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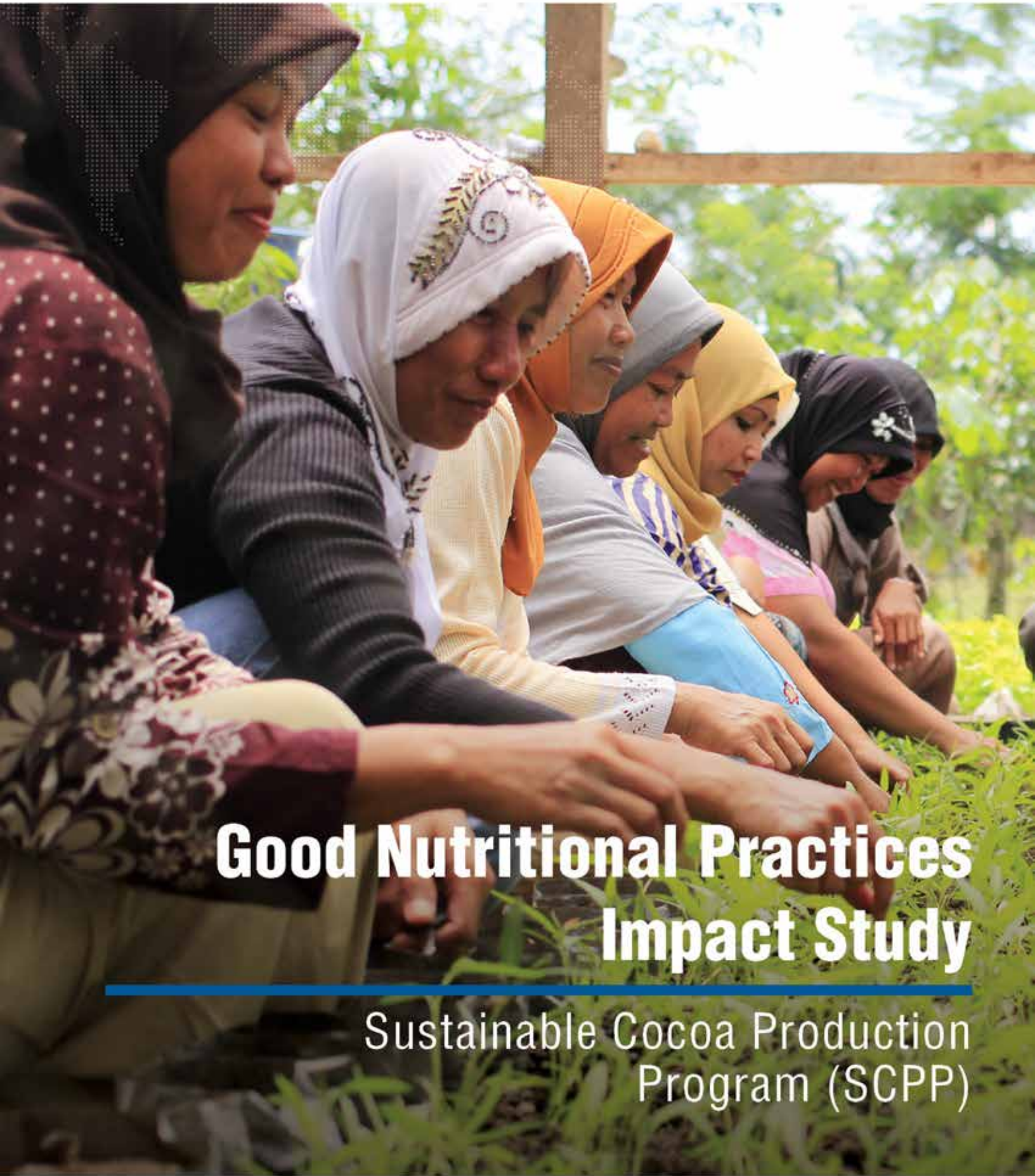
Kingdom of the Netherlands



Investing in rural people



swisscontact



Good Nutritional Practices Impact Study

Sustainable Cocoa Production
Program (SCPP)

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EXECUTIVE SUMMARY

In Indonesia, malnutrition in low-income families is not only caused by a lack of access to nutritious foods, but also often a result of inadequate feeding habits. In many communities, especially in remote rural areas, understanding and knowledge about balanced diets is still low. This situation is also true in areas where the Sustainable Cocoa Production Program (SCPP) is being implemented. To help address the issue of malnutrition in its working areas, SCPP integrated a nutrition component for cocoa farmer households, namely Good Nutritional Practices (GNP). The nutrition program was supported by the Dutch Embassy in Jakarta from December 2012 to December 2015. GNP aims to strengthen the cocoa farmers' knowledge and understanding of their family's nutritional needs.

In 2016, after three years of GNP implementation, Swisscontact conducted a field-based impact study on the GNP component. The objectives of the study were to evaluate the implementation and impact of GNP and reflect local people's perception towards the program. Different SCPP areas have significant differences in local conditions because there are different food cultures and food choices. Thus, the impact study provided additional in-depth quantitative and qualitative data to improve SCPP's monitoring of the Key Performance Indicators (KPI) related to GNP. The study was conducted in four targeted provinces in Sumatra (Aceh, West Sumatra) and Sulawesi (West Sulawesi, South Sulawesi). A case-control design was applied, with one group comprised of cocoa farmers participating in GNP training (n=80) and the other group comprising of non-participants (n=43). The field-based impact study was complemented by an ethnobotanical approach with the purpose of documenting and recommending local vegetable and fruit species suitable for the farming systems of cocoa farmers.

In addition to the field-based survey, an analysis of CocoaTrace data was also done. CocoaTrace is the computer-based tool used by Swisscontact to monitor progress and collect baseline and post-line data in order to track KPI outputs. The data (in total 38,019 baselines and 4,244 post-lines) related to home garden size, farming and socio-economic status, were analyzed more in-depth through the GNP impact study. The majority of farmers obtained most of their food from their own cultivated land, with some additional foods purchased from the local market/travelling vendor. In terms of access to vegetables and fruits, 75% of the respondents indicated good access. Unfortunately, apart from fish, other meat sources are hardly affordable for most of the respondents. The respondents' source of vitamin A is mostly from dark-green leafy vegetables. Only few farmers consumed vitamin A-rich fruits and other vitamin A-rich vegetables. In general, 30% of respondents increased consumption of fruits and vegetables after participating in GNP trainings. The largest allotment of household expenses for food is allocated for rice and fish, followed by vegetables, spices, cooking oil and eggs. If farmers have a higher income, the tendency is to

buy more rice and meat. Within the household, women take care of preparing food and make decisions on what kind of foodstuff to buy.

The study also collected the Individual Dietary Diversity Scores (IDDS) of the respondents. The total mean IDDS among those participating in GNP was 4.44, nearly a 0.5 category higher than the IDDS of the control group (4.0). Eighty-eight percent of respondents still actively maintain a vegetable garden, and 75% of those home gardens are properly managed. Forty-seven percent of farmers grow a higher number of vegetable species after participating in GNP trainings. Based on the farmers' opinions, the main obstacles with vegetable gardening are lack of seeds and pests and diseases, followed by lack of land and water shortages. The main sources of planting materials are traditional markets (43%), agri-shops (29%), and own seed production (22%). The last source is a low-cost and sustainable method of obtaining planting material.

The majority of GNP alumni consider the "Food and Nutrition Balance" topic to be the most useful compared to the other topics. They also appreciate practical lectures on home gardening. The topics that they want to learn in the future were home gardening, food and nutrition balance, and appropriate food processing methods. The participants suggested that GNP be continued over a longer period of time and accompanied by a distribution of vegetable seeds. Seventy-five percent of farmers consider GNP support for home gardening to be "good enough", only 2.5% quoted "strong support". When asked about the impact of GNP training on the whole community, the majority of respondents (42.5%) perceived that between 25-50% of the local community improved their nutritional practices. Generally, all key informants interviewed were satisfied with the GNP program; however, their main recommendation is to provide a more long-term approach.

The Program needs to focus on the most important topics for each individual community and prioritize key messages about nutrition such as promoting more frequent consumption or larger portions of dark-green leafy vegetables in order to improve dietary adequacy. It would be desirable to divide trainings into more sessions, provide more follow-ups or refreshment trainings, and distribute simple reading materials or posters with key nutritional messages for the community. The Program also needs to offer continuous capacity building for trainers and provide teaching aids to facilitate the training process. Support for home gardening needs to be stronger and more long-term and the continuity of demo plots should be ensured. Collaboration with health centers or integrated health posts (*posyandu*) could be a strategy to ensure continuous support.

1 INTRODUCTION AND PROGRAM BACKGROUND

Without good nutrition, human beings cannot achieve their full physical and intellectual potential. When people's nutritional status improves, it helps break the inter-generational cycle of poverty, generates broad-based economic growth, and leads to a host of benefits for individuals, families, communities, and countries. Good nutrition provides both a foundation for human development and the scaffolding needed to ensure it reaches its full potential. Good nutrition, in short, is an essential driver of sustainable development.¹ Therefore, ending all forms of malnutrition by 2030 is one of the new SDG targets, and it can only be addressed if all relevant stakeholders and sectors are involved and feel accountable.

Swisscontact is implementing the Sustainable Cocoa Production Program (SCPP) in Indonesia with the aim of supporting 130,000 smallholder cocoa farmers by 2020. SCPP is a large Public-Private-Producer Partnership (PPPP) in the cocoa sector involving the Government of Indonesia as the producer country, several donors from consuming countries, 12 multinational and national cocoa and chocolate companies, and farmer communities in 50 districts across the 12 main cocoa producing provinces in Indonesia.

