

Market Analysis of Complementary Foods in Nepal

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Nutrition CRSP Research Briefing Paper No. 12



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Acknowledgments

We are grateful for the collaboration of Nischal Basnet and Anuj Singh of Right Direction Nepal in Kathmandu, Sumi Devkota who assisted us in all aspects of this effort in Kathmandu, all those we interviewed in Nepal, and Jerry Martin and Barbara Seligman at DAI for their comments. The opinions expressed herein are solely those of the authors and do not represent the opinions of the sponsors. Any mistakes are solely those of the authors.

Recommended Citation

Magnani R, Gevorgyan A, Kurz K. 2012. Market Analysis of Complementary Foods in Nepal. Global Nutrition CRSP Research Briefing Paper 12.

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List of Abbreviations

CAC	Codex Alimentarius Code
CF	complementary food
DFTQC	Department of Food Technology and Quality Control
FCHV	Female Community Health Volunteer
FGD	focus group discussion
GoN	Government of Nepal
M&E	Monitoring and Evaluation
MI	Micronutrient Initiative
MNP	micronutrient powder
MoAD	Ministry of Agricultural Development
MoHP	Ministry of Health and Population
NDHS	Nepal Demographic and Health Survey
NGO	non-governmental organization
PFCF	processed, fortified complementary food
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VDC	Village Development Committee
WFP	World Food Programme (UN)
WHO	World Health Organization (UN)

Executive Summary

While best programming methods have been identified for many of the essential nutrition actions—e.g., breastfeeding, micronutrient tablet provision—the way forward for improving complementary feeding practices is much less clear, as is agriculture’s contribution. The vast majority of children in Nepal do not receive a minimum acceptable diet, and behavior change for complementary feeding within households has been difficult to achieve at scale. An underestimated constraint on child feeding is that the child’s food preparation takes a lot of mothers’ time, which is often already limited by other responsibilities. The other major constraints are the inadequate nutritive content of the child’s diet and the unhygienic quality of the meals. Underlying these constraints is families’ limited knowledge about the importance of good complementary feeding for children’s growth and development.

The production of commercial products affordable to resource-poor families who need it most could provide a complementary food option for families – preparation of children’s meals would take less time, and meals would be nutritious and hygienic. Currently in Nepal there is potential demand, but minimal supply of processed, fortified complementary foods (PFCFs) at affordable prices for consumer purchase. The purpose of the market analysis of complementary foods reported here is to investigate the supply and demand factors involved in producing a PFCF in Nepal that will be affordable, nutritious, hygienic, and involve instant or quick preparation, and to make recommendations for increasing production.

From June 18 to July 10, 2012, DAI conducted a market analysis of complementary foods. The commercial market within the Kathmandu Valley is supplied by several large producers and from imported Nestle’s Cerelac, and so commercial pilot interventions in Kathmandu are not needed or recommended. This market, however, does not serve the urban poor because commercial prices are usually not affordable.

Establishing Kathmandu Valley production for distribution to markets outside the Valley is not a viable option because transportation costs are prohibitively expensive. Small and low cost localized production ventures—cottage industries, likely run by non-governmental organizations (NGOs)—are the preferred alternative outside Kathmandu as well as in poor areas inside Kathmandu. Food standards for PFCFs are also needed. We recommend to:

- Strengthen capacity of the Government of Nepal’s Department of Food Technology and Quality Control (DFTQC) to develop and enforce standards and guidelines for production of safe and quality PFCFs, and for their nutrition and health labeling.
- Strengthen capacity among cottage industries to serve the urban slums of the Kathmandu Valley and the markets outside Kathmandu, making PFCF products that can be licensed for food safety by the DFTQC.

Enhancing the supply of PFCFs is a necessary but not sufficient step to ensure its consumption. Nutritional awareness also needs to be enhanced, per the nutrition behavioral change emphasis of the Ministry of Health and Population, Child Health Division (MoHP/CHD), and so close collaboration with their efforts is also recommended.

Part 1: Introduction – Feeding Infants and Young Children

Background

Moderate malnutrition in the first 1000 days of a child's life is an enormous problem in Nepal, affecting nearly half of children under 2 years old with long-term consequences in educability, adult work productivity, and ultimately income and national capacity. The Nepal Demographic and Health Survey (NDHS) of 2011 (Ministry of Health and Population et al., 2012) indicates that 41% of Nepali children under 5 years are undernourished according to the height-for-age variable (stunting), representing chronic poor growth in early childhood, especially in the first two years of life, the critical window of opportunity in the first 1000 days of life, including gestation. Stunting is much higher in some districts, up to 57%. Nepali children are also suffering from acute malnutrition at high rates (weight-for-height, wasting). The primary reasons for these deficits are inadequate diet; poor child care feeding; and hygiene, health-seeking behaviors and inadequate health services that limit prevention and treatment of childhood illnesses like diarrhea that cause undernutrition from 6 months to 2 years.

Child diet and feeding, or complementary feeding, is the focus of this report. In Nepal only 25% of children 6 to 24 months are fed a minimum acceptable diet (4+ food groups and the right meal frequency for their age). Complementary feeding is the feeding of solid food to children 6 to 24 months, while all the time continuing to breastfeed. Breastmilk alone (exclusive breastfeeding) is adequate food for children 0 to 6 months old, but after 6 months additional food is needed to ensure adequate child growth. Nutritionists focus on children 6 to 24 months, because this is the key time to establish good momentum of growth and nutritional status. In Nepal and globally, we know *what* children need to be fed but not *how* to ensure that they are fed this way.

Despite adversity in the last decade, Nepal has made impressive gains in improving nutrition over the last decade, and seeks to improve child diet and feeding as well. According to earlier NDHS's, stunting fell countrywide from 57% among children under 5 years in 2001 (Ministry of Health et al., 2002) to 49% in 2006 (Ministry of Health and Population et al., 2007) and further to 41% in 2011. Improved breastfeeding practices have contributed to the reduction, especially exclusive breastfeeding until 6 months of age, which has increased. The opportunity for further improvement lies with promoting adequate complementary feeding of children 6 to 24 months along with continued breastfeeding, so that each day children are eating 4+ food groups and being fed 3 times (2 times daily for children 6 to 8 months), as well as continuing to promote other key nutrition and hygiene interventions. Country-wide only 25% of children 6 to 24 months are fed a minimum acceptable diet (4+ food groups and the right meal frequency for their age, NDHS).

The Government of Nepal (GoN) is committed and on-track to meet its Millennium Development Goal of a 50% reduction in the prevalence of underweight children. Impressively, the National Planning Commission has recently developed a Multi-Sectoral Nutrition Plan to ensure a coordinated, multi-sectoral approach to food security interventions, supported by significant GoN political momentum and donor community backing (Government of Nepal, 2012). Efforts to improve availability, access and consumption of improved CFs fit squarely within Nepal's broader efforts to improve nutritional status.

Rationale for Processed Fortified Complementary Foods

Within the realm of complementary feeding that is the focus of this report, the three main limitations are: 1) inadequate nutritive content of the child's diet; 2) unhygienic quality of the meals; and 3) the extensive amount of time it takes to prepare meals for young children and to feed them. Ensuring the frequency of meals and diversity of foods, as well as the hygienic feeding conditions, can take time of caretakers that may compete with time needed to generate income and take care of other children and other domestic responsibilities. Adequate nutritive content requires frequent meals, since young children can only eat small quantities at once, along with dietary diversity to ensure that all the essential nutrients are consumed to promote growth and good nutritional status. Good hygiene requires caretaker handwashing before food preparation and before feeding a child so the food and water consumed by young children does not make them sick, since illnesses lead to weight loss and poor appetite, and hence to poor nutritional status. Finding enough time to feed infants and young children adequately requires reducing the caretakers' workload or introducing labor-saving techniques. Feeding children with PFCFs saves caretaker time and makes children's diets nutritious and hygienic.

Children are fed *jaulo*, *dal baht* and other foods that are prepared for the household and often lack the appropriate energy and nutrient density for young children. Plant-based diets of children in developing countries are typically inadequate in iron, calcium, zinc, vitamins B₆ and B₁₂, and contain dietary factors that inhibit absorption such as phytates, polyphenols and dietary fiber. Fortification of CFs and avoiding the cereals with the greatest amount of inhibiting factors such as maize can enhance the nutritional quality of CFs (Neufeld and Ramakrishnan, 2003).

