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Livelihoods and extension in Myanmar: Ayeyarwady Delta

Strengthening institutional capacity, extension services and rural livelihoods in the Central Dry Zone and Ayeyarwady Delta regions of Myanmar (ASEM/2011/043)

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Disclaimer

While this report is a product of the aforementioned project funded by ACIAR, the contents, opinions and interpretations presented herein are the authors' own. Data accuracy and analysis are the responsibility of the project team located at the Asian Institute of Technology, where the raw data files are securely stored.

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Abbreviations and acronyms

ac	acres
ACIAR	Australian Centre for International Agricultural Research
CSO	Civil Society Organisation
DoA	Department of Agriculture
HH	household
LIFT	Livelihoods and Food Security Fund
LH	landholding
LL	landless
NGO	non-government organisation
YAU	Yezin Agricultural University

Executive summary

This data compendium presents the results of socioeconomic research conducted in 2014–15 for the project 'Strengthening institutional capacity, extension services and rural livelihoods in the Central Dry Zone and Ayeyarwady Delta regions of Myanmar', funded by the Australian Centre for International Agricultural Research (ACIAR).

The research was conducted in two parts: (1) a largely quantitative survey using a structured questionnaire administered by Yezin Agricultural University (YAU) and the Department of Agriculture (including students as enumerators); and (2) focus group discussions conducted by the Asian Institute of Technology, Bangkok, with support from YAU students. The research was conducted in four townships of the Ayeyarwady Delta region: Pathein, Kyaunggon, Pyapon and Maubin. The stratified random sample for this survey included representatives of landless and landholding households. The focus groups were divided based on landholding or landless status and gender. Separate interviews were also conducted with village heads for supplementary information.

Data reported here are separated into three major categories: (1) household characteristics, including data on age, household structure, education, labour availability, household economics and consumption; (2) production, covering agriculture, livestock and fisheries, as well as irrigation, inputs and expenses; and (3) support services, examining access to credit, information sources and capacity building. Where appropriate, data are compared to secondary information, bearing in mind that data in Myanmar are scarce and often incomplete.

This compendium highlights the importance of the landless rural population in Myanmar. Their role in natural resource production, as labourers, livestock graziers and fishers cannot be underestimated. More importantly, their social dynamics are more volatile than those of landowners, leading to the paradox that, although 80% of Myanmar's population lives in rural areas, rural labour scarcity is quickly becoming the primary issue for agricultural production in the Ayeyarwady Delta.

These data are being made available so that other projects and researchers can use them for discussion, comparison, correction and analysis. We understand that socioeconomic research in Myanmar is relatively young and, therefore, we want to contribute to a community of practice that is able to use, apply and analyse these results for the development of rural Myanmar.

Introduction

The Australian Centre for International Agricultural Research (ACIAR) funded a four-year research program to help improve agricultural livelihoods in the Ayeyarwady Delta and Central Dry Zone regions of Myanmar. The program included conducting socioeconomic research to:

- support an understanding of farmer livelihoods and drivers of decision-making and change, to underpin agricultural research and extension services
- identify and support the implementation of effective farmer extension methodologies for agricultural technological change and adoption
- identify pathways for developing agricultural institutional capacity and policy change through collaborative institutional research with partner organisations.

This report summarises the key findings of baseline research conducted in the Ayeyarwady Delta in 2014. It includes surveys that increase understanding of the conditions and changes related to the livelihoods of rural households. In addition to contributing to the emerging body of data on rural conditions in Myanmar, this report also forms the basis for ongoing research activities.

A companion report summarising baseline research in the Central Dry Zone is also available. (Htway et al. 2020. *Livelihoods and extension in Myanmar: Central Dry Zone*. ACIAR: Canberra).

Study area

The population of the Ayeyarwady Delta region has one of the highest rates of landlessness, poverty and food insecurity in Myanmar (LIFT 2013, UNDP 2011).[1] Together, the Ayeyarwady Delta, Bago and Yangon regions constitute almost half the country's harvested area; however, significant areas of the Ayeyarwady Delta are vulnerable to flooding (Denning et al. 2013). In 2008, Cyclone Nargis devastated much of the area.

According to the 2014 Myanmar Population and Housing Census (Department of Population 2015a), the Ayeyarwady Delta region had a population density of 176.5 persons per square kilometre, more than double the national population density (76 persons per square kilometre). About 86% of people in the region are classified as living in rural areas (Department of Population 2015b).

The survey was conducted in four townships in the Ayeyarwady Delta: Maubin, Pyapon, Pathein and Kyaunggon (see Figure 1).

[1] *The Ayeyarwady Delta region is an administrative unit in Myanmar and covers most of the hydrological delta. All townships surveyed are part of this region.*

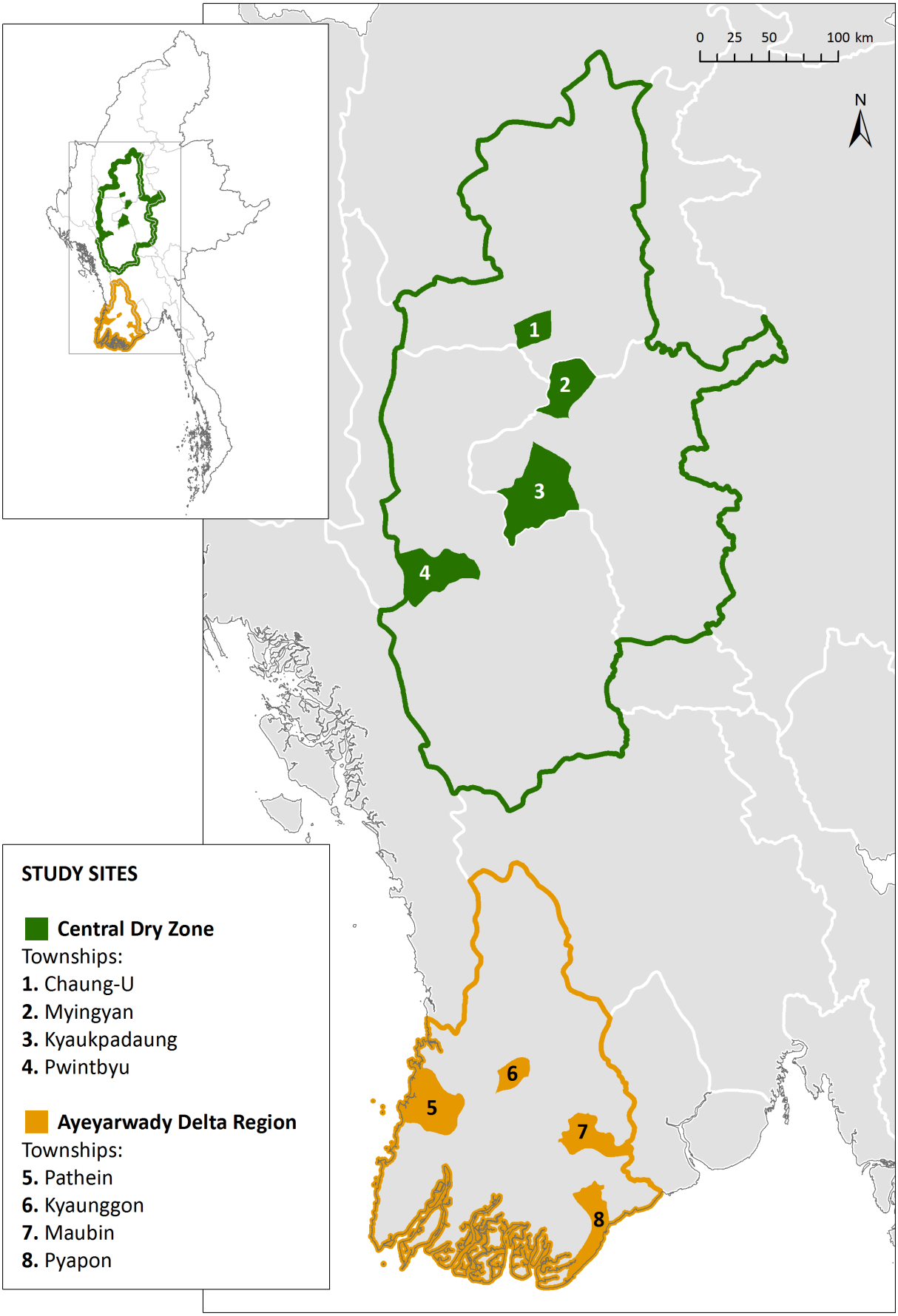

Figure 1: Study sites for the Central Dry Zone and the Ayeyarwady Delta

Methods

Township and village selection

The townships and villages were selected for the survey in consultation with staff members at the local Department of Agriculture (DoA) offices at township and district levels. Townships were selected to capture:

- the diversity of farming systems and livelihood activities in the Ayeyarwady Delta (including rice–rice, rice–pulse and rice–fish systems)
- different levels of remoteness/accessibility and proximity to main roads
- sites shared with other ACIAR projects, as well as 'control' villages with no project intervention.

Rural livelihoods and farming systems change from the south to the north of the Delta. The coastal south faces greater challenges in terms of salinity and salt water intrusion. Selection of villages to reflect the north–south salinity gradient was also considered during selection of the villages; however, southern villages were adjusted due to accessibility (see *Limitations* below).

Household survey

The survey was designed in consultation with other research projects related to legumes, fish, rice and cattle production. The original questions were tested in early 2014. They were then refined to reduce the burden on respondents, removing many of the detailed questions relating to labour and time use. These areas were explored through other research activities.

The survey for landholding households allowed for detailed information on agricultural production. In contrast, the survey for landless households allowed for more detailed information on labour and migration. Both surveys collected data on basic household demographics, income, expenditure, ownership of assets and access to services.

Proportional stratified sampling was used to reflect the percentage of households with and without access to land, as well as engagement in major livelihood activities (e.g. rice farming and fishing). A total of 748 interviews were conducted, with separate questionnaires for landholding[2] and landless households (see Table 1).

The number of women in the sample was low, particularly in the survey of landholding households, where generally the household head was interviewed, in line with local custom. The proportion of women who participated was slightly higher in the landless sample, reflecting higher rates of women-headed households and higher migration rates.

[2] *The term 'landholding' is used throughout this report to refer to households with access to land. This is used in preference to 'land owning' as, in many cases, households do not have land title even though they may use the land or have traditional land use rights.*

Table 1: Number of landholding and landless households surveyed, by township

	Landholding		Landless	
	Total	Women	Total	Women
Maubin	95	4	92	12
Pyapon	78	5	106	11
Pathein	96	16	97	6
Kyaunggon	93	5	91	13
All townships	362	30	386	42

Focus group discussions

To understand the dynamics of livelihoods in the study area, information from the household survey was complemented with qualitative data collected through focus group discussions. These were held in two of the six villages per township that took part in the survey.
The villages were selected to capture the mix of livelihoods in the region. Two focus group discussions were held in each village, one each for landless and landholding groups.
Between eight and 15 people participated in each discussion.

During the discussions, participants were asked about their resources and current livelihood, and how decisions were made about livelihood activities. Participants were also asked how and why livelihoods in the village were changing or had changed, and the changes they expected in the future.

Data collection and analysis

The survey was held in May 2014. Staff and students from DoA, the Department of Agricultural Research, Yezin Agricultural University (YAU) and the Asian Institute of Technology were trained and organised into four teams. Each team was assigned a township, and a team leader was responsible for ensuring data quality before leaving the survey villages. Masters students and staff members from YAU and DoA staff entered and cleaned data. The Statistical Package for the Social Sciences and Microsoft Excel software were used to analyse data and to present basic descriptive statistical analysis.

Focus group discussions were facilitated and recorded by small teams from YAU and the Asian Institute of Technology, with the support of local DoA offices in each township. Transcripts of each discussion were recorded in Myanmar language and translated into English. Their contents were analysed to identify key concepts, recurring themes and drivers of change and decision-making. The differences or similarities between the villages, and the relationship between landholding and landless households were also noted.

Limitations

The survey was held in May to accommodate the needs of partner organisations. As a result, it was the beginning of the monsoon season. Safety concerns were raised in relation to accessing villages, especially in Pyapon township, and the village selection was adjusted. This led to under-representation of conditions in the southern part of the Ayeyarwady Delta, which is more prone to salinity, and generally more dependent on fishing and aquaculture activities.

Household characteristics

This section summarises information relating to demographics, labour, housing and household assets, as well as basic household economics.

Data confirm there are often significant gaps between the resources, income and livelihoods of landless and landholding households, with landless households generally having lower incomes.

Demographics

Household size

Table 2 compares basic household information across the surveyed townships, and between landless and landholding households. The average size of landholding households is marginally larger. The female–male ratio among landholders is almost even (48:52). This is comparable with the female–male ratio of the rural population of Ayeyarwaddy Delta (51:49) (Department of Population 2015b). At a national level, the female–male ratio of agricultural households is 51:49 (Win 2013b).

Table 2: Number of people per household

	Landholding			Landless			Combined		
	Average size*	Largest	Smallest	Average size	Largest	Smallest	Average size	Largest	Smallest
Maubin	4.7	14	1	4.5	9	1	4.6	14	1
Pyapon	5.3	11	2	4.5	10	1	4.8	11	1
Kyaunggon	4.7	10	1	4.1	10	2	4.4	10	1
Pathein	4.6	9	2	4.5	12	2	4.5	12	2
All townships	4.8	14	1	4.4	12	1	4.6	14	1

Women-headed households

The proportions of women-headed households in our sample are low: 6.4% landholding and 8.8% landless (see Table 3). National statistics suggest 18.7% of households in rural areas are headed by a woman (Department of Population 2015a: 48).[3] The highest proportion of women-headed households is in the landholding sample in Pathein, consisting of 12.5% of the sampled households.

[3] *This figure includes areas of Myanmar that are experiencing civil conflict, which skews the average. The Ayeyarwady Delta currently does not have areas of civil conflict.*

Table 3: Women-headed households in sample

	Landholding		Landless		Combined	
	No.	%	No.	%	No.	%
Maubin	4	4.2	9	9.8	13	6.9
Pyapon	5	6.4	8	7.5	13	7.1
Kyaunggon	2	2.2	11	12	13	7.1
Pathein	12	12.5	6	6.2	18	9.3
Total	23	6.4	34	8.8	57	7.62

The average age of the household head is 48.8 years. Surveyed households in the landless sample are younger on average compared to the landholding households (see Table 4).
As the landless households are mostly young households or newly established households, they have more children aged under 14 (see Table 5).

Table 4: Average age, by years

	Household head	All household members including household head
Landholding households	52.7	34.3
Landless households	45.1	27.7
Combined	48.8	30.9

Table 5: Age structure of sampled households

Age	Maubin	Pyapon	Kyaunggon	Pathein	All townships
	Household members including household head (%)				
Landholding households					
≤14	14.4	21.2	19.2	21.4	19
15–30	32.4	29.5	29.9	30.1	30.5
31–45	20.4	21.7	18.3	20.7	20.3
46–64	25.7	21.2	26.4	21.2	23.7
≥ 65	7.1	6.3	6.2	6.6	6.6
Total	100	100	100	100	100
Landless households					
≤14	28.3	29.9	27.6	34.9	30.3
15–30	30.0	26.3	31.1	27.7	28.6
31–45	21.8	20.8	20.5	22.4	21.4
46–64	17.2	21.1	17.6	12.7	17.2
≥ 65	2.7	1.9	3.2	2.3	2.5
Total	100	100	100	100	100

Education

Nationally, around 56% of the Myanmar population has a primary school education (Aung 2013). In our sample, education levels vary significantly between townships, and also between the landless and landholding. Landless households have less access to education, with 67% reaching only primary school level compared to 54.5% in the landholding sample (monastery and primary school combined; see Table 6). Illiteracy across townships is generally 0–2%. However, for the landless in Kyaunggon and landholding in Pathein, 7.7% and 6.3% of household heads are illiterate, respectively.

Monastery education is more prominent in Pyapon and Pathein. Monasteries were the main form of education in rural areas before the development of a government education system. In general, this education is regarded as being of a lower standard than a primary school education.