To tackle high levels of malnutrition in Indonesia, especially stunting and mineral/vitamin deficiencies, SCPP added a training component on Food Security and Nutrition with support from the Embassy of the Kingdom of the Netherlands (EKN). This training component was named Good Nutritional Practices (GNP) and it targets 100,000 smallholder families that are participating in SCPP. The nutrition component was realized in six provinces where SCPP is being implemented, namely Aceh, West Sumatra, West Sulawesi, South Sulawesi, South-East Sulawesi and Central Sulawesi with a plan for expansion in the next several years. The rationale behind GNP is that by improving nutrition and food security, the labor productivity of cocoa farmers and their families will increase.

GNP combines improved performance of the cash crop sector with direct activities to improve smallholders' livelihoods, including their food and nutrition situation. The GNP training provides an overview of balanced diets, nutritious foods, horticultural training for home gardening and important nutritional issues for vulnerable groups. Specifically for this component, Swisscontact staff and Indonesian government officials developed a GNP training manual with input from the Centre for Development Innovation at Wageningen UR in the Netherlands. The service delivery model for the GNP training is making use of the existing training model for improving the productivity and quality of cocoa through Farmer Field Schools.

¹ Global Nutrition Report 2015

It follows the cascade approach. The Swisscontact program staff train master trainers who then train farmer Field Facilitators, who in turn train members of cocoa farming households.

The specific objectives of the study were:

- To evaluate the impact of GNP in selected target areas by comparing baseline and post-line data and GNP participants and non-participants;
- To record and understand farmers' perceptions and practices related to cultivation and consumption of selected nutrition improving food categories (dark-green leafy vegetables; vitamin A-rich fruits and vegetables; and other fruits and vegetables);
- To provide lessons learned and recommendations for future interventions of GNP.

2 METHODOLOGY

The survey approach and methods were designed to evaluate the impact of nutritional intervention in target areas. In the first phase of measuring the impact, a review and analysis of the existing secondary data from the CocoaTrace database was carried out. The Program collected data to monitor impact by comparing the situation of the farmers at the beginning of the GNP program (baseline survey) with the situation at the end/after the GNP program (post-line survey).

To compare the outcomes that are achieved through the program with what would have been the case without intervention, this study applied a case-control method that compared a sample group of those who participated in the nutrition program (intervention group or GNP alumni) and those who did not (control group). The two groups in comparison should represent similar characteristics in all respects, except for the participation in that specific program. A random selection strategy was applied to minimize the probability of systematic errors occurring between the intervention and control group and to increase the confidence that any differences in outcome are due to the effects of the intervention.

2.1 Secondary Data: CocoaTrace

Swisscontact applied CocoaTrace as a tool to regularly monitor progress. Swisscontact staff collected the data from all cocoa farmers participating in GNP at the beginning of implementation (baseline) and after intervention (post-line). The post-lines that were collected equaled at least 10% of the baselines. The collected data are mainly based on monitoring of KPI, i.e. Individual Dietary Diversity Scores (IDDS) and home garden size in square meters. Other variables that were used for the analysis include socio-economic status (education and poverty level), nutrition related variables (average participants raising livestock, cultivating monitored vegetable species), and farming data (availability of shade trees in a cocoa farm and cocoa productivity). In this study, 38,019 baselines and 4,244 post-lines were collected from January 2013 until July 2016 and analyzed.

2.2 Field-based Nutrition Impact Study

A field-based survey was conducted to obtain a more in-depth analysis of the intervention. The study applied both qualitative and quantitative methods. The target area selection was based on the preliminary analysis of the secondary data (CocoaTrace). Four areas out of the six areas implementing GNP training were selected (Table 1). The areas are Aceh, West Sumatra, West Sulawesi and South Sulawesi. Another area implementing GNP is Central Sulawesi. However, GNP only started operating in that area in 2016, thus it is excluded in this study. In each region, one district per province was selected, representing areas with the lowest IDDS and high IDDS levels. The study location is described in table 1.

Table 1: Study Locations

Location	Province	District	Remarks
Sulawesi	South Sulawesi	Bone	High IDDS
	West Sulawesi	Majene	Lowest IDDS
Sumatra	West Sumatra	Tanah Datar	High IDDS
	Aceh	Aceh Barat Daya	Lowest IDDS

The study applies a case-control method. The criteria for the intervention group are cocoa farmers that are participating in GNP and have a home garden. Eighty participants were recruited into this group. The control group comprised of cocoa farmers who were not participating in GNP and have a home garden. Forty-three participants were recruited into the control group. Both samples were selected randomly. The randomization of the control group was conducted by choosing every third or every fifth household (based on proximate size of the village) from one end of the village to the other end.

A number of data-gathering tools were employed, including semi-structured interviews, free-listing, open-ended interviews, focus group discussions (FGD), 24-hour food recalls, observations and home garden inventories. This data collection was conducted from February to April 2016.

Participants of FGD and in-depth interviews were selected purposively and based on their willingness to join the study. In depth interviews were done with key informants including health/nutrition specialists (*posyandu*, *puskesmas*), village heads, governmental agriculture extension officers, SCPP key farmers, farmer group leaders, knowledgeable GNP participants and also internal staff of Swisscontact. The topics of the in-depth interviews were related to food and dietary habits, home gardening and food crops, and

recommendations. Table 2 shows the distribution of informants of the field-based GNP impact study by location.

Table 2: Distribution of informants by study location

Province	South Sulawesi	West Sulawesi	Aceh	West Sumatra	Total
District	Bone	Majene	Aceh Barat Daya	Tanah Datar	4
GNP respondents	20	20	20	20	80
Number of control group respondents	11	12	10	10	43
Total Individual respondents	31	32	30	30	122
Key informants of in-depth interview	10	10	6	10	36
Number of FGD	4 (2 female, 2 male FGD)	4 (3 female, 1 male FGD)	3 ¹ (3 female FGD)	2 ¹ (2 female FGD)	13

¹ Note that in Aceh Barat Daya and West Sumatra, there were nearly no male GNP participants thus FGDs were only conducted with women.

2.3 Limitations of the Study

It must be noted that due to the size of SCPP and GNP, between 100-200 different field staff collected the CocoaTrace data, which might lead to inconsistency in data quality and accuracy. Another weakness is that for the 24-hour food recall, collected via tablets through the CocoaTrace application, there were limited options of food choices that may have caused some food categories to be slightly under-estimated.² The categories have already been revised and updated based on this finding.

In regards to the study locations of the field-based GNP impact study, all areas have specific characteristics. Although to some extent they share similar characteristics with other regions in Indonesia, any comparison and generalization that likens the findings to other areas must be done with extreme caution.

² The field survey noticed that some data enumerators omitted food categories in cases where there was no relevant food item in the options.

3 RESULTS AND DISCUSSION

3.1 Social Characteristics of CocoaTrace Respondents

The 38,019 respondents included in this study were on average 44 years old, with a 68.5% likelihood that they were living below the international poverty line of USD 2.5 per day.³ Figure 1 shows the level of education of the registered cocoa farmers. Sixty percent of the respondents have a low education level meaning they only received primary school education or less. Consequently, this indicates the need to adapt the training materials into easily understood materials with simple messages.

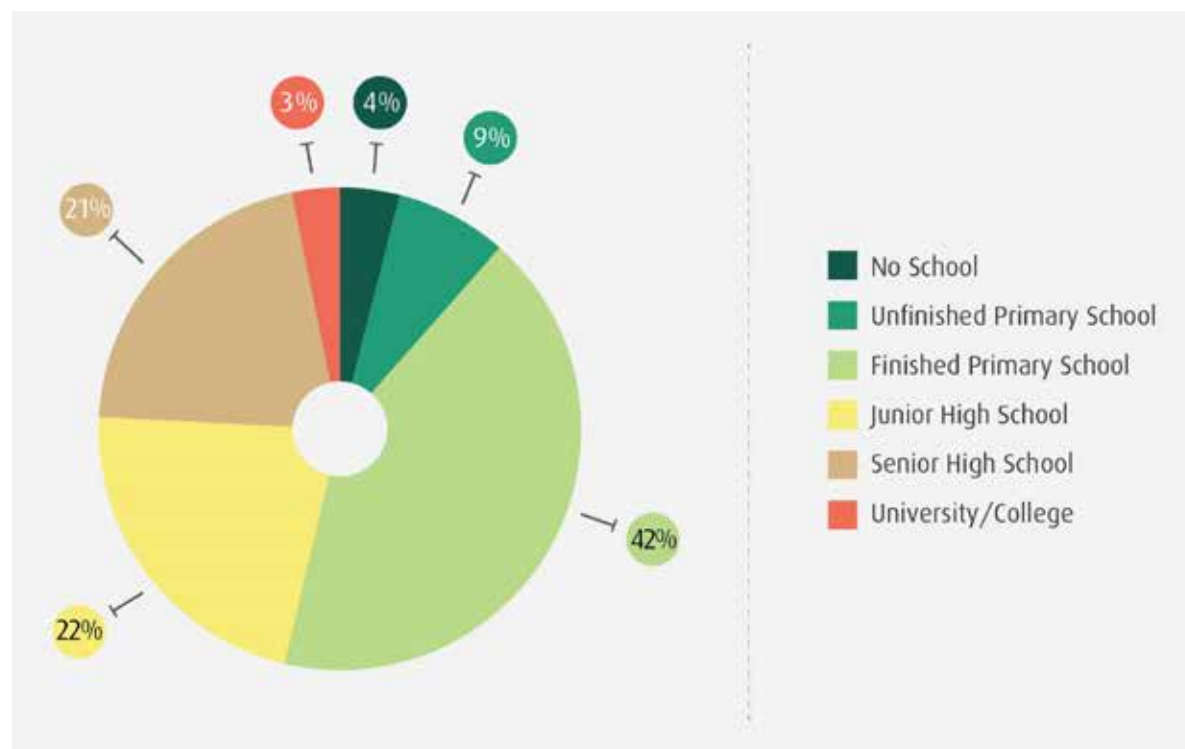


Figure 1: Level of education of registered farmers (CocoaTrace)

3.2 Dietary Diversity

The diversity of the food intake of the GNP participants was assessed through the Individual Dietary Diversity Score (IDDS). IDDS is used as a proxy of the nutritional quality of an individual's diet. It measures the number of different food groups consumed over a certain period of time, which is usually 24 hours.

