Nurturing adaptation capacities in Chin highlands

Lessons from Sakta: A Climate-Smart Village in Myanmar

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Chin land, located at the southern part of north western Myanmar bordering with India and Bangladesh, is dominant with mountainsides and terrain covered by natural forest and situated more than 1800 meter above sea level. Temperature varies from 40°F to 84°F.
A wet season has at least 0.04 inches of liquid or liquid-equivalent precipitation.
The wetter season lasts four to six months, from May to September, with a greater than 18% chance of a given day being a wet day. The drier season lasts as much as seven months, from September to May.

Most of Chin people in rural areas make their living from agriculture, cultivating upland rice, maize, corn, and millets in their traditional practice of plots under shifting cultivation, a rotating seasonal cycle of cleaning land for cultivation by cutting and burning existing vegetation.

Sakta village has 219 households with a population of over 800 individuals. It is under the administration of Hakha City, is situated along the side of Hakha-Matupi road and 20 miles from Hakha. It is also one of the Climate-Smart Village project sites operated by the International Institute of Rural Reconstruction (IIRR) and Karuna Mission Social Solidarity (KMSS-Hakha).

Sakta has faced the impacts of climate change which include flash floods and landslides, strong winds, increased temperature and, erratic rainfall, compounded with a greater amount of rain falling within a short period. Farmers are now more vulnerable than in the past.

Farmers rely on shifting cultivation as a major livelihood approach for a long time. Forest decimation and land degradation threaten agricultural production with yield declines being a common feature.

Though the government is encouraging farmers to cultivate their crops by developing semi-permanent farms and sloping agricultural land technologies, mostly the better-off farmers are able to follow and practice those recommendations.

Maize-based, semi-commercial, and subsistence farming are the major livelihood activities for most households. Upland rice, corn, maize, millets, elephant foot yam and potato are major crops.

Small-scale livestock are very important for food security while serving as emergency sources of funds. Native chicken and pig are the primary livestock, but some farmers also own *Mythum (Gayal),* a semi-domesticated animal found only in Chin and Nagaland.

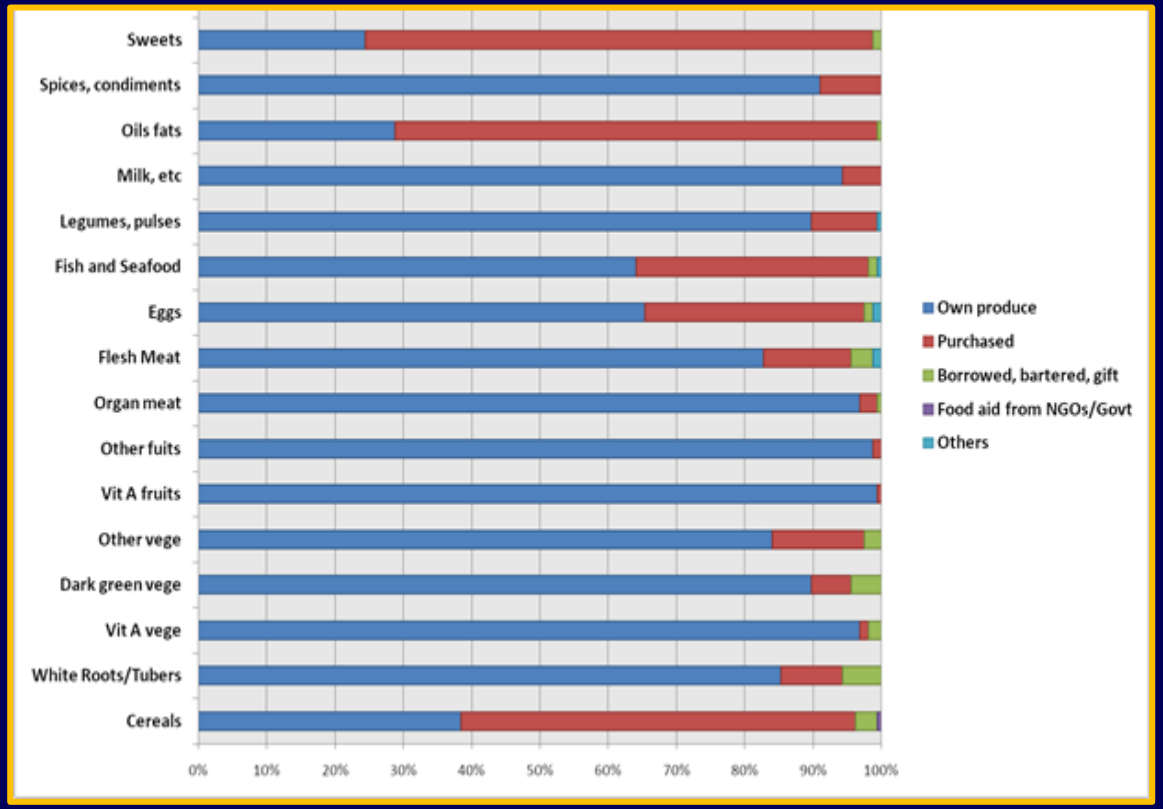
Sakta has a relatively low dietary diversity score when compared to other Climate-Smart Villages (CSVs) in Myanmar.

