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Annual performance assessment of Suchana nutrition sensitive fish and vegetable production in Sylhet and Moulvibazar

CNRS FIVDB Helen Keller International icddr,b iDE আরডিআরএস বাংলাদেশ RDRS Bangladesh Save the Children WorldFish

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Executive summary

WorldFish is promoting nutrition-sensitive fish and vegetable production systems for beneficiary households in north-east Bangladesh as part of the 'Suchana' consortium led by Save the Children and other consortium partners; HKI, IDE, icddr,b, CNRS, FIVDB and RDRS. The goal of the 6-year program is to reduce childhood stunting by additional 6% in 250,000 very poor households in Sylhet and Moulvibazar districts within first 3 years of interventions.

It was anticipated that 30% of the beneficiary households would have access to ponds or other small water-bodies and they would receive support on nutrition-sensitive fish production along with other nutrition-sensitive and nutrition-specific program components. Nutrition-sensitive fish and vegetable production interventions focused mainly on carp and tilapia polyculture along with the production of small indigenous fish species along and different types of vegetables. The main aim of the interventions was to increase the production and consumption of fish and vegetables to enhance dietary diversity of women and young children (6-23 months).

Before initiating large-scale implementation, a learning phase was implemented in 2016 targeting 14,714 beneficiary households (BHHs) from the 12 unions in Sylhet and Moulvibazar. During this period, WorldFish supported 6,610 beneficiary households (BHHs) and 103 demonstration ponds. All BHHs received nutrition sensitive horticulture related interventions, and 5,109 BHHs and 103 Demo Pond owners also received nutrition sensitive aquaculture support.

There was strong adoption of the technologies with 90% of BHHs harvesting fish and 98% harvesting vegetables over the following year. More than 80% of the fish and 76% of vegetables were consumed by household members including women of reproductive age and young children. Participation of women in aquaculture and horticulture activities increased as well. In the BHHs, more than three-fifth of the women (59%) and two-third of the young children (64%) consumed diversified diets at the annual assessment and that was only 25% for the women and 20% at the formative research. These two findings weren't directly comparable methodologically but still we may use as the reference points to get the ideas before starting the Suchana interventions. Moreover, fish was consumed on a regular basis by 91% of women compared to 51% of young children at the annual assessment indicating that more attention should be given to the promotion of feeding fish to young children.

The major challenges expressed by BHHs were joint ownership of ponds, highly turbid water during rains, and lack of technical knowledge and experience while flooding and drought also affected vegetable production. Many subjects also wanted Suchana to provide better quality fish seed, continued training and technical support. While the project provided fish and vegetable seed along with other key inputs, it is important that these are made available at the right times of the year.

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1 Introduction

WorldFish is promoting nutrition-sensitive fish and vegetable production systems to beneficiary households (BHHs) of the 'Suchana' program, a multi-sectoral nutrition intervention led by Save the Children and also involving HKI, IDE, icddr,b, CNRS, FIVDB and RDRS as consortium partners. The goal of the 7-year program supported by DFID and the European Union since 2015 is to reduce stunting by additional 6% among young children (< 2 years old) in 250,000 very poor households in Sylhet and Moulvibazar districts within first 3 years of interventions.

The Suchana program has a phased approach where each union receives intensive support for the first year, technical and behavioral change support in the second year and follow-up and monitoring in the third year. Table 1 shows the targets for unions and households for the program and for fisheries interventions. A total of 250,000 beneficiary households from 157 unions (20 upazilas) will receive support over the project period.

Table 1: Number of targets of BHHs and demo pond operators in different phases

Categories	Learning Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Total
	2016	2017	2018	2019	2020	2021	2022	
Targets for Suchana for different years								
No. of BHHs will be selected	14,751	62,500	60,042	50,207	62,500	Follow-up		250,000
No. of Union	12	40	38	27	40			157
Targets for Fisheries interventions for different years*								
No. of HHs for Fisheries interventions	4.425	18,750	18,013	15,062	18,750	Follow-up		75,000
No. of Demonstration Ponds	120	400	380	270	400	Follow-up		1,570

* *Number of beneficiary households and demonstration ponds may be changed based on local feasibilities, availability of resources and management decisions.*

It was anticipated that 30% of beneficiary-households would have access to ponds or other small water-bodies and would receive support on nutrition-sensitive fish production along with vegetable production and behavioural change messaging on nutrition. This includes technical training, coaching, inputs (lime, fish fingerlings and fish feed for fish culture; seeds, seedlings, cuttings and saplings for vegetables and fruit) and linkages with local market actors and service providers from both public and private sectors. Fish production focuses mainly on carp and tilapia poly-culture along with small indigenous fish species (SiS) using improved management practices. The main aim of this component was to increase production and consumption of nutritious food to enhance the dietary diversity and nutritional status of women and young children.

Fish is the most important supply of high quality protein, essential fatty acids, and micronutrients in Bangladesh (Roos, Wahab, Chamnan, & Thilsted, 2007). It is the most frequently consumed animal-source food across all social strata, as well as the most frequently consumed nutrient rich food (Toufique, K.A., Belton, B., 2014). While there are many variations in terms of frequency, amount, and quality of consumption, Suchana is promoting increased fish production and frequent consumption by poor and very poor beneficiary households.

However, many households do not recognize small ponds and ditches as water resources for aquaculture as they use them for domestic purposes including washing clothes, cleaning utensils, for bathing and even as a supply of drinking water where tube-wells are not available.

Rather than being used for fish culture, many ponds are connected with open water and used to collect wild fish during the rainy season that are harvested in the dry season.

Following the Suchana learning phase registration process in late 2015 and early 2016, a total of 14,751 poor and very poor households were selected for support in the following year. Out of these, 6,865 beneficiary households (46.7% of total BHHs) had access to ponds or ditches of which 6,610 BHHs received support for horticulture and 5,109 BHHs received support for aquaculture while all 103 demonstration pond owners received both aquaculture and horticulture support.

This report is based on an assessment of learning phase interventions which was carried out in July 2017. The objectives of the study are:

- To analyze production, productivity and patterns of fish and vegetables in BHHs;
- To estimate utilization of fish and vegetables produced by BHHs and changes in dietary diversity of women and children;
- To assess any changes in the ability of women to make major decisions at the household level;
- To identify any issues that need to be taken into account when planning future nutrition interventions.

2 Methodology

The study was based on quantitative surveys carried out in July 2017 for annual assessment (after the first year of support from Suchana) using structured questionnaires to collect data from the sample beneficiary households.

Well-structured and pre-coded questionnaires were used to collect the primary data (mainly quantitative but with a few more qualitative indicators) from the sample households. As there was no formal baseline for learning phase, the formative research data for Suchana was used as the reference point to get an idea about the status of pre-Suchana or before Suchana. The formative research was conducted in January 2016 at the same geographical locations with similar processes and selection criteria.

