

The reduction of low birthweight also forms an important contribution to the Millennium Development Goal (MDG) for reducing child mortality. Activities towards the achievement of the MDGs will need to ensure a healthy start in life for children by making certain that women commence pregnancy healthy and well nourished, and go through pregnancy and childbirth safely. Low birthweight is therefore an important indicator for monitoring progress towards these internationally agreed-upon goals.

WHO and UNICEF published the first global, regional and country estimates of low birthweight rates in 1992. At that time, the low birthweight rate for industrialized

countries was around 7 per cent, and in less developed countries it ranged between 5 and 33 per cent, with an average of 17 per cent. Around the year 2000, UNICEF and WHO accelerated efforts to estimate global and country rates. The process of monitoring progress towards international goals on low birthweight reduction led to a greater recognition of the limitations of the available data, in particular the relatively small proportion of infants weighed at birth.

In response, UNICEF proposed using household survey data adjusted for underreporting of low birthweight, a procedure originally developed by Boerma et al. In addition, the unprecedented household survey activity, which occurred around the end-decade assessment of progress towards the World Summit for Children goals, provided a wealth of new data. The application by UNICEF of a modification of the original estimation procedure to these data provided the basis for the joint large-scale revision of the estimates of low birthweight presented in this document.

A baby's low weight at birth is either the result of preterm birth (before 37 weeks of gestation) or of restricted foetal (intrauterine) growth. Low birthweight is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life. Many factors affect the duration of gestation and of foetal growth, and thus, the birthweight. They relate to the infant, the mother or the physical environment and play an important role in determining the infant's birthweight and future health.

- For the same gestational age, girls weigh less than boys, firstborn infants are lighter than subsequent infants, and twins weigh less than singletons;
- Birthweight is affected to a great extent by the mother's own foetal growth and her diet from birth to

pregnancy, and thus, her body composition at conception;

- Women of short stature, women living at high altitudes, and young women have smaller babies;
- Once pregnant, the mother's nutrition and diet, lifestyle (e.g., alcohol, tobacco or drug abuse) and other exposures (e.g., malaria, HIV or syphilis), or complications such as hypertension can affect foetal growth and development, as well as the duration of pregnancy;
- Mothers in deprived socio-economic conditions frequently have low birthweight infants. In those settings, the infant's low birthweight stems primarily from the mother's poor nutrition and health over a long period of time, including during pregnancy, the high prevalence of specific and non-specific infections, or from pregnancy complications underpinned by poverty. Physically demanding work during pregnancy also contributes to poor foetal growth.

Low birthweight thus defines a heterogeneous group of infants: some are born early, some are born growth restricted, and others are born both early and growth restricted. It is generally recognized that being born with low birthweight is a disadvantage for the baby.

Short gestation (preterm birth) is the main cause of death, morbidity and disability. The shorter the gestation, the smaller the baby and the higher the risk of death, morbidity and disability. It has been shown that the mortality range can vary 100-fold across the spectrum of birthweight and rises continuously with decreasing weight. Low birthweight due to restricted foetal growth affects the person throughout life and is associated with poor growth in childhood and a higher incidence of adult diseases, such as type 2 diabetes, hypertension and cardiovascular disease. An additional risk for girls is having smaller babies when they become mothers.

Low birthweight has long been used as an important public health indicator. Low birthweight is not a proxy for any one dimension of either maternal or perinatal health outcomes. Globally, the indicator is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor pregnancy health care. On an individual basis, low birthweight is an important predictor of health; efforts must therefore go into measuring it as accurately as possible at birth and organizing and planning infant care accordingly. The smaller the baby, the more important it is to monitor his or her growth in the weeks after birth. This is particularly important for infants at high risk of poor feeding and inadequate growth. Countries should therefore be encouraged to ensure accurate and reliable weighing of infants as close to birth as possible.

While in industrialized countries the epidemiology of low birthweight has been extensively studied, in less developed countries reliable data on low birthweight remain limited. The primary reason is that more than 40 per cent of babies are born at home and without a skilled attendant, and in these circumstances babies are rarely weighed. The registration of a vital event such as birth is incomplete in many developing countries, with only about 60 per cent of births registered worldwide. Even when babies are weighed at birth-although birthweight is relatively easy to measure-their weight is not always measured accurately, or recorded, reported and tabulated correctly. Caution is therefore warranted in comparing data across countries, regions and time periods.

Recent knowledge about the impact of intrauterine and early-life events on infant development, cognitive development and lifelong sequelae, indicates that a broader definition of the outcome of pregnancy is needed than birthweight alone. While low birthweight continues to be useful in focusing attention on a healthy start to

independent life, it has also become increasingly evident that the cut-off value of 2,500 g may not be appropriate for all settings.

IODINE DEFICIENCY DISORDERS

There has been dramatic progress over the past decade in the global campaign to eliminate iodine deficiency, the world's leading cause of preventable mental retardation and impaired psychomotor development in young children. In its most extreme form, iodine deficiency causes cretinism. It also significantly raises the risks of stillbirth and miscarriage for pregnant women.

Proportion of households consuming adequately iodized salt (15 parts per million or more). Most commonly and visibly associated with goiter (an enlarged thyroid gland), iodine deficiency takes its greatest toll in impaired mental growth and development, which contributes to poor school performance, reduced intellectual ability, and impaired work performance.

In 1990, about 1.6 billion people, or 30 per cent of the world's population, lived at risk of iodine deficiency disorder (IDD); some 750 million people suffered from goitre, mainly because of chronically low iodine intake. An estimated 43 million were affected by some degree of brain damage as a result of inadequate iodine intake before or during infancy and early childhood, largely because of living in mountainous or flood-plain regions where erosion sapped the local soil and crops, leaving too little iodine for healthy thyroid function.

Salt iodization has been adopted as the main strategy to eliminate IDD as a public health problem, and universal salt iodization by 2005 has been set as a global target. While other foodstuffs can be iodized, salt has the advantage of being widely consumed and inexpensive. It has routinely been iodized in some industrialized countries since the 1920s.

Consumption of iodized salt has soared in the developing world over the last decade. In the early 1990s only around 20 per cent of households consumed adequately iodized salt, but today more than two-thirds (69 per cent) of households do. About 84 million newborns are now being protected from learning disabilities caused by iodine deficiency disorders.

As of 2005, 34 developing countries had reached the USI target and 120 developing countries had salt iodization programmes, compared with 90 countries in 2000. Eighteen countries increased their proportion of household consumption of iodized salt by 20 percentage points or more and maintained a level of 70 per cent or higher.

There are large disparities in adequately iodized salt consumption among regions of the developing world. The highest levels are found in Latin America and the Caribbean and East Asia and the Pacific, while the lowest levels are in CEE/CIS. In Sub-Saharan Africa almost two-thirds of households consume adequately iodized salt. Yet there are still 36 countries in which less than half of all households consume adequately iodized salt. Some 38 million newborns are born every year unprotected from iodine deficiency and its lifelong consequences. To achieve universal salt iodization, even faster progress is needed.

VITAMIN A DEFICIENCY

Vitamin A is essential for eye health and proper functioning of the immune system. It is found in foods such as milk, liver, eggs, red and orange fruits, red palm oil and green leafy vegetables, although the amount of vitamin A readily available to the body from these sources varies widely. In developing areas of the world, where vitamin A is largely consumed in the form of fruits and vegetables, daily per capita intake is often insufficient to meet dietary requirements. Inadequate intakes are further compromised by increased requirements for the vitamin as children grow

or during periods of illness, as well as increased losses during common childhood infections. As a result, vitamin A deficiency is quite prevalent in the developing world and particularly in countries with the highest burden of under-five deaths.

