

Influence of Capacity Building on Nutrition Sensitivity of the Municipal Agriculture Development Plan in Calabarzon, Philippines

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To improve the nutrition sensitivity of the Municipal Agriculture Development Plan (MADP) of Calabarzon, a one-group pre-test post-test design quasi-experimental study was conducted involving the Local Agriculture Planners (LAP) of 57 municipalities in the region from March to December 2021. Wilcoxon Paired Signed Rank was used to determine significant differences in the nutrition sensitivity of the MADP and level of knowledge, attitude, and self-efficacy of the LAP before and after the intervention. Binary logistic regression analysis was also performed to model the change in the level of the nutrition sensitivity of the MADP. The LAP's level of knowledge, attitude, and self-efficacy as well as the nutrition sensitivity of the MADP significantly improved after the capacity building. The study also found that the change in knowledge of municipal agriculturists may increase the nutrition sensitivity of the MADP by 28%. Therefore, capacitating LAP on nutrition-sensitive agriculture can significantly improve their capability to create local agriculture plans that are also nutrition-focused.

Keywords: food and nutrition security, local agriculture planners, municipal agriculture development plan, nutrition-sensitive agriculture

Abbreviations: LAP—Local Agriculture Planners, MADP—Municipal Agriculture Development Plan, NSA—Nutrition-Sensitive Agriculture

INTRODUCTION

After years of steady decline, the trend in world hunger increased in 2015 and remained unchanged during the past 3 yrs. As a result of the slow increase, more than 820 million people around the globe are suffering from hunger (FAO 2018). In relation to this, low and middle-income countries have also been experiencing different levels of food insecurity (Smith and Floro 2020). Severe food insecurity is linked with higher income inequalities and is 20% more prevalent in low-income countries. Although moderately food-insecure households may not always experience hunger, they still lack regular access to nutritious and sufficient food, which puts them at greater risk of poor health and undernutrition (FAO 2018).

In the past years, notable progress has been made in the production and supply of nutritious food (Pangaribowo et al. 2013). However, this was not observed across low and middle-income countries including Sub-Saharan Africa and Southeast Asia as reflected by the sustained high rates of hunger, food insecurity, and undernutrition among children (Heidkamp et al. 2021). This public health concern is also an issue in the Philippines, particularly in households relying on agriculture (FNRI 2016; Capanzana et al. 2018; dela Luna and Talavera 2021).

Food and nutrition security is achieved when all people have physical, economic, and social access to safe, sufficient, and nutritious food that can provide their dietary needs according to their food preferences for a

healthy life (Shetty 2015; Canavan et al. 2016). One facet of this is nutrition-sensitive agriculture (NSA), which tends to be a pronounced factor in reducing poverty and improving health and found to be related with equity and equality, education, and women's empowerment (Luszczynska and Schwarzer 2005). NSA is a food-based approach to agricultural development that focuses on nutritionally rich foods, diet diversity, and food fortification in addressing malnutrition and micronutrient deficiencies. The overall objective of NSA is to make the food system better equipped to produce good nutritional outcomes (FAO 2017).

However, it was observed that there is a disconnection between nutrition and agriculture, resulting in a high prevalence of undernourishment and hunger among the farming sectors (Headey et al. 2012). This can be explained by the limited influences of different stakeholders that disable the communication between health and agriculture sector (Veldhuizen et al. 2020). For NSA to be effectively implemented, media materials distributed by involved agencies need to contain information on supportive policies and programs. Also, agencies must actively seek linkages among various stakeholders as supported by enabling policies to promote knowledge and incentives through different activities, i.e., capacity-building initiatives among program planners and implementers (Jaenicke and Virchow 2013; Zamora et al. 2013).

Capacity building is one of the key promotion strategies for public health nutrition intervention. It should be done in a continuous manner across the planning cycle (Baillie et al. 2009) and in the case of food and nutrition security, should incorporate the significant role of nutrition-sensitive agriculture. Therefore, this study aimed to improve the nutrition sensitivity of the Calabarzon Municipal Agriculture Development Plan (MADP) through capacity building among Local Agriculture Planners (LAP). It also sought to evaluate the influence of capacity building on the change of level of knowledge, attitude, and self-efficacy regarding the nutrition sensitivity of the MADP.