Table 6: Highest level of education, household head

	Illiterate (%)	Monastery (%)	Primary school (%)	Middle school (%)	High school (%)	Undergrad/diploma (%)	Graduate (%)
Landholding households							
Maubin	0	4.2	41.1	38.9	12.6	3.2	0.0
Pyapon	0.0	28.2	30.8	28.2	10.3	0	2.6
Kyaunggon	1.1	4.3	44.1	35.5	14.0	0	1.1
Pathein	6.3	14.6	51.0	22.9	4.2	0	1.0
All townships	1.9	12.2	42.3	31.5	10.2	0.8	1.1
Landless households							
Maubin	1.1	5.4	65.2	18.5	9.8	0	0
Pyapon	0	17.1	48.6	25.7	6.7	1.0	1.0
Kyaunggon	7.7	6.6	61.5	17.6	5.5	1.1	0
Pathein	1.0	14.4	49.5	32.0	2.1	0	1.0
All townships	2.3	11.2	55.8	23.6	6.0	0.5	0.5

Ethnicity and religion

The study populations are relatively homogenous in terms of religion and ethnicity. The majority of households in the sample identify as Buddhist, with some Christian and few Hindu or Muslim households (see Table 7). Pathein township has the highest level of religious diversity. This is consistent with the general characteristics for the Ayeyarwady Delta and Myanmar more broadly, which is predominantly Buddhist (Walton and Hayward 2014:4).

Bamar is the predominant ethnic group, with a small proportion of Kayin in all areas except for Pyapon (see Table 8). This is consistent with other data, where the majority ethnic groups in the Ayeyarwady Delta are given as Bamar and Kayin (Roussy 2008:7). Limited differences are found in ethnicity or religion in relation to land ownership.

Table 7: Religion of household head

	Buddhist (%)		Christian (%)		Hindu (%)		Muslim (%)	
	Landholding	Landless	Landholding	Landless	Landholding	Landless	Landholding	Landless
Maubin	93.7	100	6.3	0	0	0	0	0
Pyapon	100	100	0	0	0	0	0	0
Kyaunggon	97.8	98.9	2.2	1.1	0	0	0	0
Pathein	80.2	84.5	16.7	15.5	2.1	0	1.0	0
All townships	92.5	95.8	6.6	4.2	0.6	0	0.3	0

Table 8: Ethnicity of household head

	Kachin (%)	Kayin (%)	Bamar (%)	Rakhine (%)	Shan (%)	Danu(%)
Landholding households						
Maubin	1.1	22.1	76.8	0	0	0
Pyapon	0	0	100	0	0	0
Kyaunggon	0	31.2	66.7	0	1.1	1.1
Pathein	0	16.7	83.3	0	0	0
All townships	0.3	18.2	80.9	0	0.3	0.3
Landless households						
Maubin	0	10.9	89.1	0	0	0
Pyapon	0	0	100	0	0	0
Kyaunggon	0	22.0	76.9	0	0	0
Pathein	1.0	15.5	81.4	2.1	0	0
All townships	0.3	11.7	87.3	0.5	0	0

Labour

The availability of labour per household has implications for how members are able to engage in different activities to secure their livelihood. For example, labour availability affects whether households have to hire or exchange labour to cope with peak periods. In rural Myanmar, labour for agriculture can be categorised into: (1) family labour (unpaid); (2) casual labour (hired for a day or several days for a specific farm operation such as transplanting); and (3) seasonally hired labourers employed for a whole season (Kurosaki 2006).

Family labour alone is often not sufficient for farming households to manage peak work periods in agriculture. The high percentage of landless households in the two areas provides a labour pool, which is available for farming households to draw on. This is the traditional system of including landless households in agricultural activities and meeting labour demand. However, respondents suggest that the traditional patterns of labour exchange between landholding households (that hire labour) and landless households (that provide labour) are changing due to farm mechanisation and increasing non-farm income opportunities.

This section presents information on labour availability and migration, focusing on areas of employment for landless households.

Labour availability

The dependency ratio indicates the proportion of working-age population to dependents. It is calculated based on the total number of dependents (people aged under 15 or 65 and older) divided by the working-age population (aged 15–64). This is expressed as a percentage. The dependency ratio indicates the labour available to support children and the elderly.

The dependency ratio nationally was 52.5% in 2014, and 54.5% for the Ayeyarwady Delta region (Department of Population 2015a:22). In comparison, the ratios in Table 9 are much lower, particularly for landholding households. In the landless sample, for every 100 working-age people there are 48 dependents, compared to 34 dependents in the landholding sample. The dependency ratio in Pathein is the highest for both landholding and landless households (38.9% and 59.9%, respectively), while the Maubin landholding sample has the lowest dependency ratio (27%).

Table 9: Dependency ratio

	Landholding (%)	Landless (%)	Combined (%)
Maubin	27.5	44.9	35.3
Pyapon	35.3	44.1	39.9
Kyaunggon	34.2	44.9	38.9
Pathein	38.9	59.9	48.6
All townships	33.8	48.3	40.6

Labour migration

Table 10 and Table 11 indicate the number of people who migrated and the type of migration (seasonal, temporary or permanent). Information was collected for household members who were currently away from home. As the survey was conducted during the growing season, the number who were away could be expected to be slightly lower than at other times of the year because many seasonal migrants had returned to their home village to work in agriculture.

Table 10: Number of migrated household members

	Landholding		Landless		Combined	
	Household members (No.)	Working- age sample (%)	Household members (No.)	Working- age sample (%)	Household members (No.)	Working- age sample (%)
Maubin	35	9.9	27	9.5	62	9.7
Pyapon	28	9.2	35	10.6	63	9.9
Kyaunggon	12	3.7	16	6.3	28	4.8
Pathein	25	7.9	36	13.1	61	10.3
All townships	100	7.7	114	9.9	214	8.8

Table 10 shows Kyaunggon has less than half the migration compared to other townships during the survey period. Under 5% of the working-age population was absent in Kyaunggon, compared to 10% in the other townships. In the Ayeyarwady Delta, domestic migration is higher than international migration and only 8% of total migrants cross international borders (World Bank 2016).

With the exception of Maubin, the number of people who migrate as a proportion of the working-age population tends to be higher in the landless sample than the landholding sample. Higher rates of migration in the landless sample are linked to decreasing work opportunities in the villages and nearby areas. According to landless respondents, mechanisation is replacing labour. Even though innovations such as irrigation have created the opportunity for double cropping in some areas, landless respondents had experienced an overall decrease in demand for their labour.

In Pathein, 13.1% of the landless working-age sample have migrated for work, with a combined landless and landholding working-age sample of 10.3%. This is slightly higher than in the other townships. Landholding respondents in Pathein noted labour shortages as a result of landless households increasingly participating in non-farm wage labour.

Table 11: Migration by type (seasonal, temporary and permanent) as a percentage of all migration

	Landholding (%)			Landless (%)			Combined (%)		
	Seas.	Temp.	Perm.	Seas.	Temp.	Perm.	Seas.	Temp.	Perm.
Maubin	12.5	71.9	15.6	8.7	87.0	4.3	10.9	78.2	10.9
Pyapon	8.0	64.0	28.0	12.1	75.8	12.1	10.3	70.7	19.0
Kyaunggon	0	63.6	36.4	25.0	68.8	6.3	14.8	66.7	18.5
Pathein	0	88.5	11.5	2.9	94.3	2.9	1.6	91.8	6.6
All townships	6.4	73.4	20.2	10.3	83.2	6.5	8.5	78.6	12.9

Note: percentages are calculated based on household members who had migrated, as per Table 10.

In Table 11, 'seasonal migration' refers to short-term migration, which is no more than 12 months and usually linked to the annual agricultural cycle. 'Temporary migration' is

defined as 'migration for a specific motivation and/or purpose with the intention that, afterwards, there will be a return to country of origin or onward movement' (European Migration Network 2011). 'Permanent migration' is for a specific purpose but without intention to return to their origin.

The majority of migration for all townships and for both landholding and landless households is temporary. The landless households tend to have higher percentages of seasonal migration, while a higher proportion of landholding households migrate permanently.

As agricultural work is seasonal, it is common for landless households to migrate in search of additional work during the off season. Of those who provided a reason for migration, 87.9% indicated migration for the purpose of work. Other reasons include education, healthcare or marriage.

Reasons for migration

For households with a family member who has migrated, the overwhelming reason is for employment and income (see Figure 2).

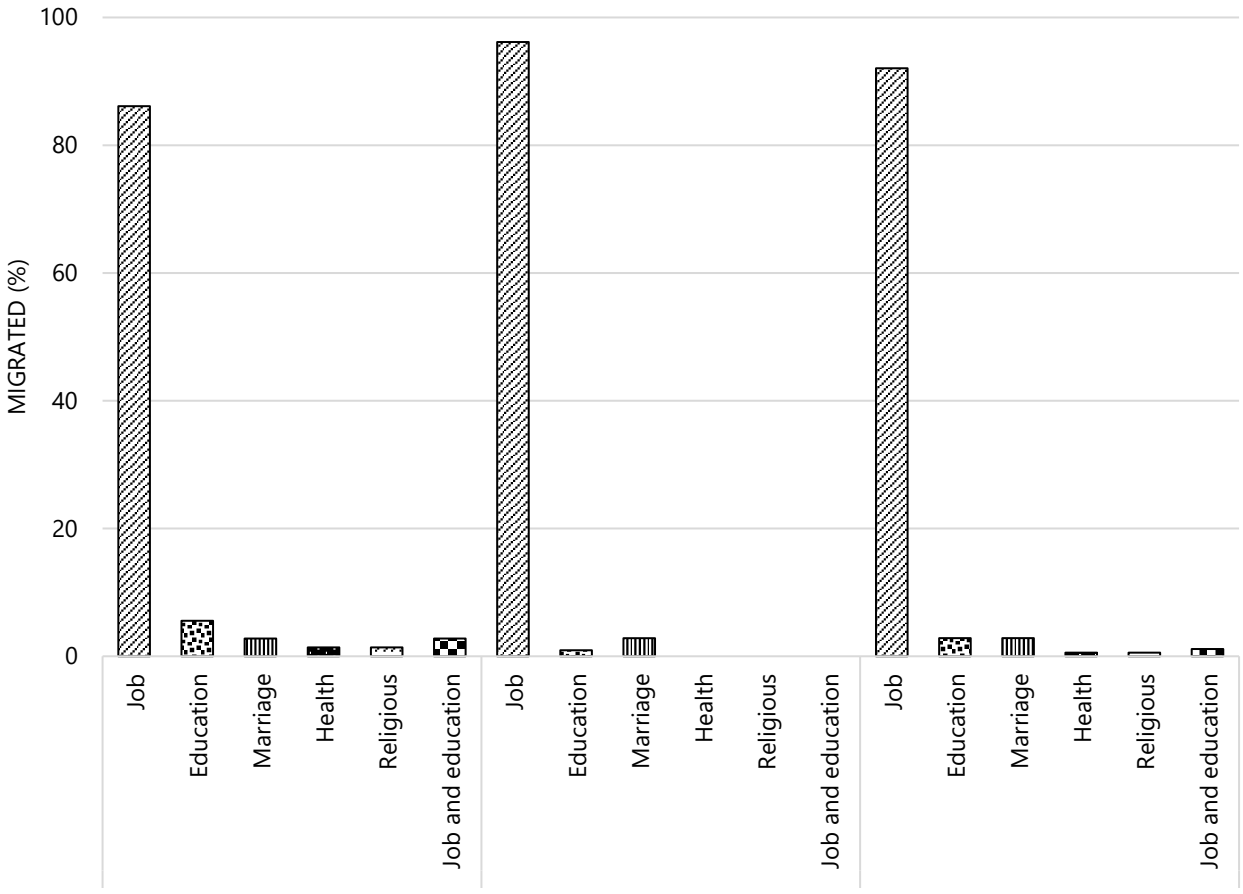

Figure 2: Main reason for migration

Landless households and labour—sectors, location and payment

This section focuses on information provided by landless households only, and focuses on labour as a key livelihood activity.

Employment sectors

Agriculture is the main employment sector for landless households in the survey, with at least one member in each household working in agriculture (see Table 12). Agriculture in this context refers to working as a day labourer on the farm of a landholding household. Other sectors include non-farm work (such as carpentry, wood chopping, brick making and small-scale trade) and fisheries (employed by large fishers as labour; see Table 12). Beyond agricultural activities, rural people also engage in non-farm activities such as construction, loading and unloading vehicles, tree cutting and domestic work in the off-farm season for supplementary household earnings (see also Rizzo 2011).

Difficulties accessing the main fishing areas during the survey period resulted in under-representation of the importance of fisheries for households in this area. We could therefore expect a higher percentage of households to engage in small-scale fishing and labouring work in fisheries in the southern Ayeyarwaddy Delta.

Table 12: Main sector of employment, landless households, by household members

Sector	Maubin		Pyapon		Kyaunggon		Pathein	
	No.	%	No.	%	No.	%	No.	%
Agriculture	92	67.2	106	71.6	91	85.8	60	65.93
Fishery	10	7.3	12	8.1	1	0.9	5	5.49
Non-farm	35	25.5	30	20.3	14	13.2	26	28.57
Total	137	100	148	100	106	100	91	100

Each sector has distinct patterns of employment and implications for landless labourers. Work in agriculture is predominantly within the home village (see Table 13). The location of employment in non-farm work is more varied, and determined by the type of work and availability. Work such as brick making, selling traditional snacks and basket weaving is usually within the village. Those working odd jobs and selling vegetables travel outside the village to access markets. Wood chopping and carpentry are both within and outside the village. Kyaunggon and Pathein have much lower percentages of household members travelling outside the village for non-farm work (see Table 13).

Table 13: Landless workers, main location of work, by sector

Main location	Household members working in sector (%)											
	Maubin			Pyapon			Kyaunggon			Pathein		
	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm
Village	93.5	20	37.1	99.1	50	19.4	94.5	0	70.6	86.7	0	50.0
Outside	0	70	45.7	0	50	61.3	0	100	23.5	5.0	0	23.1
Both	6.5	10	17.1	0.9	0	19.4	5.5	0	5.9	8.3	0	26.9
Total	100	100	100	100	100	100	100	100	100	100	0	100

Note: percentages are based on the number of landless workers, as per Table 12.

Seasonal employment

Table 14 shows the main seasons of work by sector and seasons. The majority of people engage in agricultural labour over more than one season, corresponding with peak agricultural activities such as preparing land or harvesting, though it may only be for a short period within each season. Those with agricultural work in only one season will have employment in other sectors during the other seasons.

In terms of non-farm work, Table 14 shows two main patterns: whole-year employment, which characterises as much as 57% of non-farm work in Pathein; and the summer season (pre-monsoon), which characterises as much as 46% of non-farm work in Pyapon. Summer is the low season for agricultural work, and labourers seek work in the non-farm sector.

Table 14: Landless households, main season(s) of work, by seasons

Seasons	Household members working in sector (%)											
	Maubin			Pyapon			Kyaunggon			Pathein		
	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm	Ag.	Fish.	Non-farm
Pre-monsoon	7.6	0	31.4	11.1	0	46.7	1.2	100	35.7	0	0	30.8
Monsoon	21.5	54.5	2.9	12.7	41.7	3.3	9.8	0	0	2.1	0	3.8
Post-monsoon	2.5	0		0	0	3.3	2.4	0	7.1	0	0	0
Whole year	22.8	18.2	54.3	6.3	41.7	30.0	67.1	0	35.7	34.0	0	57.7
Pre-monsoon and monsoon	36.7	9.1	2.9	68.3	0	13.3	12.2	0	0	31.9	0	0
Monsoon and post-monsoon	6.3	18.2	2.9	1.6	16.7	3.3	7.3	0	7.1	21.3	0	0
Pre-monsoon and post-monsoon	2.5	0	5.7	0	0		0	0	14.3	10.6	0	7.7
Total	100	100	100	100	100	100	100	100	100	100	0	100

Gender participation in different sectors

Figure 3 shows the breakdown of workers in the different sectors by gender. Of the people who worked as labourers in agriculture, women account for the lowest proportion in Pathein (33%) and the highest proportion in Kyaunggon (48.7%). Women are able to work in most agricultural tasks, though activities are traditionally carried out based on gender (e.g. women usually transplant rice seedlings and men usually prepare land and use machinery).

