



The Ageing of Myanmar's Farmer Population:

Implications for Agriculture and Food Security



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Contents

1 Foreword	4
2 Executive Summary	5
I Context	10
3 Introduction	10
3.1 Agricultural context	10
3.2 Research Questions	11
4 Methods	12
4.1 Literature Review	12
4.2 Focus group discussions and semi-structured interviews	12
4.3 Semi-structured key informant and gate-keeper interviews	14
4.4 Household Survey	14
4.5 Census Data	15
II Population	17
5 What will be the future age profile of Myanmar’s smallholder agriculture population?	17
5.1 Population Characteristics	17
5.2 Current age profile of Myanmar’s smallholder agriculture population	19
5.3 Future age profile of Myanmar’s smallholder agriculture population	21
III Challenges	26
6 What are the implications of an older farming population for Myanmar’s agricultural future?	26
6.1 Household change	29
6.2 Community Labour	35
6.3 Accessing economic and financial resources	37
6.4 Adapting to climate and environmental change	41
6.5 Awareness of Future Challenges	44
IV Way Forward	47
7 What broad policy and practice steps would help Myanmar to best position itself for this future?	47
7.1 Retain Labour	48
7.1.1 Household labour	48
7.1.2 Hired community labour	48
7.2 Adapt Farming Practices	50
7.3 Increase Mechanisation	51
8 Conclusion	54
References	55

List of Figures

4.1	Locations of the 30 villages where the survey was conducted	15
5.1	Total fertility rate and life expectancy at birth in Myanmar	18
5.2	Age distribution of the heads of type 1 farming households	20
5.3	Age distribution of the heads of type 2 farming households	21
5.4	Age distribution of the heads of type 3 farming households	22
5.5	Age distribution of type 3 farming households, 2014-2044	24
5.6	Age distribution of the sampled regions farmers, 2016-2046	25

List of Tables

4.1	Literature review database and search term overview	13
5.1	Population development in Myanmar by age, 1950-2015	17
5.2	The age distribution of type 3 households – farmers, 2014 -2044	23
5.3	The age distribution of farmers in the surveyed regions, 2016 -2046	25
6.1	Characteristics of respondents in 60+ age group	28
6.2	Who manages the farm in the 60+ age group	28
6.3	Difference between younger and older farmers	29
6.4	Who is managing the land by region and age	31
6.5	Contribution of older heads of household to the farm	31
6.6	Availability of household labour	35
6.7	Differences in income and landholding size between regions	37
6.8	Differences in income and landholding size between age groups within regions	38
6.9	Differences in economic situation and outlook	38
6.10	Differences in economic situation and outlook by age group (within region)	39
6.11	Change in landholdings by age group (within region)	39
6.12	Main challenges for future of farming in the region	44
6.13	Main challenges for own farm by region and age group	45
7.1	Contact with government services	49
7.2	Differences in use of machinery	51

1. *Foreword*

HelpAge has supported Myanmar since 2004 and has been a LIFT implementing partner since January 2010. Building on its field experience, HelpAge began a policy-oriented project funded by the LIFT donor consortium in 2014: *Strengthening the Ministry of Social Welfare to Fulfil Its Role in Expanding Social Protection*. The project addresses gaps in social protection capacity through support to and collaboration with the Ministry of Social Welfare, Relief and Resettlement (MSWRR), which is set to play a central role in the extension of social protection systems. The project's support has two components. The first is to build the capacity of the MSWRR to clarify its mandate on social protection as a whole and make informed decisions in choosing and designing specific instruments. The second component of the project will develop in greater detail one branch of a social protection—old age.

Awareness about the implications of rapid ageing is limited in the country. For the first time in Myanmar's history, persons aged 60 and older will outnumber children under age 15 by around 2035. In addition, shrinking family sizes resulting from sharply reduced fertility rates and the migration of younger people to cities as the economy expands will affect national development and reduce traditional family support for the older population. Although the government has expressed its desire to respond to demographic changes, the country is still unprepared for their social and economic implications. As part of this ageing component of the project, HelpAge commissioned the Oxford Institute of Population Ageing, University of Oxford, to assess the ageing trends of Myanmar's farming population.

2. *Executive Summary*

- 2.1 By 2035, for the first time in Myanmar's history, persons aged 60 and older will outnumber children under age 15. In addition, shrinking family sizes resulting from sharply reduced fertility rates and the migration of younger people to cities as the economy expands will affect national development and reduce traditional family support for the older population. Although the government has expressed its desire to respond to demographic changes, the country is still unprepared for the social and economic implications.
- 2.2 Around 70 % of Myanmar's population live in rural areas, and agriculture is still the largest sector of the economy. In 2015, farming provided 32 % of GDP, 17 % of exports and 50 % of all employment. As in other parts of south-east Asia, paddy production dominates the agriculture sector and much of this activity is undertaken by smallholder farmers.
- 2.3 It is thus important to understand how the ageing of Myanmar's farming population will affect agricultural livelihood patterns and agricultural productivity. This is of particular importance to Myanmar's future food security because of the pronounced ageing trend among the smallholder agricultural population who provide much of the country's local food production.
- 2.4 The report thus considers three main questions concerning the future age profile of Myanmar's smallholder agriculture population, the implications of an older farming population for Myanmar's agricultural future and the broad policy and practice steps which would help Myanmar to best position itself for this future.
- 2.5 The data collection comprised a literature review, focus group discussions, semi-structured key-informant and gate-keeper interviews, a household survey, and secondary analysis of the 2014 Myanmar Population and Housing Census. All the data collection for the survey, including the on-site analysis of the 2014 census, was conducted between September 2016 and January 2017.
- 2.6 Focus group discussions and semi-structured interviews were undertaken in four villages in two different regions of Myanmar. The four research sites were selected from villages with projects run by HelpAge Myanmar, and they were chosen to gather evidence on farming in two different ecological zones. Two of the villages were in the Delta region (Ayerwaddy) where water is plentiful and the main crop

is rice, and two were in Central Burma's dry zone (Mandalay) where much of the land is unsuitable for rice and mixed cropping is the norm.

- 2.7 Myanmar, like other countries in the region, has seen large declines in fertility in the last few decades. The total fertility rate has more than halved since the 1980s, and now stands at 2.25 children per women (UN data for 2010-15). Life expectancy at birth for men in Myanmar has almost doubled in the 60 years from 1950-55 to 2010-15, increasing from 33.1 years to 63.6 years, with increases for women from 39.3 years in 1950-55 to 67.7 years in 2010-15
- 2.8 Around one quarter of the heads of the farming households are aged 60 years and above and over half are aged 40-59 years. The future age profile of the smallholder population was estimated in two ways: using census data and using our own small holder survey. Calculations based on the census data suggests that households containing a least one skilled farmer will decline in number between 2014 and 2044 by around 1 million: from 4.2 to 3.2 million individuals. In addition this most common type of farming household population will itself age, with the proportion aged over 60 years increasing from 23.6 % in 2014 to more than 40 % in 2034 (41.3 %) and 2044 (40.7 %). This is driven by the declining number of younger people aged under 30 years entering this population due to reduced child bearing, and the ageing of the current population.
- 2.9 Without these farmers, the Myanmar farming population will be severely reduced in numbers unless non-farming populations can be attracted into farming, either from within or from without the country. This raises concerns about both the ability to recruit and retain young farmers and also the sustainability of farming with such an old farming population.
- 2.10 There will also be significant regional differences which are as important as the differences between age groups. It is also important to point out that the Dry and Delta regions not only face different challenges but also differences in the magnitude of the same challenges.
- 2.11 Firstly older farmers stay active for longer in the Dry zone. In our survey 93 % of older farmers in the Dry zone are still actively involved in managing their land. In the Delta this stands 59 % where 41 % of the older farmers have either handed over responsibility to another family member or have taken a tenant.
- 2.12 In general older farmers are not as well educated as younger farmers; they are less likely to report good health, and more likely to have functional limitations that might affect their ability to do farm work. Although two generation households are the most common living arrangement, one third of the older farmers live in three generation households.
- 2.13 A key question is whether the decline in young people both within farming households and wider rural communities will affect the availability of labour and how can this be compensated for.

- 2.14 Currently the ageing of the farm household is managed first through intergenerational transfer of power and decision-making either after the death of the older owner or during the farmer's lifetime. One solution to the ageing of the household is for children to stay in the village and work on the family farm. Dry zone farmers are evenly divided as to whether their children will stay whereas in the Delta a clear majority (64 %) think that they will.
- 2.15 The second big challenge of population ageing is a reduction in local labour for hire. The other main driver of demographic change across most of the region is internal migration, more specifically the migration of younger people from rural areas to cities or large towns. The fact that most migrants tend to be young means that internal migration may have a significant effect on the age structure of local populations. However older households tend to have more family labour to draw on and thus will be less likely to be affected by loss of community labour, so long as children remain on the farms.
- 2.16 Economic and financial resources are another big challenge. There are significant differences in resource between the two regions: fewer than 20 % of the respondents in the Dry zone have an income of over 300,000 MK; compared with 45 % of the Delta farmers. And only 5 % of the Delta farmers have incomes below 100,00 0MK, compared with 43 % of those in the Dry zone.
- 2.17 In both zones older farmers have less income than younger ones irrespective of farm size, indeed in both zones older farmers in both zones are more likely to have larger holdings. Similarly, in both zones older farmers are less likely to report an increase in profit or in yield than those in the younger age groups.
- 2.18 The evidence is that although older and younger farmers alike are hit by short-term fluctuations in external conditions outside their control - bad weather or a fall in prices for their main crop - younger farmers are better able to improve productivity. Similarly, while only a few farmers in both regions had changed the size of their holdings in the previous five years, where changes had occurred younger farmers were more likely to have made gains and older farmers were more likely to have incurred losses.
- 2.19 In terms of the perception of the challenges younger farmers tended to be more concerned about new pests than the older farmers. Lack of credit was of more concern for younger farmers in the Dry zone, while being similar for both age groups in the Delta. Low prices were more of a concern for the younger farmers in the Dry zone, but of more concern for the older farmers in the Delta.
- 2.20 A clear majority of farmers in both zones agree that the supply of agricultural labour for key seasonal tasks is a major problem, but few saw young people leaving the village as connected to this challenge. More older farmers see shortages of labour to hire as a greater concern than the weather, while more younger farmers saw the weather as the greater challenge.

- 2.21 Older farmers were worried about personal health but only a small proportion of them (8 % in the Dry zone and 4 % in the Delta) think that their personal health is going to be the main challenge for their ability to continue farming as they say that they would hand over farming responsibilities to someone else in the household.
- 2.22 There are clear risks to food security in Myanmar due to the ageing of the farm population: (i) lack of foresight and planning by the farming households themselves; (ii) lack of education for all age groups in the Dry zone, and especially older farmers in the Delta; (iii) lack of financial resources for all in the Dry zone, and for older farmers in the Delta.
- 2.23 The study identified broad policy steps which might be considered: (i) retain labour; (ii) adapt farming practices; (iii) increase mechanisation; (iv) sell land.
- 2.24 **Retention of labour:** not only is there a need to retain young labour—both within the household and hired—to address the demographic deficit caused by population ageing, but the sector demands energy, innovation, and physical strength. This can only be delivered by an agricultural sector which is well funded, has strong regulation and governance, and a strong emphasis on agricultural research, development and education. In addition, as the country develops and opens, the need to involve younger people in the policy decisions which affect their lives is likely to grow. The study identified two broad types of current and future labour demand: household and hired from the community.
- 2.25 Most households do not fully recognise the threat from their children and grandchildren leaving the land. Currently it is presumed that many young people will remain in the household as farmers, and take on more tasks and then decision-making going forward. These children will in the future need capital to invest in new technology and practice; to buy new land, and a more advanced education. In addition, depending on the household decision transfer process, many may have little incentive to invest in skills if the older parent or grandparent still retains control of all decisions.
- 2.26 Possible interventions: (i) mentoring around family transfer of land and decision-making; (ii) agricultural training programmes at all levels of education and adult extension programmes; (iii) conversion of the household farm into a modern enterprise maybe in collaboration with extended family members and farms – enabling pooling of labour, earnings and risks, and a shift to commercial products.
- 2.27 In both regions the seasonal nature of the farming creates demand for part-time wage work at peak periods even on small farms. This is likely to increase with the ageing of the farm households. In addition developed agriculture will require more advanced labour and other agricultural services such as transport, veterinary services, mechanized field operations, and agricultural advice. In addition, machine operators, mechanics, technicians, and others will be required in increasing numbers in the future. Young people with skills and education may be able to sell these services, thus supplementing their own farming activities.

- 2.28 **Adaptation of farming practices to boost or maintain productivity:** this will require widespread education and information on new techniques, the introduction of new crops, new seed varieties for old crops, mixed cropping or inter-cropping (relevant mainly for the Dry zone farms), a different approach to plant spacing (relevant mainly for the Delta farms), and the purchase or renting of agricultural machinery.
- 2.29 Such willingness to adapt practices will be related to the educational level of the farmers. In both regions younger farmers had higher educational qualifications than older ones, in addition the Delta farmers had higher levels of educational attainment than those in the Dry zone. Thus only 25 % of the Delta farmers and 10 % of the Dry zone farmers had more than middle school education.
- 2.30 **Increase mechanisation:** the use of machinery to help older farmers to cope with their own ageing and the loss of younger people is clearly a key solution. While there is considerable variation in the use of machinery between the two regions, overall the possibility of uptake of machinery to replace and supplement labour in the light of individual ageing and the ageing of the population looks promising.
- 2.31 **Sell land to commercial farmers:** while expert interviews suggested that both Chinese and Japanese entrepreneurs were interested in buying large parcels of rural land in Myanmar this again is beyond our scope. However, it is important to note that this would only worsen the livelihoods and welfare of older adults and encourage depopulation.
- 2.32 In conclusion, while land is relatively plentiful, the agricultural sector of Myanmar has underperformed by comparison with other countries in the region. Currently many smallholders are caught in a 'low-level equilibrium trap' – with low inputs, low quality output, low productivity, and low returns. Levels of mechanization and investment in other factors like seeds and fertiliser are low.
- 2.33 This low agricultural productivity and high rates of landlessness makes for relatively high levels of poverty and food insecurity among rural households. Labour, however is currently plentiful, yet this is most vulnerable to population ageing and to increased rural-urban migration.
- 2.34 There is however a clear difference between the Dry and the Delta zones. The Delta with its higher current productivity is ripe for external investment. The Dry zone is more vulnerable. In both zones there are possibilities through policy initiatives such as mentoring, agricultural training programmes and enterprise development to overcome the population ageing.