Average Diet Diversity Score*

Climate-Smart Village	Mean Household Diet Diversity
Htee Pu	6.5
Sakta	**4.98**
Masein	6.85
Nyaung Shwe	6.01

*Study undertaken as part of the IDRC supported IIRR project (2018-2020).

Sakta relies heavily on food grown or secured locally.



The community in Sakta village mostly sourced their food materials from their own produce, except for sweets, oils and fats and cereals. Cereals (rice) is sourced outside because the production of the households is not enough for whole season. This offers an opportunity to explore and adopt practices to make cereals (rice and maize) available whole year round.

Surveys undertaken in Sakta village (CSV) indicated that a significant number of households are not consuming most food groups.

Food groups that have 40% below (less than half of households surveyed) can be considered as less consumed food groups.

Food Groups	Households reported consumption in past 24 hours	% of household consumption/total households surveyed (N=149)
Vegetables	143	95.97
Cereals	139	93.29
Spices	123	82.55
Oils and fats	114	76.51
Eggs	60	40.27
Fish and seafood	56	37.58
White roots, tubers	45	30.20
Meats	43	28.86
Pulses	22	14.77
Sweets	14	9.40
Fruits	9	6.04
Milk	9	6.04

On establishing the Sakta climate-smart village, a baseline study was undertaken. Community-based Participatory Vulnerability Assessments showed that vegetable production and chicken and pig rearing are important activities.

Livestock	No. of Households that Produce
Chicken	74
Pig	62
Buffalo	45
Cow	29
Fowl	13
Horse	11
Mithun	4
Fish	1

Agriculture Production	No. of Households that Produce
Vegetables	129
Rice	49
Maize	40
EFY	36
Banana	25
Mango	3
Stink bean	3
Bean	2
Fruits	2
Onion	2
Potato	2