Urban and rural women alike are often time-poor, having numerous agricultural or other income-generating responsibilities, and numerous domestic responsibilities in addition to feeding and caring for their children (Panter-Brick, 1992; Leslie, 1989). Saving time on food preparation could help ensure that children 6 to 24 months old are fed more frequently each day, thus contributing to the reduction in child undernutrition.

In this paper, we examine the potential for production and consumption of PFCFs. It builds on work conducted and facilitated by the Micronutrient Initiative (MI) to promote the development of complementary food products (ORG Centre for Social Research and AC Neilsen ORG-MARG, 2004). PFCFs are one type of "complementary foods" (CFs), the broader category of all foods fed in addition to breastmilk to children ages 6 to 24 months. CFs range from homemade ones that take more time to prepare but are the least expensive all the way to ready-to-use therapeutic foods that are a ready-to-eat complete meal, but expensive. We define "processed" as quick to prepare at home. "Fortified" indicates the addition of key vitamins and minerals in powdered form to the processed complementary food. Complementary foods can be fortified through processing in the case of PFCFs, or by adding micronutrient powders (MNPs) to homemade complementary foods. PFCFs are commonly cereal-based. While the goal is to improve the nutrient quality of the complementary food compared to usual intake of children 6 to 24 months, in addition to its hygienic quality and to reduce preparation time, other foods will also need to be fed to young children, including fruits, vegetables, and animal source foods.

Making PFCFs available and accessible are expected to give households, especially poor households, another option for improving the complementary feeding of their children beyond cooking homemade foods and applying MNPs, e.g., sprinkles. The fortification will increase the nutrient intake and the processing will save caretakers in both rural and urban areas precious food preparation time, enhancing

the chance that children will be fed nutritious foods at least 3 times each day. Approaches to improving availability include simple technologies such as drying, roasting and storing that can be applied in the home or community, as well as larger-scale industrial production of processed fortified foods that can involve both the public and the private sector.

Thus, the purpose of the CF market analysis reported here is to investigate the supply and demand factors involved in producing in Nepal a PFCF that will be affordable, nutritious, hygienic, and involve instant or quick preparation, and to make recommendations for increasing production.

Part 2: Methods

The DAI market analysis team was composed of Richard Magnani, Senior Marketing Analyst, based at DAI in Bethesda, MD; Anahit Gevorgyan, Food Safety Specialist, based at DAI in Bethesda, MD; Sumi Devkota, local consultant for DAI; Nischal Basnet, Managing Director of Right Direction Nepal, a market research and strategic planning consultancy based in Kathmandu; and Anuj Singh, Researcher, Right Direction Nepal. Kathleen Kurz, Senior Nutritionist at DAI in Bethesda, oversaw the effort. Magnani and Gevorgyan visited Nepal during the period June 18 to July 10. Prior to June 18, the team conducted desk research and set up the meeting and travel schedule.

During the period June 18 to July 10, the five-person team conducted meetings with 127 people—21 from GoN (including 6 Female Community Health Volunteers, FCHVs), 15 from NGOs, 4 from United Nation (UN) agencies, 1 from USAID, 9 from cottage-industry producers of complementary foods, 15 from the private sector (including 3 pharmacists, 2 producers, 7 distributors, and 3 from a public relations firm), and 3 program beneficiaries. The team also conducted 6 focus group discussions (FGDs), 3 with mothers of children under 2 years and 3 with grandmothers of children under 2 years, and so the total number of people interviewed includes 37 mothers and 22 grandmothers who were FGD participants. Grandmothers were key interviewees because they often share the job of taking care of their young grandchildren, and they typically have a large influence on the household resource decisions that can affect child feeding. The focus groups were conducted in Kathmandu, a rural area outside Nepalgunj in Banke district, and peri-urban Surkhet in Banke, one of mothers and one of grandmothers in each location. The team conducted meetings in and around Kathmandu for the period June 19 to 25, and Nepalgunj and Surkhet on June 26 to 29, and again in Kathmandu during June 30 to July 10. Nepalgunj was chosen as the city on the Indian border in which to investigate imports of processed CFs, and Surkhet was chosen as the nearby town in the Hill region. Winrock International staff in Surkhet arranged for the interviews and focus groups there.

The team relied on key informant interviews and meetings for information on market supply and demand and public and donor programs, focus groups for insights from mothers and grandmothers about household family and infant feeding behaviors and demand drivers. The study team also organized meetings of stakeholders¹ at the beginning and end of the market analysis period to seek input on the objectives and preliminary findings.

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Part 3: Results

Supply Factors for Processed Complementary Foods

Standards and Quality Control of Fortified Complementary Foods

Nepal's Food Act and Regulations is enforced by the DFTQC in the Ministry of Agricultural Development (MoAD). DFTQC conducts food safety and quality control for imported and locally-produced food products. After a small processing company registers with the Department of Cottage and Small Industries (of the Ministry of Industry, Commerce and Supplies), DFTQC inspects its production facility and its products for chemical and microbiological safety. They also conduct product shelf life studies to determine product expiration dates. The Food Act and Regulations requires packaged processed foods to be labeled in Nepali or English with the batch number, manufacturing and expiration dates, manufacturer's name, address, ingredient list, net weight and product name as part of ensuring food safety. If test results and labels are satisfactory, the DFTQC issues a production license. The process can take as long as 2 to 4 weeks due to scarce human resources and electricity outages that affect the testing of product samples in the laboratory. Licensing is required every time product formulation changes, e.g., if fortificants are added to an existing product.

The Consumer Rights Law of Nepal regulates product labeling for nutrition information and health claims. Before manufacturers put any information or claims on the label they are required to receive pre-approval from DFTQC. With its current small staff, however, DFTQC does not have the ability to verify or validate the claims, and companies make them unverified.

As shown in Table 1, several processed CFs have nutrition and health claims on the label that are not substantiated with appropriate tests or clinical research. Instructions for preparation and feeding also vary by products. Most of these products have stated shelf-lives of up to 12 months. It is not clear whether appropriate tests were conducted to assure that product wholesomeness, taste, composition, and micronutrient content are not degraded in this timeframe and that the product has the nutritional value as stated on the label.

Currently the DFTQC has limited human and infrastructure resources to conduct monitoring and inspections on a regular basis. They also lack equipment and reagents for testing vitamins and minerals that are important for quality control and labeling compliance. DFTQC's network of food inspectors is small. Currently there are total 21 food inspectors: two in each of its five regional offices, one in each of four customs points and seven inspectors for the Kathmandu valley. Human resources are not sufficient for efficient enforcement of Food Act and Regulations and the Consumer Right Law.

The DFTQC has not developed a specific product standard for the nutritive value of PFCFs or CFs. They indicated that they will use Codex Alimentarius standards as a basis for developing Nepali standards for the quality assurance, food safety, nutrition labeling, and health claims of PFCFs. According to this, PFCF

Country Representative, Nutrition CRSP, Tufts University; Roshani Shreshta, Executive Director, Nutrition Promotion and Consultancy Service Nutrition Program; Kalpana Tiwari, Nutritionist, NTAG; and Deirdre Zimmerman, Nutrition Advisor, Nutrition Promotion and Consultancy Service Nutrition Program.

production would need to meet the Codex Standard for Processed Cereal-Based Foods for Infants and Children (Codex Stan 74-1981), which sets standards for essential composition and energy density of such foods, including the kinds of cereals, the content and quality of protein, carbohydrates, and lipids, content of sodium and calcium, and quantity of Vitamin B₁, Vitamin A and Vitamin D. This Codex standard also provides guidelines on quality factors, consistency and particle size, food additives, contaminants, hygiene, packaging, labeling, and methods for analysis and sampling. The 1991 revision also includes the Guidelines on Formulated Supplementary Foods for Older Infants and Young Children, which the Nepali standards will also have to take into account.