MATERIALS AND METHODS

Research Design

A quasi-experimental one group pre-test-post-test study to determine the effect of a designed capacity-building activity on the nutrition sensitivity of the CALABARZON MADP was conducted from March to December 2021. This design allows the same dependent variable to be measured and compared in one group of participants

before (pre-test) and after (post-test) the intervention is conducted. However, it does not include a non-treatment control group, which can affect the generalizability of the results. In this study, the researcher conducted a 3 phase intervention mapping capacity building on NSA for municipal agriculturists as an intervention. The nutrition sensitivity of the MADP before and after the capacity building in one group of LAP in Calabarzon was measured, and changes in their level of knowledge, attitude, and self-efficacy on NSA were then determined.

Intervention

An online capacity-building activity including a training manual was developed from March to August 2021 with assistance from the agricultural, nutrition and health, local government, and academic sectors. The developed manual was sent 2 wk prior to the training proper, and LAP were advised to read the manual before the scheduled capacity building. The training manual contained discussions on topics such as basic concepts of nutrition, introduction to NSA, and integration of NSA in the MADP. The manual also contained pages for preliminary activities and evaluation. An online capacity-building activity via Zoom Application was conducted for 2.5 d.

The developed training and training manual were used in the implementation of the capacity building from September to October 2021. A follow-up interview and collection of the revised MADP were done a month after the training to measure the endline from November to December 2021.

Study Site

Calabarzon is situated in the south-eastern part of Luzon Island and is composed of five provinces namely, Cavite, Laguna, Batangas, Rizal, and Quezon (Fig. 1). Despite the decrease in its agricultural land area, the province has maintained its potential to produce high-value crops leading to continuous economic growth and development (DTI 2019).

Among the provinces in Calabarzon, Quezon has the highest number of farms, followed by Batangas and Laguna. In the last decade, rice was the major temporary crop in the region in terms of area planted, followed by sugarcane and corn. Hence, rice was the number one crop among the provinces of Calabarzon, except in Batangas where sugarcane was the most significant crop. Coconut was the principal permanent crop in the region, followed by pineapple and banana. Quezon province was also the leading coconut producer in the Philippines and of rice in the region (NEDA 2018; PSA 2022).

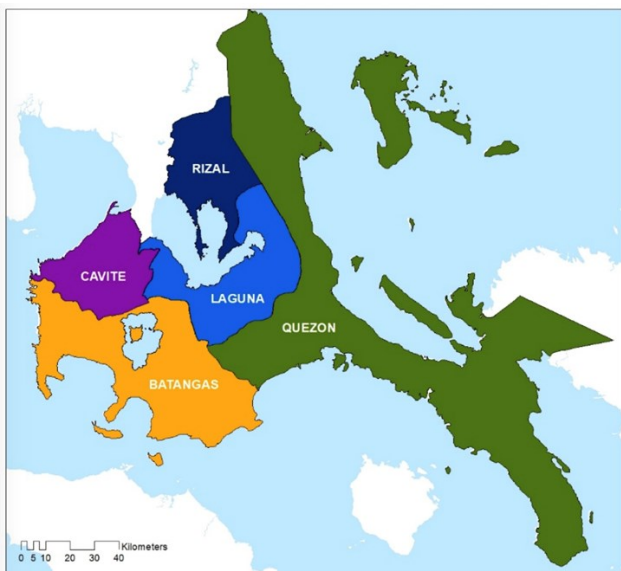


Fig. 1. Map of Calabarzon, the study site (NEDA 2018).

In 2015, the total agriculture sector of the region earned Php 135.92 B but showed a decrease of 0.6% as compared to 2014. There is also a 6.1% reduction in crop production, 5.3% in livestock, and 3.3% in poultry (DTI 2019).

The region also had a high prevalence of stunting, underweight, and wasting. The provinces of Rizal, Cavite, and Laguna recorded an increasing prevalence of stunting among preschool children. Rizal recorded the highest increase of stunted children from 21.4% in 2013 to 29.7% in 2015. In addition, Quezon recorded the highest prevalence of stunting at 33.9%. Although prevalence of wasted preschool children declined from 8.8% in 2013 to 7.6% in 2015, regional prevalence was still higher than the national estimate at 7.1%. Lastly, a small decline from 6.7% in 2013 to 5.0% in 2015 was observed in the prevalence of overweight/obesity among preschool children (FNRI 2016).