While most people know that vitamin A deficiency can lead to blindness - it is in fact the leading cause of preventable childhood blindness - many are unaware that even before blindness occurs, vitamin A deficient children face a 23% greater risk of dying from ailments such as measles, diarrhoea or malaria. Although many countries have not been able to assess the true level of deficiency due to technical and financial constraints, the World Health Organization estimates that 100 to 140 million children under the age of five may be living with dangerously low vitamin A stores. More than four million children worldwide exhibit signs of severe deficiency. The greatest burden of deficiency is among children living in South Asia and Sub-Saharan Africa.

The 1990 World Summit for Children set the goal of virtual elimination of vitamin A deficiency and its consequences, including blindness, by the year 2000. This goal was also endorsed at the Policy Conference on Ending Hidden Hunger in 1991 and the 1992 International Conference on Nutrition and the UN General Assembly's Special Session on Children in 2002. The critical role of vitamin A for child health and immune function also makes control of deficiency a primary component of child survival efforts, and therefore critical to the achievement of the fourth Millennium Development Goal: a two-thirds reduction in under-five mortality by the year 2015.

Programmes to control vitamin A deficiency enhance a child's chances of survival, reduce the severity of childhood illnesses, ease the strain on health systems and hospitals, and contribute to the well-being of children, their families and communities. Three major deficiency control strategies

currently exist, all meant to complement ongoing public health measures for the prevention and control of infectious diseases.

- *Supplementation:* Current international recommendations call for high-dose vitamin A supplementation every four to six months, targeted to all children between the ages of six to 59 months living in affected areas. Providing young children with two high-dose vitamin A capsules a year is a safe, cost-effective, efficient strategy for eliminating vitamin A deficiency and improving child survival. Giving vitamin A to new mothers who are breastfeeding helps protect their children during the first months of life and helps to replenish the mother's stores of vitamin A, which are depleted during pregnancy and lactation.
- *Food fortification:* Food fortification is being introduced in more and more countries, and holds great hope for long-term control of vitamin A deficiency. Multiple products currently serve as vehicles: sugar, oil, milk, margarine, infant foods and various types of flour are among the most common. In most cases, fortification can take several years to initiate and longer still to reach all at-risk children and their families. Even countries with successful fortification programmes may need to continue supplementation activities.
- *Dietary diversification:* Non-animal sources of vitamin A account for greater than 80% of intake for most individuals in the developing world - in order to meet the nutrition needs of children, intake of these sources would need to increase up to ten-fold. Feasible control of deficiency through dietary diversification would require increased consumption of bioavailable, vitamin A-rich foods of animal origin, coupled with continued promotion of nutritious fruits and vegetables. Multiple interventions to this effect have been carried out;

however, scale-up of these efforts is limited by a lack of well-designed assessments to attest to their efficacy and effectiveness in reducing the burden of deficiency.

In view of the challenges to rapid and large-scale implementation of food-based interventions, supplementation is currently the primary strategy to control vitamin A deficiency and among the key interventions for improving the survival of young children. Countries carrying out two annual rounds of vitamin A supplementation reaching at least 70% coverage among children 6-59 months - considered "effective coverage" - are on track to meet international development goals. Coverage at this threshold also ensures the full child survival benefit of vitamin A supplementation, which will be critical to attaining the fourth Millennium Development Goal. While guidelines do not yet exist for the phase-out of supplementation, it is expected that priority countries will need to continue vitamin A supplementation at effective coverage levels for the foreseeable future in order to realize international goals for child survival and vitamin A deficiency control.

MALNUTRITION

Malnutrition is a disparity between what the body needs and what it consumes. People need dozens of different vitamins, minerals, and other assorted nutrients each day, and those needs change as we mature. In addition to the facts, society has created many myths about malnutrition. For example, malnutrition often has socioeconomic connotations that are not always accurate.

Malnutrition can be divided into two main categories. Overnutrition results from the body taking in more than it needs, without sufficient means of ridding the body of the excess. The most common result of overnutrition is obesity, and even with proper exercise, overnutrition can occur. An

overabundance of specific vitamins and other nutrients in the body can sometimes lead to toxicity.

Undernutrition results from the body taking in less than it needs. According to the US Department of Agriculture, 13 million children live in households that regularly do not have enough food, and the Center on Hunger and Poverty reports that one in six families was food-insecure in 2002.

While undernourishment is most common in low-income environments, simply being in a moderate- to high-income environment does not prevent malnutrition. Large quantities of foods lacking in vitamins and essential nutrients can cause nutritional problems nearly as bad as those produced by hunger.

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Improving Child Nutrition Outcomes

INTEGRATED CHILD DEVELOPMENT SERVICES PROGRAMME

India is in the curious position of having very high levels of malnutrition despite large stocks of food-grains resulting from increased agricultural productivity. Moreover, the country experienced rapid economic growth during the 1990s, but this was accompanied by very modest declines in child malnutrition. Estimated levels of moderate or severe under-nutrition among children below age 3 were 52 percent in 1992, and 47 percent in 1998. There are two factors responsible for this outcome.

A significant proportion of the population remains unable to buy enough food. And the whole population is vulnerable to becoming malnourished due to exposure to diseases—in particular diarrheal diseases and parasitic infections resulting from poor sanitation and living conditions—and malnutrition in turn increases future susceptibility to disease.

These synergies take a heavy toll in labour productivity and outlays on health care, as well as mortality. To ameliorate the situation, the government of India has developed several major programmes for increasing access to food. One approach is through price controls: for example, the Public Distribution System makes some staple foods such as food-grains and sugar available at controlled prices through "fair-price shops". Another thrust has been

through income support: such as a range of food-for-work programmes and employment guarantee programmes, where people are paid (often in foodgrains) for working on building or maintaining public infrastructure. A third approach has been to directly feed children: this includes mid-day meal programmes for school-going children, and nutrition supplementation programmes.

By far the biggest nutrition supplementation programme is the Integrated Child Development Services (ICDS). The ICDS programme aims to provide child growth monitoring, supplementary feeding, and pre-school education to young children, along with some basic health services to young children, pregnant women and lactating mothers. With support from UNICEF and other donors, it has emerged from small beginnings in 1975 to become India's flagship programme in these areas. The programme has expanded rapidly: the number of blocks covered rose from 33 in 1975, to 4,200 around 2000, and over 5,500 in 2003.

During the 1990s, there was almost a doubling in the number of beneficiaries as well as in the programme budget (Government of India 2000). By 1999-2000, the budgetary allocation for the programme was around \$170 million. This is a substantial budgetary outlay, even if not large in per capita terms. It will increase rapidly in the near future, as the government aims to cover all administrative blocks. It is perhaps the largest programme of the kind in the world.

The combination of economic growth, agricultural surpluses, and a slew of programmes aimed at increasing access to food might be expected to yield more than a modest decline in child malnutrition. To begin to unravel this puzzle, we examine the functioning of the ICDS programme, which seeks to directly provide nutritional supplementation to children in need. Given the importance of the programme's objectives and the size of the budget,

it is important to assess whether it is effective in its main objective of enhancing child nutritional status.

One of the crucial determinants of programme success is programme placement: whether the ICDS centers are allocated to the areas with the highest level of malnutrition. Despite the importance of this problem, there has been little formal analysis of programme placement. Programme efficacy depends also on how well it is implemented once it is in place. This is more difficult to evaluate formally, due to a lack of prospective data on recipients and non-recipients of the programme. Several studies have sought nevertheless to evaluate programme impact, but most compare outcomes between areas where the programme is present and those where it is not—without controlling for differences in the characteristics of the children, households and villages that could bias the estimates of programme effect. We use a more rigorous methodology to ensure that the children in the "treatment" and "control" villages are matched along a wide range of dimensions, but conclusive impact evaluation depends on collecting panel data.

