

Synthesis of LANSA Research in Bangladesh

A Report

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SYNTHESIS OF LANSA RESEARCH IN BANGLADESH: A REPORT

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Abstract

Malnutrition is a major public health problem across Bangladesh. While, the potential of agriculture in improving people's diets and thereby nutrition outcomes is understood, policy instruments or strategies in this direction have traditionally been uncoordinated because of insufficient evidence on the intersection between agriculture and nutrition. The LANSA (Leveraging Agriculture for Nutrition in South Asia) research programme tried to address this knowledge gap. LANSA activities in Bangladesh included mapping of stakeholder perceptions of sectoral policies and programmes, primary research, secondary data analysis, policy dialogue, capacity strengthening, research uptake and dissemination. This paper reviews the published outputs from LANSA research in Bangladesh, synthesizes the evidence generated, and attempts to identify the knowledge gaps that still exist and make suggestions for further research. Overall, the findings highlighted the need and importance of political commitment to address malnutrition, improving literacy about nutrition sensitive agriculture, strengthening institutional capacities and coordination, and improving the effective use of financial resources.

Broadly, the following recommendations for enhancing agriculture to improve nutrition emerged:

1. Integration of nutrition and agriculture and strengthening coordination across all the government ministries.
2. Adoption of a convergence and equity approach in the programmatic choices giving emphasis on agro-ecology and seasonality.
3. Prioritization and acceleration of dietary diversity and nutrition sensitive interventions.
4. Formulation of gender sensitive approaches to support nutrition interventions in all sectors at all levels, through technical, financial and capital support for fishery, poultry, horticulture, homestead gardening, social forestry and food production sectors that support women's empowerment.

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5. Augmentation of value chain interventions through market price stabilization, proper marketing system, standardization of processing and packaging system for the products.
6. Focus on production and distribution of foods with increased nutritional value, either via bio-fortification or industrial fortification.
7. Improve infrastructure and examine removal of barriers to food distribution or directly subsidise food distribution programmes.

SYNTHESIS OF LANSА RESEARCH IN BANGLADESH: A REPORT

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I. Introduction

Malnutrition is a major public health problem across Bangladesh. Over 36 per cent of children under the age of five suffer from chronic malnutrition (stunting) and significant variations exist across the country (NIPORT, 2014). The prevalence exceeds 40 per cent in different haor¹ and coastal areas of the country (HKI and JPGSPH, 2016). The prevalence of undernourished women (BMI < 18.5) declined from 34 per cent in 2004 to 19 per cent in 2014, however, overweight or obesity (BMI > 23) increased from 17 per cent to 39 per cent (NIPORT, 2014). Deficiencies of multiple micronutrients particularly, iron, zinc and iodine affect more than half of pre-school children and pregnant women (icddr, 2013). A majority of the population is primarily dependent on cereal (rice) based diet with limited diversification. The most recent Household Income and Expenditure Survey (HIES) round shows that rice consumption has declined to around 367 gram/day; diversification is occurring though the pace has to be accelerated (HIES 2016). There is also renewed interest in agriculture and sustainable food-based solutions as a key strategy for improving diets and bringing greater nutritional benefits to poor and malnourished people. While, the potential of agriculture in improving people's diets and thereby nutrition outcomes is understood, policy instruments/strategies in this direction have traditionally been uncoordinated because of insufficient evidence on the intersection between agriculture and nutrition. The LANSА (Leveraging Agriculture for Nutrition in South Asia) research programme that commenced in 2012 tried to address the knowledge gap in this area in four countries of South Asia, viz. Afghanistan, Bangladesh, India and Pakistan. The core research question addressed by LANSА was: *“How can South Asian agriculture and related food policies and interventions be designed and implemented to improve their impacts on nutrition?”*

This was examined through three thematic lenses or research pillars which are explained below:

