

Stock taking Report

Nutrition Sensitive Interventions for Agricultural Sector

NEPAL MULTI-SECTORAL NUTRITION PLANNING FRAMEWORK FOR THE REDUCTION OF CHRONIC MALNUTRITION IN NEPAL

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Acronyms

MoAC – Ministry of Agriculture and Co-operatives,
DoA – Dept of Agriculture,
DoLS – Department of Livestock Services,
DoC – Department of Co-operative,
DFTQC – Department of Food Technology and Quality Control,
DADO – District Agricultural Development Office,
DLDO – District Livestock Development Office,
NGO – Non-governmental Organization,
I/NGO – International NGO,
CBO – Community Development Organization,
JT – Junior Technicians,
JTA - Junior Technical Assistant,
MoF - Ministry of Finance,
MoE – Ministry of Environment,
NFRP – Nepal Flood recovery Program
BSP – Bio-gas Support Program,
VDC - Village Development Committee.
DDC - District Development Committee,
NTV- Nepal TV.
IPM- Integrated Pest Management.
DFNSCC – District Food and Nutritional Security Co-ordination Committee.
CMMYT
FAO
WFP

Background

Food security and nutritional status

Food insecurity and malnutrition rates have not particularly improved for Nepal. Various indicators of food security and nutritional status show that a great deal progress needs to be made in this area. It is estimated that about 3.5 million people in Nepal are considered to be moderately to severely food insecure.¹ Similarly 41 % of the population is estimated to be undernourished.

Vulnerabilities to food insecurity are growing in Nepal. These vulnerabilities come from various factors – namely general decline in food production or agricultural growth, food price rise, seasonality in agricultural production, higher poverty rate in the food deficit areas, changes in food habits consuming junk food, especially in urban areas, lack of income and employment opportunities, lack of effective transportation for food distribution, especially in the hills and mountains, and chronic utilization problems such as inadequate access to health services, water and sanitation. Climate change has been another dimension increasing vulnerability in food security. The adverse impacts of climate change are also severe in areas suffering from low food production due to dryness or other factors. For example, mid-west and far-west Nepal are more vulnerable to climate change along with Himalayan region in general.

The malnutrition situation is also precarious. About half of the children aged under 5 years are stunted or chronically undernourished. For the same population, acute malnutrition rates are at 13 percent. There is also extreme variation from place to place. In terms of lower calorie consumption, Himalayan region and far-west region have slightly better consumption rate as compared to other region, but they have high stunting rates. Despite high production rate in tarai, the underweight problem among children is relatively high here. This shows that different geographical and development regions exhibit different food security problems.

Comparing 2001, there has been slight improvement in nutritional status of children, on average. According to one study, mortality rate among children below 5 years age was 118 (per thousand) in 2001, which dropped to 91 in 2001 and 61 in 2006². Similarly, the infant mortality rate in 2001 was 79 in 1996, 62 in 2001 and 48 in 2006. The underweight problem in this age group (under 5 years) was 43 % in 2001 but dropped slightly to 39 % in 2006. The stunting problem in this age group reduced from 57 % in 2001 to 49 % in 2006. On the other hand, the incidence of wasting has increased from 11 % in 2001 to 13 % in 2006. The problem of underweight and stunting is high among the girls than boys. Among the caste group, Dalits have highest problems in these two indicators – underweight and stunting. The second problematic

¹ <http://www.wfp.org/Countries/Nepal/overview>

² USAID, New Era, MoHP, 2007. *Nepal. Demographic and Health Survey, 2006*. Kathmandu.

group then is Madhesi middle class.³ Among the Madhesi women 43 % have Body Mass Index (BMI) is less <18.5 kg/sq m). The food insecure groups generally include households in rural areas owning less than 0.6 ha land and those depending on small retail trade, unskilled labour, and the direct users of natural resources⁴.

Table 1: Food insecurity and poverty in different regions of Nepal, 2001 and 2006.

Group/Region	Poverty Rate (%)	Population not consuming minimum calorie (%)	Stunting (low height for age among children below 5 years) (%)		Underweight (low weight for age among children below 5 years) (%)		Wasting (Low weight for height among children below 5 years age (%)	
			2001	2006	2001	2006	2001	2006
Nepal	30.8	39.9	50.4	49.3	45.2	38.6	9.6	12.6
Urban	9.6	41.6	36.8	36.1	33.5	23.1	7.8	7.5
Rural	34.6	39.5	52.2	51.1	46.7	40.7	9.8	13.3
Ecological region								
Himal	32.6	45.2	61.4	62.3	45.1	42.4	5.3	9.4
Hills	34.5	41.8	52.4	50.3	41.4	33.2	5.9	8.4
Tarai	27.6	37.4	47.3	46.3	48.4	42.3	13.3	16.6
Development region								
Eastern	29.3	37.6	47.6	40.3	43.4	32.9	9.1	10.1
Central	27.1	39.9	50.0	50.0	44.7	38.2	10.8	13.8
Western	27.1	37.2	50.1	50.4	43.4	38.5	8.9	10.9
Mid-western	44.8	44.3	53.9	57.9	49.0	43.3	8.8	11.6
Far-western	41.0	44.9	54.0	52.5	48.9	43.7	8.8	16.7

Source: 1. CBS, WFP, WB. 2006. *Small Area Estimates of Poverty, Calorie Intake and Malnutrition in Nepal*. Kathmandu: CBS/WFP/WB.

2. USAID, New Era, MoHP, 2007. *Nepal. Demographic and Health Survey, 2006*. Kathmandu.

Agricultural production and food availability in different regions:

Even though Nepal can produce in some good year required amount of cereals, the production of other food is far below the requirement. For example, in 2010, Nepal produced 272 kg cereal per capita but other food like pulses, meat, egg, milk and fish is far below the requirements. This is presented in Table 2. It shows that Nepal produced on a per capita basis in 2010, 9 kg pulses, 25 kg fruits, 105 vegetables, 90 kg potato, 23 eggs, 9 kg meat, 52 kg milk, and 1.8 kg fish. This production is grossly insufficient for good nutrition. Nepal does imports food like meat, fish

³ WFP and EU, 2005. *Nepal Comprehensive Food Security and Vulnerability Analysis*.

⁴ WFP and EU, 2005. *Nepal Comprehensive Food Security and Vulnerability Analysis*.

and fruits, particularly from India, but these imported food mainly go to urban center, particularly Kathmandu, to cater the needs of the wealthier people.

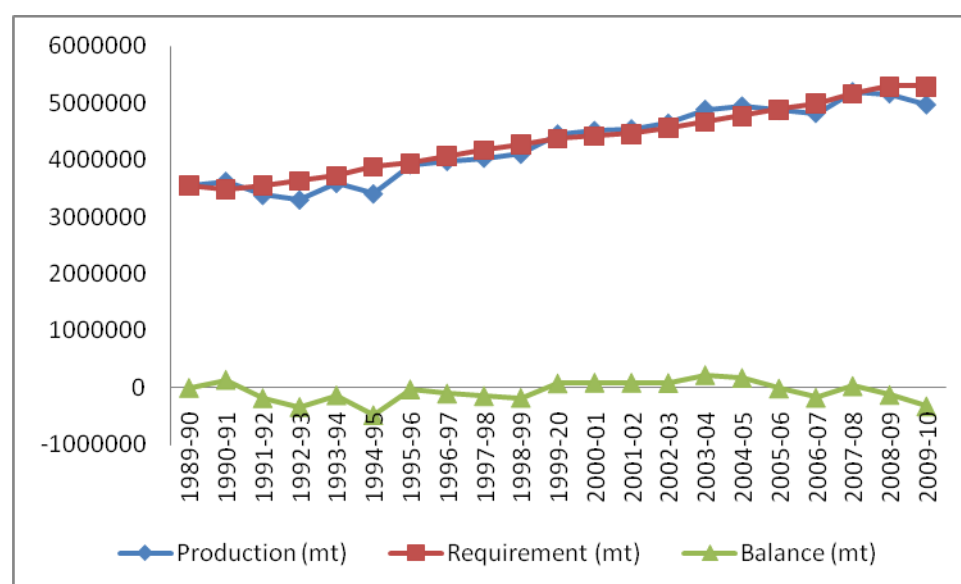
Table 2: per capita production of various food in Nepal in 2010.

	Existing (2010)	Target (2011-2013)
Cereal production	272 kg	320 kg
Pulses	9 kg	10 kg
Fruit	25 kg	26 kg
Vegetables	105 kg	120 kg
Potato	90 kg	92 kg
Egg	23 number	31 number
Meat	9 kg	10 kg
Milk	52 kg	59 kg
Fish	1.8 kg	2.1 kg

Source: Three Year Plan (2011-2013) Document, 2011. Agriculture and Food Security Chapter.

Nepal has also not been able to produce enough cereals for the country. In the last 21 years, Nepal was deficit in cereal grain production (available in edible form) for the 13 years. The amount of deficit varied from year to year. In 2011, it is expected that there will be slightly surplus as there was good weather and adequate rainfall for the crops. This is presented in the Fig. 1.

Fig. 1: Production, requirement and surplus/deficit of food (5 main cereals are included in this food balance sheet – rice, maize, wheat, millet and barley) in the last 21 years in Nepal



Source: Statistical Information on Nepalese Agriculture. GoN/MoAC 2009/2010. The tentative estimates for the year 2011 has shown that there will be slight surplus in food availability (of the main 5 cereals – rice, maize, wheat, millet and barley).

There is also wide variation in the availability of food from own production in different regions of the country. The analysis shows that hills and mountains belts of far-western and mid-western regions have very low food availability from own production. 43 districts of the country (of the 75) cannot produce enough food to meet the district's requirements. Most of the districts in these regions are food deficit. Because of difficulty in transportation (basically lack of road), it has also been difficult to efficiently transport food from surplus areas to the food deficit districts. As a result, food is very expensive if supplied through the market. The transportation cost is more than 4-7 times higher than the prices paid for the food. As a result, the access of the people to food is very low. From their own income it becomes too difficult to purchase food in the market. These food insecure areas are also the ones suffering from various types of malnutrition for generations and their impact on human growth and capital formation. These are also areas in which WFP and many other agencies provide food through various programs. The situation in these districts is such that it is at par with some of the areas in Somalia.

Table 3: Food balance situation (from own production) in different regions of Nepal in 2009-2010.