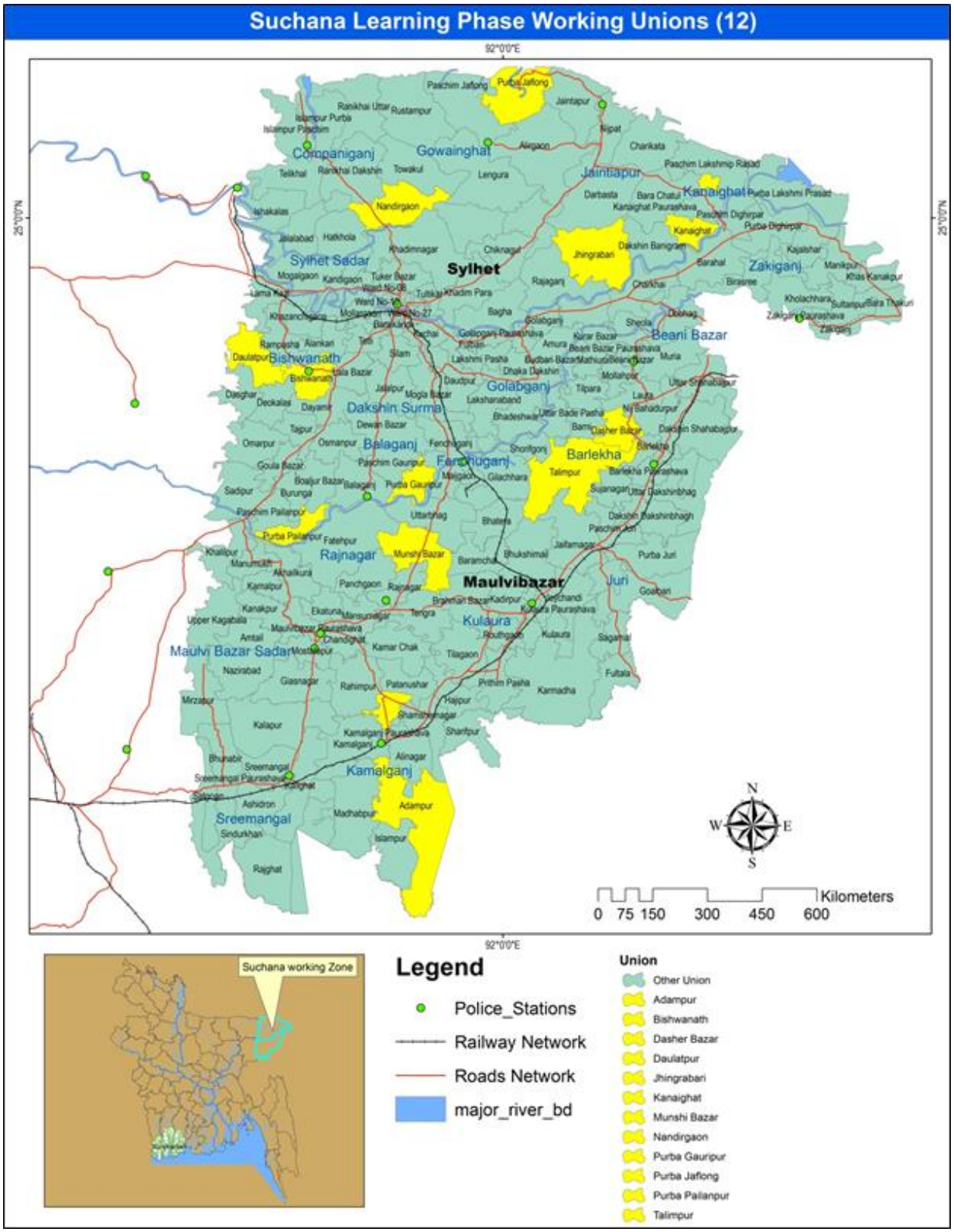
The formative research was conducted all 6 learning phase upazilas. Villages and households were selected following a similar process to that used during overall beneficiary selection for Suchana. Out of 12 unions, 6 were selected considering better representation of geographical diversity such as haors, low lying areas, hillocks and plain lands. Four villages were selected randomly from the most poverty-prone villages in each of the unions. After selecting the villages, wealth ranking sessions were conducted to identify potential beneficiary households from poor and very poor. From those potential beneficiary households, 17 sample households were selected from each of the villages following simple random sampling techniques. In total 406 households were surveyed during the formative research. Out of them, 254 (64%) households had access to ponds. Only 154 household harvested fish from their ponds within the last year before the interviews, and the data from those 154 households were used to estimate fish production. Dietary diversity data were collected only for young children (< 2 years old) and their mothers. To maintain consistency, the dietary diversity data for young children were only for children of 6 to 23 months for both the surveys.

Based on the USAID Food and Nutrition Technical Assistance (FANTA) sampling guide, the minimum sample size for the survey after one year of Suchana interventions was calculated as 379 households. With an extra allowance for contingency the target was adjusted to 417 households. However, flooding at the time of data collection (July 2017) meant that the actual total number was 399 households as it was not possible to work in more remote communities in Borlekha and Balaganj upazilas. Beneficiary households who received both aquaculture and horticulture support from the project were selected using a multi-stage cluster sampling technique. Although the two surveys did not cover the same households it was a cross sectional study, where overall selection processes and household selection criteria were the same for both surveys.

Dietary diversity is a quantitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutritional adequacy of the diet for individuals (FAO 2013). The measurement of dietary diversity in women was derived by clustering the 16 food groups listed from the questionnaire into a nine-item scale to ascertain the quality of a woman's diet considering the nutritional needs for the women (FSNSP 2014). The nine food groups are (1) Starches (grains, white roots and tubers), (2) Pulses (beans, peas and lentils) and nuts, (3) Dairy, (4) Meat, poultry and fish, (5) Eggs, (6) Dark green leafy vegetables, (7) Other vitamin A-rich fruits and vegetables, (8) Other vegetables, and (9) Other fruits (FAO, 2013)). A more recent guideline has been published and defines the minimum dietary diversity for women as consuming five out of ten foods groups, with the addition of one food group resulting from the disaggregation of nuts and legumes (FAO/FHI 2016).. However, during the formative survey, nuts and seeds were not coded separately and in order to be consistent, nuts and seeds were combined with the pulses for the post intervention survey. Only two of the post intervention sample households consumed nuts and seeds.

According the National Strategy for IYCF in Bangladesh and World Health Organization (WHO) guidelines, children aged 6-23 months need to be fed a sufficient quantity and quality of complementary foods in addition to continuing breastfeeding. WHO defines a minimum diverse diet for children as consisting of at least four out of seven food groups every day to fulfil their nutritional requirement (FSNSP 2015). The seven food groups are (1) Starches (grains, white roots and tubers), (2) Pulses (beans, peas and lentils) and nuts, (3) Dairy products (milk, yogurt, and cheese), (4) Flesh foods (meat, fish, poultry and liver/organ meats), (5) Eggs, (6) Vitamin A-rich fruits and vegetables, (7) Other fruits and vegetables (FAO 2013).

Figure 1: Map of the study area showing learning phase (yellow) unions



3 Results and discussion

3.1 Dietary diversity of reproductive age women

As can be seen in table 2, more than twice as many (58.9%) reproductive age women had diversified diets during the annual assessment and it was found only 25.0% during formative research before Suchana interventions. Meanwhile the proportion of women with less diverse diets was found as 41% after the intervention, and it was 75.0% during the formative research.. Figure 2: Proportion of reproductive age women consumed diversified diets

Table 2: Proportion of reproductive age women consumed diversified diets

Food groups for reproductive age women (15-40 years)	**Formative research** Jan 2016 (n=192)	**Annual assessment** July 2017 (n=399)
1 to 4 Food groups	75.0%	41.1%
5 or more Food Groups	25.0%	58.9%

This indicates that they are changing their behavior, either as result of the nutrition messaging or the availability of more diverse foods from their ponds and vegetable gardens or both. There may also be some other contributory factors behind this improvement which aren't available at this stage. So, further study using the longitudinal (or panel) surveys at same point of time (such as months) can be recommended to identify the more realistic attributions of the project interventions.