An increase in the IDDS from baseline (4.80) to post-line (5.18) was recorded. Figure 2 shows the increase in IDDS scores at baseline and post-line in 5 provinces where GNP

training was conducted. The highest increase was found in South Sulawesi, followed by West Sulawesi, Aceh, South-East Sulawesi and West Sumatra in that order. West Sumatra had the highest IDDS score at the baseline, thus the lowest increase might be due to the relatively high dietary diversity before intervention.

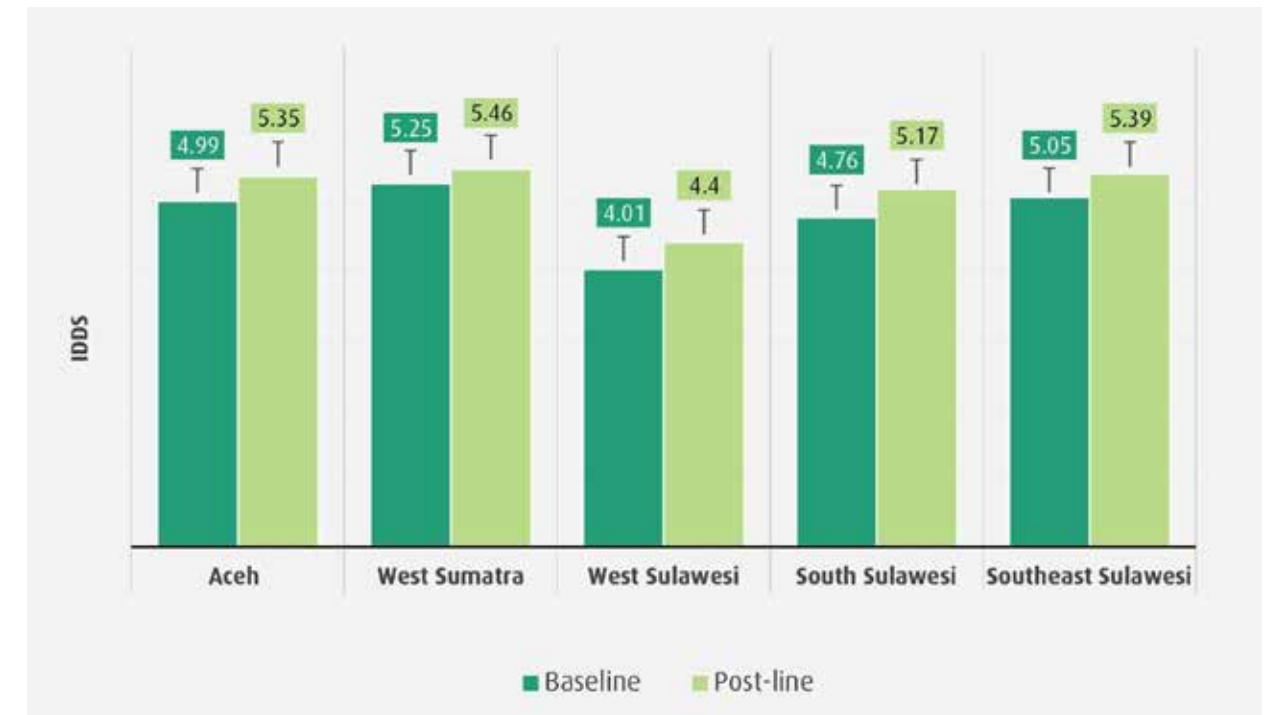


Figure 2: IDDS comparison at baseline and post-line by province (CocoaTrace)

Figure 3 shows a comparison of food categories with baseline and post-line data in GNP areas. Seven out of nine food categories showed a positive increase at the post-line. Three categories showed a slight increase (up to 5%), while four categories (dark-green leafy vegetables, vitamin A-rich fruits and vegetables, eggs, and legumes, nuts and seeds) had increased significantly by more than 5%. The category of organ meats remained unchanged. This indicates that people hardly consume organ meats and there were no dynamic changes within the food habits of this category. The only category that showed a decrease at the post-line was milk/dairy products. The participants do not commonly consume milk/dairy products.

³ Based on PPI Score 2012, Grameen Foundation

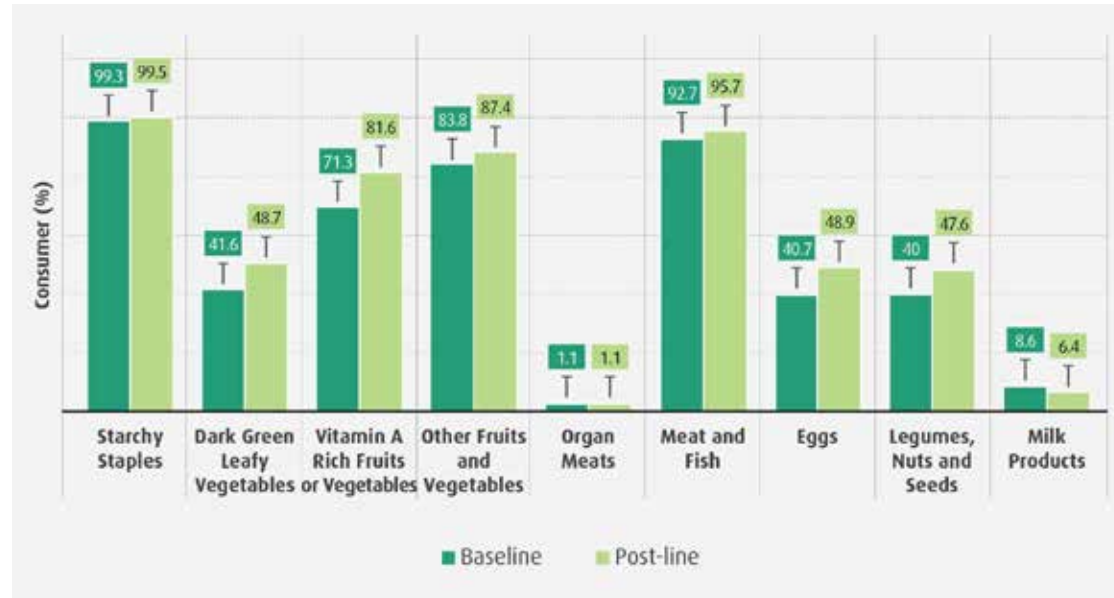


Figure 3: Comparison of food categories consumed in all GNP areas (CocoaTrace)

This is confirmed by the findings of the GNP Impact study where we analyzed individual food categories consumed among the GNP alumni compared to the control group. The results show that GNP alumni had a slightly higher consumption level of most food categories. Only the eggs and milk products category is slightly higher in the control group. The most significant difference is in the case of the vitamin A-rich fruits and vegetables and the other fruits and vegetables categories, where a higher proportion of GNP alumni consumed food from those categories compared to the control group.

3.3 Access to Nutritious Foods and Diversity of the Diet

The majority of farmers obtain fruits and vegetables primarily from their own cultivated land, with some additional foods purchased from the local market and/or travelling vendor. Only 12.5% of GNP participants and 7% of the control group rely solely on purchased foods. The GNP group has more diverse methods for fruit and vegetable acquisition, which may indicate more resilient food security strategies. Farmer groups play a minor role in food access for GNP participants. During the field survey, both groups were observed to supplement their diet with some wild edible plants. These are minor resources, but nutritionally important sources of food. Although often neglected by policy and development organizations, wild plants may contribute to dietary diversity and adequacy.⁴

⁴ Powell, B., Thilsted, S. H., Ickowitz, A., Termote, C., Sunderland, T., & Herforth, A. (2015). Improving diets with wild and cultivated biodiversity from across the landscape. *Food Security*, 7(3), 535-554.

Grivetti, L. E., & Ogle, B. M. (2000). Value of traditional foods in meeting macro-and micronutrient needs: the wild plant connection. *Nutrition Research Reviews*, 13(01), 31-46.

In terms of access to vegetables and fruits, 82% of the GNP alumni indicated good access, compared to the control group where good access was only indicated by 67% of the respondents.

During the FGD, there was also a general agreement that fruits and vegetables are easily accessible, however, in some areas it also depends on seasonal variation, the existence of travelling vendors and purchasing power.

Results show that the GNP group consumes more vegetable servings per day in both seasons. The average number of vegetable servings during the rainy season is significantly higher for the GNP alumni (3.4 servings), compared to the control group in which the average is 2.1. In the dry season the difference is smaller. The GNP participants consumed 2.8 servings of vegetables a day and the control group is not far behind with an average of 2.6.

