



Government of Nepal
National Planning Commission

FOOD, DIETS & NUTRITION: 25 YEARS OF PROGRESS FOR NEPAL

6th Annual Scientific Symposium on Agriculture–Nutrition Pathways & 25 Years of Nepal’s Progress in Nutrition

NOVEMBER 27-29, 2018
KATHMANDU, NEPAL



PROCEEDINGS REPORT 2018



About the symposium

The Feed the Future Innovation Lab for Nutrition in collaboration with the Government of Nepal and UNICEF Nepal hosted the 6th Annual Scientific Symposium on **Agriculture - Nutrition Pathways and 25 Years of Nepal's Progress in Nutrition** from 27-29th November 2019 in Kathmandu, Nepal. The symposium's focus was to discuss, share and support research on understanding the complex pathways through which agriculture and nutrition-sensitive interventions can be leveraged to improve the diet and nutrition of populations as well as to celebrate the country's success in the last 25 years in improving children's and women's nutrition and reflect on the policies and programs that have made this progress possible. The three-day event brought together 441 participants from the government, local, regional and international experts and academics, program implementers, policy makers and students. The symposium had seven scientific abstract-driven sessions with 26 presentations, six policy panels and 64 poster presentations. The 12 workshops held in the final day of the symposium were attended by 264 participants.

Opening remarks

Dr. Keith P. West, Jr. from the Johns Hopkins University and Feed the Future Innovation Lab for Nutrition, and **Mr. Tomoo Hozumi**, Country Representative from UNICEF delivered the opening remarks on behalf of the organizers. Dr. West welcomed the participants and commended the increase in the scientific rigor and the quality of work in Nepal since the inception of the symposium as evidenced by the remarkable growth in both the number of abstracts received and in attendance. Mr. Hozumi spoke about the urgency of accelerating the rate of decline of stunting in Nepal, arguing that a redoubling of efforts is essential to not only meet the World Health Assembly and the Multi-Sector Nutrition Plan II (2018-2022) goals, but also to increase the productivity of future generations in a rapidly aging Nepali society. Both speakers emphasized the Government of Nepal's commitment to nutrition and the need to strengthen the linkages between agriculture, food, diet, and nutrition efficiently and systematically.



Mr. Ovidiu Mic, Head of Cooperation for EU, spoke of the EU's commitment to support the Government of Nepal's nutrition action plan through partnerships with both the government and UNICEF. He emphasized that the partnership is based on their commitment to support nutrition-specific and -sensitive policies and practices, and to assist the government of Nepal in its Multi-Sector Nutrition Plan II. **Mr. Belay Mengistu**, Maternal Newborn and Child Health Team Leader USAID-Nepal, attributed the decline in stunting in Nepal since 1990 to government leadership and its investments in nutrition, the collaborative support of USAID, and the integration of public health into policies and programs. He described a need for further evidence on biological mechanisms, role of inequalities and socio-cultural barriers that affect nutritional status in Nepal. Finally, Mr. Mengistu emphasized the need to expand our existing knowledge and programs to contribute to the future of research, policy and implementation.

Keynote address



In his keynote speech, **Dr. Robert Bertram**, Chief Scientist from the Bureau for Food Security, USAID, described how agriculture can reduce malnutrition. Despite the global reduction in extreme poverty, hunger and stunting rates, Dr. Bertram cautioned that low income countries still face undernutrition and acute malnutrition due to caloric deficit and poor diet quality, often due to conflict. He added that the findings from the 2013 Lancet series show that the earlier approach of focusing only on nutrition-specific interventions is inadequate and that a multi-sectoral approach addressing additional elements presented in the agriculture-to-nutrition conceptual framework may be required - such as agri-food biology and safety, food

acceptability, affordability, and accessibility. He presented ideas on the framework that could be applied to the landscape of Nepal, leading to a greater impact on nutrition. Dr. Bertram concluded that while there are multiple possibilities, reducing contaminants like aflatoxins remains a challenge for Nepal and that there is a need to look for interventions both at the production and post-harvest phases to reduce them.

Inaugural address



Delivering her inaugural address, **Dr. Usha Jha**, the Honorable Member of National Planning Commission, expressed that the rapid reduction in stunting was largely driven by the government's dedication to reduce malnutrition. Acknowledging the stagnancy in reducing wasting, she emphasized the government's continued commitment make nutrition central to the national policy and plans as reflected by the Nepal Health Sector Strategy (2015-2021), National Multi-Sector Nutrition Plan II, and The Constitution, where food and nutrition security, access to quality health services, and water and sanitation are included as fundamental rights. Dr. Jha was hopeful that the current symposium would be meaningful in taking into account the government's input and collate the evidence shared and generated in Nepal to achieve the SDG goals through multi-sector collaboration and coordination.