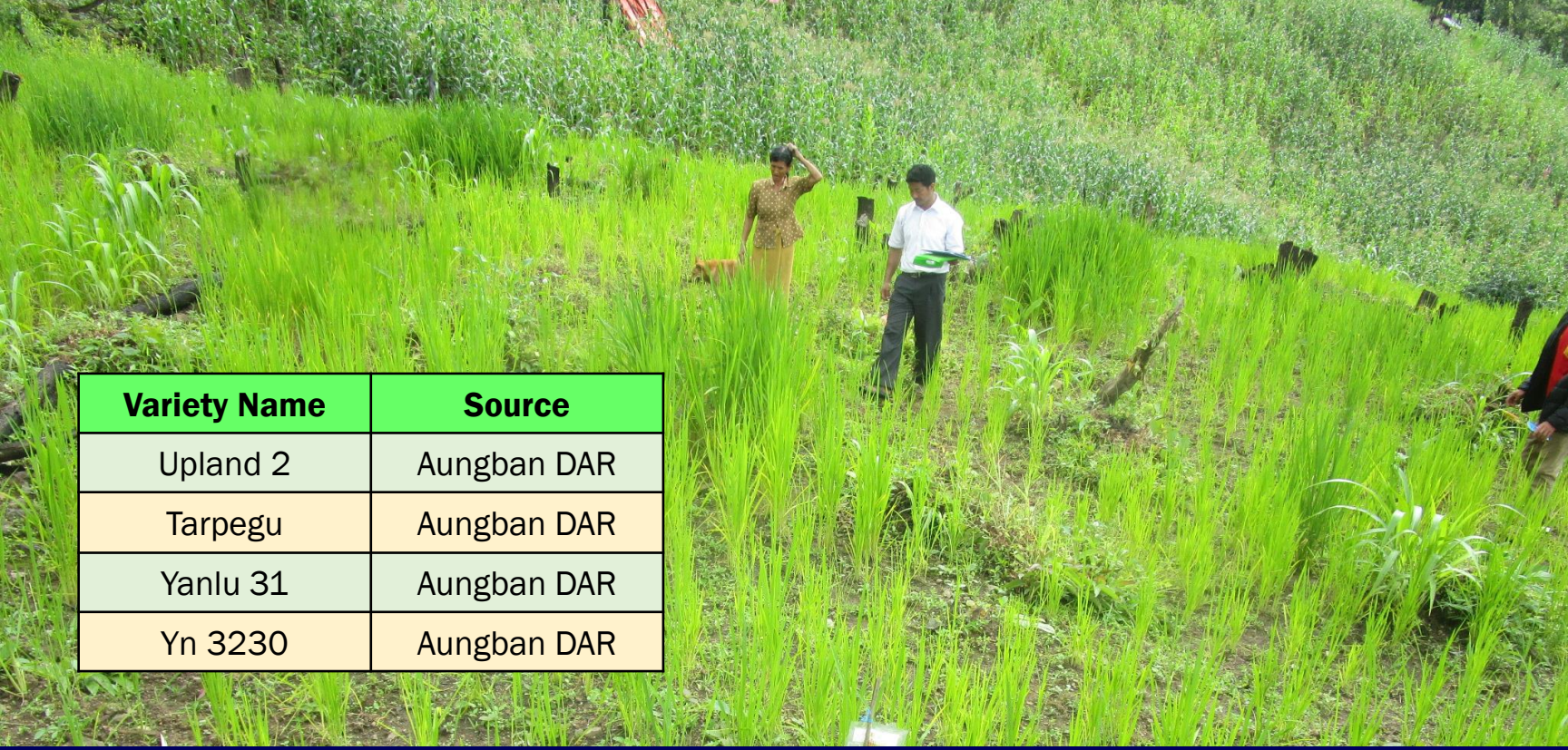
Participatory vulnerability assessments retrieved the following information from the local community.

Sakta Village at a Glance

Observed Climate Changes	Climate Impacts
1. Strong wind 2. Increased temperature 3. Erratic rainfall compounded with greater amount of rain 4. Shorter monsoon season 5. More frequent cyclones	1. Flash flood 2. Landslides 3. Animal diseases 4. Water scarcity and drought 5. Flooding

Though rice is a staple diet for the Chin community, they also consume maize and corn. Nowadays, the farmers from Sakta village are growing less upland rice because of labor scarcity, lower yields and heavy work load with lower returns (compared with other cash crops such as elephant foot yam, potato). The community is still interested in cultivating maize (corn) for human food consumption and for feeding livestock.

In an effort to raise upland rice productivity and in close collaboration with researchers from Aungban DAR, five upland rice trials were undertaken to improve the productivity of upland rice varieties with selected improved varieties from Aungban DAR.



Variety Name	Source
Upland 2	Aungban DAR
Tarpegu	Aungban DAR
Yanlu 31	Aungban DAR
Yn 3230	Aungban DAR

A total of ten farmers from Sakta village were involved in this activity. Based on the preference ranking exercise (yield, adaptability, performance and eating quality), Yanlu-31 and Tarpegu varieties were considered the best performers in the first year. However, one of the constraints was early ripening of the introduced varieties which attracted birds.

Datasheets were maintained for all the farmers engaged in adaptive research trials. The table below is a sample data recording sheet from the Participatory Varietal Selection (PVS) of upland rice varieties.

Monitoring Formats for PVS				
Crop name	Upland Rice			
Name of beneficiary	MR. CHIA HEI			
Source of variety	Upland - 2	Tarpegu	YN - 3230	Yanlu
Variety name	2/5/2018	2/5/2018	2/5/2018	2/5/2018
Sowing date	29/5/2018	29/5/2018	29/5/2018	29/5/2018
Spacing	1ft'	1ft'	1ft'	1ft'
Germination % (Good/Fair/Bad)	Good	Good	Good	Good
Resistant to drought (Good/Fair/Bad)	Good	Good	Good	Good
Resistant to heavy rainfall (Good/Fair/Bad)	Good	Good	Fair	Fair
Constraints	Destruction by Birds			
Maturity date	Oct 3rd wek	Oct 2nd Week	Oct 2nd week	October third week
Plant height	5 ft - 5.5ft	4 ft	4ft - 4.5ft	5 - 5.5ft
Harvesting date	November First week			
100 Grain weight	0.002kg	0.002kg	0.0017kg	0.0016kg
Harvested yield per plot*	0.25kg	0.28kg	0.1kg	0.22kg
Lessons learned	All varieties are adapted with soil and climate			
Constraints	Destroyed by birds			
Beneficiary's preference (Why?)	Upland -2 and Tarpegu because the maturity stage is optimum and grain per panicle is much more			