Region	Food situation	Mountain	Hill	Tarai	Nepal
Eastern	Food balance (mt)	9970	43586	17094	70650
	Deficit /total districts	1/3	3/8	3/15	7/16
Central	Food balance (mt)	-22928	-426323	27024	-476275
	Deficit /total districts	2/3	7/9	5/7	14/19
Western	Food balance (mt)	-3410	86085	121118	203793
	Deficit /total districts	2/2	3/11	0/3	5/16
Mid-Western	Food balance (mt)	-27172	-19021	31664	-14529
	Deficit /total districts	5/5	4/7	1/3	10/15
Far-western	Food balance (mt)	-53677	-95231	35297	-113611
	Deficit /total districts	3/3	4/4	0/2	7/9
Nepal	Food balance (mt)	-97217	410904	178149	-329972
	Deficit /total districts	13/16	21/39	9/20	43/75

Source: Statistical Information on Nepalese Agriculture. GoN/MoAC 2009/2010.

Institutional set-up of agricultural sector (MoAC)

Ministry of Agriculture and Co-operatives has been assigned with jurisdiction over food production. The main mandate of this ministry is 'to increase in aggregate food production' in the country. Nutrition is not much considered even though it is assumed to come from increase in production. This ministry has mandate to do research on nutrition and increase awareness for which a separate department is DFTQC has been developed. But its main mandate is to check the quality of food in the market, and not even in the production process. Nutrition on the other hand is not ordinarily considered a sector. There are no particular positions in the ministry which is for agricultural planning people dealing with nutrition or nutrition specialist.

Agricultural Ministry has been part of various committees dealing with nutrition. Despite this, nutrition has not been mainstreamed with agricultural planning process.

Agriculture has not been receiving priorities especially after 1990, the era of neo-liberal policies and structural adjustment phase. As a result, the funds allocated for this sector has also been drastically declining. There is rapid retrenching of grassroots staff. The percentage of government expenditure on agriculture steadily fell from around 30 percent in the 1980s, to below 20 percent in the 1990s, to 5 percent in 2008. In 2011 FY budget, the allocation reached to about 3 % after a drop to 2.8 % in the 2009/2010. The donors' allocation of resources in agricultural sector also fell in line with that of government until 2009. But it seems that there is resurgence of interest in agriculture among the donor community.

The decline in resources in agriculture directly impacted agricultural research and involvement of extension agents and specialist at the grassroots. Extension agents stationed at the grassroots at the VDC level were retrenched and brought up to a service center which now has to cater 5-7 VDCs depending upon the location and other factors. These extension agents (like JT/JTA in both agriculture and livestock or animal health) now cannot reach farm households owing to the wide geographical coverage. It is not only the central government, even the local governments like VDCs and DDCs also do not employ agriculturists even though they have authority to employ according to their needs using the 'block grant' that government gives to these agencies. As a result, the most effective extension system – home visit – has not been implemented now. The other area that has suffered to a great degree due to less resource in MoAC is that it has curtailed funds for conducting research. As a result, scientists have not been able to make breakthroughs in production practices including the production of high producing seeds and animal breeds.

Women's role in agriculture, their work load and nutritional status of the family

Women's involvement in agriculture has been relatively high. But in recent times, due to outmigration of adult male population for work within Nepal, India, and foreign countries, burden of work on women is growing. This has led to feminization of women's work. About 1.5 million Nepali men are working in India. Similarly, every year about 420,000 adult Nepali – mainly men but women also – migrate annually to countries other than India. Another recent

Survey estimated that 44% of households in Nepal have at least one member currently living either abroad or elsewhere in Nepal. The NFHP II mid-term survey 2009 reported that husbands of nearly one-third (32%) of the rural women were living away from them at the time of the survey, and this trend is increasing⁵.

The other problem women are facing is that their work environment is not clean and health. The task of food preparation exposes them to in-door smoke. For about 84 % of the energy consumption in Nepal comes from fuelwood as of 2011. Considering rural areas, almost all energy comes from firewood, and only a small proportion from sources like gas and electricity. There is also a direct link between wealth status and availability of better energy source like gas and electricity. The use of fuelwood for energy use, especially for cooking has several disadvantages and this is also linked to nutrition and women's health and intergenerational health status. The fuelwood also demands work from women. It is one of the main workload for women, even though in every household there are selected months (especially winter) in which more time is devoted to fuelwood collection. Even this was recognized in NPAN'07 proposed few strategies that aimed at reducing workload of women. For example, the strategy 5 (reduced household work burden for women) and 6 (improved women status), and indirectly 2 (improved care of women during pregnancy and post partum period) were aimed to this. Therefore, reducing workload as well as providing clean energy source and healthy work environment (within household) is also important. The clean source of energy is also necessary for reducing pressure on forest for fuelwood. This is especially so in the context of climate change, which asks for more forest. Even though this could appear as something outside the agriculture and nutrition sector, this is very important for this particular purpose. In this perspective, a few programs to this effect have also been included here.

Food security programs and their impact

There are different governmental agencies, NGOs and I/NGOs, and donor-supported projects working to improve different aspects of food security: food availability, access, utilization and stability.

Most of government programs in Nepal are aimed at providing food availability through home food production or through effective transportation infrastructure. However, given the fact that about 60 % households cannot produce food sufficient for more than six months, home production alone is not providing full food security. In many areas, especially in far western and mid western region, sometimes food is just not there at home or in the market.

Apart from assistance to food production through different ways like technological support, irrigation and other infrastructures or through input support, MoAc aims to increase production

⁵ Thapa S, *Declining Trends of Infant, Child and Under-5 Mortality in Nepal*, *Journal of Tropical Pediatrics*, 2008,54(4): 265-8.

Central Bureau of Statistics (CBS), *Report on the Nepal Labor Force Survey 2008*. National Planning Commission Secretariat, Government of Nepal, United Nations Development Programme, and International Labor Organization, Kathmandu, Nepal: CBS, 2009.

of food. To make available food in food deficit areas, government agency Nepal Food Corporation (NFC) used to supply food by subsidizing transportation cost. Until the 1995/96, NFC used to supply 60-70 thousand mt food in a year. But this operation has declined in recent times, especially after 2001. Now it supplies about 10,000 mt a year.

Apart from government's effort, WFP is another agency which has been helping people to have access to food through food/cash-for work or other targeted programs. From 2002 to 2009, WFP had 15 operations in Nepal and it invested about US \$ 282 million. At present, WFP has planned to help 1.8 million beneficiaries requiring about US \$ 118.93 million in order to supply and distribute 81,201 mt food in Nepal. Its activities include: assistance to food insecure population in mid and far west hills and mountains, food and cash for asset activities, micro-nutrient supplements intervention for children. Its special country programs also include school feeding and one laptop per child, girls' incentive program, mother and child health, food assistance to Bhutanese refugees and emergency operations in disasters, and food security monitoring activities.

Examining the direct impact on food security and nutrition, a number of community-based efforts that have direct interest in production and consumption MN-rich food at households (vegetables and small scale animal husbandry) by vulnerable groups, increasing income and nutritional education have been found to be improving the nutritional status. For example, HKI's AMMA (Action Against Malnutrition through Agriculture), NCPS and others have been engaged in a number of districts, with varying success. There is evolving experience with these approaches, which attempt to find a balance between household food production improvement and the workload for family members.

A number of programs have been implemented in Nepal with direct or indirect goal on nutrition. Some have aimed at increasing income and overall economic progress and some aimed at cash income through high value crops. There is not much evidence as to their nutritional outcome. A few programs reviewed here include: HKI, Flood Recovery program, Education for income generation, biogas, ICS (Improved Cooking Stove), SIMI of Winrock International, Heifer International.

Program	Food security components aimed	Number of beneficiaries	Nutrition focus	Pathway to nutrition	Impact on nutrition	Cost/budget
USAID/Flood Recovery Program (also has program on ICS)	Access Availability	128,000 households	Explicit in Phase III	Mainly income	Not measured	6.5 million for Phase I and II
USAID/EIG (Education for Income Generation)	Access Availability	91000 youths (1 from 1 household)	Implicit	Mainly income	Not measured	45-63 \$ per beneficiary and \$ 50 for training per individual.

						Total cost - \$285 per individual in one year.
HKI (Home Garden Food Production)	Availability Access Utilization		Explicit	Consumption and income	Positive	Land preparation = \$10-15, Seed=\$6 Poultry \$25 per hh
EU Food Facility in Nepal	Availability Access	92000 households	Implicit	Mainly home food consumption and income	Not measured	Euro 8 million
USAID HMRP	Availability Access	35,000 hh	Implicit	Mainly from consumption and income		5.6 million \$
Commercial Agriculture Dev Program (DoA, ADB funded)	Access		Implicit	Income	Not measured	\$ 18 million
SIMI Winrock	Access	54,000 hh	Implicit	Income (micro-irrigation)	Not measured	\$79 per beneficiary household
Heifer International						
Bio-gas company						

There are three main departments within the Ministry of Agriculture and Cooperatives (MoAC), and one of which focuses on nutrition awareness and scientific research and quality control DFTQC provides information through media about nutritious food and the latter is responsible for assuring the quality of food through establishing quality standards and monitoring compliance with these. This unit also generates and disseminates information about food quality in terms of nutrition and safety. Other units involved to some extent in nutrition issues include the Department of Agriculture, Department of Livestock, the Department of Cooperatives, and the Centers for Research and Seed, which also contribute in an indirect way to nutrition, but a major pre-occupation of the MoAC has been on increasing production.

A major policy that came with much enthusiasm was APP (Agriculture Prospective Plan) – a 15 year plan to increase the growth rate in agriculture and making this growth as an engine for overall economic growth. But this was not implemented properly – partly because of the

decline in interest of donors in agriculture. It is going to end in 2013, and there is another similar document being prepared called ADS (Agricultural Development Strategy). At present government is following Agricultural Policy 2004 which envisions replacing traditional subsistence-oriented farming in Nepal with the commercial farming. The over-emphasis on this commercial and market oriented farming misses many of the benefits of subsistence farming which is generally aimed at meeting the household requirements. From the view point of food security and nutritional requirement, many features of subsistence farming in Nepal which has been the tradition, has some advantages. Generally traditional farming are integrated, mixed and diversified farming system, integrating farming with animal husbandry, forestry and thus producing a variety of foods to be consumed by the family. They could also provide regular supply of food of different kinds. While overall increases in national food production may be important for food security, the benefits to food and nutrition security in strengthening subsistence farming are also clear, and should not be underestimated.

Policies on nutrition in the making in agriculture sector

At present, government is preparing two important policies for nutritional improvement through food security and agricultural development. These include Nutritional Security Plan of Action (by FAO) and Agricultural Development Strategy (ADS) (by the government but supported by ADB). How far these two policies have compatibility, it is yet to be seen as the former has not been started yet and the later has just been started

ADS is being adopted to replace the APP that is going to end in 2013. ADS is aimed to guide the agricultural policies and programs for another 20 years. It will have a chapter on food and nutritional security. It aims to fill the gaps that were seen in APP. APP, which just aimed at increasing the growth rate, did not specific policy and programs on food security and nutritional security. It was also not inclusive as it focussed on pockets which had potential for growth and on farmers which have more land. ADS is trying to promote inclusive coverage in terms of geographical areas, land holding size and gender. In this sense, it is like increasing the production and productivity in small holding areas.