Table 3: Proportion of women of reproductive age consuming different food groups

Different food groups	**Formative research- January 2016** n=192	**Annual assessment - July 2017** n=399
Starches	100%	100%
Pulses & nuts	54%	67%
Dairy	10%	12%
Fish & Meat (all)	84%	94%
Meat (all)	16%	20%
Fish (all)	81%	91%
Fish- large & medium	43%	39%
Fish- small	55%	74%
Eggs	8%	25%
DGLVs	24%	43%
Vitamin-A rich Fruits & Veg	5%	20%
Other Veg	94%	91%
Other Fruits	6%	30%

Table 3 shows the proportion of reproductive aged women consuming different food items over the 24 hours before they were interviewed. The consumption of small fish, pulses, eggs, (dark green leafy vegetables) DGLVs[1], vitamin A rich fruits and vegetables[2], and other fruits all

[1] **DGLVs** mean Dark Green Leafy Vegetables. All dark green leafy vegetables are under this group and it includes all amaranths (green and red), spinach, Indian spinach, black arum leaves, mastered leaves, leaves of pumpkin, bottle gourds and other common commonly green leaves. These are vitamin A-rich. In addition to being rich in vitamin A, many green leafy vegetables are rich in folate and several other micronutrients. Only very light leaves, such as iceberg lettuce, are not (FAO and FHI 360 2016).

increased considerably. Starchy food (grains, white roots and tubers) was eaten by 100% of the women in both surveys. Meanwhile consumption of other food groups was either reduced or not much different after implementation of Suchana.

3.2 Dietary diversity of children (6 – 23 months old)

Based on a survey of 77 children, table 4 shows that more than 63% of 6 to 23 months old children with diversified complementary feeding compared (4 or more food groups) during the annual assessment and it was found only 20% at the formative research of January 2016. Although it is not comparable still there was a good progress in annual assessment of July 2017..

Table 4: Proportion of 6 to 23 month old children consuming diversified diets

Food groups for children 6-23 months of age	**Formative research** January 2016 n=131	**Annual assessment** July 2017 n=77
Didn't take any solid food	20	9
1 to 3 Food Groups	60	27
4 or more food groups	20	64

However, that still leaves a considerable proportion (27 %) of children consuming less diversified diets with 3 or less food groups, and 60 % during formative research. Moreover, 9 % of children are not being fed any solid food and 20% during formative research. While the results are encouraging, more focus will be needed if the project is to achieve its goals.

Table 5: Proportion of 6 to 23 months old children consuming different food groups

Food groups	**Formative research-** January 2016 n=131	**Annual assessment-** July 2017 n=77
Starches	80%	90%
Flesh Food	34%	61%
Meat- all	7%	9%
Fish- all	31%	51%
Eggs	8%	23%
Dairy	9%	21%
Legumes	21%	51%
Vit-A rich Fruits & Veg	19%	43%
Other Fruit & Veg	46%	66%
Didn't take solid	20%	9%

Table 5 shows that highest proportion (90%) of children had complementary feeding of starchy food including grain, white roots and tubers during annual assessment, and that was 80% in

[2] **Other vitamin A-rich fruits and vegetables**- This group includes both vitamin A-rich fruits and a small but diverse group of vitamin A-rich vegetables other than leafy greens. These foods may also be good sources of vitamin C and/or folate and/or other micronutrients. The most common vitamin A-rich fruits are ripe mango and ripe papaya; others include red palm fruit/pulp and several types of melon. When eaten “green” (unripe), mango and papaya are not rich in vitamin A and if consumed “green” should be classified with “Other fruits”. Other vitamin A-rich vegetables include orange-fleshed sweet potato, carrot, pumpkin and deep yellow- or orange-fleshed squash (FAO and FHI 360 2016).

formative research. More than a half of the children consumed flesh food including fish, poultry and meat (61%), fish separately (51%), legumes 51%), and other fruits and vegetables (66%) during annual assessment, and those were 34%, 31%, 21% and 46% respectively during formative research. Vitamin A rich fruits and vegetables, eggs, and dairy products were taken by 43%, 23% and 21% respectively during annual assessment, and those were only 19%, 8% and 9% during formative research. Accept meat, most of the other food items had some upward trends which may be due to Suchana interventions or some other contributory factors including seasonal variations as two studies were not comparable.

3.3 Fish production and use

3.3.1 Pond size and ownership patterns

Table 6 shows the average overall pond size and water area of ponds managed by households in the formative research and in the annual assessment study (after 1 year of intervention). This indicates that the pond characteristics were very similar in the two studies.

Table 6: Average pond size and water area in decimal

Pond Size	**Formative research** January 2016 (n=154)	**Annual assessment** July 2017 (n=357)
Average pond size (decimal/Pond)	11.7	11.8
Average water area (decimal/Pond)	9.0	9.5

Table 7 shows that most of the ponds had joint management; 79.1% were jointly managed in the formative research and it was 73.7% in the annual assessment. On average 4.2 households shared each pond in the formative research and that was 3.7 households per pond in the annual assessment, and 18.5% of formative research households had exclusive access to a pond and that was 25.8% households in the annual assessment.

Table 7: Ownership patterns of the ponds

Pond Size	**Formative research** January 2016 (n=254)	**Annual assessment** July 2017 (n=399)
Single ownership	18.5	25.8
Joint ownership	79.1	73.7
Shared production	2.4	0.5

In only a few cases Suchana beneficiary households (2.4% in formative research and 0.5% in the annual assessment) had to share production from their pond with non-Suchana households, usually the pond owner in lieu of lease costs.

3.3.2 Fish culture practices

Table 8 analyses fish culture practices used in the ponds sampled for both studies. The main method used in ponds during formative research before Suchana was to use the pond as a trap to catch wild fish from attached natural water bodies. The pond owner places branches in the pond when water levels are high. When water levels drop, the branches are removed and fish

are harvested. This is called 'traditional aquaculture trapping fish from natural sources' and was practiced in 73 % of ponds in the formative research but it was only 0.6 % in the annual assessment indicating that there was a major change in pond management practices towards 'carp polyculture using traditional practices' (little or no feed, fingerlings from nearby water bodies) at 30.8% of BHHs and 'carp polyculture with improved practices' (high quality fingerlings and commercial feeds) were followed at 68.6% of the ponds in annual assessment.

Table 8: Uses of production technologies for HFP ponds

Fish production technologies	**Formative research** Jan 2016 (n=152)	**Annual assessment** Aug 2017 (n=357)
Traditional aquaculture trapping fish from natural sources	73.0	0.6
Carp poly-culture using local practices	5.3	30.8
Carp poly-culture using improved practices	19.7	68.6