Evolution of Vitamin A in Nepal and Current Context

Moderator:

Keith P. West, Jr., Johns Hopkins University & Feed the Future Innovation Lab for Nutrition



To See, Hear and Live: Public Health Success of Preventing Vitamin A Deficiency in Nepal

Keith P. West, Jr., Johns Hopkins University & Feed the Future Innovation Lab for Nutrition

Dr. Keith West described the vitamin A capsule distribution program in Nepal as an exemplar program noted for its collaboration between researchers, programmers and policy makers. He remarked that the government's willingness to translate discoveries into programs and policies, and the sustained political and financial support from the government and developmental organizations have been crucial in ensuring the program's sustainability and innovation. He described the historical burden of vitamin A deficiency in Nepal and how through the National Vitamin A Program, which took about a decade to scale up, over 89,000 children's lives have been saved. Dr. West then outlined the findings of various vitamin A studies conducted in Nepal over the last 30 years, mainly through the Nepal Nutrition Intervention Project, Sarlahi (NNIPS). These studies that showed that pre-school vitamin A supplementation reduced xerophthalmia and night blindness by 90%, child mortality by 30%, and hearing loss by 42%, while newborn supplementation reduces infant mortality by 13%. Similarly, supplementation before, during and after pregnancy reduced maternal mortality by approximately 40%. Dr. West concluded his presentation with evidence that dietary vitamin A intake is not adequate in Nepal and that edible oil can be a possible target for vitamin A fortification that could, in future, lead to a shift in policy in Nepal.

Panelists:

Madan Upadhaya, BP Koirala Eye Hospital

Ram Shrestha, Former Executive Director of Nepali Technical Assistance Group

Andrew Thorne-Lyman, Johns Hopkins University & Feed the Future Lab for Nutrition

Kedar Parajuli, Family Welfare Division, Department of Health Services, Ministry of Health and Population, Government of Nepal

The panelists described that the success of vitamin A distribution program was due to novelty in the approach of deploying female community health volunteers (FCHV), its holistic approach in having implementers from different sectors, innovation in procurement and delivery methods, and timely community feedback to maintain the program's momentum. However, vitamin A deficiency is still a lingering burden in many areas due to the unchanged consumption in vitamin A rich food and the shortfall of the distribution program in reaching remote populations. They opined that a recalibration of the program's focus may be necessary in the light of improving nutritional status through dietary intake rather than solely relying on pharmacological interventions. Lastly, the panelists considered the program to be instructive in achieving high program coverage in the poorest segments of the population and creating a unique link between the FCHVs and health system as a viable delivery platform.

Food Systems and the Food Policy Environment

Moderator:

Yam Bahadur Thapa, Nepal Agricultural Economics Society

Fortification of rice improves dietary adequacy and equity of nutrient intake in Nepal: evidence from a modelling approach

Naomi Saville, WFP & University College of London

Dr. Saville provided an overview of the rice fortification technology. She explained that rice is fortified via blending in hot-extruded fortified rice kernels with ordinary rice in the ratio of 1:100 by weight. Dr. Saville highlighted that Province 6 had the highest quantity of purchased rice and social safety net in Nepal. Hence, districts mainly from this province will be targeted. In summation, she stated that fortification of rice improves dietary adequacy for the fortified nutrients for all household members including pregnant mothers.



Horticulture retail supply chain: promising stakeholder in food-based nutrition intervention

Dripta Roy Chodhury, National Institute of Nutrition

Ms. Roy Chodhury described the results of a randomized control intervention trial followed by the integration of horticulture supply chain into the program. She explained the results of a three-arm food-based cluster randomized control intervention trial in 28 Anganwadi Centre schools of Alair Sub-District of Telangana India. The trial included 399 preschool children covered under Integrated Child Development Service (ICDS) welfare and found that children receiving guava had better vitamin C, folate, serum ferritin and hemoglobin status. She then proceeded to explain how the trial established a local retail supply chain by selecting a fruit vendor and establishing direct contact with the Anganwadi workers. Furthermore, she explained that the trial established feasibility of introducing regular supply of fruits in national nutrition programs.

The dynamics and temporal trends of energy and available macronutrients in Nepal: a joinpoint regression analysis of food balance sheet data from 1961 to 2013

Syed Mahfuz Al Hasan, Kagawa University

Mr. Mahfuz Al Hasan's study used joinpoint regression analysis to analyze the trends of macronutrients and energy intake over time in Nepal. The results of joinpoint regression, which maps the statistically significant slope change of energy intake change over time, shows that energy intake increased drastically between 1982 to 1989 and then again from 2001 to 2013. However, between 1982 to 1988 the energy intake from protein decreased while between 1970 and 2006 the energy intake from fat increased. He stressed that attention

is required while interpreting these temporal trends due to limitations in methodologies of data collection over time and the overestimation of food consumption and nutrients.

Nepal Multi Sector Nutrition Plan (MSNP): An Umbrella to Prevent from Undernutrition

Moderator:

Patrick Webb, Feed the Future Innovation Lab for Nutrition and Tufts University



A rigorous evidence and participation-based exercise in Nepal during formulation of Multi Sector Nutrition Plan II (2018-2022)

Pradiumna Dahal, UNICEF – Nepal

In this presentation, Mr. Dahal outlined the strategic planning process for Nepal's Multi Sector Nutrition Plan II (2018-2022). He explained the planning process included prioritization followed by causality analysis, then followed by development of theory of change for the problem identified; and, finally the strategic plan with a budgeting for the results. He also highlighted the inequities of stunting, an indicator of chronic undernutrition, across gender, residence area, wealth, education, age groups, geography, and provinces. Finally, he discussed the various basic underlying and immediate causes of malnutrition which acted as the guiding principles behind results framework.