With the exception of Maubin, the proportion of women engaged in non-farm work is much lower than for men. Women generally engage in selling fruit and vegetables, while men engage in carpentry, construction and wood chopping. In Kyaunggon, women make up only 11.8% of the labour force in non-farm work, compared to 45.3% in Maubin.

Labour associated with fisheries is mainly performed by men (80%), though the small sample size limits the reliability of analysis relating to fisheries.

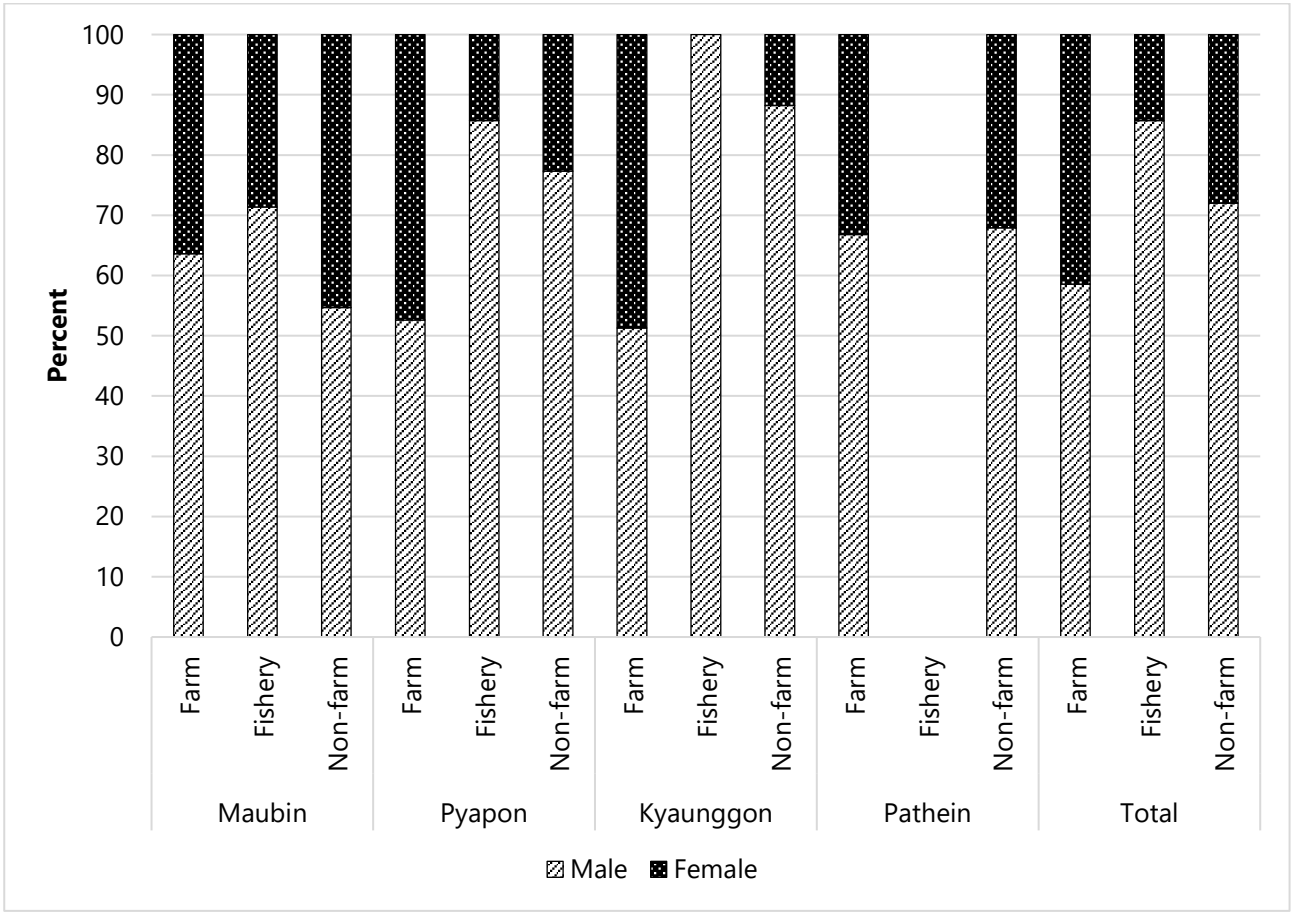

Figure 3: Gender participation in labour by sector, landless workers

Wages

Table 15 compares the average duration of work and wage rates by the type of payment agreement (advance, daily or monthly payment) across the main employment categories for landless households:

- *Advance payment* provides payment to labourers in the off season for work that will be undertaken in the peak labour periods.
- *Daily payment* is on a day-by-day basis, with wages varying depending on labour availability and whether or not meals are provided.
- *Monthly payment* is not common, and when used it is usually for managing all tasks throughout the year.

Average wage rates reflect kyat payments, and exclude provision of meals or payment in rice or other goods. In the past, payment was mostly in rice or peanuts; however, this is becoming rare and combined cash and in-kind payments are more common.

The average daily wage for fishing is lower than that in agriculture, though the average number of days worked is higher in fisheries.

The types of payment system highlight varying needs and conditions in the different sectors. Advance payment is a key strategy for both employers and labourers in agriculture, where labour demand needs to be predicted through the season. For landholding households, advance payment is one strategy to ensure labour in times of shortage. For labourers, it can address income shortages when agricultural work is scarce; however, the kyat rate is much lower for advance payments compared to a daily rate.

Agriculture has more days of work under the daily payment system, and a slightly higher daily rate, depending on the township (see Table 15). The average number of days under daily wage arrangements is highest in non-farm work.

Landless households in Maubin have almost double the number of days paid under advance payments compared to the other townships. In the focus group discussions in Maubin, landholding households considered labour scarcity a key constraint, triggered by labour migration to urban areas.[4]

[4] *Labour shortages and rising labour costs were mentioned during focus group discussions in each township; however, they were only listed as a key constraint in Maubin.*

Table 15: Average wages and duration of employment by sector and payment type, landless households

Sector	Type of wage	Average	Maubin	Pyapon	Kyaunggon	Pathein
Agriculture	Advance	Duration (days)	77	25	34	38
		Kyat/day	1,488	1,727	2,926	1,875
	Daily	Duration (days)	42	55	92	68
		Kyat/day	2,347	4,119	4,097	4,690
	Monthly	Duration (month)	9	6	6	12
		Kyat/month	53,333	79,755	53,970	30,000
Fishery	Advance	Duration (days)	–	–	–	–
		Kyat/day	–	–	–	–
	Daily	Duration (days)	101	125	20	–
		Kyat/day	2,620	1,825	2,500	–
	Monthly	Duration (month)	10	5	2	–
		Kyat/month	150,000	70,000	50,000	–
Non-farm	Advance	Duration (days)	21	23	10	–
		Kyat/day	2,000	1,818	2,000	–
	Daily	Duration (days)	139	132	40	99
		Kyat/day	4,183	5,702	2,121	2,577
	Monthly	Duration (month)	12	8	12	–
		Kyat/month	35,000	57,270	83,500	–

Note: excludes data relating to overseas labour migration.

Housing, assets and energy

This section presents results relating to household resources and assets, including housing materials, buildings, agricultural tools, vehicle ownership, and energy and water sources for both landholding and landless households. The results highlight that landholding households generally have access to higher-quality building materials for home construction, making them less vulnerable to storms than landless households. Landholding households also tend to have higher rates of ownership of other assets such as motorbikes and radios.

Housing

Residential area includes the area used for housing as well as sheds and household gardens. Table 16 compares the average residential area available to landholding and landless households across the townships. Landless households have less than half the residential area compared to landholding households. Landholding households in Pathein township have the largest average residential area, and almost double the average of households in Maubin. The size of a residential area can be a sign of wealth or a proxy indicator for building density. More importantly, the size of a residential area indicates whether the household has access to additional land in close vicinity to cultivate fruit, vegetables and essential household crops (e.g. betel) for subsistence.

Table 16: Average residential area per household (acres)

Type of household	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Landholding	0.39	0.45	0.53	0.66	0.51
Landless	0.10	0.12	0.26	0.25	0.18

Housing materials may indicate household wealth (ability to afford more expensive or more durable materials like cement) and locally available resources (LIFT 2012). Housing material also indicates vulnerability to storms and extreme weather events.

Table 17 shows the main material used for outer walls in residential homes. The majority of landholding households have houses made of timber (65.6%), which is more durable and expensive than bamboo (24.9%). In the sample of landless households, this was reversed, with 65.5% of households in bamboo-walled houses and 31.3% in timber. At the township level, Pathein provides a different case, with 52.6% of landless households in timber houses. This could be due to the proximity of villages to the provincial capital, but also because the average income of landless households in Pathein is higher than in the other townships due to fishing (see Table 28).

The most common roofing material for landholding households is corrugated iron (70.7%), while for landless households nipa (*Nypa fruticans spp.*) leaves are the most common material (64.2%, see Table 18). A higher percentage of both landless and landholding households in Pyapon and Pathein use nipa leaves for roofing (see Table 18).

Table 17: Main wall material, by township

Housing material	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Wood	69	72.6	46	59.0	64	68.8	58	60.4	237	65.5
Bamboo	16	16.8	21	26.9	21	22.6	32	33.3	90	24.9
Nipa leaves	0	0	5	6.4	0	0	0	0	5	1.4
Cement	10	10.6	6	7.7	8	8.6	6	6.2	30	8.3
Total	95	100	78	100	93	100	96	100	362	100
Landless households										
Wood	26	28.3	30	28.3	14	15.4	51	52.6	121	31.3
Bamboo	65	70.7	68	64.2	77	84.6	44	45.4	254	65.8
Nipa leaves	0	0	8	7.5	0	0	1	1.0	9	2.3
Cement	0	0	0	0	0	0	0	0	0	0
Other	1	1.1	0	0	0	0	1	1.0	2	0.5
Total	92	100	106	100	91	100	97	100	386	100

Table 18: Main roofing material, by township

	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Corrugated iron	83	87.4	44	56.4	85	91.4	44	45.8	256	70.7
Nipa leaves	12	12.6	34	43.6	8	8.6	52	54.1	106	29.3
Rice straw	0	0	0	0	0	0	0	0	0	0
Total	95	100	78	100	93	100	96	70	362	100
Landless households										
Corrugated iron	51	55.4	27	25.5	44	48.4	15	15.5	137	35.5
Nipa leaves	40	43.5	79	74.5	47	51.6	82	84.5	248	64.2
Rice straw	1	1.1	0	0	0	0	0	0	1	0.3
Total	92	100	106	100	91	100	97	100	386	100

Table 19 shows the additional structures owned by households that support activities such as cattle or poultry rearing. The most common structure owned by landless households is a pig shed, owned by one in four households, while cowsheds are owned by one in three landholding households. Pig rearing is a common activity for landless households (see Table 44).

Ownership of additional structures in the landholding sample is more diverse. Across all townships, 35.7% of landholding households own a cowshed, which is consistent with higher rates of cattle ownership in the landholding sample. Kyaunggon has the highest ownership of cowsheds, owned by 49.5% of households. Pig sheds are more common in Pyapon, owned by 42.3% of households.

Table 19: Ownership of additional structures and buildings

	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Cowshed	27	28.4	23	29.5	46	49.5	33	34.3	129	35.7
Pig shed	12	12.6	33	42.3	26	28.0	16	16.6	87	24.0
Henhouse	12	12.6	6	7.7	7	7.5	9	9.3	34	9.4
Crop storage	25	26.3	20	25.6	28	30.2	21	21.9	94	26.0
Fodder storage	4	4.2	0	0.0	9	9.7	11	11.5	24	6.7
Other	2	2.1	38	48.8	27	29.1	21	21.9	88	24.4
Landless households										
Cowshed	1	1.1	0	0.0	6	6.6	2	2.1	9	2.3
Pig shed	16	17.4	37	34.9	16	17.6	18	18.6	87	22.5
Henhouse	2	2.2	3	2.8	5	5.5	7	7.2	17	4.4
Crop storage	0	0.0	0	0.0	1	1.1	0	0.0	1	0.3
Fodder storage	0	0.0	0	0.0	0	0.0	1	1.0	1	0.3
Other	4	4.4	6	5.7	14	15.4	17	17.5	41	10.6

Tools, vehicles and other assets

Household ownership of agricultural tools indicates investment in agriculture, and the level of mechanisation and intensification. Ownership of agricultural tools for farming households is shown in Figure 4. Though landless households may invest in tools to support service provision and wage labour, these questions were not asked as part of the survey of landless households.

Focus group discussions indicated an increase in mechanisation in all townships over the past 10 years. This is supported by the survey data, with just over 30% of households in the landholding sample owning a hand tractor, and 19% owning a rice thresher.

Ownership of hand tractors and rice threshers is slightly lower in Kyaunggon and Pathein than in the other townships. In line with this data, ownership of a buffalo-driven plough and harrow is highest in these two townships (Kyaunggon: 59.1% and 63.4% respectively; and Pathein: 51% and 45.8%, respectively).

Hand tractor ownership is lowest in Pathein (9.4%). It is not clear why there is such a difference in ownership of hand tractors between Pathein and the other townships. This could be due to smaller average land sizes in Pathein, or it may be that hand tractor ownership is instead reflected in ownership of 'other' tools. A common implement is known as the one-wheel plough or *nwar pyan*. Ownership of 'other' tools is higher in Pathein than in other townships (53.1%).

Ownership of water pumps is lowest in Pyapon (42.3%) and highest in Kyaunggon (63.4%).

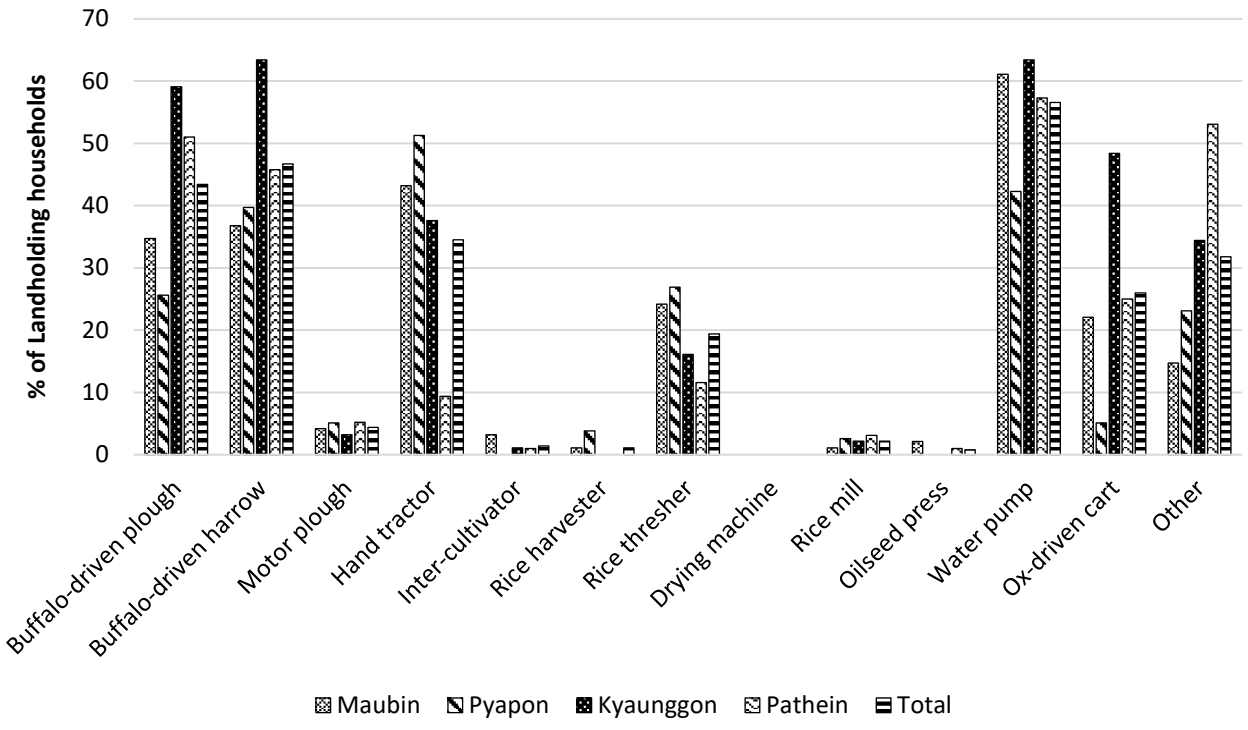

Figure 4: Ownership of agricultural equipment, landholding households

Table 20 shows vehicle ownership in the surveyed townships. Few households in either category own trucks or cars. Landholding households have much higher rates of motorcycle ownership, ranging from 35.9% of households in Pyapon to 48.4% in Kyaunggon.