Looking at the access to nutritious foods for all the household members of the GNP participants, 87.5% mentioned equal access for all members of the household, while 12.5% of respondents mentioned that the priorities are for children and ill people. In the control group, 86% cited equal access among all, and 14% indicated priority for ill people and children.

When deciding on what food items to purchase, farmers mostly opt for fish and rice, followed by vegetables, spices and cooking oil (Figure 4). Unfortunately, apart from fish, the meat resources are hardly affordable for most of the respondents. Slightly different results were reported during FGD where vegetables were on the first rank, followed by fish, eggs, rice and then various other food items.

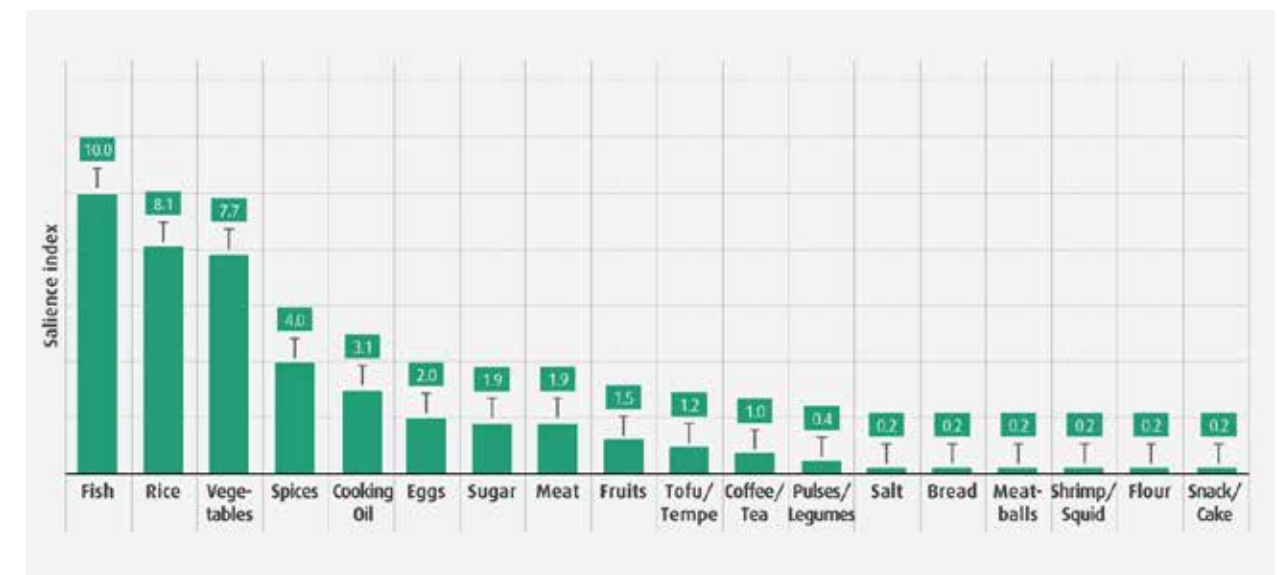


Figure 4: Aggregated food items with highest share of food expenditures (Impact Study)

With regards to gender roles, both study samples show that women are responsible for food preparation and decision-making related to foodstuff purchases.

3.4 Cultural Aspects and Dietary Changes During Pregnancy, Breast-Feeding, Childhood and after GNP Training

In most cases, people are not aware of appropriate dietary needs during the most vulnerable life periods such as pregnancy, breast-feeding and children under 5 years old. During these periods about 60% of the respondents eat as usual, thus not making any dietary change. About 30% increase the consumption of foods (some start consuming more foods in general, and some start specifically consuming more fruits and vegetables). In several cases during pregnancy and childhood, some people unfortunately eat less food than usual. Dietary practice for children under 5 years old are the most versatile (Figure 5). In general, more than 60% of the GNP alumni and 60% of the control group do not make any dietary change for young children. Twenty-one percent of GNP alumni stated that children should consume more fruits and vegetables.

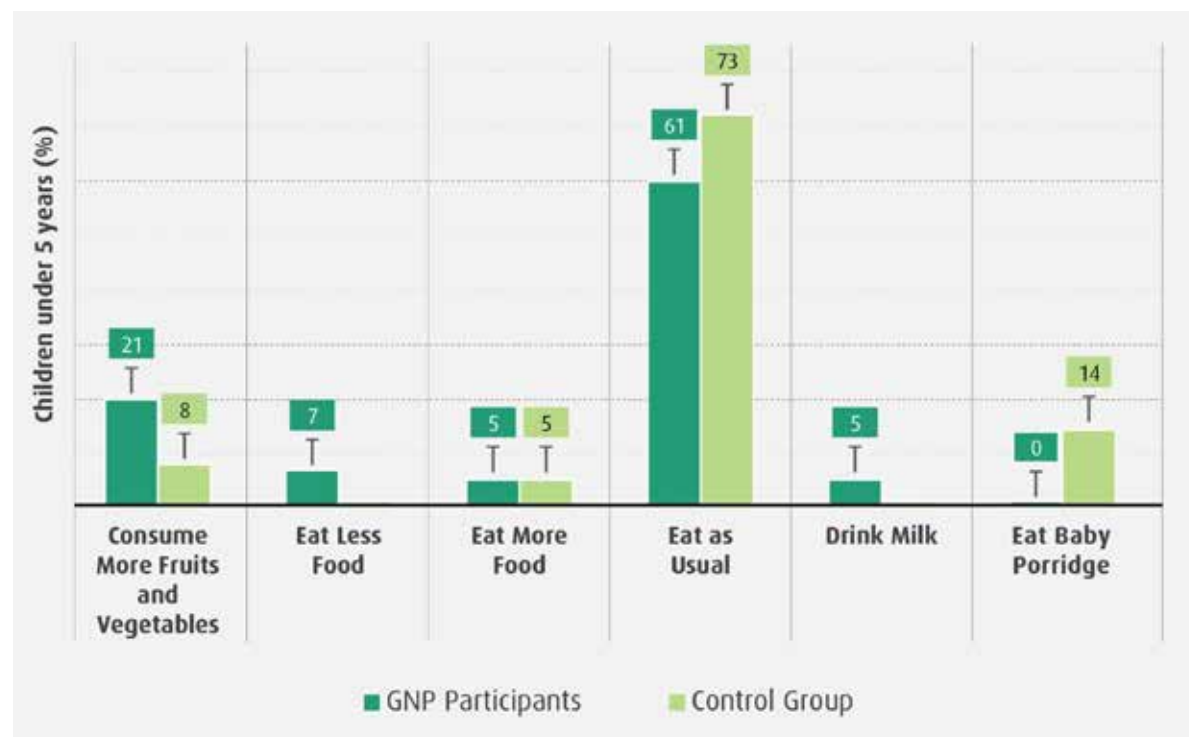


Figure 5: Comparison of dietary changes for children under 5 years old

In some regions, there are some persisting cultural beliefs that may influence the dietary diversity, nutrition and health of the local people. When GNP participants were asked directly about cultural restrictions or beliefs that influence food intake, a majority did not

mention any.⁵ As all the communities visited adhere to the Islamic religion, most people explained that there is no food restriction except for pork meat. One of the beliefs influencing food intake is that pregnant/young women should reduce consumption of all foodstuff apart from rice and fish, this leads to extreme diet simplification and such a diet may cause micronutrient malnutrition and have a negative effect on the health of the mother and fetus.

The study also specifically focused on breastfeeding habits, which is an important nutrition issue in Indonesia. In the case of colostrum, which should be given to the baby within the first hour of being born, 83% of the female GNP participants did so, while only 50% of the control group did. Within the first 6-month period during which the baby should be solely breast-fed, 67% of the intervention group and 71% of the control group fulfilled that expectation. The percentage of the GNP group is slightly lower because a few women were also giving the baby puree or fruits. While analyzing how long participants breast-fed their babies, the majority of women in both groups were lactating from 0-24 months (66% of the GNP participants and 47% of the control group). Some mothers gave the baby breast milk between 0-12 months. The number of times mothers breast-fed per day was more than 5 in both groups (85% among GNP alumni and 69% in the control group). Between 6-24 months, when complementary food is needed, the majority of participants in both groups fed children 3-4 times a day (73% of GNP mothers and 46% of the control group). Lastly, when asked if they provide vegetables and fruits to children between 6-24 months on a daily basis, more GNP participants (91%) compared to the control group (77%) were doing so. Based on these findings, in most cases we notice that women who participated in the training have better dietary habits during the lactating and child feeding periods.

3.5 Status of Vegetable Gardens and Level of Agrobiodiversity

Figures 6 and 7 describe the size of the home gardens and proportion of households that have home vegetable gardens at baseline and post-line by province based on CocoaTrace data. Aceh was the only province that saw a decrease in the average size of home gardens. The largest increase in size took place in West Sumatra and South Sulawesi (Figure 6). There was an increase in 3 out of 5 provinces in the number of households that have home vegetable gardens with the highest increase found in South Sulawesi (Figure 7).

In various areas, most of the farmers cultivate vegetables in additional areas such as cocoa farms, rice fields or forest gardens. This measurement has not been considered and is not

⁵ However, it should be mentioned that during the rather rapid approach of the field survey, informants might have been too shy to immediately speak about cultural beliefs. Later, when discussed with Swisscontact field staff, there could still be some other unmentioned beliefs.

reflected by the monitoring tool. This may be one explanation behind the declining size of home gardens. Based on the informants, the lack of land is one of the major barriers for scaling up home gardening.

