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Myanmar Agricultural Performance Survey Round Three: Note on Sample Characteristics and Weighting

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Introduction

The Myanmar Agricultural Performance Survey (MAPS) is a nationally and sub-nationally representative phone survey with the objective of collecting bi-annual data on agricultural indicators including crop production and sales, input use, crop marketing, farm and livestock assets, and farm services. The Myanmar Household Welfare Survey (MHWS)is a nationally and sub-nationally representative phone survey with the objective of collecting quarterly data on household and individual welfare indicators, including poverty, food security, dietary quality, subjective wellbeing, and coping strategies. MAPS is a sub-sample survey that includes farming households from MHWS. The MAPS Round 3 sample includes 4,892 households both from MHWS Round 4 farming households and previous MAPS rounds.

Phone surveys have several shortcomings including representativeness, enumerator trust, measurement error, and shortened survey length. To help ensure representativeness of our sample we set targets for MHWS data collection from rural, female, lower-educated, and farming households. While there are weaknesses of phone surveys, there are also advantages, particularly in Myanmar. Previous face-to-face socioeconomic surveys in Myanmar failed to reach many townships across the country either due to conflict or remoteness. Round 3 of MAPS includes 271 out of 324 townships.[1]

In this note, we provide details on the data collection of the third round of MAPS. First, we briefly describe the modules present in MAPS data. Second, we discuss the household sampling design of MHWS, MAPS Round 1, MAPS Round 2, and MAPS Round 3 and the differences between the datasets. Third, we discuss the calculation of weights for MAPS and provide descriptives of the weighted sample.

MAPS Modules

MAPS Round 3 consists of 11 modules (A-K) that are each included in the clean dataset and unique by household ID (hhid). Modules A, B, J and K are introductory and closing modules that only include information on the call and confirmation of demographic information connected to MHWS. The remaining modules provide data on farmer demographics and agricultural production and marketing.

Module C consists of background and demographic information. This includes data on farmer demographics along with farm areas and crops grown. Module D provides data on rice production and sales for monsoon 2021 and 2022, including rice variety, amounts produced and sold, and farmgate prices. Module E contains similar information to Module D but pertaining to pulses and oilseeds.

Module F consists of data on farm input use including purchased inputs, mechanization, labor, and the effect of natural shocks such as Cyclone Mocha. Module G presents information on crop marketing and Module H provides data on farm and livestock assets. Module I contains data on farm services including agricultural extension, credit, mobility issues in the community, travel times to access services, contract farming, crop residues, and changes in rice consumption and paddy growing practices.

Data Collection and Sample Design of MAPS and MHWS

The MAPS employs CATI (computer-assisted telephone interviewing) to collect representative data across all states and regions of Myanmar. The third-round interviews took place between January 2023 and March 2023. The households were selected based on their participation in MHWS and their status as a farming household. MAPS attempted to reach all MHWS farming households, of which 4,892 were interviewed for Round 3.

[1] Six townships in the Wa Self Administer Division (Wa SAZ) were excluded from this survey due to active sanctions.

Table 1 shows the timelines for MAPS Rounds 1-3. Each round asks interviewees about the most recent season as well as recall information from the season one year prior. MAPS Round 1 compared agricultural production in Monsoon 2020 and Monsoon 2021. MAPS Round 2 compared agricultural production between the dry (pre/post monsoons) season of 2021 and 2022. MAPS Round 3 compared agricultural production in Monsoon 2021 and Monsoon 2022.

Table 1. Timeline for MAPS data collection

Round	Interviews Conducted	Study Period
1	February - March 2022	Monsoon 2020
		Monsoon 2021
2	August - September 2022	Dry (pre/post monsoon) 2021
		Dry (pre/post monsoon) 2022
3	January - March 2023	Monsoon 2021
		Monsoon 2022

MAPS and MHWS are conducted in collaboration with Myanmar Survey Research (MSR), a private survey research company based in Myanmar. To obtain a randomized nationally representative sample for MHWS, a master database was constructed in which all phone numbers were stratified at the township level, so that the amount of phone numbers in each township was proportional to the population size of each township (from the 2014 Census) (DoP, 2015). Then households were selected randomly to be called in each township. We chose to randomly sample at the township level to minimize oversampling of well-connected and/or wealthier townships. Finally, to ensure that women, famers, less educated, and more remote individuals were not under sampled, minimum targets by state were set for women (half of all respondents), rural location, farming livelihood, and education level.