We begin by summarizing findings on the success of nutrition supplementation programmes elsewhere, and information from studies monitoring the implementation of the ICDS programme. We then (1) examine trends in child malnutrition in different socio-economic groups, (2) analyze whether the ICDS programme placement is consistent with its goals of reducing child malnutrition, and (3) evaluate its impact on child anthropometric outcomes as best possible given the available data. The analysis is based on the National Family Health Surveys (NFHS) 1992-93 and 1998-99, which have information on child anthropometry as well as much information on the child, the mother, the household, and the village: including whether an ICDS programme was in place in the village.

We find that a major reason why the ICDS programme has had little apparent impact on aggregate child nutrition

levels is that it is regressively distributed across states: states with the highest prevalence of child malnutrition have the lowest coverage by the programme and receive the lowest funding for it. Within states, the distribution seems to be more progressive. It also appears that where the programme is in place, its impact is hindered by the widely noted problems with programme implementation: our attempt to evaluate the programme's impact shows little evidence of impact on child nutritional status. These findings suggest that evaluations of nutritional supplementation programmes—and more generally intervention programmes—in India and elsewhere need to carefully examine the effectiveness and political economy of programme placement.

Nutrition Supplementation Programmes

Nutritional supplementation programmes have been tried in many settings, and their outcomes have been mixed. Programmes which seek to achieve highly specific forms of supplementation (such as salt iodization or Vitamin A doses) offer many examples of success not only under controlled conditions but also in actual implementation in some large programmes. For example, it is estimated that goiter rates halved in the PRC after their national salt iodization programme. Broader efforts to improve children's nutritional status through providing complementary inputs of foods with higher density of energy and/or other nutrients have been found to be successful in some controlled trials, but of limited or little effectiveness in others.

Some longitudinal community-based projects have improved child growth by delivering supplementary feeding through intensive efforts in small areas, which would be very difficult to replicate on a larger scale. A study in Guatemala found that children in villages with supplementary feeding had higher growth than those

without it. The same was found in a study in Haiti, which had temporary targeted supplementary feeding for children with growth faltering. But there is little evidence of the impact of large-scale programmes for supplementary feeding.

Reviews find that these show little evidence of success due to a variety of problems, including leakage; inadequate institutional capacity to meet the formidable challenges of implementing such programmes on a wide scale; and inadequate effort to target needy children at the optimal ages for influencing growth. An exception is the Progreso programme in Mexico, which is estimated to have had a significant positive impact on the growth of the poor children targeted for the intervention.

The ICDS programme

The government of India started the ICDS programme in 1975, with support from UNICEF. The government perceives child development to be hindered by "poverty, poor environmental sanitation, disease, infection, inadequate access to primary health care, and inappropriate child care and feeding practices". The ICDS programmes aims to alleviate some of these problems by providing a holistic package of services, including:

- Supplementary nutrition and some basic health services for children aged below 6 years, and pregnant and lactating mothers
- Nutrition and health education for mothers, and
- Growth monitoring, de-worming, and pre-school education for children.

To do this, ICDS (Anganwadi) centers are established in villages in selected administrative blocks. Most of these are in rural and tribal areas: only 6 percent of the sanctioned ICDS blocks in 2003 were in urban slums. The center is staffed by an anganwadi worker (AWW) whose task is to

provide some services directly to a rotating roster of children and pregnant women. Health and nutrition education is given by visiting homes of women who are pregnant or have infant children. The worker is also expected to liaise with other frontline workers, in particular from the health department, to assure that children and pregnant women receive key frontline MCH services, including immunization, health check-ups, and referral services. They are responsible also for ensuring ancillary health services, such as distributing folic acid to pregnant women, and de-worming children.

A large number of monitoring studies indicate that the ICDS programme has many problems with implementation, as well as programme design. One major implementation problem is that AWWs are inadequately trained, supervised and supported, while their duties require considerable understanding of nutrition, pre-school education, and maternal and child health issues. A second problem is erratic provision of supplies, and leakage in food procurement. Thirdly, the food supplementation is poorly targeted: it is not confined to malnourished children, and reaches mostly children aged 4-6 years old, who are past the optimal window for influencing growth.

Problems of programme design include a lack of community participation. The programme is run in a very top-down fashion, with all the logistical and implementational inefficiencies and rigidities that such an approach entails, and workers are not accountable to the communities they serve. Also, the heavy focus of the ICDS on nutritional supplementation leads to the relative neglect of other more cost-effective approaches to improving nutrition outcomes. This would include efforts to improve environmental hygiene and domestic health management practices, so that children are less exposed to disease and its consequent toll on child growth.

The National Family Health Surveys (NFHS) conducted in India during 1992/93 and 1998/99. The surveys cover all the states of India (with the exception of Sikkim in 1992/93, a total of 26 states at the time of survey), and the survey samples are designed to ensure that the data is representative at the state level. Both surveys target about 90,000 households each, and approximately the same number of ever-married women was interviewed. NFHS-1 (92/93) and NFHS-2 (98/99) use three types of questionnaire: the Village, Household, and the Woman's Questionnaire.

The Village Questionnaire collected information on the availability of various facilities in the village and amenities such as electricity and telephone connections, and type of the drainage system. Respondents to the Village Questionnaire were also asked about development and welfare programmes operating in the village. In particular, the Village Questionnaire identifies the villages that received the Integrated Child Development Services (ICDS) Programme.

The Household Questionnaire includes information on age, sex, education, employment status, occupation, marital status, and relationship to the head of the household for each household member. It inquires about household dwelling conditions and the ownership of various assets. Information is also obtained on religion and caste/tribe of the household head. At the same time, the Household Questionnaire does not include any direct measures of household income or consumption expenditure.

The Woman's Questionnaire gathers information from all ever-married women age 15-49 who were usual residents of the sample households or visitors who stayed in the sample households the night before the interview. The questionnaire collects information about woman's education, age at marriage, reproductive behaviour, child feeding practices and other background characteristics. In

addition, measurements of height and weight were obtained for all young children in a household to assess their nutritional status. The information on the access to ICDS programmes is available only at the village level. There is no information on which households and children within the village have actually benefited from the programme.

Main Constructed Variables

To assess household economic status in the absence of household income or expenditure data we construct, following the methodology of Filmer and Pritchett, a linear index from a set of asset indicators using principal components analysis to derive the weights for each asset indicator. Our economic status index is the first principal component of a number of household assets such as clock, radio, TV, VCR, refrigerator, ownership of bicycles, motorbikes, cars, as well as the type of utilities used in the household. The first principal component is an unobserved vector that explains the largest amount of variability in the observed data. The household assets based first principal component derived from NFHS-1 data accounts for 29.6 percent, and from NFHS-2 for 28.3 percent of the total variance of the relevant variables.

Availability of electricity, flush toilet, TV, and ceiling fan are the most influential variables in the estimation of the index. This finding is consistent across both surveys. The distribution of other factors in relationship to the economic status index also makes economic sense. For example, households with a higher wealth index are more likely to live in pucca (brick) houses, and have such amenities as refrigerator, motorbike and radio. They are less likely to use kerosene for lightning and wood for cooking, as well as utilize unsafe drinking water. Our main indicators of children's nutritional status are two indices that are commonly used to assess this from

anthropometrical data. These indices are expressed in standard deviation units (z-scores) from the median for the international reference population.

