RURAL LIVELIHOODS IN MON STATE, MYANMAR: EVIDENCE FROM A REPRESENTATIVE HOUSEHOLD SURVEY

By

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Food Security Policy *Research Papers*

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EXECUTIVE SUMMARY

The purpose of this report is to provide information and analysis to government, civil society, and donors interested in improving the well-being of the rural population of Mon State. Specifically, the report analyzes the different sources of income for rural households, as well as their socioeconomic characteristics, with a view to identifying potential pathways to improving incomes, especially for poor households, and stimulating inclusive rural growth. The overall picture that emerges is one of an economy heavily dependent on services for local employment and on international migration for income. Like a two-legged stool, such an economy is potentially unstable in the face of external shocks. Diversification of the Mon State economy, including diversification and increased productivity within the agricultural sector, will lessen the relative dependence on external migration remittances and result in more resilient growth in the future.

The analysis presented in this report is based on a sample of 1,632 rural households. The sample households were selected from village communities identified by rural enumeration areas (EAs) in the 2014 population census. All potential EAs were first stratified according to the primary agricultural activity (rice, rubber, orchard, or marine fishing). A total of 140 EAs (a little more than 6% of the sampling frame of rural EAs) were randomly selected, 35 from each of the four activity strata. For each selected EA, 12 households were randomly selected based on a household listing. The sample is designed to be representative of rural households in Mon State as a whole, as well as the major agricultural activities that rural households engage in.

The household questionnaire collected demographic information on all household members, farm and nonfarm income-generating activities, migration, assets (including land), credit, consumption, and shocks. A community survey was also administered in public areas to a group of up to six prominent village figures, such as village leaders, religious leaders, youth group or women's group representatives, and so on. The community questionnaire focused principally on village wide characteristics such as infrastructure (roads, electricity, waterways, and the like), the availability of services (banking, schooling, and so on), natural disasters, conflict, and so forth.

 In terms of livelihood strategies for rural households, agriculture, remittances from migrant family members, nonfarm enterprises, and wage labor are the largest sources of income. Wealthier households have more diversified and more remunerative income sources, emphasizing remittances, agricultural production, nonfarm enterprises, and fishing. Although nonfarm enterprises are an important source of earnings at all income levels, poorer households are more likely to depend primarily on income from wage labor.

Almost half of households in the sample had a member in Thailand, where wages are almost three times as high as in Mon State. Offering ample opportunities for unskilled laborers, migration is a common choice for working-age household members of both genders. Remittances sent by family members abroad generate almost a quarter of all income in our sample, at all levels of the income distribution. The earnings of migrants contribute significantly to consumption and asset accumulation, in particular land purchases and house construction. While migration helps bolster the Mon State economy, the absence of workers is being felt acutely in the state, where rising costs of labor are jeopardizing profitability in labor-intensive sectors such as rice and rubber.

Small-scale capture fisheries support the livelihoods of 34% of residents in Mon State's coastal zone. Many of these people are asset poor and landless, with few other livelihood alternatives. The contribution of small-scale coastal fisheries to the Mon State economy is similar to that of rice or rubber, but the fisheries receive little recognition or attention.

However, the capacity of coastal fisheries to support fisher livelihoods and make a significant contribution to the state economy is under threat from extremely limited management of fisheries for sustainable utilization of fish stocks.

Agriculture is an important component of rural livelihoods, but agriculture is not fulfilling its potential. Half of all households engage in agriculture, and one in five earns wages from agriculture. Households engaging in agriculture earn about half their income from farming and half from nonfarm income sources. Rice and rubber are the most common agricultural enterprises (with 39% and 36% of households participating, respectively), followed by betel leaf, roselle, and green gram (mung beans). Livestock rearing is practiced by 40% of households, usually on a small scale with just one type of animal. Labor scarcity and cost is a major constraint to profitability, given low productivity.

Access to land is a major constraint to livelihood strategies. Three out of every five households have no access to agricultural land, and hence are much more dependent on wage labor for their income. Even among those who do have access to land, the distribution is very unequal. The top 20% of households own 56% of the agricultural land, compared with just 2% owned by the bottom 20% of households. Only slightly more than one-third of households owning agricultural land have an official land title document. One result of unequal land distribution is that a high proportion of farmers, 43% in the case of rice, hire permanent workers (or sharecroppers in the case of rubber). Most permanent workers are of local origin.

The area planted in rubber has increased rapidly in recent years, and the majority of trees have yet to reach productive age. Mature trees are harvested with average yields of 900 pounds per acre, compared with more than 1,400 pounds per acre in Thailand and more than 1,500 pounds in Vietnam. Limited fertilizer use, unimproved varieties, and inadequately skilled labor contribute to low yields. The profitability of rubber is further undermined due to low prices associated with poor quality (a high level of impurities and moisture) and inefficient marketing channels (multiple handlers). The potential for improvement is demonstrated by the top 20% of rubber income earners, who achieve average yields of almost 1,700 pounds per acre and three times the profit per acre of the average rubber farmer.

The primary reasons for the low performance of rice and annual crops are (1) the small percentage of area cultivated in the winter season under irrigation (only one acre out of eight is cultivated in the winter season, and only 3% of rice farmers practice double cropping), (2) limited use of improved technologies, and (3) preharvest losses due to flooding and pests.

Low use of improved technology is a constraint to the performance of agriculture. Lack of access to irrigation for winter-season production limits agricultural activity largely to the monsoon season. Median rice yields are only 50 baskets (a little more than a ton[1]) per acre. Despite labor shortages, only one in four rice-growing households owns a power tiller or a tractor. Even though rental markets allow almost 60% of rice farmers to use mechanized land preparation, there is considerable scope to increase access to mechanization for timely operations. Reflecting the predominance of monsoon rice cultivation, the most popular rice varieties are traditional long-stemmed varieties that are resistant to flooding and fetch a high market price. Fertilizer use is low and chemical-based weed and pest management negligible. Improvements in crop management could greatly increase productivity and profitability. The top 20% of rice growers in terms of profitability have yields double those of the average rice farmer but with similar costs per acre.

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[1] Throughout the text, tons are metric tons.

Limited diversification of agricultural production also constrains the contribution of agriculture to household incomes. Mon State is suitable for a wide variety of horticultural production (vegetables and fruit trees), yet only one in five agricultural households engages in it. For those that do, incomes per acre are much higher than for rice or rubber.

Limited commercialization of agricultural products is both a reflection of and a contributing factor to low productivity at the farm level. Only half of rice farmers achieve a marketable surplus, and those who do have a surplus sell it shortly after harvest. A much higher proportion of other annual crops are sold. Most rubber is destined for low-quality use with multiple handling between farm and processor rather than coordinated supply chain management for high-quality manufacturing.

In conclusion, the agriculture and nonfarm sectors could make much larger contributions to rural incomes in Mon State in the future than they do today. Realizing this potential would diversify the sources of income for the state economy, providing expanded income sources for families without migrants as well as resident members of migrants' families. Diversification of Mon State's agriculture requires expanded access to irrigation for more diversified, high-value production, as well as increases in the productivity and quality of its traditional food staple and cash crops (rice and rubber). Improved access to and quality of market-oriented farm advisory services, initially publicly financed, is a necessary investment to support this transformation.

But diversification into high-value activities needs to occur in the nonfarm sector as well as in agriculture. Besides improved energy and road infrastructure, for Mon State to create higher-wage employment in the off-farm sector, the current low levels of educational attainment need to improve dramatically. Among five dimensions of well-being (food consumption, housing, clothing, healthcare, and education), households are least satisfied with the adequacy of education. Because improvements in education take time and will come too late for many school leavers over the coming decade, attention should also be given to literacy and vocational skills training opportunities, such as rubber tapping, construction, carpentry, and mechanical and electrical repair.

International migration, especially to Thailand, will continue to be an important source of income (directly and through consumption linkages) for many years, quite possibly decades, to come. Efforts should be made to improve migrant safety and welfare through insurance, language training, and education on Thai law and worker rights.

TABLE OF CONTENTS

LIST OF TABLES

TABLE   **PAGE**

LIST OF FIGURES

FIGURE   **PAGE**

1. INTRODUCTION

The present document reports on work undertaken as part of the Myanmar component of the Feed the Future Innovation Lab for Food Security Policy (FSP) program. It presents a comprehensive analysis of the economic livelihoods of households in rural Mon State, based on data from the Mon State Rural Household Survey (MSRHS).

The overall goal of the FSP program is to promote inclusive agricultural productivity growth, improved nutritional outcomes, and enhanced livelihood resilience for men and women through improved policy environments. The specific objectives are twofold: (1) to address evidence gaps for informed policy debate and formulation, and (2) to foster credible, inclusive, transparent, and sustainable policy processes. Both of these objectives entail integrating knowledge and actions at the regional and national levels for comprehensive and effective evidence-based policies.

Within this framework, FSP-Myanmar conducted the MSRHS in Mon State to deliver microlevel evidence in support of both objectives (1) and (2). This survey was conducted in May–June 2016 from a rural-representative sample of households and complemented by a community survey at the village or ward level. It collected detailed information on all income-generating activities of households and individual household members, household consumption, household assets and living conditions, and the services household members have access to.

Following the twofold objectives of the FSP, this dataset forms the basis for a two-pronged study leading to two documents. First, the statistical analysis of the MSRHS dataset provides a comprehensive picture of the economic opportunities and constraints that Mon rural residents are facing, based on numerical evidence generated from representative data. This serves to directly address objective (1) of the FSP to fill policy-relevant evidence gaps. The results of this statistical analysis are reported in the present document.

In addition to the present document, which is focused on the results of statistical analysis, a sister document was drafted to bridge the gap between the hard evidence generated from the MSRHS analysis and the requirements of the policy process. This sister document, titled "Revitalized Agriculture for Balanced Growth and Resilient Livelihoods: Toward a Rural Development Strategy for Mon State," was designed to serve as the basis for informed policy discussions in the context of a transparent policy process.

The remainder of the present report is organized as follows: Section 2 presents the data and methodology, Section 3 background information on Mon State, Sections 4 and 5 general information on households and their economic activities. Section 6 provides detailed information on all agricultural activities, including rice and rubber farming but also other crops, as well as livestock. Section 7 details off-farm or nonagricultural livelihoods such as wage work or salaried work, as well as self-employed activities in all sectors from fishing to commerce. Section 8 details the role of migration and remittances in Mon incomes. Finally, Section 9 provides information on household consumption, perceptions of well-being, and risk-coping strategies such as saving behavior. Section 10 concludes.

2. DATA AND METHODOLOGY

This report is based primarily on analysis of data collected through a survey of rural livelihoods. The survey comprised a community questionnaire, which collected general information about a sample of 143 communities (each usually a single village), and a household questionnaire, which collected detailed socioeconomic information about a sample of 1,627 households within those communities. The data were collected over nearly eight weeks in the months of May and June 2015 and analyzed in the fall of that same year. Throughout the report, we complement household survey results with information culled from secondary sources. This section describes in detail the survey methodology as well as the methodologies used for analysis.

2.1. Sample Design and Implementation

The sampling relied on a stratified two-stage design. The sampling frame for the Mon State Rural Household Survey (MSRHS) was based on preliminary data and maps from the 2014 Population and Housing Census of Myanmar. Given the survey objectives, the sampling frame was limited to the rural households in Mon State. The primary sampling units selected at the first sampling stage were the census enumeration areas (EAs), which are segments defined within the village tracts and wards for the purposes of data collection for the 2014 census. The original frame from the 2014 Myanmar census included 2,256 rural EAs for Mon State, with an average of 132 households per EA. Auxiliary information was used to classify the village tracts in Mon and help select the appropriate sample for a study focusing on household income-generating activities and livelihood strategies.

The stratification design was based on the predominant activities in each EA. We focus on four primary activities of interest: rice farming, rubber farming, orchards, and marine fishing. Each EA was classified into one of four strata according to which of these four activities was predominant. A sample of 35 EAs per stratum was selected, to ensure a reasonable dispersion of the sample within each stratum. Within each activity stratum, substrata for high and low activity levels were defined. EAs were oversampled from areas with high levels of our primary activities of interest to ensure large enough sample sizes of households performing those activities (the oversampling is corrected for with sample weights to avoid bias). This led to a tentative sample size of 140 EAs and 1,680 households, with 420 sample households per predominant activity stratum (12 per EA). This sample size provides a reasonable level of precision for the indicators by activity, especially because many sample households will be involved in more than one activity. For example, rice farming is found in all the sampling strata.

During fieldwork, small modifications to the tentative sampling framework had to be made to account for unforeseen circumstances. Seven EAs were replaced or dropped from the sample for security reasons (presence of armed groups or banditry). In addition, three EAs turned out not to be marine fishing areas as originally expected, and were resampled. Further, small numbers of fisher households prompted us to add five EAs in marine fishing areas during fieldwork, so as to increase the likelihood of obtaining significant estimates in the analysis. The final sample included 143 EAs (Table 1). All of these modifications were accounted for in the weighting scheme.

Table 1. Allocation of Sample Enumeration Areas and Households for Mon State Rural Household Survey by Activity Stratum

Stratum	Predominant activity	Total Sample enumeration areas	Sample households
1	Marine fishing	41	469
2	Orchards	32	361
3	Rubber	35	395
4	Rice	35	402
Total		143	1,627
Represented population (number of rural Mon residents)	1,195,321		

Source: All data in this table, and in the other tables and figures in this paper, come from the 2015 Mon State Rural Household Survey, unless otherwise specified.

We selected 12 households in each selected EA. Households were selected at random, excluding only those who did not participate in any way in any activity of interest for the purpose of our survey. Finally, a number of households could not be interviewed or provided incomplete responses and thus had to be dropped entirely from the dataset. This led to a final sample size of 1,627 households. The final distribution of the sample EAs and households is shown in Table 1. A more detailed explanation of the sample design and weighting procedures for the MSRHS is presented in Appendix A. This final dataset is representative of the 1.2 million people living in rural Mon State.

2.2. Community Questionnaire

In each of the sampled EAs, we collected general information using a community questionnaire. The questionnaire was administered in public areas to a selected group of up to six official respondents, usually including prominent village figures, such as village leaders, religious leaders, youth group or women's group representatives, and so on. Gender-diverse groups were selected where possible.

The community questionnaire focused principally on village wide infrastructure (roads, electricity, waterways, and so on) and the availability of services (banking, schooling, and the like). It also collected information on local projects and programs, both public and private. Additional sections of the questionnaire included questions about the environment and natural disasters, conflict, land, and prices. In total, the survey took three to five hours to administer.

In addition, the community survey collected the Global Positioning System (GPS) location of all medical, religious, and educational facilities, as well as marketplaces and major water points.

The questions in the community questionnaire referred to the village where the interview took place, regardless of EA boundaries. EAs are not administrative units, and their boundaries do not correspond to administrative boundaries. The community questionnaire is meant to capture the living environment of the interviewed households; therefore, it would not be appropriate to restrict responses to the geographic boundaries of EAs, which are meaningless to local inhabitants.

2.3. Household Questionnaire

The household questionnaire was administered to 12 households in each of the 140 sample EAs. In each household we interviewed one primary respondent (usually the head of the household, but another member could answer in the head's place if necessary).

The household questionnaire collected complete demographic information on household members, as well as information on their education, health, and occupation. In addition to current household members, it also recorded details about migrants, both short- and long-term.

Major sections of the survey were devoted to agricultural and nonagricultural income-generating activities. Separate sections recorded information on rubber, rice, other permanent crops, and other annual crops. Livestock rearing was given a separate section as well. Among nonagricultural activities, we separated salaried labor, wage work, nonagricultural business, and resource extraction activities into separate sections. Information on fish capture activities was also separated from other resource extraction activities, so as to collect information with greater detail. For each of the activities above, we took care to gather detailed information about labor use and input costs. We also recorded other sources of income, such as remittances, transfers, gifts and donations, and so on. All together, these sections allow us to determine household incomes with great precision.

The survey also recorded detailed information on expenditures of households and the assets they own (including land). Finally, the survey gathered information on housing, living conditions, and shocks.

2.4. Data Cleaning and Analysis

Data were collected on paper forms and then digitized using Census and Survey Processing System (CSPro) software. All questionnaires were entered twice independently, to ensure that digital files reflected the true answers collected on paper. Files were then compiled into .dta format to facilitate analysis with Stata software.

The survey included a number of open-ended questions that did not restrict respondents to any particular set of answers, such as household member occupation, grain varieties used in production, and so on. After the data were collected, these answers were compiled, classified into categories, and recoded according to the new classification. In addition, many categorical questions allowed for an open-ended response in case the pre-specified category choices were not sufficient (Other, specify:). These answers were also compiled and assigned new codes in the clean version of the data.

In addition to recoding work, data cleaning also made sure to correct aberrations, impossible values, inconsistencies between sections, and so on. Certain households had to be dropped because of missing information. At the end of this process, the final sample size was 1,627 households (out of the original 1,680), with 7,262 members.

3. CHARACTERISTICS OF MON STATE

3.1. Geography and Administrative Divisions

Mon State is located in the south of Myanmar, bordered by Bago region to the north, Kayin (also spelled Karen) to the east, and Tanintharyi to the south (Figure 1). It also shares a short southeastern border with Thailand. Mon is a coastal state, flanked to the west by the Andaman Sea. At 12,000 square kilometers, it is among the smaller states of Myanmar, but with about 2 million inhabitants, it is relatively densely populated. Its proximity to Yangon and Thailand contribute to its economic importance.

Mawlamyine is the economic capital and the largest city in Mon State. With 300,000 people, it is also the fourth largest city in Myanmar. Administratively, Mon State is divided into two districts: Thaton in the north and Mawlamyine in the south. A larger portion of rural households are located in the district of Mawlamyine (55.2%) than in Thaton (44.5%). The next administrative level is the township, of which there are 10. In some cases we present statistics at the township level.

Table 2 shows the number of households we interviewed in each of the townships. The number of households per township varies substantially, reflecting the size of rural population (Mawlamyine township is primarily urban and thus mostly not covered by our sample).

Table 2. Number of Sampled Households per Township (Ordered From North to South)

Township	Number of households	Percentage
Kyaikto	230	14.14
Bilin	160	9.83
Thaton	175	10.76
Paung	183	11.25
Mawlamyine	25	1.54
Chaungzon	183	11.25
Kyaikmaraw	188	11.56
Mudon	130	7.99
Thanbyuzayat	134	8.24
La Mine*	89	5.47
Ye	130	7.99
Total	1,627	100

Note**:** * La Mine is a subtownship of Ye but was its own unit in our survey's sampling frame.

Figure 1. Map of Mon State and Townships

3.2. Climate, Topography, and Agroecology

The climate of Mon State is tropical monsoon (type Am in the Köppen classification). Temperatures average 26.3°C and vary little throughout the year: the lowest monthly average is 24.2°C (January)

and the highest is 29.0°C (April).[2] The seasons are defined by the monsoon cycles: the state gets about 4,000 mm (4 meters) of rainfall per year, a quarter of which falls in August. In contrast, average rainfall in January is 5.1 mm. Most of the central and western parts of the state are part of a coastal floodplain. Elevation rises as one moves east toward the mountainous Kayin State.

Based on this topography, we defined three agroecological zones: coastal areas, lowlands, and uplands (Figure 2). Coastal areas were defined as those within 4 kilometers of the coastline. The rest of the state was split between lowlands (elevation of less than 14 meters) and uplands (elevation of more than 14 meters). Each enumeration area in the sample was assigned geospatial information collected during fieldwork using GPS units. More households live in the lowland agroecological zone (45.2%) than in coastal or upland zones (16.9% and 37.9%, respectively). We use these categories throughout the report to inform the remainder of the analysis.

Figure 2. Survey Locations by Agroecological Zone
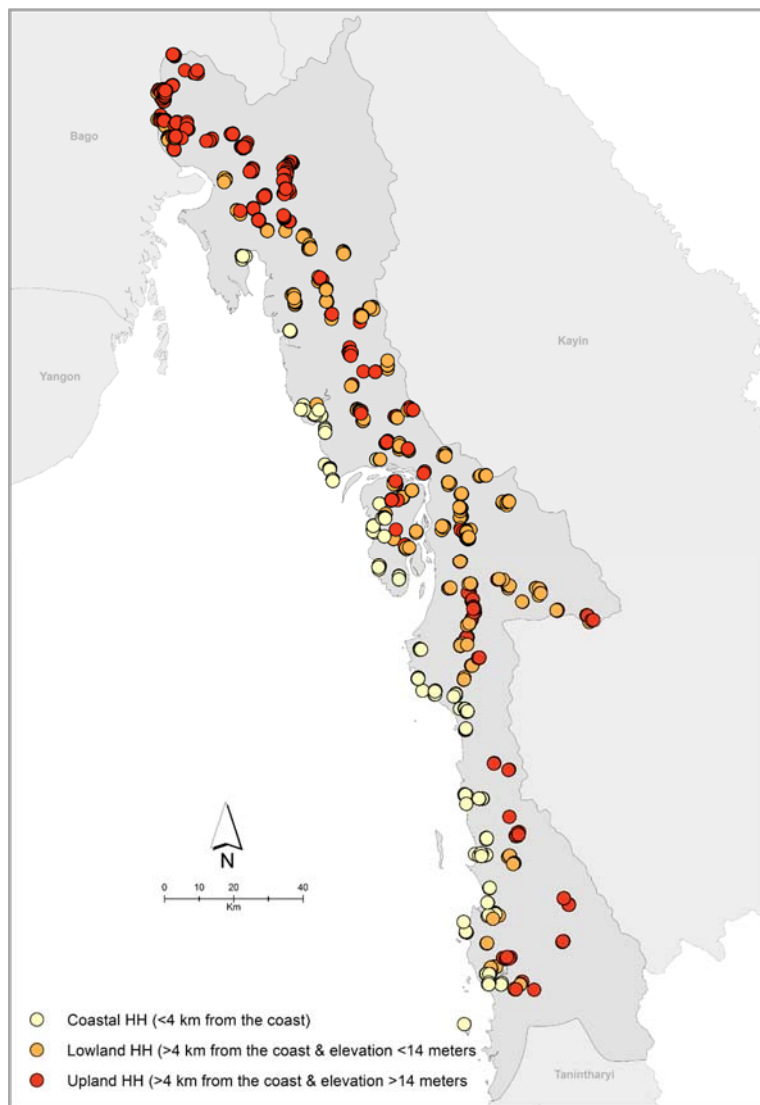
Note: HH = household.

[2] Climate data from Canty and Associates. 2016. Weatherbase database. Accessed April 24, 2016. www.weatherbase.com. Rainfall and temperature data refer to Mawlamyine.

Table 3. Village Access

Characteristic	Value
Percentage with paved road	95%
Percentage accessible by car in dry season	94%
Percentage accessible by car in monsoon	87%
Average travel time to closest urban center—dry season	33 mins
Average travel time to closest urban center—monsoon season	40 mins
Percentage with increased commute during the monsoon season > 30 minutes	6%

3.3. Infrastructure and Public Services

The community questionnaire asked about access to the village and to key infrastructure and services such as paved roads, electricity, and so on. This section will provide a brief overview of the state of the most relevant key services and infrastructure items in rural Mon State.

By and large, rural Mon residents live in villages that are easily accessible by road (Table 3). The majority (95%) of households in the survey live in a village accessible by a paved road, though only 87% of villages are accessible by car in the monsoon season. Monsoon season rains not only decrease accessibility but also increase travel time. This effect, however, is small on average: travel time to the nearest urban center increases on average by 7 minutes in monsoon season. But for a small percentage (6%) of rural Mon residents, the increase is more than 30 minutes.

Table 4 shows the prevalence of the availability of certain services in rural Mon State. Public transportation is limited: only one-fifth of villages (21%) have public transportation to reach the closest urban area. Only 61% of villages have a medical facility of any kind (rural health center, public hospital, private hospital, or private clinic). Of the 39% without local access to a medical facility, 91% have to travel to the township capital for medical services, some even farther. The far distances rural residents of Mon State have to travel to receive medical care put an onerous burden on households with sick family members, who may need to take time off of work to accompany their sick or injured relative to a treatment facility. The lack of publicly provided transportation options adds to the hardship by indirectly increasing the cost of medical care.

Table 4. Access to Services (Percentage of Villages Surveyed)

Service	Percentage with access
Public transportation	21
Medical facility	61
Primary school	80
Secondary school	37
Public electricity	51
Private electricity	56
At least one cell phone provider	97

The majority of households (80%) live in a village that has a primary school, but only 37% live in a village with a secondary school. Educational attainment in Mon State is therefore greater than 50% for primary school completion but drops off significantly for secondary school completion (see Section 4.2).

Electricity is available to 51% of households through public provision and 56% through private provision. Taken together, 81% of households live in a village with access to either public or private provision of electricity, or both. Rural households have electricity connections at much lower rates (see Section 4.4).

The recent liberalization of the telecom sector has expanded cellular access in Mon State, with 97% of households living in a village with functioning access to one or more carriers.

3.4. Economy

No official gross domestic product (GDP) estimates are available at the state level. Through estimation, we computed that the economy of Mon State is dominated by services, with agriculture and industry contributing smaller shares to GDP. Using national data, we obtained a crude estimate as follows: First, we computed per-worker contribution to GDP for each sector (agriculture, industry, services) at the national level. Applying those figures to the Mon State sectoral employment figures (46% in agriculture, 13% in industry, 36% in services), we can estimate the contribution of each sector to total GDP in the state. This procedure gives estimates of about 70% of GDP from services, 16% from industry, and 14% from agriculture. The accuracy of such figures depends on whether national-level per-worker GDP contribution is a good approximation of Mon State per-worker GDP contribution.[3]

For agriculture, the two main crops are rice and rubber. Besides those two, notable agricultural activities include orchards, horticulture, and some production of pulses. While less common, these activities have become relatively more lucrative in the recent past. Chapter 6 of this report provides a detailed analysis of agricultural activities. Industry in the state is mostly based on the processing of agricultural output, primarily rubber but also paper and sugar. Some mining exists in the state as well, with production of tungsten and antimony. The coastal areas, Ye in particular, support a sizable fishing industry, with associated processing of fish products.

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[3] Calculations courtesy of Tim Dobermann from the International Growth Center.

4. HOUSEHOLD CHARACTERISTICS

This section describes the general characteristics of households in rural Mon State, including demographics, ethnicity, education, and health. The end of the section also provides statistics on the living standards of households in our sample. Throughout the section, we present statistics for different household types, disaggregated by administrative area, geographic location, gender, landownership, or income (among other criteria).

4.1. Household Characteristics and Demographics

Rural Mon State is ethnically diverse, with three dominant ethnic groups: Mon (35.3%), ethnic Burmese (or Bamar) (36.3%), and Kayin (16.3%) (Table 5). The remaining 12% includes Pa-o, Tamil, and others. These proportions vary geographically: the Mon are a majority in the coastal areas (55%), and the Kayin represent more than one-third of the population in the uplands, closer to Kayin State (36.4%). These ethnicities correlate with the language spoken at home, though our survey also shows that a majority of household heads can speak Burmese (81.5%).

While the state is ethnically diverse, it is very homogenous in terms of religion. Buddhism is the dominant religion in rural Mon State, with more than 90% of household heads identifying as Buddhist, consistently across all agroecological zones.

Basic household characteristics vary little across the different zones (Table 5). The average household size is 4.38 people, and household heads are on average a little more than 50 years old. A high percentage of households are headed by females (23.2%), likely reflecting the high propensity of male heads to migrate. Landlessness is high—almost 60% of households do not own any agricultural land—and it is highest in the lowlands (62.4% landless).

The population in Mon is relatively mobile. Within our sample, approximately 16.9% of household members were born outside of the village where their household is located. Among them, 34.4% were household heads, 21.9% were spouses (indicating they may have migrated for marriage), and the remainder are mainly children or grandchildren (20.8% and 9.8%, respectively). Some children belong to families that moved together, while others are children of migrant parents, usually cared for by grandparents.

Table 5. Household Characteristics in Mon State, by Agroecological Zone

Characteristic	All households	Coastal	Lowland	Upland
Average household size	4.38	4.65	4.31	4.33
Percentage female-headed	23.2%	21.1%	25.4%	21.6%
Average age of household head	52.38	52.06	53.11	51.64
Average age (all members)	29.6	29.0	30.1	29.4
Mean dependency ratio*	0.84	0.95	0.88	0.75
Percentage with Buddhist household head	94.3%	98.3%	91.1%	96.4%
Percentage without agricultural land	59.0%	61.0%	62.4%	54.0%
Ethnic group of household head				
Mon	35.3%	55.9%	34.6%	27.0%
Kayin	16.3%	4.8%	9.7%	29.3%
Bamar (Burmese)	36.3%	33.8%	37.0%	36.4%
Other	12.2%	5.6%	18.7%	7.4%
Number of households in sample (unweighted)	1,627	346	587	633

Note**:** * The dependency ratio is the ratio of number of members aged 0–14 or 65 and older to the number of those aged 15–64, within each household.

The majority of those members who have moved have done so from within Mon State (Figure 3). Most commonly they came from villages/wards in the same township (35.4%) and other townships in Mon State (21.9%). The second most common pattern involves moving from neighboring states, predominantly the Bago (12.4%) and Ayeyarwady (10.3%) regions. As we will see in the rest of the report, a large fraction of households have members (or former members) that have migrated away, most of whom left in search of job opportunities.

Figure 3. Origin of Household Members Who Were Not Born in the Village They Were Surveyed in

11

Figure 4. Population Pyramid of Rural Mon State, 2015

Source: Mon State Rural Household Survey, May–June 2015.
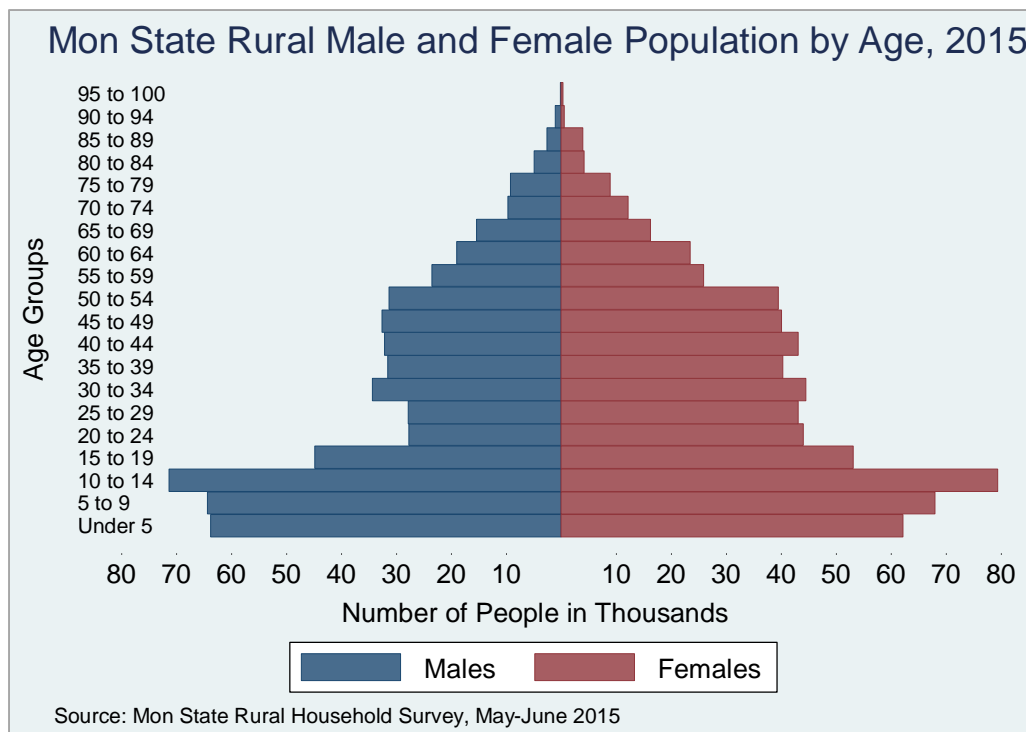
Source: Mon State Rural Household Survey, May–June 2015.

Our sample shows that there is a steep drop-off in population between the 10–14 age bracket and the 15–19 age bracket, particularly among male household members (Figure 4).[4] The sample counts more females (54.6%) than males, most likely due to migration. Almost half of households have one or more former household members that are currently (nonseasonal) migrants, most of whom are males (55%). This phenomenon contributes to the high share of female-headed households reported in Table 5 (23.2%). The propensity of young residents to migrate may also explain the relatively high dependency ratio (0.84 on average, and as high as 0.95 in the coastal zone).

4.2. Educational Attainment and Employment

Educational attainment is an important predictor of potential earnings, while the level of school enrollment among school-age children is an important indicator of the future human capital of a country. In rural Mon State, almost 23% of children between 5 and 16 years old were not enrolled in school in 2015, and almost 1 in 10 (9.3%) has never attended a formal school (Table 6). While this level of exclusion is an improvement over that of previous generations (among whom 1 in 4 adults never attended school), it is still a matter of serious concern. Males are slightly more likely to have never attended school (10% of males versus 8.6% of females among current school-age children). Among the current population older than 16, a little more than half have completed primary school, and about 1 in 20 has completed high school.

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[4] Starting from the 5–9 age group, the ratio of males to females is less than 1. While this disparity can easily be explained by migration for older age groups, migration is a less likely explanation for children 5–14. It may be the case that there is a preference to migrate with male children due to their future income-earning potential. It may also be possible that this discrepancy is the result of a sample size insufficient to get a clean distribution.

Table 6. Educational Attainment by Gender, for Population Older Than 16

Educational attainment	All (percentage)	By gender (percentage)	
		Male	Female
No formal schooling	23.8	26.2	21.9
Less than primary completion	23.3	20.9	25.2
Completed primary	20.3	19.1	21.2
Some secondary school	21.7	23.9	20.1
Completed high school	6.6	6.9	6.3
Completed tertiary degree	4.4	3.0	5.4

Educational achievement varies geographically. In Thaton district, the adult literacy rate (among those older than 16) is 84.4%, slightly higher than in Mawlamyine district (76.1%). Female-led households have a lower literacy rate (65.3%) than male-headed (80.4%). The coastal area has a slightly lower literacy rate than other zones (74.7 versus 77–79%). The pattern of lower literacy in the coastal zone will likely continue in future generations because the zone also has a below-average rate of school-age educational enrollment (73.1%).

4.3. Health

According to the 2014 census, average life expectancy in Mon State is 71.7 years, around the global average but lower than the regional developing-country average. Based on survey data, about 78% of children younger than five in rural Mon State have received a vaccination, leaving 22% of children younger than five unvaccinated.

At the time of the survey, about 16.5% of rural households reported that one member had been ill within the last 30 days. Chronic illness is common among 10.9% of family members and much higher among those older than 65 (37.6%). Female-headed households have slightly higher rates of illness (20.8%) and reported a higher rate of chronic illness for all members and for those older than 65 (14.8% and 39.6%, respectively). Chronic illness is more common in Mawlamyine district (12.7%) than in Thaton (8.6%). The disparity is greater for those 65 and older, who are almost twice as likely to be suffering from a chronic illness in Mawlamyine than in Thaton (46.4% and 23.7%, respectively). Landless households have higher rates of chronic illness for those older than 65 (41.3%), compared with landed households (33.8%).

4.4. Housing Conditions

More than 90% of households in Mon State report owning the dwelling they live in (90.4%). Only 84.8% of households own a plot of land (agricultural or residential), which means that upwards of 5% do not own the land on which their dwelling is located, perhaps because the dwelling is located on a family member's plot. The rental market is seemingly limited in Mon State, with only 1.2% of households living in a rented dwelling. The remainder of dwellings are borrowed or subsidized.

The average number of rooms in a dwelling is 1.2 and the majority of households (77%) live in a dwelling that has between 1 and 2 rooms, excluding the bathroom and kitchen (Figure 5). Since the average number of household members is 4.4, this indicates cramped living conditions.

Figure 5. Distribution of Household Dwellings by Number of Rooms, Excluding Kitchens and Bathrooms
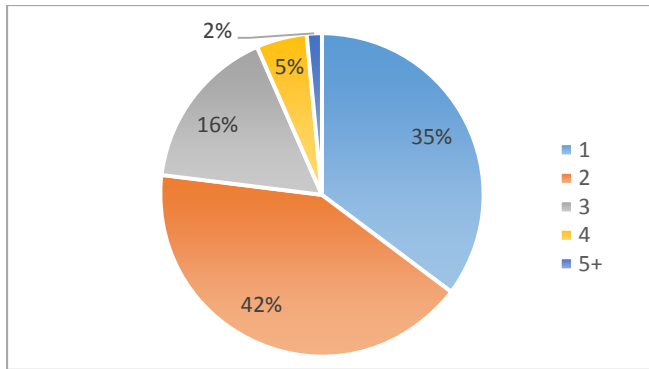
More than half of the dwellings in rural Mon State have roofs made of improved materials (57.3%), defined as corrugated sheet metal, tile, or concrete (Figure 6). The rate is slightly higher in the southern district of Mawlamyine (63.5%) than in northern Thaton (49.7%). We also computed these figures separately for the bottom three consumption quintiles (49.5%) and the top two (65.9%). The percentage of households with improved toilet facilities, defined here as a covered pit with a water seal or better, is quite low (39.3%). Once again, households in Mawlamyine and those in the top two consumption quintiles have higher rates of improved housing characteristics, with approximately 44% of Mawlamyine households and 44% of upper-quintile households using improved toilet facilities, versus 33.4% of Thaton households and 35.8% in the lowest three quintiles of consumption.

Rural Mon State residents have made improvements to their dwellings over the last five years by switching from inferior to longer-lasting and better-protecting materials. The use of thatch, leaves, or palm as the primary material for roofs has decreased from 46.4% in 2010 to 36.5% in 2015, while the use of corrugated sheet metal roofs has increased from 46.3% to 58.9% (Figure 7). The use of wood and other materials has also decreased slightly.

Figure 6. Households with Improved Roofing and Sanitation Facilities, by District and Income
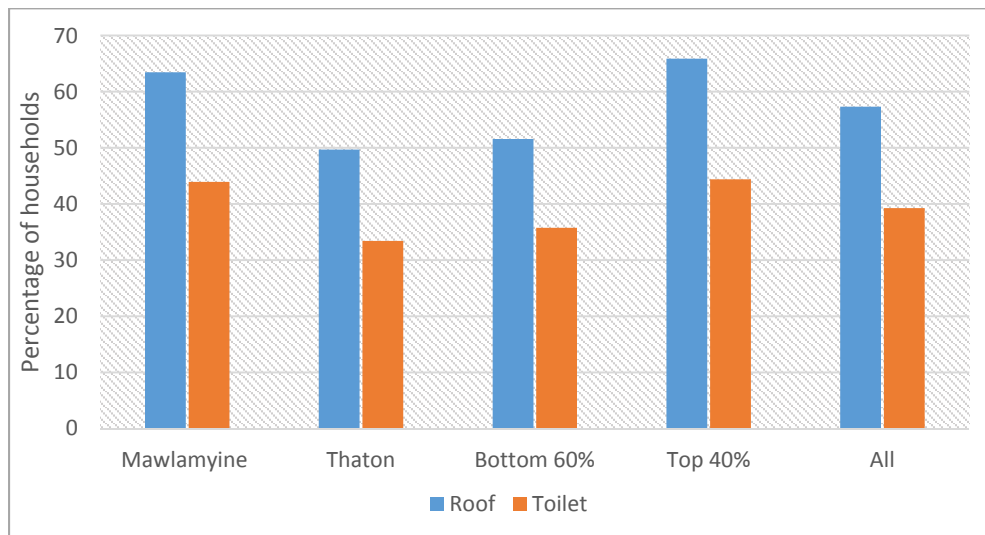
Figure 7. Type of Roofing Used in Dwelling
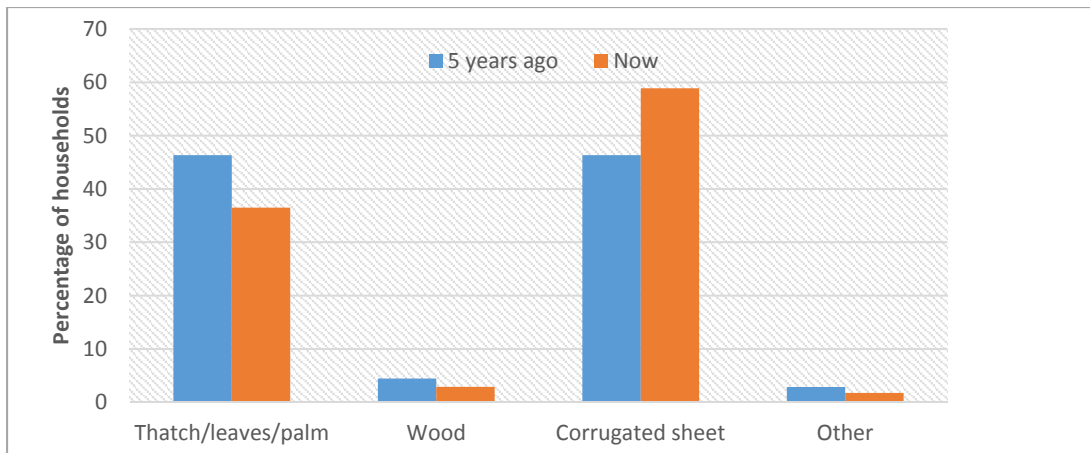
Access to electricity is much higher in rural Mon State (55.5%) than the national rural average (18%).[5] Overall, electrification has increased by 85% compared with five years prior to the survey, and it has done so across all subgroups (Figure 8). This rate is expected to continue to increase given the Ministry of Electric Power's National Electrification Plan, which calls for attaining 100% electrification by 2030. Donor funding has also been secured for a project that upgrades a gas-fired power plant in Thaton.

However, some disparities exists with respect to access to an electrical connection. Approximately 48.3% of households in Thaton, where the main power plant is located, have an electrical connection, whereas the rate in Mawlamyine is 61.3% (Figure 8). Similar disparities exist between households in the top two expenditure quintiles versus those in the bottom three.

Figure 8. Access to Electrical Connection in the Household, by District and Income Level

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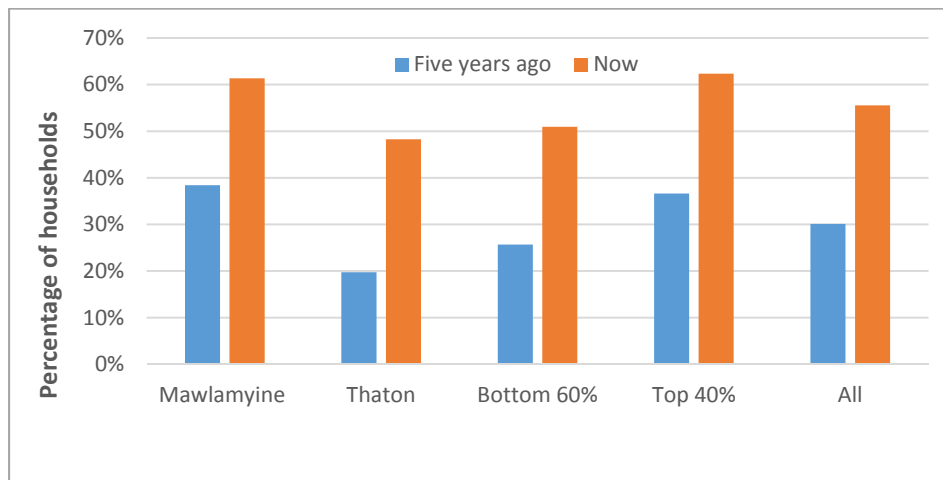
[5] International Energy Agency. 2015. World Energy Outlook Electricity Access database. Accessed April 25, 2016. http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/.