For landless households, motorcycle ownership is highest in Pyapon (11.3%). Some landless households use the motorbike for work in transportation services. Ownership of bicycles, which are cheaper to run and maintain, is more common than motorbike ownership for households in the landless sample. However, bicycle ownership in the sample of landholding households is still almost double that of landless households (64.6% and 37.2%, respectively).

Boats are used for fishing and transportation in the study area. For landholding households, boats are mainly used for transportation, whereas landless households tend to use them more for fishing.

Htaw-Hla-Gyi is a vehicle that is mainly used for transportation, including carrying people and agricultural commodities in rural areas with insufficient road infrastructure.

Table 20: Vehicle ownership, by percentage of landless and landholding households

Type of vehicle	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Large truck	0	0	0	0	1.1	0	1	0	0.6	0
Small truck	0	0	1.3	0	0	0	0	0	0.3	0
Pick-up truck	0	0	1.3	0	1.1	0	0	0	0.6	0
Passenger truck	0	0	0	0	0	0	0	0	0	0
Tricycle	0	0	1.3	0	0	0	0	0	0.3	0
Motorcycle	43.2	5.4	35.9	11.3	48.4	6.6	37.5	9.2	41.4	8.3
Bicycle	66.3	36.9	42.3	28.3	74.2	45.1	71.9	40.2	64.6	37.2
Hand-driven cart	3.2	0	0	0	1.1	0	3.1	0	1.9	0
Boat	34.7	10.9	37.2	13.2	23.7	11	26	14.4	30.1	12.5
Boat Engine	4.2	1.1	14.1	5.7	2.2	1.1	1	10.3	5.0	4.7
HtawHlaGi	7.4	0	0	0	24.7	0	2.1	0	8.84	0

* LH = landholding households

† LL = landless households

Table 21 compares ownership of selected assets between landholding and landless households. Generally, landless households own significantly fewer assets. Almost 70% of landholding households own a radio, compared to 35.5% of landless households. Mobile phone ownership is also much lower in the landless sample, with 13.8% of landless households owning a mobile, compared to 50.8% of landholding households.

In terms of energy-producing assets, landholding households have higher rates of ownership of solar panels, batteries and generators than households in the landless sample.

Table 21: Ownership of selected assets, by percentage of landless and landholding households

Asset	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Firewood/charcoal stove	94.7	92.4	85.9	95.3	100	94.5	98.9	98	95.3	95.1
Gas stove	0	0	3.8	0.9	0	0	0	0	0.8	0.3
Radio	73.7	38.1	65.4	34.9	78.5	36.3	53.1	33	67.7	35.5
TV	68.4	32.6	55.1	22.6	77.4	28.6	66.7	39.2	67.4	30.6
Mobile phone	54.7	6.5	56.4	16.1	49.5	7.7	43.8	23.7	50.8	13.8
Battery	66.3	41.3	53.8	45.3	86	38.5	76	45.3	71.3	42.8
Solar panel	20	1.1	31.2	7.5	21.5	2.2	20.8	4.1	23	3.9
Inverter	33.7	4.3	26.9	1.9	51.6	8.8	17.7	3.1	32.6	4.4
Generator	26.3	1.1	29.5	3.8	23.7	1.1	9.4	2.1	21.8	2.1
Voltage regulator	9.5	4.3	12.8	2.8	12.9	0	3.1	0	9.4	1.8
Refrigerator	2.1	0	2.6	0	0	0	1	0	1.4	0
Computer	6.4	1.1	1.3	0	1.1	0	1	0	2.5	0.3
Other	12.6	10.9	37.2	8.4	29	17.6	34.4	27.8	27.9	16.1

* LH = landholding households

† LL = landless households

Energy sources

As many as 84% of rural households across Myanmar had no access to electricity in 2014 (World Bank 2015). In the Ayeyarwady Delta region in 2014, 3.6% of households used electricity as their main energy source for cooking, and 12% used electricity as their main energy source for lighting (Department of Population 2015b:3).

Table 23 show the main sources of energy for cooking and lighting in the surveyed townships. Energy sources used for cooking are similar between landholding and landless households. Wood is the main source of energy for cooking, used by 92.5% of landholders, and 87.1% of landless households. The main difference is in Pathein, where 18.6% of households in the landless sample use charcoal for cooking, which may be due to the isolated island location, resulting in limited firewood or plant residues in this township.

Table 22: Energy sources for cooking, by percentage of landless and landholding households

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Wood	98.9	96.8	74.4	75.4	95.7	98.9	97.9	79.4	92.5	87.1
Charcoal	0	0	2.6	0	2.2	0	2.1	18.6	1.7	4.7
Electricity	1.1	0	5.1	0	0	0	0	0	1.4	0
Rice bran	0	1.1	7.7	6.6	1.1	1.1	0	1	1.9	2.6
Saw dust	0	0	10.3	0	0	0	0	0	2.2	0
Two sources	0	2.2	0	17.9	1.1	0	0	1	0.3	5.7
Three sources	0	0	0	0	0	0	0	0	0	0

* LH = landholding households

† LL = landless households

Table 23: Energy sources for lighting, by percentage of landless and landholding households

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Battery	36.8	28.3	32.1	50	53.8	28.6	57.3	42.3	45.6	37.8
Electricity	37.9	48.9	30.8	25.4	22.6	48.4	17.7	20.6	27.1	35.3
Candle	5.3	20.7	3.8	11.3	1.1	16.5	13.5	25.8	6.1	18.4
Solar/LED light	14.7	0.0	21.8	4.7	18.3	2.2	3.1	3.1	14.1	2.6
Oil lamp	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	1.6
Other/more than one source	5.4	2.2	11.6	2.8	4.4	4.4	8.3	8.2	6.9	4.4

* LH = landholding households

† LL = landless households

The main source of energy for lighting is batteries, for both landholding and landless households (45.6% and 37.8%, respectively). Landless households are more reliant on candlelight than landholding households. The other main source is generators that run on diesel or petrol, which varies across townships and samples (see Table 23). Solar panels are small panels used to charge batteries. These are more common for landholding households (14.1%), compared to landless households (2.6%).

Water sources

Table 24 and Table 25 compare sources of water for drinking and other household uses. The main source of drinking water varies by township, reflecting locally available sources. Open wells or tube wells[5] are the only sources of drinking water for both household types in Kyaunggon, and for landless households in Pathein. Almost all (99%) of landholding households in Pathein use open wells as their source of drinking water. In Pyapon, the main sources are rainwater and ponds. Households in Maubin have more sources of drinking water, though the majority use water from streams or rivers (77% and 63%, respectively) or tube wells (14.7% and 29.3%, respectively; see Table 24).

Water sources for other household use is roughly the same (see Table 25). However, more households use water from streams or rivers (of all townships, 20% and 15%, respectively, for drinking water; and 31.5% and 30.5%, respectively, for other household use).

Table 24: Main source of drinking water, by percentage of landless and landholding households

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Open well	2.1	0	0.0	0	7.5	8.8	99.0	53.6	28.7	15.5
Tube well	14.7	29.3	0.0	0	92.5	91.2	0.0	46.4	27.6	40.2
Rainwater	1.1	0	17.9	11.3	0.0	0	0.0	0	4.1	3.1
Ponds	5.3	5.4	82.1	84.9	0.0	0	0.0	0	19.1	24.6
Stream/river	77.0	63	0.0	0	0.0	0	1.0	0	20.5	15.0
Multiple sources	0	2.2	0	3.8	0	0	0	0	0	1.5

* LH = landholding households

† LL = landless households

Table 25: Main source of water for other household use, by percentage of landless and landholding households

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	LH*	LL†	LH	LL	LH	LL	LH	LL	LH	LL
Open well	3.2	0	16.7	12.2	7.5	8.8	95.8	49.5	31.8	17.9
Tube well	34.7	39.1	0.0	0	91.4	84.6	0.0	45.4	32.6	40.7
Ponds	2.1	4.3	16.7	34	0.0	0	0.0	0	4.1	10.4
Stream/river	60.1	55.4	66.7	51.9	1.1	6.6	4.2	5.2	31.5	30.3
Multiple sources	0	1.1	0	1.9	0	0	0	0	0	0.8

* LH = landholding households

† LL = landless households

Household economics

This section presents basic information on household income and expenditure for different purposes. The data provided highlight the diverse activities landless households engage in to earn a livelihood, and significant differences in income.

[5] *Tube wells are usually dug with machinery and feature pump systems to draw water up through a metal tube. Open wells are often dug manually and are used to access shallow water resources.*

Income

Survey participants were asked to indicate the primary source of income for each family member. Table 26 presents results for landholding households and Table 27 shows results for landless households.

Almost all household heads in the landholding sample identified agriculture as their primary source of income. For other household members, agriculture as the primary source of income is lowest in Maubin (22.3%) and highest in Pathein (45.8%). Labour and services were the other main income sources. Maubin is the only township where household members identify remittances as their primary income source (see Table 26).

In the landless sample, results vary between townships. In Maubin and Kyaunggon, labour is the primary source of income. Income sources are more diverse in Pyapon and Pathein, spread across fisheries, labour, trade and services (see Table 27). Pathein is the only township where livestock was mentioned as the primary source of income for household members (18.6%).

Table 26: Primary income source by household member, landholding households

Primary income source	Maubin				Pyapon				Kyaunggon				Pathein			
	Household head		Other members		Household head		Other members		Household head		Other members		Household head		Other members	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture	94	98.9	79	22.3	70	89.7	79	23.8	88	94.6	119	35.0	94	97.9	157	45.8
Livestock	0	0.0	2	0.6	0	0.0	4	1.2	1	1.1	3	0.9	1	1.0	2	0.6
Fishery	1	1.1	4	1.1	0	0.0	2	0.6	1	1.1	4	1.2	0	0.0	0	0.0
Labour	0	0.0	10	2.8	1	1.3	18	5.4	0	0.0	12	3.5	0	0.0	31	9.0
Trade	0	0.0	14	3.9	0	0.0	19	5.7	0	0.0	5	1.5	0	0.0	11	3.2
Service	0	0.0	34	9.6	0	0.0	9	2.7	0	0.0	6	1.8	1	1.0	1	0.3
Remittance	0	0.0	26	7.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rent	0	0.0	1	0.3	1	1.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Handicraft	0	0.0	11	3.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3
Other	0	0.0	0	0.0	0	0.0	19	5.7	0	0.0	4	1.2	0	0.0	2	0.6
Dependent/no data	0	0.0	174	49.0	6	7.7	182	54.8	3	3.2	187	55.0	0	0.0	138	40.2
Total	95	100	355	100	78	100	332	100	93	100	340	100	96	100	343	100

Note: where multiple sources of income are listed for an individual, the first listed is counted as the main income source. Percentages are calculated separately for the household head and other household members.

Table 27: Income sources by household member, landless households

Primary income source	Maubin				Pyapon				Kyaunggon				Pathein			
	Household head		Other members		Household head		Other members		Household head		Other members		Household head		Other members	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Agriculture	0	0.0	0	0.0	2	1.9	6	1.6	3	3.3	1	0.4	16	16.5	10	2.9
Livestock	0	0.0	1	0.3	0	0.0	2	0.5	0	0.0	0	0.0	18	18.6	7	2.1
Fishery	4	4.3	2	0.6	21	19.8	11	3.0	3	3.3	0	0.0	26	26.8	12	3.5
Labour	69	75.0	125	38.9	8	7.5	33	8.9	63	69.2	106	37.6	30	30.9	73	21.4
Trade	3	3.3	12	3.7	9	8.5	38	10.2	6	6.6	10	3.5	1	1.0	15	4.4
Service	4	4.3	5	1.6	9	8.5	11	3.0	3	3.3	14	5.0	0	0.0	8	2.3
Remittance	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Handicraft	3	3.3	9	2.8	0	0.0	1	0.3	0	0.0	0	0.0	1	1.0	1	0.3
Other	8	8.7	79	24.6	45	42.5	45	12.1	13	14.3	88	31.2	3	3.1	66	19.4
Dependent/no data	1	1.1	88	27.4	12	11.3	224	60.4	0	0.0	63	22.3	2	2.1	149	43.7
Total	92	100	321	100	106	100	371	100	91	100	282	100	97	100	341	100

Note: where multiple sources of income are listed, the first listed is counted as the main income source. Percentages are calculated separately for the household head and other household members.

Table 28 shows an estimate of average annual income per household, broken down by source. It highlights additional supplementary sources of income that may not be reflected in Table 26 and Table 27, but remain important for the household. It includes cash income only and excludes the value of food produced for home consumption.

For landholding households, unsurprisingly, a significant proportion of income is from agriculture, supplemented to varying degrees by other sources.

Incomes in landless households are on average far lower than those for households with access to land. The main exception is in Pathein, where a significant proportion of income is derived from fisheries. In general, landless households need to diversify their sources of income. The total average income varies across the townships, with the option to engage in fisheries in Pathein enabling much higher incomes for landless households than in other townships. We would generally expect more households in the sample to have income from fishing and aquaculture activities.

Focus group discussions in each township described a need for landless households to seek out alternative sources of income amid falling demand for agricultural labour, while landholding households continue to focus mainly on agriculture. However, agronomic practices are changing, including increasing use of farm machines.

Table 28: Average annual income, by source

Income source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	%	Average income (kyat*)	%	Average income (kyat)	%	Average income (kyat)	%	Average income (kyat)	%	Average income (kyat)
Landholding households										
Agriculture	80.9	3,753,089	75.5	4,685,649	86.3	4,074,853	79.2	2,940,278	80.7	3,821,139
Livestock production	1.7	48,370	8.9	458,237	2.4	585,670	6.4	215,401	4.7	319,015
Fishery	2.9	1,524,264	0.5	78,846	0.8	40,262	0.4	7,938	1.2	429,452
Labour	1.8	33,895	2.7	66,795	4.7	84,777	4.1	120,990	3.3	77,153
Trade	2.7	68,105	3.7	220,513	0.5	16,129	4.4	117,188	2.8	100,608
Service	3.6	158,638	1.1	154,359	1.6	58,468	2.6	89,635	2.3	113,683
Remittances	5.3	173,684	6.0	338,308	3.4	87,806	2.7	87,604	4.3	164,265
Rent	0.5	12,126	0.0	0.0	0.2	16,086	0.1	2,083	0.2	7,867
Household business	0.6	14,211	1.5	119,872	0.1	4,882	0.2	13,323	0.6	34,345
Total	100	5,786,383	100	6,122,578	100	4,968,933	100	3,594,440	100	5,067,526
Landless households										
Agriculture (labour)	58.2	485,190	25.2	192,950	71.6	450,890	34.6	322,890	46.4	356,070
Livestock	3.9	44,285	7.8	82,659	2.9	35,109	6.5	136,560	5.4	75,849
Marine product marketing	0.5	5,435	0.5	7,293	0.0	0.0	0.8	6,546	0.5	4,943
Marketing	6.7	81,386	16.3	177,930	7.2	83,736	11.3	252,270	10.6	151,400
Fishing	7.2	53,826	17.5	201,390	3.4	20,544	30.3	2,645,300	14.9	737,730
Fish enterprise	0.1	1,011	0.0	0.0	1.0	42,341	0.1	124	0.3	10,254
Handicrafts	10.7	94,478	8.2	76,509	0.8	8,006	6.5	79,933	6.6	65,503
Service	5.1	68,808	12.9	159,420	7.7	78,989	5.6	56,531	8.0	93,005
Remittances	7.1	116,630	7.3	146,680	4.2	76,703	3.8	74,948	5.6	105,000
Rent	0.0	0.0	2.3	35,906	0.0	0.0	0.0	0.0	0.6	9,860
Home business	0.3	2,609	1.83	15,024	1.0	22,664	0.5	11,825	0.9	13,062
Total	100	923,440	100	1,095,800	100	818,980	100	3,586,900	100	1,622,700

* US$1 is equivalent to approximately 1,100 kyat.