In addition, the 2006 amendment stated that “Nutrition claims may be permitted under national legislation.” This national legislation has yet to be developed for nutrition labeling and health claims (Codex Standard 074-1981, Rev. 1). In addition, PFCF production should comply with the Codex standards on Hygiene Practice for Foods for Infants and Children (CAC/RCP 21-1979). Specifications for vitamin and mineral fortification beyond the ones noted above, however, are not set in the Codex standards, so countries must establish their own. The Codex standard suggests that vitamins and minerals added to the products should be selected from the CAC Advisory Lists of Nutrient Compounds for Special Dietary Uses Intended for Infants and Young Children (CAC/GL 10-1979).

Table 2 shows composition of processed cereal based CFs sold in the Kathmandu shops. Soy, wheat and maize are common to most of the products. Grams, rice, peanuts, and cashews are ingredients in just one or several. Sugar is found in most of them, except the two Naya Lito products and Chhimeki’s product. Milk solids or milk powder, supplying the animal source ingredient important for child growth and development, are only found in the Nestle and Chaudhary products, which are the most expensive. Vitamins and minerals are found only in the Nestle, Chaudhary and Chhimeki products.

Funding and investment in human and technical resources of DFTQC will be critical for future enforcement of standards and monitoring of quality control and assurance, ensuring both consumer protection and fair market competition.

Table 1. Nutritional Value and Labeling Claims of Cereal Based Complementary Foods									
Product name	100g contains	Approximate Nutritional value/100 g product	Labeling/ Claims						
Nestle's CERELAC	Milk solids 32.3% Wheat flour 27% Mango pulp 15.8% Sucrose Rice flour 4.6% Corn oil Barley corn rise flakes 2.8% Mango flakes 1.09% Date crunchies 0.44% Vitamins and Minerals	<p><u>FOR GROWTH</u> Energy 411 kcal, 1720 kJ Protein 15 g Calcium 410 mg Phosphorus 330 mg Magnesium 45 mg Iodine 50 µg Vitamin D 5 µg Riboflavin (B2) 0.65 mg Folic acid 25 µg</p> <p><u>FOR ENERGY NEEDS</u> Carbohydrate 67.5 g Sugar 11 g Fat 9 g Linoleic acid 1.5g Thiamine (B1) 0.55 mg Niacin 3.5 mg Pantothenic Acid 1.5 mg Vitamin B12 0.75 µg Biotin 14 µg</p> <p><u>FOR IMMUNITY</u> Vitamin A 360 µg RE Vitamin E 2.2 mg TE Vitamin B6 0.66 mg Vitamin C 50 mg Iron 10 mg Zinc 3 mg Copper 0.3 mg</p> <p><u>OTHER COMPONENTS</u> Dietary fiber 1 g Sodium 130 mg Potassium 350 mg Chloride 250mg Ashe 4.5 g Moisture 3 g</p>	<p>Important Notice : Breast milk is best for your baby No Artificial Colors and Flavors No preservatives</p> <p>CERELAC 3 age 10-24 – start with 1 level scoop CERELAC mixed with 5-6 teaspoons of previously boiled warm water. Gradually increase quantities till your baby accepts a feed as indicated in the table below:</p> <table border="1"> <thead> <tr> <th><u>Quantity per feed</u></th> <th><u>Water</u></th> <th><u>Feeding/day</u></th> </tr> </thead> <tbody> <tr> <td>4 level scoops (33 g appr)</td> <td>100ml</td> <td>3</td> </tr> </tbody> </table>	<u>Quantity per feed</u>	<u>Water</u>	<u>Feeding/day</u>	4 level scoops (33 g appr)	100ml	3
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Product name	100g contains	Approximate Nutritional value/100 g product	Labeling/ Claims												
Chaudhary's SARBOTTAM Premium Lito	Wheat, soybean, rice, whole milk powder, sugar, dextrose, corn fat, vitamins and minerals	<p><u>FOR GROWTH</u> Energy 400 kcal Protein 16 g Calcium 410 mg Vitamin D 200 IU Riboflavin 0.6mg Folic acid 22 µg</p> <p><u>FOR ENERGY NEEDS</u> Carbohydrate 62 g Fat 6g Thiamine 0.8 mg Niacin 5 mg Pantothenic acid 1.5 mg Vitamin B12 0.25 µg Biotin 25 µg</p> <p><u>FOR IMMUNITY</u> Vitamin A 1200 IU Vitamin E 3 IU Vitamin B6 0.3 mg Vitamin C 35 mg Iron 23.5 mg Zinc 5 mg</p> <p><u>OTHER COMPONENTS</u> Dietary fiber 3 g Ash 3g Moisture 10 g</p>	<p>Important Notice: Mother's milk is best for your baby Free from any artificial colors, flavors or preservatives With added micro nutrients for your baby's overall growth, energy needs and immunity Feed your baby daily for good health and healthy growth of mind</p> <table border="1"> <thead> <tr> <th>Age</th> <th>Quantity per feed</th> <th>Water</th> <th>Feeding/Day</th> </tr> </thead> <tbody> <tr> <td>6 months onwards</td> <td>3 TSP (appr 30g)</td> <td>75 ml</td> <td>2</td> </tr> <tr> <td>8 months onwards</td> <td>4 TSP (appr 40g)</td> <td>100ml</td> <td>3</td> </tr> </tbody> </table>	Age	Quantity per feed	Water	Feeding/Day	6 months onwards	3 TSP (appr 30g)	75 ml	2	8 months onwards	4 TSP (appr 40g)	100ml	3
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ABC Sarbottam Lito Special	Soyabean 25% Maize 20% Gram 20% Wheat 20% Peanuts 5% Sugar 5% Cashew 5%	<p>*Protein 17.7 g Fat 5.2 g Carbohydrate 73.2 g Calcium 51.03 mg Iron 13.8 mg Vitamin A 430 U Riboflavin 45 U Niacin 7 U Folic acid 32 U</p>	<p><i>High protein energy health food Suitable for weaning for extra stamina and for use in sickness Nutritious food-full of protein and vitamins. High energy health food for all ages from 5 months onwards and during illness</i></p> <p>*NOTE: No vitamin and mineral premix is added to lito, vitamins and minerals shown on package are those contained in lito ingredients Feeding method: Start feeding with 1 teaspoonful from 5 months onwards and increase the quantity as the baby is able to digest</p>												

Product name	100g contains	Approximate Nutritional value/100 g product	Labeling/ Claims
Naya Lito- Box	Soyabean Maize Wheat Bengal gram Peanuts Sugar Cashew	*Energy value 425,83 kcal Protein 22.36g Fat 10.61 g Carbohydrate 60.31 g Phosphorus 386 mg Calcium 160 mg Crude fiber 0.94g Moisture 2.99 g	<i>High protein health food</i> <i>Nutritious food-full of protein and vitamins. High energy health food for all ages from 6 months onwards and during illness</i> <i>Suitable for weaning for extra stamina and for use in sickness</i> *NOTE: Nutritional value presented on the label of this product is questionable, it was not clear how they determined quantities
Sugar Free Naya Lito- plastic bag	Soya, maize, wheat *no percentages are available	Energy 366 kcal Protein 20.7 g Iron 14 mg Vitamin A 430 µg	Without sugar for children and old people <i>Ideal weaning food and nutritious snack for anyone needing extra energy</i> What you get in this Lito is lot of protein, energy and different nutrients like iron Either can mix it with different food or mix with water <i>This will help in physical development, and when you are sick will help you get well faster</i> When child completes 5 months you start with one tea spoon and then slowly increase the amount Mix required amount in boiling water to get the desired texture You can also add softly cooked vegetables and spinach to make it tastier and to increase nutrient value To make sweet put something that does not harm child's teeth, for example banana, papaya, or orange juice, etc. Other recommendations: Lito is very good for people who need additional nutrition, for example growing children, adolescents, pregnant and lactating women, sick and old people From Lito powder mix you can make roti, diro or you can mix it with milk, yogurt and tea
Naya Lito- plastic package	Soya 50%, maize 22.5%, wheat 22.5% , sugar 5%	Protein 20.7 g Fat 8.3 g Carbohydrate 53 g Calcium 400 U Iron 14 U Vitamin A 430 U Riboflavin 45 U Niacin 7 U Folic Acid 32 U	<i>Suitable for weaning for extra stamina and for use in sickness</i> You increase the amount according to how much child can digest Same instruction for preparation