I. Context

3. *Introduction*

3.1. AGRICULTURAL CONTEXT

Farming in Myanmar is divided into three zones: Delta, Dry and hill. There is a great deal of variation in temperature and rainfall across the three regions, with the average in the Delta 32 degrees and 5000 mm rainfall compared to 21 degrees in hill region and 600mm of rainfall in Dry zone (Kyi, 2016). Rainfall and access to irrigation influences crop selection, with dry regions opting for pulses and oil-crops, whilst lowland areas grow paddy rice, garlic, chickpea, sunflower and tomato, and upland with rainfall selecting upland rice, maize, wheat, garlic, potato, ginger, taro, sweet potato, vegetables and some pulses. Areas that are under-irrigated focused on rice in monsoon and summer seasons (Egashira et al., 2006).

Historically there have been three distinct phases of growth in Myanmar's agricultural sector (Matsuda, 2009). The mid-1970s to early-1980s saw a burst of growth prompted by the investment of capital and the intensification of land use through the use of fertiliser and high-yield seed varieties. After a pause, the early 1990s saw growth instigated by government investment in infrastructure and double-cropping. During the late 1990s government policies such as irrigation, dams, weirs in the mountainous region promoted further growth, the increased production driven also by population growth and the shift to a market economy.

Currently, some 70 % of Myanmar's population lives in rural areas, and agriculture is still the largest sector in the economy. As in other parts of south-east Asia, paddy production dominates the agriculture sector and much of this activity is undertaken by smallholder farmers. Paddy production, furthermore, has been strongly promoted by successive Myanmar governments, not least for its central importance as a food for domestic consumption. Not all the land is suitable for rice, however, and about two-fifths of the cropped area are given over to pulses and oilseeds. The current average farm size in Myanmar is 2.5 hectares, which is comparatively large in the south-east Asian region and only surpassed by Thailand (3.1 hectares). There is a high land: population ratio and

half of arable land is fallow (Kyi, 2016). Most of Myanmar's agricultural land (7.9 million hectares/ 19.49 million acres) is made up of small-scale farms with an average of 2.2 plots (Lon et al., 2011). Myanmar's agricultural performance is relatively weak. In 2015, farming provided 32 % of GDP, 17 % of exports and 50 % of all employment (Kyi, 2016).

3.2. RESEARCH QUESTIONS

The overarching research question was to explore how the anticipated ageing of Myanmar's farming population will affect agricultural livelihood patterns and agricultural productivity. This is of particular importance to Myanmar's future food security because of the ageing trend of the country's national population and particularly the likely ageing of rural farming population, especially smallholders, who provide much of the country's local food production.

These are approached as:

- What will be the future age profile of Myanmar's smallholder agriculture population?
- What are the implications of an older farming population for Myanmar's agricultural future?
- What broad policy and practice steps would help Myanmar to best position itself for this future?

In order to consider these three main research questions we explored:

- the major other challenges affecting the agricultural population and subsequently agricultural productivity;
- the risks to the agricultural population of these combined challenges;
- the actions which might be taken to ameliorate these.

4. *Methods*

The data collection comprised:

- a literature review;
- focus group discussions;
- semi-structured key-informant and gate-keeper interviews;
- household questionnaire;
- secondary analysis of the 2014 Myanmar Population and Housing Census.

All the data collection for the survey, including the on-site analysis of the 2014 census, was conducted between September 2016 and January 2017.

4.1. LITERATURE REVIEW

The first phase of this project involved a review of the literature related to farming, ageing, Myanmar specifically but also to other national contexts where ‘small-hold’ farming is prevalent. The aim of the literature review was to provide a context in terms of (i) the challenges faced by (Myanmar’s) smallholder farmers in the context of demographic change; and (ii) the responses to these challenges—both policy and personal responses.

For the review of the literature specific to Myanmar, several databases were used, as Table 4.1 demonstrates. The search focused on publications since 1990, and where relevant papers were located, their reference lists were also searched for further sources of information

4.2. FOCUS GROUP DISCUSSIONS AND SEMI-STRUCTURED INTERVIEWS

Focus group discussions and semi-structured interviews were undertaken in four villages in two different regions of Myanmar. The four research sites were selected from

Table 4.1: Literature review database and search term overview

<i>Database</i>	<i>Main search term</i>	<i>AND</i>	<i>Number of results</i>
<i>Medline</i>	Myanmar	Farm	15 in all fields
		Farming	115 in all fields
		Ageing	22 in all fields
		Farm AND Ageing	22 in all fields
<i>Scopus</i>	Myanmar	Farm	145 in title, abstract, keywords
		Farming	123 in title, abstract, keywords
		Ageing	153 in title, abstract, keywords
		Farm AND Ageing	3 in title, abstract, keywords
<i>Google Scholar</i>	Myanmar	Farm	23 in title
		Farming	40 in title
		Ageing	1 in title
		Farm AND Ageing	0 in title

villages with projects run by HelpAge Myanmar, and they were chosen to gather evidence on farming in two different ecological zones. Two of the villages were in the Delta region (Ayerwaddy) where water is plentiful and the main crop is rice, and two were in Central Burma's dry zone (Mandalay) where much of the land is unsuitable for rice and mixed cropping is the norm.

This part of the research had two main aims. First, it provided contextual information on land ownership and farming practices in family-run smallholdings in rural Myanmar needed to identify questions and themes for the collection of quantitative data. Second, it gave farmers and other agricultural workers an opportunity to describe how different activities were pursued, and to give their view on the challenges faced by smallholding farmers in different parts of the country.

In each village we conducted two focus group discussions (FGDs), one with older farmers and one with younger farmers. The FGDs were split in this way so that we could explore topic areas that might indicate possible differences in practices or outlook between older and younger farmers. Participants for the FGDs were selected in advance with the help of HelpAge Myanmar.

- All dry zone focus group (FG) participants either owned land, or rented land which they themselves worked, all dry zone participants came from 'farm households'.
- The Delta FG participants were a mixed group, including members of landless households as well as women who were wives of men who owned land. All participants came either from 'farm households' or from households that depended on farm work as their main source of income.

The main themes explored in the FGDs were:

- Crop production and land use;
- The main challenges faced by farmers in the area;
- Strategies for coping with challenges;
- How conditions for farm production may have changed in the last few years;
- Intergenerational support and vision of labour in smallholder households;
- Hopes and fears for the future.

4.3. SEMI-STRUCTURED KEY INFORMANT AND GATE-KEEPER INTERVIEWS

Semi-structured interviews were conducted with older farmers (and spouses) in three out of four villages. The interviews were used to construct a classification of types of farm household that were of interest for the purposes of the study:

- household owns land which the members farm themselves—with or without hired labour;
- household owns land some of which is farmed by the members of the household, and some of which is let;
- household owns land and lives locally, but does not work on the land and has no part in its management (a tenant farms the land and pays rent to the owners);
- household rents land which it manages – with or without hired labour. Basic demographic information on the village population was gathered from local administrators.

4.4. HOUSEHOLD SURVEY

The household survey was the main data collection tool for the research. The target size for the sample was 600 households, with equal numbers to be selected from townships within the two agricultural-ecological zones used in the qualitative part of the study (Delta and dry zone). The survey was conducted in 30 villages from four separate townships (see map in Figure 4.1). The two townships in the Ayeyarwady Region (Patheingyi and Pyawbwe) were chosen because of the presence of HelpAge projects in the area. The two townships in the Central Dry Zone (Pakkoku in Magway and Natogyi in Mandalay) were selected randomly from a total of six in the area. The villages, 15 from each zone, were selected by a two-step method in order to take account of variations in village size (random selection of ‘villages-tracts’ within each township; followed by selection of villages based on PPS methods). Households within the selected villages were selected by systematic random sampling.

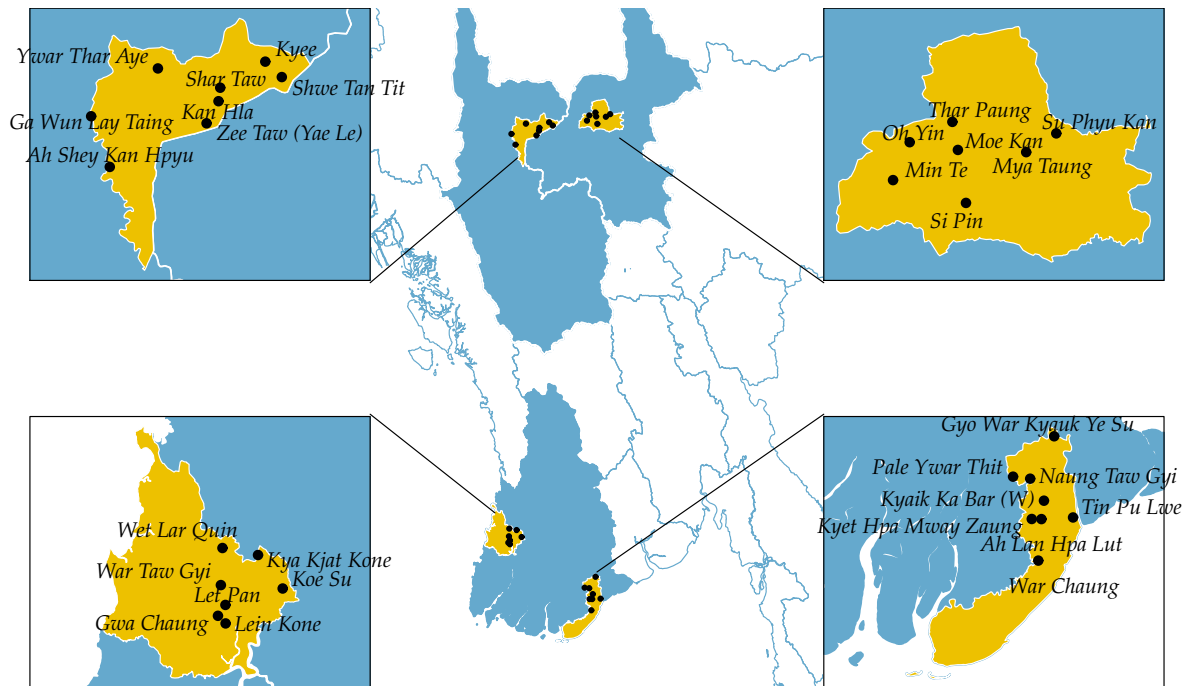


Figure 4.1: Locations of the 30 villages where the survey was conducted

The farm households fell into different categories defined partly by tenure (owning or renting), and partly by involvement in farming the land. Since our primary interest was in households that were actively engaged in farming, we stratified the farm household sample to ensure that at least 75 % of land-owning households were currently involved in farming the land, i.e. someone in the household was involved in managing the farm. Non-active farm households were included in the sample as we expected some of these to have been previously active as farmers.

The questionnaire was comprised of four modules: (i) household composition, health, income, credit; (ii) access to farm land, tenure, responsibility for managing the farm; (iii) challenges for the future and legacy; (iv) farming technologies and reasons for use or non-use. All questionnaires were administered face-to-face with the head of the household.

4.5. CENSUS DATA

From 27.11.2016 to 2.12.2016, the Department of Population, Ministry of Labour, Immigration and Population of the Republic of the Union of Myanmar granted one of our researchers controlled access to the 2014 Myanmar Population and Housing Census (2014 MPHIC). The census department provided us with onsite access to the one percent sample of the main data file at the census office in Nay Pyi Taw. The sample was used to develop and test the SPSS syntax to produce various cross-tabulations. Once the code was thoroughly tested on the sample it was checked by the deputy director of the department, who subsequently personally ran the script on the whole population dataset.

The resulting tables were automatically collated using the SPSS output management system (OMS), and were then checked by the department staff before being released. Over 500 tables were produced, most bivariate, but also some larger ones with thousands of cells.

II. Population

5. *What will be the future age profile of Myanmar's smallholder agriculture population?*

Of key interest to our question is the future age profile of Myanmar's smallholder agricultural population. Here we are using data from the most recent national census (2014) and from the two surveyed regions in the study. Farming and non-farming populations are compared, and future trends in the demography of the Myanmar farming population discussed.

5.1. POPULATION CHARACTERISTICS

The 2014 census has the total population of Myanmar to be 51,419,420, which would put it lower than the United Nations 2010 and 2015 estimates of 51.7 and 53.9 million respectively (United Nations, 2015). This total population comprises just under 52 % females and just over 48 % males, very close to the cited United Nations figures. The census puts the number of households in Myanmar at almost 11 million, giving an average of 4.4 persons per household. Population development in Myanmar since the middle of the 20th century reveals both growth and the beginnings of an ageing of the population (Table 5.1).

Table 5.1: Population development in Myanmar by age, 1950-2015. Thousands [Percentage] Source: United Nations (2015)

	1950	1970	1990	2010	2015
<i>0-14 years</i>	6,142 [35%]	11,52 [42%]	15,806 [38%]	15,410 [30%]	14,849 [27%]
<i>15-59 years</i>	10,408 [59%]	14,029 [52%]	23,398 [56%]	32,396 [63%]	34,262 [63%]
<i>60+ years</i>	977 [6%]	1,616 [6%]	2,803 [6%]	3,927 [7%]	4,786 [10%]
Total	17,527	27,167	42,007	51,733	53,897

From 1950 to 2015, the population of Myanmar tripled from 17.5 to 53.9 million people as a result of the high levels of total fertility and declining levels of mortality (see below). The first indications of an ageing of the population can be observed in the early years of the 21st century. In 2010, the proportion of the population aged under 15 years had declined to 30 % while the proportion aged over 60 years had increased to 7 %, and this continued to 2015 with percentages of 27 and 10 % respectively. Future projections indicate the older population will rise to 15 % of the population by 2050 and by 2035, they will outnumber children under the age of 15 (Knodel, 2013).