Measuring the policy process: Applying a nutrition governance indicator at the sub-national level in Nepal

Grace Namirembe, Feed the Future Innovation Lab for Nutrition & Tufts University

Ms. Namirembe introduced nutrition governance index (NGI) approach that measures the quality of governance across six different domains. When applied across 21 districts among 520, it was found that the greatest improvement was in health and agriculture sector over a two-year period between 2014 and 2016. She concluded that increase in NGI score of Ministry of Agriculture is positive and important to improvement of nutrition via nutrition sensitive pathways.

Panelists:

Patrick Webb, Feed the Future Innovation Lab for Nutrition & Tufts University

Atmaram Panday, Former Secretary of the Government of Nepal

Geeta Bhakta Joshi, Former Honorable Member National Planning Commission (NPC), Government of Nepal

The panel discussion emphasized the importance of training and joint contribution to improve the capacity of people across sectors to improve nutrition. In addition, the panelists encouraged engagement and commitment of stakeholders to move forward with the best practices. The discussion also reflected on the journey to multisector nutrition plan.

Novel Technologies and Methodologies in Agriculture, Food Safety, and Nutrition

Moderator:

Ananda Gautam, Nepal Agricultural Research Council

Pilot testing of agricultural technologies: uptake and impacts on diet diversity in Bangladesh

Sabi Gurung, Feed the Future Innovation Lab for Nutrition & Tufts University

Dr. Gurung presented the impact of piloting three agricultural technologies - cool rooms, solar chimney dryers, and floating gardens - in Bangladesh. Outcomes were measured using mixed-methods in relation to nutrition, consumption patterns, income, and health of households from 2016 to 2018. For all three technologies, households said there were

positive impacts and that diet diversity increased. Some critical issues were the lack of electricity and long bureaucratic processes. She concluded that assessment on cost-effectiveness for scaling up is needed.



Effect of thermal processing on phytic acid, inorganic phosphorous and proximate composition of pigeon pea

Dinesh Subedi, Central Department of Food Technology, Tribhuvan University, Dharan

Mr. Subedi presented results from a study on the effects of thermal processing on phytic acid and inorganic phosphorous of pigeon pea. While the pigeon pea is an important source of protein, the presence phytic acid, which reduced proteins and mineral absorption, limits its nutritive value. This study compared three thermal processing techniques - moist heating (atmospheric cooking and pressure cooking) and dry heating - to determine which reduced the most phytic acid and retained other nutrients. Results indicate that pressure cooking was the best method because it 1) reduced the most phytic acid, 2) increased the most inorganic phosphorous, and 3) levels of other nutrients remained similar to other methods.

Energy expenditure, time use, and food intakes in agricultural and rural livelihoods: Findings from Nepal

Giacomo Zanelli, University of Reading & IMMANA

Dr. Zanelli talked about using accelerometers to measure energy expenditure, time use, and food intakes in agricultural and rural livelihoods in Nepal. The study triangulated three types of data - food intake, time use, and energy expenditure - measured through accelerometers and household questionnaires to estimate metabolic expenditure and intensity of movement. Traditional surveys focus on time intensiveness while this study focuses on energy intensiveness. He calculated the caloric adequacy ratio of women and men during different

parts of the farming season by dividing food intake with energy expenditure. The results showed variability in caloric expenditure and intake according to season and gender.

Breastfeeding Promotion & Infant and Young Child Feeding in Nepal

Moderator:

Patrick Kolsteren, Ghent University



Infant and Young Child Feeding Policy and Practice

Patrick Kolsteren, Ghent University

Dr. Kolsteren provided an overview of infant and young child feeding practices (IYCF) and policies from the last 25 years. He described that policies in Nepal from 1990s to 2005 focused on development of the health system, with special emphasis on training personnel. Since 2010, upon conducting various gap analyses and joining the SUN movement, Nepal has moved towards evidence-based multisectoral plans of action. Indicators for breastfeeding practices and stunting, such as limiting prelacteal feeding or continued breastfeeding, have been improving significantly between 1996 and 2016. Exclusive breastfeeding until 6 months of age has still not reached the desired prevalence, possibly due to post-natal depression and insufficient breast milk syndrome, while long term breastfeeding might actually indicate a lack of availability of food in some cases.

Panelists:

*Pooja Pandey, Suahaara II (USAID), Helen Keller International
Prakash Sundar Shrestha, School of Medical Science, Dhulikhel Hospital
Andre Renzaho and Kingsley Agho, Western Sydney University*

The panelists identified that increasing knowledge and changing key behaviors are essential to improving breastfeeding rates but described that a large gap exists between knowledge, practice and habit formation. They pointed out that an enabling environment and shifting of focus on maternal nutritional intake is required to bring forth a sustained increase in breastfeeding. Longer maternal leave and interventions tailored to fit the traditions of different provinces are also needed. However, concerns were raised about long-term maintenance of behavior change programs and the need to design them using data from monitoring systems as well as through pilot studies. They concluded that further research and oversight is required over the breastmilk substitute market as the data on imported milk quality is rare.

Salt Iodization to Control Iodine Deficiency Disorders in Nepal

Moderator:

Chandrakant Pandav, Iodine Global Network (South Asia)

The Evolution of Nepal's Successful Iodine Deficiency Disorders Control Program

Chandrakant Pandav, Regional Coordinator, Iodine Global Network (South Asia)

The history and success of the universal salt iodization (USI) program in Nepal was described by Dr. Pandav. He credited the government's commitment to decrease iodine deficiency with bilateral and public-private partnerships as the critical factors for reaching high coverage. He also mentioned social marketing campaigns through school curriculum and health sector training to have contributed to the USI program. Acknowledging of these successes, Dr. Pandav also presented results from the latest National Nutrition Status Survey 2016 revealing either adequate or excessive iodine intake by majority of the population. He called for a re-evaluation of the iodine standard in light of increasing salt consumption trends to mitigate the rise of non-communicable diseases.