Sample Size and Sampling Design

The sample size was computed using an 80% power of the test and 95% level of confidence to detect possible changes after the intervention. The calculated minimum sample size was 55 allocating an additional 10% for possible attrition, dropout, and non-response. The sample size was computed using the formula:

$$n = [P(1-P)(Z_{\beta} + Z_{\alpha})^2] / \text{diff}^2$$

where n = sample size, P = perceived proportion of outcome, Z_{α} = the Z variate for level of significance, Z_{β} = the Z variate for power, and diff = difference between proportions.

LAP were selected through simple random sampling from the list of municipalities in Calabarzon using the randomly generated numbers from MS Excel. At the end of the study, 57 out of the total number of 65 municipalities successfully completed the capacity building with complete data.

Study Participants

The selected municipalities were invited to send LAP to join the capacity building. The LAP must be a Municipal Agriculturist/Municipal Agriculture Officer or a legitimate representative of the municipality involved in the crafting of the local agriculture development plan, willing to participate in the 2 d capacity building, and must be involved in the preparation of the MADP.

Research Variables

Knowledge. This pertains to the knowledge of local-level planners towards NSA and corresponds to the categories low, moderate, and good.

Attitude. Attitude is usually reflected by a person's behavior towards one concept or technology (Eagly and Chaiken 2007). In this study, it refers to the LAP's willingness to change with reference to the adoption of NSA in formulating MADP and corresponds to the categories as poor, neutral, and good.

Self-efficacy. Bandura et al. (1999) defined self-efficacy as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments. This work contextualizes self-efficacy as the confidence of the LAP towards the adoption of NSA and was categorized as low, moderate, and high.

Nutrition Sensitivity. This is defined as the integration of nutrition as a priority within agricultural policies, strategies, and investment plans. It also demonstrates the power of agricultural biodiversity, social and behavioral change, enterprise diversification, and women's empowerment in improving nutrition (Ruel et al. 2013). In this study, nutrition sensitivity of the MADP was treated as the main outcome variable and corresponds to the following categories: (1) not nutrition-sensitive (0 – 3 points); (2) partially nutrition-sensitive (4 – 7 points); and (3) nutrition-sensitive (8 – 10 points).

Research Instrument

A structured questionnaire was used to evaluate LAP's knowledge, attitude, and self-efficacy before and after the capacity building. The questionnaire was validated and pre-tested and Bloom's cut-off was used to assess the level of knowledge, attitude, and self-efficacy of the LAP.

A 26-item true-or-false questionnaire was used to determine the LAP's knowledge on NSA. Levels of knowledge were categorized as high, medium, and low corresponding to 80% to 100%, 60% to 79%, and < 60% correct responses, respectively (Katumbi et al. 2021; Mukhtar et al. 2022).

A 17-item, 5-point Likert scale was used to gauge the attitude of the LAP. The items had responses ranging from "strongly agree" to "strongly disagree". Levels of attitude were categorized as good, neutral, and poor corresponding to 80% to 100%, 60% to 79%, and < 60% positive responses, respectively (Katumbi et al. 2021; Mukhtar et al. 2022).

The LAP's self-efficacy was measured using a 16-item, 5-point Likert scale with responses from "very confident" to "not confident at all". Levels of self-efficacy were categorized as high, moderate, and low corresponding to 80% to 100%, 60% to 79%, and < 60% positive responses, respectively (Katumbi et al. 2021; Mukhtar et al. 2022).

Furthermore, the nutrition sensitivity of the participating municipalities' agriculture development plan was evaluated using a checklist composed of 10 indicators to assess the presence or absence of the activities and/or initiatives related to NSA (0-No, 1-Yes). The categories used were (1) not nutrition-sensitive (0 – 3 points), (2) partially nutrition-sensitive (4 – 7 points), and (3) nutrition-sensitive (8 – 10 points).