The relationship between area of land owned/used and annual income is explored in Table 29. On average, landless households in all townships except Pathein had an annual income of 1 million kyat (US$750) or less. In Pathein, the average income was significantly higher at 3,586,900 kyat, which is related to the income-earning opportunities from fisheries.

For landholding households with less than 10 acres (4.04 hectares), incomes were usually less than 4 million kyat. As land size increases, so does income. Of the households that own/hold more than 20 acres (8.1 hectares), most had an income of more than 6 million kyat per year.

Table 29: Average income, by landholding size (acres)

Land size (acres)	Annual income (kyat) 52,500–2,000,000		2,000,001–4,000,000		4,000,001–6,000,000		6,000,001–8,000,000		8,000,001–112,610,000		112,610,001–168,000,000		Total	
	HH*	%	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
Maubin														
Landless	88	95.6	4	4.3	0	0	0	0	0	0	0	0	92	100
<10	26	44.1	22	37.3	9	15.3	2	3.4	0	0	0	0	59	100
10.01–20	3	11.5	8	30.8	10	38.5	1	3.8	4	15.4	0	0	26	100
20.01–180	0	0	1	10	0	0	2	20	7	70	0	0	10	100
Pyapon														
Landless	90	84.9	14	13.2	2	1.9	0	0	0	0	0	0	106	100
<10	5	12.5	20	50	9	22.5	4	10	2	5	0	0	40	100
10.01–20	2	8.3	5	20.8	9	37.5	3	12.5	5	20.8	0	0	24	100
20.01–180	0	0	0	0	2	14.3	3	21.4	9	64.3	0	0	14	100
Kyaunggon														
Landless	87	95.6	4	4.4	0	0	0	0	0	0	0	0	91	100
<10	25	54.3	17	37	2	4.3	1	2.2	1	2.2	0	0	46	100
10.01–20	1	2.9	9	26.5	9	26.5	10	29.4	5	14.7	0	0	34	100
20.01–180	2	15.4	1	7.7	0	0	1	7.7	9	69.2	0	0	13	100
Pathein														
Landless	68	70.1	23	23.7	0	0.0	2	2.1	3	3.1	1	1	97	100
<10	39	57.4	20	29.4	7	10.3	1	1.5	1	1.5	0	0	68	100
10.01–20	1	4.3	9	39.1	9	39.1	3	13	1	4.3	0	0	23	100
20.01–180	0	0	0	0	2	40	2	40	1	20	0	0	5	100
All townships														
Landless	333	86.3	45	11.7	2	0.5	4	1	6	1.6	1	0.3	386	100
<10	95	44.6	79	37.1	27	12.7	8	3.8	4	1.9	0	0	213	100
10.01–20	7	6.5	31	29	37	34.6	17	15.9	15	14	0	0	107	100
20.01–180	2	4.8	2	4.8	4	9.5	8	19	26	61.9	0	0	42	100

* HH = household

Expenditure

Average annual expenditure by cost type is compared for landholding households (see Table 30) and landless households (see Table 31).

The proportion of expenditure is similar between landless and landholding households; however, the average expenditure is lower for landless households due to lower overall incomes. The main expenditure is for food, education and healthcare. Expenditure for social affairs makes up between 5% for landless and 10% for landholding households. This is a seasonal cost and tied to religious obligations and social cohesion in the community.

Rice and other food account for around 50–60% of household expenses. Without land to grow their own rice, almost 100% of landless households must buy rice, compared to 40% of landholding households (data not shown). Households that grow rice may grow specific varieties that are high yielding for commercial purposes, but purchase other varieties for their own consumption. Alternatively, crops may be sold to cover input costs or when prices are high (and food rice purchased when prices are lower). Many farmers, however, cannot wait for favourable market prices and sell directly after harvest to cover debt repayments.

Table 30: Average annual expenditure, by expense type, landholding households

Expense		Maubin	Pyapon	Kyaunggon	Pathein	All townships
Rice	Kyat	172,000	160,000	135,000	107,000	143,000
	%	8.21	7.13	8.85	7.59	7.98
Other food	Kyat	779,000	1,060,000	813,000	702,000	827,000
	%	42.57	45.2	35.75	46.1	42.34
Healthcare	Kyat	229,000	186,000	339,000	157,000	229,000
	%	10.01	7.78	9.75	8.77	9.14
House maintenance	Kyat	118,000	367,000	72,800	148,000	168,000
	%	4.19	8.00	3.45	6.99	5.56
Vehicle/machinery purchase and repair	Kyat	43,600	38,700	1,935	16,100	24,500
	%	1.54	1.57	0.04	0.85	0.98
Fuel for machinery	Kyat	158,000	70,100	196,000	68,800	125,000
	%	5.6	2.57	8.37	3.85	5.19
Fuel for cooking	Kyat	43,000	27,200	50,600	18,800	35,100
	%	2.13	1.29	2.58	1.46	1.89
Fuel for lighting	Kyat	44,100	30,800	68,900	40,900	46,800
	%	2.64	1.6	3.71	3.00	2.79
Electricity	Kyat	4,290	9,769	1,161	250	3,595
	%	0.23	0.40	0.05	0.01	0.16
Water for household use	Kyat	6,167	11,000	5,974	4,066	6,595
	%	0.23	0.30	0.17	0.27	0.24
Education	Kyat	344,000	334,000	300,000	175,000	286,000
	%	10.96	11.73	10.9	6.98	10.06
Recreation	Kyat	42,700	14,600	69,500	41,800	43,300
	%	1.88	0.62	2.51	1.66	1.71
Social affairs	Kyat	162,000	165,000	482,000	168,000	247,000
	%	8.07	8.21	12.98	11.21	10.19
Other	Kyat	62,600	102,000	18,300	32,300	51,600
	%	1.74	3.54	0.89	1.22	1.77
Total	Kyat	2,210,000	2,570,000	2,550,000	1,680,000	2,240,000
	%	100	100	100	100	100

Table 31: Average annual expenditure, by expense type, landless households

Expense		Maubin	Pyapon	Kyaunggon	Pathein	All townships
Rice	Kyat	333,640	325,640	306,800	318,070	321,210
	%	26.66	22.50	(27.33	21.36	24.07
Other food	Kyat	552,820	558,510	423,880	576,140	529,850
	%	44.19	38.60	37.5	38.70	39.70
Healthcare	Kyat	52,326	90,330	86,888	89,557	80,266
	%	4.18	6.24	7.73	6.01	6.01
House maintenance	Kyat	86,916	70,392	75,374	82,235	78,481
	%	6.94	4.87	6.71	5.52	5.88
Vehicle/machinery purchase and repair	Kyat	2,445	11,211	6,099	21,154	10,402
	%	0.18	0.77	0.54	1.40	0.78
Fuel for machinery	Kyat	27,582	38,611	10,59	20,722	24,799
	%	2.20	2.67	0.94	1.39	1.85
Fuel for cooking	Kyat	41,394	92,709	40,325	46,890	56,615
	%	3.30	6.40	3.60	3.14	4.24
Fuel for lighting	Kyat	30,527	42,160	34,976	43,238	37,965
	%	2.44	2.91	3.11	2.90	2.85
Electricity	Kyat	3,679	4,414	0.00	3,597	2,990
	%	0.29	0.31	0.00	0.24	0.22
Water for household use	Kyat	1,978	16,716	2,197	4,938	6,795
	%	0.16	1.56	0.19	0.33	0.51
Education	Kyat	50,842	110,510	38,225	156,890	90,801
	%	4.06	7.63	3.41	10.53	6.81
Recreation	Kyat	1,847	3,619	7,362	23,643	9,126
	%	0.14	0.25	0.66	1.58	0.68
Social affairs	Kyat	59,152	69,858	65,846	85,773	70,360
	%	4.72	4.82	5.86	5.77	5.27
Other	Kyat	5,815	15,635	24,109	16,188	15,430
	%	0.46	1.08	2.14	1.08	1.15
Total	Kyat	1,251,000	1,446,800	1,122,600	1,489,000	1,334,300
	%	100	100	100	100	100

Production

This section provides data on key farming activities and farm-based livelihood activities. It focuses mainly on landholding households, but landholders and landless households have significant connections in terms of labour. It covers all agricultural activities found in the study area, providing data for cultivated area, land use, land ownership, irrigation, crops and cropping intensity, agricultural inputs, livestock and fisheries.

Land ownership and access

All land in Myanmar, including agricultural land, is owned by the state. Selling, transferring and mortgaging agricultural land is restricted, and as such farmers operate as tenants. Under Myanmar Government policy, residents are only entitled to agricultural land if they are willing to cultivate it. This has been the government's response to rising absentee land ownership since the 1990s (Dora 2016). A land registration process has been ongoing since the introduction of the Farmland Law in 2012. The survey did not explicitly ask for respondent's land title status. Instead, we assume that landholders are entitled to the land they cultivate, whether through an official land title or by traditional ownership.

Under the Farmland Law (2012), low land (paddy land), upland (*Ya*), silty land (*Kaing Kyun*), hillside cultivation land (*Taungyar*), perennial crops land, nipa palm land (*Dhani*), garden or horticultural land, and alluvial land are classified as farmland.

About 95% of the total cultivated area in the Ayeyarwaddy Delta region is paddy land (Win 2013a). This is consistent with data from the survey (see Table 32). Combined, rainfed and irrigated areas cover 83–95% of cultivated land in the four townships. Kyaunggon has the lowest percentage of area under paddy land, while Pyapon has the largest percentage. Pyapon has the largest proportion of area under irrigation.

Table 32: Land type as a percentage of total cultivated area, townships survey

Land type	Total cultivated area (%)				
	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Low land (paddy land) rainfed area	59.38	19.40	51.91	40.39	42.77
Low land (paddy land) irrigated area	33.11	75.70	30.83	48.92	47.14
Upland (Ya) rainfed area	0.27	0.00	0.05	0.00	0.08
Upland (Ya) irrigated area	1.00	0.00	0.00	0.00	0.25
Silty land (Kaing Kyun) rainfed area	1.37	0.00	0.00	0.00	0.34
Silty land (Kaing Kyun) irrigated area	6.20	0.00	0.00	0.07	1.57
Garden—rainfed area	1.34	0.00	1.04	3.69	1.52
Garden—irrigated area	3.59	2.00	1.27	7.03	3.47
Forest area	0.00	0.00	0.00	0.00	0.00
Pasture area	0.00	0.00	1.27	0.24	0.38
Other	0.10	0.00	12.50	0.00	3.15
Total	100	100	100	100	100

Table 33: Average land ownership per landholding household, by land type (acres)

Type of land	Maubin	Pyapon	Kyaunggon	Pathein	Total
Total low land (paddy land) rainfed area	6.86	2.66	7.46	3.23	5.14
Own low land (paddy land) rainfed area	6.65	2.45	7.51	3.16	5.04
Rent-in low land—rainfed area	0.16	0.21	0.00	0.06	0.10
Rent-out low land—rainfed area	0.32	0.08	0.00	0.00	0.10
Total low land (paddy land) irrigated area	3.82	10.38	4.43	3.91	5.41
Own low land (paddy land) irrigated area	3.38	10.05	4.53	3.91	5.25
Rent-in low land—irrigated area	0.38	0.85	0.26	0.00	0.35
Rent-out low land—irrigated area	0.17	0.73	0.35	0.05	0.31
Upland (Ya) rainfed area	0.03	0	0.01	0	0.01
Upland (Ya) irrigated area	0.11	0	0	0	0.03
Silty land (Kaing Kyun) rainfed area	0.16	0	0	0	0.04
Silty land (Kaing Kyun) irrigated area	0.71	0	0	0.01	0.19
Total garden—rainfed area	0.15	0	0.15	0.29	0.16
Own garden—rainfed area	0.15	0.42	0.15	0.29	0.25
Rent-in garden—rainfed area	0.02	0.00	0.00	0.00	0.01
Rent-out garden—rainfed area	0	0	0	0	0
Total garden—irrigated area	0.41	0.27	0.18	0.56	0.36
Own garden—irrigated area	0.37	0.30	0.18	0.53	0.35
Rent-in garden—irrigated area	0.05	0.03	0.00	0.08	0.04
Rent-out garden—irrigated area	0	0	0	0	0
Pasture area	0	0	0.03	0.02	0.01
Other land area	0.01	0	1.97	0	0.51
Total	12.26	13.31	14.23	8.02	11.86

The main type of land cultivated by households is paddy land. Other land types are relatively small in our sample. Most likely, this reflects (a) the emphasis on rice cultivation in the Ayeyarwaddy Delta; (b) lack of formal land tenure for other types of land use; and (c) the disregard for communal and public land that is used for agricultural purposes but is not reflected in formal land ownership. The land registration process has been ongoing since the introduction of the Farmland Law.

The category of 'other land area' in Kyaunggon (average 1.97 acres or 0.8 hectares per household) signifies areas of ponds and reservoirs, which are used for irrigation and aquaculture.

Pathein has the smallest average land ownership per household, while Kyaunggon shows the largest average area of land ownership. The smaller land parcels in Pathein may be partly due to the presence of the large town of Pathein.

Across the survey sample, households have roughly equal areas of irrigated and rainfed land (see Table 33 and Figure 5). Comparing townships, however, Pyapon seems to possess an unusual amount of irrigated paddy. While Kyaunggon shows a high amount of rainfed land per household. Without these outliers, average acreage per household would be 1 acre (0.4 hectares) less for rainfed and irrigated paddy. Higher acreages may hinge on historical events, geomorphology and land administration.

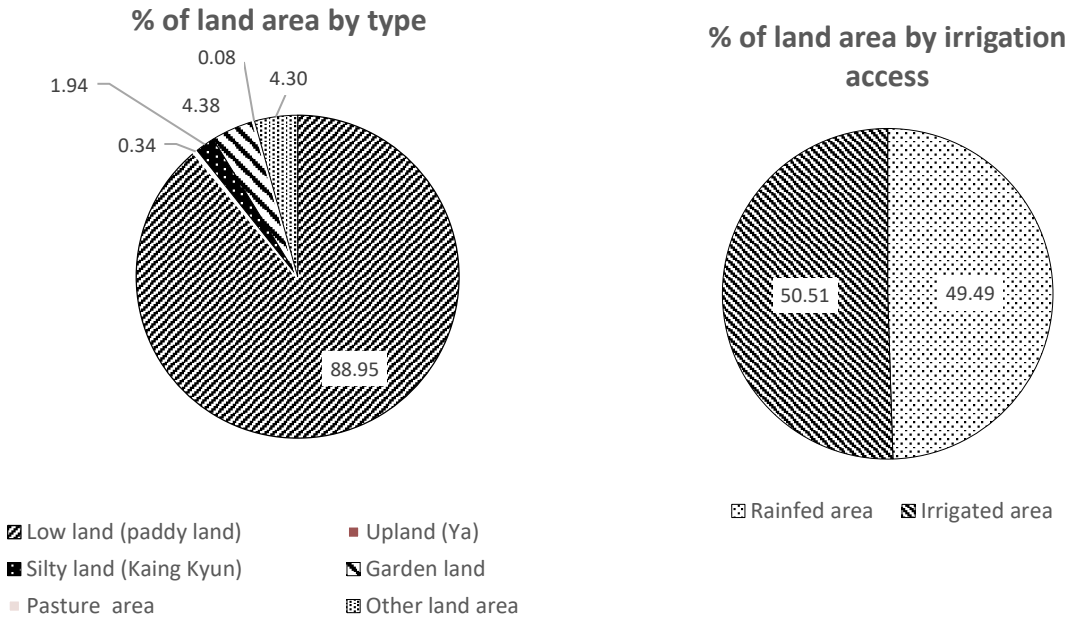

Figure 5: Proportion of land by type and irrigation

Table 34: Summer rice area sown by irrigation systems (acres)

Township	Reservoir	Tube well	River well	Water pump	Stream/river	Total
Ayeyarwaddy region	15,757.1	753.1	536.0	929,600.1	3,472.1	950,118.1
Pathein	0.0	0.0	0.0	35,467.0	0.0	35,467.0
Kyaunggon	0.0	570.1	0.0	0.0	0.0	570.1
Maubin	0.0	0.0	0.0	44,222.9	0.0	44,222.9
Pyapon	0.0	0.0	0.0	69,246.9	0.0	69,246.9

Source: Department of Irrigation (supplied on request)

Data in Table 34 were supplied to the research team as part of a key informant interview. Discrepancies with survey data are due to different data collection methods. Households interviewed responded by stating irrigation sources they personally controlled, rather than referring to large-scale government irrigation projects.

