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Fish Production Report – Small-scale Aquaculture (SSA) Farmers

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Fish for Livelihoods

Fish Production – Small-scale Aquaculture (SSA) Farmers

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Fish for Livelihoods

Capture fisheries are declining in Myanmar, yet 60% of their animal-sourced food is fish. To meet the growing demand for fish, aquaculture production is increasing. It is essential that Myanmar develops a sustainable aquaculture industry that minimizes potential environmental impacts and ensures aquaculture practices are socially acceptable and economically sound. The United States Agency for International Development (USAID) funded the Fish for Livelihoods project aims to increase fish production, labor productivity, food availability, and fish consumption especially for women and children from vulnerable households. It will provide opportunities for entrepreneurial activities in small-scale aquaculture systems, and promote social behavioral change messages that direct home production and market purchases towards nutritious-conscious household decisions.

Acknowledgments

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1. Table of contents

1. Introduction

1.1. Project introduction and implementing areas

In October 2019, USAID initiated the Fish for Livelihoods project for implementation over the period 2019-2024. The project will focus on improving the nutritional status of vulnerable households in Central and Northern Myanmar by promoting inclusive and sustainable aquaculture growth that focuses on small-scale farmers.

Part of the WorldFish mission in Myanmar focuses on Small-Scale Aquaculture (SSA) to promote the resilience and sustainability of aquaculture and integrated agriculture. WorldFish provides technical backstopping to the main field-based implementers namely: the Myanmar Fisheries Federation, Karuna Social Services Association, PACT, BRAC, Pekon Lake Committee, and Inle Lake Committee. The Activity also draws on the International Water Management Institute (IWMI) a sister CGIAR entity and member of the 1-CGIAR[1].

The intervention will focus on five inland states and regions in Central and Northern Myanmar:

- Central Dry Zone: Mandalay, Magway, and Sagaing
- North and Eastern: Shan
- Kachin

These areas present more challenges to aquaculture development and livelihood opportunities. The growth in aquaculture can play an important role to change this scenario by increasing production and income opportunities. A scoping study was conducted and as a result, 33 Townships were selected in the 3 regions and 2 states in Myanmar. Figure 1 shows the broader context of the select regions of activity intervention in Myanmar.

Project focus townships are Bamaw, Mogaung, Myitkyina, Waingmaw, Mansi, Mohnyin, Salin, Ngaphe, Myo Thit, Seik Phyu, Sinbaungwe, Taungdwingyi, Pwintphyu, Shwe Bo, Khin-U, Wetlet, Tigyaing, Kale, Madaya, Sintgaing, Patheingyi, Myittha, Sintgu, Tachileik (Tar Lay), Monghpyak, Keng Tung, Mong Kart, Mongton, Taunggyi, Pekon, Nansang, Loilen, Nyaung Shwe.

[1] https://www.cgiar.org/food-security-impact/one-cgiar/

Figure 1. **Map of Project areas**

1.2. Objectives of Fish Production survey

- To verify the fish production on average in SSA farmers ponds
- To analyze consumed, shared, and sold fishes in SSA farmers and study how many SSA have sold their harvested fishes for income generation purposes

1.3. Respondents Type

Number of participants (beneficiaries) who received fingerlings and harvested till April 2021

Region/Township	Number of SSA farmers who received fingerlings	# of Farmer Record books (FRBs)	# of FRBs in the study	# encoders
Eastern Shan	**78**	**78**	**4**	1
Tar Lay	78	78	4	1
Kachin	**50**	**50**	**6**	1
Wai Maw	50	50	6	1
Magway	**213**	**213**	**77**	1
Ngape	27	27	15	
Salin	186	186	62	1
Mandalay	**200**	**200**	**70**	1
Madaya	200	200	70	1
Sagaing	**200**	**200**	**70**	1
Khin U	200	200	70	1
Southern Shan	**345**	**345**	**121**	2
Pekhon	81	81	18	1
Pindaya	64	64	3	-
Taunggyi	200	200	100	1
Grand Total	**1086**	**1086**	**348**	7

Table 1. **Numbers of participants who received fingerlings from the project**

Out of 1086 farmers, 348 (32%) are included in the production data collection because they have harvested their ponds as can be seen in Table-1 above. The details of each of the Townships included can be seen in the para below.

- 100 farmer record books of Taunggyi (50% of actual farmer record books)
- 70 farmer record books of Khin U (35% of actual farmer record books)
- 70 farmer record books of Madaya (35% of actual farmer record books)
- 62 farmer record books of Salin (33 % of actual farmer record books)
- 15 farmer record books of Ngaphe (56% of actual farmer record books)
- 18 farmer record books of Pekon (22 % of actual farmer record books)
- 4 farmer record books of Tar Lay (5% of actual farmer record books)
- 6 farmer record books of Waing Maw (12% of actual farmer record books)
- 3 farmer record books of Pindaya (5% of actual farmer record books)

Geographical Focus

The collection of data for production focuses on year-1 farmers (SSA farmers who were provided with fingerlings in the first year (Oct 2019 – Sep 2020) of implementation) from the Townships mentioned above except Myitkyina, Waing Maw, Moe Mauk, Mansi, Moe Kaung and Pin Laung Townships. In aggregate, nine (9) Townships were considered for the survey, they are; Madaya, Salin, Ngaphe, Khin U, Tar Lay, Taunggyi, Pekon, Pindaya, and Waingmaw.

2. Methodology

2.1. Random Sampling

Random sampling was used in the selection of SSA farmers to capture production data and the sample size was 32% of year 1 farmers. All of the sample ponds were stocked and the farmer record books (FRBs) were collected from those ponds harvested by April 2021.