Myanmar, like other countries in the region, has seen large declines in fertility in the last few decades. The total fertility rate has more than halved since the 1980s, and now stands at 2.25 children per women (UN data for 2010-15) (Figure 5.1, left panel).

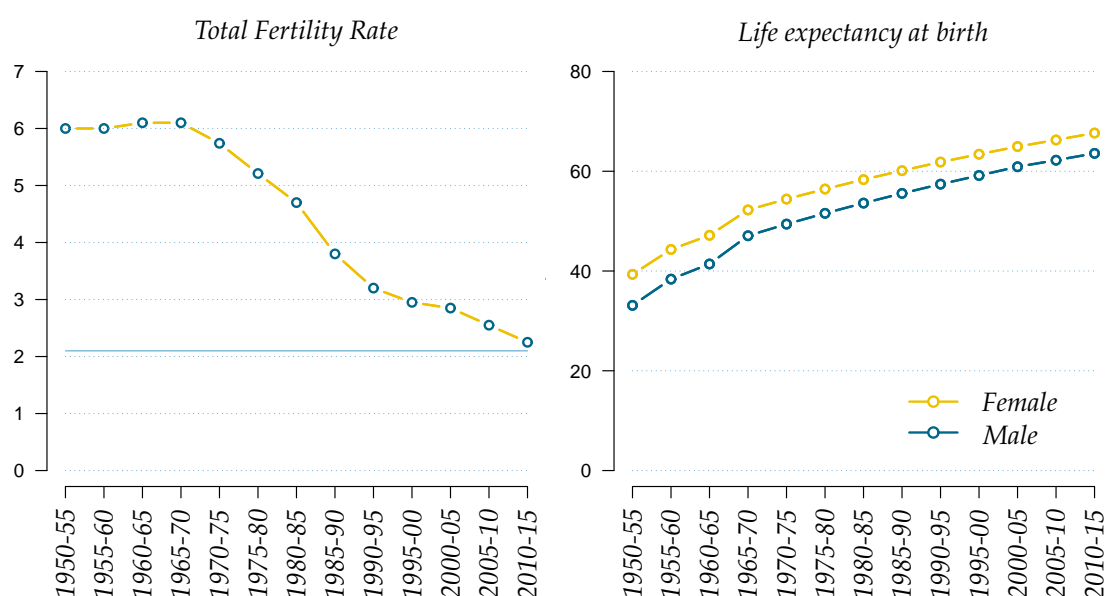


Figure 5.1: Total fertility rate (left panel) and life expectancy at birth for males and females (right panel) in Myanmar, 1950-2015. Source: United Nations (2015)

The total fertility rate has declined significantly from around 6 at the beginning of the 1950s to just above replacement rate at 2.25 in 2010-2015, which is low compared with a number of other South-Eastern Asian countries. Total fertility is significantly lower in urban areas, which may be a result of extreme delays in marriage, the prevalence of illegal abortions, and the high proportion of single, unmarried women of reproductive age. Cultural factors associated with the Buddhist religion may also have kept the TFR low.

Life expectancy at birth has improved by about 10 years over the period, though gains in life expectancy at older ages are relatively weak. As the change in the population median age shows, from 19.7 years in 1985 to 27.9 years in 2015, the population of Myanmar has been ageing (Figure 5.1, right panel).

Mortality has, likewise, declined substantially since the early 1950s resulting in increasing life expectancies at birth for both males and females (Figure 5.1). Indeed, life

expectancy at birth for males in Myanmar has almost doubled in the 60 years from 1950-55 to 2010-15, increasing from 33.1 years to 63.6 years. Increases for females are also substantial, albeit slightly more modest with an increase from 39.3 years in 1950-55 to 67.7 years in 2010-15 (United Nations, 2015).

5.2. CURRENT AGE PROFILE OF MYANMAR'S SMALLHOLDER AGRICULTURE POPULATION

In respect of the "farming population", the 2014 census data refer to households and/or heads of households and not to all of the individuals in the household.

The census data provide three different definitions of a farming household, based on the information provided by the head of household. The classifications used everywhere here are those employed in the census questionnaire. *It is important to note first of all that in the census data, an older person, who spends every day farming, may be classified as "retired",* so the data only allow us to identify those who state categorically in the completed census questionnaire that they are linked into farming in one of the three types of farming household described in the following.

The three identified farming households are:

- type 1: head of household is a skilled farmer;
- type 2: head of household or spouse is a skilled farmer;
- type 3: any relative in the household is a skilled farmer.

Farming household, type 1: head of household is a skilled farmer: in type 1 farming household, the head of the household is in a farming occupation (ISCO classification category 6: Skilled Agricultural, Forestry and Fishery Workers), and in addition this household head is not an employee, so their activity status as defined in the census questionnaire is either Employer or Contributing Family Worker. According to the census data, there are 720,280 such households out of 10,877,832 households in total in Myanmar, comprising therefore 6.6 % of the total number of households in the country.

The age distribution of the heads of these households is shown in Figure 5.2 (absolute numbers in the left panel and percentage distribution on the right) compared with the distribution for non-farming households.

Around 23 % of the farming households heads are aged 60 years and above and 52 % are aged 40-59 years. The type 1 household farming population has larger percentages of its population aged between 40 and 69 years than the non-farming population. This may indeed be linked to the registration as "retired" in the census of persons actually working the farm, while of course these "retired" persons in the non-farming population appear quite naturally.

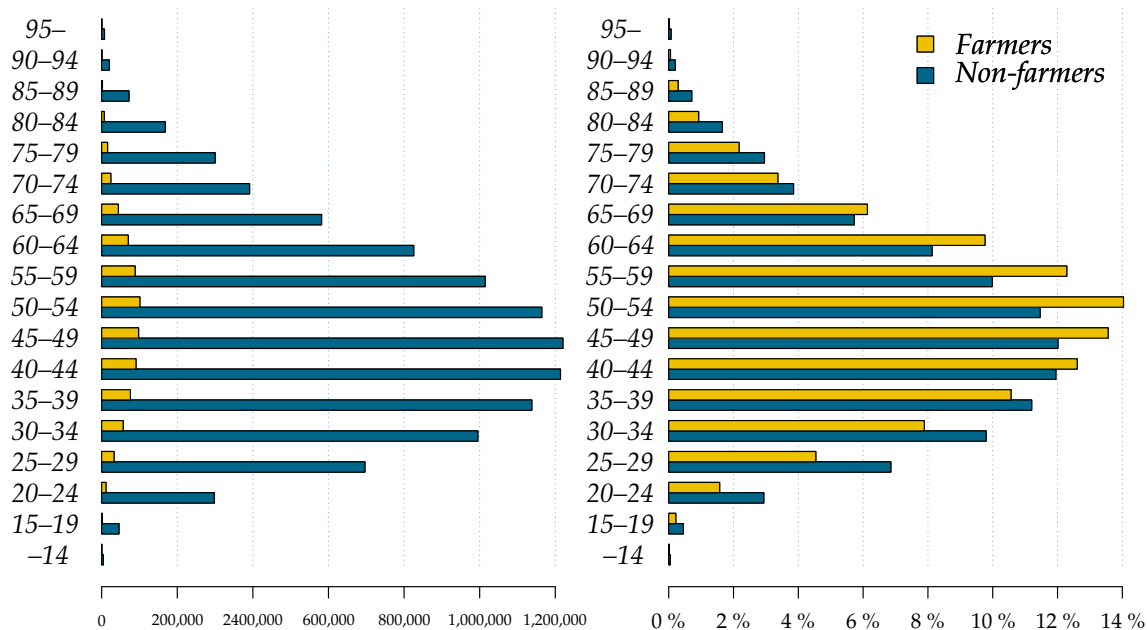


Figure 5.2: Age distribution of the heads of type 1 farming households. Counts in left panel, percentage in right. Source: OIPA calculations based on 2014 census data.

Farming household, type 2: head of household or spouse is a skilled farmer: in type 2 farming household, the head of the household or the spouse of the head of the household is in a farming occupation (ISCO classification category 6: Skilled Agricultural, Forestry and Fishery Workers), and in addition that person is not an employee. According to the census data, there are 1,167,817 such households out of 10,877,832 households in total in Myanmar, comprising therefore 10.7 % of the total number of households.

The age distribution of the heads of these households is shown in Figures 5.3 (absolute numbers in the left panel and percentage distribution on the right) compared with the distribution for non-farming households.

In this case with type 2 farming households, around 18 % of the households are aged 60 years and above and 52 % are aged 40-59 years compared with 23 and 52 % respectively for type 1 households. Again there are larger proportions aged between 40 and 64 years in the type 2 household population than in the non-farming population.

Type 1 households actually numerate to individuals in as much as these refer to the (single) heads of household. In the same way, type 2 households numerate to individuals – either the head of the household OR the spouse of a head (where this head is not necessarily a farmer).

Farming household, type 3: any relative in the household is a skilled farmer: in type 3 farming households, any relative in the household is in a farming occupation (ISCO classification category 6: Skilled Agricultural, Forestry and Fishery Workers), and in addition that person is not an employee. According to the census data, there are 4,235,580 such

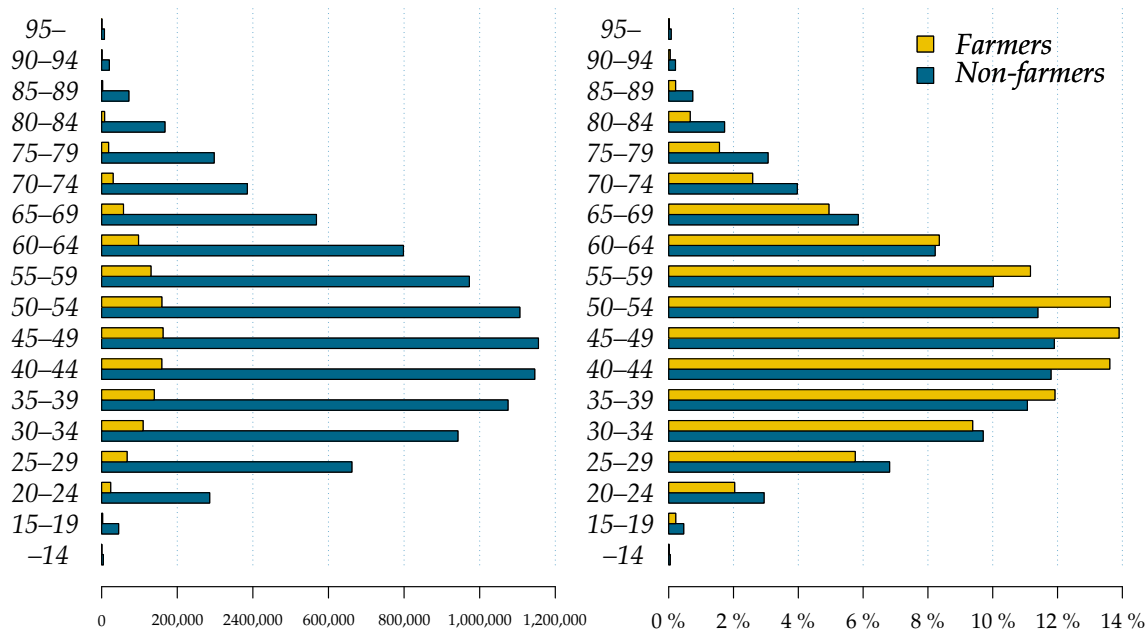


Figure 5.3: Age distribution of the heads of type 2 farming households. Counts in left panel, percentage in right. Source: OIPA calculations based on 2014 census data.

households out of 10,877,832 households in total in Myanmar, comprising therefore 38.9 % of the total number of households.

Unlike types 1 and 2, this classification does not numerate to 4,235,580 individuals. A household in this category may comprise more than 1 relative in a farming occupation and not an employee. However, this could provide a base line (minimum) for the number of farmers (but noting they are not employees or labourers).

The age distribution of these households is shown in Figure 5.4 (absolute numbers in the left panel and percentage distribution on the right).

In type 3 household, 49.5 % are aged 40-59 years and 24 % are aged 60 years and above compared with 23 and 52 % respectively in type 1 households and 18 and 52 % respectively in type 2 households. As with types 1 and 2 households, the type 3 household farming population has larger percentages of its population aged between 40 and 69 years than the non-farming population.

5.3. FUTURE AGE PROFILE OF MYANMAR'S SMALLHOLDER AGRICULTURE POPULATION

The future age profile of the smallholder population is estimated in two ways: using census data and using our own smallholder survey.