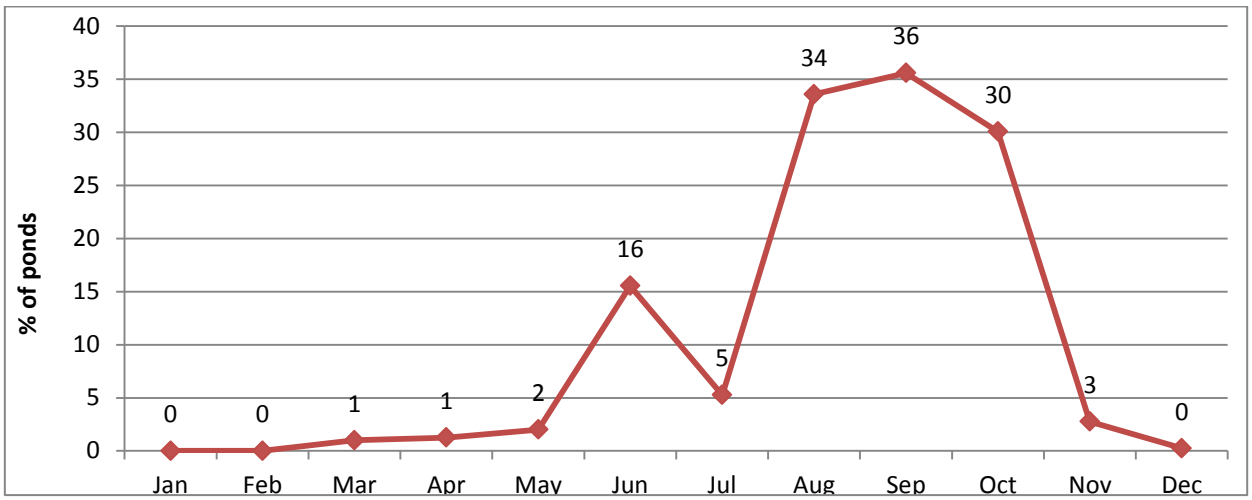
3.3.3 Stocking of fish fingerlings

All the ponds sampled in the annual assessment had been stocked with 'improved quality' fish fingerlings, but that was followed at only 30% during formative research before Suchana (table 9). The project provided a package of improved fingerlings including carp and tilapia. Almost all households stocked rui (97.5%), mrigel (95.8%) and tilapia (98.0%). The other 3 major species were catla (59.4%), bighead carp (55.6%) and Silver carp (50.6%) as well as Thai-shorputi and grass carp. Before Suchana the major types stocked were tilapia (19.3%), rui (19.3%), mrigel (11.2%), mola (8.1%), grass carps (6.8%) and Thai shorpunti (4.3%).

Table 9: Types of fish fingerlings stocked in the ponds

Fingerling Species	**Formative Research** Jan 2016 (n=161)	**Annual assessment** Aug 2017 (n=399)
Rui	19.3%	97.5%
Catla	3.7%	59.4%
Mrigel	11.2%	95.5%
Silver carp	6.8%	50.6%
Grass carp	6.8%	6.0%
Common carp	3.1%	1.3%
Bighead	0.6%	55.6%
Thai Shorpunti	4.3%	10.8%
Thai Pangus	3.1%	1.3%
Tilapia	19.3%	98.0%
Mola	8.1%	0.8%
Koi	1.9%	0.3%
Shing	1.2%	0.5%
Magur	1.2%	1.8%
Other	4.3%	1.3%
Total	**30.4%**	**100.0%**

Figure 3: Fish fingerling stocking months during annual assessment



As shown in figure 3, the majority of fingerlings were stocked between August and September 2016 when they became available through the project. While a proportion of households stocked fingerlings before August on their own initiative, one third (33 %) of the ponds were stocked with fingerlings in August 2016, 35 % were stocked in September and 30 % in October.

3.3.4 Production and use of fish

Table 10 shows that before Suchana interventions, fish production averaged 13.6 kg per pond. At an average pond water area of 9.0 decimals per pond this equates to a productivity of 1.5 kg per decimal.

Table 10: Fish productivity before and after the interventions from Suchana

Fish Productivity	**Formative Research** Jan 2016 (n=154)	**Annual assessment** Aug 2017 (n=357)
Production- Kg/pond	13.6	50.4
Pond water area- in decimal	9.0	9.5
Productivity- Kg/decimal	**1.5**	**5.3**

After the Suchana interventions, average fish production was 50.4 kg per pond, equivalent to productivity of 5.3 kg per decimal.

Table 11: Proportion of ponds had fish at the point of survey or harvested fish

Had fish or harvested	Formative research Jan 2016 (n=254)	Annual assessment Aug 2017 (n=399)
Had fish in the pond	27%	90%
Harvested or had fish in pond	63%	96%

Based on table 12, 90% of the ponds had fish at the point of survey in the annual assessment July 2017 and that was only 27% at the formative research January 2016. It can be assumed that seasonal variations had considerable influence on this as formative research was conducted dry season. Still it is also important that 96% of the ponds either had fish or harvested in last 1 year but that was 63% in the formative research.

Table 12: Proportion of ponds had harvested fish and its uses

Harvested fish and uses	Formative research Jan 2016 (n=254)	Annual assessment Aug 2017 (n=399)
Harvested fish from the pond	61%	89%
Consumed the harvested fish	60%	89%
Gifted to others	9%	37%
Sold	7%	8%

Eighty-nine (89%) percent of ponds surveyed in July 2017 in the annual assessment had harvested fish harvests within the last one year (table 10) and it was 61 % of ponds during formative research. All the BHHs reported that a portion of this fish was used for family consumption. More than one third (36.6%) said fish was gifted to others and only 8% of households sold their fish for additional income.

Table 13: Fish harvest per BHH and its uses (kg)

Fish Harvest and its uses	Formative research Jan 2016 (n=154)	Annual assessment Aug 2017 (n=357)
Harvest- Kg/HH	5.3	23.1
Consumed- Kg/HH	3.8	19.8
Gifted- Kg/HH	0.3	1.0
Sold- Kg/HH	1.1	2.3

Figure 13 shows that the annual fish harvest was 23.1 kg per BHH in the annual assessment and it was only 5.3 kilograms per household in the formative research. Out of this production, 85.7% (19.8 kilograms) was used for family consumption and 4.3% (1.0 kilogram) was gifted to others, while 10.0% (2.3 kilogram) was sold for additional income.

3.3.5 Fish species harvested from the ponds

Figure 14 shows the fish species harvested before and after Suchana interventions which of course reflects the species stocked. As per annual assessment, the main species were tilapia, rui, mrigel, mola, silver carp, bighead carp, catla and koi, other local species and in the formative research before Suchana catches were dominated by mola, koi, magur, sing, rui, and other local species with fewer proportions.

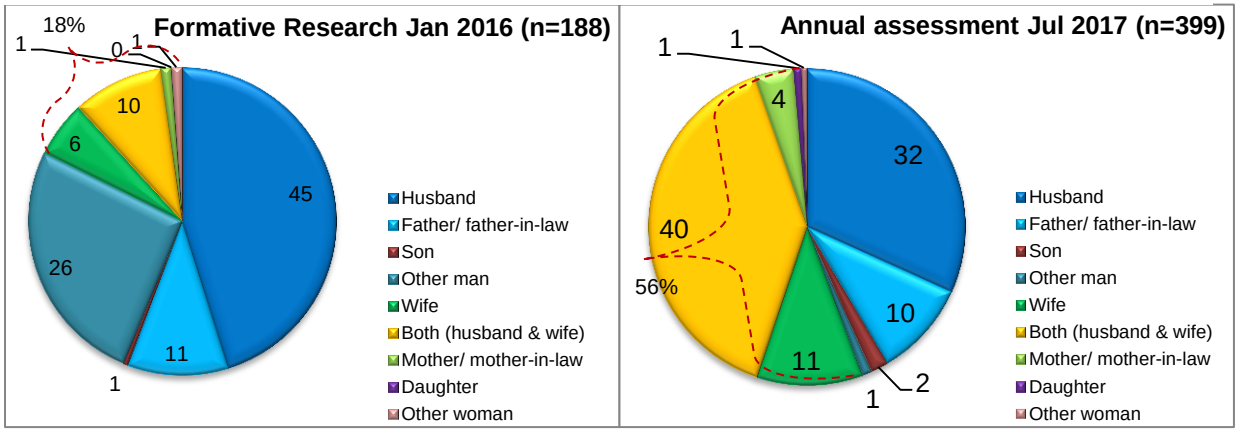
Table 14: Proportion of ponds were harvested different fish species