Height-for-age z-score (HAZ) and weight-by-age z-score (WAZ) are defined as $(m_i - m_r) / \sigma_r$, where m_i is the observed height (weight) of a child of a specified age and gender, m_r is the median height (weight), and σ_r is the standard deviation of the corresponding measurement for the reference population of children in that age-gender group. Low height-for age (stunting) reflects chronic under-nutrition and/or repeated bouts of illness. Low weight-for-age (underweight) reflects either or both acute and chronic malnutrition and /or illness. Children who are over two standard deviations below the median of the reference population in terms of these indices are considered to be severely to moderately undernourished (stunted or underweight). Anthropometric measurements are, of course, just one way of measuring nutrition outcomes. Their use has been debated, but they remain the simplest measure to obtain with any accuracy from a large population, and therefore the most commonly used by both researchers and clinicians.

Trends in Child Malnutrition between 1992 and 1998: Gainers and Losers

It is striking to see how widespread is the incidence of underweight amongst children in India. Even amongst boys (the sex in which parents invest the most) in the highest wealth tertile in 1998, over a third were underweight. This tertile has an average caloric consumption of around 2500 calories per day, so child malnutrition cannot be attributed to shortage of food. High burdens of disease are the probable cause of these high proportions underweight.

Children's nutritional status grows sharply worse amongst lower socio-economic groups. Looking at

differences by mother's education level, in 1998 the share of stunted boys amongst mothers with no education was 53 percent, compared with 29 percent among mothers with secondary or higher levels of education. The corresponding shares of underweight boys were 54 percent and 32 percent, respectively. The differences by household wealth tertiles are equally sharp: for example in 1998, 35 percent of boys from the richest tertile were underweight, compared with 57 percent amongst the lowest tertile. Differences between castes are less sharp, though the boys of upper castes show better outcomes than lower castes or tribes.

The higher socio-economic groups also made stronger gains in child nutrition status during 1992-98 than the lower groups. The gains are especially strong amongst the boys of mothers with secondary school education and above, compared with lower education groups. The same applies to the upper castes versus the lower castes and tribes. Household wealth groups show less differences in improvement during 1992-98. Girls' position deteriorated relative to boys between 1992 and 1998: they had similar or marginally lower proportions stunted and underweight as boys in 1992, but by 1998 girls were nutritionally more disadvantaged than boys across all socio-economic groups.

Girls from the highest socio-economic groups showed improvement in nutritional status between 1992 and 1998. Amongst most of the other socio-economic groups, girls showed much more modest declines in the prevalence of underweight. There was an increase in the proportion underweight amongst girls in the poorest wealth tertile and the scheduled tribes, and in the prevalence of stunting amongst girls in all the lower socio-economic groups.

This suggests that levels of discrimination against girls may actually have risen amongst the lower socio-economic status groups between 1992 and 1998: including uneducated mothers and poorer households. It has risen sharply amongst the tribal populations. This could be

because people are reducing family size in India—which, combined with strong son preference, puts pressure on reducing the number of girls in the family. Higher socioeconomic groups have greater access to sex-selective abortion, and are therefore in a position to care more equally for the children that are born. Lower socioeconomic groups have limited access to prenatal sex selection technology, and this may lead to unequal treatment of children who are unwanted. There is, for example, considerable evidence that girls are less likely than boys to be taken for medical treatment, and the quality of treatment sought also differs—which could impact on their anthropometric status.

Assessment of the ICDS' Programme Placement

Coverage of the ICDS programme is high: a substantial proportion of India's villages are covered by the ICDS today, and this number rose sharply during the 1990s. Of the villages sampled by the NFHS, a third had an ICDS programme in place in 1992, and more than a half of the surveyed villages had it in 1998 (Table 2). A few states, notably Kerala, had virtually complete coverage already by 1992. Programme coverage is especially high in the southern region, the northeastern region, and the non-poor states of the northern region. The apparent decline in coverage in Tamil Nadu during the 1990s is probably the result of re-classification of the nutritional supplementation programme to the TINP (Tamil Nadu Integrated Nutrition Programme), which is broadly similar in concept to the ICDS.

(i) Programme placement across states

For ease of discussion, we have grouped India's states by region: the South, the Northeast, and the North. Since the Northern region is vast and highly heterogeneous—comprising both the poorest and the richest states in the

country—we have divided them into the "poor North" (Bihar, Uttar Pradesh, Orissa, Madhya Pradesh and Rajasthan), "rich North" (Punjab, Haryana, Gujarat and Maharashtra) and "other North" (Himachal Pradesh, Jammu & Kashmir, and West Bengal). The poor Northern states have some of the poorest outcomes in the country not only in nutrition, but also in terms of education and child survival, reflecting a history of poor governance. The need for the programme varies substantially across states.

It is especially high in the poor Northern states, where over half of the children aged below 3 were moderately or severely underweight. These are large states, with well over 40 percent of the population of the country, and therefore contribute a high proportion of the total malnourished children in the country. At the other end of the spectrum are states such as Kerala and several of the northeastern states, with the lowest levels of child malnutrition. The northeastern states tend also to have good human development indicators in terms of levels of education and child survival, despite being relatively poor in terms of State Domestic Product per capita.

It is apparent that the programme is regressively distributed between states. The states with the highest prevalence of stunted and underweight children tend to have the lowest programme coverage (Figure 1). The other three poor Northern states are more on par with the country averages in terms of ICDS coverage—though given their high levels of malnutrition they should in fact have above average coverage.

The overall distribution of the ICDS programme coverage across states is also regressive when compared with the states' economic level, as measured by State Domestic Product per capita (Figure 1). The picture is even more regressive when we look at inter-state differentials in government budgetary allocations for the ICDS programme per malnourished child. Even allowing for some differences

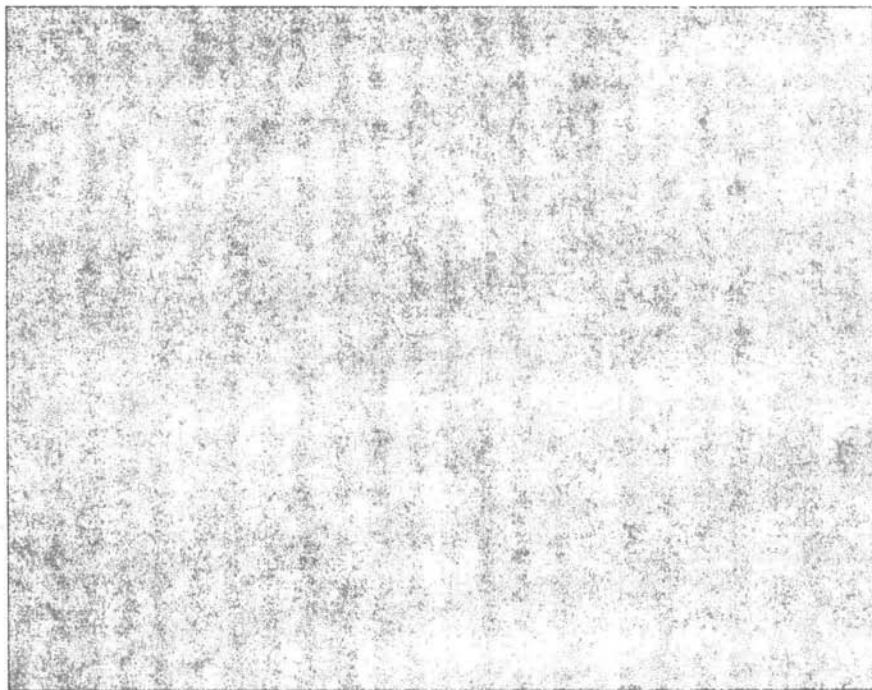
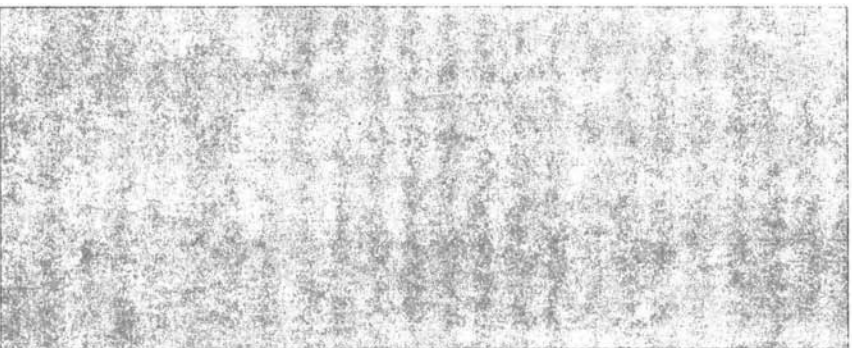


Figure 1. The relationship between ICDS program participation and states' economic and malnutrition levels

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in the purchasing power of a rupee in different states, the contrasts are sharp.