2.2. Selection of Encoders

Detailed terms of reference (ToR) with clear criteria were developed to hire encoders. The ToR was announced and advertised with the help of the field team in their respective regions and states. In the selection criteria, an appropriate weightage is given that encoders should know about databases, filling data, analysis, and management of data for agriculture or aquaculture interventions. The encoders were selected with the recommendation of implementing partners (IPs) in their respective Townships to ensure support to the encoders by the IPs to collect and analyze the data.

2.3. Training of Encoders

A training session was held with recruited Encoders on how to fill farmer record books, capture, and transfer data. The training session approximately took one day. The database was set up on MS Excel. The filling of databases took a different amount of time depending on the number of farmer's record books. To sum up, seven (7) encoders were hired to fill farmer record books and to complete the database for analysis and report writing.

2.4. Data Collection Method

The farmer record books were initially filled in by SSA farmers. When the books reached the IP offices, staff from the IP made sure the information in the farmer record books is complete and correctly filled. After the encoders have verified the data, WorldFish Monitoring and Evaluation (M&E) Coordinator further checked and where necessary asked IPs to complete any missing data, if any. Following this iterative process and after receiving data from IPs again, the data were analyzed by the M&E coordinator.

2.5. Limitations

Ponds, whose data is included in the survey, were harvested starting from January to April 2021. It is difficult to categorize production. We cannot mention separately how much money farmers have saved via consumption and giving as a present, and how much money farmers have earned from selling the product. We can only mention the total income from harvesting ponds.

Another one is that when we administered this survey, there are only around 350 Farmer Record Books (FRBs) available because the first season of batch 01 for harvesting is not finished yet for year 1 farmers. After disregarding some FRBs, those who could not become part of the survey, there are only 32% of FRBs available to record data among total grow-out farmers. This study reveals only 32% of farmers from Year 1 demonstrating that still, 68% of the farmers' production record is yet to obtain. The major challenges to collecting FRBs are the restrictions and security concerns posed by the military coup and COVID-19 prevalence across the country.

3. Analysis

3.1. Ponds Harvested according to Project Townships

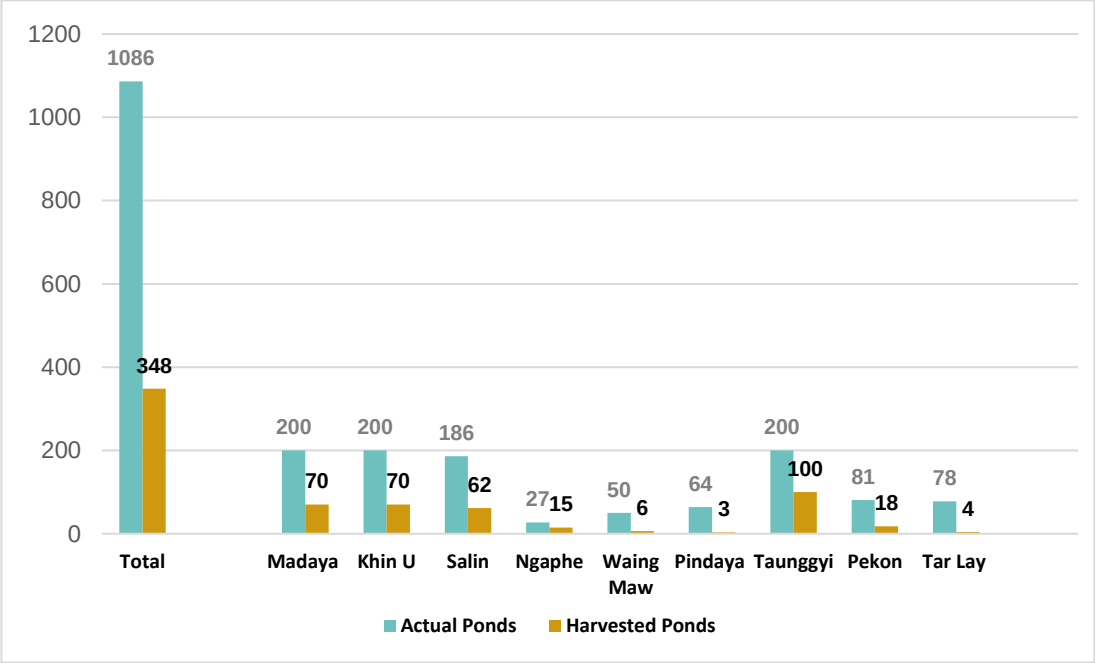

Figure 2. Township-wise number of harvested ponds

Among 1086 Small-scale Aquaculture (SSA) grow-out farmers, 32% (348 SSA farmers) had harvested their ponds by March 2021 as shown in figure-2. SSA farmers from Taunggyi Township had harvested 50% of their ponds and Pindaya and Tar Lay farmers had harvested only 5%.

The 32%, who have harvested their ponds, are those who will be analyzed in the following sections.