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¹ Wetland ecosystem areas

- 1) **Enabling environment for nutrition:** Enabling environment refer to the basic social, economic and political conditions that are broadly favourable to nutrition. LANSA attempted to answer how enabling is the wider context in linking agriculture and food systems to other determinants of nutritional status? This research question addressed two specific questions: 1) what are the barriers and facilitators to nutrition-sensitive agricultural development in the region? and 2) where, to what extent, and how, can the major disconnects between agriculture and nutrition be bridged through non-agricultural interventions? The main purpose under this research pillar was to identify key connections between agriculture and nutrition and propose ways of bridging them.
- 2) **Agriculture policy and value chain:** This research strand attempted to understand how the nutrition impact of agriculture and agri-food value chains can be enhanced through appropriate strategies and policies. This pillar was subdivided into two interrelated themes: the first examined the level of the disconnect between agriculture and nutrition that shaped the policy choices about which crops or livestock, regions, institutions and infrastructure to invest in, or have consequences for the incomes and nutrition of the poor. The second sub-theme assessed the degree to which interventions along agri-food value chains beyond the farm-gate can better connect agriculture and nutrition and how these better connections can make nutritious food more accessible to poor people who are nutritionally deficient.
- 3) **Scope for Nutrition Sensitive Agriculture:** Studies under this research theme sought to understand whether, why and how agricultural interventions improve nutrition. The key assumption was that innovative agricultural interventions may improve agricultural productivity, reduce poverty, improve access to services, and improve food and nutrition security with better health outcomes.

Gender, fragility and systems of innovation were three cross-cutting themes across the research pillars. LANSA research in Bangladesh from 2013-2018 was conducted primarily by BRAC and IFPRI. There were also three smaller studies under the LANSA responsive window grant, the outputs from which are in the pipeline. This paper reviews the published outputs from LANSA research in Bangladesh and synthesizes the evidence and attempts to identify the knowledge gaps

that still exist and make suggestions for further research. The rest of the paper is organized into three sections: the first comprises the synthesis of the findings under each of the research pillars, the subsequent section describes the reflections from policy perspective and the final section concludes with recommendations emerging from the synthesis.

II. Synthesis of the Research Evidence

1) Enabling Environments

Landscape analysis and evidence review of agriculture nutrition linkage

A series of landscape analysis and review of the existing evidence was undertaken to understand the major opportunities, challenges and gaps with regard to knowledge and action for pro-nutrition agricultural development. A mapping of relevant stakeholders was undertaken in the inception phase in 2012, and they were categorised with regard to their involvement, influence and interest in linking agriculture and nutrition (van den Bold et al., 2015). Fifteen highly influential stakeholders were selected and interviewed to capture their perceptions and views on the broader agri-food system and nutrition, to provide a baseline for further follow up. The findings pointed to mixed perspectives on countries' policy sensitivity towards nutrition. People's tendency to define nutrition from health perspective and assess agriculture based on rice-based production was recognized as a common gap in agriculture nutrition linkage. There was consensus among stakeholders on the importance of political commitment to nutrition, improving literacy on nutrition sensitive agriculture, strengthening institutional capacity and coordination, and improving the effective use of financial resources. This exercise gave leads for further studies and also helped shape the research uptake strategy.

The pathways of agriculture nutrition linkage are now well accepted. Agriculture impacts human nutrition in both positive and negative ways. The pioneering United Nations Children's Fund (UNICEF) conceptual framework for nutrition is accepted as a proven tool in showing the relevance of the food, health, and care triad as pre-conditions of nutritional well-being². The framework is however too simple for highlighting specific pathways and generating testable hypotheses. Subsequent papers further elucidated the

² UNICEF 1990

pathways linking agriculture and nutrition (The World Bank Agriculture and Rural Development Department (2007), Gillespie et al. (2012), Ruel and Alderman (2013)). A systematic review of agriculture nutrition linkages in India under LANSa identified the following seven key pathways between agriculture and nutrition (Kadiyala et al. 2014):

1. Agriculture as a source of food, the most direct pathway by which household agricultural production translates into consumption (via crops cultivated by the household)
2. Agriculture as a source of income, either through wages earned by agricultural workers or through the marketed sales of food produced
3. The link between agricultural policy and food prices, involving a range of supply-and-demand factors that affect the prices of various marketed food and nonfood crops, which, in turn, affect the incomes of net sellers and the ability to ensure household food security (including diet quality) of net buyers
4. Income derived from agriculture and how it is spent, especially the degree to which nonfood expenditures are allocated to nutrition-relevant activities (for example, expenditures for health, education, and social welfare)
5. Women's socio-economic status and their ability to influence household decision making and intra household allocations of food, health, and care
6. Women's ability to manage the care, feeding, and health of young children
7. Women's own nutritional status, when their work-related energy expenditure exceeds their intakes, their dietary diversity is compromised, or their agricultural practices are hazardous to their health (which, in turn, may affect their nutritional status).