Figure 9. Main Source of Lighting
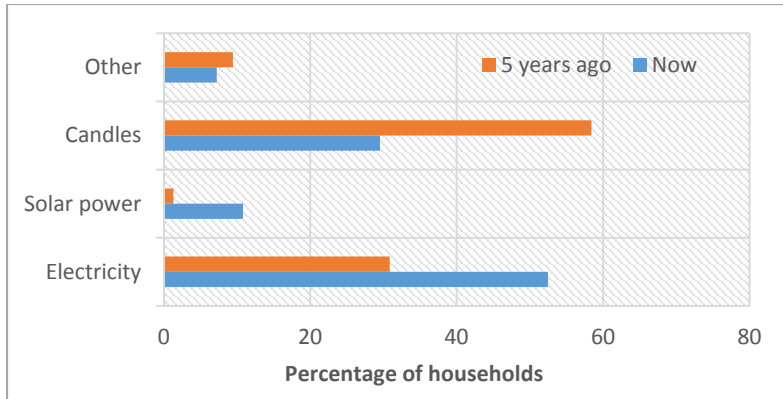
The expansion of rural electrification has had implications for improved lighting (Figure 9). The majority of households reported candles as their main source of lighting in 2010 (58.4%), which were overtaken by electricity in 2015. Solar power also grew as a source of lighting, from 1.3% five years ago to 10.8% in 2015. In contrast to dramatic improvements in access to electricity, there has been only limited change in water access over the last five years (Figure 10). Of all households, 7.3% had indoor or outdoor piped water in 2010, versus 9.9% in 2015. The majority of households report sourcing their drinking water from private wells (65.2%) and public wells (12.5%). We are unable to determine the health implications of the latter two water sources.

Figure 10. Main Source of Drinking Water in the Household
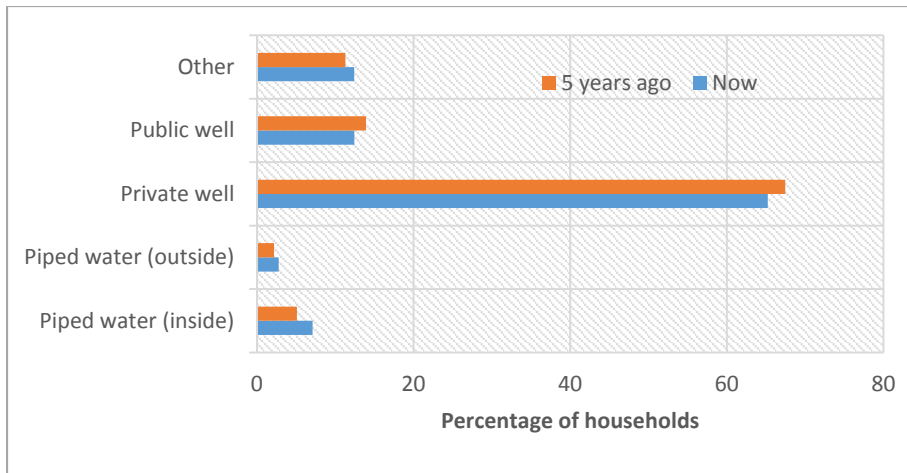
5. HOUSEHOLD ACTIVITIES, INCOMES, AND ASSETS

5.1. Overview

In order to compare the income profiles of households in Mon State, the entire sample was first ranked from top to bottom by income level per household member, and then divided into five groups of equal size (quintiles). The quintile of sample households with the highest per capita income is quintile 5, and the lowest quintile 1.

The median annual income in Mon State for the year prior to the survey was 1,612,000 Myanmar kyats (MMK), or about US$1,375. The range of incomes across rural households varies widely. Households in the highest income quintile, for example, earned a median income 3.2 times greater than the median for the whole sample, and even more on a per capita income basis (Figure 11). Households in the lowest income quintile reported a median income equivalent to just 17% of the sample median.

5.2. Location and Household Incomes

Income profiles also vary by geographic location (Table 7). Mawlamyine district has a higher proportion of households in the top two income quintiles than does Thaton district (22–24%, compared with 15–21%). Thaton district has a higher proportion of households in the lowest quintile. Perhaps due to access to the fishing and shipping industries, the coastal agroecological zone has a lower rate of households in the lowest income quintile and a higher rate in the top quintile (15% and 24%, respectively). The opposite pattern is found in the upland agroecological zone, where only 16% of households are in the top quintile of income and 23% are classified in the bottom quintile.

Figure 11. Median Income, by per Capita Income Quintiles (Participating Households Only)
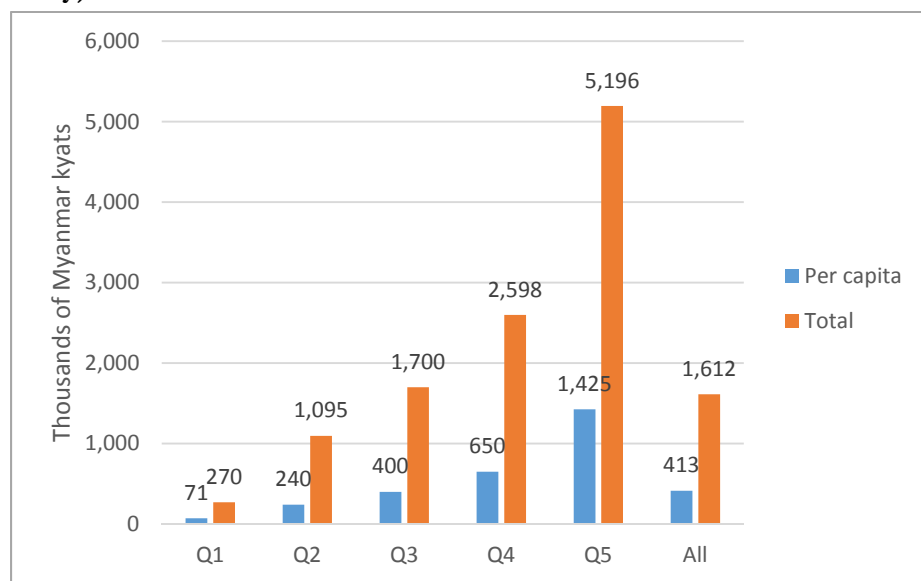
Note: Excludes households with reported negative income.

Table 7. Share of Households in Income Quintiles, by Location Characteristics

Location	Share of households in quintile (percentage)					
	Q1	Q2	Q3	Q4	Q5	All
District						
Mawlamyine	18	19	17	22	24	100
Thaton	25	17	22	21	15	100
Agroecological zone						
Coastal	15	21	19	21	24	100
Lowland	21	17	18	22	22	100
Upland	23	19	20	21	16	100

Households in the lowest income quintile are more likely to be female-headed (29%) or headed by a member with no formal education (42%, compared with the sample average of 32%) (Table 8). Households in the top income quintile are less likely to be headed by family members with no formal education (24%). Having a tertiary degree–holding family member further reinforces the relationship between educational attainment and household income. Households in the top income quintile are four times as likely to have a family member with a tertiary degree as are households in the bottom quintile (19% versus 5%).

Average household size does not vary greatly across income quintiles, although it is slightly smaller for the top income quintile.

It is not surprising that households in the two upper income quintiles have higher-than-average rates of improved toilet facilities, 42% and 57%, respectively, compared with the average of 39%. The upper two income quintiles also have access to electricity at higher-than-average rates, 60–72%, compared with the Mon average of 56%.

Table 8. Household Characteristics, by Per Capita Income Quintile

Characteristic	Share of households by quintile (percentage)					
	Q1	Q2	Q3	Q4	Q5	All
Head characteristics						
Median age	53	51	51	53	52	52
Female	29	20	21	23	23	23
No formal schooling	42	36	29	29	24	32
Highest level of education in household is tertiary	5.0	4.4	9.5	12.8	19.2	10.2
Average household size	4.4	5.0	4.5	4.3	3.8	4.4
Housing characteristics						
Improved toilet	32	33	33	42	57	39
Electricity	46	46	53	60	72	56
Own agricultural land	40	39	32	44	55	42

Figure 12. Distribution of Number of Income Sources
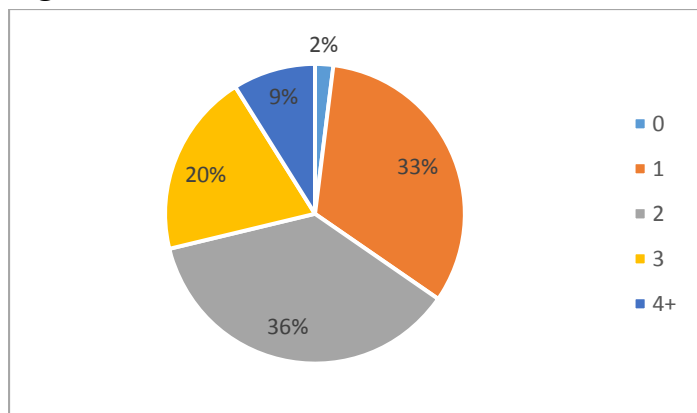
In rural Mon State, agriculture is an important source of livelihoods, with nearly 50% of households earning income from farming. Households in the middle income quintile own agricultural land at lower-than-average rates, 32% compared with the sample average of 42%, and those in the top quintile are more likely to own agricultural land (55%) than the average.

5.3. Income Sources and Livelihood Strategies

Households in rural Mon State derive livelihoods from a variety of income sources including agriculture (rice, rubber, orchards, and other annual crop and livestock farming), remittances, nonfarm enterprises, wage labor, fishing, salaried earnings, resource extraction, and other sources.[6] In this section we describe the contribution of these different income sources and how households combine them into livelihood strategies.

Households in rural Mon State average a little more than two income-generating activities (Figure 12). One-third of households participate in only one form of income generation, 36% participate in two activities, and 29% participate in three or more activities.

Households in the bottom quintile participate in fewer activities than the average, 1.7, whereas households in the top two quintiles are more diversified, participating in 2.2–2.4 activities on average (Figure 13).

The five most common income sources are wage labor, remittances, nonfarm business, rice farming, and other sources (Figure 14). While 49% of households in the top income quintile receive money from remittances, only 15% in the bottom income quintile do so, indicating the importance of migration as a strategy to improve household income. Nonfarm enterprises also increase in prominence as we move up the income quintiles, increasing from 17% in quintile 1 to 37% in quintile 5. Wage labor is the most frequent income source for households that fall in the middle income quintiles (53–55% for households in quintiles 2 and 3).

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[6] Other sources are a mixture of pensions, lottery winnings, donations, and gifts received. These sources were lumped together to emphasize their impermanence.

Figure 13. Average Number of Income Sources and Household Size, by Income Quintile
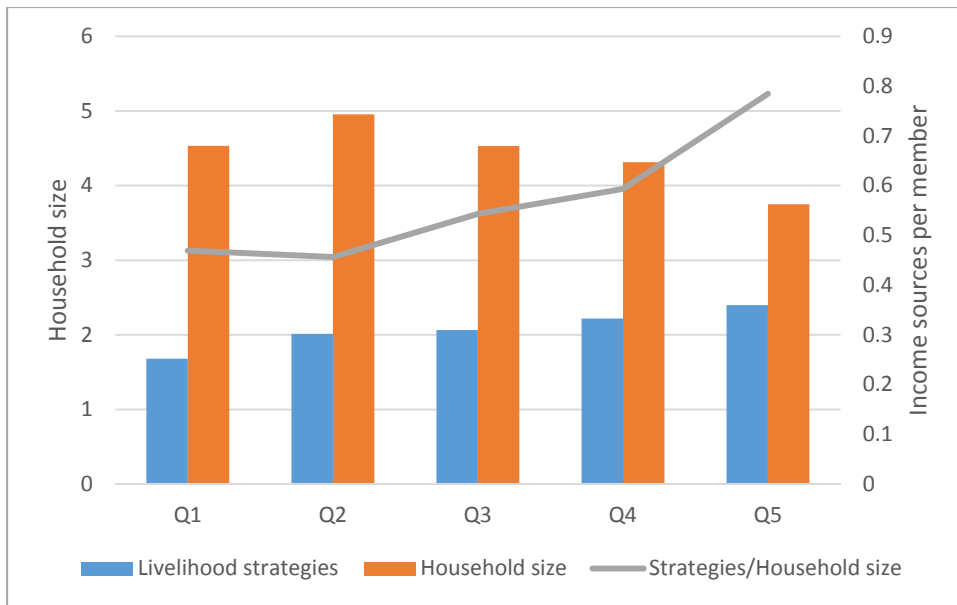
Figure 14. Share of Households Participating in Income-Generating Activity, by Income Quintile
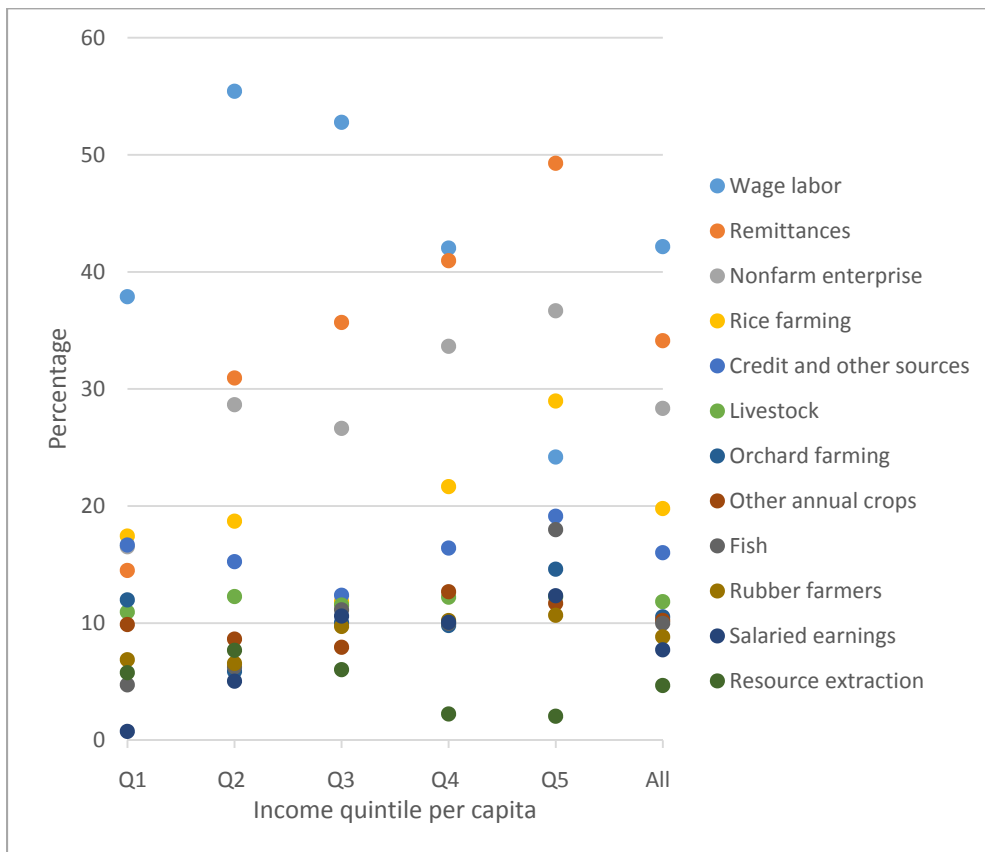
Note**:** Households with negative or zero income were not included (approximately 3% of households).

Due to constraints on land use that emphasize rice farming, it is not surprising that this is a fairly consistent activity across all income quintiles, though there is slightly greater participation among the highest-income households (29%) and the lowest participation is among middle-income households (12%). Credit, donations, and gifts are also a fairly consistent source of income across quintiles, with an average of 16% of households. The other income sources have participation rates of 12% or less. Participation rates across quintiles are fairly consistent for livestock farming, other crops, and rubber farming, with an average of 12%, 10%, and 9%, respectively. Orchard farming is more prominent among both the lowest income quintile and the highest, 12% and 15%, respectively. It is possible that the bottom-quintile households have invested in orchards and will realize higher incomes once their trees reach maturity.

Households in the top quintile fish at a rate 80% greater than average (18%), whereas households in the bottom quintile have fishing rates 53% lower than average (5%) (Table 9). Salaries are a rare income source among the bottom two quintiles but are 30–60% greater than average among the top three quintiles, ranging from 10% to 12% of households. Resource extraction is not a popular income source among all household quintiles, but it employs a larger share of households in the lower income brackets.

While it is important to know the prominence of the different livelihood strategies, more context is needed to understand how much these strategies contribute to household income. Assuming a dominant livelihood strategy to be one from which a household derives more than 50% of its income, we present the share of households with a majority of their income from different strategies by income quintile in Figure 15. It is important to note that livestock, salaried labor, annual crops, rubber farming, orchard farming, resource extraction, and other sources (credit, donations, and gifts) each constitute the dominant livelihood strategy for less than 5% of rural Mon households. Because the share of households that participate in these activities is higher than the share of those that derive a large portion of income from them, we can infer that these activities make up supplementary income for many households.

Table 9. Difference of Quintile Average from Sample Average (Percentage)

Income source	Q1	Q2	Q3	Q4	Q5
Wage labor	-10	31	25	0	-43
Remittances	-57	-9	5	20	44
Nonfarm enterprises	-42	1	-6	19	29
Rice farming	-12	-5	-40	9	46
Credit and other sources	4	-5	-23	2	19
Livestock	-7	4	-2	3	4
Orchard farming	14	-44	-5	-7	39
Other annual crops	-3	-16	-22	24	14
Fishing	-53	-37	12	0	80
Rubber farming	-22	-26	10	16	21
Salaried labor	-90	-35	37	30	60
Resource extraction	23	64	29	-52	-56

Figure 15. Percentage of Households with Majority Income from Various Sources, by Income Quintile
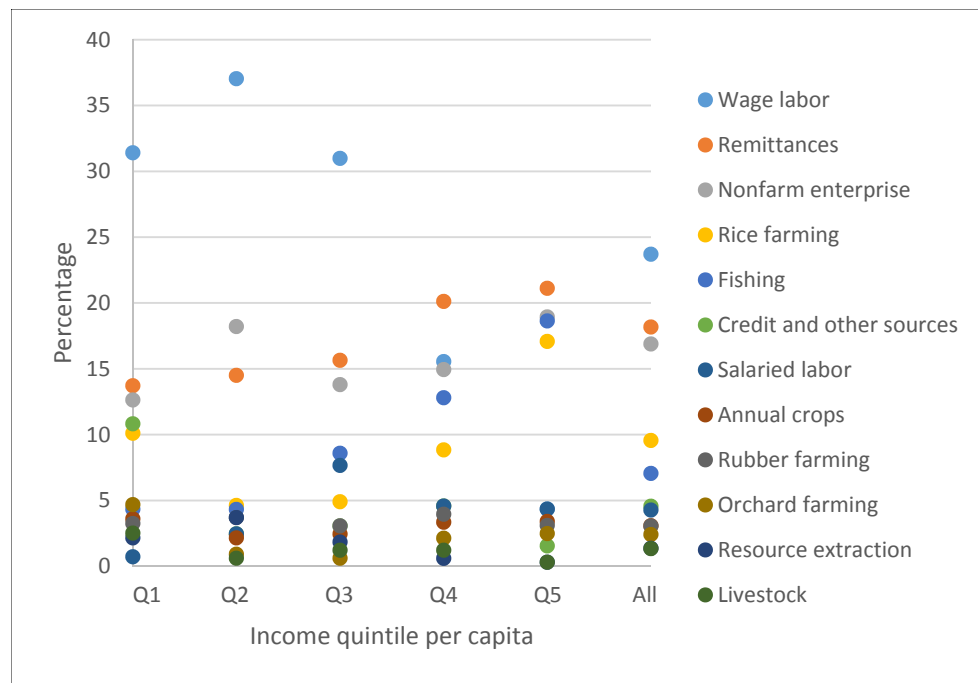
Wage labor, remittances, and nonfarm enterprises are prominent, with 59% of households reporting receiving the majority of their income from one of these sources. Approximately 24% of all households receive 50% or more of their income from wage labor, but this source is more prominent among households in the lower income quintiles (31–37%). While households in the top two quintiles are more likely to receive income from remittances (41–49%), it is a dominant source of income for only half of those who receive it (20–21%), serving as supplementary income for the remainder. Fishing and rice farming are more likely to be dominant sources of income for households in the top quintiles (17% and 19%, respectively) than for other quintiles. Nonfarm enterprises are the dominant income source for 17% of households, and this share stays relatively constant across quintiles.

For the whole sample, the largest share of income comes from agricultural (crop) production (24%), followed by remittances (22%), nonfarm businesses (18%), wage labor (14%), and fishing (11%) (Figure 16). However, the composition varies greatly by income quintile. Wage labor makes up almost half of total income (46%) for the lowest income quintile, but drops to just 4% for the top quintile. Fishing income has the opposite pattern, accounting for just 4% of total income for quintile 1 but 14% in quintile 5. Remittances make up about 11–17% of total income for the bottom three quintiles but increase to 23–25% for the top two. Nonfarm businesses consistently make up 15–19% of income across the quintiles.

Figure 16. Composition of Total Income by Income Quintile
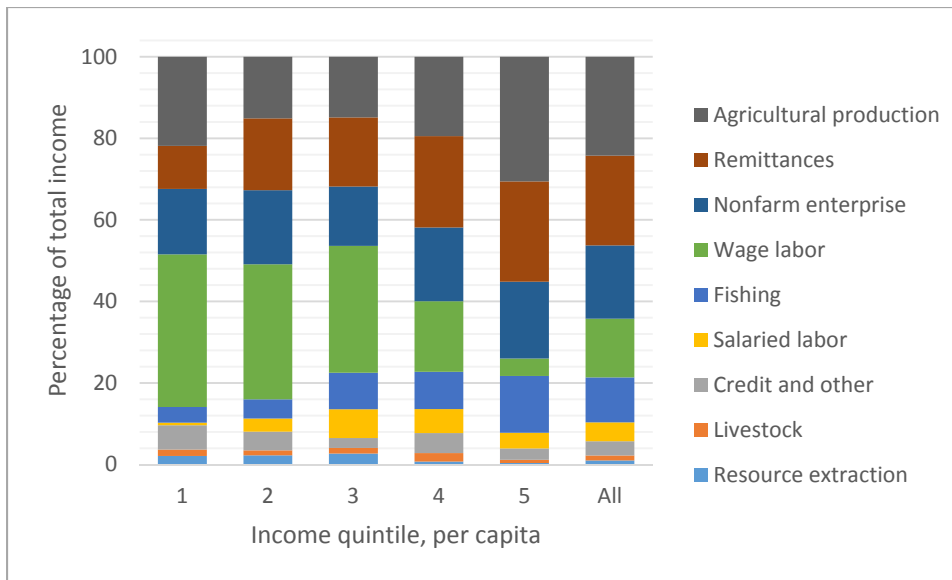
Note**:** For ease of interpretation, negative income was removed from the calculations in this figure.

As a share of agricultural production income, rice farming fluctuates from one quintile to the next (Figure 17). Households in the bottom income quintile have higher landownership rates and receive a greater percentage of their income from rice farming than do those in quintiles 2 and 3. The number increases again for quintile 5, which also has a higher-than-average rate of landownership and percentage of income received from rice farming. All other income sources from agricultural production make up a low and fairly constant share of income across quintiles, ranging from 3 to 4%, though, like rice production, their share is also slightly higher among households in quintiles 1 and 5.

Figure 17. Composition of Agricultural Income by Income Quintile
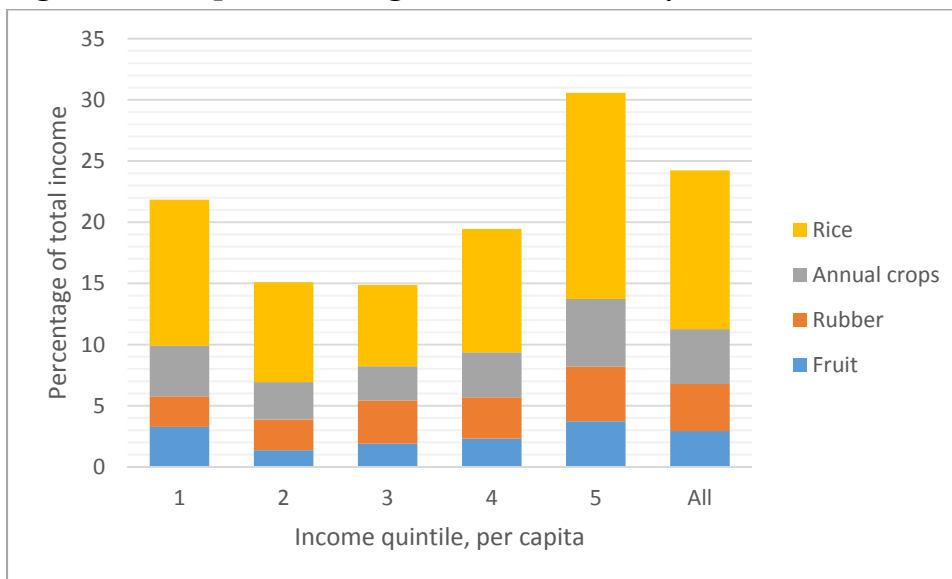
Note: For ease of interpretation, negative income was removed from the calculations in this figure.

In summary, households in Mawlamyine district are more likely to be classified in the upper quintiles than households in Thaton district, as are those in the coastal agroecological zone compared with the other zones. Households in the upper income quintiles have higher educational attainment and greater access to improved housing characteristics, such as electricity, plumbing, and roofing. Four distinct patterns emerged from the livelihood strategies and incomes. First, agricultural production, remittances, nonfarm enterprises, and wage labor are the largest sources of income for households and have the highest rates of participation. Second, households in the upper two income quintiles have slightly more diversified livelihood strategies than the average household. They are heavily reliant on remittances and slightly more reliant on income from agricultural production and fishing. Third, the bottom three quintiles participate in and receive the majority of their income from wage labor. Last, nonfarm enterprises are a steady source of income across all income quintiles.

5.4. Landownership and Tenure Arrangements

Agricultural landownership varies greatly among the different regions of Mon State (Table 10). Nearly 59.5% of households in Mon have no agricultural land, but this ranges from 73.2% in Chaungzon township to 38.5% in Mudon township. Of those households with agricultural land, the average area of holdings is 7.3 acres (median 5.0 acres), but again, this varies greatly across townships, ranging from almost 10 acres in Ye and Thanbyuzayat in the south to a little more than 2 acres in Mawlamyine township. There is little difference between the area of agricultural holdings owned and the area cultivated, an average difference of just 0.1 acres.

Table 10. Agricultural Landholdings by Township (North to South)

Township	Households owning agricultural land (percentage)	Average area of agricultural land owned (acres)	Median area of agricultural land owned (acres)	Average area of agricultural land operated (acres)
Kyaikto	34.6	6.7	4.0	6.1
Bilin	38.1	5.6	3.5	5.6
Thaton	34.5	7.1	4.0	7.4
Paung	36.6	6.6	5.0	6.9
Mawlamyine	28.0	2.3	1.5	2.3
Chaungzon	26.8	5.3	4.0	5.2
Kyaikmaraw	51.1	7.3	5.0	7.2
Mudon	61.5	8.3	6.0	8.0
Thanbyuzayat	51.2	9.9	6.0	9.4
La Mine	52.2	8.6	6.0	8.8
Ye	34.6	9.3	6.4	8.7
Mon State overall	40.5	7.3	5.0	7.2

Note: Includes land rented in and omits land rented out.

Table 11. Agricultural Landholdings by Agroecological Zone

Zone	Households owning agricultural land (percentage)	Average area of agricultural land owned (acres)	Median area of agricultural land owned (acres)	Average area of agricultural land operated (acres)
Coastal	38.6	10.3	6.0	9.9
Lowland	37.3	6.6	5.0	6.6
Upland	45.5	6.9	4.0	6.8

Mean and median landholdings are higher in coastal areas (Table 11). Median landholdings are lowest in the upland zone, where landownership rates are slightly higher than the state average but still less than half of all households.

We compute the Gini coefficient, one of the most widely used summary measures of inequality, for landholdings. The Gini coefficient can vary between the extremes of 0 (everyone has the same amount of land), and 1 (one person has all the land). The estimated Gini coefficient of landownership in Mon State is 0.76, reflecting the highly unequal distribution presented in Table 10. The coefficient increases marginally to 0.77 when operated holdings (those borrowed or rented in) are included, indicating that rather than offsetting the unequal distribution of land, borrowing and leasing have a slightly negative redistributive effect.

The Gini coefficient for the distribution of agricultural land (excluding landless households) is less extreme but still fairly high, at 0.53. To help interpret this coefficient, Figure 18 displays the Lorenz curves for landownership. It shows that the top 20% of households own 56% of all agricultural land, compared with just 2% of land owned by the bottom 20% of households. The top 40% of households own more than 75% of all agricultural land while the bottom 40% own less than 10%. This coefficient would likely be larger still if large plantations were included in our survey.

Figure 18. Lorenz Curves for Landownership
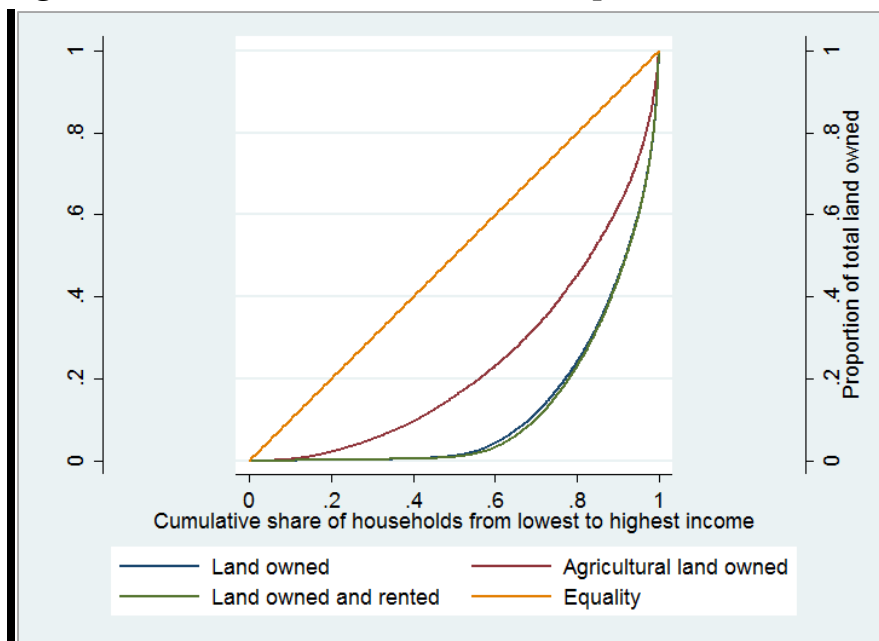
Table 12. Number and Area (Acres) of Holdings by Land Use Type

Item	Parcel type						
	Residence	Paddy field	Rubber plantation	Orchard	Other crops	Virgin/vacant/ forest land	All land
Mean area of land owned per household	0.2	6.0	5.5	3.5	3.6	5.2	2.5
Median area of land owned per household	0.1	5.0	3.0	2.0	1.5	1.5	0.3
Mean area of land rented/borrowed/leased in per household	0.1	4.8	3.9	1.2	1.0	1.2	1.2
Median area of land rented/borrowed/leased in per household	0.1	4.0	1.0	1.0	0.5	0.5	0.1
Mean area of parcels operated by operating households	0.2	5.8	5.4	3.3	3.1	4.8	2.3
Median area of parcels operated by operating households	0.1	5.0	3.0	1.5	1.5	1.5	0.2
Share of parcel type in total number of parcels (percentage)	59.2	16.3	14.5	4.0	3.7	2.0	100.0
Share of parcel type in total land area (percentage)	4.9	39.4	36.4	5.9	4.3	4.1	100.0
Share of parcel type in total parcel area owned (percentage)	82.7	84.3	96.6	87.0	81.5	89.4	85.3
Maximum area of parcels owned per household	5.0	67.0	90.0	60.0	30.0	70.0	90.0

Respondents reported six major land use types: residence, paddy field, rubber plantation, orchard, other crops, and virgin/vacant/forest land. The average area of land owned, accessed via other tenure arrangements, and operated, per household, by parcel type, is reported in Table 12. In each case, the mean is calculated using the number of households owning or operating each type of land. There is little difference in the average area of parcels owned for rubber and rice (about 6 acres each) although, interestingly, the median area of rubber plantations is considerably smaller than that of paddy fields (5 versus 3 acres). Parcels owned are generally larger on average than parcels accessed through other tenure arrangements. Residences account for the majority of parcels (59%), followed by paddy fields and rubber plantations (39% and 36% of total area, respectively).

The majority of land (85.3%) is owned outright. Among agricultural land use types, the share of land accessed through tenure arrangements other than ownership (that is, rented, borrowed, or shared in) ranges from 3.4% to 18.5%, and is highest for farmers of *other annual crops*. The maximum area

Table 13. Means of Parcel Acquisition by Parcel Type

Means of acquisition		Parcel type					
	Residence	Paddy field	Rubber plantation	Orchard	Other crops	Virgin/vacant /forest land	Mon as a whole
Given by local state	3.9	1.8	3.7	2.8	4.3	3.7	3.7
Inherited	29.5	30.5	25.7	33.4	34.0	24.0	28.6
Purchased	48.4	49.6	62.2	50.5	40.4	64.3	50.9
Received as gift	0.7	0.2	1.7	1.1	0.0	0.0	0.7
Occupied	0.9	0.4	4.1	2.0	1.6	0.0	1.7
Rented in/ borrowed	16.6	17.3	2.7	9.2	19.7	8.1	14.3
Sharecropped in	0.1	0.2	0.2	1.1	0.0	0.0	0.2

of parcels owned by landowning households is quite low, reaching an upper limit of 90 acres for rubber (Table 12).

Somewhat surprisingly, purchase is the most important form of land acquisition, accounting for between 40% and 64% of land acquisitions across all land use categories, followed by inheritance (Table 13). Seventeen percent of households access residences or land for rice cultivation by renting in or borrowing, but only 3% access land for rubber cultivation in this way. Very little sharecropping occurs, even for rice, and parcel acquisition by state grant is relatively insignificant.

Land tenure security is an important issue in Myanmar. Two-thirds of land parcels are reported to have some form of documentation that confers land use rights or indicates a history of land use. This figure is highest for agricultural parcels, at 76%. However, among agricultural land parcels, only 25% are covered by Form 7, a document introduced in 2012 that confers relatively secure, transferrable use rights, and 11% by Form 105, the land use right document that preceded Form 7. The primary form of documentation to show land use rights is either tax receipts (45%) or contracts (29%). Only 10% of residential parcels are covered by a house grant (*ain* grant), the most secure form of tenure for homestead land (Table 14). Of households with agricultural land who do not yet possess Form 7, 87% had yet to begin the application process to obtain one. Of these households, 47% reported that they did not know it was required, 22% that there was no need, and 18% that they did not know how to do so.

Table 14. Share of Households Possessing Documents Conferring User Rights, by Parcel Type and Document Type (Percentage)

Parcel type	Form 7	Form 105	Contract	Tax receipt	House grant	Other	Does not know	Total
Residence	1.3	1.9	36.4	48.2	10.9	0.6	0.3	100
Agriculture	24.9	10.7	19.9	41.5	0.9	1.2	0.9	100
All parcels	13.0	6.3	28.5	44.9	6.0	0.9	0.5	100

Table 15. Parcel Use Change from Original to Current

Parcel use	Original use			Use five years ago			Current use		
	Number of parcels	Share of parcels (%)	Mean parcel size (acres)	Number of parcels	Share of parcel s (%)	Mean parcel size (acres)	Number of parcels	Share of parcel s (%)	Mean parcel size (acres)
Residence	1,276	50.7	0.4	1,501	59.6	0.4	1,505	59.8	0.2
Paddy field	446	17.7	5.6	417	16.6	6.1	409	16.3	6.3
Rubber plantation	180	7.2	4.9	275	10.9	5.5	365	14.5	5.6
Orchard	109	4.3	3.2	110	4.4	3.6	97	3.9	3.6
Other crops	72	2.9	3.1	76	3.1	3.1	90	3.6	2.9
Vacant/virg in/forest land	404	16.1	2.9	115	4.6	2.9	41	1.6	4.1
Total	2,519	100	2.3	2,519	100	2.5	2,519	100	2.5

The total number of parcels owned by surveyed households has changed little between the time of the parcel's original acquisition and the time of the survey (Table 15). The total number of residences increased from 1,276 to 1,505, up 11%. The number of plots devoted to rubber grew from 180 to 365 (an increase of 85%). There was little change in the number of plots devoted to orchards. The number of plots used as paddy fields fell by 10%. The biggest decline in plot numbers was for vacant/virgin/forest land, which contracted by 91%. The largest number of plot conversions were from vacant/virgin/forest land to residences (43% of all plot use changes), followed by vacant/virgin/forest land to agriculture (31% of all plot use changes). Expansion of the area under rubber cultivation was thus implicated in a substantial reduction in vacant/virgin/forest landholdings, while construction of new residences reduced the area of agricultural land and, to a lesser extent, vacant/virgin/forest land.

Average parcel size declined from 2.5 to 2.3 acres, driven primarily by the growth in the number of residential parcels of smaller average size (from 0.7 to 0.4 acres) (Table 15). Interestingly, the average size of paddy parcels increased, from 5.5 to 6.4 acres, as numbers of individual paddy parcels fell, suggesting a degree of nascent consolidation taking place. The average size of rubber plantations grew slightly (from 5.0 to 5.4 acres), even as parcel numbers increased.

Conflicts were reported to have occurred over usage rights for only 3% of parcels. Of these, 91% had been resolved at the time of the survey. Conflicts were slightly more prevalent in Chaungzon and Kyaikmaraw townships (6% and 5% of parcels, respectively) than elsewhere, and conflicts over residential plots were marginally more common than over other types of land. There was little difference in prevalence of land use conflicts by ethnic group.

5.5. Other Assets

5.5.1. Large Assets

We define large assets as motor vehicles, boats, mills, and land and buildings used for nonagricultural business, excluding housing. Of the households surveyed, 90% own two or fewer

Table 16. Prevalence of Asset Ownership by Asset Type and Household Characteristics (Percentages)

Type of asset owned	Coastal	Lowland	Upland	Households with agricultural land	Households without agricultural land	Fishing house-holds	All house-holds
Motorbike/scooter	41.3	33.1	37.5	50.7	25.9	32.2	36.3
Land used for nonagricultural business	12.4	7.4	14.5	24.3	0.7	0.4	10.1
Small boat, motorized	14.6	2.4	3.1	5.0	4.3	32.8	4.6
Tractor	3.3	3.2	1.6	4.9	0.8	2.8	2.5
Car	5.0	1.6	2.3	3.9	1.3	3.1	2.4
Building used for nonagricultural business	1.5	3.5	0.9	4.4	0.6	0.5	2.2
Power tiller	1.5	2.8	0.7	4.4	0.2	0.0	1.9
Small boat, not motorized	4.8	2.0	0.5	1.9	1.9	13.2	1.9
Trawlarjee	2.0	1.4	1.4	2.8	0.4	0.0	1.4
Three-wheeled motorized vehicle	1.6	1.3	1.2	1.8	1.0	0.0	1.3
Large boat, motorized	3.5	0.9	0.3	1.6	0.8	6.8	1.1
Other motorized transportation	1.2	0.9	0.8	1.1	0.8	1.5	1.0
Mill	0.0	0.3	0.2	0.7	0.0	0.0	0.3
Truck	0.4	0.1	0.2	0.3	0.1	0.0	0.2

Note: A *trawlarjee* is a rudimentary motorized vehicle consisting usually of a tractor engine mounted onto a cart or trolley.

large assets, with a little more than half of households (52%) owning no large assets at all. Motorbikes are by far the most common type of large asset owned, with 36% of rural Mon households possessing at least one (Table 16). Households owning agricultural land are almost twice as likely as households without agricultural land to own a motorbike (51% versus 26%). Households with agricultural land also have higher levels of ownership of large agricultural assets, such as tractors and power tillers, than those without agricultural land. As would be expected, coastal households and those engaging in fishing have higher levels of boat ownership than nonfishing households and those located further inland. Cars are the most expensive large asset owned, costing approximately MMK 6,766,000 (US$5,775) on average. Motorbikes and small motorized boats are relatively more affordable, averaging MMK 924,000 and MMK 705,000, respectively.

Remittances play an important part in facilitating the purchase of large assets, particularly for those households who reported having a migrant member at the time of the survey (Table 17).

Table 17. Contribution of Remittances to the Purchase of Large Assets in Households with Migrants (Percentage of Households Reporting)

Type of asset owned	Extent of contribution		
	None at all	A small part	The majority
Car	54.5	9.1	36.4
Motorbike/scooter	54.2	12.5	33.3
Building used in nonagricultural business	56.3	18.8	31.3
Tractor	47.6	23.8	28.6
Other machinery for nonagricultural business	33.3	33.3	22.2
Power tiller	72.2	11.1	22.2
Land used for nonagricultural business	74.4	9.0	15.4
Other motorized transportation	87.5	0.0	12.5
Trawlarjee	66.7	22.2	11.1
Small boat, motorized	70.8	20.8	8.3
Three-wheeled motorized vehicle	58.3	41.7	0.0
Small boat, not motorized	80.0	20.0	0.0
Large boat, motorized	100.0	0.0	0.0
Mill	100.0	0.0	0.0
Total	60.2	14.0	26.0

Note: A *trawlarjee* is a rudimentary motorized vehicle consisting usually of a tractor engine mounted onto a cart or trolley.

Contributions from remittances to the purchase of large assets are greatest for motor vehicles, agricultural machinery, and investments in nonagricultural business. For example, more than one-third of households with a migrant member reported that purchase of cars and motorbikes had been funded mainly by remittances, and more than half of households with a migrant who had purchased a tractor reported that remittances accounted for part of the purchase costs. This indicates that remitted incomes are spent on both productive and nonproductive assets. Boats, however, are rarely purchased using remitted incomes, perhaps suggesting that fishing is not considered to be a high-potential investment opportunity. In addition, remittances play a large role in financing home construction, which we return to in Section 8.5. We devote an entire section of this report, Section 8, to the role of migration and remittances in the Mon economy.

Ownership of large assets increased substantially over the preceding five years, up from an average of 1.1 to 1.9 large assets per household (Table 18). Increases in asset ownership occurred at roughly equal rates for the bottom 60% and the top 40% of households by income, though households in the top 40% own 0.4 more assets than those in the bottom 60%. When broken into expenditure quintiles, the bottom quintile owned an average of 1.7 large assets in 2015, compared with 2.1 for the top quintile.