3.2. Average Pond Size in sample Townships

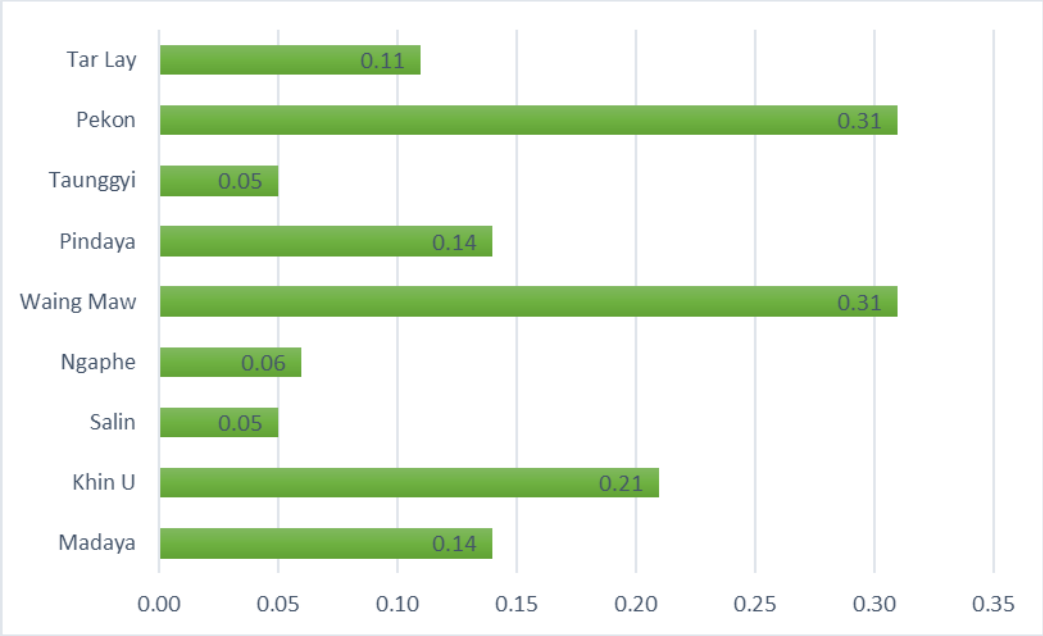

Figure 3. **Average Pond Size in each Towship in acres**

According to the figure-3, ponds from Waing Maw and Pekon townships have a larger area than the other Townships. In contrast to Waing Maw and Pekon townships, ponds from Taunggyi and Salin Townships have less area than the rest of the Townships. It can be assumed that the ponds of SSA farmers are 0.2 ha on average. The minimum pond size of SSA farmers is 0.004 ha and the maximum is 0.79 ha.

3.3. Average Production of Harvested Fish in each Township

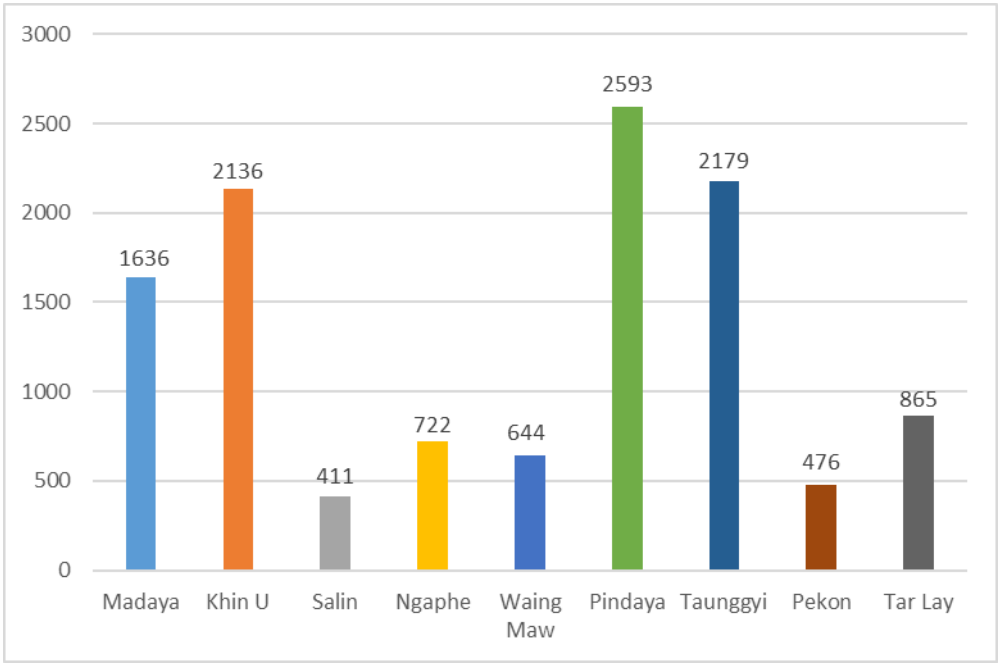

Figure 4. **Average Production of Harvested Fish in Kg per hectare**

The figure-4 above illustrates the average production of those SSA farmers who had harvested their ponds in each of the Townships. The average production of Pindaya township's farmers was on the highest side followed by Taunggyi, Khin U, and Madaya.

The average production of Salin was reported as the lowest in comparison to the other townships. The data suggests that farmers from Pindaya, Taunggyi and Khin U townships had produced over two thousand Kg in year 1 and farmers from Pekon and Salin had harvested over 400 Kg in the same production cycle. The overall average for all townships is that one farmer can produce over 1296 kg of fishes from an average pond size 0.2 ha. The minimum production is 0.82 kg and the maximum is 1306 kg.