An overview of the MHWS and MAPS Round 1 farm target sample sizes by State/Region can be found in Table 2. Round 1 of MHWS did not fully achieve the sample targets and sizes, though some sample deviations were expected given that a large share of the population was directly or indirectly affected by conflict. As a result of conflict, there were disruptions to telecommunication services, frequent power outages, economic distress, and displacement during MHWS data collection (MAPSA 2022).

Table 2. MHWS Target Sample Sizes Overall and for Famers by State/Region

State/ Region	MHWS Target Sample Size	MHWS Target Farm Sample Size	MHWS Round 1 Sample	MHWS Round 1 Farm Sample
Ayeyarwady	1,538	721	1,538	726
Bago	1,210	558	1,169	577
Chin	240	158	159	96
Kachin	408	175	385	157
Kayah	240	144	132	81
Kayin	374	170	354	175

Magway	974	502	963	505
Mandalay	1,533	624	1,483	633
Mon	511	168	480	169
Nay Pyi Taw	288	87	289	89
Rakhine	522	241	526	245
Sagaing	1,324	831	1,312	835
Shan	1,448	1,058	1,156	811
Tanintharyi	350	140	328	125
Yangon	1,830	232	1,826	241
National	12,790	5,809	12,102	5,465

Source: Authors.

MAPS Round 1 consisted of a subsample of 72 percent of the farm households from the MHWS sample (Table 3). In MHWS, households were asked if any member of their household harvested any crops in the past 12 months from their own farming activities, not as a worker. If households answered yes to that question, they were sampled for MAPS. If the household did not answer their phone after being called 5 times, then the household was dropped from the MAPS sample.

Table 3. Round 1 Response Difference between MHWS Farm Households and MAPS

State/Region	MHWS Farm Sample Size	MHWS & MAPS Round 1 Respondents
Ayeyarwady	726	472
Bago	577	432
Chin	96	47
Kachin	157	108
Kayah	81	45
Kayin	175	116
Magway	505	422
Mandalay	633	496
Mon	169	123
Nay Pyi Taw	89	79
Rakhine	245	158
Sagaing	835	616
Shan	811	550
Tanintharyi	125	77
Yangon	241	150
National	5,465	3,891

Source: Authors.

MAPS Round 2 sampling started by calling the farming households from MHWS Round 3, of which 4,346 households were reached. After this, MAPS Round 1 households were called until reaching a final sample of 5,015 farming households (Table 4).

MAPS Round 3 started by calling MHWS Round 4 households. Once they were called, previous MAPS households not included in MHWS Round 4 were attempted to be reached. Eventually, 4,892 respondents were interviewed for MAPS Round 3. This includes 1,465 respondents not previously interviewed for MAPS but interviewed in MHWS. The overall retention rate from MAPS Round 2 was 66 percent. Chin, Mon, and Kayin, areas with high conflict, had particularly low retention at 57 percent, 50 percent,

and 68 percent, respectively. Because of these rates, many new respondents were called for Round 3 (30 percent of Round 3 respondents). Magway had the highest retention rate at 83 percent.