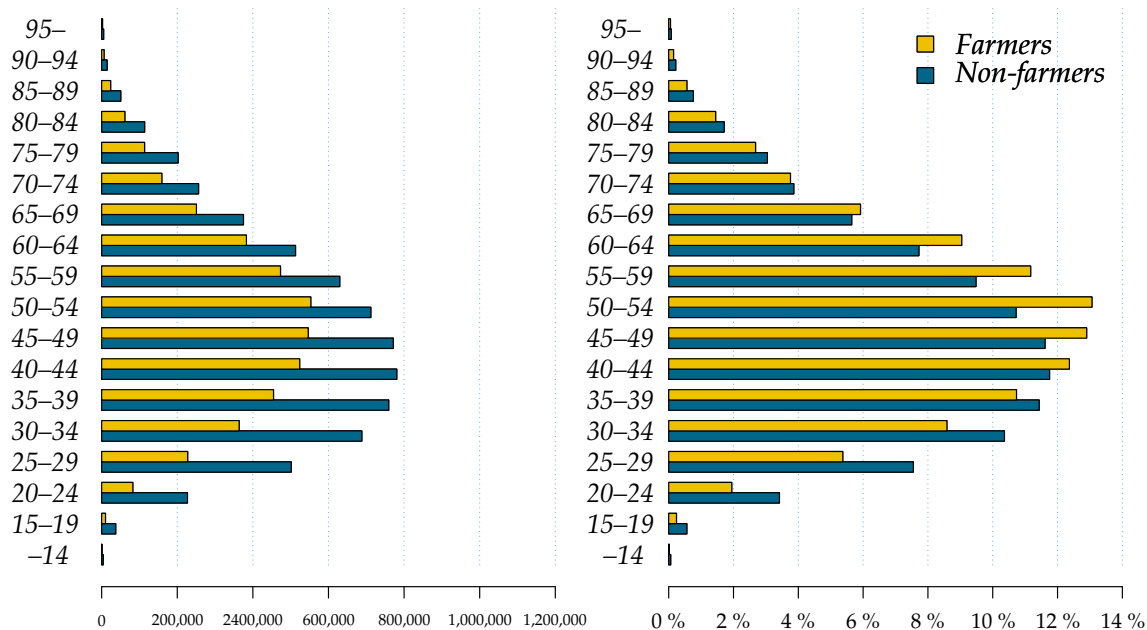


Figure 5.4: Age distribution of the heads of type 3 farming households. Counts in left panel, percentage in right. Source: OIPA calculations based on 2014 census data.

Census data results

Given that type 3 households give a best estimate of the number of farmers (but excludes farming employees), the age distribution of this group may provide an indication of the demographic development in the coming years.

The first column in Table 5.2 presents the age distribution of these 4.2 million individuals at the time of the 2014 census. Currently, the farmer population is relatively old with almost 24 % aged 60 years and above and another 24 % aged 50-59 years¹. With the assumption that the age structure of the farmer population changes in accordance with the population forecasts for the whole population (United Nations, 2015), based on these 4.2 million individuals consideration of the future age structure of the type 3 household farmer population can be made.² The results are shown in Table 5.2 and Figure 5.5 to 2044.

The first observation from Table 5.2 is that the type 3 farming households will decrease in number from 2014 to 2044 by around 1 million, from 4.2 to 3.2 million individ-

¹These percentages should not be compared with the population percentages in Table 5.1 because the farming data do not include youths and infants thereby inflating the proportion of older persons when compared with the general population.

²The base year for the forecasts is the 2014 census point. It is assumed that the age structure develops in accordance with survivorship given in the United Nations (2015) abridged life tables, assuming therefore that mortality of the farming population is no different from that of the whole population. In addition, it is assumed that younger age groups of farmers constitute the same 2005-2015 proportion of the total age group population as they age into the farming population.

Table 5.2: The age distribution of type 3 households – farmers, 2014 -2044.

<i>Age group</i>	2014	2024	2034	2044
-19	10,737	9,891	9,697	9,349
20–24	82,405	80,070	74,271	71,602
25–29	227,546	231,211	229,077	203,974
30–34	363,657	339,354	382,738	325,618
35–39	454,623	221,668	225,238	223,159
40–44	523,781	351,753	328,246	370,209
45–49	546,327	402,950	211,802	215,213
50–54	553,235	490,776	329,588	307,562
55–59	473,122	496,135	365,930	192,343
60–64	382,938	478,385	424,376	284,996
65–69	250,719	378,340	396,743	292,622
70–74	159,175	269,115	336,192	298,237
75–	207,315	240,109	362,946	420,716
Total	4,235,580	3,989,757	3,676,844	3,215,600

uals. This is clearly driven by the declining number of younger people aged under 30 years entering this population and this is itself driven by declining numbers of young people (declining fertility levels) from which the farming population stock is taken and the ageing of the stock.

Under the given assumptions, Figure 5.5 reveals quite dramatic ageing of the type 3 farming household population with the proportion aged over 60 years increasing from 23.6 % in 2014 to more than 40 % in 2034 (41.3 %) and 2044 (40.7 %).

Smallholder survey data

Using the survey data from this study we were able to estimate the age structure and age structural changes in the farming population of the two surveyed regions 2016-17 to 2046-47. It is possible to replicate the above forecasts for the sample populations of the surveyed regions on the assumption that the sampled populations are representative. The age distribution of the sample populations and the forecasts for 2026-27, 2036-37 and 2046-47 are shown in Table 5.3 and Figure 5.6. This is of course not a forecast of a real-life situation but a model situation. Here the interest is not in numbers (although there is a sense of increase or decline in total numbers) but in the age structure (ageing) of the sample population.

It must be noted that our sample population is older than the census type 3 farming

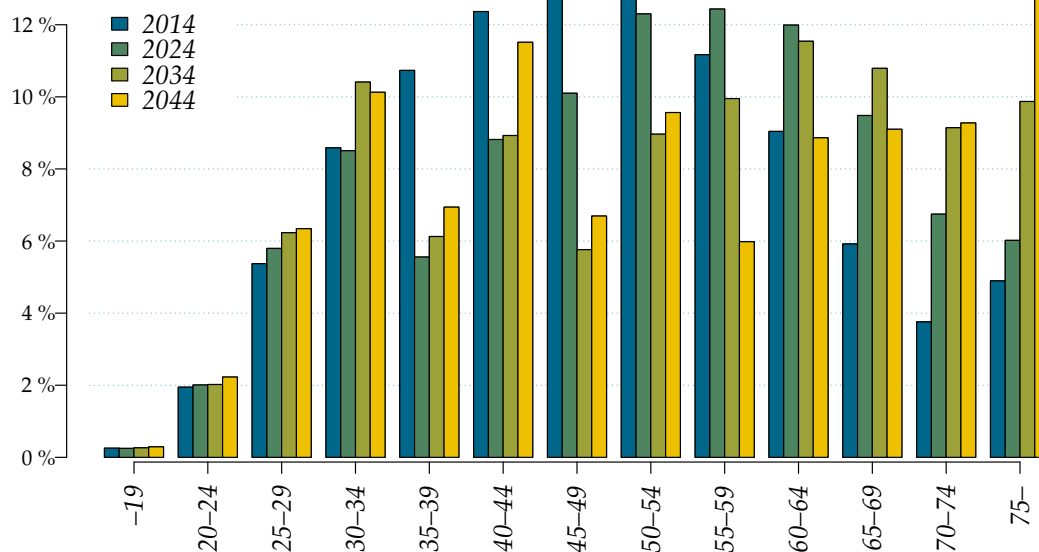


Figure 5.5: Age distribution of type 3 farming households, 2014-2044. Percentage. Source: OIPA calculations based on census and United Nations (2015) data.

household population. More than 30 % of the sample population is aged over 60 years compared with just under 24 % of the census population. If the exercise of forecasting is repeated on this sample population under the same assumptions, then the age structural changes are shown in Table 5.3 and Figure 5.6³.

Once again, the ageing of these farmers is noteworthy, even though they begin with a more aged structure than the census farming population.

- At the point of sampling 34.5 % of the farmers were aged 60 years and over. This increases to 52 % in the course of the forecasting period.
- The proportion aged 75 years and over increases from 5.3 % to 17.8 %

³The base year for the forecasts is the 2016 sampling point. It is assumed that the age structure develops in accordance with survivorship given in the United Nations (2015) abridged life tables, assuming therefore that mortality of the sampled farming population is no different from that of the whole population. In addition, it is assumed that younger age groups of farmers constitute the same proportion of the total age group population as they age into the farming population.

Table 5.3: The age distribution of farmers in the surveyed regions, 2016 -2046.

Age group	2016	2026	2036	2046
20–24	0.7 %	0.9 %	0.9 %	1.1 %
25–29	1.7 %	2.1 %	2.5 %	2.7 %
30–34	4.3 %	5.3 %	7.0 %	7.4 %
35–39	7.0 %	7.3 %	9.7 %	12.3 %
40–44	10.5 %	4.7 %	6.1 %	8.2 %
45–49	12.8 %	7.5 %	8.4 %	11.2 %
50–54	15.2 %	11.1 %	5.2 %	6.8 %
55–59	13.3 %	13.2 %	8.1 %	9.3 %
60–64	13.7 %	14.8 %	11.5 %	5.5 %
65–69	10.8 %	12.0 %	12.6 %	7.9 %
70–74	4.7 %	10.9 %	12.6 %	9.8 %
75–	5.3 %	10.1 %	15.3 %	17.8 %

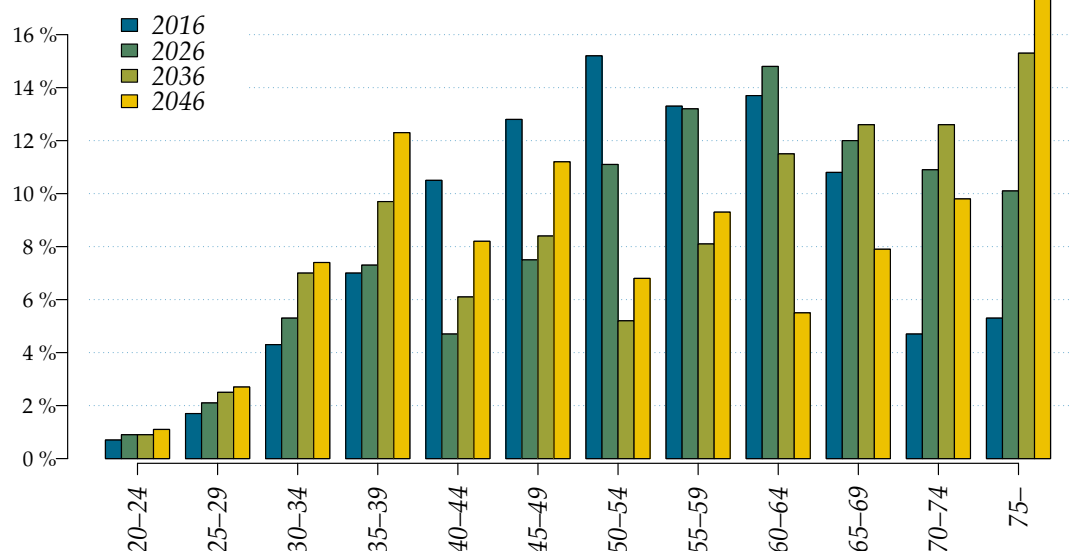


Figure 5.6: Age distribution of the sampled regions farmers, 2016-2046. Percentage. Source: OIPA calculations based on survey and United Nations (2015) data.

III. Challenges

6. *What are the implications of an older farming population for Myanmar's agricultural future?*

As discussed in Chapter 5, Myanmar is likely to experience significant age structural change or population ageing over the coming decades. It will experience both an increase in the average age of its farming community and a decrease in the availability of younger workers.

- The currently common type of farming household will decrease in number from 2014 to 2044 by around 1 million, from 4.2 to 3.2 million individuals. This is clearly driven by the declining number of younger people aged under 30 years entering this population and this is itself driven by declining numbers of young people (declining fertility levels) from which the farming population stock is taken and the ageing of the stock.
- In addition this most common type of farming household population will in itself age, with the proportion aged over 60 years increasing from 23.6 % in 2014 to more than 40 % in 2034 (41.3 %) and 2044 (40.7 %).

These demographics in themselves raise several questions of concern around whether smallholder production is structured and organized in ways that make it vulnerable to pressure exerted by demographic change of the kind associated with population ageing.

This chapter will discuss three broad questions:

1. Will this older population wish to continue farming at such old ages?
2. If they do continue, will they have the personal resources in terms of education and adaptability to take on new forms of farming required to tackle future challenges arising from factors such as climate change? Or to take on modern farming techniques necessary to increase production? In other words, are older farmers different from younger farmers in ways that affect productivity?
3. How will the decline in young people both within farming households and wider rural communities (due both to decreases in childbearing and increases in rural-

urban migration) affect the availability of labour and how can this be compensated for?

Without the aged farmers, the Myanmar farming population (based on these type 3 household forecasts) would be severely reduced in numbers unless non-farming populations can be attracted into farming, either from within or from without the country. This raises concerns about both the ability to recruit and retain young farmers and also the sustainability of farming with such an old farming population.

There are also a number of external factors creating challenges for farming. The key challenges may be summarised as (i) water including drought, flooding, irregular rainfall, poor water deforestation management and poor irrigation and drainage systems (Htoo et al., 2011; Kyi, 2016); (ii) climate induced change - including soil erosion and spreads of weeds; temperature rise and fluctuation; and crucially pests both as vector of disease and damage (Devendra et al., 2002; Kyi, 2016; Brown et al., 2008); (iii) poor governance; corruption and embezzlement (Thawngmung, 2003); and (iv) macroeconomic instability, lack of information and extension support, low investment in agricultural research, poor access to credit and new technology (Kyi, 2016; Matsuda, 2013).

Regional differences

The significant regional differences must be stressed. Indeed as will become clear the differences between the regions are as important as the differences between age groups. It is also important to point out that the Dry and Delta regions not only face different challenges but also differences in the magnitude of the same challenges.

The Dry zone makes up 13 % of the country and is situated in the lower Sagaing, Mandalay and Magway regions. One third of the total population, some 19 million people (Kyi, 2016), live here and 57 % of the land is used for agriculture, the main source of income in the area. The dry zone is characterised by high temperatures erratic rainfall and soil that is poor in quality due to a lack of nutrients. The low rainfall dictates the choice of crops to be grown, and most of the land is not suitable for growing rice. Beans, pulses, and peanuts are the main crops for just under half the sample, and sesame is common as a second crop. Farmers opt for intercropping of sesame, pigeon pea, groundnut and jujube. Typically the pigeon pea and jujube are exported while the sesame and groundnut are for personal consumption (Yee et al., 2014). Farm households here rely on income from the sale of cash crops to buy rice.

The Delta is situated in the Ayeyarwady, Yangon, Bago, Taninthayi regions and the Mon, Kahyin and Rakhine States, with some 22 million people living there (Kyi, 2016). The wet zone is characterised by high temperatures on average 32 degrees and high rainfall some 5000 m of rainfall per year. Delta areas have rich soils and grow paddy rice, garlic, chickpea, sunflower, and tomato. Rice production is both for consumption and export and provides much of the income of the Delta region.