Panelists:

*Purna Chandra Wasti, Department of Food Technology and Quality Control, GoN
Tirtha Rana, Nepal Public Health Foundation
Naveen Paudyal, UNICEF – Nepal*

The panel discussion on IDD program focused primarily on history and development of Universal Salt Iodization program and its coverage in Nepal. The panelists said that with 90% national coverage, iodized salt consumption is almost universal. They also pointed out that refined salt consumption is just above 50% in the Mountains of Nepal and stressed the importance of facilitating transport of refined iodized salt to Hills and Mountains. Finally, they concluded that Iodine intake is adequate, or even excessive, especially in Terai and emerging changes in salt consumption pattern such as consumption of processed food need to be understood.



Findings from Feed the Future Innovation Lab for Nutrition - Nepal Studies

Moderator:

Kedar Baral, Patan Academy of Health Sciences

Dietary change in Nepal 2013-2016: Insights from the Nepal Annual Household Surveys.

Gerald Shively, Feed the Future Innovation Lab for Nutrition & Purdue University

Dr. Shively examined associations between location (urban and rural) and geography (Hills, Mountains and Terai) in explaining patterns of food expenditures, household dietary diversity sources, and consumption of animal source food. He found that income responses to household dietary diversity appeared relatively weak. He concluded that location explains roughly as much of the variation in diversity scores as income, wealth, and education combined.

Household food expenditure on ultra-processed foods is associated with higher wealth and education in Nepal

Shibani Ghosh, Feed the Future Innovation Lab for Nutrition & Tufts University

In her presentation, Dr. Ghosh explained that even though households consume both ultra-processed and micronutrient rich food, there was a negative association between ultra-processed food share and micronutrient food share. She also explained that 90% of the households reported purchasing of ultra-processed foods and the purchasing was strongly and positively associated with wealth index and education status of the households.



Dietary quality over time protects young Nepali children from poor development

Laurie Miller, Feed the Future Innovation Lab for Nutrition & Tufts University

Dr. Miller's presentation focused on the relationship between children's diet, home environment, socioeconomic status and child development measured using the Ages & Stages Questionnaire (ASQ) examined in a study in Banke, Nepal. Dr. Miller found positive associations between factors such as wealth, mother's education, home quality, and dietary diversity (including specific items such as animal source foods and fruits & vegetables) and child development indicators. Interestingly, she stated that 20% of surveyed mothers reported depression and depression was negatively associated with development.

Factors associated with dietary patterns in Nepali women

Andrew Thorne-Lyman, Feed the Future Innovation Lab for Nutrition & Johns Hopkins University

Dr. Thorne-Lyman explained using latent class analysis approach to classify the Nepalese diet, reported from the PoSHAN community studies, into patterns based on consumption of food group. He explained that seven distinct diet patterns were generated using the latent class analysis approach and reported associations between diet patterns and various indicators of socioeconomic status, caste, geography and women's nutritional status.



Etiology of Anemia and Findings from Micronutrient Survey 2016 in Nepal

Moderator:

Maria Jefferds, Centers for Disease Control and Prevention

Etiology of Anemia: Findings from the Nepal National Micronutrient Status Survey

Maria Jefferds, Centers for Disease Control and Prevention

Dr. Jefferds presented results of a logistic regression analysis of factors associated with child anemia using data from the Nepal National Micronutrient Status Survey 2016. Findings showed that recent fever, worm infection, underweight, acute inflammation, genetic disorder, and being of castes other than Brahmin/Chettri increased the odds of being anemic in children. In contrast, better ferritin status, vitamin A status, and usage of micronutrient powder decreased the odds of being anemic in children. Dr. Jefferds also presented data on the determinants of anemia among adolescents and women. Finally, she stressed the benefits of combining different strategies such as micronutrient powder, iron-folic acid supplementation, fortification, infection control, and sanitation to control anemia.



Panelists:

Madhu Dixit Devkota, Institute of Medicine

Vanessa Garcia- Larsen, Johns Hopkins University

Kedar Parajuli, Family Welfare Division, Department of Health Services, Ministry of Health and Population, Government of Nepal

The panelists praised Nepal's efforts in decreasing anemia over the years; however, stated that anemia prevalence is high despite the universal iron supplementation program targeting pregnant women. The panelists pointed out that comprehensive understanding of risk factors of anemia and joint efforts from all stakeholders are important to reduce the burden of anemia. They also acknowledged that factors that contribute to the seemingly intractable anemia burden in Nepal have not been well understood. The panelists were hopeful that the increase in Nepal's GDP and income of households would improve anemia status but reiterated the challenges that remain in developing evidence-based strategies to reduce anemia.