3.4. Average Income Earned for Harvested fish in each Township

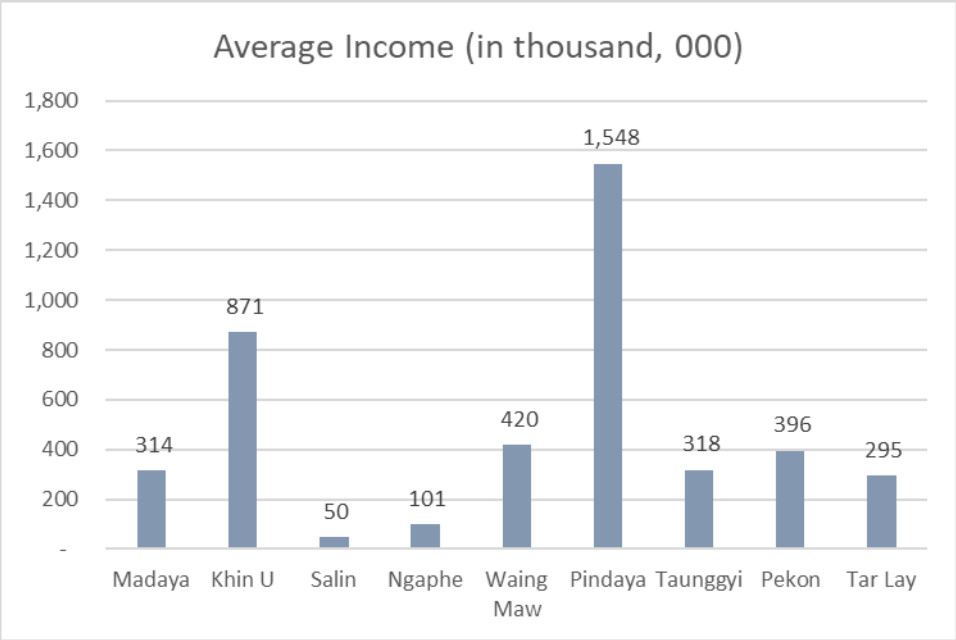

Figure 5. **Average Income in Myanmar Kyat[2] for Harvested Fish**

Figure five shows that Pindaya farmers earned more money than the rest of the Townships, and Salin township farmers earned the least from ponds harvested, whereas Taunggyi, Pekon, and Madaya Township farmers earned approximately the same amount of money. The minimum income is 2,000 Ks and the Maximum is 2,555,000 Ks.

[2] USD1 = MMK1.646 (9 September, 2021)

3.5. Average Consumption of Fishes per Farmer (Kg)

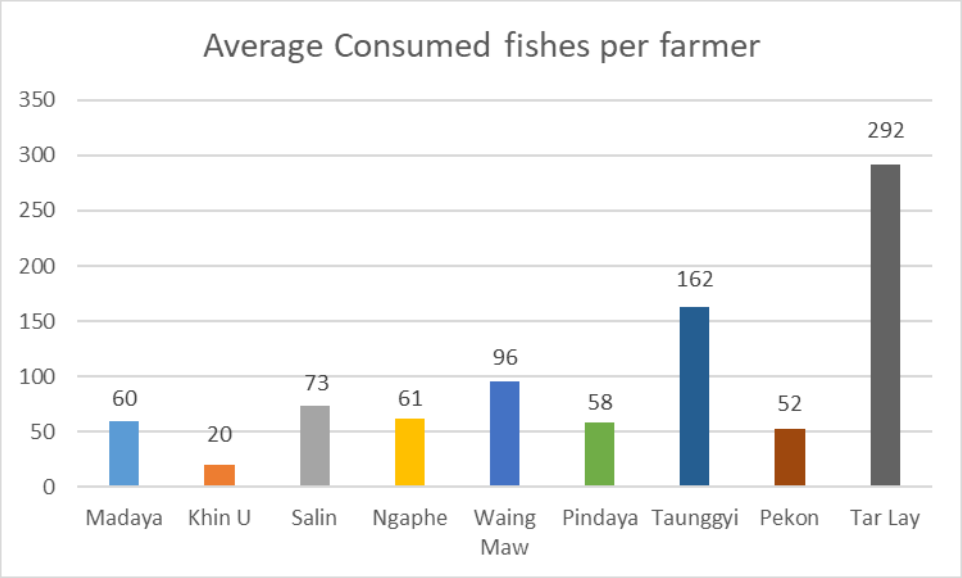

Figure 6. **Township-wise fish consumed on average**

Among the 9 Townships, Tar Lay Township farmers consumed most of their harvested fish per growth season while Khin U Township farmers consumed the least as seen in figure-6. The average Kg consumed 0.17 Hectares as a household is 97 kg.