Following the above approach, a systematic evidence review of the pathways linking agriculture to nutrition in Bangladesh was undertaken that reviewed 60 studies (Yosef et al. 2015). The aim in particular was to offer insights into unique nutrition and health challenges of Bangladesh, such as why undernutrition persisted despite economic gains or how to elevate the role of women in promoting nutrition. The review identified gaps in knowledge in all the agriculture-nutrition pathways, especially as a source of livelihood, and women's role as intermediaries between agriculture and good nutrition and health within their household. The review concluded that the nutrition issue tends to be addressed through its proximal or underlying determinants such as

dietary intake, feeding practices, and health status. The roles of broader determinants such as agriculture that determines the composition of the diet and wider economic factors such as socio-economic characteristics of households as well as that of other non-food environments are relatively neglected.

Assessing the association of nutrition with agriculture and non-agricultural factors

One study investigated the unheralded success of Bangladesh in addressing undernutrition through a regression and decomposition analysis of changes in child growth outcomes across five rounds of Demographic Health Surveys (DHS) from 1997 to 2011 (Headey et al. 2015). The study found that rapid wealth accumulation and large gains in parental education were the two largest drivers of change, though health, sanitation, and demographic factors had played significant secondary roles. The authors pointed that the multi-dimensional and multi-sectoral nature of this change reflected simultaneous social and economic progress on multiple fronts. The results suggested that effective inter-sectoral coordination was the key to overcome some very challenging obstacles. The authors agreed that although the hypotheses were entirely conjectural, the findings were supported by circumstantial evidence. They recommended that further exploration should be a priority objective of future research.

Another paper explored the agricultural determinants of nutrition in Bangladesh (Headey and Hoddinott, 2016). The paper tried to fill the knowledge gap by exploring the nutritional impacts of rice productivity growth in Bangladesh, a country that achieved rapid growth in rice productivity at a relatively late stage in Asia's green revolution, as well as unheralded progress against undernutrition. The paper identified the different impacts that productivity growth in a food staple might have on child nutrition outcomes, with a particular focus on changes in diets at the level of the household and that of the child. It then applied the framework to a descriptive overview of the evolution of Bangladesh's food system in recent decades. The authors suggested that further nutritional impact would require diversifying the food basket of Bangladeshi children through both supply and demand-side interventions.

Taking this view into consideration, Hossain et al. (2016) estimated the changes in diet diversity from the detailed food intake data estimated from the HIES rounds and analysed the drivers of

change, including the level of income and the sources of income such as agriculture (Hossain et al. 2016). The coefficient of the farm diversity index representing the household's engagement in agriculture in that analysis was found to be positive and statistically significant. Keeping other explanatory variables constant, one-unit increase in the diversity index was found to induce 0.03 unit increase in the average dietary diversity at both national and rural levels for the year 2000. The value of the coefficient became 0.01 and 0.02 at national and rural levels, respectively, for the year 2010. The findings implied that agriculture and agriculture production diversity played a pivotal role in diet diversity and hence on nutritional outcomes.

The impact of regular consumption of dairy products on child growth was documented by another study (Choudhury and Headey, 2018). Their results suggested that increasing access to dairy products could be extremely beneficial to improving children's nutrition, but needed to be accompanied by efforts to improve nutritional knowledge and appropriate breastfeeding practices. The findings were corroborated with a case study, which is discussed later.

The critical factors behind Bangladesh's 'story of change' in nutrition by a mixed-methods study considering available statistical and qualitative evidence was done by Nisbett et al. (2017). The authors commented that key factors for the improvement in nutrition in Bangladesh in past years were improving incomes; smaller family sizes and greater gaps between births; parental - and particularly women's - education and wider health access. Policy and programmatic choices generated by research and interviews with key stakeholders and work at a community helped to achieve those wider determinants. Their findings additionally suggested that community-based nutrition programmes had not yet been operating at scale as in other countries and the government arrangements for nutrition service delivery were weak.