Validity and Reliability of The Research Instrument

The survey instrument was subjected to face validation by 5 experts in the field of public health and nutrition and 3 experts from the agriculture sector. The face validation of the research instrument refers to the extent to which the test items appear to measure based on the interrater agreement of the 8 experts. Data from the face validation was analyzed using Cohen's Kappa Index (CKI). The kappa statistic is commonly used to evaluate interrater reliability based on the experts' answers. The interrater reliability is essential since it measures the extent to which the data collected correctly represents the measured variables. For example, the CKI interrater reliability for the evaluation instrument was 0.9400 for knowledge and self-efficacy and 0.8400 for attitude, while the CKI interrater agreement to evaluate the nutrition sensitivity of the agriculture development plan was 1.00. The reliability of the research instrument therefore suggested an acceptable interrater reliability agreement between experts.

Internal consistency was measured using the Cronbach alpha coefficient. To have good internal

reliability, a minimum internal consistency coefficient of 0.70 was achieved before the research instrument was used. The Cronbach alpha coefficient for the knowledge parameter was 0.8918, and 0.9578 for attitude and self-efficacy. In terms of the tool used to evaluate the nutrition sensitivity of the MADP, the Cronbach alpha coefficient was 0.9578. These values therefore signify an acceptable reliability score for the research instrument, which indicates that the survey items used in the instrument were highly correlated.

Data Collection

After the signing of the Informed Consent Form, copies of the existing development plans (e.g., MADP, Municipal Development Plan, Annual Investment Plan, etc.) were requested from the Municipal Agriculture Office of the selected municipalities. Documents were reviewed in accordance with the set of parameters of the study.

Before the conduct of the capacity building, the pre-test was sent to the LAP through email. Answers were evaluated and assessed using Bloom's cut-off as discussed in the research instrumentation. After the documents and answers for the pre-test were received, copies of the developed NSA manual were sent to LAP via courier.

The selected LAP were invited to join the 2 d online capacity building. Writeshops and workshops were done as part of the learning process using the matrices included in the manual. After a month, the participants were asked to develop an agricultural plan based on their training using the provided matrices. Submitted documents were again reviewed *vis-a-vis* indicators stated in the survey instrument. Subsequently, a post-test was sent to the participants and answers were again evaluated using the same Bloom's cut-off points.

Statistical Analysis

Mean, percentages, and frequency and percentage distributions were reported to describe the distributional characteristics of the LAP. Moreover, the test Wilcoxon Paired Signed Rank was used to identify if there was a significant difference in the level of knowledge, attitude, and self-efficacy of LAP before and after the capacity building. The same test was also administered to determine if there were significant changes in the level of nutrition sensitivity (nutrition-sensitive, partially nutrition-sensitive, not nutrition-sensitive) of the MADP after the capacity building. In addition, the McNemar test was utilized to check the significant change in the nutrition sensitivity of each indicator's MADP used to evaluate the plans before and after the capacity building (1 = positive change and 0 otherwise).

Furthermore, binary logistic regression analysis was performed to model the changes in the level of the nutrition sensitivity of the MADP ($Y = 1$ positive change and $Y = 0$ otherwise) status using the change in the level of knowledge, attitude, and self-efficacy of the LAP after the capacity building with 2 categories (1 = positive change and 0 otherwise). The logit equation, which are linear functions of the response variable, was:

$$L_{KASE} = \ln \ln \ln [P(Y=1)] / [P(Y=0)] = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

where α is the intercept and β_i , $i = 1, 2, \dots, k$ is the change in log odds of nutrition sensitivity of the MADP for every unit change in X_i , holding other factors constant. The odds ratio for significant predictors was also computed to determine the chance of having a nutrition-sensitive MADP given the change in the level of knowledge, attitude, and self-efficacy of the LAP after the capacity building. Lastly, Wald's test was used to detect the significance of the identified model (De la Torre and Lee 2013).

Ethical Considerations

The signing of the Informed Consent Forms reiterated the respondents' rights and responsibilities as study participants and were administered before their participation. This research has been approved by the Batangas Medical Center-Research Ethics Review Committee with the protocol code BatMC-RERC 2021-015.

RESULTS AND DISCUSSION

Demographic characteristics of LAP in Calabarzon

Fifty-seven municipalities participated in the capacity building on NSA for LAP in Calabarzon — 5 in Cavite, 11 in Laguna, 24 in Batangas, 4 in Rizal, and 13 in Quezon.