3.5.1 Percentages of Farmers Consuming Fishes

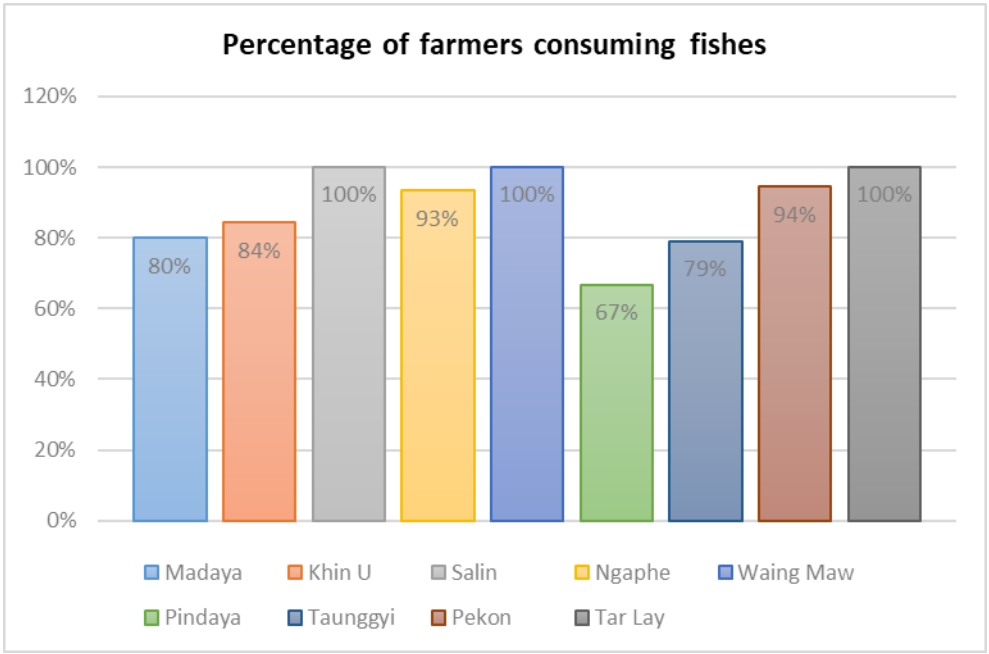

Figure 7. Percentage of Farmers Consuming Fish in each Township

100% of farmers from Salin, Waing Maw, and Tar Lay consumed their harvested fishes while only 67% of farmers from Pindaya have consumed. 90% of farmers from Khin U, Ngaphe, and Pekon Townships have consumed from their ponds. Overall, 86% of farmers have consumed the fish products they attained from their ponds.

3.6. Average fishes shared as Gifts per Farmer (Kg)

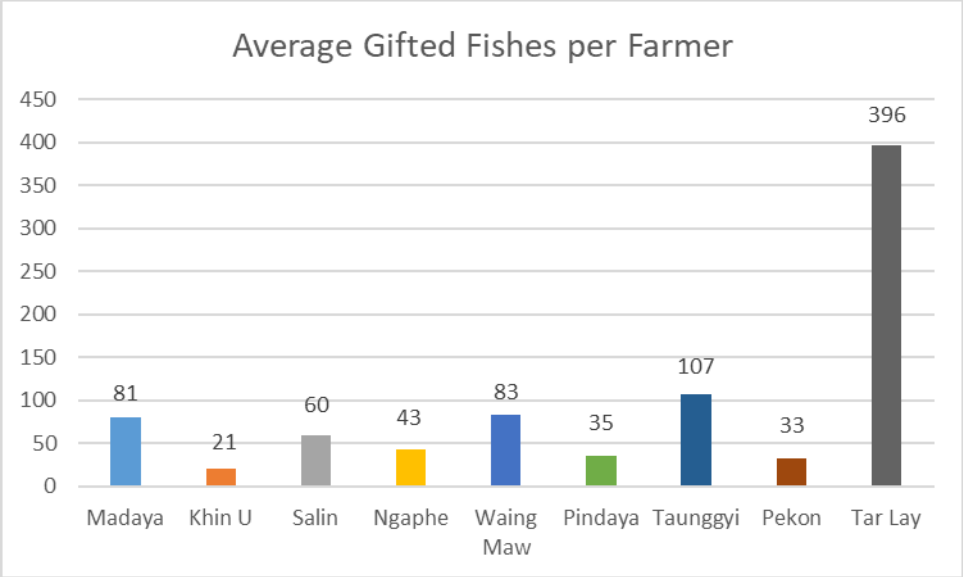

Figure 8. Average Fish Given as Gifts per season (Kg)

In figure - 8 it can be seen that farmers from Tar Lay township have shared their fishes the most and followed by Taunggyi as the second. On the contrary, only 21 kg from Salin has given their fish as gifts which were produced from their ponds.

3.6.1 Percentages of Farmers share their fishes as a gift

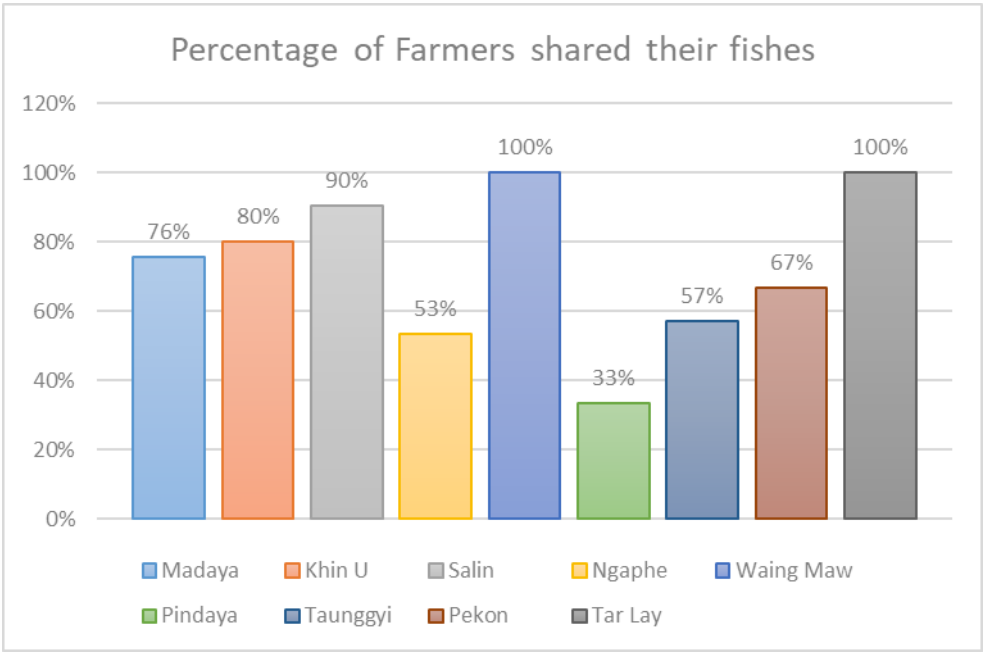

Figure 9. Percentage of male and female farmers giving fish as gifts in each Township

Figure –9 100% of farmers from Waing Maw and Tar Lay have gifted their products from their ponds while Pindaya farmers have gifted the least to their surrounding areas. In the meantime, 90% of farmers from Salin and 80% of farmers from Khin U have gifted their fish. Overall, 72% of farmers have gifted fish from their ponds.