2) Agriculture policy and agri-food value chains

i. Agriculture Policy and Strategy

One paper analysed data collected by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and International Rice Research Institute (IRRI) under the Village Dynamics in South Asia (VDSA) project to explore further in the role of crop diversification, particularly of nutrient-rich foods in increasing dietary diversity and

household consumption of nutritious foods and nutritional status (Deb and Bayes, 2017). Estimated coefficients from this analysis showed crop diversity (measured through Simpson Index as well as number of crops grown) contributed strongly to dietary diversity and, thereby, to the nutritional status of the individual. Increase in Simpson Index by one unit led to increase in dietary diversity by 0.39. The findings also revealed that the higher the level of dietary diversity, lower the likelihood of underweight prevalence at household level; the lower the level of income, higher the likelihood of being underweight. Based on the research findings, it was concluded that diversification in crop cultivation and related investment had contributed to improvement in nutrition indicators in Bangladesh. These findings are supported by the findings in Hossain et al. (2016) where agricultural diversity was identified as a significant factor in promoting dietary diversity.

Review of agriculture-nutrition pathways demanded the analysis of relationship between fragile environment and undernutrition. The issue of spatial distribution of undernutrition has emerged as a matter of concern in recent times, considering the growing evidence of wide regional variations within countries. In order to bring thinking around geographical location and seasonality into the debates on hunger and nutrition in Bangladesh, a rigorous analysis of panel data from Food Security Nutritional Surveillance Project (FSNSP) 2011 and 2012 was carried out (Mohsena et al. 2017). Analysis of FSNSP data identified *haor* and coastal belt in Bangladesh, which are geographically distinct from other parts of the country, being water logged and salinity affected areas respectively, as pockets of undernutrition. The analysis showed that overall prevalence of stunting ranged from 46.6 per cent in the *haor* basin to 30.9 per cent in other parts of Bangladesh, and the prevalence of underweight ranged from 44.5 per cent in the *haor* basin compared to 34.1 per cent in other areas. Flood plains had the highest prevalence of wasting at 12.4 per cent. The same analysis found significantly higher rates of wasting in the monsoon season compared with the two harvest seasons (post-aman and post-aus). On the other hand, analysis of 2014 panel data showed that household income was different across agro-ecologies in Bangladesh. A household living in the flood-prone ecosystem earned on average US\$331 per year/capita, which was 16 per cent less than a household living in

a favourable environment. For the households in the coastal saline environment the income US\$419 per year/capita was lower by 19 per cent. The analysis proved that fragility of the environment affected the household's ability to grow food, which in turn influenced nutritional status negatively. It appeared that though per capita income increased overtime, it was not translated into the consumption of nutrient-rich diversified foods.

ii. Agri-food value chains

A country review on agri-food value chain interventions was conducted following a common framework across Bangladesh, India and Pakistan. The paper examined existing value chain-based interventions that focused on enhancing the availability, affordability, acceptability and/or consumption of nutritious foods in households beyond the farm-gate. The review covered: 1) interventions focused on foods that are naturally nutrient-dense, 2) interventions focused on enhancing the nutritional value of foods through fortification and 3) food distribution programmes (Islam et al. 2017).

Following this, interventions were identified under each category for detailed case study: 1) School nutrition programme (SNP) as an example of food distribution, 2) milk value chain as a naturally nutrient dense food and 3) promotion of Orange Fleshed Sweet Potato (OFSP) as a fortification initiative. The three cases examined the potential of the value chain initiatives to reach the poor, following the conceptual framework discussed in Henson and Humphrey (2015). The studies aimed to assess impact by way of sustained increases in the consumption of nutrient-dense food by the poor, with a particular focus on children and women. Questions examined included whether the food was distributed and available in areas where the poor were situated, whether the product was available through markets used by the poor, and whether there was any indication that the food was consumed by the poor in necessary amounts and on a sustained basis. The analysis under the case studies considered how each reached or failed to reach poor households and women and children in these households.

A case study of the school nutrition programme was conducted at *Islampur upazila* in *Jamalpur* district where most of the target children were from the poor households, and micronutrient deficiencies were widespread. The programme was a joint initiative of the UN World Food Programme (WFP) and BRAC. The findings highlighted that there was a relatively unstructured value chain in school nutrition programme from food supplier to consumer and BRAC was playing an important role as an implementer. Rural women were involved in implementing interventions that may contribute to the nutrition of children, as well as enhancing the source of income of the poor women. The findings also highlighted the gap at the producers' level in terms of knowledge on appropriate production technology, market linkage and so forth (Kabir and Islam, 2018b).