Product name	100g contains	Approximate Nutritional value/100 g product	Labeling/ Claims
Chappa-Plastic package	Soyabean, maize, wheat and sugar	Energy Value 425.83 kcal Carbohydrate 60.3 g Protein 22.3 g Fat 10.6 g Phosphorus 386 mg Calcium 164 mg Crude fiber 0.94 Moisture 2.99 g	Mix Chappa to boiling water or milk and make the texture according to the need After 6 months completion start with one spoon of Chappa and increase the dose according to how much child can digest Other recommendations: You can make rotti, diro, halva, or mix with milk, curd (yogurt) or tea It gives additional nutritional value for growing children, pregnant and lactating women and old people
Sarbottam Pitho		Protein 14.72% Fat 4.44% Ash 1.92% Iron 11.46% Carbohydrate 75% Moisture 3.53% AIA 0.02%	<i>Mothers milk is heavenly (God given) food for children</i> Add Sarbottam Pitho to boiling water to get texture according to your liking. How to feed baby: After 6 months start with one tea spoon and increase the dose according to how much child can digest
Chhimeki Sarbottam Pitho	Soy, maize, wheat + iron, folic acid and vitamin A	NA	According to child's taste put salt and sugar in water and boil it. Add Sarbottam Pitho and make the texture as child likes. Things to remember: From the time child is born up to 6 months child should be exclusively breast fed. Wash your hands before preparing. When child is 6 months old start giving Sarbottam Pitho. Start with half spoon and increase accord to the age.

Table 2. Cereal Based Complementary Foods Sold in Nepal

Product name	Description/Claim	Producer/ Distributor	Net Weight	Retail Price Rs	Calc'd retail price (Rs)/ Kg	Shelf Life	Ingredients
Nestle's CERELAC	Infant cereal with milk Stage 1,2,3, 4, 6 mo +	Nestle, India, for Nepal only/Neprade	350 g	302	863	12 mo	Milk solids, wheat flour, mango pulp, sucrose, rice flour, corn oil, barley corn rice flakes, mango flakes, date crunchies, vitamins and minerals
Chaudhary's Sarvottam Premium Lito	Sarvotam premium Lito, for infants , 6 mo +	Chaudhary's Instant Meal (Pvt)	450 g	150	333	12 mo	Wheat, soybean, rice, whole milk powder, sugar, dextrose, corn fat, vitamins and minerals
ABC Sarbottam Lito Special	High protein energy health food Suitable for weaning for extra stamina and for use in sickness, 5mo +	Gujayshowri Lito/self	500g	105	210	12 mo	Soybean, maize, gram, wheat, peanuts, sugar, cashew
Naya Lito- box	Nutritious food full of protein and vitamins	Prem Sewa Naya Lito Udyog/self	500 g	85	170	12 mo	Soybean, maize, wheat, bengal gram, peanuts, sugar and cashew
Sugar free Naya Lito- plastic package	Ideal weaning food and nutritious snack for anyone needing extra energy	Prem Sewa Naya Lito Udyog/self	500 g	45	90	12 mo	Soybean, maize, wheat
Naya Lito-plastic package	High protein health food	Prem Sewa Naya Lito Udyog/self	500 g	45	90	12 mo	Soybean, maize, wheat
Chappa-Plastic package(also have sugar free)	Pre cooked with sugar, for young children and old people	Bajra Food Products Allied Food Industry/Yash Trading Enterprises	500 g	60	120	6 mo	Soybean, maize, wheat and sugar
Shri Sarbottam Pitho	From childhood to old age		400 g	50	125	12 mo	Soya 25%, grams 25%, maize 22.5% and wheat 22.5%, sugar 5%
Chhimeki Sarbottam Pitho		Chhimeki/ self	1 kg	150	150	3 mo	Soya, maize, wheat + nutrient factors iron, vitamin A and folic acid

Public Supply

Flour Milling Fortification. Effective fortification in the general food supply² calls for minute quantities of nutrients daily combined with sufficient household consumption of staples including cereals, fruits and vegetables, and animal source foods. The DFTQC has established a mandatory fortification program for the roller flour millers in Nepal.

In 2000, the MI explored the feasibility of fortifying biscuits, instant noodles, and wheat flour (Personal Communication, Macha Raja Maharjan, MI). MI studied six districts across three ecological zones and found that 50% of households in urban areas and 22% in rural areas consumed some amount of commercially-processed wheat flour directly or indirectly through biscuits and instant noodles daily. They found that direct flour fortification at the mill had better coverage than indirect fortification. However, about 95% of the wheat flour produced in Nepal is from small local mills registered as cottage industries, and enforcement of fortification at these mills would be impractical.

MI worked with the DFTQC to develop voluntary standards for wheat flour fortification in 2008. The goal was to work through the Nepal Flour Mills Association (NFMA) to encourage voluntary compliance of large roller mills. The voluntary approach was successful and encouraged by this DFTQC instituted mandatory standards for flour fortification at roller mills in 2011 to sustain the fortification activities. Of the 20 roller millers associated with NFMA in Nepal, the majority has started fortifying their products (*Maida* and *Atta*) with iron, folic acid and vitamin A, and is importing the pre-mix from India on their own. The DFTQC is confident that the remaining roller mills will adopt the mandatory standards soon. DFTQC estimates that the program will cover about 20% of the Nepali population in urban and peri-urban areas when all the major mills have adopted the standard.

Micronutrient Powders (MNPs). Given the low prevalence of adequate child feeding in Nepal and many other countries, and given the high concentrations of vitamins and minerals that young children require compared to fortification of the general food supply, a recent intervention has been to improve the vitamin and mineral content of CFs prepared at home by adding a sachet of MNP to a child's food at mealtime. The MoHP, with considerable support from UNICEF, has established a program to distribute MNP sachets to households through FCHVs and health facilities. The program started in 2008 through four Village Development Committees in each of two districts to test the effectiveness. Since then it has expanded to six districts, with continued expansion to nine districts by 2013. With direct budgetary support from GoN, the MoHP expects to reach all 75 districts by the end of 2015. Each household with children 6 to 24 months will be given MNP sachets at no cost to mix with CFs prepared at home. The current cost per sachet to the MoHP is \$0.0012. The MNP contains 15 micronutrients.

maxPro, a Nepali social marketing agency, was contracted by UNICEF to assist in raising nutritional awareness of MNP in six districts as a pilot program. maxPro provides four days of comprehensive training to FCHVs on infant and young child feeding and MNPs. They employ illustrated counseling cards to enhance the interaction between FCHVs and the households. maxPro also leverages community mothers groups and savings and credit groups as community mobilizers to reinforce the social marketing messages.

² Concentrations of fortification appropriate for the general population are inadequate for infants and children under 2 years, due to their rapid growth and development, and so general food fortification only partially addresses children's vitamin and mineral needs. Establishment of fortification in the general food supply paves the way, however, for systematic fortification of complementary foods.

An evaluation of these social marketing efforts indicated that distribution by FCHVs was more effective than through health facilities because access was easier in the community (Personal Communication, Rajat SJB Rana, Nanda Adhikari and Kuldip Malla, maxPro). The evaluation also identified a reduction in coverage (households accepting the sachets) and compliance (rate of sachet use) for the second six-month distribution cycle (13 to 18 months of age) compared to the first cycle (6 to 12 months). Mothers complained that the product had a bad flavor and that it caused ill health and slow child growth during the cycle. The program addressed this issue and found that the bad flavor was from the CF, not the MNP. The maxPro team concluded from the six district pilot that continuous household counseling, social marketing and community mobilization is needed to overcome problems and perceptions.

Karnali Zone Programme. In 2010, the government introduced a pilot program to distribute PFCFs in five districts of the Karnali zone, one of the most food-insecure areas in the mountains of Nepal, to reduce protein energy malnutrition and micronutrient deficiencies among children 6 to 24 months of age. The PFCF is a blend of wheat (60%), soybean (25%), and sugar (15%) and is fortified with 11 micronutrients including vitamin A, B vitamins, vitamin C, iron, calcium, zinc, and iodine. Children aged 6 to 11 months are given 1.5 kg/month and those in the 12 to 24 month group are given 2.5 kg/month. The product is distributed by health facilities free of cost to mothers or other caretakers as a take-home ration to be consumed in addition to other foods. The government reportedly will continue the pilot intervention through 2012. The impact of the pilot has not been assessed.