Table 18. Change in Large Asset Ownership during the Last Five Years, by Expenditure Group

Expenditure group	Mean number of large assets owned per household in 2010	Mean number of large assets owned per household in 2015	Increase in mean number of large assets owned per household (percentage)
Lowest 3 quintiles	1.0	1.7	70.0
Highest 2 quintiles	1.3	2.1	60.0
All	1.1	1.9	68.3

5.5.2. Small Assets

The most common small assets owned in Mon State are lamps (84%), followed by locks (63%), televisions (61%), and mobile phones (58%) (Table 19). Overall, nonelectronic durable goods such as household furniture and cooking equipment are the most common type of small asset owned, with 95% of households owning at least one type of durable good. Coastal households own on average more electronic and nonelectronic durable goods, electrical and entertainment products, and fishing gear than upland and lowland households. Households with agricultural land are more likely to own small assets than households without agricultural plots, especially manual and mechanical agriculture implements, vehicles, durable electronic goods, and entertainment products.

Table 19. Prevalence of Asset Ownership by Small Asset Type and Household Characteristics (Percentage)

Type of asset owned	Percentage of households owning, by household group					
	Coastal	Lowland	Upland	Owns agricultural land	Does not own agricultural land	All households
Durable goods (nonelectronic)	98.4	94.0	95.0	95.5	94.8	95.0
Electrical communication and entertainment products	87.7	80.5	79.6	86.2	76.7	80.6
Durable goods (electronic)	46.0	42.2	35.9	46.0	35.3	39.6
Agricultural implements (manual)	31.3	37.2	35.4	57.3	20.9	36.1
Gold	33.9	30.9	33.6	35.9	29.0	31.8
Fishing and forestry gear	48.9	26.7	27.5	32.9	28.7	30.5
Agricultural implements (mechanical)	9.4	15.7	14.8	25.7	6.2	14.3
Vehicle/transportation	7.3	10.1	9.5	17.1	4.6	9.9

Table 20. Share of Households Owning Small Assets, Percentages, by Consumption Expenditure Quintile

Type of asset owned	Q1	Q2	Q3	Q4	Q5	All quintiles
Durable goods (nonelectronic)	91.1	92.5	95.4	96.6	99.2	95.0
Electrical communication and entertainment products	59.4	72.9	85.9	89.1	94.9	80.6
Durable goods (electronic)	27.8	29.3	45.1	46.1	49.2	39.6
Agricultural implements (manual)	26.9	34.5	33.7	40.0	45.5	36.1
Gold	19.5	26.5	31.0	36.9	45.0	31.8
Fishing and forestry gear	27.0	30.5	26.6	30.7	38.0	30.5
Agricultural implements (mechanical)	6.0	11.0	15.6	17.6	21.2	14.3
Vehicle/transportation	3.7	11.1	9.6	12.8	12.1	9.9

There is a significant difference in small asset ownership across consumption expenditure quintiles (Table 20). Durable nonelectronic goods are the most widely owned small asset, with 91% ownership in the first quintile and 99% in the fifth quintile. In the fifth quintile, 95% of households own electronic communication and entertainment products, compared with only 60% in the first quintile. This is mainly driven by television and cell phone ownership. Agricultural implements, both mechanical and manual, are more widely owned in the top quintiles. Vehicles, on the other hand, which include bicycles, carts, and trishaws (three-wheeled vehicles), have even ownership over the top four quintiles.

6. AGRICULTURAL INCOME-GENERATING ACTIVITIES

Agriculture is one of the primary sources of income for Mon State residents, with 61% of Mon households in our survey earning income from agriculture production or services: 51% are engaged in agricultural production, 20% earn wages from agricultural services work, and 10% have income from both. In both lowland and upland areas, around 51% of households earn income from agriculture, while in coastal areas only 43% of households have agriculture income. Households in Mawlamyine and Chaungzon townships earn less than 40% of their income from agriculture, the lowest in the state (Figure 19).

Rice production and rubber production are the most common agricultural activities, practiced by 38.6 and 36.3% of farmers, respectively. Livestock is kept by 20% of households, though very few of these have large-scale operations. The most common annual crops are betel leaf and roselle, followed by green gram (mung beans). While most agricultural households in our sample specialize in a single type of production (rice, rubber, annual crops, orchards, or livestock), 37% of households with agriculture earnings have more than one source. Rubber producers are least likely to match their rubber income with another agricultural income source (Figure 20).

By ethnic group, the Kayin are the most likely to earn income from agriculture, and the ethnic Burmese are the least likely, with 67% and 38% of households, respectively. Of Mon ethnic households, 56% work in agriculture (results not shown in figures).

Figure 19. Percentage of Households with Agriculture Income, by Township (North to South)
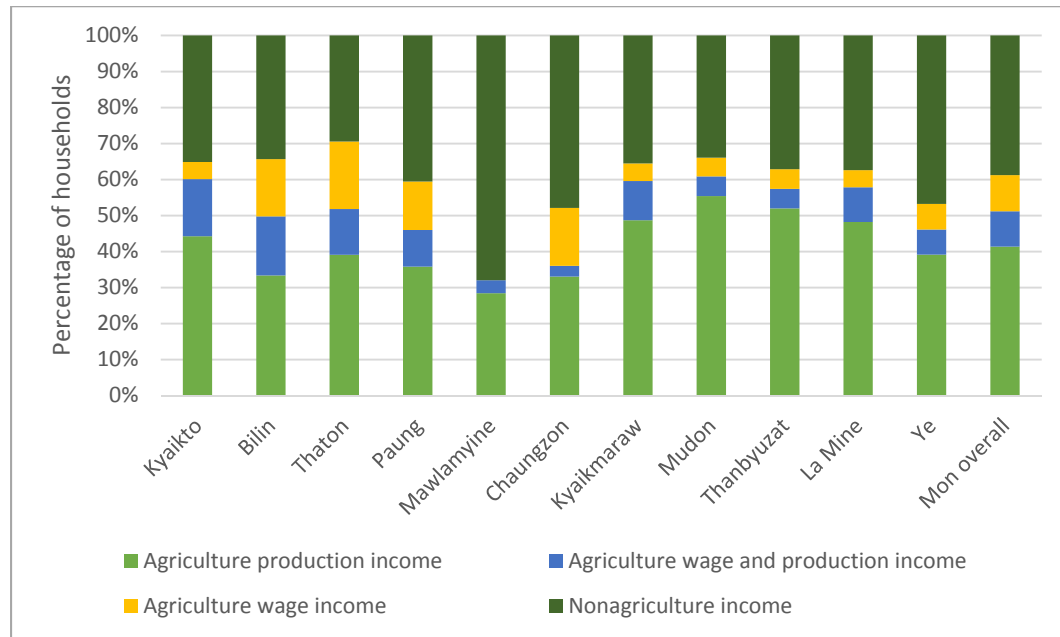
Figure 20. Percentage of Households with Agriculture Production Income
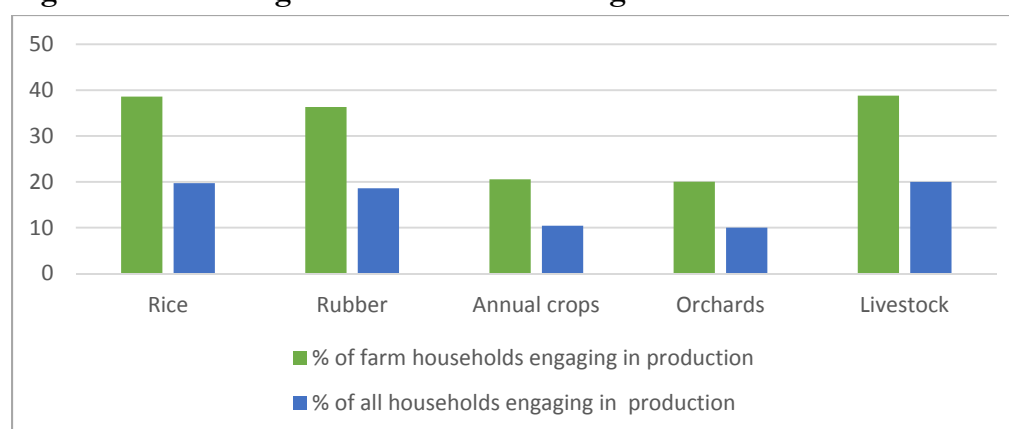
Mean income is highest for households that farm rice, followed by rubber and other annual crops. At the same time, however, on a per-acre basis, annual crops and orchards are much more profitable (Table 21). Overall, 7.0% of households with agricultural earnings have negative income from agriculture. However, this percentage drops to only 0.4% if we restrict the sample to households with two or more agricultural income sources. Per-acre costs are similar across crops, with the exception of orchards, where farmers report far lower costs. Costs per acre are greatest for annual crops and lowest for orchards.

Table 21. Mean Income and Costs for Agriculture Sectors

Indicator	Rice	Rubber	Orchard	Other annual crops	Livestock
Mean income (Myanmar kyats)	1,678,826	1,139,456	692,532	1,077,451	123,337
Median income (Myanmar kyats)	755,500	428,885	114,040	288,000	35,000
Mean income (per acre, Myanmar kyats)	205,125	205,052	393,589	1,035,906	n.a.
Mean profit (per acre, Myanmar kyats)	124,972	117,367	349,509	766,901	n.a.
Percentage with negative incomes	2.17	1.49	3.10	1.77	1.17
Percentage with other agriculture income sources	57.72	48.71	61.95	71.90	49.67
Mean costs (Myanmar kyats)	463,015	441,898	92,291	309,808	—
Median costs (Myanmar kyats)	309,000	204,000	26,000	182,000	—
Costs (per acre, Myanmar kyats)	80,153	87,685	44,080	269,005	n.a

Note: — = data not available; n.a. = not applicable.

Table 22. Cost Breakdown by Agriculture Sector

Cost category	Rice	Rubber	Orchards	Annual crops
Seeds	5%	2%	n.a.	31%
Fertilizer, herbicide, pesticide	28%	57%	32%	27%
Machinery, animals, and transportation	29%	19%	22%	19%
Labor	37%	23%	46%	23%

Note: n.a. = not applicable.

The distribution of costs varies by agricultural sector (Table 22). Labor is the most expensive input for rice and orchards; for rubber it was chemical inputs, which includes the costs for acid. Annual crops require an annual investment in seeds that makes up the largest share of costs.

Figure 21 shows the number households with agricultural producers or agricultural wage workers by quintile of income, revealing that there are fewer wage workers in the upper income quintiles.

On average, agricultural households make 51% of their total household income from agriculture, though this varies depending on sector. Orchard-farming households complement their orchard income by earning more than 55% of their income from nonagricultural sources, while for rice farmers this figure is only 42% (Figure 22). As shown in Section 4.3, livestock income does not make up a large share of income for most Mon households. Households that do engage in livestock rearing generally derive most of their income from other agricultural sources or from nonfarm employment.

The rest of this section goes into greater detail about the production systems for each of the agricultural sectors described above. In addition to the technical aspects of production, we outline the economic aspects of each activity, in particular contributions to household incomes and livelihoods.

Figure 21. Percentage of Agricultural Households per Income Quintile
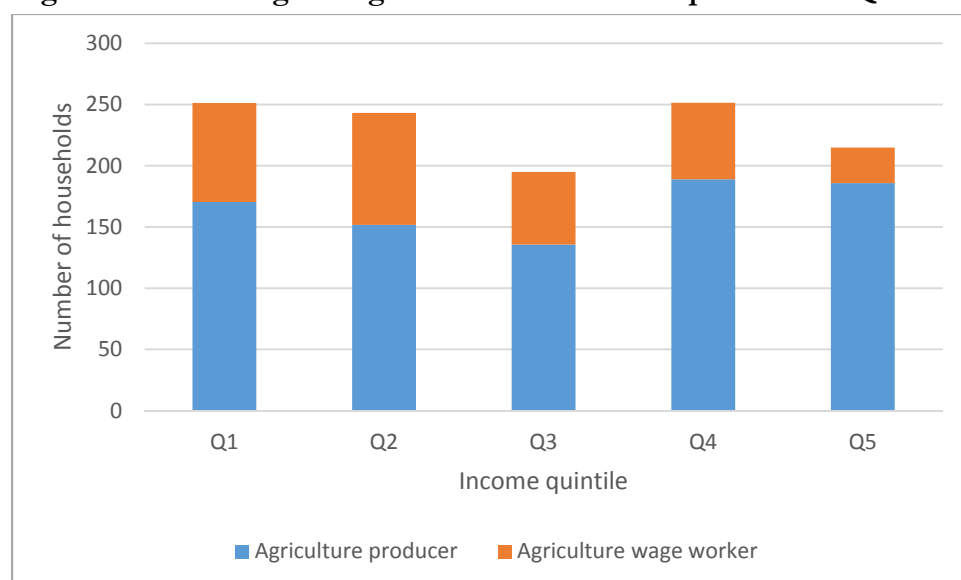
Figure 22. Agricultural Income as Percentage of Total Household Income
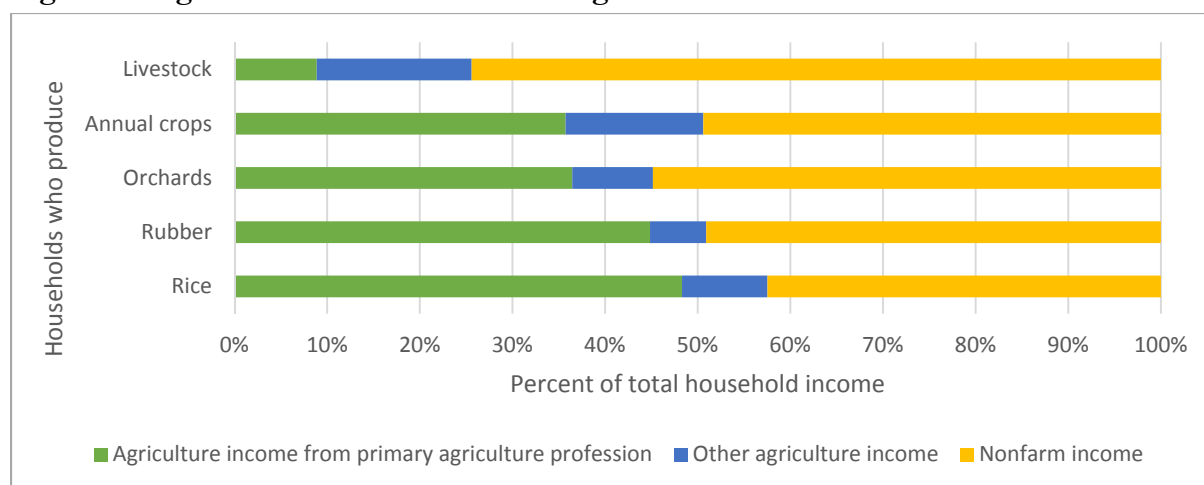
6.1. Rice Production in Mon State

6.1.1. Production System

Although rice is the most important staple crop in Mon State, rice production is of relatively low intensity. The rice sector in Mon State is dominated by small and medium-size farmers with rainfed plots. The average rice farm in Mon is 6.6 acres (2.7 hectares), which is not particularly small for the region. Forty percent of rice producers are smallholders with less than 2 hectares of land. Almost all rice farmers own their plots (86.5%), while 13% borrow, rent, or sharecrop their farm. Every rice-farming household head interviewed was born in the village where his or her rice farm is currently located.

Rice is grown throughout Mon State, though production is more concentrated in the lowlands. The lowland region is home to 57% of rice producers, the upland region 26%, and coastal areas 16% (Table 23). Rice farmers in coastal areas have slightly larger plots than farmers in lowland and upland regions. Rice farmers in Paung township have the largest plots (9.0 acres) and the largest number of acres under production in the monsoon season.

Table 23. Mon State Rice Farming Characteristics

| Characteristic | Mon State overall | By agroecological zone | | | By landownership | |
		Coastal	Lowland	Upland	Owns agricultural land	Does not own agricultural land
Average parcel size (acres)	6.6	8.4	6.6	6.2	6.6	6.3
Percentage cultivated in monsoon season	86%	98%	87%	87%	87%	87%
Percentage cultivated in cold season	13%	2%	13%	12%	12%	13%
Percentage with improved irrigation methods	23%	8%	27%	23%	24%	15%

Rice cultivation in Mon State is generally concentrated in the monsoon season. Only 3% of rice farmers in Mon have two harvests a year, due to extremely low cold-season cultivation: only 13% of farmers cultivate their land during the cold season, 10% of whom do not cultivate rice during monsoon season. Almost no coastal producers grow rice during the cold season (2%), while 12% of upland and lowland producers grow rice in that season. In most townships, more than 95% of rice land was cultivated during monsoon season (the exception being Kyaikmaraw, where it is 70%).

Irrigation: Most of the rice fields in Mon State are flooded during the monsoon season. Most rice is rainfed (89%), with the remaining percentage sourced from river or streams (7%) or pumped sources (2%). Only 23% of rice farmers in Mon use improved irrigation methods such as canals and dams, electric pumps, or hand or pedal pumps, but this varies substantially among areas: in Kyaikmaraw, 42% of rice farmers use improved irrigation techniques, while in Kyaikto the figure is only 4%. There is no difference in irrigation methods used by large and small farmers.

Seeds: Few rice farmers in Mon use commercial seed. The majority (74%) of rice farmers in Mon use seeds from their own reserves, while the remainder purchase seeds (21%) or receive them as gifts or aid (4%). Of the seeds purchased, the majority are purchased from friends, relatives, or other farmers, with 6% purchased from retailers and only 3% from the government. Seed received as gifts or aid was given by friends, relatives, or other farmers, not by the government. These patterns vary somewhat geographically: in Mudon less than 2% of farmers purchased their seeds, while in Thaton this percentage reached 42%. Nevertheless, these statistics point to low development of the commercial seed sector for rice in Mon State.

In Mon, 70% of rice is transplanted, while 30% is directly seeded. In the lowland areas where the majority of rice farmers are located, 76% of farmers transplant their rice. In the upland regions, 46% of rice is directly seeded, while in the coastal regions the rate is 42%. More than 75% of rice farmers in La Mine, Ye, and Kyaikto directly plant seeds. In Bilin, direct seeding is carried out by only 5% of farmers. Finally, there is no difference in method of planting between large and small rice farmers.

Table 24. Mon State Rice Varieties Planted

Variety	Share of rice planted	Share purchased of rice planted	Median price (Myanmar kyats per basket)	Distribution of variety across agroecological zone		
				Coastal	Lowland	Upland
Kaut gyi	11%	9%	12,000	26%	49%	26%
Kamar kyi	10%	16%	8,500	47%	31%	21%
Pawsan mway	10%	23%	8,250	20%	47%	33%
Shwe tasote	9%	26%	6,000	0%	91%	9%
Manaw tukha	8%	31%	5,500	0%	66%	34%
Baw kyar	7%	11%	8,000	15%	65%	20%
Taung pyan	5%	11%	7,000	39%	50%	11%
Bangkok	5%	30%	6,500	31%	39%	31%
Manaw pyan	3%	45%	4,500	0%	69%	31%
Shwewar tun	3%	12%	5,000	12%	65%	24%
Naga yar	2%	21%	5,000	14%	47%	39%
Other	28%	24%	6,000	10%	62%	28%

Many varieties of rice are cultivated in Mon State. No single variety is found in more than about 10% of fields (Table 24). The three most popular rice varieties are traditional varieties from Mon and fetch the highest median price per basket. Farmers rarely use improved seed varieties distributed by the government because they have long stems (making them flood resistant) and therefore a longer growing period.

Fertilizer and Other Chemical Inputs: Approximately 82% of rice-producing households use some type of fertilizer, though applications rates are low (Table 25). While the government recommends using 100.0 kg/acre, rice-farming households in Mon use only a total of 37.0 kg of fertilizer per acre (45.0 kg if we restrict to those who do apply some fertilizer). Rice-farming households in the top two consumption expenditure quintiles apply slightly more fertilizer (42.5 kg/acre) than households in the bottom three (33.0 kg/acre). Upland farmers use the least fertilizer (33.5 kg/acre), compared with farmers in coastal and lowland regions, who use an average of 38.5 kg/acre.

Urea is the most common type of fertilizer used, followed by nitrogen/phosphorus/potassium (NPK). More bags of NPK and urea per acre are used in the coastal region, whereas more bags of organic fertilizer per acre are used in lowland areas. The average price of urea in Mon is MMK 674/kg (MMK 33,710 for a 50-kg bag), while the average price of NPK is MMK 568/kg.

Machinery and Animals: Agricultural machinery is not yet universally used in Mon State where many farmers rely on animal draft power or manual labor (Figure 23). A little less than half of rice farmers (44%) use machinery at any point in the production process. An additional 41% use animal power, and the remainder rely exclusively on manual labor. In the largest rice-producing townships, Kyaikmaraw, Thaton, Mudon, and Paung, the average rate of mechanization is 47%. Mawlamyine township has the highest rate of mechanization, at 59%, compared with Chaungzon, which has the lowest (29%). We also computed those shares for different farm sizes: it is slightly more common for larger landholders to use mechanized implements in rice production (53%) than smallholders (47%).

Table 25. Mon State Fertilizer Use

Fertilizer type	Percentage of rice-producing households who use fertilizer	Average quantity applied per acre (kg)		Mean price per kg
		All rice producers	Fertilizer users only	
All fertilizer	82.1	37.0	45.0	588
Urea	71.2	14.0	20.0	674
Nitrogen/phosphorus/potassium	34.6	12.5	35.5	568
Organic	2.5	3.0	115.0	1,138*
Pesticide	10.6	0.04	0.4	164
Herbicide	1.9	0.02	1.2	239

Note: * Organic fertilizer is sold in baskets rather than 50 kg bags like the other types of fertilizer. We used 30 kg as the weight of a basket.

Figure 23. Percentage of Farmers Using Machines, Animals, or Manual Labor for Rice Farming, by Township (North to South)
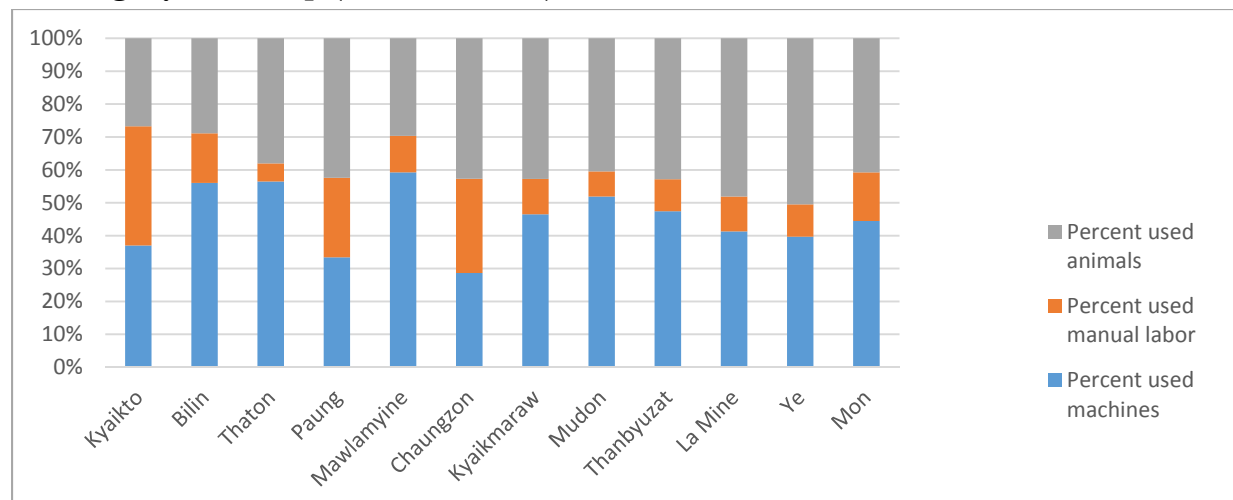
The majority of tractors are rented (68.5%), compared with owned (24.0%), indicating a strong rental market. The majority of animals used in rice production are owned (72.0%). The average spending on machinery and animals per acre for rice farmers is MMK 22,938.57, and the median is MMK 10,000.00. Per-acre costs for renting machinery are much lower than per-acre costs of renting animals. There is no major difference in terms of spending between households in the top two quintiles (MMK 24,034.29) and the bottom three (MMK 22,090.47). Further, there is little difference in spending among geographic regions.

Table 26 reports the costs of machinery or animal rental per acre of land in the various phases of the production process. Machines are most commonly used for milling (89%), transportation from farm to barn (61%), and land preparation (58%). Irrigation is the most expensive use of machinery, costing an average of MMK 76,327 per acre. Animal labor is most often used for land preparation, transportation from farm to barn, and threshing.

Table 26. Mon State Machine and Animal Use

Activity	Percentage who use			Machine cost per acre (Myanmar kyats)
	Machines	Draft power	Manual labor	
Land preparation	58	29	40	38,163
Transplanting/seeding	4	3	98	18,432
Irrigation	28	1	72	76,327
Threshing	57	21	41	26,877
Milling	89	3	13	17,334
Transportation: farm to barn	61	26	26	5,781
Transportation: barn to mill	39	26	43	3,520
Other	13	10	90	10,696
All activities	50	17	46	19,801

Labor: For those farmers who do not use machinery, rice cultivation is a labor-intensive activity, especially at the time of transplanting and harvest, when large groups of workers are usually required over short periods of time. To meet these labor requirements, farmers tend to engage in informal labor-sharing arrangements or, more commonly, to hire workers. In this section we outline farmer hiring patterns, first for permanent workers and then for temporary workers

Permanent workers are hired by 43% of rice-farming households. Of the permanent workers hired for rice production, 53% are males from the region, 25% are females from the region, 12% are male migrants, and 9% are female migrants. According to our survey, the average per-year cost of hiring permanent workers is MMK 265,000. The average daily wage paid is MMK 3,759, and the median wage paid is MMK 3,000, with males receiving on average MMK 1,000 more per day than females (Table 27). Though they are less frequently hired as permanent workers, migrant workers, on average, are paid a higher wage than that paid to local workers of the same gender by about MMK 1,000 per day. Migrant workers also receive an average of MMK 50,274 per year for transportation, meals, and gifts, compared with local workers, who receive a mean of only MMK 24,440 per year. Further, 83% of migrant workers receive lodging, while only 13% of local workers do.

There is some difference among geographic regions in terms of reliance on hired workers. Although the lowland region hires slightly more permanent workers (.42 per acre) than the other two regions (.33 per acre), average costs are slightly higher in the coastal region. At the township level, rice farmers in Chaungzon, Thaton, and Thanbyuzayat hire the most workers, while farmers in Ye hire almost none (Table 28). The majority of permanent workers hired are locals, although in Mudon and Thanbyuzayat a large percentage of migrant workers are hired. From our survey, we do not know whether temporary workers hired were migrant or local.

Table 27. Mon State Permanent Workers in Rice Farming

Indicator	Mon	Local male	Local female	Migrant male	Migrant female
Mean number of workers per acre (farmers hiring permanent workers)	0.9	0.6	0.7	0.4	0.9
Mean number of workers per acre (all rice farmers)	0.4	0.2	0.1	0.0	0.0
Mean daily wage (Myanmar kyats)	3,759	3,964	2,963	4,491	3,673
Mean cost per acre (Myanmar kyats)	50,601	37,249	26,849	31,075	46,982

Table 28. Permanent Workers in Rice Farming by Township (North to South)

Township	Workers per household	Wage (Myanmar kyats)	Percentage of rice farmers who hired		
			Permanent workers	Temporary workers	No hired labor
Kyaikto	0.4	3,075	68	30	34
Bilin	0.4	2,997	46	65	31
Thaton	0.6	3,791	65	60	22
Paung	0.4	3,785	54	57	17
Mawlamyine	0.0	3,000	14	0	84
Chaungzon	0.7	3,908	53	85	9
Kyaikmaraw	0.4	3,605	33	57	40
Mudon	0.2	3,955	50	81	12
Thanbyuzayat	0.5	4,780	53	56	29
La Mine	0.1	4,631	12	33	57
Ye	0.0	5,000	5	33	51

We do, however, observe a regional pattern in the daily wage paid to unskilled rice workers. Figure 24 shows that worker wages increase from north to south as we get closer to where Mon State borders Thailand. This wage gradient is consistent with the upward pressure on labor costs generated by the possibility to migrate to Thailand in search of higher pay, a phenomenon to which we devote an entire section below.

Of rice the farmers in Mon State, 57% hire temporary workers. On average, the yearly cost of temporary labor is MMK 11,913 per acre, though this varies widely depending on the activity. As shown in Table 29, temporary workers are mainly hired for transplanting seedlings and harvesting. The average cost per acre for hiring temporary workers for transplanting seedlings is MMK 22,900, while harvesting is MMK 11,665 per acre. Temporary workers are rarely hired to help with protection from birds or with weeding. Since herbicide and pesticide use is negligible, weeds and pests are an important issue for Mon rice farmers.

Figure 24. Average Wage Paid to Unskilled Rice Workers by Township (North to South)
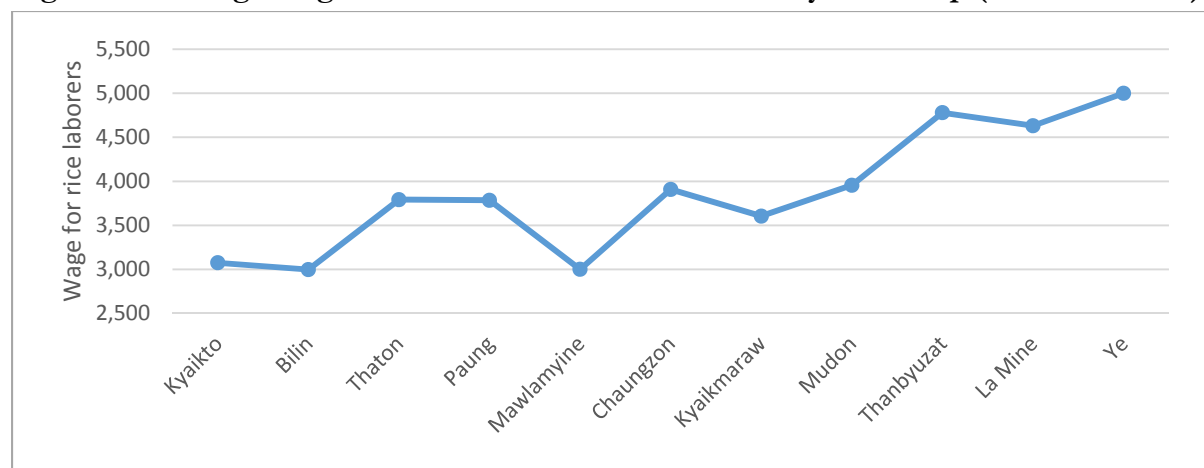
Table 29. Temporary Workers by Activity

Activity	Percentage of households who hire temporary labor	Average cost per acre (Myanmar kyats)	Percentage male workers	Percentage female workers
Nursery—land preparation	13.8	11,636	100%	0%
Nursery—broadcasting	11.2	9,445	93%	7%
Fertilizer application	9.0	2,580	100%	0%
Preparation of seedlings	8.9	9,228	100%	0%
Land preparation	4.4	3,468	100%	0%
Transplanting/seeding	75.0	22,939	45%	55%
Weeding	3.0	6,028	75%	25%
Protection from birds	0.6	0	0%	0%
Harvesting	71.3	11,665	56%	44%
Threshing	15.5	6,642	64%	36%
Transportation (mill, barn)	16.5	14,304	100%	0%
Other	2.7	12,067	75%	25%
All activities	19.3	11,913	58%	42%

The table reveals some gendered patterns of hiring. Male workers are more commonly hired than female workers as temporary labor, 58% as compared with 42%. However, female workers are more commonly hired for transplanting seedlings (55%). Male workers are used exclusively in land preparation, seedling preparation, nursery land preparation, fertilizer application, and transportation.

6.1.2. Rice Yields and Income

Average yields for Mon State are 57 baskets per acre, with a median of 50 baskets per acre. Rice baskets in Mon are 20.9 kg, making average per-acre yield 1,191 kg (2,943 kg/ha). The lowland region produces the most baskets per acre (59) compared with 57 in coastal areas and 53 in upland areas. There is also variation in yields by township: Kyaikto produces only 34 baskets per acre while Paung produces 74 baskets per acre. When rice farmers are divided into five equal groups based on per-acre income, those in the first group produce only 18 rice baskets (376 kg) per acre per year, while those in the fifth group produce 108 baskets (2,257 kg) per acre per year (Table 30).

Table 30. Rice Income and Production by Rice Income Quintile

Rice income quintile	Per-acre production, baskets	Per-acre production, kg	Per-acre revenue, Myanmar kyats	Per-acre production costs, Myanmar kyats	Per-acre net income, Myanmar kyats
1	18	376.2	88,763	108,416	-19,653
2	37	773.3	177,292	80,546	96,747
3	50	1045.0	248,885	70,236	178,650
4	73	1525.7	362,989	65,745	297,245
5	108	2257.2	551,172	75,431	475,741

Figure 25. Rice Yields Country Comparison (kg/Acre)
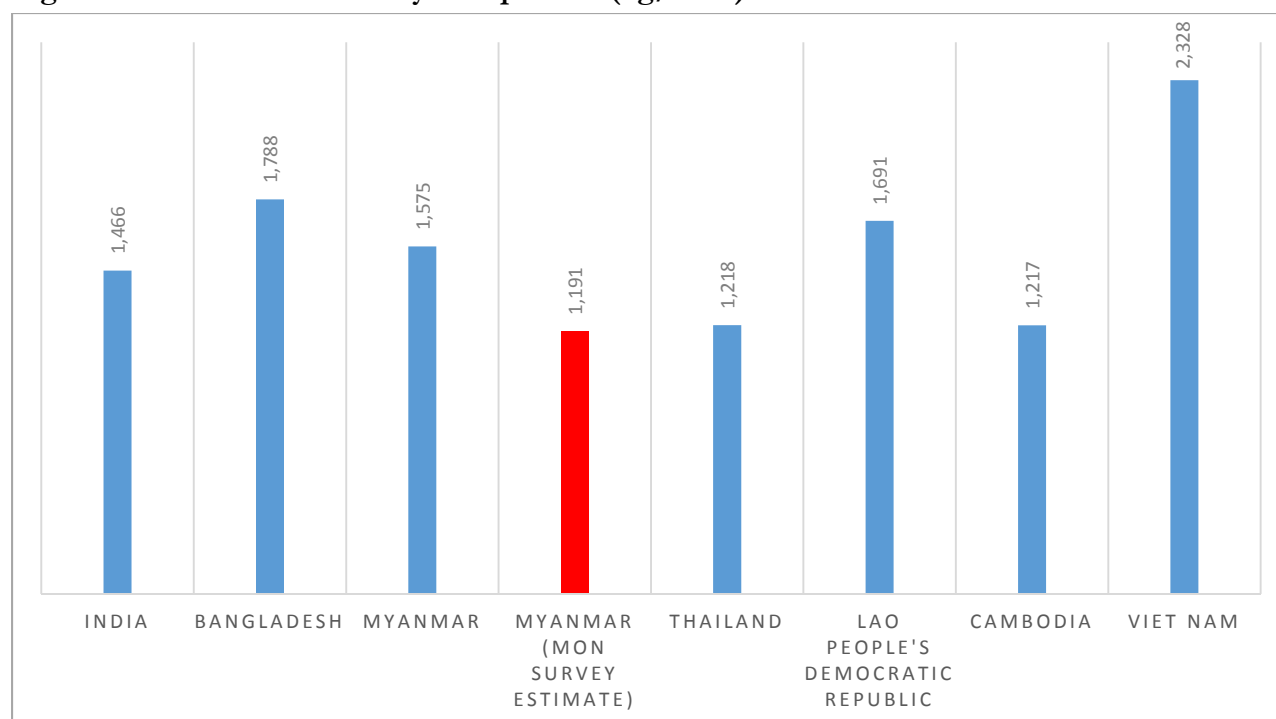
Bar chart values:
- INDIA: 1,466
- BANGLADESH: 1,788
- MYANMAR: 1,575
- MYANMAR (MON SURVEY ESTIMATE): 1,191
- THAILAND: 1,218
- LAO PEOPLE'S DEMOCRATIC REPUBLIC: 1,691
- CAMBODIA: 1,217
- VIET NAM: 2,328

Source: FAO (Food and Agriculture Organization of the United Nations). 2016. FAOSTAT database. Accessed February 15, 2016. http://faostat.fao.org; Mon State Rural Household Survey, 2015.

Those yields are relatively low by world standards. We compare yields in the region in Figure 25, using estimates from Food and Agriculture Organization (FAO) statistics.[7] The average yield estimate for Mon from our survey is 1,191 kg per acre, the lowest in the figure, a little lower than that of Thailand (1,218 kg per acre) and roughly half of Vietnamese rice yields. The yield we estimate is also lower than what the FAO estimates for Myanmar on average, which is 1,575 kg per acre, higher than yields in Thailand and Cambodia.

The average yearly net income per acre for rice producers in Mon is MMK 205,125, and the median is MMK 175,300 (Table 31). Mean costs are MMK 80,153 per acre per year, and median costs are MMK 56,814 per acre per year.

Table 31. Income and Costs (in Myanmar Kyats)

Indicator	Mean	Median
Rice revenue (per acre)*	285,278	256,000
Rice production (baskets per acre)	57	50
Price per basket (farmgate)	5,000	5,000
Rice costs (per acre)	80,153	56,814
Rice net income (per acre)	205,125	175,300

Note: * Rice revenue is calculated using both sold rice and own-consumed rice.

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[7] FAO (Food and Agriculture Organization of the United Nations). 2016. FAOSTAT database. Accessed February 15, 2016. http://faostat.fao.org.

Table 32. Costs

Indicator	Seed	Fertilizer	Machines and animals	Permanent labor	Temporary labor
Per-acre costs (Myanmar kyats)	2,418	16,080	19,888	19,871	11,588
Percentage of costs	5%	29%	28%	19%	18%
Percentage of income	2%	13%	16%	10%	8%

Labor costs contribute 37% of rice input costs and make up 18% of rice revenue (Table 32). Fertilizer and machinery each account for about one-third of the remaining costs of production. Seed purchases are generally quite small and their costs negligible.

There is very little differentiation in costs between the lowland, coastal, and upland regions, so income is only slightly higher in the lowland areas compared with the others, on account of improved yields. At the township level, incomes range from a low of MMK 112,726 per acre in Kyaikto to MMK 299,411 per acre in Paung. Per-acre production costs were lowest in La Mine and highest in Chaungzon.

6.1.3. Preharvest Loss

Preharvest losses such as those from flooding, disease, and pests all contribute to low rice yields (Figure 26) and were experienced by 61% of rice farmers in Mon State in the year prior to the survey. While 68% of farmers in the bottom three quintiles of rice income experienced preharvest losses, only 56% of farmers in the top two rice income quintiles did. Pests and diseases were the hardest to control in the highest rice income quintile.

Flooding poses the biggest problem for lowland farmers, and animal damage results in the most preharvest losses for upland farmers. Pests and diseases ae the biggest threats in the coastal and lowland areas, particularly snails (also an issue in Ayeyarwady and Bago regions). The government has tried to promote several methods to control the snail outbreak, including chemical and biological control, hand picking, baits, and traps, but so far they have proved too costly or too labor intensive. The snail infestation remains a major issue in many areas of Mon.

Figure 26. Percentages of Rice-Farming Households That Experience Preharvest Loss
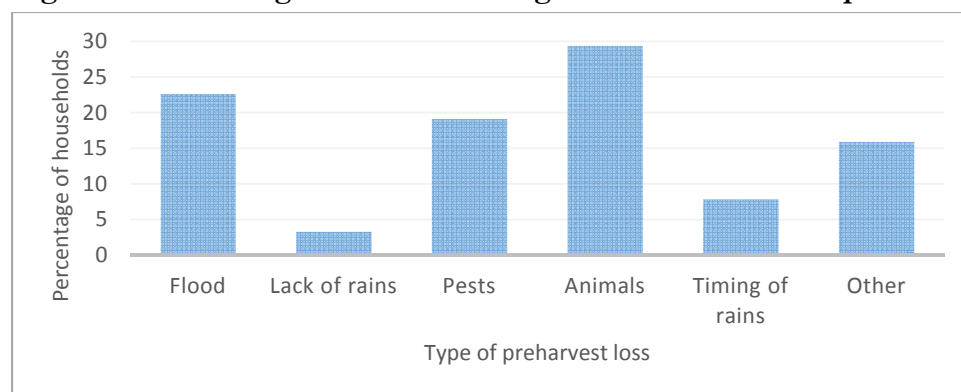
Figure 27. Final Uses of Harvested Rice

Legend:
- Sold — 25%
- Still available for sale — 4%
- Reserved for seed and own consumption — 54%
- Paid to plot owner — 7%
- Paid to hired labor — 6%
- Given out as gift — 4%
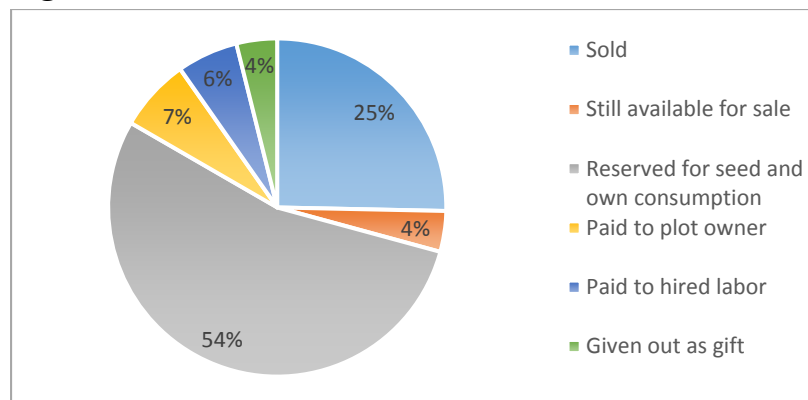
6.1.4. Commercialization and Marketing

Rice is both a subsistence crop and a possible means of generating income. However, 50% of rice farmers do not sell any of their harvest, meaning rice commercialization is low in Mon State. Overall, the average amount sold was about 30% of total harvest (Figure 27). Some farmers pay their hired labor in part with rice, but this makes up only about 6% of output. Most rice never leaves the household: it is kept either for consumption purposes (30%) or for use as next year's seed (24%).

For those 50% who do sell some of their harvest, the great majority make only one sale in the year, with only 15% reporting two or more sales in the past year. The majority of producers sell their rice only one or two months after harvesting (58% and 17%, respectively) and less than 5% wait more than five months to sell their rice, though presumably at higher prices. Most rice is sold to traders (86%) while 12% of farmers sell to neighbors and less than 1% sell to other villagers. Only 3% of rice is sold as milled rice, with the remainder sold as paddy.

On average, rice farmers in Mon had access to only 1.2 buyers during the last agricultural season, and in most cases (56%) access to more than 1 buyer did not result in a better price. Further, most rice farmers have access to only a single mill (1.2 mills on average), and those who can access 2 are offered nearly the same price by both. Farmers in the top two quintiles tend to have access to more buyers, sellers, and input sellers. Further, as income from rice increases, farmers have access to buyers offering different prices. Only 16% of rice producers in the bottom income quintile reported having access to buyers offering different prices, while 52% of buyers in the top income quintiles had access to buyers proposing different prices.

6.1.5. Conclusion: Rice

With 21% of rural households in Mon State engaging in rice production, rice is one of Mon's major crops. However, it is currently not a very profitable activity. The analysis of our data helps uncover several reasons that may be invoked to explain such low rice yields in Mon State. First, few farmers use improved varieties because the improved varieties are not compatible with Mon geography. Second, many choose broadcasting instead of transplanting, which saves on labor costs but also brings lower yields. Third, yields are low because of inadequate use of fertilizer, pesticide, and herbicide. Fourth, yields are low due to lack of improved irrigation. In addition, Mon State also suffers from widespread preharvest losses from flooding, pests, animals, and timing of rains. Postproduction, a weak processing sector and low prices mean the market environment is

disadvantageous to rice farmers. Average yearly income per acre, just above MMK 200,000, is lower than average income per acre for rubber, annual crops, or fruits.