The dairy industry has great potential in developing the economy of a country like Bangladesh. It is necessary to make milk and milk food items available in the market for many reasons as it plays an important role in enhancing nutritional status in all age groups and has a significant role in child feeding. A case study was done to map the dairy value chain in Bangladesh (Kabir et al. 2018). The findings suggested that a large portion of people in milk non-producing areas (such as *Pirgacha* of *Rangpur*) and urban slum areas did not consume milk. Others consumed at below recommended rates. Raising awareness and conveying information about importance of milk consumption actively by the government and private sectors seemed an important need. Proper market linkage was recommended so that producers at the rural level get fair price for their milk. There should be some initiatives to purchase milk directly from the smallholders. Information dissemination and behaviour communication change might be the way to change the food habits of people. To meet current market demand, the government had initiated various measures but it was felt that response only to the immediate situation may not work without adequate consideration of related problem areas.

Another case study was conducted in *Jhikargacha upazila* of *Jashore* district using a qualitative approach to assess Orange Fleshed Sweet Potato (OFSP) as a fortified food initiative in Bangladesh (Kabir and Islam, 2018a). This case study was based on a USAID Horticulture project titled "Improving Incomes, Nutrition and Health in

Bangladesh through Potato, Sweet potato and Vegetables”. The project activities addressed the implementation of a school nutrition programme along with value chain development of OFSP. The school feeding initiative targeted consumption of OFSP by school going children, to address vitamin A deficiency. The project targeted poor local women to empower them by producing vegetables in their own homestead. It also linked the producers and the market both in rural and urban areas. The objectives were to assess the sustainability of the consumption of the bio-fortified product, identify the marketing strategies needed in the initiative and overall assess the scope of improvement in the value chain. The study found that there was huge scope for OFSP marketing from rural areas to urban super markets. It also figured out the necessity for storage and processing infrastructure for OFSP. A major demand of quality OFSP seed in the market was observed. Initiative should be taken for getting fair price for the product. The pilot approach was found to have some impact on value chain development, women’s empowerment, increasing school attendance, children’s health and nutritional awareness (Kabir and Islam, 2018a).

3) Scope for Nutrition Sensitive Agriculture

A formative study was undertaken to understand the perception and needs of local farming communities on agriculture nutrition linkage (Chakraborty et al. 2017). Within the existing programmatic framework of BRAC, Bangladesh, the study aimed to understand barriers and facilitators to farming systems for better nutrition. The key findings of the study indicated that the meaning and significance of nutrition sensitive farming approaches were not yet well understood by the farming communities. The findings highlighted the importance of conveying nutrition sensitive agricultural messages that would sensitize the communities to realize the potential of agriculture in achieving better nutrition. It was also highlighted that women farmers needed to be targeted as the key beneficiaries of the interventions along with the decision makers of the households, with precise and understandable messages focusing on nutrition sensitive farming production, consumption and market opportunities.

III. Policy Reflection

The findings discussed above indicate that agriculture is connected with nutritional outcomes through multiple ways. The research objectives and multiple approaches of LANSAs such as systematic review of the existing literature, analysis of large secondary datasets and stakeholders' opinions from the policy maker level at the top to the rural community at the bottom enabled LANSAs to understand how the multiple domains of agriculture in Bangladesh are connected with nutritional outcome, and how they are perceived or practiced by the experts and communities. It also emerged that the linkage between agriculture and nutrition in Bangladesh is not only confined to production and consumption but also connected to a range of other intermediaries including knowledge, awareness, behaviour, women's participation, agency and people's needs.

Analysis of different types of data indicated that diets have diversified very little over a period of rapid productivity growth in the main food staple, i.e. rice. Household involvement with agriculture promoted diet diversity, improved food consumption score and nutrition outcomes. Crop diversity, per capita income of the household, and education level of the household head also had significant positive contribution to the dietary diversity score of the household. To overcome the challenge of accelerating dietary diversification in a rice consuming setting, agricultural programmes and development initiatives need to add the component of awareness around importance of dietary diversity and include dietary diversity and women's empowerment index for evaluating the outcome of project initiatives. The existing policy instruments such as the National Nutrition Policy, NPAN II (National Plan for Action for Nutrition – 2016 -2025) and the Second Country Investment Plan – CIP 2 on Nutrition Sensitive Food Systems (2016-2020) both emphasize coordination with multiple ministries to increase diversified production and consumption for healthy diets and strengthening women's involvement in the agriculture sector (MoHFW, 2015, FPMU, 2016). The National Nutrition Policy 2015 (NNP-2015) had emphasized the role of the revitalized 'Bangladesh National Nutrition Council (BNNC)' in playing an overarching role in overseeing the nutrition policy and NPAN implementation and in strengthening linkages with agriculture sectors to promote dietary diversity and nutrition-sensitive agriculture for enabling healthy diets. The BNNC coordinates policy initiatives of 17 Ministries under the direct chairmanship of the Prime Minister's office. These initiatives are