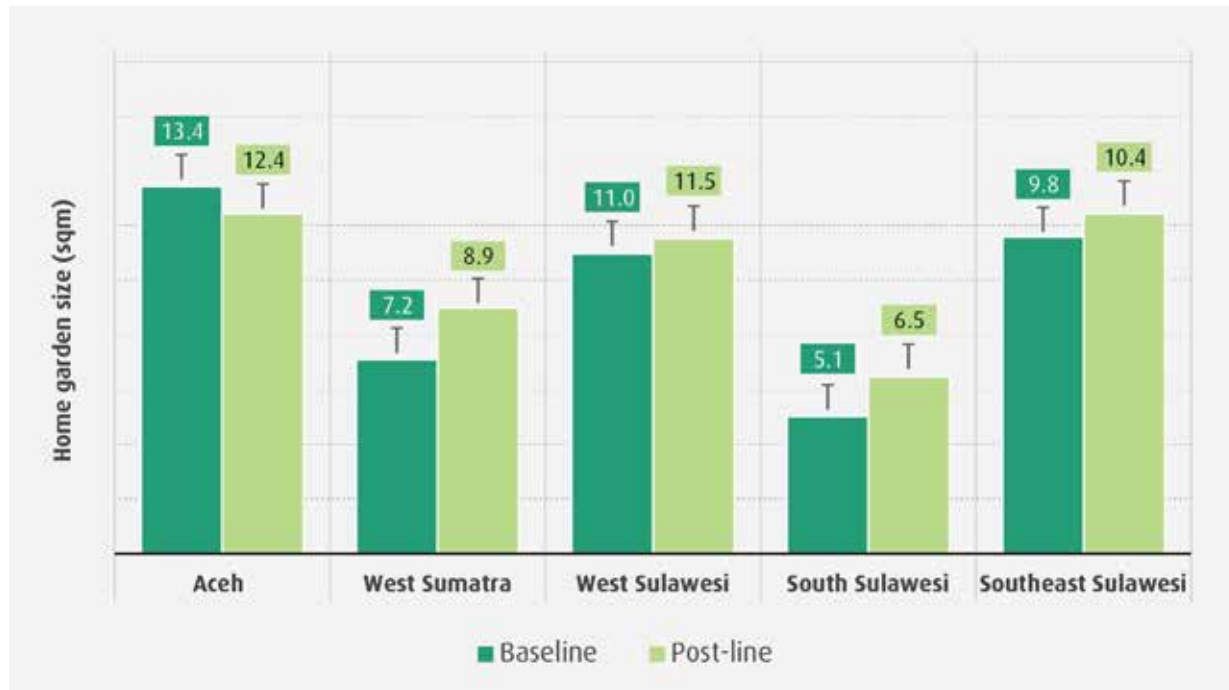


Figure 6: Home garden size at baseline and post-line by province (CocoaTrace)

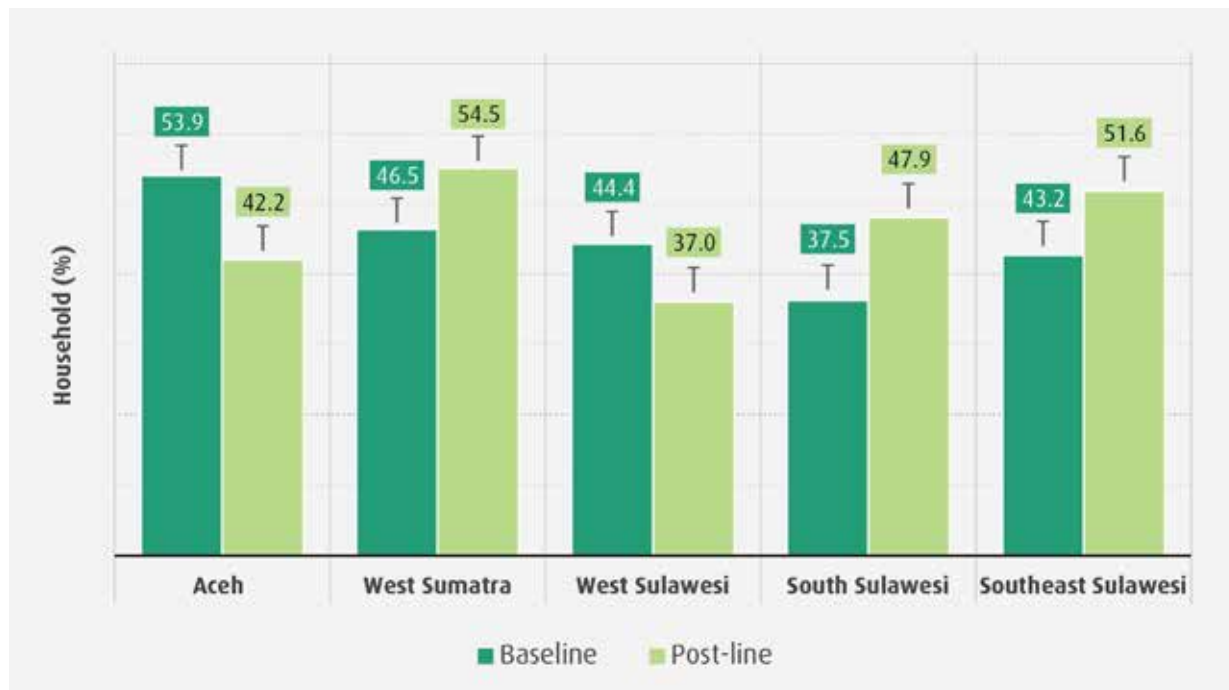


Figure 7: Proportion of households that have a home vegetable garden at baseline and post-line (CocoaTrace)

The results of the impact study show that 72% of the GNP farmers interviewed already had a home garden before the program, while 22% expanded the size and diversity of their already existing vegetable gardens. Five percent of participants established completely new gardens after participating in the GNP program. Some respondents admitted that they were unmotivated to cultivate vegetables as there is no further provision of seeds after the training and they often struggle with wild animals disrupting their gardens (as they often grew vegetables in cocoa or forest farms instead of backyards). People also considered the costs and labor, and the fact that it is often only compensated with low vegetable yields. So people tend to buy vegetables from the sellers. Another reason is the problem with floods that destroyed their vegetables on multiple occasions.

47% of GNP farmers claimed to grow a higher number of vegetable species after GNP training. When farmers were asked which particular vegetables they started to grow after GNP training, 2-3 vegetable types such as long bean, water spinach and eggplant were the most frequently mentioned vegetables. Vegetables that do not grow well according to the respondents are i.e. amaranth, chili, cucumber, paria, tomato, beans, cauliflower, cabbage and sweet pepper, mostly because of pests and soil conditions.

Figure 8 shows farmers' strategies for cultivating vegetables in other places apart from backyard gardens. Over 60% of GNP participants cultivate vegetables in cocoa gardens. Rice fields are also a commonly utilized area for vegetable cultivation. These findings mean the Program should reconsideration monitoring procedure, as there may be hundreds of square meters of cultivated vegetables at an individual level.



Figure 8: Additional locations utilized by cocoa farmers for cultivating vegetables (Impact Study)

Figure 9 shows the 20 most frequently documented vegetables that were cultivated in the home gardens of GNP respondents. The total number of vegetable species inventoried was 43. It should be noted that the GNP impact study was done during the rainy season; the situation might be different during the dry season. Moreover, vegetable cultivation is highly dynamic. This poses several constraints during regular monitoring since at certain times there is nothing cultivated, but several days or weeks later the home garden is fully occupied by crops.

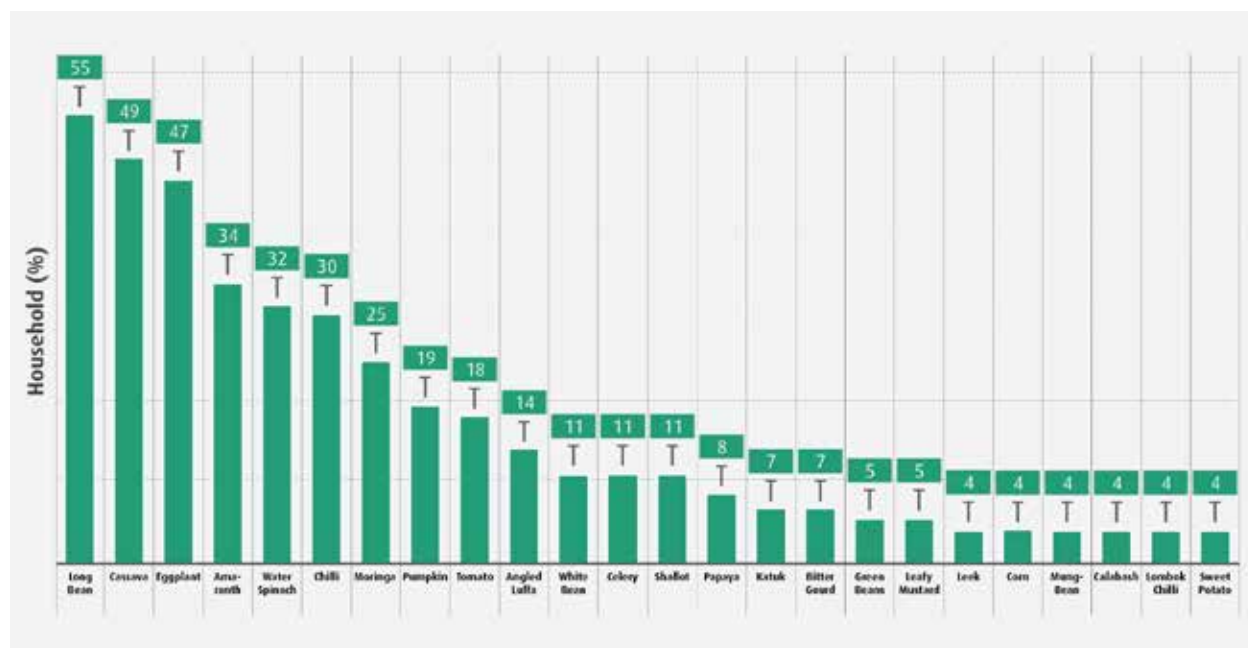


Figure 9: Twenty best-represented vegetables in the home gardens of GNP alumni (Impact Study)

All the vegetable species promoted by Swisscontact can be found within the 20 best-represented vegetables. The vegetables most frequently cultivated by the farmers are long bean (55%), eggplant (47%), amaranth (34%), water spinach (32%), chili (30%), tomato (18%) and leafy mustard (5%).