On the one hand, the issues we document for Mon State paint a rice sector facing serious challenges, but on the other hand these findings suggest that there exists enormous potential to increase yields and improve food security and farmer incomes.

6.2. Rubber Production in Mon State

Introduced to Myanmar during British rule, rubber production remains the dominant cash crop in Mon State. While there are many large rubber plantations, the majority of rubber growers are smallholders. However, the sector is currently facing issues of low profitability that generate challenges for farmers and jeopardize the viability of the rubber activity in the state.

6.2.1. Production System

According to our survey, 19% of households own rubber farms, making the sector just as large as the rice sector. Most of these farmers are smallholders operating 2 hectares (4.9 acres) of land or less but still producing more than 54% of the rubber for the region. The average size of a rubber farm is 6.0 acres, with a median size of 4.0 acres.[8] Less than 1% of our sample owns a rubber farm larger than 40.0 acres. The median plot size is 2.0 acres less than the median rice plot size, but as a percentage of farmers, there are more smallholders in the rubber sector than in rice.

Of the rubber farms surveyed, 19% are in Thaton, the district bordering Yangon region, and 71% are in Mawlamyine district, which borders Thailand. The central part of the state has the greatest concentration of rubber farms and rubber processors (in the townships of Kyaikmaraw, Mudon, and Thanbyuzayat). This is also where the largest rubber farms are found, averaging 13 acres in Thanbyuzayat. Forty-six percent of rubber farms are located in upland areas, 35% in lowland areas, and 19% on coastal land. This distribution is in contrast with rice, which has only 26% of its producers in the upland region and 57% in the lowland region.

Rubber Expansion: Rubber is increasing in terms of acreage. According to the Myanmar Ministry of Agriculture and Irrigation (MoAI), planted area in Mon has increased by 11% annually, from 132,000 acres in 1997/1998 to 504,000 in 2010/2011. Rubber expansion is primarily occurring in upland areas in Mawlamyine district, though rubber producers have expanded in all townships and all geographic zones.

Due to the rapid increase in planted area in recent years, the majority of rubber trees have yet to reach productive age. Rubber production will therefore likely double in the next few years as the trees mature. Farmers in Bilin (65%) and Thaton (59%) have the greatest number of immature plantations, suggesting that growth in these regions is new. In contrast, rubber producers in Mudon (30%) and Thanbyuzayat (31%) have fewer plots without mature trees but still appear to be expanding their rubber production.

In Mon, 36% of rubber farms have been converted from vacant land, forest, or pasture since their purchase (Table 33). In the upland area, 47% of rubber farms have been converted from vacant

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land, pasture, or forest to rubber farms, whereas in the lowland area this number is 24%. Of all rubber farm owners, 32% acquired their plots after 2008. Further, 44% of rubber farms without mature trees were acquired after 2008. Of the remaining 56% of plots with no mature trees, 50% were converted from other purposes. The remaining 28% of plots with no mature trees (15% of all rubber farms in Mon) have been recently replanted.

Seedlings: In Mon, 12% of rubber-farming households purchased seedlings in the past year (2015) (Table 34). The average price of a seedling ranged from MMK 300 to MMK 350. The two townships with the greatest number of rubber producers, Thanbyuzayat and La Mine, both located in the southernmost part of Mon, had very few producers who purchased seedlings in the past year. Moreover, in Bilin, where there has been a large expansion in production over the last several years (65% of producers have no mature trees), only 3% of farmers purchased seedlings last year.

Table 33. Percentage of Rubber Farms by Original Use

Original use	Coastal	Lowland	Upland	Mon State overall	No mature trees	Mature trees
Residence	4.8	8.3	5.3	4.6	10.7	3.8
Paddy field	3.6	3.7	1.8	3.6	4.0	3.4
Rubber plantation	59.0	61.1	37.4	48.3	36.7	55.7
Orchard	2.4	1.9	5.9	3.6	7.3	1.3
Other crops	0.0	0.9	2.4	1.6	2.7	0.8
Vacant land / forest/ pasture	30.1	24.1	47.1	36.4	38.7	35.0

Table 34. Stage of Rubber Production by Township (North to South)

Township	Percentage of rubber producers in township	Percentage with no mature trees	Percentage with mature trees	Percentage who purchased seedlings
Kyaikto	16.5	61.9	38.1	34.5
Bilin	14.5	64.9	35.1	3.3
Thaton	11.1	55.3	44.7	14.9
Paung	7.2	50.5	49.5	23.8
Mawlamyine	1.2	0.0	100.0	0.0
Chaungzon	6.0	49.0	51.0	0.0
Kyaikmaraw	32.6	57.4	42.6	22.1
Mudon	31.9	29.8	70.2	9.5
Thanbyuzayat	41.5	21.9	78.1	6.5
La Mine	41.0	38.2	61.8	3.0
Ye	17.7	30.5	69.6	0.0
Mon State overall	19.2	44.5	55.5	12.3

Figure 28. Fertilizer Use by Township (North to South)
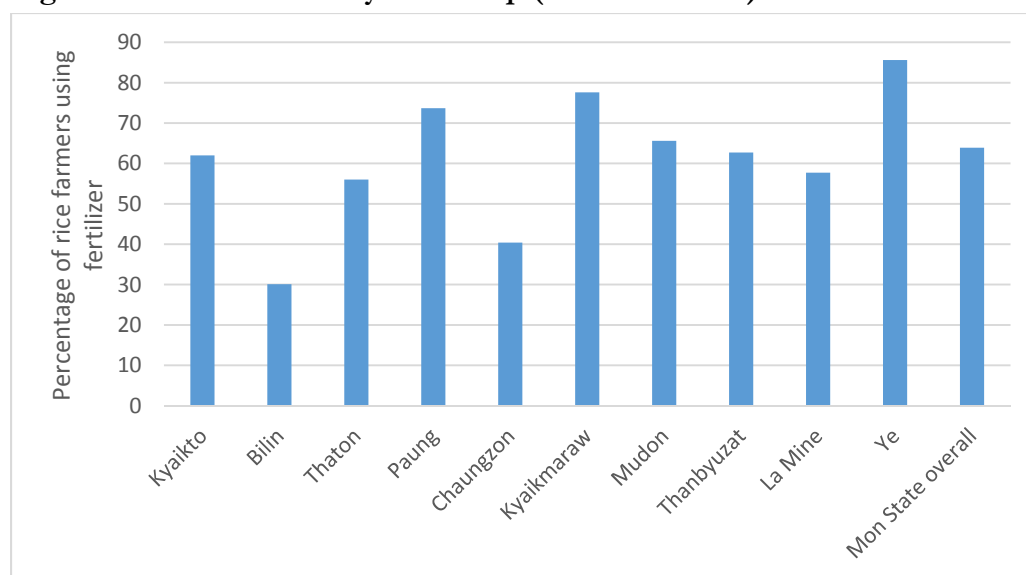
The data indicate that Kyaikto, Kyaikmaraw, and Paung will become important rubber-producing areas in the future because they have a large percentage of nonmature trees and producers continue to expand their production through the purchase of seedlings.

There are several types of improved rubber varieties in Mon, all coming from Thailand. The wild variety produces high-quality latex but is low yielding unless appropriate amounts of fertilizer are used.

Fertilizer: Of Mon's rubber farmers, 65% have used organic or chemical fertilizer in the last 12 months, averaging 50 kg per year. This is lower than the percentage of rice farmers who use fertilizer, 81%. The amount of fertilizer used differs between townships, with only 30% of rubber producers in Bilin using fertilizer, contrasted with 85% in Ye (Figure 28).

Urea is the most commonly used fertilizer, in terms of both total bags used and bags per acre (Table 35). More fertilizer is used in coastal areas, followed by the lowland and upland regions. Most of the farmers bought organic and urea fertilizers from their village, though compound (NPK) fertilizers had to be sourced from another village or another township in Mon State.

Table 35. Average Fertilizer Used (kg/Acre)

Fertilizer type	Mon State overall	Coastal households	Lowland households	Upland households
Organic	12.5	18.5	15.5	10.5
Urea	31.0	42.5	30.5	27.0
Nitrogen/phosphorus/potassium	9.5	6.0	15.5	7.5
Others	7.0	9.0	9.0	6.0
Bags per household	60.0	76.0	70.5	51.5

Rubber producers stated that it was recommended that they use fertilizer three times during production season: at the beginning, in the middle, and at the end. Most producers, however, reported applying fertilizer only twice, and some once or not at all. Fertilizer makes up 42% of rubber production costs, the largest cost component. Fertilizer is the first input that farmers cut in the face of cash constraints, because its application is not essential to produce a rubber sheet.

Labor: Labor makes up 23% of total rubber costs and is the second-largest input cost after fertilizer. Spending on daily workers (13%) is slightly higher than spending on permanent workers (10%). The average wage paid to daily workers in Mon is MMK 5,173 per day, higher than the average wage paid to rice workers. Tapping rubber trees requires some skill and can damage the tree and jeopardize production when done wrong. Therefore, those who tap rubber trees are considered skilled workers and are able to secure somewhat higher wages.

That said, rubber farmers mainly rely on family labor (Table 36). On an average rubber farm, labor is composed of 70% family workers, 19% daily workers, 8% permanent workers, and 3% migrant workers. Lowland-region farmers use the most wage and family workers per acre. Overall, only a small number of workers, both family and wage workers, are used for rubber production. Producers reported a scarcity of wage workers for tapping rubber trees across Mon State.

6.2.2. Rubber Yields and Income

Of the state's rubber farms, 46% have mature trees, of which 91% produce rubber and the remaining 9% do not. Those who do not tap their trees do not have access to family labor or cheap enough hired labor to make tapping profitable. Average yields in Mon State, calculated per acre of mature trees, are 899 pounds per year, with a median of 600 pounds per year. Average yields shrink to 585 pounds per year if the calculation uses total acres under rubber production instead of total mature tree acres, given that around 45% of trees are not mature enough to produce. Figure 29 shows the distribution of rubber yields at the township level. Yields vary from as low as 424.0 pounds in Kyaikmaraw to 1,306.3 pounds in Ye.

Table 36. Per-acre Rubber Farm Workers

Worker type	All of Mon	Coastal	Lowland	Upland	No mature trees	Mature trees
Only farms with hired workers						
Hired workers	1.9	0.3	3.1	1.5	1.9	1.9
Family workers	0.7	0.5	0.7	0.7	0.7	0.6
Total workers	2.3	0.3	3.8	1.7	2.3	2.3
All rubber farms						
Hired workers	0.6	0.4	0.7	0.5	0.8	0.4
Family workers	0.6	0.4	0.7	0.7	0.7	0.6
Total workers	1.2	0.8	1.4	1.2	1.4	1.0

Figure 29. Rubber Yields by Township (North to South), in Pounds per Acre
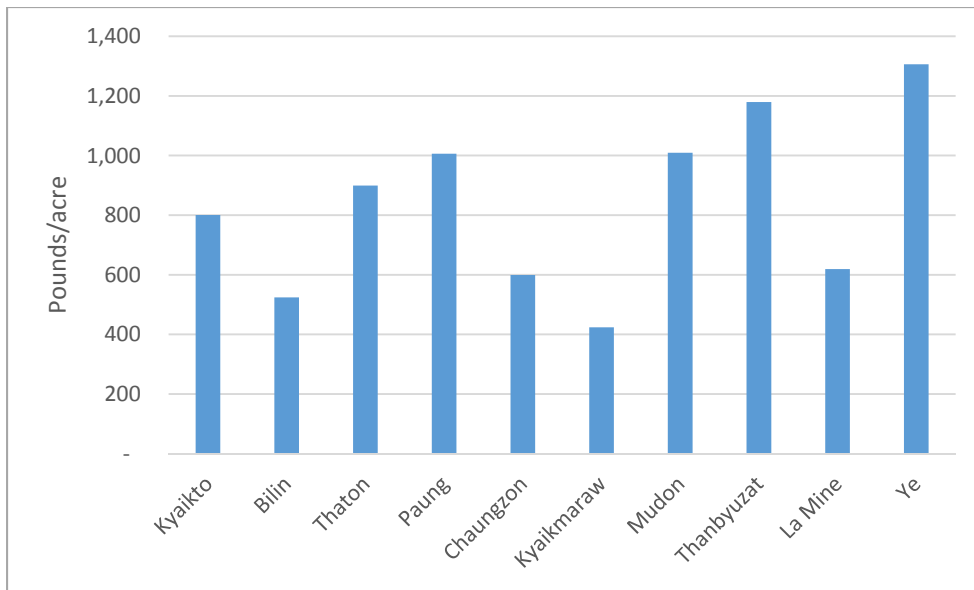
Estimates by MoAI place rubber yields in Mon State above the Myanmar average (Figure 30). The MoAI estimates are lower than our survey estimate of 899 pounds and position Myanmar yields lower than those of all major rubber-producing countries. As shown in Figure 31, our survey places yields in Mon State greater than per-acre averages for Indonesia, Malaysia, and the Philippines, but significantly less than yields in neighboring Thailand. The average yield per mature tree per year in Mon State is 3.65 pounds (median 2.50 pounds). This is much lower than the world average of 9.25 pounds (calculated assuming the tree is tapped).

Figure 30. Rubber Yields, Mon State and Myanmar, Ministry of Agriculture and Irrigation Estimates (Pounds per Acre)
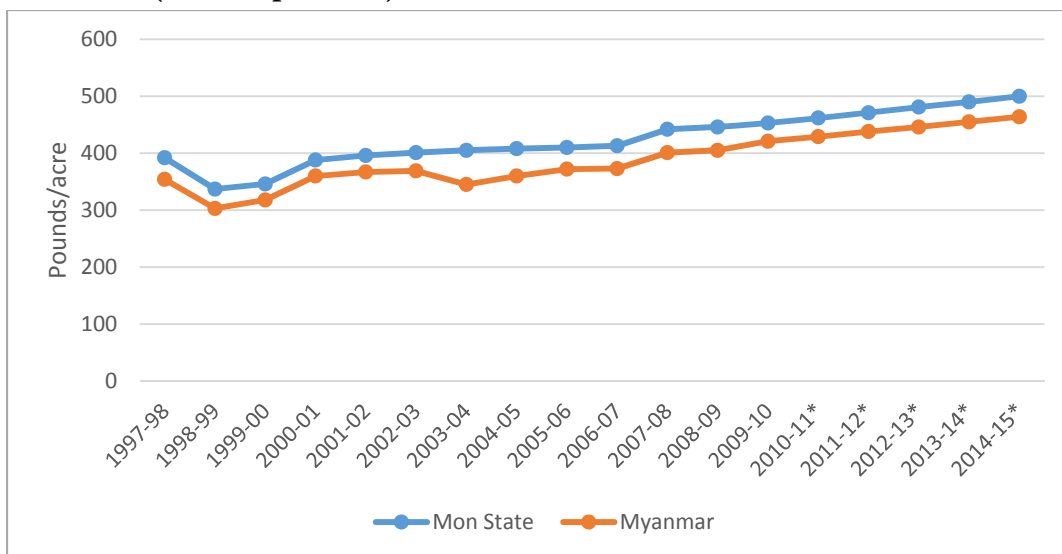
Note: Yields after 2010 are estimated assuming a constant growth rate for the period, estimated from the average growth rate over the previous period.

Figure 31. Rubber Yields of Largest Rubber Producers (Pounds per Acre)
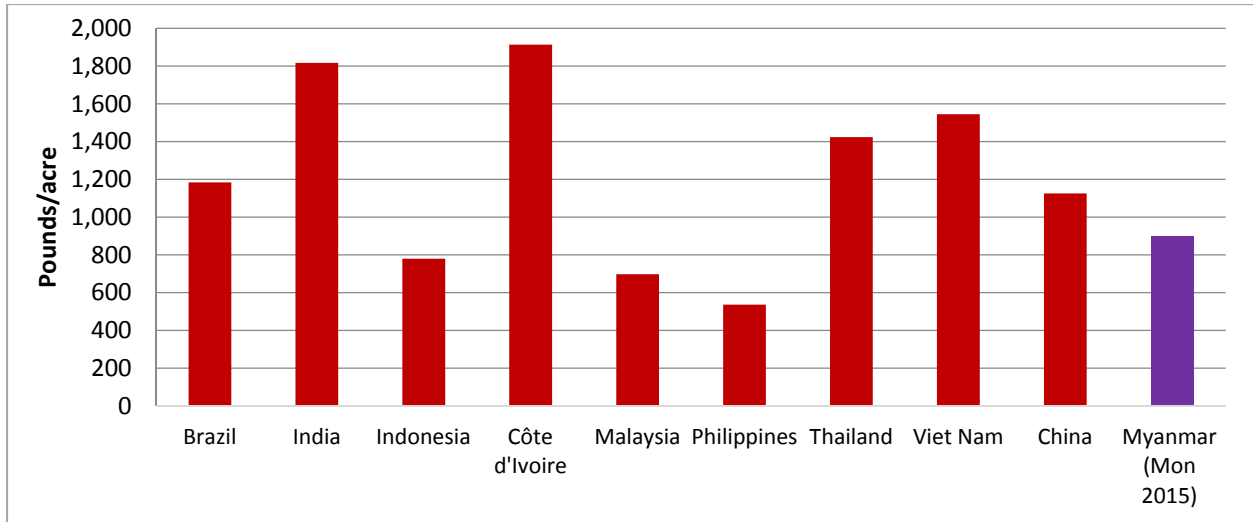
Source: FAO (Food and Agriculture Organization of the United Nations). 2016. FAOSTAT database. Accessed February 15, 2016. http://faostat.fao.org; Mon State Rural Household Survey, 2015.

Yields in Mon State are low for several reasons. First, the amount of fertilizer used is well under recommended quantities. Second, many plantations use wild varieties, which are low yielding when not appropriately nourished with fertilizer. Rubber trees are often tapped every day rather than every other day as recommended. Further, due to labor shortages, untrained labor may sometimes be used for tapping, which leads to lower yields and may damage trees and compromise production.

Prices: The average price reported for rubber in Mon State was MMK 566 (U.S. 43 cents) per pound in May–June 2015 (Figure 32), and the median was MMK 500 (U.S. 38 cents) per pound. The lowest price reported was MMK 350 (U.S. 27 cents) per pound, and the highest was MMK 2,500 (US$1.90) per pound. The average price for thin sheets (MMK 736) was higher than for thick sheets (MMK 474).

Figure 32. Rubber Prices by Township (North to South), May–June 2015

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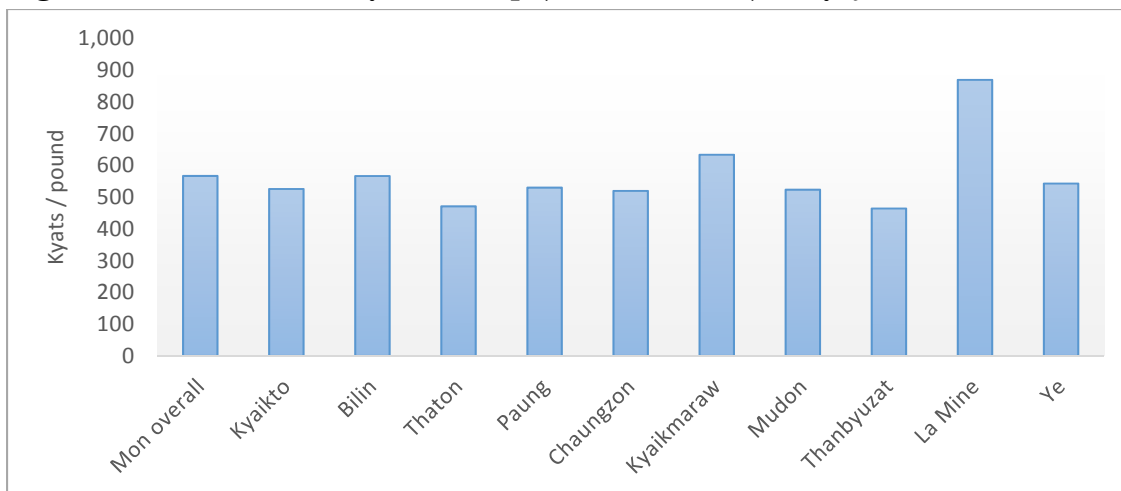
Table 37. Average Rubber Prices per Pound, May–June 2015

Currency	Mon	Thailand, TSR20 grade	Singapore, SGP/MYS type
Myanmar kyats	566	932	1,090
U.S. dollars	0.43	0.71	0.83

Rubber prices in Mon from May to June 2015 were below the period averages for Thailand (grade TSR20) and Singapore (type SGP/MYS) (Table 37). Prices are a function of quality, much of which depends on the cleanliness of the product (no dirt or foreign particles), and the physical properties of the rubber (plasticity). Thin rubber sheets have less water and extraneous matter than thick rubber sheets. Air drying also reduces the amount of water and foreign matter. The physical properties of rubber are largely determined by the quality and amount of acid used, digestion time, and the drying process.

Incomes and Profits: Average rubber income in Mon State is MMK 1,139,456, while median rubber income is MMK 428,885 (Table 38).[9] The average income is much greater than the median income because the few large plantations captured in our sample have very high earnings. Average per-acre income is MMK 205,052, roughly equal to rice income per acre but much lower than per-acre income from other annual crops or orchards.

Income has a strong positive correlation with number of mature trees, parcel size, price, and yield (Table 39). The lowest income quintile suffers a loss, so we took a closer look at the households that compose it. Some of them are households who own large plantations with only a small percentage of mature trees. These households have negative incomes due to the high costs they face in maintaining their plots, but they cannot harvest and sell much rubber because fewer than half of their trees are producing. Second, some households face very high costs for inputs (seeds, acid, fertilizer, and machinery) as well as labor and transportation. Third, the majority of households in this income quintile have very low incomes due to low yields per acre, even when restricted to only acres of mature trees. Yields in the highest rubber income quintile are more than triple the yields in the first quintile. Low yields may result from preharvest loss, age of trees, or low-yielding varieties. In some cases, households have opted not to harvest their trees due to labor costs.

Inputs (seedlings, fertilizer, acid, and machine rental costs) make up the greatest share of rubber costs in Mon State, regardless of farm size (Figure 33). Costs increase as parcel size increases, except for transportation costs, which are fairly even across parcel size groups. Fertilizer and labor are the largest costs faced by rubber producers.

Table 38. Mon Rubber Income and Costs (Myanmar Kyats)

Farm type	Mean income	Median income	Mean per-acre income	Mean costs	Median costs	Mean per-acre costs
Rubber farms with mature trees	1,139,456	428,885	205,052	441,899	204,000	87,685
All rubber farms	313,007	-17,025	60,881	433,894	158,008	82,836

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[9] These rubber income estimates exclude producers without mature trees. Although they have costs, these are investment expenses because these producers have no production and no sales.

Table 39. Quintiles of Rubber Income (per Acre)

Income quintile	Mean parcel size (acres)	Yield (pounds/acre of mature trees)	Mean # of mature trees	Percentage of mature trees	Costs (per acre, Myanmar kyats)	Revenue (per acre, Myanmar kyats)	Profit (per acre, Myanmar kyats)
1	8.74	433	764.82	54	152,962.63	63,522.92	-89,439.71
2	3.25	699	436.07	64	54,641.53	56,215.84	1,574.31
3	5.68	641	657.98	75	92,835.91	185,591.47	92,755.55
4	7.18	790	766.00	71	49,053.59	276,614.41	227,560.83
5	10.28	1,684	1,431.87	77	124,067.11	720,325.56	596,258.50

6.2.3. Conclusion: Rubber

Producers in the rubber sector face high costs and low prices. Yields are relatively low (899 pounds per acre) compared with those of larger producers, such as neighboring Thailand. Despite low yields, rubber production is expanding. Of all rubber plots in Mon, 33% were purchased after 2008, and 52% of farms have been transformed into rubber plantations from other uses. Improving rubber quality and price are key steps toward improving productivity in the rubber sector. Currently Myanmar rubber is lower in quality than that of most other countries and hence fetches a lower price. While RSS3 standard rubber is US$1,800 a ton in Bangkok, in Myanmar prices are closer to $1,350 a ton.[10] Further, domestic demand accounts for less than 10% of rubber production, 10,000 tons out of 160,000 tons produced.[11] There is great potential to increase yields and prices in the rubber sector through expanding extension services and research, strengthening marketing channels and export links, and increasing the production of value-added products. Because of this potential, the rubber sector needs to be a priority.

Figure 33. Cost Breakdown by Parcel Size Group (Acres)

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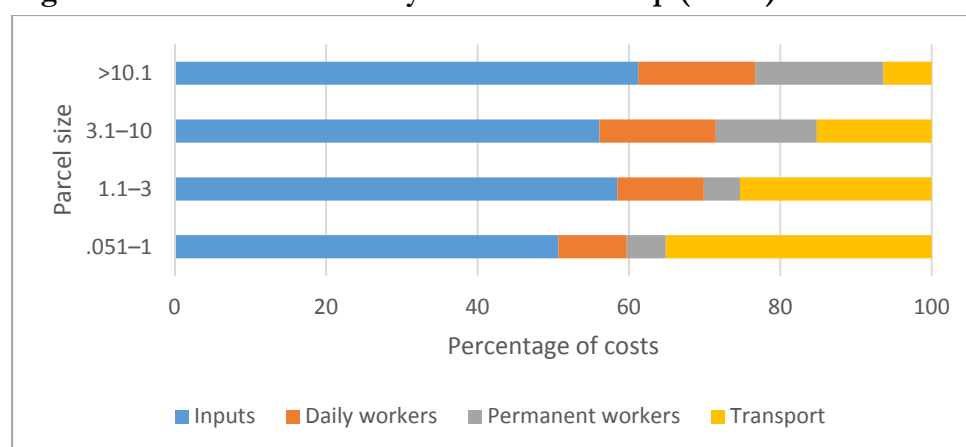
[10] *Rubber farms shutter as price stays low* (05 March 2015). Retrieved from Myanmar Times
http://www.mmtimes.com/index.php/business/13379-rubber-farms-shutter-as-price-stays-low.html.
[11] *Rubber growth bounce leads to smuggling rise* (09 June 2014) Retrieved from Myanmar Times
http://www.mmtimes.com/index.php/business/10606-rubber-growth-bounce-leads-to-smuggling-rise.html.

Table 40. Households Producing Different Crop Types in Mon State, by Crop and Agroecological Zone (Percentage)

Crop type	Mon State	Coastal	Lowland	Upland
Pulses and oilseeds	3.5	0.7	5.2	2.3
Vegetables	7.2	3.2	8.1	7.9
Fruit	6.9	3.8	4.0	11.9
Total	17.6	7.7	17.3	22.1

6.3. Other Crops

Of households in rural Mon, 18% reported farming crops other than rice and rubber. A little more than half of them cultivate orchards, and the remainder cultivate annual crops other than rice. More than half (58%) farmed only these crops, while 42% farmed these crops along with either rice or rubber. These figures indicate a low level of crop diversification in Mon. Since demand for these other crops is high, there is considerable opportunity for greater diversification of agriculture.

Other crops grown in Mon feature eight types of pulses and oilseeds, 15 kinds of vegetables, and 14 fruits. Vegetables and fruits were produced by a roughly equal share of households (around 7% each) (Table 40). Pulses are produced by about 5% of households, mostly in the lowlands areas, where pulses are most widespread. Fruit production was most common in upland areas (12% of households), while vegetable production was equally common in lowland an upland areas (8% of households). Coastal areas had the lowest share of households engaged in production of all crop types, reflecting their low agricultural potential, with only 8% of households producing any of these crop types. The greatest varietal diversity was found in the townships of Kyaikto and Bilin (fruit), and Kyaikto and Thaton (vegetables).

6.3.1. Other Annual Crops[12]

The survey captured detailed data on the production of other annual crops, including beans, oilseeds, and vegetables, but also including fruits that do not grow on trees, such as pineapples. The number of households reporting production of these crops was quite low (9%). Only 1% of coastal households grow annual crops, while 10% of upland and 13% of lowland households grow annual crops. More households in Thaton district (in the north) grow annual crops (17%), compared with Mawlamyine district (in the south) (5%). Only 65% of other annual crop growers own the land on which they farm, indicating that annual crops are more commonly grown on rented or borrowed land than either rubber or rice.

The most widely produced annual crop is betel leaf (grown by 28% of nonrice annual crop–producing households), followed by roselle (21%), bitter gourd (13%), and green gram (mung beans) (12%) (Table 41).

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[12] Other annual crops are nontree crops other than rice. For simplicity, we refer to them as *annual* even though they may include some biennial or perennial crops.

Table 41. Annual Crop Parcels Cultivated by Crop Type (Percentage) and Mean Parcel Size (Acres)

Crop	Share of households who cultivate	Share of annual crop parcels cultivated	Mean parcel size (acres)
Betel leaf	28%	16%	0.50
Roselle	21%	12%	0.36
Bitter gourd	13%	7%	0.71
Green gram	12%	7%	2.74
Eggplant	8%	5%	1.25
Watercress	7%	4%	4.82
Carrots	6%	3%	1.19
Cowpeas	5%	3%	2.92
Taro	4%	2%	5.86
Other	48%	40%	1.14
Total	100%	100%	1.48

The high number of annual crops in the category *other* (covering 40% of all parcels) indicates a very high level of diversity of crop production, but with few households producing most crop varieties. The average cropped area of parcels devoted to annual crops is small, at 1.5 acres. Average parcel size for the three most widely cultivated annual crops is lower than that of all other crops (0.4–0.7 acres).

Overall, 75% of households growing annual crops produce four or fewer crops, but there is considerable variation in patterns of crop diversity by agroecological zone. The lowest diversity is found in lowland areas, where 79% of households producing annual crops grow between one and three types. The greatest annual crop diversity is found in upland areas, where 19% of households produce seven or more types. Coastal areas occupy an intermediate position, with 63% of households growing five or six different annual crops.

Figure 34. Share of Producing Households Selling Annual Crops (Percentage)
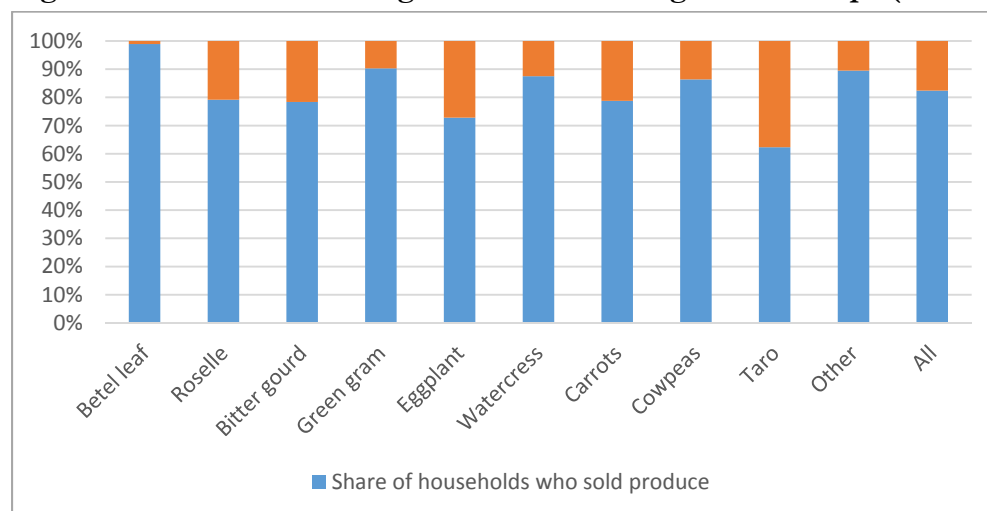
Annual crop production is predominantly commercially oriented, the lowest rate of commercialization being 60%, for taro (Figure 34). Overall, 82% of households who produce annual crops also sell them. Despite the commercial orientation of the sector, annual crop parcel sizes are small, and therefore potential returns are limited.

Several factors influence farmers' choice of annual crop production (Table 42). A significant share of producers cited high prices as being an important factor in crop choice, but low labor requirements were also reported for most vegetables, especially taro, indicating that labor costs/shortages are a significant consideration for farmers. However, no producers of green gram or cowpeas cited minimal labor requirements as influencing their planting decisions, suggesting either that they are relatively labor-intensive activities or that the value of the crop comfortably exceeds labor costs. Very few of these crops are grown for own consumption, and good soil quality is an important factor only for growing eggplant.

Input Costs: The majority of other annual crop farmers (87%) invested in seeds over the past year. Labor costs represent 30% of total costs, followed by seed costs (26%). Spending on pesticides and fertilizer make up the third-largest share of costs, at 22%. Mean spending on fertilizer was MMK 55,747 per acre (Table 43), indicating that on average other annual crop producers use slightly more than one bag per acre. Pesticides are rarely used: spending on pesticide is only MMK 5,028 per acre.

Table 42. Reasons for Choosing To Produce Annual Crops (Share of Households Responding, Percentage)

Crop	High price	Low labor requirement	For own consumption	Due to good soil quality	Other reason	Total
Betel leaf	47.9	29.8	2.8	4.1	15.5	100
Roselle	12.0	40.2	20.1	0.0	27.7	100
Bitter gourd	40.1	37.7	6.1	0.0	16.2	100
Green gram	83.4	0.0	10.6	6.0	0.0	100
Eggplant	0.0	20.9	15.6	45.5	18.0	100
Watercress	19.6	31.7	10.5	0.0	38.2	100
Carrots	41.6	26.5	7.5	0.0	24.4	100
Cowpeas	34.1	0.0	0.0	0.0	65.9	100
Taro	0.0	62.8	0.0	0.0	37.2	100
Other	29.0	36.5	8.6	2.3	23.7	100
Total	36.5	28.6	8.0	5.7	21.2	100

Table 43. Per-acre other Annual Crop Costs

Cost	Seeds	Fertilizer	Pesticide	Machinery	Labor	Other
Cost (Myanmar kyats/acre)	65,700	55,748	5,028	26,090	75,486	24,600

Table 44. Share Of Households Using Inputs by Crop Type (Percentage)

Crop type	Organic fertilizer	Chemical fertilizer	Pesticide	Herbicide	Machinery	Hired labor
Pulses and oilseeds	63.5	67.3	59.6	11.5	32.7	34.3
Vegetables	91.5	74.6	37.7	9.2	31.5	32.6
Fruit	57.9	45.6	31.4	13.2	43.8	33.2

The frequency of fertilizer use (organic and chemical) is highest for vegetables and lowest for fruit (Table 44). A slightly higher share of households use organic fertilizer than chemical fertilizer, for all crops except pulses and oilseeds, for which the share of use is similar. Use of pesticides is limited for vegetables and fruits (around one-third of households) but significant for pulses and oilseeds. Herbicide use is limited across all crop types (9–13%). Use of machinery and hired labor is also similar across all farms but significant, with around one-third of households using both. Labor costs make up 23% of production costs, at MMK 75,486 per acre on average. Only 5% of households reported using all six categories of inputs, while 18% reported using none.

Income: Annual crops differ in their earning potential (Table 45). Betel leaf, carrots, bitter gourd, watercress, and eggplant have the largest earnings of all annual crops. Further, these crops are mainly sold rather than consumed. Crops excluded from this list and placed in the *other* category, such as pigeon peas, long peas, pumpkins, and melons, are produced mainly for home consumption.

Although mean household income from other annual crops in Mon is similar to the mean incomes for rubber and rice, income per acre is almost five times higher (Table 46). This indicates that other annual crops can be an extremely lucrative form of income for Mon State. Incomes are differentiated by geographic zone. Households in upland areas have the largest income per acre but also incur the highest production costs. Those located in lowland areas have the largest parcel sizes but earn significantly lower margins per acre.

Table 45. Mean Value of Crops Sold and Consumed

Crop	Mean value of crops sold per acre (Myanmar kyats)	Mean value of crops consumed per acre (Myanmar kyats)
Betel leaf	2,590,461	49,034
Carrots	2,117,775	666
Bitter gourd	1,654,151	12,256
Watercress	1,501,458	12,672
Eggplant	1,025,802	27,347
Roselle	808,911	7,925
Green gram	358,908	14,663
Taro	188,840	0
Cowpeas	94,813	4,639

Table 46. Annual Crop Production Costs and Income (in Myanmar Kyats)

Item	Mon State overall	Coastal household	Lowland household	Upland household
Mean acres	2.0	0.2	2.3	1.3
Mean costs	281,187	40,469	279,140	198,818
Mean costs/acre	269,005	182,562	244,902	324,410
Mean income	1,077,451	722,113	1,320,000	708,424
Mean income/acre	1,035,906	3,180,000	995,251	1,040,000

In Kyaikto, 66% of annual crop farmers farm betel leaf, and its high value drives the high annual income per acre in this township—the highest in the state (Figure 35). Ye also has high income per acre but accounts for only 3% of annual crop producers in Mon. The townships around the city of Mawlamyine have the lowest incomes per acre but also the lowest costs.

There are large differences in income per household and per acre among annual crop producers, for a variety of reasons. First, the types of crops grown by the various income quintiles varies greatly (Figure 36), and the degree to which each of these crops is either marketed or consumed within the household is also quite variable (Table 22). For the lower income quintiles, many of the annual crops are planted for subsistence purposes and thus may have little to no return. Second, each of these annual crops has a different investment requirement in terms of chemical inputs, labor, and time. Those that require a higher initial investment, despite the high potential returns, may be beyond the means of households in the lowest income quintiles. For example, households that farm betel leaf, roselle, and carrots are most likely to be in income quintile 5, while farmers who plant taro, a crop with a very low investment requirement, are most likely to be in income quintile 1.

Figure 35. Income and Costs per Acre in Production of Annual Crops, by Township (North To South)
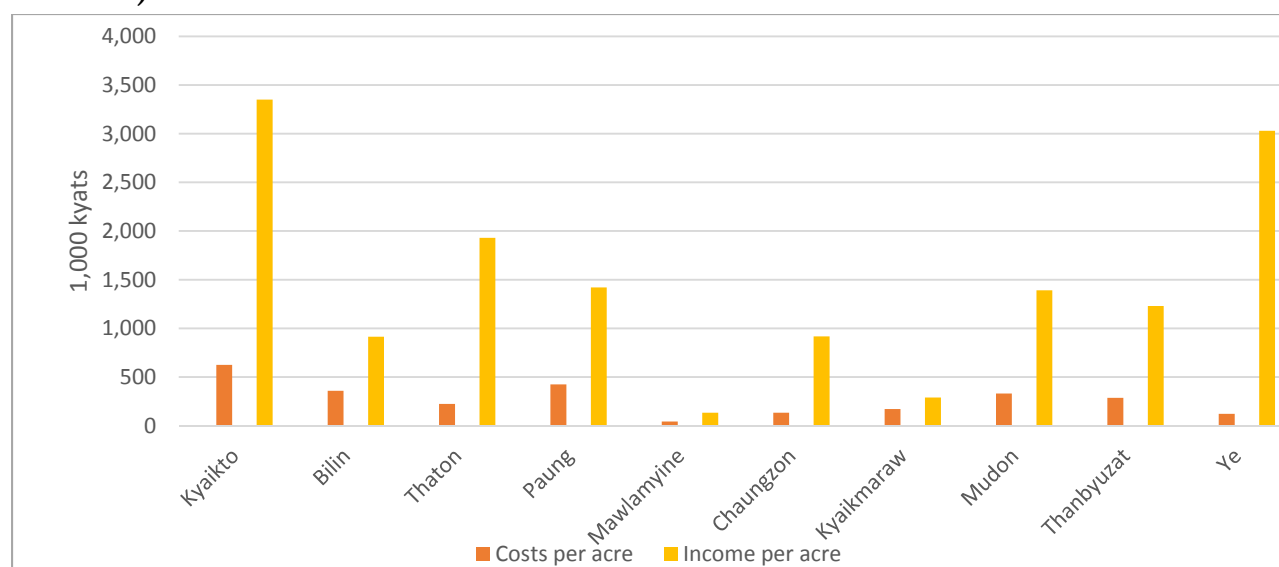
Figure 36. Distribution of Crop-Growing Households by Income Quintile
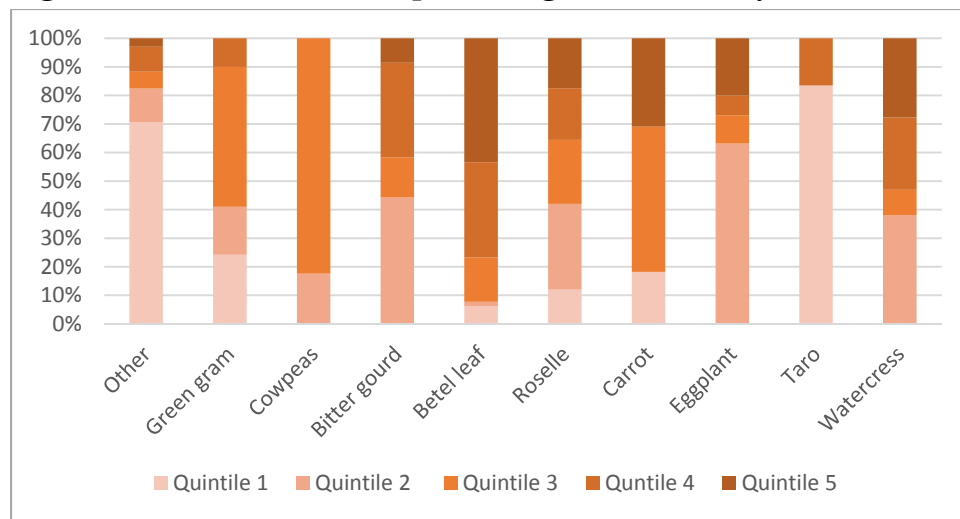
Conclusion: Other Annual Crops: Annual crops other than rice, although not widely grown in Mon State at present, are a potentially lucrative source of income for farmers. Income per acre for annual crops is five times greater than for rice and rubber. Further, there is potential for farmers who already grow annual crops to achieve productivity and income gains through higher levels of input use. Rubber producers could also benefit from diversification into other annual crops, possibly intercropped in plantations, thereby earning income while their trees are maturing. However, the costs per acre of planting other annual crops are greater than for rubber and rice. Farming some annual crops can be labor intensive, which has cost implications. Therefore, in order to farm other annual crops, households need to have initial capital or access to credit.

6.3.2. Orchard Crops

Eleven percent of households in Mon State have orchards. The majority of orchards are located in upland areas (Figure 37) and centered at the northern and southernmost ends of Mon. Palm trees, lemons, and betel nuts are predominantly produced in upland areas, whereas mangoes, durians, rambutans, and coconuts are mainly produced in lowland areas. Far fewer orchards are located in coastal areas, primarily planted in mango, lime, and guava trees.

Orchard crop farmers grow a total of 34 different types of crops. The most widely produced of these was betel nuts (grown by 16% of orchard households), followed by mangoes (15%) and coconuts (10%), of which the latter two are small-scale production operations only. The mean number of trees owned was low, less than 60 per household, with the exception lemon, betel nut, and nipa palm trees (which grow contiguously in large numbers).