3.7. Average quantities of fish sold per farmer (Kg)

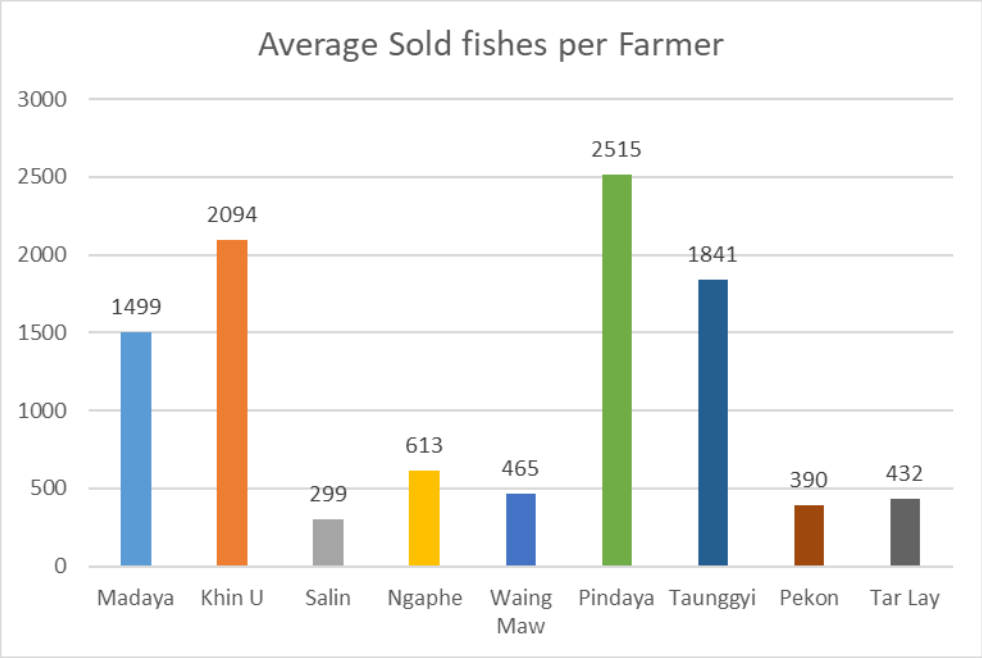

Figure 10. **Average quantities of fish sold per farmer**

Figure-10 indicates farmers from Pindaya have sold their fish the most. In contrast, farmers from Salin have sold fish obtained from their ponds the least. Farmers from Pindaya and Khin U townships have sold over 2000 Kg per farmer whereas only 299 kg of fish is sold in Salin township. The overall average for all townships is that 1128 kg of fish is sold in 0.15 ha by a farmer.

3.7.1 Percentage of farmers sold their fishes in each Township

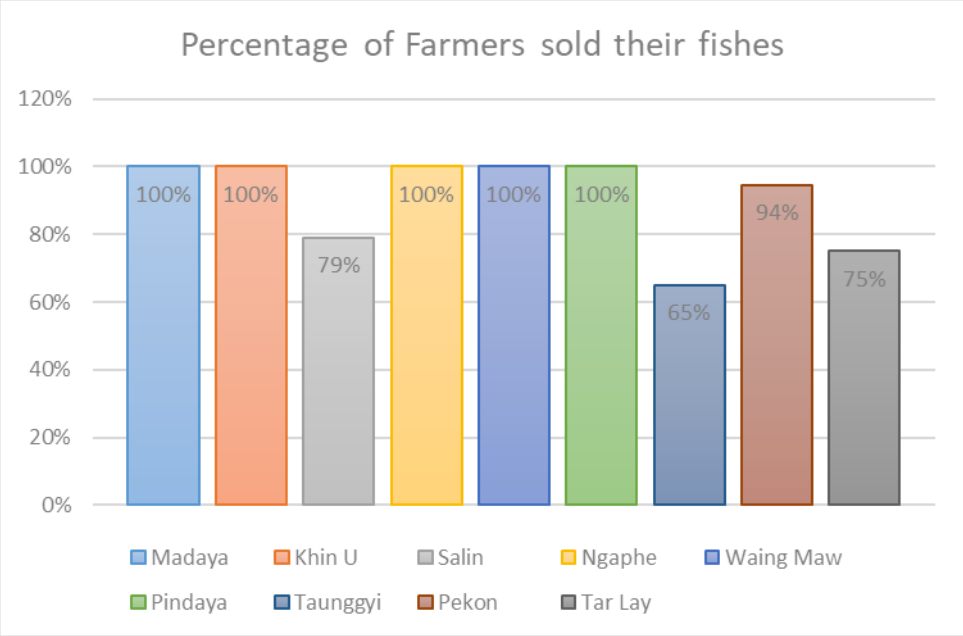

Figure 11. Average Fish Sold in each Township

Figure 11 shows that 100% of farmers of Madaya, Khin U, Ngaphe, Waing Maw, and Pindaya have sold fish from their ponds. Taunggyi is the only township where 65% of farmers sold fish from their ponds. In here, 86% of farmers have sold their harvested fishes among 348 farmers.