Except for Orissa, the poor Northern states receive by far the lowest budgetary allocations in the country. For example, Bihar (the poorest state) receives only Rs 25 per malnourished child, while Punjab (the richest state) receives Rs.334. The Northeastern states are especially well-funded (despite low levels of child malnutrition), and some of them receive a hundred times as much per malnourished child as Bihar. To make matters worse, Bihar and Uttar Pradesh do not spend all the money allocated to them. In line with their history of poor governance, they spent only 76 percent and 65 percent of their allocations respectively.

Almost all the other states use up their full allocations. Thus children across the poor Northern states with high levels of malnutrition suffer multiple disadvantages: (1) ICDS coverage is low, because central government budgetary allocations per malnourished child are much lower than the rest of the country and (2) if they live in the vast populous states of Bihar or Uttar Pradesh, their state government does not even use the budgets allocated for them. Rajasthan, Madhya Pradesh and Orissa use their allocations, but they too receive very little relative to their needs.

(ii) Programme placement across villages

Programme placement is regressive across villages in India as a whole. The top left panel of Figure 2 is constructed based on the wealth ranking among all villages in India, and shows that richer villages have a higher probability of being covered by the programme than poorer ones. For example, only half of the villages from the lowest two deciles had the ICDS programme in place in 1998—while the programme covered about 80 percent of the richest villages in India.

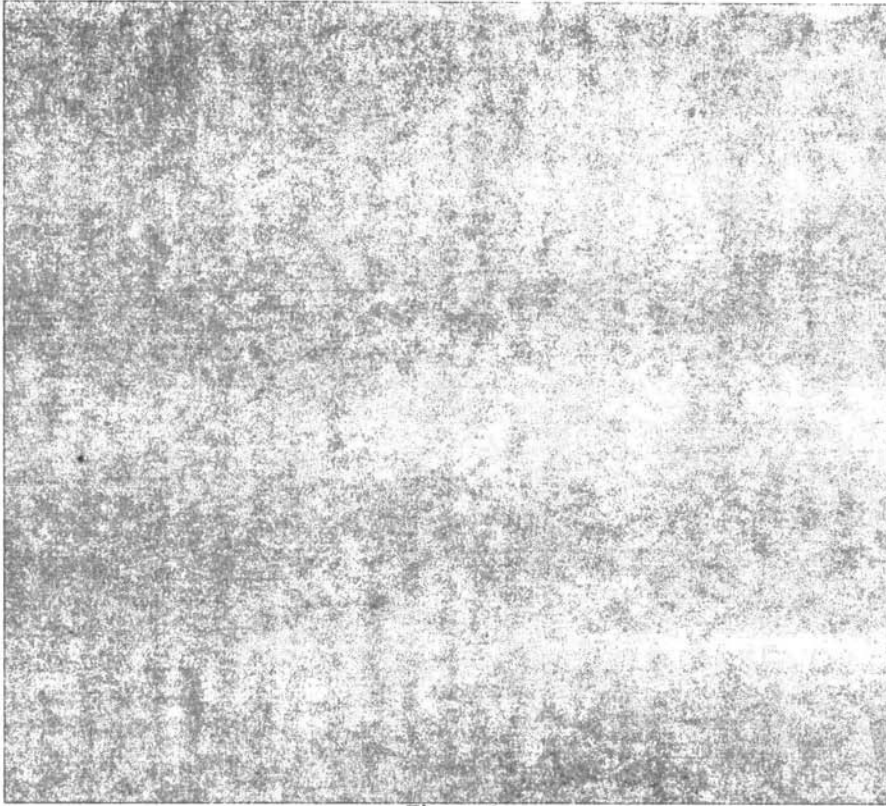


Figure 2.

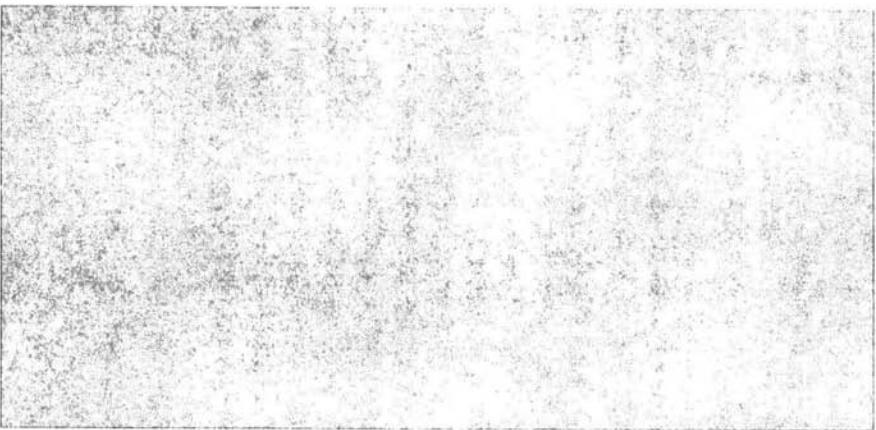


Figure 2. The relationship between village's wealth and ICDS program participation

Within a given state programme placement is less regressive, as indicated by the top right panel of Figure 2, which is based on intra-state village wealth rankings. The difference in programme coverage between the poorest and the wealthiest villages within the states is relatively small - about 60 percent of the poor villages in every state was covered by ICDS programmes compared with 70 percent of wealthiest villages. However, there was an overall trend towards greater regressiveness in programme placement between 1992 and 1998.

This is evident in the data within a given state (Fig. 2, top right panel). The same pattern emerges when we examine differences by region (Fig. 2). In the rich Northern states (also the wealthiest states of the country), the distribution was clearly progressive in 1992, and became fairly neutral across wealth percentiles by 1998. In the other regions of the country, the picture was less encouraging: from being broadly neutral across village wealth percentiles in 1992, programme placement became more regressive by 1998.

In the poorest Northern states, placement amongst villages was neutral in most wealth percentiles in 1992, except for the disproportionate allocation to the wealthiest villages (Fig. 2). By 1998, this had become more steadily regressive across wealth percentiles, with about 45 percent coverage in the poorest villages, compared with 60 percent in the richest ones. In the Southern states, the distribution was fairly neutral in 1992 and became more regressive by 1998: with around 62 percent of the poorest villages covered compared with 85 percent of the richer ones. In the Northeastern states, the distribution was fairly neutral across wealth percentiles in 1992, but became clearly regressive by 1998: with around 60 percent coverage of the poorest villages and nearly 80 percent coverage of the wealthiest ones.