Well over half of all orchard trees were in production at the time of the survey, and a similar share had been harvested within the prior 12 months. Rambutan, mangosteen, and durian, however, stand out as having a low share of trees harvested, possibly indicating that these trees have been planted more recently than other orchard crops. The sales value of harvested products varies from MMK 70,893 (bananas), to MMK 1,030,000, with a median of MMK 278,430. Households consume most of the mangoes produced (84% of production by value) while most other crops are marketed (Table 47).

Figure 37. Percentage of Orchard Crops Grown by Agroecological Zone
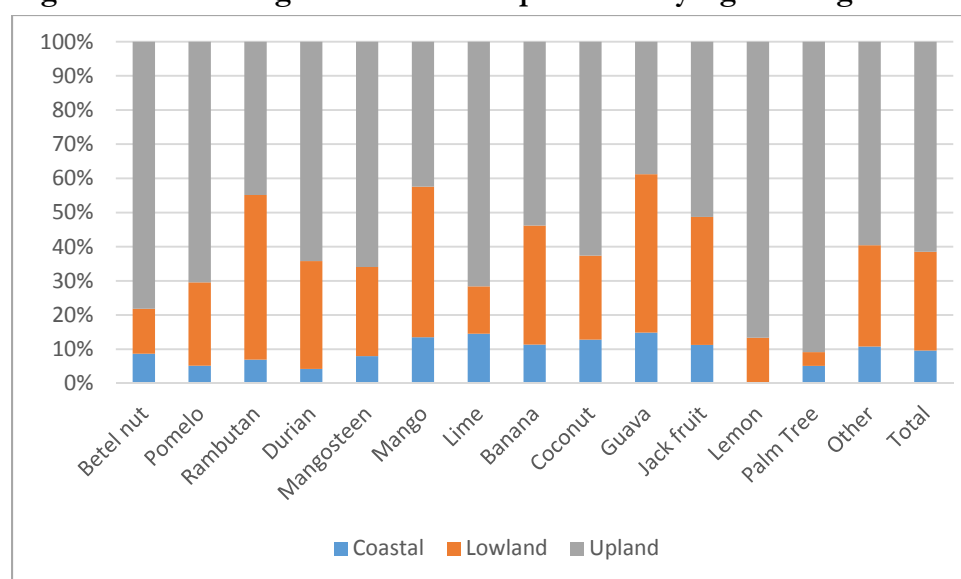
Table 47. Characteristics of Orchard Crop Production

Crop	Share of orchard households producing (percentage)	Mean # of trees owned per household	Share of trees currently in production (percentage)	Share of trees harvested within the last 12 months (percentage)	Sales value (Myanmar kyats)	Consumption value (Myanmar kyats)	Consumption value as share of sales value (percentage)
Betel nut	16.3	487	68	78.7	556,024	37,554	7
Mango	14.7	8	82	84.7	399,818	334,292	84
Coconut	10.2	41	90	83.6	266,797	13,730	5
Durian	7.9	14	55	61.1	449,421	49,187	11
Rambutan	6.8	21	55	50.8	180,023	39,639	22
Banana	5.7	48	74	87.1	70,893	9,929	14
Nipa palm	5.0	5,505	90	89.6	220,189	21,973	10
Mangosteen	4.3	24	64	59.2	104,400	32,183	31
Pomelo	4.1	47	76	93.2	418,333	44,306	11
Jackfruit	4.1	23	100	100.0	290,062	89,485	31
Guava	3.4	44	93	81.6	232,343	3,581	2
Lemon	2.9	234	72	74.7	577,063	1,290	0
Lime	2.0	56	78	83.3	200,625	7,600	4
Other	12.7	58	83	82.2	1,030,000	35,342	3

Table 48. Average Input Costs and Income per Household for Orchard Crops (In Myanmar Kyats)

Item	Mon State	Coastal	Lowland	Upland
Number of households	221	18	69	124
Labor	50,097	6,132	31,948	70,130
Chemical fertilizer	25,640	20,905	20,069	31,708
Pesticide	6,171	4,720	5,385	7,389
Machinery	8,335	11,818	2,861	11,492
Other costs	8,782	0	2,764	13,965
Total costs	99,024	43,576	63,028	134,685
Production value	457,879	284,632	211,333	631,835
Income	358,855	241,057	148,305	497,150

Inputs: Labor was the most costly input for orchards, accounting for 46% of total costs, while fertilizer accounted for 32% (Table 48). All costs for households in the upland zone were higher than in other areas, totaling MMK 134,685, and all costs other than machinery were lowest in the coastal zone, totaling MMK 43,576.

Per-acre orchard income is MMK 393,589, slightly higher than that of rice and rubber. However, orchard farmers in Mon (2 acres) have much smaller plots than rubber (6 acres) and rice farmers (7 acres). Because of this, the median orchard income per household (MMK 114,040) is well below median incomes for rice, rubber, and annual crops. Average incomes per household are highest in the upland areas. These results may reflect differences in crop choices across agroecological zones (Figure 37).

6.4. Livestock

6.4.1. Overview of Livestock in Rural Mon State

Almost 40% of households raised at least one farm animal in the 12 months prior to the survey (Table 49). Upland areas have the highest percentage of households who raise livestock (42%). Landless and female-headed households are less likely to raise livestock than others. Though raising animals is common, we will see in this section that most livestock rearing is practiced on a very small scale and primarily for subsistence.

Table 49. Distribution of Households with Livestock Activities

	Agroecological zone			Landownership		Gender of household head	
All	Coastal	Lowland	Upland	Own agricultural land	No agricultural land	Male	Female
40%	34%	39%	42%	46%	35%	43%	30%

Table 50. Average Number of Animals Owned

Type of animal	Percentage of households raising	Mean #	Mean # (all households)
Chickens	28%	15.7	4.3
Ducks	7%	23.6	1.7
Pigs	12%	2.9	0.3
Cattle	7%	2.4	0.2
Bullocks	9%	3.0	0.2

Note: Households can have more than one type of animal.

Chickens are the most common livestock in Mon State, raised by more than a quarter of households (28%). Raising chickens requires very limited up-front investment, offers a relatively cheap source of protein, and if sold, yields the quickest cash return because of a short growing period. Ducks, offering similar advantages, are raised by 6.5% of households in our sample (Table 50). On average, there are only 1.4 ducks per household in Mon State, but the average farm with livestock owned 24 ducks. This difference suggests that raising ducks, while less common, is more often done on a larger scale than other types of livestock. The second most common type of livestock in Mon State is pigs, raised by 11% of households. Cattle are raised primarily for meat and milk, while oxen are raised for draft power. The *other* category includes goats, sheep, horses, and elephants, all of which are present but not very common in Mon.

We found that relatively few households diversify their livestock holdings. The majority of households, 59%, own only one type of livestock, and very few (5%) own more than three. Households who own land are more likely to own more than one type of livestock. There is little difference in number of animals owned by agroecological zone; around 40% of households in each region own more than one type of livestock.

6.4.2. Business Operation and Marketing Channels

Of all households raising livestock in Mon State, 38% do so for subsistence purposes, whereas 62% engage in livestock raising for sale (Table 51). Coastal areas have a larger share of households raising livestock for sale, while subsistence livestock is more common in the lowlands. This distribution does not vary substantially between Mawlamyine and Thaton districts, between female- and male-headed households, nor between landowning and landless households. The rate does differ by animal: about half of chickens and ducks are raised for own consumption (52% and 46%, respectively). Pigs, on the other hand, are mainly raised for sale, with less than 3% of pig farmers breeding solely for household consumption.

Table 51. Commercial and Subsistence Livestock Operations

Type	Agroecological zone			
	All	Coastal	Lowland	Upland
Subsistence	38%	28%	42%	39%
Sale	62%	72%	58%	61%

Table 52. Distribution of Livestock Points of Sale and Buyers

Variable	Percentage of households	Number of observations
Point of sale:		
Farm/home	89.5%	195
Local market	4.4%	12
Other	6.0%	14
Type of buyer:		
Local villagers	63.1%	138
Local traders	16.3%	38
Others	20.7%	42

Of those who are engaged in livestock sales, almost all are selling their products near their homes (Table 52). The overwhelming majority (almost 90%) are selling directly from their own farms or homes, and an additional 4% are selling at the local market. Only 6% sell elsewhere. Buyers also tend to be local. Of the households that sell their livestock, the majority sell to local villagers (63%). Almost all households that derive income from livestock do so through the sale of live animals (Table 53). Less than 2% of livestock owners in our sample sell any by-products (eggs, milk, cheese, and so on), and only 2% rent out livestock services (for draft power or ceremonies).

6.4.3. Purchase and Sale Prices

The average price for a live chicken in Mon is MMK 3,756, while the average live duck sells for MMK 4,254 (Table 54). The average pig sells for about MMK 82,000, while cattle and bullocks fetch prices in the MMK 280,000–MMK 400,000 range. The slaughtered price for an animal is generally about 1.5 times the live price, with the exception of cattle. This may reflect the fact that live animals are often purchased young for a lower price, and then fattened and sold slaughtered for a higher price.

Table 53. Distribution of Live and Slaughtered Sales

Type of sale	Agroecological zone			
	All	Coastal	Lowland	Upland
Live sales only	53%	53%	55%	55%
Slaughtered sales only	3%	9%	2%	2%
Both slaughtered and live	6%	7%	5%	2%
No sales	38%	32%	38%	41%

Table 54. Average Sale Price per Animal (in Myanmar Kyats)

Type of animal	Average live price	Number of live sales	Average slaughtered price	Number of slaughtered sales
Chickens	3,756	117	8,414	6
Ducks	4,254	16	3,318	2
Pigs	81,705	46	116,597	6
Cattle	384,280	13	250,000	1
Bullocks/Oxen	288,494	19	455,210	2

6.4.4. Total Revenues, Costs, and Net Incomes

To compute total revenues from livestock activities, we summed revenue from animal sales, animal product sales, and rentals. In addition, we included the value of home consumption, estimated using the average market price. Households earn on average MMK 180,000 from livestock, with MMK 110,000 in net profit (Table 55). Upland households have the highest livestock revenue, more than MMK 220,000, whereas coastal households have the lowest, around MMK 125,000. Households who own land make on average MMK 130,000 more than households who do not own land. Landless households may raise animals on their homestead but tend to have smaller amounts of land on which to raise animals.

6.4.5. Conclusion: Livestock

Livestock rearing in Mon State is done on a relatively small scale but is a nonnegligible contributor to rural livelihoods. Forty percent of all rural households raise livestock, and two-thirds of those derive a monetary income from it. Table 56 presents the average livestock income for subsistence and commercial or semi commercial farms, valuing animals consumed in the household at the price they would have fetched on the market. Even for those households who do not sell, the value of home consumption of meats and livestock products is nonnegligible (MMK 40,000 on average), highlighting livestock's contribution to rural livelihoods in Mon.

6.5. Agricultural Extension

6.5.1. Extension Services in Mon

Myanmar has a long history of providing public agriculture extension services through the Myanmar Agriculture Service in the MoAI. In recent years, however, spending cuts left MoAI with a shrinking

Table 55. Average Total Livestock Revenue and Profit (in Myanmar Kyats, Households with Livestock)

Indicator	All	By agroecological zone			By agricultural landownership	
		Coastal	Upland	Lowland	Own ag. plot	No ag. plot
Average revenue	182,978	125,426	221,397	154,323	246,590	108,255
Average profit	116,534	105,186	210,056	131,262	213,689	93,442

Table 56. Mean Total Value of Livestock Sold or Consumed, Subsistence and Commercial Households

Type of household	Total value sold or consumed at home (Myanmar kyats)	Number of households
Subsistence	40,266	403
Commercial	147,798	410

Note: Home consumption valued at market price for slaughtered animals.

travel budget and a reduction in extension staff, limiting the impact of its extension programs.[13] Nonetheless, although in short supply, there are still extension service offices and extension agents in almost every township. In 2009 there were 5,631 government extension workers providing crop and livestock support.[14]

According to our survey, however, only 2.7% of households had met with a government extension agent in the last 12 months. Meeting with private extension agents was more prevalent (7.6%). The majority of these private extension agents work for fertilizer or pesticide companies and provide extension services only with the purchase of their agricultural inputs.

Only 4% of the farmers surveyed in Mon State reported having acquired any agriculture and livestock information in the past 12 months. Other farmers are the most common source of agriculture information for farmers who do acquire information (54%). FM radio is the second most common source (20% of farmers). Other information channels such as nongovernmental organizations, print material, and private enterprise ae much less common, with only 6.6, 3.7, and 3.5% of farmers relying on these sources, respectively. Further, government officers no longer play an important role in extension in Mon State. Finally, despite growth in the telecommunications sector, mobile phones and televisions are barely used to acquire agriculture information (1.3 and 2.8%, respectively).

6.5.2. Price Information for Agriculture and Livestock

Price information is difficult to obtain through formal channels in rural Mon. Only 8% of farmers stated they obtain price information, primarily sourced from other farmers (62%) and the radio (16%). Households rarely use government officers, television, and mobile phones as a source of price information (1%, 5%, and 2%, respectively).

The expansion of extension and information-sharing programs can help rural Mon farmers improve their agricultural productivity. Since farmers rely on each other as points of information, well-targeted extension programs could have large spillover effects. Of rural households in Mon State, 79% own either a television, a radio, or a mobile phone. Television ownership is the largest, at 62%, followed by mobile phone (58%), and radio (23%). Radio and television programs, as well as mobile phone applications, therefore have the potential to be effective tools for price information sharing.

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[13] S. Haggblade, D. Boughton, G. Denning, R. Kloeppinger-Todd, K. M. Cho, S. Wilson, S., L. C. Y. Wong, Z. Oo, T. M. Than, N. E. M. A. Wai, N. W. Win, and T. M. Sandar. 2013. *A Strategic Agricultural Sector and Food Security Diagnostic for Myanmar.* Washington, DC: USAID/Burma.
[14] FAO. 2010. Investment Assessment Project Survey. Rome.

7. OFF-FARM INCOME-GENERATING ACTIVITIES

7.1. Casual Wage Employment

In rural Mon State, 42% of households engage in casual wage work (day labor). The share of households who engage in day labor is higher among those without agricultural land than for agricultural landowners (53% and 27%, respectively). Levels of participation in casual wage labor are similar in lowland and upland zones (44–48% of households) but significantly lower in the coastal zone (31%). Thaton district, in the northern half of the state, has considerably higher levels of wage employment than Mawlamyine, in the south, which may reflect proximity to larger towns.

Nonfarm labor, which includes employment linked to transportation, construction, and manufacturing, as well as nonfarm enterprises, resource extraction, and other nonfarm skilled labor, accounts for the largest share of casual employment in the aggregate, engaging 28% of all households. The most common category of casual work relates to rice cultivation (12% of households engaging), followed by nonfarm skilled labor (7%) and labor for nonfarm enterprises (6%) (Table 57). Of rural Mon households, 22% have a family member who works as a wage laborer in agriculture, including labor in orchards and rubber plantations. Six percent of households provide labor for fishing and other forms of natural resource extraction (forest products, quarries, mining, and so on).

Table 57. Share of Rural Households Participating in Casual Wage Labor (Percentage)

Type of worker	District		Agricultural landownership		Agroecological zone			All
	Mawlamyine	Thaton	Own	Do not own	Coastal	Low-land	Up-land	
Rice laborer	8.4	15.1	5.9	15.1	11.1	15.2	8.4	11.5
Nonfarm skilled laborer	7.5	7.1	5.4	8.8	4.5	8.5	8.1	7.3
Nonfarm enterprise laborer	3.6	8.6	3.5	7.6	1.5	5.3	9.3	5.9
Orchard worker	3.0	6.0	4.8	4.2	0.9	3.8	7.3	4.4
Rubber laborer	4.1	3.6	4.1	3.7	2.1	3.8	4.9	3.9
Resource extraction laborer	1.5	4.4	1.5	3.8	1.2	1.7	5.1	2.8
Fishing laborer	3.2	2.1	0.8	3.9	7.8	1.9	1.0	2.7
Other agricultural worker	1.4	3.9	2.4	2.6	1.5	1.7	4.0	2.5
Transportation worker	1.1	3.9	1.2	3.3	0.9	2.4	3.3	2.4
Construction worker	0.6	0.7	0.6	0.6	0.0	0.7	1.0	0.6
Manufacturing worker	0.5	0.5	0.6	0.4	0.3	0.7	0.5	0.5
Other casual worker	7.7	13.9	4.4	15.0	8.4	8.1	14.4	10.6
Total	33.7	52.7	26.9	53.3	30.8	43.5	47.8	42.2

Table 58. Participation in Casual Labor by Gender

Type of worker	Male	Female
Rice laborer	57%	43%
Rubber laborer	64%	36%
Orchard worker	64%	36%
Fisher	96%	4%
Other agricultural laborer	39%	61%
Nonfarm skilled laborer	94%	6%
Nonfarm enterprise worker	51%	49%
Resource extraction worker	71%	29%
Construction laborer	80%	20%
Manufacturing laborer	85%	15%
Transportation laborer	99%	1%
Other casual worker	73%	27%
Other laborer	67%	33%
Total	69%	32%

There are significant variations in casual employment between agroecological zones. The highest share of rice employment is concentrated in the lowland zone (15%). Households in the coastal zone are much less likely than those in other zones to engage in nonfarm labor of all types. Employment in resource extraction is most prevalent in upland areas, where most forests are located. Work on orchards is also most common in the upland zone, again reflecting the main location of this type of agriculture. There is a strong gender dimension to the extent and type of casual wage labor engaged in (Table 58), with men twice as likely as women to engage in casual labor. Skilled labor, construction, manufacturing, transportation, and fishing are dominated by men. Women are more likely to work as wage labor in agriculture or nonfarm enterprises.

There is apparently very limited travel for casual work, which is overwhelmingly done within the village where the respondent household lives (85% of households) (Table 59).

Table 59. Location Where Casual Labor Is Performed (Percentage of Households)

Location of Labor	Mawlamyine	Thaton	Own agricultural land	No agricultural land	Coastal	Lowland	Upland	All
This village	86.0	84.6	86.9	84.4	90.5	87.6	80.8	85.2
Another village in this township	10.8	11.2	9.5	11.8	4.4	10.9	13.4	11.0
Another township in Mon State	1.4	2.1	0.8	2.2	0.5	0.9	3.0	1.8
Other location in Myanmar	1.2	1.9	2.6	1.2	3.3	0.3	2.6	1.6

Abroad	0.7	0.1	0.3	0.4	1.3	0.3	0.3	0.4

Eleven percent of households traveled within their township of residence for casual work, and only 4% traveled beyond the boundaries of their own township. This pattern is remarkably consistent across agroecological zones, districts, and landed and landless households, perhaps indicating well-integrated labor markets within Mon State, with insufficient spatial variation in wage rates to encourage local migration and offset transport costs. It may also indicate high demand for labor within the state, meaning that opportunities for casual work are available in all locations.

Across types of casual labor, only 21% of respondents reported needing a qualification, experience, or education/training. This varies little across employment types, with the exception of nonskilled farm labor (46%) and construction (39%). These findings indicate that, as would be expected, most forms of casual labor are low skilled and have low entry barriers. For the entirety of the preceding 12 months, 27% of wage laborers reported having performed casual labor. This figure varied little across agroecological zones but was higher for workers without agricultural land (30%) than for those with (20%), as well as for those in the northern half of the state (30%) compared with the south (24%). A higher share of laborers who worked year-round were engaged in nonfarm activities (39–56%) than in agriculture-related work (8–17%), reflecting the more seasonal nature of the latter.

Figure 38. Share of Casual Laborers Employed In Selected Farm and Nonfarm Activities, by Month (Percentage)

Rice labor

Rubber labor

Transportation labor

Nonfarm enterprise labor
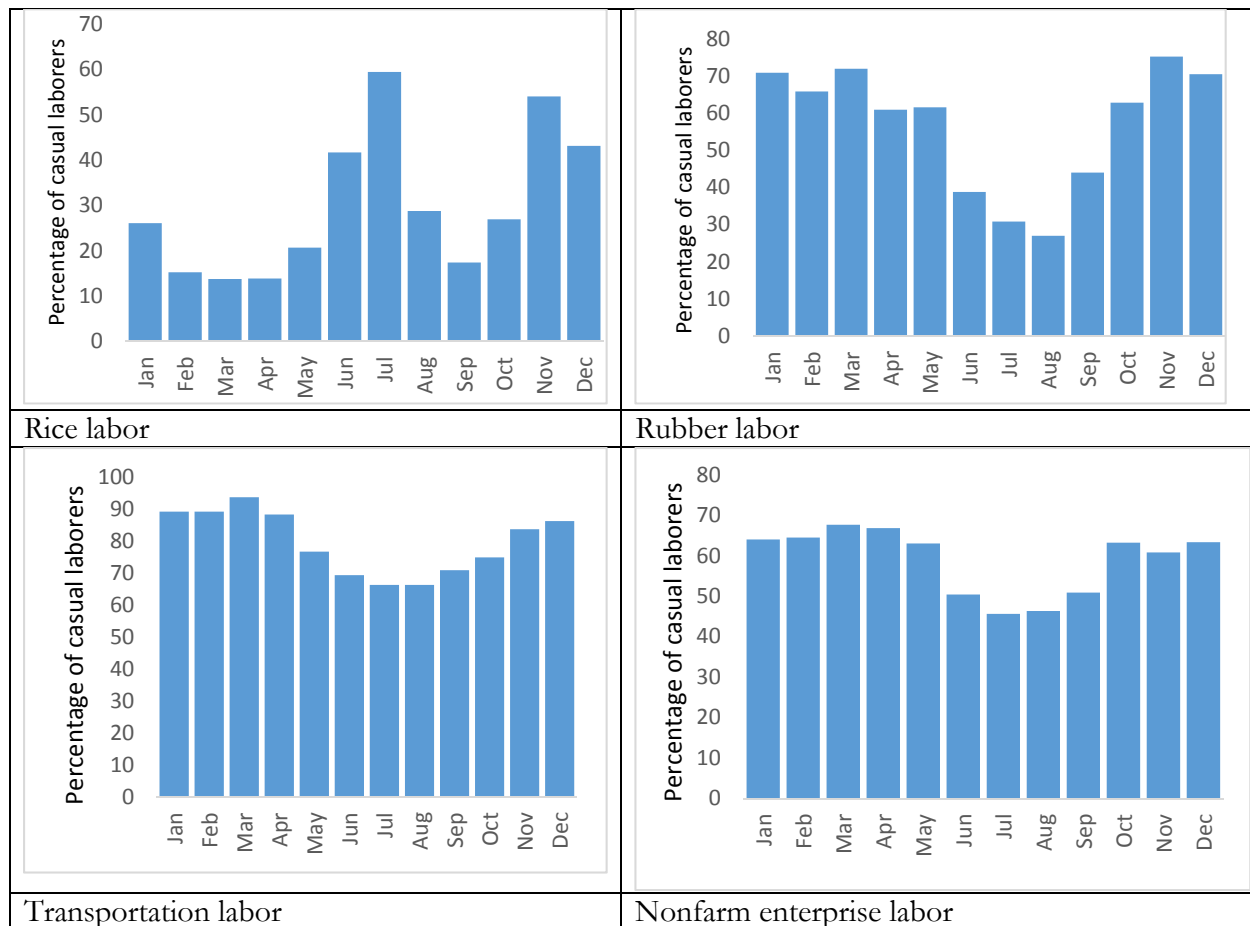
Casual employment in rice and rubber (the two largest users of agricultural labor) is highly seasonal (Figure 38). This is particularly true in the case of rice, with peaks at the time of planting and harvest. Demand for rubber labor is highest outside of the monsoon months, when tapping takes place.

Two examples of nonfarm labor (transportation and nonfarm enterprise employment) also display a degree of seasonality, with the lowest employment levels found during peak monsoon season, when heavy rain hampers activity, but still display a much smoother temporal pattern than agricultural employment overall.

The average daily wage for casual labor is MMK 3,867, while average annual earnings stand at MMK 487,153 (Table 60). Nonfarm labor is much better remunerated than agricultural labor, with daily wages for the former ranging from MMK 4,851 (manufacturing labor) to MMK 5,497 (skilled nonfarm work). In contrast, farm wages range from MMK 2,840 (other agricultural employment) to MMK 3,798 (orchard labor). Fishing labor is also relatively poorly remunerated (MMK 3,421). Patterns of annual earnings broadly reflect these trends, with five of the six highest-earning occupations being nonfarm. Rice laborers (the most numerous category of casual worker) earn lower annual incomes from this activity than most other types of workers, only 80% of the average for casual laborers, at MMK 389,509 per year. This reflects both the low daily wage for rice cultivation and the extremely seasonal nature of labor demand.

7.2. Salaried Employment

Salaried (that is, permanent or semi permanent) occupations are a relatively minor contributor to employment in rural Mon State, with only 8% of households possessing a member who earns income in this way. A slightly higher percentage of households are engaged in salaried employment in Thaton (9% of households) than in Mawlamyine (6%), again reflecting the relatively more developed nature of the northern half of the state and the availability of opportunities there. There is no significant difference in levels of salaried employment between households with and without

Table 60. Average Wage by Type of Work (in Myanmar Kyats)

Type of work	Average annual earnings	Average daily wage
Nonfarm skilled labor	980,011	5,497
Transportation labor	812,379	5,428
Construction work	702,797	4,879
Manufacturing work	672,340	4,851
Resource extraction work	595,391	3,912
Orchard work	532,062	3,798
Other casual work	525,552	3,755
Rubber labor	495,723	3,658
Nonfarm enterprise labor	475,164	3,575
Fishing labor	452,790	3,421
Rice labor	389,509	3,184
Other agricultural employment	226,570	2,840
All types	487,153	3,867

Figure 39. Share of Salaried Workers by Employment Type (Percentage)
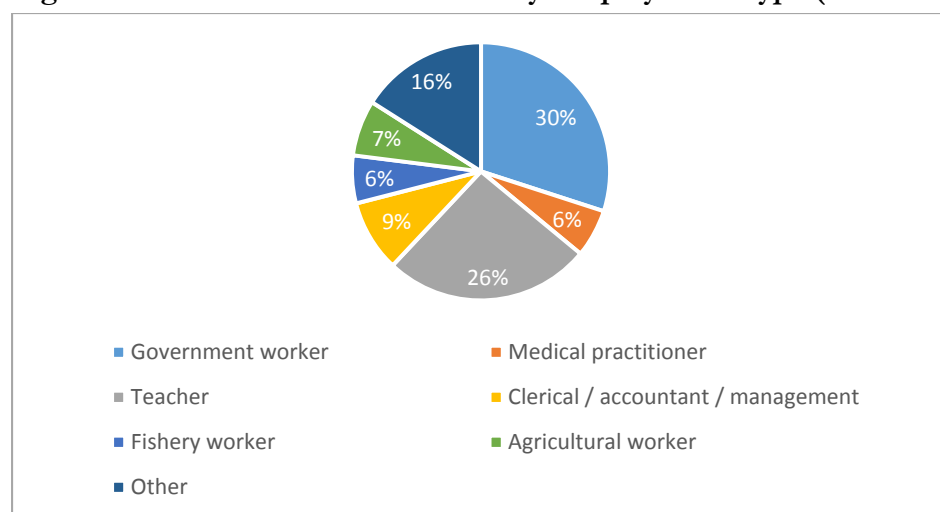
agricultural land. Higher levels of salaried employment are found in the upland agroecological zone (11%) than in the lowland or coastal zones (6%).

The largest group of salaried workers is government workers (30% of the total salaried workforce), followed by teachers (26%). A variety of other occupations, mainly in the service sector, account for the remainder of salaried employment, with salaried agricultural work accounting for just 7% of the total and fisheries work 6% (Figure 39). Salaried workers are somewhat more mobile than casual wage workers, with close to half working outside their own village, but only 17% work outside of their township. A greater proportion of salaried workers than wage laborers are in a position that requires a qualification, experience, or education/training (26%, compared with 21%). The majority of salaried workers (65%) reported working full time, a more stable and less seasonal pattern of employment than that experienced by wage laborers.

In contrast to casual wage labor, in which men predominate, more than half (55%) of salaried workers in the survey are females (Table 61). Females are more frequently employed in the medical professions and as teachers. On the other hand, the vast majority of permanent fisheries workers are men.

Table 61. Gender Breakdown of Salaried Employees, Percentages

Type of worker	Male	Female
Government worker	53.3	46.7
Medical practitioner	21.3	78.7
Teacher	16.5	83.5
Clerical worker / accountant	52.2	47.8
Fishery worker	96.9	3.1
Agricultural worker	53.1	46.9
Other	53.1	46.9
Total	44.5	55.5

The mean annual salary of salaried workers, MMK 1,222,715, is much higher than the annual income earned by casual laborers. Households residing in the upland and lowland zones (MMK 1,265,000 and MMK 1,257,000, respectively) have average annual salaried income earnings worth more than those in the coastal zone (MMK 895,000).

7.3. Nonfarm Enterprises

7.3.1. Distribution of Nonfarm Enterprise Activities

The nonfarm sector is playing an increasingly important role in providing income and employment opportunities in rural Myanmar. Almost one-third of households (29%) reported income from a business activity, including a wide variety of handicrafts, retail activities, and services (Table 62). Overall, we collected information on 533 businesses. Small retail and dry goods shops (usually selling snacks, soap, beauty products, and so on) represent 17% of businesses, while traders total 11% of businesses. Food and agricultural processing or sales account for 22% of all businesses. Among skilled trades, tailoring was the most frequent (8%).

Table 62. Nonfarm Enterprise Activities in the Mon State Sample

Activity	Number	Percentage weighted)
Retail and trade		
Dry goods shop	91	17%
Trading business	61	11%
Food and agricultural processing or sale		
Betel nut kiosk	14	3%
Food processing enterprise	2	0%
Tea shop / restaurant	22	4%
Other foodstuff sale enterprise	116	22%
Crafts and skilled trades		
Tailoring/dressmaking	44	8%
Crafts or artisan activities	25	5%
Carpentry/metalwork/mechanical	19	4%
Brickmaking	2	0%
Transportation services (taxi)	59	11%
Others		
Professional services	2	0%
Other nonfood-stuff sale enterprise	18	3%
Other skilled service enterprise	19	4%
Other unskilled service enterprise	5	1%
Fishery enterprise	7	1%
Entertainment enterprise	9	2%
Other agribusiness enterprise	7	1%
Brokerage enterprise	1	0%
Other manufacturing enterprise	4	1%
Others	6	1%
Total	533	100%

For the rest of the analysis, we break the different types of activities into broad categories as follows: (1) food and beverage processing or sale, (2) dry goods shop, (3) trading, (4) transportation service, (5) tailoring/dressmaking, (6) other crafts and skilled trades, and (7) other (Table 63). The distribution of business types is roughly the same across the three agroecological zones. Transportation services are somewhat more prevalent in coastal areas, representing 18% of businesses, versus around 10% in the other zones, possibly reflecting geographic features (flat terrain, availability of waterways, and so on) and population density. Food and beverage processing, on the other hand, are somewhat more prevalent in the uplands and lowlands.

7.3.2. Characteristics of Households Engaged in Nonfarm Enterprises

Slightly less than one-third of total households are engaged in nonfarm enterprises (Figure 40). Households in upland areas have the highest percentage (32%) of those engaging in nonfarm business. Our data also show that the gender of the household head does not seem to matter in determining the likelihood of running a nonfarm business or the type of business undertaken (Table 64).

Table 63. Distribution of Business Activities by Agroecological Zone

Activity	Coastal	Lowland	Upland	All
Food and beverage processing	22%	29%	30%	28%
Dry goods shop	13%	16%	16%	16%
Trading business	10%	13%	11%	12%
Transportation services	18%	11%	10%	12%
Tailoring/dressmaking	9%	11%	6%	9%
Other crafts and skilled trades	8%	7%	12%	9%
Other	20%	13%	15%	15%
Total	100%	100%	100%	100%

Figure 40. Percentage of Households Engaged in Nonfarm Business Activities, by Household Subgroup
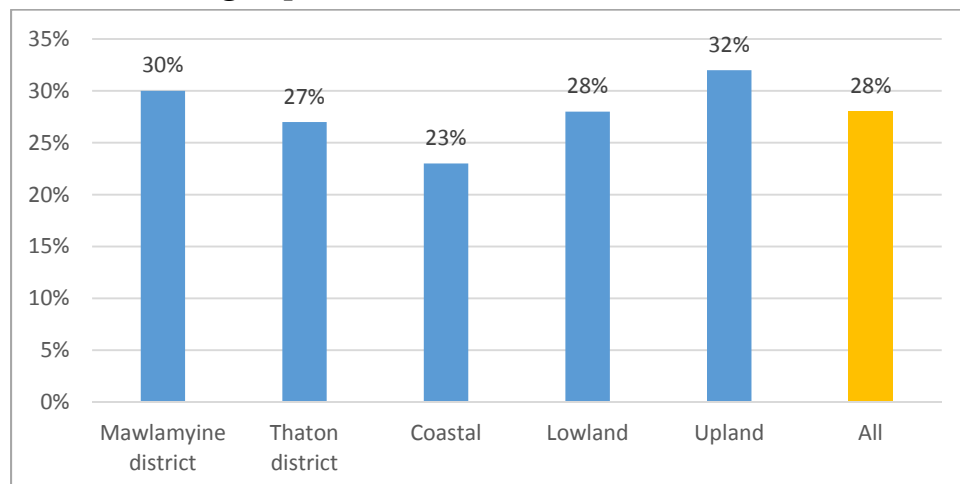
Table 64. Nonfarm Businesses and Landownership, Percentages

Business	Owns agricultural land	No agricultural land	Male household head	Female household head	All
Food and beverage	6.0	11.4	8.6	10.6	9.1
Dry goods shop	7.6	3.8	5.5	5.3	5.5
Trading business	3.1	4.4	3.5	4.8	3.8
Transportation service	2.8	4.3	4.1	2.7	3.7
Tailoring/dressmaking	4.6	1.8	3.2	2.3	3.0
Skilled trade business	3.0	3.3	3.5	2.0	3.2
Other	4.2	5.1	4.9	4.2	4.7

Higher percentages of landless households are engaged in trading (4.4%) and transportation services (4.3%) than their landed counterparts. On the other hand, among households with access to agricultural land, food and beverage businesses (6.0%), dry goods shops (7.6%), and tailoring/dressmaking activities (4.6%) are the most prevalent forms of nonfarm business activities.

A little more than 15% of households in the lowest income quintile run a nonagricultural business, while that share rises to greater than 35% in the richest quintile (Figure 41).

We also plot, for each type of business, the distribution of ownership among the five quintiles (Figure 42). In almost all categories, richer households own most of the businesses. Trading is dominated by households in the wealthier income quintiles. Conversely, richer households own a small share of transportation businesses, with a large share of these owned by households in the first and, especially, second and third quintiles.

Figure 41. Percentage of Households Who Run a Nonfarm Enterprise, by Income Quintile
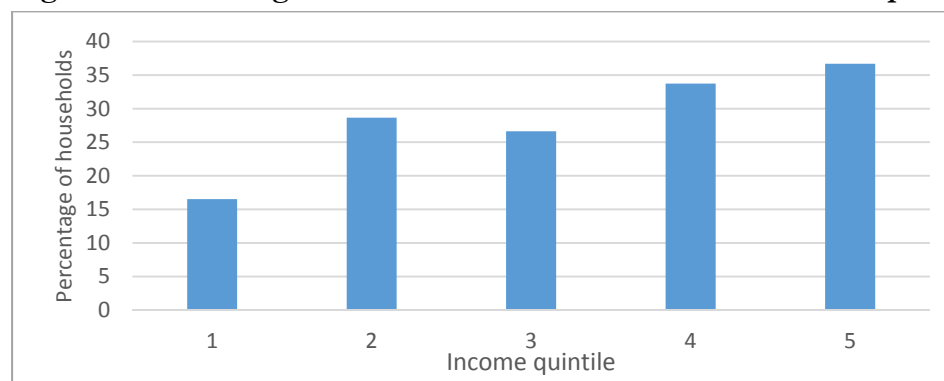
Figure 42. Income Distribution of Business Owners, by Type of Business
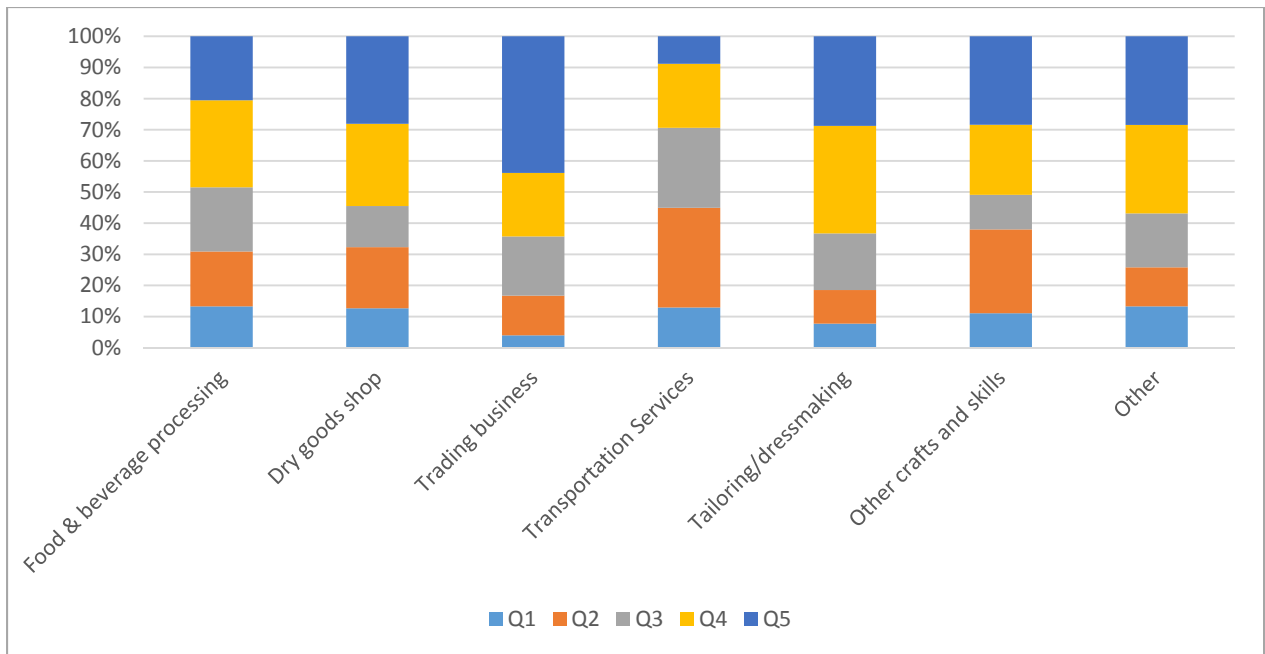
7.3.3. Business Operation

Most of the businesses we encountered were very small-scale operations. The overwhelming majority are run directly out of the residential area (61%), suggesting informality. The rest are predominantly roadside retailers, market stalls, or mobile vendors (Figure 43).

Figure 43. Location of Business, Percentage of Households
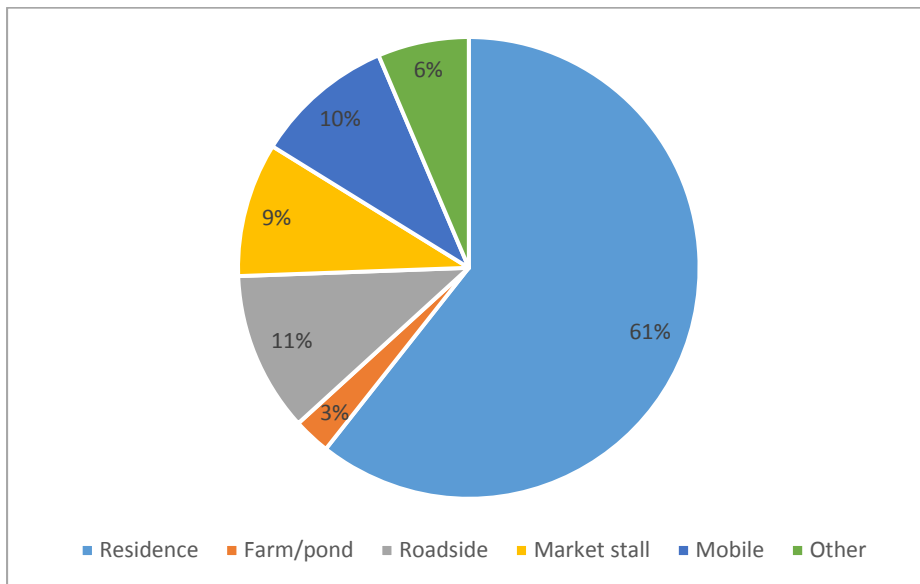
Most of the businesses in Mon State are family-operated. Among the types of nonfarm businesses, dry goods shops engage the highest number of family members (1.6), followed by food and beverage (1.4) and trading (1.3) businesses (Figure 44). Retail shops tend to involve a slightly higher number of family members, who take turns at the register, reflected in the average. Businesses involving skills, such as tailoring and other trades, engage slightly fewer family members. Transportation services are often run by a single driver in a single vehicle, which explains the low value (1.0).

Many of the businesses operate only at certain times of the year and are a means of complementing income from other sources. On average, only 67% of businesses operate year-round, but this figure is lower for certain activities such as skilled trade businesses (40%) and trading (56%) (Figure 45). On the other hand, dry goods shops and tailoring/dressmaking businesses operate nearly year-round. The mean number of months worked in the past year is 9.9, with traders operating 7.6 months out of the year and dry goods shops 11.2 months. This variability is most likely due to the monsoon season (June–September) and the seasonality of agriculture (Figure 46).