likely to address the problem of inadequate coordination on nutrition and the inadequate implementation of policies which hamper policy delivery and effectiveness to impact nutrition. FAO and FHI 360 recently introduced MDD-W indicator for the assessment of minimum dietary diversity of women to reflect the micronutrient adequacy and quality of women's diets at national and sub-national levels (FAO and FHI 360, 2016). More evidence is required to get a clear understanding about the effective approaches in promoting dietary diversity.

Agro-ecology and seasonality came out as one of the indirect determinants of undernutrition. The findings particularly highlighted the vulnerability of *haor* basin and coastal belt areas and suggested for further research to recognize the complex interplay of seasonality upon nutritional outcomes to undertake appropriate interventions. These areas need to get priority in the policy framework, with an aim to develop specific joint action plans to accelerate undernutrition reduction in those areas. Community based nutrition programmes targeting specific issues like 'diversified diet at low cost' or knowledge increasing sessions on how to build resilience in those areas to overcome agricultural loss and secure diversified intake in adverse situations could be piloted in the vulnerable areas. Although there are different ways in which South Asian agriculture can improve its impact on nutrition, sensitizing key influencers to the importance of nutrition for the health of a country's population appeared as a critical issue. Although, in recent times, the agriculture–nutrition linkages are being acknowledged in national policy spheres, the evidences are yet not sufficient to address the knowledge gap across different domains of nutrition sensitive value chains. Systematic and wide-ranging analysis is required to formulate effective longer-term policies in improving nutrition through a value chain approach (Kabir et al. 2018). Most value chains are currently business oriented and not focused on improving nutrition. Stabilised market prices, marketing systems, information dissemination, appropriate processing and packaging are crucial, to be addressed to make the value chain nutrition sensitive (Kabir et al. 2018). The CIP 2 envisages a road map towards investment in nutrition sensitive food systems and highlights the need for generating evidence for agriculture to impact diets and nutrition.

Different food fortification initiatives are ongoing in Bangladesh and OFSP is one of them. Involving 100 per cent women in the production was an innovative approach of the initiative. To

make it more popular two approaches were advised, one was to create public awareness and distribute in market both in rural and urban. The other approach was to create awareness through school nutrition programme. It was found that there was a requirement to develop the processing industry around OFSP to develop its value chain. Government and private sectors should take different initiatives to familiarize the product as well as generate awareness about the nutritional benefits of the product. Area coverage of sweet potato production is not still very high to run a processing industry. Moreover, the crop is seasonal and there is no storage capacity. But there is a scope of income generation by the poor farmer of the country after development of processing industry. So private sector should take lead to develop a proper value chain of the fortified food (Kabir and Islam, 2018a).

The findings also highlighted the needs of the rural communities in Bangladesh that are instrumental in designing and pilot testing of nutrition sensitive agricultural messages/interventions. The importance of several ideas such as knowledge and awareness on nutrition sensitive farming production, nutritious consumption, market opportunity from farmers' production and nutrition sensitive agricultural credit schemes to be addressed in a nutrition sensitive agriculture intervention model was highlighted. The findings also suggested that integration of agriculture and nutrition services can be done in different ways, such as providing services through an 'agriculture for nutrition promoter', or by two service providers one for nutrition sensitive farming and the other for nutrition specific messages under a specific management level and monitoring cell. The agricultural policy 2018 already addresses the issues of agricultural extension services however, to make the extension services more nutrition sensitive application of such models are required. For this, interactive discussions, and coordinated action plans between the agriculture extension departments and NNS (National Nutrition Service) are essential.