4. Findings

- According to the data, farmers from Salin and Ngaphe Townships have reported lower production levels than the rest of the eight Townships.

- Although Waing Maw and Pekon townships' ponds are larger than the rest townships, Pindaya and Khin U produced fishes than the others.

- According to the analyses, 86% of farmers consumed and sold their fishes and while 73% shared their fishes as gifts.

- Among 348 farmers, 85% are less than or equal to 0.2 ha (0.5) and the rest respondents are over 0.2 ha.

- Khin U, Pindaya, and Pekon Townships' farmers do not consume many fishes from their ponds but Khin U and Pindaya townships sold mostly than the rest townships

- As noted above, a similar trend could be seen when fish were given as gifts to relatives and neighboring houses, Khin U, Pekon, and Pindaya Townships' farmers shared less than the rest of the Townships.

- Among all Townships, 100% of Tar Lay Township farmers had consumed and shared most of their products.

- Pindaya Township farmers which have the least sample farmers than the other Townships, consumed and gave away the least and sold most of their fish.

5. Recommendations

- According to the study findings, it is found out that a vast majority of the farmers sold their fish and hence will increase incomes.

- Implementation Partners (IPs) should encourage and motivate their field teams to boost production and ensure ample technical assistance to SSA farmers especially in Townships that reported less production because of the causes including high fish mortality.

- Since Salin, Ngaphe, Khin U, and Madaya are located in the dry zone and production conditions are different, hence they need to learn from each other, however, exchange visits were not possible during the turbulent times with the COVID-19 and heightened security risks. This could be a possible practice in the future.

- At the time of transcribing data from Farmers Record Books (FRBs) to the database, many documentation issues were observed. IPs and field teams should promote the taking of accurate notes to capture correct income for selling fish and build the capacity of the SSA farmers and field staff, where necessary.

- The amount of fish consumed and given away was similar in most of the cases. Field leads from WorldFish and IP teams should encourage increased consumption of fish at the household level to ensure a balanced and nutritious diet.

Annexes

1. Average Production in Kg

Average Production in Kg

Townships		Average
Madaya	Size of aquaculture ponds (acre)	0.34
	Size of aquaculture ponds (Ha)	0.14
	Pond Yield (Kg/acre)	673.77
	Pond Yield (Kg/ha)	1636.29
Khin U	Size of aquaculture ponds (acre)	0.52
	Size of aquaculture ponds (Ha)	0.21
	Pond Yield (Kg/acre)	862.46
	Pond Yield (Kg/ha)	2135.61
Salin	Size of aquaculture ponds (acre)	0.12
	Size of aquaculture ponds (Ha)	0.05
	Pond Yield (Kg/acre)	171.29
	Pond Yield (Kg/ha)	411.09
Ngaphe	Size of aquaculture ponds (acre)	0.16
	Size of aquaculture ponds (Ha)	0.06
	Pond Yield (Kg/acre)	270.89
	Pond Yield (Kg/ha)	722.36
Waing Maw	Size of aquaculture ponds (acre)	0.77
	Size of aquaculture ponds (Ha)	0.31
	Pond Yield (Kg/acre)	259.25
	Pond Yield (Kg/ha)	643.96
Pindaya	Size of aquaculture ponds (acre)	0.34
	Size of aquaculture ponds (Ha)	0.14
	Pond Yield (Kg/acre)	1067.51
	Pond Yield (Kg/ha)	2592.52
Taunggyi	Size of aquaculture ponds (acre)	0.13
	Size of aquaculture ponds (Ha)	0.05
	Pond Yield (Kg/acre)	837.95
	Pond Yield (Kg/ha)	2178.66
Pekon	Size of aquaculture ponds (acre)	0.76
	Size of aquaculture ponds (Ha)	0.31
	Pond Yield (Kg/acre)	194.16
	Pond Yield (Kg/ha)	476.01
Tarlay	Size of aquaculture ponds (acre)	0.27
	Size of aquaculture ponds (Ha)	0.11
	Pond Yield (Kg/acre)	352.38
	Pond Yield (Kg/ha)	864.94
Total	Size of aquaculture ponds (acre)	0.38
	Size of aquaculture ponds (Ha)	0.15
	Pond Yield (Kg/acre)	521.07
	Pond Yield (Kg/ha)	1295.72

2. Consumed Fishes in Kg

Excluding farmers without consumed fishes

Townships		Average
Madaya	Size of aquaculture ponds (acre)	0.42
	Size of aquaculture ponds (Ha)	0.17
	Pond Yield (Kg/acre)	24.18
	Pond Yield (Kg/ha)	59.73
Khin U	Size of aquaculture ponds (acre)	0.61
	Size of aquaculture ponds (Ha)	0.25
	Pond Yield (Kg/acre)	8.28
	Pond Yield (Kg/ha)	20.21
Salin	Size of aquaculture ponds (acre)	0.12
	Size of aquaculture ponds (Ha)	0.05
	Pond Yield (Kg/acre)	30.56
	Pond Yield (Kg/ha)	73.35
Ngaphe	Size of aquaculture ponds (acre)	0.17
	Size of aquaculture ponds (Ha)	0.07
	Pond Yield (Kg/acre)	25.31
	Pond Yield (Kg/ha)	61.47
Waing Maw	Size of aquaculture ponds (acre)	0.77
	Size of aquaculture ponds (Ha)	0.31
	Pond Yield (Kg/acre)	38.68
	Pond Yield (Kg/ha)	96.06
Pindaya	Size of aquaculture ponds (acre)	0.51
	Size of aquaculture ponds (Ha)	0.21
	Pond Yield (Kg/acre)	23.97
	Pond Yield (Kg/ha)	58.21
Taunggyi	Size of aquaculture ponds (acre)	0.16
	Size of aquaculture ponds (Ha)	0.06
	Pond Yield (Kg/acre)	60.92
	Pond Yield (Kg/ha)	162.46
Pekon	Size of aquaculture ponds (acre)	0.81
	Size of aquaculture ponds (Ha)	0.33
	Pond Yield (Kg/acre)	21.31
	Pond Yield (Kg/ha)	52.31
Tarlay	Size of aquaculture ponds (acre)	0.27
	Size of aquaculture ponds (Ha)	0.11
	Pond Yield (Kg/acre)	118.87
	Pond Yield (Kg/ha)	291.77
Total	Size of aquaculture ponds (acre)	0.43
	Size of aquaculture ponds (Ha)	0.17
	Pond Yield (Kg/acre)	39.12
	Pond Yield (Kg/ha)	97.29