*plot size (Chan)

Since corn also features in the staple diet of the community, adaptability and performance observation trials of Ekery (maize) and Yezin-1 (corn) variety was undertaken. Under farmer's management and control, both introduced varieties performed well because of taste and short duration (compared with local one). Being an open-pollinated variety (OPV), farmers are able to save seeds for the next growing season.

Variety	Number of farmers		
	2018	2019	2020
Ekery	10	42	42
Yezin-1	10	42	42

For household nutritional purposes, another variety was recommended by the DAR Aungban Research Station: the sweet corn variety (OPV) named Yezin-1. This variety was introduced and tested under farmer-managed crop performance observation trials. At the beginning of the project, performance trials were started with only ten households. However, because of the performance of these newly introduced varieties (in terms of taste, pod size, adaptability and color), farmers shared and expanded the area within their community.

The table below is an example of a data recording sheet for farmer-managed adaptation trials for three varieties of corn.

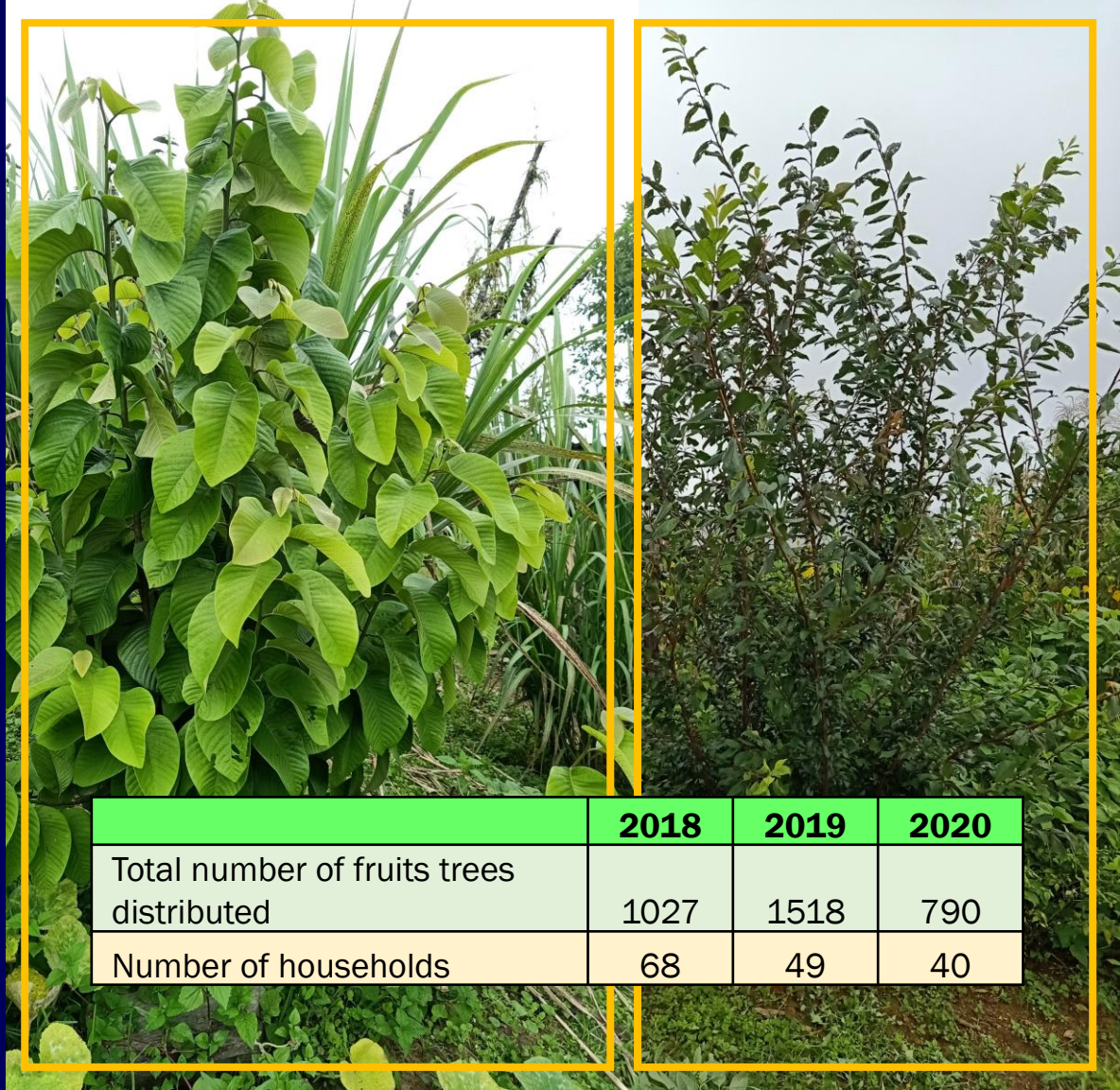
Sr	Description	Farmer name – Tin Lian		
		Variety names		
		Ekery	Yezin	Sweet Corn
1	Received date	14, August, 2019	14, August, 2019	14, August, 2019
2	Sowing date	15, August, 2019	15, August, 2019	15, August, 2019
3	Germination (Good/Fair/Poor)	Good	Good	
4	Plant Height	more than 8 feet	more than 8 feet	About 4 ft
5	Flowering date (50 % of total) (Day after sowing)	October, second week	October, second week	October, second week
6	Harvesting date	November third week	November third week	November third week
7	Edible quality (Good/Fair/Poor)	Good	Good	Good
8	Manure application (Yes/No)	No	No	No
9	Weeding (Yes/No)	Yes	Yes	Yes
10	Insects	Armyworm		
11	Disease	Leaf blight		
12	Climate impact for growing season (Heavy rain/drought/flood)	Less rainfall		
13	Beneficiaries' preference	Ekery and Yezin		
14	Reasons	Good in aroma and taste		
15	Recommendation and suggestions	2 pod per plant, smaller in size than local. She is storing for next year, interest from villagers		