World Food Programme. WFP's Mother and Child Health Care (MCHC) program is the third major channel by which children may receive fortified foods. WFP has provided food aid for many years in long-term food insecure mountain districts, and responds elsewhere to disasters. The MCHC program provides monthly take-home rations of fortified food to pregnant and lactating mothers and their young children. The MCHC program provides rations of fortified wheat-soya-blend CF ("super cereal") to 30,000 pregnant and lactating mothers and their children 6 to 36 months of age in 11 districts. Distribution is through MoHP health care facilities.

The MCHC program annually provides about 3,000 tons of super cereal to children. Of this amount about 1/3 is directed at lactating mothers and 2/3 to children. The program is implemented in the Midwest and Far West regions, but not in the Karnali Zone. It started in early 2002 and will continue through 2017.

WFP also provides CFs through a school feeding program aimed at older children and runs a smaller program to provide CFs to displaced households. The entire annual program for WFP in Nepal uses 7,000 tons of CF produced under contract by Chaudhary Mills, Bekas Milling, and NutriFood.

Commercial Supply

The leading PFCFs in Nepal are Cerelac from Nestle and Sarvottam Premium Lito made by Instant Meal Pvt. Limited of the Chaudhary Group (Table 3). Combined they comprise about 70% of estimated commercial supply in the Nepali market. Other notable producers include ABC which produces an unfortified processed CF and the NGO Chhimeki which produces a PFCF fortified with three micronutrients – iron, vitamin A, and folic acid—primarily for sale to low income households in Kathmandu. ABC distributes about 80% of its volume to pharmacies (300 of the 635 registered pharmacies in Kathmandu Valley), and 2% to wholesalers that distribute it to small grocery shops. A

large volume seems also to be produced by a group of small producers registered as cottage industries. It was not possible to identify and visit all of these producers, but based on selected cottage industry interviews and other key informants, we estimated their combined volume at 230,000 kg/yr.³ It was also not possible to determine if any of this volume was fortified.

Table 3. Estimated Commercial Supply of Complementary Foods by Producer

	Estimated Commercial Supply (Kg/Year)
Nestle	450,000
Chaudhary	195,000
ABC	14,400
Cottage Industry Producers	230,000
Chhimeki	5,000
TOTAL	894,400

Nestle's PFCF products are all produced in India. Nestle's products for export to Nepal are packaged in boxes labeled in the Nepali language.⁴ There are four Cerelac products, each for a subset of the 6 to 24 month age group. As shown in Table 4 below, Cerelac is the premium price product in the Nepali market. The flow of the product, including distribution channels, estimated volumes, and process is shown in the Nestle Cerelac diagram below.

Chaudhary's PFCFs come in seven varieties, all as flavor variants with the same basic ingredients for feeding to the 6 to 24 month age group. Chaudhary also produces PFCF for WFP distribution through three programs including the MCHC program. Even with its commercial and public-sector production, Chaudhary is well short of its 25,000 tons/year production capacity. They would like to expand production, but are constrained from advertising and promotion by Nepal's interpretation of the World Health Organization (WHO) Code of Marketing of Breast Milk Substitutes.⁵ The flow of the product is shown in the Chaudhary Sarvottam Lito diagram below.

³ Though each processed CF producer must register with the Department of Cottage and Small Industries, the registration is not indicative of the actual production activity undertaken and does not include data on production capacity.

⁴ It is not uncommon to find Nestle Cerelac in boxes marked in Hindi. These are not official Nestle export products. Instead they are smuggled by traders through the porous border where they avoid import duties and are usually sold at a discount to the official Cerelac products. Nestle is unable to control these exports.

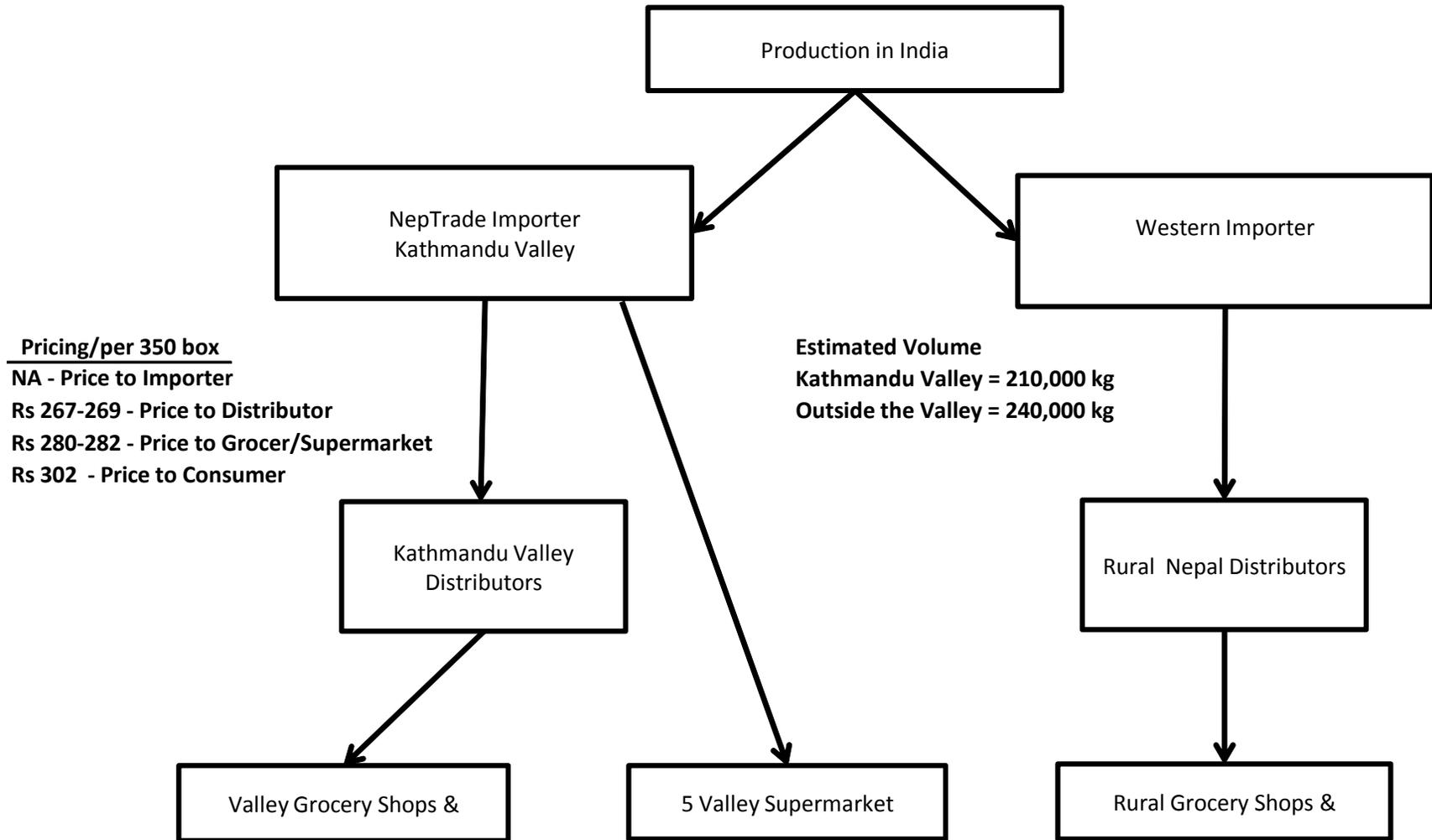
⁵ WHO's International Code of Marketing of Breastmilk Substitutes prohibits promotion of breast milk substitutes through mass media, but recognizes that its provisions concerning limitations on promotional activities do not apply to Complementary Food as long as the manufacturers and distributors do not promote them as being suitable for use as partial or total replacements for breastmilk. The Breastmilk Substitutes Act of Nepal (1992) defines complementary food as "any food suitable as a complement to breast-milk or to breastmilk substitutes, when either becomes insufficient to satisfy the nutritional requirements of the infant". This indicates that complementary food is not a breastmilk substitute.