Issues Related to Pre- and Post-harvest Management in Food-producing Households

Supported by: Feed the Future Innovation Lab for the Reduction of Post- Harvest Loss

Moderator:

Jagger Harvey, Feed the Future Innovation Lab for the Reduction of Post- Harvest Loss & Kansas State University



A Machine Learning Approach for Rainfall and Crop Prediction to Assist Farmers in Suitable Crop Production

Rishin Haldar, Institute of Engineering

Dr. Haldar talked about a study that used machine learning to discern rainfall patterns to increase yield by providing recommendations to farmers about alternative or complementary regional crop selection by factoring in the crop's rain requirements. The study used the Indian

Meteorological Department's archived data on Bundi district, Rajasthan, on maximum temperature, cloud cover, vapor pressure and wet day frequency to generate predicted rainfall (with 84% accuracy). Then, the predicted rainfall was compared with the minimum and maximum rainfall boundaries of the chosen crops, by which the crop(s) could be suggested to the farmer. The study concluded that the nearest centroid classifiers used in the study performed well for multidimensional applications and we may benefit with by archiving data archived for at the regional and national levels.

Dried blood spots for aflatoxin B1 assessment in a field study with pregnant women

Shibani Ghosh, Feed the Future Innovation Lab for Nutrition & Tufts University

Dr. Ghosh presented a study examining the agreement between aflatoxin B1 (AFB1)-lysine adduct levels measuring using dried blood spots (DBS) versus a serum sample, where DBS is proposed as a viable, non-invasive, low-cost alternative to venous blood draw for assessing AFB1 exposure. The study conducted in about 300 pregnant women in Banke, Nepal was the first conducted in a population with relatively low aflatoxin exposure. Contrary to previous studies showing strong correlations in samples with higher aflatoxin levels, this study showed modest correlation between AFB1-lysine adduct levels in DBS and serum samples. She concluded by suggesting that while DBS might allow research in more limited settings, specialized and well-trained clinical personnel are key for data quality.

Better pre- and post-harvest management reduces aflatoxin contamination in maize in different ecologies of Nepal

Ravindra Shrestha, CIMMYT – Nepal

The study presented by Mr. Shrestha assessed the pre- and post-harvest aflatoxin contamination level in maize in Nuwakot and Dang districts of Nepal by comparing different fertilizer management regimens alongside the effect of storage (traditional and improved) methods. They found that there is a high prevalence of contamination in stored, husked maize. High contamination was also seen in maize grown under a urea only regimen and under high levels of fertilizer, while moderate fertilizer application had low contamination levels. Aflatoxin contamination was decreased under all storage methods tested, i.e. using four different brands of hermetic storage bags together, non-hermetic plastics, and farmers

methods (i.e. stacked inside or outside the house). Contamination was over the safety standard in maize stored without de-husking, so immediate de-husking is recommended to minimize aflatoxin. Mr. Shrestha also stressed the importance of maintaining soil fertility and effective storage methods to limit aflatoxin contamination.

Linkages: Diet, Nutrition and Health

Moderator:

Indu Adhikary, Independent Consultant



Infant and young child feeding coping among the food insecure households in rural Nepal

Dibya Laxmi Manandhar Rijal, UNICEF–Nepal

To generate information about IYCF strategies for food insecure households, Ms. Rijal presented a mixed-methods study that collated information about coping strategies for feeding young children in food insecure households. She found that there is a diverse array of coping mechanisms that is affected by socio-cultural and economic factors, and that people had limited knowledge on nutritional value of locally available food sources. Ms. Rijal highlighted the need for further feasibility studies on medium- and long-term nutrition-sensitive interventions such as early childhood care and development services, social inclusion in income generating activities, and food or cash transfer schemes for infant and young nutrition.

Factors associated with high intakes of unhealthy snack foods and sugar-sweetened beverages among young children in Kathmandu Valley, Nepal

Alissa Pries, ARCH Project, Helen Keller International

In her study, Ms. Pries found that snack foods and sugar sweetened beverages consumption among children 12-23 months in Kathmandu is high, especially among children from poorer households and older children (~ 3 times more likely). Children whose parents are employed in paid work, and have lower education levels, and children not from upper castes were about 1.6 times, 2.3 times and 3.6-4.7 times more likely to consume these foods respectively. Ms. Pries concluded that since families from lower socio-economic status are already vulnerable to food and nutrition insecurity, they should be targeted to promote healthy snack options that are affordable and available. She added that these foods are becoming a prominent part of children's diet in Kathmandu's changing food systems and more research is needed to assess the nutritional risks of high consumption.

Dietary factors associated with overweight and obesity in reproductive aged females residing in Bharatpur metropolitan city

Richa Bhattarai, Central Campus of Technology, Tribhuvan University, Dharan

Ms. Bhattarai's cross-sectional study on the risk factors of obesity and overweight in women or reproductive age in Bhaktapur found that a high prevalence, 32.3% were overweight and 9.7% were obese. The results demonstrated that calorie and carbohydrate intake, and fruits consumption were associated with the risk of being overweight/ obese. Intake of most nutrients were inadequate, except for proteins and fats and consumption frequency of fibre and calcium rich food was low but behavioural practices promoting positive energy balance was followed by the women. Ms. Bhattarai concluded that there is a need for more behavior change programs to improve dietary practices in women residing urbanized area.