The stabilization of agriculture within rotational farming systems is important if ecosystems and their services are to be conserved. In 2018, IIRR and KMSS developed a model and collaborated with selected farmers to practice semi-permanent farming system, to reduce the deforestation rate resulting from shifting cultivation. The integration of medium-sized tree crops (avocado, orange, apple, coffee, mulberries, stink beans) along with short duration seasonal, subsistence oriented and, semi-commercial crops (elephant foot yam, corn, maize, etc.) for cultivation may enhance farmers' interest to stabilize their farms with proper soil conservation techniques. The fencing, with perennial crops and *alnus nepalensis* seedlings was introduced to selected farmers.

Alnus nepalensis is a plant of the warm temperate to subtropical zone. It can also be grown at higher elevations in tropical areas with high rainfall. The trees develop an extensive lateral root system. They fix atmospheric nitrogen, and are known to be fast growing. They give stability to slopes that otherwise tend to slip and erode. They are effectively used to reforest abandoned and deforested mountains and valleys areas because they can grow in degraded habitats with low fertility soils. *Alnus nepalensis* and *Gliricidia sepium* are being introduced to stabilize soils on slopes and as source or organic matter and green manure.

Agroforestry based farming system is a way to sequester carbon, to enhance the diversification of products which contribute to the family's nutrition and income. Integration of perennial fruit trees in the orchard, homestead and in their seasonal cropping lands can help them to adapt to semi-permanent farming systems.

The integration of perennials with seasonal vegetables crops within homestead have also been demonstrated. Locally adapted fruit trees seedlings such as avocado, plum, stink bean, pear, lime and lemon, etc. are now grown in these diverse, mixed crop and multi-story system.



	2018	2019	2020
Total number of fruits trees distributed	1027	1518	790
Number of households	68	49	40

Locally sourced planting materials and those reported by farmers to adapt well were prioritized. A mix of tree species reduces risks from pests and diseases and improves the micro-habitat.

By increasing the diversity of agriculture activities, the intake of a variety of foods is ensured, the opportunities for income are enhanced and, risks of crop failure are better managed. Homestead based production of vegetables are mainly for home consumption and occasional supplementary income. However, production is limited because of fog in winter season and water scarcity during summer.

There has been a steady increase of homestead-based gardening in Sakta village.