Table 4. MAPS Round 1, Round 2, and Round 3 Response Numbers

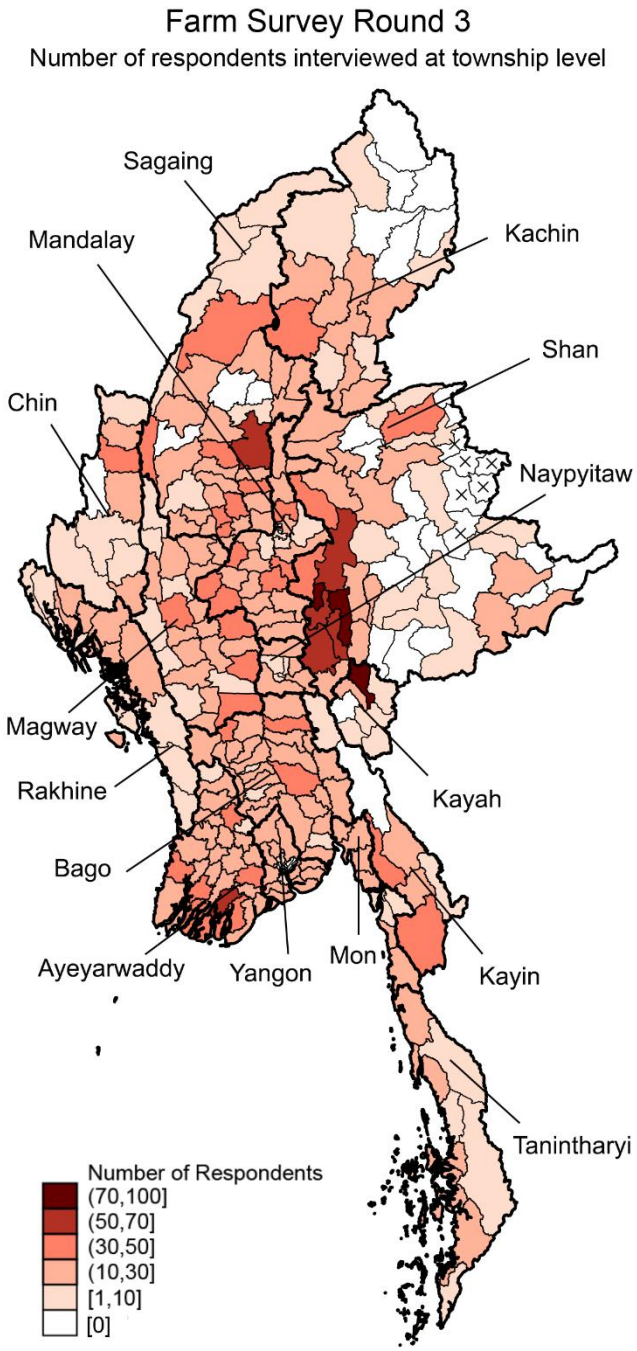
State/Region	Round 1 Respondents	Round 2 Respondents	Round 3 Respondents	Panel Respondents (Round 1-3)	Panel Respondents (Round 2-3 Only)	Percent Retained from Round 2 (%)	Round 3 Only	Percent New (%)
Ayeyarwady	472	682	646	240	232	69	152	24
Bago	432	486	518	224	132	73	147	28
Chin	47	95	95	8	33	43	54	57
Kachin	108	159	145	56	50	67	37	26
Kayah	45	60	108	11	21	53	73	68
Kayin	116	149	148	46	46	62	55	37
Magway	422	509	475	237	145	75	80	17
Mandalay	496	608	553	270	147	69	118	21
Mon	123	113	110	24	26	44	55	50
Nay Pyi Taw	79	91	80	43	19	68	16	20
Rakhine	158	270	193	83	76	59	33	17
Sagaing	616	794	689	235	243	60	197	29
Shan	550	721	800	235	231	65	313	39
Tanintharyi	77	101	124	33	29	61	58	47
Yangon	150	177	208	73	46	67	77	37
National	3891	5015	4892	1818	1476	66	1465	30

Source: Authors.

Note: Unweighted.

Figure 1 is a map of respondents in Round 3 of MAPS by state/region. Fifty-three of the 324 Myanmar townships do not appear in the MAPS Round 2 sample. Areas highly affected by conflict, the most extreme cases being Kayah, Chin, and Shan State, fell short of pre-determined targets in Round 3. Out of the 53 townships not enumerated, 25 were in Yangon where a very small percentage of the households in the MHWS sample were farmers. The full list of unrepresented townships can be found in Appendix Table A.