Contrasting zones

The household survey revealed some interesting contrasts:

1. the dry zone sample is older than the Delta sample (56 years vs 51 years), with one fifth of the farmers in the 60+ age group.
2. the dry zone sample has more three generation households (21 % vs 14 %) and more households with six or more members (31 % vs 20 %).
3. a smaller proportion of farmers in the dry zone have received more than primary school education (26 % vs 42 %).
4. dry zone farmers are less likely to report good health (59 % vs 77 %) (these differences persist when we control for age – see Table 6.1).

On the other hand:

5. older farmers in the dry zone are less likely to report functional limitations than their age peers in the Delta
6. older farmers in the dry zone are more determined to maintain active involvement in the management of the farm.
7. older farmers in the dry zone are more likely to maintain their position as the main decision-maker for the farm.
8. most striking is that 93 % of older farmers in the Dry zone are still actively involved in managing their land, while this reduced to 59 % in the Delta, where 41 % of the older farmers have either handed over responsibility to another family member or have taken a tenant (Table 6.2).

Table 6.1: Characteristics of respondents in 60+ age group

	<i>Dry zone</i>	<i>Delta</i>
<i>Middle school or above</i>	10 %	25 %
<i>Very good or good health</i>	47 %	58 %
<i>No functional limitations</i>	36 %	16 %
<i>Visits farm most days</i>	93 %	83 %

Table 6.2: Who manages the farm in the 60+ age group

	<i>Dry zone</i>	<i>Delta</i>
<i>Head of household (HH) alone</i>	64 %	31 %
<i>Head of HH shares responsibility with other family member</i>	30 %	28 %
<i>Main farm manager is other family member</i>	6 %	31 %
<i>Tenant</i>	1 %	10 %

6.1. HOUSEHOLD CHANGE

Currently the ageing of the farm household is managed first through intergenerational transfer first of power and decision-making either after the death of the older owner or during the farmer's lifetime.

Although very similar proportion of respondents in the two age groups are married, widowhood is more common among farmers aged 60 or over (14 % vs 6 %).

Table 6.3: Difference between younger and older farmers

	<i>Dry zone</i>		<i>Delta</i>	
	over 60	under 60	over 60	under 60
Female	19 %	14 %	14 %	5 %
Married	76 %	80 %	81 %	91 %
No more than middle school	90 %	63 %	75 %	51 %
Reporting poor or fair health	54 %	32 %	43 %	17 %
Reporting no functional difficulties	36 %	66 %	16 %	61 %
Three or more generation households	32 %	15 %	26 %	10 %
One or two person households	8 %	8 %	18 %	7 %

These patterns of age difference also generally hold within each of the regions considered, for example older farmers are more likely than younger ones to have only completed middle school, although for both age groups the Delta farmers had higher levels of educational attainment. Similarly older farmers are more likely than younger ones to be living in multiple generation households, and these rates are higher in the Dry zone for both groups. Only one and two person households stand out in this regard as having a large differential in the Delta (18 % vs 7 %) but showing no age difference in our Dry zone sample (Table 6.3).

Household Solution

Box 6.1 describes the process of withdrawal. What is required for this joint management of the farm is the willing cooperation of both 'partners' and the continuing ability of the older partner to make a meaningful contribution to the management of the farm. It is not uncommon, therefore, for the older farmer to relinquish the entire management of the farm to the younger partner before death, especially if it should become impracticable to visit the land regularly and make informed decisions about what to do and when. Hence, under certain circumstances, there may be a phased handover of responsibility for running the farm from one generation to the next before the death of the person who owns the land. This way of doing things can, of course, be disrupted in various ways, and most obviously by the absence of a son or son-in-law to take over the farm. In saying this, we

assume that there are quite firm expectations about appropriate division of labour between men and women on smallholder farms in Myanmar. The impression we received was that such expectations do indeed prevail: male labour was required in particular for tilling the soil.

Box 6.1

The focus group discussions suggested that the transition from active farm work to inactivity follows a typical pattern across the life course. This may be seen as a familial or household 'solution' to the problem of declining physical capacity with age.

- When younger farmers acquire land, they not only run the farm, they also work in the fields.
- As they age however, there is a phased withdrawal from physical farm work with age, with the heaviest tasks (tilling the soil) being relinquished first.
- The process of withdrawal often continues to a point where they no longer engage in any of the physical labour required for work in the field tasks.
- They are still perfectly capable, however, of running the farm. They have the know-how to organise and supervise work undertaken by other people, either family members or hired casual labour. They decide what to do and when.
- At some stage in this process of withdrawal from hard work in the fields, they start sharing the management of the land with another family member, usually a son or son-in-law.

The evidence from the household survey confirms this pattern. Most farms in the dry zone sample (71 %) have a single decision-maker or manager, with about a quarter being jointly managed with another member of the HH (see table 6.4). Older farmers, as we might expect, are more likely to share responsibility with another individual, though the difference between the two age groups in this respect is not very large. Fewer than 1 in 10 (6 %) of the dry zone farmers have relinquished the management of the land altogether and handed it over to another family member. The contrast with the Delta in this matter is very marked (see Table 6.4). As for taking tenants, very few dry zone farmers lease any of the land they own (4 %), and only a very small fraction have let all their land to a tenant. The prevalence of leasing is much greater in the Delta (16 %), and 1 in 10 of the older farmers in this region were leasing all their land.

The age differences display the same direction in both regions, but vary in strength (Table 6.4). Most marked is the much lower level of sole management by older heads of households in the Delta region (31 %) compared to more than double that in the Dry zone (64 %). Although the older farmers in both regions are partially ceding control to their spouses and children, the Delta farmers were substantially more likely to have *completely* ceded control to one of their family members (31 % vs 6 %).

Table 6.4: Who is managing the land by region and age

	<i>Dry zone</i>		<i>Delta</i>	
	over 60	under 60	over 60	under 60
Head of household alone	64 %	76 %	31 %	81 %
Head of household & another member:	29 %	23 %	27 %	12 %
- Spouse	7 %	11 %	1 %	3 %
- Child(-in-law)	16 %	3 %	24 %	9 %
Another family member	6 %	<1 %	31 %	3 %
A tenant	<1 %	0 %	10 %	3 %

In addition, the preferences or expectations of Dry zone farmers should they no longer able to visit their land because of poor health reinforces the split between the dry zone and Delta. A surprisingly large proportion registered their resolve to maintain their influence on the way that the land was managed by continuing to manage the farm jointly with another member of the family (32 %). Only 10 % of the Delta farmers expect to retain their influence on the farm in this way. The idea of retaining sole responsibility for running the farm whilst using hired labour to do the work in the fields was favoured by only a small handful of farmers in either zone.

The contribution of the head of household to the work of the farm varies both by region and by age. Older farmers in both regions are less likely than their younger counterparts to combine work in the fields with sole responsibility for the managing the farm. There do, however, seem to be clear differences between the dry zone and the Delta in this respect.

Table 6.5: Contribution of older heads of household to the farm

	<i>Dry zone – over 60</i>	<i>Delta – over 60</i>
No field work or management role	6 %	35%
No field work but co-manages	13 %	15 %
No field work but sole manager	16 %	8 %
Field work and co-management	17 %	15 %
Field work and sole management	48 %	28 %

Whereas just under half (48 %) of the older farmers in the dry zone maintain this high degree of active involvement in the work of the farm, only 28 % of those in the Delta do so. The difference between the regions is, if anything, even more marked at the other extreme, i.e. no work and no role in management. Over a third of the older heads of household (35 %) in the Delta no longer worked in the fields and had no involvement in the management of the land they own. Only 6 % of the dry zone sample had withdrawn from the work of the farm to this extent.

Looking to the future, there are age differences in the way that farmers propose to deal with this contingency. In both zones, younger farmers are less likely than older farmers (44 % vs 65 % in the dry zone; and 52 % vs 77 % in the Delta) to say that they would hand over responsibility for the farm to a child (or child in-law). The reasons for this, however, do seem to be slightly different in the two areas. The idea of taking a tenant figures more prominently as an option in the Delta, and the data suggest quite a marked age difference in this respect – with 18 % of younger farmers saying that they would do this (as against 6 % of older farmers). In the dry zone, the resolve to continue managing the farm with another family member (and not just a child) is even more marked among younger farmers than the older ones.

Box 6.2

Case study – dry zone – one generation household (still working) - Yar Tan She village, Mahlaing Township

Although the household has only two members, a husband (60) and wife (58), their family is larger, since they have four adult children, two sons and two daughters, all living separately in the same village and spending a lot of time with each other. None of these children work on their parents' farm. There are nine grandchildren (and three of them were at the interview).

The man who is the owner inherited 24 acres from his father, but now has only 5 acres which he farms himself with occasional help from his wife. He sold five acres a few years ago and the rest (i.e. 14 acres) he has sold to his children, five acres to each to a son and a daughter, and a further two acres each to a son and a daughter. He grows groundnuts, sesame and onion.

He explained the rationale behind inter-cropping (which is now common in the region):

“The first reason is the bad weather and the second is lack of farmland. If we grow only one crop say pigeon pea it will take nine months before we can harvest, so it is better to mix with other crops that take less time like sesame. If one crop has been ruined, we can at least get the other crop.”

Although he still does a lot of the field work himself (including the land preparation), he does have to hire labour, mostly for help with the onion crop. His labour costs are relatively low because his holdings are quite small. He reckons he employs about 100 days of hired labour each year. He does not have to hire draught animals for the ploughing since he has two oxen. He has no debts and has no need to borrow to work the farm. His biggest concern is the water supply. Although there is a dam, it is old and does not provide enough water.

Retaining family labour

Clearly one solution to the ageing of the household is for children to stay in the village and work on the family farm. Dry zone farmers are evenly divided as to whether children will stay whereas in the Delta a clear majority (64 %) think that their children will stay. Younger farmers in the Delta also think that their children will leave.

The fact that farmers in the Dry zone sample are much less confident than those on the Delta that their children will stay is linked to their awareness of how hard it is to make a living from the land. Indeed here the possibility that their children may make alternative choices is beginning to enter their views about the future. Even so, the results suggest that they are confident that there will be someone in the household to take over the management of the farm when the time comes.

The case study in Box 6.2 from the Dry Zone illustrates the transference of land down through the generations and reliance on hired labour .

Box 6.3 illustrates the transference of land down through the generations and change from traditional knowledge to modern agricultural information.

Box 6.3

Case study – dry zone - two generation household (no longer working) – Yin Ngwayt, Mahlaing Township

This was a couple in their eighties (both 82 years old) with five children. Apart from one of the daughters, they all live separately in the same village. The man owns eight acres. He had inherited one acre and gradually build up his present holding by purchase. He stopped going to the fields three years ago. One of the sons farms the land on his behalf and makes all the decisions “*because methods are different now*”. Besides he does not want to tell his son what to do when he himself cannot go to the fields:

“I gave advice in the past, but now they think I shouldn’t to give advice anymore since they could decide for themselves. Just listening. No more increase yield. I don’t want to tell son because I was old and I cannot work”.

He explained that his son now uses other sources of information, like the “*agriculture companies*”. The daughter who is still at home weaves mats from bamboo. She can make as many as five day and each one sells for 1,000 kyat (0.7 US cent).

In Box 6.4 this case from the Delta illustrates the transference of land down through the generations and future concerns over the replacement of cows by hand tractors and artificial fertilizers.

Box 6.4

Case study – Delta – two generation household – Kha Naung

The household is comprised of an older couple in their sixties (husband 69 and wife 65) and two unmarried adult children. The husband owns 20 acres. The couple have five children in all, three sons and two daughters. Both the daughters live and work outside the village. One of the sons is married and lives with his own family in the same village, and the other two are still part of their parent's household. The owner has succeeded in increasing the size of his holdings by a very large amount from the time when he started out as an independent farmer. He was left three acres by his parents and has purchased several other parcels of land over the last 35 years. This was done mostly when land in the area was a lot cheaper than now. He reckoned that land now was very expensive compared to when he was buying, and at current prices he couldn't afford to buy any more. In 1975 "it cost MMK 490 for one acre... Now for one acre, it will cost MMK 1 million" He plans to leave five acres to the younger of the two sons who are at home, but is not sure about the rest of the land, partly because of the strained relationship with the older son.

The owner no longer has any involvement in the work of the farm or its management. He stopped working in the fields several years ago, and the two sons who are still at home now make all the decisions. It has been like this for six years, ever since his sons stopped taking his advice and he was finding it more difficult to visit the fields regularly. The sons do all the land preparation themselves (they own a hand-tractor and another small tractor), but hire labour for all the other field work. He told us that they no longer do hand-weeding on the farm, but have relied on herbicides for the last ten years. In addition to the tractors, the farm has a mechanical thresher and its own water pump.

His main concern for the future of farming in the areas is the impact of current practices on the quality of the soil. His farm, like most of the others he knows, use chemical fertilisers and herbicides very intensively. They do not allow the land to rest, and he believes that this is not sustainable. He told us that farming changed after Nagi, which killed most of the draught animals (in his village). Replacing draught animals incurs a big cost, as he explained:

"to rear cattle [is] prohibitive due to lack of cow fodder, grazing land, and high cowhand fees. The cow fodder costs MMK 1,500 per day. For people who only have 4-5 acres of land there is little or no grazing land left. This year [the] cow fodder price is high, one tinn [basket] is MMK 500 and requires at least 3 tinns to feed. For those who have a lot of acres they use machineries instead of cows. The main problem is lack of grazing land to feed cattle. Older people cannot take care of a cow."

The result was that everyone had to turn to hand-tractors for ploughing and they no longer had a source of natural fertiliser.