In terms of food security and nutritional, the ADS will emphasize diversified food production and consumption. Similarly, the policy of promoting the crop where it is feasible is to be followed. So whatever grows in a location, that needs to be promoted rather than following the policy of promoting just rice or maize. Thus local crops are to be prioritised. The present policy of promoting rice every where is to be discarded.

For nutrition purpose, vegetables, fruits, livestock products and fat and oil are to be promoted. Calorie requirement need to come from diversified source. There is some change in the market now. People are going for coarse grain in urban areas. As a result, the price rise of coarse grain has been about 15 % per year and that of rice and wheat is about 8 % a year.

ADS will emphasize three things for production of nutritious food – seed, breed and market. In case of cow, the average production of cow per cow in Nepal is 400 lit a year. But this can be easily increased to 1800 lit per year by improving the breed.

At present, there is no priority on agriculture. It is not only so in national level, but also at district level. For example, DDC invests money only on road and does not invest on agriculture. According to decentralized principles and provisions, local agencies like DDC can keep technician (s) it needs. There are various block grants for which decision is to be done by DDC or VDC and they could invest on agriculture. But they do not do so.

Food and Nutritional Security Plan to be made by MoAC and supported by FAO will be like MoAC vision and long term framework. But the Chapter on Food Security and Nutriiton in ADS will have implementable plan. Therefore, it will be guided by the MoAC's plan to be coming.

Available evidence

International evidence

There is no complete understanding of the impact of broader agricultural plan on nutritional status partly because it is difficult to measure. For example, the *Lancet* Series did not assess agricultural subsidies or land reform measures—both designed to increase food availability to vulnerable groups. However, evidence of community-based and specific nutrition-focused programs on agriculture shows that it has greater impact on nutrition than other measures like cash transfers or income increase. On the other hand, questions are raised on the possibility of scaling up of some of the small measures which are successful in a particular context..

In a study of the evaluation of impact of poverty reduction programs on nutrition, Leroy et al (2009)⁶ studied the impact of three poverty alleviation programs in different countries. These were multi-sectoral programs that combine targeted nutrition interventions (i.e., addressing the immediate causes), with poverty-alleviation, food security enhancement, and/or income-generating approaches (the underlying causes). The three specific programs to these effects were cash transfer, micro-credit and agriculture. They found that every program has potentials if they are well thought out, properly designed with strong nutritional components with an understanding of the pathway to impact. Generally, there has been less attention to nutritional components and impact studies are not adequate because of the poorly designed programs.

Of the three programs they reviewed, Leroy et al found that agricultural interventions showed a more consistent picture of impact on micronutrient status than did the programs involving conditional cash transfers and micro-credit with education. The impacts of agriculture programs was seen in vitamin A in particular, as this was the nutrient targeted most often. The addition of animal production to home gardening programs to address the problem of low bioavailability of micronutrients in plant foods did not strengthen the evidence of an impact on either vitamin A or iron status. Few agriculture interventions assessed impact on child anthropometry, and of those that did, approximately half documented an impact on at least one indicator. A few generalized findings of Leroy's study include: targeting of women works; impact on nutrition is less successful because little attention was given to nutrition, requiring a well thought out design is necessary; necessary to linking 'nutritional component' to wider

⁶ Leroy, Jef et al. 2009. Poverty Alleviation Programs: Evidence of Impact on Nutrition. INSP/IFPRI.

development programs; several pathways and strategies should foster synergy among the pathways (consumption of staple-food, micro-nutrient rich food, income, and women); access to health service (adequate maternal and child care, feeding, hygiene, for farm households; and, co-ordination of health and agricultural institutions.

A study⁷ in Pune India, which exhibits similar socio-cultural features with Nepali society, shows that micronutrients during gestation period help improve birth weight and all neonatal anthropometry. Micronutrients supplied through Green Leafy Vegetables (GLV), fruit and milk & milk products were helpful (how they work – pathways – could be complicated; it would increase gestation period). Interestingly, they were more helpful or significant in thin and light women.

This study reveals that ‘food-based interventions’ are better than conventional supplements of the micronutrients. The study concludes “There is some evidence that supplementation with folate in pregnancy leads to improved fetal growth (Baumslag et al. 1970, Ek 1982, Goldenberg et al. 1992, Iyengar and Rajalakshmi 1975). However, an evaluation of India’s long-standing anemia prophylaxis program, with routine iron and folate supplementation to women in the third trimester of pregnancy for the past two decades, demonstrates no significant impact on birth weight (ICMR 1989). It may be that the micronutrient-rich foods discussed here provide a more effective combination of nutrients than do conventional supplements that contain only one or two micronutrients or macronutrients. Thus, food-based interventions may be more beneficial”.

In an effort to understand the linkage between agriculture and health, Hawkes and Ruel⁸ reveal that the strategy of increase in food production (staple food like rice and wheat) through strategies like green revolution did not always improved nutritional status. Green revolution is also followed in Nepal even though it was not as successful as was desired. In such strategies, the production gains did not automatically translate equally large for nutritional gain and it also did not improve child nutrition and also there was no access to food for many. Emphasis on cash income (assumed that high income would translate into extra expenditure on food) also had the same outcome. It has no impact on child nutrition. In Kenya and Philippines, household income increased by two times, but child energy intake rose only by 4-7 %. Role of micronutrients and women was found important in recent decades. Women empowerment and their role child care. Women have time (and strength) for household management and child care

⁷ Shobha Rao, Chittaranjan S. Yajnik, Asawari Kanade, Caroline H. D. Fall, Barrie M. Margetts, Alan A Jackson, Rosaleen Shier, Sadhana Joshi, Sonali Rege, Himangi Lubree and Bhavna Desai. Intake of Micronutrient-Rich Foods in Rural Indian Mothers Is Associated with the Size of Their Babies at Birth: Pune Maternal Nutrition Study.

⁸ CORINNA HAWKES AND MARIE T. RUEL, 2006. UNDERSTANDING THE LINKS BETWEEN AGRICULTURE AND HEALTH FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT Agriculture and Nutrition Linkages: Old Lessons and New Paradigms FOCUS 13 • BRIEF 4 OF 16 • MAY 2006

Household and community production of micronutrient-rich foods, such as fruits, vegetables, fish, meat, and dairy. More impact if there is effective behavioral change and communication interventions. In this regard an appropriate design is necessary. For example, in Northeast Thailand - production of green leafy vegetables in home gardens—combined with social marketing— increased vitamin A consumption among the poor. Similarly, breeding micronutrients into staple crops through biofortification has also helped if this is combined with social marketing. The program is beginning to see some positive nutritional outcomes through the development and dissemination of vitamin A-rich, orange-fleshed sweet potatoes.

There is enough evidence that production and consumption of nutritious food like vegetables, fruits, eggs and animal products have significantly increased in HKI supported home gardens which also combine with small livestock. This should be combined with nutritional education. In Bangladesh, leafy vegetable consumption increased by 1/3rd to 3/4th. Consumption of eggs increased by 48 %. It has also empowered women.⁹ Local NGOs need to be involved as service providers. It is increasingly seen that there is more impact on nutrition if animal production (eg poultry) is combined with home garden. Then nutrition education is important. Environmentally friendly techniques are essential in order to protect women and others who work on farm.

In the 'home garden model', pathway to nutrition is both – direct consumption and proper use of extra income earned. HKI also worked in Cambodia and Philippines apart from Nepal and Bangladesh. Outcome indicators measured included household food availability, consumption and income, as well as anemia prevalence in women and children 6 to 59 months. Overall, the evaluations showed improved availability and consumption of vegetables, fruits and animal products such as egg and liver in participating households. Anemia among women and children 6 to 59 months decreased during the course of the program in some countries. Household income increased as a result of the homestead food production activities. Women's involvement in household decision making improved. Therefore HFPP has the potential to improve dietary intake and nutritional status of women and young children and likely improves household food security and nutritional status of all household members.

An additional area where agriculture has considerable impact on nutrition in Nepal is in the area of wood collection and the cooking of food (Kumar and Hotchkiss 1988). Around 80% of domestic energy needs in Nepal are met by fuel wood thus exerting immense pressure on the forest resources of the country with negative impacts on environment. Indeed there is mounting international concern about the contribution of domestic cooking as a global climate change issue (Akbar et al 2011). Women are mainly responsible for cooking and collection of biomass, mainly fuel wood from the forest. Use of traditional stoves such as "*agenu*" (*open fireplace*) and "*chulo*" (*rudimentary stoves*) consumes more fuel wood and increases the burden on women. Use of biomass energy and low-grade biomass fuels lead to excessive levels of indoor smoke/air pollution. A global meta-analysis found that maternal exposure to cooking

⁹ Iannotti, Lora, Kendra Cunningham and Marie Ruel. Diversifying into Healthy Diets. Home Stead Food Production in Bangladesh. HKI.

smoke in the kitchen/house during pregnancy is associated with about 90g less mean birth weight (Pope et al 2010).

The development of an Improved Cook Stove (ICS) has been in progress since the 1950s in Nepal. Studies have shown that ICS has efficiency of 15-25% and fuel wood saving is 30-35% thus favoring the drudgery reduction of women as ICS cuts down their cooking time and hardship in collection of scarce fuel wood. Studies have shown that with the use of ICS human exposure to pollutants in the kitchen environment is also halved. Some 200,000 ICS were placed in homes during the first four years of the Tenth Year Plan (2002-2007) (Bhattarai and Risal 2009). A more recent improvement in this area has been the development of Biogas. Starting in the early nineties some 208,000 biogas plants were installed by 2010, benefitting 1.25 million people across the country. This means 420,000 tonnes/year less fuel wood burnt and 630,000 tonnes/year CO₂ saved. With the plants have come an infrastructure of installers and finance institutions, and over 6,000 people trained (Ashden Award 2006). How to make these technologies available to and used by the lower economic quintiles is the challenge however (New Era 1985, Tentscher et al 2001).

Like ICS, Biogas technology¹⁰ is also a technology that is well integrated with farming and clean domestic environment. It is simple, reliable and accessible and uses appropriate technology in terms of social, economical and geographical conditions in Nepal. In addition to providing a cost efficient energy source, biogas provides other benefits, such as:

- Convenience: the fuel comes from families' own animals – a couple of cows provide enough dung to feed the digester. Enough bio-gas is produced for a family of 6 people from the dung of a cow if linked with toilet.
- Improved sanitation, as some digesters are connected to toilets.
- Reduced time required to collect firewood, which was 2-3 hours a day. This now frees up families for other activities.
- The easy-to-use smokeless stove reduces the amount of indoor air pollution.
- Use of the by-product, digested slurry, to fertilize the soil improves crop yields.
- It also prevents greenhouse gases from escaping from earth into atmosphere¹¹.
- Promoting gender equality and empowerment of women through reduced drudgery of girls and women as it also helps in education of girls because of the provision of light.
- Improved maternal health and reduced child mortality.