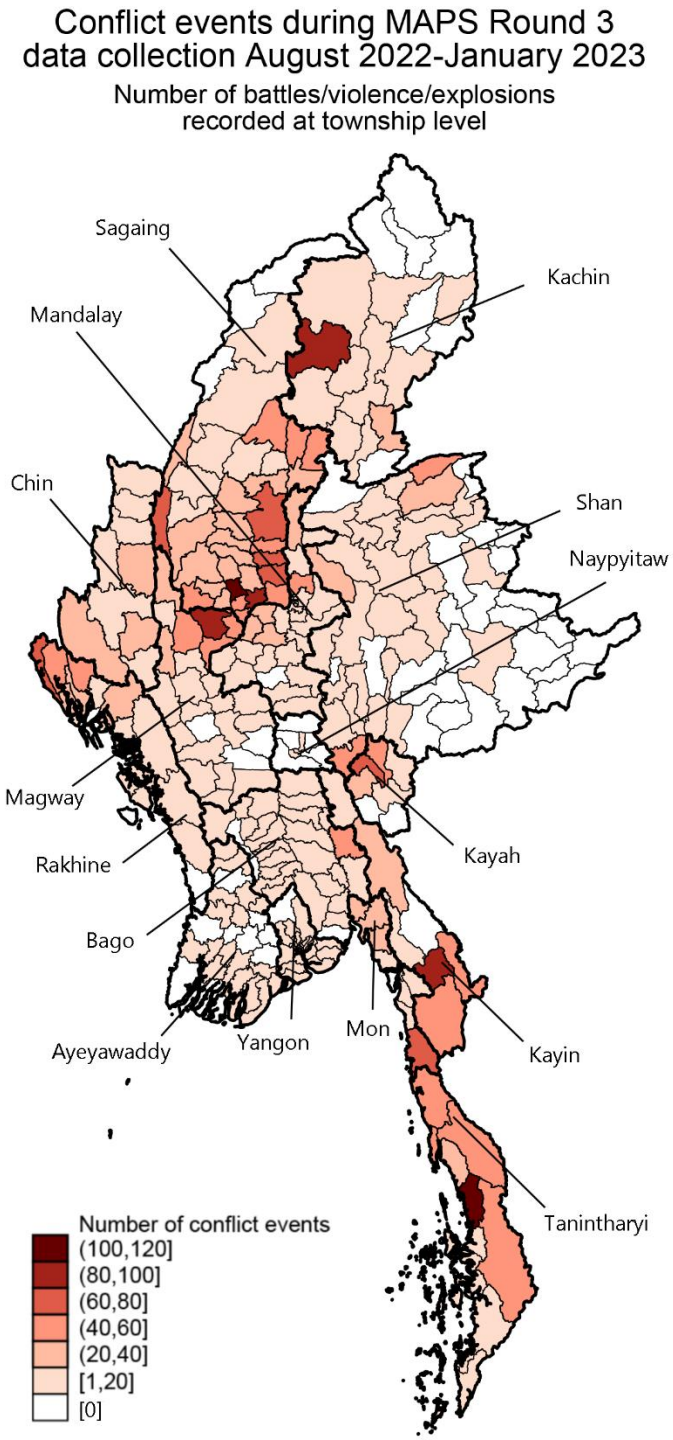
Figure 1. Interviews Conducted in the Third Round of MAPS, by Township



Source: Authors.

Figure 2 shows the number of conflict events during MAPS Round 3. The colors represent the number of events recorded in each township. Shan State, an area that is very remote, includes 12 townships that were not enumerated. The six townships in Kachin that were not enumerated are also very remote and home to very few people. The other townships that were not enumerated include two from Kayah, one from Kayin, three from Sagaing, and one from Mandalay. These townships experienced heavy conflict and as a result included very few MHWS households. Figure 3 reveals that while there were some townships that could not be enumerated because of conflict, many townships experiencing violence were amply recorded in the MAPS Round 3 sample. This highlights the benefit of phone surveys.

Figure 2. All ACLED Events During Monsoon 2022



Source: ACLED.

During Round 3 sampling we were able to retain 3,294 respondents from Round 2, but we were not able to reach another 1,598 MAPS Round 2 respondents. Because of this attrition, there may be differences between panel respondents and attrition households or those that could not be reached. Table 5 shows significance tests for several indicators to help understand the effect of attrition on the MAPS Round 3 sample. Several welfare indicators and locations show significant differences between those re-sampled

for MAPS and those who were not. MAPS panel households are more rural than those that left the sample. Panel households are also more likely to own a crop farm and cultivate more land on average. The Panel is also less likely to have difficulties purchasing pesticides and fertilizer. The attrition respondents who are facing greater production shocks could be experiencing different agricultural outcomes than those in our current sample. Data from MAPS, therefore, may paint a slightly better picture than the average agricultural situation.

There are also discrepancies between attrits and panel respondents across locations. The panel has more representations in Bago and Magway and less representation in Chin, Mon, Rakhine, Sagaing. It is likely that conflict fueled attrition in several of those states.