6.2. COMMUNITY LABOUR

The second big challenge of population ageing is a reduction in local labour for hire. The other main driver of demographic change across most of the region is internal migration, more specifically the migration of younger people from rural areas to cities or large towns. The fact that most migrants tend to be young means that internal migration may have a significant effect on the age structure of local populations. Because the rural areas that provide migrants will see a decrease in the population of prime working age, they will 'age' more quickly than the population as a whole. The fact that most migrants are looking for work also means that the labour supply in rural areas may initially be lower than it otherwise would have been, however continued out migration will eventually tighten the supply of rural labour in ways that have implications for smallholder farming. It will make itself felt in the decision-making of smallholder farmers and the farming practices that depend on a ready supply of cheap labour will have to change.

Although most farms rely on a mix of household labour and hired labour, there is a small number of farms in both regions where all the main work in the fields (ploughing, sowing, harvesting, weeding and pest management) is performed by hired labour, 7 % in the dry zone and 4 % in the Delta. The proportion of farm households where the only member working in the fields is the head of household (HoH), however, surprisingly large (43 % across the whole sample). In just under half of all farms (49 %), therefore, no more than one household member (the HoH) works on the land. Once again, we can see both regional and age differences in the labour contribution that comes from the farm household. Minimal reliance on household labour (i.e. no more than one household member) for work in the fields is more common in the Delta than in the dry zone. There is also a difference between the two age groups in this respect (and it runs in the same direction in both regions): farms with older HoHs are less likely to rely on just one family member for the work in the fields. This is what we would expect if we assume that the supply of household labour is greater in older households, i.e. there are more adult members available for work in the fields.

Table 6.6: Availability of household labour

			<i>Dry zone</i>		<i>Delta</i>	
	<i>Dry zone</i>	<i>Delta</i>	over 60	under 60	over 60	under 60
<i>No household labour</i>	7 %	4 %	8 %	6 %	2 %	5 %
<i>Only household labour</i>	34 %	58 %	29 %	38 %	34 %	58 %
<i>Average proportion HH labour</i>	27 %	25 %	27 %	27 %	25 %	24 %
<i>Average person-days of labour per year by HH members</i>	158	108	160	157	102	109

Box 6.5

Case study – dry zone – female-headed household - Yin Ngwayt, Mahlaing Township

This is a small three generation household (three adults and two children). The owner is a 60 year old widow with 10 acres. She farmed this entirely with hired labour before her daughter married. She made the decisions and helped with the weeding and the harvest. Now she lives with her daughter and son-in-law and two grandchildren. She says that all decisions are discussed between her and her son-in-law, but she hasn't done any work in the fields for three years. This is because of her knees. She also runs a small grocery shop which takes up most of her time (there are other small shops in the village, but hers is the largest).

The household has four draught oxen. They grow pigeon beans, green gram, sesame and groundnuts. Most of the crops are sent for sale in Mahlaing, the main town for the Township. She mentioned the poor quality of the road to the fields, and when she visited them, she would either walk or go by ox-cart. She thought that the main problem for the farm was the shortage of labour to hire, especially for weeding. She explained:

“The majority go to Mandalay. They find the job in the tea shops there. Some find jobs at the restaurant... Once they move out they don't come back. They send some money. This is the age of progress, after all. They buy and wear fancy clothes. [Another villager's] children all went out. He wants to sell the land, but there's nobody to buy. There is no one anymore what wants to be a farmer... I think it will get worse. Last year we fared no too bad because of the availability of harvesters. I can hardly get any workers during the rain season.”

The scarcity of labour has raised the costs for landowners:

“Due to lack of workers, the workers' fee has become dearer. For a woman worker, the daily wage is about MMK 3,000 and for a man worker, it is about MMK 5,000. About 50 youths go out and work outside our village.”

She recently took out a MMK 200,000 loan from the government agricultural department just to pay for labour costs, which she had to pay back in six months.

The data we have on labour (person-days of work on field tasks) suggests that that farming is more labour-intensive in the dry zone than in the Delta. Not only do household members in the dry zone contribute more labour to farm work than in the Delta (158 person-days/year vs 108 person-days/year), but they hire more labour as well (869 person-days/year vs 777 person-days/year). The ratio of household labour to hired labour is, however, about the same in both regions (27 % and 25 %). If we take this as a measure of reliance on hired labour, the two regions are not very different in their degree of reliance on hired labour: about 3/4 of the work in the fields is done by hired labour. Age, on the other hand, seems to make very little difference either to the total

input of labour from the household, or to the ratio of household labour to hired labour.

The heavy dependence of farm households in both regions for hired labour for various seasonal tasks means that all of them, and not just those with older heads of household, are vulnerable to shortages in the supply of casual labour.

This is clearly recognised by the farmers themselves, since a large majority of them identified it as a challenge for farming in the region (see Tables 6.12 and 6.13). Although a clear majority of farmers in both zones converge on that the supply of agricultural labour for key seasonal tasks is a major problem, there is a much higher level of agreement among farmers in the Delta that this is the most important challenge they face – with almost half expressing this view. In both regions, serious concern about shortages of labour to hire seems more common among older farmers than younger ones. This is identified as the main challenge for the region by 27 % of older farmers in the dry zone – compared to 19 % of younger farmers; and the Delta, the same figures are 52 % compared to 41 %.

The case in Box 6.5 illustrates the transference of land down through the generations and fears over the inability to recruit hired labour.

6.3. ACCESSING ECONOMIC AND FINANCIAL RESOURCES

There currently exist big differences in farm income between dry zone and the Delta. As highlighted in Table 6.7, there is a difference in the proportion of farmers within each region whose income falls below 100,000 kyat or above 300,000 kyat. There are also marked differences in the size of landholdings in the two regions, which presumably goes some way to explain the differences in income. The average size of a farm in the dry zone is about eight acres, quite a lot smaller than the 19 acres that is average for the Delta. More of the farm households in the dry zone have relatively small holdings (47 % have under 5 acres), and more of the farms in the Delta have relatively large holdings (53 % have more than 10 acres).

Table 6.7: Differences in income and landholding size between regions

		<i>Dry zone</i>	<i>Delta</i>
<i>Proportion of farmers with income:</i>	< 100,000 MMK	43 %	5 %
	> 300,000 MMK	17 %	45 %
<i>Average size of landholdings (acres)</i>		8	19
<i>Proportion of farmers with landholdings:</i>	< 5 acres	47 %	20 %
	5–10 acres	29 %	27 %
	>10 acres	24 %	53 %

Crucially from our perspective, there are also some age group differences in income

Table 6.8: Differences in income and landholding size between age groups within regions

		<i>Dry zone</i>		<i>Delta</i>	
		60+	<60	60 +	<60
<i>Proportion of farmers with income:</i>	< 100,000 MMK	51 %	36 %	6 %	3 %
	> 300,000 MMK	18 %	16 %	35 %	49 %
<i>Average size of landholdings (acres)</i>		9	8	18	19
<i>Proportion of farmers with landholdings:</i>	< 5 acres	39 %	54 %	19 %	20 %
	5–10 acres	34 %	25 %	29 %	28 %
	>10 acres	28 %	21 %	59 %	54 %

and size of holdings within each of the two zones (see Table 6.8). In the dry zone older farmers are more likely to be in the financially hard-pressed category, and in the Delta they are less likely to have monthly incomes above 300,000 kyat.¹ It seems that older farmers do not do as well as younger farmers. There is, however, no obvious association between these age differences in income and the age distribution of the size of holdings. Older farmers in both zones are more likely to have larger holdings (i.e. > 10 acres), and in the dry zone they are also less likely to have under five acres. In other words, it looks as though the association between income and age is independent of the size of holdings.

Although the majority of farmers in both zones saw no improvement in their household income over the previous year, there is quite a big difference between them if we take a longer view (see Table 6.9). Only 27 % of dry zone farmers thought their profit had increased over the past five years, compared to 61 % of the farmers in the Delta. Nor was there much sign of improvement in yield from their main crop, with only 22 % seeing an increase, compared to 45 % in the Delta. In other words, the majority of dry zone farmers are unable to point to any improvement in their ability to make a living from their land, and in this respect they are different from their counterparts in the Delta.

Table 6.9: Differences in economic situation and outlook

	<i>Dry zone</i>	<i>Delta</i>
<i>No improvement in HH income over last year</i>	81 %	84 %
<i>More profit than five years ago?</i>	27 %	61 %
<i>Increased yield from main crop over last five years?</i>	22 %	45 %
<i>Taken a loan in the last year?</i>	69 %	93 %

One of the main concerns about the ageing of the farm population is that older farmers will be less likely to adapt to and cope with the demands imposed of them. An analysis of the age differences in terms of economic factors gives some justification for this concern.

¹This is the top band we used for monthly income.

Table 6.10: Differences in economic situation and outlook by age group (within region)

			<i>Dry zone</i>		<i>Delta</i>	
	<i>over 60</i>	<i>under 60</i>	<i>over 60</i>	<i>under 60</i>	<i>over 60</i>	<i>under 60</i>
<i>No improvement in HH income over last year</i>	86 %	82 %	82 %	80 %	92 %	82 %
<i>More profit than five years ago?</i>	28 %	49 %	20 %	31 %	49 %	64 %
<i>Increased yield from main crop over last five years?</i>	22 %	33 %	16 %	26 %	36 %	47 %
<i>Taken a loan in the last year?</i>	77 %	83 %	68 %	69 %	91 %	93 %

A similar point applies to age (see Table 6.10). The proportions of older and younger farmers who reported no improvement in income over the last year was more or less the same, not only for the combined sample, but also for the dry zone farmers. When we take a longer view, however, older farmers in the dry zone sample are somewhat less likely to report an increase in profit or in yield than those in the younger age group. A similar pattern of results can be seen in the Delta sample.

Table 6.11: Change in landholdings by age group (within region)

			<i>Dry zone</i>		<i>Delta</i>	
	<i>over 60</i>	<i>under 60</i>	<i>over 60</i>	<i>under 60</i>	<i>over 60</i>	<i>under 60</i>
<i>Increase in holdings over last 5 years</i>	5 %	12 %	5 %	8 %	4 %	16 %
<i>Decrease in holdings over last 5 years</i>	14 %	7 %	12 %	8 %	18 %	5 %

What this suggests is that although older and younger farmers alike are hit by short-term fluctuations in external conditions outside their control - bad weather or a fall in prices for their main crop – there are differences between them in respect of their ability to improve productivity. Although the younger farmers who manage to do this in the dry zone are still in a minority among their age peers, more of them succeed than in the older age group. The suggestion of a connection between age and the productivity is further supported by the association between age and changes in the size of holdings (see Table 6.11). Although a minority of farms in either region had changed the size of their holdings in the previous five years, where changes had occurred younger farmers were more likely to have made gains and older farmers were more likely to have incurred losses. This can be seen in both regions.

Although we have no direct evidence on how the limited improvements of the last

five years have affected the outlook of the dry zone farmers, it would be not be surprising if dry zone farmers were on the whole less positive in their views about the future of their farms. What we can see is that they are less likely to have taken a loan than farmers in the Delta. The reasons for this are not clear, though it may have something to do with the way in which MABD loans are structured in favour of small-scale rice farmers: non-rice farmers can borrow less per acre than rice farmers (Tun et al., 2015, p.12). Age is not a factor at all in the decision to borrow.

The two vignettes in Boxes 6.6 and 6.7 illustrate the transference of land down through the generations and fears over the inability to recruit hired labour.

Box 6.6

Case study – Delta - Single person household – Kha Naung village

60 year old widower who lives alone. He has no children. Although he owns no land, he does rent five acres. He also rents a hand-tractor which he is skilled in using. He told us that not everyone can use a hand-tractor (three of the 10 older men in the FGD were unable to do so). The ability to use a hand-tractor means that he can all the land preparation himself. This is fortunate, because he has no son. It also means that he is able to carry on working in the fields for longer than a lot of the other older men. However, the hand tractor could present its own challenges: “[I] don’t know how to repair. The machine cost more than MMK 40,000,000... There’s only one person [in the village who can repair it]”. (In the FGD for this village we were told that “most men stopped doing a full day’s field work some time in their forties; they become managers and help occasionally with the field work”). For the other field tasks, especially transplanting and harvesting, he needs to hire labour. He does not know what he will do when he is no longer able to plough the land himself. His main worry is that labour costs are so high^a, and last year he noticed (like other men in the FGD) that there had been a big increase in the numbers of young men going to do seasonal work on large plantations elsewhere in the Delta. They could earn more money there than by staying in the village. He explained:

“To hire a worker for the whole day costs MMK 25,00. When the workers are scarce, we have to pay more than MMK 3,000 for weeding, harvesting, sowing. Sometimes we have to hire from another village. Due to the same cultivation time, we have to pay in advance.”

^aThe FGD told us that labour costs are (day rates) are higher for men, and even higher if they do the land preparation: “For a man it’s about MMK 3,500-4,000. The wages become more costly for the past 2 years. For a woman it was between MMK 2,000 to 2,500. Now it’s getting higher according to these skills.” They said that most of them had problems with shortage of labour at transplanting time (i.e. with the monsoon rice). The rest of the year it was easier to manage.

Box 6.7

Case study – Delta – Single person household – Aung Bala

Unmarried man, aged 31. He farms 24 acres. He inherited two acres from his father and rents the rest. He owns two hand-tractors. He usually rents them out after he has finished his own land preparation. Even though he has a lot of land, he does all the land preparation himself. The labour he needs is mainly for transplanting (monsoon rice only) and harvesting. Last year, when there were problems with the harvest because of the weather (rain at the wrong time), he hired a combine harvester for his own land and then leased it all the other farmers in the village.

The older farmers in the other FGD reckoned that labour costs had doubled in the last two years: *“it used be 2000 kyat/day and is now 4000 kyat”*. This group also told us that, although they lived by a river, it was not ‘acceptable’ for older men to fish.

6.4. ADAPTING TO CLIMATE AND ENVIRONMENTAL CHANGE

One of the key concerns of the ageing of the farmers is that they may be less able to cope with and adapt to future challenges. A key one is of course climate change.

Water is a key external factor for agriculture in Myanmar: flooding, drought and unpredictable rainfall being among the main challenges. Climate change has compounded water supply issues. The temperature predicted to rise in Myanmar, as well as rainfall but in a sporadic way which leads to flooding. As irregular rainfall is increasing, it is coupled with poor water management.