Figure 44. Average Number of Household Members Engaged in the Business Activity
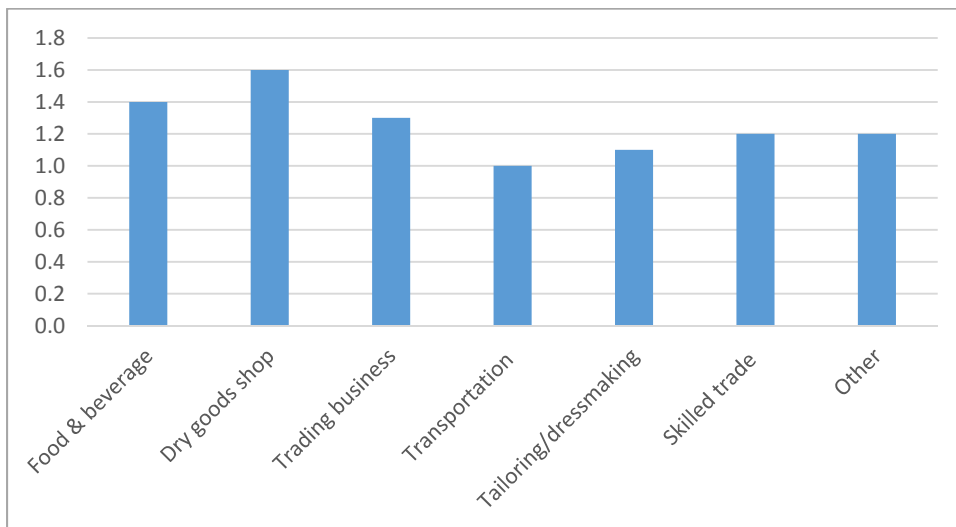
Figure 45. Percentage of Businesses Operating Year-Round
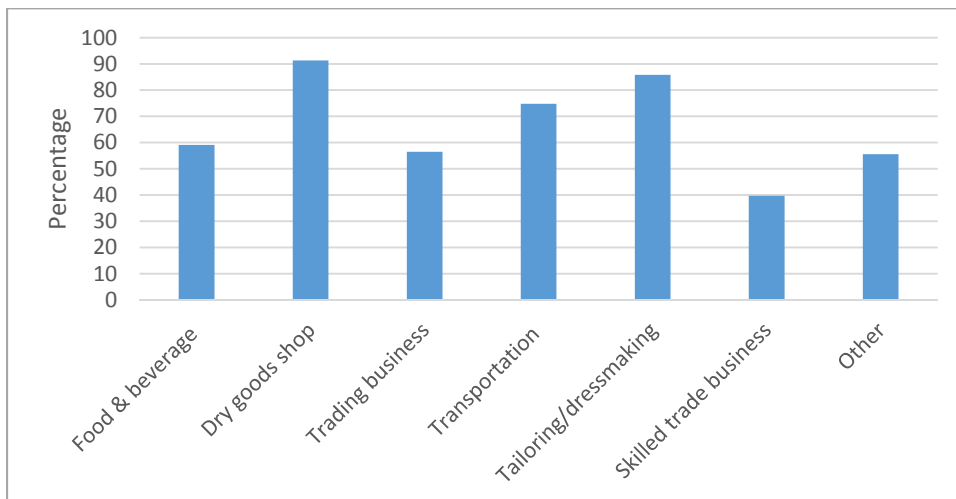
Figure 46. Percentage of Businesses Operating Each Month
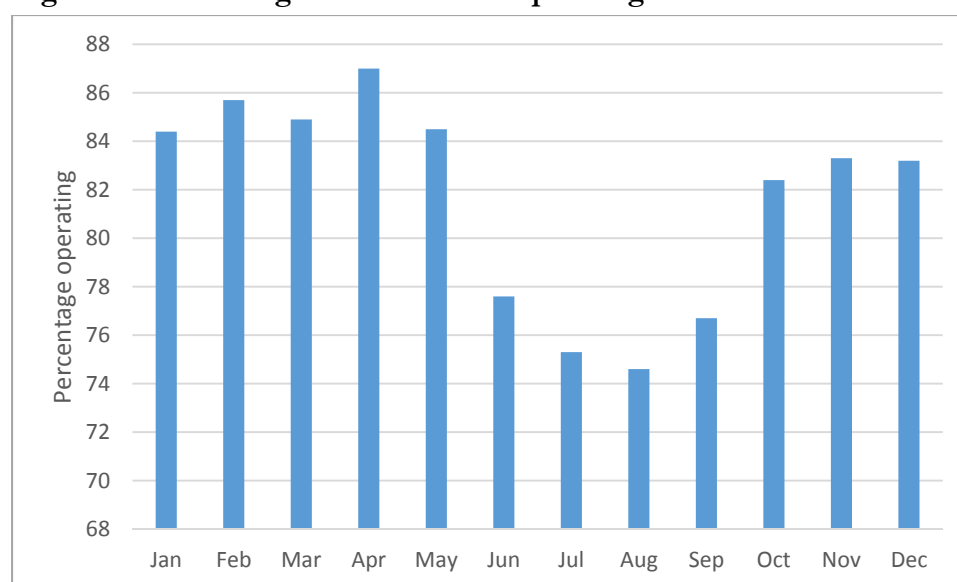
7.3.4. Business Earnings

Business earnings represent 18% of total income in our sample, without much variation among the income quintiles (between 14% and 19%). The average monthly earnings of businesses is MMK 125,000, though this varies significantly with the scale of the business (Table 65). Averages are systematically higher than medians for all categories, suggesting that there are fewer high-earning businesses and many smaller-scale businesses at the lower end of the earnings distribution. The highest average and median monthly earnings opportunities are in the other crafts and skilled trades category, reflecting the skill premium. Trade also brings high monthly earnings of MMK 153,000 and outranks most other business types—though trade businesses tend to operate only some months of the year. Tailoring/dressmaking, on the other hand, offers the lowest average monthly earnings at MMK 68,000, but tends to operate year-round. The others category also brings high returns: it is a mix of many types of activities, the most lucrative of which are entertainment services, professional services, and other businesses related to fisheries or agriculture.

Table 65. Net Monthly Earnings by Type of Business, Myanmar Kyats

Business type	Average	Median	Number of observations
All types	125,107	72,000	470
By type			
Food and beverage processing	97,420	70,000	133
Dry goods shop	141,486	72,000	90
Trading business	153,459	96,000	60
Transportation services	82,701	70,000	49
Tailoring/dressmaking	67,722	55,200	40
Other crafts and skilled trades	153,499	120,000	36
Other	191,471	84,000	62

Note: Sample limited to businesses that provided both earnings and cost information.

7.4. Natural Resource Extraction (Excluding Fisheries)

Natural resource extraction spans a variety of activities, ranging from forestry and forest products harvesting to mining. These resources are often, though not exclusively, extracted from common access areas (for example, forests or coastline). Overall, 9% of all households engage in at least one of these activities. Levels of engagement are highest in the upland zone (11% of households), where most of Mon's forests are concentrated, and lowest in coastal and lowland areas (both under 2%) (Figure 47). Households without agricultural land were slightly less likely to participate in natural resource extraction than farming households.

Figure 47. Share of Households Engaging in Resource Extraction Activity, by Household Type
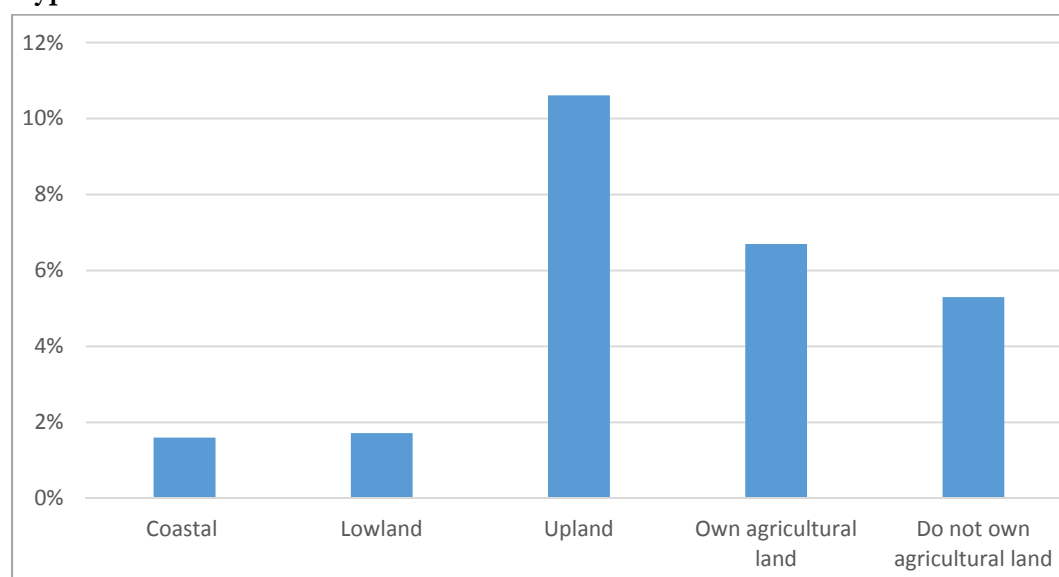
Table 66. Distribution of Resource Extraction Activities, by Type and Gender

Activity	Number of observations	Weighted share	Male	Female
Firewood/charcoal production	33	26%	62%	38%
Timber from forest	7	5%	77%	23%
Bamboo from forest	37	29%	69%	31%
Collection of nipa palms	16	13%	47%	53%
Collection of nontimber forest products	5	2%	64%	36%
Quarry or mining work	1	1%	100%	0%
Hunting	2	2%	50%	50%
Other	41	22%	57%	43%
Total	139	100%	62%	38%

Extracting bamboo from forests (29%) and collecting firewood or producing charcoal (26%) are the most common activities reported (Table 66). The figure also suggests that most of those activities are performed by males. Most resources extracted from forests or otherwise are sold (Figure 48).

Resource extraction activities are seasonal. For example, bamboo extraction is concentrated during the monsoon months (Figure 49) and the average length of time per year devoted to harvesting most forest products is only four to five months.

Figure 48. Share of Households Selling All or Part of the Resources They Extracted, by Activity (Percentage)
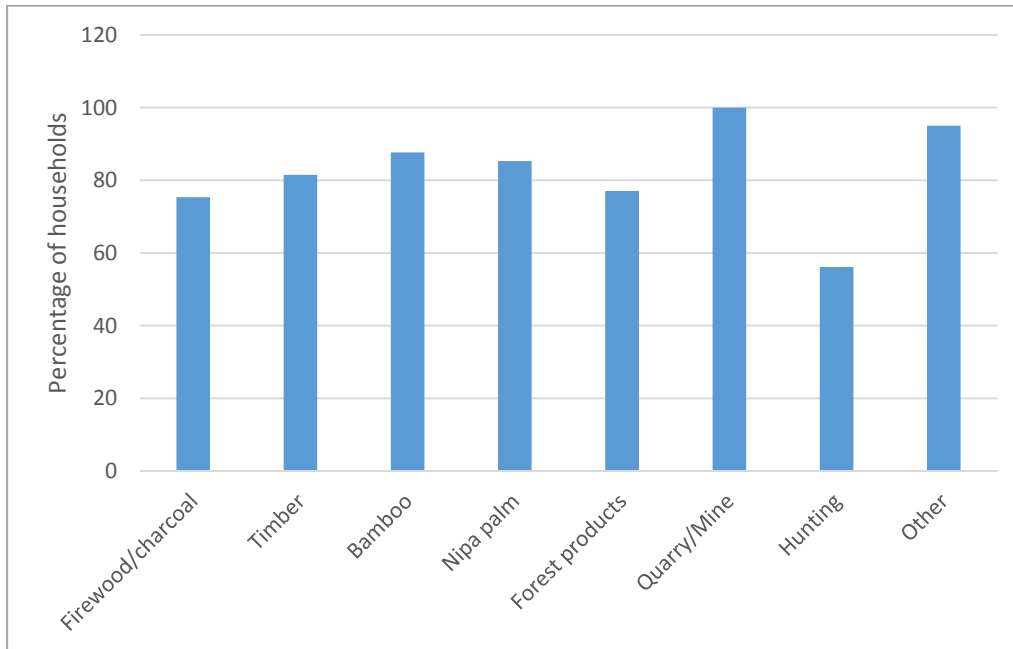
Figure 49. Share of Households Engaging in Extraction of Bamboo from Forest, by Month (Percentage)
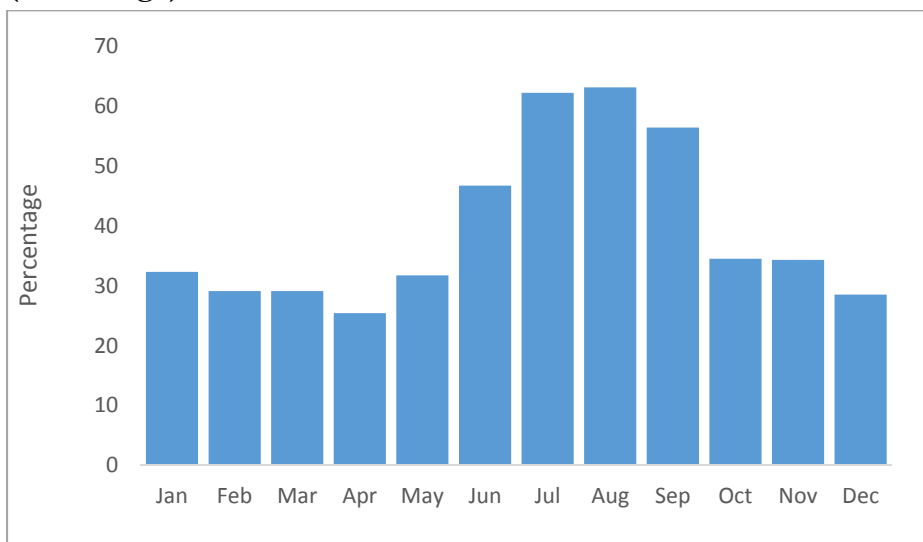
Table 67. Average Monthly Earnings from Resource Extraction

Product	Average monthly income (Myanmar kyats)
Firewood/charcoal	268,214
Timber	204,207
Bamboo	76,653
Nipa palm	92,750
Forest products	23,937
Hunting	31,250
Other	88,075
Average	133,203

Note: Too few responses were received in the mining/quarry category to compute an average.

Resource extraction activities can be significant contributors to household incomes, generating average monthly earnings of MMK 133,000 (disaggregated in Table 67). Firewood and charcoal are the most lucrative, at MMK 268,214 per month, followed by extraction of timber from forests (MMK 204,000). Most other activities generate modest average monthly earnings of approximately MMK 30,000 to MMK 90,000.

7.5. Fishing

Commercial small-scale fishing accounts for 11% of income and 10% of employment in rural Mon State. By comparison, rice cultivation accounts for 13% of total income and 20% of employment. Given that large-scale fishing enterprises, which are likely to account for the bulk of fish landings and fishing income, are excluded from this category, it seems highly likely that the economic contribution of fishing to the rural economy of Mon State is understated. Fishing income is the main source of income for only 8.8% of households in Mon State, but it accounts for a similar share of employment statewide as the cultivation of rubber, orchard crops, annual crops other than rice, and livestock rearing. The activity is particularly important in coastal areas, where 34% of households fish on a commercial basis, and in Mawlamyine district in the southern part of the state, where 15% of households fish. It is of lesser importance in the northern part of the state and areas at higher elevations (Figure 50).

Figure 50. Share of All Households Reporting Fishing Income (Percentage)
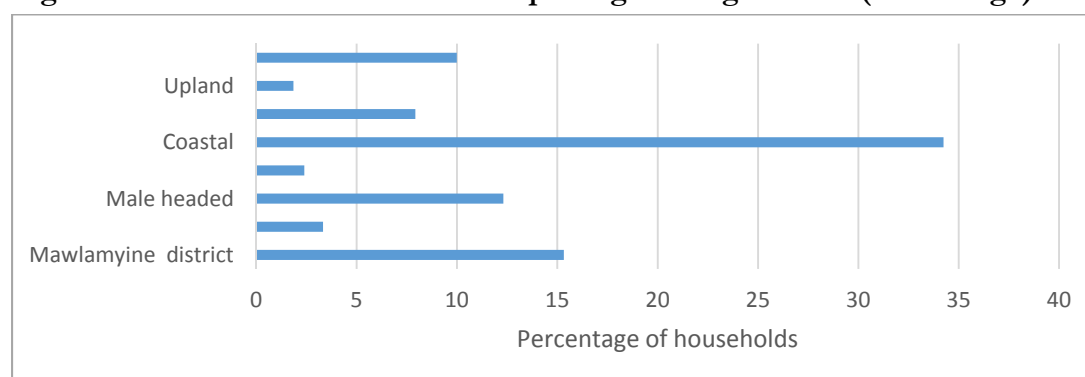
7.5.1. Capture Fishing in Mon State

The survey's fishing module was administered to commercial capture fishing households, defined as those selling all or part of their catch on a regular basis. The survey included only small-scale fishing households. Large-scale fishing operations using large boats stationed off-shore on long-term trips were excluded from the survey due to difficulty in obtaining a sufficiently large sample. However, based on observations in the field, it is likely that, though few in number, these large fishing businesses account for a major share of total catch, particularly in southern Mon. Therefore, the contribution of fishing to the rural Mon economy is greater than the data presented in this section alone would suggest.[15]

Results presented in this section thus cover households fishing in estuaries, the sea (both inshore and offshore, with and without boats), and inland areas (with boats). Approximately 79% of fishing households (approximately 7% of the total population) are included as commercial small-scale fishing households under this definition. The majority of these households fish in the sea (71%), of which about three-quarters fish inshore. The overwhelming majority of fishing households (94%) live in Mawlamyine district, in the southern half of Mon State. Fishing households are fairly evenly distributed across the five expenditure quintiles, but with an above-average share in quintile 2. The scale of fishing enterprises varies significantly across quintiles, with those in the upper quintiles owning larger boats on average.

Of the 81% of small-scale commercial fishing households that fish from a boat, most (63%) make daily fishing trips (that is, lasting for less than 24 hours). About one-third take medium-term fishing trips, lasting 12 days on average in the high season. Due to the distance to the fishing grounds, 75% of offshore fishing households conduct multi-day trips, whereas those fishing in inland and estuarine fishing grounds and inshore ae much more likely to go on daily trips (96% and 69% of households, respectively) (Figure 51). Last, 29% of capture fishing households are also involved in fish processing (drying or preserving part of their catch for sale at a later date).

Figure 51. Types of Fishing Trips

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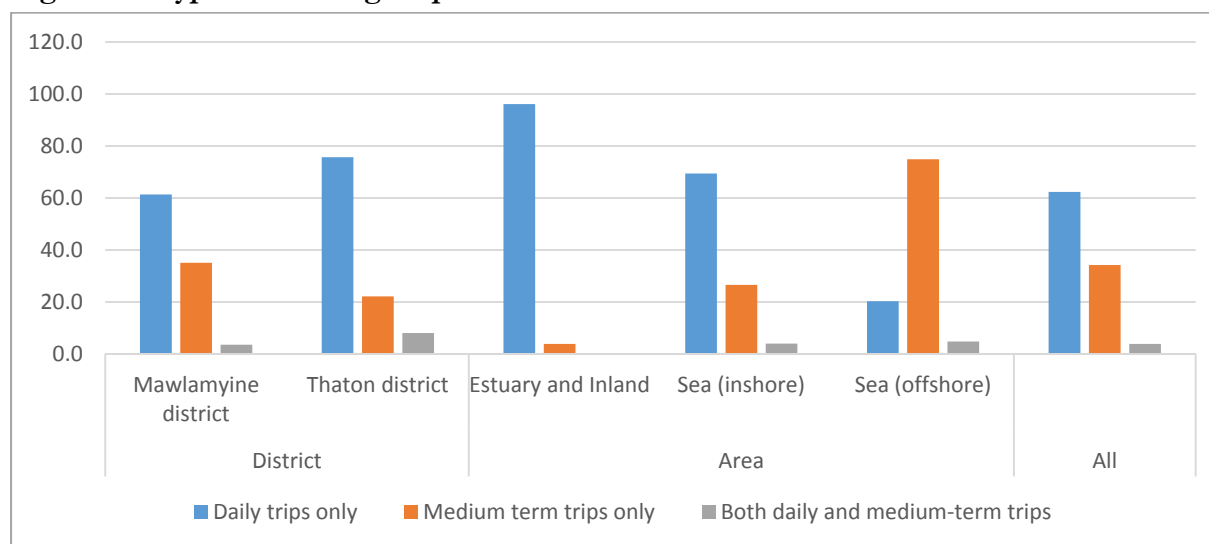
[15] Households fishing in freshwater areas without the use of a boat are also excluded. Although catching fish on a very small-scale subsistence basis (such as from rice fields using traps or nets) is common in Mon, it generally makes a limited contribution to household incomes.

Figure 52. Fishing Seasonality, Inland Freshwater (with Boat) and Estuary
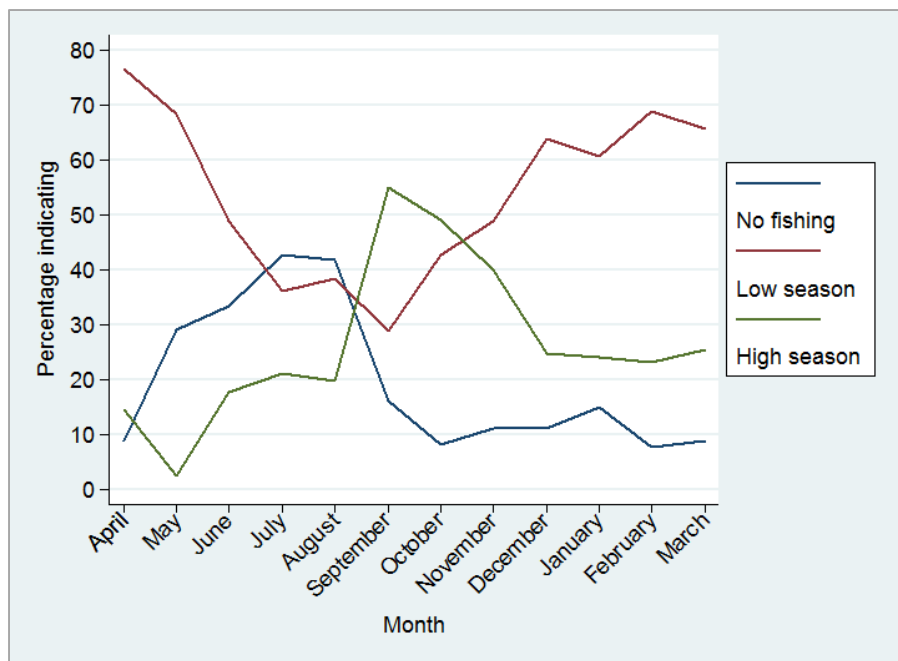
Source: Mon State Rural Household Survey 2015.

7.5.2. Seasonality of Fishing and Trip Length by Fishing Area

In this section, we analyze fishing according to the three zones in which it takes place: inland freshwater (with boat) and estuary; inshore marine; and offshore marine. Fishing in the three zones displays distinctive seasonal patterns linked to weather conditions and abundance of fish stocks. Figure 52 illustrates the seasonal fishing calendar for inland and estuarine fishing households according to the share of households who classified each month as high season, low season, or a month when no fishing takes place (off-season). The pre- and peak monsoon months of May–August were reported as off-season by the greatest share of households. High season peaks in the post monsoon months of September–November, with low season falling during the dry-season months of December–April.

Fishing seasonality for inshore marine fishing is presented in Figure 53. The pattern is similar to, but more pronounced than, that for inland and estuarine fishing (Figure 52). The main season for inshore marine fishing is September–April. The peak monsoon months of June–August are classified as off-season for the majority of households, with the dry season and pre monsoon months of December–May considered low season by more than half of households. High season runs from October through December, during the post monsoon and early dry-season period.

The seasonality of offshore marine fishing is similar to that of both inshore and inland/estuarine fishing, but more pronounced still (Figure 54). The dry-season months of September–March are the main fishing months, with more than half of households reporting May–August (early to peak monsoon) as off-season and September–December (post monsoon) as the main high-season months. Interestingly, however, more than 40% of households also considered the peak monsoon season months of July and August to be peak fishing months.

81

Figure 53. Fishing Seasonality, Inshore Sea
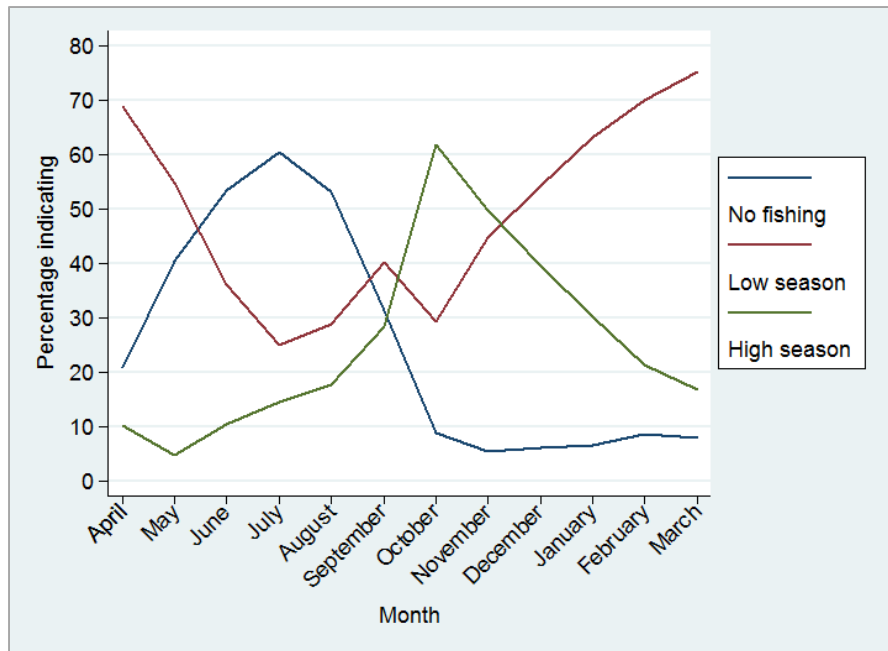
Source: Mon State Rural Household Survey 2015.

Figure 54. Fishing Seasonality, Offshore Sea
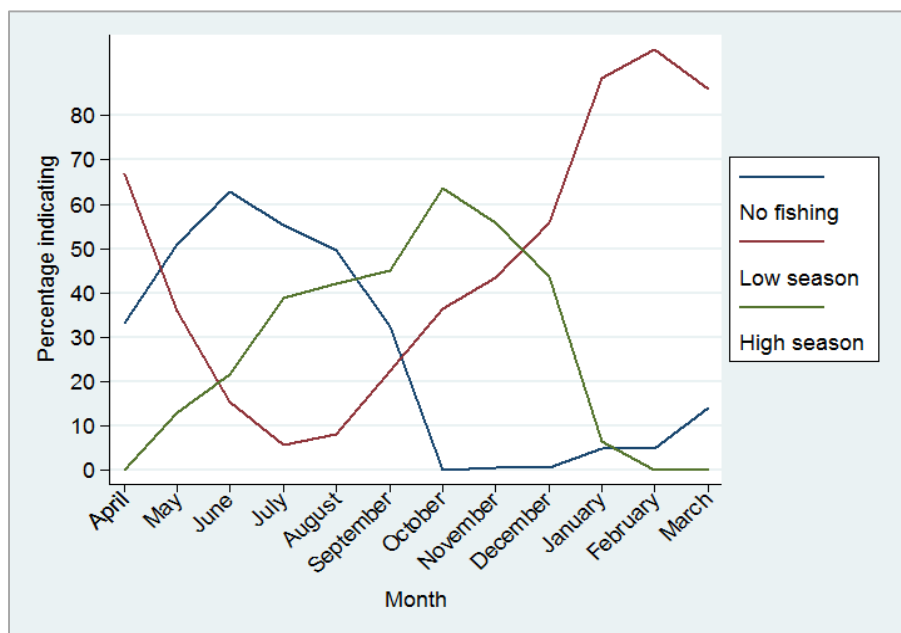
Source: Mon State Rural Household Survey 2015.

In sum, these patterns indicate the crucial importance of weather patterns in regulating the seasonality of small-scale fishing, with the heavy rains, wind, and storms associated with the early to peak monsoon months of May–August making fishing during this period challenging in all environments. Calmer weather in the post monsoon period of September–November coincides with high season in all three environments, with the greatest share of households reporting low season to

run from December through April. However, overlapping responses about the timing of high, low, and off-seasons in each environment suggest that fisheries for different species have their own specific seasonal dynamics, which are not captured here.

7.5.3. Input Costs

Input costs for fishing consist of labor; other variable costs (items purchased for each trip); and larger, less frequent expenses (for example, repairs to boats and nets), termed here as annual costs. Variable costs account for the highest share of total input costs (41%), followed by labor (37%) and annual costs (22%). Variable costs comprise fuel, ice, bait, and other costs, with fuel making up the majority (76%). A little more than half (52%) of capture fishing households employ workers. Major and minor repairs to boats and nets make up the majority of annual costs (62%), with fishing net, rope, and boxes contributing 13%, 8%, and 8%, respectively.

Daily labor is used by 15% of fishing households, which hire an average of 2.3 workers. Semi permanent labor is used by 39% of fishing households (an average of 5.7 workers per household). Households going on multi-day fishing trips and those fishing offshore (groups with a high degree of overlap) employ semi permanent workers at higher rates (82% and 83% of households, respectively) than households on daily fishing trips. Women do not play an integral role in marine capture fishing, making up only 11% of family labor, 6% of daily labor, and 1% of semi permanent labor.

7.5.4. Fishing Equipment

Fishing by boat is much more common than fishing from the shore (that is, with nets or traps), with 82% of small-scale commercial fishers using a boat. This number is even higher among marine capture fishing households, of which 92% utilize a boat. However, this figure is much lower in Thaton district (northern Mon), where 40% of marine fishing households do not make use of a boat, as compared with Mawlamyine district (southern Mon), were 93% of marine fishing households fish from a boat.

Boat characteristics vary depending on fishing location and trip duration. On average, 91% of boat-owning households own only one boat. In households that participate in offshore marine fishing, a higher-than-average percentage, 26%, own more than one boat. The average boat length is 30 feet, with boats used for offshore sea fishing and for multi-day trips larger on average (42 and 41 feet, respectively). Engine size averages 69.5 hp, with the average for both offshore and multi-day-use boats higher, at 126.6 hp and 107.9 hp, respectively. Households in Mawlamyine own boats averaging 53% larger (31 feet) than those in Thaton (20 feet). A similar trend is apparent in engine size, reflecting differences in the types of fishing practiced in the northern and southern parts of the state. Almost all boat owners use a net for fishing (98%). The most commonly used types of fishing gear (Table 68) are set bag nets (*kyar pai*)—the most commonly used category in all fishing environments, accounting for one-third of the fishing equipment used overall and 51% of the gear used in offshore fishing; drift nets (*myaw pai*), accounting for around 20% of the gear used in inshore and offshore waters; and trammel nets (*tone htet pai*), used mainly in inshore waters. *Chee pai*, crab nets, and other fishing gear accounted for 15%, 16%, and 20%, respectively, of the gear used in estuarine and inland waters.

Table 68. Types of Net Used, by Fishing Environment (Percentages)

| Net type | Fishing environment | | | |
	Estuary and inland	Sea (inshore)	Sea (offshore)	All
Set bag net (*kyar pai*)	29	25	51	34
Drift net (*myaw pai*)	14	20	22	20
Other net	20	10	14	13
Trammel net (*tone htet pai*)	1	23	4	13
Chee pai	15	12	3	9
Sein net (*sein pai*)	4	9	7	7
Crab net	16	1	0	3
Total	100	100	100	100

7.5.5. Catch

Respondents were asked about the most important species of fish landed, by volume (Figure 55) and by value (Figure 56). The types of fish most frequently reported as the most important in terms of quantity were shrimp, goby (*nga pyat*), Bombay duck (*nga nhat*), croaker (*nga pote thin*), kingfish (*nga kun shat*), pike conger (*nga shwe*), and crab. The types of fish most frequently reported as most important in terms of value were shrimp, goby, kingfish, croaker, mullet (*kan ba lu*), pomfret (*nga hmote*), and crab.

Figure 55. Most Important Fish, by Quantity (Percentage of Respondents)

84
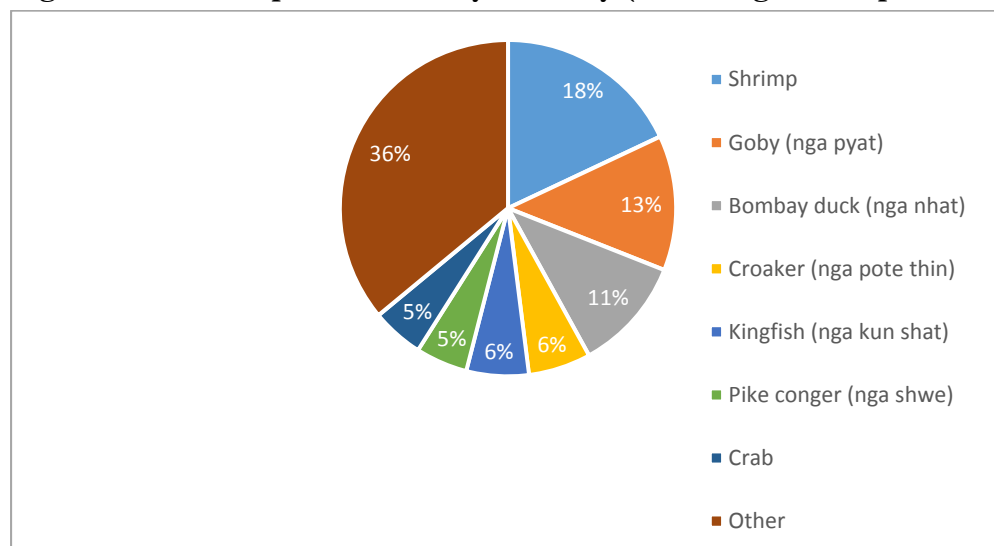
Figure 56. Most Important Fish, by Value (Percentage of Respondents)

Legend:
- Shrimp
- Bombay duck (nga nhat)
- Kingfish (nga kun shat)
- Croaker (nga pote thin)
- Mullet (kan ban lu)
- Pomfret (nga hmote)
- Crab
- Other
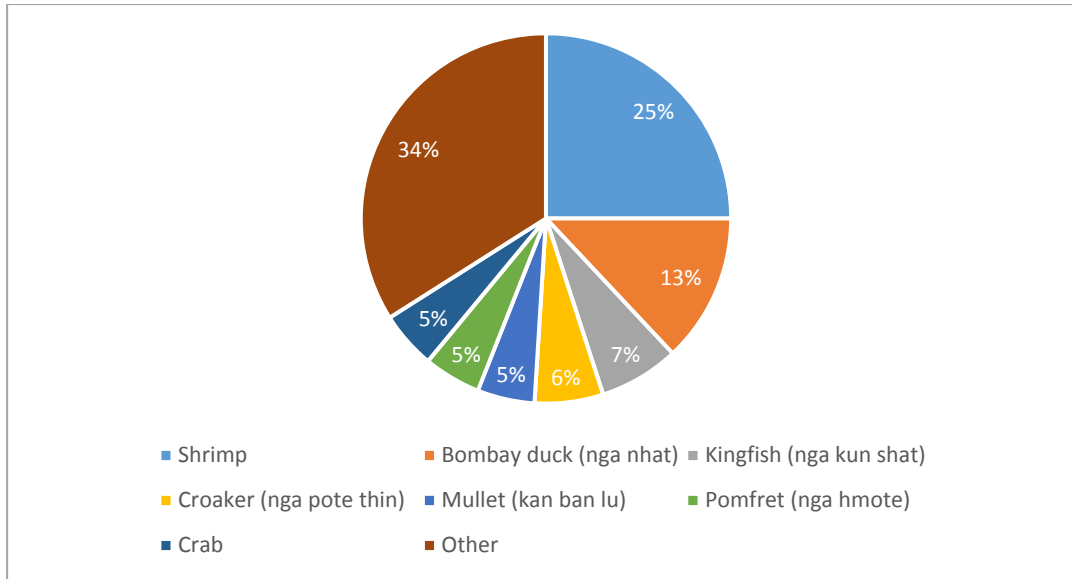
The most important fish by quantity and value reported varies by fishing type, as shown in Tables 69 and 70, with shrimp accounting for the largest share of value in all fishing environments.

Table 69. Most Important Fish by Quantity, by Fishing Environment (Percentage of Respondents)

Rank	Estuary and inland (with boat)		Marine capture—inshore		Marine capture—offshore	
	Type	Share	Type	Share	Type	Share
1	Shrimp	40%	Bombay duck (*nga nhat*)	17%	Pike conger (*nga shwe*)	24%
2	Goby (*nga pyat*)	14%	Goby (*nga pyat*)	14%	Shrimp	16%
3	Crab	14%	Shrimp	10%	Goby (*nga pyat*)	12%
4	Striped catfish (*nga tan*)	8%	Kingfish (*nga kun shat*)	10%	Pomfret (*Nga hmote*)	11%
5	Mullet (*kan ba lu*)	7%	Croaker (*nga pote thin*)	8%	*Nga kyan ywat*	10%
Other		18%		42%		27%

Table 70. Most Important Fish by Value, by Fishing Environment (Percentage of Respondents)

Rank	Estuary and inland (with boat)		Marine capture—inshore		Marine capture—offshore	
	Type	Share	Type	Share	Type	Share
1	Shrimp	20%	Shrimp	23%	Shrimp	35%
2	Mullet (*kan ba lu*)	20%	Goby (nga pyat)	14%	Pomfret (*Nga hmote*)	26%
3	Crab	14%	Kingfish (nga kun shat)	12%	Goby (nga pyat)	18%
4	Asian Seabass (*nga ka dit*)	11%	Croaker (nga pote thin)	7%	Croaker (nga pote thin)	7%
5	Striped catfish (*nga tan*)	8%	Lobster	6%	Nga ta yaw	3%
Other		26%		36%		11%

In high season, 78% of fish landed are sold fresh, and in the low season the share jumps to 89%. Figure 57 presents the distribution of buyers purchasing fresh fish from capture fishers. The sale of fresh catch is localized, with traders within the township accounting for the bulk of buyers (61%), followed by traders in Mawlamyine (27%). A very small share of fish from small-scale fisheries in Mon is sold to Yangon traders or to processing companies, likely because quantities landed by individual fishers are too small for them to transact with these buyers. This also suggests that much of the catch landed from small-scale fisheries is likely to be consumed within the state. Approximately 47% of fishers in the survey were obligated to sell their catch to the buyer to pay back advanced credit, suggesting that they are highly dependent on marketing intermediaries for working capital.

Figure 57. Most Important Buyer of Fresh Fish (Percentage of Respondents)
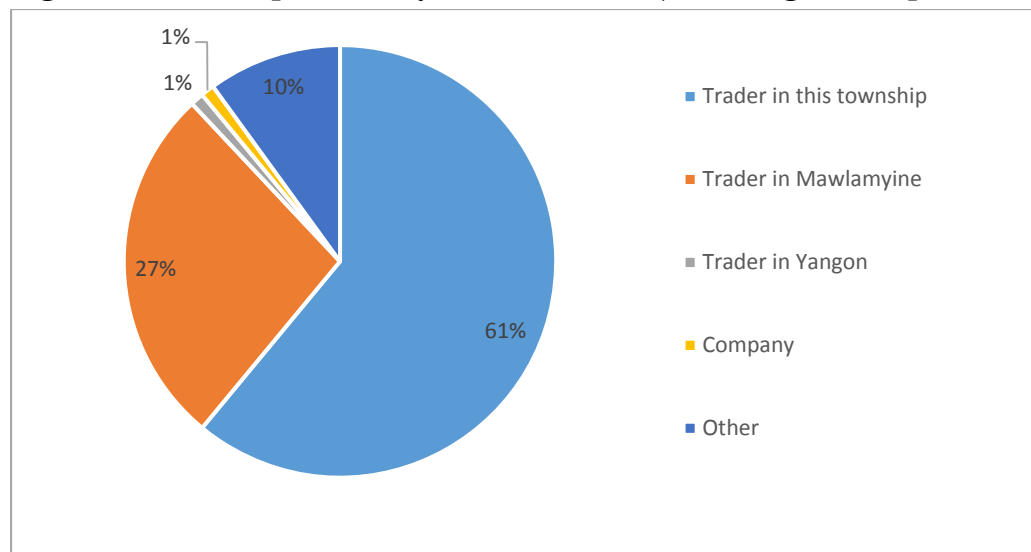
Table 71. Median Catch per Boat and Estimated Total Catch for Mon State, by Fishing Area

Fishing area	Median catch per trip (kg)		Median catch, annual (kg)	Estimated Mon State total catch (metric tons)
	High season	Low season		
Estuary and inland (with boat)	5	3	686	4,030
Sea (inshore)	33	8	2,841	136,000
Sea (offshore)	490	245	6,270	25,900

Most offshore marine fishing trips last multiple days, and offshore boats are also 42% larger on average than boats used for inshore fishing (Table 71). As a result, median landings per trip for households engaged in offshore fishing are much higher than from other types of fishing: 490 kg in high season, as compared with 33 kg for inshore and just 5 kg for estuary and inland fishing. The median annual catch per household ranged from 686 kg for inland and estuarine fishers to 2.8 tons for those fishing inshore and 6.3 tons for those fishing offshore. Based on these figures, we estimate the annual catch from small-scale fisheries in Mon at 164,930 tons, of which the vast majority originates from the inshore fishery (Table 71).

Households were asked about their perceptions of change in average fish landings in high and low season, now versus five years ago (Figure 58). More than one-third (35%) of fishing households reported a decline in daily catch in low-season months over the last five years, with 39% reporting a decline during high season. However, a similar percentage (39% and 36% in the low and high seasons, respectively) felt that yields were unchanged, and around a quarter perceived an increase. Results vary across fishing environments, with inland and estuarine fishing households more likely to report decreases in landings than those fishing in other environments (55% of households in low season and 50% in high season reporting a decline). Among inshore fishing households, the largest share reported landings to be unchanged from five years prior (46% in low season and 42% in high). However, only among households fishing offshore during low season did a greater share of respondents report that catches had increased (50%) than decreased (19%). While these findings support the general perception of declining fisheries productivity in Mon State that was expressed by informants in conversations during presurvey scoping work, they also suggest that the decline is perhaps less severe than these informants indicated.

Figure 58. Perception of Change in Catch Now Compared With Five Years Ago, by Fishing Type
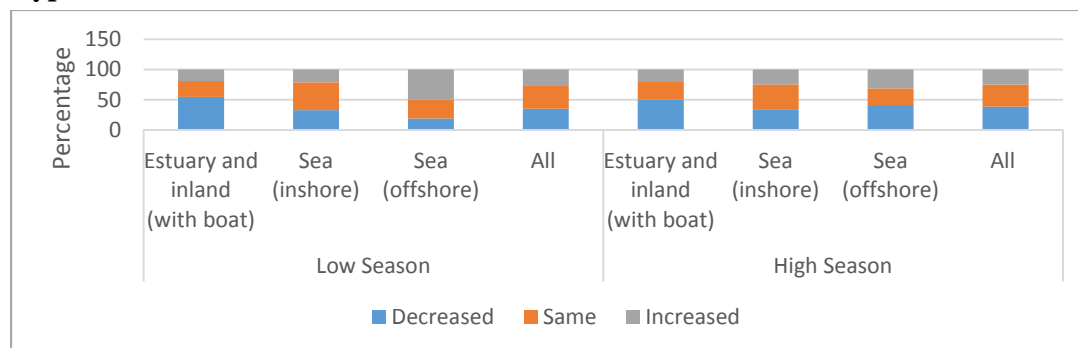
Figure 59. Share of Capture Fishing Households That Also Process Fish
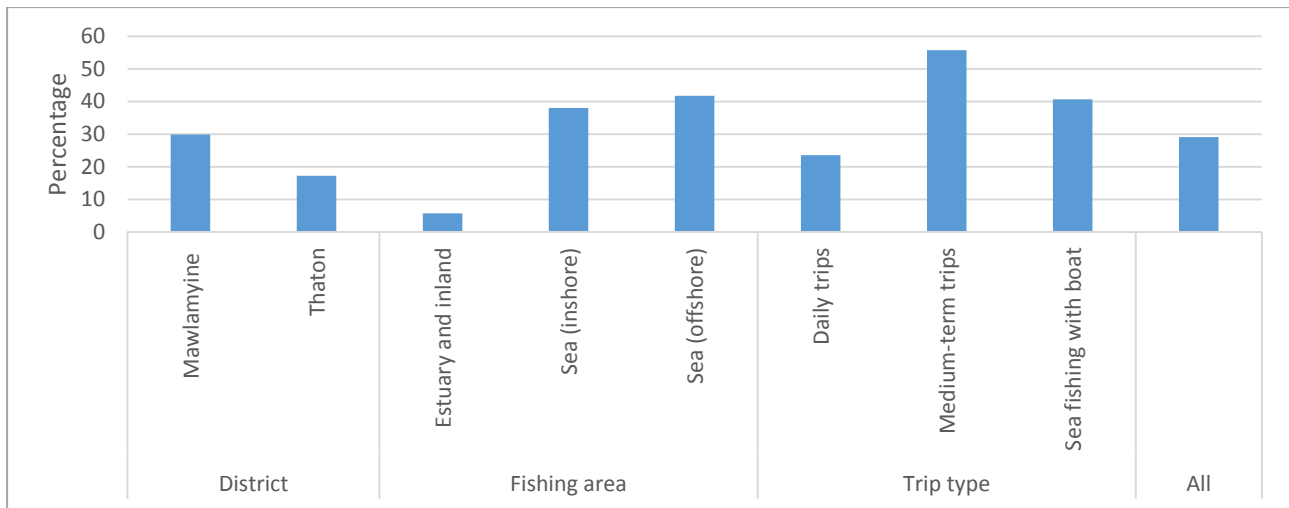
7.5.6. Processing

Processing fish, as defined here, means sun drying or preserving by other rudimentary techniques such as salting; 29% of small-scale fishing households reported processing fish in this manner. Such processing is more common among fishing households in Mawlamyine district (30%) than in Thaton (17%). Households involved in offshore and inshore marine fishing (42% and 38% of households, respectively), are more likely to process fish than those fishing estuarine or inland waters (6%). Households completing multi-day fishing expeditions are also more likely to process their catch than those engaging in single-day fishing trips (56% versus 24% of households, respectively) (Figure 59).