Seventeen fruit species out of the 20 most often cultivated fruit has already been cited in the 20 most commonly consumed fruits (Figure 10). The most frequent consumed fruits are banana, papaya, mango, rambutan, and coconut as described in the figure. This pattern suggests that farmers often eat fruit species that they cultivate. The three best-represented fruits (banana, papaya and mango) are rich in carotenoids and therefore potentially increase vitamin A intake.⁶

⁶ Englberger L., Darnton-Hill I., Coyne T., Fitzgerald M.H. & Marks G.C. (2003) Carotenoid-rich bananas: a potential food source for alleviating vitamin A deficiency. *Food and Nutrition Bulletin* 24(4), 303-318.

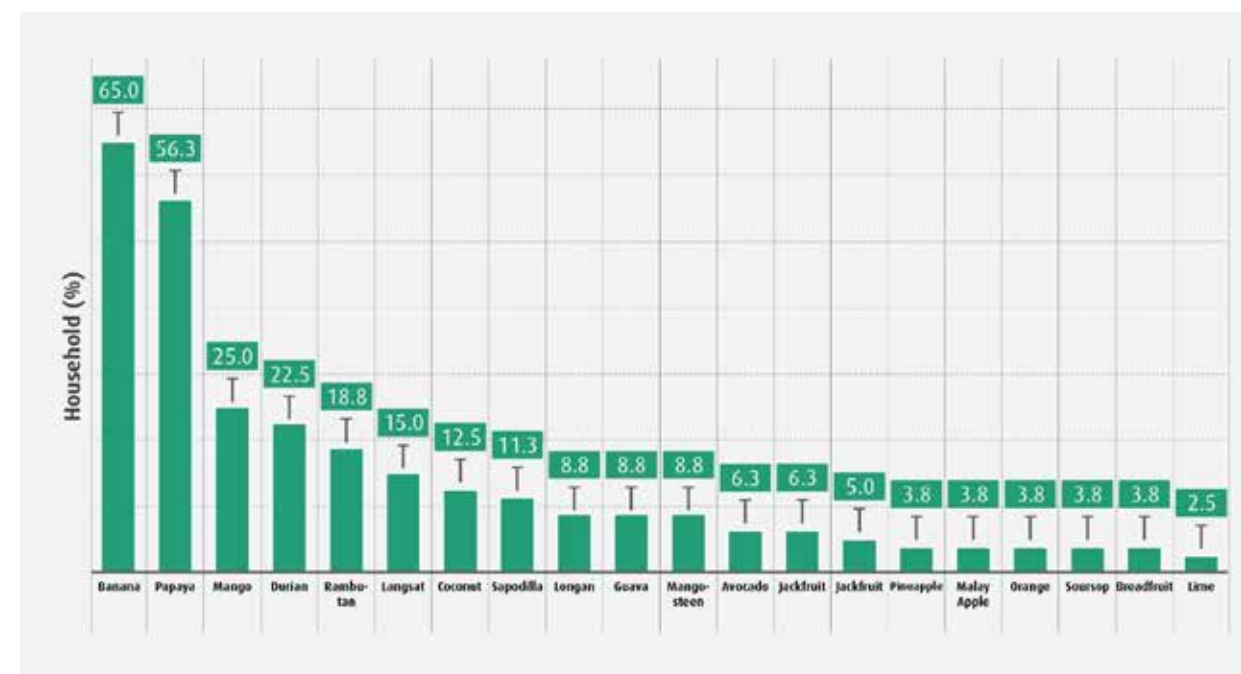


Figure 10: Twenty best-represented fruits in the home gardens of GNP alumni (Impact Study)

The availability of the farmers' own supply of vegetables during the year was examined. In general, vegetable availability is higher among GNP alumni compared to the control group. Vegetable availability during the rainy season (which is generally from November until April) was higher than in the dry season (generally from May to October). This is mainly influenced by the lack of water during the dry season (Figure 11).

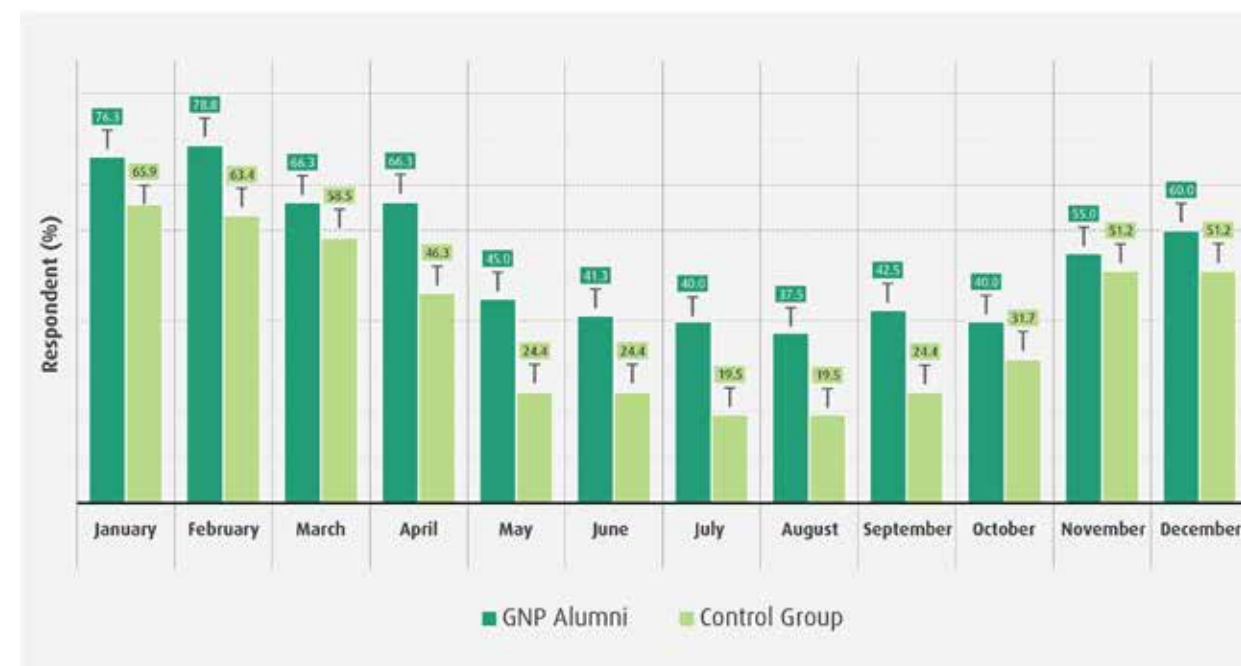


Figure 11: Seasonal availability of own supplies of vegetables (Impact Study)

The most often mentioned challenges are the lack of planting material (vegetable seeds), pest and diseases, followed by lack of land and water for irrigation. The main sources of seeds in both groups are traditional markets, agri-shops and own-seed production. Production of own seeds is a low-cost sustainable method of obtaining planting material, however, about 40% of those who produce their own seeds from both groups are also reproducing hybrid seeds, which often cause a decrease in yield and crop vitality after each cycle.

3.6 Participatory Comparison of Modern Hybrid Seeds and Traditional Varieties

Agricultural development projects often promote modern hybrid varieties as one of the main approaches to increase the production of small-scale farmers in developing countries. This approach is often realized without studying already existing informal seed systems and local crops and their varieties, even though local varieties have sustained peoples' livelihood for centuries or millennia. It was identified in the GNP mid-term report that modern varieties are hardly accessible or affordable for the majority of small-scale farmers living in rural areas. Furthermore, these hybrid seeds are most often developed by seed companies in Java, thus they might not thrive in the different local conditions of Sulawesi and Sumatra.

The study explored the experiences of the local farmers, and let them evaluate the performance of local and modern vegetable varieties. This bottom-up approach provided more information about the properties of the local informal/formal seed systems and performance of crops in the context of their origin and genetic setting. Thus, it may navigate the Program on how to further progress in terms of diversification of the farming systems and diet of the local people.