¹⁰ Ministry of Agriculture and Co-operatives does not look after energy issue like ICS and bio-gas. These are dealt under Ministry of Forestry and Ministry of Environment. Here, these activities are to be performed by MoAC through linkages with Ministry of Forest and Ministry of Environment.

¹¹ Today there are 140,000 rural Nepali households who cook with biogas. The biogas plants of Nepal have helped save 400,000 tonnes of firewood and 800,000 litres of kerosene, as well as preventing 700,000 tonnes of greenhouse gases from escaping into the atmosphere.

http://www.tve.org/ho/series7/01_energy_wise_reports/01_energy_wise_mm/dungbusters_nepal_pdf.pdf

In conclusion it seems that multisectoral programs which integrate a set of actions that address the determinants of maternal and child undernutrition at several levels, have an enormous potential to contribute to reducing maternal and child undernutrition. This potential, however, is yet to be unleashed.

International experience suggests that there are five ways agricultural projects can maximize nutritional impact during the critical window of growth faltering (IYCN Project. 2011). These include:

- Integrate nutrition counseling for women in particular;
- Incorporate home gardens;
- Introduce micronutrient-rich crop varieties, and, particularly small livestock poultry, goat, cow, fish and the like;
- Ensure that vulnerable household members consume the foods produced through social marketing and behavior change communication;
- Seek ways to support agricultural tasks performed by women, including firewood collection, weeding, harvesting, processing, and preservation.
- Ensuring that women and children live in healthy environment, especially smoke free indoor environment.

Evidence in Nepal:

An attempt has been made to identify and examine successes of the programs/activities in having nutrition impact and assess the evidence on what works. Then lessons were drawn for recommendation.

Analysis of activities undertaken by MoAC

Nepal being a agrarian country with agriculture being the main livelihood option of people, this sector has been receiving priority until the early 1980s, but investment in this sector declined after 1990. Even then, a whole ministry (MoAC) looks after this sector. MoAC is an institution in Nepal which has a mandate to formulate policies to guide the activities of other allied agencies like NGOs and INGOs. It also carries out biggest support for the farmers as compared to other agencies. The operation of other agencies is small as compared to that of MoAC. With four main departments – DoA (Dept of Ag), DoLS (dep of Livestock Services), DFTQC (Dept of Food Tech and Quality Control), and DoC (co-operative), and offices in every district, MoAC is one of the bid bureaucracies in the country. It is also one of the Ministry which has its reach up to the grassroots level. DoA and DoLS have reach up to grassroots level. They have regional and district level offices. They (DoA and DoLS) have ‘service center’ at grassroots – 4-6 in each districts. One service center could cover 5-6 VDCs (village dev committees). One of the main problems in these institutions is that they are vertically organized and linked. Horizontal linkages across the institutions are less. MoAC is also a member of National Nutrition Steering Committees (NNSC) – formed by NPC (National Planning Commission)

At the district level, DoA and DoLS have district offices. But again, they also lack horizontal link with related district offices. DDC (District Dev Committee) brings them and others together at the time of district level planning. There is a provision for District Nutrition Steering Committees (DNSC), which have been formed or are in the process of forming in some cases. . There are also food and nutritional co-ordination committee at the district level.

At the grassroots level, there are agriculture service center or sub-center – covering 5-6 VDC or about 35 000 population. There are also livestock service center or sub-center – covers 5-6 VDCs. These are usually manned by Manned by JT/JTA. These grassroots workers have no incentive to perform better and their geographical coverage is also large and thus they cannot visit houses. These grassroots workers also come from their vertically defined academic or training institutes. There is also no institutional mechanism to bring them together in an integrated way.

DFTQC, which has been given some responsibility to look after nutrition, especially awareness and research, has no presence at the district level. It exists in some district as food quality inspector to check the food in the market. This has no capacity to check quality in the production process. DFTQC has no presence at the grassroots level. The mandate of other departments is to increase food production through commercial farming. DoLC has the main objective of reducing malnutrition through production and consumption of animal products – it may have more MN and protein. NARC (Nepal Agricultural Research Council) is responsible for research that help in increasing production.

MOAC certainly a great deal of programs. Many of them are aimed mainly at increasing production or increasing the income of the people. Apart from small programs on kitchen garden and microirrigation and food security, most programs are production-oriented or in increasing the availability of food.

An attempt was made to understand what are the programs and their intended aims, a list of main programs launched under the MoAC were noted. Then their focus on nutrition was analysed. As there was no monitoring of impact of these programs, an attempt was made to see the nutrition focus or sensitivity of the program. Of the total development budget of the MoAC which stood about Rs 7.5 billion, the first priority programs were allocated with Rs 6.3 billion. Almost all priority first programs and a few second priority programs are mentioned here under.

Table 5: Various programs of MoAC and their 'stated nutritional goal'.

Dept.	Programs	Priority	Size	Main focus	Stated goal on 'nutrition'
DoA	Special agriculture production	I	large	supply of fertilizer	No

	Crop diversification	I	preratory phase	commercialization	No
	Horticulture dev program	I	medium	improving the stock	No
	Potato, veg and spices dev program	I	medium	production	Yes
	Seed improvement and quality control program	I	medium	production	No
	Fishery development program	I	large	production	No
	Crop protection program	I	medium	production	No
	Crop development program	I	medium	production of cereal	No
	Community Managed irrigation (Agriculture)	I	medium	Production in small farms	No
	Food crisis mitigation program	I	medium	production in vulnerable hh	Food security
	Soil test and improvement	I	small	production	No
	Co-operative farming small irrigation and fertilizer	I	small	production	No
	Sustainable soil management	I	small	production	No
	Commercial ag and trade	I	large	production	No
	Commercial ag	I	large	production	No
	Karnali Zone Special ag dev prog	I	medium	production	No
	Agriculture Extension Prog (district level)	I	medium	production	
	APP M and C program	II	medium	production	FS and Poverty
	janakpur Ag Dev program	II	medium	production	No
	Commercial Kit dev (urban ag)	II	small	income	No
DFTQC	Food Nutrition and Technology Dev	I	large	Quality control and Nutrition awareness, product dev	Yes
DoLS	Animal Health Service program	I	large	Production	No
	Livestock Dev prog	I	large	Production	No
	Livestock farms	I	large	Production	No
	Leasehold Forestry and Liv. Dev	I	large	production	income + poverty
	Community Livestock dev	I	medim	Production	income + poverty
	Avian Influenza Control program	I	medium	production	No
	Karnali Zone Livestock Dev progr	I	medium	production	income
	Livestock service training prog	I	large	production	No
	Livestock extension service prog.	I			

One of the activities of the MoAC that directly aimed to impact on food security is – Food Crisis Mitigation (Addressing) Program. These activities include in case of Khotang district –

- Small irrigation development and repair – 28 units costing Rs 2.8 million

- Transportation of improved seed – 8 mt costing Rs 0.2 million
- 50 % subsidy on improved seed and source seed 8 mt Rs 0.22 million
- Transportation subsidy on fertilizer (up to Service center) 124 mt Rs 3.1 million
- Demonstration of compost fertilizer and green manure 30 units 0.15 million
- Animal shed improvement program 28 units 0.47 million
- Sustainable land management training for service center level 5 units 0.1 million
- Farmers school on integrated nutrition management training 1 unit Rs 3.3 million

The impact of these activities on nutrition of the people is not known. But it can be argued that they had some impact even though it may not be direct and proportionate as compared to the more nutrition focused programs.

The unit cost of these programs could give norms for similar districts for government implemented programs.

Diversifying the diet for the target population (women and children)

Program: Homestead Food production by HKI in far west and central Nepal – 4 districts, AAMA in 3 districts

Innovations: Development of Homestead Food Production Gardens (at household level) and Village Model Farms (in a village covering 20 HFPGs); involvement of women; introduction of poultry; and, grassroots links of agriculture sector with health workers (FCHVs). This has helped in making HFPG a year-round production site. AMMA also has Essential Nutrition Action and nutritional improvement, child care, BCC (behavioral change and communication) and linkages to health service.

Challenge: Brining small farmers (women) and empowering them fully; collaboration with local vet experts is difficult;, and, reducing workload on women

Impact: 860,000 target population; consumption of GLV, fruits and eggs increased significantly within a short time and year round. There are monitoring data to prove this.

Prospect for scale up: High because most households have some land and also have some knowledge on farming.

Pathways: Direct consumption, income, knowledge and links to health service.

In Nepal case also, homestead food production initiated by HKI in far west and central Nepal (four district) has also shown that production and consumption of nutritious food like vegetables, fruits and eggs have increased within a short span of two monitoring in a 3-4 months period. This also combines farm, animal and education. The experience of the program reveal the necessity of linkage with service providers (like vet people)¹². It has helped in

¹² HKI 2004. Nutrition Bulletin. Homestead Food Production Program in Central and Far Western Nepal improves food and nutrition. Vol. 2, Issue 1.

developing more 'developed farm' (fixed and throughout the year) from modern (fixed and not throughout the year) and traditional (seasonal).

Cost: The support for preparation of home garden range from \$10 to 15 per garden. Apart from this, seeds worth \$6 and poultry worth \$25 are given to a household. This would be total cost per household would be about \$41 to \$46. The cost of Village Model Farm is slightly higher - \$20 for preparation, \$ 18 for seeds and \$ 40 for poultry. The total cost comes to about \$79 per individual household.

Program: Kitchen gardening (DADO –District Ag Development Office - as planned in DDC – District Development Committee) – small funds allocated for this, guidelines provided by MoAC (Ministry of Agriculture and Cooperative)

Innovation: Flexible funding from DAO and initial support.

Challenge: Monitoring and support from government staff difficult. Children lured by junk food as advertised by mass media.

Impact: Not studied, taken-for-granted.

Prospect for scale up: Same as Homestead Food production, but later is more developed and organized.

Cheap and clean energy

Program: Bio-gas support program (BSP), A Company supported by Government and Donors (SNV), the only institution that helps in bio-gas development.

Innovation: Locally suitable technology, collaboration of supporters, public-private co-operation for the delivery of inputs and services, subsidy for incentive and to make accessible to poor. A first CDM project in Nepal.

Challenge: Reaching the extreme poor who do not keep animals; bio-gas plant not fully operational or less operational in cold areas or in winter in mid hills.