IV. Conclusion and Recommended Strategies

The key objective of this paper was to synthesize all the empirical work done under the umbrella of LANSA, to bring together the evidence generated. The evidences were mostly focused on addressing the knowledge gap of nutrition sensitive agriculture in the context of Bangladesh. This can be translated in designing further interventions and nutrition sensitive approaches for

the vulnerable communities. Rigorous evidences are required to identify cost-effective approaches in promoting nutrition sensitive agriculture in different geographical settings. In addition, the extent farmers to which are capable of undertaking nutrition sensitive agriculture in terms of the societal and environmental setting can be identified from their individual stories. The findings suggest the following programmatic approaches as a way forward in leveraging agriculture for nutrition:

1. Integration of nutrition and agriculture and strengthening coordination across the ministries to achieve better nutrition security can be done by strengthening nutrition capacities and establishing an effective multisectoral leadership.
2. Adoption of a convergence and equity approach in the programmatic choices giving emphasis on agro-ecology and seasonality can be considered. The most fragile or vulnerable areas and population groups of the country should be identified and prioritized in undertaking need base multisectoral interventions.
3. Promotion of dietary diversity should be a priority and measure of success in food related interventions. Nutrition sensitive interventions should be accelerated that promote dietary diversity for vulnerable age groups including children and mothers (through enhancing improved availability, and adequate access), and minimum acceptable diet across all relevant line ministries (Food, Agriculture, Livestock and Fisheries, Forestry). A stronger focus and investment in Infant and Young Child Feeding (IYCF) practices should be built as a core nutrition programme. Minimum Dietary Diversity of Women (MDDW) needs to be measured using the minimum MDD-W indicator to reflect individual dietary intake and nutrient adequacy of women of reproductive age.
4. Gendered approaches should be prioritized to support nutrition interventions in all sectors at all levels, through providing technical, financial and capital support for fishery, poultry, horticulture, homestead gardening, social forestry and food production sector that support women's empowerment.
5. Value chain interventions that aim to enhance access to, and consumption of, foods those are naturally rich in micronutrients, should be augmented. These should include fresh produce such as fruit and vegetables, meat, fish, dairy products, and pulses. Market price stabilization, proper marketing system, standardization of processing and packaging system should be looked into. Production and distribution of foods with increased

nutritional value, either via bio-fortification or industrial fortification should be one of the major focuses. Improvement of the food chain through innovations or systems improvements, often involving both private and public sectors is also crucial. This can be done by improving infrastructure, removing other distribution barriers or directly subsidising food distribution programmes by the government, donors, or other stakeholders.

6. The public distribution models in Bangladesh (and India) show how success is achieved when all stakeholders are engaged (community growing vegetables and cooking, private sector providing supplies, government setting intent and funding). More such models should be piloted.
7. To exploit the potential of crop diversification, the Government of Bangladesh should come forward with developed market structure, improve road condition and make the irrigation system accessible for non-rice crops.
8. Consideration of climate-smart agriculture (CSA) for geographically vulnerable zones: Proneness to natural disasters is a characteristic of Bangladesh; about six geographic zones of the country have been identified as ecologically constrained areas; according to the Global Climate Risk Index. So CSA should be promoted, for example: traditional *gher* farming, floating vegetable gardens and *Kangkong* (water spinach) cultivation. Vegetable towers, potted vegetables supported by bamboo and polythene, have been introduced and need to be promoted to counter the salinity challenge in different parts of the country.
9. Agro-ecology and promotion of high yielding crop varieties (HYCV) and stress tolerant varieties should be considered. Over the past 40 years, saltwater intrusion into the tidal rivers of Bangladesh has become especially acute. Changes in the sea level are very likely to further exacerbate this situation. The use of salt-and submergence tolerant, HYCV is therefore an important issue. Institutional support for the identification of appropriate rice varieties, and improved access to credit and technology packages can promote such practices in a more profitable and environmentally friendly way.
10. Identification of barriers and proper mitigation: Barriers to the adoption of these and other CSA practices by small-scale farmers include the limited availability of credit, unfavorable extension staff to farmer ratio for the dissemination of new technologies and

practices, and the limited implementation of novel financing mechanism and safety net protection. All these have to be handled by multi-stakeholders concurrently.

Further research needs to be undertaken in generating rigorous evidence on cost effective approaches in promoting nutrition sensitive agriculture across different geographical settings of Bangladesh through feasibility studies and randomized controlled trials and impact assessment of interventions. In addition, large scale data would need to be collected and analysed to strengthen the knowledge gap across different domains of nutrition sensitive agri-food value chains.

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