It is now recognised that the combined impact of extreme weather and pest outbreaks, both in terms of pest damage and vectors of disease, could be catastrophic for the Asia’s agricultural sector. The impact on crops of pest damage is two-fold: direct damage from insects that feed on roots, stems, leaves, fruit or seed, and insects as vectors of (especially virus) pathogens. The consequences of climate change on endemic pests and diseases are complex and are still only imperfectly understood, not least how changing biotic and abiotic environments may drive populations above pestilential or epidemic thresholds. Added to this may be new invasive pest species, whose ranges are shifting to occupy new climate windows under changing climates, or are expanding in response to other anthropogenic (e.g. habitat) change (or are newly-introduced exotics). There is increasing evidence that extreme events, e.g. drought or flooding either in isolation or sequentially (weather whiplash) are having major impacts on pest incidence in the shorter term. Pests both as vectors of disease and of destruction have been identified as a key problem for farmers in Myanmar.

Box 6.8 is a case from the dry zone that illustrates an older farm household’s challenges of water management, economic resources and hiring labour.

Box 6.8

Case study – Dry zone – one generation household (still working) – Yar Tan She village, Mahlaing Township

The man is 67 years old and his wife is 69. They have two surviving children, who are both married and separately in the same village. Although he inherited nine acres from his father, he had to sell four acres to pay off a debt. So now he has only five acres. The couple do not own their own house, but live with his wife's sister.

He grows pigeon beans and sesame, and has grown the same crops for about 15 years. He does all the land preparation (ploughing and harrowing) himself, but has to hire draught animals to do this as he has none of his own. He also hires labour to help with planting, weeding, and harvesting:

“To sow and weed one acre we need 5 persons and we have to pay them MMK 5,000 each per day. If we have to repeat the ploughing because the weeds are thick, I have to hire the cows again, and that costs another MMK 6,000 per day.”

For him the two main problems are the costs of hiring labour and the costs of fertiliser. Despite these problems, however, he has no serious debt apart from a LIFT loan. He is very reluctant to borrow from any other sources. In the last two years, the sesame crop has been very bad, a mixture of drought and rain at the wrong time. In 2014 the weather was so bad that he lost the whole crop and was unable even to collect seeds for the new season. What would help him most, he says, would be a well:

“If water was available everything would be satisfactory. To dig a well of 300 feet depth would cost about MMK 20,000,000 (\$2,000) including the pump machineries. Water is the main requirement.”

His annual income fluctuates with the price of the crops he produces, and he finds himself unable to predict what it will be this year:

“Last year we lost our crops and had no income. For this year the prices are so low. So we just can't tell you exactly how much is our yearly income.”

The vignette in Box 6.9 illustrates the challenge of obtaining accurate information around modern farming practices.

Box 6.9

Case study – Delta – two generation household — Aung Bala

A 66 year old man living with his wife and one of their daughters. Although his rice plot was relatively small (four acres), he also had 0.5 acres where he grew cut flowers. He was one of about ten HHs in the village who now did this. They were all small-scale rice farmers who could raise the capital needed to start this new kind of cultivation. The plots are not out in the fields, since the flowers need shade. He explained why more farmers did not grow flowers:

“The main barriers are the cost of capital. To prepare the ground, to build the retaining frames, to dig grooves, to feed humus, paddy husk, ground pearls cost a lot. As they require shade putting up a roof for half an acre would cost MMK 50,000. If you use bamboo it will cost MMK 100,000. To grow 100,000 flower plants one plant Zaw gyar would cost MMK 15, Zaw bayin MMK 30-50, etc. and various flower seeds would cost MMK 500,000. The total cost could be MMK 5,000,000. You can break even only after one year if everything goes smoothly.”

He had been doing it for four years, and was one of the pioneers. It was own decision and had nothing to do with the agricultural services. Dealers from Yangon had started coming round looking for growers, so he knew that there was a market.

This man also confirmed something we had heard in the older farmers FGD, which illustrates the importance of social networks in decision-making. Many of the farmers had tried a new seed variety for their rice last year after they had been told (either by traders or farmers in a neighbouring village) that it produced a bigger crop than the variety they were currently using. The news got round that this variety was better so many of them tried it. Unfortunately the crop turned out badly because the variety was highly vulnerable (in their view) to pests.

In this FGD – younger farmers aged 30 to 47 – the whole group were very clear that they wanted to stay in the village and improve farming in the area. They thought they could see various ways in which things could be done better. They were not sure, however, whether their children would feel the same way.

6.5. AWARENESS OF FUTURE CHALLENGES

In the Dry zone the main current challenges—in order of importance—are seen to be unpredictable weather, shortage of labour to hire, low prices, new pests, and water (see Table 6.12). The main future challenges are unpredictable weather, shortage of labour to hire, low prices, young people leaving the village, new pests, soil quality, and ability to hire machinery.

Table 6.12: Main challenges for future of farming in the region

	<i>Dry zone</i>		<i>Delta</i>	
	Listed as one of the challenges	<i>Most important</i> challenge	Listed as one of the challenges	<i>Most important</i> challenge
<i>Unpredictable weather</i>	82 %	47 %	62 %	26 %
<i>Shortage of labour to hire</i>	75 %	22 %	80 %	44 %
<i>Low prices</i>	50 %	12 %	45 %	12 %
<i>Young people leaving village</i>	46 %	13 %	16 %	3 %
<i>New pests</i>	33 %	1 %	21 %	6 %
<i>Soil quality</i>	21 %	2 %	7 %	2 %
<i>Access to machinery</i>	20 %	2 %	10 %	2 %
<i>Information about new farming methods</i>	17 %	<1 %	1 %	<1 %
<i>Water supply</i>	14 %	1 %	10 %	2 %

In the Delta the main current challenges are unpredictable weather, shortage of labour to hire, new pests, and low prices. Younger farmers are more concerned about new pests than their older neighbours. Unlike the Dry zone, they were not concerned about inability to obtain machinery nor lack of agricultural information.

Age differences again generally persist across regions, e.g. younger farmers tended to be more concerned about new pests than their older neighbours both in the Dry zone and even more so in the Delta. Lack of credit is however of more concern for younger farmers in the Dry zone, while being similar (and less pressing) for both age groups in the Delta. More importantly perhaps, low prices were more of a concern for the younger farmers in the Dry zone than their older counterparts, while Delta farmers reported the opposite: younger farmers seem less concerned about low prices for their produce (Table 6.13).

A clear majority of farmers in both zones agree that the supply of agricultural labour for key seasonal tasks is a major problem, but few saw young people leaving the village as connected to this challenge.

Here again, size of holdings affects selection of labour shortage as the main challenge;

Table 6.13: Main challenges for own farm by region and age group (percentages)

	<i>Dry zone</i>				<i>Delta</i>			
	Listed as one of the challenges		<i>Most important challenge</i>		Listed as one of the challenges		<i>Most important challenge</i>	
	60+	<60	60+	<60	60+	<60	60+	<60
<i>Unpredictable weather</i>	93	87	69	64	63	66	25	33
<i>Shortage of labour to hire</i>	62	59	13	8	71	66	33	23
<i>Low prices</i>	46	54	2	12	50	32	17	9
<i>New pests</i>	31	38	2	1	17	26	8	13
<i>Water supply</i>	20	25	2	0	8	11	0	6
<i>Personal health</i>	25	16	8	0	13	8	4	1
<i>Lack of credit</i>	11	18	0	9	13	12	8	5
<i>Debts</i>	13	16	2	2	0	8	0	3
<i>No son(-in-law) to take over</i>	8	7	0	0	4	12	0	2

those with larger holdings are more likely to do this.

The evidence for an age effect is somewhat stronger in respect of the challenges people identify for their own farming (see Table 6.13). This is quite striking in the Delta where the ranking of top concerns is different for two age groups.:

- More older farmers see shortages of labour to hire as the top concern than the weather (which corroborates the suggestion of an age difference in their estimate of the importance of this factor as a challenge for farming in the community).
- For younger farmers the ranking is reversed: they are more likely to identify the weather as their main challenge rather than labour supply.

In the dry zone, on the other hand, older and younger farmers tend to agree on the centrality of the challenge they face as a result of unpredictable weather. It easily dominates the list of top concerns. It is interesting to see, however, that the two age groups do differ in their estimate of some the other challenges they have to deal with:

- Younger farmers, in particular, are much more likely to pick out lack of credit (9 % vs 0 %) and low prices (12 % vs 2 %) as their main challenge. They seem to be more frustrated with the financial constraints on their farming.
- This same pattern of age group differences is not seen in the Delta, however.

Finally, we should note that although worries about personal health loom larger for older farmers in both zones, only a small proportion of them (8 % in the dry zone and 4 % in the Delta) think that their personal health is going to be the main challenge for

their ability to continue farming. What is probably most important in these particular results is the lack of concern about the practical implications of declining health. This may be because they can turn to someone else to take over. This is consistent with the relative lack of concern among farmers in both zones about the prospect of having no son or son-in-law to take over the farm. It may be that many of these farmers already have a son or son-in-law helping to run the farm; so the next step is just a matter of time. As for those among them with children who have not yet started working on the land, we have to suppose that are they too are confident that there will be someone to share the running of the farm when the time comes.

IV. Way Forward

7. *What broad policy and practice steps would help Myanmar to best position itself for this future?*

As was discussed in Chapter 6 the likely population change facing rural areas in Myanmar will lead to some broad potential challenges:

- Whether the older population would wish to continue farming at such old ages; and if they do continue whether they have the personal resources in terms of education and adaptability to take on new forms of farming required to tackle future challenges arising from factors such as climate change, or to take on modern farming techniques necessary to increase production, or even to undertake the physical farming required.
- How the decline in young people both within farming households and wider rural communities will affect the availability of labour and how can this be compensated for.
- How prepared the older and younger current farming community are for these demographic and environmental challenges.

In considering these questions three clear risks become apparent:

1. Lack of foresight and planning by the farming households themselves;
2. Lack of education for all age groups in the Dry region, and especially older farmers in the Delta;
3. Lack of financial resources for all in the Dry region, and for older farmers in the Delta.

The analysis suggested that there were four broad policy steps that might be considered:

- retain labour;
- adapt farming practices;
- increase mechanisation;
- sell land.

While expert interviews suggested that both Chinese and Japanese entrepreneurs were interested in buying large parcels of rural land in Myanmar this again is beyond our scope. However, it is important to note that this would only worsen the livelihoods and welfare of older adults and encourage depopulation.

7.1. RETAIN LABOUR

Not only is there a need to retain young labour – both within the household and hired – to address the demographic deficit caused by population ageing, but the sector demands energy, innovation, and physical strength. This is ideally undertaken by younger people. Coincidentally the requirements to make agriculture more productive and to maintain food security – innovative and adaptable – are the characteristics that should appeal to younger adults. However this can only be delivered by an agricultural sector which is well funded, has strong regulation and governance, and a strong emphasis on agricultural research, development and education. In addition as the country develops and opens, the need to involve younger people in the policy decisions which affect their lives is likely to grow. The study has identified two broad types of current and future labour demand: household and hired from the community.

7.1.1 Household labour

As indicated in Section 6 most households do not fully recognise the threat from their children and grandchildren leaving the land. Currently it is presumed that many young people will remain in the household as farmers, and take on more tasks and then decision making going forward. These children will in the future need capital to invest in new technology and practice; to buy new land, and a more advanced education. In addition, depending on the household decision transfer process, many may have little incentive to invest in skills if the older parent and grandparent still retain control of all decisions.

Interventions to retain household labour include:

- Mentoring around family transfer of land and decision making;
- Agricultural training programmes at all levels of education and adult extension programmes;
- Conversion of household farm into a modern enterprise maybe in collaboration with extended family members and farms – enabling pooling of labour, earnings and risks; shift to commercial products.

7.1.2 Hired community labour

In both regions the seasonal nature of the farming agriculture creates demand for part-time wage work at peak periods even on small farms. This is likely to increase with the

ageing of the farm households. The other main driver of demographic change across most of the region is internal migration, more specifically the migration of younger people from rural areas to cities or large towns. Internal migration data in Myanmar is not easily available. However it seems reasonable, however, to take the rapid growth of some urban areas within the country as an indication of the beginnings of a process of rural-urban migration that is almost certain to move in step with economic development. Anecdotal reports about migration to big cities and larger urban centres in townships confirm this view. Even though it is not possible for us to quantify the rate of rural-to-urban migration in Myanmar, we can be fairly confident therefore that it is increasing and that it will continue to do so in the near future. The field research indicated that young people wanted to stay in the village and improve farming in the area. They thought they could see various ways in which things could be done better. They were not sure, however, whether their children would feel the same way.

There is an argument that developed agriculture will require more advanced labour and other agricultural services such as transport, veterinary services, mechanized field operations, and agricultural advice. In addition, machine operators, mechanics, technicians, and others will be required in increasing numbers in the future. Young people with skills and education may be able to sell these services, thus supplementing their own farming activities.

Table 7.1: Contact with government services

		Never received advice from GAS	Received advice from GAS
<i>Dry zone</i>		83 %	11 %
<i>Delta</i>		55 %	28 %
<i>over 60</i>		76 %	13 %
<i>under 60</i>		68 %	22 %
<i>Dry zone</i>	<i>Over 60</i>	84 %	7 %
	<i>under 60</i>	83 %	13 %
<i>Delta</i>	<i>Over 60</i>	55 %	26 %
	<i>under 60</i>	55 %	29 %

7.2. ADAPT FARMING PRACTICES

In the face of external challenges, farmers have already made a number of adaptations to their practice to sustain productivity. The comparison of historical Corona images (1968) and Landsat data (1989, 2000 and 2009) revealed changes in the areas surrounding Inle Lake, including urbanisation (+203 %), crop expansion (+34 %, in particular floating gardens [+390 %- main crop is tomato]), land abandon (+167 %) and deforestation (-49 %) (Htwe et al., 2017). A small-scale survey (n=76) Rakhine State revealed that farmers coped with 'shocks' such as adverse weather through self-insurance and dissaving whereas seeking help outside of the home is not favoured due to high levels of interest and no culture of mutual insurance in the community (Okamoto, 2011). To cope with the challenges of farming in areas where access to water was unpredictable, a small-scale qualitative study (n=37) found that farmers counteracted this instability by using a multiple cropping system as they were likely to experience the total failure of at least one crop due to issues such as a lack of water, sudden heavy rainfall and pests (Matsuda, 2013). Farmers had also been found in a study of the Sagaing region to, in the face of decreasing productivity, to consider new, more profitable cash crops as in that particular area, the soil had insufficient water to grow rice (Yee et al., 2014). In a study of 377 soybean farmers (Win et al., 2009), half of the sample had adopted new production techniques (apart from trying new varieties).