Dietary diversity and nutritional status of infant and young children aged 6-23 months in Bardagat Municipality in Nawalparasi District

Ranjita Chaudhary, Institute of Medicine, Tribhuvan University

In Ms. Chaudhary's findings, over 18% of children in the Terai district were wasted and wasting was much higher than both stunting and underweight (~10%). Greater wealth was

associated with increase in the odds of meeting the minimum dietary diversity as was exposure to IYCF information. Majority of the children were fed starchy staple foods, while very few children were fed eggs, flesh food and fruits. Lower dietary diversity was found to be a strong predictor of wasting. Ms. Chaudhary recommended that health education and the inclusion of a variety of food groups into daily diet might be essential in improving children's nutritional status.

Social Equity, Gender and Access to Food

Moderator:

Swetha Manohar, Feed the Future Innovation Lab for Nutrition & Johns Hopkins University



Trends and predictors of inequality in childhood stunting in Nepal from 1996 to 2016

Mirak Raj Angdembe, Research and Action for Public Health Nepal

Dr. Mirak Raj Angdembe described the trends and predictors of inequality for a health sector support program implemented by DFID. The study used data from five rounds of the Nepal Demographic and Health Survey (1996-2016) to find predictors associated with stunting. The results show that stunting consistently declined in all wealth quintiles, with the largest reduction in the richest quintile. Comparing the 1996 and 2016 concentration curve with the line of equality, showed that inequality had increased in the two decades. Lastly, he showed

that the major contributors to inequality differed between 1996 (mother's education, caste, birth order, wealth) and 2016 (mother's BMI, birth order).

Land and livelihood strategies for women's empowerment in nutrition-sensitive agriculture: a mixed methods approach

Sneha Krishnan, London School of Hygiene and Tropical Medicine

Dr. Sneha Krishnan presented preliminary results from a mixed method study on how women's land ownership affects livelihood strategies and how women's empowerment is linked to nutrition-sensitive agriculture. Results indicated that land ownership patterns affect strategies to source food through different pathways. Agriculture production strategies and land ownership were found to affect maternal diet diversity - if a woman owned land, barring starch-based food, she would have access to more than five food groups. However, decision making on how land is used, and produce is sold have gendered dimensions, making the relationship between land ownership and access to food and dietary diversity more nuanced.

Provincial disparities in child undernutrition in Nepal

Sumit Karn, Independent Consultant

Mr. Sumit Karn talked about the provincial disparities in child undernutrition in Nepal. Since most interventions are conducted at a provincial level, cataloging and understanding the differences between them is critical for the design of tailored programs. Mr. Karn's study examined socio-demographic and socioeconomic variables, such as of child's age, woman's age, wealth index, BMI, ethnicity, handwashing, and treatment of water that account for the provincial disparities in child undernutrition. He concluded that variables show varying associations at the provincial level, meaning that interventions cannot have a blanket approach to tackle undernutrition.



Evaluations of Agricultural and Nutrition Interventions

Moderator:

Kenda Cunningham, Suaahara II (USAID), Helen Keller International

Improving maternal and child diets in Nepal: what is the role for large-scale multisectoral nutrition interventions?

Indra Kshetri, Suaahara II (USAID), Helen Keller International

In assessing the associations between exposure to intensive behavior change strategy and maternal and child dietary diversity, Mr. Kshetri presented data from the large-scale Suaahara II project with results that suggested a multi-pronged intervention package is necessary to address poor dietary practices. 35% of surveyed households were exposed to at least one of the three Suaahara II platforms. Among them, interpersonal communication, and community mobilization were shown to have positive, significant association with maternal dietary diversity, whereas mass media was shown to have a positive, significant association with child dietary diversity. Exposure to all three platforms resulted in a stronger, more positive association with maternal dietary diversity. The strength of association between exposure to Suaahara II platforms and child dietary diversity increased in a dose response manner, but only among older children. Results also showed that barriers to adopt behavior change differ for children and mothers.

Impact evaluation of Agriculture and Food Security Project

Gogi Grewal, The World Bank – Nepal

Results from the Nepal Agriculture and Food Security Project (AFSP) designed to enhance food and nutritional security in 19 districts of Nepal were presented by Ms. Grewal. AFSP components included technology development, dissemination and adoption through agricultural, livestock, and nutrition interventions. Statistically significant increase in income was observed in intervention communities (11-18%) with both long and short exposure, livestock income was 18% higher, but there was no statistical difference in crop income. More AFSP households joined farmer's groups that resulted in significant gains in income from crops and livestock. Finally, Ms. Grewal said that improved food security indicators were not statistically better in AFSP areas. Contrarily, non-AFSP communities experienced nutrition

and food security improvements, even without the income gains experienced by AFSP households.



Improving agriculture, nutrition, and WASH knowledge among health workers and Female Community Health Volunteers in Nepal

Shraddha Manandhar, Suaahara II (USAID), Helen Keller International

Ms. Manandhar presented data from Suaahara II that looked how exposure to another sector is associated with knowledge about the sector among the health workers (HWs) and FCHVs of Nepal. HWs and FCHVs received training on agriculture/livestock, nutrition/health and WASH and interacted with Suaahara II and government front line workers (FLW) specialized in these sectors. Results from regression showed that those exposed to trainings and interactions in agriculture scored higher, but no significant association was seen for nutrition. However, FCHVs who received training on more nutrition topics performed significantly better in child nutritional knowledge; while health workers who were trained in nutrition in the past year performed significantly better. Concerning WASH, FCHVs who had ever received training scored higher in handwashing knowledge but there was no significant association between the number of interactions with FLWs and WASH knowledge. Finally, Ms. Manandhar said these findings are applicable for Nepal's Multi-Sector Nutrition Plan II (MSNP-II) efforts - more trainings and interactions with FLWs from other sectors can play a significant role in health workers and FCHVs gaining cross-sectoral knowledge.