Table 3: Participatory comparison on modern and traditional vegetables varieties by GNP alumni

Local Varieties – Advantages	Local Varieties - Disadvantages
<ul style="list-style-type: none"> • Good availability (n=30) • Cheap price (n=27) • Good production (n=9) • Do not know (n=14) 	<ul style="list-style-type: none"> • Low production (n=42) • Pest and diseases (n=17) • No disadvantage (n=21)
Modern hybrids – Advantages	Modern hybrids - Disadvantages
<ul style="list-style-type: none"> • Good production (n=45) • Do not know (n=32) • Good availability (n=3) 	<ul style="list-style-type: none"> • Expensive (n=37) • Do not know (n=30) • Need extra care (n=9) • Bad availability (n=2) • Low production (n=2)

The main disadvantages of local varieties were found to be lower quality, lower production, and less resistance to pests and diseases. Complementary, the main advantage of hybrids is high productivity, better quality produce and resistance to pests and diseases. The main disadvantages of hybrids are high prices, bad accessibility, dependence on purchasing seeds regularly and also the associated extra labor and costs for inputs to ensure their performance. Surprisingly, the longer period of local vegetables' growth was considered to be an advantage. This is in contrast to the general pattern for cereals and other crops (where faster growth and harvest is considered as an advantage). Certain vegetables might have a longer fruiting period. With longer growing or longer-producing local vegetable varieties, farmers can obtain multiple harvests.⁷

3.7 Marketing Strategies of Produced Fruits and Vegetables and Most Economically Viable Crops

There is no significant difference between GNP alumni and the control group in terms of how they use their own vegetables and fruits. Out of the GNP farmers, 62% use their vegetables and fruits exclusively for their own consumption, while 38% use them for consumption as well as for selling. In the case of the control group, 64% use it solely for household consumption, while 36% use vegetables for consuming and selling. Of those households who sell the production (in both groups), the income increase is insignificant. Only very few farmers indicated a significant increment in income. Farmers also share their cultivated vegetables with neighbors. They only sell the vegetables when there is excess produce. In both groups, respondents sell their vegetables to local traders (often mobile vendors) and at the local market.

With regards to the labor needed for vegetable gardening, the majority of farmers work alone or get help from other household members. Occasionally, neighbors or friends provide free assistance. Hiring labor was found only in one case.

In cultivating the crops, the respondents also considered the price of the crops. In general, it is also reflecting local prices. The vegetables with the highest prices are carrot, cauliflower, leafy mustard, green bean and potato.⁸

⁷ Globally, an overlooked, yet wise approach of farmers is to cultivate both early- and late-maturing varieties of the same crop to increase the period of food availability and to spread out the amount of work and time required

⁸ In the study areas, potato is considered and consumed as a vegetable, not as a staple food

The most economically valuable fruit is durian, followed by apple, grape, orange, langsat (a variety of duku), watermelon and mangosteen (Figure 12). During group discussions, durian was mentioned in the majority of locations, followed by apple, grape, rambutan and langsat.

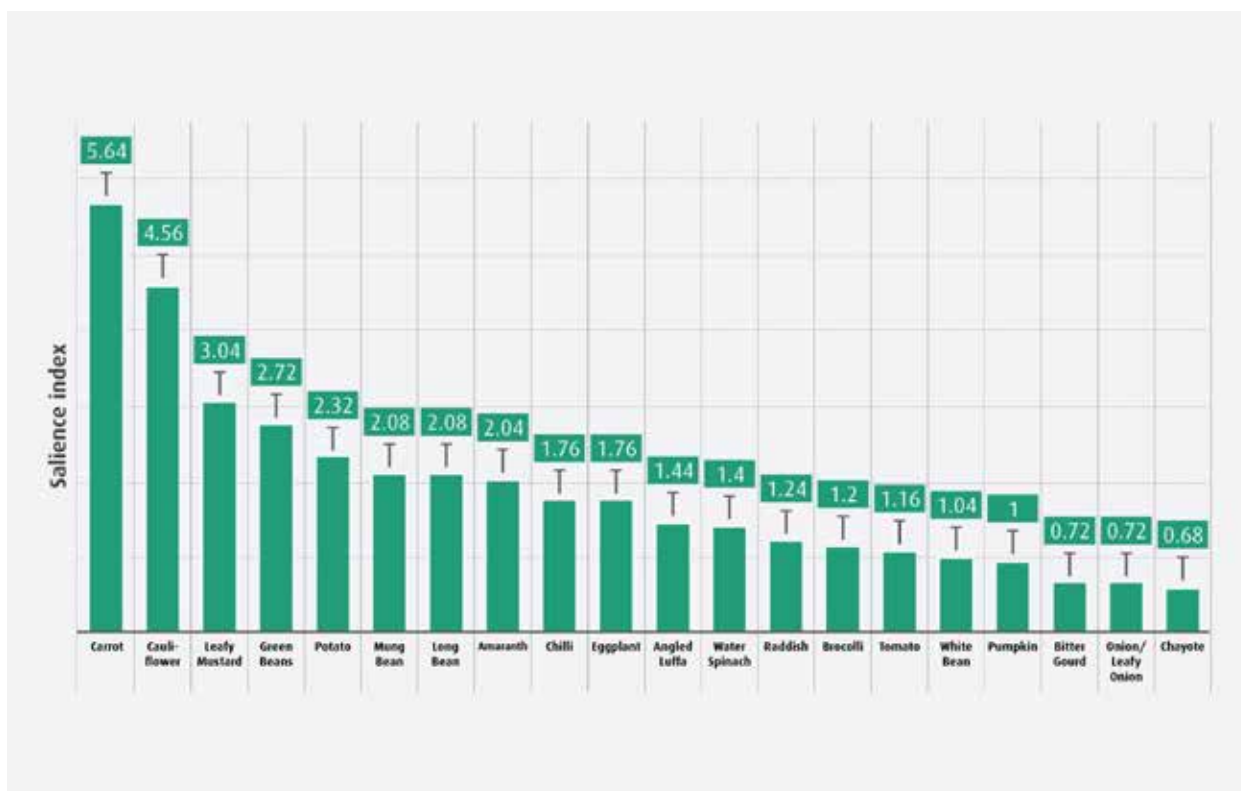


Figure 12: Twenty most valuable vegetables according to GNP participants (Impact Study)

As per market price of GNP recommended vegetables, chili, which might rather be considered as a condiment, has the highest price per kilogram (IDR 20,000 – 60,000). Chili seems to be a vital and popular additional crop among cocoa farmers. It has been observed that sometimes farmers even intercrop chili in their young cocoa farms or on the margins of older farms. During the inventory process, chili was encountered in 30% of home gardens (6th most represented crop). From the leafy vegetable category, the leafy mustard (IDR 2,000 – 8,000/bunch) has the highest value and cultivation of this vegetable could be promoted in order to increase the income from vegetable gardens. Leafy mustard was only found in 5% of home gardens of the GNP participants.

3.8 Participatory GNP Program Evaluation

The majority of the GNP alumni considered the “Food and Nutrition Balance” topic to be the most useful compared to the other topics (62.5%). The participants also appreciated practical lectures on home gardening (20%). When asked which topics they would like to

learn in future, the following topics were mentioned in consecutive order: home gardening, food and nutrition balance, appropriate food processing/cooking methods, refreshment training of existing topics, child feeding practices and prevention of diseases. Respondents did not show much consensus on other topics.

The most frequent expectation of the respondents is that GNP be continued over a longer period of time (42.5%), followed by distribution of more vegetable seeds (15%). Seventy-five percent of farmers consider GNP support for home gardening as “good enough”, but only 2.5% quoted “strong support”. About 50% of participants perceive the GNP training as gender sensitive, nevertheless, 42.5% somehow do not. When asked about the impact of the GNP training on the whole community, the largest group of respondents (42.5%) thinks that 25-50% of the local community improved their nutritional practices (Figure 13).

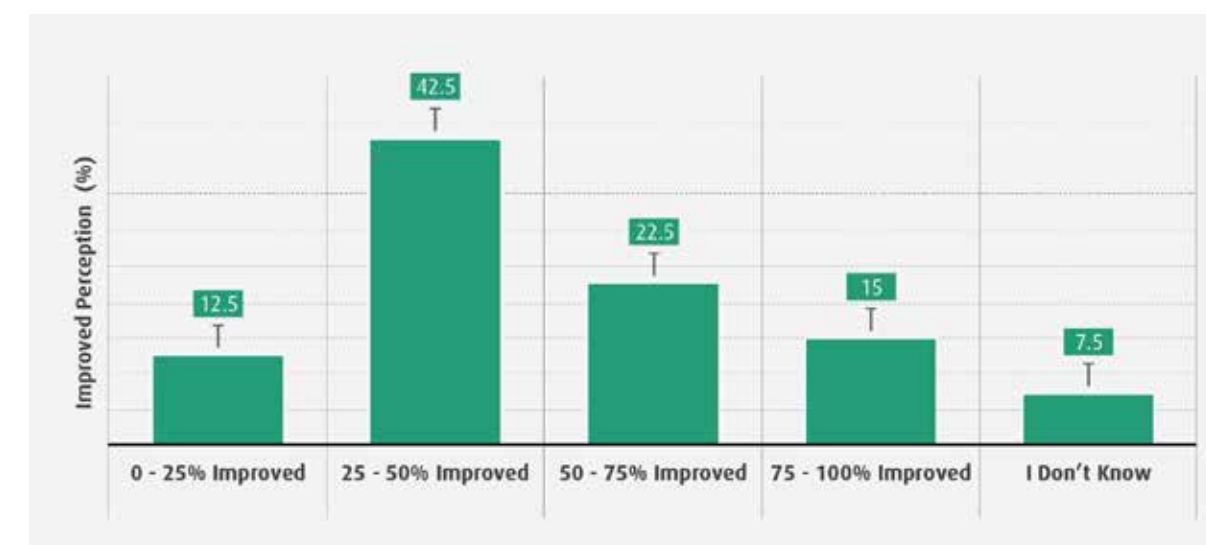


Figure 13: Respondents' perception of improved nutrition practices in the whole community/village (Impact Study)

4 Conclusions and Recommendations

Overall, both the impact field survey and the CocoaTrace analysis of the Program indicators have found evidence that three years after its implementation, the Good Nutritional Practices training resulted in higher dietary diversity among participants in all provinces. In the case of home gardens, positive results were achieved in at least three out of five provinces.