The majority (70.7%) of the LAP were female — 63.8% were married, with a mean age of 43.0 ± 12.7 and a median age of 45. In terms of educational attainment, 70.7% of the LAP were college graduates, and only 16% had master's degrees. In addition, more than half (55.2%) had a monthly income of \leq PHP 32053.00. Lastly, 44.8% of the participants were designated as Municipal Agriculture Officers/Municipal Agriculturists and 37.9% were Agriculture Technicians/ Extensionists with 82.8% having permanent designations in the local government.

Change in The Level of Knowledge, Attitude, and Self-efficacy of LAP on NSA

Table 1 summarizes the changes in the level of knowledge, attitude, and self-efficacy of the LAP towards NSA after training. Before the training, 43.9% of the LAP

showed moderate knowledge of NSA, while 35% showed low knowledge. More than half (56.1%) of the LAP had high knowledge of NSA after the capacity building and only 7.0% had low knowledge, showing that the LAP's level of knowledge significantly improved after the training.

In terms of attitude, 61.4% of the LAP already had good attitude towards NSA before the capacity building, and only 7.0% showed a poor attitude. After the capacity building, LAP who showed good attitude towards NSA went up to 86.0%, while the rest showed neutral attitude. These results show that the level of attitude of study LAP concerning NSA also significantly improved after the capacity building.

Prior to capacity building, 50.9% of the LAP were determined to have high levels of self-efficacy, while 33.3% showed moderate levels of self-efficacy toward NSA. Although higher compared to knowledge and attitude, the proportion of LAP with high self-efficacy still increased after the capacity building (78.9%). Thus, the level of self-efficacy of LAP regarding NSA also improved after the conducted training.

Results of this study show significant improvements in the knowledge, attitude, and self-efficacy of LAP on NSA after the capacity building. These were consistent with the findings of Jaenicke and Virchow (2013) and Jideani (2020) suggesting that capacity building can create awareness of the role of agriculture in the nutrition security of the household. Decision-makers need to emphasize the link between agriculture and nutrition going beyond food security. This increases the capacity of vulnerable groups to produce and prepare foods that can provide all the essential nutrients. Capacity building can also provide linkages in the different entry points of nutrition behavior, which can only be achieved when the

Table 1. Difference in the level of knowledge, attitude, and self-efficacy of LAP in Calabarzon before and after the training.

Parameters	Before (n (%))	After (n (%))	p-value
Knowledge			
High	12 (21.1)	32 (56.2)	<.0001
Moderate	25 (43.9)	21 (36.8)	
Low	20 (35.1)	4 (7.0)	
Attitude			
Good	35 (61.4)	49 (86.0)	0.0001
Neutral	18 (31.6)	8 (14.0)	
Poor	4 (7.0)	-	
Self-efficacy			
High	29 (50.9)	45 (78.9)	<.0001
Moderate	19 (33.3)	11 (19.3)	
Low	9 (15.8)	1 (1.8)	

population has access to a high-quality diet. In Cambodia, NSA programs include production, processing, and utilization. A typical example is creating community and school gardening programs that involve women as key providers (Jaenicke and Virchow 2013). In Malawi, female agriculture extension staff provide nutrition education to mothers while male staff educate the fathers (Muehlhoff et al. 2017).

Positioning agriculture to enhance household nutrition security requires skilled agricultural specialists who can understand nutrition objectives and how these can be integrated into the agriculture-health programs (Davis 2008). Thus, capacity-building plans should be based on initial assessments and contextualized into the existing agriculture systems. In addition, capacity building for non-health sectors must be tailored to their expected nutrition competencies (Fekadu 2013).

In this research, many LAP had poor knowledge but neutral attitude and moderate self-efficacy toward NSA before capacity building. In a study by Sharma and Rani (2016), nutrition-related attitudes and practices of LAP were somewhat better, but the quality of information established from these constructs is inadequate. Moreover, the use of e-learning interventions can help enhance non-nutrition professionals' knowledge on nutrition. Aside from the scientific concepts of NSA, soft skills such as problem solving and critical thinking are also necessary to integrate other nutrition-related skills into daily activities. These skills are vital to guarantee effective planning and implementation. However, educational gaps were also observed between knowledge and practice (Davis 2008).