Understanding facilitators and constraints of sustained activities of the Action Against Malnutrition through Agriculture (AAMA) project - an integrated rural nutrition intervention in Nepal

Robin Shrestha, Feed the Future Innovation Lab for Nutrition & Tufts University

Dr. Shrestha shared the results of a follow-up study of the AAMA project implemented in three districts of Far-Western Nepal. They found that most AAMA activities, especially homestead food production, and nutrition education and BCC (on exclusive breastfeeding, complementary feeding and immunization) were reported to have self-sustained and or scaled up. Small animal husbandry was reported to have been retained or expanded but mostly among Village Model Farmers (VMFs) in 2 districts but was discontinued among Homestead Food Garden Beneficiaries (HFPBs) in all 3 districts. Sustainability and scaling up also depended on other concurrent programs as seen by the sustained commercial vegetable and poultry farming in Kailali district that was reinforced by opportunities from Suaahara. Dr. Shrestha stressed the need for a continued strengthening of coordination between the VMFs and local governance to increase sustainability.



Impact of a pilot school garden project on children's food knowledge, preference and behaviour in Nepal

Dhruba Raj Bhattarai, Nepal Agricultural Research Council

Dr. Bhattarai described findings from a trial that sought to see if school gardens linked to complementary lessons and promotions 1) raised children's awareness and consumption of healthier foods, and their knowledge sustainable agriculture, nutrition and WASH, 2) improved dietary behavior and nutritional status of children 10-15 years old. A significant positive impact was seen in the treatment schools in the level of awareness in agriculture, nutrition and WASH knowledge and children's preferences for fruits and vegetables but failed to increase in their consumption. Dr. Bhattarai emphasized the importance of raising parental awareness and knowledge and increasing household availability of fruits and vegetables for sustained behavior change. Lastly, he described the project as an example of integrated approaches that was designed through the collaboration among three ministries - agriculture, nutrition and health.

Evaluation of Sunaula Hazar Din- Community Action for Nutrition Project Nepal

Manav Bhattarai, The World Bank – Nepal

The Sunaula Hazar Din project aimed to improve practices that contribute to reduced under-nutrition of women of reproductive age and children under the age of two. Dr. Bhattarai explained how the project was demand-based and required the communities to identify the drivers of malnutrition in their areas and propose appropriate interventions to reduce malnutrition. A rapid results approach facilitated communities to achieve their goals in a 100-day window. Evaluation of the project found that consumption of IFA supplements and animal-sourced protein improved in pregnant women. Improvements were also seen in child anthropometric measures and access to improved toilet and handwashing behavior by mothers but a decrease in breastfeeding and limited increase in complementary feeding practices for children was also seen. Dr. Bhattarai said that the results may have been influenced by the earthquake where children 6-59 months with severe acute malnutrition received therapeutic care and households were provided with hygiene and sanitation kits as part of humanitarian response. The overall the impact evaluation showed significant increases in - usage of IFA supplements by pregnant women and usage of improved toilets.



A Vision for Nutrition in Nepal During the Sustainable Development Goals Era (2015-2030)

Panelists:

Usha Jha, National Planning Commission, Government of Nepal

Harriet Torlesse, UNICEF ROSA

Ramesh Kant Adhikari, KIST Medical College

Keith P. West, Jr., JHU & Feed the Future Innovation Lab for Nutrition

Maria Jefferds, Centers for Disease Control

Patrick Kolsteren, Ghent University

Patrick Webb, Feed the Future Innovation Lab for Nutrition & Tufts University

Chandrakant Pandav, Regional Coordinator, Iodine Global Network (South Asia)



The final session brought together session moderators to synthesize evidence shared during the symposium and share their insights with respect to Nepal's vision for nutrition. They highlighted the strong association between the nutritional status of women and their children and asserted that a stronger emphasis on women and adolescents must be placed to have long-term improvements in nutrition. Speakers talked about the inconsistencies in Nepal's nutritional achievements including a pronounced decrease in stunting and increase in breastfeeding but persistent problems of high wasting, anemia and poor diets. They stressed the importance of working towards equity in interventions to address malnutrition, including finding ways to increase coverage of programs targeting the poor. They recommended local adaptation of interventions and indicators such as a region or district-specific dietary diversity score that is based on locally available food sources. Given the inadequacies of dietary quality and intake of nutrient rich foods, the speakers supported the continuation of micronutrient supplementation to address nutritional deficiencies. They described the need to go beyond status assessments to generate evidence on the underlying biological and social

mechanisms causing deficiency and to identify sustainable processes that lead to tangible health outcomes.

Way forward:

The speakers posited that nutritional outcomes and indicators should be placed in a life-course perspective with emphasis on familial, community and structural factors that sustain behavior change. For this, guidance from research should be based on biological significance and findings should be contextualized in terms of livelihoods and national agenda. The speakers called for a focus to be placed on key population, especially on adolescents, and that efforts should be made to end child marriage and adolescent pregnancy, provide higher education for both girls and boys and to improve their diets to break the cycle of malnutrition.