Homestead Vegetable Garden	2018	2019	2020
Number of crops grown	8	8	14
Number of households	10	25	41
Fencing net	16	-	-

Fingerlings Distribution in Sakta Village	2018	2019	2020
Number of fingerlings	7200	5000	5512
Number of seasonal ponds	15	15	18

Fish, next to rice, is one of the two main sources of food in Myanmar. Availability and access to fish is considered very important, especially for poorer segments of the population. However, “fish culture" is rare in the highlands of Chin State. Small-scale fish culture can make contribution to household's nutrition and food security and they are the good source of energy and quality protein. In Sakta village, many ponds are available for use in fish culture during rainy season (as seasonal ponds) if fish fingerlings are assured.

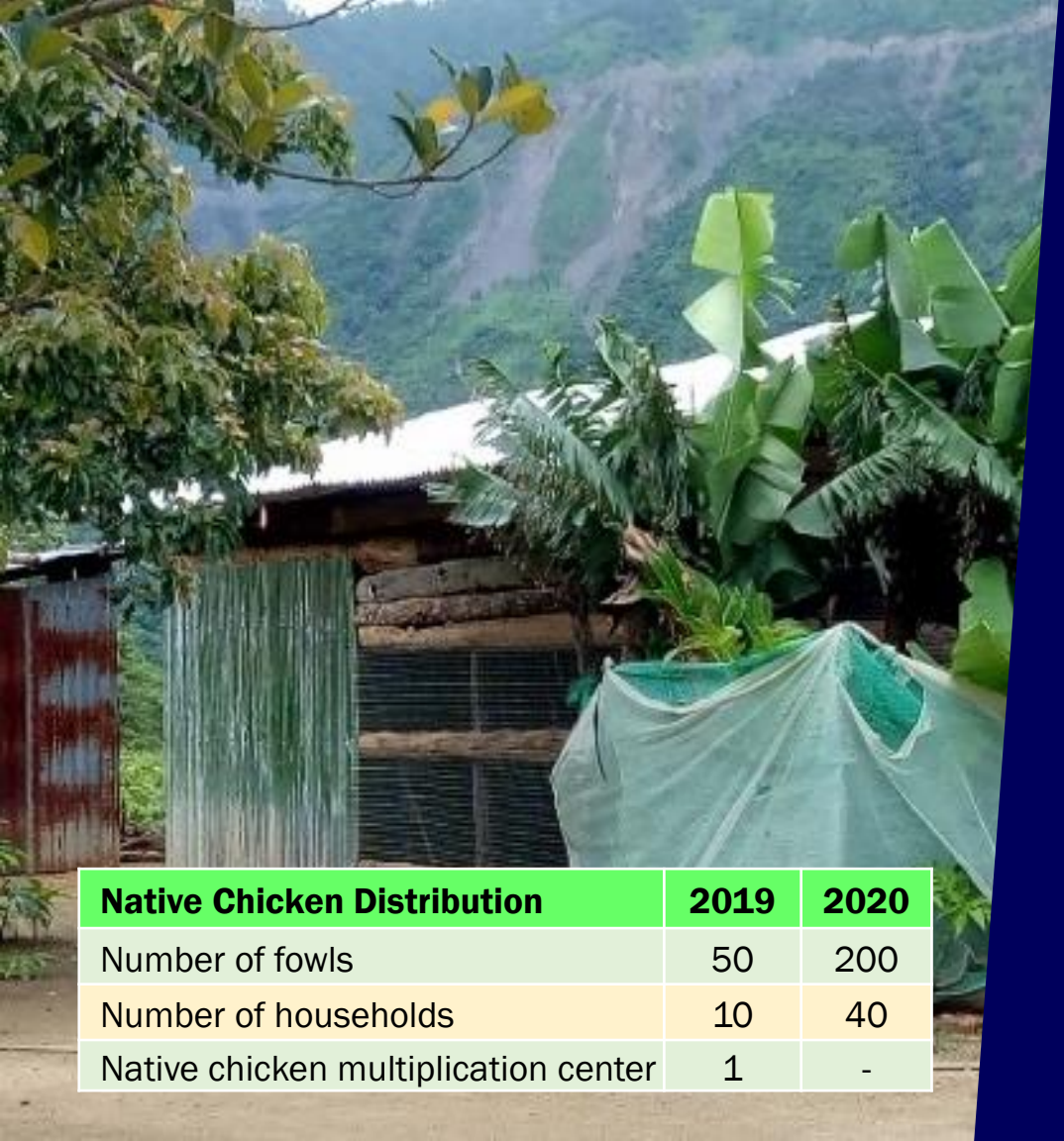
One of the limitations in short cycle fish culture in Sakta is the availability of fingerlings. In close collaboration with the Department of Fishery (Hakha), one fish multiplication center was set up to support the community: over 5000 fingerlings of golden carp and tilapia were provided.