3. Shared Fishes in Kg

Excluding farmers without shared fishes

Townships		Average
Madaya	Size of aquaculture ponds (acre)	0.44
	Size of aquaculture ponds (Ha)	0.18
	Pond Yield (Kg/acre)	33.12
	Pond Yield (Kg/ha)	80.96
Khin U	Size of aquaculture ponds (acre)	0.64
	Size of aquaculture ponds (Ha)	0.26
	Pond Yield (Kg/acre)	8.61
	Pond Yield (Kg/ha)	21.19
Salin	Size of aquaculture ponds (acre)	0.13
	Size of aquaculture ponds (Ha)	0.05
	Pond Yield (Kg/acre)	22.95
	Pond Yield (Kg/ha)	59.66
Ngaphe	Size of aquaculture ponds (acre)	0.27
	Size of aquaculture ponds (Ha)	0.11
	Pond Yield (Kg/acre)	17.51
	Pond Yield (Kg/ha)	42.97
Waing Maw	Size of aquaculture ponds (acre)	0.77
	Size of aquaculture ponds (Ha)	0.31
	Pond Yield (Kg/acre)	33.51
	Pond Yield (Kg/ha)	83.24
Pindaya	Size of aquaculture ponds (acre)	0.56
	Size of aquaculture ponds (Ha)	0.23
	Pond Yield (Kg/acre)	14.55
	Pond Yield (Kg/ha)	35.43
Taunggyi	Size of aquaculture ponds (acre)	0.22
	Size of aquaculture ponds (Ha)	0.09
	Pond Yield (Kg/acre)	43.71
	Pond Yield (Kg/ha)	106.86
Pekon	Size of aquaculture ponds (acre)	1.11
	Size of aquaculture ponds (Ha)	0.45
	Pond Yield (Kg/acre)	13.19
	Pond Yield (Kg/ha)	32.53
Tarlay	Size of aquaculture ponds (acre)	0.27
	Size of aquaculture ponds (Ha)	0.11
	Pond Yield (Kg/acre)	161.49
	Pond Yield (Kg/ha)	396.39
Total	Size of aquaculture ponds (acre)	0.49
	Size of aquaculture ponds (Ha)	0.20
	Pond Yield (Kg/acre)	38.74
	Pond Yield (Kg/ha)	95.47

4. Average Sold Fishes in Kg

Excluding farmers without sold fishes

Townships		Average
Madaya	Size of aquaculture ponds (acre)	0.34
	Size of aquaculture ponds (Ha)	0.14
	Pond Yield (Kg/acre)	617.43
	Pond Yield (Kg/ha)	1499.48
Khin U	Size of aquaculture ponds (acre)	0.52
	Size of aquaculture ponds (Ha)	0.21
	Pond Yield (Kg/acre)	845.81
	Pond Yield (Kg/ha)	2094.39
Salin	Size of aquaculture ponds (acre)	0.15
	Size of aquaculture ponds (Ha)	0.06
	Pond Yield (Kg/acre)	119.64
	Pond Yield (Kg/ha)	299.11
Ngaphe	Size of aquaculture ponds (acre)	0.16
	Size of aquaculture ponds (Ha)	0.06
	Pond Yield (Kg/acre)	229.93
	Pond Yield (Kg/ha)	613.15
Waing Maw	Size of aquaculture ponds (acre)	0.77
	Size of aquaculture ponds (Ha)	0.31
	Pond Yield (Kg/acre)	187.07
	Pond Yield (Kg/ha)	464.66
Pindaya	Size of aquaculture ponds (acre)	0.34
	Size of aquaculture ponds (Ha)	0.14
	Pond Yield (Kg/acre)	1035.53
	Pond Yield (Kg/ha)	2514.86
Taunggyi	Size of aquaculture ponds (acre)	0.19
	Size of aquaculture ponds (Ha)	0.08
	Pond Yield (Kg/acre)	775.37
	Pond Yield (Kg/ha)	1841.49
Pekon	Size of aquaculture ponds (acre)	0.81
	Size of aquaculture ponds (Ha)	0.33
	Pond Yield (Kg/acre)	158.81
	Pond Yield (Kg/ha)	389.82
Tarlay	Size of aquaculture ponds (acre)	0.14
	Size of aquaculture ponds (Ha)	0.06
	Pond Yield (Kg/acre)	185.24
	Pond Yield (Kg/ha)	432.22
Total	Size of aquaculture ponds (acre)	0.38
	Size of aquaculture ponds (Ha)	0.15
	Pond Yield (Kg/acre)	461.65
	Pond Yield (Kg/ha)	1127.69

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