Table 35 classifies the sample population by land area owned/cultivated and confirms that the study area predominantly consists of smallholders. According to Myanmar Census of Agriculture 2010, any farm under 50 acres (20 hectares) is considered a small agricultural holding (Settlement and Land Record Department 2013:6). In the four surveyed townships, however, two-thirds of households cultivate land smaller than 10 acres (4 hectares) and only approximately 10% of households are able to cultivate more than 20 acres (8 hectares). Almost all households are within the official definition of small agricultural holding, as defined by World Bank and Myanmar Development Research (2013:5).

Pathein shows the highest concentration of households with small land ownership (70%), consistent with the overall smaller land size in this township (see Table 32). Small farmers in Table 35 are able to provide for household food needs from the farm but are likely to engage in additional livelihood activities (e.g. fishing and paid labour) to make ends meet. Households with medium and large land size (above 10 acres or 4 hectares) can be considered more likely to have agriculture as their main source of income. Large farm households are likely to be employers of paid labour within the community.

Kyaunggon includes a single very large farm in the sample (177 acres or 70 acres), which is contrary to the pattern otherwise observed in the area. Across the entire sample, only nine households possess more than 50 acres (20 hectares) of land.

Landless households are likely to work for other land-owning households, rent land from other farms in the community, or cultivate public or unregistered land.

Table 35: Land area owned/cultivated by area (acres), landholding households

Land class		Maubin		Pyapon		Kyaunggon		Pathein		All townships	
		Owned	Cultivated	Owned	Cultivated	Owned	Cultivated	Owned	Cultivated	Owned	Cultivated
Small (≤10 ac)	No.	59	57	40	39	46	46	68	68	213	210
	%	62.11	60	51.28	50	49.46	49.46	70.83	70.83	58.84	58.01
Medium (10.1–20 ac)	No.	26	27	24	26	34	33	23	23	107	109
	%	27.37	28.42	30.77	33.33	36.56	35.48	23.96	23.96	29.56	30.11
Large (>20 ac)	No.	10	11	14	13	13	14	5	5	42	43
	%	10.53	11.58	17.95	16.67	13.98	15.05	5.21	5.21	11.60	11.88
Total	No.	95	95	78	78	93	93	96	96	362	362
	%	100	100	100	100	100	100	100	100	100	100
Minimum	Ac	1	1	0⁺	0⁺	0.3	0⁺	0⁺	0.06	0⁺	0⁺
Maximum	Ac	56	50	60	60	177	177	57	57	177	177
Average	Ac	11.17	11.55	13.19	13.71	14.46	14.37	7.95	7.99	11.60	11.80

Note: of the households in the 'large' category, nine have more than 50 acres (20 hectares) of land. Households in the 'small' class include six households that do not possess land. They are included as landholding households as they jointly cultivate land with other households; for example, a young couple that continues to cultivate the land jointly with their parents although formal title has not been extended to them. Usually, jointly cultivating households would proportionately share the harvested crop.

Irrigation

This section considers access to irrigation for landholding households. Irrigation reduces the risk of crop loss, and can enable double cropping or production of alternative crops.

A majority of households surveyed have access to irrigation, at least for some of their land (Table 36). Kyaunggon has the highest proportion of surveyed households without irrigation. Households in Pathein have the highest access to irrigation, with 95% of households having access to some type of irrigation.

Table 36: Access to irrigation, landholding households

	Maubin		Pyapon		Kyaunggon		Pathein		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Irrigation	73	76.8	68	87.2	64	68.8	91	94.8	296	81.8
No irrigation	22	23.2	10	12.8	29	31.2	5	5.2	66	18.2
Total	95	100	78	100	95	100	96	100	362	100

Households may have access to various types of irrigation, depending on the crops cultivated. Table 37 shows access to the different types of irrigation: flood irrigation is used for rice paddies; furrow irrigation is applied to dryland crops (such as pulses and oilseed); and sprinklers are used for vegetable crops. Accordingly, most irrigation systems refer to paddy cultivation, although around half of the rice land remains entirely rainfed (see Table 33). Pyapon has almost 90% of households with flood irrigation for paddy land. Major investments appear to have been made in irrigation infrastructure in this township.

Table 37: Type of irrigation, by system, landholding households

Irrigation system	Maubin (n = 95)		Pyapon (n = 78)		Kyaunggon (n = 93)		Pathein (n = 96)		Total (n = 362)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Flood	67	70.5	68	87.2	51	54.8	58	60.4	244	67.4
Furrow	20	21.1	11	14.1	4	4.3	5	5.2	40	11
Sprinkler	6	6.3	0	0	16	17.2	55	57.3	77	21.3

Note: percentages are based on all households; households may have access to more than one type of irrigation system.

Minimum and maximum areas irrigated, as well as average areas irrigated per household, are shown in Table 38. It reaffirms that Pyapon has a higher than average per-household area of irrigated paddy land. The maximum area of irrigated land for one household in Pathein is almost double that of all other townships (60 acres, compared to 30–35 acres).

Most irrigation is used to cultivate paddy land. The main irrigation methods are diesel pumps and gravity flow irrigation. Dry season irrigation (furrow) is minimal as is sprinkler irrigation, except in townships with a degree of specialisation of commercial crops other than rice, such as Pathein.

Table 38: Household area irrigated, by method (acres)

	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Flood-irrigated area (acres)					
Minimum	1	1	1	1	1
Maximum	35	60	30	35	60
Average	6.54	11.64	8.28	7.04	8.44
Furrow-irrigated area (acres)					
Minimum	0.08	1	0.5	0.1	0.08
Maximum	10	5	1	3	10
Average	2.47	1.82	0.75	1	1.93
Sprinkler-irrigated area (acres)					
Minimum	0.03	0	0.1	0.06	0.03
Maximum	2	0	3	3	3
Average	0.72	0	0.86	1.05	0.99

Table 39: Household water sources for agricultural production

Water source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Nil	0	0	2	2.6	0	0.0	0	0.0	2	0.5
Open well	1	1.1	0	0.0	1	1.1	22	22.9	24	6.6
Tube well	1	1.1	0	0.0	33	35.5	1	1.0	35	9.7
Rainfed	23	24.2	7	9.0	31	33.3	9	9.4	70	19.3
Stream/river	25	26.3	69	88.5	18	19.4	35	36.5	147	40.6
Canal	42	44.2	0	0.0	1	1.1	6	6.3	49	13.5
> Two water sources	3	3.2	0	0.0	9	9.8	23	23.9	35	9.8
Total	95	100	78	100	93	100	96	100	362	100

National data shows 44% of land is irrigated with gravity systems fed from dams, tanks and river diversion; 38% by river pumps; 6% by groundwater pumps; and 12% by water harvesting and other methods (National Action Plan for Agriculture 2016). Table 39 shows a predominance of stream/river irrigation in surveyed townships, although canal irrigation is used in Maubin, which can be explained by the location and accessibility of the water source. Comparison with national data is difficult as it does not show the water source when pumps are used. We can assume, however, that most stream or river water and rainwater is pumped from this source to the fields using small diesel pumps. Broadly speaking, we suggest that national data and field data are consistent in terms of predominance of water sources: pumped stream or river water and rainwater being the most frequent, followed by canal irrigation.

Irrigation is predominantly a private initiative, such as the use of small privately owned diesel pumps and sprinklers. In some cases, households may share tube wells, but it is more common for a single household to be a private operator.

Canal irrigation is the key exception, as it falls under the government's irrigation infrastructure investments. The area irrigated by government projects has increased fourfold since independence (MOAI 2013).

Table 40 shows different types of access to irrigation based on land size. Differences are most pronounced in Pathein, where 51.5% of small households can access flood irrigation, compared to 100% of larger landholders. In contrast, 63% of small landholders in Pathein grow vegetable crops on orchard land, using sprinkler irrigation, while none of the large landholders do this.

Table 40: Households' irrigation access, by land size and type of irrigation

Land size (acres)	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Flood-irrigated land										
<10	41	69.5	34	85.0	19	41.3	35	51.5	129	60.6
10–20	20	76.9	21	87.5	23	67.6	18	78.3	82	76.6
>20	6	60.0	13	92.9	9	69.2	5	100	33	78.6
Total	67	70.5	68	87.2	51	54.8	58	60.4	244	67.4
Furrow-irrigated land										
<10	10	16.9	6	15.0	2	4.3	4	5.9	22	11.2
10–20	7	26.9	5	20.8	2	5.9	0	0	14	11.4
>20	3	30.0	0	0	0	0	1	20.0	4	9.5
Total	20	21.1	11	14.1	4	4.3	5	5.2	40	11.0
Sprinkler-irrigated land										
<10	5	8.5	0	0	9	19.6	43	63.2	57	26.8
10–20	0	0	0	0	7	20.6	12	52.2	19	17.8
>20	1	10.0	0	0	0	0	0	0	1	2.4
Total	6	6.3	0	0	16	17.2	55	57.3	77	21.3

Crop production

This section presents data on crop production for landholding households. It includes cropping intensity, average yields and input costs.

Crops grown

Table 41 shows average yield per crop type for each township and compares the sample average with national averages reported by the MOAI (2013). It is noteworthy that farmers in the survey reported yields that are consistently lower than the national averages. This could be due to different data collection methods, under-reporting by farmers or overestimates by Ministry officials.

Table 41: Average yield, by crop type

Crops	Average yield (tonnes/acres)					
	Maubin	Pyapon	Kyaunggon	Pathein	All townships	National average*
Rice	1.1	1.1	1.5	1.2	1.3	1.6
Sesame	0.1	0	0	0	0.1	0.2
Peanuts	0.2	0	0	0	0.2	0.6
Green gram	0.1	0	0.3	0	0.3	0.5
Black gram	0.3	0	0.3	0.6	0.3	0.6

* National average according to MOAI (2013); townships based on survey data.

Rice and peanut crops are grown twice a year, and the yields shown are an average of both crops, as well as irrigated and non-irrigated production. Rice yields are almost consistent with official national averages (MOAI 2013). However, yields of other crops are comparatively low, emphasising rice as the main crop (see Table 42).

Table 42: Cropping pattern and intensity

Township	Average area (acres)				Cropping intensity
	Pre-monsoon	Monsoon	Post-monsoon (winter/summer)	Perennials	
Maubin	0.3	1.3	1.4	0.3	55.1
Pyapon	0.0	2.2	1.5	0.3	62.1
Kyaunggon	0.1	1.7	2.0	0	59.8
Pathein	0.1	1.1	0.9	0.2	48.3
Total	0.1	1.6	1.5	0.2	56.0

Around 40% of land is used for more than one harvest per year across the townships. While the monsoon crop is usually rice, post-monsoon crops are either rice or pulses. Perennial crops include fruit trees and betel nut.

The highest cropping intensity is found in Pyapon (see Table 42), which is consistent with its greater access to irrigation (see previous section). The lowest cropping intensity is in Pathein, which may be due to lower utilisation of land, particularly for perennials.

Expenditure on cropping

The household survey asked landholding households for information on expenses relating to crop production in the previous 12 months. This survey does not cover the amount spent on human labour in agricultural production, but future studies will focus specifically on labour.

Table 43 and Figure 6 show that around half of agricultural input costs are spent on fertiliser, while about one-third of costs are associated with agricultural machinery. Only around 10% is spent on seed.

Table 43: Agricultural input costs (average kyat, and percentage of total expenditure)

Expense		Maubin	Pyapon	Kyaunggon	Pathein	All townships
Seed	Kyat	67,600	41,000	65,000	50,200	56,600
	%	7.5	2.7	6.9	7.2	5.7
Fertiliser	Kyat	393,000	825,000	380,000	372,000	477,000
	%	43.9	54.6	40.3	53.6	48.3
Pesticide	Kyat	39,400	105,000	80,200	32,600	62,200
	%	4.4	7.0	8.5	4.7	6.3
Weedicide	Kyat	9,920	17,700	18,000	1,693	11,500
	%	1.1	1.2	1.9	0.2	1.2
Manure	Kyat	1,747	2,273	1,528	18,000	6,109
	%	0.2	0.2	0.2	2.6	0.6
Buy machines	Kyat	132,000	290,000	94,600	36,700	131,000
	%	14.7	19.2	10.0	5.3	13.3
Repair machines	Kyat	87,000	39,400	53,700	30,900	53,300
	%	9.7	2.6	5.7	4.5	5.4
Fuel	Kyat	164,000	194,000	204,000	151,000	177,000
	%	18.3	12.8	21.6	21.8	17.9
Other	Kyat	189	0	47,200	880	12,400
	%	0	0	5.0	0.1	1.3
Total	Kyat	896,000	1,510,000	944,000	694,000	988,000
	%	100	100	100	100	100

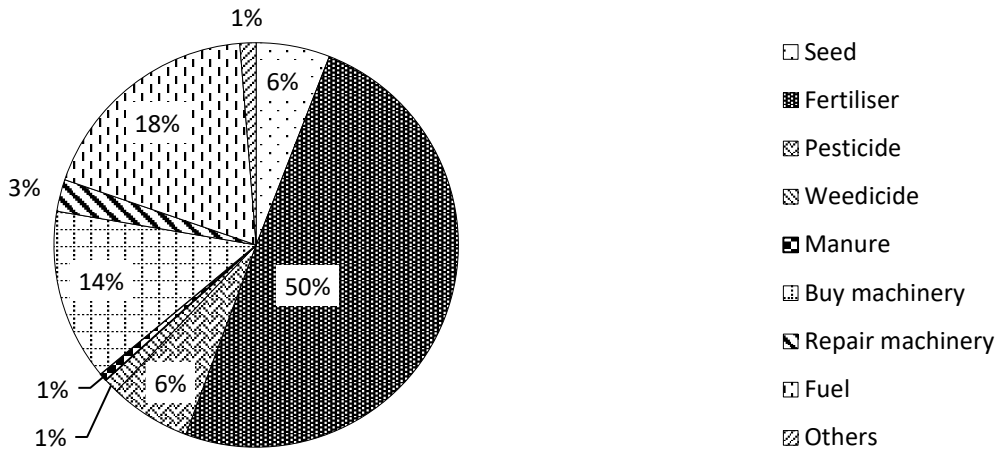

Figure 6: Expenditure on agricultural inputs (percentage of total spending)

Livestock

This section indicates rates of ownership and use of livestock and fisheries. Large livestock in the Ayeyarwady Delta are primarily draught animals. Smaller animals, such as pigs, are raised for commercial purposes, while chickens are primarily for home consumption.

Animal ownership is presented in Table 44. The percentage of households that own buffalo is lower than expected. The reason may be that cattle have replaced buffalo as the main draught animal. The single exception is Pyapon, where buffalo are still prevalent. We can assume, however, that ownership of buffalo is more frequent in the southern Ayeyarwady Delta due to environmental conditions and the suitability of buffalo to wetter climates.

Increasingly, hand tractors are replacing draught animals. While mechanisation is not yet ubiquitous, some areas, such as Maubin, have particularly low numbers of cattle and buffalo, and ownership of hand tractors is more common. In other areas, farmers are still using draught animals because they bring additional benefits, including as sources of manure and meat, as well as being saleable assets.

In addition to animal ownership, some households rent or share large livestock or tractors for labour. This means the percentage of households owning livestock does not coincide with the frequency of use of animals and tractors.