Impact: High acceptance - more than 1,300,000 persons are directly benefited by 225,356 plants; reduced workload for women; healthy in-door environment; light for children to study; and, good manure for fields.

Prospect for scale-up: Can well be integrated with Homestead Food Production Gardens.

Pathways: Improving health of women and children; increasing food absorptive capacity; improving sanitation and reducing the workload of women; education of girls by provision of light and increasing the food production through fertilizer.

Cost: BSP – Nepal (a public-private institution) and it provides technical services and arranges subsidy from the banks. The institutional cost for providing a household is about US \$ 33.80. .

57 % of the plains, 37% of the hills and rest 6% in remote hills or in mountain region is potential for biogas plants. As of now, 0.22 million biogas plants have been built with the help of BSP. But 0.5 million plants could be built in the country. All districts are not equally potential for bio-gas.

A total of 40 districts are categorized as Low Penetration Districts¹³ (LPDs) for now. These districts receive extra Rs. 700/- subsidy per plant. There is additional subsidy for the poor, Dalits, Janajatis and conflict victims. This subsidy is Rs 2,000 in Tarai, Rs2,500 for the hill districts and Rs 3,500 for the remote hill districts. This additional subsidy for the poor is available only for small sized plants mainly 2, 4 and 6 cubic metres

Bio-gas support: Institutional cost for providing services US \$ 33.80 per plant (subsidy is provided as per the subsidy rule)... Subsidy for the average size (for the household level 6 cu m) Nepali Rs 2000 to 2800 (average Rs 24000)¹⁴. Cost of construction and subsidy provided for bio-gas plant (6 cm m) by the government/donors (through the ADB and Rastriya Banijya Bank) bu co-ordinated by BSP and various bio-gas companies.

Ecological zone	Cost of construction (Rs)	Subsidy (Rs)
Terai	46,484	9,700
Hill	48,634	12,700
Mountain	59,358	16,700 (+2,000 transport subsidy)
Remote area	195,645	16,700 (+4,000 transport subsidy)

Program: ICS (Improved Cooking Stoves) activity of Nepal Flood Recovery Program

Innovation: It helps develop local capacity for making ICS from local materials. Then households are made aware through awareness campaigns.

Challenge: Making males interested in this work.

Impact: High level of impact in reducing indoor pollution and in reducing the workload as less fuelwood is required after ICS.

Prospect for scale-up: High as many households in rural areas still use firewood as energy source and they still use traditional cooking stove.

Pathways: Improvement in health of women and higher birth weight of children.

Cost: Rs 1200 per household as service cost (like awareness and training and for material support). Total budget for this was Rs 400,000 and it was used to support 1680 households.

Local communities select a person for training on ICS making. The trainees (one person in a VDC) will get training for 3 days for making stoves. He will make 20 ICSs for demonstration in a VDC. A household gets Rs 800 worth of materials for making the stove and the mason would charge Rs 400. The skill training of masons would cost Rs 300. Before hand, awareness training

¹³ These districts are Achham, Arghakhanchi, Baglung, Baitadi, Bajhang, Bajura, Bhojpur, Dadeldhura, Dailekh, Darchula, Dhanusa, Dolakha, Dolpa, Doti, Humla, Jajarkot, Jumla, Kalikot, Kathmandu, Khotang, Mahottari, Manang, Mugu, Mustang, Okhaldhunga, Panchther, Parsa, Pyuthan, Ramechhap, Rasuwa, Rautahat, Rolpa, Rukum, Salyan, Sankhuwasabha, Saptari, Sindhupalchowk, Siraha, Solukhumbu and Taplejung

¹⁴ Personal communication.

is given to all members of community and then skill training is given to mason. There are other trainings on maintenance and refresher trainings.

In another example, the institutional cost was about Rs 1900 (US \$ 28) which is in a hill village. NFRP's activity is in Tarai district, where the cost is low and transportation is cheap. The hills example is based on the project Improved stove: Institutional cost to support individual house is US \$ 28. This is based on a project 'Improved cooking stoves for every family in the village of Lekhani, Baglung District, Nepal. RECED. Cost of ICS is Rs 700 (US \$ 11). Project cost supporting 335 households 9,540 US \$. This has component of awareness raising, training for the construction of ICS and training for income generation activities. (Renewable Energy for Clean Environment and Development. In other cases the cost of a stove might go to Rs 1000 to 5000 (depending on various things) WINROCK Review.

Small and micro-irrigation schemes

SIMI (Smallholder Irrigation Market Initiative) – Winrock Nepal and International Development Enterprises (IDE)

Innovation: Micro-irrigation suitable for small farmers to grow high value crops; use of private sector to create micro-irrigation supply chain and technical services; and marketing of crops or products.

Challenges: Bringing landless farmers into the fold.

Impact: 250,000 households, whose income will increase by \$133 per year. Nutritional impacts are not measured.

Prospect for scale up: Yes, if linked with village model farms and household farms which has other supports like in AAMA.

Pathways: Increase in income.

Cost: For providing service is \$50 per beneficiary and irrigation gear needs to be purchased by farmer.

Intensifying staple food production

Program: Hill Maize research Project CIMMYT.

Innovation: Breeding and disseminating improved variety of maize for the hills, where it is also a staple food. Food production is thus increased and food security conditions improved. Meeting 30 % of the national maize seed requirements.

Challenge: Benefiting the small farmers and landless people.

Impact: Doubling the yield (3 mt/ha); food self-sufficiency of the farmers increased by 11% to 24 % in the hills, which accommodates about 45 % of the population. It will benefit at least

35,000 rural families, particularly poor and disadvantaged farmers, in 20 remote hill districts of Nepal.

Prospects for scale up: High as maize is grown by most households in the hills. About 78 % of maize is grown in the hills in Nepal.

Pathways: Consumption and reduced price due to high yield.

Cost: US \$5.63 million and a four-year project implemented by the International Maize and Wheat Improvement Centre (CIMMYT) is designed to meet at least 30% of the national maize seed requirement in the hill regions, support implementation of national seed policies, and develop new maize varieties and technologies.

Increasing food production

Program: European Food Facility in Nepal (FAO/WFP/GoN).

Innovation: Providing high quality seeds to vulnerable farmers to increase food production; immediate relief (cash for work) and food production (high quality inputs – seeds, fertilizer and technical training).

Challenge: Supply of high quality seeds to meet local agro-climate and co-ordination among agencies.

Impact: 92000 households benefiting.

Prospect for scale up: Possible in food deficit areas.

Pathway: income (from work), consumption (even GLVs) and income (from food production).

Cost: The total cost is Euro 8 million helping 92,000 households.

The two-year project, launched in June 2009, is expected to benefit over 92 000 households in 10 districts – mainly in the mid-hills and Tarai districts. Households in the targeted districts will receive input packages containing high quality cereal, pulse, potato and vegetable seeds. Fertilizers will also be distributed to farmers in selected districts along with technical training to ensure proper usage. Input packages will be adapted to the various districts according to local planting conditions and needs. Funds from the project will go towards promoting improved farming practices. Through the Ministry of Agriculture and Cooperatives (MoAC), FAO is working to develop an extensive training and capacity building programme to support farmers in applying techniques that preserve soil fertility and water resources. Attention is also being given to strengthening MoAC extension services to improve agricultural practices and farmer productivity at the village level. The WFP, FAO and other stakeholders are supporting the government in designing comprehensive food security and nutrition information and monitoring system.

Increasing income

Program: Nepal Flood Recovery Program (A USAID project implemented by Fintrack and Nepali partners).

Innovations: An Integrated program bringing together organizations dealing with agriculture, infrastructures like road and irrigation, and local capacity building through training and other activities. All supports to community are provided in similar amounts. The main being increase in household income through farming and providing support for farming through infrastructures like irrigation, bridges, and then training for kitchen garden and other nutrition related aspects like sanitation etc. It also aims to strengthen local organizations' capacity.

Challenge: The main challenge is to convert increased income to nutrition.

Impact: The income has increased by more than three times. As a result, proportionate expenses on food reduced from 58 % of income before the project to 10 % of income in the third crop-cycle 918 months).

Prospect for scale up: High

Pathway: income pathway to consumption as well as high availability of foodgrains through reduced prices of food.

Cost: \$6506377 supporting 22,000 households in 281 wards of 9 districts.

The project basically aims to develop agriculture and improve food security through activities for livelihoods and income generation. Infrastructures provided add value by improving economic conditions. Activities on sanitation, hygiene and nutrition complement food security objectives. Towards this, assistance is provided for kitchen garden, improved cooking stoves and latrines.

4435 farmers improved the economic productivity of 970 hectares of demonstration of farmland by 700 %. Over \$ 4.1 million in net-sales achieved over three crop cycles (18 months). For the objectives of sanitation, hygiene and nutrition, women, men and school children were trained. Similarly, kitchen gardens were supported and improved cooking stoves and latrines were supported. For the capacity building objectives, training for the women and youth were provided.

The livelihood and income generation activities were market-led and activities that helped farmers derive more benefits and reduce risks through diversification strategy was followed. Technical service to farmers was maximized local extension agent with a focus on individual farmers and helping farmers to gain more throughout the value chain.

In agronomic practice, the focus was on Good Agricultural Practice, improved technology and their development into an integrated crop management program. Key investment was made on irrigation through shallow tube-wells and pumps.

Demonstration farms support was done for 18 months in order to improve livelihood and increasing the income from farming. There were 6 field trainings with field day or cycle. Farmer

should contribute 0.2 to 0.4 ha of land and there was cost sharing on irrigation sets (25 %) and on seeds/other inputs (15-25-100%). Irrigation clusters were organized as focal point for program intervention and training – 1 STW per 5-9 farmers on 1-5 ha. Irrigation clusters were organized into Production Group per VDC worksite. Field training programs were organized for 1) crop selection and nursery management 2) production management 3) integrated pest management, 4) pre-harvest management, and 5) post-harvest management, and 5) marketing.

A few lessons that emerge from this project are: irrigation is first barrier, farmers must be selected after fully testing their commitment, demonstration is important, substantial impact cannot be obtained without key investment in productive infrastructure: transportation, irrigation, markets. In agriculture, integration of various sector activities deepens impact, extension to individual farmers, farming should be encouraged as a diversified business unit, strengthening linkages among important value chain actors, and food security is best achieved through increased income from increased agricultural productivity. Kitchen gardening is an effective compliment to larger scale agricultural development programs.

Program: Education for Income Generation

Innovations: Increasing income of the target group through skill (vocational and literacy) training and linking the training with employment opportunities or self-employed enterprises in the market. The training courses are aimed to meet the needs of the labour market. It aims to increase agricultural production and food security through increase in production and productivity and generation of income. Scholarships for Dalits and other targeted vulnerable groups. Training packages – 30 days skill training and 10 months for literacy (with functional literacy).