Table 5. Analysis of Attrition in MAPS

	MAPS Attrits	MAPS Panel
Female (0/1) (%)	36%	32%
Rural (0/1) (%)	91%	95% ***
Age (0/1)	46.46	46.34
Household Food Consumption Score	56.83	57.22
Asset poor (0-3 assets) (%)	36%	36%
HH is income poor (0/1) (%)	47%	49%
Natural production shock (0/1) (%)	66%	66%
HH with wage employment (0/1) (%)	29%	31%
HH with an owned crop farm (0/1) (%)	74%	78% *
Difficulties accessing mechanization (0/1) (%)	57%	53%
Difficulties accessing labor (0/1) (%)	45%	43%
Difficulties purchasing pesticides (0/1) (%)	53%	48% *
Difficulties purchasing seeds (0/1) (%)	58%	57%
Difficulties purchasing fertilizer (0/1) (%)	70%	64% **
Insecurity in community (0/1) (%)	21%	18%
Low level of social trust in community (0/1) (%)	18%	16%
Amount of agricultural land owned	6.23	6.39
Total cultivated land	4.57	5.27 **
Ayeyarwady (%)	13%	15%
Bago (%)	8%	13% ***
Chin (%)	2%	1% ***
Kachin (%)	3%	3%
Kayah (%)	1%	1%

Kayin (%)	3%	2%
Magway (%)	8%	10% *
Mandalay (%)	10%	11%
Mon (%)	4%	2% ***
Nay Pyi Taw (%)	2%	1%
Rakhine (%)	8%	4% ***
Sagaing (%)	16%	13% **
Shan (%)	17%	19%
Tanintharyi (%)	2%	2%
Yangon (%)	3%	3%

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Sample Weights

To ensure that the sample is representative of farmers at the national and state/region level we developed farm-level weights. Details of the weighting technique can be found in MAPSA (2022). First, households were weighted based on the 2019 ICS information on the number of households in each urban/rural location of each state/region (DoP 2020). Second, farm households were adjusted for oversampling in each state/region by ensuring that the percentage of farm households was equivalent to the percentage of farm households found in MLCS (CSO 2017). Third, to adjust for oversampling of more educated respondents, households were reweighted based on the share of adults with low education in each rural/urban and state/region in MLCS. Finally, to minimize selection bias of wealthier households, we used the maximum entropy approach and added constraints for agricultural land owned and women-adult-only households. Appendix Table B contains MHWS demographic targets.

Table 6 highlights the differences between the MAPS Round 2 sample and the MAPS Round 3 sample after weighting. The percentage of rural households in the sample did not change from Round 2 to Round 3. However, the sample age and gender changed significantly over Round 2 and Round 3. MAPS Round 2 was 20 percentage points less female and one year younger on average. These differences are similarly represented in the unweighted sample (Appendix Table C), but the percentage of farmers that are female is lower in both the Round 2 and the Round 3 unweighted sample. When comparing the gender of Round 1, with Round 3, there is no longer a significant difference at the national level. It is possible that this variation is due to differences in farm makeup between seasons.

Table 6. MAPS Rural/Urban, Female, and Age Demographic Makeup

State/Region	MAPS Round 2 Percent Rural (%)	MAPS Round 3 Percent Rural (%)	MAPS Round 2 Percent Female (%)	MAPS Round 3 Percent Female (%)	MAPS Round 2 Age	MAPS Round 3 Age	MAPS Round 1 Percent Female (%)	MAPS Round 3 Percent Female (%)
Ayeyarwady	97%	96%	16%	42% ***	46.1	46.9	47%	42%
Bago	95%	95%	13%	41% ***	46.0	48.0	39%	41%
Chin	79%	81%	32%	43%	49.8	48.6	43%	43%
Kachin	84%	84%	40%	48%	45.7	47.0	45%	48%
Kayah	71%	81%	16%	53% ***	41.7	45.3	50%	53%

Kayin	96%	96%	16%	43% ***	47.4	47.1	36%	43%
Magway	92%	95%	25%	44% ***	46.7	48.2 *	44%	44%
Mandalay	96%	96%	26%	37% ***	46.8	48.3	40%	37%
Mon	89%	88%	27%	40% *	48.7	50.5	48%	40%
Nay Pyi Taw	89%	95%	23%	34%	51.8	51.4	35%	34%
Rakhine	92%	95%	15%	42% ***	48.7	50.9	29%	42% *
Sagaing	94%	94%	19%	46% ***	47.4	46.8	43%	46%
Shan	94%	91%	32%	48% ***	43.3	44.6 *	46%	48%
Tanintharyi	94%	93%	23%	48% ***	49.5	49.6	62%	48%
Yangon	93%	93%	21%	39% ***	49.9	47.2	43%	39%
National	94%	93%	23%	43% ***	46.4	47.4 ***	43%	43%

Source: Authors.

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 7 shows the difference in the national dispersion of farming households between MLCS 2017, MHWS Round 1, MAPS Round 1, MAPS Round 2, and MAPS Round 3 after weighting. There are no significant differences between the samples and no changes between MAPS Round 1, Round 2, and Round 3. Shan has the largest share of farming households at 19 percent while Chin and Kayah hold only 1 percent of the national farming households. MAPS Round 1, Round 2, and Round 3 are representative of farmers at the state/region level.