Fishing households who process fish rely heavily on their own catch as inputs for processing, with approximately 96% sourcing all of their fish inputs from their catch. In these households, an average of 1.8 family members, 39% of whom were women, worked at fish processing. The majority of fish-processing households (66%) also employ nonfamily labor to assist with processing, 39% of whom are female and 61% male.

Figure 60. Share of Total Processing Revenue (Percentage), by Product
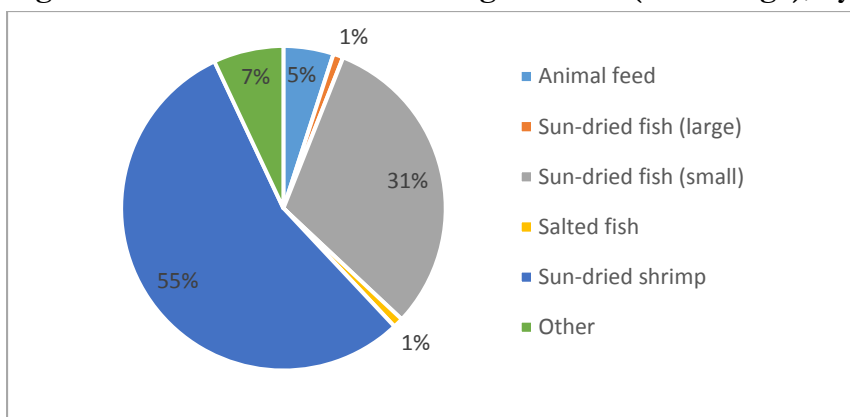
Fishing households that also process fish still, on average, earn more than two-thirds of their fishing income (68%) from selling fresh fish, with income from processed fish products accounting for the other 32%. Income from selling processed fish products accounts for 12% of total income received from small-scale fishing overall. Sun-dried shrimp accounts for the bulk of processing revenues (55%), followed by small sun-dried fish (31%), other (7%), trash fish used as animal feed (5%), salted fish (1%), and large sun-dried fish (1%) (Figure 60).

7.5.7. Conclusion: Fishing

Capture fishing makes an important contribution to incomes in Mon State, particularly in coastal areas in Mawlamyine district where there are relatively few viable alternative agricultural livelihood options. There is a great deal of variation in capture fishing strategies. Households fishing offshore in marine waters and making multi-day trips operate larger boats, land larger quantities of fish, and are more heavily engaged in fish processing activities than those fishing inshore or estuarine/inland waters. Capture fisheries' productivity in Mon appears to be declining, but to a lesser extent than suggested by anecdotal evidence. The capture fishery industry in Mon is also poorly regulated, if at all. Thus, there appears to be scope to improve fisheries management to ensure greater sustainability and productivity over the long term, through measures such as co-management. Fishers are also heavily reliant on operating capital loaned by fish traders, likely with high implicit costs. Identifying ways in which to improve fishing households' access to working capital from formal sources thus has the potential improve the profitability of the activity for small-scale fishers.

7.6. Other Income Sources

Households in rural Mon State receive a small share of their income from sources not mentioned above, including pensions, dividends, interest, lottery winnings, gifts, and donations. This accounts for approximately 4% of total income and is the dominant income source for only 5% of the sample, with 16% of households receiving income from one or more of these sources. Most of these receive religious donations (12%), followed by gifts (3%) (Table 72).

Table 72. Share of Households Receiving Income and Annual Average, by Income Source

Source	Percentage of households receiving	Annual average (Myanmar kyats)
Pension	1	484,598
Dividends	< 1	2,295,287
Interest income	2	876,155
Lottery winnings	< 1	100,871
Gifts	3	163,522
Donations (religious)	12	501,963

8. MIGRATION AND REMITTANCES

In the previous sections, we documented the important contribution of nonfarm work to income opportunities in rural Mon State. Yet one of the most popular ways to generate income for the rural inhabitants of Mon is to migrate for work. Many working-age Mon inhabitants choose to migrate, either seasonally or for the medium to long term. The motivation to migrate is rooted in income opportunities. At about US$3 per day, Myanmar has one of the lowest minimum wages in Southeast Asia (Figure 61). Even if minimum wage laws are not strictly enforced, the daily wage unskilled laborers are able to secure abroad is much higher than that in Myanmar. This wage differential motivates Burmese workers to cross the border in search of better-paid opportunities. Mon State is not the only Burmese state bordering Thailand, and worker migration is common all along the porous border. However, the historical, cultural, and linguistic proximity between the Mon and Thai peoples means that the ethnic Mon tend to find it easier to integrate into Thai society than most other workers from Myanmar.

Because migration is such a popular income-generating strategy in Mon State, the Mon State Rural Household Survey gathered extensive information on the topic, including details about short-term (seasonal) and long-term migration, as well as about the migration history of household members. In this section we outline the characteristics of migrants, including the process of migration, the activities migrants undertake abroad, incomes, and remittances.

8.1. Migration Scale and Scope

Migration out of Mon State is extremely common. A little less than half (49.5%) of households in our sample had at least one family member abroad at the time of the survey. For the vast majority of these households (95%), these migrants are away for several years at a time, which we refer to as

Figure 61. Daily Minimum Wages in Myanmar, Malaysia, and Thailand, 2015 U.S. Dollars
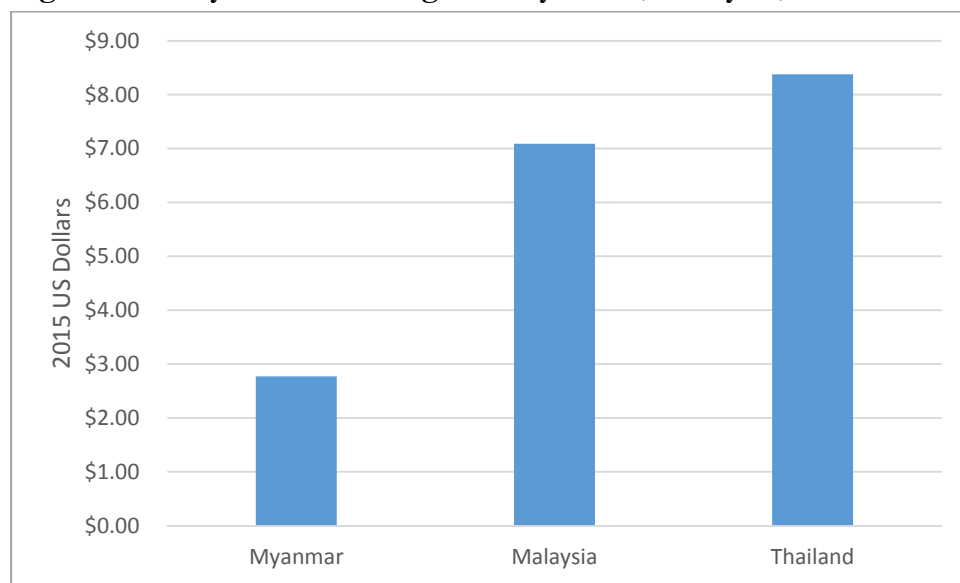
Source: Philippine National Wages and Productivity Commission. 2016. "Comparative Wages in Selected Countries." Accessed February 15, 2016. www.nwpc.dole.gov.ph/pages/statistics/stat_comparative.html.
Note**:** Malaysian peninsula excludes Borneo.

Figure 62. Histogram: Year of Departure for All Current and Past Migrants
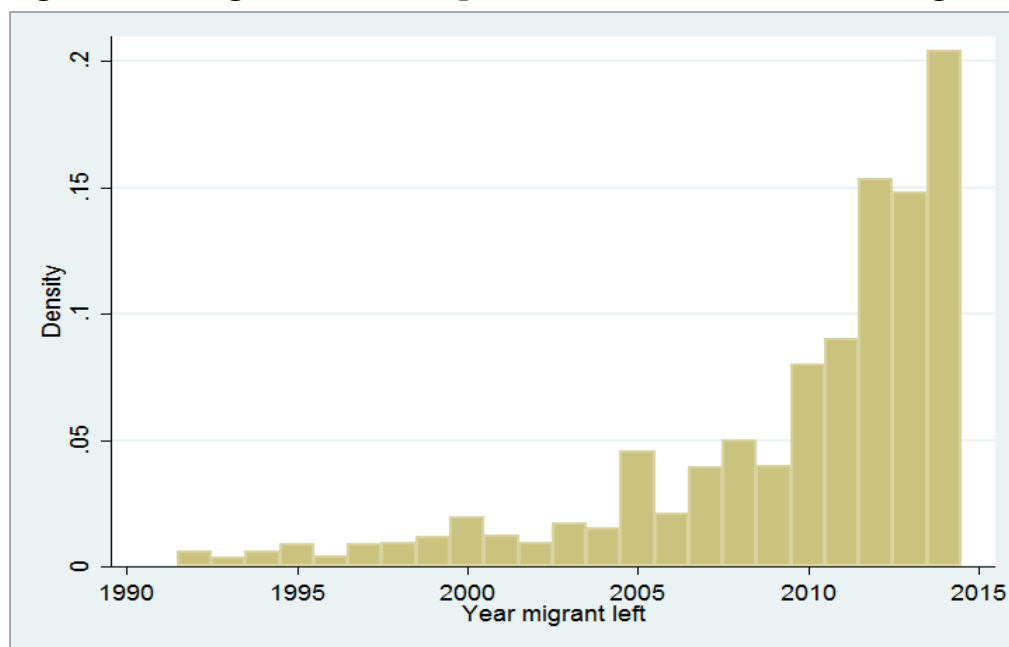
Note: Includes current and past migrants. Height represents share of distribution. Figure excludes 14 migrants with departure years between 1966 and 1989. Survey carried out in May 2015.

long-term or *nonseasonal* migration. About 10% of households also reported having *short-term* or *seasonal* migrants, who leave for months at a time, usually coinciding with yearly agricultural or fishing cycles.

Our data show that the propensity to migrate has been increasing sharply over the past few years. Figure 62 plots the year of departure of migrants reported in our data and shows a steady rise in departures. The figure includes not only migrants currently abroad but also migrants who left in the past and have returned home.

Migrants out of Mon State come from all geographic areas (Table 73) and all socioeconomic classes (Figure 63). The coastal areas are home to roughly 20% of migrant-sending households, while lowlands and uplands are home to 46% and 37%, respectively. The share of households with migrants is very high in all income quintiles, greater than 40%, suggesting that all socioeconomic classes in Mon participate heavily in the migrant economy. However, Figure 63 shows that there exists a clear association between migration and wealth, with households in higher income quintiles more likely to be migrant senders. Earlier analysis (Figure 16) showed that wealthier homes tend to source more of their income from remittances than those in the bottom income quintiles.

Table 73. Distribution of Households With and Without Migrants (Percentage of Respondents)

Agroecological zone	Has migrants	No migrants	All
Coastal	16.2%	17.6%	16.9%
Lowland	46.5%	44.0%	45.2%
Upland	37.3%	38.4%	37.9%
Total	100%	100%	100%

Figure 63. Share of Households with Migrants by Income Quintile (Percentage of Households)
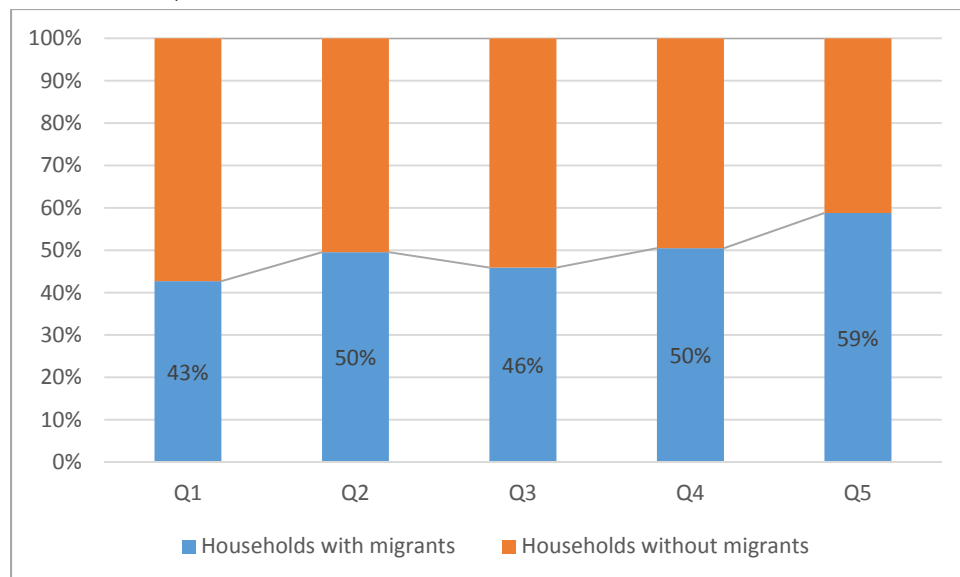
8.2. Migrant Characteristics

It is seldom the head of household or the head's spouse who migrates (Table 74); rather, it is mostly young men and women of working age (Table 75). Migration is almost equally popular among males and females, and the characteristics of migrants vary little between genders. The average age of nonseasonal migrants at the time of migration is about 24, and the overwhelming majority of migrants are young people between 16 and 35. Only 8% of migrants were younger than 16 when they migrated, and around 10% were older than 35.

Table 74. Relationship of (Nonseasonal) Migrants to Household Head (Percentage of Households with Nonseasonal Migrants)

Relationship	Male-headed households	Female-headed households	All households
Spouse	1%	11%	4%
Child	83%	64%	77%
Grandchild	4%	5%	4%
Son/daughter-in-law	8%	9%	9%
Other	4%	11%	6%
Total	100%	100%	100%

Table 75. Characteristics of Current Long-Term Migrants, by Gender

Characteristic	All migrants	By gender	
		Male	Female
Percentage female	46%		
Mean age at time of departure	24.0	24.3	23.7
Percentage younger than 16	8%	9%	8%
Percentage older than 35	10%	10%	10%
Average years of schooling	5.1	4.9	5.3
Percentage who never completed primary schooling	27%	27%	26%
Percentage from a landless household	53%	51%	54%
Percentage who do not own land themselves	90%	89%	90%
Number of observations	1,526	845	681

Most migrants also have relatively low levels of education, with only 6.1 years of schooling on average, which is barely above the national average. More than one-quarter of migrants never finished primary school (27%). Our data also show that the great majority of migrants (84%) have never been to high school (with or without completing it). These results suggest that migrants are at least partially pushed into migration by the lack of lucrative opportunities for unskilled workers in Mon.

8.3. Migrant Destinations

The overwhelming majority of long-term migrants (84%) are in Thailand, dwarfing any other location, national or international. The second most popular destination, though distant, is another location within Myanmar, followed by Malaysia (Figure 64). Thailand's geographic proximity and the low average costs of migration help to explain its popularity (Table 76). The total cost of migrating to Thailand is a little less than MMK 400,000 (approximately US$400), including costs for transportation and fees for brokers, documentation, and visa if necessary. In contrast, migrating further abroad raises the costs almost threefold.

Figure 64. Distribution of Migration Destinations for Nonseasonal Migrants (Percentage of Nonseasonal Migrants)
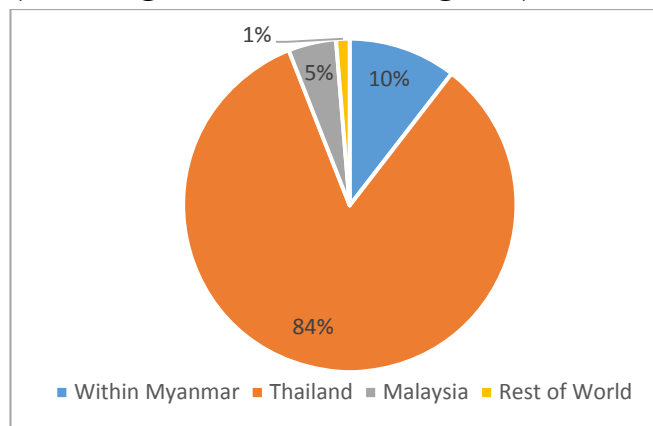

Table 76. Average Cost of Migration

Destination	Average cost of first trip (Myanmar kyats)	Number of observations
Within Myanmar	93,000	136
Thailand	392,000	1,037
Malaysia	1,018,000	54
Other countries	1,920,000	10

Migrant networks, which have consolidated over time, help facilitate migration, particularly longer-distance migration. Seventy percent of migrants already had a family member or relative resident at their chosen destination when they migrated. This percentage is somewhat higher for women (76%) than for men (66%), perhaps reflecting security concerns. Migrants not only have contacts at their destination, but those contacts often help to prearrange employment opportunities before migrants embark on their journey.

The border between Myanmar and Thailand is relatively porous. An overwhelming majority (80%) of migrants migrated to Thailand via informal channels.[16] However, although most migration was informal, 61% of migrants obtained formal legal status during their time abroad. In 2012, Thailand passed a law making it easier for Burmese citizens to obtain work visas, both before and after they have entered the country. Indeed, our data show that the share of migrants from Mon with formal documentation has increased dramatically since the passage of this law. While 55% of migrants who returned to Mon before 2012 had never obtained legal status, after 2012 this percentage drops to 32%, suggesting that a large share of migrants to Thailand are now there legally.[17]

8.4. Working Abroad

About 10% of households had a migrant who had returned from working abroad, providing a useful source of information about employment abroad. Around half of these migrants (46%) worked in rural areas while away (Table 77). The top four primary occupations reported by migrants were casual labor (27%), unskilled salaried work (24%), employment in nonfarm enterprises (18%), and rubber cultivation labor (16%). These employment patterns vary slightly by gender. Women are less likely to be working in rural areas (41.3%, versus 50.8% for men) and are most likely to be salaried workers (28.6%), mostly in the service industry. Men are most likely to work as casual labor (32.2%) doing jobs such as construction or harvest work.

 The majority of migrants work in unskilled jobs, though almost half of all migrants having returned from abroad (49%) reported having learned a skill while abroad: 20% reported having learned language skills while others acquired a skill in either rubber, factory work, or handcrafting (the

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[16] By comparison, the percentage of informal migrants to Malaysia is 46%.
[17] The question of whether or not a migrant obtained legal status after having crossed illegally was asked only of return migrants because families in Mon may not be able to provide that information about their relatives currently abroad.

categories are not mutually exclusive). There was little difference between male and female migrants in terms of skills acquisition. A little less than one-third of those who reported acquiring skills abroad said those skills had been economically useful since their return to Myanmar.

Poor working conditions (20%) were the most common reason that migrants returned to Mon. The need to care for family members and the desire to be with relatives also ranked highly. Interestingly, the lack or loss of job opportunities did not rank high among reasons to leave, suggesting that Thailand's labor market has not been saturated with low-skilled migrants. Job opportunities in Mon were not a primary reason to return home, nor was a lack of legal status.

Table 77. Summary Statistics on Employment of Migrants Returned from Abroad at Destination, Percentages

Characteristic	All returned migrants from abroad	Male	Female
Percentage working in rural areas at destination	46	51	41
Primary occupation			
Casual laborer	27	32	22
Unskilled salaried worker	24	20	29
Nonfarm enterprise worker	18	16	20
Rubber worker	16	19	13
Other*	15	14	17
Total	100	100	100
Skill acquisition			
Skills acquired (all categories)	49	50	48
Acquired language skills	21	22	20
Acquired skills in rubber	10	10	11
Acquired skills in factory work	10	9	11
Acquired handcrafting skills	9	10	8
Percentage for whom acquired skills have been economically useful since return	27	27	26
Primary reason for returning			
Poor work conditions	20	22	19
Need to care for relative / death in family	20	20	21
Schooling or personal reasons	13	9	17
Desire to be with family	10	10	10
Job prospect at home	9	11	6
Old age / incapacity to work	8	6	11
Loss of job / lack of opportunities	6	9	4
Lack of legal status	3	4	2
Other	11	10	11
Total	100	100	100

Note: * Includes other agricultural jobs, fishing, aquaculture, resource extraction, and other occupations.

8.5 Migrant Remittances

Two-thirds of long-term migrants remitted funds within the last 12 months (Table 78). This figure is slightly higher for female migrants (69%) than male migrants (63%). A higher percentage of migrants to Malaysia (78%) had remitted in the last 12 months, compared with those in Thailand (66%).

On average, a migrant remitted about MMK 818,000 annually—roughly US$800. The median amount is somewhat lower, at MMK 500,000, suggesting that the distribution is more concentrated in the lower values.[18] The annual average for male migrants (MMK 863,000) is slightly higher than for female migrants (MMK 763,000). However, median remittances from males are slightly lower than those from females (MMK 500,000 and MMK 600,000, respectively). The average annual remittance from Malaysia (MMK 1.55 million) is far higher than that from Thailand (MMK 777,000). This suggests that migrating to Malaysia, while more costly, also carries hopes of higher returns.

An almost equal share of formal (70%) and informal (66%) migrants remitted in the last 12 months. However, the average annual remittance of a migrant who crossed the border legally (MMK 1.0 million) was substantially higher than that of an informal migrant (MMK 787,000). This likely reflects the fact that migrants with legal status can secure higher-paying jobs.

These values are far from negligible for the recipient household. They are roughly equivalent to the yearly earnings of an unskilled worker paid MMK 3,000 per day and working year-round. Altogether, the total value of remittances represents about 25% of the total household incomes in rural Mon State and is slightly higher for richer households than poorer ones. In the fourth and fifth income quintiles, more than one-quarter of total income is generated from remittances (Figure 65).

Table 78. Remittances Received from Current Migrants

Remittance	All non-seasonal migrants	Gender		Destination		Legal status	
		Male	Female	Thailand	Malaysia	Crossed border formally	Crossed border informally
Remitted in the last 12 months (percentage)	66%	63%	69%	66%	78%	70%	66%
Average remittance (Myanmar kyats)	818,000	868,000	763,000	777,000	1,550,000	1,040,000	787,000
Median remittance (Myanmar kyats)	500,000	500,000	600,000	500,000	1,200,000	600,000	500,000
Number of observations	1,526	845	681	1,204	67	306	1,009

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[18] The data were corrected for outliers. Reported values falling outside of the 2-standard-deviation range around the median were imputed to the median.

Figure 65. Share of Total Household Income from Remittances
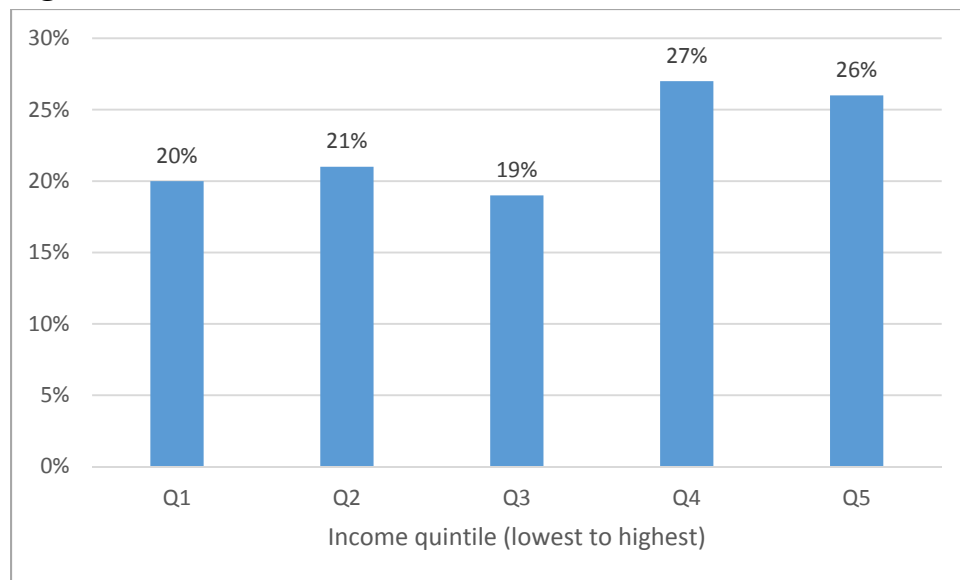
Remittances have an important effect on the Mon economy, providing one of the main sources of savings and investments. House construction is the main use of remittances for 26.4% of households (Table 79). Purchasing agricultural land (19.3%) and land for housing (9.3%) are also frequent investments. Surprisingly, payment for medical expenses (13.2%) is also an important expense. The purchase of agricultural assets or fishing equipment does not appear to be high on the list of main uses of remittances. However, Table 16 (in section 5.5.1) showed that about one-quarter of households who purchase tractors and other agricultural machinery do so primarily using remittance money. Thus, while the most important expenses met with remittances are not often productive ones, remittances do contribute somewhat to the purchases of productivity-enhancing assets.

The results vary somewhat by gender, though not dramatically. A slightly higher percentage of the remittances of male migrants (29%) are spent on house construction than those of their female counterparts (24%). On the other hand, a higher percentage of female return migrants (24%) use remittances to buy agricultural land than their male counterparts (15%).

Table 79. Largest Expenses Met Using Remittances (Percentage of Responses)

Expense type	All migrants	Males	Females
House construction	26%	29%	24%
Purchase agricultural land	19%	15%	24%
Pay medical expenses	13%	11%	15%
Purchase land for housing	9%	11%	7%
Donations to monasteries	8%	9%	7%
Purchase agricultural assets / fishing equipment	6%	5%	8%
Pay debts	6%	5%	6%
Pay for ceremonies	6%	6%	5%
Purchase durable assets	3%	4%	1%
Other	4%	5%	2%
TOTAL	100%	100%	100%

8.6. Conclusion: Migration in Rural Mon State

Migration is common in Mon State, with around half of households having at least one migrant abroad at the time of the survey. Once abroad, migrants perform a variety of low-skilled work, but their wages are greater than in Mon, so they are able to remit substantial sums of money back to their households. The remittances represent a large amount of household income and are generally used to purchase assets, particularly housing and land. However, large outflows of the labor force also put a strain on local labor markets.

9. HOUSEHOLD CONSUMPTION AND VULNERABILITY

9.1. Consumption

9.1.1. Food Consumption

The total value of weekly per capita food expenditures among households in quintile 5 (the wealthiest 20% of the population) is 1.5 times greater than among households in quintile 1 (Figure 66). The composition of these expenditures also varies across quintiles, with the share of staples decreasing as household expenditure increases, reflecting Bennett's Law (Figure 67). Conversely, the share of food expenditure allocated to meat, eggs, dairy, fruits, vegetables, fish, and seafood rises across quintiles 1 to 5. Although these patterns follow expected trends, they are not particularly strong, suggesting relative equality in terms of food consumption.[19] This situation has important policy implications. Myanmar's agricultural policy has historically sought to promote rice production to ensure low consumer prices; rice is considered politically sensitive due to its share in household expenditures. However, as these results show, consumer budgets are fairly balanced among different types of foods. As a result, the prices of more income-elastic goods such as fish, meat, and fruits may now have a significant bearing on food security and—particularly given their nutrient-rich nature—on nutrition security.[20]

Figure 66. Average Food Expenditure per Capita, per Week, by Income Quintile (in Myanmar Kyats)

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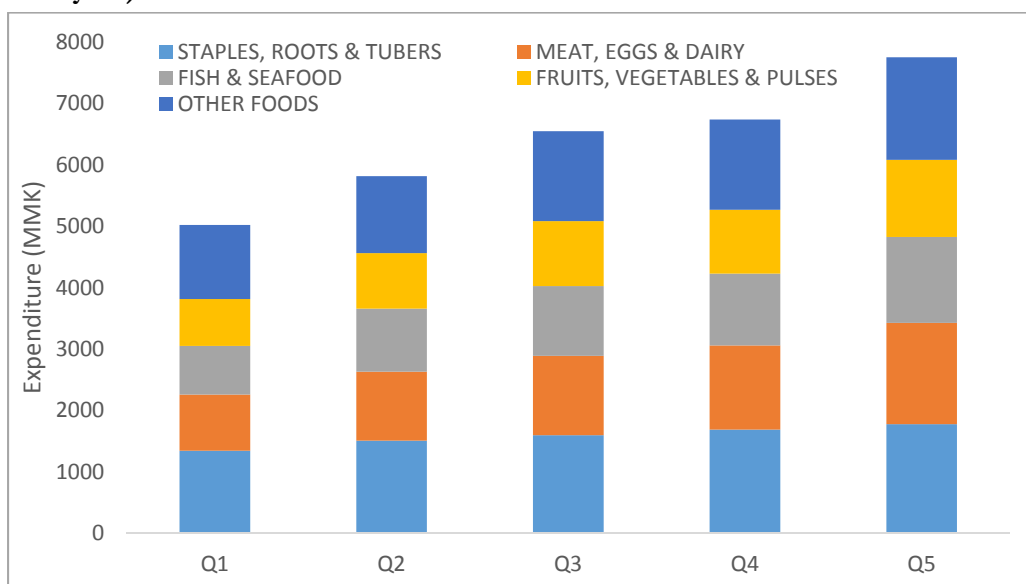
[19] Some caution should be used in interpreting these data. Our sample was collected shortly after one of the largest holidays in Myanmar, Thingyan. During this multi-day celebration, there is a tendency for migrant family members to travel back to their village with gifts, including food gifts.

[20] Our data have no information on nutritional status. UNICEF reported that child nutrition measures are better in Mon State than the national averages. In 2009–2010, 18% of children were underweight and 30% stunted in Mon State (versus 23% and 35%, respectively, at the national level). UNICEF. 2015. "Mon State: A Snapshot of Child Wellbeing." Accessed December 10, 2015. http://www.unicef.org/myanmar/Mon_State_Profile_Final.pdf.

Figure 67. Shares of Food Groups in Total Food Budget (Percentage), by Income Quintile
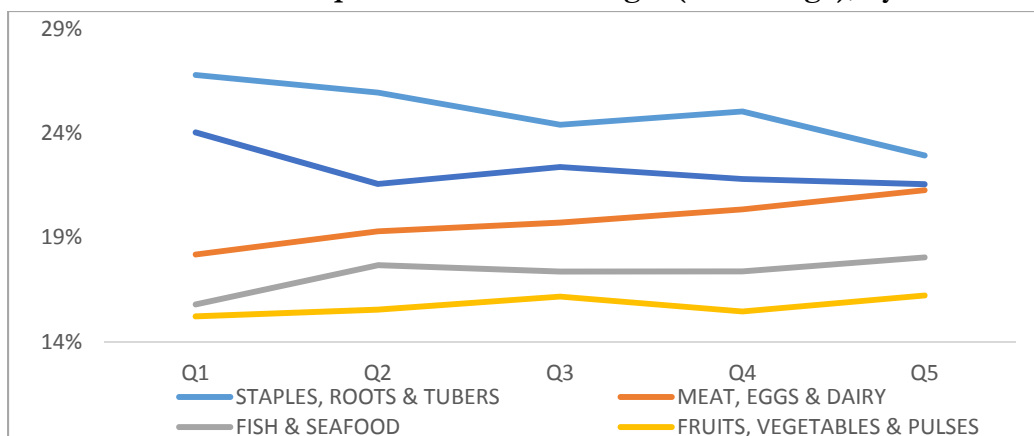
9.1.2. Dietary Diversity

Dietary diversity—the number of different food groups consumed over a given reference period—is a simple indicator of diet quality. A diversified diet is important because it is associated with caloric and protein adequacy, as well as a number of improved health outcomes. A household dietary diversity score (HDDS) can be calculated by collecting information on a household's food consumption over the preceding 24 hours, with foods categorized into 12 groups. The HDDS is computed as an index, in which 1 would be the maximum value possible (indicating that all 12 food groups were consumed).[21]

Figure 68 presents the share of households who consumed foods belonging to each of the 12 groups within the previous 24 hours. As would be expected, almost all households consumed staples. Close to three-quarters consumed vegetables, sugar or sugary foods, and miscellaneous items (a category that includes the condiments and spices commonly eaten with most meals). Between 30 and 40% of households consumed meat, eggs, or dairy products, making fish and seafood the most frequently consumed sources of animal protein (62% of households).

Figure 68. Share of Households Consuming Food Groups within the Preceding 24 Hours

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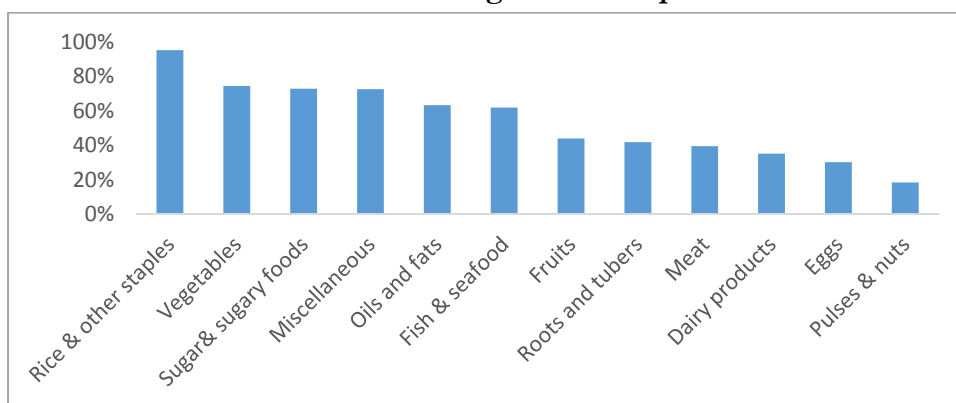
[21] For more information, see A. Swindale and P. Bilinsky. 2006. "Development of a Universally Applicable Household Food Insecurity Measurement Tool: Process, Current Status, and Outstanding Issues." 2006. *The Journal of Nutrition* 136 (5): 1449S–1452S.

Table 80. Average Household Dietary Diversity Score

| Variable	Average household dietary diversity score
By agroecological zone	
Coastal	0.57
Lowland	0.53
Upland	0.54
By household characteristic	
Male head	0.54
Female head	0.53
Owns agricultural plot	0.56
No agricultural plot	0.53
By income quintile	
Income Q1	0.51
Income Q2	0.53
Income Q3	0.55
Income Q4	0.57
Income Q5	0.58

Those owning agricultural land have higher diversity scores than those without (Table 80). Somewhat surprisingly, given their lower incomes, households in coastal zones had somewhat better scores, though this may be a reflection of their relatively cheap access to fish and seafood. Households in the bottom income quintile have a diversity score .07 percentage points lower than households in the top quintile, which is almost equivalent to having eaten on aggregate from one fewer food category in the past seven days. All these differences are small, however, suggesting, as also indicated by results in the previous section, that access to food is relatively equitable across socioeconomic groups.

9.2. Perceptions of Well-Being

The survey asked questions about the general well-being of participants and how their well-being has changed over the past five years. On a scale from *very good* to *not good*, the majority of Mon State residents (41.5%) perceive their economic and social situation as *fair* (Figure 69), with more participants feeling that they are *not good* (29.7%) than *good* and *very good* (28.7% combined). Although perception of well-being varied little by district or agroecological zone, whether households owned land had a significant impact on perception of well-being. More landless households perceived their current situation as *not good* (36.7%), compared with households owning land (19.9%). Further, more female-headed households than male-headed ones saw their well-being as *not good*. How people perceive their social and economic well-being has changed little from five years ago to today.

Figure 69. Perception of State of the Households, Five Years Ago, and Today
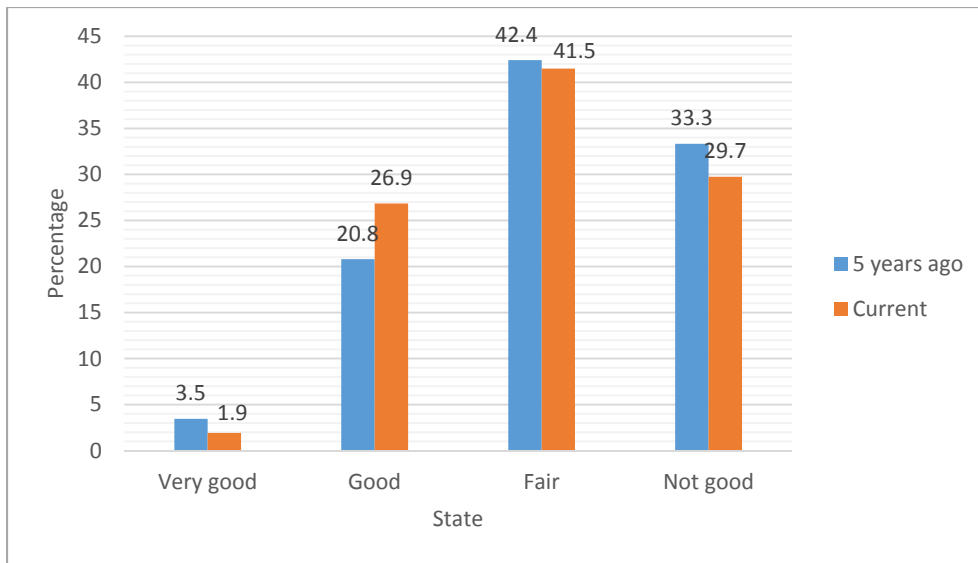
When asked how the household perceived its socioeconomic situation in comparison with its neighbors', the majority of households, 63.5%, felt that they were of *average* wealth, while 26.4% felt that they were *below average* (Figure 70). Fewer households thought that they were *slightly poorer* or *much poorer* than their neighbors. Households' relative perceptions have improved from five years ago. Households who defined themselves as *much poorer* or *below average* are more likely to be landless, located in coastal areas, or both.

Figure 70. Perception of Wealth Compared with Neighbors, Currently and Five Years Ago
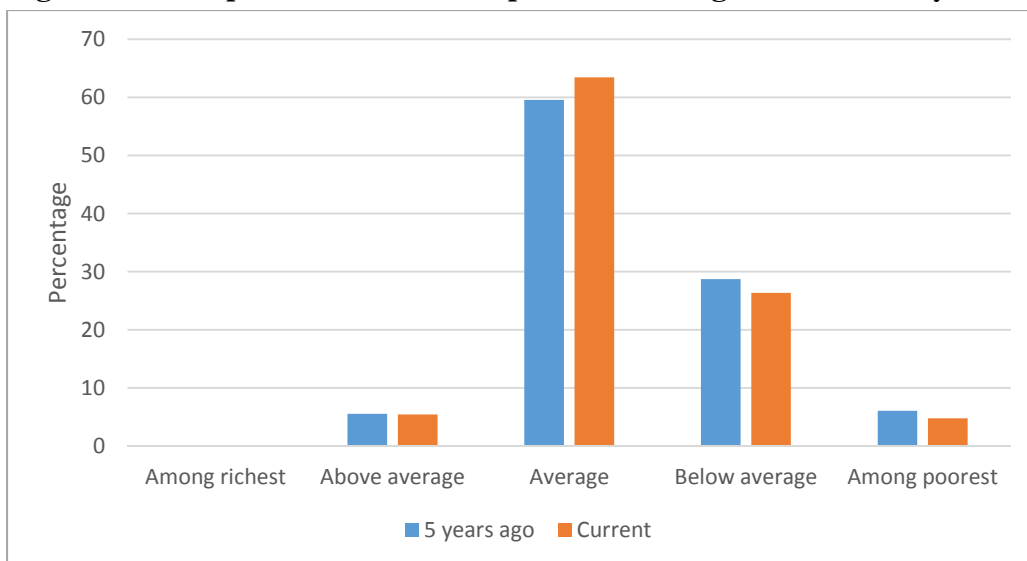
Table 81. Household Perception of Adequacy of Basic Needs (Percentages)

Perception	Food consumption		Housing		Clothing		Healthcare		Education	
	5 years ago	Now	5 years ago	Now	5 years ago	Now	5 years ago	Now	5 years ago	Now
More than adequate	7.3	6.6	7.3	7.7	7.7	7.6	6.4	6.7	4.6	5.3
Adequate	75.3	79.0	64.5	68.8	75.0	78.0	74.6	77.2	54.6	57.9
Less than adequate	17.4	14.4	28.2	23.5	17.3	14.4	19.1	16.0	40.8	36.8

Households were also asked to report whether they could adequately meet their basic needs. Less than 8% of all households perceived that their basic necessities were *more than adequately* met today as well as five years ago. As shown in Table 81, education was perceived to be the least adequate. Housing was considered *less than adequate* by 23.5% of households. Food consumption and clothing were most often considered *adequate* or *more than adequate* and were improving at the highest rate. Surprisingly, although health issues were reported to be a crucial negative shock (see next section), a majority of the households perceived that their healthcare was *adequate*. The perception of inadequate basic needs has decreased from five years ago in all categories.

9.3. Shocks

Poor, rural households in Myanmar, with limited access to social safety nets, are vulnerable to shocks such as family illness, income fluctuations, and weather-related events. In rural Mon State, 19% of the population had experienced one or more shocks in the 12 months prior to the survey. Of those who reported experiencing shocks, 69% experienced one, 20% experienced two, and 11% experienced three or more. Households in Thaton (20%) experienced shocks at a rate slightly higher than those in Mawlamyine (17%), largely as a result of flooding.

9.3.1. Types of Shocks

Myanmar spends less annually on healthcare than its regional neighbors. According to the World Health Organization (WHO), in 2013 Myanmar spent 1.8% of gross domestic product on healthcare, compared with 2.0% in the Lao People's Democratic Republic and 7.5% in Cambodia. It is therefore no surprise that the most common type of shock households experienced was health-related income loss or medical expenses (8%). Natural disasters, including losses due to floods, pests, and diseases, were experienced by 5% of households and were frequently mentioned as severe (27% of households that experienced these shocks) (Figure 72). Given the potential of climate change, the rate and severity of climate-related natural disasters, such as floods and typhoons, may increase. Other types of shocks were less prevalent. Health-related shocks were also widely considered to be the most severe (Figure 71).