The prices vary widely, as shown on a per serving basis in Table 4.

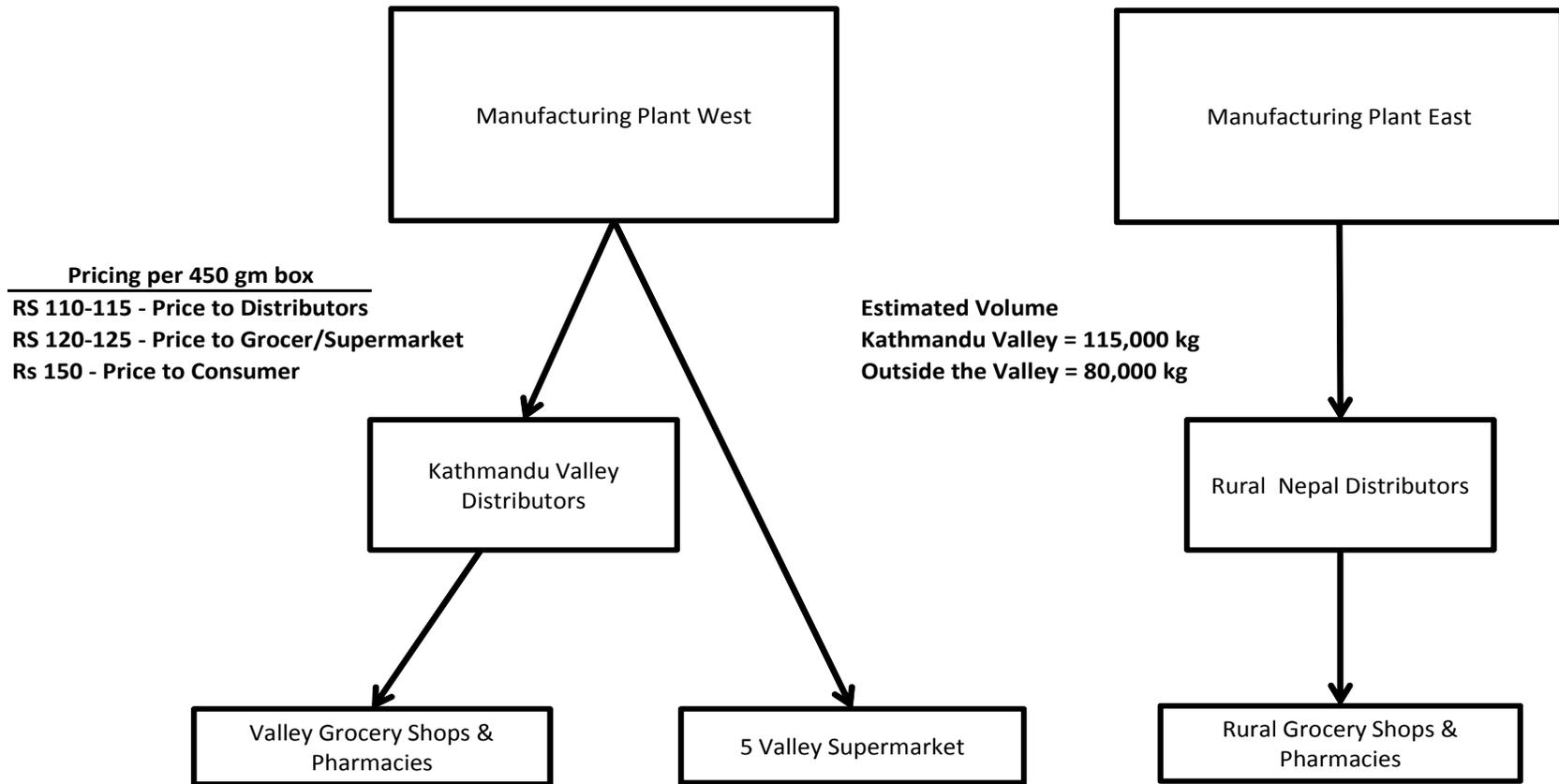
Table 4. Estimated cost per serving for different brands of PFCF in market

Complementary food	For children 6-12 mo (2 table spoon – 24gm per serving)	For children 12 – 24 mo (4 table spoon – 48 gm per serving)
Cerelac	Rs. 21	Rs. 42
Chaudhary's Sarvottam Premium Lito	Rs. 8	Rs. 16
ABC Sarbottam Lito Special	Rs. 5	Rs. 10
Naya Lito-box	Rs. 4	Rs. 8
Sugar free Naya Lito-plastic package	Rs. 2	Rs. 4
Naya Lito-plastic package	Rs. 2	Rs. 4
Chappa	Rs. 3	Rs. 6
Shri Sarbottam Pitho	Rs. 3	Rs. 6
Chhimeki Sarbottam Pitho	Rs. 4	Rs. 8

Nestles Cerelac



Chaudhary Sarvottam Lito



Demand Factors for Processed Complementary Foods

Focus Group Discussion Findings

Six FDGs were conducted in three locations that formed a continuum of urban, peri-urban and rural—Kathmandu, outside Surkhet town in Banke district, and rural area in Banke district. FDGs were conducted among mothers of children under two years old and grandmothers of grandchildren under two. Between them they formed a continuum of newer to older nutrition information, though grandmothers were catching up rapidly. The levels of awareness about nutrition generally fall along a similar continuum, from high in Kathmandu, to medium-high in the peri-urban, to medium-low in the rural. Despite increasing remoteness along this continuum, however, all seemed to have benefited from recent nutrition programmatic efforts of some sort, though FGD participants did not name any. (There is a UNICEF field office in Surkhet town, and a Banke district-based NGO named Social Development Forum, for example, as well as FCHVs, health posts and hospitals in the public health system.)

The mothers' understanding of child nutrition had to do with healthy food and often, sanitation. In Kathmandu this understanding was elaborated as healthy, nutritious food that helps children grow faster after six months of exclusive breastfeeding, without illness or other problems. In the peri-urban area the notion of a balanced set of foods was added to the healthy diet and sanitation. In the rural area mothers mentioned mostly healthy food, and were somewhat vague on which foods were healthy and why. Grandmothers in Kathmandu described child nutrition as healthy children being fed healthy foods and being taken care of with clean habits, whereas grandmothers in peri-urban Surkhet mentioned just healthy foods (lito, fruits and vegetables), and those in the rural area mentioned only children having "more" food.

Mothers cited a number of sources of nutrition information—neighbors and health-service providers in Kathmandu, also FCHVs and VDC regular meetings in the peri-urban and rural areas. They mentioned that radio and television were not important sources for them. Grandmothers, on the other hand, received their new information mostly from their daughters-in-law, since, as they mentioned, information was only disseminated to mothers, not grandmothers or others who also take care of the young children.

The children's main source of purchased CF varied between the urban and non-urban. Mothers in Kathmandu reported feeding Chhimeki's Sarbottam Pitho (cereal), since they were in Chhimeki's catchment area, and a few fed Nestle's Cerelac. Grandmothers in another part of Kathmandu reported feeding Cerelac, purchased by their daughters-in-law, because the children liked the taste. Mothers and grandmothers in the peri-urban and rural areas, on the other hand, fed children the family's food of rice, lentils and vegetables, as grandmothers had fed to their own children a generation earlier, and some fed homemade lito (cereal).

Typical diets and feeding frequencies also varied. In Kathmandu, mothers reported typically feeding their younger children lito with boiled water and ghee two times per day and jaulo once in addition to breastfeeding; and typically fed their older children lito in the morning, fruits during the day, jaulo in the afternoon, and the family meal of rice, lentils and vegetables for dinner, in addition to breastfeeding. They occasionally fed eggs, meat, liver, fish, biscuits, soups and chow chow (instant noodles). The grandmothers in Kathmandu reported more simply, saying they feed their grandchildren CFs four times per day. Mothers and grandmothers in the peri-urban and rural areas reported feeding rice, lentils and

vegetables to children after six months of age. Some also fed homemade lito, roasting the ingredients and pounding or milling them locally, and storing a 1 to 2 week supply. In the peri-urban area lito was made with the wheat, maize, and gram ingredients from their agricultural fields, and purchased soya and sugar, and ghee if available. Some learned to make lito from their sisters-in-law. Some also fed homemade jaulo. In the rural area homemade lito was made from maize, grams, chickpeas, sugar, and ghee if available. Almost half of the rural mothers reported feeding it to their children, and for as many as three times per day. Mothers in the peri-urban and rural areas reported occasionally feeding eggs and meat soup when they could afford them, and fruits from their fields when in season.