(iii) Growth of programme coverage

The growth of programme coverage across states between 1992 and 1998 was clearly progressive. States which had the lowest coverage of the ICDS programme in 1992 showed the highest rates of expansion of coverage between 1992 and 1998. This applies to the poor Northern states, where the average annual growth of coverage within a state was above 6.5 percent. Coverage was already relatively high in 1992 in the richer Northern states as well as the Southern states, where coverage grew at an average annual rate of 4.5 percent and 1.5 percent respectively.

This progressive trend is also reflected in the much more rapid growth of the programme in the poorest villages of the country during the period 1992-98. Within a given state, the picture is more mixed. Looking at the entire sample the growth of programme coverage was quite regressive: with less than 30 percent growth for villages in the lowest three wealth percentiles compared with 40 percent growth for the wealthiest villages.

The richer Northern states showed a progressive trend, with 7 percent growth in the poorest villages compared with about 4 percent in the wealthier percentiles. In the other regions, the trend in growth was regressive. In the poor Northern states the growth was somewhat regressive across most of the village wealth percentiles, except that the wealthiest villages showed lower growth than the others.

In the Southern states, the poorest villages showed almost 2 percent decline in coverage while villages in the fortieth wealth percentile and above showed about 2 percent growth. The Northeastern states showed a mildly regressive trend, with 2-3 percent growth amongst the poorer villages and 4 percent in the richest villages.

(iv) Probability of programme placement by village characteristics

The observed presence of the ICDS programme in a village

could be interpreted as a result of two processes: programme placement and programme retention. The official policy of the Government of India is to place the ICDS programme in poorer administrative blocks and villages, with a preference for larger villages where an ICDS center can have a larger population to serve. However, a number of factors could in practice modify the application of these placement criteria: for example, politicians may seek to corner benefits for their own electorate at the cost of more deserving candidates; and officials may seek to select villages which are easily accessible and have good infrastructure conditions to work in.

A village's ability to retain the programme depends on its ability to create good conditions for its functioning. There are many ways in which the levels of local cooperation are critical to making it possible for the anganwadi worker (AWW) to function. A good space has to be made available for the center. It also helps if the community is willing to help the anganwadi worker overcome difficulties encountered in her work: such as accessing water supplies, reaching the more difficult households, or rounding up children for immunization drives.

Anganwadi workers operate under difficult conditions, far from their superiors, so communities which are better at offering such support are more likely to be able to retain the programme. The probability of programme retention is likely to be indicated by the presence of other development programmes in the village, which implies that there is a network of formal agents in place to provide occasional support to the AWW, and also that the village is able to retain development programmes in general. Community capacity for collective action is also indicated by the presence of cooperatives and women's associations.

The dependent variable is a binary indicator of whether there is an ICDS center in a village. The explanatory

variables include the village's demographic characteristics, wealth, distance from towns and transport connections, infrastructure, and the presence of other development programmes and community associations.

These results confirm the results from the descriptive analysis, that programme placement is regressive between states: the estimations without the control for the state-specific characteristics demonstrate a neutral (in 1992) and pro-rich (1998) bias in placement. However, they show more clearly than the descriptive results that placement is progressive within a given state: when the state dummies are introduced, villages with lower average household wealth index were significantly more likely to have the programme.

Within a given state, villages with larger populations and villages with electricity are significantly more likely to have the programme. Villages that have development programmes such as employment generation programmes and 'fair price shops' (selling foodgrains and a few other basic food items at controlled prices), and women's associations (Mahila Mandals) have a higher probability of being selected into the programme. At the same time, such characteristics as the village's distance to the district centers, accessibility, and the average level of women's education are not significantly related to the probability of placement in either year.

If politicians are modifying the application of these guidelines to meet electoral pressures, this is not to an extent that is perceptible in the data. There also seems little evidence that programme placement is geared towards officials' convenience, as the village's connection to transport networks or distance from the district center does not increase its likelihood of being selected. A village's likelihood of being selected is also greater if it has other development programmes and community associations in place, possibly partly because this indicates the village's

ability to attract as well as to retain development programmes.

Impact of the ICDS Programme

We turn now to evaluating whether children living in villages with the ICDS programme have significantly different anthropometric outcomes from those living in village without the programme. The unconditional distributions of child anthropometric measurements in both the 1992 and 1998 surveys is very similar among children living in villages served by the programme, and those living in villages without the programme (not shown). This suggests little evidence of programme impact on child nutrition outcomes.

To investigate this more rigorously, we modeled the impact of the ICDS programme on child nutritional status, comparing anthropometric outcomes for the children in the beneficiary villages with those of children from a comparison group of villages. We use the Propensity Score Method, which removes the selection bias due to differences between villages with and without projects, to the extent that selection of a village into the programme is based purely on observable characteristics.

Each child in the villages with the ICDS programme (the treatment group in evaluation literature terminology) is paired with one in the villages without the programme (the control group), with similar observed characteristics of the child (age, birth order and gender); of the mother (age, education, caste, religion); household wealth; and of the village (population, and development indicators). We then test for significant differences in nutritional outcomes between the children in the treatment group and their matched counterparts in the control group. The results, indicate little overall effect of the ICDS programme on nutritional outcomes.

We find that the only significant effect of the programme was a positive effect on boys' stunting in the data from the 1992 survey, but not in 1998. For girls, the effect was not significant. We disaggregated the results to see whether there are significant effects at regional levels, but found none except a significant negative impact in the poor Northern states, and in the Northeastern states. There, children living in an ICDS village had a higher probability of being underweight in the 1998 survey. Other studies also find little evidence of programme impact on child nutritional status.

A national study found the prevalence of underweight children to be somewhat lower where the programme was in place, but given the sample sizes of the control and treatment groups these differences are not statistically significant. Using the 1992 NFHS data, Deolalikar found that the presence of an ICDS center is associated with a 5 percent reduction in the probability of being underweight for boys, but not for girls.

BREIF STUDY OF USDA'S DOMESTIC FOOD ASSISTANCE PROGRAMMES

USDA administers four major domestic food assistance programmes that exclusively or primarily serve the nutritional needs of children:

- National School Lunch Programme
- School Breakfast Programme
- Child and Adult Care Food Programme
- Summer Food Service Programme.

The child nutrition programmes work individually and in concert to provide a nutritional safety net for children and together account for one-quarter of USDA's domestic food and nutrition assistance outlays. In fiscal 2006, USDA spent \$12.9 billion on these programmes.

National School Lunch Programme

Numerous scientific studies have suggested a strong link between child nutrition and learning in school. This supports the importance of the availability of school meals programs in improving the educational performance of US children. Every school day the National School Lunch Program (NSLP) serves nutritious meals to more than 28 million children nationwide. Pennsylvania served more than 186 million school lunches during the 2004-2005 school year. These healthy meals enhance children's readiness to learn.

How does it work?

The NSLP is a federal and state reimbursement program for each meal served that meets federal requirements. All NSLP sponsors are required to offer free and reduced-price lunches to eligible children. Reimbursement rates are established annually by the United States Department of Agriculture (USDA). Sponsors are entitled to receive USDA commodities for each lunch they serve. The variety of commodities sponsors may receive depends on product availability and market prices.

Who may participate?

Any public school, intermediate unit, charter school, area vocational technical or career technology school, public residential child care institution, and tax exempt non-public school or residential child care institution may apply to be an NSLP sponsor.

How do children qualify for free or reduced-price lunches?

Children from families with incomes at or below 130% of the poverty level, and children in families receiving Temporary Assistance for Needy Families (TANF) and children in families receiving food stamp benefits are

eligible for free lunches. Children in families whose income is between 130% and 185% of the poverty level are eligible for reduced price lunches.