Fish species harvested	Formative Research January 2016 (n=154)	Annual assessment July 2017 (n=357)
Rui	16%	83%
Catla	5%	32%
Mrigel	11%	74%
Silver carp	4%	52%
Grass carp	8%	4%
Common carp	3%	3%
Bighead carp	0%	36%
Thai Shorputi	6%	11%
Thai Pangas	3%	3%
Tilapia	20%	90%
Koi	52%	25%
Shing	28%	11%
Magur	38%	8%
Mola	60%	65%
Others	79%	77%

3.3.6 Role of women in homestead pond aquaculture

Figure 4 shows that through support from Suchana, there were shifts in gender roles in terms of the main caretaker for aquaculture ponds. In the formative research, husband (45%) or other man (father/ father-in-law 11%, son 1%, other man 26%) were the main caretakers for ponds. However, after one year of Suchana interventions, 56% of households said that women were involved as either the main caretakers for the ponds; or jointly managed the pond with their husband.

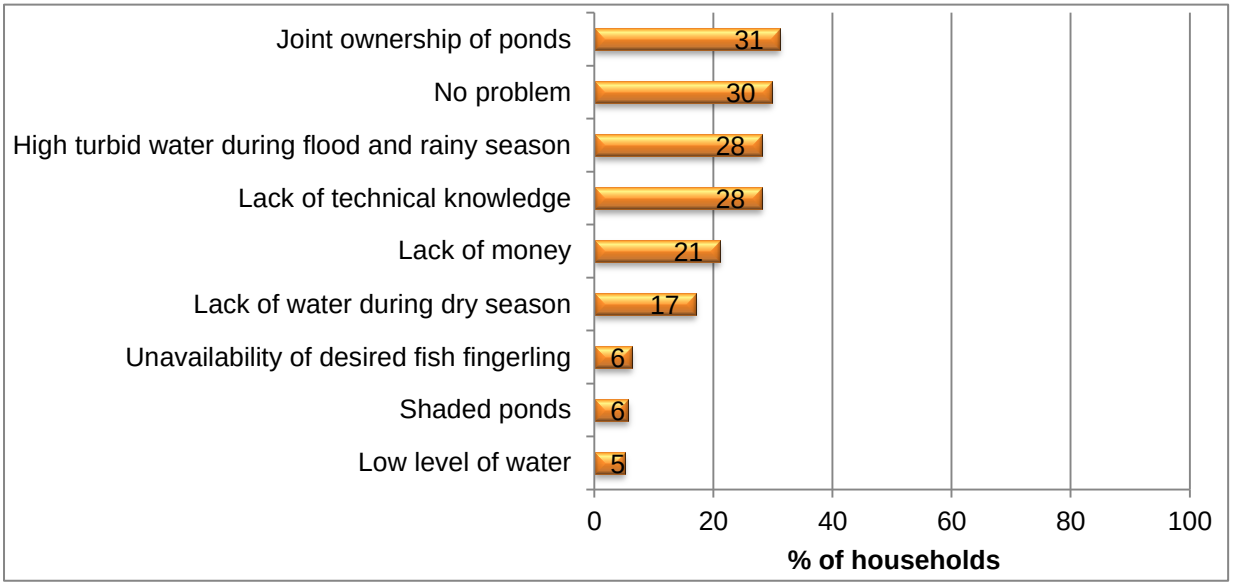
Figure 4: Main caretaker for homestead ponds



3.3.7 Main challenges

Figure 5 shows the main challenges faced by aquaculture BHHs. Thirty percent of respondents said they didn't face any challenges. For the rest of the sample, 'Joint ownership of ponds' (31%) was the most frequently reported problem. This presents itself in various ways including disputes about distrubution of harvested fish, lack of decision making independence by the individual BHHs, etc. This information was collected through earlier qualitiative studies and regular communication by the field workers with the BHHs. Highly turbid water during flood and rainy season' (28%), 'lack of technical knowledge and experiece' (28%), 'lack of money' (21%), and lack of water during dry season (17%), were cited as significant problems as well.

Figure 5: Challenges faced by the aquaculture BHHs

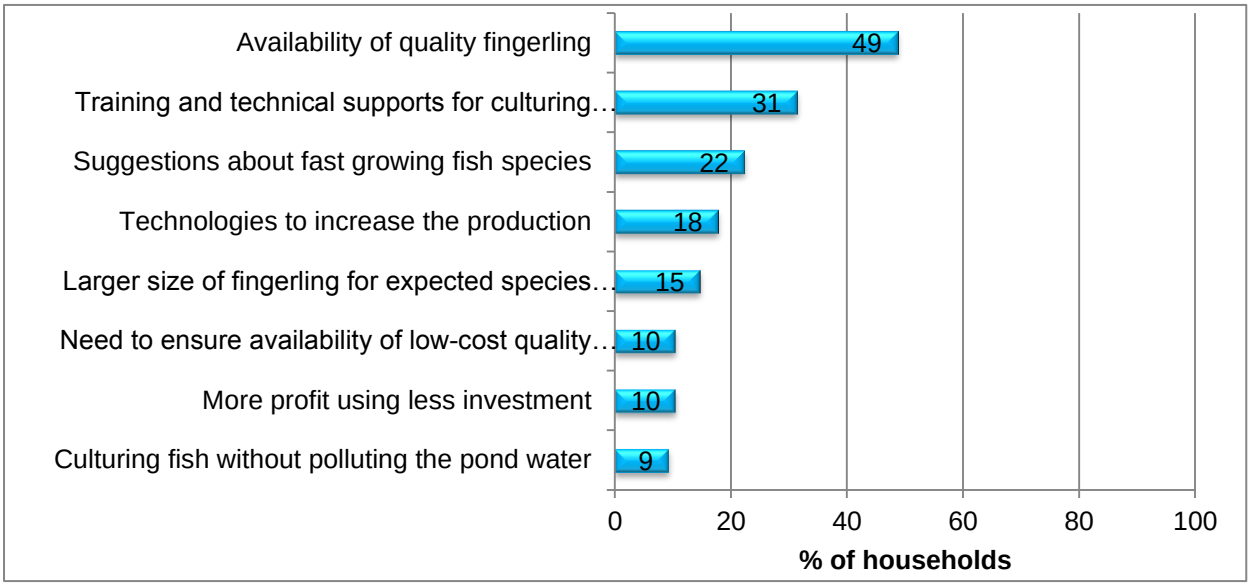


3.3.8 Future expectations from Suchana on aquaculture

Figure 6 shows future expectations/wishes of the BHHs from the project. The highest proportion (49%) would like the project 'to make quality fingerlings available'. Other expectations included 'training and technical support for culturing fish' (31%), 'recommendations on fast growing fish species' (22%), 'technologies to increase production' (18%), 'larger size of fingerling for expected species with low prices' (15%), 'ensure availability of low-cost quality feed' (10%),

higher profit margin with lower investment' (10%), and 'culturing fish without polluting the pond water' (9%).