In the kitchen garden, goats in the hills and fish in the Tarai are feasible. They rent the land for those who have no land. The price is Rs 500 per 300 sq m.

Challenge : A major challenge is to link income to nutrition. For this education is important.

Impact: It has helped to increase the income.

Prospect for scale up: Yes, especially the self-employment enterprises.

Pathway: Through income and production and consumption of food from the farm, especially from the kitchen garden.

Cost: Total cost per beneficiary per year is US \$ 285.

Nutritious food product development from local foods.

Food products development from local foods by DFTQC, MoAC.

Innovation: Developing products that are palatable from local foods, processing methods that retain nutrition (eg parboiled rice Roger’s research) - which have high nutrition value including MN.

Challenge: Encouraging private sector to make such products and market them. Such local foods are available in remote and often food insecure region, where private sector is reluctant to go.

Impact: Products are palatable but it has not gone into market yet.

Prospect for scale: High if social marketing is done.

Pathway: Consumption and income.

Program: Nutritious food for children (by DFTQC)

Innovation: Super flour (for children) testing and production and finding a right mix of cereal and legume (2:1 instead of 2:2 in the past) and simple preparation method. Experiment shows that new mix is more palatable and growth promoting.

Challenge: Social marketing even though a commercial company is producing this.

Impact: Good impact on palatability and growth promotion.

Prospect for scale up: Social marketing is necessary.

Pathway: Low price and consumption

Animal production and community development among small farmers

Program: Gift (of animal) exchange for change in life and leading to community development- Heifer International.

Innovation: Using livestock and training as the tool. Group-approach (SHG) and self-sustaining through gift of animals and social organizations to sustain welfare and social activities. Training among the group member to act as Village Animal Health Worker (VAHW). Education (Nutrition sensitive activities being prioritized through organic kitchen gardening and improved animal management).

Challenge: Linking farmers with the market to sell their products. Insurance of the animals.

Impact: About 35,000 families in 38 districts. In terms of income and asset creation – there is good impact. Consumption has increased.

Prospects for scale up: High as there are many landless and small farmer women/men that could be supported through livestock.

Pathway: Income, consumption.

Program: Local livestock insurance

Innovation: Providing livestock insurance and support to farmers in the absence of wider or regular insurance for the livestock. In the absence of this, farmers facing the death of their animals were having a great deal of problems. In this case, some fund is given from external source on which local farmers contributes through regular premium for insurance. The local committee of farmers manages the fund. They set the rules for paying the insurance. It was practiced in CLDP funded by ADB. Generally such fund has been created by the grant from external sources to the level of Rs 200,000 to 300,000 to a group of about 50 farmers. Farmers also pay premium at the rate of roughly 5 % of the value of the animals for a year. But the method differs from place to place.

Challenge : It is a local insurance not backed by higher level of insurance as is seen in other cases. Therefore, there is no guarantee that all would get insurance in case there is epidemic and local fund does not cover the cost.

Impact : It has helped in encouraging the farmers to keep large animals as this is for large animals only.

Prospect for scaled-up: Highly possible if there is external support for a 'fund'.

Pathway: Reducing the vulnerability and sudden loss of income.

Cost: Rs 4,000 per farm households.

Activities of WFP for food security

WFP's strategic priorities in Nepal are to support the country's protracted peace and recovery process by reducing hunger and under-nutrition, fostering increased resilience amongst vulnerable communities, and providing humanitarian response to and preparing for increased environmental disasters¹⁵. WFP's work in Nepal primarily targets the most food insecure and hard to reach districts of the Mid and Far Western Hills and Mountains. These areas of Nepal experience both the greatest need for assistance and the greatest gap in government and development partner support.

The bulk of WFP's assistance is provided through a protracted relief and recovery operation that aims to target 1.2 million people in 2011 through food and/or cash for work activities. WFP's food/cash-for-assets (F/CFA) programme supports communities to develop resources and enterprises aimed at reducing hunger while meeting immediate household food needs. Through the programme, beneficiaries are engaged in projects such as building irrigation

¹⁵ It has aimed to address the food security problems arising from 1. a protracted peace process and continued political instability; 2. two years of steep and sustained food price inflation; and 3. a succession of natural disasters including a series of severe droughts coupled with incidences of flooding

systems, fishery ponds, cash crop cultivation and enhanced farming infrastructure. WFP also provides 205,000 Nepalese children with a mid-day school meal, provides oil to 62,000 Nepalese families that keep their girls in school and will provide mother child health care to 37,000 women and children in 2011. WFP Nepal also supports over 70,000 Bhutanese refugees living in Nepal.

Lessons learned:

- No studies to examine the nutritional outcome of the interventions. Some studied only the consumption level – an indicator of nutritional outcome.
- Targeting women helps – but need to alleviate the problem of land ownership and not to increase work load (Homestead gardens).
- Consumption (of MN-rich food) pathway is better than transferring income to food. Income transferred to junk food – because of marketing.
- Nutrition-education is important.
- Social marketing of MN-rich foods is necessary (of local MN-rich food, and their products).
- Access to clean and cheap energy needs to be combined with nutrition-oriented ag. interventions.
- Scaling up of homestead food production (along with animal production including poultry) is a possibility with high nutrition impact. Need to be culturally sensitive also especially in animal.
- Synergy in different pathways is also essential.
- Public-private co-operation is important for sustainability (eg BSP, SIMI)
- Profitability of cereals is low in Nepal as compared to India. There could be less impact from the pathway that increases cereal production, or more investment in transportation and other infrastructures.

Strategies needed (recommendation)

Recommended policies

- Addressing consumption of MN-rich food (Homestead food production) combined with animal (culturally sensitive) –
- Homestead food production needs to be complementary to overall food production and income generation.
- Focus on women and their group organization
- Addressing ‘access to land for women’, particularly of poor households for home gardens.
- Income pathway is not fully effective – in the absence of nutritional education. Junk food producers are effective advertisers.
- Synergy in pathways

- Social marketing of proven simple and widespread measures – like consumption of MN-rich local food, their products, particular processing and cooking method (DFTQC research has shown this).
- Public private collaboration in production of nutritious products like super flour, products of local crops, supply of critical inputs (irrigation) and marketing.
- Research to enhance the yield of local nutritious crops (cereals and others).
- Emphasis on livestock production – dairy, poultry and others – at least a few for daily supply in rural areas.
- Addressing energy requirement (present source takes a lot of time of women and also puts them in health burden). Cheap and clean energy source integrated with ag. Intervention (eg bio-gas and improved smokeless stove).

Recommended Strategies at the institutional level

- Mechanism for collaboration at different levels – national, regional, district and local (among line agencies agriculture, livestock, health and food quality). Nutritional Steering Committees may fill the gap, but this needs to be effective.
- JT/JTA trained in ‘nutritional aspects’ so that they can introduce activities in their sectors. Training courses need this. Converting them to ‘food security and nutrition’ extension agents.
- Developing links between JT/JTA and village health workers.
- Mechanism to bring together JT/JTA (of ag and vet), Health workers, and other grassroots development workers together that complement each others program.
- Monitoring mechanism at local, district and national levels.
- There is severe shortage of human resource at the local level and this was started from the 1990 when structural adjustment programs were implemented and overall allocation of resources for agricultural sector was reduced. Currently there is, on average, 1 JT/JTA for 5-6 VDCs. As a result, technician cannot visit the individual household for extension. This method of extension (visiting individual household is an effective mechanism as proven from Flood Recovery Ag. Program). Using the decentralization Act, local bodies can hire required staff if they have the funds. Therefore, provision of funding for local bodies is necessary to facilitate the hiring of staff at local level.

Appendix 1

Nutritional status of various food (rice and other locally grown cereals compared)

Sr. No	Crops	Protein (gm)	Fat (gm)	Minerals (mg)	Fiber (mg)	Energy (Calorie)	Calcium (mg)	Iron (mg)
1	Barley	11.5	1.3	1.2	3.9	336	26	1.7
2	Buckwheat	10.3	2.4	2.3	8.6	323	64	15.5
3	Kaguno (foxtail millet)	12.3	4.3	3.3	8.0	331	31	12.9
4	Chino (penicum millet)	7.3	1.3	2.7	3.6	328	14	3.9
5	Junelo (sorgham)	7.6	2.4	1.0	0.6	357	17	3.6
6	Uwa – black (naked barley)	10.4	1.7	2.3	2.5	340	20	7.5
7	Wheat flour	12.1	1.7	2.7	1.9	341	48	4.9
8	Wheat flour (refined)	11.0	0.9	0.6	0.3	348	23	2.7
9	Millet (finger)	7.8	1.2	2.9	3.7	322	288	49.2
10	Rice	6.8	0.5	0.6	0.2	345	10	0.7

Jagannath Adhikari - 36/11/2019
Framework on Nutrition

Appendix 2

Log-frame (Agriculture sector)

OVERALL PROJECT OBJECTIVE 4

Ministry of Agriculture and Cooperatives contribution to multi-sectoral efforts to accelerate stunting reduction of stunting increased

PROJECT PURPOSE

Consumption of animal food products improved among lower income adolescents, young mothers and young children

KEY PRODUCTS	INTERVENTION/ACTIVITY	INDICATORS	RESPONSIBLE	ASSUMPTIONS
Result 4.1. Increased availability of animal foods at the household and community levels				
Adolescent girls and women of the poorer groups (lowest wealth quintile) maintain a home garden (at least 100 sq m) managed by them	<ul style="list-style-type: none"> Forming of groups of adolescent girls and women from the poorer groups (lowest wealth quintile). Providing access to land to women/girl from absolutely landless family (on an individual basis or group basis with the help of VDC and community groups or providing land leasing opportunities, and support for that). Training them for home garden JT/JTA help plan the garden to supply year round veg (at least 1 kg veg. per day for the household). JT/JTA help supply seed/fertilizer through trusted 'private sector' JT/JTA help plan for the production of organic manure in the home garden. JT/JTA provide technical service in case of diseases and insects. 	<ul style="list-style-type: none"> % of lower wealth quintile households (women) as member of the group. % of landless women having home garden. % of targeted women trained on home garden Number of days in a year in which regular supply of veg, eggs, meat and milk is produced in the home garden of the targeted people Number of VFM 	<ul style="list-style-type: none"> MOAC/DAO/ Service Center (JT/JTA ag and vet) 	<ul style="list-style-type: none"> Greater resource allocation to MoAC. Support from political bodies like VDC and DDC. Good public-private ownership in supplying inputs and irrigation facilities.