What are the meal requirements?

To qualify for reimbursement, NSLP sponsors must meet certain requirements depending upon the menu option they have selected for their school. In the Traditional and Food Based Menu Options, they have specific minimum requirements in four food components that consist of five food items. The components are Breads/Grains, Fruit/Vegetable, Meat/Meat Alternate and Fluid Milk. The serving sizes/amounts vary depending on the age of the students. The NuMenu and Assisted NuMenu Options are based on three menu items: an entrée, side dish and milk. In all menu options, the serving sizes/amounts vary depending on the age of the students.

School Breakfast Programme

The School Breakfast Programme (SBP) provides cash assistance to States to operate nonprofit breakfast programmes in schools and residential childcare institutions. The programme is administered at the Federal level by FNS. State education agencies administer the SBP at the State level, and local school food authorities operate it in schools.

The School Breakfast Programme (SBP) was established in 1966 as a two-year pilot project designed to provide categorical grants to assist schools serving breakfasts to "nutritionally needy" children. While the term "nutritionally needy" was not defined, the original legislation stipulated that first consideration for programme implementation was to be given to schools located in poor areas or in areas where children had to travel a great distance to school. To encourage schools in needy areas to participate, Congress authorized higher

federal payments for schools determined to be in "severe need." During the first year of operation, the SBP served about 80,000 children at a federal cost of \$573,000.

During the next few years, the pilot programme was extended several times, and a number of modifications were made to expand the programme. In 1971, Congress directed that priority consideration for the programme would include schools in which there was a special need to improve the nutrition and dietary practices of children of working mothers and children from low-income families. Even more important, in 1973, the categorical grant reimbursement structure was replaced by a system of specific per-meal reimbursement.

In 1975 the programme received permanent authorization. As part of the legislation making the SBP permanent, Congress declared its intent that the programme "be made available in all schools where it is needed to provide adequate nutrition for children in attendance." Moreover, the legislation continued to emphasize participation by schools in severe need and to provide higher reimbursement to these schools.

The School Breakfast Programme is a federally assisted meal programme operating in public and nonprofit private schools and residential child care institutions. It began as a pilot project in 1966, and was made permanent in 1975.

The School Breakfast Programme is administered at the Federal level by the Food and Nutrition Service. At the State level, the programme is usually administered by State education agencies, which operate the programme through agreements with local school food authorities in nearly 84,000 schools and institutions.

How does the School Breakfast Programme work?

The School Breakfast Programme operates in the same manner as the National School Lunch Programme ;

Generally, public or nonprofit private schools of high school grade or under and public or nonprofit private residential child care institutions may participate in the School Breakfast Programme. School districts and independent schools that choose to take part in the breakfast programme receive cash subsidies from the U.S. Department of Agriculture (USDA) for each meal they serve. In return, they must serve breakfasts that meet Federal requirements, and they must offer free or reduced price breakfasts to eligible children.

What are the nutritional requirements for school breakfasts?

School breakfasts must meet the applicable recommendations of the Dietary Guidelines for Americans which recommend that no more than 30 percent of an individual's calories come from fat, and less than 10 percent from saturated fat. In addition, breakfasts must provide one-fourth of the Recommended Dietary Allowance for protein, calcium, iron, Vitamin A, Vitamin C and calories. The decisions about what specific food to serve and how they are prepared are made by local school food authorities.

How do children qualify for free and reduced price breakfasts?

Any child at a participating school may purchase a meal through the School Breakfast Programme. Children from families with incomes at or below 130 percent of the Federal poverty level are eligible for free meals. Those with incomes between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals. (For the period July 1, 2007, through June 30, 2008, 130 percent of the poverty level is \$26,845 for a family of four; 185 percent is \$38,203.) Children from families over 185 percent of poverty pay full price, though their meals are still subsidized to some extent.

How much reimbursement do schools get?

Most of the support USDA provides to schools in the School

Breakfast Programme comes in the form of a cash reimbursement for each breakfast served. The current (July 1, 2007 through June 30, 2008) basic cash reimbursement rates for non-severe need are:

- Free breakfasts \$1.35
- Reduced-price breakfasts \$1.05
- Paid breakfasts \$0.24

Schools may qualify for higher "severe need" reimbursements if a specified percentage of their lunches are served free or at a reduced price. Severe need payments are up to 24 cents higher than the normal reimbursements for free and reduced-price breakfasts. About 65 percent of the breakfasts served in the School Breakfast Programme receive severe need payments. Higher reimbursement rates are in effect for Alaska and Hawaii.

Schools may charge no more than 30 cents for a reduced-price breakfast. Schools set their own prices for breakfasts served to students who pay the full meal price (paid), though they must operate their meal services as non-profit programmes.

What other support do schools get from USDA?

Through Team Nutrition, USDA provides schools with technical training and assistance to help school food service staffs prepare healthy meals, and with nutrition education to help children understand the link between diet and health.

How many children have been served over the years?

In Fiscal Year 2005, over 9.3 million children participated every day. That number grew to 9.7 million in Fiscal Year 2006. Of those, 7.9 million received their meals free or at a reduced-price. Participation has slowly but steadily grown over the years: 1970: 0.5 million children; 1975: 1.8 million children; 1980: 3.6 million children; 1985: 3.4 million

children; 1990: 4.0 million children; 1995: 6.3 million children; 2000: 7.5 million children.

How much does the programme cost?

For Fiscal Year 2006, the School Breakfast Programme cost \$2.0 billion, up from \$1.9 billion in Fiscal Year 2005. The cost in previous years was in 1970, \$ 10.8 million; in 1980, \$287.8 million; in 1990, \$ 599.1 million; and in 2000, \$1.39 billion.

Child and Adult Care Food Programme

USDA's Child and Adult Care Food Programme plays a vital role in improving the quality of day care and making it more affordable for many low-income families. Each day, 2.9 million children receive nutritious meals and snacks through CACFP. The programme also provides meals and snacks to 86,000 adults who receive care in nonresidential adult day care centers. CACFP reaches even further to provide meals to children residing in emergency shelters, and snacks and suppers to youths participating in eligible afterschool care programmes.

Programme Administration

USDA's Food and Nutrition Service (FNS) administers CACFP through grants to States. The programme is administered within most States by the State educational agency. In a few States it is administered by an alternate agency, such as the State health or social services department; and in Virginia, it is directly administered by the FNS Mid-Atlantic Regional Office. The child care component and the adult day care component of CACFP may be administered by different agencies within a State, at the discretion of the Governor.

Independent centers and sponsoring organizations enter into agreements with their administering State agencies to assume administrative and financial

responsibility for CACFP operations. CACFP serves nutritious meals and snacks to eligible children and adults who are enrolled for care at participating child care centers, day care homes, and adult day care centers. CACFP also provides meals to children residing in emergency shelters, and snacks to youths participating in afterschool care programmes.

Child Care Centers

Eligible public or private nonprofit child care centers, outside-school-hours care centers, Head Start programmes, and other institutions which are licensed or approved to provide day care services may participate in CACFP, independently or as sponsored centers. For profit centers must receive title XX funds for at least 25 percent of enrolled children or licensed capacity (which ever is less) or at least 25 percent of the children in care must be eligible for free and reduced price meals. Meals served to children are reimbursed at rates based upon a child's eligibility for free, reduced price, or paid meals.

Day Care Homes

A family or group day care home must sign an agreement with a sponsoring organization to participate in CACFP. Day care homes must be licensed or approved to provide day care services. Reimbursement for meals served in day care homes is based upon eligibility for tier I rates (which targets higher levels of reimbursement to low-income areas, providers, or children) or lower tier II rates.