Figure 71. Shocks Experienced, Percentage of Households
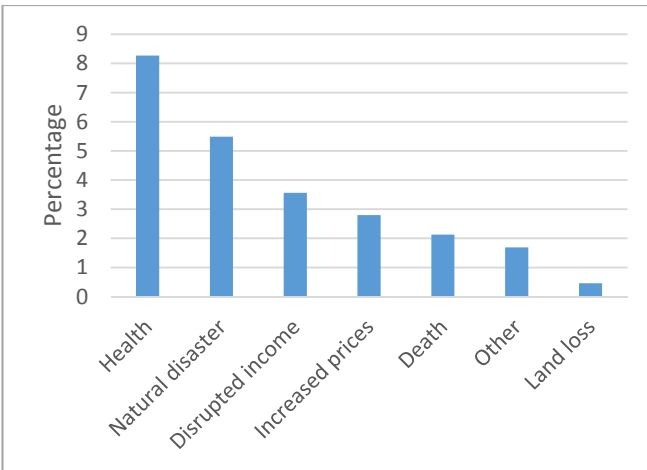
Figure 72. Most Severe Shock Experienced, Percentage of Households
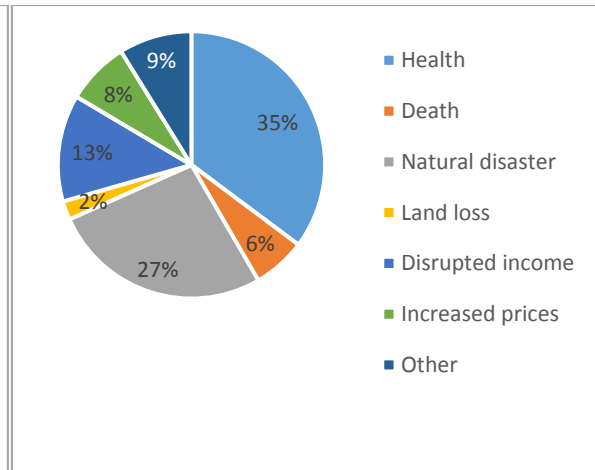
9.3.2. Coping Strategies

Lack of access to formal credit outlets and the absence of social safety nets make it challenging for poor households to cope with shocks. In our survey, households most frequently reported using asset-depleting strategies to cope with shocks, either drawing on their own savings (34%) or selling their jewelry (8%). Others received credit (23%) or aid (6%) from friends and relatives (Figure 73). These strategies did not differ much according to the type of shock experienced, with the exception of price increases, which caused a reduction in food consumption.

In our survey, households were asked whether or not they would be able to borrow MMK 50,000 if they needed the money for an emergency. The majority of households, 78%, answered that they would be able to borrow money. When asked how the household would obtain the money, 40% said from loans and 16% said by borrowing from friends and family. Less than 15% of households stated that they would obtain the money from the sale of household, farm, or business assets.

Figure 73. Primary Coping Strategies
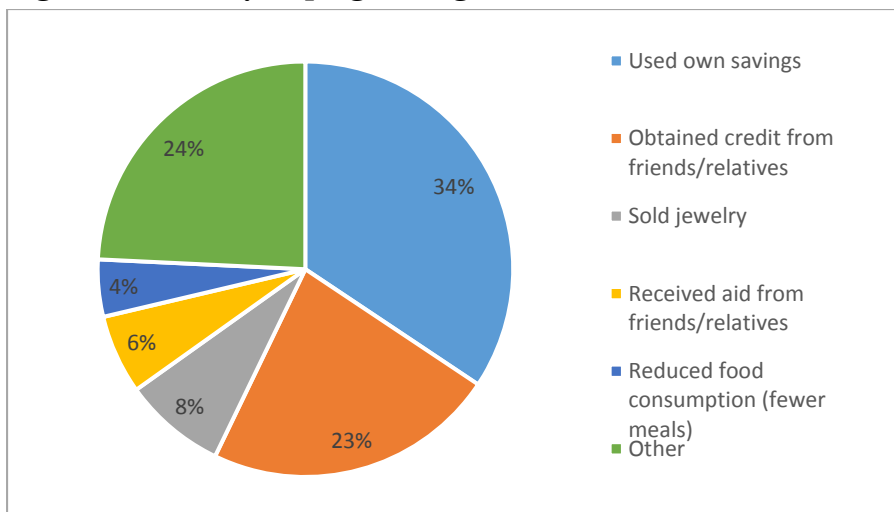
9.4. Access to Credit and Savings

Approximately 42% of households in the survey had borrowed money in the 12 months prior to the survey. Households took out 1.1 loans on average, and only 14% of these were bridge loans, that is, short-term loans that typically accrue interest at a higher rate and are meant to solve temporary liquidity shortages. More than one-third of the rural population participates in farming, an income source that requires expenditure smoothing due to its seasonality. Nevertheless, we do not find a difference in borrowing rates between households with and without agricultural landholdings. We do, however, find that households with agricultural landholdings have greater access to formal credit. The rest of this section will provide a general overview of credit use in rural Mon State.

9.4.1. Characteristics of Borrowers in Rural Mon State

The share of households that access credit does not vary much by district, agroecological zone, or income quintile (Table 82). A greater share of male-headed households borrow than female-led households. Households in the bottom income quintile borrow slightly less frequently than those in the four quintiles above, presumably because they do not have the necessary collateral or social capital to secure a loan.

Table 82. Share of Households with One or More Loans

Variable	Share of households (percentage)
By district	
Mawlamyine	40
Thaton	44
By agroecological zone	
Coastal household	44
Lowland household	41
Upland household	41
By gender of head	
Female head	38
Male head	43
By agricultural landownership	
Own agricultural plot	42
No agricultural plot	42
By income quintile	
Quintile 1	37
Quintile 2	42
Quintile 3	43
Quintile 4	44
Quintile 5	43

Figure 74. Loan Use
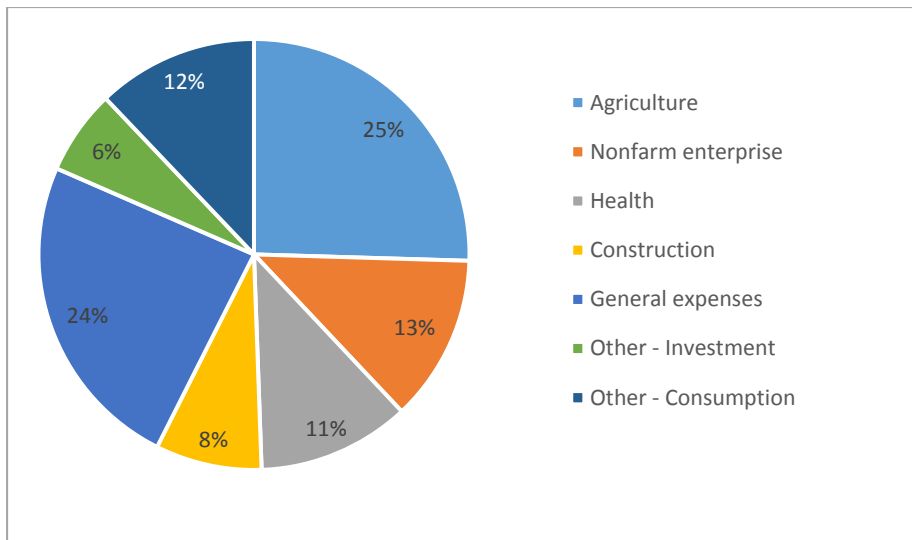
Investment activities with the potential to generate future incomes, such as funds used for agriculture (25.5%), nonfarm enterprises (12.5%), and construction (8.0%), are the most common type of loans (Figure 74). Others, such as loans for dealing with health issues (11.5%), repaying debts (1.5%), and meeting other general expenses (12.0%), were used for expenditure smoothing or to tackle an emergency situation.

9.4.2. Characteristics of Lenders

The majority of loans are acquired from moneylenders (31%) and from friends and family (29%) (Figure 75). Loans from the Myanmar Agriculture Development Bank (MADB) (15%) are the next most popular source of credit. MADB loans are restricted to households that own land and are often targeted toward rice farmers. Survey results show that indeed 89% of agriculture landholding households hold the bulk of MADB loans. Landless households, on the other hand, own the majority of loans originating from microfinance, moneylenders, and friends and relatives.

Figure 75. Sources of Loans
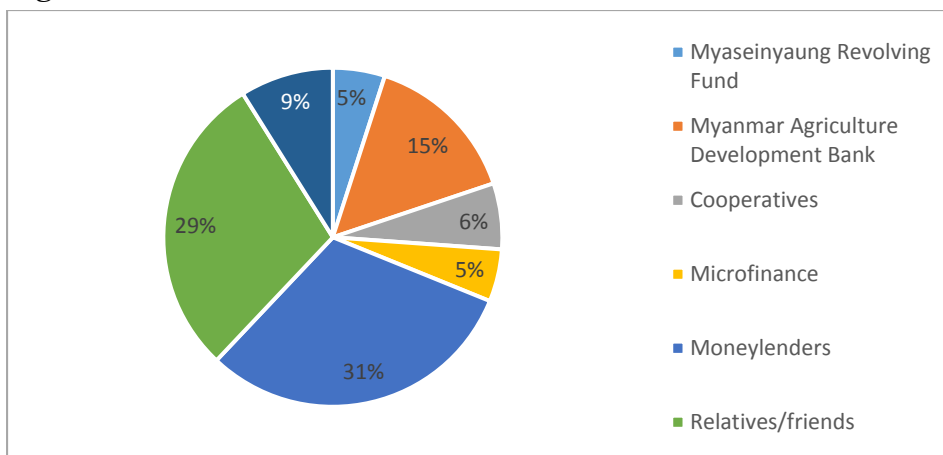
Figure 76. Share of Formal and Informal Loans
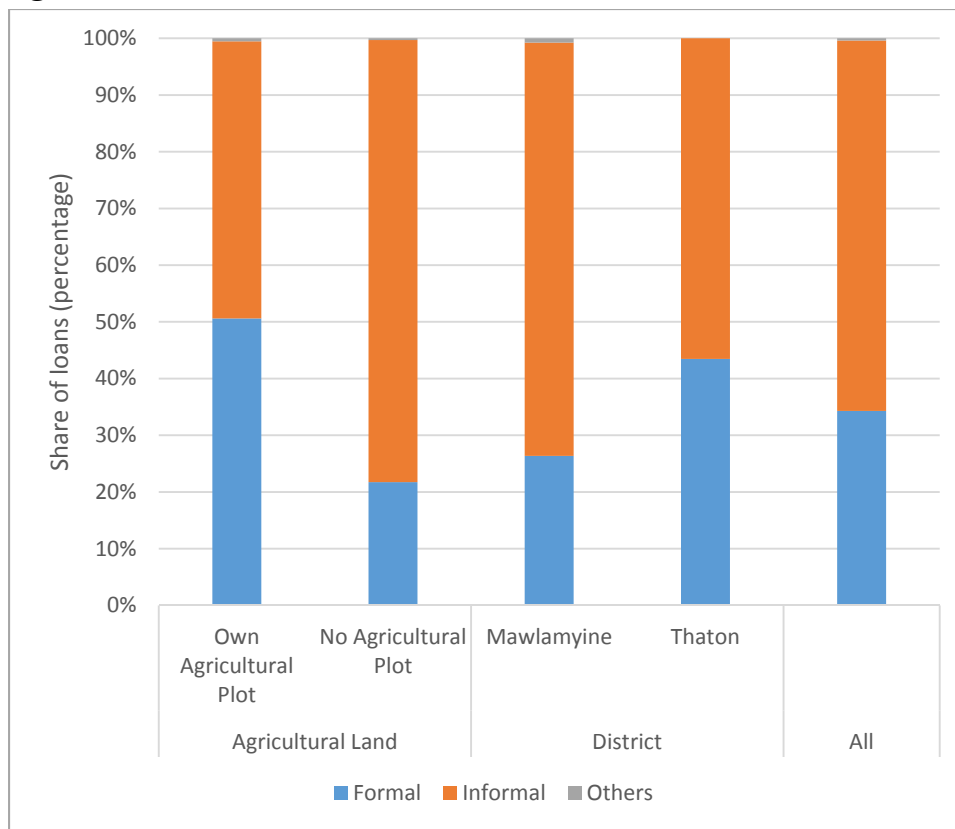
Myanmar's banking sector is concentrated in big cities, so it is expected that rural households would rely on informal methods of credit, such as pawn shops, moneylenders, relatives/friends, and private companies for the majority of their loans (Figure 76). Access to formal sources such as private banks, MADB, cooperatives, nongovernmental organizations, and microfinance institutions is less common.

The percentage of loans taken from formal sources is much greater in households with agricultural lands (51%) than in landless households (22%). There is also a clear disparity in access to formal lending between households in Mawlamyine district (26%) and households in Thaton (43%), despite the fact that Mawlamyine has a higher rate of agricultural landholdings. Female-headed households, households in the coastal zone, and households in the bottom three income quintiles also rely less on formal loans, perhaps reflecting their below-average agricultural landownership rates.

The majority of loans in Mon State are accessed locally, with 71% sourced from within the village and 19% from a nearby village (Figure 77). Only a small percentage of loans come from another township or from outside Mon State. Loans from informal sources are generally sourced from within the village, but less than half of formal loans are. This may imply that it is necessary to travel to another village or township to access formal credit.

Figure 77. Location of Lender by Source of Loan
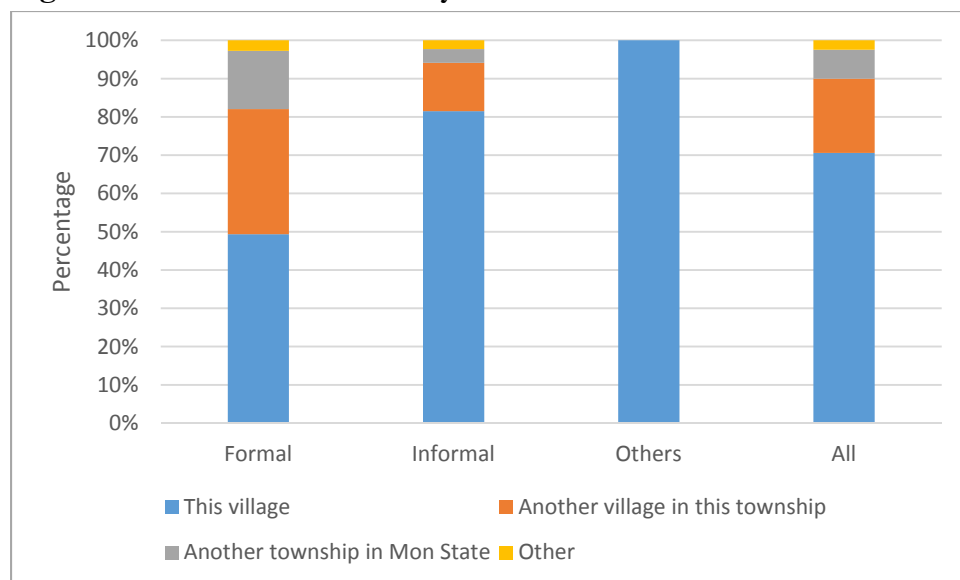
9.4.3. Characteristics of Loans

On average, households in Mon State borrow slightly more than MMK 508,000 per loan and MMK 256,000 annually (Table 83). Households with agricultural lands borrow more annually and more per loan than landless households.

Since households rely on informal borrowing for the majority of their loans, 98% of loans are provided in cash. Loans taken out informally tend not to have a repayment date, whereas the opposite is the case for loans from formal sources. However, the difference in average loan length between formal (8.5 months) and informal (7.7 months) loans is small.

The bulk of loans, 79%, are procured in the first seven months of the year (Figure 78). Borrowing peaks in April for informal loans, likely due to borrowing in preparation for the annual Thingyan Water Festival and Myanmar New Year. Approximately 35% of loans taken in April are used for general expenses. Formal borrowing, on the other hand, peaks in June, coinciding with rainy-season rice sowing. Approximately 56% of loans taken in June are used for agricultural investments.

Table 83. Average Amount of Loans Received Per Loan and per Year (in Myanmar Kyats)

Indicator	Own agricultural plot	No agricultural plot	All
Average loan size	600,187	439,667	508,230
Annual household borrowings	307,800	218,929	256,249

Figure 78. Loan Procurement
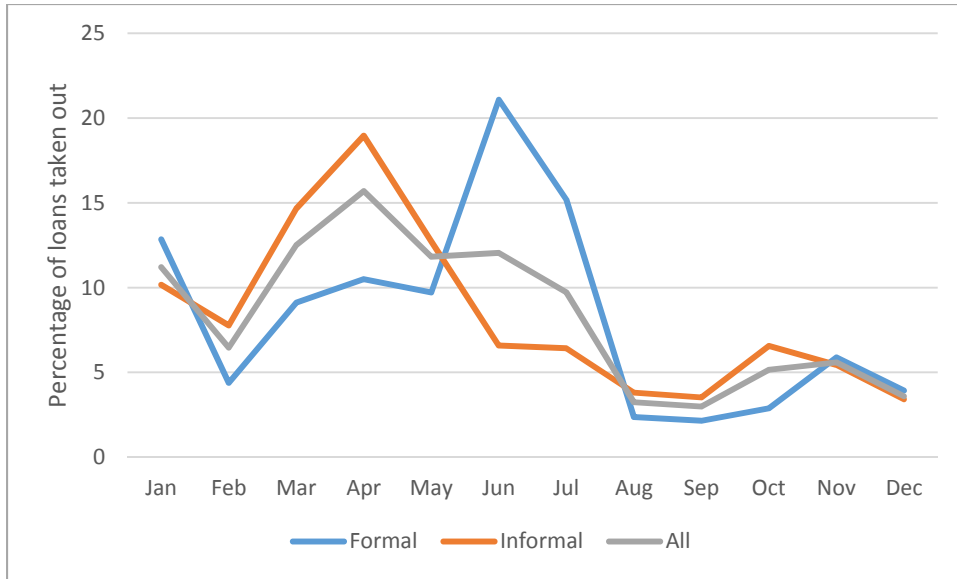
The average annualized interest rate for loans in rural Mon State is 99% (Figure 79). The average interest rate paid for loans from informal sources is 148%, six times higher than for loans granted from formal sources. Of the 58% of rural Mon residents who had not borrowed in the 12 months prior to the survey, only 3% had applied and been denied credit. Among those households that had not applied for a loan, slightly more than half, 65%, did not apply because they did not need or want a loan.

Figure 79. Mean and Median Annualized Interest Rate Paid
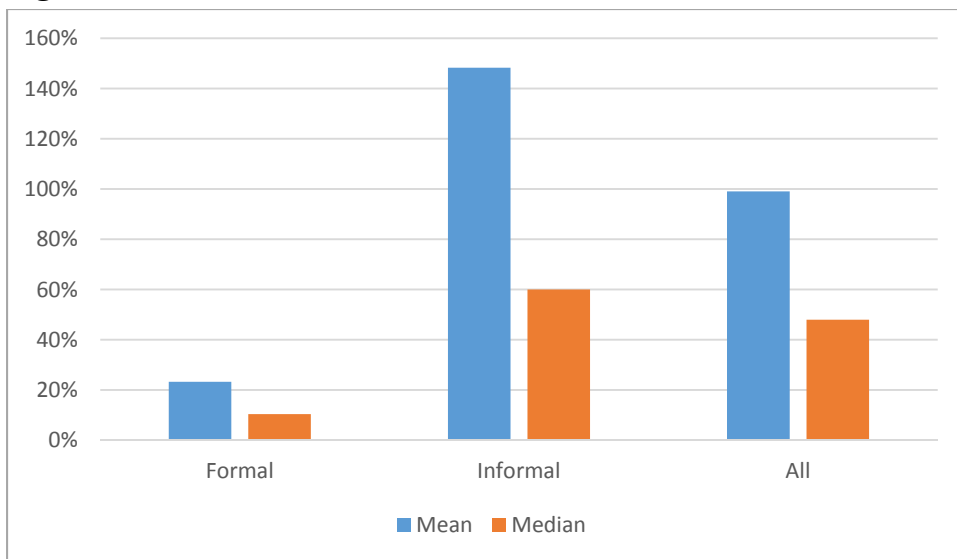
Figure 80. Opinion of Best Way to Hold Savings
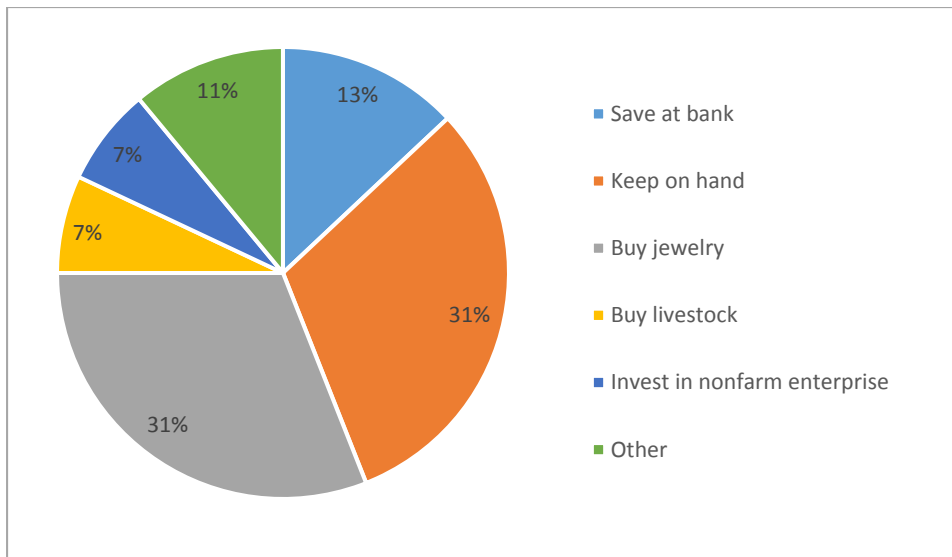
9.4.4. Savings

Myanmar is still largely a cash economy, though reforms in the last five years have slowly changed the options available for participation in the formal financial realm. However, the practice of saving at a financial institution is not very common.

Only 13% of rural residents in Mon State think the best way to save is in a bank (Figure 80). The majority of people prefer the strategy of holding cash or buying gold or jewelry. People also invest in other major assets, such as livestock, and in nonfarm enterprises, which have the potential to provide a higher rate of return than holding savings in cash or in a bank.

Another popular method of saving in countries with underdeveloped banking systems is the rotating savings group, or *su-kyay*. However, in rural Mon State, only a small share of households participate in a *su-kyay* savings group (8%) and an even smaller percentage (3%) feel that a *su-kyay* is the best method of holding savings.

9.4.5. Conclusion: Credit and Savings

Access to formal financial institutions is lacking in rural Mon State. Credit is expensive and potentially unavailable to one-fifth of the residents. The majority of loans are sourced from informal lenders with an average annualized interest rate close to 150%. Formal institutions lend at higher frequency to farmers and households in the higher income quintiles, likely because these borrowers have collateral and are borrowing large enough sums to maintain financial institution profitability. Safe and secure savings options are not readily available or used, with the majority of households preferring to hold their savings in cash or gold.

10. GENERAL CONCLUSIONS

The Mon State Rural Household Survey collected detailed information on the economic lives of a representative sample of 1,680 households. In this report we extensively analyzed these data to provide a comprehensive picture of the dominant means of livelihood throughout the state and to outline the constraints and opportunities particular to each. Survey data analysis reveals a highly diversified economy in the midst of a rapid economic transformation.

The largest share of income still comes from agricultural production, which also provides half of all jobs and is the largest rural employer. However, because it represents only a quarter of rural incomes, it is clear that Mon State has moved beyond reliance on agriculture alone. Significant contributions to rural incomes are coming from remittances (22%), nonfarm businesses (18%), wage labor (14%), and fishing (11%). Though this economic diversification can be seen as a positive sign, the high contribution of remittances also highlights the lack of opportunities for locals, with increasing numbers of the rural Mon labor force going to seek employment on the other side of the Thai border. In particular, this migration pattern reveals the shortcomings of an underperforming agricultural sector and the lack of a vibrant industrial base.

Of all the households in rural Mon State, 21% farm rice. Average yearly income per acre is low, just above MMK 200,000. Low rice incomes stem mainly from low prices, low yields, and also low quality of milled output. Increasing yields and improving marketing channels will be critical to improving rice income in Mon and improving livelihoods in the state. A very small share of the paddy area in Mon is irrigated and thus able to grow rice in the dry season (roughly 40,000 acres, out of about 700,000). Investments to expand access to irrigation have the potential to create highly profitable, rapidly modernizing farming areas, as can be seen in some other parts of Myanmar. However, this activity is conditional on the feasibility of river pumping or tube well development. In the areas where irrigation is not feasible, extension services and better input use may raise the profitability of monsoon rice, but it is not clear whether this could be enough to support a viable smallholder rice sector in the long run. Ultimately, markets will determine whether consolidation is necessary to keep production profitable.

Producers in the rubber sector face high costs and low world prices. Low input use and ineffective plantation management lead to low yields per tree, making production costly. More than 90% of the rubber produced is exported, but Myanmar rubber is inferior in quality to that of most other regional producers and thus fetches an even lower price in an already depressed market. Despite low profitability, rubber production is expanding. High prices toward the end of the first decade of this century led to a rapid increase in planted area: 33% of rubber plots were purchased after 2008, and 52% of farms have been transformed into rubber plantations from other uses. Most of these plots will enter production in the next five years. There may be great potential to increase yields and prices in the rubber sector through expanding extension services and research, strengthening marketing channels and export links, and increasing production of value-added products in Myanmar.

In the face of challenges in the rice and rubber sectors, high-value crops are a potentially lucrative source of income for farmers. Income per acre for annual crops other than rice is five times greater than for rice and rubber. These include vegetable crops destined for the growing urban markets as well as exportable pulses such as black and green gram. Fruit trees, such as pomelo or rambutan, can also be very profitable for farmers. Further, because these crops are relatively new and have not been a focus of research and extension in the state, there is potential to achieve productivity and income gains through increased and improved input use.

However, these crops all require irrigation and are labor-intensive; therefore, their development will be constrained by the availability of affordable labor or mechanized alternatives, as well as the feasibility and sustainability of irrigation solutions.

Only 40% of rural Mon State households own agricultural land. Landless residents can generate income by working for wages, primarily as agricultural laborers. Others rely on resource extraction, such as harvesting forest products (timber or others) or quarrying. Fishing is by far the most common resource extraction activity. Marine fisheries make a significant contribution to incomes in Mon State, particularly in coastal areas in Mawlamyine district where there are relatively few viable agricultural options. Capture fisheries productivity in Mon appears to be declining, but there is scope for developing sustainable resource management.

Over the past few decades, while the agricultural and resource economic base of Mon State remained stagnant, neighboring Thailand was becoming industrialized and hungry for cheap labor. The geographic and cultural proximity of Mon State with Thailand has prompted many to migrate across the border in search of higher wages. Migration out of Mon State is a key source of income for Mon households (either sent or brought back by migrants). Remitted income has had numerous positive effects on the Mon economy and has contributed to significant economic growth, fueling both consumption and asset purchases, and contributing to the development of the services industry (mostly commerce and construction). However, it has left the state constrained for labor, with rising wages imposing further strain on agricultural profits. In addition, while the average amount remitted annually represents a significant contribution to total household income, it is mostly spent on housing and asset accumulation, with only a small share used for purchasing productivity-enhancing assets that can contribute to long-run real gross domestic product growth.

The service sector is dominated by households running nonfarm enterprises (30%) or working in casual wage work (40%). Although the service sector is currently the largest contributor to economic growth, service business are small, family operated, and seasonal. The majority of these businesses are run from the house or located along roadsides. Despite upward pressure on daily wages, families with a casual worker in their household are most commonly in the lowest income quintile, highlighting the limited earning potential of someone in this line of work. Salaried (that is, permanent or semi permanent) occupations are a relatively minor contributor to employment in rural Mon State, with only 8% of households possessing a member who earns income in this way. The nonfarm sector in Mon State is dominated by informal services and over reliant on remittance-fueled demand. Thus there is need to generate economic growth from within and reduce reliance on migrant incomes.

After nearly three decades of isolation from the world economy, Myanmar has introduced ambitious reforms in both the political and economic spheres. Economic reform was started in 1988 when a new government broke with previous policy and opened the Myanmar economy to foreign direct investment. In 2008, Myanmar adopted a new constitution, and in 2010 the country had its first national assembly elections in 20 years. In 2011, these steps toward political reform culminated in the formation of a civilian government. With the successful 2015 presidential elections and the handing of power from the military government to the National League for Democracy party, Myanmar is well positioned to accelerate reforms and rapidly grow its economy. Within that framework, Mon has vast opportunities to take advantage of its geographic position and natural resources; harness endogenous growth; reduce reliance on incomes from Thailand; and develop a balanced, diversified economy.

With relatively abundant land and water, farm knowledge, and proximity to fast-growing markets for food, Mon has the potential to become a strong agricultural center for Myanmar. Moreover, there

are opportunities for Mon to improve its business environment and promote foreign direct investment to provide for the creation of nonfarm employment in services and industry. With Mon's historical, cultural, and environmental assets, the potential for developing tourism may be substantial. All of these tasks will require significant input and contribution from the Mon government. Increasing productivity in agriculture will necessitate public investment, coordinated interventions, and government support through extension and research. Creating nonfarm employment will require targeted reforms of the regulatory framework. Following the recent political overhaul, Mon State has the opportunity to focus on economic development and lay the foundation for balanced economic growth. To do so, the state will require a comprehensive plan with a coherent rural development strategy. A basis for the design of such a strategy is presented in a companion document to this study, titled "Revitalized Agriculture for Balanced Growth and Resilient Livelihoods: Toward a Rural Development Strategy for Mon State."

APPENDIX A. SAMPLING FRAME

The main objective of the Mon State Rural Household Survey (MSRHS) was to study the agricultural and socioeconomic characteristics of the rural households of Mon State, with a focus on rubber, rice, orchards, and marine fishing. Landless households were also included in the survey because they are a subgroup of special interest to the project. Therefore most of the rural households in Mon State were in scope for this survey.

The sampling frame for the MSRHS was based on preliminary data and maps from the 2014 Population and Housing Census of Myanmar. Auxiliary information was used to classify the village tracts in Mon by level of intensity of the different crop and marine fishing activities of interest.

The purpose of this appendix is to describe the sample design and weighting procedures for the MSRHS. The sampling methodology was developed in collaboration with Ellen Payongayong, Michigan State University. The sampling frame was developed with the collaboration of Yin Yin Kyaing, Deputy Director, Department of Population, Ministry of Immigration and Population, Myanmar.

A.1 Sampling Frame and Stratification for Mon State Rural Household Survey

A stratified two-stage sample design was used for the MSRHS. The sampling frame was based on preliminary summary data and maps from the 2014 Population and Housing Census of Myanmar. Based on the survey objectives, the sampling frame was limited to rural households in Mon State. The primary sampling units (PSUs) selected at the first sampling stage were the census enumeration areas (EAs), which are segments defined within the village tracts and wards for the purposes of data collection for the 2014 census. EAs with only an institutional population were excluded from the frame. The rural EAs in Mon State have an average of 132 households, which is a practical size for conducting a listing operation to update the frame of households in the sample EAs. The original frame from the 2014 Myanmar census included 2,256 rural EAs for Mon State.

In order to examine the distribution of the sampling frame of EAs by predominant crop or fishing activity, each village tract in Mon State was classified into three categories for each crop or marine fishing activity that was present: (1) low, (2) medium, and (3) high. This information on the activities and crop levels was merged with the sampling frame of EAs from the 2014 Myanmar census, which included the preliminary number of households in each EA.

Information on crop and marine fishing activities was used to stratify the sampling frame of rural EAs for Mon State in order to improve the efficiency of the sample design and ensure an effective allocation of the sample to cover these activities. Since most of the EAs in the frame had more than one activity at different levels, it was first necessary to identify the predominant crop or marine fishing activity for each EA. This required an iterative approach of tabulating the distribution of EAs by crop and marine fishing activities in different ways. Table A.1 shows the distribution of the Mon rural sample EAs by activity and level categories.

It should be noted that the classification by crop activity was carried out at the village tract level, so any given EA within the village tract may or may not have the particular activity being classified. However, it is expected that this classification should be effective overall for the purposes of stratification.

Table A.1 Distribution of Mon Rural Enumeration Areas in the Sampling Frame by Crop/Fishing Activity and Level

	Number of EAs by level				Percentage of EAs in
Activity	1—low	2—medium	3—high	Total	frame
Rubber	619	575	639	1,833	81.3%
Rice	329	655	1,166	2,150	95.3%
Orchards	570	351	338	1,259	55.8%
Marine fishing	351	246	109	706	31.3%

Note: EA = enumeration area.

It can be seen in Table A.1 that the overall predominant crop is rice, which is found in 2,150 of the original 2,256 EAs in the frame (or 95.3%), and more than half of those EAs are in the *high* level category. The least frequent activity is marine fishing, which is found in only 31.3% of the EAs, and only 15.4% of those EAs are in the *high* level category.

Next we examined the distribution of rural EAs in the frame by various combinations of crops and fishing activities (Table A.2). Most of the rural EAs in the Mon sampling frame have multiple activities. After excluding the 9 EAs that did not have any of the activities of interest and a few EAs that did not have information on the number of households in the preliminary census data, the final sampling frame of rural EAs used for the MSRHS had a total of 2,235 EAs.

Table A.2 Distribution of Mon Rural Enumeration Areas in the Sampling Frame by Combination of Crop and Marine Fishing Activities

Activity	No. of enumeration areas
None (that is, freshwater area)	9
Orchards and marine fishing	33
Rubber and orchards	64
Rice only	197
Rice and orchards	74
Rice and marine fishing	47
Rice, orchards, and marine fishing	63
Rice and rubber	588
Rice, rubber, and orchards	618
Rice, rubber, and marine fishing	156
Rice, rubber, orchards, and marine fishing	407
Total rural enumeration areas	2,256

Based on the distribution of the frame of rural EAs for Mon State shown in Tables A.1 and A.2, we used hierarchical criteria to define one stratum for each predominant activity. The stratification criteria were designed to give priority to the less frequent activities in order to ensure a sufficient number of observations for each activity in the final sample of households selected for the survey. The stratification criteria are specified in Table A.3.

In order to improve the effectiveness of the stratification, each stratum was further divided into two categories (*low* and *high*) for the corresponding activity. For this purpose the original level categories 1 and 2 were combined to form the *low* substratum for each predominant activity, and the *high* substratum corresponded to the original level category 3. Following the coding of the strata based on these specifications, the final distribution of the frame of rural EAs for the MSRHS is shown in Table A.4.

A.2 Sample Size and Allocation for Mon State Rural Household Survey

The sample size for the MSRHS depended on the survey objectives as well as overall budget constraints. One of the objectives was to ensure a sufficient level of precision for the indicators of each of the crop and marine fishing activities. The overall sample size could not exceed 2,000 households, so it was important to allocate the sample strategically to the different strata to ensure a sufficient number of sample households for each of the activities covered by the survey.

Table A.3 Hierarchical Criteria Used for Defining Strata for Predominant Activities

Stratum	Activity	Criteria
1	Marine fishing	All marine fishing in level categories 2 and 3
2	Orchards	Orchards in level categories 2 and 3, and not in Stratum 1
3	Rubber	Rubber category ≥ rice category, and not in Stratum 1 or 2
4	Rice	Rice category > rubber category, and not in Stratum 1 or 2

Table A.4 Final Distribution of Sampling Frame of Rural Enumeration Areas in Mon State by Predominant Activity Stratum and Level Substratum

Stratum	Predominant activity	Substratum		Total
		1—low	2—high	
1	Marine fishing	244	109	353
2	Orchards	227	241	468
3	Rubber	93	398	491
4	Rice	104	819	923
	Total	668	1,567	2,235

It was also important to determine the most effective number of sample households to select per cluster (EA). In order to ensure that the design effects of a clustered sample are not too great, the optimum number of sample households per cluster for this type of socioeconomic survey is generally within the range of 8 to 15 households. Taking into consideration that there would be a certain level of nonresponse, we decided to select 12 households per sample EA. A sample of 35 EAs per stratum would ensure a reasonable dispersion of the sample within each stratum. Within each activity stratum the 35 sample EAs were allocated to the level substrata in proportion to the distribution of the frame, with the *high* level stratum receiving a weight of 2. This weighting increased the sampling rate for the *high* level strata to improve the coverage of each activity.

The tentative final sampling framework included 140 EAs and 1,680 households, with 420 sample households per predominant activity stratum. We expected this sample size to provide a reasonable level of precision for the indicators by activity, especially since many sample households would be involved in more than one activity (for example, rice is found in all the sampling strata). This tentative distribution of the sampling framework EAs and households by stratum and substratum is shown in Table A.5.

During fieldwork, small modifications to the tentative sampling framework had to be made to account for unforeseen circumstances. Five EAs from Bilin township were replaced and two from Ye township were dropped from the sample for security reasons (presence of armed groups or banditry). In addition, three EAs in Thanbyuzayat were replaced with three EAs in Chaungzon township because they turned out not to be marine fishing areas. Further, five EAs in Chaungzon township were added during fieldwork to increase the sample of marine fishing households and raise the likelihood of obtaining significant estimates in the analysis.

Table A.5 Allocation of Sample Enumeration Areas and Households by Activity Stratum and Level Substratum

Stratum	Predominant activity	1—low substratum		2—high substratum		Total	
		Sample EAs	Sample households	Sample EAs	Sample households	Sample EAs	Sample households
Tentative sampling							
1	Marine fishing	18	216	17	204	35	420
2	Orchards	12	144	23	276	35	420
3	Rubber	4	48	31	372	35	420
4	Rice	3	36	32	384	35	420
Total tentative		37	444	103	1,236	140	1,680
Final sampling after EA replacement and data cleaning							
1	Marine fishing	17	190	24	279	41	469
2	Orchards	11	125	21	236	32	361
3	Rubber	4	47	31	348	35	395
4	Rice	3	36	32	366	35	402
Total final		35	398	108	1,229	143	1,627

Note: EA = enumeration area.

Finally, a number of households could not be found, refused to be interviewed, or provided incomplete responses and thus had to be dropped entirely from the dataset. The final sample included 143 EAs and 1,627 households. All of these modifications were accounted for in the weighting scheme. The final distribution of the sample EAs and households is shown in Table A.5.

A.3 Representativeness of the Mon State Rural Household Survey Sample

The 143 EAs in our sampling framework exclude areas that were not accessible to survey teams, military zones, and areas without rural activities. Overall, the 1,627 households surveyed represent 1,195,321 residents of rural Mon State. This corresponds to 85% of the rural population of Mon, according to the 2014 census of the population.

A.4 Sample Selection Procedures for Mon State Rural Household Survey

Within each predominant activity stratum and level substratum, the number of sample EAs specified in Table A.5 was selected systematically with probability proportional to size (PPS), where the measure of size was based on the number of households in the 2014 census frame. First, the list of EAs within each substratum was ordered geographically to provide additional implicit stratification. The systematic selection of the EAs with PPS within each substratum involved the following steps:

1. Cumulate the measures of size (numbers of households) down the ordered list of EAs within the substratum. The final cumulated measure of size is the total number of households in the frame for the substratum (M_h).

2. To obtain the sampling interval for substratum h (I_h), divide M_h by the total number of EAs to be selected in substratum h (n_h), specified in Table A.5.

3. Select a random number (R_h) between 0.01 and I_h. The sample EAs in substratum h will be identified by the following selection numbers:

$$S_{hi} = R_h + [I_h \times (i - 1)] \tag{1}$$

rounded up, where $i = 1, 2, ..., n_h$. The ith selected PSU is the one with the first cumulated measure of size that is greater than or equal to S_{hi}.

The selection of PSUs using systematic PPS sampling by substratum was implemented using the Complex Samples module of the IBM SPSS predictive analytics software. For the SPSS Complex Samples application, it is necessary to specify the sample selection method (systematic PPS), the variables for the stratum (PSU and measure of size), and the number of PSUs to be selected in each stratum. The stratum code was defined as the concatenation of the predominant activity code (1 to 4) and the level substratum code (1 to 2). The SPSS software generates a new database with a record for each selected EA that includes the sampling frame information and the first-stage weight for each sample EA.

A new listing of households was then compiled in each sample EA. Any households considered out of scope were screened out at the listing stage once the corresponding questions had been included in the listing sheet. Since landless households were considered eligible for selection, almost all households were included in the frame. We selected a random systematic sample of 12 households

from the listing for each sample EA. This second-stage selection procedure involved the following steps:

1. Assign each household in a valid (occupied) housing unit a serial number from 1 to M'_{hi}, the total number of households listed in the EA.

2. To obtain the sampling interval for the selection of households within the sample EA (I_{hi}), divide M'_{hi} by 12, and maintain two decimal places.

3. Select a random number (R_{hi}) with two decimal places, between 0.01 and I_{hi}. The sample households within the sample EA will be identified by the following selection numbers:

$$S_{hij} = R_{hi} + [I_{hi} \times (j - 1)], \tag{2}$$

rounded up, where $j = 1, 2, 3, \dots, 12$. The jth selected household is the one with a serial number equal to S_{hij}.

We developed an Excel spreadsheet for generating this random systematic selection of households, with formulas for calculating the interval, generating the random start, and calculating the selection numbers. This spreadsheet was used to produce a household selection table that was used in the field to identify the serial number of the in-scope sample households in reference to the total number of households listed in each sample EA.

This second-stage household selection procedure provided a representative sample of all households within each sample EA, covering the predominant and secondary activities conducted by these households. Based on the stratification of the sample EAs by predominant activity, this procedure was expected to ensure a sufficient number of sample households for the predominant activities. As mentioned previously, many households are involved in more than one activity.

A.5 Weighting Procedures for Mon State Rural Household Survey

In order for the sample estimates from the MSRHS to be representative of the population, it was necessary to multiply the data by a sampling weight, or expansion factor. The basic weight for each sample household was equal to the inverse of its probability of selection (calculated by multiplying the probabilities at each sampling stage). We maintained the sampling probabilities at each stage of selection in an Excel spreadsheet with the information from the frame for the sample EAs within each substratum.

A stratified two-stage sample design was used for the MSRHS. The overall probability of selection for sample households can be expressed as follows:

$$p_{hi} = \frac{n_h \times M_{hi}}{M_h} \times \frac{m_{hi}}{M'_{hi}}, \tag{3}$$

where p_{hi} is the probability of selection for the sample households in the ith sample EA of substratum h, n_h is the number of sample EAs selected in substratum h, M_h is total number of households in substratum h, M_{hi} is the number of households in the frame for the ith sample EA of substratum h, m_{hi} is the number of sample households selected in the ith sample EA of substratum h

(= 12), and M'_{hi} is the total number of eligible households in the updated listing for the ith sample EA of substratum h.

The two components of this probability of selection correspond to the individual sampling stages. The basic sampling weight for the sample households is calculated as the inverse of this probability of selection. Based on the previous expression for the probability, the weight for the sample households can be simplified as follows:

$$W_{hi} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m_{hi}}, \tag{4}$$

where W_{hi} is the basic weight for the sample households in the ith sample EA of substratum h.

These weights will vary based on the difference between the number of eligible households in the updated listing for each sample EA and the corresponding number of households in the 2014 census frame. Following data collection for the MSRHS, it was necessary to adjust these basic weights to take into account any noninterviews. The weight for the sample households in each sample EA were adjusted as follows:

$$W'_{hi} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m_{hi}} \times \frac{m_{hi}}{m'_{hi}} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m'_{hi}}, \tag{5}$$

where W'_{hi} is the adjusted weight for the sample households in the ith sample EA of substratum h, and m'_{hi} is the number of sample households with completed interviews in the ith sample EA of substratum h.