Studies by Bandura et al. (2011), Misyak et al. (2015), and Glanz and Bishop (2010) which evaluated the impact of experiential learnings on improving nutrition awareness and practices among farming households used Bandura's Social Cognitive Theory. Short-term practical learning opportunities were observed to increase nutrition knowledge and influence food behaviors among farming households (Franck et al. 2012; Rustad and Smith 2013). Thus, experiential learning is the foundation of improved instruction through performing the acquired skills and maximizing adults' learning potential (Richardson et al. 2003).

In a study conducted in the United States, agriculturists tend to support sustainable and environmentally responsible farming practices by including the concepts of food and health in their production system. However, they found it difficult to identify food origins, understand production practices, and evaluate how these practices influence personal,

environmental, and community health (Robinson and Smith 2003). Their interest in sustainable agriculture and nutrition, combined with inadequate knowledge, provides an opportunity for the nutrition community to conduct trainings on the aforementioned issues. Similarly, Gussow (1999) and Clancy (1999) have recommended that nutrition professionals be sustainable in delivering their services.

In addition, a study by Stark et al. (2011) observed considerable positive improvements in the knowledge, skills, and self-efficacy of LAP who have attended online trainings on nutrition. It was also observed that the effectiveness of continuing online education can enhance the practices of nutrition professionals. Finally, it should be emphasized that there is a need to establish linkages between research, policy development, and participation of private organizations to expand opportunities related to nutrition and agriculture (Hamm and Bellows 2003).

Change in The Nutrition Sensitivity of The MADP After The Capacity Building

Table 2 provides the data on the changes in the level of nutrition sensitivity of the MADP after the capacity building. Almost one-third (31.6%) of the municipalities integrated the elements of NSA into their MADP. Significant changes were also observed in programs, projects, and activities intended for the vulnerable population group which were already created by the LAP before the conduct of the study. These programs as well as other related initiatives were already integrated into their respective Annual Investment Plans with allocated budgets.

Another significant change was the integration of the MADP into the Local Nutrition Action Plan and Municipal Development Plan which warrants provision of NSA programs and activities in the MADP. Although only 30% of the LAP included capacity building on NSA for their staff and employees, significant changes were observed – monitoring and evaluation programs and strategies were created to evaluate NSA activities.

Prior to the training, none of the municipalities had a nutrition-sensitive MADP; however, after the online training on capacity building, 26.3% of the municipalities were already able to provide nutrition-sensitive plans. The number of municipalities without nutrition-sensitive MADP also decreased from 31.6% to 5.3%. Thus, the conducted training had a significant influence on the overall nutrition sensitivity of the MADP (Table 3). Nutrition interventions are traditionally provided through the health sector, but it has been established that other sectors, including

Table 2. Summary of Indicators of the Nutrition-sensitivity of the MADP in Calabarzon before and after the training.

Parameters	Before n(%)	After n(%)	p-value
1. The objectives of the MADP integrate the elements of nutrition-sensitive agriculture.	0 (0)	18 (31.6)	< 0.0001
2. The MADP provide programs, projects, and activities intended for the vulnerable groups:	39 (68.4)	57 (100)	< 0.0001
Women of reproductive age	39 (68.4)	57 (100)	< 0.0001
Children (1-10 years old)	39 (68.4)	39 (68.4)	-
Infants (0-12months)	30 (52.6)	32 (56.1)	0.5151
3. The MADP includes nutrition-sensitive programs and/ or strategies.	51 (89.5)	57 (100)	< 0.0001
Fortification and biofortification	0 (0)	0 (0)	-
Livestock production	51 (89.5)	51 (89.5)	-
Home gardening/ Community gardening	53 (93.0)	57 (100)	< 0.0001
Water, sanitation, and hygiene activities	36 (63.2)	36 (63.2)	-
Infant and Young Child Feeding	35 (61.4)	35 (61.4)	-
4. The MADP provides programs, projects, and activities intended to empower women.	57 (100)	57 (100)	-
5. The MADP includes programs, projects, and activities that support the diversification of crops.	45 (78.9)	45 (78.9)	-
6. Ordinances and policies are established to support NSA programs, projects, and activities.	0 (0)	0 (0)	-
7. Allocated budget for programs, activities, and other initiatives intended to support NSA.	0 (0)	57 (100)	< 0.0001
8. The MADP provides capacity-building initiatives to capacitate agriculture technicians/ technologists towards NSA.	0 (0)	17 (29.8)	< 0.0001
9. The MADP is integrated into the Local Nutrition Action Plan and Municipal Development Plan that entail programs and activities towards NSA.	20 (35.09)	31 (54.4)	< 0.0001
10. The MADP provides measurable outcomes that can be used to monitor and evaluate NSA programs and activities.	0 (0)	18 (31.6)	< 0.0001

agriculture, are important to address malnutrition and its underlying determinants. Therefore, recent approaches have promoted the integration of nutrition-specific interventions such as optimal infant and young child feeding (IYCF) practices or micronutrient supplementation within broader, nutrition-sensitive programs while promoting agricultural production diversity and supporting women's empowerment (Bhutta et al. 2013).