There is also evidence from the survey around the possibility of how the adaptation of farming practices might help older farmers to cope with their own ageing and the loss of younger people. One very marked difference in the farmers' perceptions of challenges in the two regions is the relative weakness of the infrastructure that supplies information on farming techniques to small-scale farmers.

One in five of the dry zone farmers highlighted the lack of information on new techniques and products as a major challenge, not an enormous number by any means, but it stands out against the fact that in the Delta this is not seen as a significant problem (see Table 6.12). When we combine this observation with what we are told about contacts with the Government Agricultural Services, we can see that these services are much less effective in the dry zone. Dry zone farmers are less likely to make use of them, and they are less likely to act on any advice they receive. Age, on the other hand, seems to have little effect on the use of Government Agricultural Services, although younger farmers are somewhat more likely to have used the services in the last twelve months (but not in the Delta).

Very similar patterns are evident in a series of questions that were asked about the recent (within last two years) of changes in farming methods, such as the introduction of new crops, new seed varieties for old crops, mixed cropping or inter-cropping (relevant mainly for the dry zone farms), a different approach to plant spacing (relevant mainly for the Delta farms), and the purchase or renting of agricultural machinery. There are quite large differences between the regions in the introduction of new seed varieties and the mechanization of tasks other than tilling. As for tilling, the main difference appears

Table 7.2: Differences in use of machinery

	Dry zone	Delta
<i>Own or rent draught animal(s)</i>	61 %	26 %
<i>Own or rent hand-tractor</i>	8 %	55 % (53 % own)
<i>Own or rent mechanical thresher</i>	1 %	41 % (38 % own)
<i>Started renting a hand tractor in last 2 years</i>	48 %	27 %
<i>Started renting other farm machinery in last 2 years</i>	48 %	27 %

to be that dry zone farmers are more likely to rent a hand-tractor than buy one. Age, on the other hand, does not appear as a factor in these choices, certainly not in the dry zone. Older farmers and younger farmers do not behave differently in these matters. The one possible exception to this concerns the introduction of mixed cropping¹. Although there are age differences in both regions for the introduction of mixed cropping, they do, however, run in opposite directions.

It should however be noted that adoption of new techniques was related to factors such as the farmers' education level and in both regions younger farmers had higher educational qualifications than older ones. In addition the Delta farmers had higher levels of educational attainment than those in the Dry zone. Thus only 25 % of the Delta farmers and 10 % of the Dry zone farmers had more than middle school education.

7.3. INCREASE MECHANISATION

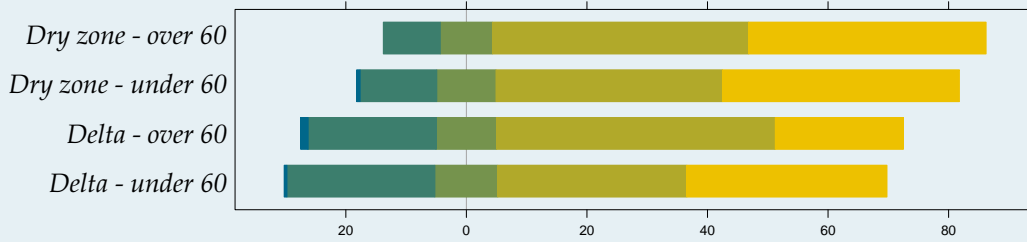
The use of machinery to help older farmers to cope with their own ageing and the loss of younger people is clearly a key solution. There is however in our survey considerable variation in the use of machinery between the two regions.

Box 7.1 has the result of a series of questions around use of machinery by age and interestingly it seems that older people are more amenable to its take up than younger farmers. In addition farmers were more amenable in the dry than delta regions.

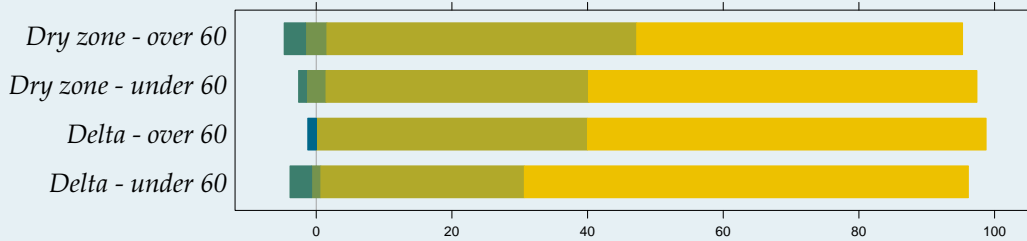
¹In the Delta, but only in the Delta, there is a small 'age effect' for the introduction of new ways of managing water supply. The difference should be seen, however, against the background of an overwhelming tendency to stick with tried and tested approaches in both age groups.

Box 7.1

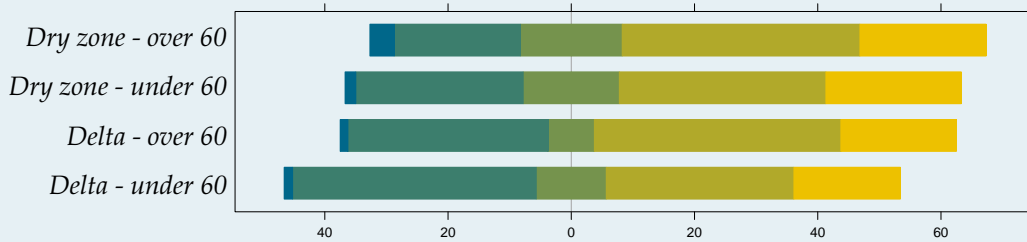
Do you think using agricultural machinery can lead to higher yields?



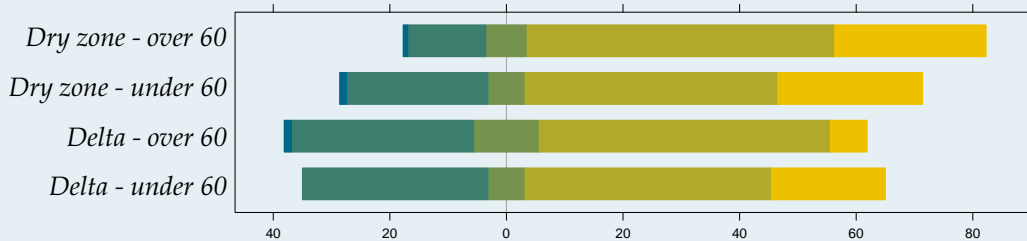
Do you think using agricultural machinery can increase ease of farming?



Do you think using agricultural machinery can increase soil quality?



Do you think using agricultural machinery can increase crop quality?

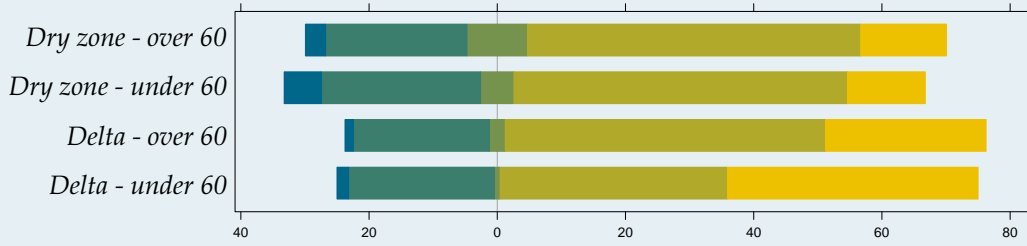


Not at all
 Don't agree
 Not sure
 Agree
 Definitely agree

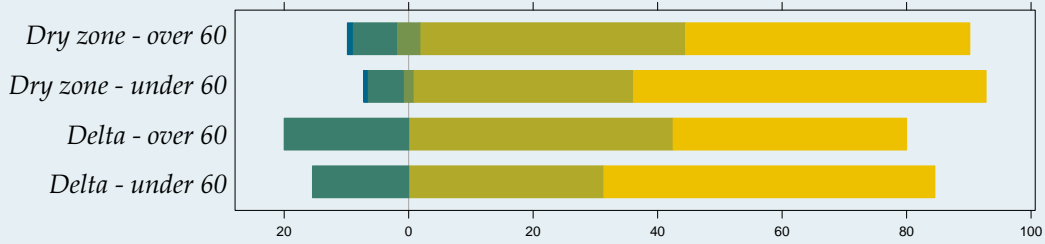
Currently older people are slightly more limited by external factors such as information and credit than younger people, but not significantly, as can be seen from the results presented in Box 7.2. Overall the possibility of uptake of machinery to replace and supplement labour in the light of individual ageing and the ageing of the population looks promising.

Box 7.2

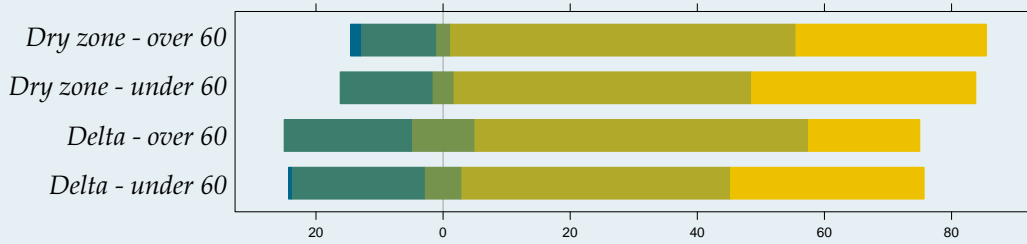
Is your ability to buy agricultural machinery limited by insufficient knowledge?



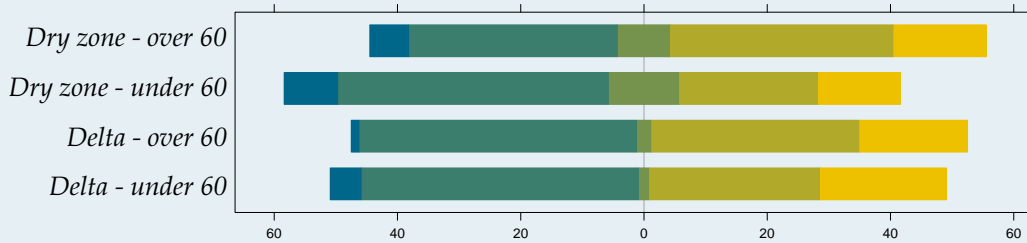
Is your ability to purchase agricultural machinery limited by not enough money?



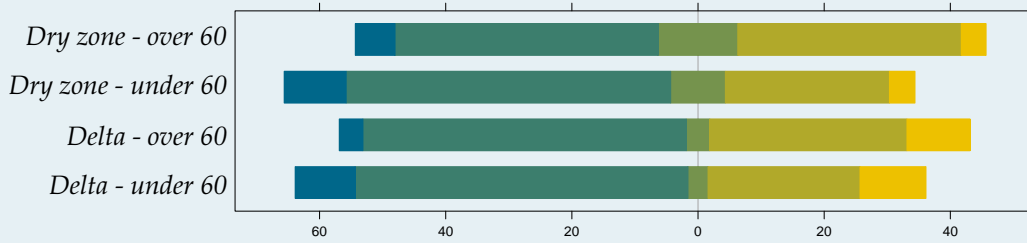
Is your ability to purchase agricultural machinery limited by limited access to credit?



Is your ability to purchase agricultural machinery limited by field characteristics?



Is your ability to purchase agricultural machinery limited by fear of failure?



■ Not at all
 ■ Don't agree
 ■ Not sure
 ■ Agree
 ■ Definitely agree

8. *Conclusion*

Since the country opened up to foreign investment in 2010, there has been a great deal of interest shown by various international agencies in the potential of Myanmar's agricultural sector as an engine for growth and poverty reduction. Land is relatively plentiful, and there is general agreement that the sector has underperformed by comparison with other countries in the region. This is most notable with paddy production, where improvements in productivity (land and labour) have lagged behind what has been seen in neighbouring countries like Thailand, but applies also to trends in output for other crops and livestock.

What this means for current smallholders is that many of them are caught in what has been described as a 'low-level equilibrium trap' – with low inputs, low quality output, low productivity, and low returns. Levels of mechanization and investment in other factors like seeds and fertiliser are low. Labour, on the other hand, is currently relatively plentiful and in particular there is a high prevalence of landless households. It is generally agreed that their economic vulnerability poses a special challenge for rural development. The combination of low agricultural productivity and high rates of landlessness makes for relatively high levels of poverty and food insecurity among rural households. In spite of national rice self-sufficiency, food security for many rural households and individuals remains a problem. It has been estimated that poor households spend over 70 % of their income on food and about one-third of rural households borrow at some point during the year in order to purchase food.

The agricultural sector stands then at a point of transition and at an important juncture for policy intervention. Awareness of the opportunities for achieving significant improvements in rates of productivity growth seems to be combined with an increasing sense of determination among stakeholders to overcome the manifold challenges that combine to hold back the sector's development.

There is a clear distinction between the Dry and the Delta zones. The Delta with its higher current productivity is ripe for external investment. The Dry zone is more vulnerable. In both there is willingness to overcome individual ageing by using mechanization to maintain productivity. In both zones there are possibilities through policy initiatives such as mentoring, agricultural training programmes and enterprise development to overcome the population level ageing.

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