They underlined that while a high burden of stunting and wasting has persisted in Nepal, the prevalence of overweight and obesity has been gradually increasing and require national, multi-system approaches that help mitigate both over- and under-nutrition. They added that people should be empowered to make good food choices by using technology to create behavior change, limiting the sale of unhealthy food items, adding nutrition-related curriculum in schools, and providing counseling on healthy eating as part of ante-natal care. They called for policymakers to review their guidelines on packaged and processed food, breastmilk substitutes and iodine fortification, and to ensure that national micronutrient recommendations are aligned with the WHO as a strategic approach to reaching Nepal's SDG goals.

They recommended the use of multiple data sources in conjunction with the DHS to generate better evidence on nutrition and to conduct routine surveillance to better monitor micronutrient programs through priority indicators. The speakers concluded that maintaining partnerships between the government, donors, researchers, and international organizations is critical to achieve high program coverage in Nepal, and that the continuation of supplementation programs is needed to prevent deficiency owing to the lack of dietary safety nets.

Acknowledgement

Feed the Future Innovation Lab for Nutrition - Asia and UNICEF thank the following partners and individuals for making this event possible: the National Planning Commission and the Honorable Member, Dr. Usha Jha, our co-organizers - Nepali Technical Assistance Group, Institute of Medicine and, Nepal Agricultural Research Council, our donors - USAID-Nepal and EU and additional support from the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss and Innovative Methods and Metrics for Agriculture and Nutrition Actions (IMMANA).

Steering Committee Members

Archana Amatya (Chair), Institute of Medicine
 Ramesh Kant Adhikari, KIST Medical College & Hospital
 Abhigyna Bhattarai, Nutrition Innovation Lab/ Johns Hopkins University
 Stanley Chitekwe, UNICEF
 Yuga Nath Ghimire, National Agricultural Research Council
 Shibani Ghosh, Tufts University
 Bikash Lamichhane, Child Health Division, Ministry of Health & Population
 Swetha Manohar, Johns Hopkins University
 Sanjay Rijal, UNICEF
 Deepak Thapa, Nepali Technical Assistance Group
 Keith West, Johns Hopkins University

Scientific Committee Members

Andrew Thorne-Lyman (*Chair*), Johns Hopkins University
 Pradiumna Dahal, UNICEF
 Devendra Gauchan, Biodiversity International
 Dhiraj Karki, Nepal Technical Assistance Group
 Angela K.C., Johns Hopkins University
 Swetha Manohar, Johns Hopkins University
 Kedar Parajuli, Family Welfare Division, Ministry of Health & Population
 Rajan Paudel, Institute of Medicine
 Raj Kumar Pokharel, Child Health Division, Ministry of Health & Population
 Sanjay Rijal, UNICEF
 Gerald Shively, Purdue University
 Binjwala Shrestha, Institute of Medicine
 Robin Shrestha, Tufts University
 Krishna P. Timsina, National Agricultural Research Council

Operations Committee Members

Abhigyna Bhattarai (*Chair*), Nutrition Innovation Lab/ Johns Hopkins University
 Sandesh Adhikari, Nepali Technical Assistance Group
 Rajan Chalise, Nutrition Innovation Lab/ Johns Hopkins University
 Dhiraj Karki, Nepali Technical Assistance Group
 Ashish Lammichane, Nutrition Innovation Lab/ Helen Keller International

Binod Nepal, UNICEF
Mukunda Nepal, UNICEF
Preeti Subba, Nepali Technical Assistance Group

Logistic Support

Binod Shrestha, Nutrition Innovation Lab/ Johns Hopkins University
Priya Shrestha, Nepali Technical Assistance Group
Shilpa Shrestha, Nepali Technical Assistance Group

Volunteers

Akshaya Acharya, Nepali Technical Assistance Group
Anjali Shrestha, YPARD
Anushuya Guragian, YPARD
Bandana Wasti, YPARD
Muna Dahal, Nepali Technical Assistance Group
Nitesh Shrestha, Nepali Technical Assistance Group
Pranay Udas, Nepali Technical Assistance Group
Prativa AC, Nepali Technical Assistance Group
Rashmi Jha, Institute of Medicine
Ristina Thapa, Nepali Technical Assistance Group
Rita Pradhan, Nepali Technical Assistance Group
Sabina Sidgel, Institute of Medicine
Sajjan Yogesh, Institute of Medicine
Sangita Joshi, Nepali Technical Assistance Group
Saurab Pariyar, Nepali Technical Assistance Group
Shweta Adhikari, YPARD
Smriti Dhakal, Nepali Technical Assistance Group

Webpage Support

Ranjita Shrestha, Tufts University

Note takers/ Rapporteurs

Sudikshya Acharya, Nutrition Innovation Lab/ Helen Keller International
Ashish Pokharel, Nutrition Innovation Lab/ Helen Keller International
Tiffany Tong, Independent Consultant

PRIMARY FUNDERS



WITH ADDITIONAL SUPPORT FROM



This report was partly funded by the USAID Feed the Future Innovation Lab for Nutrition, and the European Union and UNICEF partnership for improved nutrition 'Poshanka laagi Haatemalo'. The views expressed herein can in no way be taken to reflect the official opinion of the USAID, European Union and UNICEF.

Authors: Angela K.C. & Abhigyna Bhattarai

For further information please visit: <https://www.nutritioninnovationlab.org/symposiums/2018-symposium>