The results also revealed that the conducted capacity building and the use of the training manual significantly improved the nutrition sensitivity of the local agriculture development plan. Integrating nutrition into the food and agricultural sector without detracting from the agriculture sector's goals is vital to increasing production and improving the income of the farming sector (Herforth et al. 2012).

The ability of the agriculture planners to incorporate nutrition objectives in their respective plans and programs can be determined by their capacity to implement their activities based on their mandate (Davis 2008). In the context of Philippine local government units (LGU), the mayor spearheads the municipal agriculture planning process; however, the LAP must also participate in regular trainings for them to maintain their engagement in the LGU's existing mandate. In addition, workshops and re-tooling seminars must be provided to improve the capacity of the agriculture sector to handle the issues of the specific problem matrix. Thus, these interlocking accountabilities must be observed among different levels and agencies (Saloma et al. 2013).

Funding is also essential in supporting the projects, activities, and programs (PAPs) of an institution. In the Philippines, implementation of different programs, including nutrition and agriculture activities, is highly decentralized as mandated by Republic Act (RA) 7160 (Local Government Code 1991). RA 7160 devolved the execution of powers and function to the LGUs, including the provision of basic services and implementation of programs. After the decentralization of program implementation, the volume of capital outlays in agriculture was also devolved to LGUs, resulting in financial constraints. The LGUs are also mandated to create revenues to provide additional funds to finance their obligations, while local agencies can increase their spending by raising their tax revenue.

Aside from the aforementioned factors, some key NSA components which have not been emphasized in the created MADP were biofortification and fortification. Biofortification and fortification are strategies that aim to enhance the nutrient content of a specific product to address micronutrient deficiency at the consumer level. Biofortification is the process of improving the bioavailability and concentration of nutrients in the crop through plant breeding and genetic engineering, while fortification is the process of adding fortificants directly in the food during food processing at the production level (Yadav et al. 2020).

The poor emphasis on biotechnology and fortification can be explained by the mechanisms of public perception

Table 3. Change in nutrition sensitivity of the Municipal Agriculture Development Plan in Calabarzon before and after the training.

Nutrition-sensitivity	Before n (%)	After n (%)	p-value
Nutrition-sensitive	0 (0)	15 (26.3)	
Partially nutrition-sensitive	39 (68.4)	39 (68.4)	< 0.0001
Not nutrition-sensitive	18 (31.6)	3 (5.3)	

of biotechnology (Allum et al. 2008). Accepting the concept of biotechnology and fortification in farming is usually driven by their attitude, anticipation of potential health benefits, health and safety risks, environmental issues, and distrust of technology. Moreover, people tend to be unwilling to learn about new technology and have poor confidence in regulating innovations (Mataia et al. 2003). This concern has been amplified by the limited appreciation of farmers for the different nutritional benefits of their crops and hesitancy to adopt new technologies that can increase their productivity (Ogada et al. 2010). This attitude resulted in poor quality production of crops and other produce (Hazell et al. 2010; Akukwe 2020).

However, this result of the study is not consistent with related works conducted in other countries, which shows that agriculture workers and agriculturists are more likely to be educated about biotechnology. It is also suggested that biotechnology can be an effective tool that deals with problems in agriculture and nutrition, including the environment (Aerni 2000; Mataia et al. 2003).

Furthermore, the absence of change in several indicators can be explained by the lower capacity of some LGUs for future implementation of different agriculture extension services. Moreover, many local chief executives are not engaged in planning and crafting agriculture policies. These processes have remained at the national level, leading to poorly managed local programs and activities (Siamwalla 2001). Thus, defining the functional relationships and responsibilities between government agencies at different levels remains unclear, and the linkages between training, extension, and research remain weak (Anderson and Feder 2007).