Such a fish multiplication center was aimed to improve the access of local farmers to a source of fingerlings in support of seasonal fish culturing practices which enhance household's nutrition and food security. The owner of the fish multiplication center, U Van Twang Ling was able to sell about 15,000 fingerlings to members of the Sakta community and nearby villages. He earned over 20,00,000 kyat worth by selling fingerlings and fresh fish.

Native breeds are very important for successful small-scale livestock enterprises because they already adapted well to local conditions and can be raised with locally available foods. Native pigs in rural areas are very important sources of protein and are used to trade/barter with other commodities.

Piglet Distribution in Sakta Village	2018	2019	2020
Number of piglets	20	-	50
Number of households	20		50
Breeding center	-	2	-

Ideally, climate-smart agriculture should prioritize social inclusiveness objectives. Women members from the landless, poor, marginal and small-scale farmers are prioritized in such homestead production of vegetable gardening, small-scale livestock rearing such as native chicken and pig.



Native Chicken Distribution	2019	2020
Number of fowls	50	200
Number of households	10	40
Native chicken multiplication center	1	-

To support household level chicken production, a native chicken multiplication center was set up to maintain good local breeds for sharing/ sale within the community. In 2019, one chicken multiplication center was established with 25 chickens. Over 40 chickens were sold and eaten thus, being a modest start in just the first year.

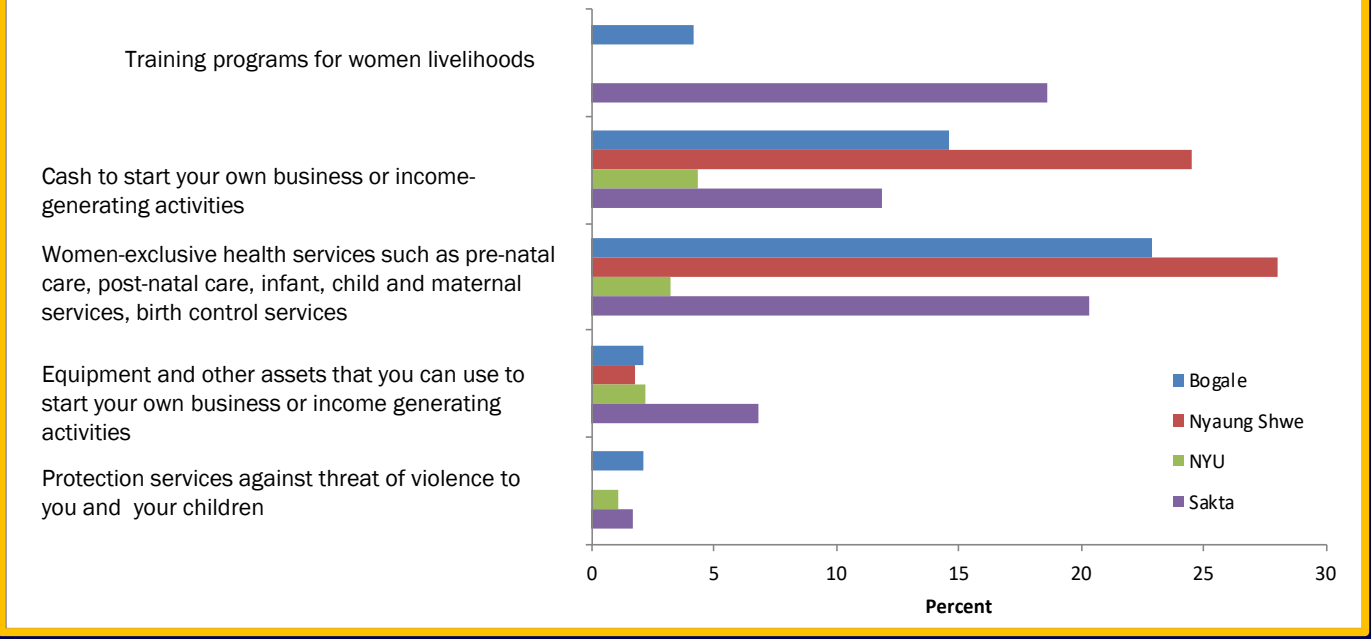
Root and Tuber Crops in Sakta Village	2019	2020
Number of planting materials	150	620
Number of households	9	11

Root and tuber crops such as potato, taro, sweet potato and elephant foot yam are considered as semi-commercial crops of the community. By supporting planting materials of roots and tuber crops and other nutritionally-rich vegetable seeds, income generation opportunities are fostered.