"At-Risk" Afterschool Care Programmes

Community-based programmes that offer enrichment activities for at-risk children and teenagers, after the regular school day ends, can provide free snacks through CACFP. Programmes must be offered in areas where at least 50%

of the children are eligible for free and reduced price meals based upon school data. Reimbursable suppers are also available to children in eligible afterschool care programmes in seven States—Delaware, Illinois, Michigan, Missouri, New York, Oregon, Pennsylvania, and West Virginia.

Emergency Shelters

Since July 1, 1999, public or private nonprofit emergency shelters which provide residential and food services to homeless children may participate in CACFP. Eligible shelters may receive reimbursement for serving up to three meals each day to homeless children, through age 18, who reside there. Unlike most other CACFP facilities, a shelter does not have to be licensed to provide day care. However, it must meet any health and safety codes that are required by state or local law.

Adult Day Care Centers

Public or private nonprofit adult day care facilities which provide structured, comprehensive services to nonresidential adults who are functionally impaired, or aged 60 and older, may participate in CACFP as independent or sponsored centers. For-profit centers may be eligible for CACFP if at least 25 percent of their participants receive benefits under title XIX or title XX. Meals served to adults receiving care are reimbursed at rates based upon a participant's eligibility for free, reduced price, or paid meals.

Meal Reimbursement

Independent centers and sponsoring organizations receive cash reimbursement for serving meals to enrolled children and adults that meet Federal nutritional guidelines. The CACFP meal pattern varies according to age and types of

meal served. Centers and day care homes may be approved to claim up to two reimbursable meals (breakfast, lunch or supper) and one snack, or two snacks and one meal, to each eligible participant, each day. Shelters may serve each child up to three reimbursable meals (breakfast, lunch and supper), each day. Afterschool care programmes may claim reimbursement for serving each child one snack, each day.

Reimbursement for centers is computed by claiming percentages, blended per meal rates, or actual meal count by type (breakfast, lunch, supper, or snack) and eligibility category (free, reduced price, and paid). The State agency assigns a method of reimbursement for centers, based on meals times rates, or the lesser of meals times rates versus actual documented costs.

Programme payments for day care homes are based on the number of meals served to enrolled children, multiplied by the appropriate reimbursement rate for each breakfast, lunch, supper, or snack they are approved to serve. Sponsoring organizations also receive administrative funds related to the documented costs they incur in planning, organizing, and managing CACFP.

Commodities or Cash-in-lieu of Commodities

In addition to cash reimbursement, USDA makes donated agricultural commodities or cash-in-lieu of commodities available to institutions participating in CACFP.

Pricing of Programme Meals

Centers participating in CACFP may charge a single fee (nonpricing programme) to cover tuition, meals, and all other day care services, or they may charge separate fees for meals (pricing programme). The free and reduced price policy statement describes the institution's pricing policy. All day care homes and the vast majority of centers participate in CACFP as nonpricing programmes, since the fees they charge cover all areas of their day care services.

Funding of Benefits and State Administrative Costs

Funding Programme Benefits

FNS provides cash assistance to each State agency for meals served to eligible children and adults in day care centers based upon the participant's eligibility under the Income Eligibility Guidelines for free, reduced price, or paid meals. National average payments for meals served in centers are adjusted annually on July 1, to reflect changes in the *Food Away From Home* series of the Consumer Price Index. Meals served in emergency shelters and afterschool care snacks are reimbursed at the rates for free meals and snacks.

Payments for meals served in day care homes are also adjusted annually on July 1, based on changes in the *Food at Home* series of the Consumer Price Index. The level of reimbursement for meals served to enrolled children in day care homes is determined by economic need, based on either the location of the day care home, or the household income of the day care home provider, or the household income of each enrolled child. Meals served to the day care home provider's own children are reimbursable only if those children are determined eligible for free and reduced price meals.

The level of commodity assistance or cash in lieu of commodities is based on the numbers of lunches and suppers served in centers in the preceding year, multiplied by the national average payment for donated foods. Commodity assistance rates are also adjusted annually on July 1, to reflect changes in the *Food Used in Schools and Institutions* series of the Consumer Price Index.

Funding State-Level Administrative Costs

FNS makes State Administrative Expense (SAE) funds available to State agencies for administrative expenses incurred in supervising and giving technical assistance to

institutions participating in CACFP. Additional funds are also available to States to help State agencies and institutions comply with Federal audit requirements. "One and a half percent audit funds" is equal to 1.5 percent of the reimbursement payments made to the State, during the second fiscal year preceding the year for which the funds are to be made available.

Summer Food Service Programme

When schools close their doors for vacation next summer, over 12 million poor children, who qualify to receive a free or reduced price lunch during the academic year, will be deprived of this vital meal. The implications for these children's health and well-being are significant. For over two months, the vast majority of these children will not have access to nutritious meals like the ones they receive during the school year.

The Child Nutrition Programmes represent an effective and vital part of US nutrition safety net. The National School Lunch Programme (NSLP) serves about 27 million meals on a given day. Just over half of these meals are served free or at a reduced price. However, once summer vacation or the long vacations in year-round schools arrive, school meals aren't available for most children. In fact, only about a million children receive meals under the NSLP on a given day during the summer. Some of these children are participating in summer school, and some are on their regular track in year-round schools. In addition, the Summer Food Service Programme (SFSP) serves another 2 million lunches each day. As you can see, the combined number of meals served under both programmes represents only a fraction of the free and reduced price lunches served each day during the regular school year.

Both programmes increase participation, but it is particularly important for the SFSP to become more accessible as the number of schools providing summer

classes or operating year-round is more limited than the total number of schools potentially available for the SFSP. The SFSP is intended to function as a nutrition link between the end of one school year and the beginning of the next, and for more than twenty-five years it has filled this role successfully in many communities. However, the SFSP is presently available in too few locations, with the result that the number of poor children benefiting from good, nutritious lunches under this programme is unreasonably low. To put it another way, the 2 million lunches served under the SFSP per day are only about 12 percent of the free and reduced price school lunches served on a given day during the regular school year. These numbers are especially alarming because the SFSP is specifically designed to be operated in economically depressed areas where alternatives to school lunches are not readily available or where many children cannot afford them.

Some children may not reside in eligible areas, but many do. To meet their needs, we must have more schools and community organizations to provide them. Nearly 20,000 school food authorities operate the NSLP in nearly 90,000 schools during the regular school year. By contrast, the total number of school sponsors in the SFSP in July 2000 was only 1,610, less than 10 percent of all school districts nationwide. Even adding in the schools operating under the NSLP during the summer months leaves a large number of unutilized schools that could serve as sponsors, sites or vendors in the SFSP.

Recent USDA Initiatives

In recent years, the U.S. Department of Agriculture (USDA) has undertaken a number of initiatives to attract additional sponsors, particularly schools. USDA began by listening to people to find out what we could do in partnership to assist local operators or potential operators. USDA convened summits attended by school administrators, community

activists and State personnel. These meetings were designed to acquaint local organizations, especially schools, with the benefits of the programme and look for ways to increase participation. Based on what we learned at these summits, USDA has taken a number of actions.

In 2000, USDA published a final regulation that implemented several paperwork burden reduction provisions. We waived the eligibility documentation requirements for sites that have participated in the programme during the current or previous two years and have been determined to be area-eligible. This regulation also streamlined the application process for sponsors that have participated successfully in the programme during the same period of time.

US also issued policy memoranda that increase State and sponsor flexibility and provide sample application forms which reflect the streamlined requirements for experienced sponsors and sites. Other materials advise local sponsors on topics ranging from improving nutrition education and the quality of meals served, to ways of building local partnerships and obtaining funding from the community.

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