Figure 6: Future expectations from Suchana on fish culture



3.4 Vegetable production

Vegetables have a very important role in our diet as a source of valuable micronutrients (FPMU 2014) and vegetable production is a traditional agricultural activity in rural Bangladesh. Considering its importance, homestead vegetable production has been one of the common interventions recommended for all beneficiary households in Suchana. The results presented in this section of the report summarize the vegetable production activities by BHHs who also received support on fish culture in the learning phase of the project. This data is based on the learning phase survey carried out in July 2017. Unfortunately there was no adequate comparable or referral data related to the pre-intervention situation for vegetable production so it is not possible to refer any pre-intervention status. Therefore only the findings related to the vegetable production from annual assessment have been presented this section.

Figure 7: Proportion of BHHs that had vegetable production and the usage of them

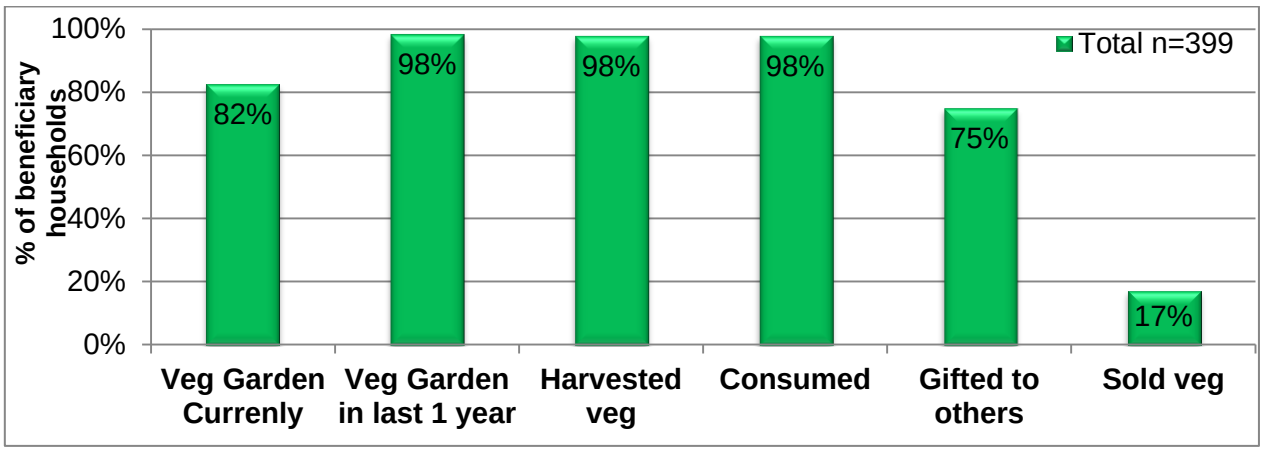
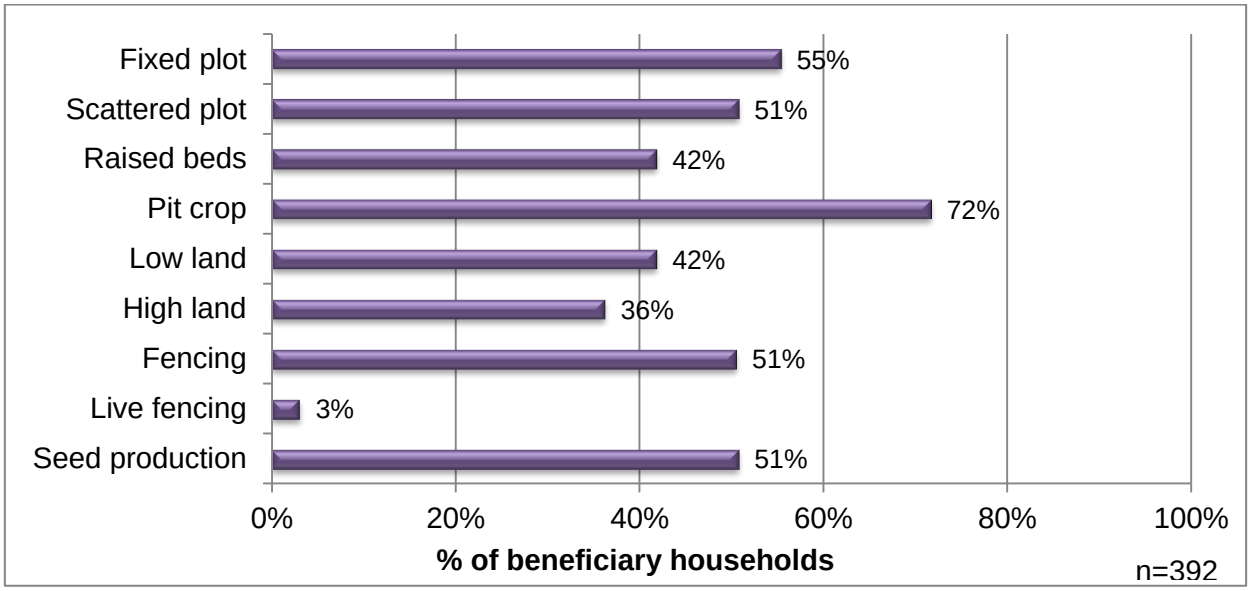


Figure 7 shows that more than eighty percent of the households had active vegetable gardens at the time of the interview and almost all (98%) had one within the previous one year. Almost all (98%) households that had gardens had harvested vegetables and 98% of the households reported that they consumed all or some of the vegetables within the household. Three-quarters (75%) of the households gifted some vegetables to others, and 17% of the households reported that they sold vegetables at the market. The usual locations for these gardens were homestead land, pond dikes, roadsides, and nearby crop lands. Most of them produced vegetables during both summer and winter seasons. The average area of vegetable garden was 3.3 decimals per household.

Figure 8: Major characteristics of vegetable gardens (percentages)



As shown in figure 8, more than a half of the households had vegetable gardens as fixed plots, and 51% of the households had scattered plots. Almost three quarters (72%) of the households had pit crops[3] at their vegetables gardens, and 42% of the households had raised bed. More than one third (36%) households had vegetable gardens in high land and 42% of the

[3] Pit crops are where vegetables (usually gourds and vines) are planted in small pits. Growers make the pits in the soil and mix in the required amount of manure and fertilizer then put the seeds in the pit. They may also build a trellis or grow the vegetables directly on the soil or mulch.

households had gardens in low land. More than a half of the households had fencing and only 3% of the households had live fencing. Half of the households were also producing vegetable seeds.