Table 7. Dispersion of National Farming Households

State/Region	MLCS 2017 Farming Households (%)	MHWS Round 1 Farming Households (%)	MAPS Round 1 Farming Households (%)	MAPS Round 2 Farming Households (%)	MAPS Round 3 Farming Households (%)
Ayeyarwady	14	14	14	14	14
Bago	11	11	11	11	11
Chin	1	1	1	1	1
Kachin	3	3	3	3	3
Kayah	1	1	1	1	1
Kayin	3	3	3	3	3
Magway	9	9	9	9	9
Mandalay	11	11	11	11	11
Mon	3	3	3	3	3
Nay Pyi Taw	2	2	2	2	1
Rakhine	6	6	6	6	6
Sagaing	14	15	14	14	14
Shan	19	15	19	19	19
Tanintharyi	2	2	2	2	2
Yangon	3	3	3	3	3

Note: Asterisks show significance between ROUND 1 and ROUND 2 at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Source: Authors.

Table 8 compares the unweighted and weighted sample for households with low-educated adults in MAPS Round 2 and MAPS Round 3. In the unweighted sample, both rounds show average levels of low education at 49 and 52 percent. This is an underestimate of low-education households due to the difficulties of sampling this group. After weighting, Round 2 is averaged to 69 percent low-education and

Round 3 is averaged to 68 percent. There are no statistical differences in education between the two rounds.

Table 8. Percent of Low-educated and Farming Households, Unweighted and Weighted, MAPS Round 2 & Round 3

	Unweighted		Weighted	
State/Region	MAPS Round 2 Percent Lower-Educated (%)	MAPS Round 3 Percent Lower-Educated (%)	MAPS Round 2 Percent Lower-Educated (%)	MAPS Round 3 Percent Lower-Educated (%)
Ayeyarwady	50%	50%	70%	68%
Bago	37%	41%	66%	68%
Chin	13%	34%	60%	63%
Kachin	40%	40%	61%	59%
Kayah	30%	54%	62%	62%
Kayin	64%	69%	83%	78%
Magway	50%	50%	68%	65%
Mandalay	50%	53%	62%	61%
Mon	52%	56%	67%	68%
Nay Pyi Taw	42%	38%	60%	63%
Rakhine	48%	44%	74%	70%
Sagaing	51%	53%	66%	65%
Shan	60%	65%	78%	77%
Tanintharyi	25%	50%	66%	69%
Yangon	43%	43%	53%	63%
National	49%	52%	69%	68%

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Source: Authors' estimates from MHWS and MAPS.

Table 9 shows the difference in the amount of owned agricultural land between MAPS Round 1, MAPS Round 2, and MAPS Round 3 respondents, before and after weighting. Before weighting, there are slight variances in the ownership distribution between the three groups but after weighting there are no statistical differences. However, there was an issue of oversampling large farm owners and under sampling farmers without land. In Round 3, the weighting process brings down the number of large farms 8 percentage points and brings up the number of landless farmers by 8 percentage points.

Table 9. Difference in Owned Agricultural Land between MAPS and MHWS Respondents.

Agricultural Acreage	MAPS Round 1 Unweighted (%)	MAPS Round 2 Unweighted (%)	MAPS Round 3 Unweighted (%)	MAPS Round 1 Weighted (%)	MAPS Round 2 Weighted (%)	MAPS Round 3 Weighted (%)
0 Acres	6	1	6	14	14	14
0 to 2 Acres	17	22	20	22	22	22
2 to 4 Acres	19	19	19	19	19	19
4 to 7.5 Acres	22	23	22	20	20	20
More than 7.5 Acres	37	35	33	25	25	25

Source: Authors.

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 10 shows the average area cultivated by farmers and the percentage of farmers growing major crops during MAPS Round 1, Round 2, and Round 3 after weighting. Farmers cultivated much larger portions of land in Round 1 and Round 3 with an average of 6.05 and 6.12 acres respectively, compared with 4.86 acres in Round 2.

In Round 2, significantly fewer households grew rice, maize, groundnut, sesame, and pigeon pea compared to Round 3. However, there was a significant jump in the percentage of farmers growing green gram. These differences are likely due to routine changes in the crops grown during the dry (pre/post monsoon) season and the monsoon season. However, significantly less farmers grew rice, groundnut, sesame, green gram, and pigeon pea in Monsoon 2022 (Round 3) than in Monsoon 2021 (Round 1). These changes cannot be tied to the difference in season.