Although this nutrition-sensitive agriculture component focused on increasing the availability of vegetables categorized as dark-green leafy vegetables and other fruits or vegetables, it is remarkable that after the GNP training the consumption of nearly all food categories had increased.

It is obvious that scaling up vegetable home gardening is not feasible in all places and the Program will still face that challenge. Nevertheless, the complex nutrition training has improved nutrition by encouraging participants to adjust food choices, rather than solely focus on cultivation of own crops. This is evident in two provinces where even though there was no expansion of home gardens, the dietary diversity had increased quite significantly (particularly in West Sulawesi and Aceh).

It seems that although the majority of small-scale cocoa farmers live in rural areas and close or under the poverty line, there are still food options available there. The increased dietary diversity scores after the nutritional training indicate that it is rather a matter of low nutritional awareness and inappropriate feeding habits. Despite the fact that certain foods such as meat (apart from fish) are rather unaffordable and thus rarely consumed, relevant nutrients were supplemented by increased consumption of other food categories. For example, protein needs were replenished by higher consumption of legumes, which are also excellent sources of important minerals including zinc, calcium and iron. Moreover, the category of eggs showed an increase in consumption and should be further emphasized, as it is a more affordable and accessible animal resource than meat. Eggs are a great source of animal-based, complex proteins with easily absorbed minerals and vitamins. In the case of vegetable based categories, local people were found to be unaware of their nutritional importance. Vegetables were also found to be consumed infrequently and in rather small amounts. Local people's taste preference is largely oriented towards their sweet perception and vegetables are often considered somewhat bitter, for that reason there is basically no consumption of raw vegetables and a tendency to overcook and mix them with other ingredients such as coconut milk. Adjusting the mindset and taste preferences of the people is hard to implement and would need strong behavioral change through a highly effective and attractive training program. Yet, comparing the situation at the baseline versus post-line, as well as between the intervention and the control group, the GNP program improved consumption of vegetables.

Key informants' feedbacks were constructive and generally very positive about GNP. The main recommendation was a more long-term and deeper approach. From that perspective, the Program would be able to improve how it addresses local nutritional problems, community needs, agricultural development, human behavioral changes, and in general 'fit the local context'.

As already mentioned, the strength of GNP is linking nutritional knowledge with agriculture. Remarkably, the GNP program is currently further strengthening its intervention by implementing trainings on simplified fishpond culture and establishing tarpaulin (foil) ponds in the most marginalized communities, where a lack of protein in the diet has been

observed. In addition, the Program is also paying special attention to the identification and promotion of nutrient-rich local foods, which is a good sign for both sustainable and culturally sensitive food based strategies. Future program implementation adjustments based on the suggested recommendations, collaboration with relevant partners or associated implementers, and program hand over to development partners or community initiatives may result in a robust and sustainable intervention leading to better nutrition and health, poverty reduction and a more productive future for cocoa farming communities in SCPP areas.

4.1 Recommendations

The recommendations were based on the information coming out of both studies, supplemented by a literature review and program observation. The recommendations are given with respect to the individual topics i.e. dietary diversity, home gardening and program implementation and monitoring.

4.1.1 Dietary Diversity

The Program should continue to promote important messages on the consumption of dark-green leafy vegetables by encouraging people to eat more than one serving a day and/or eat bigger portions to improve the dietary adequacy. Considering the fact that people have low access to meat and rarely consume other vitamin A-rich vegetables and fruits, green leafy vegetables play a crucial role in the diet and health of the local communities. Raising awareness on already existing local vegetables and fruits, including wild food plants, could contribute to a sustainable diet. Promoting consumption/cultivation of legumes would be desirable, accessible legumes include tempeh, tofu, ripe seeds of common beans, red beans, mung beans, soy beans, peanut, cowpea, pigeon pea, *petai*, *jengkol* etc. Another important message should focus on highlighting the importance of appropriate dietary changes for pregnant women, breast-feeding women, infants and children. Few people improved their diet during this vulnerable period, most did not change, and some even ate less due to cultural beliefs.

During the fieldwork and consequent nutrition study, we noticed that farmers are interested and enthusiastic about the nutritional values of local vegetables. More local vegetables should be incorporated into the current GNP manual and awareness about their nutritional potential should be increased. In most of the areas, farmers have traditional knowledge about collecting and consuming wild vegetables and other wild food resources. Even though wild plants often overreach cultivated plants in terms of micronutrient content, in the survey areas, both knowledge and consumption is limited. People often consider wild plants less prestigious, and despite their abundance, prefer to buy modern

vegetables from the market. Therefore, the Program should also stress the nutritional significance of wild resources and local crops.

Simplified reading materials/flip charts/posters with key nutrition messages would be useful for the community (e.g. importance of dark-green leafy vegetables, vitamin A-rich foods and legumes; value of local plant resources and traditional foods; nutrition during vulnerable life periods; etc.). In the areas where fishponds are currently being developed to increase consumption of fish, make sure that the increase in the availability of fresh water fish will not cease consumption of more nutritionally rich seafood.

4.1.2 Home Gardening

In general, it is important to make farmers aware about the importance of crop diversity (nutrition, resilience and environment). Larger and commercialized farmers can utilize modern crop seeds, but for the majority of small-scale farmers, it would help to develop basic seed production techniques. Modern hybrid seeds are expensive, hardly accessible, developed in different conditions, and will not reproduced in later cycles. Cultivation of legumes would be highly desirable in terms of human nutrition as well as environmental functions leading to bio-intensification of farming system (various beans/peanut varieties can be grown in vegetable gardens, while in cocoa agroforests, other nutritional foods can be grown e.g. *petai*, *petai china*, *jengkol*).

Many villages are conceptualized only as dense housing settlements without any land dedicated to agricultural activities. Over 1/3 of respondents quoted lack of land as the main barrier in developing vegetable gardens. In those situations, it is hardly possible to have vegetable backyard gardens (apart from polybags). However, many farmers cultivate vegetables in the cocoa farm, rice field, field margins or other spaces. It would be desirable to support and develop vegetable cultivation in those areas, as there is more land available and cultivation can be scaled up more easily – even to a commercial level. In the case of limited land for backyard gardens, apart from polybags, vertical gardening or decorative wood constructions with climbing vines (e.g. bitter melon '*paria*' or chayote '*labu siam*') could be innovative and attractive for the farmers.

From the perspective of climate change and scarcity of water during the dry season, it would be useful to develop water saving technologies and small-scale irrigation schemes to increase farmers' motivation, enhance continuity of vegetable cultivation, improve diets during the dry season, and offer new marketing options.

Support of home gardening needs to be stronger and more long-term. The continuity of demo plots should be ensured and simple reading materials or posters with key nutritional messages should be distributed to the community. Follow up trainings on home gardening

can be developed with a focus on agroecology, agroforestry, crop diversification, crop rotation, intercropping, economic profitability and nutrition-sensitive agriculture.

4.1.3 Program Implementation and Monitoring

The Program needs to offer continuous capacity building for trainers and provide teaching aids to facilitate the training process. As individual GNP trainers vary in teaching quality and monitoring quality, the delivery chain and quality of the trainings should be crosschecked. Staff with a background in nutrition or those who are assigned to specialize in nutrition could be more effective at delivering the training. In terms of cultural sensitivity, the trainer should ideally be from the community/local area so they have a better understanding of the local social context and are able to provide long-term support. Collaboration with health centers or integrated health posts (*posyandu*) could be a strategic way to ensure continuous support.

Based on the fact that nutrition is a broad and sensitive topic that requires a longer process for effective behavioral change, it would be important to divide trainings into more sessions, or generally have more follow up/refreshment trainings. The content of the GNP module is very good and complex. Also, the training of trainers is of high quality and participatory, however, it is a lot of information being transmitted in a short period time. It would be ideal to involve stakeholders such as the government, other NGOs, *posyandu* and other stakeholders. Collaboration with wider stakeholders will ensure the GNP program's future sustainability.

Considering program monitoring, it would be useful to record not only food categories consumed within 24 hours, but also in which part of the day foods were consumed (i.e. morning, afternoon, lunch). With this method, categories for consumption frequency would be clearer and being aware of common eating periods could help navigate better accuracy related to data collection. It would also be useful to monitor snack consumption (as an extra category, not counted in the IDDS), as there is a considerable increase in consumption of conventional snacks and sweet stuff in recent years. A focal point could also be to monitor the IDDS of children under 5 (3-5 years), as the low intake of vegetables and fruits among children was already highlighted in the mid-term report and among the key informants. In the case of home gardens, monitoring of more selected micronutrient-rich plants could be useful (currently *moringa*, *katuk*, pumpkin and cassava have been added).⁹

⁹ Moringa - *Moringa oleifera* is an extremely rich source of iron and vitamin A; Katuk – *Sauropus androgynus* is a very good source of iron and vitamin A; pumpkin leaves are very rich in vitamin A and iron, while fruit is rich in vitamin A; and cassava leaves are a very good source of iron and vitamin A. Leaves of all vegetables are also good sources of folate, calcium and vitamin C among others.