Figure 9: Harvest and use of vegetables produced in the past year

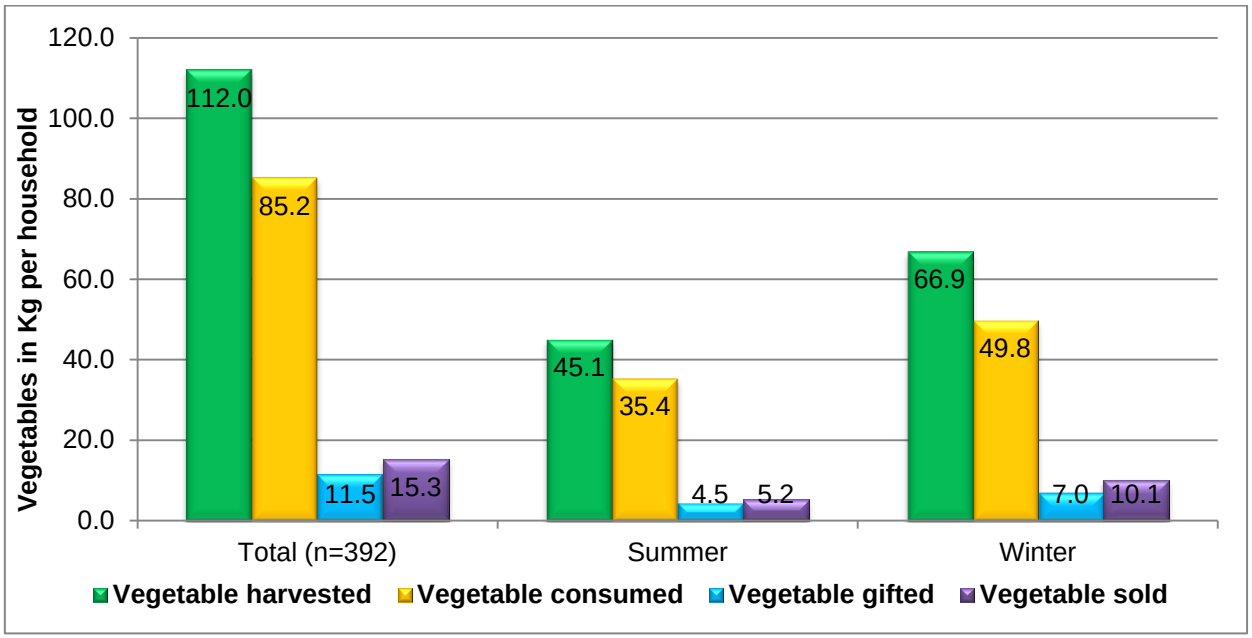
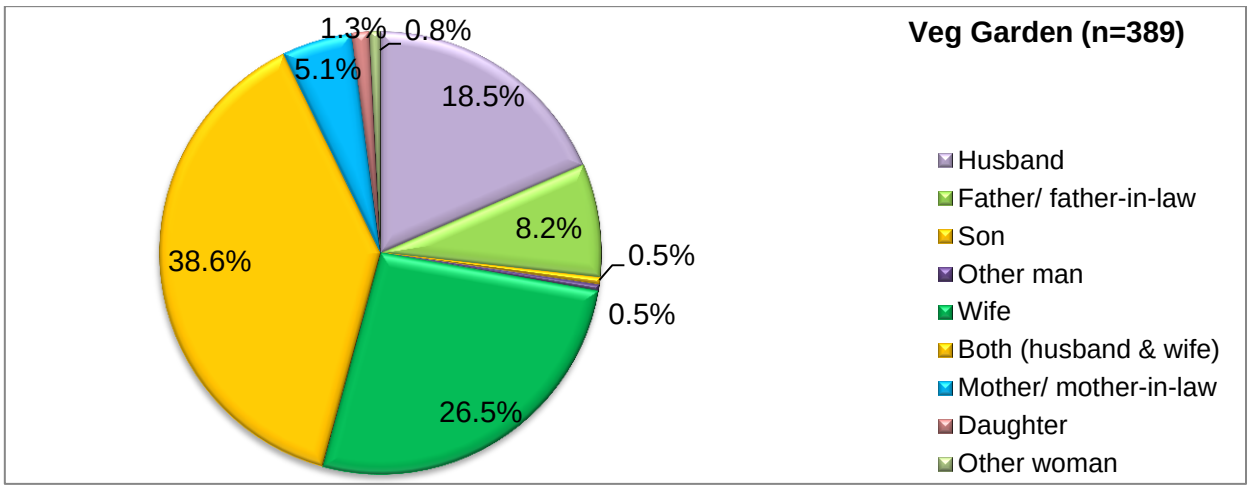


Figure 9 shows that on average, households harvested 112 kg of vegetables over the last 1 year. Of this, 85.2 kg was used for family consumption which represented 76.0% of the total harvest. Only 15.3 kilogram was sold to the market (14% production) while the rest was gifted to neighbors and relatives.

3.4.1 Main caretaker for vegetable gardens

Figure 10 shows that in 73.2% of the households, women were either the sole caretaker or jointly sharing responsibility of the gardens. In only 27.8% BHHs we found the husband or other men to be the main caretaker of gardens. Data shows that women tended to be more involved process than the men. It also reflects a significantly higher female participation in the vegetable production than in the fisheries.

Figure 10: Main caretakers for Suchana vegetable gardens



3.4.2 Uses of different fertilizers for the vegetable gardens

Figure 11: Proportion of BHHs using fertilizers in their homestead gardens

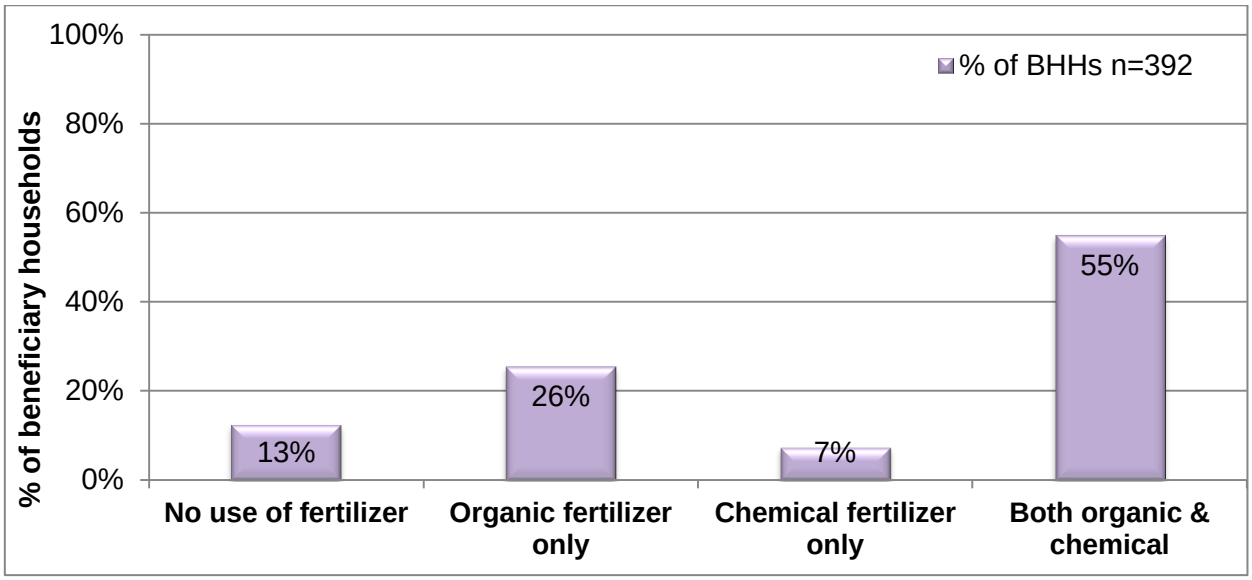
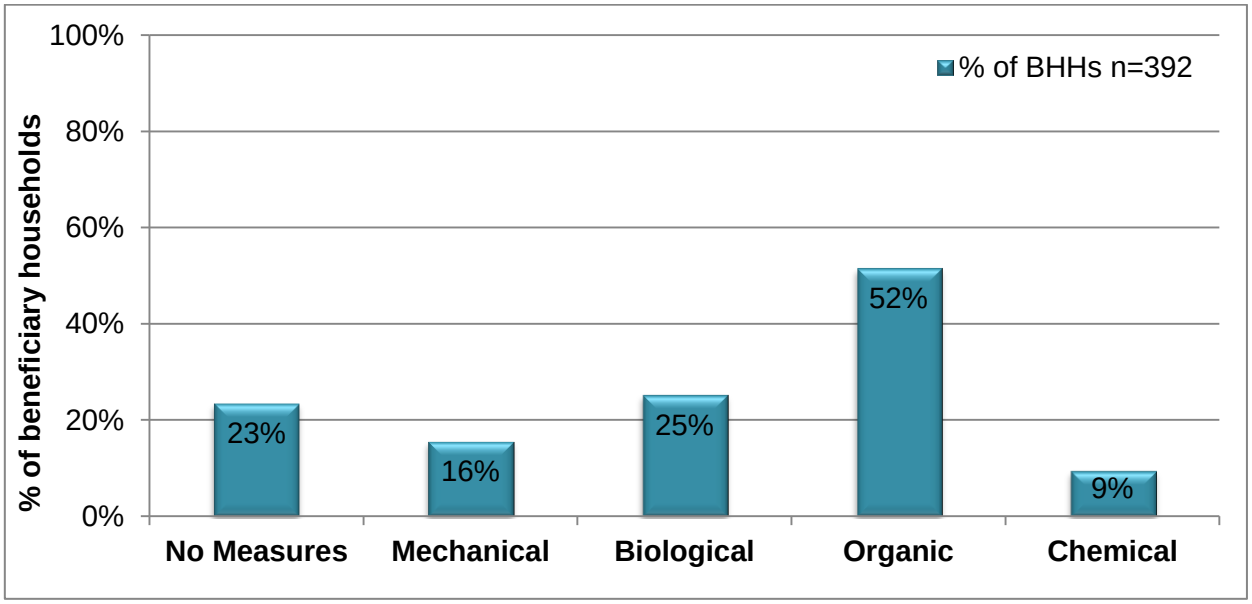