Table 10. Descriptive Crop Farmers, MAPS

	Unit	MAPS Round 3	MAPS Round 2	MAPS Round 1
Total number of farmers	Number	4,892	5,015	3,891
Area cultivated - acres	Mean	6.12	4.86 ***	6.46
Crops grown				
Rice (%)	% of farmers	60%	13% ***	65% ***
Maize (%)	% of farmers	10%	2% ***	10%
Groundnut (%)	% of farmers	9%	5% ***	11% ***
Sesame (%)	% of farmers	9%	7% ***	12% ***
Green gram (%)	% of farmers	4%	10% ***	5% **
Pigeon pea (%)	% of farmers	7%	1% ***	5% ***
Betel leaves (%)	% of farmers	5%	4%	5%

Source: Authors' calculations based on MAPS. Comparisons are with Round 3.

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

Conclusion

MAPS is a socioeconomic phone survey with the aim of being representative for farmers at the national and state/regional levels. However, because phone ownership and phone access are not universal, there may be underrepresentation of lower income, less educated, and more remote households. We took three main steps to ensure representativeness. First, we sampled from a large and geographically dispersed database of phone numbers at the township level. Second, we used a target-based sampling strategy to achieve gender parity as well as obtain quotas of rural, farming, and low-educated households. Third, we created sampling weights to further improve national and subnational representation.

Due to power outages, disruptions to phone service, and non-responses it was hard to reach some of our previously surveyed households. Because of this, 34 percent of MAPS Round 2 households were not interviewed for Round 3. Further, panel respondents generally experienced more positive outcomes than attrits which could represent a bias in our sampling. Overall, the Round 3 sample is more female than in Round 2 despite sharing the same dispersion of farming households. Regardless of any shortcomings, we were able to survey 271 out of 324 townships.

The crops grown during the monsoon season vary significantly than those grown during the dry (pre/post monsoon) season. However, there were also significant differences between the monsoon seasons year over year. Despite limitations, MAPS is representative at the national and state/regional levels. MAPS, by collecting high-frequency data on agricultural indicators is critical for understanding the state of crop

production and sales, input use, crop marketing, farm and livestock assets, and farm services across Myanmar.

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APPENDIX

Table A. Myanmar townships not enumerated in the current round of MAPS

State	Township	Population Size	Number of Households	Comments
Kachin	Injangyang	1,420	285	Low Population
Kachin	Khaunglanhpu	11,635	1,711	Low Population
Kachin	Machanbaw	8,353	1,719	Low Population
Kachin	Nawngmun	7,025	1,212	Low Population
Kachin	Sumprabum	2,405	479	Low Population
Kachin	Tsawlaw	6,499	1,073	Low Population
Kayah	Hpruso	28,318	5910	
Kayin	Hpapun	32,719	6,502	
Chin	Thantlang	49,949	9,782	
Mandalay	Pyigyitagon	219,454	43,875	Urban areas
Sagaing	Kalewa	54,744	11,735	
Sagaing	Pinlebu	109,289	21,900	
Sagaing	Wuntho	69,442	14,205	
Shan (North)	Hopang	59,438	11,216	Wa SAZ
Shan (North)	Konkyan	59,565	9,665	Kokang SAZ
Shan (North)	Laukkaing	83,860	15,181	Kokang SAZ
Shan (North)	Manton	37,254	7,683	Pa Laung SAZ
Shan (North)	Matman	19,050	3,318	Wa SAZ
Shan (North)	Mongmao	69,364	10,445	Wa SAZ
Shan (North)	Mongyai	36,747	8,485	
Shan (North)	Namtu	48,460	11,641	
Shan (North)	Narphan	114,724	16,474	Wa SAZ
Shan (North)	Pangsang	88,732	16,457	Wa SAZ
Shan (North)	Pangwaun	96,940	13,969	Wa SAZ
Shan (South)	Kyethi	70,623	14,712	
Shan (South)	Laihka	48,831	8,790	