Several groups of grandmothers compared feeding their grandchildren with feeding their children the generation earlier. In Kathmandu, they said that today's children were more active and smarter, and had more food options, as opposed to the older way where children had no choice, and were only fed the family meal of rice, lentils and vegetable. In the rural area, grandmothers said that today's recommendation was to be more systematic about what foods are to be fed to children to promote health.

In many of the FGDs, mothers and grandmothers talked about the children not liking the lito that could be purchased in shops because of its bad taste. Brands were not mentioned, with the exception of Cerelac, which was preferred by children for its sweetness. Some thought of the bad-tasting lito as medicinal treatment to be used during a child's illness. Others said they valued lito for its nutritional value but could not woo children to eat it due to the bad taste.

On the issue of pricing the CFs for sale, mothers in Kathmandu reported that the Chhimeki product was reasonably priced, and the grandmothers in Kathmandu said only that their daughters-in-law made the purchasing decision and the choice of food. The peri-urban mothers and grandmothers said that they were unlikely to buy lito at the shops, because they could make it at home. The rural mothers said that lito was new to them, and they were still thinking about its value, whereas the rural grandmothers said that some people will buy any processed CF if the price was right. The rural grandmothers also said that people will use MNF sachets if someone would teach them how.

Implications for Demand

Within Kathmandu, mothers and grandmothers indicated a high demand for purchasing a processed CF (generally lito, a cereal with grain and legume flours,) to feed children under two years and older. They regard it as an important part of a nutritious diet for the children, thus contributing to their growth, active development, and intelligence. Supply of CFs exists (e.g., Nestle's Cerelac and Chhimeki's Sarbottam Pitho), but many consumers are price-sensitive to Nestle's relatively higher priced product and taste-sensitive to the less than palatable taste and texture of most products except Cerelac. In the grandmothers' group, when complementary food was purchased, Cerelac was mentioned most often. In the mothers' group, Chhimeki's lower price allowed more people to purchase it. Overall, CFs, with the exception of Nestle's Cerelec, were considered to have a bad taste and sometimes were not palatable by their children, though caretakers valued them for their medicinal and nutritional qualities.

Outside the Kathmandu Valley, demand for purchasing a processed CF was low. Among caretakers who knew that children need special food, the preference was for making fresh, cooked food for their children, or for roasting and storing a dry food made from flours that could be made into porridge as needed by adding boiling water and sugar, and ghee if available. In the peri-urban area near Surkhet, PFCFs were available for purchase, but their taste was not preferred. In the rural area, no PFCF products

were available in stores, but almost half the mothers from the FGD reported making and storing their own dry CF product at home. In the Terai and the hills, families had plots and grew wheat, maize, and rice, which they used to prepare separate foods for their young children⁶. However, about 25% of households are landless and about 60% produce enough to sustain the household for only 6 months of the year, so ingredients for CFs are not available in some households (Pokharel et al., 2009).

There are other families and caretakers, on the other hand, who may not understand that children need special foods, or who are food insecure and therefore cannot access the food or find time to prepare the food for children and sometimes, the entire family. According to the 2011 NDHS, about 17% of the rural population (3.74 million) is considered extremely food insecure and two-thirds of these live in the Terai (MoHP et al., 2012). These families do not prepare special foods, but rather prepare a single meal for all members of the household, and feed small amounts of only that meal to their young children.

Demand for PFCFs is different in the Kathmandu Valley and the rest of the country. Job opportunities are greater in the Kathmandu Valley so the time for meal preparation is constrained in urban households particularly when both parents work. This is an added hurdle for mothers preparing a separate meal for their infant. The time of rural women can also be constrained due to multiple responsibilities for livelihood and domestic purposes. They may have, however, more time flexibility and spend more time with their youngest children.

To begin to approximate the Kathmandu Valley maximum potential market for processed cereal-based CFs, we calculated all 6 to 24 month old children being fed 50-70 g of cereal every day for 18 months at 2.5 to 3.5 million kg/year⁷. The maximum potential consumption is unlikely to exceed 70%, which is 1.8 to 2.5 million kg/year.

Using the same method, we estimate the maximum potential market outside Kathmandu Valley at 16.5 to 23.1 million kg/year. We estimate that the current market for processed grain-based CFs is proportionally lower outside the Valley as discussed previously. Consequently, we estimate that the maximum CF consumption potential is 50% yielding a current potential grain based CF market of 8.3 to 11.6 million kg/year outside Kathmandu Valley.

Creating Demand for Fortified Complementary Foods

To enhance complementary feeding in general involves increased knowledge about the importance of good child feeding practices and the nutritive value of foods for young children (i.e., adequate protein, fat, calories and micronutrients). Knowledge and perceptions can be modified through social marketing and health and nutrition education interventions. Some messaging examples include the following:

- Adequate nutrition is critical for physical and mental growth and cognitive development, especially birth-2 years.
-

⁶ Rice, wheat, & maize are the major cereal crops produced in Nepal. The MoAD reports that rice makes up 45% of total grain production, followed by maize (26%), wheat (24%) with lesser amounts of barley and millet.

⁷ This is based on Kathmandu Valley population of 3.5 million, of which 11.2% is under 5 years (NDHS 2011). No data are available on 6 to 24 month population. Assume 35% of the under 5 group is in the 6 to 24 months group, or 137,200 at any given time (3.5mm * .112 * .35). There is no universal agreement on the optimum feeding rate per day of cereal based CFs. We selected a range of 50 gm to 70 gm per day though some sources suggest up to 150 gm/day.

- Essential fatty acids, protein, vitamins and minerals (micronutrients) are important for promoting growth and development, and improving immunity, and small amounts of animal source foods have been found to be particularly nutritious.
- PFCFS should be prepared hygienically, including adding water or milk that is boiled.

The parent or caregiver should be a positive influence to assist and encourage infants to eat appropriate foods in sufficient quantity. Assistance should include the following elements:

- *Timeliness* – Foods should be introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding.
- *Adequacy* – Foods provide sufficient energy, fat, protein, and micronutrients to meet nutritional needs.
- *Safety* – Foods should be hygienically stored and prepared, and fed with clean hands using clean utensils, not bottles and teats.
- *Proper feeding* – Foods are given consistent with a child’s signals of appetite and satiety, and that meal frequency and feeding method (encouraging feeding with fingers, spoon or self-feeding) vary according to age.

Once awareness in families has been increased, consumer demand for PFCFs may also increase. Once this gets established, consumer demand will be dependent on the perception of good quality, texture, color, flavor, ease of preparation, storage, and reasonable pricing.

Taste and palatability were clearly major factors in purchase and feeding choices of mothers and grandmothers in the focus group discussions; rejection by the child firmly ended the use of that product. A number of focus group respondents reported that children had swallowing problems with some locally processed CF. In contrast, children like Cerelac because of its sweeter taste and for smoother texture due to its finer grind. Though Cerelac is more expensive, it continues to dominate the market for purchased CFs.

Part 4: Discussion

From the preceding analysis and discussion, the team concluded that establishing Kathmandu Valley production for distribution to markets outside Kathmandu is not viable. It would require a sizeable production scale and faces prohibitive transportation costs and distribution constraints. Even Chaudhary, which has the most extensive distribution system among the domestic CF producers, distributed to the western rural regions from its production facility in the West, and Cerelac distribution in the West is handled by an importer in that area. Varying demand preferences add to the difficulty of marketing countrywide though Nestle has come closest to establishing a nationwide product based on the high profile brand name of Cerelac.