The *carolus* variety of potato was recommended by the Heho Potato Seeds Multiplication Center and was introduced and tested in 2019 and 2020. The performance of this variety (yield, size and disease resistance) was better than the traditional variety. Farmers are saving planting materials of the variety for sharing locally. Thus, a local seed system for potato is emerging.

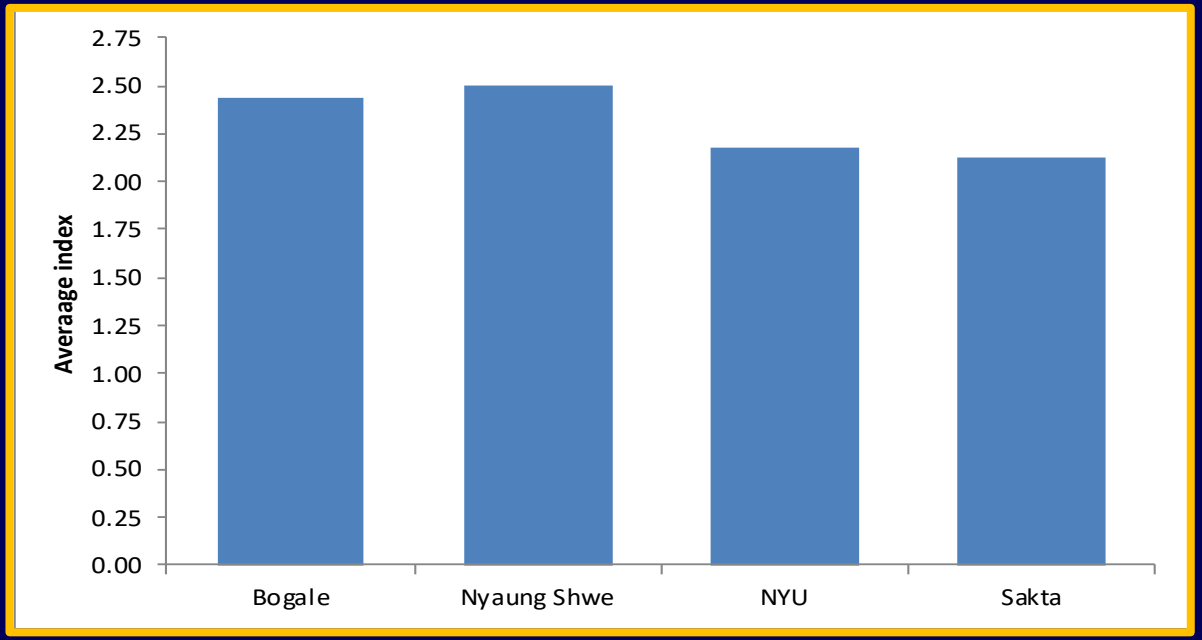
Support services targeted to women can help them overcome barriers to their economic development.

Percentage of female respondents who received support services for women from any external (NGOs) and government agencies for the past 3 years (since 2015) by climate-smart village.



Being able to accumulate and control productive and other assets is important in any effort to economically empower women.

Average index on the female respondent's perception on the extent of control and power over household assets by climate-smart village.



With the declaration of the World Food Summit in 2021, there is a new interest in agroecological approaches serving as the foundation for regenerating degraded landscapes and restoring on ecosystem services. Approaches featured in this document, demonstrate small but strategic efforts to support the transition to diversified and resilient food systems. Healthier, diversified diets and indeed (even) increases in productivity can be achieved through climate smart and regenerative agriculture approaches. Women-responsive approach can address a previous neglect of deliberate targeting of women. Context-specific solutions such as those derived in Sakta village support local outscaling of measures to enrichen local food systems and to support the outscaling of innovations by KMSS, local governments, and other CSOs/NGOs in Chin State, Myanmar.

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