The observed changes in the MADP must be enabled by different mechanisms, including support from the local chief executives, appropriate funding and human resources, and multi-sectoral collaborations. It is vital to have a transdisciplinary and comprehensive approach to capacity development, including research, training, and policy formulation (Khandelwal et al. 2012). Moreover, organizational development training can also aid the local-level planners in creating a more significant plan. It

will improve the linkage between the health system and the agricultural sector to create a healthier community. Thus, the radical restructuring of local government units should involve improved social structure and social agents' linkages to create small but incremental changes (Devine et al. 2004).

Model for The Change in Nutrition Sensitivity of The MADP

Table 4 provides the fitted binary regression model for the change in nutrition sensitivity with the change in the knowledge, attitudes, and self-efficacy scores of LAP as the regressors. The model suggested that attitude and self-efficacy were not significant predictors of the change in nutrition sensitivity of the MADP, while every increase in the change of knowledge on NSA improves the chance of having a nutrition sensitive MADP by 28% (OR:1.28; $p = 0.0218$). The model's accuracy was 70.2%, which shows that most of the changes in MADP due to changes in knowledge were correctly classified. The proportion of those correctly identified as true positives was 76.9%, and true negatives were 54.6%. True positives were the municipalities that had significant improvement in their MADP and were correctly identified by the model. Subsequently, true negatives were the municipalities that did not have significant changes in the MADP and were correctly identified by the model.

Generally, there was a significant improvement on the level of nutrition sensitivity of the MADP after the capacity building; however, some indicators did not change. Mahoney and Thelen (2010) suggested that an institution does not automatically require substantial and drastic changes —instead, small but significant developments are vital in translating the institution's capacity to adopt new systems and technologies.

Previous works have also suggested that improvements in knowledge, attitude, and self-efficacy do not warrant practice changes. The decision of the LAP to perform the learned concepts of NSA is affected by their ability to radically rationalize and often requires

Table 4. Estimated logistic regression model on the improvement of nutrition-sensitivity of MADP after the training using the change in knowledge, attitude, and self-efficacy as predictors.

Factors	Coefficient	OR	95% CI	p-value
Constant	-0.4446	0.64	[0.35, 1.17]	0.4321
Knowledge	0.2444	1.28	[1.09, 1.27]	0.0023
Attitude	-0.0111	0.99	[0.96, 1.02]	0.4986
Self-efficacy	0.0002	1	[0.96, 1.04]	0.9882
Wald's test of model significance		$p = 0.0218$		

autonomous social agents and motivation (Ryan and Deci 2006). Furthermore, change in practice would only be reached if the required activities related to NSA also fit the talents and skills of the LAP.

A study by Stark et al. (2011) suggested that when professionals were trained, they could initialize collaborations between the farming and non-farming sectors to implement different programs and activities that support healthy eating and active living. Devine et al. (2004) found that professionals wanted a more interactive discussion with peers and experts. Online activities provide practitioners from rural communities with more learning opportunities since they can maximize their time and resources. Due to limited time and funds, professionals wanted affordable, flexible, and convenient options for training. Thus, an online training activity can provide an efficient way for professionals to acquire new knowledge and skills.

Limitation of the Study

A control group was not randomly assigned to provide comparison among intervention groups. Also, the research design cannot distinguish whether the change in knowledge, attitude, self-efficacy, and nutrition sensitivity of the MADP resulted from the method of instruction (online) or in the design of instruction as an approach, independent of the process being used. The authors' objective was to develop a method of instruction that can effectively train professionals to improve the knowledge, attitude, and self-efficacy of the LAP toward NSA.

CONCLUSION

Significant improvements were observed in the level of knowledge, attitude, and practices of LAP after the conducted capacity building on NSA. Moreover, it was observed that the nutrition sensitivity of the MADP can be improved through the aforementioned activity – the change in knowledge of LAP may increase the nutrition sensitivity of the MADP by 28%. Thus, educating and capacitating LAP on NSA can significantly improve their capability to create MADP that are also nutrition-focused. It is also recommended that the agriculture sector develop or provide capacity building initiatives on NSA to allow better integration of nutrition and agriculture concepts and to facilitate progress towards food and nutrition security.

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