Small and low cost localized production ventures seem like the preferred alternative for the markets in urban slums of the Kathmandu Valley and for the markets outside Kathmandu, and should be pilot tested for feasibility in these settings. Small scale production typically means higher unit production costs compared to larger scale production. This limits the small producer’s ability to reduce prices, but can be efficient in rural Nepal because the high transportation costs of distribution are avoided. This will affect the urban producer to a greater extent than the rural producer due to the greater number of urban competitive products available. A small urban producer will face a greater need to expand volume

to keep their prices competitive.

In addition, household nutritional awareness would need to be raised so that households understand the specific benefits of feeding high-quality CFs to their infants, including nutrient-dense homemade CFs as well as PFCFs as a time-saving, high-quality alternative. Information could be conveyed to households that processed CFs are similar to ready-made foods in that only warm or hot liquid is needed for mixing. The benefits of better child nutritional status (better child growth and development) include less childhood sickness and reduced household costs for health care, improved child mental acuity and school achievement, and higher long term earning potential. Significant efforts are needed by MoHP, USAID and other donors to conduct social marketing and behavior change communication of PFCFs with concentration on areas where PFCFs are or can be made available.

Part 5: Recommendations

Strengthen DFTQC Capacity to Develop Standards for Complementary Foods

A high priority is to strengthen the capacity of the DFTQC to develop and enforce standards for complementary foods consistent with the ones from Codex Alimentarius Code. This will provide a strong foundation for the production, marketing and sale of high-quality PFCFs. We recommend that the capacity of the DFTQC be strengthened to:

- Develop standards and guidelines for production of safe and quality PFCFs, and for their nutrition and health labeling;
- Set in place a system for enforcing these standards, including adaptation of existing protocols for quality assurance testing of PFCFs.

To adapt Codex standards to the Nepali context, the DFTQC should have the capacity to conduct the following steps to inform the standards development, which can be undertaken in collaboration with current Nepali nutrition committees, academia and programs:

- Assess the effects of variations of energy, protein and micronutrient density, feeding frequency, food quantity, and dietary diversity on total energy and nutrient intake;
- Investigate the bioavailability of micronutrients, particularly iron and zinc in various foods. Research outcome will inform establishing guidelines for optimal type/level of fortification depending on characteristics of food vehicle, and establishing the amounts consumed per day and per serving by age group.

Strengthen Capacity to Produce Processed Fortified Complementary Foods

Inside the Kathmandu Valley, there is considerable unmet demand for high quality PFCFs in the lower price range. To supply this demand, we recommend that cottage industry in the Kathmandu Valley receive technical support to strengthen their capacity to produce high quality, good-tasting PFCFs in as efficient a manner as possible so the price is affordable by poorer households. This could perhaps be undertaken with one or a few NGO cottage industries in Kathmandu Valley as a pilot project to test

feasibility and to develop a technical support model for promoting PFCF production elsewhere. If the proof of principle is established, expansion of technical support could be considered to other cottage industries inside the Kathmandu Valley who are already producing such products, and to cottage industries outside of the Kathmandu Valley, as discussed below. Key elements of technical support would be:

- If PFCF production facilities exist at a cottage industry, conduct an operational audit of their production, packaging, and distribution systems and explore how to expand the facility and reduce unit production costs.
- Provide training in business planning and assist the NGO cottage industry to develop a business plan for expanded operations, including a strategy for product improvement, pricing, marketing, sales, and accessing capital.
- Improve PFCF product development through testing alternate formulations and processing methods, including variations in ingredient proportions, additional ingredients, grinding and roasting sequence, roasting time, granularity based on grinding settings, and taste tests to evaluate alternative formulations.
- Follow-up with families who have purchased the PFCF to monitor and promote good child feeding behavior, e.g., appropriate daily feeding frequency per the child's age, and feeding a variety of foods such as fruits, vegetables and animal source foods, in addition to the PFCF.

Outside the Kathmandu Valley, the PFCF terrain is far less developed. If the proof of principle is established from pilot tests inside Kathmandu Valley, production outside Kathmandu could also be considered. Additional analysis would need to be conducted to choose towns or rural areas outside Kathmandu Valley according to their potential for supply and demand. As the focus groups in just two areas outside Kathmandu suggested, willingness to pay for a PFCF can be limited, and a product must taste good to the child in order to be considered for purchase by the family. Expansion outside Kathmandu Valley should be considered upon consultation with the MoHP, MI, and USAID implementers such as Save the Children and Helen Keller International, and other stakeholders.

Extending the promotion and education for making and storing homemade lito at home is also recommended for outside Kathmandu Valley, as well as monitoring its use and its contribution to improved infant and young child feeding and ultimately, along with improved hygiene and increased health-seeking behavior, improved child nutritional status.

Improve Household Nutrition Awareness

The team found a substantial need for improved nutrition messaging and child-feeding guidelines, which could be accomplished through a combination of social marketing with child-feeding messages on radio, billboards, and other media, and behavior change communication at the household level to enhance uptake of the improved complementary feeding practices. The focus group discussions suggested that the importance of child nutrition, and good child feeding practices to promote it, was not adequately understood. Without this context, we could not expect the contribution of PFCFs to child nutrition to be appreciated. Under the new Multi-Sectoral Nutrition Plan, the GoN and other agency efforts will raise nutrition awareness further. The importance of getting this message out and understood cannot be underestimated.

References

- Codex Standard for Processed Cereal-Based Foods for Infants and Children. 1981. Codex Stan 74-1981, amended in 1985, 1987, 1989 and 1991. (http://siweb.dss.go.th/standard/Fulltext/codex/CXS_074E.pdf)
- Codex Standard for Processed Cereal-Based Foods for Infants and Young Children. 2006. Codex Standard 074-1981, Rev. 1 (www.codexalimentarius.org/input/download/standards/290/cxs_074e.pdf).
- CAC Recommended International Code of Hygienic Practice for Foods for Infants and Children. 1979. CAC/RCP 21-1979. (http://std.gdciq.gov.cn/gssw/JiShuFaGui/CAC/cxp_021e.pdf).
- CAC Advisory Lists of Nutrient Compounds for Special Dietary Uses Intended for Infants and Young Children. 1979. CAC/GL 10-1979. (<http://www.codexalimentarius.org/standards/list-of-standards/en/?provide=standards&orderField=fullReference&sort=asc&num1=CAC/GL>).
- Government of Nepal, National Planning Commission. 2012. *Multi-Sectoral Nutrition Plan for Accelerating the Reduction of Maternal and Child Under-Nutrition in Nepal*. Volume 1. Kathmandu, Nepal.
- Leslie, Joanne. 1989. Women's time: a factor in the use of child survival strategies. *Health Policy and Planning*. 4(1), 1-16.
- Ministry of Health and Population [Nepal], New ERA, and ICF Macro International Inc, 2012. *Nepal Demographic and Health Survey, 2011*. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and ICF Macro International Inc.
- Ministry of Health and Population [Nepal], New ERA, and Macro International Inc. 2007. *Nepal Demographic and Health Survey 2006*. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and Macro International Inc.
- Ministry of Health [Nepal], New ERA, and ORC Macro. 2002. *Nepal Demographic and Health Survey 2001*. Calverton, Maryland, USA: Family Health Division, Ministry of Health; New ERA; and ORC Macro.
- Neufeld, Lynnette and Usha Ramakrishnan, 2003. "Specific Strategies to Address Micronutrient Deficiencies in the Young Child: Targeted Fortification (Lessons Learned from the Developed and Developing World)." Nestle Nutrition Workshop Series: Infant Nutrition, Vol. 54. Sao Paulo, Brazil.
- ORG Centre for Social Research and AC Nielsen ORG-MARG Nepal. 2004. *Feasibility of Developing a Low-Cost Fortified Complementary Food for Commercial Introduction in Nepal*, Final Report Prepared for the Micronutrient Initiative. Kathmandu, Nepal.
- Panter-Brick, Catherine. 1992. Women's work and child nutrition: the food intake of 0–4 year old children in rural Nepal. *Ecology of Food and Nutrition*, 29(1), 11-24.
- Pokharel, Raj Kumar, Robin Houston, Philip Harvey, Ramu Bishwakarma, Jagannath Adhikari, Kiran Dev Pant, and Ritu Gartoulla. 2009. *Nepal Nutrition Assessment and Gap Analysis (NAGA)*. Kathmandu.