Table 44: Households that raise livestock

Livestock	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Buffalo	0	0	19	24.4	0	0	8	8.3	27	7.5
Cattle	25	26.3	11	14.1	47	50.5	45	46.9	128	35.4
Pig	20	21.1	32	41	41	44.1	29	30.2	122	33.7
Chicken	38	40	30	38.5	38	40.9	54	56.2	160	44.2
Duck	12	12.6	27	34.6	19	20.4	19	19.8	77	21.3
Landless households										
Cattle	0	0	0	0	6	6.6	2	2.1	8	2.1
Pig	24	26.1	43	40.6	35	38.5	44	45.4	146	37.8
Chicken	16	17.4	14	13.2	30	33	34	35.1	94	24.4
Duck	5	5.4	8	7.5	6	6.6	9	9.3	28	7.3

Qualitative interviews indicated that mechanisation in the Ayeyarwady Delta received a distinct push over the previous few seasons. The establishment of farm vehicle retail stores and favourable financing schemes has promoted this trend.

Increasingly, farmers and landless households have turned to pigs to diversify their income. Around 35% of households raise pigs, which is also the average for chickens and cattle, albeit the latter only among farmers. Several development programs in the Ayeyarwady Delta focus on pig raising for landless farmers.

Minimum, maximum and average numbers of animals kept per household are shown in Table 45. The average number of chickens per household is elevated across the landholding sample due to a few large chicken farms in Pyapon, Pathein and Kyaunggon.

Table 45: Number of animals per household, 2014

	Buffalo	Cow	Pig	Chicken	Duck
Landholding					
Maubin (no. of HHs*)	0	25	20	39	12
Minimum	0	2	1	2	1
Maximum	0	12	4	50	70
Average	0	2.76	1.85	8.23	17.08
Pyapon (no. of HHs)	19	10	32	30	27
Minimum	2	2	1	1	3
Maximum	11	7	25	1,000	200
Average	4.21	4.5	3.41	51.33	76.15
Kyaunggon (no. of HHs)	0	47	42	38	19
Minimum	0	2	1	1	1
Maximum	0	11	11	24,000	15
Average	0	3.3	2.14	649.3	5.79
Pathein (no. of HHs)	8	45	29	53	19
Minimum	1	1	1	1	2
Maximum	7	8	22	1,025	40
Average	2.75	3.07	3.14	63.08	12.42
All townships (no. of HHs)	27	127	123	160	77
Minimum	1	1	1	1	1
Maximum	11	12	25	2,400	200
Average	3.78	3.2	2.66	188.02	33.86
Landless					
Maubin (no. of HHs)			23	16	5
Minimum	0	0	1	1	3
Maximum	0	0	5	16	9
Average	0	0	1.74	3.5	5.2
Pyapon (no. of HHs)			43	14	8
Minimum	0	0	1	1	1
Maximum	0	0	10	20	100
Average	0	0	1.98	5.64	29.25
Kyaunggon (no. of HHs)		5	34	29	6
Minimum	0	2	1	1	2
Maximum	0	5	9	50	7
Average	0	3.6	1.97	13	3.67
Pathein (no. of HHs)		2	44	34	9
Minimum	0	2	1	1	1
Maximum	0	4	21	500	16
Average	0	3	2.27	31.47	7.22
All townships (no. of HHs)		7	144	93	28
Minimum	0	2	1	1	1
Maximum	0	5	21	500	100
Average	0	3.43	2.03	17.01	12.39

* HHs = households

Table 46: Population changes, average number of animals per household

Livestock		Maubin	Pyapon	Kyaunggon	Pathein	All townships
Landholding households (average number of animals)						
Buffalo	Typical herd size (past 5 years)	0	4.4	0	3.1	4.0
	2013	0	4.2	0	2.8	3.8
	Consumed (no., 2013)	0	0	0	0	0
	Sold (no., 2013)	0	2.8	0	0	2.8
	Lost (no., 2013)	0	2	0	0	2
	Bought (no., 2013)	0	3	0	1	2.3
Cattle	Typical herd size (past 5 years)	2.8	4	3.1	3.3	3.2
	2013	2.8	4.5	3.3	3.2	3.3
	Consumed (no., 2013)	0	0	0	0	0
	Sold (no., 2013)	1.5	2	2	2	1.8
	Lost (no., 2013)		1	0	0	1
	Bought (no., 2013)	1.5	2.3	2	1.8	1.9
Pig	Typical herd size (past 5 years)	2.4	2.8	1.7	3.3	2.5
	2013	1.9	3.5	1.8	2.9	2.5
	Consumed (no., 2013)	0	0	0	0	0
	Sold (no., 2013)	2.2	3	2.3	3.3	2.7
	Lost (no., 2013)	2.8	1.5	1	5	2.8
	Bought (no., 2013)	1.7	2	1.6	1.8	178
Chicken	Typical herd size (past 5 years)	14.7	18.5	15.6	52.8	204
	2013	8.5	59.7	18.8	64.9	39.6
	Consumed (no., 2013)	9.8	7	7.1	10.6	9.3
	Sold (no., 2013)	40.1	20.7	515.8	119.8	197.7
	Lost (no., 2013)	17.9	10	338	18.4	56.8
	Bought (no., 2013)	2.8	251.8	0	776.5	1548
Duck	Typical herd size (past 5 years)	17.8	71.2	5.7	13	30
	2013	17	79.3	5.8	14.1	34.7
	Consumed (no., 2013)	17	10	2	6.6	9.3
	Sold (no., 2013)	10	35	8.3	14.3	16.2
	Lost (no., 2013)	15	11.2	3	8	9.6
	Bought (no., 2013)	2.5	105.8	0	0	89.9

Landless households (average no. animals)						
Cattle	Typical herd size (past 5 years)	0	0	3	3	3
	2013	0	0	3.5	3	3.4
	Consumed (no., 2013)	0	0	0	0	0
	Sold (no., 2013)	0	0	0	2	2
	Lost (no., 2013)	0	0	0	0	0
	Bought (no., 2013)	0	0	0	2	2
Pig	Typical herd size (past 5 years)	1.5	1.7	1.7	2.5	1.9
	2013	2.3	1.9	1.9	2.5	2.1
	Consumed (no., 2013)	1	0	0	2	1.7
	Sold (no., 2013)	2.6	1.9	1.7	2.1	2.1
	Lost (no., 2013)	2.2	1	3.5	1	2.1
	Bought (no., 2013)	1.5	1.5	1.6	1.5	1.5
Chicken	Typical herd size (past 5 years)	7	5.7	10.8	36.6	19.3
	2013	4.9	7	13.4	36	19.2
	Consumed (no., 2013)	8.3	3.1	8.3	9.9	8.1
	Sold (no., 2013)	7.9	4.7	11.8	10.5	58.8
	Lost (no., 2013)	14.2	7.3	7.7	10.3	9.8
	Bought (no., 2013)	1.6	1	0	289.4	156.5
Duck	Typical herd size (past 5 years)	5.3	42.3	3.6	8.6	16.2
	2013	10.8	32	5.8	7.2	14
	Consumed (no., 2013)	3.0	60	0.0	3.5	17.5
	Sold (no., 2013)	18.0	100	2.0	11.5	25.6
	Lost (no., 2013)	9.0	30.0	4.0	15	13.7
	Bought (no., 2013)	2	3	0	2	13.3

Table 47: Percentage of animal population (average per household) consumed, sold or lost, 2013

Livestock	Consumed	Sold	Lost	Percentage of total animals Starting population in 2014 (% of 2013 herd)
Buffalo	0	10.8	3.92	85.3
Cattle	0	3.4	0.73	95.9
Pigs	0	55.2	7.89	36.9
Goats	0	0	0	100
Chickens	2.6	50.8	9.12	37.4
Ducks	6.5	6.3	5.25	82

Table 46 and Table 47 show average annual changes in household animal numbers, due to sale, household consumption, or loss of animals. The number of livestock owned by landholding and landless households does not vary significantly, except in the case of large ruminants held for animal labour. It is evident that livestock rearing is not a major income-generating activity in the Ayeyarwady Delta (Table 48). Livestock is kept for draught power or subsistence purposes. Commercial farms, such as the chicken farm in Kyaunggon, are rare.

While there are no full-time pig farmers, these animals seem to be sufficiently easy to raise and add to household income without draining household labour resources or other inputs. Average costs for different types of livestock are shown in Table 49, while costs vary significantly across the livestock types and townships, provision of pens/shelter and feed are among the main expenses.

Table 48: Main reason for rearing livestock (percentage of households)

Reasons	Buffalo	Cattle	Pigs	Chickens	Ducks
Draught	96.4	94.5	0	0	0
Household consumption	0	0	0.8	38.4	33.8
Extra income	3.57	3.1	97.5	36.5	52.5
Draught and extra income	0.	2.3	0	0	0
Household consumption and extra income	0.	0	1.7	25.16	13.8
Total	100	100	100	100	100

Table 49: Average costs of livestock production (kyat)

Animal	Expense type	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Landholding households						
Buffalo	No. of HHs	0	13	0	1	14
	Building	0	76,538	0	0	71,071
	Feeding	0	0	0	0	0
	Raising	0	275,000	0	0	255,357
	Health	0	5,269	0	0	4,893
	Reproduction	0	0	0	10,000	714
	Total	0	356,808	0	10,000	332,036
Cattle	No. of HHs	15	9	35	24	83
	Building	124,667	234,444	86,243	35,429	94,564
	Feeding	1,568,467	50,889	18,917	66,806	316,270
	Raising	0	31,667	31,528	3,000	17,596
	Health	4,167	2,833	2,806	1,292	2,617
	Reproduction	0	0	0	3,542	1,024
	Total	1,697,300	319,833	139,494	110,068	432,071
Pigs	No. of HHs	17	29	25	27	98
	Building	12,059	21,724	23,088	389	14,517
	Feeding	314,415	751,222	111,044	209,056	362,766
	Raising	0	0	0	0	0
	Health	1,412	3,983	4,560	926	2,842
	Reproduction	0	2,069	1,920	852	1,337
	Total	327,886	778,998	140,612	211,222	381,462
Chickens	No. of HHs	5	11	8	25	49
	Building	4,800	55,909	126,875	58,220	63,459
	Feeding	18,080	182,692	42,487,745	360,036	7,163,324
	Raising	0	0	0	1,200	612
	Health	0	10,909	75,000	2,920	16,184
	Reproduction	1,800	0	0	0	184
	Total	24,680	249,510	42,689,620	422,376	7,243,763
Ducks	No. of HHs	4	22	3	10	39
	Building	1,250	70,682	30,467	8,050	44,408
	Feeding	104,250	902,326	38,393	126,900	555,189
	Raising	0	18,000	0	0	10,154
	Health	0	2,320	0	0	1,308
	Reproduction	0	0	0	0	0
	Total	105,500	993,328	68,860	134,950	611,059

Landless households						
Cattle	No. of HHs	0	0	4	2	6
	Building	0	0	102,500	0	68,333
	Feeding	0	0	6,250	0	4,167
	Raising	0	0	0	0	0
	Health	0	0	1,500	0	1,000
	Reproduction	0	0	0	2,500	833
	Total	0	0	110,250	2,500	74,333
Pigs	No. of HHs	23	39	34	43	139
	Building	5,957	20,641	15,765	2,349	11,360
	Feeding	257,739	265,296	155,723	228,320	225,805
	Raising	0	0	0	0	0
	Health	2,022	2,938	2,209	1,070	2,030
	Reproduction	4,609	0	2,647	7,791	3,820
	Total	270,326	288,876	176,344	239,529	243,015
Chicken	No. of HHs	4	10	11	24	47
	Building	0	0	3,909	8,333	5,170
	Feeding	50,400	45,166	38,584	91,523	67,742
	Raising	0	0	1,818	0	426
	Health	0	0	0	1,563	798
	Reproduction	0	0	0	0	0
	Total	50,400	45,166	44,311	101,419	74,136
Ducks	No. of HHs	4	8	4	5	19
	Building	2,250	5,333	375	2,400	2,868
	Feeding	74,000	358,917	351,500	76,520	223,058
	Raising	0	0	0	0	0
	Health	0	0	0	0	0
	Reproduction	0	0	0	0	0
	Total	76,250	364,250	351,875	78,920	225,926

* HHs = households

Table 50: Relationship between landholding size and livestock ownership, landholding households

Land size (acres)	Buffalo		Cattle		Pig		Chicken		Duck	
	HH*	%	HH	%	HH	%	HH	%	HH	%
0–10	11	5.2	55	25.8	68	31.9	93	43.7	41	19.2
10.01–20	7	6.5	50	46.7	41	38.3	51	47.7	28	26.2
20.01–180	9	21.4	23	54.8	13	31.0	16	38.1	8	19.0
Total	27	7.5	128	35.4	122	33.7	160	44.2	77	21.3

* HH = household

Note: percentages are based on the total number of households in each land size.

Table 50 shows animal ownership by landholding size. It makes sense that the households with larger land areas are more likely to own draught animals. Households with 10.01–20 acres (4–8 hectares) have a slightly higher proportion of pig, chicken and duck ownership.

Fisheries

Fishing and aquaculture are important livelihood activities in the Ayeyarwady Delta. Fish is primarily a marketed commodity, although it is also important to supplement household diets. Most fish caught is sold for income. Homemade fish paste or dried fish for household consumption are staples in the Ayeyarwady Delta.

Data is presented here based on survey findings; however, it should be interpreted with caution as:

- The surveyors found it difficult to get precise fish catch data. Compared to livestock and farm data, respondents were far less confident about estimating their fish catch.
- The size of the fishing population within the sample is very low (22 households), so it is not representative.

An overwhelming proportion of fish produced by households in the Ayeyarwady Delta is sold, either to local markets or traders. Landless households retain a slightly higher proportion for home consumption (see Table 51).

The location of fish production varies according to the area within the Ayeyarwady Delta region. While fishers in Pathein and Pyapon use the river and sea as a source, Maubin and Kyaunggon farmers engage in aquaculture using small ponds on their land. Naturally, landless households depend on open waterways for wild catch (see Table 52).

Table 51: Fish farming, wild capture and use, 2013

	Maubin (HH* = 5)	Pyapon (HH = 3)	Kyaunggon (HH = 9)	Pathein (HH = 5)	All townships (HH = 22)
Landholding households					
Current quantity of fish production per household (kg)					
Minimum	407.5	25	24.45	97.8	25
Maximum	97,800	1,712	407,500	342	407,500
Average	26,145	1,130	46,266	202	25,069
Median	815	868	114	163	342
Consumed quantity of fish (kg)					
Minimum	8	2	2	8	2
Maximum	571	245	98	33	571
Average	214	90	31	18	86
Median	82	25	10	16	16
Marketed quantity of fish (kg)					
Minimum	399	23	20	65	20
Maximum	97,230	1,630	407,500	326	407,500
Average	25,932	1,040	46,243	187	24,996
Median	734	1,467	264	163	399
Landless households					
	Maubin (HH = 7)	**Pyapon (HH = 24)**	**Kyaunggon (HH = 3)**	**Pathein (HH = 49)**	**All townships (HH = 83)**
Current quantity of fish production per household (kg)					
Minimum	2	46	51	5	2
Maximum	514	1,467	6,765	1,142,630	1,142,630
Average	181	344	2500	27,017	15,884
Median	815	1,655	114	163	375
Consumed quantity of fish (kg)					
Minimum	3	2	34	0	0
Maximum	82	293	342	5,135	5,135
Average	41	42	142	326	202
Median	82	25	10	16	16
Marketed quantity of fish (kg)					
Minimum	2	46	2	5	2
Maximum	432	5,705	6,716	1,142,630	1,142,630
Average	152	517	1,769	25,480	15,156
Median	734	1,467	264	163	399

* HH = household

Table 52: Main locations for fishing activity (number of households)

	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Stream/river	0	0	2	66.67	1	10	5	83.34	8	33.34
Pond	2	40	1	33.33	8	80	0	0	11	45.83
Rice field	3	60	0	0	1	10	0	0	4	16.67
Flooded field	0	0	0	0	0	0	1	16.67	1	4.17
Landless households										
River	4	57.1	15	62.5	0	0	1	2	20	24.1
Stream	1	14.3	2	8.3	1	33.3	8	16.3	12	14.5
Canal	0	0	1	4.2	0	0	0	0	1	1.2
Pond	0	0	0	0	1	33.3	0	0	1	1.2
Rice field	0	0	1	4.2	1	33.3	1	2	3	3.6
Flooded field	0	0	0	0	0	0	6	12.2	6	7.2
Other (sea)	1	14.3	0	0	0	0	25	51	26	31.3
>2 places	1	14.3	5	20.9	0	0	8	16.3	14	16.8

The costs associated with fishing activities vary widely and depend on technique and location (see Table 53). While wild caught fish usually require a boat with an engine, a net, hooks and containers, aquaculture requires an initial investment in preparing the pond and feed. Landholding households spend more on fish production than landless households.