	<ul style="list-style-type: none"> • Provision of cheap credit facility and links to institutions providing this service. • JT/JTA help develop a 'village model farm (VMF)' in every ward covering 20 individual women's garden in line with HKI's internationally proven model. VMF to act as 'resource center'. • Micro-irrigation facilities for the home garden 	<p>and home gardens.</p> <ul style="list-style-type: none"> • %age home gardens having year round irrigation 		
Animal, poultry or fish production is integrated with home garden as per the suitability of the agro-ecological region and cultural preference (at least 1 milking cow, or 2 goats/sheep or pig, or 5 poultry birds, or small fish pond, or combination of these in the home garden)	<ul style="list-style-type: none"> • JT/JTA help in supplying suitable breeds of animals, poultry birds or fish. • Linkage with forest officials for access to fodder for the animals. • JT/JTA help plan in such a way that there is regular availability of animal/fish products and/or egg – at least 2 eggs a day or 1 lit milk a day or some fish or meat regularly for the household. • JT/JTA provide technical service in case of diseases and health problems of animals, poultry or fish. • Provision of cheap credit facility and links to institutions providing this service. • Developing a 'local fund' – partly a grant from external agencies including government and partly the contribution of clients – for the insurance of the animals, and is managed by the groups formed. 	<ul style="list-style-type: none"> • Number of days of regular availability of animal/fish products and/or egg – at least 2 eggs a day or 1 lit milk a day or some fish for a targeted household. • Perception of target group on availability of breeds, animal feed/fodder, vet services and credit. • Coverage of targeted households into local insurance schemes 	<ul style="list-style-type: none"> • MOAC/DAO • Banks/Financial Institutions 	<ul style="list-style-type: none"> • More resources to MoAC. • Good co-ordination among DoA and financial institutions • Good public-private ownership in supplying inputs and breeds.
Reducing post-harvest (or processing) losses of	<ul style="list-style-type: none"> • IEC materials on post-harvest and processing techniques and ways to 	<ul style="list-style-type: none"> • Booklets/Pamphlets on post harvest and 	<ul style="list-style-type: none"> • MoAC/DAO 	<ul style="list-style-type: none"> • More resources to MoAC

the food – particularly MN-rich food	<p>reduce losses.</p> <ul style="list-style-type: none"> • IEC materials to enhance knowledge on processing practices that help retain nutrients. 	<p>food processing.</p> <ul style="list-style-type: none"> • Audio-visual program. 		
Result 4.2. Increased income among young mothers and adolescent girls from lowest wealth quintile				
Targeted households/ communities have surplus food for sale	<ul style="list-style-type: none"> • Targeted women’s group (formed as above) to act as co-operative, or self-help group, for marketing (of inputs and surplus production) 	<ul style="list-style-type: none"> • Coverage (%) of targeted women in co-operative 	<ul style="list-style-type: none"> • MoAC/DAO 	<ul style="list-style-type: none"> • Support from political bodies like VDC and parties
Regular savings and credit activities of the co-operative or self-help group formed.	<ul style="list-style-type: none"> • Training on co-operative, savings and credit management for the targeted women. 	<ul style="list-style-type: none"> • % of targeted women trained 	<ul style="list-style-type: none"> • MoAC/DAO / Service center 	<ul style="list-style-type: none"> • Support from political bodies like VDC and parties
Increase in ‘fund’ generation among the targeted women groups	<ul style="list-style-type: none"> • Training on fund management, investment and income generation. 	<ul style="list-style-type: none"> • % of targeted women trained 	<ul style="list-style-type: none"> • MoAC/DAO / Service center 	<ul style="list-style-type: none"> • Enough marketing opportunities of the products.
Result 4.3. Increased consumption of animal foods by young mothers and children.				
Regular consumption of nutrient dense foods (green leafy vegetables combined with fruits, meat or fish, 1 egg per day or 0.5 lit milk per day or their combination) by young mothers and children (6-24 months).	<ul style="list-style-type: none"> • Social marketing of MN-rich local food and their products using mass media (like TV, radio, regular screening of film). 	<ul style="list-style-type: none"> • % of targeted women (as above) regularly consuming MN-rich food 	<ul style="list-style-type: none"> • MoAC / NTV / Commercial TV and Media 	<ul style="list-style-type: none"> • Support from civil society and political bodies. • Target groups have access to media like radio and TV
Increased awareness of women and people in	<ul style="list-style-type: none"> • Behavioural change communication activities 	<ul style="list-style-type: none"> • % of women (-9 to 24 months 	<ul style="list-style-type: none"> • MoAC / DAO 	<ul style="list-style-type: none"> • Target people having access

general on nutrient rich foods and of the importance of their consumption.		mothers) and adolescent girls knowing about the MN-rich food (an indicator need to be developed)		to media like Radio and TV
Result 4. 4. Reduced workload of women and better home and work environment.				
Targeted families have access to clean and cheap energy source (bio-gas plant in hills and Tarai to combine with homestead food production, and improved cooking stove in mountains).	<ul style="list-style-type: none"> • Efficient co-ordination to avail subsidy for bio-gas plant that is regularly provided by the government through 'bio-gas company'. • Access to cheap credit for other cost in biogas and improved stove with chimney to remove household smoke • Training for local dealer on bio-gas. 	<ul style="list-style-type: none"> • % of home gardens combined with bio-gas in the hills and Tarai • Perception on the availability of subsidy and credit. • Availability of local dealer dealing with bio-gas 	<ul style="list-style-type: none"> • MoAC / BSP / Financial institutes 	<ul style="list-style-type: none"> • Support from political bodies • Peaceful environment for transportation of goods
Adult males are willing to share some of the burdens of the women.	<ul style="list-style-type: none"> • Awareness-raising activities about the gendered division of work. • Awareness about the importance of women's health for the family and children. 	<ul style="list-style-type: none"> • % male taking some of the activities that women usually do. 	<ul style="list-style-type: none"> • MoAC / DAO 	<ul style="list-style-type: none"> • Support from political bodies
Result 4.5. MoAC staff capacity to contribute to multi-sectoral efforts improved				
Nutrition is mainstreamed in agricultural sector programs/activities	<ul style="list-style-type: none"> • Developing monitoring indicators and mechanisms to monitor the nutritional outcome of agricultural programs/activities. • Forming a joint monitoring team consisting of agricultural extension agents (JT/JTA agri. and vet) and 	<ul style="list-style-type: none"> • Development of indicators to measure nutritional outcome • Formation of the monitoring team 	<ul style="list-style-type: none"> • MoAC/ DAO 	<ul style="list-style-type: none"> • Encouragement to mainstream nutrition in planning process.

	women's groups.			
More human resources on nutrition at grassroots level of MoAC	<ul style="list-style-type: none"> Regular refresher training for JT/JTA (agri as well as vet) on nutrition 	<ul style="list-style-type: none"> % of JT/JTA trained on nutrition 	<ul style="list-style-type: none"> MoAC/ DAO 	<ul style="list-style-type: none"> Encouragement to take part in training
Increased motivation of agricultural and vet extension agents at the grassroots to work on nutrition outcome.	<ul style="list-style-type: none"> More resources to Ministry of Ag. and Cooperatives to provide incentives (more allowances when in the field, promotion) for grassroots extension agents and experts when they are in the field, and tied to the nutritional outcome. Developing a system of rewarding staff (allowances, leave, training, promotion etc) for the work they do in the multilateral assignments like Nutritional Steering Committees. 	<ul style="list-style-type: none"> Rs 100,000 support to district and service center for equipment. Rs 200000 for each DAO for field visit 30 % of salary as allowances for JT/JTA in project district 	<ul style="list-style-type: none"> MoF / Donors / MoAC 	<ul style="list-style-type: none"> Support from political leaders and proper co-ordination with MoF and Donors.
Increased coordination at the grassroots level for service delivery and monitoring.	<ul style="list-style-type: none"> A mechanism is formed for effective co-ordination of grassroots service providers (mainly ag and vet JT/JTA, community health female volunteers) through bi-monthly meeting, joint supervision of the targeted households and their gardens. 	<ul style="list-style-type: none"> Co-ordination committee formed at Service Center level and its frequency of meetings. 	<ul style="list-style-type: none"> MOAC / DAO 	<ul style="list-style-type: none"> Support from local political bodies

Notes:

1. Even though fruit consumption is low in Nepal – its production has not been emphasized here as it takes long time (at least 4 years).
2. Consumption of fruits here is assumed to come from 'income' pathway. (There were comments from few persons – who talked with me later on - that we should also emphasize fruit production).

3. For the production of MN-rich food in homestead garden and other support like biogas etc, we emphasize poorer women and adolescent girls, but for the consumption we emphasize all women -9 to 24 months of child birth. Poorer women of this group will get MN-rich food from production as well as income, for the wealthier women it should come mainly from 'income' and their own production done without support. Social marketing is meant for all.
4. Production of vegetable is a cheap venture and also it gives quick return for consumption or sale. The cost of production of vegetable in general range from Rs 1.6 to Rs 3.5 per kg depending upon the type (data are available from research reports). Given this, it should be possible to consume 1 kg vegetable per day – a minimum norm that we need to keep for the target.
5. A milch cow would cost depending upon the type and quality – Rs 50,000 to 80,000. If milk cows and buffaloes are introduced it also calls for some type of insurance because of the high cost of the animals. If such animals die, the women will have a huge financial burden unless loan is written off on this account. Again this might cost. Generally a 'local fund' is maintained for this purpose – generated by grant to which people also contribute a small amount. This fund is used for this insurance purpose.
6. For access to land for absolutely landless women – there could be various alternatives which are mentioned in the log frame – VDC can allot some common land for this purpose. Some NGOs have organized a group of such women and have made arrangement for lease of land. It is fenced and depending upon the interest of group members, either individual plots are allotted or it is all done in groups – but generally former has positive results. NGOs pay the land rent generally for some years. Once the income increases, then women are asked to pay the rent of the land.

Preliminary draft for discussion and comments – not for citation and circulation

Log-frame (Agriculture sector)

OVERALL PROJECT OBJECTIVE 4

Ministry of Agriculture and Cooperatives contribution to multi-sectoral efforts to accelerate stunting reduction of stunting increased
PROJECT PURPOSE

Consumption of animal food products improved among lower income adolescents, young mothers and young children

KEY PRODUCTS	INTERVENTION/ACTIVITY	INDICATORS	RESPONSIBLE	ASSUMPTIONS
Result 4.1. Increased availability of animal foods at the household and community levels				
Adolescent girls and women of the poorer groups (lowest wealth quintile) maintain a home garden (at least 100 sq m) managed by them	<ul style="list-style-type: none"> Forming of groups of adolescent girls and women from the poorer groups (lowest wealth quintile). Providing access to land to women/girl from absolutely landless family (on an individual basis or group basis with the help of VDC and community groups or providing land leasing opportunities, and support for that). Training them for home garden JT/JTA help plan the garden to supply year round veg (at least 1 kg veg. per day for the household). JT/JTA help supply seed/fertilizer through trusted ‘private sector’ JT/JTA help plan for the production of organic manure in the home garden. JT/JTA provide technical service in case of diseases and insects. Provision of cheap credit facility and links 	<ul style="list-style-type: none"> % of lower wealth quintile households (women) as member of the group. % of landless women having home garden. % of targeted women trained on home garden Number of days in a year in which regular supply of veg, eggs, meat and milk is produced in the home garden of the targeted people Number of VFM and home gardens. 	<ul style="list-style-type: none"> MOAC/DAO/ Service Center (JT/JTA ag and vet) 	<ul style="list-style-type: none"> Greater resource allocation to MoAC. Support from political bodies like VDC and DDC. Good public-private ownership in supplying inputs and irrigation facilities.