Shan (South)	Langkho	38,344	9,548	
Shan (South)	Mawkmai	33,810	7,194	
Shan (South)	Monghsu	68,589	15,867	
Shan (South)	Mongpan	23,503	5,421	
Shan (East)	Monghpyak	28,235	6,155	
Shan (East)	Mongla	27,691	5,208	
Shan (East)	Mongping	65,886	13,299	
Shan (East)	Mongyawng	75,413	17,196	
Yangon	Ahlone	48,612	10,943	Urban areas
Yangon	Bahan	78,793	17,426	Urban areas
Yangon	Botahtaung	36,661	8,397	Urban areas
Yangon	Cocokyun	1,172	351	Low Population
Yangon	Dagon Myothit (East)	155,258	33,913	Urban areas
Yangon	Dagon Myothit (North)	200,629	42,704	Urban areas
Yangon	Dagon Myothit (Seikkan)	159,313	37,905	Urban areas
Yangon	Dagon Myothit (South)	358,350	76,984	Urban areas
Yangon	Dawbon	72,683	14,409	Urban areas
Yangon	Hlaing	147,191	32,837	Urban areas
Yangon	Hlaingtharya*	663,463	148,711	Urban areas
Yangon	Kamaryut	72,697	16,299	Urban areas
Yangon	Kyauktada	25,754	6,120	Urban areas
Yangon	Kyeemyindaing	106,702	23,062	Urban areas
Yangon	Lanmadaw	36,302	8,599	Urban areas
Yangon	Latha	18,161	4,473	Urban areas
Yangon	Mingalartaungnyut	126,134	25,918	Urban areas
Yangon	Pabedan	31,328	6,563	Urban areas
Yangon	Pazundaung	45,347	10,306	Urban areas
Yangon	Sanchaung	87,228	20,635	Urban areas
Yangon	South Okkalapa	153,687	32,725	Urban areas
Yangon	Tamwe	156,340	35,360	Urban areas
Yangon	Thaketa	212,290	45456	Urban areas
Yangon	Thingangyun	201,316	43,320	Urban areas
Yangon	Yankin	66,792	14,637	Urban areas
Total not enumerated (nationwide) c		5,058,514	1,066,365	
Total (nationwide) c		51,144,607	11,162,510	
Share of total not enumerated c		9.89%	9.55%	

Source: Authors

Table B. MHWS respondent characteristic targets for each state and region, in percentage of respondents

State/ Region	Gender (female)	Location (rural)	Education level (low)	Livelihood (farming)
Ayeyarwady	50	86	54	47
Bago	50	78	52	46
Chin	50	79	50	66
Kachin	50	64	42	43
Kayah	50	75	47	60

Kayin	50	78	57	45
Magway	50	85	56	52
Mandalay	50	65	49	41
Mon	50	72	52	33
Nay Pyi Taw	50	68	43	30
Rakhine	50	83	58	46
Sagaing	50	83	54	63
Shan	50	76	60	73
Tanintharyi	50	76	50	40
Yangon	50	30	31	13

Source: Authors

Table C. Percent of MHWS and MAPS rural/urban, female, and age

	MAPS Round 2 Percent Rural	MAPS Round 3 Percent Rural	MAPS Round 2 Percent Female	MAPS Round 3 Percent Female	MAPS Round 2 Age	MAPS Round 3 Age	MAPS Round 1 Percent Female	MAPS Round 3 Percent Female
Ayeyarwady	96%	1	13%	39% ***	47	47.4	0	39%
Bago	94%	1	0	34% ***	47.9	47.9	0	0
Chin	75%	1	0	44%	45.9	48.8	0	0
Kachin	82%	1	0	43%	45.6	47.8	0	0
Kayah	65%	1	22%	51% ***	42.1	46.9	0	51%
Kayin	92%	1	0	41% ***	47	47.7	0	0
Magway	97%	1	22%	40% ***	46.2	48.6 *	0	40%
Mandalay	97%	1	0	35% ***	47.1	49.2	0	0
Mon	89%	1	0	39% *	49.2	51.6	0	0
Nay Pyi Taw	93%	1	0	32%	51.9	51.4	0	0
Rakhine	93%	1	0	33% ***	48.4	50.3	0	33% *
Sagaing	94%	1	0	43% ***	48.4	47.5	0	0
Shan	93%	1	0	44% ***	43.5	45.2 *	0	0
Tanintharyi	85%	1	0	48% ***	48.3	50	0	0
Yangon	93%	1	0	34% ***	48.2	47.6	0	0
National	93%	1	0	40% ***	46.9	47.8 ***	0	0

Source: Authors

Note: Asterisks show significance at p-values * p < 0.10, ** p < 0.05, *** p < 0.01.

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