Table 53: Average costs associated with fishing (landless households) (kyat)

Item	Maubin (HH* = 5)	Pyapon (HH = 21)	Kyaunggon (HH = 2)	Pathein (HH = 27)	All townships (HH = 55)
Fish seed	0	0	80,000	55,556	30,182
Fish feed	0	0	57,000	1,303,717	642,079
Fishing material	189,000	277,071	74,000	2,695,124‡	1,448,724
Fuel	35,800	9,448	135,000	579,759	296,380
Other	600	762	2,628,000⁺	2,630	97,200
Total cost	225,400	287,281	2,974,000	4,636,785	2,514,565

* HH = household

‡ Respondents use equipment for offshore fishing, which is more expensive.

⁺ There is likely a strong bias due to the small sample size.

Support services

Survey participants were asked questions about their access to different support services, including access to loans and participation in different types of training events or extension services in the preceding 12 months. Access to services varies significantly, depending on whether households own land, with landless households accessing fewer services.

Credit

Households were asked if they had taken a loan in the previous 12 months. The responses reflect loans taken from formal providers only. Enumerators reported participants are not comfortable discussing informal loans, such as those provided by family or friends or through other unofficial mechanisms. However, family, friends, money lenders and shopkeepers have been found to be the main providers of credit (LIFT 2012). It is likely that if informal loans had been included, the percentage of households (especially landless households) in the sample that had taken out a loan would be higher.

Access to credit

In the previous 12 months, 54.1% of households in the landless sample, and 88.7% of households in the landholding sample had accessed credit from formal providers (see Table 54).

Significantly fewer landless households in Maubin had taken out a loan (30.4%) compared to the other townships, with the lowest proportion in Pathein (47%) and the highest in Pyapon (69.8%). In contrast, LIFT reported that 88.4% of all households in the Ayeyarwady Delta and coastal region had taken out a loan in the 12 months before the survey; and 87.5% of landless households in the region had accessed a loan (LIFT 2012:60). Landholding households had similar rates of loan access across the townships.

Table 54: Households accessing loans in the past 12 months, landholders and landless

Type of households	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding	84	88.4	75	96.2	81	87.1	81	84.4	321	88.7
Landless	28	30.4	74	69.8	61	67.0	46	47.4	209	54.1

Table 55 breaks down access to loans by land ownership. Within the landholding sample, only slight differences are shown in the number of households accessing loans, though farmers with less than 10 acres (4 hectares) are slightly less likely to have accessed a loan through formal means (84% compared to 92–93% for the larger landholding households). Landless households are less likely to have taken out loans.

Table 55: Number of households that accessed loans, by land ownership

Land class (acres)	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landless	28	30.4	74	69.8	61	67	46	47.4	209	54.1
<10	52	88.1	39	97.5	35	76.1	53	77.9	179	84.0
10–20	23	88.5	22	91.7	34	100	21	91.3	100	93.5
>20	8	80.0	14	100	12	92.3	5	100	39	92.9

Note: percentages are based on the total number of households in each land ownership category.

Table 56 shows the main sources of credit for those households that had taken a loan in the previous 12 months.

Government loans are characterised by low interest rates, but are generally less flexible than other loan types, requiring repayment at a fixed date. In the following four tables, 'NGO' (non-governmental organisation) refers to credit provided by international organisations such as PACT and iDE. Their interest rates are low, and landless households can access credit; however, NGOs' coverage across townships varies significantly. 'CSO' (civil society organisation) refers to locally run, community-based organisations. Similar to NGOs, CSOs provide loans with low interest rates but their strength and presence across townships varies. Private loans have significantly higher interest rates on average and are more flexible in terms of timeframes for loan repayment compared to government loans.

Table 56: Loan access by provider, number of households that accessed credit

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Government	76	90.5	65	86.7	78	96.3	67	82.7	286	89.1
NGO	0	0	30	40	0	0	13	16.0	43	13.4
Private	24	28.6	12	16	12	14.8	0	0	48	15.0
CSO	2	2.4	2	2.7	4	4.9	24	29.6	32	10.0
Landless households										
Government	0	0	0	0	0	0	0	0	0	0
NGO	0	0	71	95.9	4	6.6	26	56.5	101	48.3
Private	28	100	11	14.9	21	34.4	12	26.1	72	34.4
CSO	0	0	4	5.4	42	0.7	17	37.0	63	30.1

Note: data based on all loans taken, including multiple loans (up to four) for some households. Percentages are calculated based on the number of households that accessed a loan per township.

Of the landholding households that had taken a loan, most (89%) had accessed government-provided loan services, followed by a mix of NGO and private sources (see Table 56). Unable to access government loans, landless households are more reliant on NGO, private and CSO loans than landholding households.

In Maubin, private loans were the only source of credit reportedly used by landless households, with an average interest rate of 12.3% (see Table 56 and Table 57). Compared to other townships, in Pyapon NGOs are a significant source of credit, for both landholding and landless households. This indicates an active NGO in Pyapon township.

Credit conditions

Table 57 compares the average interest rates charged for credit. Landless households borrowing from private providers experience the highest interest rates, more than double the farming households (see Table 57). Higher interest rates are charged for shorter-term loans, on average less than 6 months (see Table 58). NGO and CSO interest rates are similar, between 1.9% and 2.3%.

Table 57: Average interest rate by type of provider (%)

Source	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Average interest rate (%)					
Landholding households					
Government	0.7	0.8	0.8	0.9	0.8
NGO	–	2.2	–	1.9	2.0
Private	6.3	4.0	6.8	–	5.7
CSO	2.0	2.5	2.0	2.2	2.2
Landless households					
Government	–	–	–	–	–
NGO	–	2.3	8.3	1.6	2.3
Private	12.3	11.0	7.5	16.9	11.3
CSO	–	2.3	2.0	2.4	2.1

Table 58: Average duration of loan by type of provider (months)

Source	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Landholding households					
Government	6.1	5.8	7.4	6.4	6.4
NGO	–	5.3	–	9.5	7.4
Private	5.8	6.8	12.1	–	8.2
CSO	6	6	10.2	6.7	7.2
Landless households					
Government	–	–	–	–	–
NGO	–	9.2	7.9	9.5	9.2
Private	4.8	4.8	10.2	5.4	6.2
CSO	–	7	10.7	7.2	9.6

Average loan amounts vary significantly across townships and loan providers. Landless households borrow significantly less on average across all provider types (see Table 59). Comparing the different provider types, CSOs and NGOs lend less on average compared to private and government providers.

Table 59: Average loan amount by provider (kyat)

Source	Maubin	Pyapon	Kyaunggon	Pathein	All townships
Landholding households					
Government	683,160	1,003,900	892,280	680,560	814,975
NGO	–	208,200	–	138,080	173,140
Private	3,064,400	919,170	601,670	–	1,528,413
CSO	150,000	230,000	142,000	135,420	164,355
Landless households					
Government	–	–	–	–	–
NGO	–	110,070	200,000	81,154	130,408
Private	94,286	153,640	119,760	536,250	225,984
CSO	–	82,500	60,952	91,176	78,209

Table 60: Loan amount by townships (kyat)

	50,000–500,000		500,001–1,000,000		1,000,001–1,500,000		1,500,001–2,000,000		2,000,001–3,000,000		3,000,001–31,000,000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households												
Maubin	34	40.9	32	38.6	6	7.2	8	9.6	1	1.2	2	2.4
Pyapon	18	24.3	26	35.1	10	13.5	15	20.3	2	2.7	3	4.1
Kyaunggon	17	21	39	48.1	16	19.8	5	6.2	4	4.9	0	0
Pathein	39	48.2	29	35.8	8	9.9	4	4.9	1	1.2	0	0
Total	108	33.8	126	39.5	40	12.5	32	10	8	2.5	5	1.6
Landless households												
Maubin	28	100	0	0	0	0	0	0	0	0	0	0
Pyapon	74	100	0	0	0	0	0	0	0	0	0	0
Kyaunggon	60	98.4	1	1.6	0	0	0	0	0	0	0	0
Pathein	44	95.7	0	0	0	0	1	2.2	1	2.2	0	0
Total	206	98.6	1	0.5	0	0	1	0.5	1	0.5	0	0

Note: US$1 is equivalent to approximately 1,100 kyat. Where households took more than one loan in the past 12 months, the data only relate to the first loan.

Table 60 breaks down average loan amounts by township. As expected given landless households' more limited loan access and collateral, very few had taken out loans valued at more than 500,000 kyat (approximately US$450). Of the households in the landholding sample, 73.3% had taken loans of up to 1 million kyat. Pyapon had the highest proportion of households with loans of up to 2 million kyat (20.3%).

Reasons for taking a loan

Table 61 provides a breakdown of the main reason households take out a loan. For landholding households, 87.4% across the sample takes out loans to support aspects of crop production. This is consistent with the main purpose for government loans, which is to support agriculture. For landless households, 55.6% of the sample use loans to support household consumption. In Maubin township, this accounts for 85.7% of loans taken. In Pyapon and Pathein, 14–18.5% of loans are used to support fishery activities, while 11.1% are used for livestock.

Table 61: Main purpose for taking loan

Reason for loan	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Crop production	90	90.9	99	88.4	85	89.5	88	81.5	362	87.4
Livestock	0	0.0	5	4.5	0	0.0	7	6.5	12	2.9
Fisheries	2	2.0	0	0.0	0	0.0	1	0.9	3	0.7
Buy machinery	0	0.0	1	0.9	2	2.1	0	0.0	3	0.7
HH consumption	5	5.1	3	2.7	0	0.0	0	0.0	8	1.9
Education	0	0.0	0	0.0	0	0.0	1	0.9	1	0.2
Health	1	1.0	2	1.8	0	0.0	1	0.9	4	1.0
Other	0	0.0	1	0.9	0	0.0	1	0.9	2	0.5
Combination	1	1.0	1	0.9	8	8.4	9	8.3	19	4.6
Landless households										
Crop production	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Livestock	0	0.0	10	11.1	5	7.5	6	11.1	21	8.8
Fisheries	2	7.1	13	14.4	0	0.0	10	18.5	25	10.5
Buy machinery	0	0.0	4	4.4	1	1.5	4	7.4	9	3.8
Household consumption	24	85.7	50	55.6	51	76.1	8	14.8	133	55.6
Education	0	0.0	2	2.2	0	0.0	6	11.1	8	3.3
Health	2	7.1	3	3.3	1	1.5	1	1.9	7	2.9
Other	0	0.0	7	7.8	4	6.0	7	13.0	18	7.5
Combination	0	0.0	1	1.1	5	7.5	12	22.2	18	7.5

Note: data based on all loans taken, including multiple loans for some households.

Extension and information provision

Access to information and support services is central to supporting households to make decisions relating to changing agricultural practices. Group memberships may support households to access information and provide increased power or social capital in farming and marketing decisions. This section focuses on the extent to which households are participating in these kinds of opportunities.

Training

Table 62 shows the number of households that received training in the previous 12 months. Although landholding households attended significantly more training than landless households, the percentage of households that went to a training event was still generally less than half. Very few landholding households had attended training in livestock or fisheries.

Very few landless households had attended any training. The highest was 14% in Pyapon, linked to training offered by an NGO relating to pig rearing and fisheries.

Table 62: Number of households that received training in the past 12 months

	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Agriculture	38	40.0	42	53.8	22	23.7	34	35.4	136	37.6
Livestock	1	1.1	1	1.3	2	2.2	3	3.1	7	1.9
Fisheries	–	–	2	2.6	3	3.2	–	–	5	1.4
Landless households										
Agriculture	1	1.1	3	2.8	2	2.2	4	4.1	10	2.6
Livestock	1	1.1	6	5.7	–	–	–	–	7	1.8
Fisheries	–	–	9	8.5	–	–	–	–	9	2.3

The DoA is the main source of training reported, providing 45–85% of the training attended (see Table 63). The DoA is under pressure due to limited resources, and usually chooses key or champion farmers to demonstrate for others.

'Private' mostly refers to agrochemical companies that provide training related to their products. Inputs are provided to farmers and the cost is recovered at harvest. Farmers will attend this kind of training to improve their chances of a good yield. In contrast, NGOs are limited by their geographic scope of working with 'project villages'. This geographic variation is also reflected in Table 63.

Table 63: Main training providers (number of households)

Provider	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Government	34	85	34	66.7	19	70.4	30	65.2	117	65.2
NGO	4	10	12	23.5	5	18.5	6	13	27	13
Private	2	5	5	9.8	3	11.1	10	21.7	20	21.7

Group membership

Village organisations can provide members with a network to access resources and information, and increase market negotiating power. Table 64 shows membership in village organisations is low, approximately 20% of the overall sample. Landholding households are more commonly members

than landless households. This is consistent with the pattern found across the entire country. Kyaunggon shows very low membership by both landholding and landless households. Community-managed groups are the most common group (see Table 65).

Table 64: Membership of village organisations (percentage of households)

	Landholding			Landless		
	Member	Not member	No answer	Member	Not member	No answer
Maubin	26.3	66.3	7.4	2.2	97.8	0.0
Pyapon	38.5	57.7	3.8	38.7	32.1	29.2
Kyaunggon	4.3	94.6	1.1	2.2	97.8	0.0
Pathein	22.9	69.8	7.3	24.7	73.2	2.1
All townships	22.4	72.7	5.0	17.9	73.6	8.5

Table 65: Membership of village groups, by type of group (number of households)

	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Government	4	19.0	9	29.0	2	66.7	2	9.5	17	22.4
Community	15	71.4	13	41.9	1	33.3	10	47.6	39	51.3
NGO	0	0.0	8	25.8	0	0	8	38.1	16	21.1
Private organisation	2	9.5	1	3.2	0	0	1	4.8	4	5.3

Information

Table 66 shows if, and where, households sought technical information regarding crop, livestock or fisheries production in the previous 12 months. Almost none of the landless sample and only half of the landholding sample actively sought information.

Most households that had sought information tended to seek it from the government, rather than an NGO, industry or private company.

Table 66: Households seeking agricultural information, by source

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Government	31	32.6	29	37.2	21	22.6	21	21.9	102	28.2
Other	28	29.5	12	15.4	20	21.5	35	36.5	95	26.2
Did not seek information	40	42.1	39	50.0	58	62.4	44	45.8	181	50.0
Landless households										
Government	3	3.3	6	5.7	2	2.1	7	7.7	18	4.7
Other	1	1.1	0	0.0	2	2.1	7	7.7	10	2.6
Did not seek information	89	96.7	100	94.3	88	90.7	85	93.4	362	93.8

Radio (45.6%) and TV (39.8%) are the main sources of agricultural production information for landholding households (see Table 67). Very few landless households receive technical information via these sources, despite a third of households having a TV and/or radio (see Table 21). This may indicate a lack of relevant production information (e.g. livestock) aired in these formats.

Table 67: Main technology for receiving agricultural information (number of households)

Source	Maubin		Pyapon		Kyaunggon		Pathein		All townships	
	No.	%	No.	%	No.	%	No.	%	No.	%
Landholding households										
Radio	48	50.5	42	53.8	40	43	35	36.5	165	45.6
TV	39	41.1	22	28.2	32	34.4	51	53.1	144	39.8
Internet	0	0	3	3.8	1	1.1	1	1	5	1.4
Journal	3	3.2	5	6.4	4	4.3	7	7.3	19	5.2
Other	2	2.1	6	7.7	2	2.2	3	3.1	13	3.6
Landless households										
Radio	10	10.9	4	3.8	7	7.7	17	17.5	38	9.8
TV	6.5	6.5	0	0	7	7.7	13	13.4	26	6.7
Internet	0	0	0	0	0	0	0	0	0	0
Journal	0	0	0	0	1	1.1	2	2.1	3	0.8
Other	0	0	1	0.9	0	0	0	0	1	0.3

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