	<p>to institutions providing this service.</p> <ul style="list-style-type: none"> • JT/JTA help develop a ‘village model farm (VMF)’ in every ward covering 20 individual women’s garden in line with HKI’s internationally proven model. VMF to act as ‘resource center’. • Micro-irrigation facilities for the home garden 	<ul style="list-style-type: none"> • %age home gardens having year round irrigation 		
<p>Animal, poultry or fish production is integrated with home garden as per the suitability of the agro-ecological region and cultural preference (at least 1 milking cow, or 2 goats/sheep or pig, or 5 poultry birds, or small fish pond, or combination of these in the home garden)</p>	<ul style="list-style-type: none"> • JT/JTA help in supplying suitable breeds of animals, poultry birds or fish. • Linkage with forest officials for access to fodder for the animals. • JT/JTA help plan in such a way that there is regular availability of animal/fish products and/or egg – at least 2 eggs a day or 1 lit milk a day or some fish or meat regularly for the household. • JT/JTA provide technical service in case of diseases and health problems of animals, poultry or fish. • Provision of cheap credit facility and links to institutions providing this service. • Developing a ‘local fund’ – partly a grant from external agencies including government and partly the contribution of clients – for the insurance of the animals, and is managed by the groups formed. 	<ul style="list-style-type: none"> • Number of days of regular availability of animal/fish products and/or egg – at least 2 eggs a day or 1 lit milk a day or some fish for a targeted household. • Perception of target group on availability of breeds, animal feed/fodder, vet services and credit. • Coverage of targeted households into local insurance schemes 	<ul style="list-style-type: none"> • MOAC/DAO • Banks/Financial Institutions 	<ul style="list-style-type: none"> • More resources to MoAC. • Good co-ordination among DoA and financial institutions • Good public-private ownership in supplying inputs and breeds.
<p>Reducing post-harvest (or processing) losses of the food – particularly</p>	<ul style="list-style-type: none"> • IEC materials on post-harvest and processing techniques and ways to reduce losses. 	<ul style="list-style-type: none"> • Booklets/Pamphlets on post harvest and food processing. 	<ul style="list-style-type: none"> • MoAC/DAO 	<ul style="list-style-type: none"> • More resources to MoAC

MN-rich food	<ul style="list-style-type: none"> • IEC materials to enhance knowledge on processing practices that help retain nutrients. 	<ul style="list-style-type: none"> • Audio-visual program. 		
Result 4.2. Increased income among young mothers and adolescent girls from lowest wealth quintile				
Targeted households/ communities have surplus food for sale	<ul style="list-style-type: none"> • Targeted women's group (formed as above) to act as co-operative, or self-help group, for marketing (of inputs and surplus production) 	<ul style="list-style-type: none"> • Coverage (%) of targeted women in co-operative 	<ul style="list-style-type: none"> • MoAC/DAO 	<ul style="list-style-type: none"> • Support from political bodies like VDC and parties
Regular savings and credit activities of the co-operative or self-help group formed.	<ul style="list-style-type: none"> • Training on co-operative, savings and credit management for the targeted women. 	<ul style="list-style-type: none"> • % of targeted women trained 	<ul style="list-style-type: none"> • MoAC/DAO / Service center 	<ul style="list-style-type: none"> • Support from political bodies like VDC and parties
Increase in 'fund' generation among the targeted women groups	<ul style="list-style-type: none"> • Training on fund management, investment and income generation. 	<ul style="list-style-type: none"> • % of targeted women trained 	<ul style="list-style-type: none"> • MoAC/DAO / Service center 	<ul style="list-style-type: none"> • Enough marketing opportunities of the products.
Result 4.3. Increased consumption of animal foods by young mothers and children.				
Regular consumption of nutrient dense foods (green leafy vegetables combined with fruits, meat or fish, 1 egg per day or 0.5 lit milk per day or their combination) by young mothers and children (6-24 months).	<ul style="list-style-type: none"> • Social marketing of MN-rich local food and their products using mass media (like TV, radio, regular screening of film). 	<ul style="list-style-type: none"> • % of targeted women (as above) regularly consuming MN-rich food 	<ul style="list-style-type: none"> • MoAC / NTV / Commercial TV and Media 	<ul style="list-style-type: none"> • Support from civil society and political bodies. • Target groups have access to media like radio and TV
Increased awareness of women and people in general on nutrient rich	<ul style="list-style-type: none"> • Behavioural change communication activities 	<ul style="list-style-type: none"> • % of women (-9 to 24 months mothers) and adolescent girls 	<ul style="list-style-type: none"> • MoAC / DAO 	<ul style="list-style-type: none"> • Target people having access to media like

foods and of the importance of their consumption.		knowing about the MN-rich food (an indicator need to be developed)		Radio and TV
Result 4. 4. Reduced workload of women and better home and work environment.				
Targeted families have access to clean and cheap energy source (bio-gas plant in hills and Tarai to combine with homestead food production, and improved cooking stove in mountains).	<ul style="list-style-type: none"> • Efficient co-ordination to avail subsidy for bio-gas plant that is regularly provided by the government through 'bio-gas company'. • Access to cheap credit for other cost in biogas and improved stove with chimney to remove household smoke • Training for local dealer on bio-gas. 	<ul style="list-style-type: none"> • % of home gardens combined with bio-gas in the hills and Tarai • Perception on the availability of subsidy and credit. • Availability of local dealer dealing with bio-gas 	<ul style="list-style-type: none"> • MoAC / BSP / Financial institutes 	<ul style="list-style-type: none"> • Support from political bodies • Peaceful environment for transportation of goods
Adult males are willing to share some of the burdens of the women.	<ul style="list-style-type: none"> • Awareness-raising activities about the gendered division of work. • Awareness about the importance of women's health for the family and children. 	<ul style="list-style-type: none"> • % male taking some of the activities that women usually do. 	<ul style="list-style-type: none"> • MoAC / DAO 	<ul style="list-style-type: none"> • Support from political bodies
Result 4.5. MoAC staff capacity to contribute to multi-sectoral efforts improved				
Nutrition is mainstreamed in agricultural sector programs/activities	<ul style="list-style-type: none"> • Developing monitoring indicators and mechanisms to monitor the nutritional outcome of agricultural programs/activities. • Forming a joint monitoring team consisting of agricultural extension agents (JT/JTA agri. and vet) and women's groups. 	<ul style="list-style-type: none"> • Development of indicators to measure nutritional outcome • Formation of the monitoring team 	<ul style="list-style-type: none"> • MoAC/ DAO 	<ul style="list-style-type: none"> • Encouragement to mainstream nutrition in planning process.

More human resources on nutrition at grassroots level of MoAC	<ul style="list-style-type: none"> Regular refresher training for JT/JTA (agri as well as vet) on nutrition 	<ul style="list-style-type: none"> % of JT/JTA trained on nutrition 	<ul style="list-style-type: none"> MoAC/ DAO 	<ul style="list-style-type: none"> Encouragement to take part in training
Increased motivation of agricultural and vet extension agents at the grassroots to work on nutrition outcome.	<ul style="list-style-type: none"> More resources to Ministry of Ag. and Cooperatives to provide incentives (more allowances when in the field, promotion) for grassroots extension agents and experts when they are in the field, and tied to the nutritional outcome. Developing a system of rewarding staff (allowances, leave, training, promotion etc) for the work they do in the multilateral assignments like Nutritional Steering Committees. 	<ul style="list-style-type: none"> Rs 100,000 support to district and service center for equipment. Rs 200000 for each DAO for field visit 30 % of salary as allowances for JT/JTA in project district 	<ul style="list-style-type: none"> MoF / Donors / MoAC 	<ul style="list-style-type: none"> Support from political leaders and proper co-ordination with MoF and Donors.
Increased coordination at the grassroots level for service delivery and monitoring.	<ul style="list-style-type: none"> A mechanism is formed for effective co-ordination of grassroots service providers (mainly ag and vet JT/JTA, community health female volunteers) through bi-monthly meeting, joint supervision of the targeted households and their gardens. 	<ul style="list-style-type: none"> Co-ordination committee formed at Service Center level and its frequency of meetings. 	<ul style="list-style-type: none"> MOAC / DAO 	<ul style="list-style-type: none"> Support from local political bodies

Notes:

7. Even though fruit consumption is low in Nepal – its production has not been emphasized here as it takes long time (at least 4 years).

8. Consumption of fruits here is assumed to come from 'income' pathway. (There were comments from few persons – who talked with me later on - that we should also emphasize fruit production).
9. For the production of MN-rich food in homestead garden and other support like biogas etc, we emphasize poorer women and adolescent girls, but for the consumption we emphasize all women -9 to 24 months of child birth. Poorer women of this group will get MN-rich food from production as well as income, for the wealthier women it should come mainly from 'income' and their own production done without support. Social marketing is meant for all.
10. Production of vegetable is a cheap venture and also it gives quick return for consumption or sale. The cost of production of vegetable in general range from Rs 1.6 to Rs 3.5 per kg depending upon the type (data are available from research reports). Given this, it should be possible to consume 1 kg vegetable per day – a minimum norm that we need to keep for the target.
11. A milch cow would cost depending upon the type and quality – Rs 50,000 to 80,000. If milk cows and buffaloes are introduced it also calls for some type of insurance because of the high cost of the animals. If such animals die, the women will have a huge financial burden unless loan is written off on this account. Again this might cost. Generally a 'local fund' is maintained for this purpose – generated by grant to which people also contribute a small amount. This fund is used for this insurance purpose.
12. For access to land for absolutely landless women – there could be various alternatives which are mentioned in the log frame – VDC can allot some common land for this purpose. Some NGOs have organized a group of such women and have made arrangement for lease of land. It is fenced and depending upon the interest of group members, either individual plots are allotted or it is all done in groups – but generally former has positive results. NGOs pay the land rent generally for some years. Once the income increases, then women are asked to pay the rent of the land.