Figure 11 shows that more than half (55.5%) of the beneficiary households reported using both the organic and chemical fertilizers for the vegetable gardens. A little more than a quarter (26%) households used organic fertilizers or manures, 7% of the beneficiary households exclusively used chemical fertilizers while 13% of the households didn't use any fertilizers for their vegetable gardens.

3.4.3 Uses of pest and diseases of the vegetables gardens

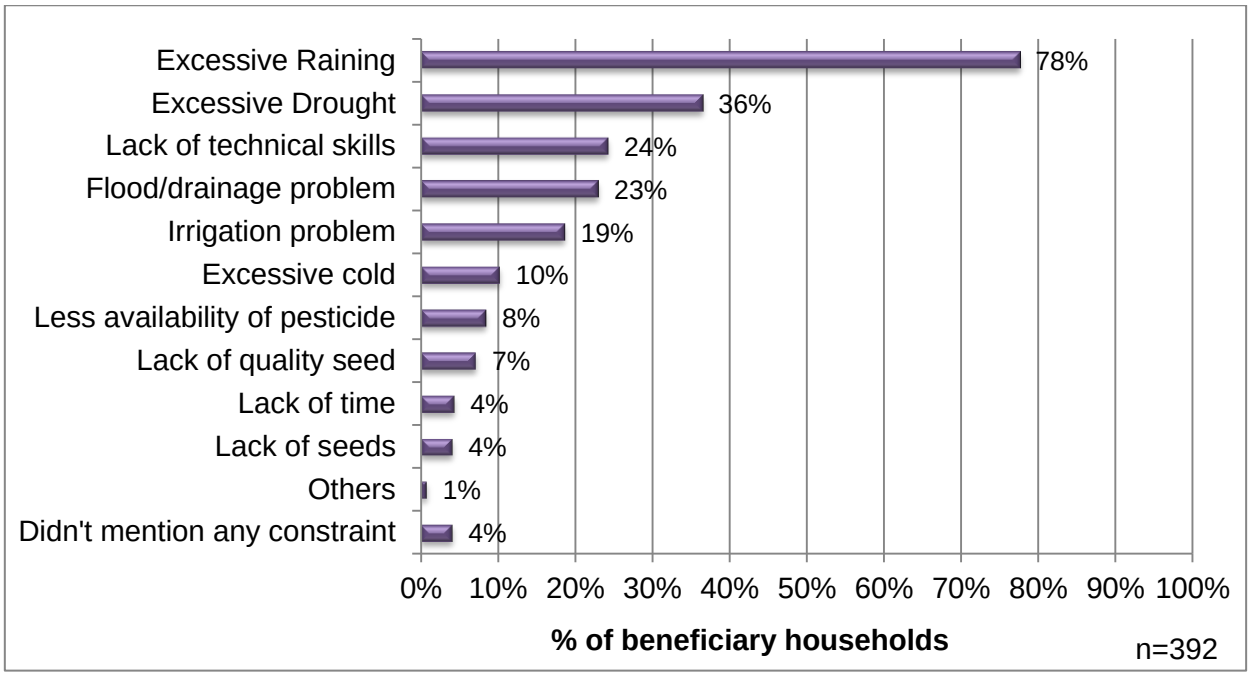
More than a half (52%) of the sample households used organic pest-control measures such ashes, kerosene oil with ash, soap-water, and juice of neem leaves (figure 12). A quarter of the households used biological methods, and 16% households used mechanical methods. Only 9% used chemical methods. Almost a quarter (23%) of the households either did not take any measures or did not face any attack from pests and diseases.

Figure 12: Proportion of different pest and disease control measures used by the BHHs



3.4.4 Major challenges faced in homestead gardening

Figure 13: Major challenges faced by the households in vegetable production



The highest proportion (78%) of beneficiary households mentioned 'excessive rain' as one of major constraints. The other reported constraints were excessive drought (36%), flood/ drainage problems (23%), lack of technical skills (24%), irrigation problems (19%), extreme cold (10%), unavailability of pesticides (8%), lack of quality seed (7%), lack of quality seeds (7%), lack of time (4%), lack of seeds (4%) and few others (1%).

4 Conclusion and recommendations

The survey shows that there has been attractive progress in the production and use of fish and vegetables in the beneficiary households leading to considerable higher dietary diversity.

Dietary diversity of women of reproductive age and young children (6 to 23 months of age) positively reflects the utilization of homestead produce for better nutritional outcomes. More than twice the proportion of women and three times the proportion of young children consumed more diverse diets in the annual assessment in reverence to the formative research. Although it isn't comparable directly as there was no baseline data, results from the formative research are used as the reference point to get the idea about the progress of the annual assessment. This has been possible through an integrated approach combining livelihoods interventions and behavioral change communication. It is important to note that 91% of the women consumed fish whereas only 51% of children were given fish as part of their complementary feeding so additional attention should be given to promote feeding fish to children.

More than 80% of the fish harvested from Suchana ponds and 76% of vegetables produced in homestead gardens were consumed within the household including by women of reproductive age and young children which should result in improved nutrition. Most of the beneficiary households have effectively utilized improved aquaculture and horticulture technologies and practices. Participation of women in aquaculture and horticulture activities has considerable progress as well. For instance, women have participated in taking care of the aquaculture in

more than half of the BHHs (56%) which was only 16% in the formative research. They have also been involved in vegetable gardening in almost three quarters of the BHHs (72.2%).

Despite considerable progress of fish and vegetable production, some challenges were also observed including joint ownership of ponds, highly turbid water during floods and in the rainy season, lack of technical knowledge and experience, lack of money, etc. Many households expressed their expectations of increased availability of quality fingerlings, continuation of training, and technical support.

To summarize, the study indicates that the project needs to continue support for the aquaculture and vegetable growing initiatives as they are resulting in greater dietary diversity for women and young children which should be contributed in reduced stunting rates in the target areas of Sylhet and Moulvibazar districts.

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